

Enclosure 1





United States Department of the Interior

NATIONAL PARK SERVICE

SEQUOIA AND KINGS CANYON NATIONAL PARKS
THREE RIVERS, CALIFORNIA 93271-9700



IN REPLY REFER TO:
N1623

January 14, 1991

Dear Wilderness Enthusiast:

You are invited to participate in planning that will result in revision of the "Backcountry Management Plan" and "Stock Use and Meadow Management Plan" for Sequoia and Kings Canyon National Parks. Our goal is to update the existing Plans and to combine them into a single document, a Wilderness Management Plan for these two Parks.

Your recommendations are very important to us, for we want this revised Plan to best represent public concerns and interests. Opportunity to provide your views will be available in two ways. You may attend a meeting or provide written information. Three public meetings have been scheduled as follows:

| | | |
|-------------|---|---------|
| February 12 | Ash Mountain Headquarters, Sequoia National Park | 7:00 PM |
| February 14 | Radisson Hotel Visalia | 7:00 PM |
| February 28 | City Council Chambers 301 Westline St., Bishop | 7:00 PM |

We encourage you to contribute by personally presenting your concerns and recommendations. Should you be unable to attend one of these public meetings we welcome your written comment. It must be received by March 15, 1991.

The following is a list of some important issues that are now addressed in the existing Plans. We list them here simply to suggest areas where we especially seek your ideas and information. Please feel free to offer recommendations about any other topics of concern to you.

- Human waste disposal
- Water quality concerns
- Bears and proper food storage techniques, including use of metal food storage boxes
- Wilderness information and education
- Use of helicopters and chain saws in wilderness
- Commercial operations, i.e. outfitters and guide services.
- Aesthetic values in wilderness
- Stock use restrictions, i.e. grazing, carrying feed, stock free areas, off-trail travel, campsite management, etc.
- Backpacker restrictions, i.e. crowding, campsite management, off-trail travel etc.
- Campfires, fire wood use, fire closures.
- Designation of Special Management Areas or Zones, i.e. trail-free areas, Stock-free areas, cross-country zones, etc.

The issue of maximum party size for both people and stock is currently being resolved for consistent application throughout all Central and Southern Sierra Wilderness areas, including these Parks. Your comments on that topic will be incorporated into the public involvement process now underway by an Interagency Group that is working to resolve that question.

Following this initial comment period we will revise the existing Plans into a Draft Wilderness Management Plan that best reflects National Park Service mandates and the various recommendations we receive. A copy of that Draft Plan will be provided to interested individuals and groups, including everyone who participated in the initial comment period, for additional review and comment. We anticipate having a revised Plan approved and in effect by the summer of 1992.

Thank you very much for your assistance.

A handwritten signature in black ink, appearing to read "J. Thomas Ritter". The signature is fluid and cursive, with a large initial "J" and "R".

J. Thomas Ritter
Superintendent

Enclosure 2

In accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, codified as amended at 42 U.S.C. § 4332(2)(C), the National Park Service will prepare an environmental impact statement (EIS) in conjunction with the general management plan. The EIS will describe the affected environment, propose alternative proposals, assess impacts of the alternatives, and propose mitigation measures for the impacts. After considering public comments, the National Park Service will memorialize its final decision in a formal record of decision.

2. Scoping Process

An initial public meeting concerning the proposed action will be held at the following date, time and location: Wednesday, May 14, 1997 7 p.m. to 9 p.m., Pedernales Electric Cooperative (PEC) Headquarters Auditorium, 200 Avenue F, Johnson City, Texas 78636.

FOR FURTHER INFORMATION CONTACT: To obtain information or provide comments other than at the meetings, please contact Leslie Starr Hart, Superintendent, Lyndon B. Johnson National Historical Park, P.O. Box 329, Johnson City, Texas 78636. The responsible official for this EIS is John E. Cook, Regional Director, Intermountain Region, National Park Service, 12795 West Alameda Parkway, P.O. Box 25287, Denver Colorado 80225-0287.

SUPPLEMENTARY INFORMATION: Representatives from the planning team will be present to receive comments and answer planning questions at the public meeting. The public is encouraged to attend and submit verbal and/or written comments on the proposed general management plan/EIS. Comments may also be mailed to the Regional Director at the address above.

The draft and final general management plan/environmental impact statement will be distributed to all known interested parties and appropriate agencies. Full public participation by Federal, State, and local agencies as well as other concerned organizations and private citizens is invited during this scoping process and throughout the preparation of the document.

Dated: April 24, 1997.

Leslie Starr Hart,
Superintendent.

[FR Doc. 97-11193 Filed 4-29-97; 8:45 am]

BILLING CODE 4310-MR-M

DEPARTMENT OF THE INTERIOR

National Park Service

Sequoia and Kings Canyon National Parks; Notice of Intent to Prepare Environmental Impact Statement for a Wilderness Management Plan

SUMMARY: In accordance with § 102(2)(C) of the National Environmental Policy Act of 1969 (PL91-190), Sequoia and Kings Canyon National Parks (Parks) are initiating an environmental impact analysis process to identify and assess potential impacts of alternative strategies for future management of the Sequoia-Kings Canyon Wilderness within these parks. Through this process the Parks will identify and analyze a range of alternatives in order to evaluate options for achieving wilderness stewardship objectives while accommodating visitors and authorized users, protecting cultural and natural resources, and providing for legally mandated management requirements.

Background

The Parks desire to revise and consolidate current wilderness-related plans such as the 1986 Backcountry Management Plan and the 1986 Stock Use and Meadow Management Plan, incorporating management direction provided in the California Wilderness Act of 1984 which designated 736,980 acres as the Sequoia-Kings Canyon Wilderness. Toward that end, seven public scoping sessions have been held prior to publication of this Notice. These sessions were held in California, during 1996 on May 28 (Visalia), June 13 (Clovis), June 18 (Three Rivers), July 9 (San Francisco), July 16 (Los Angeles), July 25 (Bishop), and October 5 (Sacramento). All suggestions and comments received during these sessions (and written information received by mail during this time) have aided the Parks in preliminary identification of issues and concerns to be addressed in preparing a draft environmental impact statement and wilderness management plan (DEIS/WMP). These comments will be retained in the administrative record throughout this planning process.

Comments

Notice is hereby given that the National Park Service will prepare a DEIS/WMP document. At this time, all interested individuals, organizations, and agencies wishing to provide additional comments or suggestions should address them to the

Superintendent, Sequoia and Kings Canyon National Parks, Three Rivers, CA 93271. All such new information should be postmarked no later than sixty (60) days from the date of publication of this Notice. All respondents will be included in timely project updates.

Decision Process

The subsequent availability of the DEIS/WMP will be announced by formal Notice and via local and regional news media. The DEIS/WMP is anticipated to be completed and available for public review during fall, 1998. In addition, it is anticipated that several public hearings will be held; details will be included in the Notice of Availability and also will be publicized via local and regional news media. The final environmental impact statement and wilderness management plan document (FEIS/WMP) is anticipated to be completed approximately one year later. Notice of the Record of Decision will be published in the **Federal Register** not sooner than thirty (30) days after distribution of the FEIS/WMP documents. The responsible official is the Regional Director, Pacific West Region, National Park Service.

FURTHER INFORMATION: Questions or new requests to be placed on the DEIS/WMP mailing list compiled for distributing timely project updates may be directed to the attention of the Sequoia-Kings Canyon Wilderness Coordinator at the above address or via telephone at (209) 565-3137.

Dated: April 15, 1997.

Patricia L. Neubacher,
Acting Regional Director, Pacific West Region,
National Park Service.

[FR Doc. 97-11117 Filed 4-29-97; 8:45 am]

BILLING CODE 4310-70-P

DEPARTMENT OF THE INTERIOR

National Park Service

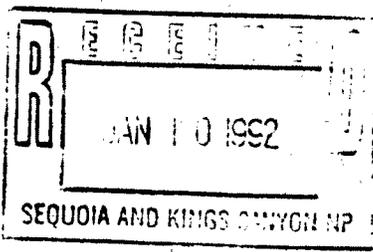
National Register of Historic Places; Notification of Pending Nominations

Nominations for the following properties being considered for listing in the National Register were received by the National Park Service before April 19, 1997. Pursuant to § 60.13 of 36 CFR Part 60 written comments concerning the significance of these properties under the National Register criteria for evaluation may be forwarded to the National Register, National Park Service, P.O. Box 37127, Washington,

Enclosure 3

CYK

Gary Suencher
P. O. Box 2143
Hammoth Lakes Ca. 93546



Jan. 8, 1992

J. Thomas Sitter
Superintendent, Sequoia and Kings Canyon N. P.
Three Rivers, Ca. 93271

Dear Thomas:

I have reviewed the Wilderness Management Plan for Sequoia and Kings Canyon N. P. and would like to comment on it. My initial impression is that your agency is managing the Parks concerning stock and grazing use primarily on historical and traditional data and not on sound unbiased scientific data that an E.I.S. would develop. Just because mechanized mining, clear cut logging, massive sheep grazing, and homesteading were traditional and historic uses of the Park that predated the Wilderness Act does not justify them continuing today. This same logic should carry over to stock use management. On pp 14 par. 3 you state that, "Pack and saddle stock support such opportunities for a wide variety of park visitors who otherwise could not enjoy these special places". To take that rational one step further, you deny wilderness to handicapped people such as quadraplegics for whom it is physically impossible to enter the wilderness on foot or horseback. Then you allow another large user group, people who choose not to exercise or stay in shape, to have easier access to the wilderness if they have the money. Where is the rational? I also feel this document leaves out many impacts that stock use has listed on pp 14 A thru D such as: E. non-native species of grass introduced into the

Wilderness. F. The much greater impact stock has on trails relative to hikers. G. Items such as large glass containers, ice chests, tables/chairs, etc. are brought into and sometimes left in the wilderness. H. The danger of sleeping people being stepped on by free roaming stock.

In any wilderness where the need for trailhead/use quotas are needed to preserve the wilderness values from impact due to over use, stock use should be greatly reduced. What is the total impact of an average hiker party of 3 people going cross country relative to an average stock party of 3 people and 25 animals going cross country? 3 times greater, 3 times greater, you tell me.

I am totally opposed to the Park bringing unmaintained trails back to a condition suitable for stock use, and totally opposed to allowing cross country travel by stock parties in certain areas primarily based on past historic use. I feel the Park should be heading in a direction to reduce the use of stock and their impacts and feel this document has the opposite effect. The 1971 Master Plan for these Parks proposed to eliminate stock entirely. Recently you increased the stock limit from 20 to 25 animals per group without any environmental documentation to support such a decision. In conclusion I feel this Wilderness Management Plan is guided by the strong congressional lobbying efforts of the Special Use Permittees and not by sound environmental documentation. I strongly urge you to do an E.I.S. before continuing with the current Management Plan. Thanks For your time.

Gary Guenther
Gary Guenther

CC Congressman George Miller

12/26/91

Dear Sir:

The following comments are in reference to the Sequoia and Kings Canyon National Parks Draft Wilderness Management Plan. Over many years I have hiked a lot in the parks, from Elizabeth Lake and Bearpaw to the Rae Lakes and Mt. Whitney. It is beautiful country, and deserves the best.

In general, I am disturbed that the NEPA process is not being followed. I believe that there is the possibility of significant environmental consequences, and enough public controversy, especially between stock users and backpackers, to require a full EIS. The sheer size and diversity of the area included in the plan, and its pristine resources within a National Park, also argue for the highest quality planning possible.

The document I have has no alternatives, including a no action alternative and a protection alternative, as required by NEPA. There is no good rationale for the decisions made. There is no hard data on the baseline conditions, or the environmental consequences of the decisions made. There are more than enough additions or changes in this plan to require that the 1986 EA not just be amended, but replaced by a comprehensive EIS. In particular, the proposal in the 1971 Master Plan to eliminate entirely the use of pack and saddle stock in the backcountry should be addressed in detail, from an environmental standpoint. This whole plan seems to cater to commercial packers, and this (perceived?) bias should be corrected.

Specific comments on the draft plan are below.

INTRODUCTION

VI. Modification of the Plan. This section is much too general. Comments should be solicited from everyone, not just a few people, generally following the pattern for amending the California Desert Plan. Also, membership on the proposed Wilderness Advisory Board is very ill defined. Who nominates the members? What user groups will be represented? How do you know a backpacker or horse person when you see one, and how do you know how many other backpackers or horse people he really represents? Why are only user groups represented - the park belongs to all the people, so why aren't members of the general public represented? In particular, scientific expertise on high altitude ecology would be the best qualification.

PART I - VISITOR USE

I. Quotas. Historical use levels must not be used to determine trailhead quotas. This is antithetical to all principles of good management. The only consideration should be the carrying capacity of the area in question.

II. Permits. If I have to get a permit, everyone should. Change statement to say "All commercial guide service operators including

commercial packers operating from bases in the park must (not "should") obtain a permit reservation . . . "

III. Education. Education is important, especially for those who are in the backcountry most. Education and training in backcountry regulations and etiquette for commercial packers must be required.

IX. Commercial services. If resource damage causes a reduction in use, commercial and non commercial users must be reduced by the same percentage. Why do packers, who do most of the damage in the backcountry, get kid glove treatment? They don't own the park. We do.

PART II. STOCK USE MANAGEMENT

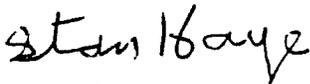
Without the detailed environmental information or justification for the decisions in this part, I can make no comments.

PART III - ADMINISTRATION AND SUPPORT FACILITIES

This section seems reasonable, but, again, without the detailed environmental information it is impossible to tell for sure.

Please keep my name on your mailing list and keep me informed.

Sincerely,



Stan Haye
P. O. Drawer W
Independence, Ca 93526

November 1991

Mr. Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Morris:

I have received and looked at the Draft Wilderness Management Plan for Sequoia and Kings Canyon National Parks and would like to offer my comments, which fall mainly in the areas of Stock Use Management and Human/Bear Management.

In regard to Stock Use Management, I am concerned with the goals expressed in the Objectives and Management Policies F and H (Introduction, page 4) regarding minimizing human and stock induced change and not degrading the Parks' natural resources and values. In this regard, I do not feel the Draft Plan goes far enough in controlling stock use and separating stock and human uses, especially in regard to stock and foot use of trails.

You point out correctly in the Part II Introduction that stock have several distinctive impacts on park resources, including grazing, trampling, deposition of feces and urine, and drift fences. But then in the second paragraph of the Management System (page 17) you state that other backcountry users besides stock impact Park resources, implying that stock use is no worse than other uses. I disagree; the effects named above are far worse from stock than from other users. Therefore greater control should be effected for stock uses.

Furthermore, you point out in the Part II Goals and Objectives (page 16) that you want to ensure that the effects of stock use must "remain within acceptable limits". I assert that the only acceptable limit is the preservation of the resource, and that stock use must be controlled and restricted accordingly. In this regard, your goal of ensuring that certain meadows and grasslands are protected from stock use entirely is commendable.

However, I urge that the Draft Plan be amended to close certain trails as well as certain meadows and grasslands to stock use. Thus, under Maintained Trails (page 18) the wording of the first paragraph should be changed to "Travel by stock is permitted only on those primary and primitive NPS maintained trails approved by the Superintendent, based on impact and quantitative use criteria (as described on page 19), except..." Furthermore, it should be clearly stated that no off-trail cross-country use of stock is allowed.

Ideally, there would be two sets of trails, one for stock and one for other foot users. However, I realize that this may not always be practical and has the negative impact of doubling the numbers of trails. However, it may be useful in some areas.

In regard to Human/Bear Management, I refer to Objectives and

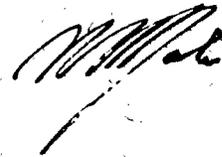
Management Policies P and D, regarding assuring inaccessibility of human food to bears and further research in this area. I support the placement of the metal food lockers in popular campsites, and feel more should be added as the need develops. Furthermore, maps of these locations should be available to travellers for planning purposes before applying for the required wilderness permits.

I have briefly looked into the lightweight food storage canisters you mentioned, and agree that they may be a good solution. But, as you point out, availability is presently limited. As far as I know, they can be obtained only in Alaska. Furthermore, they are expensive, about \$150 for the smallest of the two sizes now on the market. Consideration should be given to having a stock of these canisters at certain park locations for sale or possibly even for rent.

Further research should be encouraged in this area. One possible approach is that of a "bear repellent"; an intense, foul-smelling substance that could be applied to food containers to either mask the smells of the food within or simply to keep the bears away. While I have also looked into this briefly, I have not yet identified any suitable chemicals. But I feel this approach should nevertheless be continued and supported.

Before closing, I want to state my support for two other points in the Draft Plan. One is the group size limits listed under permits (page 7). The other is the item under Trails (Administration and Support Facilities, page 26), that areas without trails will not be made more accessible by new trail construction.

Yours truly,



Rick Jali
P. O. Box 1717
Mammoth Lakes, CA 93546

901 Hobart St.
Menlo Park, CA 94025
Dec. 25, 1991

Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon Wilderness
Three Rivers, CA 93271

Dear Sir,

Thank you for the opportunity of commenting on the "Draft Wilderness Management Plan", for Sequoia and Kings Canyon Wilderness. I have backpacked in the high Sierras for 35 years and have introduced many youngsters to low impact camping while a Scout Leader.

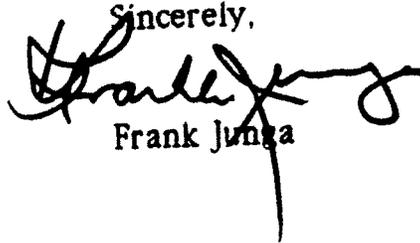
My main objection to this plan is the implicit assumption that, "The use of Pack and saddle stock is recognized as an appropriate and legitimate activity" in the wilderness area. This precept remains in place even though you recognize that this activity has "several distinctive impacts on the park resources". All the "distinctive impacts" you list are negative impacts. It is my firm conviction that pack and saddle stock use is contrary to the practices of good stewardship of the wilderness. This philosophy is often condemned as elitist, that it would deny some people access to the wilderness. Some yes. But even with pack services many are denied access to the wilderness because of physical or financial limitations. Pack services are for the affluent and are not a panacea for lack of access. I realize, that for political reasons, pack and stock use will be with us for many years. For that reason the rest of my comments and questions will be directed toward improvement of the Management Plan.

1. Who will choose the members of the Wilderness Advisory Board?
2. Can the nominations be challenged?
3. Will the representatives of the commercial community be chosen from outfits using the wilderness? I think that to reduce favoritism, the commercial representatives should have no contact with the park.
4. Why not make use of gas stoves mandatory in the backcountry?
5. You state on page 17, under Management System that "stock impact will be defined and objective criteria established whenever possible." I don't think a more vague sentence could have been written. Either you have regulations or you don't! This sentence gives you a perfect "out" when confronted with criticism.
6. In paragraph A it appears that you leave open the possibility that more land may be opened to pack and saddle stock use. This certainly

would not be in the interests of good management.

7. The success of the Management Plan relies on Research and Monitoring of areas used by stock and pack animals. Research and Monitoring require manpower (read money) and money. The political climate in Washington in the last 12 years has not been sympathetic to the needs of our parks and wilderness areas. To rely, for the success of your program, on funds which may not be available for years, is to place the health of Sequoia and Kings Canyon Wilderness in danger. I sincerely hope that in the final Management Plan that you chart a less perilous course.

Sincerely,

A handwritten signature in black ink, appearing to read "Frank Junga". The signature is fluid and cursive, with a long, sweeping tail that extends downwards.

Frank Junga

c.c.

The Honorable George Miller
Washington, D.C.

Douglas Morris
Sequoia and Kings Canyon National Parks
Three Rivers, California 93271

December 31, 1991

Dear Mr. Morris:

Please enter the following comments into the public record regarding the draft Wilderness Management Plan for Sequoia and Kings Canyon National Parks.

First, I must express my indignation at the manner in which the Park Service is proceeding with this management plan. The process is illegal, unprofessional, and unjust. Furthermore, it makes a mockery of the entire public involvement process. Having expressed interest and submitted comments prior to the drafting of the plan, I fully expected to be notified when the draft plan was released. Instead, it was only through a friend (and at a very late date) that I learned of the plan's release. As a consequence, I have had insufficient time until now to review the plan. (I have contacted numerous friends who had written as well and only *one* received a copy of the draft). I find it disturbing that the Park Service appears to be offering public comment periods only to satisfy legal requirements, rather than to honestly assess how the public feels about wilderness management. I would guess that your rationale for not sending the draft to all interested parties was that it would be too expensive. That is ridiculous! If a person has previously expressed interest in the plan he or she has every right to comment on the plan. At the very least, people who had expressed interest in the plan should have been sent a postcard announcing the draft's release. That way, those who were serious about reviewing the document would have been afforded the opportunity.

The management plan itself is a hollow document, replete with vague language and contradictory objectives. Particularly disturbing is the lack of substantive change regarding stock management. The public has clearly indicated to you that they want a reduction in the number of recreational stock, yet you have chosen to ignore them. Despite the noble-sounding goals and objectives outlined in Sections III and IV, there are few concrete changes proposed for stock management, and the language is sufficiently nebulous to preclude any meaningful analysis of how effective those changes will be (particularly since the often-referenced Appendices were omitted).

For example, the goal stated on Section III (Objective A, page 3) is to *"provide for a variety of visitor experiences in ways that preserve natural and cultural resources, and do not seriously intrude on the quality of wilderness experiences associated with those resources."* Yet you propose to increase the number of stock allowed per party, even after acknowledging (during the group size modification process) that the vast majority of wilderness users find large stock parties to be an intrusion on their experience!

You state in Section IX (page 10) that commercial services will be allowed to operate *"with sufficient controls so that the opportunity for visitors to experience the backcountry on their own is not unduly affected."* Yet it is unclear

whether commercial trips will be included as part of trailhead quotas (page 6). If so, this is a direct contradiction since backpackers and private stock users will be denied access to wilderness because of commercial use. The Park Service should consider *elimination of all commercial operations in national park wilderness areas*. This exploitative use of public resources has no place in national park wilderness. *Maximizing commercial profit and preserving wilderness values are two fundamentally incompatible objectives*. If the Park Service feels that providing access to people who cannot carry a backpack is an important service, then the Park Service should provide these services on a nonprofit, ecologically-sound basis.

On page 14, you state that stock use is a "*traditional and historically significant*" activity in national parks. This is a meaningless statement. Cattle grazing, sheep grazing, mining and logging were also "*traditional and historically significant*" activities, yet these activities are prohibited in the parks. Grazing by recreational stock is no different. It is a consumptive use of park vegetation and is no more justifiable than a backpacker picking wildflowers. I encourage you to eliminate all grazing in these parks and require that animals carry their feed and be tied up when not in use. This would still allow stock use, but would eliminate all of the impacts you list in Part II, Section I (page 14).

Instead of selecting the obvious alternative (elimination of grazing), the Park Service proposes to increase the intensity of management in ways I find unacceptable. The Park Service should be seeking ways to eliminate drift fences, not proposing to build new ones (page 23). The Park Service should be restricting grazing, not adding areas of "*historical use*" to the Park's inventory (page 20). The Park Service should be taking concrete action on grazing impacts, not proposing monitoring schemes that are both inappropriate for wilderness settings and impossible given current fiscal constraints (pages 20-21). You cannot convince me that you have sufficient resources and expertise to closely monitor all 330 forage areas for changes in species composition!

I applaud your decision to prohibit cross-country travel by stock (page 18); however, I am strongly opposed to designating "*certain unmaintained trails*" as open to stock use. All currently unmaintained trails should be allowed to recover to a natural state. If you continue to allow stock on these "*historic routes*" then you have accomplished nothing by restricting cross-country travel. Anyone who has spent any time in the backcountry knows that free-roaming stock will continue to wander over the landscape in these trail-free areas.

In summary, there is nothing in the draft management plan to assure me that substantive steps are being taken to reduce stock impacts. To the contrary, the Park Service proposes to increase the allowable number of stock per party, to open historic routes to stock travel, to continue to allow grazing by recreational stock, to possibly increase the number (or the intensity of use) of meadows open to grazing, and possibly to increase the number of drift fences in the backcountry. It appears to me that the Park Service is trying to create the illusion that positive steps are being taken to reduce stock impacts (by creating new definitions and promising unrealistic monitoring programs), while taking as little concrete action as possible. The simple fact is that stock impacts can only be minimized by reducing the number of animals, by prohibiting stock use in large areas, and by eliminating grazing privileges. These objectives should be explicitly stated in the plan.

Lastly, I encourage you to do what should have been done at the outset of this process: *to perform an EIS with a full description of possible alternatives to this plan and their associated ecological and social impacts*. To proceed with the present process is unconscionable. There are clearly many controversial and unresolved issues that *by law* must be analysed in a thorough EIS.

I am greatly saddened that an agency for which I once held high regard is attempting to circumvent its legal and professional responsibility in the interest of convenience and expediency. I fear that unless substantial changes are made in your attitudes and policies, the Park Service will join the Forest Service and BLM as agencies that people view with suspicion and distaste. I implore you to restore honesty and good faith to this process.

Respectfully yours,



Brian C. Spence
25828 Foster Road
Monroe, OR 97456

CC: Thomas Ritter

JAN 2

SEQUOIA AND KINGS CANYON

Eva Eagle
1530 Olympus Ave.
Berkeley, CA 94708
(415) 841-8887
(415) 987-4482 (w)

December 27, 1991

J. Thomas Ritter, Superintendent
Sequoia & Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Ritter:

Over the years, the area encompassed by Sequoia and Kings Canyon National Parks has been my favorite backpacking destination. Over the years, my husband and I have taken a number of long treks in the area. We have taken the well-traveled trail to Mount Whitney, but have also gone cross country on unmarked routes such as Echo Col. We enjoy taking long trips, which permit us to get far enough from the trailhead to enjoy the solitude of the high country.

In the course of our travels in your parks, the one drawback we have found is the number of stock that are destroying the trails and littering the meadows. We learned this during our first trip to SEKI in 1978 when we did a loop that included both parks. On the third day out we filled our canteens in a lovely stream, only to discover stock roaming in that stream a mile or two later. That night we wanted to make camp in Cloud Canyon, but had considerable difficulty finding a site that was free of horse manure. We also wanted to find a site that was far enough away from the large horse party already there, already loud enough to disturb our sleep. We looked forward to the next day going over Colby Pass, which we knew was closed to stock. At least we could count on a safer watershed, trails without horse dung, and the opportunity to camp in more esthetic environs. We learned on that trip the importance of avoiding trails that could take stock and areas popular with stock parties. As a result, a major portion of our subsequent trips has been on lesser developed trails.

This summer we went backpacking in Sequoia Park for the first time in several years, entering at Mineral King. Although the countryside was beautiful, we were distressed to find the trails and lakeside campsites crowded with large horse parties. The stock were not controlled in the camping areas, roaming through all of the other campsites, dropping their dung everywhere, and ringing their bells at all hours of the night. Apparently this situation is no longer confined to lakes on a few major trails and close to the trailhead. While hiking, we were passed by large groups of horses and mules being taken to pick up customers at points that would have taken us several days to reach on foot. The

packer takes people in long distances, leads the horses back, and returns two or three days later. Thus a long length of trail gets double the damage for each horse in the party. And a number of the wonderful old foot trails have evidently been "improved" for the use of stock. Now I hear that the new Wilderness Management Plan proposes to "improve" an unspecified number of additional backcountry trails.

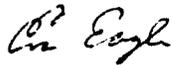
I would like to remind you that a trail that has been widened for stock has not been improved, but merely made less interesting. Once the stock start using that trail it becomes dusty and polluted. The sites along that trail suffer from over-use by the large parties brought in to a small area, as well as by the stock themselves. This is particularly true when the packers don't control the stock. And the character of the wilderness experience that we can usually count on when three or four days from the trailhead is completely destroyed when a large group of people camp in the area with all the comforts of home, including alcohol and radios.

We have been backpacking all over the West, and many parks have managed to balance the needs of packers with the needs of hikers. Why can't we have some trails for multiple use and others for hiking only? Why can't the packers keep their stock better confined when they camp? Why not limit the size of stock parties to small groups, more in keeping with the wilderness spirit of the parks?

What is happening in Sequoia and Kings Canyon National Parks is a shame. Large portions of the park are being ruined to serve the commercial interests of a few packers and the pleasure of a few clients. Meanwhile, the far more numerous visitors—hikers—are left literally in the dust! Certainly packers provide an important service for some visitors, but they do not need to use the entire park in order to provide that service.

I ask you to submit a management plan for your parks that will preserve their beauty for the next generation of hikers and will preserve their fragile lands from degradation by hungry stock. I hope to hear soon that you are revising the Wilderness Management Plan or at least delaying its implementation while an Environmental Impact Statement is written.

Thank you,



Eva Eagle

RECEIVED
JAN 6 1992
SEQUOIA AND KINGS CANYON

WILLIAM M. KRIEG

ATTORNEY AT LAW
1330 "L" STREET, STE. G
FRESNO, CA 93721

(209) 441-7485

December 31, 1991

J. Thomas Ritter, Superintendent
SEQUOIA & KINGS CANYON NATIONAL PARKS
Three Rivers, California 93271

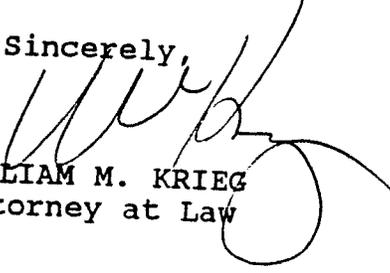
Dear Mr. Ritter:

I recently reviewed your Draft Wilderness Management Plan and am dismayed and disappointed at your lack of concern for the ecology, environment, and the experience of visitors to the areas under your supervision. This plan is the triumph of commercial interests, which have for too long guided your policy making.

Your proposal to increase maintained trails and stock limits to 25 animals is exclusively and outrageously a commercial decision. Stock groups to any degree are disruptive, destructive, unsightly, and unhealthy. One need only walk a trail within a day behind such a group to have an entire wilderness experience turned foul.

Please add my voice to those demanding that an EIS for the Wilderness Management Plan be prepared, with special attention to reasonable alternatives which better balance and protect non-commercial interests. Thank you for your close attention to these sentiments.

Sincerely,


WILLIAM M. KRIEG
Attorney at Law

WMK:lys

cc: Honorable George Miller, Chairman, Committee on Interior and Insular Affairs

CPR

FEB 3 1992

9342 46th Avenue, S.W.
Seattle, WA 98136
December 27, 1991

J. Thomas Ritter, Superintendent
Sequoia & Kings Canyon National Parks
Three Rivers, California 93271

Dear Mr. Ritter,

I have spent many months visiting the magnificent backcountry of your Parks, and I am very interested in seeing those places protected. I have witnessed first-hand the damage caused by livestock use, and the lackadaisical attitudes of the packers.

I oppose your proposal to increase stock group size limits from 20 to 25 animals per party, as well as your plans to increase the number of backcountry trails to be maintained for stock use. I am very disappointed that you are attempting to adopt a plan without considering alternatives that would better protect resources and the experiences of visitors. Please prepare an environmental impact statement.

Sincerely,



Jim Brady

cc: Congressman George Miller

JAN 3 1992

2790 Glendessary Lane
Santa Barbara, Ca. 93105
December 26, 1991

J. Thomas Ritter, Supt.
Sequoia & Kings Canyon National Parks
Three Rivers, Ca. 93271

Dear Mr. Ritter:

I recently learned that the park is planning to make changes which I feel will reduce the quality of wilderness experiences available to many of us who have long enjoyed the Sierras. I would hope that the Park Service will prepare a proper EIS for the wilderness management plan. I am aware of proposals to increase the amount of trails that stock can use; I find that a sad direction to be moving.

As a long term back packer, now 55 years old, I strongly object to the damage I see these animal groups cause in the wilderness country. The trail damage is terrible and in the good Reagan years and beyond the funding is far from adequate to maintain these, even if they were being used with care and animal groups are not helping.

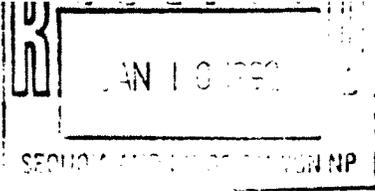
More than a few times I have found the remains of groups that were transported into the wilderness with stock; it is clear that they are the problem because the things I have found could not have been carried in by individuals on their back. For my money, stock are totally inappropriate, but I am willing to live with them for handicapped people; sadly I usually see some fat dude from the asphalt jungle world riding the horses, tearing up the trails and leaving far too much impact on meadows and water sources.

The sad part is that the stock people are the organized ones and so you listen to them and not to the bulk of those who use the back country and really care about it. Haven't we learned that just turning a buck is not a justification for some of our abuse of natural settings? I urge you to look at decreasing the number of stock allowed and certainly not increasing that number! It also seems far more appropriate, given limited resources to maintain trails, that more of these be closed to stock rather than opening them.

I hope you will give more consideration to some of these concerns; I know that the damage caused by overuse of the few wilderness areas we have is much more difficult to correct than it is to prevent.

Sincerely,

Curtis C. Ridling
Curtis C. Ridling



WILLIAM P. SCHAEFER
3008 SAN PASQUAL STREET
PASADENA, CALIFORNIA 91107

January 7, 1991

Mr. J. Thomas Ritter, Superintendent
Sequoia + Kings Canyon National Parks
Three Rivers, Ca 93271

Dear Mr. Ritter,

I have just learned that you are planning to upgrade backcountry trails in the parks so that they will be more readily accessible to stock. I am strongly opposed to this; there are too many horses and mules on the trails already, and there are few places where one can escape their dust and odor. I've walked a lot of trails in your parks and covered many miles off-trail. That country is superb and needs to be kept that way, without worn-down trails, muddied stream crossings and messy campsites. People who use stock simply do not take care of the wilderness as well as backpackers; don't make it possible for them to get anywhere they can't get now. In fact, I will applaud any effort you make to reduce the impact of stock in the high country. Let them stay lower, where their damage will heal more quickly.

Sincerely,

William P. Schaefer

xc: Honorable George Tiller

29 December 1991

Mike Stubblefield
1230 E. Collins St.
Oxnard, CA 93030

Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Sir:

I'm writing this letter in response to the Draft Wilderness Management Plan currently under consideration for Sequoia and Kings Canyon National Parks.

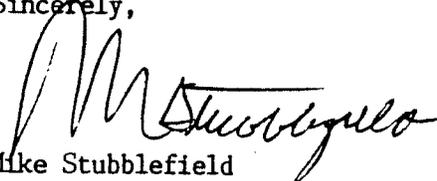
I've been backpacking in the Sierra high country between Yosemite and Mt. Whitney for 20 years. Without a doubt, the only low points on any of my many hikes have been my encounters with parties mounted on horses and mules. You don't allow dogs, dirt bikes or even mountain bikes in national parks. Why the special dispensation for horses and mules?

Most of the people who ride into the mountains take enough stuff to outfit a Boy Scout troop, and a lot of them leave half of it at their campsites. The yahoos who lead these happy campers into the high country think they own the trail; not once in 20 years have I ever heard one of them offer to get out of MY way!

But what really offends me - and what should really concern you - is how pack animals tear up the trails, eat alpine meadows and deposit feces on trails and in streams. Manure attracts flies and diminishes the wilderness experience for everyone else.

Therefore, I beg you: PLEASE don't allow parties of 15 to take 25 pack stock into the mountains. Don't allow them to take any pack stock with them! A national park is not a theme park. If these people have to ride horses to enjoy nature, they should go to dude ranches.

Sincerely,



Mike Stubblefield

JAN 2 1991

SEQUOIA AND KINGS CANYON NATIONAL PARKS

ROBERT BENEDETTI
24208 HERITAGE LANE
NEWHALL, CA 91321

December 28, 1991

J. Thomas Ritter, Superintendent
Sequoia/Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Ritter:

Thank you for keeping me informed on the issue of stock use under the Draft Wilderness Management Plan.

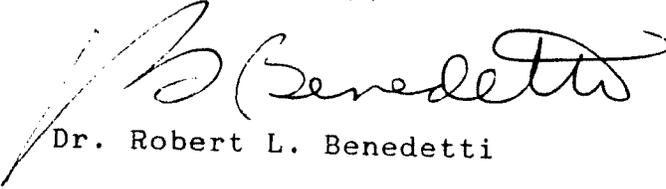
While I understand the reasoning behind the adoption of a uniform stock party size across the several jurisdictions in the southern Sierra, I would argue that the uniform size should be the lowest presently allowed, i.e. 20.

By your own figures the vast majority of users prefer the lower limit. Only a few commercial packers will benefit from the larger size; more than 90% of the rest of us will continue to suffer trail damage, puddles of urine, piles of manure, and wrecked meadows.

I am especially concerned with the possible increase in trails open to stock and the creation of new stock trails.

The preparation of an Environmental Assessment regarding this plan is inadequate; an Environmental Impact Statement would provide consideration of more options.

Yours most truly,


Dr. Robert L. Benedetti

cc: The Honorable George Miller, Chairman
Committee on Interior and Insular Affairs
1324 Longworth
Washington, D.C. 20515

DENNIS SCHUMACHER, M.O.

POB 862

LOVE PINE

CA 93545

I HAVE LIVED NEAR THE SIERRAS FOR 3 YEARS AND HAVE HIKEED EXTENSIVELY IN SEQUOIA AND KINGS CANYON PARKS.

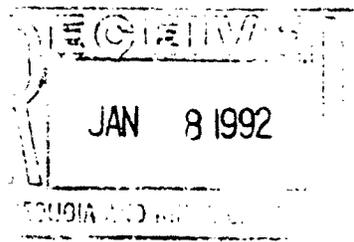
IT HAS BEEN MY OBSERVATION THAT STRICTER RULES ADOPTED IN THE LAST 10 YEARS HAVE HELPED THE OVERALL ENVIRONMENTAL HEALTH OF THE PARKS. I ALSO HAVE OBSERVED THAT PACK HORSE ACTIVITY ACCOUNTS FOR MOST OF THE DAMAGE TO TRAILS, MEADOWS AND CAMPSITES, MAINLY DUE TO THEIR LARGE SIZE AND LACK OF A "KEEP IT CLEAN AND SIMPLE" ATTITUDE.

I BELIEVE THE PACK HORSE POLICIES SHOULD STRONGLY FAVOR SMALLER PARTIES (LESS THAN 10 HORSES) AND STRICTER REGULATION OF THEIR ACTIVITIES.

THANK YOU
SINCERELY,



D. SCHUMACHER



Dec. 26, 1991

Mr. J. Thomas Ritter, Superintendent
Sequoia & Kings Canyon National Parks
Three Rivers CA. 93271

Dear Sir:

I am very disappointed at your plan to increase both the number of stock permitted and the trails maintained for stock use. This portion of the Sierras gets very heavy use and commercial stock use has no place on many of the fragile areas. I have been at many of the high lakes (Lake South America in particular) and have seen the banks broken and turned into mud by the horses. Also many native wilflowers found only in these areas are being endangered by loose stock grazing. On dry summer trails I have experienced a large commercial group comes by sending up a huge cloud of dust that is impossible to avoid breathing, and then afterwards having to walk thru piles of fresh manure.

I am requesting you to prepare an EIS for the Wilderness Management Plan before attempting to adopt any plan to increase stock usage. Glacier Park and Mount Rainier are doing much more to restrict stock usage and permit hikers to have a pleasant experience. It appears a few commercial interests are able to exert undue influence on Park officials.

Yours truly,

Tom
Thomas Clohessy
P.O. Box 845
Sonoma CA. 95476

cc. Hon. George Miller
Committee on Interior Affairs

R 13 12 13 11 12
 JAN 23 1992
 SEQUOIA AND KINGS CANYON NP

January 26, 1992

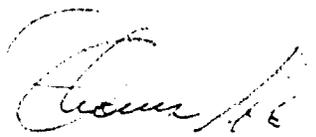
J. Thomas Ritter, Superintendent
 SEKI
 Three Rivers, CA. 93271

Sir:

I am very concerned about the condition of the wilderness areas in Sequoia and Kings Canyon. Having spent considerable time there, I see a consistent increase in damage to the backcountry caused by stock. Meadows are trampled, native plants are stripped from riparian areas, feces and urine litter the trails and camp areas, and the trash brought in by folks sitting on horses collects in heaps and exacerbates the bear problem. I am most concerned that the NPS's obligation to provide a sanctuary for native plants and wildlife is being severely compromised by domestic livestock.

I understand that the NPS receives fees from stock users and so naturally is biased toward them. However, the majority of the public assumes that you are maintaining your multi-generational public trust responsibilities by protecting the national parks as the law requires. Clearly the NPS is shirking its duties by not severely limiting stock use in wilderness areas such as SEKI. As you know, the national parks are the only places where lands are supposedly managed for ecological integrity.

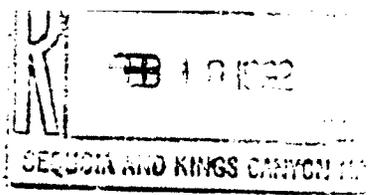
Please send me the EA you prepare for your back country management plan and a copy of that plan. I hope you will severely limit livestock use of NPS lands as soon as possible and put the public and the land before special monied interests.



Tom Ribe
 980 E. 27th Ave.
 Eugene, Or. 97405

cc: Rep. George Miller, Committee on Interior and Insular Affairs.

| | | | |
|-------------------------------------|------|----|------|
| <input checked="" type="checkbox"/> | SUPT | 10 | 1/28 |
| | AO | | |
| | MA | | |
| | CMS | | |
| | RS | | |
| | WS | | |
| | CPI | | |
| | CRM | | |
| <input checked="" type="checkbox"/> | CPR | | |
| | CPM | | |
| | PSO | | |
| | BUDG | | |
| | CO | | |
| | PERS | | |
| | CA | | |
| <input checked="" type="checkbox"/> | FILE | | |



Lassie Hammock
Feb. 5, 1992
3134 Chesapeake
Davis, Calif 95616
916 7582860

J. Thomas Ritter
Superintendent Sequoia & Kings Canyon National Parks
Three Rivers, Ca 93271

Dear Mr. Ritter

I am incredibly disappointed in your Draft Wilderness Management Plan. Stock use in the High Sierra should be banned as soon as possible. We have been visiting the Rock Creek Lakes basin Mono Pass Area for 15 years and have watched in horror as the Rock Creek Pack Station systematically destroyed the region. It is happening all over the Sierra and you need to stop it. The preferential treatment of stock companies and users over hikers ~~by~~^{by} U.S. government agencies is disgraceful.

Please do not increase the network of trails maintained for stock. This is not appropriate use of public money. The number of stock trails should be decreased at least, and eliminated best of all.

I can not believe you are increasing the stock limits from 20 to 25 in the parks. In this time of drought, air pollution etc, the plant life of the Sierra's is disappearing before our eyes, while you, the government in charge of protecting these areas are accelerating the ~~is~~ dismal process with you policies.

Sincerely
Lassie Hammock

CC. Congressman George Miller

December 31, 1991

Douglas Morris
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Morris:

I have recently learned that the draft wilderness management plan for Sequoia and Kings Canyon has been released for public comment until January 1, 1992. Yet I have not been notified of its release and the pending public comment period nor did I receive a copy of the draft, despite the fact that I had written a letter in March 1991 with a list of my concerns for inclusion in this draft. From whom did you choose to solicit comments?

I also understand that you have included in your draft a change in the stock group size limit from 20 to 25 without any mention of the environmental consequences of such an increase, and in the face of mounting evidence in backcountry ranger reports that the limit of 20 stock has already caused unacceptable damage to the park wilderness. Even maintaining the status quo on stock policies ought to require some sort of new assessment of the current status of environmental impacts caused by these practices before such allowances are again made. Certainly your intention to increase the stock group size limits requires such scientific scrutinization. I urge you to perform an environmental impact statement before putting this change into practice.

Please enter these comments into the public record and keep me informed of the status of the wilderness management plan for Sequoia and Kings Canyon National Parks.

Peace,


Dr. Michelle T. Zagotta

December 30, 1991

JAN 2 1992

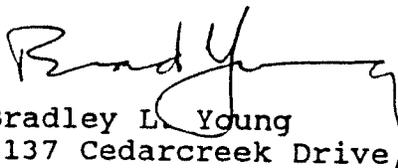
SEQUOIA AND KINGS
J. Thomas Ritter, Superintendent
Sequoia and Kings Canyon National Parks
3 Rivers, California 93271

Dear Mr. Ritter:

It is my understanding that the Sequoia and Kings Canyon National Parks recently released a Draft Wilderness Management Plan that presents only a single, poorly defined alternative and that is not accompanied by environmental assessment as required by Federal law. It appears that the present Draft Plan continues to put the interests of commercial stock users before those of hikers. For example, this poorly thought out proposal would continue to allow free roaming and grazing by stock and would even authorize the construction of additional fences around meadows. In sum, this ridiculous and shortsighted proposal would allow and encourage increased degradation and destruction of fragile alpine meadows, trails and water supplies.

I am supremely disappointed that the Park Service would attempt to adopt such a plan without considering reasonable alternatives that would better protect resources in the experience of visitors. (Actually, one would expect such behavior from the Forest Service but certainly, not the Park Service). Please, I urge that stock use in the National Parks of the High Sierra be reduced and further limited and the damage they inherently cause be thereby reduced.

Very truly yours,


Bradley L. Young
1137 Cedar Creek Drive, Number 5
Modesto, Ca. 95355

cc: Honorable George Miller, Chairman

Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Sir,

I would like to make a few comments on the Draft Wilderness Management Plan for Sequoia and Kings Canyon Wilderness.

1. Introduction to Part I, Visitor Use, II Permits.

Twenty five pack and saddle stock, traveling together, is excessive on most back country trails. The only trail that this many stock could be justified is the one in support of Bear Paw Meadow. Transportation of trail maintenance crews and equipment might also justify this many stock. These unique situations can certainly be taken care of with Variances.

2. Part II, Stock Use Management, Section 1, Introduction.

A significant impact on park resources by pack and saddle stock is not listed. This is the accelerated degradation of back country trails.

From a backpackers perspective, it seems unfair to regulate the number of stock, per trip, to higher level than people. It is obvious from this document, that stock contribute to degradation of the wilderness environment, way out of proportion to the numbers of people.

I have been backpacking in the Sierras since 1969. I wish that my numerous encounters with commercial stockmen were as pleasant as my encounters with back country rangers.

Thank you for allowing me to comment on this obviously difficult to write plan. I wish you could please everyone.

Sincerely,

H. Gene Staley

H. Gene Staley
4371 Mt. Jeffers ave.
San Diego CA 92117-4740

JAN 6 1992

SEQUOIA AND KINGS CANYON

PO Box 161
Oceanside, Oregon
97134

December 28, 1991

J. Thomas Ritter
Superintendent
Sequoia and Kings Canyon N. Parks
Three Rivers, CA 93271

Dear Mr. Ritter.

I am alarmed at the Draft Wilderness Management Plan for two of our country's greatest National Parks. The plan caters to the interests of stock users to the detriment of hikers and the wilderness resources. The preferred alternative continues to allow free roaming and grazing for stock animals, more fence building around meadows, increasing the number of trails to be maintained for stock use (building larger trails), and increasing the limit on size of stock groups from 20 to 25.

I am a fishery research biologist who has spent years working in some of the largest and remote wilderness areas in the country. I have seen the incredible damage that stock animals and bureaucratic catering to stock animals is doing to the Wilderness and it has to stop. A congressional hearing in 1989, with testimony from Wilderness Rangers from around the country concluded that we are loving our Wilderness to death. If so, stock use is largely responsible, from what I have seen in hiking more than 2000 miles of trail in the course of my mountain lake survey and research work.

If you are looking for guidance in developing a plan that is progressive, I suggest contacting Rocky Mountain National Park personnel. They restrict stock to lower less-fragile elevations and designated camp areas at least one-half mile from lakes and removed from other sensitive habitats. The High Sierra Hikers Association has also presented you with a detailed proposal for improvement that calls for closing several existing trails to stock, prohibiting cross-country travel and requiring stock to carry their own feed.

I urge you to adopt strong and progressive policy for scaling down stock use in National Park Wilderness Areas before they are further damaged. The HSHA proposal gets my full support. The Park Service has been a negligent steward of the land in letting a vocal minority of outfitters and stock users run rampant over the interests of hikers and the Wilderness. I look forward to some changes.

Sincerely


Peter Bahis

cc: George Miller, Jim Bradley, DC

DEC 30 1991

Dec 27, 1991

J. Thomas Ritter, Superintendent
Sequoia and Kings Canyon National Parks
Three Rivers, CA, 93271

Dear Superintendent Ritter,

Thank you for sending the Draft Management Plan for the Sequoia and Kings Canyon National Parks. It would appear however that you have the cart before the horse; an EA, or more appropriately, an EIS, should have PRECEDED the Plan. One can only presume that we may eventually receive an EA or EIS only because of public pressure. Which raises the question why agencies such as yours are so reluctant to uphold the laws of the very government of which they are a part.

As to the Draft Plan:

-The proposal to increase stock limits from 20 to 25 is simply wrongheaded. What has happened to the vision exemplified in the 1971 Plan which would have eliminated pack and saddle stock entirely? Indeed, why INCREASE limits for an outdated activity run by profit-making enterprises for the benefit of a very few (a minuscule portion of which are disadvantaged) to the very real detriment of the vast majority of us who use our own non-hoofed feet?

-The Plan also calls for additional stock trails and even proposes off-trail travel for stock ("--- historic travel routes are recognized as appropriate for stock travel where no trails were developed.") Does this not mean that limited Park funds will be used to make remote trails available to stock rather than used to maintain presently existing trails?

Very truly yours,


William S. Thomas
3010 Hermosa Road
Santa Barbara, CA, 93105

P.O. Box 3222
Chico, California 95927-3222
26 December 1991

Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Morris,

The following comments on SEKI's Draft Wilderness Management Plan are my personal opinions as a concerned citizen and do not necessarily reflect in any way the views or positions of my employers or anyone else.

There are certainly other alternatives for managing the backcountry of Sequoia and Kings Canyon National Parks in addition to the one outlined in the Draft. Why is only one alternative presented?

I am not happy about the proposal to create a network of "historic" trails to be maintained for stock use. What are the costs/benefits of such a program? Who will pay the costs? Who will benefit? The Draft is short on details. It is my opinion that stock use should be confined to the current system of maintained trails, in order to reduce environmental and social impacts.

I also oppose plans to increase the stock group size limit from 20 to 25 head. Research findings indicate that stock group sizes should be lowered in order to protect the "experience" of visitors to the Sequoia-Kings backcountry.

The CSIWM have said that an increase in the stock group size limit in SEKI (from 20 to 25 head) is needed to ensure consistent group size limits throughout the Sierra. But the Draft proposes the number "10" for cross-country group size. Is consistency not so important after all? How do you justify the number of 10? To provide consistency, I support the number of 8 used in other areas, however, an even smaller number (i.e. 4-6) would better protect resources and the experience of visitors.

Please prepare an environmental impact statement and place my name on the mailing list to receive a copy. Thank you.

Sincerely,



Tom Suk

PETER STEKEL
4266 WINSLOW PL. N. #101
SEATTLE, WA 98103
206-633-3917

December 2, 1991

Douglas K. Morris, Chief Ranger
Sequoia-Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Morris,

Thankyou for the draft Wilderness Management Plan for the Parks. I have read through it and would like to make some comments.

I appreciate the time, energy, and effort that the NPS staff has devoted to the draft Plan. Particularly I want to commend you for your devotion to the NPS ideal of preserving and protecting the Park's resources for our, and future, generations.

1. Visitor use. Provision should be made for people planning on extended-day backpack trips as "overnighters" can claim all permit space leaving long-term hikers out in the cold. For instance, overnighters going to Pear Lake can effectively fill the trail quota barring people who wish access to Deadman Canyon via the Tablelands.
2. Education. During the aftermath of the Yellowstone fires, NPS staff made outreach visits to businesses and organizations. I would like to see programs developed which reach the communities of Three Rivers, Woodlake, Fresno (and vicinity), Visalia, and East Side towns. The purpose would be to educate the public about Park policies and procedures.
3. Wood fires. Page 8 comments on use of gas stoves: They should be required, not encouraged in all areas.
4. Camping and campsites. Areas listed in appendix I-E should be rigorously rehabilitated.
5. Commercial services. Companies, like Outward Bound, should not be allowed to field over 75 individuals/year in the backcountry. This would avoid overuse of areas used by large groups year after year. Just look at what a few years of Sierra Club use did to Bullfrog Lake earlier this century. Companies making lots of money taking clients into the backcountry shouldn't be allowed to preclude the general public from the

Peter Stekel/NPS letter

trailheads by filling the quotas.

6. Plans for Sequoia Groves and Fisheries Management are good and "right on the money."

7. Bighorn Sheep. If the Sheep are reestablished, how will this affect backcountry use? Will there be more closures? What are the areas to be reestablished with the Sheep? These points are unclear in the draft Plan.

8. Stock. All stock use should be limited in terms of size (less than 10 animals/trail/WEEK) and length of stay (1 day/campsite). Stock use should be discouraged and attempt to phase it out by 2010 be made, or reduce it by 75% of the 1990 level.

NPS should not be allowed to graze any government stock in the Park as it sets a bad example.

NPS staff, trail crews, employees, etc. should not be allowed to use any stock as it sets a bad precedent.

9. Standards for primary and primitive trails. In paragraph B.3, why impact one area with trail construction and another by obtaining material from concealed sites? Keep the barrow pits next to the already extant eyesore vs. making another. People using the backcountry should be aware of their impact on the landscape.

10. Bridges. Don't build anymore and don't carry any more into the backcountry. Follow the Rocky Mountain plan. If a ford is dangerous to be made by foot, fell a tree. Make the backcountry an exciting place to be. Most bridges are over-built in order to handle stock. Get rid of the stock.

11. Your sign plan is wonderful. I suggest replacing signs as needed vs. pulling out all the current ones and putting up new signs. Save some money this way.

12. Helicopter use. No copter flights should be allowed between July 4 and September 1 for ANY administrative, non-emergency use, in any area of the backcountry wilderness.

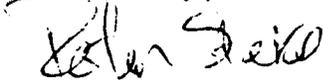
13. Cabins and administrative camps. I appreciate the sentence about service personnel "must always comply with regulations prescribed for visitors." This has not always been the case in the past but is less of a problem due to the energies of people like Dave Parsons and David Graber.

14. Scientific study and impact monitoring. The Plan is unclear about who and when all equipment used during a study will be removed. What happens if a study is many years long and a site is marked? Also, some incentive for outside researchers to

Peter Stekel/NPS letter

submit progress reports should be made. I would suggest cutting off funding if reports aren't submitted by January 15 of each year. Best to cut your losses than continue to fund scientific "dead beats."

Sincerely,

A handwritten signature in black ink, appearing to read "Peter Stekel". The signature is written in a cursive, somewhat stylized script.

Peter Stekel

P.S. Please note that my address has changed. Thanks!

December 13, 1991

Douglas K. Morris - Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, California 93271

Ref: D18

Dear Mr. Morris:

Thank you for allowing me to participate in the review of the Draft Wilderness Management Plan for the Kings Canyon and Sequoia National Parks. I have enclosed my comments to this document as part of this letter.

When I received the plan by mail with the enclosed introductory information, I assumed I would be doing a paragraph-by-paragraph review of a basically complete plan. After reading the plan, I felt that there were some basic issues that I needed to address first.

My primary criticism of the plan is the large numbers of pack and stock animals allowed in the park wilderness, and that they are allowed to graze in the wilderness. The use levels of pack animals in the wilderness are due, for the most part, to the commercial operations serving the region. The direct effects of allowing domestic animals in the parks are well known, and the measurements of these effects are a subject of monitoring and study. Even so, the actual reasoning used to arrive at the stated limits were not spelled out in the plan. Though many of the problems with pack animals are disclosed in the plan, and others were listed in my letter to you of February 10, 1991, I will list them again:

- (1) Affects on meadow vegetation, with an intrinsic effect on indigenous wildlife due to decreased forage.
- (2) Erosion of trails and streambanks, and damage to root structures.
- (3) Deposition of feces on trails and in water, with resulting water quality reduction and the potential for disease transmission to native animals.
- (4) Constructions such as hitches and barriers that compromise wilderness values.
- (5) Litter from pack groups that detracts from the wilderness experience.

The wilderness is not a place to conduct business. There is an intrinsic problem with business use of wilderness because the success of business requires growth. This causes increased

demands on the wilderness and thus compromises wilderness values. In the case of pack and saddle firms, there is clearly a cumulative impact on the park by allowing domestic animals to graze in the meadows and thus consume resources that would otherwise be available to indigenous park fauna. These resources are the base of an entire food chain that supports all park life.

None of the arguments set forth in the plan justify the commercial use of pack animals in the park. If the parks were but a small part of extensive wilderness, as they were historically, then it might be different. But the situation has now changed. The parks are now an island of wilderness in a sea of civilization. The animals and plants that live in these parks need to be protected to the extent possible. We can't expect the native life to compete with commercial levels of livestock in the park, nor should we allow it. A wilderness cannot double as a ranch, and the wilderness plan should reflect that.

The quotas and limits on pack animals should not be driven by economic reasons. If the park service has financial ties to commercial pack and saddle businesses operating in the parks, then consider charging (more) for wilderness permits as an alternative. Money will be saved in trail maintenance, meadow recovery activities, and any other actions undertaken to mitigate affects by pack animals.

If the park service insists on allowing pack animal enterprises to operate in the parks, then it must apply more rigorous standards to those using pack animals in the wilderness than are currently set. For instance, if the maximum party size is 15, then make that a total group number including people and pack animals. Defecation on trails and in streams must be reduced. And since people are not allowed to forage in the parks, pack animals should carry their own food. Grazing should be prohibited.

Beyond the general comments I have made here, I have some specific comments as well:

Page 4 - Objectives and Management Policies - Item D

The item as stated is far too general. One of the basic objectives of the plan should be the continued study of animal populations within and adjacent to the wilderness to determine whether certain animals are in decline, or if populations are only stable in the park because of migration from less desirable locations. Provisions should be made in the plan to act on these data when available. Clearly the relationship between the parks and adjacent national forest wilderness makes this kind of cooperative effort possible.

Page 4 - Objectives and Management Policies - Item I

This item does not appear to be at the same level as the others. Perhaps a more general wording such as "support established wilderness camps at existing use levels".

Page 4 - Objectives and Management Policies - Item J

I believe supporting commercial establishments of any kind is contrary to the basic wilderness principles. (See page 3 - Laws and Policies - Items C and E.)

Page 4 - Objectives and Management Policies - Item L

The wording here should be consistent with the other items.

Page 5 - Modification of the Plan

The formation of an advisory board is a good idea. If the park service initiates the formation of such a board, it should understand that backpackers, environmentalists, and operators of pack service companies do not represent the same kind or level of interest in the park. Though these voices need to be heard, the advisory board should contain primarily disinterested parties with knowledge of park resources, environmental science, and administration. It may not function well if polarized by largely contrasting interests.

Page 7 - Permits - last paragraph

The number of pack and saddle stock, as I stated previously, should be reduced.

Page 10 - Winter Use last paragraph

Rewrite and include proper appendix reference.

Page 10 - Commercial Services

Commercial use of wilderness should be discouraged.

Pages 17-18 - Part II Section IV Stock Use Management Item A Areas Open to Stock Use

Close all meadows to grazing, and reclaim damaged meadows. Stock traffic over trails with extensive stream crossings should also be restricted

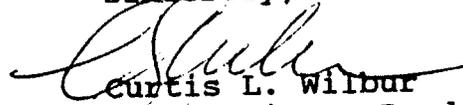
Pages 20-22 - Item C Grazing Management

I believe my general comments cover this topic, but in summary: Grazing in the wilderness should be eliminated. Despite the extensive studies performed, the intrinsic effect on wildlife is ignored here. Clearly it is possible for pack stock to carry its own feed, as stated on page 21, paragraph 6.

It appears that a great deal of the plan is contained within the appendices. For that reason, it would probably have been best to send these out for review as well.

This concludes my comments on the plan. I would like to know the names and addresses of those selected to join the advisory committee, and how to request copies of annual progress reports on research activities in the park wilderness.

Sincerely,



Curtis L. Wilbur
1635 Springer Road
Mountain View, California 94040

cc: John Rasmussen - Western Sierra Nevada Committee
Sierra Club

J. Thomas Ritter
Superintendent
Sequoia & Kings Canyon National Parks

December 28, 1991

Dear Mr. Ritter ,

As a long time visitor to the Sierra high country and wilderness, and as a native Californian I am writing to express my dismay at the apparent direction of wilderness administration. I am sure that it will come as no surprise to you that those of us who have had the privilege of experiencing California's back country have come away with a sense of reverence for its beauty and the inspirational and restorative quality that it gives to each of us.

Knowing that the remaining wilderness represents only a vestige of pristine California instills in most of us a jealous sense of stewardship which unfortunately is not always expressed to those who have been charged as you have with the considerable task of administering this precious resource. However as you and your staff are about to launch strategies for the future use of the Sierras I feel it is urgently necessary that you know how certain use of the back country has impacted that experience to which I have referred.

In 1991 I spent approximately 30 days in the Sierras, west, east, north, and south. The areas which I visited in some cases were the obvious routes of pack animal excursions. The evidence that made them obvious in large part is the reason for this letter. I do not consider myself to be squeamish however the volume of manure and pack party litter was truly intolerable. One camp ground in the Pinto Lake vicinity was so extensively fouled that entire campsites were rendered uninhabitable. Other sites were hung with the paraphernalia of absent packers (feed sacks, etc.) which although not as putrid discouraged if not prevented backpackers such as myself from using them.

My party remained at the Pinto Lake campground for only one night although under more favourable circumstances we would have stayed longer. The area is a lovely site with much to offer but on that first night we were roused from our sleeping bags by a herd of mules which had wandered out of the nearby meadow into our campsite. It was only the clanging bell of the lead mule which roused us in time to avoid a possible trampling. In the morning the site which we had cleared of dung the day before was again fouled by the herd.

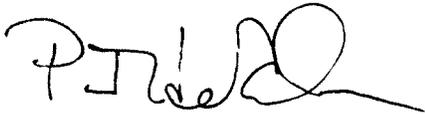
While the herd incident was an isolated occurrence the problem of fouled campsites as well as trails was definitely not. As you know backpackers are held to a high level of responsibility for their actions on Sierra trails. My experience has shown that to the greatest extent we adhere to regulations thus preserving the environment for the pleasure of all. It is unfair that a small minority of users (pack train parties) spoil through irresponsible use this experience for all who come after them.

As you may well imagine backpackers spend some time around the evening campfire in the company of new acquaintances made on the trail. When they do the talk predictably turns to their mutual experiences. This issue of pack animal destruction of the back country is a frequent subject. Theories of damage caused by hooves on the trails, grazing in the meadows and the attitude of the packers themselves are supported by statistics which imply the genuine concern of those expressing their thoughts. I might add that an unpleasant rumor that some familial relation between your office and the pack companies explains the leniency afforded them.

In closing I want to state in the strongest terms my concern that you and your staff weigh carefully the consequences of allowing this activity to continue unchecked. Plans to increase the existing stock use trail network as well as to increase to 25 the number of animals per group is extremely ill advised. In any event it is imperative that you undertake and complete an Environmental Impact Statement to accurately assess the situation at hand.

I would appreciate any response you feel appropriate to this letter as well as any memos updating the progress of the wilderness planning process. Also I would like to see a copy of the Draft Wilderness Management Plan.

Faithfully yours,

A handwritten signature in dark ink, appearing to read 'Peter J. Hearn', written in a cursive style.

Peter J. Hearn

cc: Hon. Geo Miller, Chairman, CIIA, Washington, D.C.

Vision Quest

Inspired Writing and Photography by Andy Selters

Tom's Place, Rural Station
Bishop, CA 93514
(619) 935-4932

December 18, 1991

Douglas Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271'

Dear Mr. Morris:

Thank you for soliciting comments on the Draft Wilderness Management Plan for the Parks. In general I find the plan very appropriate. I have just a few comments:

For bear management, I encourage you to go forward with a program to make lightweight food storage canisters available to users. They might be rented from park offices, or made available in equipment stores. Life Link corporation of Jackson, Wyoming has long experience working with high-impact plastics for outdoor recreationists, and may be able to help with development.

Some of us at Wilderness Press wonder if winter users may be responsible for a spread of intestinal parasites in the water supplies of the Parks. I am an avid backcountry skier, and I know how easy it is for skiers to contaminate streams or even lakes when the landscape is blanketed in snow. Encouraging winter users to take special care to avoid contaminating streams should be a part of the Park's educational program.

I urge you to monitor carefully, as your draft plan implies you will, the condition of trails before giving clearance to stock use. My experience is that stock can have a serious impact on a trail when it is wet, and minimal impact on the same trail when it is dry.

I urge you to require stock parties to carry "grazing substitute feed" year round, not just when meadows are closed. This would eliminate the grazing impacts that stock use brings, and go a long way toward patching the relationship between backpackers and stockmen.

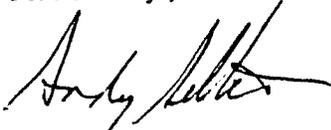
If grazing is to be continued, and if llamas are indeed more efficient in feed per load carried, then the Parks should encourage the use of llamas, as they have less impact on trails as well. I know packers will balk at llamas as a non-traditional animal, but tradition is not a strong enough reason to resist an improvement that helps save meadows and trails, and may thereby allow them to conduct a larger business.

On page 26 you mention the possibility of approved cross country stock use. I can't think of any place in the Parks where stock should be allowed to travel cross country.

Finally, I have a couple of requests. Could you send me a list of Park trails listed "Primary" and "Primitive," and the proposed stock use cross-country travel zones? Also, on page 25 you mention photos on file that show vegetation change since 1918. Are these photos available to the public, at Ash Mountain?

Once again, thank you for soliciting comments, and I look forward to hearing from you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Andy Selters".

Andy Selters

Author and photographer, Wilderness Press guidebooks

DAVID C. FRANKENBACH
430 West Lambert Road
La Habra, California 90631
(310) 697-6439

December 3, 1991

Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, California 93721

Dear Mr. Morris:

Thank you very much for the opportunity to review and comment on the Draft Wilderness Management Plan for Sequoia and Kings Canyon National Parks.

I believe this draft plan has many good aspects. I am particularly encouraged that the addition of new trails, and upgrading of primitive trails into maintained trails, will be kept to a minimum. There are already an adequate number of maintained trails to allow access to regions of interest to most backcountry travelers. Sufficient area must be left trailless to allow the opportunity to experience the sense of adventure and solitude which comes with cross country travel to continue to exist.

I would recommend that the Wilderness Management Plan take a more proactive stance regarding the management of stock use in the backcountry. While it may be true that other backcountry users have an impact on trails, water sources, and camps, I believe the impact on these resources caused by stock use is measurably greater. For this reason stock management plans must address these issues as well as the grazing issue. I would suggest the following specific changes to the draft plan:

- The maximum party size for stock should be lowered. Smaller stock parties will have a lesser impact on the environment they travel through, and will not intrude on the experience of others as much as a larger stock party.
- Instead of simply encouraging the use of lightweight camping gear for stock users, a specific maximum ratio of stock/people should be established. This will be a much more effective policy for limiting the excessive use of stock to carry non-essential items into the backcountry.

- I would recommend that research be undertaken to determine the quantitative impact of stock use in areas other than grazing areas. In particular, I believe the impact of stock use on water sources and trail erosion should be measured. This will aid in establishing objective criteria for managing the future use of stock in the parks.

Again, I thank you for the opportunity to contribute to this process.

Regards,

A handwritten signature in cursive script, appearing to read "David C. Frankenbach". The signature is written in dark ink and is positioned above the printed name.

David C. Frankenbach

Dwight M. Willard
1074 Neilson Street
Albany, California 94706
(510) 526-9278

December 23, 1991

Douglas Morris, Chief Ranger
Sequoia/Kings Canyon National Parks
Three Rivers, CA 93271

Re: Draft wilderness plan

Dear Mr. Morris,

I have the following comments on the Draft Wilderness Management Plan:

1. In general, I found the Plan to be too vague in several areas, particularly regarding restrictions on stock users. For example, "Areas or trails may be closed to stock use where there is evidence of adverse effects on resources." (emphasis added) That isn't informative, and it isn't a clear plan. Will you ban stock where they are damaging resources or not? If the parks' plan is to allow continued resource damage by stock, the Plan should admit it, so the public can object. If not, then the Plan should spell out a mandatory ban on stock use when stock creates or threatens to create or perpetuate resource damage.

Stock use

2. I favor a ban on non-administrative stock use in the National Park wilderness. The Sierra wilderness is not like Yellowstone with its huge meadow expanses and virtually unlimited routes for dispersed horse travel. While someplace like Yellowstone may accommodate horse use, Kings Canyon and Sequoia wilderness is primarily high country where stock are inappropriate and damaging to the wilderness resource. The parks also have numerous heavily used travel corridors, where damaging stock use inappropriately conflicts with other non-damaging use. How can the NPS insist on "no-trace" camping for backpackers but not for stock users (who heavily impact the landscape even if they are conscientious)? The fact that a use is "traditional" does not make it appropriate to continue. The NPS mandate to protect Park and wilderness resources should supersede established but conflicting stock use patterns.

3. Having backpacked throughout the Sierra for more than 20 years, I have seen many examples of stock damage to resources such as long-term overgrazing damage and gouged wet meadows, not to mention bacterial and visual dung pollution. The

damage is obvious and undeniable. The National Park Service should not plan as if certain levels of avoidable resource damage from stock are acceptable. The NPS should bar avoidable resource damage from stock. It is insufficient for the parks to just try to eliminate or mitigate a few worst examples of stock damage.

4. My opinion is partially based on my observation that stock behavior "regulations" won't work. The regulation approach is flawed because it attempts not to eliminate resource damage, but merely to eliminate the most severe examples of it. But even so, it is also flawed because stock use regulations are likely to be commonly disregarded by stock users, who, by definition, don't have "no-trace" camping values. Their sympathies are against any such regulations. As a matter of values and practicality, they will often disregard them. They know that in many cases the risks of being cited for violations will be nil. The example described below illustrates the problem of irresponsible stock users.

5. The draft Plan says, "Virtually all alpine and subalpine lakes basins...have been closed to grazing." What about the lakes at the head of Blue Canyon? I don't know if there is a grazing ban or not there, but in summer this year a party allowed their several horses to graze and excrete freely along a subalpine lakeshore. Were there regulations to prohibit that damaging stock use or not? Even if there were regulations intended to keep stock away from lakeshores, the regulations wouldn't be enforced in areas like Blue Canyon which are away from the main travel corridors. Once the stock is in the backcountry, compliance with regulations is problematical at best. The only effective way to protect resources against stock damage is a clear ban on stock entry into the wilderness.

Cairns

6. Cairns are not a major issue, but I wish to comment on them. Eliminating damaging stock use is the proper priority, not eliminating cairns. I object to the proposal for removal of all cairns on unmaintained and cross-country routes. Excessive cairns could be removed, but not all. That proposal is as inappropriate as one to remove all summit registers would be. I find cairns, like summit registers, to be inobtrusive, harmonious and natural in the Sierra wilderness, which no one mistakes for never-trod virgin territory. Cairns contribute to visitor enjoyment and safety, without being an intrusion on wilderness. In the Sierra, cairn evidence of human existence and caring is no more an intrusion on wilderness than the sight of a previously used campsite.

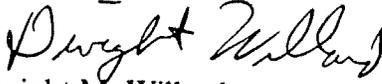
Party size

7. I object to the proposal to allow parties of 25 (people and/or stock). I favor a ban on stock, and a limit of 15 or less people, with provision for a discretionary waiver in rare circumstances to allow a larger group for a class, boy scout group, etc. only if the

NPS was satisfied that the group trip plan justified that large size of a group. Commercial guide profit motives would never be justification for a waiver. The NPS could then impose proper conditions on any waiver, including change of trip campsite locations if appropriate to avoid campsites vulnerable to further resource damage, etc.

Please keep me on the mailing list concerning the wilderness plan.

Yours,


Dwight M. Willard



Joseph K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, California 93271

Nov 22, 1991

Dear Ranger Morris,

Thank you for sending the Draft Wilderness Management Plan. I appreciate the invitation to comment - will keep it short!

Your proposed policy regarding campfire use is excellent. Use of a small "comfort" fire within guidelines of "Best Camping Practice" is very important to many visitors. Education is the key to better control impacts from big fires and other human impacts.

Complete restrictions and closures of sensitive areas is acceptable to most, the reason needs to be made very clear, AGAIN Education.

I would like to see more restrictions on trails to small, secluded areas to exclude pack stock - not from all such areas, but perhaps on a sensitive + difficult trail basis. Resist building any more "high standard horse trails."

It seems also time to set a "cost of maintenance factor" to use to determine fees from packers, concessionaires and other for-profit use of "our" wilderness. A small charge - per person per night for overnight use is long overdue, perhaps \$1.50 per night with \$10.50 yearly max (cost) - some receipts. The sooner our sacred areas are returning enough to help offset costs, the better. If this concept could just be mentioned in the futures section it might help become a reality.

No overnight fee should apply to everyone & be transferable along the various forests.

Thanks again, keep up the great work.

New Address:

Mike Antonieff

M. ANTONIEFF, P.O. Box 11399, TAHOE PARADISE, CALIF. 96155

DEC 3 1991

To: Superintendent, Sequoia and Kings Canyon National Parks
Subject: Use of pack animals

I have reviewed the proposed wilderness management plan for Sequoia and Kings Canyon National Parks and do not agree with the rules governing the use of pack animals. It is undeniable that such use is traditional and historic; travel by horseback was commonplace even before the park was created, but this was long before our society had become enlightened about the importance of our environment, and the preservation of sensitive ecosystems. Prostitution, for example, dates back to biblical times, but its long history does not justify its existence.

The use of a pack animal by an able bodied person clearly conflicts with the principle of minimum impact. It is undeniable that one person with two pack animals will impact the trails, meadows, and water sources many times more than one person on foot, yet the quotas listed in your proposal imply these ratios.

Obviously, there are certain valid uses of pack animals: Maintenance of park facilities requires transport of heavy materials and tools, and certain handicapped people might otherwise never experience the beauty this park has to offer. I also do not recommend shutting down all recreational pack animal use immediately, but any modern wilderness management plan should recognize that such practices will eventually be prohibited. The management plan for Sequoia and Kings Canyon Park should not compromise the minimum impact principle so that a selfish few can profit. It should immediately discourage pack animal use except where absolutely necessary.

Sincerely,

Timothy K. Brand
10161 Lebanon Dr.
Cupertino, CA 95014

28 December 1991

Alan J. Savage
5203 Wheaton St.
Dayton, Ohio 45429

Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Morris and Mr. Ritter:

I would like to thank you for keeping me in touch with your park's Draft Wilderness Management Plan and allowing me a chance to publically comment.

In short, I do not believe that the DWMP currently under review goes far enough in curtailing stock use in our park's backcountry.

I realize that this is a sensitive issue and that perhaps special interest group (stock-user advocates) pressures have been strong. And the park deserves much credit for initiating the changes currently under proposal. However, I believe that prudent park backcountry management demands that stock use be severely curbed. While the proposed plan does make positive steps, I strongly encourage park managers to stop these huge pack trips of up to 25 animals.

The effects of large stock parades in our wilderness areas are obvious. I have seen the degradation in many of our western parks, including Sequoia, Kings Canyon, and Yosemite. Torn up trails and waterbars, destroyed steps, heavily impacted camps, litter of bottles and cans miles from trailheads, trampled meadows, horse feces in ponds and streams, horse feces on the trail in disgusting quantities, and of course the insects (and certainly Giardia) which are attracted to mammalian scat.

Popular horse trails--like the John Muir--have been truly changed by the presence of stock use, and I do not believe that the change is for the better. And I know of few (if any) backpackers who favor stock use in these degrading quantities.

And so, I believe that your DWMP stops short in its attempt to prudently manage our wilderness resource. Indeed, am I correct in reading that in 1966 twenty head of stock per party was the maximum limit? Are we becoming more lenient by now allowing 25? If so, I must say that I disagree with your management approach. I would only hope that special interest group pressure has not wrangled its way into this plan's good intentions. Our wilderness will only see increased backpacking use in the next 25-50 years--our prudent planning now will ensure a pleasant experience in the future.

I heartfully encourage you both to cut stock use by half and put some real "teeth" into the enforcement of stock regulations in Sequoia/Kings Canyon National Parks. Your prudent decisions affect people all over this great country. Thank you for your time.

Sincerely,


Alan J. Savage

CLK

DEC 2 1991

KINGS CANYON

~~Therese~~ Ritter, Supt.

Nov. 29, 1991

Kings Canyon / Sequoia Ntl. Parks
Three Rivers, CA.

Dear Sir:

Thank you for sending me the "Draft
Wilderness Management Plan".

I believe the Plan is generally a good
plan with one major exception: I believe
25 horses & mules are too many to allow
for one party. If a major objective
is reducing impact on the park wilderness,
then the number of stock should be
reduced to half (12 or 13), and the
maximum number of people being packed
in should be reduced accordingly (9 or 10).

I'm sure the packers could still
operate profitably without such big
parties.

Sincerely,
Dave Oldenburg
330 Pine Lane
Bishop, Ca. 93514

2694 Vancouver Ave.
Ventura Calif. 93003
December 24, 1991

To: Douglas K. Morris, Chief Ranger
Sequoia and Kings Canyon National Parks
Three Rivers, Ca. 93271

Thank you for the copy of the draft Wilderness Management Plan of the above Parks.

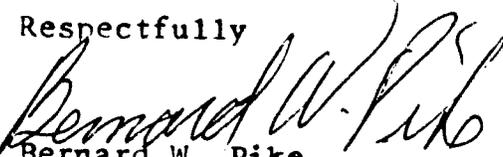
I do not have the experience or knowledge to comment on the majority of the items covered by the plan. As a backpacker I do have an interest in each item but trust the judgement and guidance of the park service and the advisory group to make reasonable and fair decisions on all aspects except the item concerning Stock Use Management.

I feel the only way to keep the Sierras pure and in a natural state is to ban all livestock from them. I realize this is a big mountain to climb but I am sure the rewards will be worth the effort.

During July 1990 I walked the south third of the Muir trail and during July 1991 I walked the north two-thirds. Spending that much time that close to the impact convinced me of the negative impact that livestock has had on the environment. You see their droppings every where they have been, even in or near the streams. Their impact on the wet meadows is even more critical. This evidence leads me to believe that livestock is the primary cause of giardiasis in the streams of the Sierras and their continued use will perpetuate this problem.

In conclusion I ask that every effort be made to curtail or discontinue the use of livestock in the Sierras.

Respectfully


Bernard W. Pike

JAN 7 1992

January 6, 1991

SEQUOIA AND KINGS CANYON NATIONAL PARK

J. Thomas Ritter, Superintendent
Sequoia-Kings Canyon National Park
Three Rivers, CA 93271

Dear Superintendent Ritter:

As a frequent visitor to Sequoia-Kings Canyon, I am writing with a comment about the Draft Wilderness Management Plan.

I have serious concerns about the heavy use of horses and mules in the Park. Their damage to trails, water sources, stream and lakeshores, undeveloped campsites, and vegetation is rampant in the backcountry.

I encourage you to add language to the final version of the Wilderness Management Plan which does the following:

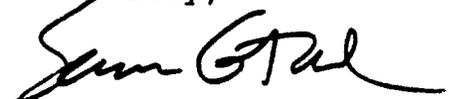
- 1) severely restricts or eliminates access of stock to the backcountry;
- 2) severely reduces the allowable size of a party of pack animals;
- 2) absolutely prohibits off-trail and secondary-trail travel by stock;
- 3) prohibits all grazing.

Pack animals cause vastly disproportionate damage in a park which, justifiably, asks backpackers and hikers to travel and camp "clean". Why are the standards so different for the few who individuals who choose this high-impact mode of travel? It appears that either these privileged constituents or the commercial pack outfits have undue influence.

In this time of fiscal austerity, I simply cannot see a rational justification for spending money on trail repairs, trail upgrading, construction of special fences, etc. for the benefit of stock users. Any provisions to increase their access should be removed, since greater access means greater environmental degradation.

I urge you to uphold your responsibility as the Park's chief steward: please protect the magnificent beauty of the backcountry from the abuses of pack animals and their users.

Sincerely,



Sam Gitchel
5356 N. Callisch
Fresno, CA 93710

Copy to: Honorable George Miller

Sirs:
In your Wilderness Plan
you say the major cause of damage
is caused by pack stock, yet you
do not propose a significant reduction
in the number of pack stock. I have
backpacked in the Sierra for many years
(30+) and have seen many areas ruined
by pack animals. They destroy trails,
leave piles of shit ~~at~~ camping
sites as well as bringing people to
the mountains that throw their junk
around. Pack animals should be
banned from all wilderness areas
except for use in trail repair.

Otherwise the Management Plan
is ~~fairly~~ fairly good.

R W Holsinger
20225 Northglenn Dr.
Cupertino Ca 95014



RUSSELL D. BUTCHER
Southwest-&-California Representative

December 27, 1991

RE: DRAFT "WILDERNESS MANAGEMENT PLAN":
SEQUOIA-KINGS CANYON NAT'L PARKS

Mr. Douglas K. Morris
Chief Ranger
Sequoia-Kings Canyon National Parks
Three Rivers, California 93721

Dear Doug:

National Parks and Conservation Association, a 285,000-member nonprofit organization founded in 1919 to promote the protection, enhancement, and public understanding of the National Park System, has carefully reviewed the draft "Wilderness Management Plan" for Sequoia-Kings Canyon National Parks.

This document, we understand, is intended as a "revision and combination of two previously approved plans--the 1986 Backcountry Management Plan and the 1986 Stock Use & Meadow Management Plan. We further understand that a NEPA-compliance Environmental Assessment is yet to be prepared and made available for public review, to cover those portions of the Wilderness Management Plan that "represent additions [to] or changes from the previous Plans."

Our comments and suggestions are as follows:

(1) Only the proposed action, called "The Plan," is presented in this document. The document fails to offer a range of alternatives, with various options for each element of the alternative. Such a range of alternatives should include substantive choices, so that the reviewing publics may express their preferences for all, parts, or none of the proposed action or preferred alternative.

(2) We are concerned that a number of informational appendices, that are an integral part of the draft "Wilderness Management Plan," are either not attached to the draft document or are not even completed yet. We seriously question the validity of such a public presentation of a document, which by its own admission is not yet complete. How can the public be expected to understand the proposed action in its relevant totality?

An example of this problem concerns which trails are to be maintained and which are not; and which of each are to be closed

National Parks and Conservation Association
Box 67, Cottonwood, Arizona 86326
(602) 634-5758

to stock travel? Will there be new areas opened to stock travel and use? This kind of data seems fundamental. Without it we are handicapped in our effort to understand just what is being planned.

In light of our comments under (1) and (2), above, we suggest that the present draft "Wilderness Management Plan" be renamed a scoping document that is preliminary to a true draft Wilderness Management Plan, complete with a range of alternatives, an Environmental Assessment or Environmental Impact Statement, and relevant appendices.

(3) The reviewing public is being asked to put its stamp of approval on the goal of upgrading some "historic" backcountry trails. Which ones? Why? To expand upon the number of routes stock groups may use? Could this in effect constitute cross-country travel? What about the vital resource data, upon which such an important decision should be based? How do the interests of hikers fit into such determinations?

(4) In order to comply with the relevant provisions of the National Environmental Policy Act (NEPA), the draft "Wilderness Management Plan" should be accompanied with at least an Environmental Assessment, if not an Environmental Impact Statement. We understand from the covering letter of November 12 that "Following public comment and development of the Wilderness Management Plan, an Environmental Assessment will be completed to address changes to the existing Plans. There will be an additional period of public review of this Environmental Assessment."

Why is this process being offered in piecemeal fashion? To be properly reviewable The Plan, Alternatives to the proposed action, appendices, and EA or EIS all need to be presented simultaneously as a single package. Which brings us back to our suggestion that the present document be renamed as a scoping document.

(5) We note that a "key change" of The Plan is to substantially expand and redirect monitoring and grazing management of meadows and grasslands utilized for forage by stock animals. Carrying capacity, The Plan proposes, will be based on "residual biomass," which may result in "some limited change in patterns of use as packers are directed away from a few of the most popular and convenient meadows, which are sometimes severely overused, to areas that are underutilized [emphasis added]."

This statement sounds like the management philosophy of a multiple-use agency wherein the object is to balance extractive resource uses to achieve "sustained yield." It does not sound like a national park management objective, in which the park resources are to be protected unimpaired. In fact, your summary

statement says expressly that "This Plan redirects emphasis to the standard range management practice [emphasis added]."

Is it appropriate and ecologically sound to spread this extractive utilization of meadows and grasslands to a wider proportion of the parks' wilderness backcountry? What impacts would this action have upon native wildflowers; upon rare or endangered species of plantlife? If there are presently unacceptable impacts--and certainly "severely overused" aptly describes a kind of unacceptable impact, then we strongly urge that there needs to be a meaningful way to reduce those impacts--not by impacting a larger expanse of that fragile ecosystem, but by making the needed reduction in the extractive use sufficient to enable restoration of the existing "severely overused" areas, without impairing other places.

The bottom line here is for the National Park Service to follow the legal mandates of park management; and to base carrying capacity upon authoritative data regarding the health and welfare of the resources.

Concerning carrying capacity, we respectfully draw your attention to National Parks and Conservation Association's own widely acclaimed publication on carrying capacity, VISITOR IMPACT MANAGEMENT, Volumes 1 & 2, published in 1990. This document offers much important, timely, and useful information on this subject that is so vital to the welfare of the National Park System and to the quality of the visitor's experience.

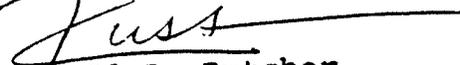
(6) We are concerned that the draft plan is hard to compare with the 1986 plans. We urge that this comparison should be carefully done--perhaps through the commonly used technique of a chart in which elements in each plan (and each alternative to the proposed action) can be succinctly indicated and thus quickly compared for differences/similarities.

(7) Finally, the draft document contains a matter that is ambiguous: it is called a draft "Wilderness Management Plan," which clearly suggests it applies exclusively to congressionally established wilderness areas. Yet, in the Introduction of the document (page 2), reference is made to The Plan's objective to define "the primary policies which guide visitor use and resources protection for the roadless areas, including designated wilderness, of these Parks [emphasis added]." This confusion needs to be clarified, so we know the document is addressing an area of the parks that is somewhat larger than the wilderness areas.

4-NPCA re draft wilderness mgt. plan, Sequoia-KC

Please let us know if we can be of further help on the issue of wilderness management at Sequoia-Kings Canyon, at this phase of the process. We look forward to participating as the process progresses.

With best regards,



Russell D. Butcher
Pacific Southwest Regional Director

cc: NPCA Headquarters
HS Hikers Ass'n.

LAW OFFICES
BIGGAM, CHRISTENSEN & MINSLOFF

LAWRENCE BIGGAM
GERALD CHRISTENSEN
JON C. MINSLOFF
WILLIAM H. MINKNER
STEPHEN S. SIEGEL
JAMES McMILLIN
NANCY A. DE LA PEÑA
KENNETH M. AZEVEDO
DIANA L. AUGUST
ENDA T. BRENNAN
SUSAN K. FRITCHMAN
LARRY D. SHALLBERG
SHARON FLEMING
CHENOA PORTER
LAURENCE J. COHEN
GEORGE J. GIGARJIAN
KIMBERLY C. BAUMBAUGH
RAQUEL MARISCAL
LINDA K. HARVIE
CONSTANCE I. BAKKERUD
ERIC A. STANFORD

2103 NORTH PACIFIC AVENUE
SANTA CRUZ, CALIFORNIA 95060
TELEPHONE (408) 429-1311
FAX (408) 429-5664

February 5, 1991

Mr. Stanley T. Albright
Regional Director
National Park Service
P.O. Box 36063
San Francisco, CA 94102

Dear Mr. Albright:

I have backpacked in the Sierras for a number of years. I have become increasingly concerned with the pack trains of horse and mule that penetrate deep into the back country lakes and rivers.

The trails that have been used by stock are deeply rutted, dusty when dry, and muddy bogs when wet. The campsites used by stock have been trampled by the stock and severely fouled by their riders since they bring to the area so much excess food and equipment that they will leave metal grills, rope, plastic tarps, pans, etc. I have yet to see a campsite of even a few horsepackers that don't have a fire ring the size of a small ball ring burning logs four feet long.

Most horse packers that I have met travel in groups of six people with ten animals which has a devastating impact on any area that they invade. The meadows where the animals graze are trampled and polluted with the vegetation grazed and the trees scarred from their rubbing and the rope scars from where they have been tied.

I understand that some people are not physically able to walk miles carrying a heavy pack to enjoy our wonderful areas of solitude and inspiration. These individuals could use one pack animal for three to four people's gear and not the current three animals for two people.

COOPY

Mr. Stanley T. Albright
Regional Director
National Park Service
San Francisco, CA

February 5, 1991
Page Two

Your current policy is to allow up to twenty horses to be used by a single group. It is being considered to increase this number to twenty-five at Yosemite and Sequoia/Kings Canyon national parks.

I urge you to please not allow this increase in the number of animals chewing up our back country. Instead please consider limiting the number of stock per group to a maximum of three. This number of animals would still allow groups physically unable to hike with a pack or those wedded to the cowboy and horse mystique, to still enjoy the Sierras and not ruin it for the rest of us.

Sincerely,


WILLIAM H. MINKNER
Attorney at Law and
Backpack Hiker

WHM/blw

cc: Thomas Ritter/Supt.
Sequoia & Kings Canyon Ntl Pks

Michael Finley/Supt.
Yosemite Ntl Pk

High Sierra Hiker's Assoc.
Truckee, CA

*I support limiting the number of stock allowed in the Sierras.

Diana L. August
Becky L. Waltzer
Tracy Ortega
Kelly Polito
Gene Harmon
George O. ...
Ken ...
Erda Brennan

Enclosure 4

David Campbell
1511 Rambling Rd.
Simi Valley, CA 93065

November 10, 1996

Ralph Moore
Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Sir:

I am writing concerning the wilderness management plan for Sequoia and Kings Canyon National Parks and would like my letter to be placed in the administrative record for the SEKI wilderness management planning process.

I have been hiking, backpacking, and climbing mountains in Sequoia & Kings Canyon Parks every summer for 30 years and have a deep love and respect for these mountains. I am also quite concerned about the misuse and damage to trails, meadows and camp sites by commercial packers. I believe that at least 90% of the trail damage and trail erosion is due to horses and mules. And it is disappointing and disturbing to arrive at a beautiful camp site after many hours of hiking to find horse manure covering all the flat areas. (One example I remember was Colby Lake deep in the Western Divide between Whaleback and Milestone Mountain.)

I also know such commercial outfits get preferential treatment over the ordinary citizens. I think it is grossly unfair for ordinary citizens to be restricted by the wilderness permit system while commercial packers write their own permits. In Kings Canyon the Park Ranger lectures backpackers about not building wood fires above 10,000 ft. But the local packer is granted an exemption and is allowed to build wood fires at State Lakes, which is over 10,000 ft.! I know this because I observed it happening in August of 1994. When I reported it to the ranger at Cedar Grove, she called her supervisor and confirmed that the packer really did have special permission! Her only explanation was that the packers have a strong lobby! (Incidentally, I filed a complaint, but never received the courtesy of a reply.)

Now I do feel stock use should continue in the parks, but with correction of some of its abuses of the wilderness. I think the number of animals per party should be reduced to 10 or less. I think grazing in wilderness areas should be much more restricted than it now is to protect fragile meadows. I believe camping by parties with stock should be limited to specific designated locations. And certainly they should not be allowed to camp at sites away from established trails. (In 1994, I camped at Grouse Lake, a couple of miles off the Granite Lakes trail, and saw that horses or mules had been brought in to that otherwise pristine little lake, crashing through trees and shrubs along their way.) I believe some trails should be designated only for foot travel, to give people a break from the dust and manure of stock-used trails.

Yours truly,

D. Campbell

Ralph Moore,
Wilderness Coordinator

10/22/96

Re: SEKI Management Plan

Dear Sir,

As a backcountry hiker I would like to register my objection to and disgust with the use of stock animals, mule trains, and horse trips in the SEKI wilderness.

Perhaps you've never been back there, but I can tell you from first hand experience that they cause extensive damage.

There's nothing worse at the end of a long day than to get to a camp only to find it littered with horse poop, or to try and hike on a trail that has been turned into a dust trench by countless mules.

Please enter my objection in the SEKI administrative record.

JACK FUNK

[REDACTED]
[REDACTED], CA [REDACTED]

Thank you

[Handwritten signature]

DAVID K. BERKE, M.D., F.A.C.C.
A PROFESSIONAL CORPORATION
2287 MOWRY AVE. SUITE D
FREMONT, CALIFORNIA 94538
TELEPHONE (510) 797-9924
FAX (510) 793-9199

October 31, 1996

Ralph Moore
Wilderness Coordinator
National Parks Service
Sequoia and King's Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore:

Please place this letter in the administrative record for SEKI's Wilderness Management Planning Process.

As a regular hiker in Sequoia and King's Canyon National Parks I am concerned about the large number of stock animals that are using the parks and damaging the back country as well as degrading the water supply. I am particularly concerned about the large size of the stock parties brought in by commercial outfitters. I think it is reasonable to allow continued stock use but with greater controls.

I oppose domestic livestock grazing. I think camping with stock animals should be prohibited in the high elevation areas and restricted to designated sites.

I think some trails should be foot travel only and not open to stock. Particularly the limit should be no greater than six animals per group.

I also vigorously object to commercial mule packing outfits being allowed to write their own wilderness permits since the rest of us have to apply and also be educated each time we pick up our permits about the rules of the parks.

Thank you for considering my concerns.

Sincerely yours,



David K. Berke, M.D.

vb

cc: High Sierra Hikers Association
P.O. Box 8920
South Lake Tahoe, CA 96158

HOWARD J. WHITAKER
2041 Campton Circle
Gold River, CA 95670-8301

COPY

22 October 1996

Mr. Ralph Moore
Wilderness Coordinator
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore,

RE: SEKI Wilderness Management Plan

Please place the following comments in the administrative record for SEKI's wilderness management planning process.

1) The large numbers of stock animals that use the SEKI wilderness are damaging the fragile backcountry meadows, wetlands, streambanks and lakeshores. In addition, SEKI's wilderness campsites, trails, and water quality are also being degraded and polluted by stock manure and urine, and by soil erosion resulting from trampling by stock animals. Excessively large stock parties damage sensitive areas and detract from the wilderness experience of backcountry visitors. As an example of how severe the impact of stock is, I have quit using the SEKI backcountry as a result, and I know of several other foot travelers who have done the same.

Due to the severe, unremitting impact of stock use in the SEKI wilderness, the time has come to completely ban stock use. It will probably be necessary to implement the ban in a phased manner, which should include the following measures:

a) all grazing by domestic livestock in SEKI should be prohibited. Stock users should be required to carry compressed feed for their animals, and to keep the animals tied up, far from water sources, when they are not being ridden;

b) camping with stock animals should be allowed at designated sites only, and should be prohibited in fragile, high-elevation areas;

c) a network of "foot travel only" trails should be designated for visitors who desire an experience free of the dust, manure, and flies found on trails used by stock animals;

d) the maximum number of stock animals per group should be reduced from 20 to 5;

e) the practice of allowing commercial mule-packing outfits to write their own wilderness permits must be discontinued. Commercial clients should stand in line with the rest of us to obtain permits, and more importantly, they should be educated about wilderness ethics and regulations from experienced rangers, not the packers.

2) The Sierra Nevada bighorn sheep are severely threatened with extinction. The latest studies indicate that there may be fewer than 100 sheep remaining in SEKI. The NPS must take all action necessary to assure the survival of this magnificent but disappearing species, even if measures require closure of large areas of wilderness to visitors until bighorn populations stabilize.

3) Daily overflights by military jets shatter the natural quiet of the SEKI backcountry. The wilderness management plan should address this issue and overflights need to be regulated in order to restore tranquility to the SEKI wilderness.

Sincerely,

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke, positioned below the text "Sincerely,".

October 28, 1996

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers CA 93271

copy

Dear Mr. Moore,

Please place this letter in the Administrative Record for SEKI's Wilderness Management Planning Process.

The large number of horses and mules using the SEKI wilderness damage the stream banks, lake shores, meadows and wetlands. Horse and mule manure and urine degrades the quality of the wilderness campsites, trails and streams. Streams are also polluted by soil erosion caused by trampling of horses and mules.

The number of stock per party should be limited to a maximum of eight stock animals (20 is way too many animals for one group) to reduce the damage to sensitive areas and to improve the quality of my back country experience.

Each stock user should be required to carry feed for their animals to eliminate grazing and to keep animals away from water when they are not being ridden.

Use of designated campsites should be required of stock users. These sites should not include fragile, high elevation areas. Use of designated trails should also be required for stock users so that cross country travel is eliminated.

A separate network of trails should be maintained for foot travel only to allow back country visitors to have an trip free of stock manure with its attendant odor, dust (powdered manure) and free of the flies that the manure attracts.

Please take steps necessary to assure the survival of the Sierra Nevada bighorn sheep.

Thank you for your consideration of these important matters.

Best Regards,



David M. Edlund
1922 Tioga Blvd.
New Brighton MN 55112



Queen of Angels-
Hollywood Presbyterian
Medical Center

October 24, 1996

Richard D. Schneider, M.D.
Queen of Angels-Hollywood Presbyterian Medical Center
1300 N. Vermont Avenue
Los Angeles, California 90027

Ralph Moore
Wilderness Coordinator, National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, California 93271

Dear Mr. Moore:

Please place this letter in the administrative record for SEKI's wilderness management planning process.

I strongly object to large stock parties being permitted in the National Parks. These stock animals do considerable damage to the environment especially the fragile high elevation areas. In my opinion, stock animals should be prohibited entirely from the National Parks. Overall, I understand that there are certain economic interests pushing for stock animal permits. At the absolute maximum, these groups should be limited to six animals and camping should be limited to designated sites only. If possible, the stock animals should be kept away from foot trails used by hikers. They should certainly not be allowed off designated trails at any time.

Please consider the impact that stock animals have on other wild life such as the Sierra Nevada Big Horn Sheep which are nearly extinct. These wild animals need protection from human intrusion and also from the noise caused by military jet aircraft.

I have been and remain a strong supporter of the National Park Service and its mission. I wish to convey that I sincerely feel that stock animals degrade the natural environment.

Sincerely,

Richard D. Schneider, M.D.

cc: High Sierra Hikers Association
Box 8920
South Lake Tahoe, Ca 96158

88 Karen Lane
Walnut Creek, CA 94598

October 31, 1996

COPY

Subject: Wilderness Management Plan

Mr. Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore:

As a regular user of Sierran wilderness areas I have developed a strong opposition to the large numbers of packer stock in these areas. The damage they do to riparian areas and other fragile environments is brutal. I see no excuse for continued loose grazing in any park. These are the few areas in the nation where we have the potential to protect these environments, so let us do our best to enhance them.

Large parties of stock are especially damaging. They also detract from the wilderness experience by converting trails into dusty, manure-laden slots and by degrading stream and lake cleanliness. The higher the elevation, the more serious the degradation. On the subject of higher elevations, the severely threatened Sierra Nevada bighorn sheep need special protection. If necessary, some areas with higher populations of bighorn sheep should be closed to all visitors.

Parties camping with stock should be limited to special camps which have been carefully planned to protect fragile areas and water sources. These parties should also be limited in number of stock, perhaps 8 to 10 animals (at absolute maximum) to a party, and only one party to one of these camps. Such a limit would allow parties to consist of 5 to 7 riders and 3 to 4 pack animals.

To summarize, protection of fragile areas must include locating stock at significant distance from springs, streams and lakes, limitation to certain trails, no loose animals and permits to be issued by park employees only.

Thank you for your attention. I would appreciate your placing my letter into the administrative record for the Sequoia and Kings Canyon National Parks wilderness management planning process.

Sincerely,

Ralph Kraetsch

Sunny Newell Sorensen
7117 Westmoorland Drive
Berkeley, CA 94706
510.204.9304

December 13, 1996

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

RE: SEKI Wilderness Plan

Dear Mr. Moore:

I am writing to give my comments on the Sequoia and Kings Canyon wilderness plan, and wish this to be placed in the administrative record for SEKI's wilderness management planning process.

The most urgent of my concerns is that the SEKI wilderness is suffering greatly from the large numbers of stock animals that use it. Fragile backcountry meadows, wetlands, and riparian areas are being severely damaged by these animals, causing soil erosion and water pollution. Trails are trashed and require extra maintenance, which they don't receive; stock manure and urine leave a stench on the trails and harmful bacteria in the water. This can hardly be called a good wilderness experience either for those who visit, or the animals who live there.

I've been backpacking for a number of years and have seen first hand the expansion of the number of stock and damage they cause to wilderness areas. I am also a conscientious Sierra Club backpack leader who limits the number of hikers on my trips to 10 or less— although the Parks and Forest Services tell me I can take 15. I am absolutely appalled at the damage I see on the trails, in the meadows, and around lakes. Damage created by horses, mules, and cows. Allowing 20 head of stock to each party is, in my opinion, a gross error in judgement on the part of the Park Service. **Conscientious management would limit the total number of horses, mules, or donkeys to a maximum of SIX for every 12 people, and designate a limited number of horse and mule ONLY trails and horse and mule ONLY camps with the restriction that require the horse users to maintain them in a low impact manner and keep them clean of manure and trash.** No horses should be allowed cross country travel. Who would pay for this to happen? The packers and horsemen. The Park Service could raise funds by weighing in the horse and charging by the pound. The Park Service could also encourage the use of llamas, which are no more severe on the environment than deer.

Another part of this issue is the hypocrisy with which the Park Service "administers" permits for commercial packers. It appears they are able to write their own permits, and can

write as many as they want in any given period. This would be fine if they had, as I mentioned above, specific trails not used by backpackers and a limited number of horse camps— away from backpackers— which they maintained. But this is not the case. From first hand experience, I've found they have a "different" set of wilderness rules to follow— that don't seem in harmony with the rules for backpackers. Three years ago, for instance, I led a Sierra Club trip of six over 12,000 Mono Pass down into the recesses. At Summit Lake, two groups of packers joined together and 40 horses were drinking, urinating, and pooping on the edge of this fragile lake. It wasn't SEKI....but you know it happens there, too. I'd like to see this addressed and corrected.

Next is **the issue of grazing domestic livestock. There needs to be an end to this**, regardless of who thinks it's their historic right to continue. Fragile meadows are trampled to death, and streams are being polluted even more. Are you waiting for an E-coli lawsuit before you do anything? Cows in the wilderness are a thing of the past...just like the sheep. You aren't charging cattlemen enough for the damage that is done, and what the ranchers get from this "privilege" is a drop in their financial bucket. It is NOT their right or heritage to graze cattle anymore than it is my right or heritage to defecate in the streams.

I'd also like to point out that **bighorn sheep are nearly extinct in SEKI**. According to my information, there are less than 100 left. Perhaps as you are reducing and eliminating the number of stock in the area, you could also set aside some sections of the park to protect the sheep. This may mean closing an area to all traffic during certain times of the year until such a time when their numbers increase. It would be an effort well worth the inconvenience to backcountry visitors.

Last, I'd like to ask **what can done about the continual military jets that fly over SEKI**. They really shatter the wilderness experience for everyone. How to resolve this problem needs to be addressed.

Sincerely,

Sunny Sorensen

cc: High Sierra Hikers Association ✓

The Sierra Club

The Wilderness Society

STEPHEN V. O'NEAL

230 Southampton Ave.
Berkeley, CA 94707

Telephone 510-526-5076

November 3, 1996

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

RE: SEKI's Wilderness Management Planning Process

Dear Mr. Moore:

As someone who travels in the backcountry of Sequoia and Kings Canyon National Parks ("SEKI") every year I want to make sure that the following comments are placed in the administrative record for SEKI's wilderness management planning process. Please incorporate this letter into that administrative record.

Over the past few years in my travels in the SEKI backcountry I have become concerned and frustrated over the use and abuse of the backcountry by large numbers of domestic stock animals. The trail quality and camping experience has been greatly compromised by the manure and urine deposited by horses and mules on the trails and in off-trail areas as well. Numerous campsites have been destroyed by the trampling of what seem to be ever-increasing numbers of domestic stock. The trails themselves are often reduced to powder by the hooves of the horses and mules used by commercial packers. Into that powder is mixed the manure those horses and mules deposit on the trails. As a result, instead of enjoying the pure alpine air, which is one of the points of a trip in the first place, hikers are forced to breathe a mixture of dust and powdered manure that creates air quality that would not be tolerated in any factory or on any freeway in California.

Leaving aside the offal generated by the domestic stock animals and the trampling of meadow and trail they perform, the sheer size of the stock parties greatly detracts from the wilderness experience for which the wilderness areas were created in the first place. After pulling a 12,000 foot pass in hail and rain, making your way down to the trees and feeling close to nature, the sight of 15 or 20 people and horses brought in by a commercial packer with all the trappings of civilization, engaging in what amounts to a tailgate party, ruins the experience. There are any number of sites within the National Parks reachable by motor vehicle which can and do cater to the people who want a large-group experience with the comforts of civilization. However, our wilderness areas were not created with that kind of an experience in mind, but rather as an alternative. The domination of SEKI

by the commercial packers has resulted in a great natural resource which Congress set aside to be enjoyed by all of us being exploited and ruined for commercial gain.

I want to register my strong belief that all stock use in the SEKI wilderness should be prohibited. If that is not done I believe that at a minimum controls should be imposed to protect the wilderness including:

- the prohibition of grazing of domestic livestock in SEKI. Stock users should be required to carry compressed feed for their animals and keep the animals tied up well away from water sources when not being ridden;

- the restriction of camping with stock animals to designated sites only, with an absolute prohibition in high-elevation areas;

- the establishment of a network of foot-travel-only trails which would permit those of us who object to breathing powdered horse manure to travel in peace;

- the reduction of the maximum number of stock animals so that no more than four stock animals could travel in a group. The current "limit" of twenty is outrageous and designed solely for the pecuniary gain of the commercial packers.

A further area of concern has become overflight of the wilderness by military jets. On a trip down the southernmost 50 miles of the Muir Trail in September the activity by military jets gave the wilderness the feel of an air show. Surely the post-Cold War military can find someplace for its pilots to fly other than over designated wilderness areas within our National Parks.

Adoption of the points raised above in the wilderness management plan for SEKI would have a profound positive impact on the wilderness experience and bring SEKI more closely in line with what Congress clearly intended when our wilderness areas were first established.

Very truly yours,



Stephen V. O'Neal

bcc: High Sierra Hikers Association

Thur Nov 14, 1996
Karl Diederich
1360 E. Old Vail Road
Tucson, Arizona 85706
(520) 806-1575
karld@aztec.asu.edu

Mr. Richard Moore, Wilderness Coordinator
National Park Service
Sequoia & Kings Canyon National Parks
Three Rives, CA 93271

Dear Mr. Moore:

Thank-you for your and your teams' effort in ascertaining public input for your wilderness management plan. Although I was not able to attend any of your meetings, I would like to write a few comments. Please place this letter in the administrative record for Sequoia-Kings Canon wilderness management planning process.

You have a wonderful opportunity to improve your parks and the experience the vast majority of public derives from your parks. I have greatly enjoyed numerous hikes in different parts of Sequoia and Kings Canyon parks spanning two decades, and have suggestions revolving around two methods which would greatly improve your parks: Reducing the severe impact of stock damage and addressing military jet overflights, which also reduce the wilderness experience.

I have seen tremendous stock impact, both as damage the wilderness itself, and in reducing the wilderness experience of the majority of the public trying to enjoy your park.

I suggest that commercial outfitter stock use be phased out in your parks over the next three years. Your parks are heavily used, and commercial exploitation provides very little additional use of your park.

I suggest that all stock parties (hopefully only private), be limited to 6 head. Large parties particularly damage sensitive areas and detract from the wilderness experience. I have seen beautiful lake shores turned to mud.

I suggest that stock be required to stay on designated maintained trails. Off trail stock travel has enormous detrimental impact.

I suggest that stock travel be closed to trails which are not sufficient for their heavy impact.

I suggest further that additional foot travel only trails be created so that the majority of your visitors can enjoy a wilderness experience free of stock pulverized dusty trails covered with manure and stinking of urine and surrounded by flies.

I have wound up traveling trails recently made unpleasant by stock animals. It changed the whole focus of my hike, and really altered what should have been a wonderful experience.

I suggest that camping with stock be limited to designated sites only. I have seen numerous stock parties in my various trips in your backcountry. Some have even followed standard regulations. However, most do not. Having a regulation telling people in general terms where it is permissible to camp with stock is not working. I recommend that you designate specific sites, and allow camping at these sites only.

I suggest eliminating livestock grazing in your parks. In this matter, the demonstrated violations by stock parties is even worse. Stock users should be required to carry compressed feed for their animals.

Likewise, due to the egregious damage at water sources, I suggest that stock animals be required to be tied up far from water sources when they are not being ridden.

On the second issue, of frequent overflights by military jets. Your wilderness plan really should address this. Please seek to eliminate it. They greatly disturb the tranquility of your park and the wilderness experience of the public there.

Finally, I am very concerned about the declining trend in the number of Sierra Nevada Bighorn sheep in your parks. I suggest your wilderness management plan include necessary actions to ensure their survival.

Thank you for your attention.

Sincerely,



Karl Diederich

bcc: HSHA

copy

October 31, 1996



Mr. Ralph Moore, Wilderness Coordinator
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore:

It is my understanding that SEKI (Sequoia and Kings Canyon National Parks) is currently in the process of drafting a wilderness management plan, and that you are leading that effort. As you may know, I had sent a letter to the Superintendent on September 25, 1996, as well as an earlier letter on September 23, 1994, regarding wilderness management issues at SEKI. (Copies of both letters are enclosed). Because the issues raised in my letters remain unresolved, I request that both letters be placed in the formal administrative record for your wilderness planning process.

Concerning the issue of stock use within SEKI, I'd like to add the following points. I believe that the number of animals within any party should be limited to not more than 20 and they should be confined to major trails and officially designated camp sites. Stock handling issues such as grazing in the meadows, roaming free near bodies of water and "loose herding" are all practices which should be prohibited. Stock manure should be scattered or removed from the trails almost immediately following its appearance. Stock animals are not indigenous to the Sierra and their unchecked presence is an abominable activity which must be rectified. Just as wilderness rules have been proscribed governing the conduct of individuals within and for the preservation of SEKI, so too we need a more stringent code governing the use of stock animals in that same environment.

In summary, I urge that stock parties be kept on trails and in officially designated campsites, that the number of animals in a group be kept small and that someone be required to clean up after them. Or, as we've all heard so many times before, require that they and their handlers "take nothing but photos, and leave nothing but footprints".

Sincerely,

Bond R. Shands, Jr

Post Office Box 40788

*San Francisco, California
94140-0788*

*Telephones: 415/703-8068
(office)*

*415/821-1485
(residence)*

*415/703-8055
(office fax)*

Internet E-mail Addresses:

*bond_shands@ci.sf.ca.us
(office)*

*bshands@pacbell.net
(residence)*

COPY

September 23, 1994

Superintendent
National Park Service
Sequoia & Kings Canyon National Parks
Ash Mountain
Three Rivers, CA 93271



Bond R. Shands, Jr

1362 Guerrero Street

San Francisco, California
94110-3623

Telephones: 415/703-8068
(office)

415/821-1485
(residence)

415/703-8055
(fax)

CompuServe Mail ID:
73531,511

Internet E-mail Address:
73531.511@compuserve.com
-or- TamHiker@aol.com

Dear Superintendent:

On Monday, September 12th, I returned from a nine day Sierra Club National Backpacking Trip in Kings Canyon Park. Our route out of Cedar Grove was up the Lewis Creek Trail over Kennedy Pass and through the Volcanic Lakes area to the lower State Lake, then back to the Copper Creek Trail and Cedar Grove via Glacier and Grouse Lakes.

Our small group hoped for a wilderness experience while endeavoring to sharpen our no-trace camping skills. However, we were all amazed and distraught over the amount of horse manure we found in each and every meadow we crossed. While I expect to find the stuff on the trails, which we gladly share, the fact that all of the meadows in the Monarch Divide were so completely covered with horse feces was a most unpleasant bit of reality I had certainly not expected to see. And, when we reached State Lake, the manure was everywhere, even extending down to the lake front. In addition, the State Lake area was riddled with numerous horse paths. It was most unpleasant, and instead of remaining in that area for a couple of days, we departed after only one day. As I said, we had hoped for a wilderness experience. Instead, what we found more closely approximated a barnyard experience.

It appears to me that the local packer concessionaire is using the National Park lands as his private grazing pasture. And, instead of limiting his animals to remote meadow sites, our State Lakes experience proves that his animals are allowed to roam uninhibited wherever they please. Meanwhile, visitors such as myself are required obtain a permit and we are expected to practice no-trace camping while backpacking in these same areas. Yet the packer seems most uninhibited in his use of these lands. Some might see this as evidence of a double standard. Before making this judgement call, I'll await your clarification as to why it's not!

In the *Sequoia Bark* newsletter from the park (Summer 1994 edition), there's an article titled *Park of Forest* which outlines the National Park Service mission "... to emphasize strict preservation of natural and historic features.....", etc. I would suggest that there's nothing natural about the abundance of horse manure in the High Sierra meadows, and that it only exists there because you allow it. Quite frankly, you should be ashamed of yourself, just as I'm ashamed for you. I urge that you immediately take action to insure that the park back country meadows are kept from being used as a barnyard and pasture.

Sincerely,

A handwritten signature in black ink, appearing to read "Bond R. Shands, Jr.", written in a cursive style.

COPY

September 25, 1996



Mr. J. Thomas Ritter, Superintendent
Sequoia & Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Ritter:

I am writing to express my concern and unhappiness over conduct by members of your field staff during the last week of August in Sequoia National Park. The details of my complaint are as follows.

From Sunday, August 25th through the following Wednesday, I was a member of a group of Sierra Club peak climbers camped at the Big Arroyo site near the junction of the High Sierra and Big Arroyo Trails. During this same period, a group of park service personnel were camped below us further down the Big Arroyo Trail. At night a number of stock animals from the other camp were set free and allowed to roam up and down the area between the two camps. The lead animal was equipped with a very noisy cow bell. Each evening and throughout the night, the animals entered our campsite and had to be chased off. After the first night, a passing ranger was asked to transmit a complaint down to the other campsite. That complaint apparently fell on deaf ears, for the evening animal intrusions continued.

Mr. Ritter, I have to tell you that I don't visit National Parks in order to participate in a barnyard experience. Having my ears assaulted each evening by the sound of an unpleasantly-sounding, loud cow bell is not my concept of wilderness solitude. Arising one or more times during the night in order to drive the animals away is not my idea of night time entertainment. In short, those animals made our evening attempts at rest and sleep a futile, miserable exercise.

The experience I've related above is, in my opinion, all the more disgusting because it occurred as the result of actions by members of your staff. Whether due to sheer stupidity, uncaring incompetence, or just plain insensitive concern for the rights of others, it seems to me that several members of your staff need to attend a good class in basic wilderness courtesy and manners. I hope that you will convey my concerns to those responsible and that you will see that this type of episode is not allowed to occur again within the areas of your jurisdiction.

Sincerely,

A handwritten signature in black ink, appearing to read "Bond R. Shands, Jr.", written over a horizontal line.

Bond R. Shands, Jr

Post Office Box 40788

*San Francisco, California
94140-0788*

*Telephones: 415/703-8068
(office)*

*415/821-1485
(residence)*

*415/703-8055
(office fax)*

Internet E-mail Addresses:

*bond_shands@ci.sf.ca.us
(office)*

*bshands@pacbell.net
(residence)*



United States Department of the Interior

NATIONAL PARK SERVICE
Kings Canyon National Park
Sequoia National Park
Three Rivers, California 93271-9700

IN REPLY REFER TO:

N1623

October 8, 1996

Mr. Bond Shands, Jr.
P.O. Box 40788
San Francisco, California 94140-0788

Dear Mr. Shands:

I appreciate your writing to describe your recent trip into the Big Arroyo area of Sequoia National Park and regret that your trip did not meet your expectations. We apologize for any inconvenience the National Park Service stock party may have caused. I can assure that it was not the intent of our staff to disrupt your solitude in any way. I will pass along your concerns and we will try to do better.

We sincerely want you to be able to have the best possible wilderness experience when you come here. Our Wilderness Office staff will be glad to help you plan a trip with minimal stock encounters, if that is your desire. Certain areas do present a much higher likelihood of encountering stock than do others.

Thank you again for taking the time to write. I hope your next visit to these parks will be a good one.

Sincerely,

Michael J. Tollefson
Superintendent

COPY

October 18, 1996



Michael J. Tollefson, Superintendent
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, California 03271-9700

re: N1623

Bond R. Shands, Jr

Post Office Box 40788

*San Francisco, California
94140-0788*

*Telephones: 415/703-8068
(office)*

*415/821-1485
(residence)*

*415/703-8055
(office fax)*

Internet E-mail Addresses:

*bond_shands@ci.sf.ca.us
(office)*

*bshands@pacbell.net
(residence)*

Dear Mr. Tollefson:

Thanks for your October 8th, 1996 response to my earlier letter concerning stock use within the park. As you know, I expressed my unhappiness over the actions of your staff in allowing National Park Service stock animals to freely wander into my campsite on three successive evenings while staying in the Big Arroyo area.

My interpretation of your letter leads me to believe that you condone the practice of allowing National Park Service stock animals to freely roam within established campsite areas of the parks under your jurisdiction. And, if I further understand your position in this regard, I assume that you have no intention of changing this practice despite the aesthetic injury it delivers to visitors who are in the park.

Assuming that my interpretation of your position in this matter is correct, I further assume that you have no practical objection to my pursuing this matter with higher level officials in the Department of the Interior as well as my own elected representatives. As you no doubt may have noted, I resent my treatment by your staff in this matter, and that complaints to them and you remain unresolved. It is my intention to see if a more satisfactory resolution of my concern is available from a more understanding source.

Very truly yours,

701 Bamboo Terrace
San Rafael, CA 94903
11-10-96

National Park Service
Attention: Ralph Moore, Wilderness Coordinator
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Ranger Moore:

I would like to have this letter placed in the administrative record for SEKI's wilderness management planning process.

The wilderness trails and water sources are being polluted by domestic stock.

Humans are requested to camp and bury feces off the trail and away from water sources. Stock should do the same. Perhaps people who use stock should be required to clean up and bury all their stock manure.

An alternative would be to reduce the number of stock and to not allow them in some campsites and water sources.

Some trails and campsites should be for hikers only for those who want to escape pack animals.

It is very discouraging to find the only water source and campsite for miles polluted with stock manure.

Thanks for considering these points.

Happy (manure free) trails,

Hal Parker

A handwritten signature in cursive script that reads "Hal Parker".

nps1196

Please place this letter in the "administrative record for SEKI's wilderness management planning process"

November 9, 1996

Dear Mr. Moore,

I am writing in regards to the draft plan in Sequoia-Kings Canyon National Park. I tried writing earlier but found the comment parameters required for those who did not attend the public workshops a bit too complicated.

I have hiked in the Kings Canyon area and found it truly disappointing-- the natural beauty was nice but it was far from what it ought to have been.

First of all, the trail I chose to hike on was wide enough to drive a truck down, and were not talking foreign economy sized vehicles. The trail was sandy, dusty, and trampled-- however, off trail was actually quite nice. There was also a disgusting amount of horse shit all along the trail, which I don't believe is part of the native environment. If I, as a hiker, were to unload my waste along the trail I would probably be given a citation. The fragrance of the natural forest is actually quite pleasant, it is a shame a hiker has to leave the trail to experience that. Why is it that way? Why do we allow our national treasures to be abused in this way? There are countless acres of wilderness in this condition. Why is it that in our national parks we tolerate this?

It is truly time to put an end to the destruction. I have seen many trails destroyed by inconsiderate horse riders. I have seen horse hoof prints in lakes. I have seen piles of horse shit in the water of lakes and streams. I have even found a dead horse left in a stream half rotted away and crawling with maggots-- care for a drink? I have seen tree roots dug up and exposed to leave large circular pits of bare soil-- dust pits with a dead tree in the center. I have seen meadows full of hoof-print holes filled by stagnant water-- insects and mud were everywhere. I have seen meadows with a few wild flowers at the edge and the center mowed down to nubbins by horses. I have seen... need I go on? It seems rather incredible to me that the people we ask to protect our natural resources dole them out to the highest bidders.

Why is it that I can't take my dog to the trails of a national park, but I can take my horse? Please make some sense with your "new" draft plan. Look at me with a straight face and tell me horses should be allowed in the national parks and that they do not damage the wild-ness of the park. Tell me that I will have an unspoiled wilderness to show my kids in twenty years. My father camped in the meadows of Yosemite when he first visited it in the 40's --they don't allow that any more and for good reason. I think it's time to put an end to horse travel in our national parks. Do

I have a problem with people who are handicapped or otherwise couldn't visit the wilderness? -- No, I would make an exception to people who NEED horses in order to be there, not those who simply want them. Regardless, I do believe 20 animals per group is way out of line. Something more like 6 animals total would be a little more realistic. I don't believe being gravitationally challenged is a valid reason for riding a horse into the wilderness. If a person can park in a designated handicapped space, they probably should be permitted to ride, however I think that these cases would be few and far between-- significantly reducing the impact on the sensitive and fragile environment. I am not against the forest service using horses to do necessary maintenance either, I just don't believe we need commercial 20 mule teams in our national parks. Why should people be allowed to profit by bringing large groups of animals into the backcountry and damaging it. I have seen the results of that scenario; barren camp places, damaged plants etc. The fragile places can't survive when you allow large herds of horses to graze and trample. I don't believe I should have to tolerate a spoiled wilderness on account of a thoughtless group of backcountry travellers.

Please put an end to the travel of horses in the national park. In the very least there should be areas of travel that horses and mules are restricted to-- my dog is restricted to the paved areas. There should be areas to walk that are free from the all too familiar horse shit. There should be areas where foot travel is the ONLY permitted method of travel-- and not just a few miles here and a few miles there. I should be able to enter the wilderness in a hiking only area and hike many miles without entering horse trampled wilderness. There are areas where native wildlife are threatened-- they don't need the competition offered by horse travel.

I also don't understand why aircraft are allowed to fly over wilderness areas. I'm not impressed to have some yahoo in his military jet come buzz me. It seems to me that if the military can restrict airspace for the military only, that the park service should be able to do the same. I don't think my peace and quiet should be shattered by a military fly by, especially in the U.S.A.

I would also like to see an end to the presence of fences. It struck me as very odd to be hiking in the wilderness and to suddenly arrive at a wire fence--- they don't belong there and neither do the animals they are meant to contain. What about the native animals that do belong there?--- Are they able to open the gates and go where they need to? I don't think so.

I find it hard to believe that the forest service tolerates such abuse of the wilderness. From my experience the backcountry rangers I have talked to, who see the destruction first hand and who are appalled by it, are not the ones making policy. Please save a wilderness area in its pristine state for my children and theirs to come.

Thank-you,

A handwritten signature in cursive script, appearing to read "Ron Gosswiller".

Ron Gosswiller
3714 Justine Drive
San Jose, CA 95124



Copy

JOAN & ROBERT BENEDETTI
650 HARBOR STREET #3
VENICE, CA 90291
(310) 302-0013

November 5, 1996

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore,

Please place this letter in the administrative record for SEKI's wilderness management planning process.

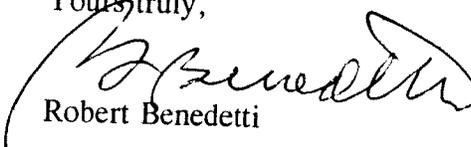
Having hiked the backcountry of both parks extensively, I am alarmed at the continuing damage to fragile meadows and other wet areas, and disgusted by the piles of manure and puddles of urine deposited on trails by the excessively large stock parties using the backcountry.

My personal preference would be for the elimination of pack use altogether, but recognizing that some people cannot get into the backcountry without pack help, I would urge the adoption of the following:

1. A limit of 6 stock animals per party;
2. Stock parties to camp at designated sites only, and prohibited from fragile high-elevation areas;
3. Restriction of stock parties from all but a specific network of stock trails, with the majority of trails reserved for foot travel only;
4. That stock parties carry their own feed and not be permitted to graze;
5. That packers AND THEIR CLIENTS have to apply for permits like everybody else.

Please also do whatever is necessary to preserve the bighorns, and to block military overflights in the Parks.

Yours truly,


Robert Benedetti

October 25, 1996

From: Irvin Lindsev, 150 Lions Field Drive, Santa Cruz, CA 95065

To: Ralph Moore, Wilderness Coordinator, National Park Service,
Sequoia and Kings Canyon National Parks, Three Rivers, CA 93271

(To be placed in the "Administrative record for Sequoia and Kings
Canyon National Parks (SEKI) wilderness management planning process.)

The many stock animals that use the SEKI wilderness are damaging fragile backcountry meadows, wetlands, streambanks and lakeshores. Wilderness campsites, trails and water quality are being ruined by stock manure and urine and by the erosion from stock hooves. Really large stock parties (like up to 20 animals per group) damage sensitive areas a lot and almost destroy the wilderness experience. On our school trips we've seen manure strewn snow scapes, reported more than 20 stock per group and stock in closed meadows, been sickened by the clouds of urine soaked trail dust and been disheartened by the farmyard appearance of mile after mile of smelly, urine/manure strewn, deeply eroded wilderness trails.

There should be no stock in the wilderness because then even the kids have to walk through the mess. To deal with the odor, bacteria, water pollution, nature & trail damage, flies and danger from poorly trained animals and riders is not part of the wilderness experience.

All stock grazing should be prohibited. Stock owners can carry compressed animal feed and keep their animals tied away from water when they are not being ridden.

There is no camping with stock animals in fragile or high elevation areas and otherwise should ONLY be at designated sites.

A people network of "foot travel only" trails should be established for those who want an experience free of the dust, manure and flies found on the trails used by stock animals.

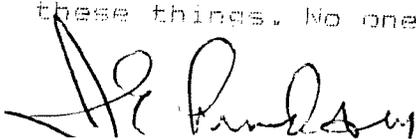
There should be heavy fines for stockers breaking the rules. There are plenty of good people who will volunteer to help watch.

If stock in the wilderness must continue....The maximum number of stock per group should be six. More simply allows stockers to destroy invaluable wilderness for their own profit. No more letting commercial outfits write their own wilderness permits. Their clients must stand in line like everyone else AND be educated about wilderness ethics and regulations by experienced rangers - not the packers.

On one of our field trips we saw evidence of bighorn sheep. These magnificent wild creatures must be protected even if it means areas are completely closed. To allow a wild animal species to approach extinction simply for the profit of a few stockers is a crime.

Military jets are so noisy that the wilderness experience becomes a hike by the airport. These flights should be heavily regulated to allow the natural tranquility of the wilderness to remain intact.

Wilderness and nature is for everyone: now and in the future. Destruction and extinction is making a decision for millions who follow us and cannot yet speak, the children and their children. Only the minority few who profit from this destruction and extinction want these things. No one else. The majority, without exception, says no.



William P. Schaefer

3002 San Pasqual Street
Pasadena, California 91107

(818)795-6433

October 23, 1996

Mr. Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, California 93271

Dear Mr. Moore,

I am writing to comment on your wilderness planning and I ask that this letter be placed in the administrative record for SEKI's wilderness management planning process. I am a long-time - over 50 years - and fairly heavy user of the backcountry in the Parks and I'm concerned that the places I like and enjoy so much remain as beautiful and pleasant as possible.

I continue to be troubled by the noise, the dust and the mess of large pack trains in the wilderness. If people pack properly, one mule can carry all the stuff needed for three people for a week. A group of six, then, would require at most nine animals, yet I see strings of 15 or more horses and mules in the mountains. These people aren't having a wilderness experience, they're moving the city into the backcountry. All that equipment and gear is simply inappropriate for the setting; I urge you to put an absolute limit of at most ten on the number of pack and saddle stock in a party that enters the wilderness. By doing so, you will limit the damage these animals do to sensitive environments, reduce the amount of manure on the trails, decrease the damage that stock cause to the trails and help preserve the delicate wilderness.

As a corollary, SEKI should consider reserving some backcountry trails for hikers and walkers with llamas. People and llamas do little damage to trails, can camp without polluting the lakes and streams and create little dust or noise. We should be allowed some areas where we are not exposed to the damage of pack stock nor their pollution. In areas where stock are permitted they should not be allowed to roam free or graze in the meadows. Hooves churn up damp areas, polluting streams and creating muddy places in the trails. Stock should be restricted to camping at designated sites only, and their feed should be carried in - weed-free, of course.

If visitor quotas are properly established and visitors are properly educated, we can expect to have clean campsites, decent trails and clear water. Thus the number of visitors must be controlled; all who want to use the wilderness need to get permits in the same way, with no favoritism shown to those who use commercial packers. Everyone who enters the wilderness needs to know the proper code of behavior, and education of the public must remain an important feature of your work. Measures such as these ought to give a near-pristine wilderness experience, yet I find that the feeling of wilderness is shattered often by the ear-splitting noise of military jets blasting at low levels up the canyons of the park. I've been scared out of my wits in the Upper Kern, climbing Mt. Stanford, by a Navy fighter less than 500 feet overhead. I was a Navy pilot; I know that it's fun to cruise close to the ground. But I insist that a National Park is absolutely not the place to allow this stupid behavior. Military

flights are controlled and the Park Service must get the several base commanders to stop these low-flying intruders. One or two blasts from a jet takes away completely the feeling I have striven through three day's hiking to achieve, that of being a part of the wilderness.

Last, I want to note that, although you have designated some areas for the preservation of the bighorn sheep, not everyone pays attention to these protected areas. I was camped at Baxter Lake, wanting to travel to Woods Lake through a sheep area and resigned to walking a whole day down to the Muir Trail and back up when I met a Park Service ranger who had just passed through the sheep reserve from Woods Lake, just where I'd have liked to have gone. I support having some areas closed to hikers in order to protect the lambing grounds of the sheep, but you ought to be sure that the rules apply to everyone, not just the visitors.

Thank you for listening. I hope that this process results in better protection for the backcountry, both for me and for my children to enjoy and not harm.

Sincerely yours,

WPS:TEX



→ cc: High Sierra Hikers Association

Marcus Taylor
2566 18th St.
Sacramento, CA 95818-2450

October 22, 1996

Ralph Moore Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore:

I am writing to convey my comments on the U.S. National Park Service's wilderness management plan for the Sequoia and Kings Canyon National Parks. In general I find that your efforts to inform foot travelers about practices to preserve habitat and quality are excellent. I believe it is now time that you apply the new practices to all historical uses within the lands under your jurisdiction. Specifically:

- **More controls are needed on pack animal grazing.** Pack animals have damaged alpine meadows and streambanks throughout the Sequoia and Kings Canyon National Parks. *The time has come for the National Park Service to recognize the cumulative impacts of years of mismanagement and take steps to mitigate them, not just continue the status quo while continuing to deal more stringently with hikers.*
- **Eliminate all provisions that allow expansion by commercial mule packing outfits.** Prohibit any further expansions in commercial pack station, and discontinue the practice of allowing packers to issue their own wilderness permits. *For too long foot travelers have been considered second-class users relative to the commercial packers who generate much larger and intensive disturbances to the environment. The National Park Service must adopt a stance to treat the two groups equally in the future.*
- **Establish a network of stock-free trails.** A network of "foot travel only" trails is needed so that hikers who desire may enjoy a few trails with the dust, manure, and flies that cover trails used by stock.
- **Require stock handlers to manage manure as part of their permit.** Traveling in the Grand Canyon National Park, the trail is free of the dust, manure, and flies that cover trails in the Sequoia and Kings Canyon National Parks. This is because stock handlers are required to place collection buckets on each of their animals, a part of their permit. Given that the National Park Service is going to require foot travelers entering the Whitney Zone to pack out their wastes, the National Park Service should require stock users to manage their manure in all permits issued for stock use. *Those who choose not to comply should not be issued permits.*
- **Reduce the limits on the number of pack animals per group.** Reduce the number of pack animals per group to 10. The sheer impact on the wilderness of 20+ animals per group is huge. Upper limits of 10 animals should suffice the needs of any commercial group. *The National Park Service needs to drop its stance of granting and expanding entitlements to historical uses and start anew with a scientifically-based appraisal of mitigations required to repair the years of abuse of the environment for their benefit.*
- **The Sierra Nevada bighorn sheep are severely threatened with extinction.** The Park Service should take every measure to save the few remaining animals in the Parks, *even if it requires the closing of large portions of the wilderness to help populations stabilize.*

- Daily overflights by military jets shatter the natural quiet of the backcountry. Now that the cold war is over the Park Services' wilderness management plan should eliminate these flyovers to maintain the peace of the backcountry.

Finally I would like to share my experience of your new privatized system for obtaining wilderness permits. I wrote the National Park Service on March 30, 1996 to request permission to enter the Sequoia and Kings Canyon National Parks. Hearing nothing from the Service in the following two months, I called your office and was informed that the old system was to be privatized, I was told that I would be charged three dollars per person for a permit. I received a form from your contractor which I dutifully filled out and returned. To my surprise my Visa statement indicated that I was charged \$4 per person. Furthermore, I learned the rules have been to allow 100% reservation of all spots up to six months in advance. This policy change is in direct conflict with the history of the system under which 68% of the permits were issued on the day of entry. Hiking should continue to be a spontaneous activity, and if the National Park Service is going to charge for a service that was previously free then they should charge the quoted price. Please cancel the rule changes that preclude me from obtaining a permit for entry on the same day.

The National Park Service has done an excellent job of changing its past practices with respect to foot travelers. It is time for the Service to apply this creativity to wilderness users and close the chapter on favoring historical high impact activities and users over other low impact uses. I strongly encourage you to exercise your stewardship responsibilities to improve the Sequoia and Kings Canyon National Parks for future generations.

Sincerely yours,

Marcus Taylor
U.S. Citizen and Taxpayer

October 21, 1996

Mr Ralph Moore
Wilderness Coordinator
Sequoia and Kings Canyon National Park
Three Rivers, CA 93271

Dear Mr Moore:

Thank you for sending me the information regarding the Wilderness Management Plan for Sequoia-Kings Canyon National Park. Since I was unable to attend the public workshop I am writing to offer some thoughts on what I consider to be critical issues that need to be addressed.

My long term goal would be to preserve the wilderness in as pristine condition as possible. In my experience of over 30 years in the Sierra backcountry and many hiking trips in Sequoia-Kings Canyon, the most noticeable problems result from the use of packstock and horses. This user group is degrading the wilderness environment at an alarming rate. The direct effects of packstock and horse use include trail destruction, overgrazing and damage to meadows, streamsides and lake shores by hoof trampling. Other problems are pollution of water, deterioration of campsites, large quantities of animal waste on trails and around campsites, plus the ability to transport large groups of people which compounds a variety of human impacts.

I believe the Wilderness Management Plan should include new policies to reduce or eliminate these conditions. Some ways that this could be accomplished would include---1. Reducing the number of pack trains allowed through quota reduction. 2. Reducing the maximum group size. 3. Mapping areas vulnerable to damage and restricting or prohibiting horses and packstock in these areas. 4. Establish a fee system for packers to collect funds for repairing trail damage and restoration of impacted areas including campsites regularly used by packers. 5. Developing and implementing minimum impact techniques for packstock and horses. Enforcement of these controls will be necessary. That may include increased ranger patrols and substantial fines for violations.

I am aware that there are many issues to consider in the planning process. I have focused on packstock and horses because the problems are glaring and there is a potential for great improvement in current conditions. Perhaps the Sequoia-Kings Canyon Wilderness Plan could be a model for other Parks.

Thank you for the opportunity to make these comments. I would appreciate being included in your mailing list for further input.

Sincerely,


Jonathan Braun

PO Box 627
San Anselmo, CA 94979 (415) 459-6973

October 23, 1996

Mr. Ralph Moore
Wilderness Coordinator, NPS
Sequoia and Kings Canyon NP
Three Rivers, CA 93271

Re: Administrative Record for SEKI's
wilderness management planning
process.

Dear Mr. Moore,

I was pleased to meet you
and your associate Debbie Bird
in Sacramento last month. I
thought that the meeting was
quite cordial and handled well.

I have been hiking on ~~the~~
various parts of the PCT for the
last six years. This summer I
hiked, with three friends, through
a portion of Kings Canyon. We
went from Bishop Pass to Tuolumne
Meadows.

I am concerned about the heavy
use of horses and mules on the
PCT/GMT. They damage the trail
and they drop excrement and
urinate - often near water
sources.

Often when we find a campsite for the night, we must first clear away the manure so that we can set up a tent. We practice "no trace camping", but the horse people do not.

Two years ago we stopped near Woods Creek on the SMT/PCT in Kings Canyon. We set up our tents and had dinner. Toward dusk a very, very large group of horses, mules, wranglers, and dudes arrived and set up camp nearby.

All night long those horses and mules were in our site, near our tents, and making noises. The ground was beat up and there was horse horse dropping all over.

I recommend that (1) stock size be limited to eight; ~~and~~ (2) some sites be for exclusive use of hikers; and (3) wranglers be required to pick-up manure of their horses and toss it 100 feet away from the trail and water.

Sincerely
Ben Fleming

DONALD HERZOG

October 26, 1996

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore:

Re: Horses and Stock in Wilderness Areas
Administrative Record For KEKI's Wilderness Management Planning Process

Please place this letter in the Administrative Record for KEKI's wilderness management planning process.

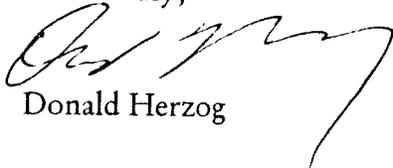
When hiking and backpacking, my wilderness experience is seriously degraded by the effects of horses and mules. Campsites and trails are despoiled with stock waste, the trails eroded and trampled by steel hooves, and the lakes polluted by animal feces.

Two people with 6 animals have an environmental impact several hundred times greater than that of two backpackers. The erosion caused by stock animals is a very significant cause of the sedimentation of our fragile alpine lakes. Animal feces and urine pollute the water and contribute to aquatic plant growth, depleting oxygen in the water. Walking through smelly and infectious manure is unpleasant and unhealthy.

Historical use is not sufficient to justify the damage and degradation caused by horses and mules. Many other historic uses such as guns, fires, unrestricted assess, mining, and tree cutting are restricted because of their impacts. The argument that horses permit access to people who could not otherwise make the trip is also inadequate to justify the destruction of the resource. If I'm unable to ride a horse, am I to be permitted to use a helicopter or an ATV for access.

Please eliminate stock from the wilderness areas except for the absolute minimum use required for patrolling, trail maintenance, and rescue. This would result in the greatest reduction in resource degradation while negatively impacting the smallest number of users. Horseman would still be welcome in wilderness areas. They would just have to leave their stock outside, just as bicyclists do.

Yours truly,



Donald Herzog

October 28, 1996
Daniel Kozarsky and Carol MacFarlane
366 Sierra Vista Ave., #12
Mountain View, CA 94043

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear sir:

It is our understanding that you are gathering public input for development of a wilderness management plan for Sequoia and Kings Canyon National Parks. As frequent backpackers in the SEKI wilderness we would like to submit the following comments. Please place these in the administrative record for SEKI's wilderness management planning process.

The SEKI wilderness is an extraordinary treasure that should be maintained in a pristine state. Stock parties have by far the greatest negative impact on the wilderness and on humans' experience of that wilderness. Most SEKI trails and campsites which have significant pack usage are degraded by dust, manure and erosion, especially wet areas (such as stream banks). It makes for very unpleasant hiking for those on foot.

We urge you to adopt the following controls:

- Limit the maximum number of stock animals per party to well below the present limit of 20. We suggest a number in the 5-10 range.

As an alternative, limit the sites where large pack trips can be taken, so that large stock party trips are not taken to fragile, high-elevation areas.

- Allow camping with stock animals at designated sites only. Again, camping should be prohibited in fragile, high-elevation areas.
- Require all stock users to bring their own feed for the animals, and keep the animals tied up far from water sources.
- Establish a network of "foot travel only" trails for visitors who desire an experience free of dust, manure, and flies.

As an example of how large stock parties diminish the wilderness experience, in 1994 we were completing a long and wonderful backpack in Sequoia National Park, returning from Nine Lakes Basin towards Hamilton Lakes and Giant Forest. Just below Nine Lakes Basin the trail passes the incredibly beautiful Precipice Lake, which we had never seen before. Several minutes later we were stunned to see a very large pack train come down the trail, only

feet from a place of sacred beauty. Having 20 domestic animals troop by you can ruin the feeling that you are in a cathedral of nature.

Thank you for your consideration. Please help to increase the wilderness character of an area which we understand to be one of only two remaining places in the continental U.S. where one can get more than 10 miles from any road.


Daniel Kozarsky


Carol MacFarlane

cc: High Sierra Hiker's Association

Jeffrey Kane
Brown University
Box 4044
Providence, RI 02912

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

10/26/96

Mr. Moore:

As a frequent visitor to the SEKI, I would like to give some input regarding the wilderness plan that is being drafted. Please include this letter in the administrative record for the SEKI's wilderness management planning process.

As a backpacker I am often appalled by the impacts caused by stock use. Non-indigenous animals are forced into the backcountry to tear up trails, vegetation, attract other pests such as flies and cowbirds, and force hikers to constantly avoid their foul and unsightly excrement in a land designated by Congress to be "untrammeled by man." What about horses. As a wilderness user who relies only on the feet that God gave him to experience the gift of the backcountry, I would be most happy to see all stock use in the SEKI wilderness be prohibited. However, I realize there are other entrenched interests which may have to be accommodated (even if it does require a loose interpretation of the Wilderness Act), and so as a compromise, I offer the following suggestions regarding stock use:

- All grazing by livestock in the SEKI should be prohibited, requiring stock users to carry feed so that native vegetation is not harmed and that idle animals are tied up far from water sources to help keep the water pollution-free.
- Camping with stock animals should be allowed at designated sites **only**, and should be prohibited in fragile and/or high elevation areas.
- A network of "foot travel only" trails should be established for users like myself who desire a wilderness experience free of livestock.
- The maximum number of stock animals per group must be lowered from 20! This is greater than the maximum people group size limit, and the impact of one stock animal on a trail is equivalent to that of several people. The smaller the number the better, but I suggest a limit of 6 or animals per group, which will be capable of carrying plenty of provisions into the backcountry.
- Cross-country, off-trail travel by horse should be prohibited. The impacts of stock trammeling off trail are severe. There are plenty of trails to keep stock users happy, and if they need to get somewhere off-trail, they can walk.

It is my understanding that the Sierra Nevada bighorn sheep are severely threatened with extinction, especially in the SEKI. It is the duty of the Park Service to do everything within its power to avert this disaster, even if it means closing areas of the wilderness to users like me until bighorn populations stabilize.

On many occasions, the tranquillity of my stay in the wilderness has been annihilated by the overflight of a military jet. Is not the sky above part of the wilderness as well? The new plan should address this issue, perhaps by regulating such flights.

Thank you in advance for considering my opinions in drafting the wilderness management plan for the SEKI.

A handwritten signature in black ink, appearing to read "J M Kane". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Jeffrey Kane

26135 Altadena Dr.
Los Altos Hills, CA 94022
415 948 8120

Ralph Moore
Wilderness Coordinator
Sequoia & Kings Canyon National Parks
Three Rivers, CA 93271

29 Oct 96

This letter concerns the new management plan for the Sequoia-Kings Canyon Wilderness. It is intended for the administrative record for the wilderness management planning process.

Pack and saddle stock are clearly detrimental to all wilderness values except access. Stock cause more damage to plants, meadows, soils, and trails than do equal numbers of humans on foot. They degrade campsites. Stock also require bigger, more expensive trails, and allow visitors to carry destructive tools, such as axes, saws, and shovels. Stock numbers should be reduced now, and they should be restricted to a small number of major trails and campsites, prohibited from all others, prohibited from any off-trail travel, and prohibited from grazing. Stock should carry their own feed.

Commercial pack outfits should be more tightly controlled and pay large user fees. Their trailhead quotas should be steadily reduced as the number of applicants turned down for foot travel increases. Clients of pack outfits should face the same probabilities of getting a permit as do the rest of us. Our wilderness does not exist so some can make a profit from it at the eventual expense of the rest of us.

Until the day comes when overwhelming public pressure eliminates stock from wilderness areas, they should be treated as automobiles presently are (for roughly the same reasons) in the non-wilderness areas of National Parks: tightly restricted to designated roads, no off-road travel, no use of certain secondary or abandoned roads, and, increasingly, subject to strict quotas. To protect Park values, large parts of the non-wilderness parts of National Parks are presently inaccessible to those who can't or won't leave their cars. Analogous limits should apply to those who can't or won't leave their stock.

Sincerely,

Malcolm Clark

Dale Greenlee
2701 Robinson Creek Rd
Ukiah, CA 95432
October 30, 1995

Mr. Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Mr. Moore:

My intent here is to urge ou to NOT allow larger pack animal groupings, particularly on the trails shared by hikers, and in areas of threatened native animals.

My varied experiences of family, adult, and youth oriented excursions into Kings & Sequoia since the early days of the 1950s provide me with a sense of urgency about this matter. Since 1992 I have gone with a group of men on week long 50-70 mile packtrains. I have experienced the diving way to pack trains, fought the flies, picked my way through feces, hunted for other camp sites not overrun with flies, denuded ground, and an over abundance of "biscuits." I've been there!

Not only should the maximum number of stock animals per group NOT be expanded, I would encourage a reduction below twenty (20). I know, there is more profit in larger groups, but at what/who's expense? I urge consideration of regulations requiring stock animals be restricted to designated and maintained trails... in other words, crosscountry tripping, should not be tolerated.

I've been on well maintained trails, those torn up by cattle/horses, water bars torn out by horse hoofs, in wet and dry conditions. While I am not an ecologist nor an Earth First nut, I am an appreciator of our natural beauty, and enjoy pack trips 3-6 times per year. I have written before and will probably write again, knowing that people have short memories for "the other point of view."

Dale Greenlee

Oct. 29, 1996
2 Baggins End
Davis, CA 95616
mtstevenson@ucdavis.edu

Ralph Moore
Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Park
Three Rivers, CA 93271

Dear Ralph Moore:

I would like my comments to be placed in the administrative record for SEKI's wilderness management planning process. I was not able to attend the local meeting in Sacramento because I was hiking in Kings Canyon that weekend!

1. What are your personal expectations when using the wilderness?

I want to have an experience free of visual evidence of human destruction. Stock animals (especially horses and cows) are destroying ecosystems around the world and their presence in protected wilderness is a symbolic reminder of the destruction their use has caused. Their presence alone is a blight on the landscape, regardless of the environmental problems that come with them. The impact of humans alone is bad enough, I certainly don't want to see some of their tools of destruction (horses) toted along with them. I want clean water to drink, without huge piles of horse feces in the middle of free running streams (I saw this in Kings Canyon a few weeks ago). I want clean air to breath, free of the stench of urine, running in rivulets down the trail. I don't want choking dust and clouds of flies brought to certain trails by horses.

It disturbs me to see people using stock animals in wilderness, not caring about the water and air pollution they are causing. Meadows are getting trampled and fragile plant populations grazed, while the horse people lounge in extravagant camps, abusing the very surroundings they are enjoying.

All stock use in wilderness should be eliminated except for special purposes and with special restrictions. These special purposes include providing access for handicapped individuals or senior citizens, native american religious uses, and occasional trail maintenance projects that would be impossible otherwise. At all times only one stock animal per person should be allowed (a few weeks ago in Kings Canyon I saw SIXTEEN horses being led by only TWO people). All horses should wear a "poop-bucket" like used in parades, so that feces can be carried out of the wilderness. Also, compressed feed should be carried to feed the horses.

6. How we protect environmental quality.

It can be stated without argument that horses cause significant environmental damage, even more so than humans, because the horse is so much larger than a person and does not bring its own food into the wilderness. In some situations, even humans should be banned from some wilderness areas (like bighorn breeding areas), but in all cases (exceptions stated above) stock

animals should be banned from wilderness areas. The NPS is obliged by law to ban stock use from wilderness areas. I will go through each law, and current NPS management policies that were enacted to protect environmental quality.

NPS Organic Act of 1916. The NPS is directed to promote and regulate the use of national parks and “to conserve... the wild life therein...” Allowing horses to eat hundreds (perhaps thousands) of individual plants every day is in direct violation of the directives of this law. Not only are the plants not being protected, but the other animals that depend on those plants are being harmed by the absence of a food source (bighorns) or breeding area (insects).

Wilderness Act of 1964. This law dictates that wilderness should generally appear to be affected solely by the forces of nature, with the imprint of man’s work substantially unnoticeable. A hiker’s footprint on the trail can disappear with a little wind or rain, and the trail appears to be little visited. However, piles of horse manure occurring every few hundred feet for mile after mile of trail take weeks or even months to disappear. I don’t consider this aspect of horse use to be “substantially unnoticeable.” Its like walking through a minefield of stinky, sticky blobs of feces for mile after mile! Horse users will tell you that horse feces is neither stinky or sticky, but they are wrong. They are riding high up on their horse, an extra 5 feet away from the foulness, with their head up in the breezes. Of course they think its not too bad. In summary, horses are not natural beings, they were bred by humans for humans to use and therefore should be considered as “man’s work” and the use of horses in wilderness is not “substantially unnoticeable.”

Wild and Scenic Rivers Act of 1968 and Clean Water Act. These laws not only apply NPS, but to all. Allowing horse manure to enter stream water, especially a drinking water supply used by human wilderness visitors, is in direct violation of these laws. Allowing horses to accelerate erosion of stream banks and hillsides is also in direct violation of these laws.

Endangered Species Act of 1973. “The bighorn was once numerous from the mountains of southern Canada to northern Mexico; disease, food scarcity, and over hunting, however, have reduced the bighorn population. Today, they are found only in remote mountain areas and national parks in the United States... Bighorn sheep eat grasses, flowers, young plants, and even cacti”. (adapted from Grolier Multimedia Encyclopedia 1995) Horses eat many of the same foods as California Bighorn sheep and therefore compete with the Bighorn for a limited food supply. All horses should be banned from all of SEKI, not just wilderness, for this reason alone. The fact that I have quoted a description of the bighorn population problem from an encyclopedia, and not a scientific journal article, shows that this problem is very well known and generally accepted as true. Banning livestock from wilderness areas could help the declining populations of Bighorns.

NPS Management Policies. I was amazed to read some of these policies in the “sideboards” sheet made available. They are very honorable goals that I completely agree with, but any horse use on NPS lands contradicts many of these policies. I will quote them here.

“Human impacts on natural population dynamics will be minimized. NPS will strive to protect the full range of genetic types (genotypes) native to plant and animal populations in the parks...”

This is a shockingly broad and far reaching policy statement and I applaud it. It means that

every single individual plant and animal in the parks must be protected, unless some overwhelming genetic evidence shows that certain populations are made of "clones" (having identical genotypes). In any population that reproduces sexually almost ALL individuals are of different genotypes. Therefore, grazing horses in wilderness eat hundreds of unique genotypes every day!

"Nonnative (exotic) species will not be allowed to displaced native species if this displacement can be prevented..."

This policy statement is clearly not followed. Simply read an information pamphlet that is given out with wilderness permits. I don't have a copy here, so I can't quote it, but it states that over grazing your stock in wilderness can cause weeds to invade the meadows. Weeds are exotic plant species and their invasion can be prevented by banning horse grazing! NPS should follow their own directives and ban horse grazing.

Additional points I would like to make about the informational pamphlet paraphrased above... The pamphlet states that no pets are allowed in the wilderness. I consider stock animals as pets. Horses and mules in the wilderness are used purely for recreational purposes. Therefore they are pets. Therefore they should be banned from entering wilderness for the same reasons that other pets are banned.

"Visitors will be encouraged and/or required to comply with the concept of no-trace or minimum impact wilderness use for both themselves and their livestock."

If you compare the impact of one hiker to the impact of one human with two horses, it cannot be denied that the hiker is causing less impact than the human with two horses. The human with horses is not practicing minimum impact. If they were, they would leave the horse at home. If visitors are to be truly encouraged or required to comply with minimum impact standards then they should not be allowed to bring horses into wilderness.

Conclusions.

Overall, I think the NPS does an excellent job and I appreciate the dedication and caring I have seen in many NPS employees. But it is strange to me that horse use is allowed to continue in our National Parks, allowing a small minority of people to degrade a treasured resource. I understand that horse riding is a beloved pastime for some people, I've enjoyed it myself, but I would **never** take a horse into a specially preserved and protected area such as NPS designated wilderness.

The majority of backcountry wilderness users are hikers. We, the hikers, are being forced to endure witness to a destructive and disgusting (fecal matter and urine in drinking water) management practice that allows horses into pristine wilderness. Please obey the law and follow NPS policy. Please phase out all use of horses and mules in NPS designated wilderness as quickly as possible (exceptions with special restrictions stated above).

Sincerely,

MAX STEVENSON

Max Stevenson

B.A. Applied Ecology, UC Irvine, 1991

Ph.D. Plant Biology, UC Davis, 1997 (expected)



David Ostrov
PO Box 686
Cambridge, MA 02139

October 30, 1996

Dear Sir,

Please place this letter in the administrative record for SEKI's wilderness management planning process.

We should do what we can to preserve the SEKI wilderness for future generations with as little change as possible.

In order to do this we have to limit the total impact by visitors.

At the same time we should also try to maximize the total number of visitors.

Which leads to the obvious conclusion that we should do our best to minimize the impact that each visitor has on the wilderness.

The visitor to the SEKI wilderness who travels with the assistance of a horse or a mule has far greater impact on the trail and campsite and on the water quality than the visitor who travels unassisted.

This means that if people are allowed to travel with the assistance of a horse or a mule, and if the total impact permitted on the SEKI wilderness is held constant, then less people will be permitted to visit the SEKI wilderness.

I do not think that this would be a desirable outcome. For this reason I hope that you decide to ban all stock animals from the SEKI wilderness.

Thank you for considering my view.

Sincerely,



Ralph Moore
Wilderness Coordinator
N.P.S.
Sequoia and Kings Canyon National Park
Three Rivers, CA 93271

Dear Sir,

These comments pertain to the SEKI wilderness management planning process. Please place them on administrative record.

1.) What are your personal expectations when using the wilderness?

The only expectation I have when I am in the wilderness is to see a landscape in its natural and primeval state. This means the wilderness should be left *as unaffected by humans as possible*. I expect to use small, low-impacted trails. I expect to use water which is free of horse and human feces, horse and human urine, and horse generated parasites. I expect the air to be free of biting horse flies, excess dust created from pulverized horse feces, and the fumes of fresh horse feces and pools of urine. Campsites should be free of trash, large fire scars, horse feces, horse urine, signs of grazing, and trampled vegetation. Meadows should be free of all stock animal destruction and over-use by humans.

During my 15 years of hiking in the Sierra, these reasonable expectations have rarely been met. The overwhelming reason for this shortcoming is due to the use of stock animals. The very definition of wilderness as stated in the Wilderness Act of 1964 is completely contradicted by the commercial use of stock animals. Commercial stock use has nothing to do with the "wilderness concept". It utterly decimates the natural conditions of the Sierra. It leaves miles of obvious and unreasonable destruction to land which is supposed to be protected for future generations. It pollutes, degrades, and contaminates Sierra water sources. It threatens and eliminates native Sierra organisms. It mocks the concept of "minimum tool" and provides careless people with luxuries and conveniences. Most of all, stock animals are completely unnecessary to experience the wilderness. They are not needed by 99% of park users!!!! I have hiked nearly 1000 miles of the Sierra, and I have never felt the need to sit on the back of a stock animal. Like the Yosemite Zoo, the feeding of the bears in Yosemite Valley, and the Fire Fall, the use of stock animals is an activity which denatures the most basic idea of wilderness preservation. The commercial stock companies have had their way for long enough. They should be eliminated completely.

2.) How we learn about the wilderness.

SEKI should be actively involved in educating the users of the wilderness about how to preserve the wilderness. An ideal scenario would require a five minute oral exam for all persons wanting to receive a wilderness permit. One exam could be used by a person for that entire season. The exam would cover issues of waste disposal, food storage, fire building, and personal safety. People could study and learn about these issues right where they receive their permit. The cost could be covered by an increase in the ridiculously low entrance price to the park.

3.) How we get there.

Access to the wilderness for able bodied individuals should be only on foot. Horses, mules, llamas, and all other means of transportation should be completely eliminated from the park because of their unparalleled destruction of the Sierra ecosystem. Trail maintenance and any portering of supplies should be done by juvenile delinquents who are given the option to volunteer. Trails should be as small as possible. They should avoid erosion problems and sensitive meadow areas. Finally, the network of trails should be kept to a minimum and should provide general access to a region. All other exploration in a region should be by cross country navigation.

5.) How we interact with each other in the wilderness.

Trails should have human quotas placed on them during high use periods. All stock animal use should be banned from all trails in the park. This ban would allow for a slight increase in the human foot use quotas. Fire arms should not be allowed anywhere in the wilderness. People who receive a backcountry permit and require rescue due to a gross lack of preparation, should be charged for their rescue. Power drills for placing rock bolts should continue to be illegal.

6.) How we protect environmental quality.

If SEKI really wants to protect environmental quality, all use of commercial stock animals should end immediately. Commercial stock use utterly decimates the natural conditions of the Sierra. It leaves miles of obvious and unreasonable destruction to land which is supposed to be protected for future generations. It pollutes, degrades, and contaminates Sierra water sources. It threatens and eliminates native Sierra organisms. It ruins the aesthetic wilderness experience for 95% of park users. On a recent trip up Bubbs Creek Canyon, I encountered 18 inch high piles of fresh horse excrement, 20 foot long streaks of horse urine, piles of horse excrement in the middle of Bubbs Creek tributaries, biting gnats from passing horses, and air which wreaked of horse waste. Are humans allowed to dump their waste into Sierra streams? Are humans allowed to urinate all over trails? Why are horses allowed to and what is the difference? Why are dogs not allowed in the park? The hypocrisy must stop now. The Sierra as we know it cannot survive another wilderness plan which allows stock animal use.

Dan Ovadya
2413 Elendil Ln.
Davis, CA 95616

Chris Metzler
1765 Village Run North
Encinitas, CA 92024

November 7, 1996

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore,

I am writing regarding SEKI's wilderness management plan, and would like this letter to be placed in the administrative record for the wilderness management planning process.

My concerns center largely on the number and distribution of stock permitted within SEKI back country areas. I believe that the number of stock permitted in a party is too large. (I understand that the current maximum number of stock in a single party is 20.) In order to preserve the wilderness for all users, I believe that the number should be considerably smaller, such as 5. This will allow stock parties to continue to visit the wilderness while reducing the negative impacts which large parties have on trails, campsites etc.

Additionally, I believe that grazing by domestic livestock should be prohibited. Just as we backpackers carry our own food (after all hunting is not allowed within SEKI), so domestic livestock should bring in their own food, so as to protect the natural environment for all users.

Also, I believe that stock should be restricted to a series of designated trails, so that those of us that prefer to not step in and smell the bodily wastes of these animals will be able to truly enjoy the wilderness experience.

Please realize that I don't want to restrict all stock use in SEKI, as this would limit access to the area among those who, for whatever personal or physical reason, choose not to use their own feet as the primary transportation method. I simply would like to see the wilderness

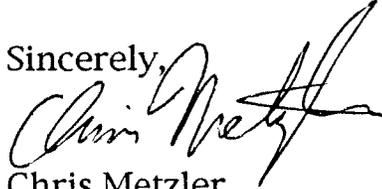
experience of all users improved by establishing some reasonable limits on the use of domestic livestock.

A final issue I wish to address is that of aircraft overflights. I find them to be annoying, and to significantly degrade the wilderness experience. I include in this military flights, domestic airline traffic, helicopter use and private fixed wing aircraft. While I realize that there is perhaps only a limited degree to which you can control such activity. I do hope that, as the wilderness management plan is developed, this issue will be addressed in such a way as to restore a greater degree of tranquility to the SEKI wilderness.

I have been backpacking the SEKI wilderness region since 1973. It is my favorite part of the Sierra Nevada, and I always feel refreshed and at peace following my visits. I hope that the wilderness management plan will improve the wilderness experience both for me and for all users.

Thank you very much.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris Metzler". The signature is fluid and cursive, with a large, sweeping flourish at the end.

Chris Metzler



November 7, 1996

CEDU HIGH SCHOOL

Ralph Moore Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore:

I understand that the NPS is in the process of drafting a wilderness management plan for Sequoia and Kings Canyon National Parks. Please place this letter in the administrative record.

As a backpacker myself and the director of a private school that regularly brings groups of youngsters into SEKI, I have become increasingly concerned with the impact that stock animals are having on the SEKI. Hiking trails are choked in dust, covered with manure and deeply rutted from horse shoes. In addition, alpine meadows show heavy use from grazing and watering stock in streams and lakes.

I believe that the wilderness can and should be used by all - as long as the fragility and beauty of the wild areas are respected by all users. It is clear that livestock are destroying our most sensitive areas and that new, more restrictive legislation is required.

Two areas of particular interest to me and my school are hiking trails and overflights of military aircraft. I am requesting NPS to explore the creation of a trail system throughout the more fragile parts of SEKI restricted to foot traffic only. Secondly, military jets routinely fly low over the Kern Canyon destroying the solitude of the area. They should be prohibited from overflying National Parks.

I appreciate your attention to and filing of this letter.

Sincerely,

William L. Valentine
Executive Director CEDU Mountain

WLV/cl

cc: High Sierra Hikers Association

copy to HSHA

November 4, 1996
734 Spruce St.
Berkeley, CA 94707

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Ralph Moore,

I am writing this letter regarding the new wilderness management plan for Sequoia and Kings Canyon National Parks (SEKI). I want this letter to be placed in the administrative record for SEKI's wilderness management planning process.

As a backcountry hiker who has spent nearly 100 days in the Sierra during the past year, I have some comments and complaints regarding stock use with the SEKI wilderness. I understand that many people regard stock use as their "right" within SEKI wilderness, however many of these people are unaware of the damage that the stock cause. I frequently see campsites used by packers which are within 100 ft of a water source. Surrounding areas are highly degraded from grazing. Trees have rings left by ropes which were tied directly to the tree. Not to mention the erosion caused in along steep switchbacks where hikers are constantly forced to walk off the trail to let stock parties pass. My own biggest complaint: The piles of manure which cover the trails, especially steep hills, where the stench is unwelcome. Systems exist which can be attached to the animals to collect the dropping. I feel that all stock users should use such a system on heavily used trails as well as at campsites. The manure can then be distributed off the trail.

I realize that many people enjoy backpacking in wilderness areas. My complaints are not directed at the small private parties of people (6 animals or less), but the large commercial or other stock parties. My experiences have shown me that smaller groups tend to respect the wilderness, pack in a minimal amount of camping "necessities", and respect the hikers. In contrast, the larger the group, the more the attitude of "this place is mine and hikers must get out of my way".

Overall, my requests are:

1. All grazing by stock in SEKI should be prohibited to protect slow growing, fragile alpine plant communities.
2. All campsites should be further away from water and trails are those specified in rules aimed at hikers. That is, more than 100 ft from the trail or water.)
3. All stock should stay on maintained trails. That is, no cross-country travel should be allowed.
4. Manure-collecting bags should be attached to the animals on heavily used trails.
5. The number of stock in a party should be limited to 6.

Thank you very much for your consideration.

Sincerely,
Elizabeth Wenk
Elizabeth Wenk

November 12, 1996

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore,

I wish for this letter to be placed in the administrative record for SEKI's wilderness management planning process.

I have been shocked and saddened to see the damage done to the fragile alpine areas in the High Country of the Sierras by the stock animals. Humans are instructed to be sensitive to these places, yet human damage is slight compared to what the horses and mules do. As a short person with my face at times only a couple of feet from the trail, hours of breathing trail dust that is largely composed of manure laced with urine becomes as much of a health hazard as the polluted water.

I hesitate to push for a total ban on stock animals because there are some people who, for various reasons, would be unable to enjoy the wilderness without them, but their use should be vastly curtailed. The animals should be tethered FAR from water and their camping areas should be designated and far from backpackers camp areas. And wherever possible, there should be separate trails for animals and people.

Sincerely,

Genie McKenzie
"P.C.T. Trekker"

2520 Martingale Ct.
Santa Rosa, CA 95401

*copy of
sent to
note*

11 NICHOLL AVE
RICHMOND, CA 94801
11-12-76

Ralph Moore, Wilderness Coordinator

Comments re: Wilderness Management
Plan for SEKI:

The greatest detriment to the backcountry
experience - and to the wilderness itself -
is the use of stock + the ensuing damage
to meadows, streams, etc. Ideally, all stock
should be prohibited from the backcountry.
But - a large improvement could be made
by tighter control of commercial stock
use.

First, stock animals per group should
be limited. 6 or 8 would be a good number.

Second, all grazing should be prohibited.

Third, camping with stock animals
should be restricted + enforced.

Fourth, NPS should explore ways
to restrict its own stock use.

We also support protection of the
bighorn sheep.

Sincerely,

Gerald + Mignon Gregg

11/12/96

Dear Sirs - Ralph Moore and others

Please place this letter in the administrative record for SEK's wilderness management planning process.

I backpacked close to 100 miles of trail in the southern Sierras this year and wish to voice my opinion on some upcoming issues:

1. Most of the trail I hiked over was used by both pack animals and hikers. The few stretches of trail which were noticeably absent of stock animals were much more pleasant - you could actually smell the flowers instead of just road apples. Also this part of the trail had much less damage. I hauled out 5 lbs of cans, bridge spikes, toys, etc. - stuff a backpacker would never had taken in.
2. Is it not possible to establish separate "foot travel only" trails? It is quite obvious the horses are doing the major damage to the trail and this would be more obvious with separate trails.
- 3.
3. Twenty stock animals per group should be reduced from 20 to 6.
4. A two thousand pound animal causes too much damage to leave on the trail.
5. Protect the big horn sheep - even at the expense of closing some or more acreage for a few years.
6. If it is necessary to install more semi permanent batrines, so be it. T.P. sticking out horizontal rocks around boulders used as

to make these structures blend in and they could be located discretely hidden from view of the main trail with only a sign on the trail.

7. We need a few more rangers in the back country. It disturbs me that more and more hikers are carrying firearms. If people feel more secure, I believe they won't be as apt to pack firearms.

Thank you for your consideration on these points

Cordially

Jim Harick
1369 Sevilla St.
Cimarrillo, CA

93010

Ralph Moore, Wilderness Coordinator
National Parks Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Sir,

Please place this letter in the administrative record for SEKI's wilderness management planning process. It has been my experience that stock animals are a detriment to the fragile wilderness in the the Sierras. The direct effects of stock animals on trails and meadows is obvious. The indirect effects of pollution and destruction of riparian habitat are becoming more apparent. I would favor a prohibition of the use of stock animals in these national forests. I would hope that an equitable solution whereby stock animals would be gradually eliminated could be reached.

On our last trip in the Sierras a group of about 20 pack animals, riders and handlers passed us while we were resting at the top of a 12,000 foot pass. We spent the rest of the day stepping around manure. Not fun.

If we cannot eliminate stock animals, then let us have some "foot travel only" areas. Good scenic areas, not some places where no one wants to visit. Let the stock users have the leftovers.

Sincerely,

Frank A. Junga 

PO Box 164

Cobalt, CT 06414

*Please
note
my
new
address*



November 14, 1996

Ralph Moore
Wilderness Coordinator
National Park Service
Sequoia/Kings Canyon National Park
Three Rivers CA 93271

Mr. Moore

I would like the following comments placed in the administrative record for the Wilderness management planning process.

I have been using the SEKI backcountry annually since 1975 and as a former Backcountry Ranger (North Cascades National Park 1981-1992) I have in general been impressed by the management of the SEKI Wilderness. However there are a few management problems that I would like to see be addressed.

1. Initial contact of wilderness users at east side trailheads.
2. Backcountry horse use
3. Group sizes
4. Military over flights

1. I approach the SEKI Wilderness exclusively from the eastside. When obtaining a permit I receive little or no information about regulations, minimum impact etc. While I understand eastside permits are not issued by Park Service Personnel, some sort of coordination/communication needs to be established between the Park Service and eastside issuing agencies. The permit system should be used not only as a regulatory tool but an educational tool as well.

2. Horse use is out of control in the SEKI wilderness. It is hard to believe the inconsistencies of Backcountry horse use throughout the Park Service. There is overwhelming evidence that large numbers of horses greatly impair the backcountry resource. The same resource that the Organic Act states the Park Service is to "leave unimpaired for future generations", yet Sequoia still allows up to 20 head per party. SEKI should follow the precedence set by other parks by limiting use as follows.

1. Party sizes should be limited to 12 including horses, packers and clients. (Any combination)
2. No grazing allowed, (compressed, pelletized food only).
3. Horses should be restricted to "main" trails maintained for stock. **No cross country travel.**
4. Horse parties should be required to use designated, hardened camp sites with hitch rails.
5. Horse camping should not be allowed above treeline.

3. Group sizes of any kind should be limited to 12 on trail and 6 people off trail
4. Attempt to limit over flights by military and civilian aircraft

Thank you for your efforts
Sincerely


John Dittli

P.O. BOX 3398
306 LAUREL MOUNTAIN ROAD
MAMMOTH LAKES, CA 93546
PHONE FAX 619 934 3505
Email: dittli@telis.org

Jan. 20,1997

To: National Park Service

Subject: Wilderness management plan for Sequoia and Kings Canyon Parks

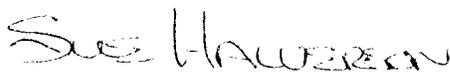
I would like this letter to be placed in the administrative record for SEKI's wilderness management planning process. I have become aware of continued conflict between backpackers and stock animals who are trying to share a fragile backcountry. I have been backpacking for over 20 years and have only seen continued high impact on wilderness campsites, and less sites becoming available to backpackers. It is very discouraging to have spent a long day on the trail and arrive to find the only available campsite covered with stock manure. We are all becoming accustomed to filtering our water, but what do you do with manure. We usually try to clear a spot and put our bag down, but you are never truly out of it. It is a problem, as we read more and more about hikers and campers becoming ill from some unknown wilderness disease, I'm sure the stock manure isn't helping the situation.

I understand that using commercial outfitters is the only way some people can see and enjoy the backcountry. I do believe however, that some changes could be made, such as using compressed feed, tying up animals away from water sources, allowing stock animals to camp in designated sites only, and possibly structuring trails so foot travel can avoid the manure and flies left by the stock animals.

I understand that commercial outfitters can write their own wilderness permits. It's great that their clients don't have to stand in long lines, but are they missing a ranger education on wilderness ethics that helps to lessen the impact on the land? I think we all need to contribute to management of the backcountry, but seeing a large (possible 20) horsepower team and uneducated clients coming into the wilderness doesn't leave much to the imagination. We all make some kind of impact, but if YOU get to decide the future of the backcountry then YOU will make the biggest impact.

My last comment concerns the bighorn sheep. I understand that studies indicate there may be fewer than 100 sheep remaining in SEKI. I was lucky enough to see a bighorn about four years ago in Kings Canyon. I saw it on a rock outcropping above me and was literally speechless, and of course will never forget that experience. Remember who we are and who they are and give them the space they need, we can afford the time.

Sincerely,



Sue Halverson

430 MANCHESTER PL
DORRIS CA 94526

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA. 93271

October 25, 1996

re: request to place this document in the administrative record for SEKI's wilderness management planning process

Dear Mr. Moore:

I am the president of the California Save Our Streams Council, a statewide, grassroots citizens' group founded in 1981 to protect streams and watersheds throughout California from degradation by small hydroelectric projects and other environmental insults. We are currently supporting a petition before the State Water Resources Control Board to restore minimal flows in the San Joaquin River below Friant Dam as the absolutely essential first step in restoration of the damaged San Francisco-Bay Delta ecosystem.

Sierra watersheds start in the High Country. Yet from the very moment the snow hits the slopes the integrity and purity of the snowmelt are soon compromised by air pollution. Historical livestock grazing in the Sierra was severely damaging. The impact of current stock on the High Sierra, particularly in riparian areas, can cause further significant impacts to creeks and riparian zones, according to the Final Report to Congress of the Sierra Nevada Ecosystem Project. While the SNEP report focused on the deleterious, and, in some cases irreversible impacts of, unwise grazing decisions in the past and present, these livestock impacts are also clearly caused, to a lesser extent, by the large numbers of animals, (horses, mules, etc.) which also abuse the SEKI wilderness. Streambanks, lakeshores and creeks are being recurrently degraded by animal wastes, which also perpetuate giardia.

Stock parties of up to 20 animals can create serious localized impacts on streamsides and riparian vegetation, polluting the creeks and harming the fisheries.

The California Save Our Streams Council has taken a position that all cattle grazing should be eliminated or phased out quickly in all fragile backcountry meadows, wetlands, streambanks and lakeshores. Coincident with that policy is a desire to reduce the impacts of stock parties.

SOS supports efforts to impose the following policies regarding SEKI:

- Prohibit all grazing by domestic livestock. Stock users should carry their own feed and should keep animals away from creeks unless necessary to cross or to provide drinking water. Horse and mule owners should be required to keep animals tethered away from creeksides to eliminate fecal contamination.
- Camping with stock animals should be allowed at designated sites only, and should be prohibited at high elevations or in fragile meadow and riparian areas.
- The park should work toward establishing numerous foot trails

prohibited to use by stock and their attendant manure, flies and dust.

- Pack animals should be limited to 6-8 in a party. Commercial outfitters should not be allowed to write their own wilderness permits nor should their clients be given preferential treatment over ordinary citizens in obtaining permits to enter wilderness areas.

- All steps feasible should be taken immediately to identify areas utilized by Bighorn Sheep and all steps taken to minimize any disturbance, even if that means prohibiting or drastically reducing entry into large areas of wilderness.

- Work with the appropriate military agencies to reduce unnecessary training flights over the backcountry, because of the intrusive noise and visual pollution that is caused by such activity.

I thank you for the opportunity to present the views of CSOSC. I wish to remind the National Park Service that it has a special trust responsibility to protect the interests of both the public at large and unborn generations in a High Sierra free of despoilation for private gain.

The last page of the SNEP executive summary states, "most of the problems of the Sierra can be solved, although the timescale and degree of solution will differ depending on the problem." The problem of pack animal impacts on trails, campsites and riparian areas can be reduced immediately by implementation of the suggestions herein.

Thank you for your attention. CSOSC wishes to be added to any mailing list for the SEKI wilderness management planning process.

Cordially,

Lloyd Carter
CSOSC
616 W. Lamona
Fresno, Ca. 93728

1095 Woodside Way
Del Mar, CA 92014
23 October, 1996

COPY

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Sir:

This letter is to express my opinion regarding the wilderness management planning process for SEKI, and my hopes for the useage of this park, in accordance with an overall wilderness plan, which I know you are trying to formulate. If possible, I would appreciate this letter becoming part of the administrative record.

It was my pleasure to meet a few of the park rangers at your July meeting in Los Angeles, when you made a really pro-active attempt to ascertain public opinion with regards to the future use of the park. It was sorely disappointing to see how few of the public were in attendance. And that is a point in itself: the majority of the public is silent. That doesn't mean that the majority of the visitors, especially to the back country, are without an opinion. They are just silent, but I am convinced, that if each of the back-country visitors could be interviewed, most would express the sentiment that I am going to express now:

Keep the back country pristine. It should be devoid of changes wrought by man. Animals that would not normally be there should not be brought there by man. The wilderness experience is degraded by the damage and signs left by these animals. The National Parks should not be used by any parties for commercial gain. All trails into the high country should be for foot travel only. All citizens should have equal access to permits; it is indecent that profit makers should have the ability to sidestep daily quotas to which the public is subject, by writing their own wilderness permits. The military must be approached, at the highest levels, by your superiors to their superiors, to cease the noisy intrusion of military aviation into the wilderness experience.

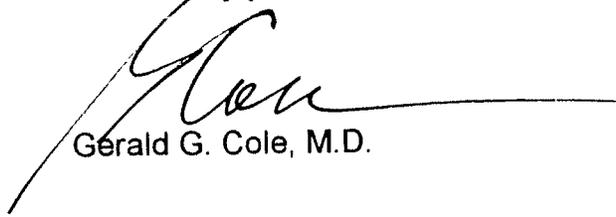
Please take a long view, a view through the next century. Severe adjustments in the way man co-exists with his environment will occur. The old way of doing business will not last another 100 years. And the need for for a tranquil and pristine experience for humans in the next century will be even greater than they are now. With an ever more crowded planet, you have within your grasp now, at the end of this century, the ability to establish ground rules for the next century, and how SEKI will be used. Commercial useage of the park must cease, just as atmospheric pollution must cease in the next century. Each pack animal brought into the park degrades it several times as

much as one human being on foot.

Please be bold in your recommendations for the 21st century. Please ask yourself how you you would like the park left to your children after your stewardship is done. Please resist all the competing interests that belabor your decision making processes, but act with the purest of intents. You, with luck and elightenment in Washington, will be drawing up a plan for the 21st Century for SEKI.

It was a genuine pleasure to meet the Rangers in Griffith Park last July. I was impressed with, and grateful for your dedicated public service.

Sincerely yours,



Gerald G. Cole, M.D.

October 28, 1996

Ralph Moore, Wilderness Coordinator
Sequoia-Kings Canyon National Park Service
Three Rivers, CA 93271

Dear Mr. Moore:

I want my comments to be placed in the administrative record for SEKI'S wilderness management planning process.

I like not seeing many people and feel all livestock should be prohibited. I especially believe that cattle do not belong in the National Parks or the National Forests. Cow bells are very noisy and cows cause lots of damage. I feel they should be prohibited. I think the parks, especially the wilderness areas should be stock free. I do not approve of large mule or lama trains carrying lots of unnecessary gear into the mountains.

Please, prohibit stock and cattle in the Sequoia-Kings Canyon wilderness. If there must be any stock allowed, make camping with stock at designated sites only and make stock users carry feed for their animals. Establish backcountry quota for private and commercial groups limiting the party size to **eight** people. Allow no dogs or other pets. Don't continue to allow commercial mule-packers to write their own wilderness permits. Limit the size of the pack animals allowed to **four**.

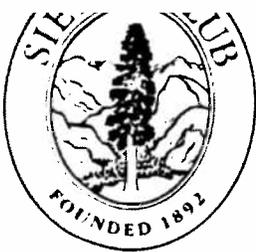
I would like campfires prohibited, except in well developed areas. I would like groups limited to **eight** people, with no horses or stock animals allowed.

Please, take any actions necessary to assure the survival of the bighorn sheep in the area, even if that necessitates closing off a large portion of the wilderness to visitors.

I feel that the park service has a duty to protect the wilderness from destruction and exploitation, educate all visitors on wilderness preservation and keep the areas pristine.

Sincerely,

Myrriah Ellis



The Toiyabe Chapter of the Sierra Club

Nevada and Eastern California

PO Box 8096, Reno, NV 89507

*One Earth,
One Chance.*

certified mail - return receipt requested

Ralph Moore, Wilderness Coordinator
National Park Service
Sequoia and Kings Canyon National Parks
Three Rivers, Ca 93271
Nov. 11, 1996

Subject: Public Comments regarding scoping input on SEKI's
Wilderness Plan

Dear Ralph:

The Range Of Light Group and Toiyabe Chapter, Sierra Club consists of numerous members that live adjacent to and recreate in SEKI's Wilderness Areas and have several concerns related to its future management. We believe the guiding principles of wilderness management are contained in the 1964 Wilderness Act. Management direction should always place resource protection paramount. Where a choice must be made between wilderness values and visitors or any other activity, preserving the wilderness resource is the overriding value. Economy, convenience, commercial value, comfort, historical and traditional uses are not standards of management for wilderness.

Many of our members attended the public hearing July 25, 1996 in Bishop concerning public comments on the future management of SEKI. We have concerns in that the format selected focused on recreation. While wilderness areas were set aside in part for the recreational opportunities they offered, it was not the primary reason for establishing the wilderness concept. Wilderness areas were established primarily for setting aside lands in an un-modified, un-occupied natural state. We believe that management direction should embrace a less utilitarian approach to wilderness management.

Currently the John Muir/Ansel Adams Wilderness Plan is being developed by the Forest Service concurrently with Seki's and Yosemite's Wilderness Plans. We believe that it is paramount that all these land managing agencies work together, in developing their wilderness plans. The High Sierra wildernesses should be managed as one eco-system, striving for consistency in management. In the past we feel this hasn't occurred, resulting in a lot of important issues not being addressed. We support

management direction influenced primarily by research/science. Its our understanding that the majority of SEKI wilderness visitors access the Park via U. S. Forest Service administered land. That raises some interesting issues that concern trail head quotas, the issuance of wilderness permits, and commercial use.

One of these is the trail head quotas for the general public and the lack of quotas for commercial uses. The trail head quota system was implemented primarily to address overuse/crowding and the resource damage that resulted during peak use times. Because trail head quotas apply to the number of visitors that can access a given trail per day, it essentially limits the number of visitors, at any one time, in any drainage. Since service days are based on season long totals, and can be utilized on the trail heads of choice at any time, the potential to overcrowd areas with commercial users is especially high during peak use periods. (1) This lack of temporal/spatial controls, on commercial users, has in effect caused an exceeding of the quotas previously set for these areas. While we believe that these daily trail head quotas are most likely necessary, we have been unable to locate any documentation or data to substantiate the actual numbers. These quotas should be based on both biological and social factors in combination with ongoing resource monitoring to assure that the resource is not in a declining trend.

A recent change on surrounding Forest Service managed areas that will have significant impact on SEKI was contracting out the issuance of wilderness permits. While the Inyo N.F. program of disseminating resource related educational material to wilderness visitors in the past had room for improvement, now it is non-existent. (2)

Several of our members utilize commercial packers in SEKI and support its continued use as an appropriate and legitimate wilderness activity as well as private stock users. On the other hand we also recognize the greater impact stock supported parties have on the resource and have focused many comments on mitigating these impacts while still allowing its continued use.

Currently, there are **no restrictions on the amount of commercial pack stock use, primarily from surrounding National Forest Lands, that can access Sequoia-Kings Canyon N.P.** While east side pack stations have a specified amount of priority service days and a cap on the number of stock they are allowed to operate with on paper, their use above this amount is routinely exceeded by either poor accountability and/or increases granted by the Forest Service. (3)

Pack stations operating on the west side, primarily off the Sierra N. F., have no service day or stock limits. Added to this is the fact their service days do not apply while they are in SEKI. The U.S.F.S. and N.P.S. have increasingly restricted access to the general public through the quota system, to protect the resource from impacts related to overuse. Examples: Bishop Pass 100 in 1979, currently 36 per day. The White Mountain Ranger District has reduced its quotas by 38% since they were implemented in the late 70's. (4) In the same time frame they increased the amount of stock authorized to operate from 255 head to 330 head, a 25% increase. (5) The only factor that currently limits the amount of commercial packing that takes place within SEKI is the ability of the commercial packers to market their services in combination with the managing agencies lowering the quota for the public, thus increasing demand for their services.

This statement is supported by a quote from the recently released SNEP Report; "**Some prospective backpackers who are unable to get permits enter on commercial stock permits and then continue their backpack trips**". (6)

This situation is in conflict with the intent of the 1964 Wilderness Act Section 4(d)(6) "*Commercial Services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the area*". A "**Needs Assessment**" should be done to address the need for and the role of outfitters and guides in the wilderness plan. This assessment should address the type, number, and amount of recreational use that is to be allocated to outfitters and guides and to ensure their services to the public are in a manner that is compatible with use by other wilderness visitors and that maintains the wilderness resource.

A correspondence from the Sierra National Forest brings up a concern in that the John Muir/Ansel Adams Wilderness Plan does not plan to address the amount of commercial packing, but defers it to the reissuing of individual special use permits. (7) Currently the Sierra N.F. is in the processes of reissuing a 10 year special use permit to High Sierra Pack Station. The Environmental Assessment on this action fails to identify its impact on the wilderness or acknowledges any limits on service days or the amount of stock they are allowed to operate with. In other words even on paper there are no restrictions on the amount of use allotted even though they operate on trail heads with daily quotas.

This catch 22 situation needs to be resolved as all wilderness areas between SEKI and Yosemite N.P are currently drafting wilderness plans. This will require all the agencies involved to come together and resolve the amount of commercial use allocated.

We feel an equitable solution to the situation would be that when use restrictions are imposed (*quotas*), systems should be implemented so that the outfitted-guided visitors will have an equal, but not greater opportunity for visitation than non-commercial visitors. All visitors should go through the same system of obtaining a wilderness permit, then it would be their option whether to seek out and utilize an outfitter/guide service or not.

Concerning group size we believe 15 people and 20 head of stock is too large, 10-12 people and 15 head of stock should be the maximum allowed. The maximum group size for cross-country travel should be limited to 8-10 people. We are aware of a loop-hole in the current maximum group size/stock limit thus invalidating the intent of the regulation. The loop-hole is that there is no distance, or other criteria written into the regulation so groups in excess of the maximum group size can and frequently do set up two separate camps, in close proximity to each other, and commingle as one. The Inyo N.F. attempted to put a $\frac{1}{2}$ mile separation distance in the operating plans of the commercial pack stations but met such resistance that they backed down. (8) Zion N.P. addressed this issue in their Compendium and does not allow like groups to share the same trail or drainage. We believe that all the agencies involved need to be consistent with this issue and address it in their regulations/CFR's to insure the intent of the regulation is met. (9)

We would like to see meadow ecosystems in a natural un-grazed condition. All stock parties should be required to supply weed free feed and eliminate grazing. No National Parks, outside of the High Sierra's, allow grazing of recreational stock, with the exception of some Parks where large ungulates evolved. Glacier N.P, Rocky Mountain N.P., and Mt. Rainier N. P., to mention but a few, do not allow this consumptive use (grazing) of its resources. Elimination of grazing would reduce the introduction of exotic plants, improve water quality, leave more forage for wildlife, eliminate the need for drift fences and bells. "Monitoring is increasingly important since packstock use is now the primary impact of the high sierra"; (10)

Aesthetics is an important and often overlooked element when evaluating grazing impacts. Most visitors would prefer, and have a right to see a meadow system in it's natural un-grazed condition. While SEKI meadow management plan has attempted to mitigate grazing impacts I'm familiar with areas where it's failed. Colby and McClure Meadows are examples where past stream bank restoration projects have failed to restore the stream bank as well as the meadow ecosystem back to a more natural state even with the strict grazing guidelines at these sites. We deplored the recent illegal grazing of cattle, from surrounding National Forest land, in SEKI by Anheuser-Busch. We hope you will taken measures, other than fencing the park boundary, to assure this does not happen again.

We support restricting low-level Military overflights to air space above 16,000'. We believe that summit registers are appropriate, but should not be bolted to the rock and not maintained with Park Service funding.

SEKI's utilization of chain saws and power drills for trail maintenance is too extensive. We would support a move to more primitive means of management, IE minimum tool concept. The underlying determining factor of utilizing stock support or helicopters in management should be *what is better for the resource*. We would support a move to utilizeing helicopters more for supplying trail crews than stock. Factors to consider when utilizing stock should be condition of trail, condition of meadows, length of stay, conflict with other users, etc. Non-essential administrative use with either stock or helicopters should be eliminated. We do not support the use of helicopters for doing snow surveys unless dangerous avalanche conditions absolutely dictate it. Structures should be kept to the minimum necessary for management.

The primary focus of trail work should be resource protection driven versus comfort or safety of users. In general, we would prefer to see old sections of trail built over versus extensive re-routes. Where re-routes are necessary the old trail sections need to be rehabilitated. Opening dates should be established, based on wet, normal, or dry years to determine trail readiness for stock. If large continuous areas of snow cover the trail it is not ready for stock as it would lead to a proliferation of secondary trails. Shoveling snow from trails by NPS personal should not be done. If others want to do this it should only be considered if its confined to the trail tread and its for short sections. We do not support the construction of any new trails.

We support a modest network of foot travel only trails, primarily trails that are currently little used by stock, unsafe, and/or costly to maintain for stock. We support the stock closure of the Mount Whitney Trail from both east and west access.

Commercial Pack Stations should be required to provide trail maintenance commensurate with their trail impacts. Yosemite N.P. currently has in place a system where the horse packing/riding concession within the Park does this. Currently, commercial pack stations from surrounding National Forest land pay an annual fee of only \$60.00 for unlimited access to the Park. With the current reductions in funding and a trend for user fees we believe that if fees are imposed they should be based relative to the impact by the user group. In other words stock users would need to provide greater funding relative to their increased impact on trails as well as monitoring of meadows if grazing is to continue.

While many of us enjoy the luxury of a camp fire we recognize them as one of the largest human impacts in this wilderness. We strongly support the continuation of elevational closures in combination with criteria for site specific campfire closures at lower elevations. In the southern part of the SEKI we believe that the current elevational closures are too high. They should primarily be based on where the predominant tree is either a whitebark pine or foxtail pine. There seems to be several exceptions to the elevational closure above the stated elevation as well as distances from certain lakes where campfires are allowed. These exceptions are confusing to the visitors and need to be eliminated. If a popular destination in a drainage fails to meet the site specific criteria for allowing campfires then the entire drainage should be considered for closure. Allowing stock users to pack in wood or utilize solid fueled BBQ's in campfire closed areas should not be allowed for obvious reasons.

We feel that SEKI has come a long way in the past 20 years in educating visitors on proper food storage, particularly with bears. While the bear boxes are working in keeping food from bears we are concerned about how they concentrate use. Encouraging visitors to bring their own bear proof canister might be the preferred method in the future. The most important point is keeping human food from bears.

A greater emphasis needs to be placed on educating wilderness visitors. In general backpackers have been more receptive to educational efforts than stock users. My experiences have led me to conclude that backpackers generally violate resource related regulations out of ignorance while commercial packers do it from arrogance. (11) Current fines are insufficient to discourage resource related violations and need to be increased.

Due to past introductions of non-native fish native biota have suffered tremendously, in particular the Yellow Legged Frog. We support efforts to bring the native aquatic ecosystems back to a more natural state. We have concerns about the impacts that the nest-parasitizing brown-headed cowbird is having on the native song bird population. Efforts to reduce their impacts need to be explored and implemented. The rapid decline of the Sierra Nevada bighorn sheep from 250 in the late 1970's is of critical concern. Strong management efforts should be directed at increasing the herd population evaluated and adopted. (12)

While its easy to take for granted current SEKI regulations such as the prohibition on pets, weapons, cross country travel by stock more than ½ mile from designated stock corridors, elimination of fish stocking, we support their continuation. We appreciate the opportunity to comment on SEKI wilderness scoping and would like to be included on all mailing lists concerning this issue. We also request that this document, including all supporting documents referenced, be maintained in the record concerning SEKI's Wilderness Plan. Thanks

Gary Guenther

References included:

- (1) Tally Sheets Rainbow Pack Station 1993 -1995
Summary of data from tally sheets and misc documents
- (2) Wilderness Watch comments May 30, 1996 on No-Show and Outfitter/Guide Wilderness Permit Proposal
- (3) Correspondence with Glacier Pack Station 8-11-95 and 10-4-95 concerning overuse of allotted service days. 6-5-95 meeting notes on Rainbow P.S. requesting more stock and service days. Red's Meadows P.S. 9-7-1993 letter to Inyo Forest Supervisor on service days.

(4) Request for info on service days and quotas White Mtn district and response 7-8-91. Also response from Congressman Lehman 10-3-91. Trail head quota summary Inyo N.F.

(5) Service day and stock number totals both present and historical.

(6) SNEP report pp602, vol II, ch 19.

(7) 11-4-95 correspondence from High Sierra Area Manager on E.A High Sierra P.S. and Wilderness Plan

(8) Operating Plan for Pine Ck P.S. showing the removal of the ½ mile group separation.

(9) Zion N.P. Compendium 4-10-95, pp 5,6,10,12.

(10) SNEP report pp 918-920 pertaining to grazing

(11) SEKI case Incident report #'s 686, 869, 705. French Canyon resource damage report 11-15-91. M. Hornick statement on destruction of trail by Pine Ck P.S. Summary violations 1989 through 1991 Inyo N.F. Investigation Report Red's Meadow P.S. 8-9-91 on new trail construction.

(12) SNEP report pp 80 vol I, ch 5. Cowbirds.



FRIENDS OF THE INYO

Box 406, Lone Pine, California 93545

Friends of the Inyo is a coalition formed to help protect the Inyo National Forest's unique qualities: its scenic beauty, clean air, abundant water, varied wildlife and plant populations, and many opportunities for low-impact recreation.

November 24, 1996

Ralph Moore
Wilderness Coordinator
Sequoia-Kings Canyon National Parks
Three Rivers, CA 93271

RE: Sequoia-Kings Canyon National Parks Wilderness Management Plan

Dear Ralph,

These scoping comments on the forthcoming Sequoia-Kings Canyon National Parks (SEKI) wilderness management plan are submitted on behalf of Friends of the Inyo, Inc., an eastern Sierra non-profit conservation organization. Friends of the Inyo (FOI) was formed in 1986 for the purpose of commenting on the draft Inyo National Forest Land and Resources Management Plan. Since that time, FOI has been involved in various public land management issues throughout the eastern Sierra. FOI has an abiding interest in management of the SEKI wilderness, particularly as it relates to use of the adjacent John Muir and Golden Trout wilderness areas of the Inyo National Forest.

Resource Protection and Wilderness Use

FOI believes that human use of the wilderness should never come at the expense of protection of the wilderness resource. Where conflicts arise, they should be resolved in favor of the resource. This tenet should guide all decisions made by the Park Service on wilderness management within the parks. A recent article in National Parks magazine entitled "Dispelling the Myth" aptly points out that, while resource protection and access are both important purposes of the National Park System, Congress clearly contemplated the protection of the individual parks' unique and outstanding resources as having a higher priority than recreational use of, and access into, the parks. Whether the issue be group size, stock use, protection of Sierra bighorn sheep herds, wood fires, etc., the Park Service should utilize existing data, input from the scientific community and common sense to protect SEKI's resources first and foremost.

Management of Lakes and Streams for Native Biota

FOI is aware of the perilous state of the native mountain yellow-legged frog in the Sierra, and efforts to prevent further decline and an eventual listing by implementing experimental reintroductions. FOI supports reintroduction of the mountain yellow-legged frog to selected waters in the SEKI wilderness provided that the methods utilized in the reintroduction do not adversely impact the wilderness (e.g., manual removal of fish under strict guidelines defined by the Park Service in conjunction with researchers would be acceptable). Priority areas for reintroduction should include water bodies where populations of the frog already exist in the vicinity (to allow movement and expansion of populations) and where fishing pressure is relatively small (i.e., not front country or popular fishing waters).

Group Size

The SEKI wilderness plan should consider modifications to the current group size limits for humans and for stock; FOI understands that studies on group size have been conducted in SEKI and the John Muir Wilderness. A concept that is applied in some wilderness areas of the western U.S. (e.g., North Cascades National Park) is the "heartbeat" limit. Instead of allowing x humans and y stock, a limit of, say, 10 heartbeats is placed on all parties using the wilderness. It is up to the group to decide how they want to divide the heartbeats between humans and stock. The Park Service should research the application of this concept in other park wilderness areas to determine whether it could be applied successfully in SEKI's wilderness.

Stock Use

FOI is not opposed to stock use in wilderness. Use of stock is a legitimate and appropriate wilderness use. We are concerned, however, with apparent inequities between commercial stock users and other wilderness visitors (including hikers and private stock users). The practice of allowing commercial stock users to write their own wilderness permits, with unlimited wilderness access, should be eliminated, and a system devised that is fair to **all** users.

Additionally, we are concerned about the impacts (ecological and aesthetic) of grazing animals in fragile sub-alpine and alpine meadows and riparian areas within the SEKI backcountry. The Park Service should use data it has available and input from scientific experts to issue a decision on allowable stock numbers based on what will protect the resources of the SEKI wilderness for future generations.

It may well be that some areas of the parks are more amenable to stock use, while other areas are so sensitive as to warrant stock use being precluded (e.g., some high elevation lake basins and alpine meadows). (The same is true for human use; some areas can withstand a greater degree of use than others (see below).) Obviously, it wouldn't

make sense to eliminate stock from heavily used areas and thoroughfares such as along the John Muir Trail, nor would we support that. Impacts in sensitive areas along the Muir Trail, however, should be mitigated. Restriction of stock use would make most sense in off-trail, "pristine" areas (see below), as well as those areas particularly sensitive to stock impacts (e.g., upper Tyndall Creek drainage).

Trails

FOI sees no need for trail upgrades or new trails in the SEKI wilderness. The current network of trails affords the visitor ample access into the backcountry.

FOI also believes the Park Service should consider establishment of "trailless," or designated pristine, regions within national park wilderness. Too often, the concept of wilderness "zoning" has been utilized to allow degradation of areas within wilderness that are closest to civilization or heavily used, e.g., trailheads, the Whitney zone, and the Muir trail system. The lowest "zone" should contain strict standards for protection of wilderness resources. And, instead of allowing "zoning" to justify degradation of wilderness resources, this concept could and should be utilized to protect the **most** pristine regions of the parks. The Bridger Wilderness in the Wind River Range (WY) has designated large areas of the wilderness as "trailless," where travel is not deliberately encouraged, and trails are not maintained. In addition, these should be areas where group size is limited to that below the standard group size in other, more heavily used areas of the parks. Criteria for "pristine" areas should include those that are not currently utilized by stock or humans in significant numbers, nor do they contain maintained trails.

FOI is very concerned about possible plans to upgrade several trails on the Inyo National Forest to afford increased access to sensitive and less-visited areas of the SEKI backcountry. These include the Taboose, Sawmill, Baxter, and Shepherd Pass trails; the former three access Kings Canyon National Park and the latter accesses Sequoia National Park. All of these passes bring the visitor into the range occupied by the declining Sierra bighorn sheep herds (Mt. Baxter and Mt. Williamson herds); additionally Shepherd Pass accesses the fragile spring system and wet alpine meadows of the upper Tyndall Creek drainage within Sequoia National Park. All of these trails are extremely strenuous, which currently limits their use. These portions of SEKI cannot afford an increase in use that might occur by upgrading the trails to allow stock or greater numbers of people to access these sensitive areas. Alternate and easy access into the most popular portions of southeastern Kings Canyon (Rae Lakes and Bubbs Creek) and Sequoia (Mt. Whitney) national parks is currently available, through Kearsarge Pass, Trail Crest and Cottonwood Pass. FOI urges the Park Service to recognize the sensitive nature of the ecosystem in these areas, particularly for bighorn sheep, and to discourage the Inyo National Forest from upgrading these trails to make them passable to stock and more easily traveled in general.

Wilderness Education

The amount and quality of wilderness education on the Inyo National Forest has dramatically decreased over the past ten years, due to a number of reasons (budget cuts, changing priorities, etc.). Permit-issuing kiosks have been closed, the wilderness ranger program has been drastically reduced, and permits are now issued by a private concessionaire with no/little knowledge of the wilderness resource (see below for an example). Hopefully the trend in SEKI hasn't been the same. FOI believes it is of the utmost importance that a high priority continue to be placed on wilderness education, both in and out of the field. If funding is an issue, there may be a creative way to solve the problem of wilderness education, e.g., a trained volunteer corps of wilderness educators who can communicate wilderness ethics and regulations (with or without authority to issue citations) to backcountry visitors.

Inter-Agency Coordination

FOI is concerned about the lack of coordination amongst the agencies managing wilderness in and surrounding SEKI, particularly between the Inyo National Forest and SEKI. As an example, I took a backpack trip this past summer into the Golden Trout Wilderness and Sequoia National Park. I obtained a permit from Wilderness Reservations, Inc. (the Inyo National Forest concessionaire), as I planned to enter the wilderness via Cottonwood Pass in the GTW. The person who issued my permit did not ask if I was entering the Park. I told him that I would be traveling in the Park in order to be sure I obtained a copy of Park regulations in addition to Inyo National Forest wilderness regulations. The permit that was issued to me contained absolutely no information about Sequoia National Park wilderness, nor did the issuer have any knowledge of Park regulations. Had I wanted to build a fire in the Miter Basin, for example, I would not have known what the regulations on wood fires were in this portion of the Park. Or, had I brought a dog with me and entered the Park by a cross-country route (as I did), I would not have known from the permit that pets were prohibited in the Park until I reached the Park boundary via trail, while hiking out (and only then if I turned around to read the Park boundary sign).

Another example of poor coordination between the Inyo National Forest and the Park is the recent trespass by cattle from the Golden Trout Wilderness (GTW) in the Siberian Outpost of Sequoia National Park, which I discovered on that same trip and documented in a personal letter to the Superintendent. The meadow in Siberian Outpost, which according to one Park Service official hadn't been grazed since 1914, was in a degraded condition when I discovered the trespass in June, 1996. The Park Service, in a letter to me dated July 23, stated that, to rectify potential future trespass by cattle, it was considering building a fence along the SEKI-GTW boundary. This option not only would be unacceptable to the public and cause adverse impacts to migrating wildlife, it constitutes a stop-gap, band-aid approach to problem-solving, and illustrates the lack of coordination that exists between the two agencies.

This lack of coordination, and, thus, true "ecosystem management," between the Inyo National Forest and SEKI poses a real risk to the resources of the SEKI backcountry, be they fragile alpine meadows or the timberline whitebark and foxtail pine forests. We urge the Park Service to prioritize working with its neighbor agencies to improve wilderness management and resource protection across Park borders, in order to ensure that the resources of the SEKI wilderness are adequately protected.

The millions of people already living within a day's drive of the Sierra Nevada will continue to increase, bringing increased pressure to bear on the resources of SEKI's wilderness. To ensure long-term protection of the wilderness resource, the Park Service should enlist the services of scientists to estimate the carrying capacity of the SEKI wilderness. Based on such an analysis, upper limits on both private and commercial use of wilderness should be specified in this wilderness plan. The plan should also specify procedures for amending wilderness quotas in the future, which allow for full public involvement through a NEPA process. SEKI's wilderness deserves no less.

Please include these comments as part of the administrative record for the SEKI wilderness management planning process. Please also place our organization on the mailing list to receive further information about the SEKI wilderness management plan at the following address: Friends of the Inyo , Attn. Sally Miller, P.O. Box 22, Lee Vining, CA 93541.

Thank you for the opportunity to comment on the plans.

Sincerely,

A handwritten signature in cursive script that reads "Sally Miller".

Sally Miller
for Friends of the Inyo
P.O. Box 22
Lee Vining, CA 93541



National Parks and Conservation Association

PACIFIC REGIONAL OFFICE

19 October 1996

Ralph Moore
Wilderness Coordinator
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

RE: SEQUOIA AND KINGS CANYON NATIONAL PARKS WILDERNESS MANAGEMENT PLAN

Dear Mr. Moore:

The National Parks and Conservation Association (NPCA) is America's only private nonprofit citizen's organization dedicated solely to protecting, preserving and enhancing the U.S. National Park System. NPCA was founded in 1919 and currently has over 500,000 members, including over 90,000 in California.

We appreciate this opportunity to participate in the scoping process for the development of the Sequoia-Kings Canyon National Parks Wilderness Management Plan. NPCA encourages the planners to focus on shaping a plan that protects the pristine qualities of the Sequoia-Kings Canyon Wilderness. As pressures increase both within and without our vulnerable park lands, it is critical that we protect what is left rather than dilute legislative intent due to current political and/or economic pressures. Therefore, the Wilderness Management Plan should adhere to the highest standard of resource protection. NPCA would like to help the park however we can to achieve this end.

We realize the park has just begun development of a General Management Plan and is also serving as one of several laboratories for "strategic planning." We urge the park to exploit this opportunity to merge planning efforts. Planners should work collaboratively to develop a set of planning documents which reinforce each other. For example, we would like to see the various plans mutually respond to anticipated increased frontcountry and backcountry use. As general visitation increases, larger numbers will respond by escaping to the backcountry, thereby increasing impact to the wilderness. Therefore, this is an appropriate area to be addressed by both the GMP and WMP.



Pacific Regional Office
P.O. Box 1289, Oakland, CA 94604-1289
Tel: (510) 839-9922 • Fax: (510) 835-4441

National Office
1776 Mass. Ave., N.W., Washington, D.C. 20036
Tel: (202) 223-6722 • Fax: (202) 659-0650



Resource Management

One of the essential roles of wilderness is to provide "outstanding opportunities for solitude." During the scoping process, the public repeatedly supported the protection of the pristine and tranquil qualities of wilderness. Again, we urge the park to adhere to a high standard of resource protection throughout the wilderness area. We discourage the development of wilderness management zones, which can lead to inconsistent wilderness management and lower levels of protection for zones closer to developed areas. Certain areas should be subject to particular restrictions to protect sensitive resources, but pre-ordained zones are inappropriate. The park should also be careful not to inadvertently create concentrated use zones, as has occurred through the establishment of bear boxes.

In dealing with meadow management, we appreciate the research already completed on the impacts of overgrazing on wilderness meadows. However, NPCA strongly recommends that other stock impacts be addressed, including trampling on wet meadows, competition with native herbivores and aesthetic issues. Though visual impacts may not signify extensive or significant biological impact, visual resources are nonetheless an important element of wilderness and should be protected.

In light of the perilous condition of the bighorn sheep herd, efforts towards their protection are critical. We encourage the park to continue to reduce grazing and human incursions wherever there is a possibility that these activities are impacting the sheep populations. We also encourage the park to look at options for getting the sheep listed as threatened or endangered to maximize protection, thereby assisting their recovery.

Military overflights are an intrusion to wilderness, impacting and impairing values such as solitude and tranquillity. The military's voluntary compliance has historically been inadequate. In addition to establishing a system of more stringent enforcement, we recommend that the NPS examine possible legislative or FAA restrictions. During this planning process, we recommend that the park consider the possibility of adding airspace to wilderness boundaries. Also, we encourage additional research on the impacts of overflights on wildlife, stock animals, and visitors.

Permit system

NPCA suggests incorporating a backcountry education program with the wilderness permitting process. As the use of Sequoia-King's Canyon Wilderness intensifies, it will be important to mitigate visitor impacts through education. However, education won't be enough to protect the resource from visitor impact.

Visitor use should

be restricted as needed to restore and perpetuate pristine wilderness conditions. Decisions, such as party size limits, should be based on resource protection goals. Larger groups often cause more intense trailside and cross-country zone impact. This often results in the creation of social trails, satellite sites, illegal fires and modification of natural features to accommodate the extra numbers (moving rocks, logs, trampling vegetation). These considerations should steer group size restrictions. Furthermore, if a larger party breaks into smaller sub-groups to comply with group size regulations, the sub-groups should be required to camp far enough apart so that the creation of social trails between sites is discouraged. At Rocky Mountain National Park, groups are no larger than 8, and groups must camp at least one mile apart.

NPCA supports the expansion of park wilderness through the addition of proposed wilderness areas such as Hockett Plateau, the area west of Giant Forest, etc. We also recommend that until final determinations are made, these areas be managed as part of wilderness.

Stock Use

Stock use concerns pervaded the San Francisco and other hearings and will be an issue of frequent public discussion during this planning process. NPCA would like to help NPS respond to the concerns of both groups so long as the final arbiter is resource protection. The use of stock deserves consideration as a traditional visitor use appropriate for certain areas of the park. However, NPCA emphasizes the NPS management policy which requires the NPS to "encourage and facilitate those uses of wilderness that require the wilderness environment and do not degrade wilderness resources and character...[and] appropriate restrictions may be imposed on any authorized activity in the interest of preserving wilderness character and resources." We also emphasize the importance of wilderness to be "protected and managed as to preserve its natural conditions... with the imprint of man's work substantially unnoticeable." In the

wilderness plan, we would like to see an analysis of if and how horseback trips are consistent with wilderness management objectives. A carefully crafted resource protection standard will help guide

decisions concerning stock use. We also would like greater clarification as to why most national parks have significantly lower limits than Sequoia-Kings for maximum numbers of stock animals. We also would like to know why the park shifted away from its expressed intention to phase out stock use per the 1970 Master Plan.

The plan needs to closely examine impacts to wildlife, soil, water and vegetation due to grazing and trampling, including impacts to water quality and aquatic ecosystems. We understand the National Biological Service is currently assessing environmental changes caused by packstock grazing in meadows, including alterations in

groundcover, species composition and plant production in Yosemite National Park. Other studies have shown that stock cause greater impacts to trails and campsites than hikers. Also, research has been completed on user group interactions and conflicts. These types of information should guide the park's stock use management decisions about the appropriate level of stock use. For example, data may suggest that stock use should be restricted from high elevation areas and areas containing more sensitive resources, such as wetlands.

NPCA also encourages the park to require commercial stock users to comply with the current permit system. NPCA does not understand why the current system only applies to private users, leaving commercial stock use unrestricted. Commercial and private stock use should be regulated on equal terms. Lowering regulatory standards for commercial pack trips also limits the NPS ability to fulfill its mandated responsibility to protect the resource. By installing a standardized permitting system, the park will be able to educate all stock users and ensure the public's awareness of important safety and regulatory information. We also believe commercial stock operations should pay fees in proportion to their trail use and impacts, based on the number of animals taken on the trails. The current flat fee structure for commercial outfits is not reflective of the additional impacts stock groups have on park resources. Before NPS allows commercial operations to persist and expand, NPS needs to solicit public input and examine the environmental repercussions of increased use.

We also suggest that an identification and reporting system be established to facilitate the reporting of stock use violations by both park personnel and visitors. At Rocky Mountain National Park, they record the

colors of helmets and ropes of rock climbers to ease future identification of the group. A similar approach could be used at SEKI, where commercial packers identified their groups with some type of flagging.

Ecosystem Management

Park managers are increasingly challenged to manage parks that are fragments of larger ecological systems, which are additionally stressed by encroaching development. The Sierra Nevada is an area where agencies need to work together to effectively manage their shared bioregion. NPS should actively develop cooperative management strategies with outside land management agencies. The park particularly needs to coordinate with the National Forest Service, which largely borders the park. The absence of this type of management is short-sighted and will lead to future management conflicts like the recent cattle trespass at the Siberian Outpost. Furthermore, resource management for both agencies could significantly benefit. For example, prescribed fire is an important resource management tool. However, its potential to restore natural processes is restricted by political boundaries. If this and other resource management tools were applied more in line with ecological boundaries, they have greater potential to benefit the health of the resources administered by both agencies.

The findings of the Sierra Nevada Ecosystem Project could serve as a useful tool to help agencies refine joint management practices. The Sierra Nevada Ecosystem Project suggests the application of Biodiversity Management Areas (BMAs) to reduce threats to biodiversity and conflicting land uses and improve scientific conservation through the use of "mapped information about land ownership, land use, potential impacts to biodiversity and biological communities" to calculate priorities and strategies. This approach was developed in response to "the cooperative, multisector, multijurisdictional nature of effective biodiversity conservation in the Sierra Nevada." Furthermore, to enhance public understanding and input, the Wilderness Management Plan should include an explicit description of the vegetation types, managing agencies, and activities outside park boundaries.

Interpretation

The NPS should exploit the education potential of park units to illustrate how external forces impact our shared natural resources. Interpretive materials should help the public better understand the regional influences on parks and the need for ecosystem management as fundamental to resource protection.

Visitation Trends

We also suggest that the plan address anticipated impacts from projected visitor use and the country's shifting demographics. This requires the development of strategies which will respond to the pressure of increasing visitor demand as well as the creation of an outreach strategy that diversifies the constituency that accesses and appreciates wilderness, strengthening future public support.

Again, NPCA thanks you for the opportunity to play a role in the development of the Sequoia Kings Canyon Wilderness Management Plan. We appreciate this effort to keep the public involved in the shaping process, and look forward to a continuing relationship during the planning process. If there is any way in which we may be of assistance, please do not hesitate to contact us.

Sincerely,

Brian Huse
Director, Pacific Region

September 13, 1996

Ralph Moore, Wilderness Coordinator:

I attended the scoping workshop in San Francisco. The overwhelming majority of the attendees almost unanimously expressed their distress at how their wilderness experience was compromised by the destruction and litter left by stock use of the Wilderness.

We were admonished to not "get political" but to stay within the scoping procedures which directed us to describe what we wanted for our wilderness experience and how we might achieve what we want. But these scoping procedures overlook facts about the present use which ought to be the basis for future management plans. Following are questions to which I would like to have factual (or at least quantified estimated) answers.

How many backpackers use the wilderness? How many permits are issued? How many permits requests are denied because of quotas? How have these numbers changed during the past twenty years?

How many people are served using horses? How many permits are issued for them? and how many are denied because of quotas? How have these numbers changed?

What are the maintenance costs consequent to backpacker use? What are the maintenance costs consequent to stock use? How are these costs paid for?

Expressions of individual wishes can distort the planning process by organized management of the number of attendees expressing a particular point of view. All of us involved in the planning process would be helped by answers to my questions, and to other questions of fact which examine the costs and benefits of the different forms of wilderness recreation.

Please respond.

Sincerely yours,


Jack Robbins
~~225 S. ... CA 94045~~

copy: Dennis Martin



Oct 28.

Dear Ralph Moore -

Thank you very much for sending me statistics on backcountry use.

Two things are clear. First, stock use is declining - in 1995 commercial use was only 10% of what it was in 1955. Maybe we should just wait and it will decline to nothing.

Second, only about 5% of the recreators' use stock.

I think it is wrong for the NPS to contaminate the trails with manure, urine & flies, for the 95% who go on foot.

YOSEMITE ASSOCIATION P.O. BOX 545 YOSEMITE NATIONAL PARK CA 95389



printed on recycled paper

over.

7. |
November 2, 1996

Ralph Morse, Wilderness Coordinator
Sequoia and Kings Canyon National Parks

Dear Mr. Morse,

As a frequent and long time (20 years) visitor of Kings Canyon and Sequoia National Parks I want to share my knowledge and opinions regarding your upcoming management plan for the Parks and I request that my letter be placed in the administrative record for SEKI's wilderness management planning process. I'll try to make my comments brief and direct.

Wilderness areas, such as SEKI, are being loved to death (I have seen this throughout the U.S. and even in other parts of the world.) Over the years I have seen overgrown primitive trails like the Shepherd Pass trail used to be, turned into double-wide mule routes. I've seen rarely visited high meadows, such as in Milestone Basin, turned into churned up bogs with horse-hoof prints going directly past Park Service signs forbidding stock animals beyond that point. I've seen the last few white bark pines at a secluded lake in the Wright's Lake Basin disappear with the appearance of a new fire ring on the shore of the lake.

There is no denying that SEKI is a rare and

beautiful place that is being increasingly degraded. That is why I support trailhead quotas and I support wood fire restrictions (although I recommend a single uniform restriction: no woods fires about 9000 feet, because as I have found out when telling others to put out illegal campfires, it is too easy to plead ignorance to the exact restriction in a certain area.) I support restricted access to larger areas that are highhorn sheep habitat to attempt to reverse the recent die off.

Finally, I can see no way to prevent further degradation of SEKI, without also restricting stock animal use. Stock animals have had the most significant negative impact on the Parks -- trail erosion, meadow degradation, water degradation, visual and factory degradation of the wilderness experience, degradation of camping areas in the backcountry, competing with native animals for forage. I support a limit of 10 stock animals per party. I strongly support limiting stock animal access only to lower elevation routes such as those along major rivers - Kern, Kings, and San Joaquin. From base camps along these rivers stock animal users can hike to higher alpine areas. Stock animals should be prohibited from trailheads in the Eastern Sierra that generally cross high passes. This would greatly reduce trail erosion and upkeep costs on

these

highly erodable steep trails.

To reiterate: I have seen SEKI slowly but more increasingly being degraded. I think the only way to reverse this trend and restore its health is to limit woodfire and stock animal use to elevations below 9,000 feet and to limit stock animal party size to 10. Trails above 9,000 feet should be allowed to return to a self-maintaining state (with maintenance done only in eroding areas). Continue trailhead quotas for hikers and enlarge the bighorn sheep restricted areas. If you can have any impact on military jet overflight, I also support more stringent regulation as the overflights both detract from wilderness solitude and probably have a negative effect on the bighorn sheep.

I envision a recovering SEKI with small camps for pack animal users at lower elevations and ^{responsible} hikers only above 9,000 feet. Please keep me informed as you finalize the management plan to preserve SEKI.

Most sincerely,

Kevin E. Kingma

KEVIN E. KINGMA

~~10000 10000 10000~~

~~10000 10000~~, CA ~~10000~~

P.S. I think at this time it has become necessary to require all SEKI backcountry users to pack out their toilet paper (similar to the requirement on Mt. Tabor).



5/11
M-

~~XXXXXXXXXX~~
~~XXXXXXXXXX~~, Ca ~~XXXXXX~~

July 19, 1996

Ralph Moore
Wilderness Coordinator
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore:

I wish the following to become part of the record of the public meetings held for the Management Plan for Sequoia-Kings Canyon Wilderness.

1. My personal expectations when using the Wilderness is a place free of man-made noise; no exotic animals such as cows and pack animals; clean water; absence of commercial/recreational aircraft fly-overs; no off-road vehicles; meadows that are pristine; streams that have retained their values the way god made them; scenic beauty; wildlife; native plants; fish.
3. I support the individual permit system and quotas for use of the Wilderness; I do not approve of commercial stock owners issuing their own wilderness permits. We hike and back pack,
4. All camp sites must be far away from any water source including springs, lakes and streams. Campfires are not necessary as they are mainly for psychological reasons; wear more clothes; go to bed. Campfires cause air pollution, fire hazard, use wood from nearby. Commercial outfits/users must be required to engage in more primitive camping experience rather than civilized with luggage, heavy bulky items to minimize the number of stock animals. Camping and wet or dry cow flops are not compatible.
5. Minimize stock trails; foot travel only trails are superior to stock trails.
6. Environmental Quality protection-- No commercial recreational flyovers; no free roaming live stock; feed for animals carried in; prevent contamination of the water by humans and exotic animals.
7. We use Wilderness for peace and quiet; view wildlife; study plants; hiking; to see the stars at night. Utter silence is a thrilling experience.

The Wilderness experience is not for everyone. Stop promoting the "use" of Wilderness. The cash-register-boys do not need to take everything in this world.

Thank you for the opportunity to make some written comments as I am unable to attend the meetings.

Mary Ann Henry
Mary Ann Henry
~~XXXXXXXXXX~~

~~Sequoia National Park~~
~~Sequoia National Park~~, California ~~93271~~
14 August 1996

Wilderness Planning Administrator
Sequoia and Kings Canyon National Parks
Three Rivers, California 93271

Dear Sir/Madam,

Recently I received an announcement that your office is conducting public hearings in order to develop a long-range plan for wilderness areas in Sequoia and Kings Canyon National Parks. Unfortunately, I was not able to attend these events. Although I have not had the benefit of interaction with other interested persons, I would like to add several observations to the discussion.

First, I am very concerned about the conduct of my fellow backpackers. I think we all assume that a simple review of wilderness regulations stamped on the back of a permit is sufficient reminder. But in my experience of nearly two decades of backcountry travel, this has not proven to be the case. I do not believe that enough of my fellow hikers understand sufficiently the rationale for low-impact camping. They do not realize how fragile and vulnerable the Sierra ecology really is.

It seems to me that we have been in a situation similar to automobile travel before 1910. Before that time, if you could afford the equipment, you could drive. For safety considerations, a system of licencing, insurance, and training was then instituted. I would suggest that Wilderness Licence be required that would be renewed periodically. Such a licence would be issued on completion of a course of study of wilderness basics with emphasis on the rationale behind various regulations. Wilderness permits would be issued only to those with a Wilderness Licence. I strongly urge that those who abuse the backcountry be prohibited from receiving a permit and that fines be raised far beyond parking violation levels. And I believe we backpackers should be willing to pay some kind of trail maintenance fee.

Second, I have been dismayed by the activities of professional packers in the wilderness. I realize that they provide a service to some by providing access. And I am sure that there are regulations governing their activities. In my opinion, however, packers provide this access at a very high price in meadows degraded, in trails damaged, and streams and camp sites polluted by animal waste.

I believe that packers and their animals should follow the same kind of rules that the rest of us do. For example, backpackers must carry sufficient food, carry their garbage out, and bury their fecal waste. Similarly, packers should be required to carry enough feed for

their animals (obviating the need to forage in meadows) and to bury the wastes of their animals away from water sources (as humans do). Meadows are a common resource and should not be abused for the private profit of a few. And we all drink from these streams. Finally, I think that packers should make a major contribution to a trail maintenance fund since hooves make a much greater impact than hiking boots.

Finally, I continue to be amazed at the persistent problem of noise from low-flying military aircraft. It was especially disruptive in early July when we experienced between six to twelve sorties per day and the noise lingers and echoes for five minutes at a time. A wilderness experience is not a wilderness experience with such disruption, especially for those of us who live the rest of the year near airports and naval air bases.

Aircraft noise is not new and other parks, such as Grand Canyon, have found solutions to this issue. I would urge a cooperative effort between the Park Service and the military to restrict such low-flying aircraft from all Sierra wilderness areas. This would mean that such flights would be restricted to an area south of the Golden Trout Wilderness Area and Tulare county line.

Because I love the Sierra backcountry so much, I am anxious to be part of the dialogue concerning its future. I would appreciate any further information that you are making available to the public.

~~Sequoia & Kings Canyon National Parks~~
Sequoia & Kings Canyon National Parks
Three Rivers, CA 93271
~~14 Aug 96~~

Ralph Moore
Wilderness Coordinator
Sequoia & Kings Canyon National Parks
Three Rivers, CA 93271

14 Aug 96

This letter concerns the coming new management plan for the Sequoia-Kings Canyon Wilderness.

I started backpacking in the High Sierra in 1945 and have traveled in the Sierran high country every year but one since then, several times using pack stock. More than half of those years have been in Sequoia-Kings Canyon Wilderness. I am a USGS Geologist (retired) and have done geological research in the Sierra Nevada since 1964.

Here are my comments about the 8 NPS management categories:

1. Personal expectations in the Wilderness

To experience a natural environment, with freedom to travel and camp off-trail, and a minimum of 1) other visitors, 2) constructed trails, signs, and bridges, 3) pack and saddle stock, and 4) other evidence of human activity.

- Present trailhead quotas are very successful at limiting numbers of visitors, although they may have to be increased in the future for equity, as environmental concerns permit.
- No new trails should be constructed, some old ones should be abandoned, and most, if not all signs could be removed. (All visitors have access to increasingly detailed and specialized maps; signs are not necessary.)
- Pack and saddle stock should be further limited, and eventually eliminated from our wilderness areas. Right now they should be restricted to a small number of major trails, prohibited from others, and prohibited from any off-trail travel. (Clearly, stock cause more damage to plants, meadows, soils, and trails than do an equal number of humans on foot. Pack stock also require bigger, more expensive trails, and allow visitors to carry destructive tools, such as axes, saws, and shovels. These all lead to destructive effects that I have observed and photographed.)

2. How we learn about wilderness

Existing sources of information are fine.

- The Wilderness Permit system very adequately supplies the information and regulations we need to know for a safe and minimum impact trip.
- Lots of books explain the importance of wilderness generally. Supply lists of them to people who inquire.
- We don't need any more information about and how to get to Sequoia-Kings Canyon Wilderness. Plenty of maps and books do that; there are hardly any secret places left to discover. They've all been described in print for someone's profit. And why would we want to increase publicity about this Wilderness when people-pressure is already a major problem?

3. How we get there

See #1 above

4. How we spend the night

Quietly, isolated, with minimum impact on the land and others.

- Present polices on fire, numbers of nights at popular places, distance of camps from trails and water are excellent.

- Stock grazing should be curtailed or prohibited near camps.

5. *How we interact*

As little as possible with other groups, consistent with allowing as many people as possible into the wilderness at any time.

- Group sizes should be reduced, not increased. (I have traveled in large groups in Sierran wilderness).
- Commercial outfits (both packers and foot parties) should be tightly controlled and pay hefty user fees. Our wilderness does not exist so some can make a profit from it at the eventual expense of the rest of us.
- Use by non-profit groups should be under the same quota system and rules as for the rest of us ordinary citizens.
- Also see #1 above.

6. *How we protect environmental quality*

Environmental degradation is at an absolute minimum, consistent with allowing people access to the wilderness.

- Existing trailhead quotas are an excellent way to limit people, and existing regulations do a good job of limiting pollution and degradation by individuals. More back-country rangers would be helpful here.
- Stock use and imported weeds via stock are 2 major, controllable sources of environmental degradation. Reduce their numbers!

7. *How we use the wilderness*

All of our use has a minimum impact on the wilderness.

- Non-destructive research is fine, if controlled properly and if compatible with other users and wilderness values.
- Educational use is OK if under the same controls as for other citizen users.
- Commercial use should be either severely restricted or eliminated (see #5 above).

8. *How the Park Service gets the job done.*

With minimum impairment of wilderness values.

- Back-country rangers who educate and enforce are great. Increase their numbers.
- Reduce trail crews to an absolute minimum.
- Consider using helicopters intensively during one week every October for maintenance and re-supply of ranger stations and work camps. Advertise the date widely, require good planning, and do the job. It will be easier on wilderness values than the present use of stock for many of those jobs.

My experience over the years with NPS people has been overwhelmingly positive. Protecting wilderness is a difficult job, and I appreciate the pressures you get from all sides. If I can help, let me know.

Sincerely,

Malcolm Clark
Malcolm Clark

MEMORANDUM

TO: Wilderness Coordinator
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

FROM: Nellie D. Patterson
[REDACTED]
[REDACTED] CA [REDACTED]

DATE: August 21, 1996

SUBJECT: **Desired Conditions for the Sequoia and Kings Canyon Wilderness**

I believe that input is still being gathered for the draft management plan for the Sequoia/Kings Canyon National Parks wilderness and I am sending a few comments, somewhat along the lines of the suggested format.

1. **Personal Expectations**

For me, the fundamental desired condition would be for the wilderness to remain in its original unaltered state; that is, for the natural systems that have evolved over past millennia free of human interference to continue to function and, in particular, for the wild animals that inhabit the parks to persist in abundance.

There is strong evidence that wild animal populations are declining on a worldwide basis, not only in urban or developed settings, but also (albeit more slowly) in wilderness preserves and national parks. Because of the magnitude of this problem, it is essential that all activities within the parks be carefully evaluated in terms of their environmental effects, particularly their impacts, actual and potential, on wildlife.

3. **How We Get there**

Trails, Bridges, Cross-Country Travel

Trails, bridges, roads and all such improvements are artificial constructions whose effects on wilderness values are largely negative. Their necessity ought to be questioned, especially (as often appears to be the case) where trails exist primarily for the benefit of pack stock. Another question that can be raised is whether cross country travel is really more destructive than building trails that zigzag up over steep, unstable terrain.

The same considerations apply to maintenance of existing trails. Lack of trail maintenance can be viewed as a means of safeguarding wilderness values — and an economical one at that. Enhancing access to remote locations while at the same time closing or restricting entry to popular areas only transfers the problem of excessive use.

4. How We Spend the Night

Campsites/Campfires

Camping should be more strictly controlled. Despite laudable educational efforts, camping in meadows, alongside streams, on lakeshores, and in other sensitive areas is still a common sight. Wood fires should be prohibited in the wilderness. Down wood is an important element of the ecosystem, essential foraging and nesting material for many wild animals, and should be left in place.

6. How We Protect Environmental Quality

Based on my view of the fundamental desired condition, I would always give the highest priority to the protection of environmental quality.

Wildlife

Special attention should be directed to the protection of rare, endangered, threatened and sensitive species habitat and to its restoration where it has been seriously damaged. Programs now in place for animals in these categories that are found in the parks (including birds such as the northern goshawk, California spotted owl, great gray owl, and willow flycatcher and mammals such as the Sierra Nevada red fox, American marten, Pacific fisher, and Sierra Nevada bighorn sheep) should be evaluated to ensure that they are adequate to provide for the continued viability of these species. The focus, however, should not be entirely on rare and endangered species. It should include all species that are native to the parks. Their essential habitat needs to be protected and all activities which are threatening or disturbing to them should be curtailed.

Water Quality

The causes of water pollution in the back country must be found and corrected. Advising travelers to boil or filter water will not solve the problem for wild animals, who undoubtedly suffer equally with humans from polluted water supplies.

7. How We Use the Wilderness

Research

There should be a much greater commitment of resources to sponsoring and promoting wilderness research. It is quite literally true that we are losing the wilderness because we do not understand it. For example, the condition of many animals in the Parks is largely unknown. Population censuses have not been completed for many species and habitat requirements have been studied scarcely at all.

Commercial Use

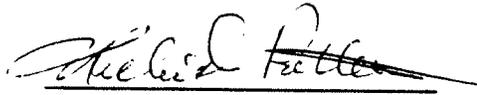
I believe that all commercial uses of the wilderness should be deemphasized. Use of pack stock in support of wilderness travel should be discontinued. Horses and mules are livestock, and all of the objections to livestock in the wilderness are quite as valid against them as against cattle, sheep and goats.

Pack stock should not under any circumstances be allowed to graze high altitude meadows and they should be banned from trails leading into remote areas such as the Wallace Lakes and Lake South America. Some of the readily observable consequences of the introduction of pack stock into Wallace Creek Canyon a few years ago are the following: (i) Conversion of a faint footpath into a broad, rutted trail; (ii) trampling of vegetation and compaction of soil around the high altitude lakes; (iii) deposits of manure around the lakeshores and in the creek at the trail crossings (a very likely water pollution source); (iv) an influx of visitors into an area that previously had seen little human use. There are, undoubtedly, numerous unobservable (and far more serious) adverse effects.

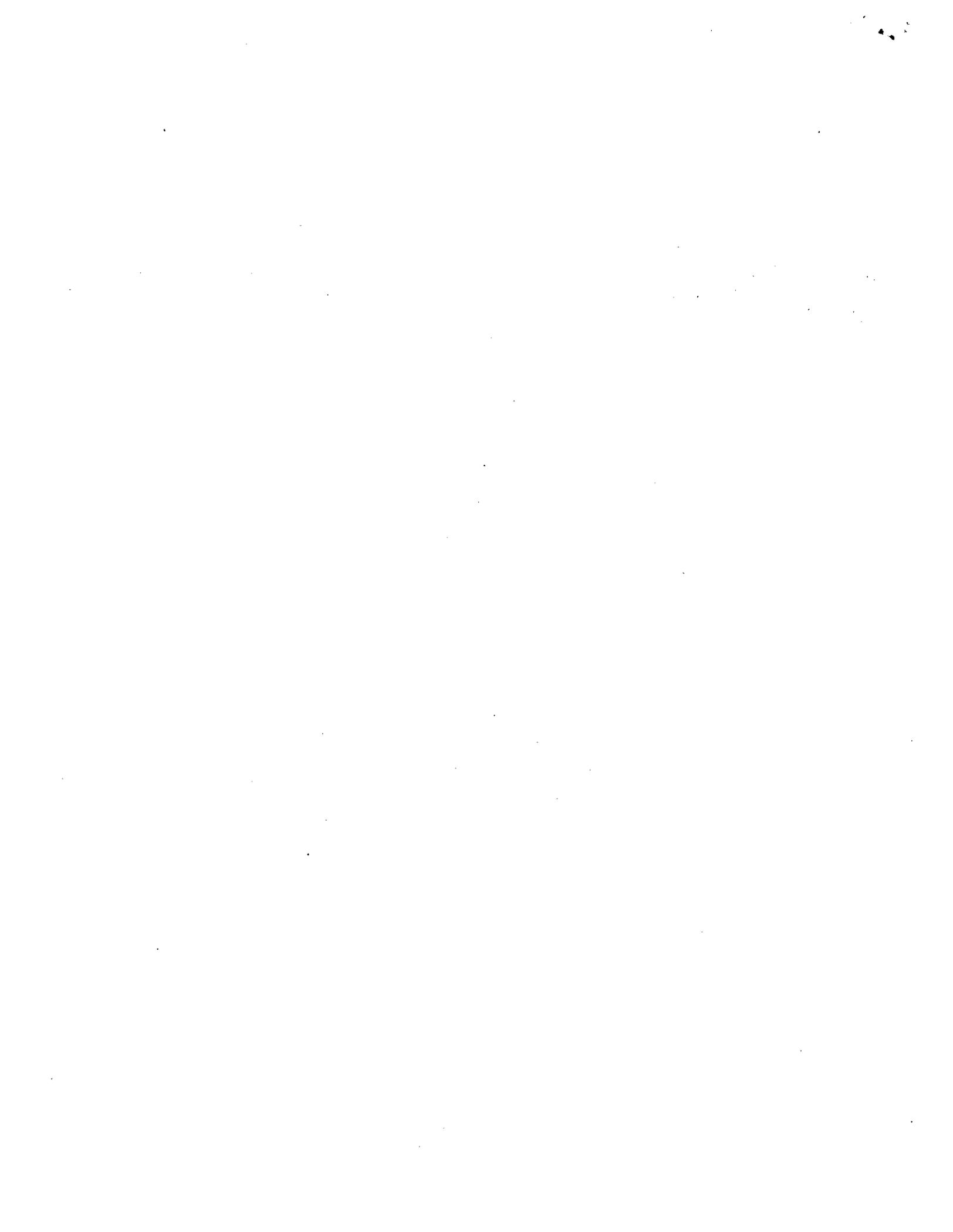
8. **How We Get the Job Done**

Regulations

Wilderness regulations are, in general, quite reasonable and not at all onerous for the visitor. There is one glaring exception: the wilderness entry quota system. Minimizing damage to popular back country sites from overuse is important. However, it is imperative that some alternative be found to the grossly unfair, arbitrary, inefficient and unreasonable entry permit system now in effect.



Nellie D. Patterson



October 26, 1996

Dear Mr. Moore,

Please place this letter in the administrative record for SEKI wilderness management planning process.

Stock animals ARE damaging SEKI backcountry. All grazing by domestic livestock should be prohibited in SEKI NP. Camping with stock animals should be at designated sites only. A network of "foot travel only" trails should be established. The maximum number of stock animals per group should be reduced from 20 to 5. No cross-country travel by stock should be permitted.

Everyone I speak with wants bighorn sheep saved. Please take all necessary actions to assure their survival.

Lastly, no military jet overflights. Let's have tranquility.

Thank you very much.
Sincerely,
Jane and Glenn Ward

[REDACTED]
[REDACTED] CA [REDACTED]

October 24, 1996

Ralph Moore
Sequoia and Kings Canyon National Parks
Three Rivers, CA 932371

Dear Mr. Moore:

I would like my comments to be included in your administrative record for SEKI's wilderness management planning process—or whatever other document might have an effect.

How often I have been in an area in the Sierra where supposedly there are controls on the places stock animals are allowed to go—to travel, to set up camp, to graze—and have found the “rules” absolutely not followed. So what does “follow”, is great damage to the fragile backcountry meadows, lakeshores, wetlands.

Please put more controls into effect: I understand that backcountry personnel are a limited resource now, but it is the rules, at least, that need to be set more stringently. My experience with commercial packers has been pretty awful. Camping with stock animals should be limited only to areas where they can do little if any harm. And the damage the hoofs have done to meadows has been painful to see. One should be able to travel by foot without having to cope with manure, flies, deep hoof damage to trails.

If only so-and-so many people are allowed on foot, certainly no more than that number should be allowed on horses! The number of stock animals should be cut way back—maybe from the current (is it twenty?)--to six or eight. We struggle to obtain permits, but I guess the packers just write their own—this strikes me as grossly unfair.

I wish you the best in trying to juggle different interests, while keeping in mind that some things just cannot be replaced.

Sincerely yours,



Betsy Carpenter

Sir,

OCT 25 96

I am writing concerning the drafting of a wilderness management plan for Sequoia and Kings Canyon National Parks.

In drafting your plan I urge you to consider placing severe limitations on the number of stock animals and parties allowed in wilderness areas. Large and numerous stock parties are severely damaging these areas. A limit of 6 stock per party and 1 party per day per trailhead would be prudent. The proliferation of so many stock parties in the back country is ruining the wilderness experience for many hikers.

I recently camped at Bench Lake below Cabot Pass and a stock party left a mound of trash that was unbelievable. I took a trip in the Humphrey Basin area this summer. A stock party was camped at Hutchinson Meadow and the entire meadow looked like a giant latrine. A stock party had a huge fire going in the middle of the day. It looked like they were trying to burn all the wood in the forest.

There are warnings not to drink the water because of Giardia. The real problem is horses shitting as close to streams and lakes as they

can.

The wilderness would still

be pasture if there was no
pack animals allowed. I
realize some people may not be
able to hike into the back
country so some pack stock
is understandable. However
in developing your plan, please
consider the mess these
undisciplined people are
creating in my forest.



Dear Ralph Moore,

9/9/96

I was unable to attend any of the workshops on the Sequoia-Kings Canyon Wilderness Plan so I am responding in writing.

My wife and I recently visited Sequoia-Kings Canyon for the first time. We are experienced backpackers and we spent two weeks day hiking and backpacking in Kings Canyon, the sequoia groves and Mineral King.

I am responding below by category number.

Cat. 1. My personal expectations when using the wilderness include peace and quiet, few people, clean camp sites, small or no fire rings, no domestic animals, etc. etc. It would be nice to be able to get trail difficulty ratings and brief descriptions including water availability, interesting terrain features and camp sites near water - i.e. mini trail guides.

We encountered several pack trains and had several evening discussions about pack animals.

One packer was singing to his horse & was friendly while another was taciturn but all encounters proved to be dangerous and extremely awkward ~~as~~ for getting off the trail to grant right of way to

horses. I would prefer not to have horses in the wilderness/backcountry except perhaps as rescue for injured hikers. Ruttled trails, trashed campsites and smelly, fly infested trails are not my idea of a wilderness experience. Horses also attract cow birds which are decimating certain bird species that nest in the area.

2. See comments in #1 re. trail info

3. I prefer a minimal amount of signage but appreciate it when mileage is included. Foot travel has less impact, much less, than stock use and bridges can be simpler. I would like more first come first served wilderness permits.

4. Livestock have devastated meadows throughout the Sierra for many decades. It is past time to stop. No domestic animals in the wilderness, except for rescue purposes and perhaps ranger patrols. How do get people to keep campfire rings small and wood consumption minimal? Fire has an aesthetic appeal and adds light and ambiance to a wilderness evening but more + more wilderness areas are banning fires. I like a small fire but support the bans. Bear boxes seem to be a necessity at well used sites and treeless areas but they detract from the wilderness experience. We

observed a bear that was not intimidated by a large group of backpackers in camp but behaved very well by killing and eating two marmots within 50 feet of our large camp.

5. If stock animals are allowed they should be severely limited in group size and number of groups. Better no stock. If they are allowed, no meadows, creeks or lakes should be open to stock - $\frac{1}{2}$ mile distance. Please, no separate foot trails although some areas might be for stock only - but very few.
6. Education about maintaining water quality, protecting meadows and not feeding ~~or~~ or disturbing wildlife should be part of the permit process. We had an informative talk by a ranger before we departed. He also layed out rules for human waste disposal, food disposal, etc. Perhaps a course + license should be required for back country use - similar to getting a hunting license. I am appalled at the frequency of tin and aluminum in campfire ~~in~~ pits, grates + grills, paper (especially toilet) left along trails and around camp sites, huge fire pits, especially in for tail pine groves and other abuses by back country visitors. Silver Lake in Mineral King is one example.

7. See other comments

8. Helicopter and chain saw use in backcountry should be minimal - rescue and dice trail maintenance. Explosives should never be used. Most of the explosive use I have observed has been to make trails accessible to stock. You don't need fences if you don't allow stock in the backcountry.

My recent experiences in Kings Canyon - Sequoia were pretty good. The stock situation was not as bad as other places in the Sierra, but could be a lot better. I hope you are able to put together and foot-user friendly plan for Sequoia - Kings Canyon.

Sincerely,

Ray Pusch

~~Ray Pusch~~

Alpine, CA ~~10000~~

and

Chris Pusch

July 20, 1996

Sequoia Kings Canyon National Park

re: public input for wilderness plan

Dear Sir:

I attended your meeting on July 9, 1996 at Fort Mason.

At this meeting many persons were explaining their concern for stock use in high alpine areas. They were speaking from and relating personal experiences. The female ranger present (I do not recall her name) interrupted the discussion with a statement "We do not want to politicize this discussion". After the meeting several distressed members of the public personally told her how inappropriate this comment was. The public was only relating personal incidents. Quite possibly the only politicizing is being done by commercial interests at headquarters.

When this comment did not stop the public from discussing environmental problems they had observed caused by livestock, the female ranger then stopped the meeting, saying she was not allowing oral comment.

The impression many got from the meeting was that the Park Service has already decided on stock regulations or lack thereof, and they were only taking very limited public comment to satisfy any legal challenges.

I request that this letter be placed in the public file for the planning of wilderness regulations.

Yours truly,

Thomas Clohessy
P.O. Box 845
Sonoma CA. 95476

cc. High Sierra Hikers

Juliet Kendrick
236 Charlott
Wofford Heights, CA 93285

8/6/96

Ralph Moore, Wilderness Coordinator
Sequoia and Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Moore,

I am an avid backpacker in the Parks, and wish to submit the following comments on the Sequoia/Kings Canyon management plan:

1. My personal expectations in the wilderness-

a. I expect to be in a non-crowded and quite place, where there are a limited number of people, few if any pack animals, no cattle, and no vehicles.

b. I do not wish to see animal (or human) manure on trails or near the water I will be drinking. I do not expect to see trash in the wilderness.

c. I would hope that the wilderness is not over run by non-native or invasive plants.

d. I do not expect there to be grazing animals in any designated wilderness. If stock animals are grazed, they should adhere to strict limitations so that the wilderness is not overgrazed.

2. How we learn about the wilderness-

a. I have been leading Sierra club trips in the Sierras for over 20 years. I have learned by experience, although I do find published trail guides (such as "Backpacking in the Southern Sierra") useful.

b. As a Sierra Club outings leader, I take it as a personal responsibility to teach trip participants about how to limit impact to the wilderness. I also firmly believe in leading and teaching by example.

c. My vision for how the Park Service might enhance user knowledge and respect for the wilderness is simple. Instead of simply laying out rules such as "no burning wood above 9000 ft.", for

example, explain the ecology of the forest, and how critical to the soil the nutrients in decayed wood are at high altitudes. Explain the "whys", not just the "whats" of forest etiquette. If people can have an understanding of why the rules are important, they will respect and follow them more readily.

This can be carried out through signage, pamphlets distributed at the trailhead, or through permitting processes. I even believe that some actual testing of such knowledge might be in order prior to issuing permits, etc.— especially in high use areas.

3. How we get there-

a. I believe that trail maintenance and appropriate signage are critical to a safe and enjoyable experience.

b. Trails should not be accessed by any motor vehicles, ever.

c. No livestock should be allowed on fragile high country trails at all.

d. Stock animals should be strictly limited, and their use reduced from present levels. Especially invasive are large groups of professional mule-packers and they should be disallowed from the wilderness trails altogether. Stock animals should not be allowed in larger groups than are hikers. If only 15 people are allowed on a permit, then only a combined number of 15 animals and people should be allowed on a permit. The idea here is not parity, but limiting impact to the wilderness!

e. Stock users should be required to pay a fair price for the repair work made necessary by their animals use of the wilderness. This would include repair of trail wear and tear, erosion abatement, restoration for grazing impacts, etc. Stock animals are far more destructive than are responsible hikers.

4. How we spend the night-

a. Having had many encounters with bears, marmots, and other wildlife over the years, I believe that education needs to be increased about the impacts that humans feeding the animals has on their life cycles, feeding habits, and tendencies to become dependent on human food. The "nighttime" experience is now often marred by foraging animals, looking for human food.

b. Places where stock animals are allowed to spend the night should be carefully selected to minimize damage to important resources, including water quality, fragile meadow systems, rare plants, etc.

c. Stock animal overnight impacts should be monitored so that damages are tracked, repairs made, and adjustments to camp areas made where appropriate. All of this should be paid for by the fees charged to bring the stock in.

6. How we protect environmental quality-

a. Impacts from all users—stock animals and humans—should be carefully monitored in all sensitive areas. These would include riparian, meadow, high altitude, and special habitat areas for rare plants and animals. If damage exceeds acceptable levels, based on sound scientific principles, use should be curtailed in these areas.

b. Stock animals are a source of non-native plant propagules. Although I do not know how to limit this source of biological pollution, I do feel strongly that it is something which needs further study (and possibly restrictions on feed, as well as on where animals are allowed to go).

c. A direct consequential approach might prove useful in popular areas where abuse of natural resources is excessive. Signs indicating that a popular area has been closed until damage from irresponsible uses (such as defecating near streams, not respecting fire exclusion areas, or camping too close to water's edge) might actually help people get the connection between taking care of the wilderness and having a wilderness to enjoy.

d. While I am both a rabid backpacker and an environmentalist, I believe very strongly that use in wilderness areas must be carefully monitored and restricted. I favor a pay as you go approach, where everybody who is allowed access pays enough to cover some fair portion of the costs of basic monitoring and corrective practices. Use should be limited to fewer, less damaging activities and numbers, and confined to less sensitive areas in the case of stock animals.

e. If the Park Service has the task of caring for our parks in perpetuity, but has no budget from Congress, either the uses need to be curtailed, or alternate funding methods must be established. The resource should not be the victim of political or budgetary chicanery.

Thank you for the opportunity to comment on this very important management plan. Please keep me informed of other opportunities to give input on this and similar planning efforts. I am the primary spokesperson for my immediate family of 22 individuals all of whom I am proud to say appreciate, enjoy, and protect our wilderness at every opportunity we get. We are 4 generations of ultra-low impact backpackers who love the Sierras. Among our immediate group are 5 certified Sierra Club outings leaders and 2 professional environmentalists.

Sincerely,

Juliet Kendrick

→ CC High Sierra Hikers Association

copy

August 1, 1996

Attn: Ralph Moore
Sequoia Kings Canyon National Park
Ash Mountain
Three Rivers, CA. 93271

WILDERNESS PLAN INPUT

Dear Sir:

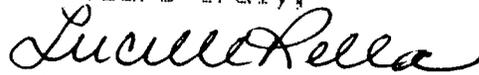
I was at your Fort Mason meeting for public input to the wilderness on July 9, 1996. It appeared to me that the purpose of the meeting was more for the Park Service to defend present stock usage than to hear public input.

When one participant related some environmental damage caused by horse users, your ranger in an argumentative voice said and I quote, "Horse users have rights, too." Does this sound like you are trying to get honest input or argue stock users rights. This is only one of several instance that sticks in my mind. Ms. Bird even accused the participants of trying to politicize the discussion when suggestions not acceptable to her were mentioned.

If you want this study to have any credibility with the public you must replace these 2 rangers who are heavily biased toward stock usage, and put someone in charge who has a scientific education in conservation and environmental studies.

Please include this letter in your file for public input.

Yours truly,



Lucille Rella
1541 Denmark St.
Sonoma CA. 95476

cc. High Sierra Hikers

Enclosure 5

David Campbell
1511 Rambling Rd.
Simi Valley, CA 93065

November 20, 1994

High Sierra Hiker's Association
c/o Peter Browning, Coordinator
Box 8920
South Lake Tahoe, CA 96158
Dear Sir:

Enclosed is a contribution to support your lawsuit regarding Seq. & Kings Cyn. Nat. Park increasing the stock limit to 25 without an Environmental Impact study. I can't easily afford that donation, but I really want to support your efforts.

I have been hiking, backpacking, and climbing all over the Sierra for 28 years, so have extensive familiarity with trail conditions and effects of stock on trails, camp sites, meadows, etc. and how they have changed. I might say up front that I have liked horses since a small kid, most of my family have been ranchers and farmers (in Texas), and I currently live in a neighborhood zoned for horses, so I like being around them. Packers I've met on the trails in the Sierra have nearly always been courteous and friendly.

What I have a problem with is their special treatment by the National Forest and National Parks. It seems that the permit system has reduced the number of hikers and backpackers over the last 10-15 years, but the stock traffic has steadily increased over most of the range. And 99% of the trail damage is clearly due to stock. Many trails are turned into dust bins by heavy stock traffic. Plus it is often hard to find a camp site, even in remote areas, that is not covered with horse manure.

But to be more specific, King's Canyon is one of the worst examples of special treatment of packers by the Park Service. I was there last August 19-23, 1994. We hiked up the Copper Creek trail from King's Canyon and over Granite Pass. Before starting, I listened to a lecture by a park ranger, including emphasis on not have wood fires above 10,000 ft. because of it's detrimental effect on the environment. And I signed a permit declaring my responsibility to ensure that my party adhered to numerous regulations, including the one about fires. (I had no problem with that since my party doesn't usually have wood fires anyway.) On Aug. 21, approaching State Lakes, I saw a large sign saying "No Wood Fires above this point". I went on to climb State Peak, but on the way back, at State Lake, 10,250 ft., I saw a man carrying a large log toward the camp fire at a packer camp. I asked him if he was aware that it was illegal to have wood fires there. He replied that it was OK, because he was with the packer! On returning to King's Cyn. a couple of days later I asked the ranger at Cedar Grove about it. She didn't know, but made a phone call to another park service

office, and found out that what the man said was indeed true!! King's Canyon National Park had granted the local packer exclusive right to have wood fires anywhere they want in that area! She suggested that I submit a written protest, which I did on the spot, and she assured me I would shortly receive a response. But after 3 months I still haven't!

On this same trip we camped one night at Grouse Lake, 10,469 ft., below Goat Mtn. This pretty lake is about a mile cross country from the Copper Creek trail. There we talked to a party of two backpackers camped there. They said it was one of their favorite camp sites and they had come there annually for several years. But they were very upset, because that previously undeveloped site by the lake was full of horse manure (they couldn't even use the site) and they found tracks and broken shrubs indicating a party of 15-20 stock (their estimate) had been brought in, off trail, to Grouse Lake. I also relayed this information to the ranger. She seemed to sympathize. She said they receive "many such complaints". I asked her why the park service allowed this sort of thing to go on. Her explanation was that the packers have a strong lobby!

Good luck in your efforts!

Yours truly,

A handwritten signature in cursive script that reads "David Campbell". The signature is written in dark ink and is positioned below the typed name "David Campbell".

Enclosure 6

12-5-07

Dear Mr. Axtell,

This summer I had the opportunity to hike the entire John Muir Trail. I am grateful for the National Parks and forests which we were able to enjoy and their continued availability to the public. I realize that caring for these lands is a tremendous responsibility and the administration of the details for such large areas must be overwhelming.

As an avid backpacker there are some observations I would like to share with you. The most negative aspect of the trip was the trail conditions and encounters with pack stock. The entire trail is so heavily used that some areas show extreme wear and degradation. The groups of packers who we met on the trail were often assuming and inconsiderate of the fact that we went out of our way to give them the right of way. They were often rude and most always unappreciative.

The impact caused by these stock animals in the following areas (and in general) ruins my wilderness experience. The trails are badly eroded. Sometimes they are deeply rutted and very wide. The amount of manure on and off the trails can't be good for the ecosystem and health of the water. In areas where there are horse camps there is more litter, more flies, and huge scared worn areas where no duff or top soil remain. The visual impact of these large camps with their tarps and equipment ruin the views. They are often loud. I believe that allowing so many to use certain lakes, basins, or meadows on a repeated basis exposes the area to irreparable wear.

1) Traveling south toward Woods Creek Junction (north of the actual junction) there were places where the trail is deeply rutted, sometimes 2-3 deep "grooves" side by side. I observed horse tracks all over outside the trail area where they are continuing to break down the vegetated, less worn areas

2) All the trail out of Cedar Grove or Roads End in Sequoia National Park to the main John Muir Trail is thrashed. Large amount of manure on and off the trail. Many areas off trail near the river show torn up vegetation and erosion.

I would like to know how you will address these issues and what actions I may expect. Thank you for your time and attention to my concern.

C. Felciano

Celeste Felciano
P.O. Bob 863
Glen Ellen Ca. 95442

Robert A Dawson
350 Lake Anne Road
Delhi, LA 71232

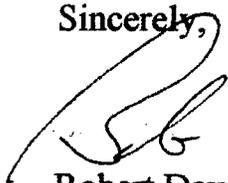
High Sierra Hikers Association
P O Box 8920
South Lake Tahoe, CA 96158

Greetings;

Enclosed please find my check for \$50 for your organization. My contribution is motivated by the following: on August 26, 2005, I camped at Kings River campsite, four miles south of Mather Pass, in SEKI. I and other Backpackers shared this site with a stock packer with 10 guests and approximately 16 pack animals. I was appalled that a group this large was permitted at one site at one time. My primary objection is the damage from grazing and trampling the area. Of secondary concern was the constant intrusion of the animals, bells and all. I complained via e-mail at SEKI's website, but received no reply.

If you have a venue to voice this complaint, please do so. If can be of assistance, please advise.

Sincerely,



Robert Dawson

COPY

September 25, 1996



Mr. J. Thomas Ritter, Superintendent
Sequoia & Kings Canyon National Parks
Three Rivers, CA 93271

Dear Mr. Ritter:

I am writing to express my concern and unhappiness over conduct by members of your field staff during the last week of August in Sequoia National Park. The details of my complaint are as follows.

From Sunday, August 25th through the following Wednesday, I was a member of a group of Sierra Club peak climbers camped at the Big Arroyo site near the junction of the High Sierra and Big Arroyo Trails. During this same period, a group of park service personnel were camped below us further down the Big Arroyo Trail. At night a number of stock animals from the other camp were set free and allowed to roam up and down the area between the two camps. The lead animal was equipped with a very noisy cow bell. Each evening and throughout the night, the animals entered our campsite and had to be chased off. After the first night, a passing ranger was asked to transmit a complaint down to the other campsite. That complaint apparently fell on deaf ears, for the evening animal intrusions continued.

Mr. Ritter, I have to tell you that I don't visit National Parks in order to participate in a barnyard experience. Having my ears assaulted each evening by the sound of an unpleasantly-sounding, loud cow bell is not my concept of wilderness solitude. Arising one or more times during the night in order to drive the animals away is not my idea of night time entertainment. In short, those animals made our evening attempts at rest and sleep a futile, miserable exercise.

The experience I've related above is, in my opinion, all the more disgusting because it occurred as the result of actions by members of your staff. Whether due to sheer stupidity, uncaring incompetence, or just plain insensitive concern for the rights of others, it seems to me that several members of your staff need to attend a good class in basic wilderness courtesy and manners. I hope that you will convey my concerns to those responsible and that you will see that this type of episode is not allowed to occur again within the areas of your jurisdiction.

Sincerely,

A handwritten signature in black ink, appearing to read "Bond R. Shands, Jr.", written in a cursive style.

Bond R. Shands, Jr

Post Office Box 40788

*San Francisco, California
94140-0788*

*Telephones: 415/703-8068
(office)*

*415/821-1485
(residence)*

*415/703-8055
(office fax)*

Internet E-mail Addresses:

*bond_shands@ci.sf.ca.us
(office)*

*bshands@pacbell.net
(residence)*

Dear Superintendent:

RECEIVED
08/20-8/21/96

Date: 8/18/96

I would like to make the following comment about Sequoia and Kings Canyon National Parks.

Glacier Valley has too much stock use. There are hoof prints + horse feces everywhere.

Also, having to walk miles + miles over horse feces is not pleasant. If humans have to bury their's, stock users should at least brush horse feces off the sides of the trails at least the big piles.

SEQUOIA AND KINGS CANYON NATIONAL PARKS
VISITOR CENTER
MAMMOTH, CALIFORNIA

Jeva Kluss Nipp

My name: _____

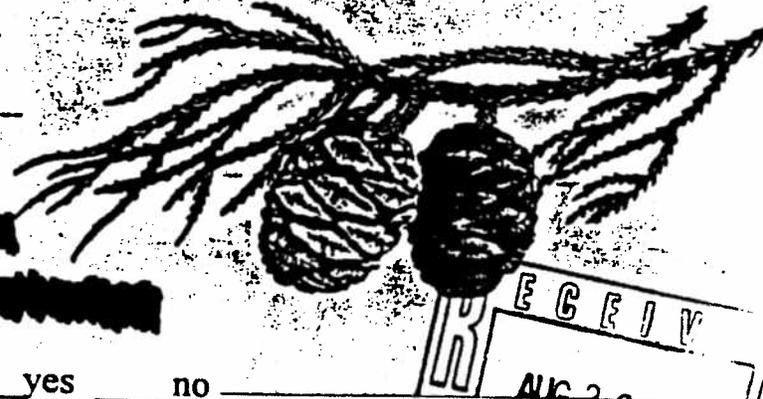
My mailing address: _____

~~_____~~ CA ~~_____~~

May we contact you about your comment? yes no

My telephone number: ~~_____~~ - ~~_____~~

Please either return this form to any visitor center, or mail it to the address on the back. Thank you for your time and comment.



To: Chief Ranger

Please prepare response for

Superintendent's signature

by 9-6-96

David Campbell
1511 Rambling Rd.
Simi Valley, CA 93065

November 20, 1994

High Sierra Hiker's Association
c/o Peter Browning, Coordinator
Box 8920
South Lake Tahoe, CA 96158
Dear Sir:

Enclosed is a contribution to support your lawsuit regarding Seq. & Kings Cyn. Nat. Park increasing the stock limit to 25 without an Environmental Impact study. I can't easily afford that donation, but I really want to support your efforts.

I have been hiking, backpacking, and climbing all over the Sierra for 28 years, so have extensive familiarity with trail conditions and effects of stock on trails, camp sites, meadows, etc. and how they have changed. I might say up front that I have liked horses since a small kid, most of my family have been ranchers and farmers (in Texas), and I currently live in a neighborhood zoned for horses, so I like being around them. Packers I've met on the trails in the Sierra have nearly always been courteous and friendly.

What I have a problem with is their special treatment by the National Forest and National Parks. It seems that the permit system has reduced the number of hikers and backpackers over the last 10-15 years, but the stock traffic has steadily increased over most of the range. And 99% of the trail damage is clearly due to stock. Many trails are turned into dust bins by heavy stock traffic. Plus it is often hard to find a camp site, even in remote areas, that is not covered with horse manure.

But to be more specific, King's Canyon is one of the worst examples of special treatment of packers by the Park Service. I was there last August 19-23, 1994. We hiked up the Copper Creek trail from King's Canyon and over Granite Pass. Before starting, I listened to a lecture by a park ranger, including emphasis on not have wood fires above 10,000 ft. because of it's detrimental effect on the environment. And I signed a permit declaring my responsibility to ensure that my party adhered to numerous regulations, including the one about fires. (I had no problem with that since my party doesn't usually have wood fires anyway.) On Aug. 21, approaching State Lakes, I saw a large sign saying "No Wood Fires above this point". I went on to climb State Peak, but on the way back, at State Lake, 10,250 ft., I saw a man carrying a large log toward the camp fire at a packer camp. I asked him if he was aware that it was illegal to have wood fires there. He replied that it was OK, because he was with the packer! On returning to King's Cyn. a couple of days later I asked the ranger at Cedar Grove about it. She didn't know, but made a phone call to another park service

office, and found out that what the man said was indeed true!! King's Canyon National Park had granted the local packer exclusive right to have wood fires anywhere they want in that area! She suggested that I submit a written protest, which I did on the spot, and she assured me I would shortly receive a response. But after 3 months I still haven't!

On this same trip we camped one night at Grouse Lake, 10,469 ft., below Goat Mtn. This pretty lake is about a mile cross country from the Copper Creek trail. There we talked to a party of two backpackers camped there. They said it was one of their favorite camp sites and they had come there annually for several years. But they were very upset, because that previously undeveloped site by the lake was full of horse manure (they couldn't even use the site) and they found tracks and broken shrubs indicating a party of 15-20 stock (their estimate) had been brought in, off trail, to Grouse Lake. I also relayed this information to the ranger. She seemed to sympathize. She said they receive "many such complaints". I asked her why the park service allowed this sort of thing to go on. Her explanation was that the packers have a strong lobby!

Good luck in your efforts!

Yours truly,

A handwritten signature in cursive script that reads "David Campbell". The signature is written in dark ink and is positioned below the typed name "David Campbell".

COPY

September 23, 1994

Superintendent
National Park Service
Sequoia & Kings Canyon National Parks
Ash Mountain
Three Rivers, CA 93271



Dear Superintendent:

On Monday, September 12th, I returned from a nine day Sierra Club National Backpacking Trip in Kings Canyon Park. Our route out of Cedar Grove was up the Lewis Creek Trail over Kennedy Pass and through the Volcanic Lakes area to the lower State Lake, then back to the Copper Creek Trail and Cedar Grove via Glacier and Grouse Lakes.

Our small group hoped for a wilderness experience while endeavoring to sharpen our no-trace camping skills. However, we were all amazed and distraught over the amount of horse manure we found in each and every meadow we crossed. While I expect to find the stuff on the trails, which we gladly share, the fact that all of the meadows in the Monarch Divide were so completely covered with horse feces was a most unpleasant bit of reality I had certainly not expected to see. And, when we reached State Lake, the manure was everywhere, even extending down to the lake front. In addition, the State Lake area was riddled with numerous horse paths. It was most unpleasant, and instead of remaining in that area for a couple of days, we departed after only one day. As I said, we had hoped for a wilderness experience. Instead, what we found more closely approximated a barnyard experience.

It appears to me that the local packer concessionaire is using the National Park lands as his private grazing pasture. And, instead of limiting his animals to remote meadow sites, our State Lakes experience proves that his animals are allowed to roam uninhibited wherever they please. Meanwhile, visitors such as myself are required obtain a permit and we are expected to practice no-trace camping while backpacking in these same areas. Yet the packer seems most uninhibited in his use of these lands. Some might see this as evidence of a double standard. Before making this judgement call, I'll await your clarification as to why it's not!

In the *Sequoia Bark* newsletter from the park (Summer 1994 edition), there's an article titled *Park of Forest* which outlines the National Park Service mission "... to emphasize strict preservation of natural and historic features.....", etc. I would suggest that there's nothing natural about the abundance of horse manure in the High Sierra meadows, and that it only exists there because you allow it. Quite frankly, you should be ashamed of yourself, just as I'm ashamed for you. I urge that you immediately take action to insure that the park back country meadows are kept from being used as a barnyard and pasture.

Sincerely,

A handwritten signature in black ink, appearing to be "Tam Hiker". The signature is written in a cursive, flowing style.

Bond R. Shands, Jr

1362 Guerrero Street

San Francisco, California
94110-3623

Telephones: 415/703-8068
(office)

415/821-1485
(residence)

415/703-8055
(fax)

CompuServe Mail ID:
73531.511

Internet E-mail Address:
73531.511@compuserve.com
-or- TamHiker@aol.com

July 12, 1993

Bruce Babbitt, Secretary
Department of the Interior
18th and C Streets, N.W.
Washington, D.C. 20240

Dear Secretary Babbitt,

Re: Sequioa/Kings Canyon National Parks.
Proposal to increase horse/mule limit.

I am the Backpacking Chairman of the Sierra Club, Mother Lode Chapter, based in Sacramento. The Mother Lode Chapter encompasses 24 counties, spanning the area from Yosemite north to the Oregon border, and from the Sierra/Cascades across the Central Valley to the Coast Ranges. Our Chapter has approximately 17,000 members, including over three hundred active outings leaders. We support many, many times that number of members and non-members who actively participate in our hiking, backpacking, winter and river touring, and other wilderness activities.

We now hear that Sequioa and Kings Canyon National Parks are again considering a proposal to raise the limit on horses and mules from 20 to 25 per group.

We are are very much aware of the significant negative impacts that have resulted from the overly-generous high county and wilderness-area access allowed to horse-packers and livestock.

We can all recount stories of "packer camp" sprawl around countless lakes, or large camps carelessly established in the middle of once pristine meadows. The camps are invariably characterized by large areas of ground denuded of all vegetation, stumps of illegally cut trees, often gigantic fire pits, and other artificial "improvements" such as hitching rails and even tables.

We have all experienced "wilderness" meadows, creeks and streams fouled and trampled by cattle, trails so fouled with horse manure and flies that they'll actually make one sick to one's stomach, and garbage-bag sized piles of garbage - cake boxes, tin cans, beer and wine bottles, food packages, plastic forks and plates, etc - abandoned in the nearby woods at packer camps 15 miles or more from the nearest trailhead.

We also are very disturbed about the continuing encroachment into the high country of non-native, stock-following cowbirds, who are causing a significant and alarming decline of native Sierra songbirds through parasitizing of the songbirds' nests.

The Forest Service obviously lacks the resources to police those who deliberately litter and vandalize our national parks. Additionally, there is no way to adequately mitigate the loss of sensitive habitat

and native species caused by the over-use of these areas by pack and grazing stock. The only way to avoid or reduce these impacts is to limit packer and stock access to such areas.

Raising the pack animal limits will benefit only commercial packers, at the cost of further deterioration of our parks, and a diminution of the quality of everyone else's "outdoor" experience. According to the High Sierra Hikers Association, over 75 percent of wilderness visitors oppose higher stock limits.

The Park Service has provided no valid justification for raising the existing stock limits. We encourage you to intervene in this action, and require the Park Service to lower the stock limit from 20 to 15, instead of raising it.

Thank you very much.

Cordially,

Ken Green

cc: HSHA

LAW OFFICES
BIGGAM, CHRISTENSEN & MINSLOFF

LAWRENCE BIGGAM
GERALD CHRISTENSEN
JON C. MINSLOFF
WILLIAM H. MINKNER
STEPHEN S. SIEGEL
JAMES McMILLIN
NANCY A. DE LA PENA
KENNETH M. AZEVEDO
DIANA L. AUGUST
ENOA T. BRENNAN
SUSAN K. FRITCHMAN
LARRY D. SHALLBERG
SHARON FLEMING
CHENOA PORTER
LAURENCE J. COHEN
GEORGE J. GIGARJIAN
KIMBERLY C. BAUMBAUGH
RAQUEL MARISCAL
LINDA K. HARVIE
CONSTANCE I. BAKKERUD
ERIC A. STANFORD

2103 NORTH PACIFIC AVENUE
SANTA CRUZ, CALIFORNIA 95060
TELEPHONE (408) 429-1311
FAX (408) 429-5664

February 5, 1991

Mr. Stanley T. Albright
Regional Director
National Park Service
P.O. Box 36063
San Francisco, CA 94102

Dear Mr. Albright:

I have backpacked in the Sierras for a number of years. I have become increasingly concerned with the pack trains of horse and mule that penetrate deep into the back country lakes and rivers.

The trails that have been used by stock are deeply rutted, dusty when dry, and muddy bogs when wet. The campsites used by stock have been trampled by the stock and severely fouled by their riders since they bring to the area so much excess food and equipment that they will leave metal grills, rope, plastic tarps, pans, etc. I have yet to see a campsite of even a few horse-packers that don't have a fire ring the size of a small ball ring burning logs four feet long.

Most horse packers that I have met travel in groups of six people with ten animals which has a devastating impact on any area that they invade. The meadows where the animals graze are trampled and polluted with the vegetation grazed and the trees scarred from their rubbing and the rope scars from where they have been tied.

I understand that some people are not physically able to walk miles carrying a heavy pack to enjoy our wonderful areas of solitude and inspiration. These individuals could use one pack animal for three to four people's gear and not the current three animals for two people.

COPIES

Mr. Stanley T. Albright
Regional Director
National Park Service
San Francisco, CA

February 5, 1991
Page Two

Your current policy is to allow up to twenty horses to be used by a single group. It is being considered to increase this number to twenty-five at Yosemite and Sequoia/Kings Canyon national parks.

I urge you to please not allow this increase in the number of animals chewing up our back country. Instead please consider limiting the number of stock per group to a maximum of three. This number of animals would still allow groups physically unable to hike with a pack or those wedded to the cowboy and horse mystique, to still enjoy the Sierras and not ruin it for the rest of us.

Sincerely,


WILLIAM H. MINKNER
Attorney at Law and
Backpack Hiker

WHM/blw

cc: Thomas Ritter/Supt.
Sequoia & Kings Canyon Ntl Pks

Michael Finley/Supt.
Yosemite Ntl Pk

High Sierra Hiker's Assoc.
Truckee, CA

*I support limiting the number of stock allowed in the Sierras.

Diana L. August
Becky L. Waltzer
Gacey Ortega
Kelly Polito
Gene Harmon
George O. King
Ken Brown
Erda Brennan

Enclosure 7

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

CASE INCIDENT RECORD

| | | | | | | | | | | | | |
|---|--|---|--|---|-----------------------------|-------------------------------|-------------------------------------|---------------------|------------------------------------|-------------|---------------------|--|
| 1. ORGANIZATION CODE 1 8,5,5,0 | | 2. ORGANIZATION (PARK) NAME Sequoia and Kings Canyon | | | 3. LOCATION CODE 0,5,0,5 | | 4. CASE/INCIDENT NO. 1,0,1,0,3,4 | | | | | |
| 5. LOCATION OF INCIDENT PINTO LAKE | | | | 6. WHEN DID IT OCCUR? | MO. 0:8 | DAY 0:6 | YR. 9:1 | 24 HOUR TIME 2:1 | HRS. 0:0 | MIN. 0:0 | 7. DAY OF WEEK 3 | |
| 8. OFFENSE/INCIDENT CODE 6,9,0,2,0,0 | | | 9. NATURE OF INCIDENT Visitor complaint re: livestock | | | 10. HOW REPORTED Visitor | | | | | | |
| 11. REPORTED BY Mr. Pete Hearn | | | | 12. ADDRESS LaCrescenta, CA 91214 3137 Prospect Ave | | | 13. PHONE HOME BUSINESS | | | | | |
| 14. RECEIVED BY Thomas Suk | | | | 15. WHEN RECEIVED: DATE 8-7-91 | | | 16. TIME BROADCAST | | 17. WHEN INVESTIGATED DATE TIME | | | |
| 18. INVESTIGATED BY | | | | 19. OFFICER/RANGER NO. 3,1,4 | | 20. WHEN CLEARED DATE TIME | | | 21. DISPOSITION | | | |

| 22. INVOLVED PERSONS | 23. ADDRESS | 24. PHONE | 25. SEX | 26. RACE | 27. AGE | 28. DATE OF BIRTH |
|----------------------|--|-----------|---------|----------|---------|-------------------|
| 1 Pete Hearn | 3137 Prospect Ave LaCrescenta, CA 91214 | | M | W | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |

29. DETAILS OF INCIDENT

Mr Hearn stated that he camped along Cliff Creek in the vicinity of Pinto Lake on the night of August 6. He requested that I register a formal complaint re: his group's encounter with livestock. He complained that he had a "hard time finding a habitable camp" due to presence of large quantities of stock manure. He complained that he was "kept up all night" due to presence of stock roaming throughout his camp, and the noise of animals' bells. He also complained of the volume of stock manure on trails.

| 30. QUANTITY | 31. PROPERTY STOLEN OR DAMAGED | 32. ESTIMATED VALUE | RECOVERED | |
|------------------------------------|--------------------------------|---------------------|-----------|-----------|
| | | | 33. DATE | 34. VALUE |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 35. PROPERTY CODE OF HIGHEST VALUE | 36. TOTAL | | 37. TOTAL | |
| | | 00 | | 00 |

INVESTIGATED BY (Signature and Date)

APPROVED BY (Signature and Date)

01 / 1 / 1

00 / 1 / 1

8/11/91

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

CASE INCIDENT RECORD

| | | | | | | | | | |
|---|--|--|--|--|-----------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------|
| 1. ORGANIZATION CODE 1 8,5,5,0 | | 2. ORGANIZATION (PARK) NAME Sequoia and Kings Canyon | | | 3. LOCATION CODE 0,5,0,5 | | 4. CASE/INCIDENT NO. 1,0,1,0,3,5 | | |
| 5. LOCATION OF INCIDENT PINTO LAKE | | | | 6. WHEN DID IT OCCUR? | MO. 0:8 | DAY 0:6 | YR. 9:1 | 24 HOUR TIME 2:10:0 | 7. DAY OF WEEK 3 |
| 8. OFFENSE/INCIDENT CODE 6,9:0,2:0,0 | | 9. NATURE OF INCIDENT Visitor complaint re: livestock | | | 10. HOW REPORTED visitor | | | | |
| 11. REPORTED BY Mr Bruce Bowen | | | | 12. ADDRESS 1530 Olympus Ave Berkeley CA 94708 | | | 13. PHONE { HOME BUSINESS | | |
| 14. RECEIVED BY Thomas Suk | | | | 15. WHEN RECEIVED: DATE 8-7-91 | | 16. TIME BROADCAST | | 17. WHEN INVESTIGATED DATE TIME | |
| 18. INVESTIGATED BY | | | | 19. OFFICER/RANGER NO. 3,1,4 | | 20. WHEN CLEARED DATE TIME | | DISPOSITION 21. | |

| 22. INVOLVED PERSONS | 23. ADDRESS | 24. PHONE | 25. SEX | 26. RACE | 27. AGE | 28. DATE OF BIRTH |
|----------------------|---------------------------------------|-----------|---------|----------|---------|-------------------|
| 1 Bruce Bowen | 1530 Olympus Ave Berkeley CA 94708 | | M | W | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |

29. DETAILS OF INCIDENT

Mr Bowen stated that he camped along Cliff Creek in the vicinity of Pinto Lake on the night of Aug 6. He requested that I record a formal complaint re: his group's encounter with livestock. He complained that stock were "wandering unattended" and "stomping through camp" wearing "loud bells." He also complained of "damage to trails" due to stock use. He suggested that the NPS close some trails to stock to allow trail hikers a stock-free experience. He also suggested that the NPS "keep stock out of fragile areas."

| 30. QUANTITY | 31. PROPERTY STOLEN OR DAMAGED | 32. ESTIMATED VALUE | RECOVERED | |
|------------------------------------|--------------------------------|---------------------|-----------|-----------|
| | | | 33. DATE | 34. VALUE |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 35. PROPERTY CODE OF HIGHEST VALUE | | 36. TOTAL | | 37. TOTAL |
| | | | 00 | 00 |

INVESTIGATED BY (Signature and Date) *Thomas Suk* APPROVED BY (Signature and Date) *Bruce Bowen 8/16/91*

Enclosure 8

McClure Ranger Station: End of Season Report 1994

George Durkee

*Go tell the Spartans, you who read:
We took their orders, and are dead.*

Inscription to the Spartan dead at
Thermopylae, c. 480 BC

Stats:

| | |
|-------------------------|---|
| Visitors Contacted | 1100 |
| Miles Hiked | 680 |
| Citations | 1 (dog) |
| Warnings | 40 (camping on veg.; unclean camp etc.) |
| Medivacs | 5 |
| Rescues | 1 (gnarly, Mt. Darwin) |
| Searches | 2 (Monarch Divide, Mt. Goethe) |
| Grazing nights observed | 100 (McClure to Darwin Cr.) |

OVERVIEW

A drought year. Came in June 10 via Florence Lake and found the cabin in good shape--no sign of any major mouse infestation over the winter with some evidence that a martin was checking the inside of the cabin occasionally... . Nonetheless, I used a backpack pump to spray the entire downstairs with a solution of Clorox and water. In spite of reassurances by the park safety officer regarding Hanta virus, the McClure cabin is a hazard due to a 50 year accumulation of mouse feces. Most of it is extremely difficult to get to because of wire mesh put up to prevent mice from getting into the cabin. The attic should now only be cleaned by someone in full Hazmat gear. I consider it unsafe and will not do it. Jack Vance told me he hopes to restore the cabin in '95. This project should be encouraged.

Although the number of small parties was probably about the same as in past years, the number of scout groups was down considerably. This significantly reduced the hassle index. There were also few law enforcement contacts this year.

In mid-September I did boundary patrol in the Kettle Dome area during hunting season. Although shots were heard for several days, no hunters were contacted near the boundary nor were signs of poaching or intrusion seen. A series of heavy storms with snow after 9/21 effectively closed the area to hunting activity. These same storms also kept most people from any more hiking. After 10/3 there were no more hikers in the McClure area because of 2 ft. of snow on the ground.

RECOMMENDATIONS

This year I've pulled about 10 previous year end reports for the McClure area and did a literature review. Hard as it is to believe, each year shows some of the **SAME** recommendations for the

area. It should be noted that 2 of us (Morgenson and myself) have each spent over a cumulative year (Randy 2 years!) in that area. There is one recommendation that stands out year after year (since Graban in 1977):

1) CLOSE MCCLURE MEADOW TO STOCK USE! (Graban, Gustafson, Durkee, Brennan, Scattaregia, Morgenson). "McClure Meadow is one of the most unique examples of an alpine meadow in the Sierra. Even after twenty years of fairly strict grazing regulations, it still shows much evidence of poor recovery... . in the summer heat--even a week after a stock party leaves--the entire meadow smells like a corral. [this] is a major source of complaints by hikers." Durkee, 1981

The National Park Service seems embarrassed to make management recommendations based on esthetic grounds. Park visitors have an absolute right to view meadows in all stages of maturation: from the first green shoots to the "knee-high grasses, ripe and open panicles drifting on the moving air, luminous-bronze in the backlight." (Morgenson, 1989). They do not get this moving experience if the meadow has been browsed to putting green length and smells like a corral.

At the same time, it would probably be acceptable to increase the allowable grazing above Colby Meadow (in consultation with the meadow specialist) to 2-3 days.

2) Get rid of the old Soil and Moisture check dams (circa 1960) from McClure & Colby Meadows (Durkee & Morgenson).

3) Limit cross country travel to group size maximum of 6-8 (Durkee, Scattaregia, Morgenson). The Ionian Basin has become a major destination by Sierra Club groups (4 trips), Scouts and private hiking clubs. There are not more than 3 camping spots in the entire basin and none can sleep more than 4 people without damage to vegetation.

1991 Annual Report

Little Five Lakes Ranger Station

by Thomas Suk

Contents

| | |
|--|----|
| Summary statistics..... | 3 |
| The Visitor..... | 5 |
| Pack & Saddle Stock: issues/incidents..... | 7 |
| Bears: issues/incidents..... | 17 |
| Patrol notes..... | 21 |

ACTION ITEMS:

| | |
|---|----|
| 1. Kern drainage campfire regulations..... | 23 |
| 2. Kaweah drainage campfire regulations.... | 27 |
| 3. Stock management at Little Five Lakes... | 29 |
| 4. Stock management at Big Five Lakes..... | 45 |
| 5. Stock management at Lost/Soda Creeks.... | 51 |

APPENDICES:

| | |
|--------------------------------------|----|
| A. Gear needing repair for 1992..... | 53 |
| B. Station needs for 1992..... | 55 |
| C. Notes for the '92 ranger..... | 59 |

SEQUOIA and KINGS CANYON NATIONAL PARKS

Backcountry Ranger Annual Report Summary Information

1991

STATION: Little Five Lakes LENGTH of SEASON: June 10 - Sept 21

1. Total Visitor Contacts: 1032
 - Day hikers: 36
 - Backpackers: 926
 - Stock Users: 60

2. Stock Observed: 138
3. Llamas Observed: 0
4. Total Miles Covered: 410
 - Hiked: 410
 - Rode: 0
5. Trash Removed (pounds): 200
6. Total # Firerings Worked: 64
 - Rehab/Cleaned: 40
 - Removed: 24
7. Total Campsites Worked: 10
 - Rehabilitated: 10
 - Removed: 0
8. Total Law Enforcement Contacts: 20
 - Citations: 0
 - Type Violation:
 - improper food storage (4)
 - illegal grazing (4)
 - collecting wood from standing trees (4)
 - camping too close H₂O (3)
 - camping on vegetation (3)
 - illegal campfire (2)
 - Written Warnings: 1
 - Verbal Warnings: 19
9. Emergency Operations: 1
 - Searches: 1
 - Rescues: 0
 - Medivacs: 0
10. Special Projects:
 - analysis of grazing opening dates
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____

THE VISITOR

I contacted over one thousand visitors in the backcountry this year. I will summarize some general observations. These do not apply to everyone, nor do the views expressed necessarily agree with my own. I present this mainly to give managers a general feeling for public attitudes and opinions.

- * Despite all the warnings, many visitors do not believe a particular area is frequented by bears until they see one.
- * Many visitors feel that once their food is hung in a tree, it is safe.
- * Despite our encouragement, many visitors are scared to throw rocks at bears.
- * Many visitors do not believe bears will wander above treeline.
- * Many visitors want more food storage lockers. Some feel that we should simply destroy problem bears. Very few want to carry bear-resistant food containers.
- * Hikers do not like stock wandering through their campsites.
- * Hikers object to being told to camp 100 feet from water when they see stock urinating and defecating in and near streams and lakes.
- * Visitors have a difficult time burying their excrement.
- * If visitors see a firepit (or campfire scar), they think it is OK to have a fire.

Some suggestions to consider:

- * **BEARS:** Emphasize the following points:
 1. Hanging food is ONLY a "delay tactic."
 2. You must: a) counter balance food as well as possible, and b) **CAMP NEARBY** (i.e. within rock-throwing distance) to chase bears away.
- * **HUMAN WASTE DISPOSAL:** Let's consider buying plastic hand trowels in bulk, and pass them out (or sell them for cost) at trailheads. ("When you empty your bowel, use your trowel.")

- * **HIKER/STOCK CONFLICTS:** Tell irate hikers that there is not conclusive evidence that horses spread human-infective Giardia. This usually calms them down. (Although horses have been shown to carry Giardia, they have not yet been studied to see if it is the same strain of Giardia which infects people.)

- * **CAMPFIRE IMPACTS:** Spend sufficient time/resources to completely eliminate fire scars in closure areas, or visitors will rapidly rebuild firepits. Backcountry rangers already know this, but managers and trailhead supervisors often allocate insufficient resources to do the job "right."



PACK & SADDLE STOCK, issues/incidents

Mineral King Pack Station (MKPS) operated the 1991 season with little regard for grazing regulations (see case/incident no.'s 100549, 100660, 100704, 101005), food storage regulations (see case/incident no.'s 100662, 100663, 100926, 101005), and minimum impact camping regulations (see case/incident no.'s 100704 and 101005).

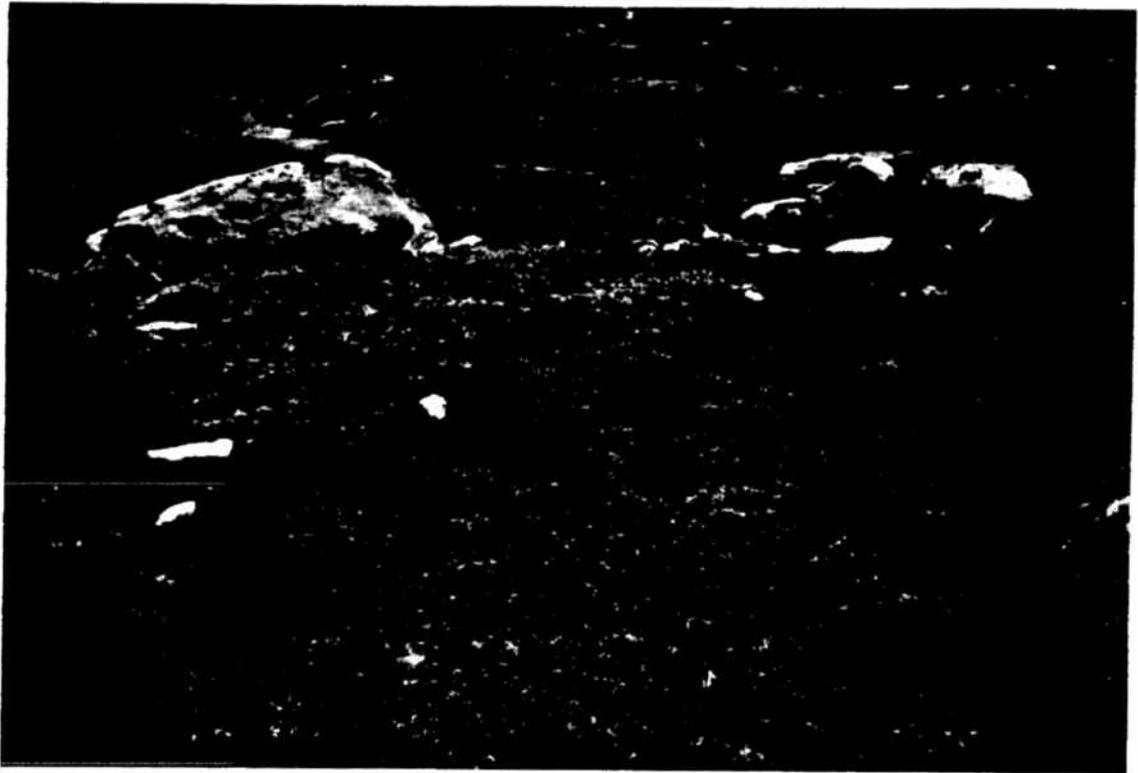
MKPS packers were completely ignorant of grazing opening dates, and were generally uncooperative when I contacted them in the field. Photographs of impacts resulting from violations by Mineral King Pack Station are attached.

I feel that it is poor land stewardship to allow Mineral King Pack Station to issue their own backcountry permits. We should require all pack station clients to obtain their permit from the NPS. (Reasons for this are numerous; see my '89 and '90 reports for a detailed discussion.)

I contacted two private stock groups this year (led by Jim Wells of Three Rivers and Ruth Heuer of Strathmore). In contrast to the commercial packers, these private stock parties were well informed and cooperative.

I have several specific recommendations regarding stock management in the Little Five patrol area. See the Action Items section of this report.



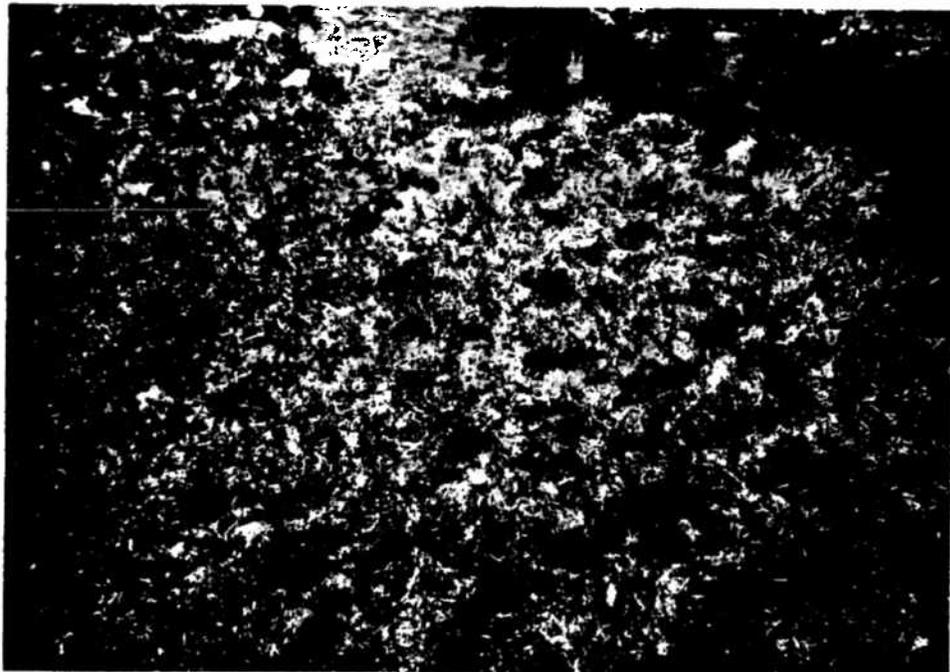


Case 100660. "Forester Meadow." Opening date: July 15. Mineral King packer grazed 10 head night of July 3. Meadow was still very wet. Forage was just coming up and was very short. The packer ignored my instructions and returned to graze the meadow again on July 5.





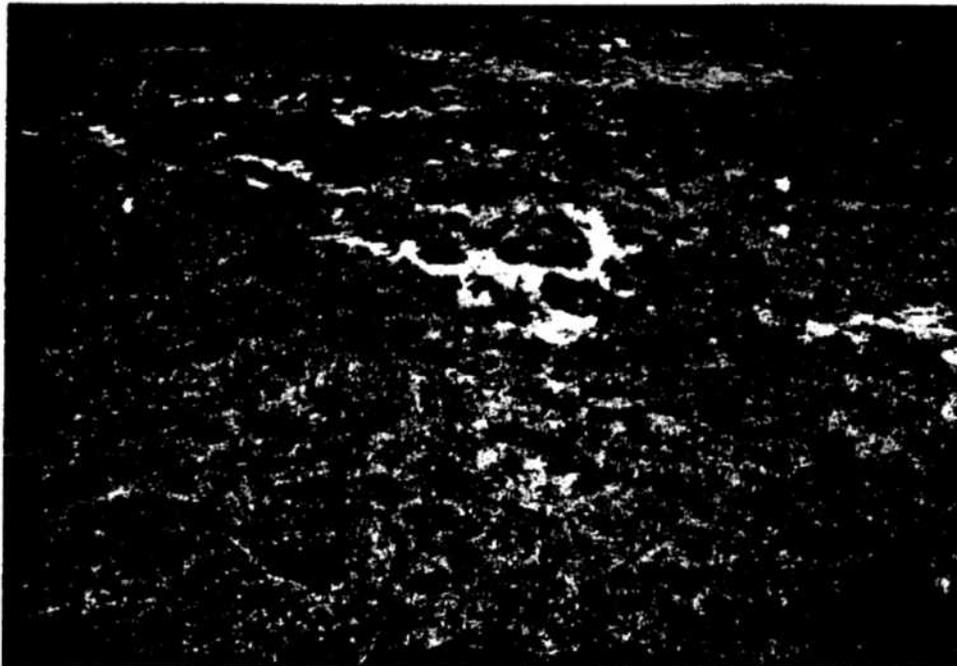
Case 100704. Little Five Lakes. Opening date originally July 15, amended to July 20 due to wet soil conditions. Mineral King packer grazed 11 head nights of July 11-12. Grazing was concentrated on fine forage in the saturated areas.



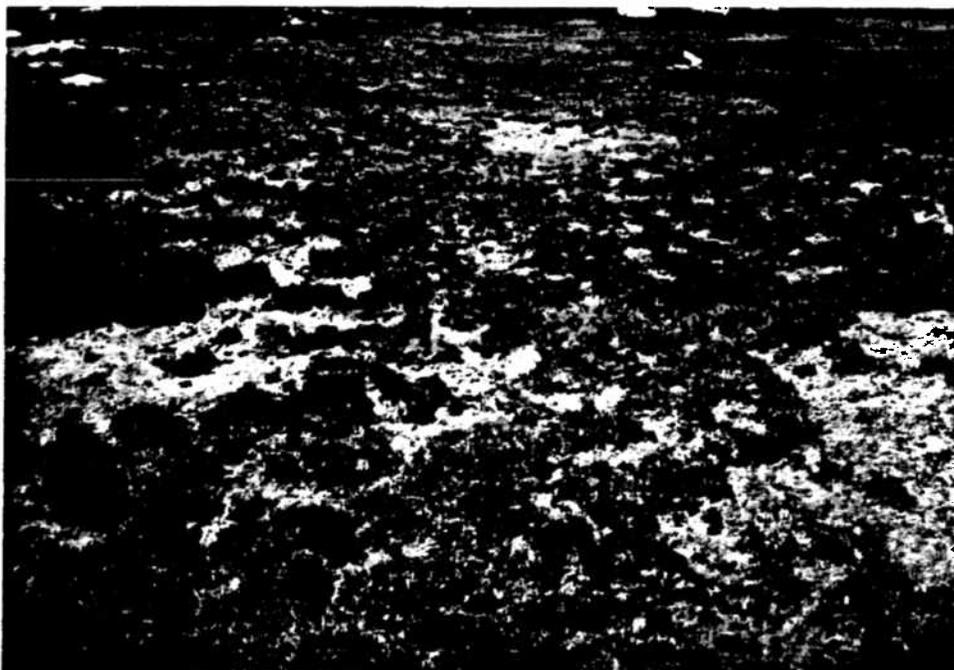


Case 101005. Little Five Lakes. Wet stringer meadow permanently closed to grazing since 1978. Mineral King packers grazed 18 head nights of August 4-5. Stock seem to prefer the fine forage in the wettest areas.





Case 100549. Big Five Lakes. Opening date August 1. Much of the forage area at Big Five is perpetually wet in normal years. After meeting with packers' organizations in early July, NPS amended the opening date and allowed commercial pack station to begin grazing on condition that stock be "kept out of wet areas." Photos taken July 25 show lingering wet condition of soils and soil loss from trampling impact.



BEARS

The bears had a big year in my area. I personally received dozens of bear incident reports. Unfortunately, the only immediately available alternatives for decreasing incidents in the area appear to be: destroying "conditioned" bears and/or installing food lockers "one day apart" on popular trails, such as the High Sierra Trail and the Black-rock/Sawtooth loop. However, only a few lockers are presently available, and installing other food storage devices (i.e. barrels) is even more controversial.

Bear(s) got through a properly functioning electric fence and broke into my station while I was away in August. (Approximately \$200 damage to the tent...and they broke my graphite fishing rod.) They did not get any food. It is critical that the Little Five ranger store all food and trash in the lockers when away on patrol. The electric fence is a useful deterrent, but it will not keep all bears out. I even put breakable items on the floor when I went on overnight patrols, so they wouldn't be knocked off shelves by marauding bears. Proper food/trash management is very time consuming. Constructing a bear-proof cabin for the ranger at Little Five should be seriously considered.

Acute problems existed this season at: Pinto Lake, Cliff Creek (at Timber Gap crossing), Spring Lake, Columbine Lake, Little Five Lakes, Nine Lake Basin, and upper Big Arroyo. Solutions will not be easy. An understanding of site-specific problems is critical to developing a response.

Pinto Lake. A popular first-night and last-night camp for both backpackers and stock parties. One locker currently exists; it is full to capacity most nights in August. This problem is exacerbated by the fact that MKPS drops "spot" trips at this location and instructs them to use the locker. One option is to install a second locker. However, capacity would still be exceeded when stock parties and/or commercial "spot" trips are present. A second (and more effective) option is to install another locker (for hikers), plus a barrel for stock groups' exclusive use. This could provide storage capacity for spot trip clients, as long as they don't bring ice chests. ("Coolers" will not fit in the barrels.) Large (or extended) stock parties would still have to sleep

near and defend their food. Packers would occasionally lose food to bears under this option, as happened at least once this year (case/incident 100926). The barrels will not be effective unless Don Bedell assures that all "spot" parties have no more food than they can fit inside the barrel(s), (i.e. no ice chests). A third option is to limit use instead of increasing food storage capacity. We could reduce the present Timber Gap trailhead quota and require packers to operate under the quota system.

Cliff Creek Crossing. Not as popular as Pinto Lake. Stock parties do not camp here since there are no large campsites. One locker currently exists. Capacity is exceeded only when commercial spot trips are present. One option is to install a barrel for use by pack station clients (spot trips). Again, this will be effective only if trips are planned so that all food fits in the barrel. A packer informed me that MKPS previously used a site downstream of the crossing ("Judge's Camp") for spot trips, but they now drop clients at the crossing site due to bear activity. Installing a food barrel away from the crossing site (i.e. at Judge's Camp) has advantages: 1) barrel would not be in view of large numbers of visitors, and 2) flat spots for camping are limited at the crossing. (I do not know of any LZ's in this area; barrel would probably have to be dropped off with a long line and someone on the ground to direct the drop and unload the net.) Another option is to prohibit MKPS from leaving clients in the Cliff Creek drainage without a packer to defend their food, and requiring MKPS to leave enough room in the existing lockers for other visitors. A third option is the same as that listed previously under Pinto Lake.

Spring Lake. This is a popular cross-country destination. A "user trail" exists over Glacier Pass, but it is badly eroded, and getting worse. A few trees exist, but good "hanging" branches are few. Hikers approach the lake from four distinct directions (which makes it impossible to place a locker with confidence that everyone will find it). One option is to install a locker. This would be a major philosophical leap, as no lockers have yet been placed in off-trail areas. This would encourage more use of an already over-used location. Second option is to recommend that visitors not camp at Spring Lake due to presence of bears and lack of good hanging trees. Third option is to reduce trailhead quota over Glacier Pass to one group per day. This would reduce overcrowding and ensure that everyone has at least a "marginal"

tree in which to hang food. Fourth option is to require groups camping at Spring Lake to carry bear-resistant food containers.

An opportunity exists to take the long overdue step of reducing use at Spring Lake. Installing a food locker would have the opposite affect. I prefer the second and third options, and monitoring the situation further.

Columbine Lake. This is a popular first/last campsite on the Blackrock/Sawtooth loop. Only a few trees; no good hanging branches. Great fishing. Very scenic. People really want to camp there. Dozens of bear incidents this season. Our first reaction was to request installation of a locker. The major problem (re: effectiveness of placing a locker) is that there are several trails between the outlet of Columbine Lake and Sawtooth Pass. The "main" or "official" trail is impossible to distinguish from the array of user trails. Most hikers would have a hard time finding the locker because of the varied terrain. If we install a locker and advertise that it exists at Columbine, hordes of hikers would plan on camping there. If significant numbers of hikers don't find the locker, incidents will continue and perhaps even increase. A related problem is that there is no single area at Columbine which offers enough good (i.e. flat) areas for camping. Three candidate locations are: 1) chained to one of the trees near (just below) the small lake, 2) between the first location and the outlet, and 3) approximately lake level near the flat spots at the inlet. If not chained, people and/or bears will probably move the locker. Due to steep terrain, bears could roll the locker and get it "stuck" in very difficult-to-move places (or damage it beyond usefulness). Location #1 offers the only site (i.e. a few trees) where the locker can be chained, but large groups will end up camping on the shore of the small lake (only large flat spot nearby) quickly destroying the vegetation there. Locations #2 and #3 also don't have enough flat areas to support the number of visitors who will flock to Columbine if they know a locker exists there.

I recommend re-constructing the trail wherever the trail crew leader believes it will last, if possible through the camping areas at locations #1 and #2, and avoiding the meadow area at the inlet. Then place a locker, visible from the trail, at whichever location along the "new" trail offers the most camp areas. It may become necessary to install a second locker for two reasons: 1) not enough campsites near the first locker (folks will be unwilling to hike from many of the sites regardless of where we place the locker...too much distance and verti-

cal), and 2) one locker probably won't have enough storage capacity for the magnitude of folks who want to camp at Columbine Lake. The critical item for '92 is to get the trail fixed up so people can stay on the "official" trail and find the locker.

Little Five Lakes. The ranger station lake has the only locker east of the Great Western Divide on the Sawtooth/Blackrock loop. This year, almost everyone saw a bear (or had an incident), or camped nearby someone who did, on their way in to Little Five (i.e. at Columbine, Pinto, Spring, etc.). Many legions of visitors altered their plans to "lay over" at the ranger station lake because they knew about the locker there. (They also knew they could have a fire there, which added to the "magnetism" of the ranger station lake.) The result is that 5-10 groups camped here most nights during August, the locker overflowed, and I had to store extra food in the barrel behind the station. This was only a problem for two reasons: 1) I had to stay "home" or people would hang and lose the overflow, and 2) I received numerous complaints about overcrowding. Option one is to install a locker at Big Five Lakes, to alleviate overcrowding and overflow of the locker at Little Five. I recommend chaining the locker to a tree, visible from the trail, at the lowest Big Five Lake (i.e. Big Five #1 at 9830 elev.), and placing a note on the trail junction sign north of Big Five (at the top of the switchbacks leaving Big Five #1 for Little Five) guiding visitors coming from the north towards the locker. (Visitors coming from the south will pass, and should see, the locker.) Many experienced visitors like to camp at the upper Big Five Lakes, but ample trees are present, and they should be able to hang and defend their food. Option 2 is to remove the locker at Little Five and let the bears have everyone's food. (Just seeing if you're still awake.)

High Sierra Trail. Many incidents occurred this summer in upper Big Arroyo and Nine Lake Basin. I did not have time to evaluate specific sites for locker placement. Next year's ranger should evaluate the HST to see if additional locker(s) make sense. (The first camp area east of Kaweah Gap, and the Chagoopa Plateau are possibilities for completing a network of lockers which would be "one day apart.")

PATROL NOTES

Mineral King road patrol and trailhead rangers did not have a working system for picking up pack station permits and relaying trip itineraries to me. Despite several requests for advance notice of trip itineraries, I received only one radio call the entire summer from Mineral King staff to relay stock group itineraries. A system needs to be in place whereby permits are picked up daily from the Mineral King Pack Station, and itineraries relayed to the appropriate (i.e. Little Five, Kern, Hockett) backcountry rangers. It is critical that the backcountry rangers know the trip plans of stock parties and large backpacking parties, so that we can contact these groups in the field to deliver the minimum impact message.

It would be far better if pack station clients were issued permits by the NPS, because we could then control the information they receive prior to entering the backcountry, and we would know their plans (and be able to alter them before violations occur, such as grazing before opening dates). However, even if permits are issued by the NPS, trailhead or other sub-district staff must be responsible for relaying trip itineraries to the backcountry ranger(s), so that contact can be made in the field. Such systems work well at Grant Grove, Cedar Grove, and Lodgepole, and need to be implemented at Mineral King.

I was very surprised to learn that Mineral King trailhead staff rarely went on overnight patrols. The late afternoon, when visitors are "setting up camp," is the most common time to observe violations (i.e. tents on vegetation, camping too close to water or otherwise illegally, building illegal firepits, collecting firewood, etc.). Sierra District has recognized this by scheduling many backcountry/trailhead personnel on 1100-2000 patrol days. By only going on dayhikes, Mineral King trailhead personnel are missing the best opportunities to educate visitors in the field and to avoid violations before they occur. Trailhead personnel would be more effective if they "camped out."

I was also surprised to learn that Mineral King trailhead staff rarely ventured out of the Mineral King Valley. Other outlying areas need extra coverage by trailhead personnel, but have been mostly ignored (i.e. Cliff Creek, Pinto Lake, Forester Lake, etc.). Trailhead personnel also need to get into the backcountry to become familiar with the areas they are responsible for telling visitors about.

Three persons is not enough to adequately operate a trailhead operation in the Mineral King area. An additional one or two persons would allow them more time to complete work projects and patrol areas outside of the Mineral King Valley itself.

The Cliff Creek area, although technically in the Giant Forest sub-district, needs more coverage by the Mineral King trailhead staff and the Little Five ranger. Violations of the campfire prohibition occur regularly at Spring Lake, and this site requires a substantial effort to keep free of fire rings and fire scars. It would be a good site for a directed Scout or Outward Bound work project, if this can be arranged (to remove evidence of campfires). Pinto Lake should be closed to fires. If managers make the decision, a large effort will be required to remove all the historic firepits.

I suggest that a cache box be installed at Pinto Lake for rangers' use. It should contain all the basics: sleeping bag, pad, tent, stove, fuel, utensils, food, tools, etc. This would make it possible for back-country, frontcountry and/or trailhead rangers to efficiently patrol the area. For instance, if a cache were present at Pinto Lake, Mineral King staff could hike over Timber Gap, clean up the Cliff Creek crossing sites and proceed to Pinto Lake. They could then comfortably camp at Pinto, and work around Pinto the following day, spending a second night there. The third day, proceed up Cliff Creek, work for a few hours at Spring Lake, and hike out over Glacier Pass, all without having to carry heavy loads (just a super-light bivy bag & shovel, and some extra food). We could pack in the supplies each spring on a mule when the commercial packers (or trail crew) are going that way (i.e. plan ahead so it doesn't require a special trip). Have everyone purchase and mark their own food at the beginning of the season and have it ready with the gear to get on the first available trip. One of us will have to be at Pinto Lake to meet the packer and pack the cache. In the fall, bring the tent, sleeping bag and stove out "on foot" (heavy food items will have been consumed) for winter storage. Similar systems work great up in "the other Park" (i.e. Kings Canyon).

ACTION ITEM #1

Kern drainage campfire regulations

THE PROBLEM:

Most everyone agrees that the campfire limit (11,200 ft.) in the Kern River drainage is too high. Impact continues to occur in areas where fuels are scarce; visitors exhaust ground fuels and seek firewood from standing trees. Concern has also been expressed that downed logs are being damaged which may provide significant information to researchers studying past climatic history.

DISCUSSION:

Resolution of the problem has been controversial. At the SEKI fall backcountry management meeting in 1989, a proposal was tentatively adopted to lower the elevational campfire limit in the Kern. This proposal was later dropped when strong objections were received from the Backcountry Horsepersons, who felt that campfires should only be prohibited at specific (posted) sites where a demonstrated shortage of fuel exists.

The current system of campfire regulation in the Kern drainage has several shortcomings. First, by adopting site specific closures as opposed to an elevational limit, it becomes necessary to attach a detailed list of fire regulations to visitors' backcountry permits. This is problematic because visitors have a "saturation point" beyond which information received is not assimilated. At least two distinct processes are at work here: 1) as permit attachments grow in volume, visitors become overwhelmed by the size of the "mess" they've just been handed, and they tend to disregard the whole package, and 2) the most important minimum-impact messages (i.e. bury your excrement, store your food, and extinguish your fire, etc.) become "lost" in a heap of paper. We should strive for a single permit attachment which clearly emphasizes the most important points, yet contains all the pertinent regulations. I shall return to this point later.

The second major shortcoming of site-specific campfire closures is that they are more difficult for the visitor to understand. Visitors often do not see fire closure signs (profusion of signs is another problem) and/or do not receive this year's permit attachment. Elevation fire limits are much easier to understand and enforce.

Thirdly, and most importantly, site-specific campfire closures address only the symptoms, and not the real problem. The problem is that significant ecosystem alterations may result when campfires are allowed in high-elevation areas where fuel production is low. Site-specific wood shortages are merely a symptom resulting from the current (and past) distribution of use. By waiting for a demonstrated ground fuel shortage before closing a low production area to campfires, we are allowing foreseeable impact to occur before taking action.

If we continue to close only specific sites to fires, visitors will tend to shift to nearby areas where fires are allowed (as happened this summer at Little Five Lakes). As shortages occur in these areas, the list of closed sites will increase, and probably be amended almost annually. This will require more permit attachments, more work and confusion for permit issuers (who are often unfamiliar with the specific sites), and an incredibly complex network of closed areas.

RECOMMENDATION:

I recommend that SEKI adopt a conservative campfire elevation for the Kern drainage (such as 10,400 feet), and study areas above that elevation for specific opening to campfires. This offers several advantages:

1. Areas where wood production is low would be proactively protected from impact resulting from shifting use patterns.
2. The permit attachment (minimum-impact sheet) could simply state:

Wood fires are permitted only in the following areas:

KINGS CANYON NP - BELOW 10,000 FEET

Except: Fires prohibited at Granite Basin

KERN RIVER DRAINAGE - BELOW 10,400 FEET

Except: Fires prohibited above 10,000 ft. at
Nine Lake Basin/Big Arroyo

KAWEAH RIVER DRAINAGE - BELOW 8,000 FEET

NOTE: Fires are permitted above these elevations at a few specific locations. Contact the nearest ranger station for details.

This leaves room for more critical messages on the handout, and helps to prevent overwhelming the visitors with too much information.

3. As opposed to posting site-specific closures, only a few signs would be needed (at the trail entries to the Kern) which state: "FIRES PROHIBITED ABOVE 10,400 FEET IN THE KERN RIVER DRAINAGE".
4. I do not feel that areas above 10,400 ft. open to fires need to be posted. However, if managers decide to post excepted open areas, it is much more positive to post open areas than closed sites.
5. As fire regulations are amended (for example, to open specific areas above 10,400 ft.), we can avoid the annual enforcement nightmares that occur when visitors fail to learn about new closures. (It is not nearly as much of a problem if visitors are uninformed of newly opened areas, as if they are uninformed of newly closed areas.)

ACTION ITEM #2

Kaweah drainage campfire regulations

THE PROBLEM:

Downed firewood at Pinto Lake is scarce. Wood production is low. Visitors have exhausted ground fuels and are taking wood from standing trees.

DISCUSSION:

The current campfire limit in the Kaweah drainage is 9,000 feet, although Hamilton Lake (8200 feet) is closed to fires. Pinto Lake (8700 feet) should also be closed to fires (see reports by previous back-country rangers, including Bearpaw rangers).

Lowering the fire limit to 8,000 feet would make more sense than adopting a site-specific closure for Pinto Lake. An 8,000 foot limit recognizes that ample firewood does not exist in most areas above that elevation in the Kaweah drainage. An 8,000 foot limit would exclude both Pinto and Hamilton Lakes, preventing the need to list current (and future) problem areas as exceptions to the inadequate 9,000 foot limit. (Any areas between 8,000 and 9,000 feet which are determined to have adequate fuels for campfires could be opened as in the discussion for Action Item #1.)

RECOMMENDATION:

Prohibit fires in the Kaweah drainage above 8,000 feet.

ACTION ITEM #3

Stock management at Little Five Lakes

THE PROBLEM:

Stock continue to trample the closed meadow at the Little Five ranger station lake.

DISCUSSION:

The stringer meadow south of the ranger station has been closed to all grazing since 1978. The meadow is perpetually wet and is highly susceptible to trampling impacts.



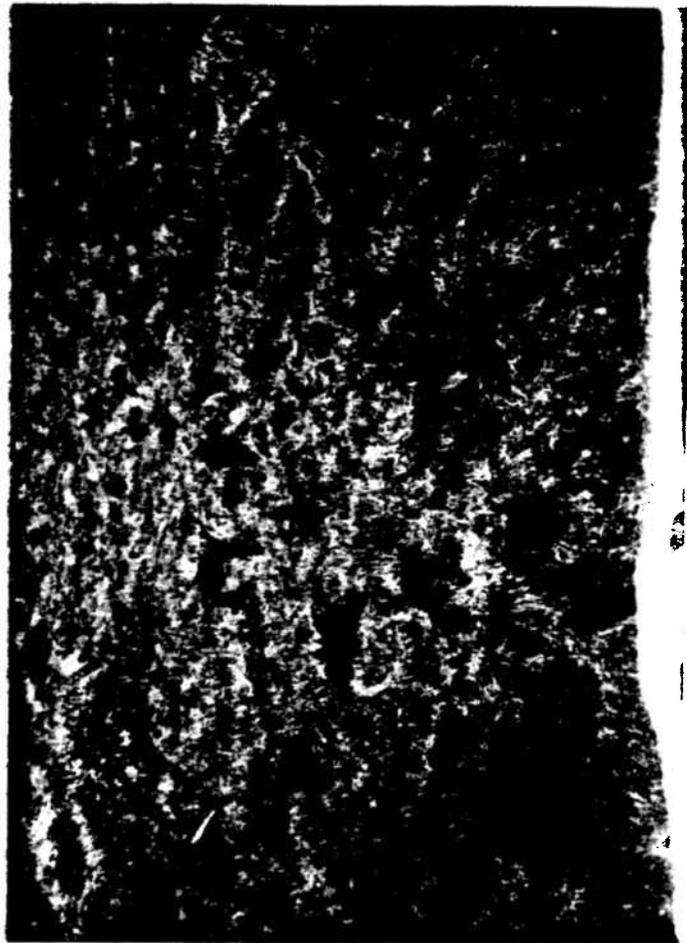
Photo 3-1 shows the proximity of the "closed" meadow to the "open" meadow.

The open meadow is too dry to support significant forage, and contains predominantly coarse, non-preferred feed such as Antennaria, etc. (Photo 3-2 shows non-preferred condition of the open meadow). Since the closed meadow contains fine grasses/sedges which are preferred by stock, animals released anywhere in this area quickly drift to (and remain in) the closed area, causing trampling impacts (see photos 3-3 through 3-10).



photo 3-2





Three options were explored in detail:

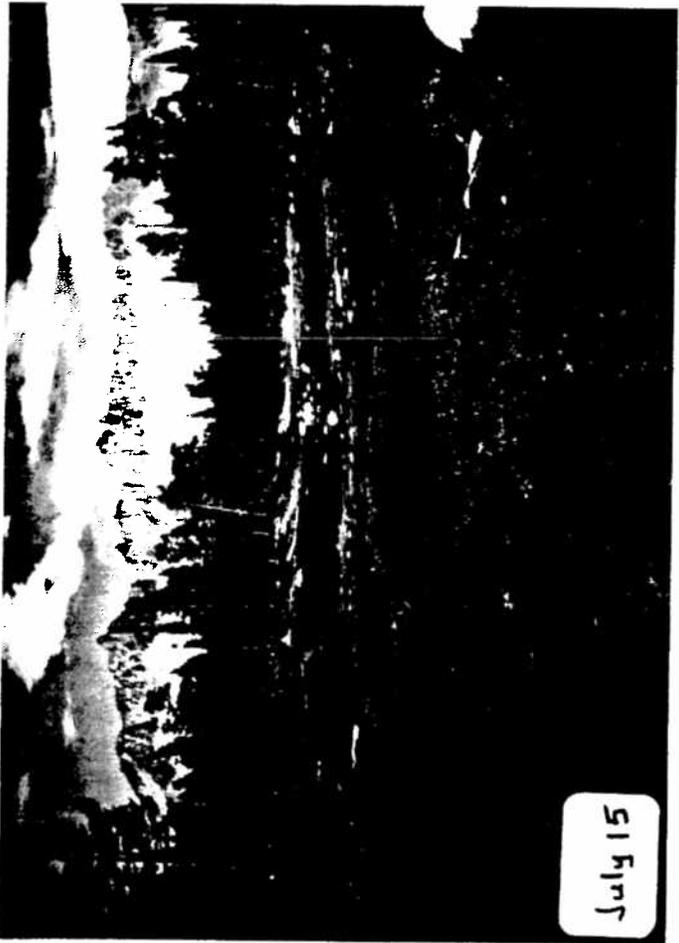
1. Allow grazing in the currently closed meadow, but adjust the opening date to provide time for the wet areas to dry out.
2. Prohibit grazing within 1/2 mile of the ranger station lake, to provide effective protection for the perpetually wet (closed) meadow.
3. Construct drift fences to keep stock out of wet areas.

I explored the first option since it was suggested previously in a report by Mike Neuman (Range Conservationist). Note that Mike visited the area during dry years. This year, the snowpack was estimated at 73 percent of normal, within the 50% to 150% range for a normal precipitation year.

Soils in the closed meadow remained wet throughout the 1991 season. Since the meadow does not dry out during a "normal" year, adjusting the opening date cannot realistically provide adequate protection. To illustrate this, I took photos at three points in the closed meadow on July 15, August 1, August 15, and September 1. (See photos 3-11 through 3-22). Seasonal changes in the vegetation are quite obvious, however if you look closely, you can see that the soil remained wet into September. Opening this meadow to grazing, even with adjusted opening dates, would result in increased (and in my view unacceptable) trampling impacts.

Drift fences do not appear to be feasible as at least one-half mile of fence would be required to exclude stock from the closed meadow, and the fence would have to be built right to the shore of the lake (which would not be popular with fisherpersons or photographers).

I spent considerable time looking for alternative forage areas, in hopes that something might be available near enough to be a feasible substitute yet far enough away to preclude stock from drifting back to the closed meadow. Don Bedell stated that he has used the meadow just north of the trail to Big Five at approx. 10,200 feet elevation. This meadow could be grazed by groups who want to camp at Little Five Lakes, although several concerns are noteworthy. First, stock will probably drift from this meadow up into the closed meadow. (Releasing stock here will reduce, but not eliminate, drift into the closed meadow at



July 15



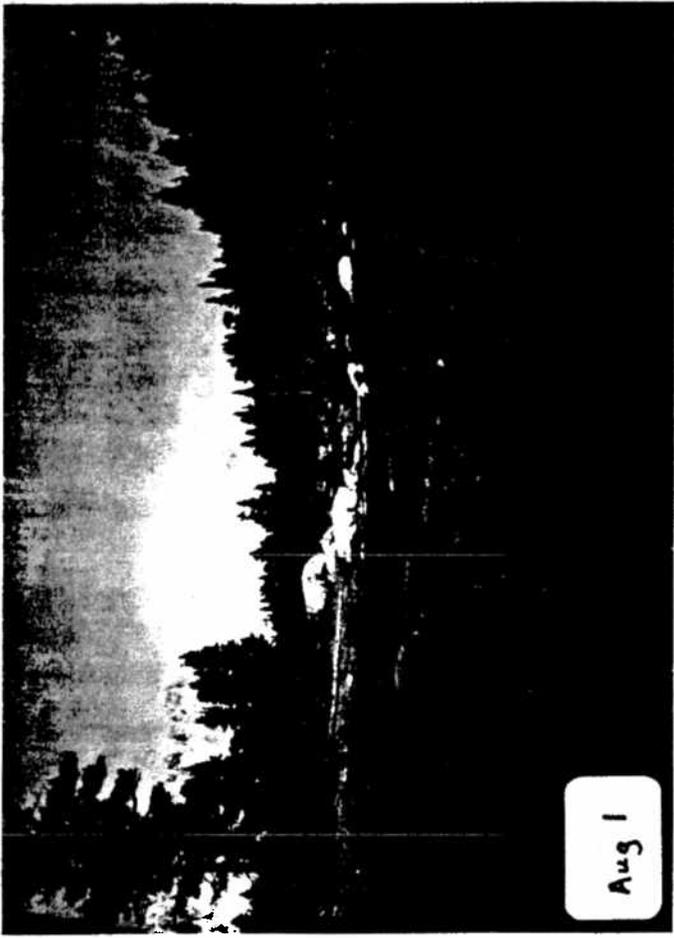
Aug 1



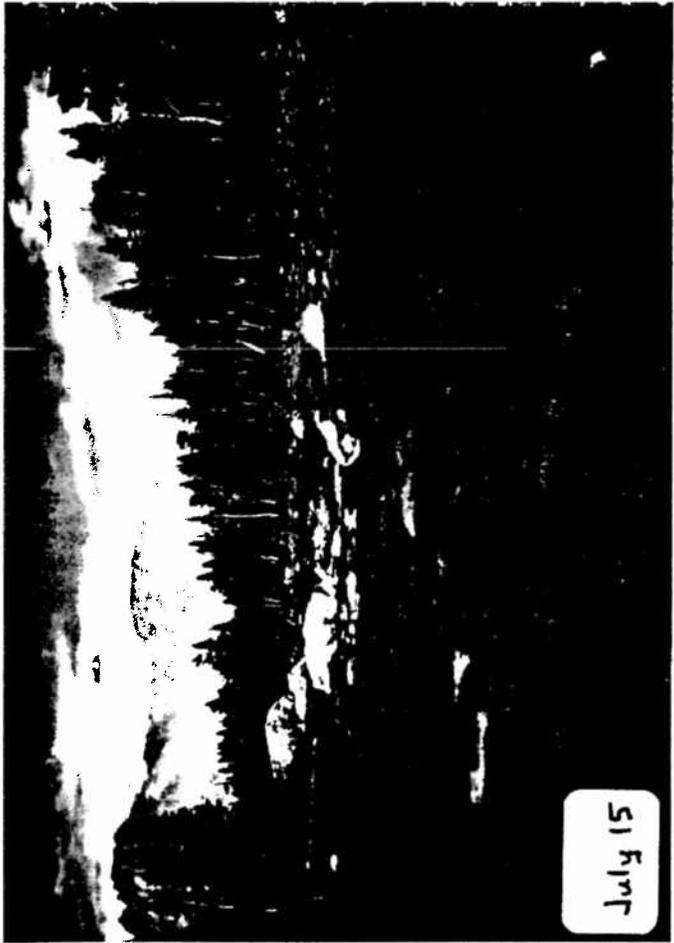
Aug 15



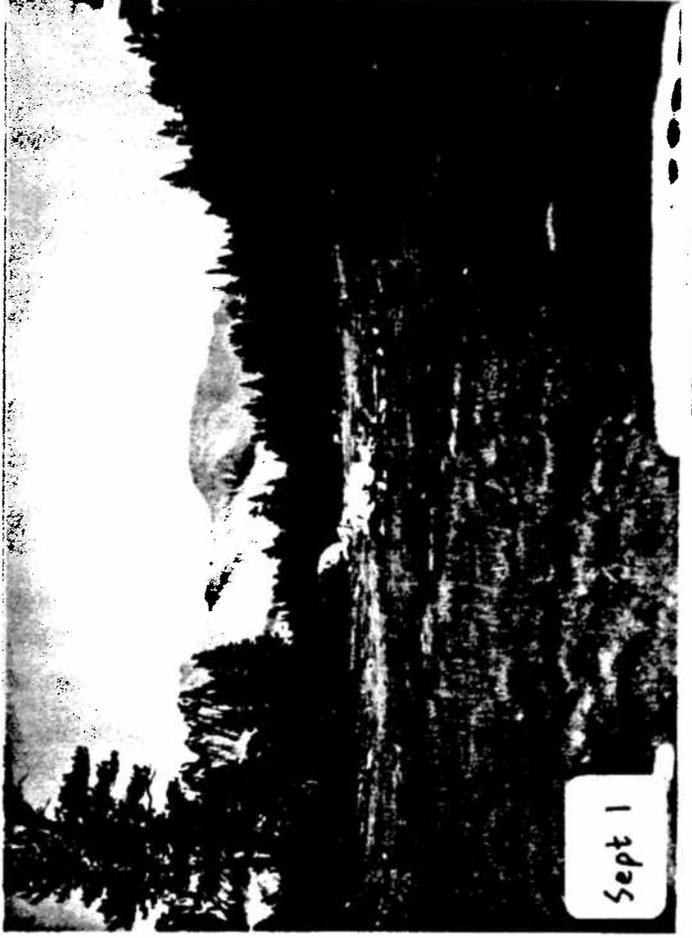
Sept 1



Aug 1



July 15



Sept 1



Aug 15



Aug 1



Sept 1



July 15



Aug 15

the ranger station). Second, this meadow, and areas along its inlet creek where stock will likely drift, stay wet well into the summer. If grazing is allowed, opening dates should be adjusted to prevent grazing until 7/15 (dry), 8/1 (normal), 8/15 (wet). Third, the meadow does not offer much feed, and would not support alot of use. Fourth, it would be a long walk for packers camped at Little Five to bring stock down to this meadow to graze. The temptation to release stock uphill of this meadow would be great, increasing the chance of drift into the closed area.

The "Long Lake drainage" is the only area at Little Five which could be responsibly grazed before the 7/15, 8/1, 8/15 opening dates. Only experienced packers who are familiar with the site (i.e. have been there before), and who will take extra measures to keep stock on the side slopes and away from the wet lakeshores and creekbeds should be allowed such a privilege. Stock should be released near where the main trail crosses the drainage, and NOT up at the traditional packer camp near Long Lake. (This requires packers to take stock about 1/2 mile down-canyon from the traditional camp before releasing their stock for the night.) The slopes around and above Long Lake dry out much later than the slopes downstream near the main trail. Stock are generally cooperative if released on the ridge just northwest of where the main trail crosses the drainage. There is only, however, enough forage here to accomodate a few early-season trips. The area should only be opened after being checked by the ranger, and early-season use should be strictly limited to only two or three trips.

Two other alternatives, which would be the most effective at reducing trampling impacts, are to allow only burros/llamas, or to prohibit grazing entirely and require packers to supply feed all season long when camped at Little Five Lakes.

RECOMMENDATION:

To provide protection for wet meadow areas, prohibit grazing at Little Five Lakes except by burros & llamas, or prohibit grazing entirely. This is necessary to prevent trampling impacts which occur when horses and mules drift from open areas into the closed wet meadows.

ACTION ITEM #4

Stock management at Big Five Lakes

THE PROBLEM:

Erosion is visibly evident in the forage areas at Big Five Lakes. Soil loss & compaction and streambank impacts are present in the meadow areas between lakes #4 and #5, and in the meadow areas leading up to "Hands and Knees Pass."

DISCUSSION:

Big Five is a very popular subalpine lake basin; visitors often complain about stock impacts present there. Trampling by stock has caused accelerated soil loss and streambank destabilization in the forage areas above Big Five #4 (see photos 4-1 through 4-8). The access route (basically an unmaintained user trail) to these upper Big Five Lakes is badly eroded due to stock use.

Don Bedell of Mineral King Pack Station has stated that his packers can keep stock out of the wet areas. I have seen nothing to indicate that this is likely or even possible (without packing in feed).

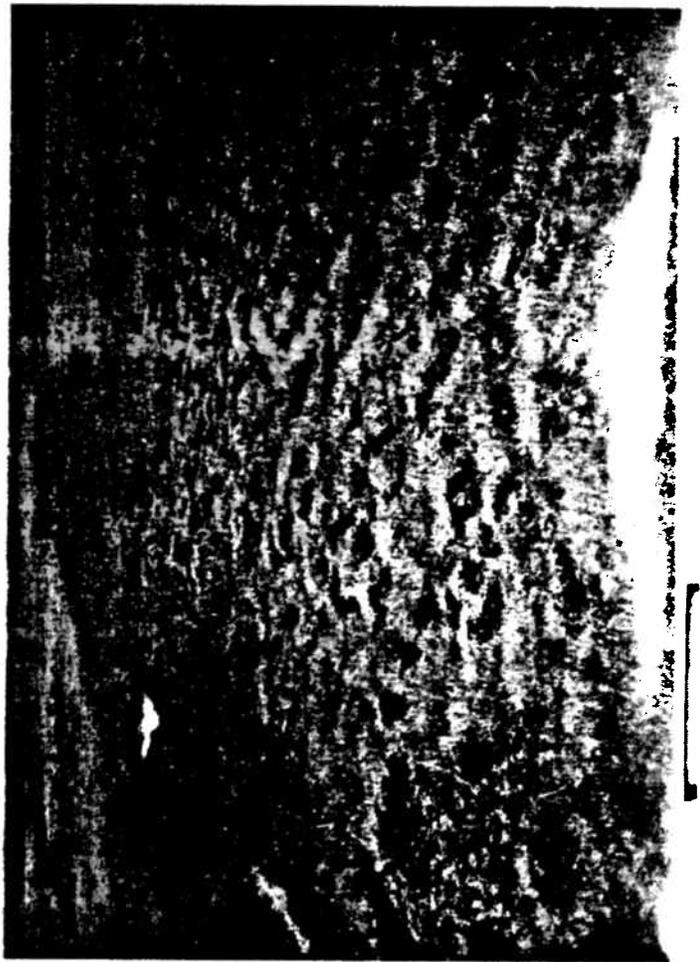
Options include closing the area to grazing, limiting grazing, and/or conducting research to provide additional information. Grazing will need to be significantly curtailed for limitations to be effective. (The soils remain saturated throughout the season in much of the forage areas; only a few nights of grazing per year by heavy animals may prevent this area from "healing.") One option (to avoid prohibiting grazing entirely) would be to allow only private walking burro (or llama) parties of five head or less.

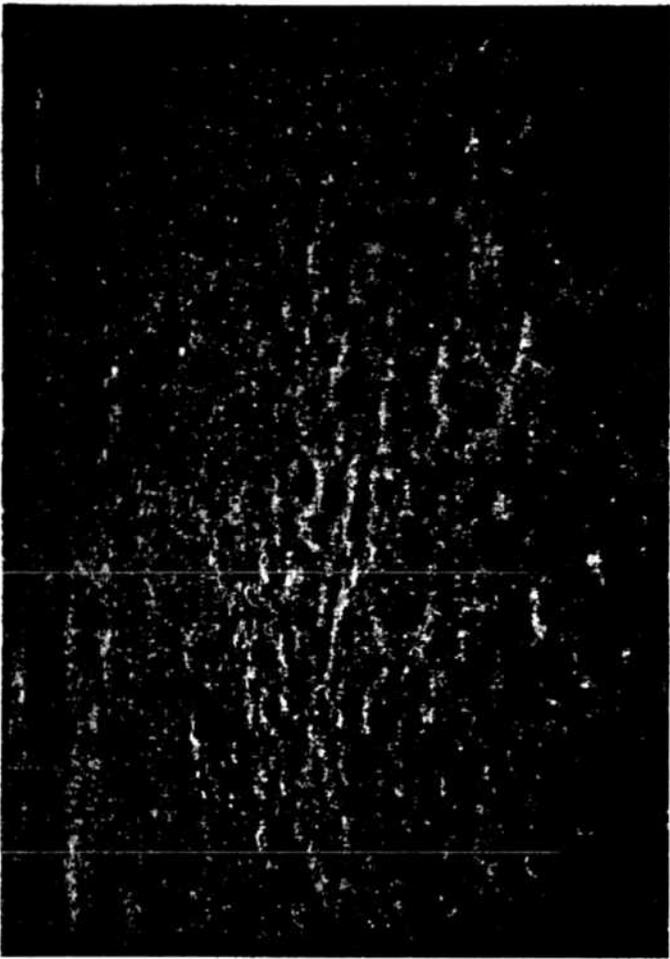
RECOMMENDATION:

Prohibit grazing, or limit grazing to private walking burro (or llama) parties only, with a five head limit, and perhaps also a one-night or two-night limit. Adopt the opening dates of 7/15 (dry), 8/1 (normal), and 8/15 (wet), as recommended by the SEKI Range Conservationist ("Recommendations for 1991 Meadow Management," by Michael Neuman, January 17, 1991).

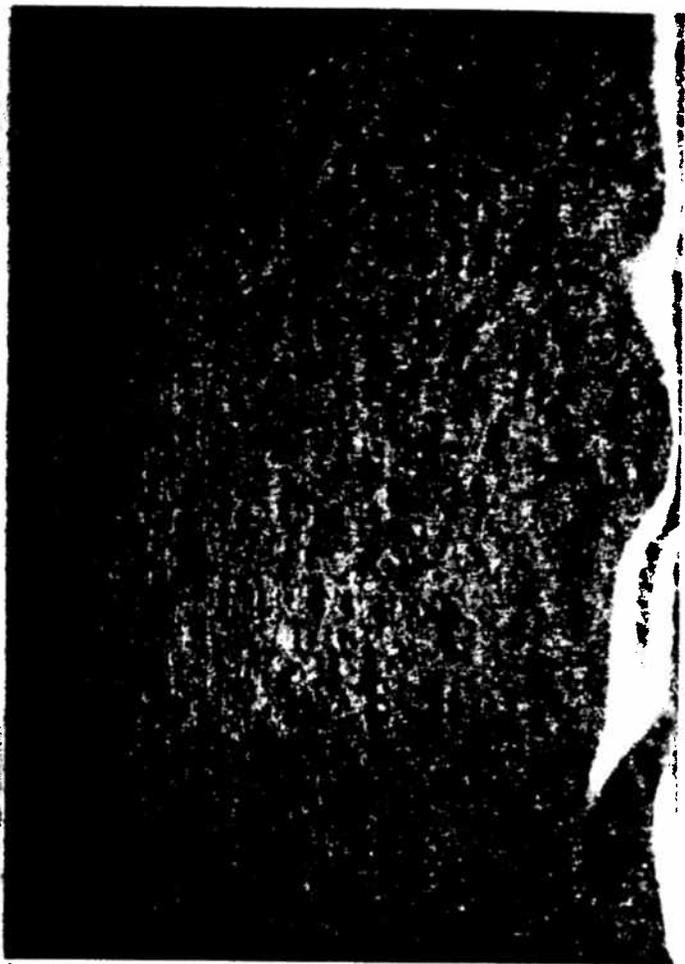


Page 47





page 49



ACTION ITEM #5

Stock management at Lost Creek and Soda Creek

THE PROBLEM:

Opening dates for grazing at Lost Creek and Soda Creek are insufficient to protect soils/meadows from trampling impacts.

DISCUSSION:

This year the forage areas in Lost and Soda Canyons remained wet over two weeks past the July 1 opening date. Tyler Johnson (Kern trail leader) visited upper Lost Canyon on July 15 and described it as "very wet." Jim Harvey (NPS packer) also passed through Lost Canyon on July 15, and commented that the meadows at the Big Five junction were only "marginally" ready for grazing due to wet soils. Case/incident report 100549 contains my own detailed observations.

Lost and Soda Canyons are physiographically similar to upper Rattlesnake Canyon, yet Lost/Soda currently opens for grazing two weeks earlier.

RECOMMENDATION:

Adjust opening dates (for all precipitation years) at Lost Creek and Soda Creek to coincide with opening dates at Upper Rattlesnake Creek.

Enclosure 9

Jacob



United States Department of the Interior

NATIONAL PARK SERVICE

SEQUOIA AND KINGS CANYON NATIONAL PARKS
THREE RIVERS, CALIFORNIA 93271



California's First National Park

IN REPLY REFER TO:
N1623

September 6, 1989

Memorandum

To: Superintendent

From: Chief Ranger

Subject: Wilderness Management

The purpose of this memo is to propose a new concept to our present methods of managing the backcountry of these Parks. I am convinced by discussion with Backcountry Rangers, letters from visitors, and personal observation that we need to improve our stewardship of some of the high lakes basins. These are the destination points of a substantial number of wilderness visitors. Many have walked two or three days to reach these destinations and expect the classic "Sierra Scene" as their reward. Our present Plan provides for preservation of this "scene" in a very inconsistent fashion.

Lets briefly review our evolution in terms of managing such places. Initially, we simply identified the most popular sites that seemed to need special management (ie. no wood fires, grazing closures, quotas, camping limits, designated campsites, etc) and established restrictions case by case. The list of such places and specific controls became longer and more complex each year. Then we attempted to shorten the list with respect to fire closures by---somewhat arbitrarily---establishing elevational closures. Since then, the list of exceptions to these elevation closures has grown considerably. Management of grazing has been based mainly upon biological rather than aesthetic considerations, and always with a cautious eye toward the often vocal stock interests. As a result such "destination" places as Milestone Basin, Crabtree Lakes, Center Basin, Miter Basin, Pear Lake, Wright Lakes, Rae Lakes, Evolution Lakes Basin, Dusy Basin, etc. etc. are managed in different ways. Some benefit from intense controls already; others enjoy virtually no special protection beyond basic fire elevational closures and general provisions of the Stock Use and Meadow Management Plan. The latter are quite vulnerable to severe impact. For example, on our recent visit to Milestone Basin we encountered several foot travelers who were very critical about the impact of stock in this place that they had

hiked several days to visit. A dozen or more letters in recent years have angrily and thoughtfully provided the same message. They are right! When Paul and I visited the Basin in late August manure and hoof prints were everywhere; the Basin was anything but natural. It was like driving a week to visit the Grand Canyon and finding it filled with smoke.

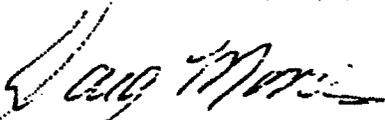
My proposal is that we apply the concept, possibly even the term, that has evolved with respect to restoration of fire in Sequoia Groves. Portions of these Groves have been identified as "Special Management Areas", in part because they are also among the most popular "destination points." Park Managers were apparently persuaded that certain places in these Groves should be judged as "Special" and that different criteria and standards should be applied to their management. I believe that we should also consider our high lakes basins as "Special Management Areas" and make every effort to uniformly perpetuate them in the most natural scene possible.

While the manure and grass consumption by stock can be defended biologically, this unnatural situation seems consistently judged to be an unacceptable intrusion upon the aesthetic values in these places. Uniformly closing these lake basins to overnight stock grazing should have minimal real impact on stock enthusiasts. The streamside meadows necessary for traditional stock travel in these Parks would be outside the scope of this proposal. Likewise, wood fires would be uniformly prohibited, again a restriction now in effect in virtually all of the high lakes basins.

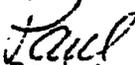
I believe the process to implement this concept would be as follows:

1. Gain consensus of Park Squad - something to be discussed on Squad trip.
2. Establish criteria under which such wilderness "Special Management Areas" would be identified.
3. Applying that criteria, list those areas.
4. Modify the Backcountry Management Plan accordingly - in compliance with NEPA as appropriate.
5. Communicate the new policies with the packers and visitors.

Your consideration and comments are most appreciated. A copy of this memo has been distributed to the Squad as well.


Douglas K. Morris
Chief Ranger

Concurred:


Paul A. Fodor
Sierra District Ranger

Enclosure 10

RECOMMENDATIONS
WILDERNESS MANAGEMENT STAFF
1991 SEASON

| | |
|----------------------------|----|
| ADMINISTRATIVE/SUPERVISORY | 2 |
| AIRCRAFT | 10 |
| CAMPFIRE REGULATIONS | 11 |
| MISCELLANEOUS | 13 |
| PACKERS/MEADOW MANAGEMENT | 18 |
| PUBLIC INFORMATION | 29 |
| RANGER STATIONS | 30 |
| REHABILITATION | 31 |
| RESUPPLIES/MOB-DEMOB | 31 |
| SIGNS | 32 |
| TRAILS | 33 |
| TRAINING | 34 |
| WILDERNESS PERMITS | 35 |
| WILDLIFE | 37 |

ADMINISTRATIVE/SUPERVISORY

1

Provide feedback to persons submitting recommendations/suggestions.

Response: The Sierra District has compiled and categorized 162 recommendations and comments submitted by the wilderness rangers in 1991. They have all been addressed and are included within this document. The fact that they have all been given time and attention does not mean to imply that they have all been resolved. Sierra District Management will continue to work on the important issues within it's operation and continue to provide feedback to our rangers in the field.(RC)

2

MK trailhead rangers would be more effective if they camped out and patrolled into adjacent areas of common concern.

Response: I agree and we will have trailhead rangers going out overnight routinely from Mineral King if we are funded for 3 positions. We have done so in the past but for long trips-5 day trips. Two day trips in the Mineral King basin are appropriate and will be frequent in the summer of 92. (RJB)

3

An additional 1-2 rangers are necessary for the MK trailhead operation to allow more time for work projects and to patrol areas adjacent to the MK Valley.

Response: I believe we can complete most of our field projects in the Mineral King basin with our current staffing level of three. It should be understood by everyone that Mineral King is not within any backcountry ranger's patrol area therefore field projects-placing signs, collecting trash, destroying fire pits etc. is all done by the trailhead staff. (RJB)

4

Cliff Creek area...needs more coverage by the MK staff and the Little Five ranger due to excessive campfire violations at Spring Lake.

Response: We'll include this in the priorities for the Little Five Ranger for the '92 season and see if the Mineral King TH staff will have any opportunities to assist at Spring Lake. (EM)

5

I suggest you approve it to be OK for us to be out on paid time for food 2-3 times per summer...not many of us will do that every summer, but approval should be there just because of our unique lack-of-fresh-food living situation.

Response: We have no way at the moment to authorize paid time for non-work time. We would like to provide opportunities for back country personnel to have fresh food as often as possible. We are going to provide a monthly resupply by air this year to help the cause. At the present time we do not anticipate authorizing work time for employees to be out of the back-country grocery shopping, however, we will consider a request by an employee to waive

the "sixth day overtime" in order to have two consecutive days off. The Kern SDR will be utilizing stock on some of his patrols this summer and will do some resupplying on those occasions.(RC)

6

Reduce the R.S. manual to one small volume...there is much in those 2 books we don't need.

Response: We will revise the ranger station manual this winter-spring. We intend to revise the ranger station manual into two parts; the "need-to-know" information and reference material.RC. I personally thought the small format manuals were excellent and provided most of the information the rangers needed in the field. With a good filing system at the station for the various forms needed maybe that is all that is necessary. (RJB) I agree with the above response. (ALN)

7

Reduce the ranger handbook to only those things useful to carry daily (e.g. remove the F.S. BC ranger guide)...redo the whole thing so it is readable...much of the photocopying is a blur & tiny print isn't worth the effort.

Response: We intend to revise the handbook this winter-spring. We will look at including "need-to-know" information for daily patrols only and improve the quality of the print.RC. As I stated above I thought the "handbook" manual was more functional than the station manual. Obviously a closer look at both is needed. (RJB)

8

Keep paperwork, reports, and assigned projects for BC rangers to an absolute minimum. The obvious fact is that all of this subtracts directly from time we can spend working on the land & with the wilderness visitor, & we are the only ones out here doing that.

Response: Unfortunately, documentation is a necessary exercise in today's world for a variety of reasons; liability, funding justification and , oh yes, AUO are just a few examples. The Sierra District Managers are committed to doing all that is reasonable to minimize paperwork and maximize time spent with the visitor. Specific and constructive recommendations to help us accomplish this goal are welcome. (RC)

9

SEKI has had an ongoing problem recruiting backcountry rangers with stock skills. Almost all of us who subscribe to NPS minimum impact philosophy and recognize the extent of damage by stock in the parks have qualms of conscience about using them, and most of us prefer to backpack. Most seasonal BC rangers assiduously avoid training in stock skills for fear that they would be "type cast" thereafter as "stock rangers" and limited to serving at Kern, Hockett or Roaring River. It has been suggested before, that elevating these positions to GS-6 would provide incentive for obtaining the extra skills needed and for serving in those relatively "low country" positions. The Animal Packers, who do nothing else, earn about 1 1/2 times as much as the stock ranger who needs

to have all the ranger skills as well. A GS-6 classification would not close the gap but would help!

Response: We have currently updated and revised the Backcountry Ranger P.D.'S and have requested that they be reviewed for classification by the Personnel Officer. There is a technical problem that I'll summarize. The 025 classification standards are two grade intervals at GS-5 and above. Positions can be classified at the 6 or 8 level based on lead or supervisory duties evaluated. Excepted qualification standards (which we must use for the seasonal employment servicewide program) require two seasons at the 6 level to qualify for the 7 level. Since our wilderness rangers won't have lead or supervisory responsibilities, it is unlikely that we will be able to classify them at the 6 level. Since our rangers have been 5's for many seasons, and not 6's, they will not be able to qualify at the 7 level. Stand-by for future developments.(RC)

10

If you wish to compensate commissioned rangers at a higher rate, you may want to look into the possibility of upgrading them to GS-6. The required backcountry skills at SEKI, plus an LE Commission, plus EMT qualification are certainly a more demanding set of requirements than those GAAR used to justify a GS-6 for their people.

Response: See #9 above.(RC).

11

An alternative to consider is converting the LE/EMT folks to subject to furlough (at the moment, your only Commissioned rangers are Rob, Randy & I-- and Julie if she gets better). We're also the ones who are most interested in doing the snow surveys. If you end up able to force the State DWR to give us the Kern Snow Survey route, and if we (ie Rob, Randy & I)ended up doing the survey, we'd end up working pretty close to the 6 months that OPM recommends (or requires??) for a STF appointment. Rob and I agree that getting STF--even at the GS-5 level--would be almost preferable. Yellowstone converted several of their long term seasonal backcountry folks to STF GS-6's, calling them "lead Rangers" & giving them some level of supervisory or training responsibilities (I think Mammoth Caves did something similar for their BC rangers, or at least got the GS-6). STF appointments were also commonly used during the 50s and early 60s for long term seasonals as a way of keeping their expertise and recognizing that they'd chosen a career (however tenuous) as seasonals. Just an alternative thought...Appreciate your making the attempt.

Response: It may sound heartless, but it is not sound financial management from the Park's standpoint. There is the added benefits ratio for FERS employees plus the government cost of health insurance during the furlough period plus the added cost to the retirement system (STF employees get 6 months free credit per work year towards retirement). Add to that the fact that we have a lot of other seasonal employees in these Park's who work more than the 6 months minimum whom we should consider for STF if we were to convert the Sierra Rangers. Lastly, if we establish these positions to STF we have no way to tell if the present incumbents are eligible to be considered (In the 50's & 60's it was done by Executive Order in which temporary

employees were converted to permanent STF). (RFC)

12

Although it would be nice to have everyone LE & EMT qualified, it would be a major hardship for a number of our BC rangers to take the 7 weeks off from their winter work and go through one of the LE training centers at their own expense. We're probably talking actual expenses of \$2,000 or so plus whatever they lose in salary during that period. Alden mentioned that you're revising the PD's to attempt to get GS-6 for LE/EMT rangers. If you pull this off, we'll probably dedicate a statue to you in the public square...

Response: We are willing to explore any reasonable ideas that you may have to assist long term non-commissioned rangers in acquiring their law enforcement commissions with the least amount of hardship. The Park will provide the First Responder training course. We plan to follow through with our program to provide enhanced visitor and resource protection (Level II Law Enforcement Commission and Level III EMS certification) by the summer of 1994.

New position descriptions were written and submitted this winter for classification. They reflect the duties, responsibilities and knowledge that we as managers feel are important for the wilderness ranger positions. They have recently been reclassified by the Personnel Officer as GS-025-05. Even with application of the highest bench mark for working independently without close supervisory controls the position does not meet criteria for a GS-6. (RC)

13

Sierra District has also been unique in the Service in that I think this is the last park that doesn't require LE Commissions for its backcountry rangers. I would strongly urge that this policy be maintained. Our strength lies not in the assorted "real ranger" certificates that many of us (myself included) collect--Commission, SAR training, Park Medic, EMT & etc.--but in our dedication to wilderness & backcountry. Our expertise comes from "on-the-job training" and common sense. There is not one person here who, official certificates of training or not, I would not feel completely comfortable working with on any EMS, SAR or even a law enforcement incident, even over frontcountry people who look good on paper.

Response: We agree that this is about the last "large" NPS area that doesn't require law enforcement commissions for its backcountry rangers. The intent of requiring any type of training in our operation is to strengthen the assurance of quality in the services that we provide - both to the public and the resource. Some of this training requires certification by policy or law. The acquisition and retention of these skills should in no way diminish your continued dedication to wilderness management. In fact, it is intended to further your knowledge, confidence and ability to better achieve our mission.

14

Continue the expertise and enthusiasm of Sierra District--both backcountry rangers and frontcountry office staff. I've been a seasonal for 22 years and with Sierra District for 15. To stay a "mere" seasonal that long is a sign of the incredibly positive working environment built by Paul, John and Alden over

the past years.

Response: Agreeably, expertise and enthusiasm are among the cornerstones of any operation. There is no doubt that past Sierra District personnel have these qualities, and more, and took pride in their temporary work force. Current "new" staff has come up through the seasonal ranks and understands the concerns of seasonals. We must work together on a progressive wilderness management program if we are to have any hope of fulfilling our commitment to preserving this special place. "Working together" entails maintaining operations on the basis of integrity, consistency, communication, incentive, reward, as well as, expertise and enthusiasm. There have been changes and there will no doubt be more changes, our job is to direct any changes towards improvement of operations and the protection of the resource. (EM)

The Sierra District Staff will continue to be enthusiastic and the Wilderness Reservation Office Staff definitely will remain helpful, courteous, and have open doors for the backcountry rangers. You are a wonderful group of hearty souls and we welcome your return. (GB)

Thank You! (ALN)

15

We could probably save time at training, and some headaches for you folks at the beginning of the season, if you could bring one of us on a week to 10 days early to go around to the different departments (research, fire, Law Enforcement, etc.) to see what projects/information they have for us while in the backcountry. We'd then write it up in a summary in a way that makes it clear from our point of view what needs to be done. Many of us feel that a lot of time is used up in training by information that could be more succinctly presented, or even just dealt with in a two page set of instructions. This same person could also contact all the rangers and find out what equipment (packs, stoves, white gas, etc.) they'd need for the season and have it ready when they arrive for training. This would save another full day of training-- putting us in the backcountry earlier.

Response: Alden will be assisting at Ash Mountain during spring training and mobilization. We will streamline training as much as possible without deleting those areas we feel are important. We will have equipment ready for mobilization based upon the "station needs lists" which were submitted at the end of the 1991 season. (EM)

We will stream line and organize the equipment issue process in 1992. (ALN)

16

Continue the long seasons, so that is a bonus.

Response: Long season's depend on the operation's needs and the dollars available to fund them. We will continue to select the employees that are best qualified to meet those needs. As we did last year, and if money allows, we will make an inquiry in early August to find out who may be available to extend their appointments to fill assignments (RC).

17

"Grandy's" is not the place to go for dinners to be sent in.

Response: TEN(10)-FOUR(4)!!! (EM)

18

Office folks often do not acknowledge our radio traffic with "copy" or "standby" and we are left hanging...don't know if it is our radio acting up/whether they heard us??

Response: The office staff will be trained to answer/acknowledge your calls appropriately. We regret any inconvenience and "letting you hang" ... we'll make a concerted effort to be 'on top' of the radio calls from this time forward. We would ask that when the backcountry rangers do call Sierra District they 'key' the mike (count to yourself) 1,001;1,002; then 735 Sierra and your call number. (By doing the keying and the counting you allow the repeaters to "come on" and we hear who you are calling. (GB)

19

Should radio be in front office?...problems trying to get someone to answer radio at check-in times.

Response: Since the Sub-district Rangers are not always in the office in summer months --a "squawk box" will be installed in the Backcountry Reservation Office so that the employee(s) on duty in that office can hear the radio and assist the backcountry rangers. (There just isn't anymore room, at present, to put the complete radio set up in the outer/front/first office). When the Sub-district Rangers are in the office they will then be able to hear the radio calls and can also answer the radio. PLEASE remember that there are five phones being answered and we cannot always "JUMP" to the radio; give us some time to politely put the caller "on hold" or explain that we have an emergency and take their name and phone number to call them back. This courtesy will be most gratefully appreciated by all. (GB)

20

Set-up AUO guidelines so all BC rangers are consistent in their interpretation of what constitutes AUO.

Response: AUO will continue in 1992. The guidelines have been established and will be included in the general training session. (RC).

These guidelines, once established, must be adhered to for the documentation will be crucial for application to the T&A and for audit purposes.(GB)

21

Pay non-commissioned BC rangers GS-5 due to level of responsibilities. Maybe pay commissioned BC rangers GS-6.

Response: Reference recommendations/responses #9, #10 & #11. (RC).

22

Seems absurd to spend the time tallying up all the data currently "required"

on year end reports (fire rings obliterated, fire rings maintained, sites maintained, etc)... so much of this is overlapping if it isn't being used for anything. Is it??

Response: The only information I need from rangers is stock use observations, which they began collecting in 1990. This information is becoming increasingly important as a way to verify stock use reports from commercial, private, and administrative packers, and to identify private packers who have not reported their use. This information doesn't overlap anything- wilderness permits show PLANNED trips, not actual trips; the information IS being used. (MJN)

I do not have an understanding of why this data has been collected. I am hesitant to discontinue collecting this data for fear it would jeopardize the objective for which it was originally determined to be needed. I will continue to investigate the purpose of this data with hopes of justifying whether it is still needed or not. (EM)

23

Why don't the Resources Management people get a directive or create their own directive to get recommitted and involved in the problems of the backcountry? Why is it that we have all these knowledgeable people and field experts totally involved in the problems of the frontcountry while we try to figure out so many complex ecological issues of the remoter places by the seats of our pants and simple-minded common sense and plain old opinionatedness?

Response: I like the suggestion that the Resource Management do more in the backcountry; but for most problems the backcountry rangers themselves may be the most qualified considering their many years of experience. (HW).

The Sierra District will work closely with Resource Management on issues of mutual concern. This will become more apparent in '92 in regards to bear management and other important issues. This is a good example of where a team approach can benefit wilderness and we need to aggressively pursue it. (RC).

24

Start incentive system for seasonal rangers to get/retain EMT cert. and LE Commission. The workplace-world seems to revolve around some sort of incentive system for added skills.

Response: The position descriptions for BC Rangers with and without LE & First Responder qualifications have been revised and classified. EM

The knowledge and skills required for the wilderness ranger jobs such as basic SAR, LE commissions and First Responder (EMS Level III) are not added skills; but requirements to meet minimum standards for the job. We are allowing a phase in period (1994 season) for the long term seasonal rangers who do not currently possess these qualifications but may work toward obtaining them. An incentive award program is in place for all Park employees and I encourage the Sierra District supervisors to use it as a method to recognize outstanding performance by our seasonal staff. RC.

25

Make better use of fire recon flights, trail crew flights, or packers in getting supplies & mail to BC rangers.

Response: We will continue to coordinate with Trails & Fire Ops to get supplies & mail to BC rangers as timely as possible. EM.

We have a schedule for resupply for 1992. Mail is simply a continuing struggle. ALN

26

If we (BC rangers) receive groceries, mail, and govt supplies morale stays high and we can take care of the rest.

Response: We will schedule monthly aerial resupplies in July & August for all stations and September & October for extended tours. We will continue to coordinate with Trails & Fire Ops along these lines. EM Those of us in the frontcountry DO appreciate how important resupplies are for you folks and will continue to do our best to meet your needs. Some restructuring is needed however in the WAY we manage your resupplies. A standardized shopping list, specific days for order submissions, etc. are in the works. (RJB)

27

Only 2-3 days of preseason training...we're already trained-we don't need more.

Response: We are planning 3 days of general BC training (June 8-10) with a 2 day add on (June 11-12) for those interested in working with stock. There are certain details of training and administration that we feel are necessary to address and this gathering provides the most efficient means to catch everyone at once. (EM)

I don't feel that 3-5 days of training before you disappear into the backcountry is excessive but I certainly agree that meaningful training has to be our purpose. Perhaps we developed a pattern in our training and we need to look at fresh ideas and topics for the future which I think you will see in 1992. (RJB)

28

Continue "low-key" supervision...most of the time we know what needs to be done (please-no lists of projects).

Response: We realize that BC rangers generally know what needs to be done on a daily basis and we're not going to hold your hands while you're doing your job. However, we are managing the backcountry as a whole and viewing each individuals contributions to the overall program. You may be asked to contribute to projects we feel are important to the District as a whole. (EM)

No one intends to smother you folks with supervision but you surely realize that there may be a difference in what we feel backcountry priorities and projects should be. Micro-managing backcountry rangers won't happen. (RJB)

29

Continue feedback concerning low-flying aircraft or calling them in will seem worthless after awhile.

Response: Agree. In fact, based on your reports last year, we have been able to identify one problem source (Air National Guard in Fresno) and have taken steps to stop their "weekend flights" up the Kern. We were fortunate in our timing this winter to have our message taken to all military installations in the adjacent areas by a team of supervisory flight personnel who were making the rounds for other closely related reasons. I have developed contacts with flight commanders at China Lake and Edwards and they have indicated to me that they will work to minimize/cease all low level flights over the Parks. We are also involved this summer in a nationwide program (40 NPS areas) that the National Park Service has entered into as a result of a Congressional mandate.

The program is being administered by private contractors and contains many elements. The one that we will be involved in providing support to is a visitor survey to determine the social impacts of the low flying aircraft. Both wilderness and front country visitors will be surveyed.

In addition, I have a pack trip planned in the Kern this summer with a Lieutenant Commander from China Lake who is interested enough in resolving the problem to come to the Park to get an on the ground perspective. I hope to involve his counterpart from Edwards AFB on the same trip. (RC)

AIRCRAFT

1

Aircraft overflights (Upper Kern)...on some days it seems there's barely a minute when one doesn't hear jet noise (see reports from the past 3 years' aircraft observation days)...it's horrifying-depressing-aggravating...the low-fliers are one problem, but an almost worse problem is the hordes who fly "legally" between 2000-10,000' AGL. It's like living next to a freeway...if you want a crusade, Randy, figure out a way to make the airspace below 30,000' over the Parks inviolable. I will PERSONALLY present you with the Holy Grail...it's the worse abuse in the Park-worse than stock & fires.

Response: I think that the key to achieving a resolution to this issue (like many of the others) is like eating an elephant..... one bite at a time. Let's work on the mavericks first.....then we'll see what the possibilities are of a long term solution, ie. "Restricted Zone". (RC).

2

Military jets continue to violate what this park is all about...the reporting system does not work...we need to expose them by media and put pressure on Congress. A video with sound should be made from Mt Whitney and used to show the public this problem...the park has never tried this way and I believe this is the obvious next step.

Response: I think your recommendation has merit. We will try to pursue it in '92. I also want to take the opportunity this season to see if we've had any

impact this winter in presenting the information that you provided us, through your reports last summer. We must continue to explore all reasonable avenues to mitigate this problem.(RC)

3

All air traffic over this park should be stopped...it is not only disturbing to the peace, it is dangerous to hiker and climber safety as well. Between 1984 and 1987 I recorded two incidents involving visitor safety from low-flying jets (one involving falling ice on the mountaineers route and another where a young girl almost leapt over the side of Mt Whitney from fright).

Response: I need these actual, documented cases to support our position. Can you help with the specifics?

CAMPFIRE REGULATIONS

1

By waiting for a demonstrated ground fuel shortage before closing a low production (firewood) area to campfires, we are allowing foreseeable impact to occur before taking action. I recommend that SEKI adopt a conservative campfire elevation (10,400') for the Kern drainage, and study areas above that elevation for specific opening to campfires.

Response: This issue is addressed in the new wilderness management plan.(ALN)

2

Pinto Lake campfire regs...downed firewood is scarce---wood production is low---visitors have exhausted ground fuels and are taking wood from standing trees. I recommend prohibiting fires in the Kaweah drainage above 8,000.'

Response: Fire closures are a combination of elevational and local closures. The area ranger can document a problem and get a local area closed. (ALN)

3

Spend sufficient time/resources to completely eliminate fire scars in closure areas, or visitors will rapidly rebuild fire pits. BC rangers already know this, but managers and trailhead supervisors often allocate insufficient resources to do the job "right".

Response: Unfortunately, there are only so many resources to allocate to the many concerns of the District. There are other concerns that we would like to allocate more resources to also, but cannot. (EM)

We are ahead of where it all started in 1960.... Reclaiming the wilderness is going to be a one step at a time process. ALN

4

Everyone who's ever worked in the Kern agrees the fire limit needs to be lowered...in many places 11,200' is ABOVE tree line...in others, trees are slow-growing and stunted above 10,400'. People rapidly use the small wood and then either hack branches off standing snags/trees or burn enormous logs...much of the wood being burned is ancient. In the Kern-Kaweah above

Gallats Lake (10,000) there is almost no bare ground other than rock...the rest is grassy...so people build fires right on the grass (I found four fire-troughs right in the meadow at 10,300'). The practice of setting a fire-limit for each small drainage is cumbersome and confusing for visitors. I believe we should lower the limit to 10,400' in the Kern and make exceptions for a few areas where fires will be allowed higher than the limit...most urgent places to restrict wood fires (Tyndall area) are the Upper Kern and the Kern-Kaweah.

Response: This issue is addressed in the new draft wilderness plan. ALN

5

No fires should be allowed on (near) the Muir Trail between Vidette Meadow and Wright Creek...this is what the new reg was meant to do, but doesn't. Lowering the limit to 10,400' would solve problems.

Response:

As in #4 above. (ALN)

6

It would help if we could standardize the fire regulations.

Response: Agree. As in #4 above. (ALN)

7

I suggest a strong effort to start weaning people from campfires...there is no question the mountains would be cleaner & look better if people didn't have fires...and that would leave the wood for the mountains.

Response: We do suggest this in all of our hand out material. See campfire discussion in new wilderness plan. (ALN)

8

The fire regulations at the Kern are too confusing. As currently written I find them unenforceable. We need to set a lower limit (say, 10,400') and then make a few exceptions for specific signed sites where fires are allowed (no more than 4-6 exceptions probably need be made, mostly at "traditional" stock sites).

Response: See fire discussion in new wilderness plan. (ALN)

9

Do not indefinitely depend upon local downed trees at Charlotte Lake for firewood...not enough dead trees to totally support wood stove (currently sufficient wood for winter & probably 92 summer season).

Response: A pellet stove has been purchased for Charlotte. It is currently being modified for high elevation use. (ALN)

10

What would happen if we tried to get stock users, especially commercial packers, to shovel ash out of their fire pits before they leave camp? Object

would be to keep some fire pits from growing up into belly high castles.

Response: Harvey and Morey will include this suggestion in the subject matter for early-season sessions with the packers. Some outfits are pretty good about doing this, with a little coaxing, maybe the others will follow suit. (EM)

In the big picture, some people build fire pits and some people unbuild them. Mostly rangers unbuild. (ALN)

MISCELLANEOUS

1

I suggest that a cache box be installed at Pinto Lake for rangers' use. Contents = sleeping bag, pad, tent, stove, fuel, utensils, food, tools, etc. This would make it possible for BC, FC, and TH rangers to efficiently patrol this area.

Response: Blain, Morey and Tschohl will discuss this idea and work out the logistics if deemed feasible. (EM)

2

Spring Lake...would be a good site for a directed Scout or Outward Bound work project to remove evidence of campfires.

Response: We have added this to the list of projects for work groups to do. ALN

3

Let's consider buying plastic hand trowels in bulk, and pass them out (or sell them for cost) at trailheads. (When you empty your bowel, use your trowel.)

Response: We will talk to the Natural History Association about the idea! ALN4 The closures have made a tremendous difference...the camp areas look as good as if they'd been closed for recovery...despite the hassles, the new regs are, by and large, serving their purpose.

Response: (What closures?) I believe our goal is, or should be, to develop regulations that are clear, concise, and logical. This improves compliance by keeping relations with visitors positive, and makes action easier when enforcement is needed. When in the short term it appears we're not making much progress, think back over the past thirty years and it becomes clear how much we've accomplished! (MJN)

5

The Mt Whitney Hut is obsolete and a hazard to visitor safety and should be removed.

Response: This was the position that the Sierra District took on the issue as well as our counterparts in the Inyo National Forest. However, due to historical preservation considerations, it was determined by Park Management that the preferred alternative is to install a lightning protection system in early June of 1992. Warning signs will continue to be posted to advise the public to descend from the summit during periods of storm activity. (RC)

6

Gather a file in Sierra District office (if it doesn't exist) of all backcountry reports & use that file as reference...some of what I's asked to report is repetitive...and a R.S. file of that area's past reports would be useful.

Response: Reports are currently compiled by year back to 1975. Several people routinely refer to these reports. (EM)

7

Sierra District has for a number of years been a very well run organization...the backcountry has been well managed and is generally in good condition. Just carrying on the tradition would not be all bad. I would suggest approaching change with care.

Response: Care and full consideration of your input will be major elements in the decision making process. Behind every change will be a reason to justify the action. Our intent is to make decisions based on the best information available and we recognize that in many cases you will be the best source. (RC)

8

The practice of assigning the mounted BC rangers a horse & mule should be changed to two horses...the horses should be cool blooded and both should be capable of being packed, ridden and be able to be left alone in the pasture...this practice will cut down on unneeded stock on the trail (mules can't as a rule be left alone), allowing the ranger greater flexibility...save wear on the shoes and be more in line with Park Stock Use Plans and Policy.

Response: I will discuss this with Roy Lee. (EM).

There are really four considerations here, (1) the impact of a extra animal on the trail system during routine patrols,(2) the inconvenience factor for the ranger having to drag the mule around on routine patrol and , (3) the impact of an extra horse being left to graze the Hockett pasture all day with the mule, (4) the extra head of stock also costs money which would not appear to be a real good return for the dollars spent. (RJB)

9

Trailhead rangers should work with backcountry rangers to share ideas & workload. Working by one's self all the time does not promote development of skills.

Response: I agree that it would be good to have trailhead rangers spend some time with a backcountry ranger which I thought normally happened as the trailhead staff visited various ranger stations. I know it happened at Hockett though maybe not on a regular or scheduled basis. (RJB)

10

Trailhead rangers should do more overnights. Presently trailhead rangers in MK do mostly day trips and therefore do not contact visitors at dusk who are

setting up camp (too close to water, building fires, grazing closed meadows, leaving food out, etc...) Visitors who are contacted while hiking during the day tend to forget(?) what rangers told them by the time they set up camp.

Response: I believe this was answered in another section; the same question. I agree with the rangers spending more overnights; probably one overnight per week per ranger and the rest of his/her workdays in the office or patrols as needed. (EM)

11

Continue having Onion Valley trailhead ranger with Mt Gould Channel 3 capabilities on their radio.

Response: This is the plan. We all feel this is important to enhance eastside communications. (ALN)

12

Continue having local rangers stock snow survey supplies.

Response: We will continue to have our wilderness rangers supply and inventory the snow survey supplies. This was resolved in the fall of '91. (RC).

13

Fix or move Mt Gould repeater (not your problem, but you could impress upon radio shop how much we need the repeaters. It was totally dead 8/25 to present).

Response: There is a new repeater poised at the radio shop to go to Mt Gould spring '92. Helicopter priorities and logistics did not allow the radio shop to address the problems in '91 as well as they wanted. (EM)

This was a bad scene. The Gould repeater is high priority and should always be working. (ALN)

14

Visitors should not be allowed to store food caches in barrels at Ranger Stations...sets a dangerous precedent.

Response: I agree. (EM).

I understand the need for food caches on long trips but I don't believe most of our "cachers" are long distance hikers. Barrels at stations are supposed to be for packers to drop caches into so that food storage boxes don't get overwhelmed. Let's discuss this one; maybe abolish our involvement with caches altogether. Backpackers often "strip" the food at the cache and leave considerable garbage in the barrels to save weight. (RJB)

The concept of the barrels at ranger stations is that commercial packers leave food drops there! ALN

Obviously, we are not altogether on this issue. Let's keep the communication going and try for a resolution in '92. RC.

15

We have to increase our vigilance in the Baxter Canyon area and probably try to run a late season patrol...Bighorn Sheep poaching...campers not using MI practices or following regs.

Response: We are aware of the problems. We are working on them with state fish and game wardens too. ALN

16

I believe that rangers and trail crew now constitute the 2nd largest impact on the backcountry (stock use 1st). We've got to get our administrative act together.

Response: Impacts to the wilderness, caused by our own administrative use is an issue that we have direct control over. However, we as managers need to determine, through justifiable means, what impacts are allowable and commit to them. Standards established for the public to abide by are weakened by poor example. (RC)

17

The plumbing at the Corp of Engineers snow pillow at Tyndall looks tenuous. I think it ought to be redone. Much of the pipe and hose is exposed and there is a significant danger of it leaking, spilling a large amount of toxic anti-freeze.

Response: This comment was forwarded to the CA. Snow Survey Office in Sacramento. They called me last fall and said that they were intending to act on your observation right away. Please verify that corrections have been made and let me know this summer.(RC)

18

Some organization is apparently putting new register boxes on summits and bolting them into place. These are much larger than the usual Sierra Club boxes and uglier. We should make an effort to find out who these folks are and prohibit or regulate their actions to a very few popular peaks.

Response: I've personally looked into this. There is a "Sierra Register Committee" that plays an active role in preserving historical mountaineering records. Historical records are placed in the Sierra Club Archives at the Bancroft Library, U.C. Berkeley. They have an M.O.U. with the Park to "anchor" boxes to the summits to prevent thefts. However, the means by which they are to be anchored, where they are to be placed, etc. is to be determined by the Park. I will meet with their representative in '92 to further clarify the "rules" by which registers may be placed. We (Sierra District) agree with your input that installation of these boxes should be limited and impacts minimized. (RC)

19

There is still an outhouse proposed for Guitar Lake. I strongly oppose this...they do nothing but create more problems, attracting marmots and filling up with garbage. Although Guitar Lake has sanitation problems, I found

conditions were helped last year by a strongly worded sign. Until this method obviously fails, there is no need for an outhouse.

Response: The proposal for sanitation facilities at Guitar Lake has been approved. Taken into consideration were various proposals, the degree of historical impact, and the current and future use projections. Specifically, the reduced trailhead quotas for Mt. Whitney on the eastside (from 100 to 50 per day) and a \$3.00 permit processing charge by the USFS has led to an increase in backpacker activity approaching Whitney from the west. This in turn, has resulted in greater impacts to the area surrounding Guitar Lake. We feel that this trend is likely to continue with or without the presence of a latrine. It will be a vault type and is scheduled to be installed during the '92 season. (RC).

20

BC rangers need a secure place to store weapons...NPS 9 standards

Response: Yes they do. NPS-9 standards are not practical for backcountry weapon storage though, so we need to explore metal boxes or keeping of the weapons in food storage boxes for stations that have them. Gun safes in the backcountry probably are not feasible. Rangers in the frontcountry are also faced with the dilemma when storing their weapon at home. (RJB).

21

Fanny Pack Holsters for BC rangers...Durkee's got ideas...\$50 apiece.

Response: I see George has been window shopping through catalogs again! Get us a copy of the advertisement and we'll consider it's merits. Please do a comparative analysis as to why a backpack or conventional holster doesn't suffice. (RJB)

22

Inoculate seasonal EMT's for Hepatitis B...should be a standard procedure for all first responders.

Response: WRO is seeking additional funding from WASO to provide hepatitis B vaccinations for employees who qualify under WRO guidelines (seasonal & permanent rangers qualify). This is expected to happen before the '93 season. In the meantime, if you would like to go to NAS Lemoore, we have a program established for you to receive a vaccination at no cost. If interested contact Dave Ashe at 713. (RC)

23

I feel we should be able to enforce a 100' camping limit from water where terrain permits, yet the regs read as though it is a suggested limit...different rangers interpret the reg differently, compounding the problem.

Response: We are addressing section 2.10 b (3) of the Compendium of Superintendent's Designations. The basis for this reg comes from 36 CFR 2.10 (b)(3) which states " The following are prohibited: Camping..... within

100 feet of a flowing stream, river or body of water, except as designated." To qualify this reg for our use, we have permitted camping between 25-100 feet from a flowing stream, river, or body of water as a rule, and "begun" designating (2.10 b(3)(ii)) those areas where "camping within 100 feet of water is prohibited". We need to continue adding to this list as existing campsites are relocated beyond the 100 foot line and new "candidate-areas" are determined. To give enforcement an additional tool, "the construction of new sites within 100 feet of water is prohibited" under 2.10 b(3)(i) in the Compendium. We should be using this when someone rebuilds a campsite that we have previously removed to a suitable location further from the water. EM per PA.

24

Removal of airplane wreckage at the base of Darwin Glacier...once sacked for removal, not removed and sacks have disintegrated. Helitack coordinated prior to resacking...6-10 sacks for 400-500lbs. I would suggest that we bag it up and have the military haul it out as it is a recent military crash.

Response: We will do this in 1992. ALN

PACKERS/MEADOW MANAGEMENT

1

Close the eastern side of the Great Western Divide (so called "Western Kern Plateau" in the grazing regulations) to unlimited off-trail stock use. It should never have been opened...we were bamboozled on that.

Response: In the new Wilderness Management Plan, there is no provision for off-trail stock use. Instead, traditional routes will be approved on a case-by-case basis. On the west Kern, this will result in closure of Crytes and Laurel Creeks at the very least. The only areas likely to remain open (along traditional routes) will be Big Arroyo and Chagoopa Plateau. I don't know what will become of South Rattlesnake Cyn. and the trail that's formed to reach it. MJN

2

Get the stock out of the meadows and into their nosebags by requiring stock users to carry feed. That will be an intense political battle!

Response: It is mathematically impossible for stock users to carry enough feed for a long trip. Considering that one animal can carry five animal-nights of feed, a week-long trip with ten head of riding and dunnage animals would require an additional fourteen head of animals just to carry feed for the first ten. The additional fourteen would require another twenty head to carry their feed, etc. etc. The places where carrying feed works typically have shorter trips, less remote backcountry, and better trailhead access. MJN

We can work to reduce grazing and require more supplemental feeding in areas which are less appropriate for grazing (higher elevations)...allow more grazing and require less supplemental feeding in areas which are more appropriate for grazing (lower elevations). The key is developing resource sensitivity through information, education and enforcement. EM

3

John Vincent and Tim Loverin would like to see the "sandy portions" of the Sugarloaf Meadows open earlier.

Response: If Vincent and Loverin are referring to the dry sandy flats occupying much of Sugarloaf Valley, there isn't much feed there- stock will naturally drift into the wet meadows. If they're referring to the sandy areas within Sugarloaf Meadow, these are scars of past use that destroyed the vegetation. Either way, I don't think we should open the area sooner- it already has some of the earliest opening dates in the Parks.MJN

4

Need an early-winter meeting with commercial packers to iron out procedures for establishing opening dates for grazing.

Response: ~~Randy has me working on an early-winter bulletin concerning opening~~ dates, but I still think that actual dates must depend on actual meadow conditions measured early in the season. Long-term, we may be able to predict dates once we know more about the drying patterns of individual meadows.MJN

We definitely need to increase our "in person" relations with these people as well as including what "they think" in our program. We need to work together in that gray area between resource protection and economics...sad but true. EM

5

State Lakes...Problem - The 10,000' fire limit for the Kings River drainage was relaxed at State Lakes to provide the Cedar Grove Pack Station an alternative destination to overgrazed East Lake (see separate section of this report). This year's experience indicates that this may result in unacceptable increases in stock impacts to the lakeshore meadows at State Lakes.

Response: Closing the lakeshore meadows to stock, as has been done at Woods Lake, would not significantly reduce the forage available to stock parties, but would protect the fragile lakeshore meadows from grazing impacts and would provide greater incentive to stock users to distribute their use throughout the area. Closing the entire area to grazing will be unnecessary if this succeeds. (MJN)

6

Rock Creek Meadow #2...Problem - Most users unfamiliar with upper Rock Creek are unaware of the location of Rock Creek Meadow #2, even if they read in the regulations that it is closed to grazing. Consequently, trespass grazing occurs regularly, jeopardizing a long-term species composition monitoring project.

Response: Placement of a sign at the drift fence just below the meadow might solve the problem. A sign has been ordered. (MJN)

This sign reads; THE FIRST MEADOW ABOVE THIS FENCE CLOSED TO GRAZING. In addition, a sign reading NO GRAZING will be placed where the trail enters the upper end of designated meadow. EM

7

Lake Reflection...Problem - There is no specific regulation prohibiting stock users from riding to Lake Reflection, but the area, being more than one-half mile from the nearest maintained trail (which ends at the south end of East Lake) is in fact closed to stock access.

Response: Replacement of the existing sign at the north end of East Lake, which is not in compliance with current signing standards, should include the line "NO STOCK ABOVE EAST LAKE MEADOW." A new sign for East Lake sign has been ordered.MJN

8

Little Five Lakes stock mgmt...stock continue to trample the closed meadow at the Little Five ranger station lake. To provide protection for wet meadow areas, prohibit grazing at Little Five Lakes except by burros & llamas, or prohibit grazing entirely. This is necessary to prevent trampling impacts which occur when horses and mules drift from open areas into closed wet meadows. See EOS report, T.Suk, pp.29-43 (photos!).

Response: Because stock visit the closed meadow adjacent to the R.S., it qualifies as a "sensitive area" as defined in the Wilderness Management Plan. As such, it can be used as a key area for determining opening dates for the Little Five Lakes area. If, as Suk indicates, it never dries out, this is sufficient grounds for closure. This fact will need to be verified over a period of years, but the area can be kept closed from year to year if it is wet until a permanent closure can be adopted.MJN

9

Big Five Lakes stock mgmt...erosion is visibly evident in the forage areas at Big Five Lakes---soil loss & compaction and stream bank impacts are present in the meadow areas between lakes #4 and #5, and in the meadow areas leading up to "Hands and Knees Pass." I recommend prohibiting grazing, or limiting grazing to private walking burro/llama parties only, with a five head limit, and perhaps also a one-night or two-night limit. Adopt the opening dates of 7/15 (dry), 8/1 (normal), and 8/15 (wet), as recommended by the SEKI Range Conservationist ("Recommendations for 1991 Meadow Management," by Michael Neuman, January 17, 1991). See EOS report, T. Suk, pp.47-49 (photos!).

Response: This has been an area of concern for me, and is a prime location to start using soil strength to set opening dates. Then the meadow will be open for grazing only when it is dry and firm enough to withstand it. If overgrazing remains a concern after appropriate opening dates are adopted, a grazing quota or other limits on use levels can be adopted.MJN

10

Lost Creek and Soda Creek stock mgmt...opening dates for grazing are insufficient to protect soils/meadows from trampling impacts. Adjust opening dates (for all precipitation years) at Lost Creek and Soda Creek to coincide with opening dates at Upper Rattlesnake Creek.

Response: This makes sense on the surface. Are different dates possible for upper vs. lower Lost Canyon, with upper Lost = upper Rattlesnake and lower

Lost = lower Rattlesnake? This needs further examination.MJN

11

Upper Vidette Meadows... Problem: When visited for the first time on 9/1, the lower two of the three significant meadows in the area were found to be severely overgrazed. Utilization was uniform at an excessive 80%, and the only vegetation not grazed to within 1/2" of ground level was wild onion. A 10-343 form was submitted as case # 101365, recommending that the meadow be closed for the remainder of the grazing season; no formal action was taken. In addition, an extensive and highly redundant trail network was observed leading to the lower two meadows and nearby camps. The uppermost of the three meadows was very wet, even on 9/1. Hoof prints up to 8" deep were found throughout the meadow, with evidence of active erosion. Whatever vegetation had not been grazed into the mud had been trampled into it. Before 1987, these three meadows were part of the Vidette Meadow complex and received little use. The only drift fence until that time was the one above the meadows. In that year, in response to recommendations by successive meadow specialists dating back to 1961, a drift fence was built between these and East Vidette Meadow, creating a forage area bounded on both sides by drift fences. Consequently, the ease of holding stock in this area has invited its abuse. In 1985, McClaran (Neuman 1991) recommended that "if this fence is built... the upper fence should be removed." Data for 1991 stock use is unavailable, but use reported in the past three years (1988-1990), confirms the prediction that the area would be abused. Grazing use has averaged 384 nights per year on only 5.3 acres of meadow; three users have accounted for 94% of that use. Use by Cedar Grove Pack Station (42%) increased dramatically in 1989 and 1990. Administrative use (28%) appears to be cyclic and/or declining. Onion Valley Pack Station, often assumed to be the primary user of the area, accounted for only 24% of the use. The median length of stay was one night, but of the 59 trips reported for the period, about half were longer than one night (two to six nights), and 19% of the trips were longer than two nights. Conditions at Upper Vidette Meadows rival those of known trouble areas at East Lake, and resemble an overgrazed pasture. It appears that the increase in use is a fairly recent phenomenon, offering hope that lasting damage has not yet occurred. Nevertheless, there is ample justification for limiting use. Had the primary users treated the area responsibly, there would be no need for management to intervene, but this has unfortunately not been the case.

Response: As recommended by McClaran, the upper drift fence should be removed on the grounds that it is against Park grazing policy to permit such concentration of use. In addition, until a realistic grazing quota can be established under terms of the new Wilderness Management Plan, I recommend the establishment of a two night grazing limit. The upper meadow is too wet for any grazing and should be closed. The trail network leading to the lower meadows should be reduced and rehabilitated by NPS trail crews with assistance from Cedar Grove Pack Station.

12

Grazing dates (Tyndall area)...the opening dates for meadows in this area were, on the average, 15-20 days too early. I didn't request a change because reliable sources said that it was unlikely that there would be stock-use in the area until the passes opened, generally the case...consider for the

future.

Response: The opening dates adopted by the 1986 Plan were the result of political wrangling, and were typically two weeks earlier than the dates recommended by DeBenedetti. I expect that when we start monitoring opening date conditions, we'll be revising a lot of dates to be later.MJN

13

Milestone should be closed to grazing to prevent the reoccurrence of the disasters of '89 and '90...putting the trail on the "unmaintained" list in Doug's new mgmt plan would take care of this.

Response: The regulations adopted in 1991 appear to have worked, although they surely made Lo's life more difficult. I think we should give it a chance.MJN

14

It is the belief of many in the Kern that the crew could be more productive with less dependence on stock, and that the use of 11 animals, in conjunction with weekly helicopter flights, is excessive.

Response: We are concerned and want to know about any administrative use in the wilderness that appears to exceed limits of acceptability. This may involve resource damage, social impacts or both. Please give us specific examples through documentation in your end-of-season report so that we can begin to establish guidelines applicable to all administrative users. (RC)

15

If the Kern-Kaweah is so "dangerous" that it requires him loose-herding all the way down, maybe John Vincent Jr. ought not to be planning trips there.

Response: Agreed-"in theory", however we need to remember that there are many variables to be considered in the decision to loose-herd and that it is incumbent upon us to work with packers in the gray area between safety and resource protection. I'm told that the sections of trail on this route upon which it might be necessary to loose-herd are Colby Pass and below Rockslide Lake to the Kern. Someone else's judgement might be a little different under differing circumstances? An important point here is that we need to document these incidents so that they can be brought up at the annual "concession" evaluations. EM

16

Possible solution to #18...make Upper Rock Creek a one night limit or make the wet stringer meadows off limit to stock. The people working there seem to be willing to work things out, but Dennis Winchester seems to be the stubborn one. He will get away with whatever he can as long as we let him...change; these regs will force him to choose new areas better suited to grazing (ie, Lower Rock Creek).

Response: I don't have Winchester's '91 stock use report, so I can't say how he reacted to our improved interpretation of the existing two night regulation. Perhaps we could keep the two night limit, but make it one night

at a time, so he can have one night at each end of a trip that goes somewhere else. The wet stringer meadows could be protected through monitoring soil conditions, which would likely push the opening dates forward.MJN

17

Use of the Mitre Basin should not be allowed for stock...the trail (hiker's trail, not maintained) is dangerous for stock and riders...people have been injured there...visitors say it is not safe (case # 101459).

Response: The "maintained" trail will end at Pinned-up Meadow. According to the new WMP, this should eliminate stock use above that point?? EM

18

The problem with stock use here (Rock Creek) comes mainly from Cottonwood's repeated use of the same camp and stringer meadows at Lower Rock Creek Lake...Cottonwood's trips are usually from three to four days long...with the two day grazing limit it means that I have to check on them for three consecutive days to find them in violation...this is a difficult thing when covering a large patrol area... my guess is that they do violate this often (case # 101459).

Response: I agree. Making it a one night limit per stay, two nights per trip might ease the enforcement burden.MJN

19

Trail crews, good as they are, need a better knowledge of backcountry regs & minimum impact requirements...this past summer neither NPS trails packers knew the Evolution area stock use regs...I think it should be required that NPS packers working in the BC know the stock regs...I think you'll find Jerry Torres cooperative in this...there was one violation which put me in an awkward enforcement position.

Response: I agree. We're attempting to make the regulations easier to understand, and will hopefully be preparing a map that illustrates everything. Cooperation from supervisors is also important.MJN

The folks were trained on BC regulations and minimum impact in 1991. ALN

20

Reduction in grazing...there is a world of difference between an ungrazed & a grazed meadow-the ungrazed is more in line with our charter.

Response: I believe that the management and monitoring program we're developing will give us greater control over stock impacts, so that the difference will no longer be so great.MJN

21

Preseason meetings with Pack Station personnel-including the field packers is needed...many pack stations hire teenagers and this reality must be considered in efforts to personally educate this group as they will be doing the work in the field. Education implies relationship and this process must begin preseason and continue throughout the season...long term education and information can and will modify many unacceptable practices...park mgmt must

be personally involved in the process-local BC rangers where possible should also be involved.

Response: We will continue our efforts in training the Pack Stations, and when available, their employees. We will welcome any available Backcountry Rangers to assist with this training. You are "on the ground" and therefore a main asset to the system. Going along with Item 22--I'd like to follow through with Jim Harvey assisting us with these visits.GB

I will be contacting Jim Harvey to work jointly on sessions with packers to discuss techniques, concerns, and requirements for resource protection. EM

In my opinion one of the problems is that our presentations are given at the beginning of the season with the pack station staffing at it's lightest level. As the summer progresses more packers are hired, including very part time and occasional packers, who will never be attending a presentation. They often don't know anything about the expectations of the rangers in the using of the backcountry. These comments were given to me by an ex-packer. We need a video or slide program--prefer a video, which will allow ALL PACKERS to be well informed regardless of the date they come on duty at the pack station. I am interested in pursuing this and have some sources for the taping. It may cost us some money but we'd be the leading edge in this effort. (RJB)

Banff National Park in Alberta has just completed such a video, maybe we won't have to reinvent the wheel. EM (Gordon Irwin, Warden Banff NP, Alta 403-762-4506)

NOLS is developing a stock use video that we might use. 12-18-91 ALN

22

NPS Packer Harvey (758) has offered to train all commercial pack station workers, "They'll listen to me. I won't wear a uniform."...Take him up on the offer!

Response: See response #21 (EM)

23

Packer's should , at least, tell trailhead every day where groups are going...any false omissions should be "giving false information to a federal officer." (This is supposed to be happening, but isn't.)

Response: Packers have been instructed to direct their clients to the Ranger Stations for permit issuance during operating hours. It will then be up to the trailhead operation to forward that information to the respective ranger(s). We have required the packers to send us their itineraries for the '92 season. We will forward them to the rangers responsible for those geographical locations. If stock users are utilizing closed areas, appropriate action should be taken to mitigate the violation.

24

Stop kowtowing to the horse folks. BC rangers are too often portrayed as "anti-stock". We're not, but in our direct and daily experience, stock does a

disproportionate amount of damage to alpine ecosystems that cannot be justified by arguments of "historical use". When minimum impact regulations were implemented 20 years ago, everyone except the stock users went along with the program--usually cheerfully--recognizing the common good. For a number of years we've been making the same recommendations for restrictions on stock use that are too often ignored. Current studies on meadows concentrate entirely on the long term effects of grazing on species composition and change. It's been pretty well established for a number of years that the level of grazing is unlikely to affect species composition in most meadows. The complaints from backpackers--and our direct observations and concerns--have consistently centered around the aesthetic damage stock does; manure, torn up trails, meadows cropped down to putting greens. Research and regulations, then, have to go much farther to address these concerns. Craig London and his partner Dave (Mt Whitney Pack Station) have consistently shown that a pack outfit can do an excellent job of keeping impact to an acceptable minimum and still retain a satisfied client base. It is long past time that we hold the other commercial outfits to these same standards.

Response: Most decisions concerning stock related impacts in SEKI have been and will continue to be sociologically grounded. We are hopeful that in the next 3-5 years we will be able to apply scientific research to augment the process. In the meantime, we will work to improve our ability to be proactive by calling upon stock users to join us in an effort to mitigate further impacts in the wilderness. The BCHC has taken their own initiative to write minimum impact guidelines for stock users and have sought NPS input for it's design and content. In addition, we are looking at implementing new, alternative approaches to concerns that have continued to persist in specific areas. Some commercial packer's do better than others when it comes to treading on the wilderness. We will focus our energy on those who need help. (RC)

25

Require Pack Stations to use bear-proof panniers (Yosemite rumored to have them) on stock if available. Consider allowing pack stations to place 55 gal. drums in key locations for spot trips/food drops.

Response: We began a program in 1991 to install 55 gallon drums in select wilderness areas where stock use is concentrated. I have also met with a bear proof canister manufacturer in Visalia to discuss making bear proof panniers. He is looking into costs and material types. Two commercial packers have voiced an interest in testing prototypes. We will continue to pursue this idea. (RC)

26

Pack stations should not place food drops in bear boxes.

Response: This is stated within the respective Commercial Use Licenses - we need to enforce it. EM

27

Reduce/control administrative use of meadows by NPS stock.

Response: Evolution is a slow process. We certainly have fewer rangers on stock. The current management direction from the superintendent is that NPS use of stock will not be reduced, as of May 1991. ALN

28

I see the Palisades Lakes and Marjorie Lake areas as not being appropriate areas for stock camping...they could be closed with little hardship on users.

Response: Marjorie Lake will be closed when we close the Cartridge Pass trail. Palisade Lakes is little used, but I agree in principle. If we can show that sensitive areas are being impacted, then we'll have a case. MJN

Lake Basin area is in effect closed to stock. ALN

29

It would really help if some system were devised whereby plans of stock groups could be routinely relayed to us (BC rangers)...it has always been difficult to get this information, even when we make a special effort about it.

Response: While in attendance at commercial packer meetings this past winter I requested them to send us their trip itineraries for the 1992 season. That request will be followed up by a memorandum in early June as a reminder. The current status is that we have begun to receive them in the mail and they are being copied and forwarded to the respective rangers.

30

It seems clear that none of our efforts to get Tim Loverin to comply with Park regulations have been effective and that we need a much stronger approach to gain compliance.

Response: I've met with Tim on at least three occasions this winter to discuss his operation. He has reflected a genuine interest in working closely with us this season. We also plan to go onsite in Cedar Grove to review policy and regulations with his staff. Let us know how it's working this summer and we will take whatever action is appropriate. In the meantime, we appreciate your continued efforts to reflect a courteous and helpful image to all user groups.

31

Bill Wyman of Thatcher School is apparently using his "traditional" X-country routes in the Rock Creek and Tyndall/Wright Lakes area. His actual impact with 3-8 burros is minimal, but illegal. We should either grant an exemption or write him a letter asking him to stop. I recommend prohibiting this practice.

Response: Bill Wyman will be contacted on this issue this winter. ALN

32

To impress packers we're serious about enforcing Park regulations, automatically cite them into court and move to have them suspended for several weeks from packing in the Park. With repeated violations, we should make a serious effort to suspend the permittee for a week or two when in flagrant violation of regs.

Response: We will make a reasonable effort to work with all user groups including the packers. If a violation notice is warranted, it will be issued to the violator, not the pack station. The pack station owner will be informed of all contacts that his/her packer has with our rangers concerning park violations. Administrative action may or may not be taken, depending on the nature of the incident. Permit suspensions or revocations are always an option. These decisions will be made through recommendation by the District Rangers and/or the Chief Ranger to Park Management. (RC)

33

Stop support for present meadow mgmt program in favor of real mgmt...the present program can not articulate where it's been or where it's going...what is it going to get us...past programs have not met with much success...it seems to be only a diversion..."smoke and mirrors".

Response: This year, for the first time, I have been able to clearly articulate where the meadow management and monitoring program is going. It may be several years before all the elements are in place (particularly if funding remains erratic), but we will get there. I will be happy to discuss the program with anyone who asks.MJN

We welcome your concerns about improving mgmt. We need to remember that the public's voice has become much more sophisticated. We need to show a solid basis for our mgmt decisions. The "organized" public voice of today demands strict attention to detail if programs are to move forward. Absent this attention, any hope for progress in protecting the resource becomes mired in legal proceedings while resource degradation continues. EM

34

I feel that Vidette Lakes should be listed on the stock regs sheet as a closed area and that the pack stations should be informed that the park will no longer tolerate their travel to these areas.

Response: We're planning a new map that will accompany the new Wilderness Management Plan and will be provided to trailheads, permit issuers, and pack stations, which will make open and closed areas very clear.MJN

35

The Kearsarge/Bullfrog Lakes stock regulation is confusing. It states that "the low trail to the lakes is closed to stock." Does this mean that the lateral from the Kearsarge Pass trail down to the basin is open to stock use? If so, it should be made more clear in the regs. If not, the entire basin should be signed as closed to travel and grazing. Our SEKI MI sheet should also state that the lakes are closed to grazing, as it does for Bullfrog Lake.

Response: It should be unnecessary to duplicate regulations between the stock use regs and the MI sheet. I agree that the regulations are confusing and need to be clarified.MJN

Kearsarge Lakes / Bullfrog Lake basin is closed to stock use completely. This basin is a long term research rehab study area! ALN

36

The Charlotte drift fence needs to be redone ASAP...compromising wet, fragile meadows above it.

Response: I agree. It has been well documented that Charlotte Lake Meadow is ecologically important, fragile, recovering from past abuse, and must be protected- see the big meadow book for background.MJN

This project is on a priority work list. ALN

37

Try closing McClure Meadows to all grazing...stock parties could still camp there..see if stock would stay out if pushed up or down canyon. Work with 3 local packers...Fred Ross said it wouldn't affect him. This was talked about on staff trip.

Response: This looks good from the standpoint of having an ungrazed meadow in Evolution Valley where visitors can see it.MJN

Excellent idea. We should put it in the new stock use meadow management plan. ALN

38

We have not seriously explored the idea that it is not an unavoidable consequence that stock parties can visit the backcountry and not graze the mountain meadows, at least not to the extent that they do. I've been writing about this for several years and have no evidence anyone has heard.

Response: See #2 above. Also, if is this writer's intent that stock graze between the meadows but not the meadows themselves, I don't think we can control stock motion- stock will graze in meadows if they can.MJN

39

Drift fences in the backcountry are generally poor. It might be time to think of a crew for a season or two to work on them. Our techniques of trail building have advanced dramatically in recent years but fences remain neglected. Rebuild all backcountry drift fences...remove obsolete fences.

Response: I propose an inventory and evaluation of the current drift fence situation to justify each and every fence out there, determine its needs, and coordinate with Maintenance to get the work done.MJN

I'll ask Leroy to address this at the General BC Training 6/92. EM

40

I think we can remove the Franklin Meadow fence; one mile lower there is another one. Some of it is hammered to trees & wire is cutting into trees...its presence may actually encourage stock use of Franklin Meadow.

Response: OK. Check with all users.MJN

Let's do it in 1992. ALN

41

Don Bedell would like to continue trying to coordinate with Interp and/or Res. Mgmt. for NPS people to go on "interpretation rides".

Response: This proposal was made in writing by Bedell last winter, '90, and was approved as far as I knew. He was told to get with Larry Waldron to work it out but I don't believe management had any problem with it. Don just needs to "do it"! RJB

42

Mcgee Canyon out of Colby Meadow should be closed to stock traffic totally, completely, forever.

Response: Stock can only go a short ways up the canyon now and the only logical place to graze is in Colby Meadow. There is no proper stopping place for stock above Colby in this drainage. We will take a closer look at the issue this summer and give it further review. ALN/RC

43

Close McClure Meadow to stock grazing.

Response: See #37 above.MJN

PUBLIC INFORMATION

1

I was appalled to see the ream of papers people were given with their permits this year...what a bewildering bunch of junk! A two-page NPS handout on water quality??.come on! Nobody ever reads more than the first few lines of any handout. Not only did people not receive the new NPS regs, the ones they did get were incorrect. I recognize that something new is being designed...all I can say is, if it isn't brief, catchy, and to-the-point, forget it. We need a new plan for educating people about wilderness ethics. I have submitted my ideas for several years and I'm not going to repeat them.

Response: The Minimum Impact sheet has been revised and reprinted and is much improved over last years version thanks to input by several persons....READ IT and continue to forward your input for the review and revision process to take place annually. We have also made vast improvements in the "Back Country Basics" information guide that is sent to all persons making inquiries about trips into the wilderness. Again, your continued input is requested. We have a slide program that does "go out" to various groups who wish to view it. We are working with an idea to have another trailhead program like the one we present at Lodgepole, IF we can get electricity to the permit issuing stations. GB/RC

2

We need to revise the information on the wilderness handout sheet...a lot of info is obsolete...we need to include some new info on HAPE and other dangers (ie, Rock Creek Gorge, Mist Falls, Big Arroyo).

Response: See #1 above. RC.

3

We need a better public information effort...apparently something is being developed to be handed to backcountry travelers...this should help...our current minimum impact sheet is poor-confusing & difficult to read. We need something easy to read, large enough print for middle-aged eyes, a logically organized list of rules & minimum impact requirements & SEKI rules list separate from F.S. .. Perhaps also interpreters could help in the frontcountry...working at trailheads?? At present, we are not adequately getting the word to BC travelers.

Response: See #1 & #2 above. I would like to suggest that the BC rangers take a "Holiday Weekend" turn at the permit issuing stations to see "how we can better educate and get the word out to the BC travelers". INTERPRETERS ARE USED AT TRAILHEADS--Mineral King, Ash Mountain, Lodgepole, Grant Grove, Cedar Grove.GB

RANGER STATIONS

1

Tyndall Cabin...great shape...Jack sent Sierra District specs for spark-arrester for the stovepipe...I support Jack's idea to solarize the station.

Response: Randy and Jack plan to meet this spring and come up with a plan to, eventually, solarize all those cabins where it is feasible. Of course funding will be the big question as usual. EM

2

Constructing a "bear-proof" cabin for the ranger at Little Five should be seriously considered.

Response: Randy and Scott will be working on "Recommendations for Action" on BC cabins this spring. Funding??? EM

3

If we get the Traeger stove to work, we'll probably need a hotter burning pellet for next year...check with Jack Vance.

Response: This has been done. Modifications are in progress. We now know that hotter pellets will work. ALN

4

It would be nice to convert all the stations to solar power...I would think that the payback time for the system (batteries & white gas saved) would be fairly quick.

Response: We agree and have been aggressive on implementing a trial effort in the '92 season at two of our ranger stations. We have selected Charlotte and Crabtree for installation of a solar energy panel that will hopefully generate enough energy to run a radio charger and two small fluorescent lights. (RC).

REHABILITATION

1

Kearsarge Basin...There is ash everywhere, few unblackened rocks, shards of glass, mutilated trees, and on and on. I don't know what the answer is, but this area should be the first to receive heavy rehab work. Designated sites might help, or maybe closing each lake for a few years at a time, coupled with rehab work to be done by volunteer groups.

Response: It is better now than it has been since 1950. At one time there were 100 plus head of stock a day coming over Kearsarge pass into this basin, what they buried after years of this is still coming to the surface.

ALN

2

The South Fork Crossing is the only place on the JMT where fires are allowed between Pinchot and Mather Passes. The main camp is wedged in a triangle bordered by the John Muir Trail (20 feet away), the South Fork Kings River (50 feet away) and a side creek (25 feet away). The other camp showing most use is across the river. It is also close to the JMT and only about 40 feet away from the river. I propose to shut down the mainly-used camps and put in few well-placed new sites, one down-river and a couple up-river. This would help to alleviate problems having to do with water quality (drainage of human waste into the river) and aesthetics (campers clustered around the trail crossing). A small sign with map will probably be necessary to communicate the idea to campers. See EOS report, S. Graban, Figure 1.

Response: We will do it in 1992.

RESUPPLIES/MOB-DEMOB

1

Feeding BC rangers...No one else works in the BC for a prolonged period of time on the diet of a BC ranger.(It is almost demoralizing to see a string of mules with fresh food go by my cabin once a week bound for a park crew 2 miles upstream.) I think the most any of us ask for is a resupply once a month. This has been talked about, even promised, never achieved...It's time. (The one resupply this year was deeply appreciated, believe me. Last year there was none.)

Response: We will schedule monthly aerial resupplies in July & August for all stations and September & October for extended tours. We will continue to coordinate with Trails & Fire Ops along these lines. (EM). There appears to be a big difference folks in our being able to provide "hitch hike" supplies to our rangers in the Kings, (mostly by mule,) and the Kern. It is logistically very difficult for us to get your food to Cedar Grove and arrange to get it out on a pack train. Some flights might be possible in the Kings but it is a great deal more difficult than the Kern. We anticipate having a more structured resupply system than last year which I hope will help you. (RJB)

2

Don't be stingy with Blazo for R.S.s ...the alternative is burning native wood

which belongs to the mountains. Compared to the energy budget for running the District office, the energy budget for running the R.S.s is small.

Response: We never have been stingy with Blazo folks! You may be misinterpreting as the real problem is "getting the blazo to you." It weighs alot and in one case last summer we had to try several times to get blazo into a particular station. The blazo was ready and sitting behind the heliport for several weeks. Sorry! (RJB)

3

Sierra District needs to implement a well planned resupply program for our wilderness staff.

Response: See response #1...Alden & Eric will be working on the details, winter '92. EM

SIGNS

1

An error in the New Army Pass sign must be corrected.

Response: A new "entrance" sign has been ordered without an elevation because the best map we have isn't accurate and we were unable to get there with an altimeter prior to the sign committee's deadline for sign requests. (EM)

NOTE: We hope to provide an altimeter for each station at some time in the near future.

2

I think a sign out by the Muir Trail saying, "Bench Lake 1 1/2 Miles - No Wood Fires Allowed", may be appropriate to put the idea in people's minds before they arrive at the lake.

Response: We will do it in 1992. ALN

3

Post a sign at the Rock Creek Crossing warning people not to descend X-country to the Kern because of danger.

Response: This concern for visitor safety is commended. There is a philosophical concern for "over-signing" dangers in the wilderness, however if truly warranted and properly justified, I believe current policy would allow for this sign. EM

4

There are multiple signs at several intersections in the Charlotte patrol area which seem to be redundant.

Response: Prepare your proposal to improve the situation and submit it to the Sierra Crest Ranger. RC.

5

I propose that the directional north/south sign at the Bullfrog junction be removed.

Response: Forward this request to the Sierra Crest Ranger for action.

TRAILS

1

Cement Table Meadow... Problem - A new trail has formed to bypass a deep bog where the main trail passes near the stream at the lower end of the meadow. This spot has been a problem for years, and it was only a matter of time before users began bypassing the area.

Response: Perelli agrees there's a problem, and seconds the recommendation to reroute the trail around the meadow.MJN

2

Trails (Upper Kern/Tyndall)...Almost no attention has been paid the Upper Kern trails for years, and they show it...all the trails need lots of erosion/water-control work...small slides on Wallace Creek and Forester Pass will need work next year...have the trail crew spend at least two weeks in the Upper Kern/Tyndall area for the next several years, keeping their stock at Harvey Meadow. Traditionally, trail work in the Kern has been prioritized according to the wishes of the pack stations...it's time for resource damage to take priority.

Response: I will discuss this with Leroy. EM

3

I recommend that the Milestone trail, the Upper Kern loop (to Lake South America) and the Wright Lakes "trail" be placed on the unmaintained trails list and thereby closed to stock.

Response: The status of these sections of trail as proposed in the new WMP are as follows:

Milestone - maintained.
Upper Kern Loop (Lk SA to Milestone) - unmaintained.
Wright Lakes - primitive. EM

4

Kern-Kaweah, the Shepherd Pass trail from the pass to the Kern, John-Dean cut-off, and Wallace Creek to 11,200' would be on the "primitive" list, and all need work to bring them up to standards.

Response: The status of these sections of trail as proposed in the new WMP are as follows:

Kern-Kaweah - primitive.
Shepherd Pass (pass to Kern) - maintained.
John-Dean cut-off (1 mile below Ranger Station to Kern) - primitive.

Wallace Creek - primitive. EM

5

I think more people are coming in over Taboose Pass and the impact is increasing...the trail rut is occasionally knee and thigh-deep in the meadow sod and parallel tracks are developing.

Response: I haven't been there, but it sounds like a problem. Would rerouting the trail help?MJN

The park side of Taboose Pass does need rehab work. I believe it is on the project list. The east side of Taboose Pass is very self limiting, there will never be very much use of this trail.ALN.

6

Work needs to be done on the high trail in the wet, muddy areas of multiple trails and meadow trampling located 300 yards west of the Kearsarge Lakes junction and in the area where the Mt Rixford drainage streams across the trail.

Response: I haven't seen it, but it sounds like a problem, too.MJN

Yes, the trail crew know about it. 12-18-91 ALN

TRAINING

1

Provide 1st Aid/CPR courses for pack station personnel-before 7/1 (Vincent)

Response: First of all we need to provide 1st Aid and CPR courses for our own personnel to bring us up to acceptable standards. That will occur during the 2nd week of wilderness ranger training in '92. Time allowing, we have offered to train as many of the packers as we can in the new Red Cross Standard First Aid and CPR course (1990 version). It entails 8 hours of training and several of the packers have shown an interest. We will begin eating the elephant this summer. RC

2

It would be good if there were more contact between Park personnel and the permit-issuers on the east side, particularly in Lone Pine, since they seem to be abysmally ignorant of anything having to do with the Park. Since at least 75 of the people we see on the crest get their permits on the east side, it seems like it behooves us to have better communication with them. Invite them to a day of our training? Put on a day of training over there?

Response: Done. This occurred in May of '92 for a full day at the Mt. Whitney Ranger Station in Lone Pine. It went very well and we plan to make it an annual event. GB/RC

3

The matter of training...some summer rangers live on the east side, or close, and enter the mountains from there. For those, you might save the nation's gas by letting them sign papers & get equipment in Bishop. A seasonal (which could

rotate) could EOD early to work on this at ASH Mtn. and get the equipment to Bishop...there would still be a day of EMS for those who need it, but perhaps a Bishop doc could do this too (Carolyn Weyhausen?). Since some of our medevacs go to Bishop, it might be useful to work more with them anyway. And there's the law enforcement refresher for those who need that, but some folks occasionally do that elsewhere. And stop this business of coming in May for LE (1200 miles for me, 1700 miles for Rob) then again in June to start work. Finally, this experienced crew doesn't need even one day of training/lectures. Just put all the year's info & instructions in a folder (not in the R.S. manual- that should be long-term or permanent info)...Talk to others & find ways to reduce our time at ASH Mtn & maximize our time in the BC, where our job is.

Response: We all need refresher training to update ourselves on the current trends in all subject areas. I really hope that the underlying concern is the quality of training and not the question as to whether or not it is necessary. The opportunity for us all to get together at the onset of the season allows everyone an opportunity to communicate with management on a first hand basis. This program has value and will continue. Law enforcement training has been scheduled this year to be in succession with the 3 days of general training and then the mobilization process. The Sierra Crest Sub-District supplies and materials will now be mobilized/demobilized from an eastside storage location. (RC)

WILDERNESS PERMITS

1

A system needs to be in place whereby permits are picked up daily from the Mineral King Pack Station, and itineraries relayed to the appropriate (ie, Little Five, Kern, Hockett) BC rangers. Such systems work well at Grant Grove, Cedar Grove, and Lodgepole, and need to be implemented at Mineral King.

Response: That was to be done this year, '90 but things were a little hectic in Mineral King. Patrol has to do the pickup along with everything else they do. Next year they will be going to Bedell's immediately after the campground fee collection pickup in the morning thus giving plenty time for the trailhead rangers to call the pertinent backcountry staff after the 11:00 roundup. (RJB)

2

Stock users should receive Wilderness Permits from Ranger Stations...Rangers know where/when/how much stock in each area..Pack client's get educated (re;wilderness regs/ethics)...results in better compliance.

Response: Since Eastside Packers are working directly with the USFS we don't have jurisdiction to require where the permit is obtained---we will, however, be involved with a training session for these Eastside Packers. GB

Yes, stock users should get their permits through proper procedures. ALN

3

Try to ensure that all USFS permit writer's give out adequate and accurate information as well as the SEKI MI sheet. Same goes for pack station permit writers.

Response: Please refer to #1 under "Public Information". RC.

4

Video-tape of wilderness regs for visitors seeking permits...then rangers issuing permits will ask visitors about regs (verbal quiz)...ranger will clarify regs and help plan trip...rangers will be sure visitors understand regulations.

Response: In SEKI we are now stamping the back of the visitors' copy of the wilderness permit, and then discuss the items that apply to where the visitor(s) will be hiking and check off them off. The Minimum Impact information is attached and the permittee is asked to sign the permit. The USFS in Lone Pine has just recently completed a video segment similar to the one you suggest. We will also look into developing one for our Parks. RC\GB

5

An attempt should be made to have all stock users (where possible) contact the Park Service for their Wilderness Permits. In many cases the pack stations don't always make the best venue for the discussion of backcountry "Rules & Regs." From direct observation in the field, visitors who have been contacted by the Park Service are much better informed...this contact is almost always manifested by better compliance with park policy (e.g. cleaner camps and better stock mgmt).

Response: See # 2 above. This could happen on the west side, but politically it will never happen on the east side. ALN

6

Stop our counting of people, miles, and mules...Alden gets better numbers from wilderness permits...our count doesn't mean much.

Response: The on the ground ranger counts are actual, real information. The wilderness permit counts are a portion of vapor, theory, and smoke. People do not go where they say they will and stay as long as they plan. 12-18-91 ALN

7

Cedar Grove and Onion Valley trailheads need to tell visitors that Harrison Pass is a tough, unmaintained, X-country route, not a trail as some maps would lead one to believe. I turned several parties around this summer who were not fully aware that Harrison Pass is steep, loose Class 2 scree...permit writers should be aware of this inconsistency.

Response: This will be done from now on. ALN

8

USFS employees need to be made aware that we have specific grazing regs, opening dates and a special MI sheet for stock. Some of the private parties this summer did not receive complete info from the ranger stations.

Response: You are 100% correct!! In 1992 we hope to get an even tighter control on OURSELVES and get the ABSOLUTE/COMPLETE grazing regs, opening dates and REG SHEET to ALL USFS permit issuers.GB
This is a persistent problem. Even when we get the info to USFS permit

issuers, they don't use it. A better training effort should help, backed up by better checking and follow-up during the season. Our efforts to improve the format of our regulations should also help. MJN

9

Too many stock parties in Evolution Region don't know the grazing regs...almost no private parties know them...there needs to be a specific effort by permit issuing people, including commercial packers, to hand copies of the grazing regs to all stock parties, especially private parties...And I don't see copies of MI requirements attached to permits written by commercial packers.

Response: We WILL BE contacting the Pineridge Ranger District and the High Sierra Ranger Station, as well as the Bishop offices who issue wilderness permits, to be as specific as possible about our stock regs. Once again--visitors are entering on USFS lands and we can only 'enforce' on our lands. GB

We can improve this in 1992. The folks at High Sierra Ranger station are very responsive. ALN

WILDLIFE

1

Pinto Lake...not enough food storage capacity for both backpackers and stock parties. Possible Solutions = (1) install a second locker (2) Install a second locker for hikers and a barrel for stock groups (3) limit use instead of increasing food storage capacity...reduce the Timber Gap trailhead quota and require packers to operate under the quota system.

Response: A barrel was flown into Pinto Lake in September. EM

2

Cliff Creek Crossing...not enough food storage capacity when commercial spot trips are present. Possible Solutions = (1) install another locker for spot trips downstream of the crossing (Judge's Camp)...advantages (A) locker would not be in view of large numbers of visitors (B) flat spots for camping are limited at the crossing. (2) prohibit WRITTEN from leaving clients in the Cliff Creek drainage without a packer to defend their food, and requiring WRITTEN to leave enough room in the existing lockers for other visitors (3) limit use instead of increasing food storage capacity.

Response: A locker was flown into "Bedell's Camp" about 1 mile below Cliff Creek Crossing in September. EM

3

Spring Lake...not enough food storage capacity (good hanging branches are few). Possible Solutions = (1) install a locker (2) recommend that visitors not camp at Spring Lake due to presence of bears and lack of good hanging trees (3) reduce trailhead quota over Glacier Pass to one group per day to ensure that everyone has at least a "marginal" tree in which to hang food (4) require groups camping at Spring Lake to carry bear-resistant food containers.

An opportunity exists to take the long overdue step of reducing use at Spring Lake. Installing a food locker would have the opposite affect. I prefer the 2nd and 3rd options and monitoring the situation further.

Response: Where bears are terrorizing visitors in areas where bears would not normally be, we should consider removing/relocating the bear. Another point to be made on this is that we shouldn't be placing lockers on the basis of every bear problem that occurs or we'll have "brown boxes" everywhere. I will discuss this further with Harold Werner. EM

4

Columbine Lake...not enough food storage capacity & no single area which offers enough good areas for camping & difficulty in placing a locker to maximize its use. Possible Solutions = (1) re-constructing the "main" trail and rehabilitating all the "user" trails, then install a locker at whichever location along the "main" trail offers the most camp areas (2) solution #1 plus the addition of a second locker if camp areas are too dispersed (3) install multiple lockers in hopes that people will find them.

Response: see Response #3 above. EM

5

Little Five Lakes...not enough food storage capacity. Possible Solution = (1) install a locker at the lowest Big Five Lake (ie, Big Five #1 at 9830'), to alleviate overcrowding and overflow of the locker at Little Five (2) install a second locker at Little Five (3) both solutions 1 & 2

Response: A locker was flown into the Big Five Lakes area in September. EM

6

High Sierra Trail...many bear incidents occurred this summer in upper Big Arroyo and Nine Lakes Basin. Evaluate the HST to see if additional locker(s) make sense...the first camp area east of Kaweah Gap and the Chagoopa Plateau are possibilities for completing a network of lockers which would be "one day apart".

Response: see Response #3 above. EM

7

For the last few years, bear incidents here (Wheelbarrow Camp) have been numerous...we either need to close the area to camping, put in a bear box, or come up with a new plan. Forester is a tough pass and that camp gets a lot of use from people who want/need to get as high as possible before heading south over the pass the next day, and from people who collapse in exhaustion after heading north over the pass...Therefore, it would be difficult to close the area to camping...people would camp on one side or the other and problems would continue.

Response: A food storage locker was flown into this location in September. EM

8

Tyndall Crossing...there are campsites on both sides of the creek while the box is on one side...when the water is high, people inevitably camp where the box ISN'T...since there were no bears, there were no problems...if and when a bear comes around again, there will be. Concerned about the impact around sites near the box which receive most of the use...the answer would be to have another box, for the east side campsites...however, use & problems were down this year so I'm happy to let it slide and see what happens>

Response: Sounds like we've got a good handle on this and I'm looking forward to assessing this situation with the area ranger this summer. EM

9

Bubbs Creek...problem is that big groups quickly fill the boxes (Center Basin Jct). I suggest that groups over 4 or 5 yield the right-of-way to others and set up a "bear watch".

Response: The bear boxes are not the ultimate, immaculate solution. ALN

We may need to consider increased food storage capacity in the heavy use areas. We will ask you to do further monitoring in '92. RC.

10

The bear boxes work well...they are not obtrusive to the wilderness and help a lot to keep the area clean. The park must put in a box at Wheelbarrow Camp on Bubbs Creek. See Rec.#2

Response: I think we are going to do just that. ALN

11

For the most part campers camped near the bear boxes...this actually helps keep the area cleaner by concentrating use with other areas receiving little or no use.

Response: Thanks for the input! EM

What is the question? ALN

12

Personal contact between rangers & visitors regarding bears (i.e. bear rangers) in campgrounds...This is very effective in saving bears...Visitors often are surprised to hear bears will try to get human food during the day...Signs & literature convince visitors to put away food at night, but only personal contact with rangers convinces visitors to put away food during the day.

Response: I think the above statement was well proven at Mineral King this summer through the efforts of the MK Bear and Marmot Tech. With only one ranger on duty the Bear Tech is really needed to make these contacts with the public; there are no campground rangers in Mineral King to help in this regard. (RJB)

13

Suggest modifying Harold Werner's quest for bear data. Unless he's got a good reason, how about we just send in bear observations/incidents once a week, via mail, rather than use up radio time (and Gail's time) sending them in right away, as Harold has asked. Unless there's an injury involved, I can't see any reason he needs the data right away.

Response: Observations may be sent in by mail whenever possible. INCIDENTS will need to continue to be reported over the radio so that a determination can be made as to whether or not a management action is required.

14

Consider limiting bear box use by groups...they overwhelm the boxes, forcing solo backpackers, who are less able to hold a "bear watch", to hang...and often lose their food.

Response: This is a good idea! This suggestion has been added to the Backcountry Basics trip planner. EM

15

Do not place a bear box at Wheelbarrow Camp. It will significantly increase resource damage/impact in that fragile area which is located at timberline.

Response: The majority vote was in favor of placing a box at this location, so one was flown in, in September. EM

See # 10 above. ALN

16

We need to establish standards on what criteria to use to put in bear boxes...If a box is put in at Wheelbarrow Camp it will increase use well beyond its limits. Up to now, boxes have only gone into areas that were already pretty well bombed out. I believe that should continue to be the overriding criteria.

Response: Thanks for your input. The criteria for placement of "Food Storage" boxes is being developed by Sierra District and Resource Management personnel. No further placement of boxes into the wilderness will be effected until the criteria has been established. (RC)

17

Most visitors are getting adequate bear warnings and literature at trailheads...the question is; how do we compel them to heed it?

Response: Normally the steps taken to alter the public's behavior include information, education, and enforcement (in that order). If we are indeed doing an adequate job of informing visitors, then we need to take a closer look at our education and enforcement efforts. This Park seems somewhat lackadaisical about education/enforcement of regulations created to help keep wildlife (bears) wild. We can help the bears by being more diligent about educating park visitors and enforcing appropriate regulations. EM

About half the people going up the East side of Kearsarge pass in 1991 were hit by a bear or bears. There were five bears working 5 miles of trail just outside the park. The bears were out side the park because we bear boxed them inside the park. The point is that half the people on Kearsarge pass trail this year are believers now! ALN

18

Articulate a long-range defensible plan for bear boxes.

Response: Refer to #16 above. We encourage and welcome your input. (RC)

Enclosure 11

master plan

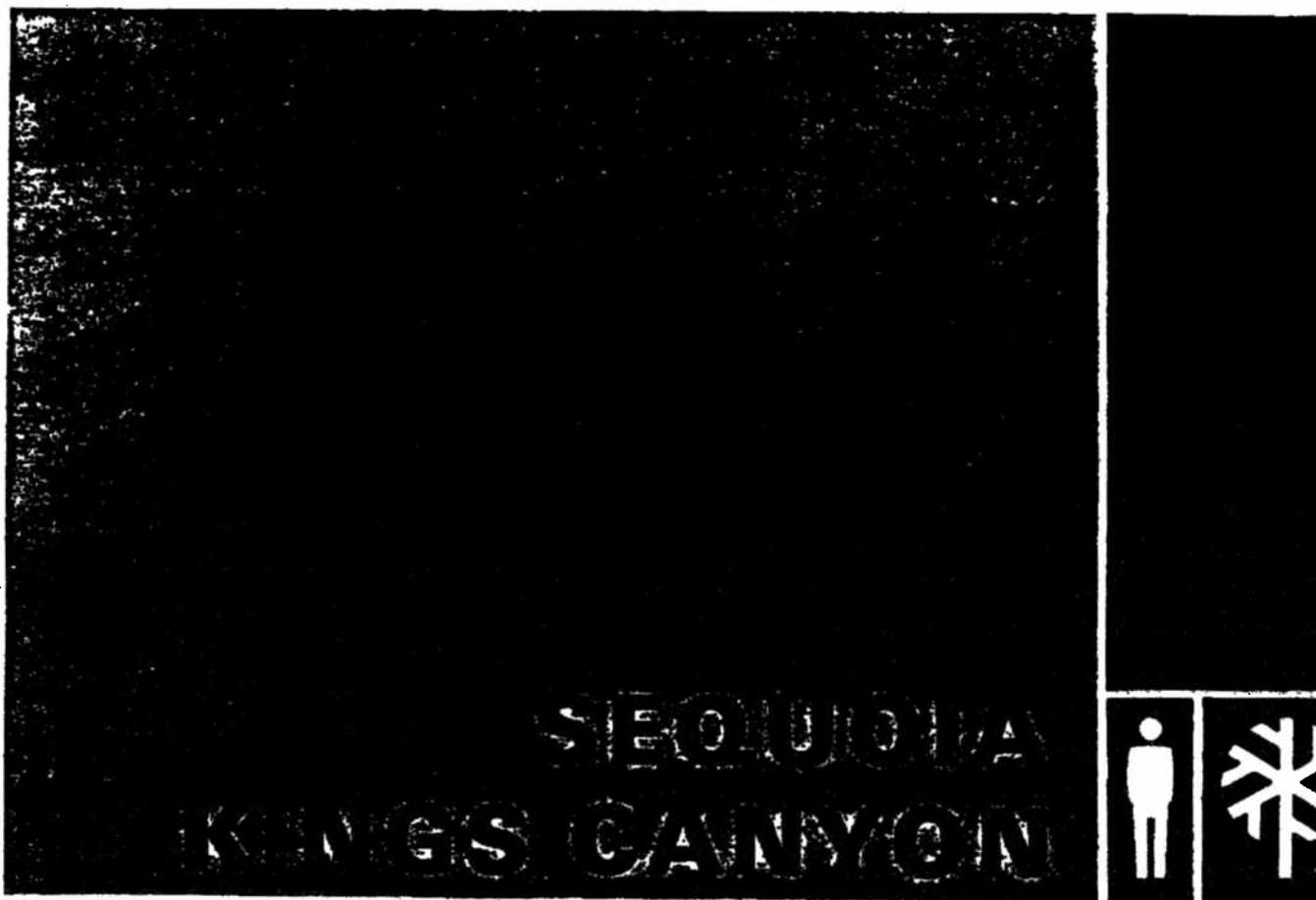
RECEIVED

COPY

AUG 25 1994

COPY

MORRISON & FOERSTER



NATIONAL PARKS • CALIFORNIA

GLENN O. HENDRIX
chief, office of environmental planning and design
January 29, 1971

JOHN S. McLAUGHLIN
superintendent, sequoia-kings canyon national parks
January 29, 1971

JOSEPH C. RUMBURG, JR.
director, western region
January 29, 1971

recommender

approved



Visitor Use

- In congested areas or areas where automobile traffic is undesirable, other systems of transportation should be utilized to provide appropriate use, consistent with quality experience and resource protection.
- Additional opportunities should be developed to enable park visitors to view the High Sierra. More ready access to overlooks such as Big Baldy and Panorama Point offer opportunities to develop new viewing possibilities. Trams and lifts should be considered for developing overlooks of the Sierra Crest, since they may be more practical and less damaging to the environment than roads.
- Visitor contact facilities for information and orientation, located at trailhead entrances into the parks, should be developed, especially on the east side.
- Encourage development of trailer courts, campgrounds, and overnight accommodations outside of the parks but in close proximity to them.
- Motor nature trails which provide a quality park experience for visitors will be developed from existing administrative roads where feasible and practical.
- Winter sports and snow activities at Giant Forest, Lodgepole, Wolverton, and Grant Grove should be maintained at a simple family-participation level. This will not preclude the upgrading of existing facilities at Wolverton.
- Campground capacity in the parks should be maintained at existing levels. Campgrounds in Giant Forest should be removed from the sequoia groves to the Clover Creek-Willow Meadow area. All campgrounds require improvement and rehabilitation to properly regulate camping activity and protect the environment.
- The entire trail system should be evaluated in terms of existing and projected needs and the altered pattern of use, arising from increasing numbers of foot travelers compared to horse and packtrain use.
- Because of the damage resulting from livestock foraging for food and resultant trampling of soils, possible pollution of water, and conflict with foot travelers, use of livestock in the higher elevations for any purpose should be phased out as conditions permit. Search and rescue, fire suppression, resource-management activities, and maintenance and supply functions should be serviced by helicopter instead of livestock. Livestock may be used in the lower elevations and around developed areas where it can be stabled and fed without open grazing on park lands.
- Touring by ski and snowshoe is increasingly popular with visitors. Proposed year-round developments adjacent to the parks at higher elevations will, undoubtedly, greatly stimulate winter touring of the snow

Enclosure 12

Enclosure 13

To: Max Younkin, D. Team Leader, SUP Proje.
From: Joan Benner, High Sierra Area Manager
Subject: High Sierra Pack Station Permit Renewal and E.A.
Date: November 4, 1995

Since the cumulative effects of this pack station operation on designated wilderness and on developed site recreation activities was not requested during the internal scoping process, I am now offering my comments and request the following information be included in the files for use in this and future planning projects.

To my knowledge, the John Muir Wilderness management plan revision team decided not to address this type of commercial service in the wilderness planning process, deciding instead to defer to each Ranger District to address each pack outfit's potential impact during the permit renewal process. Since the majority of the public providing comment in the initial scoping phase expressed concerns about the volume and management of commercial packer outfitter guide operations on the wilderness resource, I feel obligated to bring forth a variety of issues well known to wilderness and recreation field managers.

RECREATION USE:

There are conflicts between developed campsite users, dispersed campers in the Hooper Diversion Road area, and High Sierra Pack Station (HSPS) stock grazing in the Jackass Meadow area needing resolution.

Campers object constantly to the presence of stock in the campground. Their concern is safety, especially for their children (mine also, and the government's liability in the event a mule kicks a visitor) and the presence of manure in the campsites. Visitors enjoy viewing the animals but want them confined to the meadow. The fence separating the meadow-side Jackass campground loops from the meadow just temporarily impedes the stock entry into the campground; the animals either walk across the bridge or in low water periods, cross the river to entry the campground to graze.

There will be an additional conflict when the new Jackass Meadow handicap access "boardwalk" nature trail begins being used next year. To address the concerns of the HSPS owners, who had objected to the construction of the boardwalk as a possible hazard to their animals, a split-rail fence was planned for a future phase of construction. We now have temporary fencing materials to erect next spring to protect visitors, especially those in wheelchairs, from encountering stock on the boardwalk and to provide a barrier to "protect" the stock from the risk of injury on the boardwalk. The HSPS is now objecting to the fence construction because of their perception that the fence will reduce the amount of forage available to their stock.

The visitors camping in the Hooper Diversion area have complained about the number of animals congregating in the area in late summer and early fall, the dust and manure created by the stock, and to what they have described as "over grazing" in the drought years. These visitors also enjoy viewing the animals but do not want them in their campsites. This problem needs to be resolved.

Even if the recent "traditional level" of animal grazing days is actually confirmed, future grazing levels should be determined by utilizing the principles of ecosystem management, the best grazing management practices, and by considering additional factors such as aesthetics, public safety, wildlife needs, Native American traditional uses, wetlands protection, and other recreation uses.

AR v 3 001003

In my conversations with Arn Snyder (High Sierra District Ranger, retired about the historic use, he stated that he did not permit the extent of grazing now occurring. He only approved meadow use for the HSPS's mares with young foals in the early summer. I am not certain if this applied to P... and Hell Hole meadows too. The increase in grazing apparently occurred during the 15 years Dudley Robertson (retired, former recreation officer, asst. special uses officer, & HSA manager) monitored the HSPS activities.

WILDERNESS USE:

The number of service days assigned to each pack station utilizing the John Muir Wilderness was set in the mid-1980's by asking the pack stations what their use was (since record keeping was inaccurate in some offices) and by averaging this total over a three year period. (conversation with Dick Warren, Inyo NF retired and Tom Balint, Mono Ranger District, Inyo NF). There was no environmental analysis to determine whether the volume of use, and the cumulative volume of all the pack stations use, was detrimental to the wilderness resources. Some of the present commercial use is in excess of what the fragile alpine terrain can absorb in stock and human traffic and impact. For instance, the Rock Creek Pack Station has approximately 3500 service days annually and reports about 3000 service days use on this district.

Considering the reporting may not be accurate, I estimate a minimum of 6,000 horse nights, from east slope pack stations alone, spent on the west slope of the John Muir Wilderness, on this district, annually. The accumulated data indicates that stock-supplied visitors comprise only 8 to 12% of the use, (Ernie Degraff, Clemson paper) yet this is misleading because it is the number of shod animals supporting these visitors which create over 80% of the impacts we regularly document. Impacts include trail tread deterioration, breakdown of waterbars, loss of solitude due to larger & often noisy groups, concentrated grazing, and large "barren core" campsites. This issue needs to be addressed.

There appeared to be no consistent method, in the early 1980's, to factor each pack station's use into the newly established trailhead quotas. At the White Mtn RD, on the Inyo NF, where I worked regularly with Dick Warren and Ernie Degraff on the quota program, the reported pack station customer totals were averaged over the quota period and the totals taken off the top with the remaining numbers assigned to hiker use.

Although the hikers are required to enter the wilderness on the date space is available within the daily quota, the pack stations conduct business when customers arrive. The greatest demand period is weekends and holidays. This concentrated entry of customers and the volume of stock effectively negates one of the purposes of the quota - to spread out the use to reduce crowding and insure solitude. Hikers and organized groups are well aware of this inconsistency in management, and utilize the pack stations when they, as hikers, are denied a permit to their first choice trailhead when the quota is "filled". All the pack stations quietly admit that the daily quotas for hikers has benefited them since it has increased their business. This issue needs to be addressed.

One suggested solution is to analyze the use patterns at all entry points within the central Sierra Nevada Wildernesses for one season, and establish what the daily use should be. All permits should then be issued by Forest Service personnel; once the wilderness visitor obtains a reservation or a first-come/first-serve permit, then the pack station could be hired for the trip. This would eliminate the pack station use being an "over-ride" as it now is, and would eliminate the inequity between permit availability between hiker groups and stock-led groups.

The information we have on the district would not be useful in determining the actual commercial use because the packstation use data is often not entered into the annual wilderness use data base since the pack stations sometimes misplace their copies of the permits, forget to turn them in, or are not collected by Forest Service personnel. Dick Warren and Charlie Hellen have agreed with me that use totals, especially packstock use totals, as reported for the past 3 to 5 years, are inaccurate. In addition, I do not believe it is this District's Special Uses policy to spot check the permits and compare them, for accuracy, to the customer-use tally sheet as the Inyo N.F. does. We need to increase our accuracy of data gathering and reporting and require the pack stations to do the same.

Pack stations traditionally use the same campsites within their travel territory for their customers. The Forest Service supports this pattern since the practice limits the number of impacted campsites within the area. There is some conflict between pack stations about certain sites, even though no pack station has priority use of a site. This sometimes results, especially in August, in too many large pack station parties spending the night in close proximity. There are many packer sites too close to water and the trail (water pollution problems and in violation of wilderness regulations). Packer-use campsites need to be inventoried, those sites not in compliance with regulations closed, and approved sites assigned to limit damage and reduce conflict between pack stations.

Commercial pack stock incidental grazing in the wilderness is not now monitored frequently enough to prevent deterioration of some fragile high elevation meadow complexes. Certain packstations have "assigned" horse nights of grazing at certain popular meadows, but compliance has not been checked due to limited funding for wilderness rangers. At the time this forage assignment was made, I do not recall reading that other factors such as riparian habitat, sensitive species, or stream bank protection were taken into consideration. At this time, the following pack stations regularly travel within the approximately 200,000 acres of Pineridge RD administered John Muir Wilderness: High Sierra Pack Station, Reds Meadow Pack Outfit, Rock Creek Pack Station, Pine Creek Pack Station, and Bishop Creek Pack Station. Occasional trips are taken by D&F Pack Station, Shooting Star (also known as Rainbow), and McGee Pack Trains. With this amount of commercial stock use, grazing needs to be addressed with each business since the wilderness planning team also deferred this issue back to the individual permit administrator.

If you and your team need more information, I can be reached at the Hat Creek RD, Lassen NF, for the next six weeks. I will return to Pineridge for the period of 12/15 to 1/15, then return to Hat Creek for the remainder of my 120-day detail.



Enclosure 14

Recreation in the Sierra

ABSTRACT

Recreation is a significant activity in the Sierra Nevada, which serves as a center for a wide range of recreational activities. The Sierra contains some of the world's outstanding natural features, and they attract visitors from throughout the country and the world. Lake Tahoe, Yosemite Valley, Mono Lake, and the Sequoia Big Trees attract millions of visitors each year. Recreational activities on public lands alone account for between 50 and 60 million recreational visitor days (RVDs) per year, with nearly three-fifths to two-thirds of those RVDs occurring on lands administered by the U.S. Forest Service. The California Department of Parks and Recreation has the second greatest number of RVDs, followed by the U.S. Bureau of Reclamation, the National Park Service, and the U.S. Bureau of Land Management. Additional recreational activities on private lands account for millions more RVDs that are currently not accounted for by any agency in a consistent or reliable format that would allow direct comparisons with public land recreational use data. Inconsistency in the data classification and collection methodologies of the various public agencies also limits the usefulness of the recreational activity data that are available. This report brings the available data together into a common digital format and makes it available for analysis. The role of state and federal agencies in providing recreational opportunities in the Sierra Nevada is summarized, and more specific data provided about the types of recreational activities pursued under each agency's jurisdiction. There is significant variation by subregion and recreational activity class, moreover, which makes some agencies more important than others for specific types of recreation in specific areas. These differences by subregion and recreational activity class must be accounted for in any assessment of policy scenarios for the Sierra Nevada that might affect the availability of future opportunities for recreation. A more detailed assessment of recreational activities in the eastern Sierra subregion is also described to illustrate how subregional assessments can provide critical information on user characteristics and activities at a finer level of disaggregation.

INTRODUCTION

The Sierra Nevada region is a popular destination for recreationists. Year-round local residents and California residents and nonresidents pursue a wide variety of recreational activities. These pursuits occur throughout the entire region, from the bottom of steep river canyons to the top of the highest mountain peaks. The mountain range is the natural infrastructure that supports wilderness backpackers, skiers, fishing enthusiasts, off-road vehicle users, naturalists, and many others. All individuals who pursue outdoor activities within the Sierra Nevada rely upon the natural world for an enjoyable experience. The ecological conditions of the Sierra Nevada are therefore important factors influencing patterns of recreational activity. The frequency, duration, timing, and spatial pattern of recreational activities will in turn affect those ecological conditions.

Ecological, social, and economic conditions for many Sierra Nevada communities and residents are closely intertwined in the recreation sector. Tourism activity in the region, of which recreation constitutes a significant part, is also dependent in part upon the condition of Sierra Nevada ecosystems. The assessment in this chapter focuses exclusively on recreational activities on the public lands and public waters in the Sierra Nevada. This recreational activity may be either local in origin or involve tourism, which is in turn a subset of all activity related to the travel industry. Tourism that does not involve recreational activities utilizing the natural resources of the Sierra Nevada are not addressed in this report. Tourism throughout the Sierra Nevada is nevertheless conducted against the backdrop of the Sierra Nevada's recreational opportunities, so the two are closely intertwined and include most of the economic activity described by Stewart (1996) in the tourism and developed recreation sectors.

the Inyo National Forest. Big-game hunting and cold-water fishing occur more than small-game hunting, bird hunting, or ice fishing. Skiing, both cross-country and downhill, are the most popular winter sports on the Inyo National Forest.

The Inyo National Forest includes portions of the John Muir Wilderness and the Ansel Adams Wilderness, and many day-hikers, backpackers, rock climbers, mountain climbers, and stock (e.g., horses, mules) users travel to these wilderness areas using trailheads that are located on the Inyo National Forest. Overnight visitors to these wilderness areas are required to fill out a backcountry permit, thus allowing the Inyo National Forest to maintain records regarding party size and length of stay. Most backcountry travelers obtain permits for the Ansel Adams Wilderness through either the Mono Ranger District or the Mammoth Ranger District. Backcountry permits for the John Muir Wilderness are most often acquired from the Mammoth Ranger District, Mono Lake Ranger District, Whitney Ranger District, and White Mountain Ranger District. Over 12,000 wilderness permits were issued during 1993, 7% to stock users and 93% to individuals traveling on foot (figure 19.71). Only fourteen percent of the 847 stock permits were noncommercial; while 86% of those using stock entered the wilderness with a commercial guide. Commercial permittees "write their own permits," however, so there is no independent confirmation of the usage figures reported. The backpacking permits, by contrast, are issued directly by USFS personnel. Some prospective backpackers who are unable to get permits enter on commercial stock permits and then continue their trips backpacking. The steep eastern escarpment of the Sierra Nevada has also created a good business in carrying backpacks up to the high country on the backs of mules, so some trips are "assisted" by stock.

These raw estimates of permits issued for stock and foot access to the wilderness understate the importance and im-

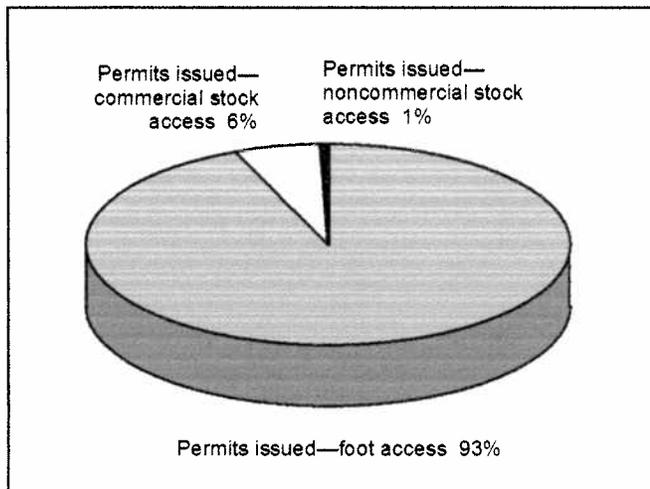
port of stock access. In 1993, there were approximately 89% more stock users on a given permit than backpackers in both the Ansel Adams and the John Muir Wildernesses. The mean number of backpackers per wilderness permit was 3.19, while stock users averaged 6.02 individuals per wilderness permit (figure 19.72). Visitors with noncommercial foot-access permits spent an average of four days in either the Ansel Adams or John Muir Wilderness. Stock users typically spent about 36% more time in the John Muir Wilderness than backpackers. Backpacker trips in the Ansel Adams Wilderness during 1993 were, on average, about 11% shorter than those taken by stock users (figure 19.73). Taken together, the effects of both larger group size and longer trip length for stock users resulted in stock users' accounting for 13% of wilderness permit RVDs even though they were issued only 7% of the wilderness permits. Approximately 80% of wilderness-permit RVDs on the Inyo National Forest were for the John Muir Wilderness, with the remaining 20% for the Ansel Adams Wilderness. There were a total of 39,870 visitors and 371,122 RVDs in wilderness use in the Inyo National Forest in 1993. Note that the average RVD ratio of 9.31 for these visitors is more than four times the average RVD ratio for Yosemite National Park visitors.

Downhill skiing is an activity requiring a permit on the Inyo National Forest and occurs primarily in the Mammoth and June Lakes subregion. There is a fairly reliable RVD record for the Mammoth Mountain ski area, because the concessionaire submits annual ski ticket sales records to the Forest Service. Forest Service officials subsequently convert the ticket sales records into RVD units. Unfortunately, RVD counts for the Mammoth Mountain Ski Area reflect all four seasons; disaggregated data was not available to assess the ratio of winter RVDs to annual totals. The twenty-seven-year Mammoth Mountain Ski Area use record does not show a consistent growth trend as measured by RVDs. There was a 64% increase in Mammoth Mountain Ski Area RVDs between 1966 and 1986, but RVDs decreased by 33% between 1986 and 1993. Over the twenty-seven-year period, there has been a 46% net increase in RVDs.

The timing of snowfall as well as other factors appear to be important determinants of skier RVD levels. These other factors include economic conditions in southern California (the primary market for skiers at Mammoth Mountain and June Lake) and the cost of skiing. Historical snow levels for the region have been quantified by the Los Angeles Department of Water and Power through measurement of the snow's water content. We therefore correlated twenty-seven years of snow water content data for the Mammoth region to the ski area's annual RVD counts. A simple overlay of the two data sets (figure 19.74) shows a relatively weak relation between these two variables. To further test the strength of the relationship, a regression analysis was performed, and its results supported the conclusion that the dependent variable of RVDs was not strongly affected by the independent variable of snow levels (r -squared = 0.027; t -value = 0.845). A stronger relation-

FIGURE 19.71

Proportion of 1993 permits by type issued for the John Muir and Ansel Adams Wilderness Areas. Total permits = 12,095.



Enclosure 15

(Exhibit 23)

Department of
Agriculture

Forest
Service

Lessem
National
Forest

Hat Creek Ranger District
P.O. Box 220
Fall River Mills, CA 96028
916-336-5521 VOICEMAIL

File Code: 3320

Date: 4-9-96

Subject: Inyo NF Wilderness Reservation System

To: Bill Bramlette, Deputy Forest Supervisor
Friscola Franco, Wilderness Landscape Team Representative

Since I was closely involved with the development with the Inyo National Forest wilderness permit, user education and computerized WRS system, I offer the following suggestions for change when the 1997 reservation program is instituted. I emphasize with the challenge you are facing in implementing a new reservation and permit system in a short period of time without being able to involve the public.

1. If funding permits, resume personal pick-up of permits. Since the front desk employee is most often the only Forest Service representative the wilderness user encounters during their visit, face-to-face contact to inform the hikers of their responsibilities and touch upon the highlights of LNT camping is critical in reducing resource damage.

In my Bishop Creek drainage study, funded by the Consent Decree, I found that almost all wilderness violations were committed by hikers who picked up their permit from a night box and had not talked to a uniformed Forest Service employee. A few were hiking up the wrong drainage, because they had not bothered to look at their permit before starting their hike. Those who picked up their permits from front desk personnel, not only recalled the LNT message and individual drainage regulations, they remembered the name of the employee.

1. Reinstitute the 50% first-come/first-served portion of the quota on the non-Whitney trailheads if additional personnel can be hired in 1997. I fear the public need will not be served by eliminating the FCFS set aside. One thing we learned the hard way was that if a permit/reservation system is not perceived as fair and equitable then the public will not accept it nor abide by the honor system to enter only on the date of their permit and adhere to the regulations. Many disgruntled hikers accepted the quota system after we explained our fairness-oriented decision making process and demonstrated that we had responded to their suggestions.

An important change benefitting small groups of hikers was to increase the FCFS portion of the quota from 25% to 50%. This was done because most people do not know 4 to 6 months in advance when they can visit the wilderness. Large groups were reserving big chunks of the quota leaving little space for individuals and locals. A second important change was the reissuance of the no-show permits. This is very popular with the hiking public and increased their acceptance of the daily limits.

Unfortunately the east slope pack stations increased their use after the Forest-wide trailhead quota system was instituted, since hikers unable to obtain permits quickly learned to book damage trips. Pack station employees have privately admitted to me and my employees that many trips are not logged or reported to the Forest Service. Eliminating FCFS permits will further increase pack station business since hikers are well aware of the inequities of our quota system.

AR V.3

000284

Enclosure 16

FILED MESSAGE FOR Priscila Franco Jun 13,96 3:29 PM

T Priscila Franco:R05F04D53A

From: Diana Worman:R05F04A
Postmark: Jan 30,96 11:17 AM
Status: Previously read
Subject: Reply to a reply: wilderness permits

Reply text:

From: Diana Worman:R05F04A
Date: Jan 30,96 11:17 AM

I didnt know that. Its not right. Its not fair. Im getting to the point that I dont want anything to do with this system. Shit...when ever someone doesnt get a permit through the "public system"...Im going to tell them to go sign up for a dunnage trip. If I were the contractor...Id be pretty disgruntled too. Its also disconcerting to me that it is obvious that the forest service is incapable of being honest, forthright and fair....and that is humiliating and embarrassing. We create our own problems. All I can say is that I hope that enough people catch on to how "full of it" we are. Its a shame that we cant have integrity from within our organization, rather than have a process that has to cause alot of anger and extra effort on the publics part. Frankly...Im committed to the program....committed to getting it changed.

Original message:

To: Priscila Franco:R05F04D53A
Date: Jan 30,96 11:07 AM

10. That was one of the decisions I asked the line for and they said no, at least not this year. Also, if we want them to, we need to start a dialogue with them about it at least a year in advance. Line did agree with the idea of making the permits that the packers issue accountable with numbers and making them consistent with all the other permits that we and other permittees (some districts have CG posts and resort permittees issuing permits) issue, which should help to meet some of the concerns that folks have over this subject.
Bill

From: Diana Worman:R05F04A
Date: Jan 30,96 9:58 AM
-----XXXXXXXXXXXX-----

From: Priscila Franco

Postmark: Jan 30,96 12:16 PM

Status: Previously read

Subject: Reply to a reply: wilderness permits

Comments:

From: Priscila Franco:R05F04D53A

Date: Jan 30,96 12:16 PM

Wow. I'm moved by your emotional level on this issue. As you know I'm much more tolerant of the Forest Service and the bureaucracy than you are and am glad if you are willing to get in there and make things change quicker than maybe I would given our different styles. You may not remember this, but I sent out a summary of the decisions by the line about this system back in Oct or Nov including this about the packers not having to pay or go through the contractor. For all the comments I got from this team about it then, I was surprised when nobody challenged Dennis about it when he came out to our meeting in December. I personally am not as concerned about them paying as I am about them getting the quota off the top and Dennis' lack of support about allocation of commercial use. Remember him saying John and I were "jousting at windmills" and if the process came out recommending a reduction in service days he couldn't support that? Not to get you riled up even more about the packers, but I'm bringing this up to let you know that is where I'm putting my energy right now--working through the wilderness plan to get a process for logical, resource protective allocation of commercial use. It will be slow going and in the end, line will choose to implement the process or not.

Cill

Message:

From: Diana Worman:R05F04A

Date: Jan 30,96 11:17 AM

I didnt know that. Its not right. Its not fair. Im getting to the point that I dont want anything to do with this system. Shit...when

DE 1 H-4

AR v.3 000273

FILED MESSAGE FOR Priscila Franco Jun 07,96 2:06 PM

To Richard LaBorde:R05F04D51A
CC wild/trails

From: Priscila Franco
Postmark: Apr 02,96 8:52 AM
Status: Previously read
Subject: Reply to a reply: Forwarded: WRS controversy/3-29 meeting

Reply text:

From: Priscila Franco:R05F04D53A
Date: Apr 02,96 8:52 AM

Thanks Rick. I tried to call you about this and some other stuff last week...I understand your frustration and have heard it from others on our team and on the forest. Last October, I took this very concern about the packers to the line team and the decision was to not include the packers in the new system this year. I've given my input to Becky on the plan to include packers when we evaluate our quotas and am working with John E on a total needs assessment and allocation of use process. So I'm doing some things to address your concern. As far as giving other o/g's permits that exceed quotas OR giving them permits within the quota off the top like we've done for the packers, I admit is not a clean way to handle it and that's why John & I have pushed for the needs assess and allocation of use process. Unfortunately that won't be done in time to deal with these uses this year. Our team definitely needs to discuss what CAN be done this year. I'll put it on the agenda for this Thurs. Call me if you want.
Cill

Preceding message:

From: Richard LaBorde:R05F04D51A
Date: Apr 01,96 7:19 AM

my issue is to stop letting the packers issue permits and make everyone use this new system. It is time we stopped trying to fool the public on this issue. they are not fooled anymore. the past policy of letting the packers override the quota sys. was never right and our quotas were exceeded alot on weekends due to this practice.

-----X-----

AR v.3

000283

Enclosure 17

ACTIVITY ALLOCATION / ACTUAL USE TABLES FINAL

MBH 6/28/2000

| ACTIVITY | CURRENT SD ALLOCATION | ACTUAL SD USE | ALT 1 PROPOSAL |
|-----------------------------------|-----------------------|---------------|----------------|
| Pack Stock supported | 18,767 * | 13,134 | 13,600 |
| Backpacking | 2399 | 2,177 | 2,320 |
| Non traditional Packstock | 0 | 0 | 500 |
| Mountain Guiding / Winter guiding | 2312 | 2,018 | 2,500 |
| Credited Educational | 0 | 0 | 1000 |
| Day hiking | 50 | 48 | 0 |
| Day rides | 3055 * | 3130 | 3,200 |
| Total | 26,583 | 20,507 | 23,120 |

Includes day rides, current permits do not break it out.

Pack Stock use includes the following operators

| OPERATOR | ACTIVITY | HIGH TWO | YEAR 2000 ALLOCATION | PROPOSED AUTHORIZATION |
|----------------------------|-------------------|---------------|----------------------|------------------------|
| Bishop Pack Outfitters | Pack Station | 1082 | 1200 | 1100 |
| Cottonwood Pack Station | Pack Station | 206 | 250 | 250 |
| Frontier Pack Trains | Pack Station | 1881 | 2585 | 2000 |
| Glacier Pack Train | Pack Station | 644 | 770 | 650 |
| McGee Pack Station | Pack Station | 629 | 2000 | 650 |
| Mammoth Lakes Pack Outfit | Pack Station | 1731 | 2087 | 1800 |
| Mt. Whitney Pack Trains | Pack Station | 66 | 200 | 75 |
| Pine Creek Pack Station | Pack Station | 637 | 900 | 650 |
| Rainbow Pack Station | Pack Station | 466 | 800 | 500 |
| Reds Meadow Pack Station | Pack Station | 3005 | 3100 | 3100 |
| Rock Creek Pack Station | Pack Station | 2391 | 3800 | 2400 |
| Sequoia/Kings Pack Station | Pack Station | 263 | 875 | 275 |
| 3 Corner Round | Packstock, hiking | 133 | 200 | 150 |
| | | 13,134 | 18,767 | 13,600 |

Backpacking includes the following operators:

| OPERATOR | ACTIVITY | HIGH TWO | YEAR 2000 ALLOCATION | PROPOSED AUTHORIZATION |
|---------------------|----------------------------|----------|----------------------|------------------------|
| Adventure 16 | Backpacking | 243 | 243 | 250 |
| Arnot Explorations | Backpacking | 118 | 118 | 120 |
| Call of the Wild | Packstock supported hiking | 89 | 89 | 100 |
| Poway | Backpacking | 302 | 315 | 320 |
| Rainbow Expeditions | Backpacking | 27 | 38 | 40 |
| Sea and Summit | Backpacking | 129 | 141 | 150 |
| Sierra Club | Backpacking; and | 1036 | 1200 | 1100 |

| | | | | |
|------------------|------------------------|------|------|------|
| | stock supported hiking | | | |
| SNP Natuurreizen | Backpacking | 65 | 65 | 65 |
| UCSD | Backpacking | 168 | 190 | 175 |
| | | 2177 | 2399 | 2320 |

Mountaineering /winter guiding includes the following operators

| OPERATOR | ACTIVITY | HIGH TWO | YEAR 2000 ALLOCATION | PROPOSED AUTHORIZATION |
|--------------------------------|-----------------------|----------|----------------------|------------------------|
| Alpine Skills International | Mountain Guide | 274 | 395 | 300 |
| American Alpine Institute | Mountain Guide | 150 | 180 | 150 |
| Dave Beck | Winter Mountaineering | 72 | 72 | 72 |
| Jackson Hole Mnt. Guide | Mountain Guide | 112 | 180 | 120 |
| Mountain Adventures Unlimited | Backpacking | 16 | 20 | 20 |
| Pacific Crest Outward Bound | Winter skills | 151 | 199 | 200 |
| Sierra Mountain Center | Mountain Guide | 320 | 365 | 350 |
| Sierra Mountain Guides | Mountain Guide | 236 | 115 | 250 |
| Sierra Mountaineering Int'l | Winter mountaineering | 290 | 311 | 320 |
| Sierra Wilderness Seminars | Mountain Guide | 162 | 170 | 170 |
| Sky's the Limit | Mountain Guide | 13 | 15 | 20 |
| Yosemite Guides | Mountain Guide | 201 | 190 | 210 |
| Yosemite Mountaineering School | Mountain Guide | 21 | 100 | 30 |
| | | 2018 | 2312 | 2212 |

Day hiking includes the following operators:

| OPERATOR | ACTIVITY | HIGH TWO | YEAR 2000 ALLOCATION | PROPOSED AUTHORIZATION |
|----------|------------|----------|----------------------|------------------------|
| REI | Day hiking | 49 | 50 | 0 |

Enclosure 18

| Early Attention Letters Code 6 –Government entities | | |
|--|--|---|
| Letter | Respondent | Comment Summary |
| | | of their high altitude training; this activity is not permitted in the PA and discussion should ensue. Feels the plan should address snowmobile use in the Red Meadows area and the impacts of overflights. |
| 1127 | Kathryn Henderson Mayor of Bishop, California and Michael Dorame Chairperson Inyo County Board of Supervisors | Believes the USFS should allow for continued use of campsites with future closures subject to public review. Feels the USFS should allow commercial service providers the opportunity to continue wilderness permitting. Fair and equitable trailhead quotas should be implemented for public and commercial service providers. Believes the USFS should comply with the 1964 Wilderness Act and the 1984 California Wilderness Act by perpetuating historic uses of these areas. The RDEIS should Utilize and include historic record of trail existence and classification to identify and designate maintainable trails. |
| 1241 | John T. Doolittle U.S. Representative 4 th District, California | Requests a comment period extension. Concerned that the alternatives do not maintain historic uses, such as horseback riding, as required by the Wilderness Act. Believes the reduction or exclusion of horses and mules will deny senior citizens and people with physical infirmities their ability to enjoy National Forests. |
| 1245 | William C. Tweed Acting Superintendent, NPS Sequoia and Kings Canyon National Parks | Questions how factors will apply to commercial activities in the preferred alternative. Also questions the need for year-round quota enforcement in the preferred alternative. Favors reductions in the cross-country party size. Recommends campfire elevation restrictions of 10,000' across the proposed area. Suggests the USFS make some editorial changes. Feels the USFS should document how much administrative pack stock use is occurring, e.g. from ranger patrols or trail crew use. Questions how the increase in the Whitney quotas is justified with the levels of resource impact occurring there now. |
| 1300 | Kai Dunn Water Resource Control Engineer Mono/Owens Watershed Unit California Regional Water Quality Control Board | Requests that the Final EIS should describe appropriate measures to ensure compliance with the water quality standards and control measures in the Basin Plan. Requests the USFS prepare a monitoring plan to assess water quality for high use areas. Believes the USFS should evaluate proposed actions in wetlands based on its effect to the survival and quality of the wetlands. Suggests that the RDEIS should include details regarding field checks to determine range readiness or when those inspections will occur. Requests erosion control and |

Enclosure 19

APK

P-185



Shauna_Dyas@nps.gov
07/28/2004 01:05 PM

To: comments-pecificsouthwest-inyo@fs.fed.us
cc:
Subject: Comments on Proposed Action

Please see below.

Shauna Dyas
SEKI
shauna_dyas@nps.gov
559-565-3101

----- Forwarded by Shauna Dyas/SEKI/NPS on 07/28/2004 01:04 PM -----

SEKI
Superintendent
Sent by: Shauna
Dyas

Comments on Proposed Action

07/28/2004 12:50
PM PDT

the Interior

Parks

IN REPLY REFER TO:
Rivers, California 93271

United States Department of
NATIONAL PARK SERVICE
Sequoia and Kings Canyon National
47050 Generals Highway

Three

(559) 565-3341

OFFICIAL ELECTRONIC MAIL SENT VIA EMAIL
NO HARD COPY TO FOLLOW

July 28, 2004

Pack Stock Use Proposed Action
Inyo National Forest
351 Pacu Lane, Suite 200
Bishop, CA 93514

To Whom It May Concern:

Thank you very much for the opportunity to comment on your planning documents. We value the long-term cooperative working relationship between the Inyo and Sierra National Forests and Sequoia and Kings Canyon National Parks (SEKI). By working collaboratively, we can assure the protection of valuable wilderness resources and provide for the enjoyment of these resources by the visiting public.

I know that our staffs have been working together on stock and meadow issues and that your Interdisciplinary Team has developed some excellent protocols to determine meadow conditions. My staff informs me that we will be continuing our work together towards creating comparable monitoring

protocols. Thanks to you and your staff are in order for the assistance provided. Continued cooperation on common issues will assure that we are each accomplishing our missions of public land stewardship.

The staff of SEKI have reviewed the Trail Management Plan - Proposed Action , and the Commercial Pack Stock Use Authorizations for the Ansel Adams and John Muir Wildernesses - Cumulative Effects Analysis - Proposed Action - June 2004. Our review of the documents focused specifically on effects that may directly or indirectly affect the manner in which we manage these parks. Thank you for considering our comments, most of which pertain to the pack stock document.

. These parks have chosen to monitor and regulate commercial stock use with the unit of "stock nights," versus number of trips. This allows for the managing agency, i.e. the NPS, to maintain better data and controls on actual use and does not encourage operators to maximize party size. We feel that choosing number of trips as the regulatory unit may lead to operators using more stock and thus increasing impacts. We feel stock nights are a better measure of use and will work better than number of trips in controlling and reducing resource impacts.

. This analysis of the John Muir (JM) and Ansel Adams (AA) Wildernesses without incorporating similar actions on the Golden Trout Wilderness may have a significant effect on SEKI. Controls implemented on the JM and AA should be concurrently implemented on the Golden Trout as since the implementation of the 2001 AA, JM, and Dinkey Lakes Wilderness Plan these parks have witnessed a subsequent increase of use into Sequoia National Park via Cottonwood Pass. We would expect that this proposed action on the AA and JM wildernesses may continue to shift commercial stock use to the Golden Trout Wilderness which does not have these controls in place.

. As the time frame of this comment period did not allow us to fully analyze all use numbers, we will be more thoroughly evaluating the proposed changes and providing additional comments throughout this planning process. We do have concerns that the proposed use numbers for the Shepherd Pass, Taboose Pass, Bishop Pass (and indirectly, Cottonwood Pass) trailheads may result in unacceptable increases in stock nights in the parks. We are also concerned about the anomalous assignment of service days to the other pack stock operators (specifically Three Corner Round and Mt. Whitney Pack Trains as indicated on P. 74) as these are likely to impact the parks directly.

. The shift of emphasis to destination quotas from trailhead quotas is a good one and will lead to better conditions for the operators and the resources.

. In the next action of this process (alternatives development?), it will be important for us to see how the numbers were arrived at, i.e. what were the parameters and guidelines for developing the use numbers? How do these numbers compare with past use? Without this information it is difficult to determine the impact of the specific quotas on the parks.

. In regards to the "unassigned" quotas, these parks would request that the line officer consult and receive concurrence for any approvals that result in entry into the parks. Any trips approved would need to operate within the parameters of any park-related controls.

. Line 370a in the Pack Stock Use CEA provides for 8 trips to Lamarck Col. These parks have seen an increase in use on the west side of the Col and subsequent resource impacts in a fragile and untrailed area. These include multiple, braided use trails which lead to increased erosion, and

the proliferation of hiker-built cairns. We feel that allowing stock support of trips that will go over the Col is a factor that contributes to resource impacts in SEKI and would like to see this quota removed. We have also had several rescue/medical responses requiring evacuation in this area recently due to inexperienced hikers attempting this difficult route (e.g. four broken legs in 2001). Easing the approach to the route by providing stock support exacerbates this situation. Also, the pack station owner constructed the current trail that leads to the base of Lamarck Col without authorization back in the 1950's and 1960's. At that time the NPS successfully petitioned the USFS to have the trail construction halted. This was, and is, due to the fact that the area in the park accessed via Lamarck Col is sensitive and susceptible to undesired impacts if overuse occurs. In response to the Trail Management Plan, it is our preference that Trail 3004 be Trail Class 2, Not Recommended for Stock above the Grass Lake Spur Trail (3004A), and that Trail 3004C be Trail Class 1, Not Recommended for Stock.

• We believe that allowing operators to pack in firewood is not a viable practice, as it will likely have negative biological and social impacts. It will lead to the use of more stock, and would confuse other user groups who would see fires occurring in non-fire areas. There is also the danger that wood which is packed in (and may come from a variety of sources) could contain non-native fungal pathogens or insects that could infect and harm native organisms.

• We do not believe that opening the Mt. Whitney trail to stock is appropriate, specifically for safety reasons. These parks have found that mixing stock and hikers on this narrow steep trail is a significant safety issue and we will not open the currently closed portion of the Mt. Whitney trail of Sequoia National Park to stock. We do not believe there is an appropriate place near Trail Crest for stock to safely stop, offload, and turn around, all while hikers are also using the trail. We feel that if the east side is opened to stock, pressure may be put on these parks to do the same which would result in unacceptable unsafe conditions for trail users. We also believe that having one trail which is not open to stock is an acceptable condition.

Thank you for providing the opportunity to work together on mutual concerns, and for considering these comments. I know that by sharing our actions with each other that we can carry out our missions professionally and effectively. I believe that through our collaborative efforts the preservation of our contiguous wildernesses is being better accomplished than at any time in the past. This of course benefits the quality of resources and visitor experiences on public lands. I look forward to seeing your future alternatives, and to continuing to work together on common issues and throughout this planning process.

Sincerely,

/s/ Richard H. Martin
Richard H. Martin
Superintendent

Enclosure 20



United States
Department of
Agriculture

Forest
Service

Inyo National Forest

351 Pacu Lane, Suite 200
Bishop, CA 93514
(760) 873-2400
(760) 873-2538 TDD

File Code: 2300/2320

Date: June 7, 2005

Dick Martin
National Park Service
Sequoia and Kings Canyon National Park
47050 Generals Highway
Three Rivers, CA 93271

Dear Mr. Martin:

As you are aware, the Inyo and Sierra National Forests are preparing an Environmental Impact Statement (EIS) for new management direction for commercial pack stock use in the Ansel Adams and John Muir Wildernesses. The comment period for the Draft EIS is in progress. A response to our initial proposed action last year was received from you on 7/28/2004. In that correspondence you indicated a number of reservations regarding use proposals that may affect the Park, given that a number of our trailheads provide access to the Park's wilderness.

Throughout this process we have been communicating with the affected parties, the packers. It often comes up that they believe that we are unduly regulating their use into the Park, and that the Park does not have issues with their use. In order to avoid further misunderstandings on this matter I would like to ask that you provide us clear direction for the amount of use that you feel is acceptable from the trailheads in question. As you know the CEQ regulations state that *"when a cooperating agency with jurisdiction by law objects to or expresses reservations about the proposal on grounds of environmental impacts, the agency expressing the objection or reservation shall specify the mitigation measures it considers necessary to allow the agency to grant or approve applicable permit, license, or related requirements or concurrences"*. (1503.3)

In this situation I feel it is imperative that the Park document the mitigations they desire as it relates to the packer use into the Park. Specifically you have indicated concerns with Shepherd Pass, Taboose Pass, Bishop Pass, and Lamarck Col as well as the operations of Mount Whitney Pack Trains and Three Corner Round (7/28/2004). Further, more specific mitigation measures are requested for these areas/operators. I would also like to have documentation for your concurrence or mitigations for Sawmill Pass, Kearsarge, Baxter Pass and the use into the Evolution Valley from the west.

You indicated in the 7/28/2004 letter that you would like to know how the numbers were arrived at for this use. Our use records (tally sheets, wilderness permit data) are available for you to review and there is a good summary of this use in the DEIS (Appendix B, pgs 1-3). If you need additional information I know that our staffs have a good working relationship that should facilitate any data needs that you have. In addition, perhaps you can share your records of pack stock use in the Park for the past 5-10 years so we may compare with our data.



We will be formulating a Final EIS and Record of Decision over the next two-three months. It will be critical that your input is received in a timely manner for us to incorporate into the documents. Our comment period closes June 15, 2005, and I am hopeful that the specific mitigations are being considered in your response. If you need more time given our desire for specific mitigations, please contact me at (760) 873-2477. I am committed to continuing a close and seamless management in the areas of shared boundaries, we have a long history of working together on these issues and I trust that will continue. Thank you for your assistance in this matter.

Sincerely,

/s/Bill Bramlette (for)
JEFFREY E. BAILEY
Forest Supervisor

Enclosure 21

425



United States Department of the Interior

NATIONAL PARK SERVICE
Sequoia and Kings Canyon National Parks
47050 Generals Highway
Three Rivers, California 93271-9651
(559) 565-3341

IN REPLY REFER TO:

N1623

June 27, 2005

Trail and Commercial Pack Stock Draft EIS
Inyo National Forest
351 Pacu Lane, Suite 200
Bishop, CA 93524

To Whom It May Concern:

Thank you for the opportunity to comment on the *Draft Environmental Statement (DEIS) for Trail and Commercial Pack Stock Management in the Ansel Adams and John Muir Wildernesses*. Thank you also for the extension of the comment period which has allowed us to be thorough in our review of the document. This document is obviously the result of much effort and shows significant professional input of the contributing personnel. Much of the information you have compiled will likely prove valuable to Sequoia and Kings Canyon National Parks (SEKI) in the future as we take steps toward developing our Wilderness Stewardship Plan. It is very evident that you are striving to meet the mandates of your mission of preserving the wilderness resource and character while allowing for appropriate use of the wildernesses. The DEIS and plan treat the issue of commercial stock use fairly and appropriately by recognizing that stock use is traditional and reasonable in the wilderness environment, but that control and regulation is necessary to ensure these areas will remain *"unimpaired for future use and enjoyment as wilderness."* We believe that you have found a good balance of use and preservation and that your DEIS is thorough and your plan takes appropriate steps and has the flexibility to adjust as conditions change and as more information is gathered.

We fully support you in your efforts to provide controls of those activities which have the potential for unacceptable impacts in the fragile wilderness environment. We thank you for implementing controls that assist us in assuring the preservation of the wilderness within these parks. We appreciate the fact that you continue to assist us by implementing a variety of wilderness preservation measures that support us in our mission, such as issuing permits and providing SEKI specific information including regulations and practices for overnight users of these parks who enter through the forest, both stock users and hikers. As you know, we often face the same situations and we also must work to assure that uses are sustainable and do not generate any level of impairment to wilderness resources or character. Our comments below speak to those areas of the DEIS and plan that we feel may have effects on the resources and management of these parks, either directly or indirectly. We request that you strongly consider these comments for inclusion in your final action in order to provide for the continued protection of the wilderness resources of Sequoia and Kings Canyon National Parks. We have

also included some comments as they relate to Devils Postpile National Monument, as the management of that site is overseen by these parks.

We have reviewed the DEIS and find that there are aspects of different alternatives that we prefer and others that we do not feel are in the best interests of wilderness preservation. These parks have a preference for Alternative 2 on the whole. We believe that destination quotas may provide better options for assuring wilderness preservation, and that the treatment of trails is more appropriate. Our comments on what we feel are relevant aspects follow.

Some specific aspects that we support include:

- The designation of specific stock campsites. We believe this will assure that impacts are controlled and limited to specific areas, and do not increase and spread over wider areas.
- The establishment of primary operating areas. This will assure that operators will have a good knowledge of the geography and conditions of their area, allowing them to minimize impacts.
- The continued closure of the Mt. Whitney trail to private and commercial stock use. The high levels of use and confining topography of this trail do not allow for safe use by both stock and hikers.
- The continuance of issuance of wilderness permits directly by the USFS or specific designated contractor. We believe that the agency should be responsible to assure proper and thorough information, which can change frequently, is being communicated with each permit. We do not support operator issued permits.

Some specific aspects that we do not support are:

- The practice of "sanding." This activity poses several risks, including the introduction of materials to areas where they are not found, and the potential for excavation of materials from "borrow" areas. In other words it is not environmentally sound to bring in outside material or to "borrow" and displace local material to simply speed up accessibility.
- The practice of packing in charcoal and firewood. We strongly oppose the packing in of firewood or charcoal to areas where fires are generally prohibited. This practice would pose a myriad of problems and will not be allowed in SEKI. The practice takes significant risks with minimal rewards at best. By bringing in firewood, there is a risk of importing non-native, and potentially harmful, pathogens and materials, e.g. weed seeds. There is also a compliance issue in that coals/ashes may be dumped counter to instructions to remove these materials. We believe that ecological values should not be subservient to economic values. This practice would have other effects as well, including requiring additional stock to carry the wood/charcoal (which would increase impacts and costs to clients), the false impression that fires are allowed in what are supposed to be "closed" areas to other user groups, and the potential dissatisfaction of those other user groups who subject themselves to citations and may feel that a double-standard exists for the benefit of a commercial entity. On page D-37 of the DEIS, a US Forest Service policy states: *"Where a choice must be made between wilderness values and visitor or any other activity, preserving the wilderness resource is the overriding value. Economy, convenience, commercial value, and comfort are not standards of management or use of wilderness."* We feel that the packing in of wood or charcoal is not in the best interest of preserving the wilderness resource and urge you to continue with the

· decision made in the 2001 Wilderness Management Plan to *“Prohibit. . . packed in firewood, or fire pans within areas closed to wood campfires.”*

- The classification of Trail 3004C, Lamarck Col, as Trail Class 2. We previously communicated our concern that stock support will contribute to the amount of use over the Col and into a fragile and untrailed area of Kings Canyon National Park. This area has received notable resource impacts, including multiple braided use trails and user-built cairns, and a demand for emergency medical services to people who become injured due to their ability not meeting the technical nature of the route. Though the level of use facilitated by stock may seem small, we believe that each incremental effect adds up to an undesirable cumulative impact. We again encourage you to designate Trail 3004C as “Trail Class 1*, Not Suitable for Commercial Stock.”
- The non-treatment of commercial stock use over Cottonwood Pass. With the controls proposed in all alternatives, we fully expect that commercial stock operators will at times seek other areas in which to operate. This will have an effect on SEKI, specifically in the area of Cottonwood Pass in the Golden Trout Wilderness. We have seen an increase near 50% of commercial stock use in the meadows of Sequoia National Park in this area after the implementation of the 2001 plan (for the years 2002-2004), which utilized service days. We do not feel this level of use is sustainable. We would urge you to incorporate the Cottonwood Pass Trail in this analysis and alternative process, specifically as it pertains to any service days allotted to those operators who receive outfitter-guide permits (as opposed to resort permits). Though the Golden Trout and John Muir Wildernesses have a distinct political border, we do not feel that this border should preclude you from incorporating decisions that are directly related to this proposed action. If Alternative 2 is chosen, Cottonwood Pack Station would be the primary operator, and we would expect destination quota numbers similar to those for Sequoia Kings Pack Trails and Kearsarge Pass. If Alternative 3 is chosen, we would expect quota numbers also similar to Kearsarge Pass for commercial stock, and retaining the quota for the general public of 40 (or less).
- The absence of analysis for commercial stock use over New Army Pass. Currently operators leaving the Horseshoe Meadow area prefer utilizing Cottonwood Pass, but if controls were put on Cottonwood Pass, some operators may seek to enter SEKI via New Army Pass. New Army and Cottonwood passes should be considered together to assure appropriate levels of use are determined. This is more of an issue if Alternative 3 is chosen which controls the area via a general trailhead quota, and less of an issue if Alternative 2 is chosen. It appears that if Alternative 2 is chosen, no commercial use would be permitted over New Army Pass as the destination is Cottonwood Basin. We would support only a very small amount of commercial use over New Army Pass.
- The holding of exit quota spots, from Trail Crest east, for commercial operator clients as specified for Alternative 3. We feel that all visitors should compete equally for exit quota spots.
- Daily party sizes and yearly totals for these select passes:
 - Taboose Pass in Alternative 3 – A single quota with 10 people/day and 50 stock/year allowed is proposed. We feel that the narrow and rocky condition of the trail, does not allow for safe passage of large stock groups and hikers and would encourage you to place a limit of 10 head/day on this trail. The annual limit as specified is acceptable.

Shepherd Pass in Alternative 3— A single quota of 15 people/day and 100 stock/year allowed is proposed. We feel the narrow, rocky condition of the trail does not allow for safe passage of large stock groups and hikers, and that the fragile nature of the high country accessed does not support this level of stock well and would encourage you to place a limit of 10 head/day and a seasonal limit of 80 stock/year. The high meadow areas accessed by this trail have seen a notable increase in use in the past three years and they will not be able to sustain this level of use.

Shepherd Pass in Alternative 2 – A destination quota of 18 trips per season is allotted. Due to the reasons stated above, we would encourage you to set the quota at 10 trips in order to assure that meadows in the area do not become overused.

(NOTE: we feel the other quotas and use numbers as delineated in Alternatives 2 and 3 are acceptable at this time. We will continue to enforce our group size limits of 15 people and 20 stock as well as our monitoring efforts and may need to enact further control of use in these parks if impacts to resources and experiences so warrant.)

- The level of signing for trails designated as “Not recommended for Stock.” In general, wilderness should be as free from human installations as possible. Since these trails are primarily limited to commercial operators, it is reasonable to expect these operators to know where they can and cannot go. To place signs to assure no use seems unnecessary and counter to wilderness management practices.

If we determine that stock impacts in the parks are not acceptable, we of course reserve the right to utilize our authorities to enact additional controls, primarily through our Incidental Business Permits (IBPs) with these operators. We have already enacted the policy of not issuing IBPs to any new stock operators pending the development and implementation of our upcoming Wilderness Stewardship Plan.

In regards to how the DEIS relates to the management of Devils Postpile National Monument (DEPO):

- It does not appear that a thorough evaluation of the carrying capacity and impacts of the 1500 annual day use riders to Rainbow Falls has been conducted. The use of this area by commercial stock operators has been conducted via the NPS's Incidental Business Permit system. DEPO will be developing a General Management Plan in the upcoming years, and will address carrying capacity and resource impact issues in connection with this use. We are willing to accept the use numbers as allotted in the DEIS and Plan, but reserve the right to control and regulate use in DEPO pursuant to resource impacts determined through future monitoring and analysis.
- We also feel that trails which lead into DEPO, specifically those sections of trail number 2000.3 (Ref. #'s I-24 and I-25) should be classified no higher than Trail Class 3. These are classified as Trail Class 4 in Alternatives 1 and 2. These trails are in wilderness, and the higher level of trail class has conditions that we feel are not appropriate in wilderness. Trail Class 3 more accurately reflects the current condition and the maintenance level that we work to accomplish.

Thank you considering our comments and for your cooperation in working toward mutually beneficial solutions. Your efforts in the management of wilderness use, whether by stock users or hikers, are critical to these parks preserving our portion of these contiguous wildernesses. We fully support you in your efforts and feel that the alternatives of this plan will work toward

those ends. I believe that through cooperation we are better able to effectively and professionally achieve our missions. Through our collaborative efforts the preservation of our contiguous wildernesses is being better accomplished than at any time in the past. This leads to improving the quality of park and forest resources and visitor experiences on public lands. Please feel free to contact me or my staff if we can provide any further information or for clarification of any of these issues.

Sincerely,

A handwritten signature in cursive script that reads "Russel J. Wilson". The signature is written in black ink and includes a long horizontal flourish extending to the right.

Russel J. Wilson
Acting Superintendent

Enclosure 22



File Code: 2720

Date: March 24, 2000

Mr. Greg Allen
Allen Outdoor Products
600 S. Main St.
Bishop, CA 93514

Dear Greg:

Thank you for coming in on March 14, 2000 to meet with Keith Waterfall, Marilyn Loughrey and I in regards to your purchase of Rainbow Pack Station. We met on February 4, 2000, to discuss the generalities of a special use permit and your intentions for operating Rainbow Pack Station. The intent of our March 14, 2000 meeting was to answer any additional questions and give you specific data to allow you to make an informed decision regarding the purchase of Rainbow Pack Station.

As we mentioned last month, your amount, area, and type of use needs to remain similar to Rainbow Pack Station's use in the past. To determine the appropriate level of authorized use, we reviewed the past years' tally sheets and looked at the highest two years of the past five years. This is as per the Forest Service handbook direction.

As a result, we determined that Rainbow Pack Station's use will be 465 overnight service days in the John Muir Wilderness, 116 day use service days in the John Muir Wilderness, and 210 day use service days outside of the John Muir Wilderness. This was determined by averaging the highest two years of use out of the last 5 years. As you know, a service day is computed by multiplying the number of clients by the number of days, or portion of a day that service is provided.

You received the 1994-1999 spreadsheets that were derived from Rainbow's tally sheets. Rainbow has primarily conducted spot and dunnage trips with relatively few full service trips. We also reviewed the destinations that were utilized by Rainbow Pack Station. The data illustrates that over 50% of the trips went over Bishop Pass into the Kings Canyon National Park. You indicated at our meeting that you plan to continue this level of service into the Park. Full days spent in the park do not count towards your service days. We encourage you to pursue your opportunities in Kings Canyon National Park. You should contact the park to determine what their expectations of use are as well. We gave you Ralph Moore's phone number for more information.

The spreadsheets we gave you illustrate the areas that Rainbow Pack Station has used in the past. We expect that you will use this as a planning tool when booking clients. We are also concerned with some of the destinations that Rainbow has previously used. These concerns include resource conditions, trail conditions, and/or lack of appropriate campsites. The areas discussed included Ruwau, Marie Louise, Hurd and Tyee Lakes. We ask that you do not



provide services to those destinations at this time. Please work closely with Keith in the field to determine other appropriate destinations.

We also discussed the amount of stock you will have at the pack station. You mentioned that you currently have 26 head of stock, but are looking for other options to increase your herd. You felt that you could operate with a maximum of 40 head.

You also asked about the ability to issue wilderness permits to your clients this year. As Keith explained, there are no changes anticipated for this summer. There is an alternative in the Wilderness Plan for the Forest Service to retain the ability to issue all wilderness permits. Keith explained the reasoning behind that alternative and the benefits of that option.

You discussed the opportunity of the Backcountry Horsemen and the pack station volunteering to do trail work. We welcome your offer of assistance, and explained that we need to evaluate the project based on resource needs and scope of project to be accomplished. We would need to prioritize those areas that need work and select projects that the group can do within their time frame and skill level. Please be aware that these can only be maintenance projects. Anything beyond that would require environmental analysis and fit within the Forest Priority list.

Marilyn then explained the documents needed from you as part of the permit process. You will need to complete and submit:

- 1) an application for special use permit
- 2) a resume outlining your technical expertise, training, certifications, work experience, qualifying business experience and other pertinent information
- 3) the requested documents for your financial ability determination (FAD). The auditor will be contacted upon receipt of your application. Once the auditor receives all the documents requested, your FAD will take a minimum of a month for analysis.
- 4) a business plan outlining how you plan to operate to ensure that your business is successful and viable.
- 5) a copy of the legal documents (typically, a bill of sale) showing the change in ownership of the business once you have completed the above and the sale is finalized.

It is in your best interest to return these documents as soon as possible to Marilyn so that the issuance process will be completed as soon as possible.

We will be initiating the environmental analysis for the change in ownership concurrently. This will involve scoping, writing the environmental document, and the decision. As explained in the previous meeting, this may take some time as well.

Please feel free to contact Marilyn Loughrey if you have any additional questions regarding this permit issuance process. Thank you very much for your time and effort.

Sincerely,

A handwritten signature in cursive script, appearing to read "Lucinda J. McKee".

LUCINDA J. McKEE
Assistant Forest Supervisor

Enclosure 23

Mt. Whitney Trail



When it is relatively free of snow, from approximately July to October, the Mount Whitney Trail provides a non-technical, but strenuous, route to the summit of Mt. Whitney.

Mt. Whitney is extremely popular wilderness destination. To preserve its wilderness character, all visitors must be committed to extremely high standards of conduct. Practices that are appropriate in other areas might not be acceptable at Mt. Whitney. Before visiting Mt. Whitney, review the information below and make sure that a trip to the Mt. Whitney Trail is right for you.

At a Glance

| | |
|----------------------------|---|
| Reservations: | Wilderness permits may be reserved in advance. For more information click here... |
| Permit Info: | Wilderness permits are required year-round for all overnight visitors, and for day hikers in the Mt. Whitney Zone. Between May 1 and November 1, use is regulated by limited entry quotas. Permits are issued only at the Eastern Sierra InterAgency Visitor Center, located 1 mile south of Lone Pine, CA, at the junction of US Highway 395, and State Route 136. |
| Information Center: | Eastern Sierra InterAgency Visitor Center: (760) 876-6200 For maps and trail guides visit http://esiaonline.com |

General Information

Directions:

From Lone Pine, CA, travel 13 miles west, on Whitney Portal Road. The trailhead is on the right side of the road, at Whitney Portal.

General Notes:

Current Conditions

[Trail Report](#)

[Weather Forecast](#)

Dispose of Waste Properly!

All Mt. Whitney visitors must pack-out their solid human waste. In 2010, Mt. Whitney visitors pack out over 6,800 lbs of human waste! Pack-out kits are distributed with wilderness permits.

In addition, all visitors must pack-out all of their trash, food and gear.

Traveling in Bear Country

Historically, there has been a high level of bear activity in the Mt. Whitney area. From Memorial Day weekend through October 31, all food, food related trash and scented items must be stored in bear-proof containers. At the trailhead, all food and scented items must be removed from vehicles and stored in the bear proof lockers that located in parking areas. Dispose of trash in bear proof trash receptacles at the trailhead.

For more information about traveling in bear bear country, [click here...](#)

Safety Is Your Responsibility!

Wilderness travel involves an element of risk. By any route, climbing Mt. Whitney is difficult and potentially dangerous. Every year visitors become sick or injured; some die. In 2010, 3 people died while attempting to climb Mt. Whitney. Several others were involved in very bad accidents or became gravely ill.

Common accidents include simple stumbles and falls, falls from cliffs, slides on snow and ice covered slopes. Illnesses that have stricken visitors include altitude related illnesses, severe electrolyte imbalances, pre-existing medical conditions, cardiac illness and more.

Accessibility:

Parking:

Parking is available at Whitney Portal. Frequently during summer, all parking spaces are occupied. Please car pool whenever

Enclosure 24



National Park Service
U.S. Department of the Interior



Sequoia & Kings Canyon National Park

Climbing Mt. Whitney

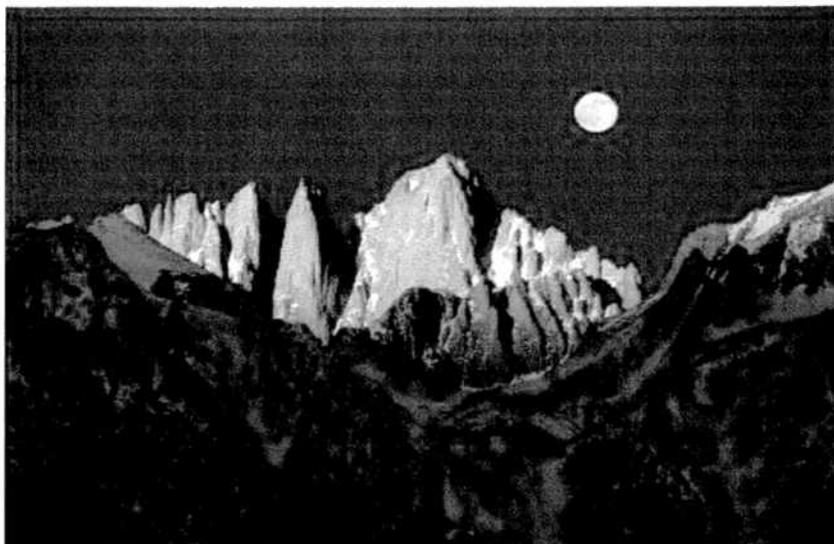


PHOTO © BY JIM BAUMGARDT, IMAGE COUNTS, WWW.IMAGECOUNTS.COM

Moon over Mt. Whitney.

Accessing Mt. Whitney

Many visitors to Sequoia and Kings Canyon National Parks are interested in seeing Mt. Whitney, the tallest mountain in the "lower 48" states. However, Mt. Whitney is on the east side of the Great Western Divide, a chain of mountains that runs north/south through the center of Sequoia National Park, "dividing" the watersheds of the Kaweah River to the west and the Kern River to the east. Because many of the snowcapped peaks in the Great Western Divide reach altitudes of 12,000' (3657 meters) or higher, it is impossible to see over them to view Mt. Whitney from any of the roads on the west side of the Sierra. The best place from which to see Mt. Whitney is the Interagency Visitor Center on Highway 395, just south of the town of Lone Pine on the east side of the Sierra. Highway 395 can be reached via Tioga Pass in Yosemite National Park (open summer only), or by going around the southern end of the Sierra from the town of Bakersfield. *There are no roads across the Sierra in Sequoia and Kings Canyon National Parks.*

Know Before You Go

Mt. Whitney is the most frequently climbed mountain peak in the Sierra Nevada, if not in the U.S. Because of this, the National Park Service, along with the U.S. Forest Service (which manages the Whitney Portal Trailhead), have implemented a permit system to minimize the impact of day-hikers on the Mt. Whitney backcountry. **All hikers entering the Mt. Whitney zone, including day-hikers, are required to obtain a permit**—either your park wilderness permit if you are entering the zone from the west or an Inyo National Forest Whitney Zone permit if you are entering from the east.

Mt. Whitney can be most directly reached by a 10.7 mile (17.1 km) trail from Whitney Portal, 13 miles (21 km) west of the town of Lone Pine on the east side of the Sierra. Ice axes and crampons are needed in spring and early summer, but technical climbing equipment is not usually necessary between mid-July and early October. The elevation at the trailhead is 8360' (2550 meters). The elevation at the summit is 14,494' (4418 meters). Permits for this trailhead must be obtained through the Inyo National Forest. Please read the [reservation information](#) provided by the Forest Service if you are interested in going to Mt. Whitney from Whitney Portal. Contact the Mt. Whitney Ranger District, PO Box 8, Lone Pine, CA 93545, 760-876-6200, for additional information about this trailhead.

Enclosure 25

Recreation Passes & Permits

Wilderness Permits - Mt. Whitney Zone

Mt. Whitney Zone



The Mt. Whitney Zone includes the following trails:

- Mt. Whitney Trail
- North Fork Lone Pine Creek Trail (also known as "The Mountaineers Route")

[Click to enlarge](#)

Wilderness Permits are Required Year Round

Limited Entry Quotas apply between May 1 and November 1. Different types of use have different quotas. The following limited entry quotas regulate use to protect the Mt. Whitney Zone

| Type of Permit / Use | Visitors / Day | Reserveable / Day |
|---|----------------|-------------------|
| Mt. Whitney Trail Overnight | 60 | 60 |
| North Fork Lone Pine Creek Trail Overnight | 10 | 6 |
| Mt. Whitney Zone Day Use * | 100 | 100 |
| "Trail Crest Exit" ** | 25 | 15 |
| * Combined day day use on both trails | | |
| ** Trail Crest Exit quota applies to visitors who descend the Mt. Whitney Trail after beginning a trip elsewhere. | | |

Where to Obtain Permits

All Permits for entering the Mt. Whitney Zone **MUST** be obtained from:

| | |
|--|--|
| Eastern Sierra InterAgency Visitor Center Junction of Highway 395 and State Route 136 2 miles south of Lone Pine, CA (760)876-6200 or TDD(760)876-6201 | Wilderness Permit/ Wilderness Information Phone line (760)873-2483 |
|--|--|

For permits issued during the quota period, May 1 to November 1:

- Unreserved permits must be obtained in person inside the visitor center during business hours, beginning at 11am on the day before the permit entry date.
- Reserved permits can be picked up one or two days before the permit entry date. You must pick up the reserved permit, a reservation letter can NOT be used as permit substitute.

For permits during the winter season, the quota is not in effect for trips that begin before May 1 or after November 1.

- During business hours, permits must be obtained in person inside the visitor center.
- After business hours, permits can be self issued at the kiosk beside the highway, near the visitor center driveway.
- Reservations are not needed for winter season trips, the number of permits that will be issued is unlimited.
- Permits are available the day before your trip entry date.

Reservations

Due to the high demand for Day Use and Overnight Mt Whitney Permits, a lottery is held for reservations. There is not a waiting list for cancellations. The space left after the lottery will be available to reserve at the end of April.

- For trips in May, June or July; apply on April 20, 2011
- For trips in August, Sept. or October; apply April 27, 2011
- Application to reserve after the lottery.

Reservation Application for trails NOT Included in the Lottery is for reserving Overnight trips starting on the North Fork of Lone Pine Creek and trips exiting Trail Crest. These can be reserved 6 months in advance.

Reservation fees:

- \$15 / person
- Fee to change: \$10 / Group
- No refunds after reservation is issued.
- Payment must be provided with application; funds will be returned if reservation is not available.

Change is Coming to the Mount Whitney Lottery ~2011

For 2011 the application period will be extended.

Applications postmarked **February 1 to March 15, 2011 will be accepted.**

New software is in development for 2012 that should allow a future lottery that is paperless with online application forms and email notification of results.

Until then, join us in 2011 for one more year of the traditional lottery process...

How do we do it? Applications are drawn from a really big box filled with paper application forms that are stirred into random order. On **February 16** we begin making reservations from the application pool. Applications received February 16 or later are stirred into the application pool each day. Every application is drawn and considered. This process will take 6 weeks or more. When your application is drawn, a reservation is made if space is still available for the entry date and group size you requested. Please be sure that your application is accurate and complete before you mail it. We cannot revise, intercept, or confirm the status of applications.

Results will be sent by mail, usually after April 1.

Submission of an application indicates your agreement to the Mt Whitney Lottery Terms and Conditions, so be sure to review those terms and conditions included with the application form.

Questions? Call the Inyo National Forest Wilderness Permit Office staff at ~ 760-873-2483

Phone line hours are 8am to 4:30. Winter schedule~ closed on weekends and holidays. After May 15 we will be open every day for the summer schedule.

**Wilderness permits are required year round for Mt. Whitney,
but some of these permits are NOT in the lottery.**

If you want a reservation,

Here are 3 questions to determine if your trip is in the lottery.

Question 1. When does your trip begin?

For trips that begin during the quota period of **May 1 through November 1, Continue to Question 2**

- Winter season trips for day use and overnight/ multi-night are not reserved in the lottery. Self issue permits can be issued at the Eastern Sierra InterAgency Visitor Center for trips that begin before May 1 or after November 1.

Question 2. Is your trip a Day Hike?

Enter the lottery to reserve a Day Use Permit.

See more information about day hikes below and under Wilderness Permit Definitions.

- A Day Use permit is required if the entire trip will be on one calendar date and you will enter any part of the Mt. Whitney Zone.
- A Day Use permit is valid for any route, including access to Mountaineer's Route, East Face/Buttress routes, Mt Russell.

Question 3. Overnight trips ~Where does your trip begin? (Overnight includes 1 or more nights)

Enter the lottery if you are entering the Mt. Whitney Zone on the Mt. Whitney Trail. (not the NF of Lone Pine)

See the questions below for how to reserve other types of overnight permits.

Does your trip start in a National Park? Permits for trips starting in Yosemite, Sequoia and Kings Canyon National Parks are not in the lottery. Obtain these permits from the park where your trip begins.

My trip is starting on an Inyo National Forest trail and ending at Whitney Portal via Trail Crest; do I need to enter the lottery? No, your reservation is not in the lottery, however an additional exit quota for coming out at Mt. Whitney will apply to your exit date. These dates fill quickly, starting 6 months in advance of the trip. You can reserve the entry trail you are starting on, be sure to request "Trail Crest Exit" with the reservation.

Scroll down for Wilderness Permit Definitions and other common Mt. Whitney questions

When will the trail be clear of snow?

- Expect the switchbacks above Trail Camp to be covered by snow and ice through the end of June or early July.
- Snow may cover the trail again in late September or October.
- During early spring, late fall and winter, trails will be partially or entirely covered with snow or ice.

Winter mountaineering skills, experience and equipment are essential for a safe excursion when ice and snow are on the Mt. Whitney Trail.

I'm going on a multi-night trip; do I also need a day use permit for the day we will summit?

- No, the overnight permit is valid for your summit day; **day use permits** are only for people who are doing their entire trip on one day.

I'm not going all the way to the summit, do I need a permit?

- Day hiking any where in the Mt. Whitney Zone requires a permit.
- If you are overnight anywhere in the wilderness boundary you need a wilderness permit for the area you are entering. Camping near Lone Pine Lake requires a Mt. Whitney Overnight Permit.

My trip to Mt Whitney is not using the regular Mt Whitney trail to the summit; do I need to enter the lottery?

- If you are day hiking, YES, day use permits for all routes are reserved by the lottery.
- If your trip is overnight and starting on a trail other than the Mt Whitney Trail, NO your trip is not in the lottery, follow the directions for reserving the entry trail you are starting on. This includes the Mountaineers Route up the North Fork of Lone Pine Creek and entry points for the John Muir Trail, like Kearsarge Pass.

What should I put for my exit trail? If you are coming back to Whitney Portal to end your trip, you can put "SAME" or "Mt. Whitney Trail". If you will continue your trip to exit elsewhere, indicate where your trip will end. Example: John Muir Trail hikers going to Yosemite would indicate Happy Isles- Yosemite.

Where do I pick up the permit? Mt Whitney Wilderness Permits must be picked up at:

Eastern Sierra InterAgency Visitor Center

at the junction of Highway 395 and SR 136.

Visitor Center phone (760) 876-6200.

Open Daily (winter-8am to 5pm; summer 8am to 6pm)

Why does the calendar of Mt Whitney available dates show last year?

- The calendars were rolled back to show what dates had space left after the 2010 lottery was complete.
- Hopefully this information will be helpful to groups planning to enter the 2011 lottery.

How can I tell if you received my lottery application? You can use a mail service that has tracking or use the informal method of including a postcard (with stamp and your address on it). We will mail your postcard back to you with the date your application was accepted to the lottery.

Wilderness Permit Definitions

Day Use Permit: If the entire trip will be on one calendar date and you will enter the Mt. Whitney Zone, a Day Use permit is required. Day Use includes all routes (access to Mountaineer's Route, East Face/Buttress routes, Mt Russell). No consecutive day use, if the trip is more than one calendar date an Overnight permit is required.

Overnight / multi-night permit: Trips lasting one night or more that start on the Mt. Whitney trail require a Mt Whitney Overnight permit. This includes trips that will end elsewhere (i.e. Pacific Crest and John Muir trails). Day permit can not be used as part of an overnight trip to pass through the area. Overnight use does not include all routes. Entry via North Fork of Lone Pine Creek is a separate reservation that is not in the lottery (NF of Lone Pine Creek trail gives access to the Mountaineer's Route, East Face /Buttress & Mt. Russell).

Group Size: You are limited to the number of people indicated in your group size, with a maximum group size of 15 people. Large groups can not exceed 15 people even if they are on separate permits.

Entry Date: is the day you will begin walking on the trail. All of your group must start on the entry date listed on your permit. Your permit will not be valid if you miss your entry date. Do not include extra days you are staying at Whitney Portal Campground before you start on the trail.

Trail Crest Exit Quota: An additional quota limits the number of people to 25 people each day, that are finishing their trips at Mt. Whitney. A separate quota applies to trips that start on Inyo National Forest trails but did not originate in the Mt Whitney Zone. The quota applies to the date you end the trip at Whitney Portal. You are allowed to camp along the Mt. Whitney trail if you wish.

Enclosure 26



United States
Department of
Agriculture

Forest
Service

Inyo National Forest

White Mtn. Ranger District
798 N. Main Street
Bishop, CA 93514
(760) 873-2500
(760) 873-2501 TDD

File Code: 2720/2320

Date: May 13, 2008

Route To:

Subject: Case by Case Approval, Trail Crest, Cottonwood Pack Station

To: Files

This memo documents the Order for Injunctive Relief for commercial pack stock use signed May 8, 2008, which eliminated the 2006 Destination Management Strategy for commercial pack stock operators, required the forest to revert back to the trail quota requirements of the 2001 Wilderness Management Plan. Under the Destination Management Strategy, Cottonwood Pack Station was allotted 10 trips where the party could exit SEKI via Trail Crest. With the elimination of this trip quota, Acting District Ranger Diana Pietrasanta, on May 13, 2008, concluded that the District would restore the opportunity of Cottonwood Pack Station to reserve up to 8 trips to exit SEKI via Trail Crest from the non-resolvable quota, as had been the case prior to the 2006 FEIS and ROD for commercial pack stock services in the John Muir Wilderness. The opportunity does not guarantee that quota space would be available at the time of request and that requests for any more than eight trips requires typical case by case trail use approval. Service to be provided shall be one way in nature and all parties would hike out over Trail Crest unassisted.

Carmen John
Permit Administrator


Diana Pietrasanta
Acting District Ranger

5.13.2008
Date





United States
Department of
Agriculture

Forest
Service

Inyo National Forest

White Mtn. Ranger District
798 N. Main Street
Bishop, CA 93514
(760) 873-2500
(760) 873-2501 TDD

File Code: 2720

Date: April 19, 2004

Route To:

Subject: 2004 One Way Commercial Service - Trail Crest Approval - Cottonwood Pack Station

To: Cindy Gervasoni, Wilderness Reservations Office

Dennis Winchester of Cottonwood Pack Station has case-by-case approval to request quota space for eight (8) trips originating from Cottonwood Pack Station and exiting over Trail Crest. This does not guarantee quota is available at the time of a request.

Quota space requested may be provided only for one way commercial service. Any other service, such as packing out dunnage for the hiking group that exits the Mt. Whitney trail or providing shuttle service to or from the Whitney Portal trailhead, is considered commercial and quota reservations will not be granted.

This letter corrects the previously authorized number of trip requests, stated in the March 3, 2004 letter, from 4 requests to 8 requests.

GARRY OYE
District Ranger

cc: MaryBeth Hennessy, Files



Enclosure 27

Richard Judd
51 Parkside Drive
Berkeley, CA 94705

October 5, 2004

David Graber
GMP Coordinator
Sequoia and Kings Canyon National Parks
47050 Generals Highway
Three Rivers, CA 93271

Dear Mr. Graber:

Please consider these comments on the draft General Management Plan for Kings Canyon and Sequoia National Parks.

My concerns are that the Plan will allow stock to continue to damage the backcountry, and also that damage caused by stock use will inevitably lead to otherwise unnecessary limits on hiking access. The net effect will be to keep many people out of the wilderness in order to make up for the disproportionate damage caused by packtrain access for a few.

In August 2000 my family backpacked over Piute Pass, down Piute Creek, up Evolution Creek and, one rainy afternoon, hurried into Colby Meadow looking for a place to put up tents before the rain got worse. When the rain partly cleared off after dinner, we had spectacular views of the surrounding slopes and mountains through the shifting mist and clouds.

The next day, in the morning light we discovered that in the large clearing where we had camped, there was not a patch more than 3 or 4 feet square that was free of mule or horse excrement, of varying ages and consistencies. Much of the area had been swept in an effort to clean things up, but the overall effect was of a farmyard—a depressing contrast to the spectacular preceding evening. Where both tents were pitched, all around the large fire ring left in the center of the clearing, and in the area where we had cooked and eaten, grass and pine needles had been replaced by droppings and their fragments.

The Plan needs to consider realistic alternatives to give places like Colby Meadow a chance to recover, and to keep other spots from suffering the same consequences. Permit quotas regularly turn hikers away from most points of entry into this part of the backcountry. Trailhead quotas might be doubled if pack trips' effects on the backcountry did not have to be taken into account. The damage Colby Meadow has suffered from pack stock is out of all proportion to the number of backcountry visitors who rode in, magnified something like ten times by the stock necessary to carry not only the visitors themselves but their dunnage, packers and the packers' food and equipment.

Colby Meadow is certainly not the only environment degraded by pack stock. For instance, the Piute Pass trail itself toward the end of that summer was chewed up, full of exposed, trip-hazard rocks and dust churned up by stock traffic, turning into a slog what should largely be a pleasant climb up an attractive drainage.

The common justification for allowing packers in the backcountry is to make possible a wilderness experience for those who cannot hike in, because they are too old, too young or have a disability. In more than 30 years of visiting the High Sierra, I have yet to see a party using stock which lived up to this justification. My younger son, age 11 during the summer of 2000, carried his pack with us, including hiking out over Lamarck Col. My wife and I are now both over 50. Most pack train visitors I have ever seen are between those ages, neither old enough nor young enough to justify a need for assistance based on age. Likewise, I have never seen an overnight stock party in the wilderness which included individuals with apparent disabilities. The vast majority of stock travelers choose to ride as a matter of preference.

Backpacking aches, pains and fatigue are real enough, and I would not outlaw alternatives to hiking on some high moral ground. All other things being equal, getting more people a chance to experience the backcountry is a good thing. However, allowing access by pack train inevitably has the opposite effect when wilderness management requires limiting entry overall, reducing the overall number of people who can spend time in the mountains, as well as routinely causing damage beyond the capacity of hikers at their worst, to meadows, trails, and streams.

One alternative that should be considered, if pack trains are to be permitted as a means to allow access to those unable to hike, is limiting stock access to trips with young children, those over 60 and people with disabilities. In mixed groups, able individuals could hike. This would intrude into visitors' privacy and freedom of choice, but that seems preferable to having to deny wilderness permits to many others so that a few have the freedom to choose to use mules or horses.

Another alternative that should be considered is to require packers either to bury or to collect and carry out their animals' defecations. Humans, who leave behind a fraction of what mules or horses do, are now strictly admonished to deposit waste at least 100 feet from water, buried at least 6 inches deep, or to carry it out. Mules and horses, in contrast, foul trails, stream crossings, camps and meadows indiscriminately, burying nothing. Their leavings are then inevitably spread by those who must walk through after them.

Another alternative worthy of consideration would be to regulate what stock carry. This past summer I spent a night at Fifth Lake on the North Fork of Big Pine Creek.* Three men who had been packed in to a campsite a few hundred feet away were enjoying the comforts of a full-sized two-burner Coleman stove, a folding aluminum camp table and cold beers, among other things. I don't know how many extra animals are used over the course of a season to transport creature comforts, but even one animal weighs many times what a human does, and does corresponding damage. Over the years my consistent impression has been that pack trips

* Big Pine Creek and the Piute Pass trail aren't in the national parks, but they are park entry points. The same issues that affect next-door Forest Service wilderness exist in Kings Canyon and Sequoia.

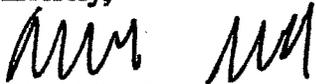
enable their passengers to achieve a standard of living which requires more weight, and more animals, than needed to enjoy the backcountry.

One thing stock could usefully be required to carry is their own feed. This would protect grass and meadows.

Finally, most important, the Park Service should consider phasing out pack stations. In reality, pack trains persist largely because horse and mule packers are a Sierra tradition, and provide a livelihood for a handful of owners and work for their employees. However, times have changed, and will keep changing. Demands on the backcountry have grown, and a steady tide of new or newly recognized impacts has curtailed once seemingly essential features of High Sierra trips, like campfires and drinking from streams. The environmental damage caused by pack trips, and the otherwise avoidable limits they cause on the number of people who can get into the wilderness, will only worsen and lead to greater conflicts in the future. The Plan should provide now for phasing out or at least scaling back permits as they expire, allowing owners and employees a transition.

Steve Roper foresaw in 1976 (in the Climber's Guide to the High Sierra, p. 26) much of what packtrains have caused since. It has become obvious that his concerns were more than the "rantings of an anti-packtrain fanatic" which he called them. I hope that it will not take another 30 years to bring this problem under better control.

Sincerely,


Richard Judd

Enclosure 28



- [Home](#)
- [About Broads](#)
 - [Staff](#)
 - [Board of Directors](#)
 - [Advisory Board](#)
 - [Broadband Leaders](#)
 - [Our Partners](#)
 - [Sponsors](#)
 - [Finance Documents](#)
 - [Employment](#)
 - [Scrapbook](#)
 - [Photo Gallery](#)
- [Our Work](#)
 - [Wilderness](#)
 - [Broads Healthy Lands Project](#)
 - [Public Lands Livestock Grazing](#)
 - [Off Road Vehicles](#)
 - [Recapture Utah!](#)
- [Events](#)
 - [Broadwalks](#)
 - [Past Events](#)
- [News](#)
 - [Broadsides Newsletter](#)
 - [News Archive](#)
 - [Press/Media](#)
 - [Broadly Speaking e-News Archive](#)
- [Get Involved](#)
 - [Take Action](#)
 - [Volunteer Opportunities](#)
 - [Broadbands](#)
 - [Be Informed](#)
 - [Recommended Reads](#)
 - [Recommended Films](#)
- [Join or Donate](#)
 - [Planned Giving](#)
 - [Gifts of Stock](#)
 - [Mailing a Donation](#)
 - [Auction](#)
 - [Auction Donation](#)
 - [Past Auction Donors](#)
 - [Shop](#)
 - [Broads Wish List](#)
- [Great Old Blog](#)
- [Contact Us](#)

About Great Old Broads for Wilderness



Broads clean up after the Shovel Brigade in Jarbidge NV, 2000

Our History

Great Old Broads for Wilderness was founded in 1989, on the 25th anniversary of the Wilderness Act, by a feisty group of lady hikers who wanted to refute Utah Sen. Orrin Hatch's notion that wilderness is inaccessible to elders. Today our wrinkled ranks have grown to include men and younger women (Broads-in-Training), though the majority of our membership continues to be older women committed to protecting wilderness areas.

Our Vision

Wild places will have the respect and protection needed to preserve them for future generations.

Our Mission

Great Old Broads for Wilderness is a national organization that uses the voices and activism of elders to preserve and protect wilderness and wild public lands. Conceived by older women who love wilderness, Broads gives voice to the millions of older (and not so able) Americans who want to protect their public lands as Wilderness for this and future generations. We bring voice, knowledge, commitment, and humor to the movement to protect our last wild places on earth.

Our Members

Great Old Broads, with lifetimes of adventures and experiences to draw from, bring a broader perspective and valuable insights to wilderness discussions than other environmental organizations with more youthful memberships are able to do. Great Old Broads are uniquely qualified to speak up for the lands and to protect what we have learned is valuable and important. We are prepared to alleviate the destruction to wilderness, and we are optimistic that we will make a difference. Our forte is raising public awareness for the importance of wilderness, and using press coverage to alert the public to inappropriate development and management decisions affecting wilderness.

There are particular advantages to being old and gray (besides the senior citizen discount). We're an anomaly in the environmental activist area and the press and others are curious as to what we have to say. Our approach in this endeavor is the use of a sense of humor and our well-aged grace. Our message on behalf of wilderness may be similar to that of other organizations, but Great Old Broads have the ability to attract the public's interest and attention in ways that other groups cannot. Correspondingly, because we are both older and (presumably) wiser, people give greater deference to our message than to that of younger environmentalists.

We bring a unique perspective, and some well-earned wrinkles, to the wilderness effort. As life-long nurturers and care-givers, our approach is one of perseverance and determination, rather than militancy and contentiousness. If Great Old Broads are anything, we are indefatigable in our quest, with a heart-felt and lifetime outlook on the benefits of protecting our wild, public lands. In addition, Broads are known to bring wisdom, grace, and humor to wilderness discussions.

Join or Donate

•

• Search:

To search, type and hit **e**

• Broadsides Newsletter

 [Subscribe](#)

 [See the Latest Issue](#)

• Broadly Speaking e-newsletter

 [Subscribe to our e-newsletter](#)

 [Broadly Speaking Archive](#)

•

Events Calendar

- ✓ **Fri 9/16/2011:** 3-Day San Juan Raft Trip FUNdraiser - UT
- ✓ **Mon 10/31/2011:** Wild for Wilderness On-Line Auction
- ✓ **Thu 11/10/2011:** Big Cypress Swampwalk - FL

• Get the Great Old Blog

Enter your email address:



San Diego Broadwalkers, 2010

A Broadwalk is first and foremost a whole lot of fun! Broadwalks are events where you will meet other amazing Broads and learn about wilderness issues particular to a specific area through on-the-ground exploration and discussion with folks who know the area and the issues. Each year we have several Broadwalks available. Tennessee to Washington, California to Vermont and many places in between have felt the firm tread of Broads walking on the land to gain first hand experience so we can advocate for protection with passion and knowledge of place.

Every Broadwalk takes on its own unique character, but we usually begin gathering on Thursday afternoon to get acquainted and set up camp. Things really kick off with dinner and a speaker from the local grassroots organization to frame the weekend's events and purpose. Friday, Saturday, and Sunday we spend our time hiking with local guides in proposed wilderness or threatened landscapes to learn first-hand about the place. A range of hikes is offered from easy to challenging. We usually build in some sort of service project on one of the days – hauling away old culvert, pulling noxious weeds, building or removing fences, inventorying potential wilderness, brushing trails, monitoring ORV impacts—the possibilities are endless. Each day we have more local speakers to share information on the area's history, natural history, wilderness issues, music, writings, photography, etc. We really rub elbows with locals on both sides of an issue, with agency land managers, and with other wilderness advocates. We also often get to talk to the media about our group and the wilderness that we work to protect. The event ends on Monday after breakfast, sometimes with a meeting at government offices to voice our concerns, sometimes just with farewell to friends, old and new.

For those who prefer not to camp, there often are local motels where you can stay, then join us each day for our activities, speakers, and meals. We help folks connect to share rides with others who are driving or flying into the area. Sometimes folks join us for part of an event which is generally OK as long as we have enough space and know which meals and nights to plan on.

Meals are group events, either catered or prepared by a camp cook, which allow us more time in the field and more time to visit with each other. Participants provide their own trail lunches. Delicious food, drink, and camaraderie are an essential part of our weekends! There is nothing like spending time with a group of Great Old Broads!

First-timer?

Read what a first-timer had to say about her experience. [Dr. Jeannie Fennell](#) joined Broads for our San Juan Mountains Broadwalk in July 2011.

Broadwalk/Event Refund/Cancellation Policy

All cancellations and requests for refunds must be made to Broads main office by phone, letter, e-mail, or fax.

Cancellation fees apply as follows:

- » More than 2 weeks prior to the event start date 50% of the event fee.
- » 0-14 days prior to event start date – entire event fee is forfeited.
- » Date of notice received by Broads will determine cancellation fee.

Emergency illness, death of an immediate family member

Refunds may be granted if an attendee is unable to attend the event due to family death, illness or other extraordinary circumstance. In such an event, Broads office must be contacted by phone, letter, or e-mail.

[Upcoming Broadwalks and Events](#)

[Register for a Broadwalk](#)

[Join or Donate](#)

•

• **Search:**

To search, type and hit e

• **Broadsides Newsletter**

[Subscribe](#)

[See the Latest Issue](#)

• **Broadly Speaking e-newsletter**

Enclosure 29



WILDERNESS WATCHER

WILDERNESS WATCH NEWSLETTER • VOLUME 9 • NUMBER 2 • SPRING 1997

Challenge of Wilderness

Wilderness is not Supposed to be Convenient

by Greg Lais

Greg Lais is the Executive Director of Wilderness Inquiry, a non-profit organization providing outdoor adventures for people of all ages and abilities.

Over the years many people have claimed that Wilderness and wilderness designations discriminate against people with disabilities, the elderly, and anyone else who is not young and physically fit. This claim has been difficult for wilderness preservationists to answer. It is also the notion that sparked the founding of a Minneapolis based, non-profit group called Wilderness Inquiry.

In 1977, prior to the passage of the Boundary Waters Canoe Area Wilderness Act, a U.S. Senator from Minnesota stated that reducing motorized use in the Boundary Waters would discriminate against "the handicapped, the elderly, and women." Some friends of mine and I decided to test the hypothesis that Wilderness was inaccessible to people with disabilities. We planned a 100 mile wilderness trip involving two people who used wheelchairs as well as two young men who are deaf. Through the course of the trip, we discovered that traveling in the wilderness with an integrated group of people was a tremendously powerful personal

experience for everyone involved. It opened our eyes. We wanted more. Almost 20 years later, more than 30,000 people have had the opportunity to share this kind of experience in Wilderness areas throughout the United States, Canada, Australia, and Europe. Wilderness Inquiry has grown beyond its fledgling state. And, yes, some people are still saying that Wilderness designations discriminate against people with disabilities and the elderly.

On our first trip we learned that the world is not easily split into disparate camps such as "the disabled" and "the able-bodied". The lesson that comes through so clear in the contrast of a wilderness environment is that each person has their own unique abilities that defy stereotyping. If the desire is there, every person can go out and discover the beauty and mystery of Wilderness, regardless of their level of ability. Wilderness appreciation is not at all limited to those who are independently mobile in the woods. In fact, often the opposite is true. People who infrequently visit the wilderness often cherish the opportunity more.

continued on page 7...



Photo supplied by Wilderness Inquiry Inc.

In This Issue

Wilderness is not Supposed to be Convenient

- Greg Lais

Wheelchairs and the Law

-George Nickas

Wilderness First!

-Dave Willis

Chapter Notes & Current Issues

The Wilderness Conference!
(Plan on attending! See Page 6)

*... "Wilderness is not
Supposed to be Convenient"
- continued from front page*

As our society has become less dependent upon muscle power due to technical innovation, people go more places with less effort. Wilderness travel takes us back to different modes of transportation and makes us rely on our bodies to provide the energy to move—a notion that intimidates many who are unsure of their physical capabilities. Instead of being an obstacle, this can be an exciting means to discover what we are in fact able to do.

Whether it's winter or summer, by working together and experimenting with new ideas, participants on WI trips team up to overcome the challenges of wilderness travel. Water based activities, such as canoeing and kayaking, provide the means to travel great distances with relative ease. People who push their own wheelchairs generally have more than enough upper body

strength to paddle a canoe. The greatest physical difficulty facing some persons is with back support and balance, but with simple adaptations these problems can be remedied.

On shore, people with balance problems often team up with persons who use wheelchairs to cross "portages"—trails between bodies of water. The wheelchair provides a stable base for the person with balance difficulties, who in turn helps give the extra push needed to get over the many rocks and bumps along the way.

The means for successful wilderness travel by mobility impaired people are no secret—hard work and determination. Should Congress pass legislation to make it more convenient to visit the Boundary Waters and other wilderness areas? No. Effort is what helps to define a wilderness experience. Without effort, wilderness is not wilderness — it becomes merely a roadside attraction. ■

*"From the President's Desk"
- continued from page 2...*

camping in public or commercial campgrounds and taking walks along groomed trails. Designated wildernesses, however, were intended from the beginning to be protected as very special places, providing a very special sort of experience. Let's use Glacier National Park as an example - part of the park is designated wilderness, and part of it is not. The corridor along the Going-to-the-Sun highway provides excellent campgrounds, spectacular scenery, wildlife viewing and interpretive services. It is accessible to everyone by auto and via board walks around the Logan's Pass visitor's center. It is not, however, wilderness.

Many of the physically challenged people who travel in Glacier National Park will want to visit the wilderness portions of the park for recreation. Their visit, however, must be consistent with provisions in the Wilderness Act. Those provisions were clarified in 1990 by the ADA (Americans With Disabilities Act) - in essence, assistive devices necessary to permit a disabled person to live and function anywhere would not be disallowed by the Wilderness Act, but modification of the wilderness (e.g., construction of wheel chair trails or hand rails), or the use of mechanical transport or aircraft would not be allowed.

A few years ago Dave Willis, who lost most of both hands and both feet in a mountain climbing accident (see article) put this in perspective when he said, "Bill - looking for wilderness with wheel chair trails and hand rails is like looking for darkness with a flashlight." ■



Photo supplied by Wilderness Inquiry Inc.

Enclosure 30

ORIGINAL RESEARCH

An Analysis of Human Pathogens Found in Horse/Mule Manure Along the John Muir Trail in Kings Canyon and Sequoia and Yosemite National Parks

Robert Wayne Derlet, MD; James Reynolds Carlson, PhD

From the Emergency Department (Dr Derlet) and the Clinical Microbiology Laboratory (Dr Carlson), University of California, Davis, Medical Center, Sacramento, CA.

Objective.—To determine the prevalence of microorganisms that are potentially pathogenic for humans in horse/mule manure along the John Muir Trail (JMT).

Methods.—Random samples of horse/mule manure were collected along sections of the JMT in Yosemite, Kings Canyon, and Sequoia national parks (NP), as well as in portions of the Pacific Crest Trail (PCT) and selected JMT/PCT access trails. Convenience samples of wild animal scat found within 1 mile of trails were also collected. The fresh specimens were individually preserved both in 0.9% saline and polyvinyl alcohol (PVA)-containing tubes and stored at 4°C until time of analysis. Bacteriological analysis was performed using standard microbiology laboratory procedures. PVA samples were stained with trichrome and were then examined by a parasitologist.

Results.—Collection: A total of 186 trail miles were sampled, including 113 on the JMT (Yosemite 37, Kings 53, and Sequoia 23). The PCT samplings included 24 miles, and NP and wilderness area access trails added an additional 49 miles. A total of 102 samples were collected, which included 81 samples from pack animals and 21 identified as having come from wild animals. Pack Animal Bacteria: All plated specimens grew large numbers of commensal gut flora. Potential pathogenic bacteria were found in only 12 samples and included *Hafnia alvei* (4), *Serratia odorifera* (1), *Citrobacter freundii* (1), *Escherichia vulneris* (1), *Clostridium clostridioforme* (1), *Yersinia enterocolitica* (1), *Sherwinella putraformus* (1), and *Enterobacter* spp (4). No *Escherichia coli* O157, *Salmonella*, or *Aeromonas* were found. Microscopic examination for protozoal organisms revealed occasional commensal ciliates and 1 *Giardia*. Wild Animal Pathogens: One specimen grew *Y enterocolitica*, and another grew *Enterobacter amnigenus*.

Conclusions.—We found a low prevalence of human pathogens in pack animal manure on the JMT.

Key words: pack animals, excreta, John Muir Trail, bacteria, *Hafnia*

Introduction

Backpacking has become increasingly popular throughout the Sierra Nevada mountain range, and backpackers usually rely on streams and lakes along the trail as sources of drinking water. In addition to humans, certain animals such as beavers and cattle are known to serve as a reservoir for zoonotic infectious diseases that may contaminate Sierra water sources.¹ Backpackers may use one of several different methods either to filter out or

destroy potential pathogenic organisms that may cause diarrhea and other illnesses. Popular portable water filtration or purifying systems use filters with small enough micropores that protect against *Giardia lamblia*, *Cryptosporidium*, and other microorganisms.² Iodine or other halogens can be used to purify water.¹ Variables in the iodination method, including 1) concentration of the pathogenic organism, 2) concentration of the halogen, 3) temperature of the water, and 4) contact with water before drinking or mixing with substance, which may neutralize the halogen, all increase the risk to backpackers for certain microorganisms.

Horses, mules, and pack trains have been a part of the Sierra high country since the 1800s, and during the sum-

Corresponding author: Robert W. Derlet, MD, University of California, Davis, Medical Center, Division of Emergency Medicine, 2315 Stockton Blvd, PSSB 2100, Sacramento, CA 95817 (e-mail: rwdertlet@ucdavis.edu).

mer months, these animals may be found in significant numbers. The Forest Service has strict controls on the number of backpackers entering wilderness areas to limit impact. However, the restrictions on pack animals operated out of commercial pack stations are unclear and have been the subject of recent debate.³

One potential problem with pack animal traffic is the amount of manure left on trails that may contain pathogens capable of causing serious infection in humans. Horses and pack animals are zoonotic reservoirs for bacteria and protozoa that may be transmitted to humans and result in illness. Species of bacteria excreted by pack animals that cause disease in humans include *Yersinia enterocolitica*,⁴ *Salmonella*,⁵ *Escherichia coli* O157,⁶ and *Aeromonas*.⁷ During the spring snowmelt and runoff, the manure may be swept into adjacent creeks, and pathogenic organisms may be present in lakes for extended times. In addition, summer thundershowers may wash horse manure off the trail into streams and rivers. It is known that *Giardia* may last many years in cold water. The aim of this study was to determine whether specific pathogenic organisms including *Salmonella*, *E. coli* O157:H7, and/or *Giardia* could be found in horse/mule manure in quantities that could contaminate water sources for backpackers along popular sections of the John Muir Trail (JMT) and other high Sierra trails.

Methods

Samples of fresh horse/mule manure were collected along sections of the JMT in the Yosemite, Kings Canyon, and Sequoia national parks (NP). In addition, popular access trails to the JMT, Pacific Crest Trail (PCT), and portions of the PCT trail between Lake Tahoe and Yosemite were also sampled. Specimens were collected on multiple overnight trips from August to September 2000. Specimens eligible for collection were only those that were relatively fresh as defined by the presence of flies, manure odor, or noticeable moisture in or about the specimen. The trail prevalence or "frequency" of manure was recorded as manure sites per mile. One manure site was defined as all manure found within a 30-foot length of trail. Trails were divided into 2-mile sections, and 1 specimen was collected within each section. Manure sites within these sections were selected by convenience. On heavily contaminated trails, 2 samples were taken within each section. Heavily manured trails were defined as having 10 or more manure sites per mile. Convenience samples of wild animal scat found within 1 mile of trails were also collected. One of the authors (R.D.) has experience in identifying horse, mule, deer, marmot, and other samples of scat from the Sierra Nevada range using accepted guides.⁸

The collected specimens were immediately divided between two 5-mL screw-cap tubes—one containing 0.9% saline and the other containing polyvinyl alcohol (PVA)—before transport to the University of California, Davis, Medical Center Clinical Microbiology Laboratory. Specimens were refrigerated and stored at 4°C within 96 hours of collection.

Bacteriological analysis was performed by plating each of the samples onto each of the following agar plates: sheep blood agar, MacConkey agar, sorbitol MacConkey agar, and Hektoen agar. Nonsorbitol fermenting colonies that grew on the sorbitol MacConkey plate were further screened for *E. coli* O157 by performing an antigen-specific latex-agglutination test. Identification of *Salmonella* or *Yersinia* spp was performed by subplating lactose-negative Hektoen nonfermenters onto triple sugar iron agar and lysine iron agar slant tubes. Isolates displaying characteristics of pathogenic bacteria were then further tested using standard microbiology laboratory techniques.^{9–12}

To determine the effectiveness of bacterial preservation during transport and storage, selected samples underwent further testing. Gram stains of colonies that grew on sheep blood agar were performed. Selected gram-negative colonies were analyzed for general identification using a septon panel analyzer. Anaerobic incubation and identification of anaerobes following standard clinical lab procedures were also performed on selected samples.¹³

Samples preserved in PVA for *Giardia* analysis were applied to glass slides and prepared for trichrome staining. A microscopic examination by a trained parasitologist was performed.

Results

SAMPLE COLLECTION

A total of 186 trail miles were sampled, including 113 on the JMT (Yosemite NP 37 miles, Kings Canyon NP 53 miles, and Sequoia NP 23 miles). PCT samplings included 24 miles, and NP and wilderness area access trails added an additional 49 miles.

The incidence of manure sites varied widely and is displayed in Table 1. Highest concentrations were found along the Tuolumne-Glen Alun Trail in Yosemite NP, and the lowest were found along the JMT in the Mather Pass area of Kings Canyon NP. Some 2-mile sections of trail were devoid of pack animal manure.

A total of 102 samples were collected, which included 79 samples from pack animals and 23 identified as having come from wild animals. One pack animal sample taken in Kings Canyon NP was found to have dried be-

Table 1. Incidence of manure on selected trails*†

| Wilderness (place) | Trail | Trail location | Distance surveyed (miles) | Manure sites per mile |
|-----------------------|-------|---------------------------------------|---------------------------|-----------------------|
| Yosemite | PCT | Tuolumne—Glen AuLin | 6 | 20–40‡ |
| Yosemite | JMT | Tuolumne—Sunrise | 6.6 | 20 |
| Yosemite | JMT | Tuolumne—Donahue Pass | 13 | 10–20 |
| Tahoe National Forest | PCT | Echo Summit to Bryon Meadow | 4 | 2.2 |
| Mokulumne | PCT | Sunset Lake to Raymond Creek | 13 | 1.0 |
| Kings Canyon | JMT | Woods Crossing to Rae Lake | 6.3 | 0.9 |
| Kings Canyon | JMT | Bench Lake Junction to Woods Crossing | 13 | 0.5 |

*Table depicts only 61.9 of 186 miles sampled.

†PCT indicates Pacific Crest Trail; JMT, John Muir Trail.

‡Range noted where large variations occurred along the same trail.

cause of leakage of the saline transport media. Because of the potential for contamination by bacteria after collection, this 1 specimen was discarded from bacterial analysis.

PACK ANIMAL BACTERIA

Of all plated specimens tested, each grew many morphologically different colonies on sheep blood, MacConkey, sorbitol MacConkey, and Hektoen agars. All 4 quadrants of each sheep blood and MacConkey plates grew out organisms, indicating a high concentration of viable bacteria in each specimen. Gram stains of selected colonies revealed gram-positive cocci resembling *Enterococcus*, gram-positive rods, and gram-negative rods resembling common enteric organisms. The most commonly identified bacteria included *E coli*, *Bacillus*, and *Enterococcus* spp. The proportion of individual bacterial types varied among samples, creating a different fingerprint for each sample, validating that each sample was unique. A total of 25 pack animal samples grew non-fermenting *E coli* colonies on sorbitol MacConkey plates; however, latex-agglutination tests failed to confirm *E coli* O157.

Enteric bacteria that may have pathogenic potential in susceptible individuals were identified as follows: *Hafnia alvei* (4), *Enterobacter cloacae* (2), *Clostridioforme* (1), *Serratia odorifera* (1), *Citrobacter freundii* (1), *Sherwinella putraformus* (1), *Escherichia vulneris* (1), *Y enterocolitica* (1), *Enterobacter asburia* (1), and *Enterobacter ns* (1). One sample contained 2 pathogenic organisms. Table 2 shows the distribution of pathogens by geographic area. The JMT in northeastern Kings Canyon NP had the lowest incidence of pathogens (1 of 25 samples), whereas other areas had higher concentrations of pathogens.

WILD ANIMAL BACTERIA

Similar to pack animals, specimens grew multiple colonies of *Enterococcus*, *Bacillus* spp, and enteric gram-negative rods (Table 3). Pathologic bacteria were found in only 2 specimens. Scat from an unidentified wild animal in the Bishop Pass area of northeast Kings Canyon NP grew out *Y enterocolitica*. *Enterobacter amnigenus* was found in a deer specimen near Lake Tahoe.

GIARDIA

Giardia was identified in 1 pack animal sample near Tuolumne Meadows.

Five other samples from pack animals along the JMT had symbiotic ciliates including *Blepharospaera*, *Endolimax nana*, and *Beutschlii*.

Discussion

The JMT from Yosemite Valley to the Mount Whitney Summit measures 210 miles. Our sampling of 113 miles provides an analysis of over 50% of the JMT and nearly 83% of the NP portions of the JMT. An additional 49 miles of JMT/PCT access trails and 24 miles of PCT trails also provided information on human pathogens in the Sierra Nevada mountain range. Significant amounts of pack animal manure were found in many sections of the JMT along the trails, especially in Yosemite. In the authors' opinion, the high incidence of manure along the trails significantly decreased aesthetic value as well as wilderness experience. However, many more remote sections of the trail contained low concentrations of manure.

We were surprised at the finding of large numbers of viable enteric bacteria, which grew out when each spec-

Table 2. Microbiologic analysis of fecal excreta: pack animals*

| | Total no. samples | No. samples with enteric gram + | No. samples with enteric gram - | No. samples with potential pathogens | Potentially pathogenic organisms |
|------------------------------|-------------------|---------------------------------|---------------------------------|--------------------------------------|--|
| JMT: | | | | | |
| Yosemite NP | 12 | 12 | 12 | 3 | <i>Hafnia alvei</i> (1) <i>Escherichia vulneris</i> (1) <i>Citrobacter freundii</i> (1) |
| Kings Canyon/Sequoia NP | 17 | 17 | 17 | 1 | <i>H. alvei</i> (1) |
| Other trails: | | | | | |
| Yosemite NP | 16 | 16 | 16 | 2 | <i>Giardia</i> (1) <i>Sherwinella putraformus</i> (1) |
| Kings Canyon NP (JMT access) | 6 | 6 | 6 | 3 | <i>H. alvei</i> (1) <i>Clostridium clostridioform</i> (1) <i>Enterobacter clocae</i> (1) |
| PCT (non-NP) | 22 | 22 | 22 | 3 | <i>E. clocae</i> (1) <i>Yersinia enterocolitica</i> (1) <i>Enterobacter ns</i> (1) |
| PCT access | 8 | 8 | 8 | 3 | <i>Serratia odorifera</i> (1) <i>H alvei</i> (1) <i>Enterobacter asburia</i> (1) |
| Totals | 81 | 81 | 81 | 15 | |

*JMT indicates John Muir Trail; NP, National Park; and PCT, Pacific Crest Trail.

imen was plated in the laboratory. We had postulated that, because of exposure on the trail to extreme temperatures and direct sunlight, many samples would have small amounts of bacteria and only 1 or 2 surviving species. Therefore, much of the manure encountered by the hiker is teeming with assorted commensal pack animal bacteria. The chief aim of the bacteriologic analysis was to identify *E coli* O157 and *Salmonella*. Neither

organism was identified in our analysis. Therefore, at least in these limited samplings, pack animals have a low likelihood of importing *E coli* O157 and *Salmonella* into wilderness areas.

However, small amounts of pack animal manure did contain other microorganisms capable of human disease. *H alvei* was identified in 4 pack animal specimens. *H alvei* is a gram-negative facultative bacillus that belongs

Table 3. Microbiologic analysis of fecal excreta: wild animals*

| | Total no. samples | No. samples with enteric gram + | No. samples with enteric gram - | No. samples with pathogens | Potentially pathogenic organisms |
|------------------------------|-------------------|---------------------------------|---------------------------------|----------------------------|------------------------------------|
| JMT: | | | | | |
| Yosemite NP | 2 | 2 | 2 | 0 | |
| Kings Canyon/Sequoia NP | 8 | 8 | 8 | 0 | |
| Other trails: | | | | | |
| Yosemite NP | 2 | 2 | 2 | 0 | |
| Kings Canyon NP (JMT access) | 3 | 3 | 3 | 1 | <i>Yersinia enterocolitica</i> (1) |
| PCT (non-NP) | 3 | 3 | 3 | 1 | <i>Enterobacter amnigenus</i> (1) |
| PCT access | 2 | 2 | 2 | 0 | |
| Totals | 20 | 20 | 20 | 2 | |

*JMT indicates John Muir Trail; NP, National Park; and PCT, Pacific Crest Trail.

to the family *Enterobacteriaceae*.¹⁴ Sophisticated laboratory techniques such as ours need to be used to avoid false identification of certain *Hafnia* strains.¹⁵ This organism has been found to cause human diarrheal disease and other intestinal disorders in a number of environments.^{16–20} It has also been found in a number of mammalian hosts.²¹ Some *Hafnia* strains, which possess the attachment effacement gene (*eaeA*), may have clinical importance as an emerging human pathogen.²² Of equal concern are reports that resistance to beta-lactamase can be derived from chromosome-encoded sections of *Hafnia* that are transferred to *Klebsiella* and *E coli* strains.^{23,24} Reports of diarrheal disease from *H alvei* in Sierra Nevada hikers have not been published. However, this is a pathogen that could be potentially ingested through untreated Sierra water. *Y enterocolitica* was isolated from 1 wild animal estimated to be a medium-sized mammal. This is consistent with previously published studies. One study of 34 sites of lake and stream water in the Mammoth Lakes areas found *Y enterocolitica* at 10 of the sites.²⁵ Another study isolated *Y enterocolitica* from 10 of 121 soil samples taken in northwest California.²⁶ *Y enterocolitica* has been associated with appendicitis both in this country and abroad.²⁷ *Yersinia* has also been described in small wild animals in Japan.²⁸

The potential for finding *Giardia* or *Cryptosporidium* in pack animal manure also exists. A study of horses in Kentucky and Ohio showed that *Giardia* was present in 17% to 35% of samples, and *Cryptosporidium* was present in 15% to 31%.²⁹ Studies of farm animals in Canada have reported that 20% of horses are infected with *Giardia* and 17% with *Cryptosporidium*.³⁰ Studies from Europe suggest this might be a worldwide problem.³¹ However, a 1997 report did not find any *Giardia* or *Cryptosporidium* in 91 horses used for backcountry recreation in California.³² Our finding of 1 *Giardia* is consistent with this study. These 2 studies taken together suggest that the risk of pack animals and horses importing *Giardia* into the Sierra watershed is relatively low.

There are limitations in this study. Although extensive care and planning were taken in executing this study, it does have several potential weaknesses. This study sampled manure only during the months of August and September, but potentially, there could be other months in the Sierra when other pack animals could introduce pathogens. Although every attempt was made to preserve specimens, it is possible that some bacteria may have died during transport back to cold storage. Against this hypothesis is the fact that large numbers of bacteria were found in all sealed samples. We believe our collection and preservation system would have identified significant pathogens, as many nonpathogenic bacteria with

similar environmental and nutritional requirements were cultured from the samples. It is possible, although unlikely, that duplicate samples were taken along a trail. The probability of this is low because of the large numbers of manure sites and, upon plating in the lab, the proportion of different organisms was unique to each sample. In addition, within a given stretch of 10 miles, manure samples with different morphologic characteristics and of different ages were collected. Finally, it is possible that because of extreme heat, cold, and intense sunlight, certain pathogenic bacteria may have died before being collected. However, this is unlikely because bacteria with similar nutritional and environmental requirements were easily cultured from samples.

Conclusion

Pack animal manure commonly encountered by backpackers on Sierra Nevada trails contains large numbers of commensal enteric bacteria normally found in animals. Human pathogens with potential medical importance are present but have a low prevalence.

Acknowledgment

Supported by a Wilderness Medical Society Hultgren Grant.

References

1. Backer HD. Field water disinfection. In: Auerbach PS, ed. *Wilderness Medicine*. St Louis, MO: Mosby Inc; 2001: 1186–1236.
2. Gerba CP, Naranjo JE. Microbiological water purification without the use of chemical disinfection. *Wilderness Environ Med*. 2000;11:12–16.
3. US Department of Agriculture. US Forest Service Pacific Southwest Region: Ansel Adams, John Muir, Dinkey Lakes and Monarch Wilderness: Special Newsletter, April 2000. Washington, DC: USDA; 2000.
4. Butler T. *Yersinia* species, including plague. In: Mandel GL, Bennett JE, Dolin R, eds. *Mandell, Douglas, Bennett's Principles and Practice of Infectious Diseases*. 5th ed. Philadelphia, PA: Churchill Livingstone; 2000:2406–2414.
5. Humphrey TJ, Threlfall EJ, Cruickshank JG. Salmonellosis. In: Palmer SR, Soulsby L, Simpson DIH, eds. *Zoonoses*. New York, NY: Oxford University Press; 1998: 191–206.
6. Nelson S, Clarke RC, Karmali MA. Verocytotoxin-producing *Escherichia coli* (VTEC) infections. In: Palmer SR, Soulsby L, Simpson DIH, eds. *Zoonoses*. New York, NY: Oxford University Press; 1998:89–104.
7. Hathcock TL, Schumacher J, Wright JC, Stringfellow J.

- The prevalence of *Aeromonas* species in feces of horses with diarrhea. *J Vet Intern Med.* 1999;13:357–360.
8. Farrand J. Familiar animal tracks of North America. In: *National Audubon Society Pocket Guide*. New York, NY: Chanticleer Press; 1998:1–192.
 9. Schreckenberger PC, Janda JM, Wong JD, Barron EJ. Algorithms for identification of aerobic gram-negative bacteria. In: Murray PR, Barron EJ, Pfaller MA, Tenover FC, Tenover FC, eds. *Manual of Clinical Microbiology*. Washington, DC: American Society for Microbiology; 1999: 438–441.
 10. Farmer JJ III. Enterobacteriaceae: introduction and identification. In: Murray PR, Barron EJ, Pfaller MA, Tenover FC, Tenover FC, eds. *Manual of Clinical Microbiology*. Washington, DC: American Society for Microbiology; 1999:442–458.
 11. Bopp CA, Brenner FW, Wels JG, Strockbine NA. Escherichia, Shigella and Salmonella. In: Murray PR, Barron EJ, Pfaller MA, Tenover FC, Tenover FC, eds. *Manual of Clinical Microbiology*. Washington, DC: American Society for Microbiology; 1999:459–474.
 12. Aleksic S, Bockemuhl J. Yersinia and other enterobacteriaceae. In: Murray PR, Barron EJ, Pfaller MA, Tenover FC, Tenover FC, eds. *Manual of Clinical Microbiology*. Washington, DC: American Society for Microbiology; 1999:483–496.
 13. Engelkirk PG, Duben-Engelkirk J, Dowell VR. 1992. *Principles and Practice of Clinical Anaerobic Bacteriology*. Belmont, CA: Star Publishing; 1992.
 14. Rodriguez LA, Vivas J, Gallardo CS, Acosta F, Barbeyto L. Identification of *Hafnia alvei* with the MicroScan WalkAway system. *J Clin Microbiol.* 1999;37:4186–4188.
 15. Janda JM, Abbott SL, Albert MJ. Prototypal diarrheagenic strains of *Hafnia alvei* are actually members of the genus *Escherichia*. *J Clin Microbiol.* 1999;37:2399–2401.
 16. Albert MJ, Alam K, Islam M, Montanaro J, Rahman ASM. *Hafnia alvei*, a probable cause of diarrheal illness in humans. *Infect Immun.* 1991;59:1507–1513.
 17. Ratnam S. Etiologic role of *Hafnia alvei* in human diarrheal illness. *Infect Immun.* 1991;59:4744–4745.
 18. Ratnam S, Butler RW, March S, Parsons S, Clarke P. Enterobacter hafniae-associated gastroenteritis—Newfoundland. *Can Dis Wkly Rep.* 1979;5:231–232.
 19. Reina J, Hervas J, Borrell N. Acute gastroenteritis caused by *Hafnia alvei* in children. *Clin Infect Dis.* 1993;16:433.
 20. Westblom TU, Milligan TW. Acute bacterial gastroenteritis caused by *Hafnia alvei*. *Clin Infect Dis.* 1992;14:1271–1272.
 21. Gordon DM, FitzGibbon F. The distribution of enteric bacteria from Australian mammals: host and geographical effects. *Microbiology* 1999;145:2663–2671.
 22. Ridell J, Siitonen A, Paulin L, Lindroos O, Korkeala H. Characterization of *Hafnia alvei* by biochemical tests, random amplified polymorphic DNA PCR, and partial sequencing of 16S rRNA gene. *J Clin Microbiol.* 1995;33: 2372–2376.
 23. Nadjar D, Rouveau M, Verdet C, Donayb L, Herrmann J. Outbreak of *Klebsiella pneumoniae* producing transferable AmpC-type beta-lactamase (ACC-1) originating from *Hafnia alvei*. *FEMS Microbiol Lett.* 2000;187:35–40.
 24. Ismaili A, Bourke B, de Azavedo JC, Ratnam S, Karmali MA. Heterogeneity in phenotypic and genotypic characteristics among strains of *Hafnia alvei*. *J Clin Microbiol.* 1996;34:2973–2979.
 25. Harvey S, Greenwood JR, Pickett MJ, Mah RA. Recovery of *Yersinia enterocolitica* from streams and lakes of California. *Appl Environ Microbiol.* 1976;32:352–354.
 26. Botzler RG. Yersinia in the soil of an infected wapiti range. *J Wildlife Dis.* 1979;15:529–532.
 27. Bennion RS, Thompson JE Jr, Gil J, Schmit PJ. The role of *Yersinia enterocolitica* in appendicitis in the southwestern United States. *Am Surg.* 1991;57:766–768.
 28. Kaneko K, Hashimoto N. Occurrence of *Yersinia enterocolitica* in wild animals. *Appl Environ Microbiol.* 1981; 41:635–638.
 29. Xiao L, Herd RP. Epidemiology of equine cryptosporidium and giardia infections. *Equine Vet J.* 1994;26:14–17.
 30. Olson ME, Thorlakson CL, Deselliers L, Morck DW, McAllister TA. Giardia and cryptosporidium in Canadian farm animals. *Vet Parasitol.* 1997;68:375–381.
 31. Pavlasek I, Hess L, Stehlik I, Stika V. The first findings of giardia spp. in horses in the Czech Republic. *Vet Med.* 1995;3:81–86.
 32. Johnson E, Atwill ER, Filkins ME, Kalush J. The prevalence of shedding of cryptosporidium and giardia spp. based on a single fecal sample collection from each of 91 horses used for backcountry recreation. *J Vet Diagn Invest.* 1997;9:56–60.

Enclosure 31

ORIGINAL RESEARCH

Risk Factors for Coliform Bacteria in Backcountry Lakes and Streams in the Sierra Nevada Mountains: A 5-Year Study

Robert W. Derlet, MD; K. Ali Ger; John R. Richards, MD; James R. Carlson, PhD

From the Department of Emergency Medicine, University of California, Davis, School of Medicine, Sacramento, CA (Drs Derlet and Richards); The John Muir Institute of the Environment, University of California, Davis, Sacramento, CA (Dr Derlet); the Department of Environmental Sciences and Policy, University of California, Davis, Sacramento, CA (Mr Ger); and the Department of Public Health, Microbiology Section, San Mateo County, San Mateo, CA (Dr Carlson).



Category 1 Continuing Medical Education credit for WMS member physicians is available for this article. Go to <http://wms.org/cme/cme.asp?whatarticle=1922> to access the test questions.

Objective.—To provide a 5-year longitudinal assessment of risk of acquiring disease from Sierra Nevada Wilderness area lakes and streams. This study examines the relative risk factors for harmful water microorganisms, using coliforms as an indicator.

Methods.—Streams and lakes in the backcountry of Yosemite and Kings Canyon National Parks and neighboring wilderness areas were selected and water was analyzed each year over a 5-year period. A total of 364 samples from lakes or streams were chosen to statistically differentiate the risk categories based on land usage, as follows: 1) areas rarely visited by humans (Wild), 2) human day-use-only areas (Day Hike), 3) areas used by backpackers with overnight camping allowed (Backpack), 4) areas primarily impacted by horses or pack animals (Pack Animal), and 5) cattle and sheep grazing tracts (Cattle). Water was collected in sterile test tubes and Millipore coliform samplers. Water was analyzed at the university microbiology lab, where bacteria were harvested and then subjected to analysis using standardized techniques. Statistical analysis to compare site categories was performed utilizing Fisher exact test and analysis of variance.

Results.—A total of 364 sampling sites were analyzed. Coliforms were found in 9% (4/47) of Wild site samples, 12% (5/42) of Day Hike site samples, and 18% (20/111) of Backpacker site samples. In contrast, 63% (70/111) of Pack Animal site samples yielded coliforms, and 96% (51/53) of samples from the Cattle areas grew coliforms. Differences between Backpacker vs Cattle or Pack Animal areas were significant at $P \leq .05$. All samples grew normal aquatic bacteria.

Conclusion.—Surface water from watersheds below cattle areas and those used by pack animals is at high risk for containing coliform organisms. Water from Wild, Day Hike, or Backpack sites poses far less risk for contamination by coliforms.

Key words: water, Yosemite National Park, Kings Canyon National Park, Sierra Nevada Mountains, cattle, Coliforms

Introduction

The Sierra Nevada Mountain Range in California serves as an internationally recognized recreational area and an important natural resource, in that it provides 50% of the

state's drinking water.^{1,2} The Sierra extends from Tehachapi Pass in the south 400 miles northward to Soldier Meadows, near Lassen National Park.³ Much of the land still retains wilderness character, with roughly 4 000 000 acres of land designated as official wilderness by the National Park Service or the US Department of Agriculture (USDA) Forest Service, and is protected from development, logging roads, and motor vehicles.⁴ Most

Corresponding author: Robert W. Derlet, MD, Emergency Medicine, 4150 V St, Suite 2100, Sacramento, CA 95817 (e-mail: rwderlet@ucdavis.edu).

of these protected areas range from 1800 to 4200 m in elevation. Surface-water quality at high-elevation headwaters is important to hikers, backpackers, and fishermen, as well as downstream urban water districts.^{2,5} Non-point source pollution may result in contamination of surface waters with harmful substances, including both microbial organisms and toxic substances.² Therefore, the issue of potential microbial pollution from day hikers, backpackers, horses and pack animals, and commercial cattle and sheep grazing is important. Microorganisms include coliforms, pathogenic bacteria, and protozoa such as *Giardia* or *Cryptosporidium*.⁶ Although concerns have been raised regarding *Giardia* in the Sierra, many authors have suggested that other fecal pathogens, such as enterotoxigenic *Escherichia coli*, may play a greater role in mountain-acquired illness.⁶⁻¹⁰

The unique geographic features of the Sierra have resulted in challenges to water ecology and quality. Much of the watershed consists of granite or metamorphic bedrock, with little topsoil.¹¹ As a result, soil buffering capacity is extremely low, providing little or no biogeochemical retention or transformation of nutrients such as nitrogen and phosphorus.⁵ Relatively small amounts of nutrient addition or habitat disturbance can lead to significant impacts on nutrient flux and subsequent impacts on water quality and aquatic ecosystems.¹² Pollution from soap, sunscreens, food particles, and human and animal waste may enter the waterways. These substances include nutrients known to increase rates of surface-water eutrophication, in turn prompting conditions that lead to increased survival or growth of microorganisms such as bacteria and algae.¹³⁻¹⁵

Monitoring for each type of microorganism is expensive and difficult; this difficulty is compounded by the high alpine geography that requires multiple hiking days to access remote sites. As an alternative to testing for all microorganisms, testing for coliforms can provide an index of risk for pathogenic waterborne disease.^{16,17} Coliform bacteria have been established as indicators of fecal pollution or contamination, including *Giardia*, of waterways in the United States.¹⁷ In wilderness areas, coliforms may originate from one or a combination of sources including 1) wild animals endemic to the area; 2) humans visiting during daylight; 3) backpackers who camp overnight; 4) stock or pack animals, such as horses and mules; and 5) cattle or sheep grazing. Coliform pollution of wilderness areas by humans may occur through inadequate burial and disposal of fecal material. In addition, bathing or swimming in lakes may also result in microbial pollution.¹⁸ Pack animals may pollute by deposition of manure either directly into lakes and streams or indirectly by deposition of manure onto trails or meadows, and these animals have been documented to

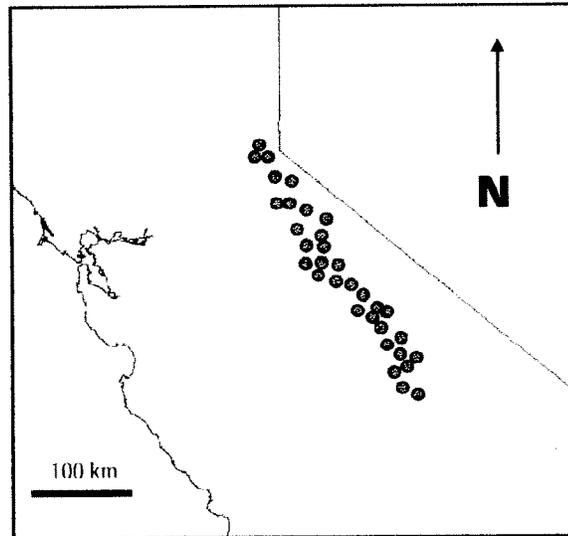


Figure. Study area and sample collection sites. Sites were located throughout the majority of the Sierra Nevada range. In some cases each dot represents more than one sampling site because some sites were too close to display individually.

import *Giardia* into the Sierra wilderness.^{19,20} This manure may be washed into waterways by either summer storms or annual snowmelt.^{21,22} The USDA Forest Service leases tracts in wilderness areas for cattle grazing.²³ Both cattle and pack animal manure are known to potentially contain microbes that are pathogenic to humans, including viruses; protozoa such as *Giardia* and *Cryptosporidium*; and bacteria such as *E coli* and *Salmonella*.²⁴⁻²⁷ Finally, some coliform and other bacteria potentially may originate from natural wild animal and bird zoonotic reservoirs.²⁸

We have surveyed the surface water of Sierra Nevada wilderness areas during selected summers in past years, but debate still continues regarding the impact of backpackers, cattle grazing, or livestock on the watersheds in wilderness areas.²³ In this report, we use results from previously published surveys (years 2003 through 2006) and combine them with new results reported here to create a continuous 5-year data set.²⁹⁻³¹ The goal of this paper is to determine the relationship between land use patterns and the prevalence of coliforms in the Sierra Nevada surface water.

Methods

FIELD SITE SELECTION

Sites were selected that include all common types of land use in wilderness areas of Kings Canyon, Sequoia, and Yosemite National Parks, as well as the following

USDA Forest Service wilderness areas: Carson-Iceberg, Emigrant, Hoover, and John Muir (the Figure). The Hall Natural Research Area, adjacent to the eastern boundary of Yosemite and the southern boundary of the Hoover wilderness, was also included. No overnight camping or motor vehicles are allowed in the Hall area. Sites were selected randomly from areas representative of different use patterns. Relative differences in the number of sites in each category reflect the prevalence of land use patterns along the various trails. Risk classifications included 1) natural areas not visited by humans or domesticated animals (Wild); 2) day hike areas used only by humans and in which overnight camping was not allowed (Day Hike); 3) areas used by backpackers with overnight camping allowed (Backpacker); 4) areas traversed by animals such as horses and mules (Pack Animal); and 5) cattle and sheep grazing tracts (Cattle). Site characteristics were stratified with the assistance of the National Park Service and the USDA Forest Service based on use described by the risk classifications of this study. Cattle grazing is not permitted in National Parks, so all samples in cattle grazing tracts were taken from within Forest Service wilderness areas.

FIELD WATER COLLECTION

Water samples were collected from June through September for the 5-year period ranging from 2002 to 2006. For sites subject to repeated analysis, samples were taken during the same week each year. Water was not collected within 3 days of thundershowers to prevent skewing of results from trail runoff. Samples were not taken in the real-time visible presence of pack animals or cattle. Water was collected in 1) sterile test tubes, 2) Millipore total coliform count samplers (Millipore Corporation, Bedford, MA), and 3) Millipore heterotrophic bacteria count samples. All samples were collected in duplicate. Although the manufacturer suggests immediate incubation, this was not possible as a result of the remote wilderness conditions of the study. Our control studies have shown that colony survival is not affected for up to 1 week at temperatures below 30°C, a condition to which we adhered in the field by monitoring the temperature of the sample container and returning to the laboratory within 7 days of all sampling (R. W. Derlet, MD, unpublished data, May 2002). To prevent deterioration from higher temperatures during transport from trailhead to laboratory (a trip taking, on average, 8 hours), samples were kept in a cooler at 5°C. Each sample device measured bacteria for 1 mL of sample. This was multiplied $\times 100$, as per standardized procedure of reporting colony-forming units (CFU)/100 mL in the water literature.^{17,30} The mean value of duplicate sam-

ples is reported. Water temperature was measured at each site using a stream thermometer (Cortland Line Company Inc, Cortland, NY). Location and elevation were determined using US Geographical Society topographical maps, guide books, and backcountry rangers.

ANALYSIS OF WATER SAMPLES

Details of analysis for bacteria have been described in detail elsewhere.^{28,29,32} The analysis for coliform counts and total bacterial counts required incubating Millipore counting plate paddles at 35°C for 48 hours. Bacterial colonies were counted, then harvested and subplated for further analysis, following standardized procedures.³² Colonies were plated onto Sheep Blood, MacConkey, and Sorbitol agars (Reel Inc, Lenexa, KS). Lactose fermenting colonies from MacConkey plates were presumed to be coliform bacteria and were subject to further testing. Further screening and initial identification was done by subplating onto Eosin Methylene Blue (EMB Levine), Cefsulodin Irgasan Novobiocin, and Hektoen agars. The color and morphology of the colonies were recorded. Controls and samples, including coliform-inoculated and coliform-free water, were subjected to simulated field conditions and tested to provide quality assurance of methods.

DATA ANALYSIS

The entire data set was analyzed to compare the results of water analysis to the different land use patterns. A subset of sites that had been subject to an annual analysis for at least 4 of the 5 years was analyzed separately to determine if these specific sites produced consistent results each year. Coliform-positive samples were correlated with water temperature and elevation. For this purpose, very low temperature was arbitrarily categorized as 0°C to 10.9°C, low as 11°C to 15.9°C, mild as 16°C to 20.9°C, and warm as 21°C and higher. Elevation was compared in 500-m intervals from 2000 m to 3500 m. Statistical significance between groups was calculated with Fisher exact test and analysis of variance (ANOVA) utilizing STATA Software (College Station, TX). Data are reported with 95% confidence intervals, unless otherwise stated.

Results

Sample sites are illustrated in the Figure, and results are summarized in Tables 1 through 6. A total of 364 samples were collected from 105 different streams or lake sites. Coliforms were found in 4 of 47 Wild sites (8.5%, CI 1.8–15.2), 5 of 42 Day Hike sites (11.9%, CI 3.1–

Table 1. Percentage of coliform-positive sites by land use and raw data (positive sites/total sites)

| <i>Land use</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> | <i>Totals</i> |
|-----------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Wild sites | 25 (1/4) | 0 (0/4) | 7 (1/15) | 18 (2/11) | 0 (0/13) | 9 (4/47) |
| Day hiker | 0 (0/5) | 25 (2/8) | 17 (1/6) | 18 (2/11) | 0 (0/12) | 12 (5/42) |
| Backpack | 18 (6/34) | 22 (7/23) | 7 (1/15) | 14 (3/21) | 17 (3/18) | 18 (20/111) |
| Pack animals | 66 (12/18) | 55 (18/33) | 80 (12/15) | 56 (14/25) | 70 (14/20) | 63 (70/111) |
| Cattle | 100 (7/7) | 88 (7/8) | 100 (15/15) | 92 (13/14) | 100 (9/9) | 96 (51/53) |
| Totals | 38 (26/68) | 45 (34/76) | 45 (30/66) | 39 (32/82) | 36 (26/72) | 41 (150/364) |

18.9), and 20 of 111 backpacker sites (18.0%, CI 12.0–24.0). In contrast, 70 of 111 Pack Animal sites (63.1%, CI 55.5–70.5) yielded coliforms, and 51 of 53 Cattle sites (96.2%, CI 91.5–100) grew coliforms. The differences between Wild, Day Hike, or Backpacker and either Pack Animal sites or Cattle sites were statistically significant ($P \geq .05$, Fisher exact test).

With regard to temperature, 9 of 23 samples at very low temperature were positive (39.1%, CI 12.2–66.8), and 59 of 158 samples at low temperatures were positive (37.3%, CI 17.9–38.2). For mild temperatures, 65 of 160 samples were positive (40.6%, CI 29.9–51.3), and 2 of 5 samples from warm temperatures were positive (40.0%, CI 4–76). There was no significant difference between coliform growth and temperature range ($P = .56$, ANOVA). For elevations between 2000 and 2499 m, 24 of 51 samples were positive (47.0%, CI 27.0–67.0), and for elevations between 2500 and 2999 m, 60 of 162 samples were positive (37.0%, CI 24.3–49.7). For elevations above 3000 m, 66 of 151 samples were positive (43.7%, CI 30.4–57.0). No significant difference in coliform growth and elevation range was detected ($P =$

.57, ANOVA). Coliform counts in positive samples ranged from 100 to 500 CFU·mL⁻¹.

Subanalyses performed on sites that were sampled at least 4 of the 5 years are listed in Tables 2 through 6. These sites were sampled at similar times during 4 of 5 summers. A total of 58 of these sites provided 246 samples for analysis. Coliforms were found in a similar frequency when compared to the total analysis. In this sub-analysis, coliforms were found in 2 of 38 Wild samples (5.0%, CI 0–11), 3 of 42 Day Hike samples (7.1%, CI 0.6–13.6), 11 of 62 Backpacker samples (17.7%, CI 9.2–24.9), 40 of 65 Pack Animal samples (61.5%, CI 51.5–70.9), and 35 of 37 Cattle samples (94.5%, CI 87.6–100).

Heterotrophic bacteria were also identified from the samples. Concentrations ranged from 400 to 12 200 CFU/100 mL. Although not statistically significant, total bacterial counts for positive samples tended to be lower at the Wild and Day Hike sites, with a combined mean of 2333 CFU/100 mL (CI 1562–3105), compared with 5248 CFU/100 mL (CI 2838–7650) for Backpacker sites, 5819 CFU/100 mL (CI 3010–8628) for Pack An-

Table 2. Wild sites: Number of coliforms at each site by year (colony-forming units [CFU]/100 mL)

| <i>Wilderness area</i> | <i>Place</i> | <i>Elevation, m</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> |
|------------------------|-------------------------------------|---------------------|-------------|-------------|-------------|-------------|-------------|
| Yosemite | Johnston Pass Creek | 2780 | 100 | None | * | None | None |
| Yosemite | Raymond Pass Creek | 2943 | None | 100 | * | None | None |
| Yosemite | Upper Yosemite Creek—Side Creek | 2501 | None | None | None | None | None |
| Yosemite | Hoffmann Creek | 2560 | None | None | * | None | None |
| Yosemite | Upper Middle Dana-Gibbs Creek | 3016 | None | None | None | None | None |
| Kings Canyon | Bago Springs Creek | 2840 | * | None | None | None | None |
| Kings Canyon | Spring, north of Glen Pass JMT† | 3353 | * | None | None | None | None |
| Kings Canyon | Creek above Rae Lake Ranger Station | 3231 | * | None | None | None | None |
| Kings Canyon | Creek draining Lake 10 315 | 2768 | * | None | None | None | None |

*No data.

†John Muir Trail.

Table 3. Day hike only sites: Number of coliforms at each site by year (colony-forming units [CFU]/100 mL)

| <i>Wilderness area</i> | <i>Place</i> | <i>Elevation, m</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> |
|------------------------|---------------------------------------|---------------------|-------------|-------------|-------------|-------------|-------------|
| Yosemite | Budd Creek | 2622 | None | * | None | 200 | None |
| Yosemite | Gaylor Lake | 3150 | None | * | None | None | None |
| Yosemite | Upper Gaylor Creek | 3155 | None | * | None | None | None |
| Yosemite | Lower Gaylor Creek | 2835 | None | * | None | None | None |
| Yosemite | Granite Lake | 3176 | None | * | None | None | None |
| Yosemite | North Fork Tuolumne River, headwaters | 2438 | * | None | None | None | None |
| Yosemite | Dana Fork of Tuolumne River | 2941 | 100 | None | None | 200 | None |
| Kings Canyon | Bull Frog Lake | 3231 | * | None | None | None | None |
| Emigrant | Blue Lake Creek | 3048 | * | None | None | None | None |
| Hall Area | Green Treble Lake—lower | 3010 | None | None | None | None | None |

*No data.

imal sites, and 5732 CFU/100 mL (CI 2947–8517) for Cattle sites.

Field collection observations confirmed the characterization of land use categories. Wild areas had no trails or visible evidence of human or domesticated animal use upstream of the sampling site; Day Hike areas were posted as such or were posted with “No camping” signs. Backpacker areas had no evidence of recent or remote pack animal manure on trails, but they did show evidence of campsites. Pack Animal areas had animal manure on the trails, and in Cattle areas cow pies were observed in meadows and woodland. No manure was observed directly in lakes or streams at the time of sampling.

Discussion

In our 5-year analysis, overall consistency was found each year with respect to the prevalence of coliforms overall and also in each designated land use area. This consistency and reproducibility of results is an important finding of this 5-year analysis and has implications for validating single-year data. Total coliform prevalence ranged from 36% to 45% each year. Total annual precipitation was similar each of the years sampled, with no drought years.³³ Only a few other studies have examined backcountry water in the Sierra, providing few data with which to compare our findings.^{7–9} We believe that analyzing the data by land use areas provides a useful prospect of impact on water quality.

Table 4. Backpacking sites: Number of coliforms at each site by year (colony-forming units [CFU]/100 mL)

| <i>Wilderness area</i> | <i>Place</i> | <i>Elevation, m</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> |
|------------------------|--|---------------------|-------------|-------------|-------------|-------------|-------------|
| Yosemite | Yosemite Creek | 2278 | None | 100 | None | None | None |
| Yosemite | Booth Lake | 3001 | * | 100 | None | None | None |
| Yosemite | Townsley Lake | 3154 | * | None | None | None | None |
| Yosemite | Vogelsang Lake | 3147 | * | None | None | None | 100 |
| Yosemite | Ten Lakes #2 | 2813 | None | None | * | None | None |
| Yosemite | Ten Lakes #3 | 2750 | None | None | * | None | None |
| Yosemite | Ten Lakes #4 | 2727 | 100 | None | * | 300 | 400 |
| Yosemite | East Ten Lakes | 2865 | None | None | * | None | None |
| Kings Canyon | East Creek at confluence of Bubbs Creek | 2494 | * | 100 | None | None | None |
| Kings Canyon | Charlotte Creek | 2219 | None | 100 | 200 | 100 | None |
| Kings Canyon | Charlotte Lake near ranger station | 3165 | * | None | None | None | None |
| Kings Canyon | Upper Rae Lake | 3213 | * | None | None | None | None |
| Kings Canyon | 60 Lakes Drainage Creek | 2926 | * | 100 | None | None | None |
| Kings Canyon | South Fork Kings River at Upper Paradise | 2134 | * | None | None | None | None |
| Kings Canyon | North Fork Woods Creek | 2621 | * | None | None | None | None |

*No data.

Table 5. Pack animal sites: Number of coliforms at each site by year (colony-forming units [CFU]/100 mL)

| <i>Wilderness area</i> | <i>Place</i> | <i>Elevation, m</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> |
|------------------------|--|---------------------|-------------|-------------|-------------|-------------|-------------|
| Yosemite | Tuolumne River (Lyell Canyon) | 2804 | 200 | 100 | 200 | None | 200 |
| Yosemite | Rafferty Creek | 2673 | 100 | None | * | 100 | 100 |
| Yosemite | Fletcher Lake | 3095 | 700 | None | None | None | None |
| Yosemite | Fletcher Creek | 3060 | 500 | 100 | 100 | 100 | None |
| Yosemite | Dog Lake | 2804 | 100 | 200 | * | 100 | 100 |
| Kings Canyon | Bubbs Creek at confluence of Kings River | 1560 | 100 | None | * | None | None |
| Kings Canyon | Bubbs Creek at Junction Meadow | 2469 | 200 | None | * | None | 200 |
| Kings Canyon | Bubbs Creek at Vidette Meadow | 2896 | 100 | None | * | 200 | None |
| Kings Canyon | Arrow Lake | 3154 | * | 100 | 350 | None | None |
| Kings Canyon | Arrow-Dollar Creek Trail Crossing | 3145 | * | 100 | 200 | None | 100 |
| Kings Canyon | Dollar Lake | 3115 | * | 100 | None | 100 | 300 |
| Kings Canyon | Rae Lake (middle) | 3211 | * | None | None | None | 200 |
| Kings Canyon | South Fork Kings at Lower Paradise | 2011 | 0 | 100 | 500 | 100 | 300 |
| Kings Canyon | Copper Creek | 1555 | 100 | 100 | 300 | None | None |
| Kings Canyon | Lewis Creek | 1219 | 200 | 100 | * | 200 | None |

*No data.

CATTLE AREAS

We have found that areas frequented by cattle had the greatest degree of coliform contamination into the wilderness watershed, ranging from a prevalence of 88% to 100% for each year sampled over the 5-year period. We are not surprised at the finding of coliforms below cattle grazing areas. On traditional US rangelands, coliforms can be expected to be found in the watershed.³⁴ A recent study of South Carolina watersheds found non-point pollution with *E coli* to be high in cattle grazing areas.³⁵ In some respects, finding coliforms below grazing areas serves as a positive control for the study. However, until recently, data on the impact of cattle on Sierra water have been limited.³⁰ Cattle harbor and excrete many microorganisms capable of causing disease in humans, in-

cluding protozoa, bacteria, and viruses.²⁵⁻²⁷ Miller and colleagues³⁶ found up to 14 000 *Giardia* cysts per liter of water in storm surface water below coastal California dairies. Cattle are also noted to carry *E coli* strain O157:H7 at a rate of 1% to 30%, placing persons who drink untreated water below established cow pastures at risk for very serious disease.²⁶ Studies on this strain have also shown it to survive in cold water.³⁷ In addition, cattle manure contains large amounts of nitrogen, phosphorus, and other growth factors for algae.¹⁴ These substances also create an aquatic environment that supports pathogenic microorganisms.¹²⁻¹⁵ Each wilderness "cow use day" is equivalent to 100 to 120 human use days in terms of environmental impact with respect to waste pollution.^{38,39} Despite these concerns, the US Forest Ser-

Table 6. Cattle risk watershed sites: Number of coliforms at each site by year (colony-forming units [CFU]/100 mL)

| <i>Wilderness area</i> | <i>Place</i> | <i>Elevation, m</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>2005</i> | <i>2006</i> |
|------------------------|---------------------------------------|---------------------|-------------|-------------|-------------|-------------|-------------|
| Carson | Upper Clark Fork River | 2072 | * | 100 | 250 | None | 400 |
| Carson | Lower Clark Fork River | 2316 | * | 100 | 300 | 100 | 600 |
| Carson | Disaster Creek | 2366 | * | 200 | 350 | 300 | 550 |
| Carson | Arnot Creek | 2000 | * | 100 | 100 | 200 | 100 |
| Carson | Woods Creek | 1976 | * | 100 | 100 | 250 | 100 |
| Emigrant | Kennedy Creek | 2244 | * | None | * | 300 | 200 |
| Hoover | Buckeye Creek | 2377 | 200 | 200 | 500 | 300 | 450 |
| Hoover | Molydunite Creek | 2773 | 100 | 300 | 400 | 300 | 200 |
| Hoover | South Fork Walker River (Burt Canyon) | 2719 | None | 200 | 250 | 200 | 200 |

*No data.

vice has recently increased proposed cattle grazing tracts in the Sierra Wilderness.²³

PACK ANIMAL-IMPACTED AREAS

The finding of a high prevalence of coliforms in wilderness areas frequented by pack animals is important. Very few other studies have attempted to analyze land use patterns and risk for finding pathogenic microorganisms in the high-elevation areas of the Sierra Nevada.^{8,9} A report on the Rae Lakes region of Kings Canyon National Park found that water from lakes and streams with higher human activity tended to have a higher prevalence of coliforms.⁸ However, these areas were also subject to pack animal traffic. In that study, lakes and streams found free of coliforms were inaccessible to horses and mules. Pack animals produce high volumes of manure, which is deposited directly onto the surface of trails, soil, or meadows.^{24,38,40} In contrast to human waste, pack animal manure is not buried in the soil. Manure deposited on the ground can be swept into streams during summer rains or spring snow runoff.^{21,22} The National Park Service is concerned about manure contamination of surface waters because of its effect on water.^{40,41} Fecal contamination, as indicated by the finding of coliforms, would place the watershed at risk for harboring microbes capable of causing human disease. As is the case with cattle, these threats include certain pathogenic strains of *E coli*, *Salmonella*, *Campylobacter*, *Aeromonas*, and protozoa such as *Giardia*. Pack animals entering the High Sierra have been subject to analysis, and *Giardia* has been found in their manure.²⁰ The organism *Hafnia alvei* was found in one study conducted along the John Muir Trail in the Sierra Nevada, even in old manure.²⁴ *H alvei* can cause diarrhea in humans.⁴² The pack animal areas studied were also traversed by humans. Therefore, it is possible that some of the coliforms found at these sites originated from humans. An examination of results from the Backpack sites helps to clarify this issue. In comparison to Pack Animal sites, only a small percentage of Backpacker sites had coliforms. This finding would support the conclusion that most of the microbial contamination in pack animals areas is a result of pack animal manure. Furthermore, in Day Hike areas in which pack animals are not allowed to travel, only low levels of coliforms were found.

BACKPACK-ONLY SITES

Coliform was found in an average of 18% of these sites. Wilderness regulations require that human waste must be buried at least 100 feet from waterways.^{40,41} Discussions with wilderness backcountry rangers indicate that

there is generally good compliance with these regulations. When disposed of properly in humus topsoil, which contains a multitude of bacteria and fungi, these environmental microbes degrade many of the pathogens. Some Wilderness areas now also ask backpackers to carry out their toilet paper.

WILD SITES

In contrast to the other site types, coliforms were found in only 9% of Wild sites. The source of coliforms found in the wild is speculative. Coliforms may be present as a result of waste contamination from the many species of birds and native mammals. Environmental coliforms have been reported in the environmental literature.⁴³

Heterotrophic, aquatic bacteria are part of a normal ecosystem of lakes and streams.⁴⁴ Indeed, if bacteria were absent, the normal food chain from frogs to fish, as well as the ecological balance, would be in jeopardy. A prior study identified many species, including *Achromobacter* species, *Pasteurella haemolytica*, *Rahnella* species, *Serratia* species, *Yersinia intermedia*, *Yersinia* species, and *Pseudomonas* species in wilderness surface water.²⁹ We found total bacterial counts to be lower at Wild and Day Hike sites, compared to other categories in this 5-year analysis. This may result from the effects of camping, which include the deposition of bacteria from skin contact into surface water and also the stirring up of bacteria-rich bottom sediment in lakes and streams.³⁹

LIMITATIONS

Multiple confounding factors may affect wilderness field findings. Annual precipitation varied during the years of the study. Wind, water flows, and cloud cover may affect results. Although samples were taken during summertime traffic by humans and domesticated animals, these represent single-point-in-time samples; additional samples at different times may have increased the accuracy and significance of findings. Data in this report are applicable only to Sierra Nevada Wilderness Areas and not to areas with human habitation. Finally, overall use patterns were not quantified (backpacker use in terms of persons/night; animal use in terms of heads of livestock/acre, etc).

RECOMMENDATIONS

In wilderness areas where cattle or pack animals have been present, we recommend that drinking water be treated. In Sierra Nevada wilderness areas, water from alpine sidestreams that are free from upstream domes-

ticated animal use have a very low risk of harboring coliforms and we believe have a minimal risk of illness if drunk untreated.

Conclusion

In this 5-year analysis, coliform prevalence in Sierra Nevada Alpine wilderness water varied by land-usage patterns of humans and domesticated animals. Water in areas of cattle grazing or in areas used by pack animals has a high probability of containing coliform organisms. Water from lakes and streams of Wild, Day Hike, or Backpack watersheds bears significantly less risk of harboring coliforms.

References

- Carle D. *Introduction to Water in California*. Berkley, CA: University of California Press; 2004:10–52.
- Barten PK, Ernst CE. Land conservation and watershed management for source protection. *J AWWA*. 2004;96:121–135.
- Farquhar F. *History of the Sierra Nevada*. Berkley, CA: University of California Press; 1965:1–8.
- California Wilderness Coalition. Available at: <http://www.calwild.org>. Accessed January 8, 2008.
- Goldman CR. Four decades of change in two sub alpine lakes. *Verh Int Verein Limnol*. 2000;27:7–26.
- Rockwell R. Wilderness water purity, especially in the High Sierra. *Am Alpine News*. 2000;11:238–240.
- Rockwell RL. *Giardia lamblia* and Giardiasis. *Calif Mountaineering Club Newsl*. 1996;7:12–15.
- Silverman G, Erman DC. Alpine lakes in Kings Canyon NP: California baseline conditions and possible effects of visitor use. *J Environ Manag*. 1979;8:73–87.
- Suk TJ, Sorenson SK, Dileanis PD. The relationship between human presence and occurrence of *Giardia* cysts in streams in the Sierra Nevada, California. *J Freshw Ecol*. 1987;4:71–75.
- Zell SC, Sorenson MS. Cyst acquisition rate for *Giardia lamblia* in backcountry travelers to Desolation Wilderness, Lake Tahoe. *J Wilderness Med*. 1993;4:147–154.
- Moore J. *Exploring the Highest Sierra*. Stanford, CA: Stanford University Press; 2000:171–209.
- Horne A, Goldman C. Streams and rivers. In: *Limnology*. 2nd ed. New York: NY: McGraw-Hill; 1994:356–383.
- Tao W, Hall KJ, Ramey W. Effects of influent strength on microorganisms in surface flow mesocosm wetlands. *Water Res*. 2007;41:4557–4565.
- Jansson M, Bergstrom AK, Lymer D, Verde K, Karlsson J. Bacterioplankton growth and nutrient use efficiencies under variable organic carbon and inorganic phosphorus ratios. *Microb Ecol*. 2006;52:358–364.
- Miettinen IT, Vartiainen T, Martikainen PJ. Phosphorus and bacterial growth in drinking water. *Appl Environ Microbiol*. 1997;63:3242–3245.
- Romppe A, Servais P, Baudart J, de-Roubin M-R, Laurent P. Detection and enumeration of coliforms in drinking water: current methods and emerging approaches. *J Microbiol Methods*. 2002;49:31–54.
- American Public Health Association. Microbiologic examination. In: Clesceri LS, ed. *Standard Methods for the Examination of Water and Wastewater*. 20th ed. Baltimore, MD: United Book Press Inc; 1998: Section 9; 1–140.
- Blostein J. Shigellosis from swimming in a park pond in Michigan. *Public Health Rep*. 1991;106:317–322.
- Xiao L, Herd RP. Epidemiology of equine cryptosporidium and *Giardia* infections. *Equine Vet J*. 1994;26:14–17.
- Atwill ER, McDougald NK, Perea L. Cross-sectional study of faecal shedding of *Giardia duodenalis* and *Cryptosporidium parvum* among packstock in the Sierra Nevada Range. *Equine Vet J*. 2000;32:247–252.
- Ramos MC, Quinton JN, Tyrrel SF. Effects of cattle manure on erosion rates and runoff water pollution by faecal coliforms. *J Environ Manag*. 2006;78:97–101.
- Guber AK, Shelton DR, Pachepsky YA, Sadeghi AM, Sikora LJ. Rainfall-induced release of fecal coliforms and other manure constituents: comparison and modeling. *Appl Environ Microbiol*. 2006;72:7531–7539.
- US Department of Agriculture Forest Service. *Environmental Assessment: Rangeland Allotments Phase 1. Stanislaus National Forest*. Sonora, CA; US Dept of Agriculture; 2006.
- Derlet RW, Carlson JR. An analysis of human pathogens found in horse/mule manure along the John Muir Trail in Kings Canyon and Sequoia and Yosemite National Parks. *Wilderness Environ Med*. 2002;13:113–118.
- Mattison K, Shukla A, Cook A, et al. Human noroviruses in swine and cattle. *Emerg Infect Dis*. 2007;13:1184–1188.
- Renter DG, Sargeant JM, Oberst RD, Samadpour M. Diversity, frequency, and persistence of *Escherichia coli* O157 strains from range cattle environments. *Appl Environ Microbiol*. 2003;69:542–547.
- Berry ED, Wells JE, Archibeque SL, Ferrell CL, Freetly HC, Miller DN. Influence of genotype and diet on steer performance, manure odor, and carriage of pathogenic and other fecal bacteria. II. Pathogenic and other fecal bacteria. *J Anim Sci*. 2006;84:2523–2532.
- Kirschner AK, Zechmeister TC, Kavka GG, et al. Internal strategy for evaluation of fecal indicator performance in bird-influenced saline inland waters. *Appl Environ Microbiol*. 2004;70:7396–7403.
- Derlet RW, Carlson JR. An analysis of wilderness water in Kings Canyon, Sequoia and Yosemite National Parks for coliform and pathologic bacteria. *Wilderness Environ Med*. 2004;15:238–244.
- Derlet RW, Carlson JR. Coliform bacteria in Sierra Nevada wilderness lakes and streams: what is the impact of backpackers, pack animals, and cattle? *Wilderness Environ Med*. 2006;17:15–20.
- Derlet R. Backpacking in Yosemite and Kings Canyon Na-

- tional Parks and Wilderness Areas. How safe is the water to drink? *Traveler Med.* 2007; In press.
32. Schreckberger PC, Janda JM, Wong JD, Barrone EJ. Algorithms for identification of aerobic gram-negative bacteria. In: Murray PR, Barron EJ, Pfaller MA, Tenover FC, Tenover FC, eds. *Manual of Clinical Microbiology*. Washington, DC: American Society for Microbiology; 1999: 438–441.
 33. California Climate Data Archive, Western Regional Climate Center. Scripps Institute of Oceanography California Energy Commission. Available at: <http://www.calclim.dr.edu/ccda/data.html>. Accessed January 8, 2008.
 34. Yers HL, Cabrera ML, Matthews MK, et al. Phosphorus, sediment and *Escherichia coli* loads in unfenced streams of the Georgia Piedmont, USA. *J Environ Qual.* 2005;34: 2290–2300.
 35. Klout RW. Locating *Escherichia coli* contamination in a rural South Carolina watershed. *J Environ Manag.* 2007; 83:402–408.
 36. Miller WA, Lewis DJ, Lennox M, et al. Climate and on-farm factors associated with *Giardia duodenalis* cysts in storm runoff from California coastal dairies. *Appl Environ Microbiol.* 2007;73:6972–6979.
 37. Want GD, Doyle MP. Survival of enterohemorrhagic *Escherichia coli* O157:H7 in water. *J Food Prot.* 1998;61:662–667.
 38. Ohio State University. Ohio Livestock Manure Management Guide. In: *The Bulletin #604*. Columbus: Ohio State University; 2006:1–9.
 39. Rendtorff RL, Kashgarian M. Stool patterns of healthy adult males. *Dis Colon Rectum.* 1967;10:222–228.
 40. Durkee G, Meier P. *End of Season Report, McClure Ranger Station 2007*. Kings Canyon National Park. Three Rivers, CA: U.S. National Park Service; 2007:1–23.
 41. Sequoia and Kings Canyon National Park. Minimum impact regulations. Wilderness Permit Handout. Available at: http://www.nps.gov/seki/planyourvisit/camp_bc.htm. Accessed January 8, 2008.
 42. Westblom TU, Millgan TW. Acute bacterial gastroenteritis caused by *Hafnia alvei*. *Clin Infect Dis.* 1992;14:1271–1272.
 43. Stuart DG, Bissonnette GK, Goodrich TD, Walter WG. Effects of multiple use on water quality of high-mountain watersheds: bacteriological investigations of mountain streams. *Appl Microbiol.* 1971;22:1048–1054.
 44. Page KA, Cannon SA, Giovannoni SJ. Representative freshwater bacterioplankton isolated from Crater Lake, Oregon. *Appl Environ Microbiol.* 2004;70:6542–6550.

Enclosure 32

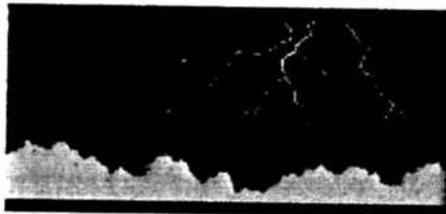
Livestock Grazing and Weed Invasions in the Arid West

by

**A. Joy Belsky Ph.D.
and
Jonathan L. Gelbard**

April 2000

**A SCIENTIFIC REPORT PUBLISHED BY THE
OREGON NATURAL DESERT ASSOCIATION**



Oregon Natural Desert Association

BEND OFFICE

16 NW Kansas, Bend, OR 97701

VOICE: 541-330-2638 • FAX: 541-385-3370

E-MAIL: onda@onda.org

WEBSITE: www.onda.org

PORTLAND OFFICE

732 SW 3rd Ave., #407, Portland, OR 97204

VOICE: 503-525-0193 • FAX: 503-228-9720

E-MAIL: jbelsky@onda.org

Preparation and publication of this report were supported by
True North Foundation, Northwest Fund for the Environment, and Rogue Wave Foundation

PUBLISHED BY THE
Oregon Natural Desert Association

BEND OFFICE
16 NW Kansas, Bend, OR 97701
VOICE: 541-330-2638 • FAX: 541-385-3370
E-MAIL: onda@onda.org
WEBSITE: www.onda.org

PORTLAND OFFICE
732 SW 3rd Ave., #407, Portland, OR 97204
VOICE: 503-525-0193 • FAX: 503-228-9720

AUTHORS:

A. Joy Belsky, Ph.D.
Oregon Natural Desert Association
732 SW 3rd, Suite 407
Portland, Oregon 97204
503-228-9720
jbelsky@onda.org

Jonathan L. Gelbard
Department of Environmental Science and Policy
2132 Wickson Hall
University of California
Davis, California 95616
jlgelbard@ucdavis.edu

The authors wish to thank the Washington State University Cooperative Extension Service for permission to reproduce drawings of weed species originally published in *Range Plants: Their Identification, Usefulness, and Management*, by Ben Roché. Illustrations for that publication were drawn by Kappy Brun, Cindy Talbott, and Janet Zehm.

PREPARATION AND PUBLICATION OF THIS REPORT WERE SUPPORTED BY:
True North Foundation
Northwest Fund for the Environment
Rogue Wave Foundation

Printed on recycled paper.

Executive Summary

Nonindigenous plants (also referred to as alien, exotic, or introduced weeds) are invading arid and semi-arid grasslands, shrublands, and woodlands of the American West at an exponential rate. Management efforts intended to control their spread have been largely ineffective. This may be due to a lack of attention to domestic livestock grazing, the dominant land use of the region.

The contribution of livestock grazing to weed invasions has generally been downplayed while the effects of drought, historic overgrazing, fire, and seed introductions associated with outdoor recreation, roads, and wildlife have been emphasized. In this paper, we review the scientific literature relating livestock grazing to the invasion of nonindigenous plant species in the arid and semiarid lands west of the Rocky Mountains.

At the landscape and regional scales, livestock grazing is one of several factors causing and enhancing the invasion of alien weeds into grassland, shrubland, and woodland communities; but at the community scale, livestock may be the major factor causing these invasions. Most studies find that plant communities grazed by domestic livestock contain a greater density, frequency, or cover of nonindigenous plants than ungrazed communities. A few studies document positive, but only temporary, reductions of weed numbers by sheep and goats, but most weedy species are avoided by cattle.

Livestock contribute to alien weed invasions by:

- (1) transporting weed seeds into uninfested sites on their coats and feet and in their guts,
- (2) preferentially grazing native plant species over weed species,
- (3) creating patches of bare, disturbed soils that act as weed seedbeds,
- (4) destroying microbiotic crusts that stabilize soils and inhibit weed seed germination,
- (5) creating patches of nitrogen-rich soils, which favor nitrogen-loving weed species,
- (6) reducing concentrations of soil mycorrhizae required by most western native species, and
- (7) accelerating soil erosion that buries weed seeds and facilitates their germination.

This review suggests that nonindigenous weeds will continue to spread through arid and semi-arid grasslands, shrublands, and woodlands in the western United States unless selective grazing, nutrient redistribution, and soil disturbances by livestock are greatly reduced or eliminated.

At the community scale, livestock may be the major factor causing weed invasions.

Introduction

Invasive, nonindigenous plants, also referred to as alien, exotic, or introduced weeds (i.e. species that have been moved beyond their natural range by humans (178)), are spreading through public and private grasslands, shrublands, and woodlands of the arid and semi-arid West at a rapid, and in some areas exponential, rate (65, 155). As a result, the region's native plant communities are being severely degraded.

Alien annual grasses such as cheatgrass (*Bromus tectorum*) and medusahead (*Taeniatherum caput-medusae*) and forbs such as the starthistles and knapweeds (*Centaurea* spp.) and leafy spurge (*Euphorbia esula*) have invaded over 40 million ha of western grasslands, shrublands, and woodlands (30, 104, 122, 173). Large, low-elevation areas of California are currently dominated by introduced annual grasses (14), and arid and semi-arid portions of the Pacific Northwest have been invaded by over 860 exotic plant species (65), representing over 20% of the estimated 3,700 alien plant species currently recorded in the United States (178). Of these, 115 have been legally declared "noxious weeds" by one or more states (65). In spite of federal, state, and local activities to combat spread of these weeds, weed invasions into western plant communities continue at epidemic rates (155).

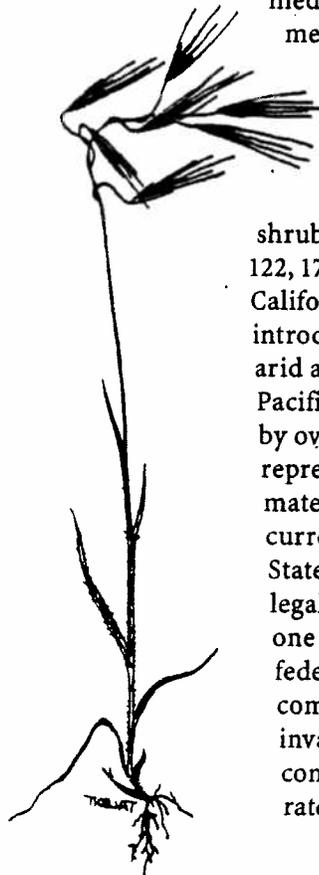
These findings are of serious concern because nonindigenous

species are suspected of being the second main cause, following loss of habitat, for the listing of all threatened and endangered species in the United States (57, 177). According to a recent survey by Wilcove et al. (177), alien species have contributed to the endangerment or extinction of 33% of at-risk

Nonindigenous species are suspected of being the main cause following loss of habitat for the listing of all threatened and endangered species in the United States.

plant species. Additionally, invasions that alter the biological landscape constitute a significant component of global environmental change (168). Introduced weeds alter western ecosystems by increasing fire frequency (30, 36, 173), reducing biodiversity (126, 137, 178), reducing wildlife habitat (18, 90), disrupting nutrient cycling and hydrology (167), increasing topsoil loss (94), and altering soil microclimate (53). Long-term monitoring suggests that some weed-altered arid and semi-arid communities may never recover, even with the cessation of all anthropogenic disturbance (30, 31, 180).

The rapid spread of nonindigenous plants in the West, estimated at 2,200 ha (5000 ac) per day on western federal lands (155) or 14% annually (158), indicates that weed management strategies currently used by federal land-management agencies have been largely ineffective (65, 155).



Cheatgrass
(*Bromus tectorum*)

While most weed scientists and federal agencies conclude that the most effective and least expensive way of managing introduced plant species is to prevent new infestations (e.g. 79a, 140, 155, 163, 178), recent weed management plans and agency publications (e.g., 12, 65, 154, 155, 156, 157, 158, 162, 163, see also 141) have given little attention to prevention. Instead, these publications emphasize weed control and eradication using herbicides, biological control, mechanical weed removal, fire prevention, and plowing. Prevention is often limited to exhorting hikers to clean their boots, asking drivers to wash off their vehicle undercarriages, and recommending that owners of pack animals use weed-free feed (e.g., 141, 154, 155, 156, 163).

THE MISSING COMPONENT

Missing from these federal management plans is a thorough analysis of the relationship between livestock grazing and weed invasions. Not only has grazing long been the dominant land use of most western grasslands and shrublands (58), but livestock grazing has also been a major use of western woodlands (23) and low- and mid-elevation forests (24). The 100->200-year history of livestock grazing in the American West is known to have degraded stream and riparian ecosystems, stripped uplands of native grasses, severely depleted herbaceous plants in all plant communities, increased erosion, and endangered native species (8, 9, 25, 58, 116, 121, 183). Evans and Young (53) noted that significant portions of the sagebrush-grasslands in the Great Basin have been degraded to the point that they produce less than 50% of their biological potential.

Numerous scientific papers have listed the influence of past and current livestock grazing on the spread and ever-increasing dominance of introduced weeds (e.g., 14, 18, 38, 45, 78, 91, 113, 183, 185, among others). In Washington State, for example, 84% of yellow starthistle (*Centaurea solstitialis*) and 80% of diffuse knapweed (*Centaurea diffusa*) populations are found on lands predominantly used for livestock grazing (135). However, these conclusions about the causal relationship between livestock and weed invasions have not been translated into effective weed control policies, nor even discussed in most agency educational materials.

Management plans for federal lands lack thorough analysis of the relationship between livestock grazing and weed invasions.

Livestock are not the only factors contributing to weed invasions in the West. Anthropogenic causes of soil disturbance such as outdoor recreationalists, off-road vehicles (ORVs), trucks, road construction, and logging; and natural causes such as wildfire, burrowing animals, wind, floods, and natural erosion enhance the vulnerability of communities to invasion. Resource availability (60, 77, 80, 146), distance to seed source (60, 146), drought (113, 148), and above-normal precipitation (50, 155) contribute to invasions at multiple spatial scales, while wildlife (48, 188), fire (173, 187), soil chemistry, texture, and depth (80, 134, 182), and surface microclimate and microtopography (53) contribute to invasions at local scales. Rising levels of carbon dioxide in the atmosphere may also increase the growth rates of weedy annuals (44, 125).

The admitted lack of effectiveness of current federal weed prevention programs (65) can be traced to several causes. First, limited funds have been concentrated on weed control rather than on prevention (79a, 98). Second, unorthodox definitions of weed prevention, such as "early detection", "education, training, and inventory" (11) and "spot control" (162) have often been applied to weed management programs, rather than the more usual definitions of reducing the influx of weed seeds or reducing community vulnerability to invasion. Third, efforts have concentrated more on preventing the introduction and spread of weed seeds along roads and trails than on preventing activities that disturb soil surfaces and open plant communities to invasion. This is not to say that preventing invasions along roadsides is unimportant, since roads act as corridors for the movement of weeds into new regions and support high densities of

nonindigenous plants. However, roadside disturbances are only part of the problem.

Finally, the ineffectiveness of current weed prevention programs in the arid and semi-arid West may result from insufficient attention being given to the multiple impacts of

livestock grazing. Recent BLM and US Forest Service reports and management plans to combat introduced weeds (e.g., 157, 158, 162, 163) recommended neither significant changes in livestock management nor reductions in livestock numbers. In some cases, they even consider increasing livestock grazing in weed-dominated areas (157, 158, 163). Where changes in livestock management are considered, emphasis is on altering season of use by livestock or changing the grazing system, but little evidence is provided showing that these changes are effective. Surprisingly, some of the recommended grazing systems such as rest-rotation and time-controlled grazing have been found to favor weed growth (117, 183). In addition, changes in livestock management are usually recommended only after weed eradication programs are implemented, not before weeds have entered the community (e.g., 141, 163).

In this paper, we review the multiple influences of livestock grazing on invasions of nonindigenous plants in grasslands, shrublands, and woodlands of the American West. We include arid and semi-arid lands west of the Rocky Mountains, including California, but exclude the Sonoran, Mojave, and Chihuahuan Deserts of the American Southwest. Most of the studies discussed in this paper are from the described region, but papers from other regions are included if they describe general ecological factors not likely to differ among regions.

Recent BLM and US Forest Service plans to combat introduced weeds recommended neither significant changes in livestock management nor reductions in livestock numbers.

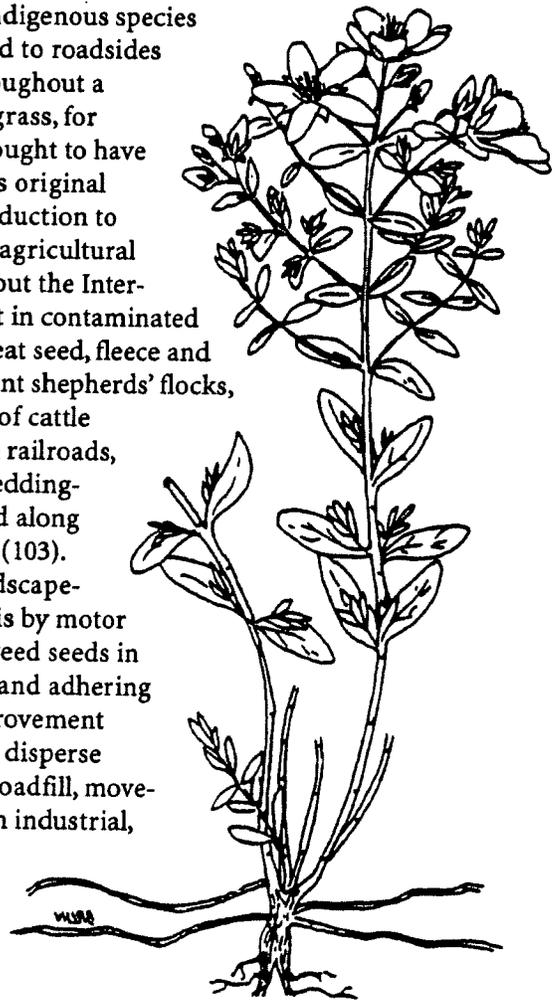
Weed Introductions at Different Ecological Scales

Inattention to the impacts of livestock grazing may be due, in part, to a confounding of ecological scale (7) by land managers. In this report, ecological scale refers to different levels of biological organization ranging from large, i.e. the continental or regional scale, to small, i.e. the local or community scale. Most federal land management plans concentrate on roadside invasions, thereby looking primarily at the landscape scale, not the full range of scales.

The invasion process begins with a regional-scale introduction of weed seeds and plant parts from overseas or distant geographic areas (Figure 1). Ships, trains, and trucks carry agricultural seed and animal feed contaminated with weed seeds over long distances, and weed seeds hitchhike in ship ballast, packing materials, and mud adhering to vehicles. Escape of introduced ornamental plants such as leafy spurge, Dalmation toadflax (*Linaria dalmatica*), and St. Johnswort (*Hypericum perforatum*) from gardens and parks and intentional introductions of alien species such as Johnsongrass (*Sorghum halepense*) have also led to widespread introductions (15, 105, 143, 175, 178). The introduction of cheatgrass into the western U.S. from southwestern Asia occurred both accidentally (in contaminated wheat seed) and deliberately (following a study to identify new grass species to reseed overgrazed rangelands in eastern Washington) (103).

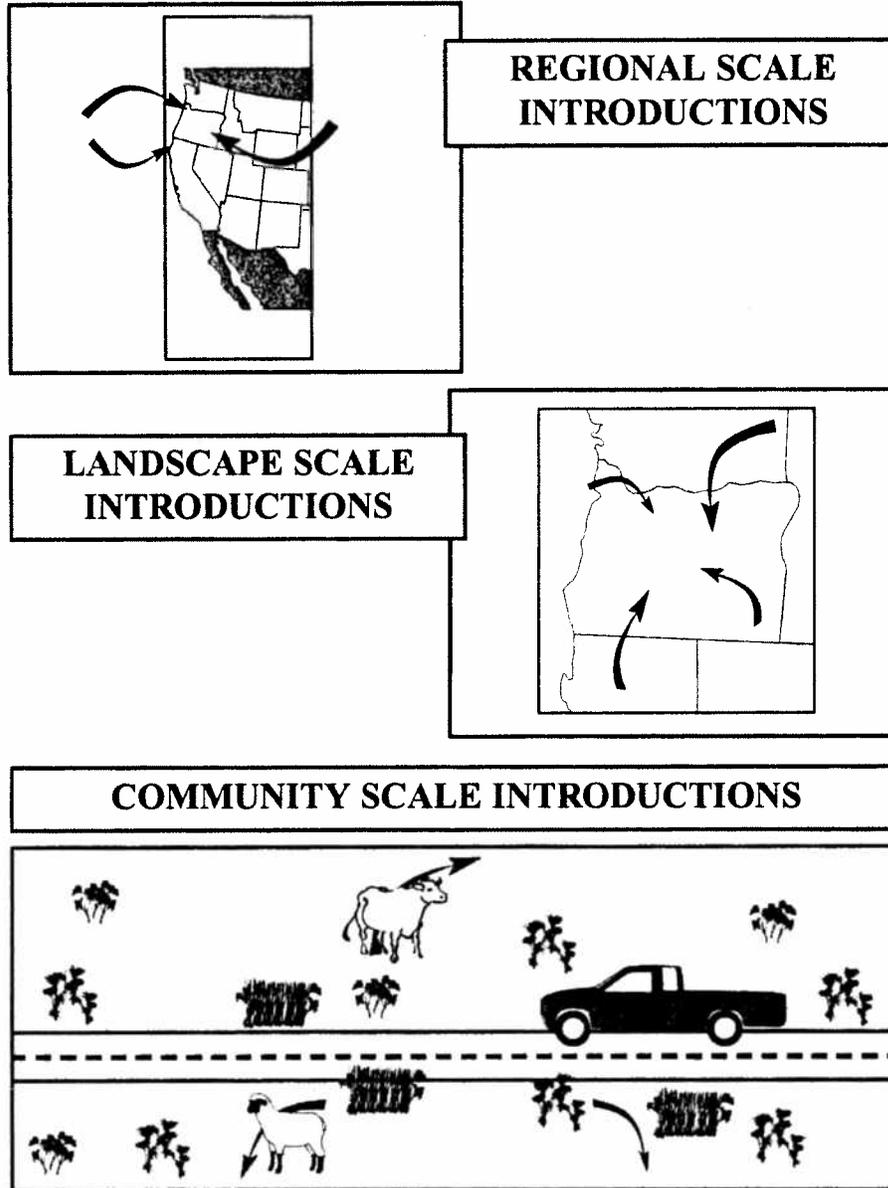
Introductions of alien species at the regional scale create localized points of infestation, usually around sea ports, train stations, and industrial sites frequented by commercial trucks, as well as in and surrounding agricultural fields and along major highways.

The second or landscape-scale introductions (Figure 1) occur when seeds of nonindigenous species are transported to roadsides and fields throughout a region. Cheatgrass, for example, is thought to have spread from its original points of introduction to roadsides and agricultural lands throughout the Intermountain West in contaminated alfalfa and wheat seed, fleece and dung of itinerant shepherds' flocks, dung and hair of cattle transported on railroads, and in cattle bedding-straw discarded along railroad tracks (103). Additional landscape-level dispersal is by motor vehicles with weed seeds in their radiators and adhering mud, road improvement operations that disperse contaminated roadfill, movement of unclean industrial, logging, and agricultural equipment (155), and



St. John's Wort (*Hypericum perforatum*)

**FIGURE 1:
WEED INTRODUCTIONS AT DIFFERENT ECOLOGICAL SCALES**



Introductions of nonindigenous plants at different geographic scales into arid and semi-arid shrublands, grasslands, and woodlands of the American West.

livestock trucks transporting animals from infested into uninfested areas (135). Flowing water, wind, and far-ranging birds also transport weed seeds throughout regions (133, 135). Landscape-level introductions typically result in infesta-

tions along secondary roads, throughout agricultural lands, and along the banks of streams and irrigation ditches (135).

At the third and smallest level, local- or community-scale introductions (Figure 1) occur where weed seeds are

transported from travel corridors, agricultural areas, and stream banks onto adjacent plant communities. Natural vectors such as wind, flowing water, and native wildlife, and anthropogenic vectors such as livestock, hikers, ORVs, and agricultural equipment move seeds into and throughout native communities (133, 135, 138).

LIVESTOCK AS VECTORS OF NONINDIGENOUS PLANTS

Although weed seeds may be introduced into communities by natural vectors or recreationalists (133), the more than 20 million cattle and sheep grazing western grasslands, shrublands, and woodlands of the American West (160) may be the most pervasive factor moving seeds into and throughout plant communities. Unlike large wildlife species, which are sparse in the arid West (106), and outdoor recreationalists, who for the most part are restricted to trails, roads, and campgrounds, cattle and sheep are far-ranging; they reach all

but the steepest slopes and areas farthest from water (38). While in some areas, Off Road Vehicles, mountain bikes, or hikers may be the dominant source of weed introductions, livestock are more likely the cause of weed introductions into non-recreational or remote areas away from roads or trails.

The effectiveness of livestock as weed seed vectors is illustrated by their ability to transport viable seeds in their hair and digestive tracks, and in mud on their feet (91, Table 1). One study found that in one grazing season, a single cow in a pasture in Alberta, Canada, redistributed over 900,000 viable seeds (42). Dore and Raymond (42) also reported that a single cow deposited an average of 37,000 viable seeds of late-season annuals in dung per day in the fall. The authors concluded that cattle were the most important dispersers of seeds of pasture species. In other studies, individual sheep were found to transport up to 17 viable leafy spurge seeds per day in their dung (119) and 14 viable halogeton (*Halogeton glomeratus*) seeds per 500

TABLE 1. LIVESTOCK AS VECTORS OF SEEDS OF NONINDIGENOUS PLANT SPECIES.

| ANIMAL VECTOR | WEED SPECIES | VIABLE SEEDS TRANSPORTED | CITATION REFERENCE # |
|----------------------|---------------------------|--|-----------------------------|
| Cattle | Many | A maximum of 37,000 viable seeds/cow/day in dung | 42 |
| Cattle | Houndstongue | 65% of burrs per stalk attach to cattle | 40 |
| Sheep | Halogeton | 14 seeds/500g dung | 91 |
| Sheep | Knapweed species | Up to 17 seeds/sheep/day in dung; up to 39 seeds in fleece | 119 |
| Sheep | Squarrose knapweed | 4.5 achenes per 10 grams wool from head | 136 |
| Sheep | 13 non-indigenous species | In dung | 74 |

Non-native weeds are most likely to invade sites that experience disturbances that differ in type or frequency from their natural disturbance regimes.

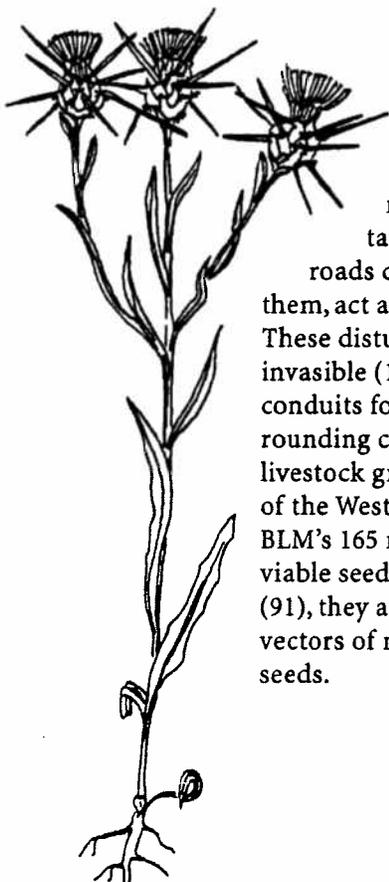
grams of dung (91). Sheep also carried an average of 39 leafy spurge seeds in their fleece (119). Cattle dispersed seeds of houndstongue (*Cynoglossum officinale*) on their heads, chests, and undersides, brushing

them off on shrubs, poles and other animals (40).

By dispersing seeds into and throughout communities, livestock facilitate invasion of entire landscapes. In Australia, Brown and Carter (33)

found the invasion of an alien shrub into a grassland to have been caused by a shift to cattle as the dominant livestock species. In addition, range developments such as water tanks and ponds, and the roads constructed to access them, act as loci for weed spread.

These disturbed sites are highly invulnerable (129, 149) and act as conduits for invasion into surrounding communities. Given that livestock graze 70% of the land area of the West (164), including 94% of BLM's 165 million acres, and carry viable seeds for as long as ten days (91), they are undoubtedly major vectors of nonindigenous plant seeds.



Yellow starthistle
(*Centaurea solstitialis*)

LIVESTOCK GRAZING AND THE INVASIBILITY OF ARID AND SEMI-ARID COMMUNITIES

For nonindigenous species to become important constituents of plant communities, not only must their seeds enter the communities, but the communities must be open to invasion. In other words, the communities must be invulnerable (127). The primary determinants of plant community invulnerability are the number of safe sites for seed germination in the community (53, 68), the amount of plant cover or biomass (127), and perhaps resource availability (146). Community invulnerability is enhanced by increases in soil disturbance (178), which aids seed establishment by creating safe sites for seeds and temporarily increasing soil nitrogen. Invulnerability is also enhanced by reductions in plant cover, which reduce competition for limited resources (77, 78, 127). Crawley (34) and Rejmanek (127) found that the most invulnerable communities were those with low average levels of plant cover and frequent disturbance (see 17 for additional examples). Schiffman (139) concluded that nonindigenous plant species are most likely to invade sites that experience disturbances that differ in type or frequency from their natural disturbance regimes.

The rapid invasion of nonindigenous plants recorded throughout the West suggests not only that weed

seeds are being transported into native grasslands, shrublands, and woodlands at high rates, but that these communities are highly invasible (30, 104, 106, 184). This invasibility can best be explained by low plant cover, which is common in arid and semi-arid regions; an absence of co-evolved predators, competitors, and parasites in the new environments; climates similar to those in the invasive species's area of origin; and exotic forms of disturbance.

Evolutionary Vulnerability

Grasslands, shrublands, and woodlands west of the Rocky Mountains may be more vulnerable to disturbances by domestic livestock and to weed invasions than other regions. For thousands of years prior to the arrival of livestock, large grazers were sparse in the Intermountain West and California (14, 79b, 106, 109, 112, 121, 169). Native herbivores such as deer, elk, and pronghorn are not thought to have been abundant enough to have exerted strong selective pressures on native grasses and

broadleaved herbaceous species (38, 104, 113). Thus, the introduction of domestic livestock in the 1800s added a new type of perturbation to western ecosystems, e.g. heavy grazing and trampling (79b, 106, 139). In the classic discussion of this topic, Mack and Thompson (106) concluded that unlike grasses of the Great Plains, which evolved under thousands of years of intense grazing by American bison, bunchgrasses west of the Rocky Mountains were only lightly grazed. Consequently, these species evolved little tolerance of intense grazing and trampling, causing them to be highly sensitive to the actions of introduced cattle and sheep. As a result, within 20-40 years of the beginning of livestock production west of the Rockies, many western grasslands and shrublands were reported to be severely damaged (73, 103, 189).

Unlike grasses of the Great Plains, bunchgrasses west of the Rocky Mountains evolved with little tolerance for intense grazing and trampling, causing them to be highly sensitive to introduced cattle and sheep.

Livestock Disturbances

Livestock increase the invasibility of plant communities by disturbing vegetation and soils (138) and by altering ecosystem processes such as fire frequency and nutrient cycling (10, 79a). These impacts act together to increase community invasibility.

1) Selective Grazing

A major cause of increased community invasibility is selective grazing by livestock (14, 45, 91, 117b, 183). Livestock, especially cattle, preferentially graze native plant species while avoiding most weeds, which are poor forage and have low palatability due to toxins, spines, and distasteful compounds (17,

Most studies suggest that livestock grazing leads to reductions of native species while pastures become increasingly dominated by alien species.

34, 91, 117, 166, 181). As a result, the size, density, and competitive vigor of native plants are reduced while weedy species are released from competition (18, 91, 101, 117, 142). With continued livestock grazing, native species decline in density and cover,

leaving bare patches that are readily colonized by weedy annuals (48, 72, 129).

Examples of declines in vigor by native species and increases in density of nonindigenous species are numerous (Table 2). In Utah, individual plants of cheatgrass, halogeton, and Russian thistle (*Salsola pestifer*) were larger, sometimes by an order of magnitude, in heavily grazed communities than in ungrazed communities (71); and three years of repeated sheep grazing in Montana significantly reduced shoot

and root biomass of the native bunchgrass, Idaho fescue (*Festuca idahoensis*), but had no effect on spotted knapweed (*Centaurea maculosa*) (118). Clipping studies (which duplicate grazing studies but without the trampling) of two bunchgrasses and two sod-forming grasses in eastern Washington resulted in significantly higher numbers of yellow starthistle in clipped than unclipped plots (134); while a single clipping of Idaho fescue (30% or 90% of shoot removed) increased spotted knapweed biomass and numbers (81). In a follow-up study, Jacobs and Sheley (82) found that clipping bunchgrasses more than once on a grass-dominated site reduced cover and density of the grasses but increased the cover of knapweed. Although not all species and habitats have been rigorously tested, most grazing and clipping studies (Table 2) suggest that livestock grazing leads to reductions of native species while pastures become increasingly dominated by alien species.

2) Trampling

Trampling also increases plant community invasibility (78, 104, 129). Through hoof action, livestock damage biological soil crusts, create safe sites for weed seeds, increase soil nitrogen levels, and create competition-free patches of bare ground that are open to invasion (48, 77, 78, 129, 137, 138). Trampling can also injure the shoots of native plants (171), reducing their competitive and reproductive capacities. The most severe effect of trampling may be compaction of soils, which damages plant roots (171) and causes roots to

**TABLE 2. IMPACTS OF LIVESTOCK GRAZING ON
INVASIVE, NONINDIGENOUS PLANT SPECIES.**

| <u>LOCATION</u> | <u>GRAZER</u> | <u>EFFECT OF GRAZING</u> | <u>REFERENCE #</u> |
|------------------|-----------------------|--|--------------------|
| California | Cattle | Medusahead was abundant on grazed but not ungrazed stands that were high in clay | 147 |
| Nevada | Cattle, sheep, horses | Cheatgrass, peppergrass, and halogeton increased "to an extreme degree" during 50 years of grazing | 131 |
| Oregon | Cattle, sheep | Cheatgrass cover and density were extremely low on a relict site but had up to 11% cover and 254 plants/m ² on grazed sites | 62 |
| Washington | Cattle, sheep | In undisturbed vegetation, cheatgrass was sparse and the plants dwarfed | 38 |
| Washington | Cattle | After three years light grazing, cheatgrass and tumbled mustard invaded areas where cattle congregated | 129 |
| Montana | Livestock | Ungrazed rough fescue and bluebunch wheatgrass communities were "fairly resistant" to invasion by diffuse knapweed | 93 |
| British Columbia | Cattle | Knapweed cover on a site sprayed with herbicide was higher in grazed than ungrazed plots | 107 |

become more concentrated near the soil surface (43). These changes may prevent native plants from acquiring sufficient resources for vigorous growth

Soil compaction by large grazing mammals also locally reduces populations of soil decomposers and lowers soil hydrologic conductivity, aeration, and redox potential (20, 43, 174), changes that appear to favor weedy species over native bunchgrasses (41, 20). Rickard (129) recorded the effects of livestock trampling in Washington State, where he found that cheatgrass and tumble mustard (*Sisymbrium altissimum*) invaded a trampled grassland, but not nearby untrampled grasslands. In

another study, the cover of introduced species in a site trampled by humans in Utah was significantly greater than in undisturbed sites (20).

Where livestock reduce vegetative cover and disturb soil surfaces, they also increase wind and water erosion (21, 43, 48, 102, 174). Soil movement resulting from erosion often buries weed seeds with loose soil particles, increasing the probability of their germination (51). Evans and Young (51) found that cheatgrass emergence was 30 times greater, tumbled mustard emergence 20 times greater, and medusahead emergence eight times greater when their seeds were buried 1 cm deep than when

their seeds were broadcast on a smooth soil surface. Fall grazing is especially conducive to cheatgrass invasion since livestock are more likely to bury cheatgrass seed in the soil profile when soil surfaces are dry (R. Rosentreter, pers. comm.). Thus, disturbances that loosen surface soils may increase nonindigenous plant invasions.

Native wildlife species such as gophers, ground squirrels, and deer also disturb soils and create bare patches. Although sometimes implicated in the spread of invasive species into intact communities (e.g. 153), native species do not appear to be major causes of community invasibility (139). Grasslands and shrublands that have

Native wildlife create disturbance types that are "evolutionarily and ecologically usual" while livestock create disturbances that differ in type, frequency, and intensity from normal disturbance regimes.

long been protected from livestock disturbance, such as the US Department of Energy's Hanford Site in eastern Washington and a semi-isolated plateau known as The Island in central Oregon, still possess their native wildlife species but, except along roads, are relatively free of nonindigenous plant species (62, A.J. Belsky, personal observation). This difference between wildlife and livestock impacts may be, as Schiffman (139) discusses, due to native wildlife species creating disturbance types that are "evolutionarily and ecologically usual" while livestock create disturbances that differ in type, frequency, and intensity from the normal disturbance regimes. Holland and Keil (79b) and Archer and Smeins (10) similarly concluded that native herbivores such as elk, pronghorn antelope, and deer differ from livestock in their impacts on the vegetation by

having different grazing patterns. They noted that native wildlife graze an area and then move on, allowing the vegetation to recover, while domestic livestock graze the same area repeatedly. In addition, livestock, but not native grazers, graze bunchgrasses down to their bases, damaging their growing buds.

3) Impacts on Soil Crusts

Microbiotic crusts (also referred to as biological, cryptobiotic, cryptogamic, or microphytic crusts) are living mats of lichens, mosses, algae, and cyanobacteria that blanket exposed soils in deserts, dry grasslands, and shrublands around the world. These crusts are important components of arid and semi-arid ecosystems in that they increase soil stability (21) and fix atmospheric nitrogen (N) (55). Cyanobacteria in these crusts may be the main source of N input into arid and semi-arid ecosystems (54, 55). In the western United States, microbiotic crusts have also been found to enhance soil fertility, increase elemental content of plant tissues, increase water infiltration and holding capacity, and contribute to mycorrhizal colonization (reviewed in 69, 70, 96).

By trampling these fragile crusts, livestock disturb, and in some cases completely destroy, this important component of arid ecosystems. Disturbance of these fragile crusts by cattle and sheep hooves (29, 83), which is widespread over the American West, most likely reduces the establishment and vigor of native plants (22,70), thus indirectly increasing community invasibility (20,46, 55, 137).

There is also evidence that intact microbiotic crusts reduce weed invasions directly by preventing the germi-

nation and establishment of annual weed seeds (46, 64a, 104, 137, 138), even when abundant seed sources are nearby. Crusts appear to have less effect on germination and establishment of native perennials (84). Two mechanisms have been proposed. The first is that crusts act as physical barriers to weed establishment by preventing seeds or their roots from contacting mineral soil (104). Some native species overcome this barrier by having special structures such as genticulate awns, which drill seeds through the crust into the soil (84).

A second mechanism is that crusts may prevent burial and germination of weed seeds by stabilizing soils (J. Belnap, personal communication). This idea is supported by Evans and Young (51), who found that emergence and growth of cheatgrass, medusahead, and tumble mustard were substantially enhanced by seed burial. Whatever the causal mechanism, sites with intact microbiotic crusts seem to be significantly more resistant to invasion than sites with disturbed crusts (84, 104). For example, Gelbard (unpublished data) found in a multivariate analysis of data from over 650 sites in southern Utah and eastern Nevada that in sites lacking microbiotic crusts, 20% of the plant species were aliens, while in sites with intact crusts, only 9% of species were aliens. In addition, Gelbard (1999) found that cheatgrass cover was four times higher on sites lacking microbiotic crusts than sites with crusts (16% vs. 4%). Approximately 64% of these sites had been disturbed by livestock, 25% by wildlife, 12% by outdoor recreationalists, and 2% by fire. Destruction of microbiotic crusts may therefore be one of the major ways that livestock predispose communities to weed invasions.

Nonindigenous plants are sometimes found in high numbers in areas with undisturbed microbiotic crusts, especially under conditions of high soil nitrogen or above-average rainfall. In a year of unusually frequent rainfall, for example, cheatgrass appeared at high density in an undisturbed community having well developed microbiotic crusts in Canyonlands National Park, Utah (49). Before this, the community had resisted cheatgrass invasion for 60 years, even though it was surrounded by communities with high cheatgrass densities (J. Belnap, personal communication). In another case, cheatgrass increased substantially after an unusually heavy spring rain in a kipuka, i.e., an island of soil and vegetation protected from grazing animals by old lava flows (87). However, a nearby kipuka supporting a similar shrub-steppe community was not invaded.

Livestock disturb and sometimes destroy microbiotic soil crusts, which reduce weed invasions directly by preventing the germination and establishment of annual weed seeds.

4) Impacts on Mycorrhizae

Besides damaging microbiotic crusts, grazing disturbances may enhance community invasibility by reducing colonization of grasses by vesicular-arbuscular mycorrhizae (VAM) (1, 27, 28, 176). VAM fungi form symbiotic relationships with plant roots, improving transport of essential nutrients and water from the soil into the roots of the colonized (mycorrhizal) plants (4). Allen et al. (5) suggested that VAM fungi reduce community invasibility by increasing native plant vigor. When VAM numbers are reduced due to disturbance or fire, plant species that require VAM fungi for vigorous growth,

which include most native species in arid and semi-arid communities of the West (6, 176), are less vigorous and are put at a competitive disadvantage relative to weeds that do not require VAM fungi (5, 41, 61).

In a few cases, but not all (e.g., 6), livestock grazing has been found to reduce mycorrhizae numbers in the soil as well as to reduce their ability to form symbioses with host plants.

Bethlenfalvay and Dakessian (27) explored the effects of livestock grazing on mycorrhizal colonization in a sagebrush (*Artemisia tridentata*) community and found VAM colonization of five native perennial grasses in a grazed community to be 28-60% lower than in an adjacent ungrazed

community. Broadleaved plants were not affected. A follow-up study by Bethlenfalvay et al. (28) found that VAM colonization of Fairway crested wheatgrass (*Agropyron desertorum*), an introduced perennial forage grass, was 50% lower in a grazed than ungrazed sagebrush community. Similarly, Harper and Pendleton (70) found lower mycorrhizal infection in plants in uncrusted than crusted soils. In a study using mycorrhizal native grasses and mechanical disturbances of the soil, Doerr et al. (41) found that mycorrhizal infections declined with increasing soil disturbance. They concluded that the effects of mycorrhizae on plant community succession are so substantial that if perennial grasses are desired, then disturbances should be minimized.

While mycorrhizal species are benefited by VAM colonization,

nonmycorrhizal weeds such as Russian thistle and halogeton may not be. VAM fungi can parasitically extract carbohydrates from nonmycorrhizal plants and kill their roots or root segments (2, 3, 5). Allen and Allen (3) found that in one site in Wyoming, inoculation of soils with mycorrhizal fungi reduced the cover and density of Russian thistle by 30% and 40%, respectively. Similarly, Allen et al. (5) found that the cover of early seral nonmycorrhizal species, including halogeton and black mustard (*Brassica nigra*), could be reduced by as much as 40% with the addition of mycorrhizal fungi. Thus, VAM inoculation of soil may be a tool to control some nonindigenous plant species.

5) Impacts on Soil Nitrogen

Livestock also increase the invasibility of grass-, shrub-, and woodland communities by redistributing soil nitrogen (N), creating locally enriched areas. High soil N content favors the establishment of weeds that prefer high N concentrations (55, 77). Such N "hot spots" occur in areas where animals deposit N in urine and dung or where disturbances increase N mineralization rates in the soil. Nitrogen hot spots are concentrated where livestock congregate near streams, fences, water tanks, and salt licks (10, 115, 149).

High soil N increases invasion by nitrophilous weeds such as cheatgrass and medusahead by stimulating germination of their seeds and enhancing their growth over that of native species (17, 52, 144, 150, 184). A study of competition between cheatgrass and the native perennial bluebunch wheatgrass (*Pseudoregnaria spicata*) found that application of nitrogen fertilizer quadrupled the number of cheatgrass plants but depressed wheatgrass yields by 50% (179). In a study examining the effects

Livestock grazing has been found to reduce mycorrhizae numbers in the soil as well as to reduce their ability to form symbioses with host plants.

of both fertilization and grazing on competition between cheatgrass and intermediate wheatgrass (*Elytrigia intermedia*), Kay and Evans (85) found that applied nitrogen favored cheatgrass at the expense of the perennial grass. They also found that a combination of grazing and fertilization favored cheatgrass over wheatgrass more than fertilization alone. Hobbs and Atkins (76) working in Australia concluded that introduced annuals respond more

Application of nitrogen fertilizer quadrupled the number of cheatgrass plants but depressed native bluebunch wheatgrass yields by 50%.

favorably than native plants to a combination of soil disturbance and fertilization. Disturbance significantly increased the establishment of introduced annuals while fertilization significantly increased their biomass. Native annuals, however, showed little response to soil disturbance. Such combinations of disturbance and fertilization, in the form of trampling and dung, are common in grazed communities.

6) Impacts on Fire Regimes

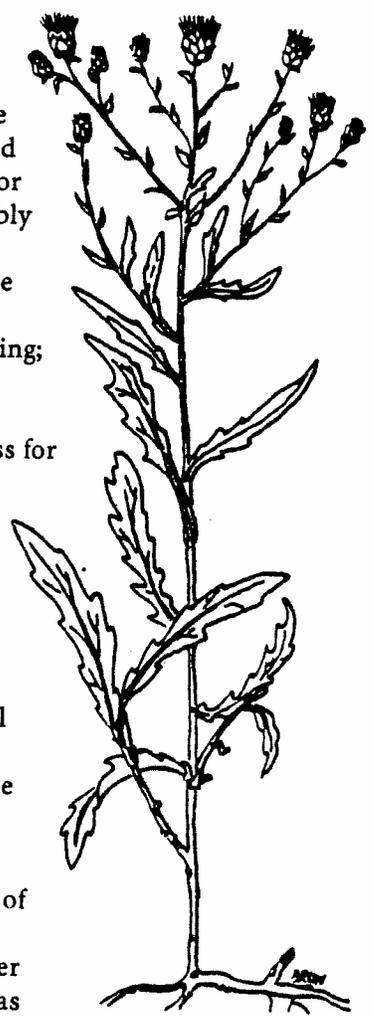
Finally, dominance by alien species in arid and semi-arid communities is increased by the shorter fire-return intervals that often occur when annual weed cover is high. Once a grazed area is invaded by cheatgrass, which is denser than native bunchgrasses and dries out earlier in the growing season, fires become more frequent (30, 123, 173, 187). Frequent, early-season fire is lethal to many species of native bunchgrasses and shrubs, opening up communities to

fire-tolerant alien species (30, 36, 187). One of the long-term consequences of nonindigenous plant invasions in the Intermountain West may be the absence of community recovery once flammable weeds have produced a permanently shortened fire-return cycle (30, 173, 187).

Can Ungrazed Communities Resist Invasions of Nonindigenous Species?

In most cases, established perennial grasses and healthy grasslands are able to retard, if not completely prevent, invasions by nonindigenous species (169, 184). Nonindigenous plants are generally absent or sparse in undisturbed grasslands and shrublands (39, 62, Tables 2), or their invasions are considerably slowed (93). Pickford (123) found that cheatgrass was rare (<1% cover) in communities protected from livestock grazing; and, as noted above, a site in Canyonlands National Park resisted invasion by cheatgrass for 60 years. Likewise, Daubenmire (38, 39), Goodwin et al. (62), and Belnap (20) observed few cheatgrass plants growing in undisturbed bunchgrass and blackbrush communities. Even where introduced annual species had established, their populations were small and the plants dwarfed (38).

Ungrazed and lightly grazed but still healthy stands of perennial grasses have been found to deter invasion by other nonindigenous weedy species as well. Yellow starthistle (134), medusahead (35, 181, 186), bull



Russian Knapweed (*Centaurea repens*)

thistle (59), diffuse knapweed (26), halogeton (32, 128), dyer's woad (*Isatis tinctoria*) (108); musk thistle (56), and Russian thistle, tumble mustard, alfalfa (*Medicago sativa*), sweetclover (*Melilotus officianalis*), horseweed (*Conyza canadensis*), and storksbill (*Erodium cicutarium*) (39) were all found to be less frequent in ungrazed or lightly grazed communities than in more disturbed ones. These reports provide strong evidence of the effectiveness of healthy native plant communities in deterring weed invasions.

Some weed species have been found to invade undisturbed grasslands and shrublands (e.g., 49, 73, 87, 89, 91, 93). Spotted knapweed, for example, invaded fescue (*Festuca* spp.) communities adjacent to roadsides in Glacier National Park (153), and leafy spurge invaded the remote Danaher Creek area of the Bob Marshall Wilderness (18). In spite of these and other reports, serious weed infestations in ungrazed, undisturbed grasslands and shrublands appear to be limited.

Can Range Communities Recover when Livestock are Removed?

The elimination of livestock grazing from grasslands and shrublands has often, but not always, been found to result in a reduction in weed numbers (Table 3). In eastern Oregon, the frequency of the alien grass *Bromus hordeaceus* declined in wet meadows that had been protected from grazing for 15 years, but increased 2-48% where grazing continued (63). In the same community the frequency of the introduced grass timothy (*Phleum pratense*) declined from 33% to 3% where protected and the frequency of tall buttercup (*Ranunculus acris*) declined from

55% to 12%. Similarly, after 20 to 40 years of protection from livestock grazing in British Columbia, cheatgrass cover was 1% (versus 3% on a grazed site), and its frequency was 4% (versus 12% on a grazed site.) (111). In addition, seedlings of native perennial bluebunch wheatgrass were able to invade cheatgrass stands after ten years of protection in western Montana (72). Finally, Monsen (114) reported that protection from grazing for 58 years in southcentral Idaho allowed native species to increase in density and cover on north exposures, although not on south and west exposures.

Little research has focused on the environmental conditions necessary for weed-dominated arid and semi-arid communities to recover through natural successional pathways, or for native species to recolonize weed-dominated stands (114). Since several important weedy species, e.g., cheatgrass, medusahead, leafy spurge, and knapweeds, outcompete native species for water (72, 188), reestablishment of native perennials is most likely to result from the elimination of livestock in high rainfall areas (114) or in habitats characterized by high soil moisture availability (38). However, Monsen (114) also noted that during a recent drought, cheatgrass disappeared from extensive sagebrush communities in Nevada, Idaho, and Utah and was replaced in some areas by perennial bunchgrasses.

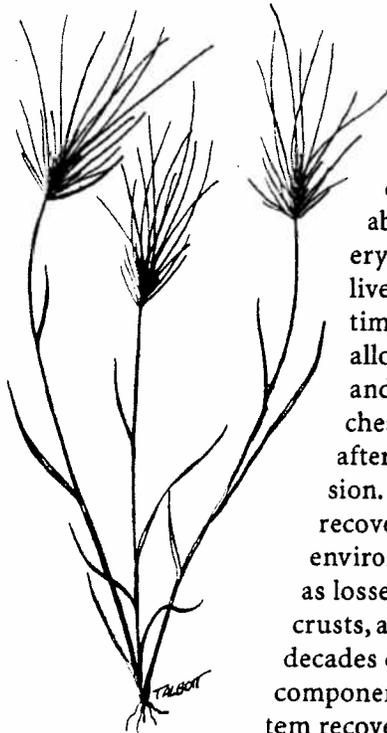
A number of studies have not found a decline of nonindigenous weeds when disturbances, including livestock grazing, were eliminated (e.g. 31, 39, 128, 130, 172). However, some of these results are not clear-cut. Robertson (130), for example, found that cheatgrass increased 38% during 30 years of protection from livestock grazing in a eroded

TABLE 3. EFFECTS OF PROTECTING PREVIOUSLY GRAZED COMMUNITIES FROM LIVESTOCK GRAZING.

| <u>LOCATION</u> | <u>GRAZER</u> | <u>YEARS OF PROTECTION</u> | <u>EFFECT ON PLANT COMMUNITY</u> | <u>CITATION REFERENCE #</u> |
|-----------------------------|---------------|----------------------------|---|-----------------------------|
| California | Cattle, sheep | 4 years | Cheatgrass cover was three times higher in grazed vs. protected pastures | 85 |
| California | Cattle | 6 years | Cover of native species was significantly higher and the cover of introduced species was significantly lower in protected than grazed coastal prairies | 47 |
| California | Cattle, sheep | 10-15 years | Scattered plants and small stands of perennial grasses appeared in annual grassland | 16 |
| California, Channel Islands | Cattle, sheep | Variable | Native vegetation recovered while alien species declined in cover | 64b |
| Colorado | Cattle, sheep | 10 years | Cheatgrass, pepperweed, and other annual weeds were less frequent in protected than grazed plots | 152 |
| Utah | Cattle | 5-40 year | Perennial grass cover averaged 23% and 10% on protected and grazed plots, respectively. Cheatgrass cover averaged 1.3% and 2.3% on protected and grazed plots, respectively | 123 |
| Utah | Cattle, sheep | 6-15 years | Reduced occurrence of halogeton in exclosures | 128 |
| Oregon | Cattle | 10 years | <i>Phleum pratens</i> frequency declined from 33% to 3% and tall buttercup frequency decreased from 55% to 12% in protected stands while remaining stable in grazed stands | 63 |
| Idaho | Cattle, sheep | 16-23 years | No exotics recorded in ten community types | 67 |
| British Columbia | Cattle | 30-40 years | Perennial grass cover was 3-10 times higher in protected pastures while cheatgrass cover was 3 times higher in grazed pastures | 111 |

sagebrush-grass community in Nevada. However, the cover of native perennial grasses, forbs, and shrubs also increased during this period.

Studies of grassland restoration suggest that livestock grazing inhibits community recovery. Young and Evans (186), for example, found that application of the herbicide 2,4-D to remove low sagebrush in California resulted in an increase of native grasses in ungrazed plots, but to a severe invasion of medusahead on grazed plots. Another study suggested that weed-dominated communities in Idaho can be restored to communities more closely resembling native communities by reseeding with native or other perennial grasses in conjunction with removal of livestock (84).



Medusahead
(*Taeniatherum*
caput-medusae)

Although often attributed to weeds having established a new climax or steady state in western grassland and shrubland communities (100), the absence of community recovery following elimination of livestock grazing may sometimes be due to the short time allowed for recovery. McLean and Tisdale (111) found that cheatgrass began to decline only after 30 years of livestock exclusion. In other cases, lack of recovery may be due to severe environmental degradation, such as losses of topsoil, microbiotic crusts, and mycorrhizae, following decades of heavy grazing. These components are important for ecosystem recovery (e.g. 30, 41, 174). Such environmental damage may require hundreds of years before reversal (19) or require active restoration by land managers.

The loss of native seed sources following heavy livestock grazing also prevents recovery. For example, when livestock were removed from California grasslands that no longer contained native plant species, introduced species continued to dominate (16). However, in California's coastal prairies where native bunchgrasses still occurred, less than 10 years of protection from livestock grazing led to increases in native perennial grasses and reductions in introduced species (16).

Alien weeds may also maintain their dominance in western communities by having traits such as rapid growth rates, high seed production, and tolerance of grazing and fire (e.g. 30, 72, 130, 132). In addition, native species may be unable to recolonize weedy sites due to difficult-to-detect microsite changes, such as changes in microbial concentrations in the soil (e.g. 41, 71). Whatever the explanation, the failure of many communities to recover after disturbance is eliminated underscores the importance of preventing the disturbances and seed introductions that encourage weed invasions in the first place.

Can Livestock Be Used to Control Nonindigenous Plants?

Range scientists and land managers have suggested that livestock be used to control invasive plant species (e.g., 117, 163) since, theoretically, grazing would reduce the vigor, seed production, and seedbanks of palatable nonindigenous species and reduce the probability of destructive wildfires. Evidence to support the long-term effectiveness of this form of weed control is scant, although short-term reductions in weed cover are not uncommon (e.g. 97).

Goats and sheep are more successful at controlling alien weeds than cattle (reviewed in 117), although control by any of these species is seldom complete (92, 97, 117). Not only are many weedy species unpalatable even to goats and sheep (e.g. 108), but livestock commonly select native or introduced forage species over weeds. For example, in a feeding trial in Idaho, goats avoided the noxious weed leafy spurge when also offered the introduced perennial grass, crested wheatgrass (*Agropyron cristatum*), but preferred leafy spurge over the native forb arrowleaf balsamroot (*Balsamorhiza sagittata*) (170). In this same study, sheep avoided leafy spurge when paired with either balsamroot or crested wheatgrass. In another study, sheep reduced the density of spotted knapweed; but one year after grazing had ceased, grazed areas had twice as much knapweed as ungrazed areas (120). In this study sheep disturbances also increased the area of bare ground and the frequency of another introduced weed, Kentucky bluegrass (*Poa pratensis*). Finally, sheep in a mixed meadow of spotted knapweed and Idaho fescue reduced the root and shoot biomass of the fescue, but had no effect on the weed (118). The authors concluded that sheep grazing reduced the ability of the native bunchgrass to compete successfully with spotted knapweed.

Cattle have not been found to reduce leafy spurge, knapweed, or other broadleaf species (88, 91, 95). They do, however, reduce the biomass of cheatgrass, which is palatable in the winter and spring. Such grazing is counterproductive since cattle grazing on grasslands in the spring also weakens native perennial grasses and disturbs wet soils (113, 184). These activities increase weed growth and enhance the probability of future invasions.

Vallentine and Stevens (165) concluded that the use of cattle to reduce cheatgrass and enhance establishment and growth of perennial grasses would require a high degree of grazing control, which may be a major limitation under practical management situations. The absence of studies showing the long-term effectiveness of weed control by cattle supports their conclusion.

Other studies also confirm this conclusion. Cattle in a study in Nebraska selectively grazed some weed species, but not others (99). The cattle, therefore, did not provide effective weed control. Finally, in a clipping study of different combinations of spotted knapweed and bluebunch wheatgrass, the grass was found to be less tolerant of defoliation than the weed (86). These authors concluded that the feasibility of controlling knapweed with livestock was doubtful.

Other range scientists appear to agree. Not only did Young (183) report that tumbled mustard and Russian thistle take over cheatgrass sites that have been heavily grazed by cattle, but both Lacey (91) and Tucker (151) concluded that the use of livestock to control range weeds was limited. Finally, Vallentine and Stevens (165) concluded that with a few possible exceptions, grazing is not an effective general tool for cheatgrass control. By disseminating weed seeds in dung and fur, disturbing soil surfaces, creating nutrient hot-spots, and grazing preferentially on native species, livestock are more likely to create and maintain weedy communities than to control them.

Many weedy species are unpalatable, even to goats and sheep, and livestock commonly select native or introduced forage species over weeds.

Conclusion

The spread of nonindigenous plants through grasslands, shrublands, and woodlands of the American West has been described as one of the greatest environmental threats facing native species and ecosystems of the region (30, 104, 177). Although invasion by

The spread of exotic weeds throughout grasslands, shrublands, and woodlands in the West has been described as one of the greatest threats facing the region's native species and ecosystems.

nonindigenous species is usually ranked as a threat separate from livestock grazing (e.g., 57, 177), we suggest that in many areas of the West, current extensive invasions by nonindigenous plants should be classified as a subset of livestock grazing, not an independent threat. Without disturbance to native plants, microbiotic crusts, and soils resulting from livestock grazing and trampling, and corresponding increases in light, water, and nutrients for the remaining weeds, it is doubtful that alien plants would have spread so far or become so dense. At least they would not be invading as rapidly, and certainly not over the vast area of western grasslands, shrublands, and woodlands as they now are. Neither would these weeds achieve the same degree of community dominance.

Recent research showing that livestock significantly increase invasions by nonindigenous plants in the western U.S. is persuasive. Similar results were found in all western states and for nearly every introduced species that has been studied. Although many of these studies would have benefited from both better replication and more recent research techniques, the pattern of evidence is overwhelming.

By ignoring the relationship between livestock grazing and nonindigenous plant invasions, rangeland managers have been unsuccessful at stopping or even slowing these invasions. A new draft management plan for 73 million acres of public lands in the Columbia River Basin (163) and another for 6 million acres of BLM lands in southeastern Oregon (157) call for restoration of weed-dominated communities. However, they propose neither reducing livestock numbers nor significantly altering livestock management.

Recent research showing that livestock significantly increase invasions by nonindigenous plants in the western U.S. is persuasive.

Another proposal for restoring weed-dominated communities in the Great Basin (158) also avoids implicating livestock grazing more recent than the 1800s. All such plans are doomed to failure.

Most of the current recommendations in management plans for stopping nonindigenous plant invasions on public lands in the West focus on preventing landscape-level introductions of weed seeds by washing vehicles and using

Not until plant communities and soils are allowed to recover their natural defenses (such as healthy, deep-rooted native plants and intact microbiotic crusts) will the spread and dominance of exotic weeds in the American West be reduced or reversed.

weed-free livestock feed. Although useful, these strategies are similar to rearranging deck chairs on the Titanic. Similarly, recent calls to use livestock to control weed infestations appear unlikely to succeed. Preferential grazing of native plant species over non-indigenous species by livestock, combined with livestock's disturbances of soils, microbiotic crusts, mycorrhizae, nutrients, and fire cycles, will likely keep these communities open to invasion and prevent community recovery. Not until plant communities and soils are allowed to recover their natural defenses such as healthy, deep-rooted native plants and intact microbiotic crusts will the spread and dominance of nonindigenous weeds in the American West be reduced or reversed.

Literature Cited

1. Allen, E.B. 1995. Mycorrhizal limits to rangeland restoration: soil phosphorus and fungal species composition. Pages 57-61 in Rangelands in a Sustainable Biosphere. Proceedings of the Fifth International Rangeland Congress, Volume II, Salt Lake City, Utah.
2. Allen, E.B. and M.F. Allen. 1984. Competition between plants of different successional stages: mycorrhizae as regulators. Canadian Journal of Botany 62:2625-2629.
3. Allen, E.B., and M.F. Allen. 1988. Facilitation of succession by the nonmycotrophic colonizer *Salsola kali* on a harsh site: effects on mycorrhizal fungi. American Journal of Botany 75:257-266.
4. Allen, M.F. 1991. The ecology of mycorrhizae. Cambridge University Press, Cambridge.
5. Allen, M.F., S.D. Clouse, B.S. Weinbaum, S.L. Jenkins, C.F. Friese, and E.B. Allen. 1992. Mycorrhizae and the integration of scales: From molecules to ecosystems. Pages 488-515 in M.F. Allen, editor. Mycorrhizal functioning: an integrative plant-fungal process. Chapman Hall, New York.
6. Allen, M.F., J.H. Richards, and C.A. Busso. 1989. Influence of clipping and soil water status on vesicular-arbuscular mycorrhizae of two semi-arid tussock grasses. Biology and Fertility of Soils 8:285-289.
7. Allen, T.F.H., and T.B. Starr. 1982. Hierarchy perspectives for ecological complexity. University of Chicago Press, Chicago, Illinois.
8. Archer, S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. Pages 13-68 in M.Vavra, W.A. Laylock, and R.D. Pieper, editors. Ecological implications of livestock herbivory in the West. Society for Range Management, Denver, Colorado.
9. Archer, S., D.S. Schimel, and E.A. Holland. 1995. Mechanisms of shrubland expansion: land use, climate or CO₂. Climatic Change 29: 91-99.
10. Archer, S., and D.E. Smeins. 1991. Ecosystem level processes. Pages 1099-139 in R.K. Heitschmidt and J.W. Stuth., editors. Grazing management: an ecological perspective. Timber Press, Portland, Oregon.
11. Asher, J. 1995. Explosion in slow motion. Natural Resource News, Blue Mountains Natural Resources Institute, Special Edition, October, US Service, Pacific Northwest Region, La Grande, Oregon.
12. Asher, J., and C. Spurrier. 1997. Impacts of invasions of non-native plants on western wildlands. The Grazier, Oregon State University Extension Service No. 293:2-5, Corvallis, Oregon.
13. Baker, H.G. 1974. The evolution of weeds. Annual Review of Ecology and Systematics 5:1-24.
14. Baker, H.G. 1978. Invasion and replacement in Californian and neotropical grasslands. Pages 368-384 in J.R. Wilson, editor. Plant relations in pastures. CSIRO, East Melbourne, Australia.
15. Baker J.G. 1986. Patterns of plant invasions in North America. Pages 44-57 in H.A. Mooney and J.A. Drake, editors. Ecology of biological invasions of North America and Hawaii. Springer Verlag, New York.
16. Baker, H.G. 1989. Sources of the naturalized grasses and herbs in California grasslands. Pages 29-38 in L.F. Huenneke and H. Mooney, editors. Grassland structure and function: California annual grassland. Kluwer Academic Publishers, Dordrecht, The Netherlands.
17. Beck, K.G. 1999. Biennial thistles. Pages 145-161 in R.L. Sheley and J.K. Petroff, editors. Biology and management of noxious rangeland weeds. Oregon State University Press, Corvallis, Oregon.
18. Bedunah, D.J. 1992. The complex ecology of weeds, grazing, and wildlife. Western Wildlands, Summer 1992:6-11.
19. Belnap, J. 1994. Potential role of cryptobiotic soil crusts in semiarid rangelands. Pages 179-185 in S.B. Monsen and S.G. Kitchen, editors. Proceedings-ecology and management of annual rangelands. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
20. Belnap, J. 1995. Surface disturbances: their role in accelerating desertification. Environmental Monitoring and Assessment 37:39-57.

21. Belnap, J., and D.A. Gillette. 1998. Vulnerability of desert biological soil crusts to wind erosion: the influences of crust development, soil texture, and disturbance. *Journal of Arid Environments* 39:133-142.
22. Belnap, J., and K.T. Harper. 1995. Influence of cryptobiotic soil crusts on elemental content of tissue of two desert plants. *Arid Soil Research and Rehabilitation* 9:107-115.
23. Belsky, A.J. 1996. Viewpoint: western juniper expansion: is it a threat to arid northwestern ecosystems? *Journal of Range Management* 49:53-59.
24. Belsky, A.J., and D.M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the Interior West. *Conservation Biology* 11:315-327.
25. Belsky, A.J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation* 54:419-431.
26. Berube, D.W., and J.H. Myers. 1982. Suppression of knapweed invasion by crested wheatgrass in the dry interior of British Columbia. *Journal of Range Management* 35:459-461.
27. Bethlenfalvai, G.J., and S. Dakessian. 1984. Grazing effects on mycorrhizal colonization and floristic composition of the vegetation on a semiarid range in northern Nevada. *Journal of Range Management* 37:312-316.
28. Bethlenfalvai, G.J., R.A. Evans, and A.L. Lesperance. 1985. Mycorrhizal colonization of crested wheatgrass as influenced by grazing. *Agronomy Journal* 77:233-236.
29. Beymer, R.J., and J.M. Klopatek. 1992. Effects of grazing on cryptogamic crusts in pinyon-juniper woodlands in Grand Canyon National Park. *American Midland Naturalist* 127:139-148.
30. Billings, W.D. 1990. *Bromus tectorum*, a biotic cause of ecosystem impoverishment in the Great Basin. in G.M. Woodwell, editor. *The Earth in transition: patterns and processes of biotic impoverishment*. Cambridge University Press, New York.
31. Brandt, C.A., and W.H. Rickard. 1994. Alien taxa in the North American shrub-steppe four decades after cessation of livestock grazing and cultivation agriculture. *Biological Conservation* 68:95-105.
32. Branson, F.A. 1985. Vegetation changes on western rangelands. *Range Monograph 2*, Society for Range Management, Denver, Colorado.
33. Brown, J.R., and J. Carter. 1998. Spatial and temporal patterns of exotic shrub invasion in an Australian tropical grassland. *Landscape Ecology* 13:93-102.
34. Crawley, M.J. 1983. *Herbivory: the dynamics of animal-plant interactions*. University of California Press, Berkeley.
35. Dahl, B.E., and E.W. Tisdale. 1975. Environmental factors related to medusahead introduction. *Journal of Range Management* 28:463-468.
36. D'Antonio, C.M., and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. *Annual Review of Ecology and Systematics* 23: 63-87.
37. Daubenmire, R.F. 1942. An ecological study of the vegetation of southeastern Washington and adjacent Washington. *Ecological Monographs* 12:53-79.
38. Daubenmire, R.F. 1970. Steppe vegetation of Washington. *Washington Agricultural Experiment Station Technical Bulletin* 62.
39. Daubenmire, R.F. 1975. Plant succession on abandoned fields, and fire influences, in a steppe area in southeastern Washington. *Northwest Science* 49:36-48.
40. De Clerck-Floate, R. 1997. Cattle as dispersers of hound's-tongue on rangeland in southeastern British Columbia. *Journal of Range Management* 50:239-243.
41. Doerr, T.B., E.F. Redente, and F.B. Reeves. 1984. Effects of soil disturbance on plant succession and levels of mycorrhizal fungi in a sagebrush-grassland community. *Journal of Range Management* 37:135-139.
42. Dore, W.G., and L.C. Raymond. 1942. Viable seeds in pasture soil and manure. *Scientific Agriculture* 23:69-76.
43. Dormaar, J.F., and W.D. Willms. 1998. Effect of forty-four years of grazing on fescue grassland soils. *Journal of Range Management* 51: 122-126.
44. Dukes, J.S., and H.A. Mooney. 1999. Does global change increase the success of biological invaders? *Trends in Ecology and Evolution* 14:135-139.
45. Dwire, K.A., B.A. McIntosh, and J.B. Kauffman. 1999. Ecological influences of the introduction of livestock on Pacific Northwest Ecosystems. In D. Gobel, editor. *Environmental history of the Pacific Northwest*. Washington State University Press, Pullman, Washington.

46. Eckert, R.E., Jr., F.F. Peterson, M.S. Meurrisse, and J.L. Stevens. 1986. Effects of soil-surface morphology on emergence and survival of seedlings in big sagebrush communities. *Journal of Range Management* 39: 414-420.
47. Elliott, H.W. III, and J.D. Wehausen. 1974. Vegetational succession on coastal rangeland of Point Reyes Peninsula. *Madrone* 22:231-238.
48. Ellison, L. 1960. Influence of grazing on plant succession of rangelands. *Botanical Review* 26: 1-78.
49. Enserink, M. 1999. Biological invaders sweep in. *Science* 285:1834-1836.
50. Evans, R.A., H.R. Holbo, R.E. Eckert Jr., and J.A. Young. 1970. Functional environment of downy brome communities in relation to weed control and revegetation. *Weed Science*. 18:154-161.
51. Evans, R.A., and J.A. Young. 1972. Microsite requirements for establishment of annual rangeland weeds. *Weed Science* 20:350-356.
52. Evans, R.A., and J.A. Young. 1975. Enhancing germination of dormant seeds of downy brome. *Weed Science* 23:354-357.
53. Evans, R.A., and J.A. Young. 1984. Microsite requirements for downy brome infestation and control on sagebrush rangelands. *Weed Science* 32, Supplement 1:13-17.
54. Evans, R. D., and J. Belnap. 1999. Long-term consequences of disturbance on nitrogen dynamics in an arid ecosystem. *Ecology* 80:150-160.
55. Evans, R.D., and J.R. Ehleringer. 1993. A break in the nitrogen cycle in aridlands? Evidence from N15 isotope of soils. *Oecologia* 94:314-317.
56. Feldman, I., M.K. McCarty, and C.J. Scifres. 1968. Ecological and control studies of musk thistle. *Weed Science* 16:1-4.
57. Flather, C.H., L.A. Joyce, and C.A. Bloomgarden. 1994. Species endangerment patterns in the United States. General technical report RM-241. U.S. Forest Service, Ft. Collins, Colorado.
58. Fleischner, T.L. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8:629-644.
59. Forcella, F., and H. Wood. 1986. Demography and control of *Cirsium vulgare* (savi.) Ten. in relation to grazing. *Weed Research*. 26:199-206.
60. Gelbard, J.L. 1999. Multiple scale causes of exotic plant invasions in the Colorado Plateau and Great Basin, USA. Master's Project, Nicholas School of the Environment, Duke University, Durham, North Carolina.
61. Goodwin, J. 1992. The role of mycorrhizal fungi in competitive interactions among native bunchgrasses and alien weeds: a review and synthesis. *Northwest Science* 66: 251-260.
62. Goodwin, J.R., P.S. Doescher, L.E. Eddleman, and D.B. Zobel. 1999. Persistence of Idaho fescue on degraded sagebrush steppe. *Journal of Range Management* 52:187-198.
63. Green, D.M., and J.B. Kauffman. 1995. Succession and livestock grazing in a northeastern Oregon riparian ecosystem. *Journal of Range Management* 48: 307-313.
- 64a. Hacker, R.B. 1987. Species responses to grazing and environmental factors in an arid halophytic shrubland community. *Australian Journal of Botany* 45:135-150.
- 64b. Halvorson, W.L. 1992. Alien plants at Channel Islands National Park. Pages 64-96 in C.P. Stone, C.W. Smith, and J.T. Tunison, editors. *Alien plant invasions in native ecosystems of Hawaii: management and research*. University of Hawaii Cooperative National Park Resources Studies Unit, Honolulu, Hawaii.
65. Hann, W.J., J.L. Jones, M.G. Karl, P. F. Hessburg, R.E. Keane, D.G. Long, J.P. Menakis, C.H. McNicoll, S.G. Leonard, R.A. Gravenmier, and B.G. Smith. 1997. Landscape Dynamics of the Basin. Volume 2 in Quigley, T. and S. Arbelbide, editors. *An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great Basins*. General technical report PNW-GTR-405. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon.
66. Hanson, W.R., and L.A. Stoddart. 1940. Effects of grazing upon bunch wheat grass. *Journal of the American Society of Agronomy* 32:278-289.
67. Harniss, R.O., and N.E. West. 1973. Vegetation patterns of the National Reactor Testing Station, southeastern Idaho. *Northwest Science* 47:30-43.
68. Harper, J.L. 1977. *The population biology of plants*. Academic Press, London, Great Britain.
69. Harper, K.T., and J.R. Marble. 1988. A role for non-vascular plants in management of semiarid rangelands. Pages 135-169 in P.T. Tueller, editor. *Vegetation science applications for rangeland analysis and management*. Kluwer Academic Publishers, London, United Kingdom.
70. Harper, K.T., and R.L. Pendleton. 1993. Cyanobacteria and cyanolichens: can they enhance availability of essential minerals for higher plants? *Great Basin Naturalist* 53: 59-72.

71. Harper, K.T., R. Van Buren, and S. Kitchen. 1996. Invasion of alien annuals and ecological consequences in salt desert shrublands of western Utah. Pages 58-65 in J.R. Barrow, E. Durant, R.E. Sosebee, and R.J. Tausch, editors. Proceedings: Shrubland ecosystem dynamics in a changing environment. General technical report-338. U.S. Forest Service Intermountain Research Station, Ogden, Utah.
72. Harris, G.A. 1967. Some competitive relationships between *Agropyron spicatum* and *Bromus tectorum*. Ecological Monographs 37:90-111.
73. Harris, G.A. 1991. Grazing lands of Washington State. Rangelands 13:222-227.
74. Heady, H.F. 1954. Viable seed recovered from fecal pellets of sheep and deer. Journal of Range Management 7: 259-261.
75. Heady, H.F. 1977. Valley grassland. Pages 491-514 in M.G. Barbour and J. Major, editors. Terrestrial vegetation of California. J. Wiley, New York.
76. Hobbs, R.J., and L. Atkins. 1991. Fire-related dynamics of a *Banksia* woodland in southwest Western Australia. Australian Journal of Botany 38: 97-110.
77. Hobbs, R.J. 1989. The nature and effects of disturbance relative to invasions. Pages 389-405 in J.A. Drake, H.A. Mooney, F. Di Castri, R.H. Groves, F.J. Kruger, M. Rejmanek, and M. Williamson. 1989. Biological invasions: A global perspective. John Wiley and Sons, Chichester, Great Britain.
78. Hobbs, R.J., and L.F. Huenneke. 1992. Disturbance, diversity, and invasion: implications for conservation. Conservation Biology 6: 324-337.
- 79a. Hobbs, R.J., and S.E. Humphries. 1995. An integrated approach to the ecology and management of plant invasions. Conservation Biology 9: 761-770.
- 79b. Holland, V.L., and D.J. Keil. 1995. California vegetation. Kendall/Hunt Publishing Company, Dubuque, Iowa.
80. Hulbert, L.C. 1955. Ecological studies of *Bromus tectorum* and other annual brome grasses. Ecological Monographs 25:181-213.
81. Jacobs, J.S., and R.L. Sheley. 1997. Relationships among Idaho fescue defoliation, soil water, and spotted knapweed emergence and growth. Journal of Range Management 50:258-262.
82. Jacobs, J.S., and R.L. Sheley. 1999. Grass defoliation, intensity, frequency, and seasonal effects on spotted knapweed invasion. Journal of Rangeland Management 52:626-632.
83. Jeffries, D.L., and J.M. Klopatek. 1987. Effects of grazing on the vegetation of the blackbrush association. Journal of Range Management 40: 390-392.
84. Kaltenecker, J.H., M.C. Wicklow-Howard, and M. Pellant. 1999. Biological soil crusts: natural barriers to *Bromus tectorum* L. establishment in the northern Great Basin, USA. Pages 109-111 in D. Eldridge and D. Freudenberger, editors. People and rangelands building the future. VIth International Rangeland Congress Proceedings, Townsville, Queensland, Australia.
85. Kay, B.L., and R.A. Evans. 1965. Effects of fertilization on a mixed stand of cheatgrass and intermediate wheatgrass. Journal of Range Management 18: 7-11.
86. Kennet, G.A., J.R. Lacey, C.A. Butt, K.M. Olson-Rutz, and R. Haferkamp. 1992. Effects of defoliation, shading, and competition on spotted knapweed and bluebunch wheatgrass. Journal of Range Management 45: 363-369.
87. Kindschy, R.R. 1994. Pristine vegetation of the Jordan Crater kipukas: 1978-91. Pages 85-88 in S.B. Monsen and S.G. Kitchen, editors. Proceedings-ecology and management of annual rangelands. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
88. Kirby, D., and R. Lym. 1987. Grazing behavior of cattle in a leafy spurge infested pasture. Abstract. Annual Meeting, Society for Range Management. Boise, Idaho.
89. Kleiner, E.F., and K.T. Harper. 1972. Environment and community organization in grasslands of Canyonlands National Park. Ecology 53:299-309.
90. Knick, S.T. and J.T. Rotenberry. 1997. Landscape characteristics of disturbed shrubsteppe habitats in southwestern Idaho (USA). Landscape Ecology 12: 287-297.
91. Lacey, J.R. 1987. The influence of livestock grazing on weed establishment and spread. Proceedings, Montana Academy of Science. 47: 131-146.
92. Lacey, C.A., R.W. Kott, and P.K. Fay. 1984. Ranchers control leafy spurge. Rangelands 6:202-204.
93. Lacey, J.R., P. Husby, and G. Handl. 1990. Observations on spotted and diffuse knapweed invasion into ungrazed bunchgrass communities in western Montana. Rangelands 12: 30-32.
94. Lacey, J.R., C.B. Marlow, and J.R. Lane. 1989. Influence of spotted knapweed on surface runoff and sediment yield. Weed Technology 3:627-631.

95. Lacey, J.R., and R.L. Sheley. 1996. Leafy spurge and grass response to picloram and intensive grazing. *Journal of Range Management* **49**: 311-314.
96. Ladyman, A.R., and E. Muldavin. 1996. Terrestrial cryptogams of pinyon-juniper woodlands in the southwestern United States: A Review. General technical report RM-GTR-280. U.S. Forest Service, Rocky Mountain Range and Experiment Station, Ft. Collins, Colorado.
97. Lajeunesse, S. 1999. Dalmatian and yellow toadflax. Pages 202-216 in R.L. Sheley and J.K. Petroff, editors. *Biology and management of noxious rangeland weeds*. Oregon State University Press, Corvallis, Oregon.
98. Larson, L., M. McInnis, and G. Kiemnek. 1997. Rangeland weed invasion. *Rangelands* **19**:30-32.
99. Lawrence, B.K., S. S. Waller, L.E. Moser, B.E. Anderson, and L.L. Larson. 1995. Weed suppression with grazing or atrazine during big bluestem establishment. *Journal of Range Management* **48**:307-313.
100. Laycock, W.A. 1991. Stable states and thresholds of range condition on North American rangelands: A viewpoint. *Journal of Range Management* **44**:427-433.
101. Louda, S.M., K.H. Keeler, and R.D. Holt. 1990. Herbivore influences on plant performance and competitive interactions. Pages 413-444 in J.B. Grace and D. Tilman, editors. *Perspectives on plant competition*. Academic Press, San Diego.
102. Lusby, G.C. 1971. Hydrologic and biotic effects of grazing vs. non-grazing near Grand Junction, Co. *Journal of Range Management* **24**:256-260.
103. Mack, R.N. 1981. Invasion of *Bromus tectorum* L. into western North America: An ecological chronicle. *Agro-ecosystems* **7**:145-165.
104. Mack, R.N. 1989. Temperate grasslands vulnerable to plant invasions: characteristics and consequences. Pages 155-179 in J.A. Drake, H.A. Mooney, F. Di Castri, R.H. Groves, F.J. Kruger, M. Rejmanek, and M. Williamson, editors. *Biological invasions: A global perspective*. John Wiley and Sons, Chichester, Great Britain.
105. Mack, R.M. 1991. The commercial seed trade: an early disperser of weeds in the United States. *Economic Botany* **45**:257-273.
106. Mack, R.N. and J.N. Thompson. 1982. Evolution in steppe with few large, hooved mammals. *American Naturalist* **119**:757-773.
107. Maxwell, J.F., R. Drinkwater, D. Clark, and J.W. Hall. 1992. Effect of grazing, spraying, and seeding on knapweed in British Columbia. *Journal of Range Management* **45**:180-182.
108. McConnell, E.G., J.O. Evans, and S.A. Dewey. 1999. Dyer's woad. Pages 231-237 in R.L. Sheley and J.K. Petroff, editors. *Biology and management of noxious rangeland weeds*. Oregon State University Press, Corvallis, Oregon.
109. McDonald, J.N. 1981. North American bison: their classification and evolution. University of California Press, Berkeley.
110. McIlvane, S.K. 1942. Grass seedling establishment and productivity - overgrazed and protected range soils. *Ecology* **23**:228-231.
111. McLean, A., and E.W. Tisdale. 1972. Recovery rate of depleted range sites under protection from grazing. *Journal of Range Management* **25**: 178-184.
112. Milchunas, D.G., O.E. Sala, and W.K. Lauenroth. 1988. A generalized model of the effects of grazing by large herbivores on grassland community structure. *American Naturalist* **132**:87-106.
113. Miller, R.F., T.J. Svejcar, and N.E. West. 1994. Implications of livestock grazing in the Intermountain sagebrush regions: Plant composition. Pages 101-146 in M.Vavra, W.A. Laylock, and R.D. Pieper, editors. *Ecological implications of livestock herbivory in the West*. Society for Range Management, Denver, Colorado.
114. Monsen, S.B. 1994. The competitive influences of cheatgrass (*Bromus tectorum*) on site restoration. Pages 43-50 in S.B. Monsen and S.G. Kitchen, editors. *Proceedings-ecology and management of annual rangelands*. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
115. Nash, M.S., W.G. Whitford, A.G. de Soyza, J.W. Van Zee, and K.M. Havstad. 1999. Livestock activity and Chihuahuan Desert annual plant communities: boundary analysis of disturbance gradients. *Ecological Applications* **9**:814-823.
116. Ohmart, R.D. 1996. Historical and present impacts of livestock grazing on fish and wildlife resources in western riparian habitats. Pages 245-279 in P.R. Krausman, editor. *Rangeland wildlife*. Society for Range Management, Denver, Colorado.

117. Olson, B.E. 1999. Grazing and weeds. Pages 85-97 in R.L. Sheley and J.K. Petroff, editors. Biology and management of noxious rangeland weeds. Oregon State University Press, Corvallis, Oregon.
118. Olson, B.E., and R.T. Wallander. 1997. Biomass and carbohydrates of spotted knapweed and Idaho fescue after repeated grazing. *Journal of Range Management* 50:409-412.
119. Olson, B.E., R.T. Wallander, and R.W. Kott. 1997. Recovery of leafy spurge seed from sheep. *Journal of Range Management* 50:10-15.
120. Olson, B.E., R.T. Wallander, and J.R. Lacey. 1997. Effects of sheep grazing on a spotted knapweed-infested Idaho fescue community. *Journal of Range Management* 50:386-390.
121. Painter, E.L. 1995. Threats to the California flora: ungulate grazers and browsers. *Madrono* 42:180-188.
122. Pellant, M., and C. Hall. 1994. Distribution of two exotic grasses on intermountain rangelands: status in 1992. Pages 109-112 in S.B. Monsen and S.G. Kitchen, editors. Proceedings-ecology and management of annual rangelands. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
123. Pickford, G.D. 1932. The influence of continued heavy grazing and of promiscuous burning on spring-fall ranges in Utah. *Ecology* 13: 159-171.
124. Piemeisel, R.L. 1951. Causes affecting change and rate of change in a vegetation of annuals in Idaho. *Ecology* 32:53-72.
125. Potvin, C., and L. Vasseur. 1997. Long-term CO₂ enrichment of a pasture community: Species richness, dominance, and succession. *Ecology* 78:666-677.
126. Randall, J.M. 1996. Weed control for the preservation of biological diversity. *Weed Technology* 10:370-383.
127. Rejmanek M. 1989. Invasibility of plant communities. Pages 369-387 in J.A. Drake, H.A. Mooney, F. Di Castri, R.H. Groves, F.J. Kruger, M. Rejmanek, and M. Williamson, editors. Biological invasions: A global perspective. John Wiley and Sons, Chichester, Great Britain.
128. Rice, B., and M. Westoby. 1978. Vegetative responses of some Great Basin shrub communities protected against jackrabbits or domestic stock. *Journal of Range Management* 31: 28-34.
129. Rickard, W.H. 1985. Experimental cattle grazing in a relatively undisturbed shrub-steppe community. *Northwest Science* 59:66-72.
130. Robertson, J.H. 1971. Changes on a sagebrush-grass range in Nevada ungrazed for 30 years. *Journal Range Management* 24:397-400.
131. Robertson, J.H. and P.B. Kennedy 1954. Half-century changes on northern Nevada ranges. *Journal Range Management* 7:117-121.
132. Robertson, J.H., and C.K. Pearse. 1945. Artificial reseeding and the closed community. *Northwest Science* 19:58-68.
133. Roché, B.F. Jr. 1992. Achene dispersal in yellow starthistle. *Northwest Science* 66:62-65.
134. Roché, B.F. Jr., C.R. Roché, and R.C. Chapman. 1994. Impacts of grassland habitat on Yellow starthistle (*Centaurea solstitialis* L.) invasion. *Northwest Science* 68:86-96.
135. Roché, C.T., and B.F. Roché Jr. 1988. Distribution and amount of four knapweed species in eastern Washington. *Northwest Science* 62:242-253.
136. Roché, C.T., B.F. Roché Jr., and G.A. Rasmussen. 1992. Dispersal of squarrose knapweed capitula by sheep on rangeland in Juab County, Utah. *Great Basin Naturalist* 52:185-188.
137. Rosentreter, R. 1994. Displacement of rare plants by exotic grasses. Pages 170-175 in S.B. Monsen and S.G. Kitchen, editors. Proceedings-ecology and management of annual rangelands. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
138. Rosentreter, R. 1999. Restoration of community structure and composition in cheatgrass dominated rangelands. Pages 92-99 in R. Rose and D.L. Haase, editors. Symposium proceedings, native plants propagating and planting. College of Forestry, Oregon State University, Corvallis, Oregon.
139. Schiffman, P.M. 1997. Animal-mediated dispersal and disturbance: driving forces behind alien plant naturalization. Pages 87-94 in J.O. Luken and J.W. Thieret, editors. Assessment and management of plant invasions. Springer-Verlag, New York.
140. Sheley, R.L., J.S. Jacobs, and M.F. Carpinelli. 1998. Distribution, biology, and management of diffuse knapweed (*Centaurea diffusa*) and spotted knapweed (*Centaurea maculosa*). 1998. *Weed Technology* 12:353-362.
141. Sheley, R.L., S. Kedzie-Webb, and B.D. Maxwell. 1999. Integrated weed management on rangeland. Pages 57-68 in R.L. Sheley and J.K. Petroff, editors. Biology and management of noxious rangeland weeds. Oregon State University Press, Corvallis, Oregon.

142. Sheley R.L., B.E. Olson, and L.L. Larson. 1997. Effect of weed seed rate and grass defoliation level on diffuse knapweed. *Journal of Range Management* 50: 39-43.
143. Sheley, R.L., and J.K. Petroff, editors. 1999. Biology and management of noxious rangeland weeds. Oregon State University Press, Corvallis, Oregon.
144. Smith, S.D., and R.S. Nowak. 1990. Ecophysiology of plants in the Intermountain lowlands. Pages 179-241 in C.B. Osmond, L.F. Pitelka, and G.M. Hidy, editors. *Plant biology of the Basin and Range*. Springer Verlag, Berlin, Germany.
145. Stewart, G., and A.C. Hull, Jr. 1949. Cheatgrass (*Bromus tectorum* L.) - an ecological intruder in southern Idaho. *Ecology* 30:58-74.
146. Stohlgren, T.J., D. Binkley, G.W. Chong, et al. 1999. Exotic plant species invade hot spots of native plant diversity. *Ecological Monographs* 69:25-46.
147. Stromberg, M.R., and J.R. Griffen. 1996. Long-term patterns in coastal California grasslands in relation to cultivation, gophers, and grazing. *Ecological Applications* 6:1189-1211.
148. Tisdale, E.W., M. Hironaka, and M.A. Fosberg. 1965. An area of pristine vegetation in Craters of the Moon National Monument, Idaho. *Ecology* 46:349-352.
149. Tolsma, D.J., Ernst, W.H.O., and Verwey, R.A. 1987. Nutrients in soil and vegetation around two artificial waterpoints in eastern Botswana. *Journal Applied Ecology* 24:991-1000.
150. Trent, J.D., J.A. Young, and R.R. Blank. 1994. Potential role of soil microorganisms in medusahead invasion. Pages 140-143 in S.B. Monsen and S.G. Kitchen, editors. *Proceedings-ecology and management of annual rangelands*. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
151. Tucker, R. 1990. The myths of knapweed. *Knapweed 4 (#1)*, Cooperative Extension, Washington State University, Pullman, Washington.
152. Turner, G.T. 1971. Soil and grazing influences on a salt-desert shrub range in western Colorado. *Journal Range Management* 24:31-37.
153. Tyser, R.W., and C.H. Key. 1988. Spotted knapweed in natural area fescue grasslands: an ecological assessment. *Northwest Science* 62:151-160.
154. U.S. Bureau of Land Management. 1994. Noxious weed strategy for Oregon/Washington. BLM/OR/WA-94/36+4220.9. U.S. Bureau of Land Management, Portland, Oregon.
155. U.S. Bureau of Land Management. 1996a. Partners against weeds: An action plan for the Bureau of Land Management. BLM/MT/ST-96/003+1020. U.S. Bureau of Land Management, Billings, Montana.
156. U.S. Bureau of Land Management. 1996b. Lower John Day River Integrated Weed Management. Environmental Assessment OR-053-3-063. U.S. Bureau of Land Management, Prineville, Oregon.
157. U.S. Bureau of Land Management. 1998. Draft Southeast Oregon resource management plan/environmental impact statement. BLM/OR/WA/EA-98/043+1792. U.S. Bureau of Land Management, Vale, Oregon.
158. U.S. Bureau of Land Management. 1999. The Great Basin restoration initiative: out of ashes, an opportunity. National Office of Fire and Aviation, Bureau of Land Management, Boise, Idaho.
159. U.S. Congress Office of Technology Assessment. 1993. Harmful non-indigenous species in the United States. OTA-F-565. US Congress, Washington D.C.
160. U.S. Department of Interior. 1994. Range Reform '94, Draft Environmental Impact Statement. U.S. Bureau of Land Management, Washington, D.C.
161. U.S. Forest Service. 1997. Okanogan National Forest integrated weed management environmental assessment. U. S. Forest Service, Okanogan County, Washington.
162. U.S. Forest Service. 1998. Deschutes National Forest noxious weed control environmental assessment. U.S. Forest Service, Bend, Oregon.
163. U.S. Forest Service and U.S. Bureau of Land Management. 1997. Eastside Draft Environmental Impact Statement. Interior Columbia Basin Ecosystem Management Project, Walla Walla, Washington.
164. U.S. General Accounting Office. 1988. Rangeland management: more emphasis needed on declining and overstocked grazing allotments. GAO/RCED-88-105. U.S. General Accounting Office, Washington D.C.
165. Vallentine, J.F., and A.R. Stevens. 1994. Use of livestock to control cheatgrass - a review. Pages 202-206 in S.B. Monsen and S.G. Kitchen, editors. *Proceedings-ecology and management of annual rangelands*. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
166. Van Dyne, G.M. and H.F. Heady. 1965. Botanical composition of sheep and cattle diets on a mature annual range. *Hilgardia* 36:465-492.

167. Vitousek, P.M. 1990. Biological invasions and ecosystem processes: towards an integration of population biology and ecosystem studies. *Oikos* 57:7-13.
168. Vitousek, P.M., C.M. D'Antonio, L.I. Loope, and R. Westbrooks. 1996. Biological invasions as global environmental change. *American Scientist* 84:468-478.
169. Wagner, F.H.. 1989. Grazers, past and present. Pages 151-162 in L.F. Huenneke and H. Mooney, editors. *Grassland structure and function: California annual grassland*. Kluwer Academic Publishers, Dordrecht, The Netherlands.
170. Walker, J.W., S.L. Kronberg, S. L. Al-Rowaily, and N.E. West. 1994. Comparison of sheep and goat preferences for leafy spurge. *Journal Range Management* 47:429-434.
171. Watkins, B.R., and R.J. Clements. 1978. The effects of grazing animals on pastures. Pages 283-289 in J.R. Wilson, editor *Plant relations in pastures*. CSIRO, East Melbourne, Australia.
172. West, N.E., F.D. Provenza, P.S. Johnson, and M.K. Owens. 1984. Vegetation change after 13 years of livestock grazing exclusion on sagebrush semidesert in west central Utah. *Journal Range Management* 37: 262-264.
173. Whisenant, S. 1990. Changing fire frequencies on Idaho's Snake River plains: ecological and management implications. Pages 4-10 in *Proceedings from the symposium on cheatgrass invasion, shrub dieoff and other aspects of shrub biology and management*. General technical report INT-276, U.S. Forest Service, Ogden, Utah.
174. Whitford, W.G. 1988. Decomposition and nutrient cycling in disturbed arid ecosystems. Pages 136-161 in E.B. Allen, editor. 1988. *The reconstruction of disturbed arid lands: an ecological approach*. Westview Press, Boulder.
175. Whitson, T.D., editor. 1996. *Weeds of the West. Pioneer of Jackson Hole*, Jackson, Wyoming.
176. Wicklow-Howard, M.C. 1994. Mycorrhizal ecology of shrub-steppe habitat. Pages 207-210 in S.B. Monsen and S.G. Kitchen, editors. *Proceedings-ecology and management of annual rangelands*. General technical report INT-GTR-313. U.S. Forest Service, Intermountain Research Station, Ogden Utah.
177. Wilcove, D.S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. *Bioscience* 48:607-615.
178. Williams, J.D., and G.K. Meffe. 1998. Nonindigenous species. Pages 117-128 in M.J. Mac, project director. *Status and trends of the Nation's Biological Resources*. U.S. Biological Survey, Washington, D.C.
179. Wilson, A.M., G.A. Harris, and D.H. Gates. 1966. Fertilization of mixed cheatgrass-bunchgrass wheatgrass stands. *Journal of Range Management* 19:134-137.
180. Yorks, T.P., N.E. West, and K.M. Capels. 1992. Vegetation differences in desert shrublands in western Utah's Pine Valley between 1933 and 1989. *Journal of Range Management* 45: 569-578.
181. Young, J.A. 1992a. Ecology and management of medusahead. *Great Basin Naturalist* 52:245-252.
182. Young, J.A. 1992b. Population-level processes: Seed and seedbed ecology. Pages 37-46 in J.C. Chambers and G.W. Wade, editors. *Evaluating reclamation success: the ecological considerations*. General technical report NE-164, U.S. Forest Service, Radnor, Pennsylvania.
183. Young, J.A. 1994. Changes in plant communities in the Great Basin induced by domestic livestock grazing. Pages 113-123 in K.T. Harper, L.L. St. Clair, K.H. Thome, and W.M. Hess, editors. *Natural history of the Colorado Plateau and Great Basin*. University Press of Colorado, Niwot, Colorado.
184. Young, J.A., and F.L. Allen. 1997. Cheatgrass and range science: 1930-1950. *Journal of Range Management* 50:530-535.
185. Young, J.A., and R.A. Evans. 1971a. Invasion of medusahead into the Great Basin. *Weed Science* 18:89-97.
186. Young, J.A., and R.A. Evans. 1971b. Medusahead invasion as influenced by herbicides and grazing on low sagebrush sites. *Journal of Range Management* 24:451-454.
187. Young, J.A., and R.A. Evans. 1978. Population dynamics after wildfires in sagebrush grasslands. *Journal Range Management* 31:283-289.
188. Young, J.A., and W.S. Longland. 1996. Impact of alien plants on Great Basin rangelands. *Weed Technology* 10:384-391.
189. Young, J.A., R.A. Evans, and J. Major. 1972. Alien plants in the Great Basin. *Journal of Range Management* 25:194-201.

Enclosure 33



The effect of seeds of exotic species transported via horse dung on vegetation along trail corridors

Jonathan E. Campbell^{1,2} & David J. Gibson¹

¹Department of Plant Biology, Southern Illinois University, Carbondale, IL 62901-6509, USA; ²Current Address: Department of Geography, University of California, Los Angeles, CA, 90095, USA (e-mail: jcampbel@ucla.edu)

Accepted 25 August 2000

Key words: Biodiversity, Endozoochory, *Kummerowia striata*, Illinois, Rarefaction

Abstract

It has been suggested that exotic species will colonize within forests more frequently by the continual introduction of seeds through horse dung deposited along trails. Whether or not these exotic species have the ability to spread into and establish in the forest interior has been disputed. To address this, horse dung and soil samples were collected from trails during Autumn 1994 and Summer 1995 from three areas in southern Illinois, USA open to recreational horse travel. In addition, deer dung samples were collected from each of the study areas. Vegetation data were collected from each of the trail systems as well as from a trail along which horse travel was prohibited. The density of vascular plants in 0.25 m² quadrats placed at varying distances from the trail center to 5 m into the forest interior were recorded. Finally, dung samples were placed in situ along horse trails at one site to examine seedling germination in natural conditions. While 23 exotic species germinated from samples of horse dung placed out in a greenhouse, only one of these exotic species was also found in trail plots (*Kummerowia striata*). Similarly, while there were empirically more exotic species found along the trails allowing horse travel than there were on the trail lacking horse travel, the relative importance of those species was negligible along both trails. These results suggest that the emigration of exotic species via horse dung does not pose an immediate threat to the plant communities adjacent to trails in these forest systems. Nevertheless, the large number of exotic species in horse dung reflects the constant threat to any system from these species. Care must be taken, when allowing horseback use in areas, to anticipate invasion by exotic species from horse dung

Introduction

A community dominated by native vegetation is considered relatively desirable, or 'healthy' (Noss 1990). The primary concern with exotic, or non-native, species is their effect on this native vegetation. Exotic species often compete with native plant species for available resources, thus decreasing the number of native species and rendering the community 'unhealthy' (Mooney & Drake 1986; Meekins & McCarthy 1999; Davis et al. 2000). Williamson (1996) suggests that it is common for roughly 10% of non-native species to become established in a community and that 10% of those will become aggressively invasive species. Although Williamson's (1996) 'Tens Rule' suggests that most invaders have little impact on communities, the

cumulative effect of the unchecked spread of exotic species may be reduced heterogeneity and biological diversity (Mooney & Drake 1986; Soule 1990; Westman 1990).

Disturbance is a component of many natural plant communities (Pickett & White 1985; Holland & Olson 1989; Hobbs & Huenneke 1992). For example, fire greatly influences the species diversity and vegetative structure of both prairie (Kucera & Koelling 1964; Collins & Gibson 1990) and forest communities (Ohmann & Grigal 1981; Scheiner et al. 1988; Bartos et al. 1994). However, areas that experience frequent disturbance, particularly unnatural disturbance, are most susceptible to biological invasions (Elton 1958; Braithwaite et al. 1989; Binggeli 1996). All contemporary ecosystems are subject to some form

of unnatural disturbance, therefore no system is free from the possibility of invasion by exotics (Hobbs & Huenneke 1992).

Horse travel is a source of frequent disturbance in many forest ecosystems. Horse trails normally contain a barren treadway and a trail edge community with both natural and exotic species; many of these trail edge species cannot survive within the forest interior (Bates 1935; Benninger-Truax 1992). The impact to trails and adjacent areas from erosion caused by horses and other users is also well documented (Burde & Renfro 1986; Hammit & Cole 1987; Wilson & Seney 1994). In addition to erosion, Bates (1935) suggests that horses also effect vegetation by grazing along and defecating on trails.

Studies of horse dung show that horses pass large numbers of seeds through their digestive tract. Harmon & Kiem (1934) fed horses seven different species of seeds and recovered 12.9% of those seeds in the resulting dung. Benninger (1989) reported 15 different plant species arising from horse manure in samples collected from the Rocky Mountain National Park, USA. In addition, Hammit & Cole (1987) state that horse manure is a major source for exotic seeds in wilderness recreation areas. Most seeds pass through a horse's digestive tract within 48 hours of consumption (Alexander 1946; Vander Noot et al. 1967). However, Janzen (1981) showed that guanacaste seeds (*Enterolobium cyclocarpum*) may remain viable in the horses' digestive tract for up to two months, and deduced that horses could contribute to establishing local as well as distant populations.

Dung can be a source of viable seed for taxa not otherwise present in a community. The role of herbivores in dispersing seeds is well established (Ridley 1930; Harmon & Kiem 1934; Heady 1954; Janzen 1982; Fenner 1985; Hammit & Cole 1987): seeds can be spread from one location to another by attachment to the body of animals (epizoochory) or by being ingested and later excreted (endozoochory). In some cases, the seed coat of seeds moving through the digestive system of herbivores may become scarified, enhancing germination (e.g., legumes). Many native herbivores such as deer (Heady 1954; Gonzalez-Spinosa & Quintana-Ascencio 1986), wild boar (Middleton & Mason 1992), and emus (Brunner et al. 1976), have proven effective seed dispersers. In addition, stock animals such as cattle (McCully 1951; Harper 1977; Janzen 1982; Welch 1985), sheep (Harmon & Kiem 1934; Heady 1954; Piggin 1978), and pigs (Harmon &

Kiem 1934) have all been shown to pass viable seeds through their intestinal tract.

The fear that exotic species may be spread into pristine or relatively undisturbed natural areas via the dung from recreational horse travel has led to an acute debate between environmental groups and equestrian groups. Natural Areas have been established by federal agencies (wilderness or scientific areas) and state bureaus (nature preserves or reserves) to protect high quality natural communities. In some federal areas, multiple use, including recreation, is allowed. Recreation and preservation are not always compatible (Cole 1993).

Land owners, land managers, and environmentalists in southern Illinois are concerned about exotic seed dispersal via horse dung (Faulkner 1993; Blackorby 1994a,b, Land 1994). The Shawnee National Forest contains over 1000 km of horse trails (Shawnee National Forest 1992) as well as a number of exotic plant species. Among the aggressive exotics present in the Shawnee National Forest are Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), kudzu-vine (*Pueraria lobata*, and sweet clover (*Melilotus* spp.) (Evans 1981). Some agencies, such as the Illinois Nature Preserve Commission (INPC) and environmental groups like the Illinois Native Plant Society (INPS), expect land managers to primarily concern themselves with the preservation of 'natural' conditions, and believe that natural areas are threatened by horse travel (Faulkner 1993). Conversely, The Illinois Federation of Outdoor Recreation (IFOR), an equestrian group, feels that natural areas should continue to be multiple use lands, available for recreational users (Blackorby 1994a). IFOR also believes that suggestions that horses are responsible for the influx of exotic species are unsupported.

This research is designed to determine whether there is a relationship between the spread of exotic species into forest systems and recreational horse riding: (1) Does horse dung transport seeds of exotic species, (2) Can seeds transported via horse dung germinate *in situ*? (3) Can seedlings emerging from horse dung alter the vegetative composition on or around trails?

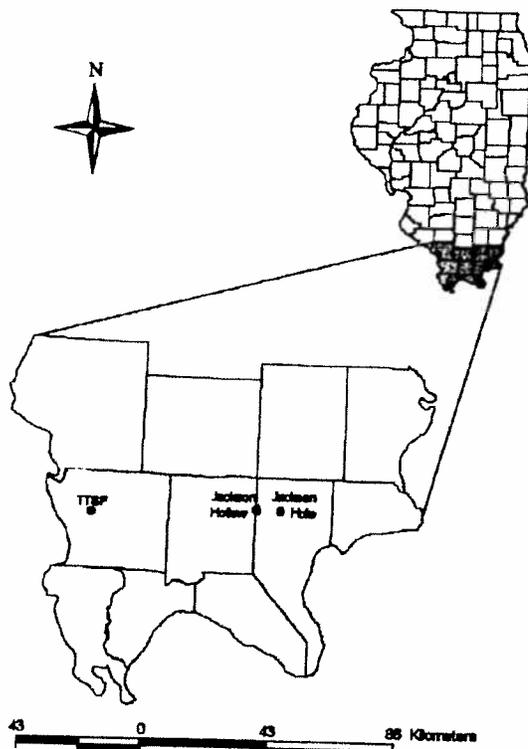


Figure 1. Location of the three study sites for the study of seed dispersal along horse trails in southern Illinois. A fourth trail that was free from horse travel was studied as TTSF (Trail of Tears State Forest).

Materials and methods

Study sites

This study was conducted in three forest areas in southern Illinois, USA; Trail of Tears State Forest, Jackson Hole Ecological Area, and Jackson Hollow Ecological Area (Figure 1). In all, three horse trails and one hiking trail were examined. Unfortunately, the Jackson Hole and Jackson Hollow Ecological Areas did not contain trails restricting horse travel. Nevertheless, the hiking trail at Trail of Tears State Forest was incorporated into this study to allow us to compare and contrast hiking trails with horse trails.

The Trail of Tears State Forest (TTSF), located in west-central Union County, Illinois, comprises 2070 ha. There are approximately 29 km of horse trails in addition to hiking trails. The forest, located in the southern section of the Ozark Natural Division,

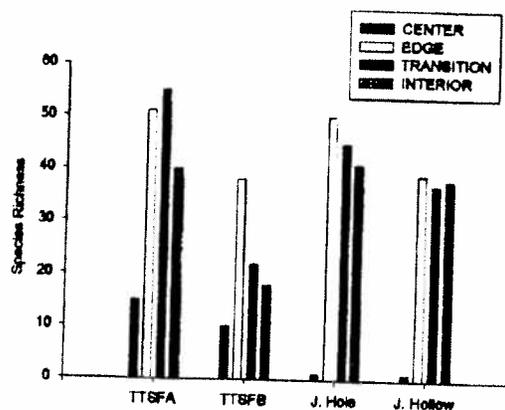


Figure 2. Total number of species at each of the four trail systems. (TTSF-A = trails subject to horse travel at Trail of Tears State Forest, TTSF-B = trails free from horse travel at Trail of Tears State Forest, J. Hole = Jackson Hole, J. Hollow = Jackson Hollow).

is on the eastern edge of the Salem Plateau (Leighton et al. 1948). Purchased by the State of Illinois in 1929, Trail of Tears State Forest is managed by the Illinois Department of Natural Resources. Ninety percent of the forest is Oak-Hickory forest, while the remaining 10% is pine plantations (Anonymous 1972). Two trail systems were studied at TTSF, one which is open to horse travel (TTSF-A) and one in which horse travel is prohibited (TTSF-B). Horse trails receive light to moderate use at TTSF and are open from May 1 until the second weekend in November (K.A. West, pers. commun.).

Jackson Hole Ecological Area (142 ha) and Jackson Hollow Ecological Area (116 ha) are located within the Greater Shawnee Hills Section of the Shawnee Hills Natural Division (Leighton et al. 1948; Schwegman et al. 1973; Stritch 1982). These areas are dominated by mesic oak-hickory forest, although much of the forest on Wellston-Berk soils has succeeded to beech-maple. Horse trails at both Jackson Hole and Jackson Hollow receive heavy use and are open year round (Beth Shimp, personal communication).

Sampling

To determine the dominant flora found along horse trails, 100 sample sites were located randomly along each of the three trail system (TTSF-A, Jackson Hole, Jackson Hollow). In addition, to determine the difference between trails subject to and trails free from horse travel, 100 sample sites were placed out on trails

at Trail of Tears State Forest (TTSF-B) that were free from horse travel. To attain 100 sample sites, five transects, containing 20 sample sites each, were placed on each trail system. The 20 sample sites were placed out along the trail in 5 m intervals. All transects were randomly located by placing a numbered grid over a map of the study site and picking an x- and y-coordinate from a random number table. When this random point did not fall directly onto the trail, the transect was placed at the location on the trail closest to this point. The determination of the direction that the 20 sample sites were placed from the original random location and which side of the trail the transect was placed were determined by a coin toss. Sample sites were comprised of a series of four 0.5×1 m plots oriented perpendicular to the trail. The first plot was placed in the center of the trail (CENTER), the second was placed adjacent to the edge of the trail (EDGE), the third was placed 1 m from the trail center into the forest (TRANSITION), and the fourth plot was placed 5 m into the forest interior (INTERIOR). Density of all plant species less than one meter in height was recorded for each plot during summer 1995. Nomenclature and determination of whether or not a species was exotic to the sites followed Mohlenbrock (1986).

To determine the germinable seed bank in horse dung, 40 dung samples (400 ml each) were collected from each TTSF-A, Jackson Hole, and Jackson Hollow during Summer (June and July) 1995. TTSF-A samples were supplemented with collections from the nearby Black Diamond Ranch, located approximately 1 km from TTSF-A, with direct trail connections onto the TTSF horse trail system. Forty dung samples were also collected during Autumn (August and September) 1994 from TTSF-A. All dung samples collected in the field (both summer and autumn samples) were approximately 0–2 days old. Soil samples were taken from each of the three trail systems adjacent to each summer dung sample in the center of the trail to a depth of approximately 5 cm. In addition, 22 deer dung samples were collected during Summer (June and July) 1995 from the three study sites (5 from TTSF-A, 10 from Jackson Hole, and 7 from Jackson Hollow).

To identify the germinable seeds in the dung and soil, each sample was spread evenly over vermiculite in a 12.7×17.8 cm tray. The trays were then placed in the greenhouse. Seedlings germinating in the greenhouse trays from Autumn 1994 were identified and recorded until May 1995, while seedlings germinating from greenhouse trays from Summer 1995 were identified and recorded until November 1995.

Seedlings were removed from the trays upon identification; some were preserved as voucher specimens. Some species with dormancy-breaking requirements (i.e., cold, scarification, etc.) may have escaped our screening process.

To quantify the seedlings arising *in situ*, five grids, each consisting of 32 plots, were placed along the horse trails at TTSF-A. The placement of grids used the same randomization method used to locate transects along the trail. Each of the plots were 12.7×17.8 cm, corresponding to the size of the greenhouse trays. Four hundred ml of horse dung was spread evenly over 80 of the 160 plots. Forty of those 80 treated plots received horse dung collected from TTSF-A during August and September of 1994, while the other 40 were treated with horse dung collected from TTSF-A during June and July of 1995. The remaining 80 plots in each grid remained untreated. Each of the five grids contained 8 plots treated with dung collected in the fall, 8 plots treated with dung collected in the summer, and 16 untreated plots. All treatments were randomly placed within each grid. Stem densities of all herbaceous species were recorded monthly in all plots during Autumn 1994 (August–November) and 1995 (March–November).

Data analysis

Normality of all data sets was tested using SigmaStat 2.0 (Jandel Corporation, San Rafael, CA). In most cases, non-parametric statistics were used to analyze the data in this study because of their highly non-normal distribution. Absolute and relative densities of all species were calculated for each data set. Relative density was calculated by dividing the density of each species by the total density of all species in each respective data set.

Detrended Correspondence Analysis (DCA: Hill 1979; Hill & Gauch 1980) was used to describe the species composition at each of the trail sites. The DCA was conducted by detrending via 26 segments using CANOCO for Windows Version 4.02. For each plot, distance from trail was assigned a rank of 1 (CENTER), 2 (EDGE), 3 (TRANSITION), or 4 (INTERIOR). These ranks were then compared with sample scores along the first DCA axis using a one-way Kruskal-Wallis Analysis of Variance (ANOVA) on Ranks, followed by a Dunn's Test for all pairwise comparisons, to see if species composition in trail sites varied with distance from trail.

An ANOVA on Ranks extended for factorial designs (Zar 1998), followed by a Tukey Test for multiple comparisons, was employed to determine if stem density values at different distance differed between trails subject to horse travel and trails free from horse travel at Trail of Tears State Forest (TTSF-A and TTSF-B). All ANOVAs were calculated using Sigma-Stat for Windows Version 2.0 (Jandel corporation, San Rafael, CA).

The RAREFRAC procedure from the Statistical Ecology software package (Ludwig & Reynolds 1988) was used to calculate rarefaction curves on horse dung and soil samples in the greenhouse germination study (Autumn, $n = 40$; Summer, $n = 120$, respectively) and field grid experiment ($n = 40$). Rarefaction analyses are used to create richness curves which illustrate the expected number of species over an array of theoretical sample sizes (Simberloff 1978; Simberloff 1979; Gotelli & Graves 1996). *Juncus tenuis* was excluded from the rarefaction analyses on the summer horse dung samples because of its overwhelming dominance (>90% relative density) in those plots.

Mann-Whitney Rank Sum Tests were used to determine if field grids treated with horse dung had significantly different stem density values than untreated field grids.

Results

Trail vegetation

The Kruskal-Wallis Analysis of Variance (ANOVA) on Ranks showed that the principal gradient of vegetation composition from the Detrended Correspondence Analysis (DCA) (eigenvalue = 0.679; percentage variance of species data = 3.8) was related to distance from the trail center ($H = 120.777$, $df = 3$, $p < 0.001$). A Dunn's Test on all pairwise comparisons further showed that species composition on all four trial distances were significantly different ($p < 0.05$), with the exception of the CENTER and EDGE positions ($Q = 2.559$, $p > 0.05$). Indeed, several species on the four trail systems were identified only at one or two distances; e.g., the exotic *Poa pratensis* was limited to the edge and transition plots. Species richness was always highest in the one of two plots adjacent to the trails (EDGE and TRANSITION), while the CENTER plot maintained the lowest species richness values at all sites (Figure 2). The density of graminoids, as

well as exotic species, was consistently higher near the trail than in the forest interior, whereas the density of vines was lower (Figures 3a-d). Total relative density of exotic species found on the trail systems was low (TTSF-A = 4.15%; TTSF-B = 1.23%; Jackson Hole = 0.65%; Jackson Hollow = 1.06%). In all 1600 trail plots, 5 exotic species were identified on the four trail systems (Table 1). In addition, an ANOVA on Ranks extended for factorial designs showed that overall stem density values at Trail of Tears State Forest were significantly different ($F = 5.861$, $df = 3$, $p = 0.003$) between trails subject to (TTSF-A, 34.25 stems m^{-2}) and trails free from horse travel (TTSF-B, 26.35 stems m^{-2}). The multiple comparison Tukey test showed that all four distances exhibited significantly higher stem density values at TTSF-A (CENTER: $q = 2.905$, $p < 0.05$; EDGE: $q = 10.814$, $p < 0.05$; TRANSITION: $q = 10.451$, $p < 0.05$; INTERIOR: $q = 8.379$, $p < 0.05$).

Greenhouse trays

A wide variety of species, many of which are exotic and not normally present in the forest interior, can survive passage through the horses' digestive tract: *Digitaria* spp., *Festuca arundinacea*, *Melilotus* spp., *Poa annua*, *Trifolium repens*, *Chenopodium ambrosioides*, *Eleusine indica*, *Kummerowia striata*, *Amaranthus spinosa*, and *Plantago* spp. are some of the exotic species that germinated abundantly from dung in the greenhouse (Appendix 1). *Kummerowia striata* and *Prunella vulgaris* were the only exotic species found both growing along the trail systems and germinating from the horse dung in the greenhouse trays. *Kummerowia striata* was found in horse dung samples collected during Autumn 1994 at TTSF-A and in horse dung samples collected during summer 1995 at Jackson Hole. However, along the four trail systems, it was found only at TTSF-A and with a relative density of 0.2%. Another exotic species, *P. vulgaris*, was also found in horse dung samples collected during summer 1995. Several native species also occurred frequently in greenhouse trays; e.g., *Juncus tenuis*, *Callitriche terrestris*, *Erigeron* spp., *Lobelia intraya*, and *Leersia virginica*.

Horse dung samples collected in the Autumn from TTSF-A and placed out in the greenhouse yielded a total of 43 identifiable (4 unidentifiable) taxa, 19 (44.2%) of which were exotic (Figure 4a). Soil samples collected from TTSF-A, Jackson Hole, and Jackson Hollow yielded 40, 25, and 38 species, re-

Table 1. Relative densities of exotic species identified in trail vegetation plots at each study site. Origin for each species is taken from Mohlenbrock (1986). (TTSF-A = trails subject to horse travel at Trail of Tears State Forest, TTSF-B = trails free from horse travel at Trail of Tears State Forest).

| | Species | Origin | Density (stems m ⁻²) | Rel. density (%) |
|----------------|---------------------------|-----------------|----------------------------------|------------------|
| TTSF-A | <i>Kummerowia striata</i> | Asia | 0.10 | 0.2 |
| | <i>Lonicera japonica</i> | Asia | 0.85 | 2.2 |
| | <i>Poa pratensis</i> | Europe and Asia | 0.18 | 0.5 |
| | <i>Prunella vulgaris</i> | Europe | 0.28 | 0.7 |
| | <i>Rosa multiflora</i> | China and Japan | 0.03 | 0.6 |
| TTSF-B | <i>Prunella vulgaris</i> | Europe | 0.10 | 0.3 |
| | <i>Rosa multiflora</i> | China and Japan | 0.23 | 0.8 |
| Jackson Hole | <i>Lonicera japonica</i> | Asia | 0.08 | 0.3 |
| | <i>Prunella vulgaris</i> | Europe | 0.05 | 0.2 |
| | <i>Rosa multiflora</i> | China & Japan | 0.03 | 0.1 |
| Jackson Hollow | <i>Lonicera japonica</i> | Asia | 0.05 | 0.2 |
| | <i>Prunella vulgaris</i> | Europe | 0.13 | 0.6 |

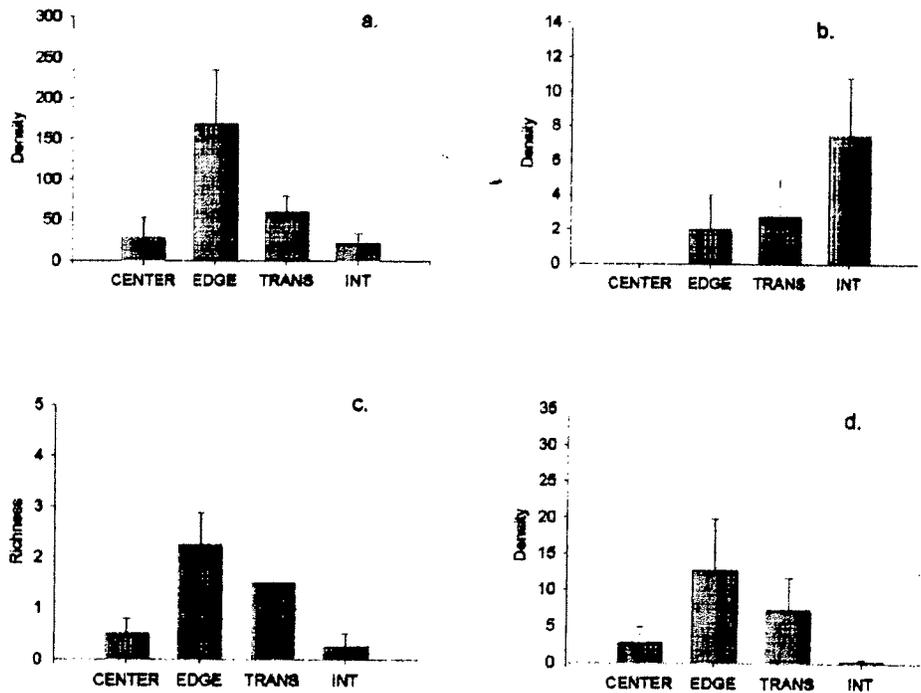


Figure 3. (a) Mean density (± 1 standard error) of graminoid taxa. (b) Mean density of vine taxa (excluding *Parthenocissus quinquefolia*). (c) Mean richness of exotic taxa (d) Mean density of exotic taxa identified at each distance from horse trails.

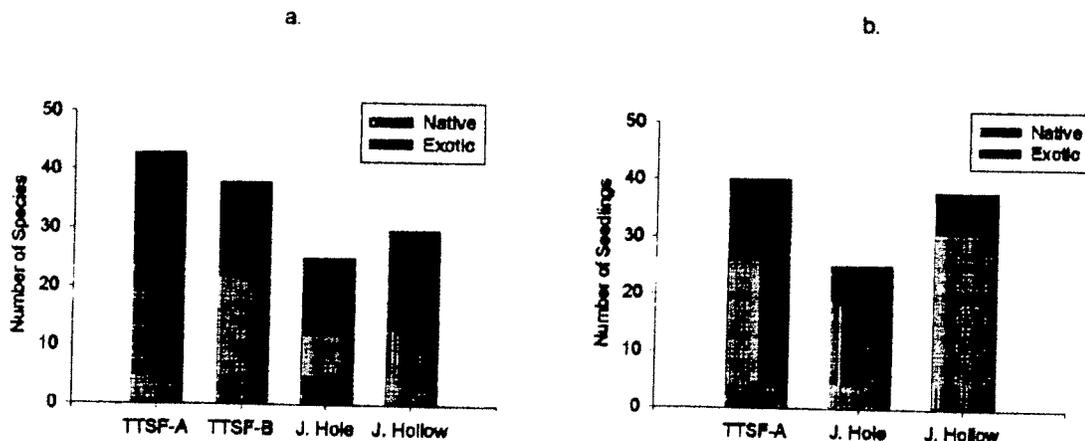


Figure 4. Richness of exotic versus native seedlings germinating from (a.) horse dung samples and (b.) soil samples. (TTSP-A = trails subject to horse travel at Trail of Tears State Forest, J. Hole = Jackson Hole, J. Hollow = Jackson Hollow).

spectively (Figure 4b). The number of unidentifiable species in each of the soil samples at each site was 3, 1, 2, respectively. Overall, the percentage of exotic species in the summer dung and soil samples ranged from 6.7 to 34.4%. The mean % exotic species, however, was similar between the dung (15%) and soil samples (13.9%) at the three study sites. Rarefaction analysis suggested estimated species richness was lowest in the autumn dung samples (11 species) and highest in summer dung samples (18 species) (Figure 5). Rarefaction analysis was also run on exotic species in the different samples, however exotic species richness was not high enough in all cases to yield interpretable rarefaction curves. Nevertheless, the richness of exotic species in comparison with native species was higher in fall and summer dung samples (40.4 and 26.5%, respectively) than they were in summer soil samples, trail plots, or field grids (15, 5.5, and 13.3%, respectively). In addition, 14 of the 17 exotic species found in the summer soil samples were also found in one or more horse dung samples. These results show that the exotic seeds transported via horse dung to contribute to and remain viable in the soil seed bank. However, of the 30 exotic species found in the dung and soil samples, *Kummerowia striata* was the only one found in trail survey plots; and it occurred only at TTSP-A with a relative density of only 0.1%.

Two species germinated from the 22 deer dung samples. Six individuals of *Rubus* sp. germinated out of three different greenhouse trays. A fourth tray contained one individual of *Ranunculus sceleratus*.

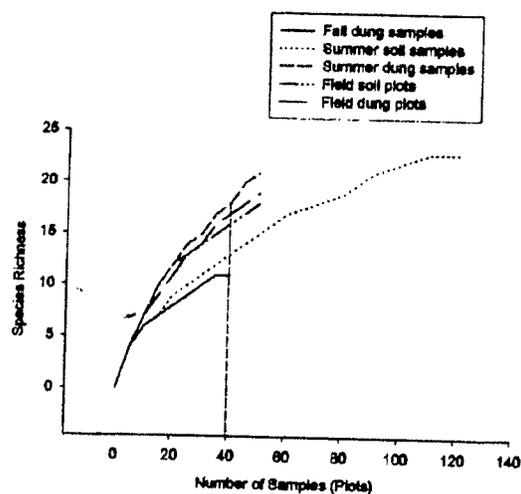


Figure 5. Results of rarefaction analysis examining the difference between species richness in fall and summer dung samples, summer soil samples and field soil and dung plots. The vertical dashed line indicates where valid comparisons of species richness can be made among samples and plots.

Field grids

Field grid plots treated with dung and untreated plots at TTSP-A yielded 25 and 20 species, respectively. Three of the species from treated plots and two species from untreated plots were exotic. The three exotic species that emerged from the treated plots were *Digitaria ischaemum* (relative density = 0.8%), *K. striata* (39.2%), and *Trifolium repens* (0.8%). The two ex-

otic species emerging from the untreated plots were *K. striata* (9.0%) and *Poa pratensis* (3.3%). Of these species, only one individual of *K. striata* and two individuals of *P. pratensis* were found in quadrats placed along the trails at TTSF-A. These species were not found on trails at Jackson Hole or Jackson Hollow. Stem densities in treated and untreated plots were statistically indistinguishable ($T = 932$, $p = 0.807$). Rarefaction analysis showed both untreated grid plots and plots treated with horse dung resulted in relatively similar estimated species richness (16 and 17 species, respectively) (Figure 5).

Discussion

Vegetation along horse trails

Horse trails act as conduits for species dispersal through the forest matrix. Our study shows that the vegetation along horse trails is significantly related to the distance from the trail center. These findings support the results of Adkison & Jackson (1996); i.e., the density of graminoids is higher along trail corridors than in the forest interior, while the density of vines is lower. These trends in the vegetation along trail corridors are partially due to the fact that the perennating tissue in graminoids is located at ground level allowing some defense against trampling, but vines are not so protected. The one vine species that did not follow this trend was *Parthenocissus quinquefolia*: it can successfully regrow from severed portions of the shoot (Adkison & Jackson 1996). These findings are consistent with those of Benninger-Truax et al. (1992) who found that the number of exotic species is higher along trail corridors than in the forest interior. Compared to the forest interior, trails are sites of significantly higher soil density (Bates 1935; Weaver & Dale 1978), lower soil moisture (Dale & Weaver 1974; Liddle 1975), higher light intensity (Cole 1978; Hall & Kuss 1989), and greater trampling pressure (Dale & Weaver 1974; Hammit & Cole 1987). Trails are sites where compositional shifts in the vegetation are to be expected (Adkison & Jackson 1996).

The exotic species found along trails during this study are comparable to those reported in previous studies. We have found 5 exotic species at Trail of Tears State Forest (TTSF), three at Jackson Hole, and two at Jackson Hollow (Table 1). Evans' (1981) recorded each of the 5 exotic species at TTSF found along trails in this study as growing primarily in

human-disturbed communities. In addition, he identified additional invasive exotics such as *Pueraria lobata* and *Mellilotus alba*. Smith (1992) also noted the occurrence of both of the exotic species recorded in this study at Jackson Hollow. However, Stritch (1982) did not identify *Rosa multiflora* growing in any of the communities he sampled. While only comprising a relative density of 0.12% along trails at Jackson Hole in our study, the presence suggests that this species is currently invading these communities.

The occurrence of exotic species in our study, when compared to other studies, was relatively low. Of the eleven U.S. National Parks reviewed by Vitousek (1988), Sequoia-Kings Canyon had the lowest percentage of exotic species (6–9%), while the Hawaiian Volcanoes had the greatest percentage (64%). Of the four sites we studied, the percentage of exotic species ranged from 3.9% at Jackson Hollow to 6.9% at TTSF-A. Similarly, Shimp (1996) examined three Research Natural Areas in southern Illinois (Dennison Hollow, Panther Hollow, and Barker Bluff) and also found 26 exotic species (3.8% of total species richness). *Lonicera japonica*, *Rosa multiflora*, *Microstegium viminium*, and *Lespedeza cuneata* are exotic species found both in our study and Shimp's study. Both *L. japonica* and *R. multiflora* were found in the trail vegetation plots at sites in this study. In addition, although *M. viminium* and *L. cuneata* were not found in any of the plots in this study, they were observed growing elsewhere along the horse trails at Trail of Tears State Forest.

Horses as vectors for exotic seeds

A large number of germinable seeds representing a whole variety of native and exotic species are present in horse dung. Nevertheless, *Kummerowia striata* was the only exotic of seven species that was identified both in the dung samples and found growing on the horse trails. The other six species, *Callitriche terrestris*, *Dichanthelium dichotomum*, *Juncus tenuis*, *Leersia virginica*, *Lobelia intraya*, and *Verbena urticifolia* were not found in trails free from horse travel at TTSF. These species may have entered the trail system via horse dung. While only *K. striata* is an exotic, the presence of these seven species demonstrates that seeds transported via horse dung can become established on trail systems.

Deer dung samples produced many fewer germinating seeds than did the horse dung. *Rubus* sp. and *Ranunculus sceleratus* both germinated from samples

of deer dung placed in the greenhouse. While other studies found the related congener, *Rubus procerus* (e.g., Brunner et al. 1974), to be dispersed by animals, the species that we found did not occur along the trails or germinate from horse dung or soil samples. This suggests that recruitment from deer dung may not influence vegetation composition along the trail corridors. Other studies have observed deer to be important dispersers of seed (Malo & Suarez 1998).

The field grids yielded similar results to the greenhouse trays. There was not a significant difference between the controls and the horse dung grids. Nevertheless, *Digitaria ischaemum*, *T. repens* and *K. striata* were found growing out of the horse dung treated plots. *Digitaria ischaemum* is an agricultural weed, whereas *T. repens* is widely planted in pastures. *Kummerowia striata* is also an agricultural weed, however, prior to the 1990's it was planted in some areas in southern Illinois (although not at our study sites) as a food source for quail and other wildlife. It was noted earlier that neither *D. ischaemum* nor *T. repens* were found in any of the trail plots, which suggests that they may not be colonizing and establishing along the trails despite germinating from the horse dung. Such species probably do not constitute a serious threat to the forest around the trail system. However, some exotic species from horse dung, though not found in the trail plots, may yet have the capacity to germinate *in situ*. Indeed, Kowarik (1995) points out that a long period of time often exists between importation and establishment of exotics, often over 100 years.

We have shown that a number of the native and exotic species, which can germinate *in situ*, are transported via horse dung. However, few of these species were found growing along the trails. This suggests that while erosion and soil compaction due to trampling are still considerable concerns along horse trails, the exotic species present in horse dung constitute only a limited threat to plant communities, at least in these forested ecosystems. Perhaps high light intensities required by these exotic species for germination and growth are not present within the forested trail corridor. This could contribute to the inability of many species to germinate *in situ*, become established, and persist in the trail corridor. Nevertheless, one must recognize the noxious potential of some exotic species (Bratton 1982). Their spread is possible within more open communities, some of which may be found within forests containing horse trails (e.g., glades, hill prairies, or barrens). For these reasons, it is important to try and reduce the number of potential invading

plant species in a nature preserve. Care must be taken to balance the needs of the recreational community against the possibility of establishment of an invasive plant species.

Acknowledgements

Financial support was provided by a three-way challenge cost share agreement between the U.S. Forest Service, the North Central Forest Experimental Station, and Southern Illinois University at Carbondale. Some materials and field assistance were provided by K. A. West and the staff of Trail of Tears State Forest. We thank Philip A. Robertson, Beth A. Middleton, Beth Shimp and Jerry Van Sambeek for their continuous support on this project, and to Mark A. Basinger for providing his expertise in plant identification. Thanks are further due to Don Combs and Nancy Downs, owners of Black Diamond Ranch, for allowing collection of samples on their property.

References

- Adkison, G. P. & Jackson, M. T. 1996. Changes in ground-layer vegetation near trails in midwestern U.S. forests. *Nat. Areas J.* 16: 14-23.
- Alexander, F. 1946. The rate of passage of food residues through the digestive tract of the horse. *J. Comp. Pathol.* 56: 266-268.
- Anonymous 1972. Trail of tears state forest. Illinois Department of Conservation, Springfield, Illinois. Site Brochure.
- Bartos, D. L., Brown, J. K. & Booth, G. D. 1994. Twelve years biomass response in aspen communities following fire. *J. Range Manag.* 47: 79-83.
- Bates, G. H. 1935. The vegetation of footpaths, sidewalks, cart-tracks, and gateways. *J. Ecol.* 23: 463-487.
- Benninger, M. C. 1989. Trail as conduits of movement for plant species in coniferous forests of Rocky Mountain National Park, Colorado. M.S. Thesis, Miami University.
- Benninger-Truax, M. C., Vankat, J. L. & Schaefer, R. L. 1992. Trail corridors as habitat and conduits for movement of plant species in Rocky Mountain National Park, Colorado, USA. *Landsc. Ecol.* 6: 269-278.
- Binggell, P. 1996. A taxonomic, biogeographical and ecological overview of invasive woody plants. *J. Veg. Sci.* 7: 121-124.
- Blackorby, C. 1994a. IFOR and horsemen fight to keep trails open in Shawnee National Forest. Illinois Federation of Outdoor Recreation Newsletter.
- Blackorby, C. 1994b. Shawnee update. Illinois Federation of Outdoor Research Newsletter.
- Braithwaite, R. W., Lonsdale, W. M. & Esbergs, J. A. 1989. Alien vegetation and native biota in tropical Australia: the impact of *Mimosa pigra*. *Biol. Cons.* 48: 189-210.
- Brunner, H., Harris, R. V. & Amor, R. L. 1976. A note on the dispersal of blackberry *Rubus procerus* P. J. Muell. by foxes and erms. *Weed Res.* 16: 171-173.

- Bruton, S. 1982. The effects of exotic plant and animal species on nature preserves. *Nat. Areas J.* 2: 3-13.
- Burde, J. H. & Renfro, J. R. 1986. Use impacts on the Appalachian Trail. Proceedings, National Wilderness Research Conference: Current Research. Pp. 138-143. USDA Forest Service, General Technical Report INT-212. Ogden, Utah.
- Coblentz, B. E. 1990. Exotic organisms: a dilemma for conservation biology. *Cons. Biol.* 4: 261-265.
- Cole, D. 1978. Estimating the susceptibility of wildland vegetation to trailside alteration. *J. Appl. Ecol.* 15: 281-286.
- Cole, D. 1993. Minimizing conflict between recreation and nature conservation. Pp. 105-122. In: Smith, D. S. & Hellmund, P. C. (eds), *Ecology of greenways*. University of Minnesota Press, Minneapolis, Minnesota.
- Collins, S. L. & Gibson, D. J. 1990. Effects of fire on community structure in tallgrass and mixed-grass prairie. Pp. 81-98. In: Collins S.L. & Wallace, L. L. (eds), *Fire in North American tallgrass prairies*. University of Oklahoma Press, Norman, Oklahoma.
- Dale, D. & Weaver, T. 1974. Trampling effects on vegetation of the trail corridors of North Rocky Mountain forests. *J. Appl. Ecol.* 11: 767-772.
- Davis, M. A., Grime, J. P. & Thompson, K. 2000. Fluctuating resource in plant communities: a general theory of invasibility. *J. Ecol.* 88: 258-534.
- Elton, C. S. 1958. *The ecology of invasions by animals and plants*. Methuen, London, UK.
- Evans, M. 1981. The vascular flora of Trail of Tears State Forest, Union County, Illinois. M.S. thesis, Southern Illinois University at Carbondale.
- Faulkner, J. 1993. Damage to natural areas purchased with LAW-CON funds. Illinois Nature Preserves Commission.
- Fenner, M. 1985. *Seed ecology*. Chapman & Hall, London.
- Gonzalez-Espinosa, M. & Quintana-Ascencio, P. F. 1986. Seed predation and dispersal in a dominant plant: *Opuntia*, ants, birds, and mammals. Pp. 273-284. In: Estrada, A. & Flemming, T. H. (eds), *Fruigivores and seed dispersal*. Dr. W. Junk Publishers, Dordrecht.
- Gotelli, N. J. & Graves, G. R. 1996. *Null models in ecology*. Smithsonian Institution Press, Washington D. C.
- Griffith, D. & Lacey, J. R. 1991. Economic evaluation of spotted knapweed *Centaurea maculosa*. control using picloram. *J. Range Manag.* 44: 43-47.
- Hall, C. N. & Kuss, F. R. 1989. Vegetation alteration along trails in Shenandoah National Park, Virginia. *Biol. Cons.* 48: 211-227.
- Hammit, W. E. & Cole, D. N. 1987. *Wildland recreation: Ecology and management*. John Wiley & Sons, New York.
- Harmon, G. W. & F. D. 1934. The percentage and viability of weed seeds recovered in the feces of farm animals and their longevity when buried in manure. *J. Am. Soc. Agron.* 26: 762-767.
- Harper, J. L. 1977. *Population biology of plants*. Academic Press, London.
- Heady, H. F. 1954. Viable seed recovered from fecal pellets of sheep and deer. *J. Range Manag.* 7: 259-261.
- Hester, E. F. 1991. The U.S. National Park Service experience with exotic species. *Nat. Areas J.* 11: 127-128.
- Hill, M. O. DECORANA - a FORTRAN Program for detrended correspondence analysis and reciprocal averaging. Ecology and Systematics, Cornell University, Ithaca, New York.
- Hill, M. O. & Gauch, H. G. 1980. Detrended correspondence analysis: an improved ordination technique. *Vegetatio* 42: 47-58.
- Hobbs, R. J. & Huenneke, L. F. 1992. Disturbance, diversity, and invasion: implications for conservation. *Cons. Biol.* 6: 324-337.
- Holland, P. & Olson, S. 1989. Introduced versus native plants in Austral forests. *Prog. Phys. Geog.* 13: 260-293.
- Janzen, D. H. 1981. *Enterlobium cyclocarpum* seed passage rate and survival in horses, Costa Rican pleistocene seed dispersal agents. *Ecology* 62: 593-601.
- Janzen, D. H. 1982. Differential seed survival and passage rates in cows and horses. *Oikos* 38: 150-156.
- Kowarik, I. 1995. Time lags in biological invasions with regard to the success and failure of alien species. Pp. 15-38. In: Pyšek, P., Prach, K., Rejmanek, M. & Wade, M. (eds), *Plant invasions - general aspects and special problems*. SPB Academic Publishing, Amsterdam, The Netherlands.
- Kucera, C. L. & Koelling, M. 1964. The influence of fire on composition of central Missouri prairie. *Am. Midland Nat.* 72: 142-147.
- Land, F. 1994. Troubled trails. *Western Horseman*, April, 6-97.
- Leighton, M., Ekblaw, G. E. & Hamberg, L. 1948. Physiographic divisions of Illinois. *Geology* 56: 16-33.
- Liddle, M. J. 1975. A selective review of the ecological effects of human trampling on natural ecosystems. *Biol. Cons.* 7: 17-36.
- Ludwig, J. A. & Reynolds, J. F. 1988. *Statistical ecology: A primer on methods and computing*. John Wiley & Sons, New York.
- Maló, J. E. & Suarez, F. 1998. The dispersal of a dry-fruited shrub by red deer in a Mediterranean ecosystem. *Ecography* 21: 204-211.
- McCully, W. G. 1951. Recovery and viability of Macartney rose seeds fed to cattle. *J. Range Manag.* 4: 101-106.
- Meekins, J. F. & McCarthy, B. C. 199. Competitive ability of *Allaria petiolata* (Garlic Mustard, Brassicaceae), an invasive, nonindigenous forest herb. *Int. J. Plant Sci.* 160: 743-752.
- Middleton, B. A. & Mason, D. H. 1992. Seed herbivory by nilgai, feral cattle, and wild boar in the Keolado National Park, India. *Biotropica* 24: 538-543.
- Mohlebrock, R. H. 1986. *Guide to the vascular flora of Illinois*. Southern Illinois University Press, Carbondale, Illinois.
- Mooney, H. A. & Drake, J. 1986. *The ecology of biological invasions of North America and Hawaii*. Springer-Verlag, New York.
- Noss, R. F. 1990. Can we maintain biological and ecological integrity? *Cons. Biol.* 4: 241-243.
- Ohmann, L. F. & Grigal, D. F. 1981. Contrasting vegetation responses following two forest fires in northeastern Minnesota. *Am. Midland Nat.* 106: 54-64.
- Pickett, S. T. A. & White, P. S. 1985. *The ecology of natural disturbance and patch dynamics*. Academic Press, Orlando, Florida.
- Figgin, C. M. 1978. Dispersal of *Echium plantagineum* L. by sheep. *Weed Res.* 18: 155-160.
- Ridley, H. N. 1930. *Dispersal of plant throughout the world*. Reeve, Aston, Kent, UK.
- Scheiner, S. M., Sharik, T. L., Roberts, M. R. & Kopple, R. V. 1988. Tree density modes of tree recruitment in a Michigan pine-hardwood forest after clear-cutting and burning. *Can. Field-Nat.* 102: 634-638.
- Schwegman, J. E., Fell, G. D., Hutchinson, M. D., Paulson, G., Shepherd, W. M. & White, J. 1973. *Comprehensive plant for the Illinois Preserves system. Part II - The Natural Divisions of Illinois*. Illinois Nature Preserves Commission, Springfield, Illinois.
- Shawnee National Forest. 1992. *Shawnee Nation Forest Amended Land and Resource Management Plan Alternative 5 - Final Supplemental Environmental Impact Statement*. USDA, Forest Service Eastern Region.

- Shimp, J. 1996. Vegetation analysis and vascular flora of three Research Natural Areas RNAs in the Shawnee Nation Forest: Barker Bluff, Dennison Hollow, and Panther Hollow in southeastern Illinois. M.S. Thesis, Southern Illinois University at Carbondale.
- Simberloff, D. 1978. Use of rarefaction and related methods in ecology. pp. 150-165. In: Dickson, K. L., Cairns, J. and Livingston, R. J. (eds), *Biological data in water pollution assessment: quantitative and statistical analyses*, ASTM STP 652. American Society for Testing and Materials.
- Simberloff, D. 1979. Rarefaction as a distribution-free method of expressing and estimating diversity. Pp. 159-176. Grassie, J. F., Pall, G. P., Smith, W. & Taillie, C. (eds), *Ecological diversity in theory and practice*. International Co-operative Publishing House, Fairland, Maryland.
- Smith, R. G. 1988. The vascular flora of Jackson Hollow. M.S. thesis, Southern Illinois University at Carbondale.
- Soule, M.E. 1990. The onslaught of alien species, and other challenges in the coming decades. *Cons. Biol.* 4: 233-239.
- Stritch, L. R. 1982. A floristic survey of the Hayes Creek Canyon watershed, Pope County, Illinois. M.S. thesis, Southern Illinois University at Carbondale.
- United States Congress, Office of Technology Assessment. 1993. *Harmful non-indigenous species in the United States*. OTA-F-565. United States Government Printing Office, Washington, D.C.
- Vander Noot, G. W., Symons, L. D., Lydman, R. K. & Fannesbeck, P. V. 1967. Rate of passage of various feedstuffs through the digestive tract of horses. *J. Animal Sci.* 26: 1309-1311.
- Vitousek, P. M. 1988. Diversity and biological invasions of oceanic islands. Pp. 181-189. In: Wilson, E. O. and Peters, F. M. (eds), *Biodiversity*. National Academic Press, Washington, D. C.
- Weaver, T. & Dale, D. 1978. Trampling effects of hikers, motorcycles, and horses in meadows and forests. *J. Appl. Ecol.* 15: 451-457.
- Welch, D. 1985. Studies in the grazing of heather moorland in north-east Scotland; IV. Seed dispersal and plant establishment in dung. *J. Appl. Ecol.* 22: 461-472.
- Westman, W. E. 1990. Park management of exotic plant species: problems and issues. *Cons. Biol.* 4: 251-259.
- Williamson, M. 1996. *Biological invasions*. Chapman & Hall, London, England.
- Wilson, J. P. & Seney, J. P. 1994. Erosional impact of hikers, horses, motorcycles, and off-road bicycles on mountain trails in Montana. *Mountain Res. Devel.* 14: 77-88.
- Zar, J. H. 1998. *Biostatistical analysis*. Prentice Hall, New Jersey.

Appendix I. Absolute (seedlings m²) and relative densities of species identified in dung samples.

| | TTSFA-Summer | | TTSFA - Autumn | | Jack. Hole | | Jack. Hollow | |
|---------------------------------|--------------|------|----------------|-------|------------|------|--------------|------|
| | Abs. | Rel. | Abs. | Rel. | Abs. | Rel. | Abs. | Rel. |
| Exotic species | | | | | | | | |
| <i>Amaranthus spinosus</i> | 4.20 | 0.11 | 86.10 | 4.75 | 1.05 | 0.13 | 2.10 | 0.26 |
| <i>Avena</i> sp. | 11.55 | 0.29 | 0.00 | 0.00 | 1.05 | 0.13 | 4.20 | 0.53 |
| <i>Cardimine hirsata</i> | 1.05 | 0.03 | 5.25 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Cerastium glomeratum</i> | 2.10 | 0.05 | 0.00 | 0.00 | 1.05 | 0.13 | 2.10 | 0.26 |
| <i>Chenopodium ambrosioides</i> | 0.00 | 0.00 | 264.60 | 14.58 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Daucus carota</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Digitaria ischaemum</i> | 27.30 | 0.69 | 613.20 | 33.80 | 2.10 | 0.25 | 2.10 | 0.26 |
| <i>Digitaria sanguinalis</i> | 2.10 | 0.05 | 119.70 | 6.60 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Eleusine indica</i> | 2.10 | 0.05 | 130.20 | 7.18 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Festuca arundinacea</i> | 11.55 | 0.29 | 12.60 | 0.69 | 9.45 | 1.14 | 21.00 | 2.64 |
| <i>Kummerowia striata</i> | 0.00 | 0.00 | 191.10 | 10.53 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Matricaria chamomilla</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Mellilotus</i> sp. | 15.75 | 0.40 | 1.05 | 0.06 | 25.20 | 3.04 | 13.65 | 1.71 |
| <i>Mollugo verticillatus</i> | 1.05 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Plantago lanceolata</i> | 1.05 | 0.03 | 5.25 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Plantago major</i> | 0.00 | 0.00 | 89.25 | 4.92 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Poa annua</i> | 30.45 | 0.77 | 2.10 | 0.12 | 9.45 | 1.14 | 48.30 | 6.06 |
| <i>Polygonum aviculare</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Polygonum cespitosum</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Polygonum convolvulus</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Portulaca oleracea</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Prunella vulgaris</i> | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Rumex crispus</i> | 1.05 | 0.03 | 4.20 | 0.23 | 0.00 | 0.00 | 5.25 | 0.66 |
| <i>Rumex obtusifolius</i> | 1.05 | 0.03 | 0.00 | 0.00 | 2.10 | 0.25 | 3.15 | 0.40 |
| <i>Taraxacum officinale</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Trifolium pratense</i> | 5.25 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Trifolium repens</i> | 118.65 | 3.02 | 16.80 | 0.93 | 35.70 | 4.31 | 77.70 | 9.75 |
| <i>Verbascum thapsus</i> | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 | 1.05 | 0.13 |
| <i>Veronica perigrina</i> | 30.45 | 0.77 | 2.10 | 0.12 | 1.05 | 0.13 | 4.20 | 0.53 |
| Native species | | | | | | | | |
| <i>Agrimonia</i> sp. | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Ambrosia artemisiifolia</i> | 0.00 | 0.00 | 2.10 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Aster pilosus</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Boehmeria cylindrica</i> | 0.00 | 0.00 | 4.20 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Bromus</i> sp. | 1.05 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Callitriche heterophylla</i> | 0.00 | 0.00 | 3.15 | 0.17 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Carex blanda</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.35 | 0.92 |
| <i>Carex cephalophora</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Carex</i> spp. | 2.10 | 0.05 | 0.00 | 0.00 | 1.05 | 0.13 | 3.15 | 0.40 |
| <i>Cyperus ovularis</i> | 0.00 | 0.00 | 2.10 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Dichanthelium boscii</i> | 0.00 | 0.00 | 10.50 | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Dichanthelium dichotomum</i> | 0.00 | 0.00 | 2.10 | 0.12 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Eclipta prostrata</i> | 0.00 | 0.00 | 4.20 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Eleocharis obtusa</i> | 2.10 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Erigeron annuus</i> | 0.00 | 0.00 | 6.30 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Erigeron philadelphicus</i> | 3.15 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Erigeron</i> spp. | 1.05 | 0.03 | 19.95 | 1.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Erigeron strigosus</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Iva annua</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |

Appendix 1. Continued.

| | TTSEFA-Summer | | TTSEFA - Autumn | | Jack. Hole | | Jack. Hollow | |
|------------------------------|---------------|-------|-----------------|------|------------|-------|--------------|-------|
| | Abs. | Rel. | Abs. | Rel. | Abs. | Rel. | Abs. | Rel. |
| <i>Juncus marginatus</i> | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Juncus tenuis</i> | 3593.10 | 91.35 | 152.25 | 8.39 | 642.6 | 77.57 | 535.50 | 67.19 |
| <i>Leersia virginica</i> | 2.10 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Lepidium virginicum</i> | 2.10 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Leucospora multifida</i> | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Lindernia dubia</i> | 0.00 | 0.00 | 0.00 | 0.00 | 2.10 | 0.25 | 0.00 | 0.00 |
| <i>Lobelia inflata</i> | 0.00 | 0.00 | 1.05 | 0.06 | 2.10 | 0.25 | 0.00 | 0.00 |
| <i>Ludwigia alternifolia</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Myosurus minimus</i> | 2.10 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Oxalis stricta</i> | 3.15 | 0.08 | 1.05 | 0.06 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Panicum sp.</i> | 0.00 | 0.00 | 6.30 | 0.35 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Penthorum sedoides</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.10 | 0.26 |
| <i>Pilea pumila</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 1.05 | 0.13 |
| <i>Plantago rugelii</i> | 0.00 | 0.00 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Plantago virginica</i> | 11.55 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 5.25 | 0.66 |
| <i>Poa sp.</i> | 0.00 | 0.00 | 7.35 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Ranunculus abortivus</i> | 4.20 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Ranunculus sceleratus</i> | 28.35 | 0.72 | 0.00 | 0.00 | 2.10 | 0.25 | 46.20 | 5.80 |
| <i>Salix nigra</i> | 0.00 | 0.00 | 6.30 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Senecio glabellus</i> | 1.05 | 0.03 | 0.00 | 0.00 | 1.05 | 0.13 | 0.00 | 0.00 |
| <i>Solidago canadensis</i> | 3.15 | 0.08 | 6.30 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Solidago ulmifolia</i> | 1.05 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Verbena urticifolia</i> | 0.00 | 0.00 | 19.95 | 1.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Veronica arvensis</i> | 8.40 | 0.21 | 1.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| <i>Woodsia obtusa</i> | 0.00 | 0.00 | 0.00 | 0.00 | 80.85 | 9.76 | 0.00 | 0.00 |

Enclosure 34

Horse riding in urban conservation areas: Reviewing scientific evidence to guide management

By Jill Landsberg, Bill Logan and David Shorthouse

This article was prepared by Jill Landsberg while a senior research scientist with CSIRO Wildlife and Ecology in Canberra, in collaboration with Bill Logan and David Shorthouse (both from Wildlife Research and Monitoring Unit, Environment ACT, PO Box 144, Lyneham, ACT 2602, Australia. Email: david_shorthouse@dpa.act.gov). The work arose from a review, in February and March 1999, of the potential effects of horse riding in Canberra Nature Park. Jill is now based in Cairns [School of Tropical Biology, James Cook University, PO Box 6811, Cairns, Qld 4870, Australia. Tel: +61-7-40421443. Email: Jill.Landsberg@dwc.csiro.au].

Summary We undertook a literature review of the impacts of horse riding in conservation areas, and used it to guide management of horse riding in Canberra Nature Park (CNP), a large, fragmented semi-natural park in and around the city of Canberra in the Australian Capital Territory. The literature review established that, because of their relatively large weight and small area in contact with the ground, horses have a relatively high potential for doing environmental damage. Impacts tend to be generally lowest for hikers, followed by motorcycles, horses and four-wheeled vehicles. One study showed horse traffic caused more damage on established trails than motorcycles, off-road bicycles or hikers. Most published studies of horse-riding impacts in Australia have been conducted in alpine and sub-alpine environments, and in temperate woodlands and forests on sandstone near Sydney. They have shown that impacts are generally highest in previously untracked areas. Impacts on established trails are generally most marked on sections of trail that are wet, boggy or steep, and on unplanned and unmaintained trails. Impacts are lowest on constructed and maintained trails. Trail proliferation, associated with avoidance of untrafficable sections and short-cutting, can be a major problem. Horses also have potential to spread weeds, because pastures and dried stock feeds contain large numbers of weed seeds that retain high levels of viability in horse manure. The risk of weed establishment is highest when manure is deposited in disturbed, damp sites, particularly when riding off-track. Much less weed establishment is apparent when horse riders remain on-track. Horse riding is a popular activity, but one that is relatively expensive to provide for, and one that may reduce opportunities for lower-impact recreational park users. For all these reasons it appears socially equitable that provision is made for lower numbers of horse riders compared to numbers of park users involved in lower impact, more passive, recreational activities. We conclude by describing how this information was used to develop principles to guide management of horse riding and assess risk at individual sites in Canberra Nature Park.

Key words Canberra Nature Park, environmental impacts, horse riding, recreational opportunities, tracks and trails, urban conservation area, urban park.

Introduction

Horse riding in conservation areas is a contentious issue, particularly on the outskirts of cities, where increasing use of parks by all types of users places greater pressure on park resources and creates greater potential for conflict between different user groups. This is exemplified by debate about the appropriateness of horse riding in Canberra Nature Park (CNP), a large, fragmented, semi-natural park in and around the city of Canberra in the Australian Capital Territory (ACT) (Fig. 1). The debate was fuelled recently by the release of a draft Plan of Management for the park that rationalized pre-existing patterns of use by permitting horse riding along a limited number of designated routes. Some

advocates of horse riding claimed they had been discriminated against because they were no longer allowed in some areas they had previously used. Many non-equestrian residents were vocal in their disapproval of horse riding being permitted anywhere in the park, largely because of perceived threats to conservation values. Resolution of the debate was hampered by a perceived lack of scientific evidence about horse-riding impacts in environments like those in CNP. In September 1998, the ACT Legislative Assembly recommended:

That the government seek expert advice . . . on the whole issue of horse riding in Canberra Nature Park . . . In particular, advice should be sought on the competing claims about the effect of horses on conservation areas and on how best to ensure

the present conservation priority can be upheld in the context of adjacent city use of Canberra Nature Park.

A consultant was contracted to prepare a report examining published evidence on the impacts of horse riding in conservation areas comparable to CNP. This article presents a summary of that report and the horse-riding policy that was developed from it for areas of CNP.

The Canberra Nature Park context

Environment

Canberra Nature Park consists of 27 discrete reserves, totalling some 6000 ha (Environment ACT 1998). It has an urban

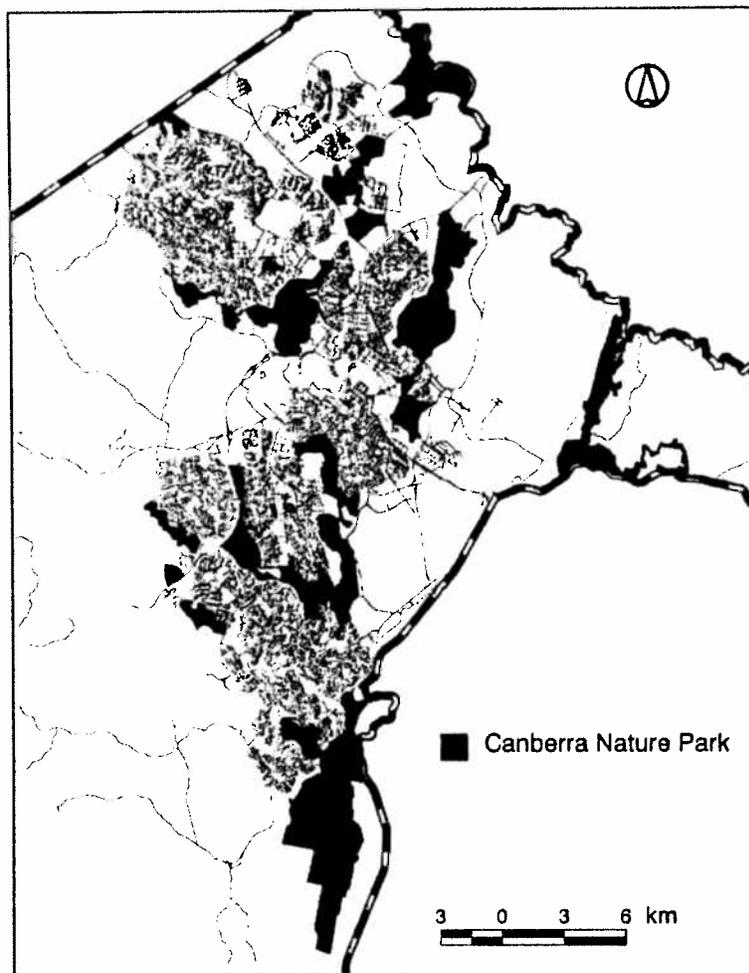


Figure 1. Map of the northern section of the Australian Capital Territory, showing the fragmented nature of Canberra Nature Park and its close association with the city of Canberra.

fringe of around 200 km and more than 6000 residential leases adjoining its boundaries. This means there are management issues for CNP that are typical of many other peri-urban parks such as: fragmentation, high rates of visitor use, provision of areas for public utilities, and greater vulnerability to domestic pets and urban encroachment. Canberra Nature Park occurs mainly on isolated hills and ridges of erosion-resistant rock and rolling country formed on moderately weathered rocks. The native vegetation is a mosaic of dry open eucalypt forest, grassy woodland and grassland, some of which retains habitat for threatened flora and fauna (Environment ACT 1998). Some areas contain mostly exotic species or mixtures following tree clearing or prior land uses. The regional climate is sub-humid and

temperate, with an annual average rainfall of 634 mm and temperature of 19.4°C.

Park management and pre-existing provision for horse riding

Conservation of the natural environment is recognized in legislation as the paramount management objective for CNP; provision for public use is a secondary objective (*Land Planning and Environment Act 1991*). Sites with special conservation significance include habitat for native flora or fauna, and sites of particular cultural, landscape or geological significance (Environment ACT 1998). Special legislative provisions under the *Nature Conservation Act 1980* apply to native plants and animals declared as threatened

with regional extinction. To date, 22 species and two ecological communities have been declared vulnerable or endangered in the ACT. Both of the endangered communities and 11 of the threatened species have been recorded or have potential to occur in CNP (Environment ACT 1998).

No data are available on the total numbers of recreational park users. Of the 550 respondents who supplied individual submissions to the draft Plan of Management, 77% visited the park more than once a month (Environment ACT 1998). Their most popular recreational activity was walking (around 90% of respondents). In addition to passive enjoyment (walking, jogging, picnicking etc.), the other recreational activities that have been permitted in the park are:

- bicycling (permitted in all 27 reserves, but restricted to formed vehicle trails)
- dog walking on leash (permitted in 17 reserves, with no restrictions about trails)
- horse riding (permitted in 12 reserves, and restricted to authorized trails).

Cars and motorcycles are not permitted in any of the reserves (except for management purposes).

Although there are no data on the number of horse riders using CNP, the ACT Equestrian Association estimated it had approximately 2000 members in 1992 (Manning 1993), many of whom would presumably ride regularly in CNP. There has been extensive provision for equestrian trails on public land in the ACT, including within conservation areas; the Canberra's Equestrian Trails pamphlet (ACT Government undated) shows 108 km of trails close to urban areas and an additional 60 km in Namadgi National Park, well to the south of the city. Nearly 40 km of trails are shown in CNP. The remaining urban trails skirt around residential areas and traverse areas of public open space, including softwood plantation forests. Underpasses and bridges have been constructed in a number of locations. The trail system has been planned to link government horse-holding paddocks and equestrian activity areas, and to connect with rural trails. The Bicentennial

National Trail uses part of the trail system to pass through the ACT (Canberra's Equestrian Trails pamphlet, ACT Government undated).

Equestrian trails are rarely single purpose, however, and are frequently used by walkers, joggers and cyclists (Manning 1993). This can cause problems for horse riders, particularly when dogs, trailbikes and cyclists frighten horses. Also, ACT equestrians have identified a number of other problems with the trail system, including poor maintenance of trails, problems with lack of separation from traffic when the trail travels along road verges, and unsafe road crossings (Manning 1993). These problems place greater pressure on the trails within CNP. Within the Park, there is a relatively low level of provision for rider satisfaction, with authorized loop trails designated in two reserves only.

Social attitudes

Many local residents have been vocal in their disapproval of pre-existing horse-riding policies in CNP, largely because of perceived risks to conservation values. ROASTING Inc. (Residents of Adjoining Suburbs Taking Interest in Nature reserve Governance) is a community group set up in 1998 for the purpose of 'defending the conservation values of the nature reserves of CNP' (P. Bell, convener of ROASTING Inc., pers. comm., 2000). It has made numerous submissions to government that are critical of management of horse riding in CNP. There is also an active, volunteer, Park Care program supported by Environment ACT. Because weed control is one of the major activities undertaken by Park Care groups, they are understandably very concerned about the potential for horses to contribute to spreading weeds into natural areas of the park.

A questionnaire survey conducted by park rangers between December 1995 and April 1996, however, provides some interesting indications that the wider community of CNP users appears to be relatively tolerant of current levels of horse riding in the Park. The survey's results need to be interpreted with caution as it is far from definitive; it was not prepared by qualified researchers, was undertaken in an unstruc-

tured manner, and may not have accessed the full range of users (Odile Arman, Manager, Canberra North District, pers. comm., 2000). The survey sought the opinions of 81 people using The Pinnacle, one of the Park reserves where horse riding has been particularly contentious. The respondents were engaged in a range of activities including walking (49%), dog-walking (16%), mountain-bike riding (16%) and jogging (11%). None was engaged in horse riding. Nearly all (94%) had used The Pinnacle before and many (81%) were regular users. Nearly all (95%) knew that horse riders used the reserve and nearly all (95%) were happy with the current level of use. Fewer people said they would be happy with an increased level of horse riding but they were still in the majority (62%).

Scientific evidence about effects of horse riding

A review of the scientific literature revealed there has been relatively little quantification of the effects of horse riding in Australian conservation areas, particularly in environments like CNP. However, numerous studies have been conducted in other areas, as summarized below.

Environmental impacts of trampling

Mechanical forces exerted by a horse and rider

The most immediate impacts on soil and vegetation caused by a horse or any other animal are those due to forces transmitted through the animal's feet. The size of these

forces is a function of the gravitational forces associated with the animal's weight, and the greatly increased forces created by movement (Liddle 1997). Gravitational force can be converted to pressure by dividing weight by the area in contact with the ground. Calculations of this sort show that the static pressure exerted by a shod horse and rider is more than 20 times the pressure exerted by a man wearing boots and more than twice the pressure exerted by a trail bike or four-wheel-drive vehicle (Table 1).

These pressures apply to static forces only; the combination of horizontal, lateral and vertical forces that come into play during movement are much greater, but also much more complex. The forces required to accelerate, decelerate or turn increase the complexity even further, as do interactions among these various forces and the ground surface (Liddle 1997). Rather than attempting to measure these complex forces, most studies focus on their net impacts on soils or vegetation.

Development of trails in previously untrampled areas

The greatest impacts of trampling generally occur on previously untrampled ground, where some disruption of the soil surface and damage to vegetation invariably occurs. This is particularly so in the montane areas where most scientific studies of the impacts of trampling on previously untracked soils have been done. Gillieson *et al.* (1987) quantified relationships between soil and vegetation changes on newly developing horse tracks in subalpine grassland in Kosciusko National Park in Australia. They found that

Table 1. Total weight, area in contact with the ground, and calculated stationary pressure exerted on the ground in association with a range of outdoor recreational activities

| Source of pressure | Average weight (g) | Contact area (cm ²) | Static pressure (g cm ⁻²) |
|--|--------------------|---------------------------------|---------------------------------------|
| Man wearing boots | 80 000 | 388 | 206 |
| Woman wearing boots | 57 000 | 356 | 160 |
| Unshod horse and rider | 613 000 | 478 | 1282 |
| Shod horse and rider | 613 000 | 140 | 4380 |
| Trail-bike | 229 000 | 114 | 2008 |
| Four-wheel-drive Toyota, empty | 2 100 000 | 1355 | 1550 |
| Four-wheel-drive Toyota, with four people and gear | 2 500 000 | 1483 | 1688 |

Source: Liddle (1997).

vegetation damage was apparent after only 10 passes by two horses, but soil damage was not apparent until 30 passes had occurred. The first soil change observed was the formation of a distinct rundle that the authors suggested would channel overland flow; at this stage of track development (30 × 2 horse passes) no significant changes were detected in soil bulk density or crust hardness or infiltration rate. They suggested that this intensity of use, equivalent to one commercial party, was probably within the use-threshold of this particular tussock grassland.

Difference among users and vegetation types. Differences among users and vegetation types. In one of the earliest studies of trampling effects, Weaver and Dale (1978) compared the effects of hikers, horses and motorbikes on previously untracked soils in natural grassland and shrubby pine forests in the mountains of Montana, USA. After 1000 passes they found that damage tended to be least on grassy and stony sites, and was generally greater on slopes than on level ground. Motorcycles were most damaging when going uphill while hikers and horses were most damaging when going downhill. In all the environments studied, horses tended to cause most damage and hikers the least. However, the motorbike in their study was small (90cc) and slow moving (20 km/h); they cautioned that a larger or faster vehicle would be likely to cause more damage. Weaver *et al.* (1979) later undertook a comprehensive review of trail development and recovery in montane regions in north-west USA. They concluded that, in terms of soil bulk density, bare ground, trail depth and trail width, impact generally increases with increased user numbers regardless of user identity, but that impact per number of user passes generally increases from hiker, motorcycle to horse. Liddle (1997) used these data and several other sources of information to calculate and compare use-thresholds for different types of users (Table 2). In three different environments, tolerance to trampling (indicated by a high use-threshold) was consistently highest for walkers, followed by motorcycles, horses and a light van.

The relatively high use-thresholds shown by grasslands in the Rocky Mountains (Table 2) have also been demonstrated in Australian alpine grasslands. In the Central Plateau of Tasmania, for example, Whinam *et al.* (1994) showed that 20–30 horse passes were sufficient to cause changes in shrubland, herbfield and bolster heath, but had little effect on dry grassland.

There are relatively few other data comparing use-thresholds for horse riding in different environments, but Liddle (1997) compiled an extensive set of data comparing pedestrian use-thresholds (Table 3). These data indicate that, at least for walkers, some types of eucalypt woodland have an extremely low tolerance of trampling. They also illustrate the huge range of tolerances shown by similar vegetation types in different environments. For example, grasslands on sand dunes in Scotland have a relatively low use-threshold, but pastures on sand dunes in Wales and subtropical grasslands near Brisbane have the highest use-thresholds of any of the

vegetation types compared. There may also be seasonal differences. For example, Weaver *et al.* (1979) found that trampling the Rocky Mountains in spring had generally smaller impacts on vegetation. Rates of recovery also varied, with montane grassland recovering more quickly than forest.

Liddle (1997) suggested that the productivity of different environments might be a useful predictor of their tolerance of trampling, with vegetation in productive environments tending to be more tolerant of trampling. However, this is a generalization that needs to be treated with caution; damp areas are frequently very productive but they are also very vulnerable to trampling damage, and fertile areas while productive are often vulnerable to weed invasion.

Changes in plant composition. Use-thresholds usually indicate gross changes in vegetation cover or structure, but more subtle changes in plant composition also occur. Dale and Weaver (1974) and Weaver *et al.* (1979) found that, although the biggest impacts occur on the trail itself,

Table 2. Comparison of the number of passes required to reach a use-threshold of 50% reduction in vegetation cover for walkers, motorcycles, horses and a light van

| Environment | User | Use-threshold |
|--------------------------|------------|---------------|
| Rocky Mountain forest | Walker | 300 |
| | Motorcycle | 80 |
| | Horse | 80 |
| Rocky Mountain grassland | Walker | 1100 |
| | Motorcycle | 1000 |
| | Horse | 650 |
| Welsh sand dune pasture | Walker | 1828 |
| | Light van | 203 |

Source: data compiled by Liddle (1997).

Table 3. Comparison of the number of pedestrian passes required to reach a use-threshold of 50% reduction in vegetation cover for a range of different communities

| Vegetation type | Location | Use-threshold |
|---------------------------------|-----------------|---------------|
| Eucalypt woodland | Brisbane | 12 |
| Snow-bank community | Rocky Mountains | 44 |
| Spruce woodland | Finland | 48 |
| Stone stripe community | Rocky Mountains | 57 |
| Grassland on sand dunes | Scotland | 119 |
| Heath on acid soils | Scotland | 161 |
| Heath on sand dunes | Denmark | 258 |
| Forest floor | Rocky Mountains | 300 |
| Subtropical rainforest clearing | Brisbane | 550 |
| Grassland in mountains | Rocky Mountains | 1000 |
| Pasture on sand dune | Wales | 1445 |
| Grassland in subtropics | Brisbane | 1412 |

Source: data compiled by Liddle (1997).

changes were also apparent away from its edges. Not only did some plants common in forest understorey, particularly shrubs and taller trees, disappear from the edge of trails, other plants, especially introduced and native grassland species, became more common.

There are probably multiple causes of these differences, including direct effects of trampling and changes in light, seed supply, soil water and nutrients following soil disturbance. In an English heath, Liddle and Chitty (1981) showed that elevated soil nutrients were particularly important in contributing to changes in the composition of plant species along horse tracks. Although some of the nutrients may have come from manure, they suggested that much of the increase in nutrients may have come from breakdown in soil organic matter and other soil changes caused by trampling.

Impacts on existing trails

Existing trails are more robust, and horse riding on them may cause negligible damage in some environments. In a study in the Rocky Mountains of Colorado, Summer (1980, 1986) found that the most influential factors affecting trail degradation were soil parent material, texture and organic content, grade of trail and side-slope, rockiness, and type of vegetation. In the environments she studied, trails were most resistant to damage by horse traffic when they crossed rock outcrops, slopes of talus (broken fragments of bedrock), and tops of moraines. Trails on level valley floors and terraces with well-drained soils were resistant to erosion, but susceptible to trail widening over time. The trails most vulnerable to horse traffic were those that crossed colluvial slopes (colluvium is rock and soil transported by gravity), moraine sideslopes, wet bogs and alpine areas. Gillieson *et al.* (1987) found similar differences in vulnerability along an established horse trail in subalpine woodland in Australia, with impacts on plant cover being most marked on the wettest parts of the trail.

One of the most detailed studies of impacts on trails constructed to different standards (Table 4) was undertaken by Uptis (1980), in eucalypt forest on sand-

Table 4. Classes of trails distinguished in Ku-ring-gai Chase National Park

| Class | Construction | Description |
|-------|-------------------------------------|---|
| 1 | Unplanned and unmaintained trails | Narrow (0.8–2 m), ill-defined, often bifurcating trails formed by repeated trampling of the vegetation. |
| 2 | Constructed but unmaintained trails | Wider (2–4 m) trails constructed at some time by park managers, but no longer maintained. |
| 3 | Constructed and maintained trails | Wide (5–9 m) trails constructed and currently maintained by management. They are characterized by a lack of vegetation, presence of drains and culverts and, in some cases, paving materials. |

Source: Uptis (1980).

stone soils in Ku-ring-gai Chase National Park near Sydney. Horses accounted for around 80% of the trail use during her study. In general, trail condition was poorest (in terms of erosional features and sediment movement) on trails in construction class 1 (unplanned and unmaintained) and best on trails constructed to class 3 (constructed and maintained), even though class 3 trails tended to have the highest levels of use. In addition, trails on steeper slopes (greater than about 7° in this environment) were frequently in poor condition, regardless of class of construction.

Differences among users and vegetation types. Experimental work by Wilson and Seney (1994) in the Rocky Mountains in Montana compared impacts on established trails from a range of recreational uses. They found that horses and hikers contributed more to sediment movement than either motorcycles or off-road bicycles, and that this effect was most pronounced when trails were wet. Horse traffic yielded the most sediment movement overall, on both wet and dry tracks. In

a recent study of recreational impacts in the Wet Tropics World Heritage Area in north-eastern Queensland, Turton and colleagues assessed biophysical impacts on both walking and mountain-bike tracks (Day & Turton 2000; Turton *et al.* 2000). The relative impacts of the two activities have yet to be compared, but indicators of impact levels appear similar on both types of tracks.

Whinam and Comfort (1996) showed that there were big differences among vegetation types in the amount of track degradation caused by horse riding on pre-existing trails in subalpine environments in Tasmania. The sites they monitored were cross-sectional transects located across existing commercial horse-riding trails. All were affected by horse traffic, but those in eucalypt forest and moorland were affected most and those in rainforest least (Table 5). The highest rate of soil loss occurred from a site in eucalypt forest where there was a log across the trail, the next highest loss was from a peaty moorland site. Rates of soil loss were lowest from the rainforest sites, possibly

Table 5. Vegetation types, drainage, track width and soil erosion from monitoring sites across pre-existing trails used by horse riders in subalpine Tasmania

| Site | Vegetation type | Drainage | Track width (cm) | Soil loss or gain after 24 months (cm ² per 1 m width) |
|------|-----------------|----------------|------------------|---|
| 1 | Rainforest | Well drained | 80 | +9 |
| 2 | Rainforest | Well drained | 220 | -35 |
| 3 | Eucalypt forest | Well drained | 115 | -108 |
| 4 | Eucalypt forest | Well drained | 140 | -397 |
| 5 | Moorland | Poorly drained | 210 | -236 |

Source: Whinam and Comfort (1996)

Note: the gain in soil recorded at one site was due to the shoulders of the track collapsing in across the monitoring transect.

because of churning and re-working of the humus soil between tree roots.

Impacts on formed roads

With the exception of the study by Uptis (1980), most of the research that has been done on the impacts of horse riding on trails has not described how the trails were constructed. However, the usual inference is that the trails have mainly developed through repeated use. In many conservation areas in Australia (e.g. many Victorian national parks), horse riding occurs on vehicular roads constructed for purposes such as management access and bushfire management. Provided trails such as this are maintained and do not traverse steep slopes, they may be capable of sustaining relatively high levels of use by horses and vehicles (Uptis 1980).

Trail proliferation

Recreational users do not always stay on established trails. In a general discussion of effects of hikers and horses on mountain trails, McQuaid-Cook (1978) noted that trail proliferation is one of the biggest environmental issues associated with trails. For example, trails making long stretches of switchbacks up a steep slope are frequently disregarded in favour of faster, but much more damaging, short-cuts straight up the hill. Also, if the surface of an existing trail becomes untrafficable due to damage or tree fall, riders bypass the damaged section by riding around it. Trail braiding of this sort has been demonstrated in subalpine environments in Tasmania (Whinam & Comfort 1996) and in lowland eucalypt forests near Sydney (Uptis 1980). Uptis estimated the rate of proliferation of trails in Ku-ring-gai Chase National Park to have been about 0.6 km/year during the 30 years prior to her 1980 study.

McQuaid-Cook (1978) suggested that horses, especially when shod, cause more damage than hikers on steep short-cuts. He also suggested that equestrian trails generally have a less compacted and often more incised path than pedestrian trails, particularly in areas of moderate slope. This he attributed to shod hooves tending to loosen and move soil rather than flatten

and harden it. However, these suggestions need to be treated with some caution, since no scientific evidence is cited in their support.

Contribution of horses to the spread of weeds

The contribution of horses to the spread of weeds is one of the key environmental concerns raised by members of the community concerned about horse riding in CNP (Standing Committee on Urban Services 1998).

Horses as agents of weed spread. There is potential for horses to act as agents of spread of the plants they eat, because seeds of many plant species pass uninjured through the digestive tracts of horses. Small seeds or seeds with hard seed coats have the highest levels of survival, with highest rates of transmission 2 and 3 days after ingestion. However, a small number of seeds may be passed up to 13 days after ingestion (St John-Sweeting & Morris 1991). Weaver and Adams (1996) recorded 29 plant species germinating from horse manure samples collected from horse trails in three national parks in Victoria. The most widespread and abundant species were Winter Grass (*Poa annua*) and Hare's-foot Clover (*Trifolium arvense*).

Sources of potential weed seed in horse diets include both local pastures and dried stock feeds, which may be rich in weed seed. For example, hay and grain imported for feeding livestock during the 1980-1981 drought in southern New South Wales contained viable seeds of many weedy species. The most common were Paterson's Curse (*Echium plantagineum*), Wild Radish (*Raphanus raphanistrum*), Sorrel (*Acetosella vulgaris*), Swamp Dock (*Rumex brounii*), Buchan Weed (*Hirshfeldia incana*), Knotweed (*Polygonum aviculare*) and Onion Grass (*Romulea rosea*) (Thomas *et al.* 1984).

Weed establishment in disturbed areas. Horse trails may also provide environments suitable for establishment of many species of weeds, regardless of the primary agent of transport of the seed. Many introduced herbs (grasses and forbs) seed prolifically, and opportunistically occupy

disturbed spaces. They also tend to have high relative growth rates and compete vigorously for available moisture, thereby inhibiting recruitment of native species; tendencies that are exacerbated in nutrient-enriched sites. Thus, disturbed sites within any environment are very vulnerable to invasions by many species of introduced grasses and forbs; and sites such as watercourses are particularly vulnerable because they also represent the mesic end of local moisture gradients (Humphries *et al.* 1991). The extent to which horse trails provide conditions for weed establishment therefore depends on the degree of disturbance associated with them, and their moisture and nutrient status. Logically, the potential for weed establishment on horse trails is likely to be greatest on softened tracks in damp areas, particularly if soils are also fertile. Manure deposited in disturbed, damp sites could pose a particular risk.

Horses and weed spread in conservation areas. Despite the clear potential for weeds to be spread by horses and/or establish along horse trails, there have been relatively few scientific studies of this issue. Gibbs (1993) cites unpublished work by Ziegeler suggesting that there are greater levels of weed infestation in Tasmanian wilderness areas along tracks frequented by riding parties when compared with walking tracks. In experiments with horse manure in alpine environments in Tasmania, Whinam *et al.* (1994) showed that the highest rates of weed establishment occurred at shrubland sites where the soil had been disturbed and grazing by rabbits and native marsupials was experimentally excluded. However, few weeds established in open plots that were not protected from grazing by wild animals, particularly in grassland. Nor were any weeds observed during a study of the impacts of horse riding on pre-existing trails in the Central Plateau Conservation Area of Tasmania (Whinam & Comfort 1996). Similarly, Gillieson *et al.* (1987) did not record any weed establishment during their study of horse-riding impacts in tussock grassland in Kosciusko National Park.

The most comprehensive study undertaken of horse and weed association in

Australian conservation areas is that of Weaver and Adams (1996) in Kinglake, Otway and Alpine National Parks in Victoria. They found there was substantial overlap in the weed species germinated from horse manure and the weeds present along trails used by horses, indicating that horses were probable agents of spread of at least some of the weeds established along trails. However, they also cautioned that many of the species that can germinate from manure were not present on track verges, presumably because track conditions did not favour their establishment. There are several possible reasons. For example, Liddle and Chitty (1981) suggested that lack of water may inhibit some species from establishing on trails in dry environments, while Whinam and Comfort (1996) suggested that continued churning by horses may also inhibit successful establishment of some species that germinate from manure. Weaver and Adams (1996) cautioned that many of the weed species associated with horse trails may also be introduced by vectors such as vehicles and birds. For example, Hatton (1989) showed that Sweet Briar (*Rosa rubiginosa*) can be spread by both horses and birds together, or by either in isolation if the other is not present; and Wace (1979) showed that there is considerable potential for weeds to be spread by vehicles.

Weaver and Adams (1996) concluded that, while banning horse riding would not necessarily prevent weeds from spreading to nature reserves, concerns about dispersal of weeds by horses are legitimate. They also found that when horses were closely confined to a track, weed establishment was much reduced. They sampled weed distribution away from seven tracks, five of which had no physical constraints on off-track riding and two of which were constrained by very steep slopes on either side of the track. Near the tracks where horses were not constrained, numbers of weed species showed a clear pattern of decline with distance from track, with some weed species still apparent 20 m from the track margin. However, only one species, Winter Grass, established near the two tracks where horses were constrained, and it was restricted to the track margins.

Socioeconomic issues

Management objectives

There are agreed national standards for management of protected areas when the primary purpose is nature conservation (Australian Nature Conservancy Agency and New South Wales National Parks and Wildlife Service 1995). Two points are particularly relevant when a specified, legally defined State or Federal management objective is oriented to protection and maintenance of biodiversity. The first is about the concept of 'natural' in the Australian context:

... ecosystems presumed to be present at the time of European settlement (1788) represent natural ecosystems; and 'natural' areas are those which largely retain the landscape character that existed prior to European settlement. (p. 6)

The second point of agreement is about land allocation when there are conflicting land uses:

At least three-quarters and preferably more of the area must be managed for the primary purpose of biological conservation; and the management of the remaining area must not conflict with that primary purpose. (p.10)

Since horses are not native animals there is usually legislation governing whether, and if so where and when, horses may be taken into public land managed for nature conservation. There may also be legislative restrictions on the type of building and other works permitted on public conservation land. This could constrain the construction or maintenance of roads, tracks, fences, gates or other infrastructure or amenities provided for equestrian use.

Most urban conservation areas are also managed to provide for some level of recreational use, as is the case in CNP (*Land Planning and Environment Act 1991*).

Provision for recreation

The challenge for management is to provide a balance between allowing people to visit and experience conservation areas without causing the areas to become so degraded that they lose

their conservation value. Furthermore, because different sections of the Australian community enjoy different recreational activities, potential exists for some activities to reduce the spectrum of recreational opportunities available for others. While various models (reviewed by McArthur 2000) have been used to determine appropriate management provision for recreation, one of the most widely applied to natural areas in Australia is the Recreational Opportunity Spectrum (ROS) (van Oosterzee 1984; McArthur 2000). Under this model, each recreation opportunity is seen as having natural dimensions such as landscape and vegetation, recreational dimensions such as the level and nature of use, and management dimensions such as facilities and regulations. The management dimensions seen as appropriate for providing natural recreational opportunities include semi-natural access and non-mechanical forms of conveyance (feet mainly), limited and natural-appearing onsite management, infrequent social interactions, limited regimentation of visitors, and limited evidence of visitor impact (Clark & Stankey 1979, cited in van Oosterzee 1984).

Popularity of horse riding

Horse riding is a popular recreational activity in Australia, receiving various levels of government recognition and support. The Bicentennial National Trail, a joint project between government agencies and equestrian associations, provides a continuous route for riding horses from Cooktown in Queensland to Melbourne in Victoria, passing through the ACT en route. Some sections of the Bicentennial National Trail pass through conservation areas. Independently of the Bicentennial National Trail, urban conservation areas in several States experience high levels of equestrian activity, reflecting the popularity of horse riding among suburban residents. Few detailed data are available, however, numbers of horse riders using several of Sydney's suburban National Parks were estimated at more than 1000 during 1995-1996 (Harden 1996).

Potential for conflict between users

As with many other aspects of the controversy surrounding horse riding in conservation areas, there is surprisingly little documentation about how it is perceived by other users. Australian reviews generally cite American work. For example, Harden (1996) cites work by Watson *et al.* (1994) in the John Muir Wilderness, USA, that found about one-third of walkers who met horse riders disliked the encounter, although their reasons were not stated. Gibbs (1993) cites work by Stankey (1973) in wilderness areas in Wyoming, where user perceptions of conflict varied with environment and level of use. In one area where back-packing was the norm, 59% of parties preferred not to meet horse riders, while in a second area where stock use was common only 21% of walkers preferred not to meet horse riders.

In the United Kingdom, Banister *et al.* (1992) surveyed the attitudes of walkers, anglers and cyclists to other users along canal-side towing paths popular for a range of recreational activities. The users reported as being most likely to affect respondents' enjoyment if their numbers increased were motorcyclists (who were almost universally disliked) and horse riders (disliked by about half of respondents). Cyclists were disliked by about a third of respondents, anglers by about 20% and walkers by about 10%.

Conversely, other recreational activities may cause problems for horse riders. Horses may be frightened by loud noises, sudden movements and unfamiliar objects and may therefore be startled or become uncontrollable if suddenly confronted with other trail users, particularly cyclists and dogs (Manning 1993). Because of the size and nature of horses, they may pose risks to the safety of riders or other recreational users of public conservation areas. There is anecdotal evidence that potentially risky encounters with other users occur, but there is little evidence of horse-related injuries occurring in conservation areas.

Financial costs

The financial costs associated with managing facilities for horse riding can be substantial. Gibbs (1993) reported that the

North Metropolitan District of the New South Wales National Parks and Wildlife Service allocated \$80 000 from its annual budget to maintain a network of bridle tracks in Ku-ring-gai Chase National Park and other north metropolitan parks. Harden (1996) cited an unpublished report by Davidson *et al.* (1994) that estimated it would cost \$325 000 to repair and upgrade 33 km of horse tracks in Ku-ring-gai Chase (excluding supervision costs), and a further \$34 000 per annum for maintenance. Thus the estimated cost of repairing and upgrading tracks in this dry eucalypt forest was approximately \$10 000 per km initially, plus an extra annual expenditure of \$1000 per km for maintenance. Similar costs were estimated for track works in subalpine environments in Tasmania (Whinam & Comfort 1996). The cost of rehabilitating 2 km of four-wheel-drive track used by riders was estimated to be of the order of \$17 000, while the cost of basic hardening of 900 m of track was estimated at \$26 000. Track drainage, realignments to avoid problem areas and track hardening are the main forms of track remediation recommended by Harris (1993) for the horse tracks in the Victorian Alps.

Policing and enforcing compliance with restrictions on access can also be costly in terms of staff time and provision of infrastructure such as signs, fences and access points. Current estimates of costs for infrastructure used to manage horse riding in CNP include: \$100-200 per sign, \$4500 per km for fencing and \$1500 per cavaletti crossing. (Cavalettis are special barriers that can be crossed by horses but not wheeled vehicles.) Signs are required for most recreational activities, but the other requirements are either specific to horse riding (fencing and cavalettis) or much higher for horse riding than for other recreational activities (trail maintenance and hardening). Fencing is used to create laneways that constrain riders to authorized trails; this cost could be avoided if riders complied with regulations restricting them to authorized trails.

Social equity

On grounds of social equity, all recreational activities in publicly owned conservation areas should be treated

equivalently, to the extent they do not compromise the primary objective of management for nature conservation (Vollbon 1996) and do not impose conditions (such as noise pollution, danger or physical competition) which competitively exclude other recreational users (McArthur 2000). Thus, equity also implies equal responsibility to conform to rules established to minimize impacts and conflicts between users. Equity in terms of not compromising nature conservation values is not the same as treating each person equally, regardless of activity. A single horse rider generally has a greater negative impact on conservation values than a single dog walker or hiker. Furthermore, the management resources required to provide for a single rider are frequently greater than the resources required to provide for a single participant in many of the other recreational activities that occur in conservation areas. Vollbon (1996) argued that it is therefore socially equitable for more walkers than riders to use conservation areas, on the grounds that walkers individually do less damage, and cost less to manage.

Implications for managing horse riding in Canberra Nature Park

Probable high risk of environmental damage in some areas

There is a large body of scientific evidence indicating that environmental damage is very likely to occur when horses are ridden off established trails, on poorly constructed or maintained trails, and on trails across steep, wet or boggy terrain. Environmental damage is most likely to have serious consequences for nature conservation when it affects areas that have high natural integrity or provide habitat for threatened flora and fauna. Objective criteria can be constructed for assessing different areas according to level of risk posed by horse riding. Since nature conservation is the paramount management objective of the CNP, it is reasonable that horse riders should be denied access to areas of the Park where there are high risks of damage to nature conservation values.

Apparently low risk of environmental damage in other areas

There are few studies and no scientific evidence of environmental damage caused specifically by horses when they are ridden along well-constructed and -maintained trails across gently sloping, well-drained terrain. There are, instead, rational grounds for suspecting that horses may cause negligible damage under these circumstances. However, this conclusion is based on an absence of reports of damage, rather than any positive evidence that damage does not occur. In particular, there have been few studies of weed spread associated with horse use of such trails. There is therefore an urgent need for undertaking a carefully designed monitoring study that will allow a more informed decision to be made. Management policies should be sufficiently flexible to allow appropriate adaptive responses to the results of monitoring.

Need for equity in providing opportunities for natural recreation

If the precautionary principle were to be strictly applied, most recreation activities could be banned from all Australian conservation areas including CNP, on the grounds that they undoubtedly pose an inherent risk of causing environmental damage. It would not be equitable to single out horse riding on these grounds only. However, levels of environmental impact vary, as do levels of impact on other people's experience. The balance of evidence suggests that, per user, horse riding is probably associated with higher environmental impacts than any of the other recreational activities permitted in CNP. Management costs are also higher. Furthermore, although the effect of low levels of horse riding on the recreational experience of other users may not be high, there is sufficient potential for conflict to justify limiting the level of horse-riding activity. Thus, while it would not be equitable to ban horse riding altogether, it would be equitable to restrict it to a greater extent than other less damaging and/or conflicting recreational activities.

Principles to guide management of horse riding in Canberra Nature Park

The following principles for the provision of recreational horse riding opportunities in CNP were developed within the constraint that horse riding in the Park must not compromise primary management objectives for conservation of the natural environment. They reflect the potential for horses to impact mechanically upon vegetation and ground surfaces and to introduce weeds to natural areas. They also take account of the historical development of a horse-trail network that links government horse paddocks, provides the ACT component of the bicentennial horse trail and currently is dependent upon access to parts of CNP for continuity. Safety and conflict issues associated with using and sharing multi-purpose facilities are also recognized.

1. **The activity being provided for is recreational trail riding.** More specialized activities that involve off-trail or fast riding, such as training for or conducting cross-country or endurance events, are not appropriate and will not be provided for. Commercial horse riding will be subject to the same management principles, in addition to any applicable concessions policy.
2. **Dogs will not be allowed to accompany horses and riders in CNP,** because of the potential for accident, injury and disturbance.
3. **Horse riding will be confined to specified trails that form part of the ACT horse-trail network.** Priority will be given to maintaining trail links that service government horse paddocks and the bicentennial trail. Trails will be identified by appropriate signage.
4. **Trails will be located near the perimeter of reserves and in zones that have already been extensively modified,** as far as possible, so that potential for undesirable impact on nature conservation values can be

either avoided or subject to low risk. Gentle grades will be preferred.

5. **Trails will be constructed and maintained to a standard** that is characterized by: adequate drainage in wet areas; a hard or stable surface so that erosion potential is minimized; few opportunities for weed establishment by having a hard surface, or being located in a disturbed area that already is dominated by exotic species; and adequate visibility and passing width for riders and other users.
6. **Where discrete sites of scientific, ecological or cultural significance may be subject to, or at risk of, damage, horse riding will be excluded or physically separated** from these sites by trail location or barriers.
7. **Rationalization of horse trails will be necessary where pre-existing horse-riding activities are in conflict with conservation requirements.** Where a trail forms an important link in the horse-trail network and there is no readily available alternative route, horse riding may be allowed to continue if the trail is of satisfactory construction and maintenance standard, and impact can be confined to the trail. Changes may need to be staged (e.g. to allow an alternative route to be developed before closing a trail segment).
8. **A high degree of rider compliance will be required** if horse riding on unfenced trails is to continue in CNP. A code of conduct for equestrian use of CNP will be developed in collaboration with the equestrian community.
9. **A programme for monitoring will be developed** for levels of use of horse trails, compliance with use constraints (including any code of conduct) and the impact of horse-riding activities on nature conservation values, and the experience of other park users.
10. **These principles may be modified** if the results of the monitoring programme indicate that the impacts of horse-riding activities are unacceptably high.

Assessing risk at individual sites within CNP

Individual areas of CNP were evaluated to determine their suitability or otherwise for horse riding according to these principles, using a proforma for recording objective assessment of risk (available on request from Bill Logan or David Shorthouse). This procedure was applied to all areas with established patterns of equestrian use, and to other areas where horse riding was a subject of contention. Of the 13 separate reserves that were evaluated, 12 were found suitable for some level of horse-riding activity. In many cases the existing horse trails were in highly modified areas and of satisfactory standard. Some otherwise satisfactory trails were identified as needing drainage works, and several short steep sections were also identified for upgrading or re-routing. Several possibilities for new perimeter trails to provide circuit loops were identified for exploration. Several trails that crossed reserves or did not meet safety or construction standards were deemed unsuitable and will be closed. Several other long-established trails across reserves were identified as potentially suitable, providing that riders exhibit very high levels of compliance in using only designated trails. The amended horse-riding policy for CNP has established a framework for management of a recreational activity that has been dogged by controversy for several years. While some criticism is still in evidence, the process has advanced to a stage where management decisions can be taken in an open, consistent and justifiable manner. All sides have increased certainty as to where horse riding is or is not permitted. Implementation of horse-riding policy will be a continuing activity involving consultation with both proponents and antagonists. The monitoring programme will be crucial for showing whether it is also compatible with CNP's paramount management objective of nature conservation. In the absence of local data, the policy is necessarily based on reasonable hypotheses. Future management will need to embrace an adaptive approach that ensures new knowledge, including the results of monitoring studies, is used to modify manage-

ment practices as necessary to achieve primary conservation outcomes.

Acknowledgements

We thank Mark Dunford, Environment ACT for drafting the figure, Frank Ingwerson, Environment ACT, for his extensive search of the literature, Alison Ramsey, NSW National Parks and Wildlife Service for access to the unpublished report by R. Harden (1996), and Odile Arman, Parks and Conservation Service ACT, for allowing us to use unpublished survey data.

References

- Australian Nature Conservancy Agency and New South Wales National Parks and Wildlife Service (1995) Application of IUCN Protected Area Management Categories Draft Australian Handbook. Unpublished report prepared for the Australian and New Zealand Environment and Conservation Council (ANZECC).
- Banister C., Groome D. and Pawson G. (1992) The shared use debate: a discussion on the joint use of canal towing paths by walkers, anglers and cyclists. *Journal of Environmental Management* **34**, 149–158.
- Clark R. N. and Stankey G. H. (1979) The Recreational Opportunity Spectrum: a framework for planning, management & recreation. USDA Forest Service General Technical Report PNW-98.
- Dale D. and Weaver T. (1974) Trampling effects on vegetation of the trail corridors of north Rocky Mountain Forests. *Journal of Applied Ecology* **11**, 762–772.
- Davidson D., Corbett M. and Wright J. (1994) Track and trail upgrading and management — Kuring-gai Chase National Park and adjoin land. Unpublished report to National Parks and Wildlife Service, Sydney; cited in Harden (1996).
- Day T. J. and Turton S. M. (2000) Ecological impacts of recreation along mountain bike and walking tracks. In: *Impacts of Visitation and Use: Psychosocial and Biophysical Windows on Visitation and Use in the World Heritage Area*. (eds J. M. Bentrupperbaumer and J. P. Reser) pp. 143–152. Cooperative Research Centre for Tropical Rainforest Ecology and Management, Cairns.
- Environment ACT (1998) CNP Management Plan, December 1998 Draft. Department of Urban Services and Parks and Conservation Service, ACT Government, Canberra.
- Gibbs R. (1993) Australian Alps National Parks Horse Riding Management Strategy. Prepared for the Australian Alps Liaison Committee Recreation and Tourism Working Group June 1993 (Program Co-ordinator, Janet Mackay).
- Gillieson D., Davies J. and Hardy P. (1987) Gurragorambla Creek horse trail monitoring, Kosciusko National Park. Unpublished paper to Royal Australian Institute of Parks and Recreation Conference, Canberra.
- Harden R. (1996) (Task Force Convenor) Proposal for research into recreational horse riding in service reserves and wilderness areas. Unpublished report to NSW NPWS, Sydney.
- Harris J. (1993) Horse riding impacts in Victoria's Alpine National Park. *Australian Ranger* **27**, 14–18.
- Hatton T. J. (1989) Spatial patterning of sweet briar (*Rosa rubiginosa*) by two vertebrate species. *Australian Journal of Ecology* **14**, 199–205.
- Humphries S. E., Groves R. H. and Mitchell D. S. (1991) Plant invasions of Australian ecosystems. In: *Plant Invasions The Incidence of Environmental Weeds in Australia*. pp. 1–134. Kowari 2, Australian National Parks and Wildlife Service, Canberra.
- Liddle M. (1997) *Recreation Ecology*. Chapman & Hall, London.
- Liddle M. J. and Chitty L. D. (1981) The nutrient-budget of horse tracks on an English lowland heath. *Journal of Applied Ecology* **18**, 841–848.
- Manning M. (1993) Demographic characteristics of users, utilization levels and problems of the ACT urban equestrian trail system. Undergraduate thesis, School of Applied Science, University of Canberra, Canberra.
- McArthur S. (2000) Visitor management in action — An analysis of the development and implementation of visitor management models at Jenolan Caves and Kangaroo Island. PhD thesis, University of Canberra, Canberra.
- McQuaid-Cook J. (1978) Effects of hikers and horses on mountain trails. *Journal of Environmental Management* **6**, 209–212.
- St John-Sweeting R. S. and Morris K. A. (1991) Seed transmission through the digestive tract of the horse. In: *Plant Invasions The Incidence of Environmental Weeds in Australia*. pp. 170–172. Kowari 2, Australian National Parks and Wildlife Service, Canberra.
- Standing Committee on Urban Services (1998) Final draft management plan for CNP Report Number 7. Legislative Assembly for the Australian Capital Territory, Canberra.
- Stankey G. H. (1973) Visitor perception of wilderness recreation carrying capacity. USDA Forest Service research paper INT-142; cited in Gibbs (1993).
- Summer R. M. (1980) Impact of horse traffic on trails in Rocky Mountain National Park. *Journal of Soil and Water Conservation* **35**, 85–87.
- Summer R. M. (1988) Geomorphic impacts of horse traffic on montane landforms. *Journal of Soil and Water Conservation* **42**, 128–128.
- Thomas A. G., Gill A. M., Moore P. H. R. and Forcella F. (1984) Drought feeding and the dispersal of weeds. *Journal of the Australian Institute of Agricultural Science* **1984**, 103–107.
- Turton S. M., Kluck T. and Day T. J. (2000) Ecological impacts of recreation along walking tracks. In: *Impacts of Visitation and Use: Psychosocial and Biophysical Windows on Visitation and Use in the World Heritage Area*. (eds J. M. Bentrupperbaumer and J. P. Reser) pp. 135–142. Cooperative Research Centre for Tropical Rainforest Ecology and Management, Cairns.

- Uptis A. I. (1980) An integrated study of tracks in Kuring-gai Chase National Park with implications for management. BSc (Hons) thesis, Macquarie University, Sydney.
- van Oosterzee P. (1984) The recreation opportunity spectrum: its use and misuse. *Australian Geographer* **10**, 97-104.
- Vollbon T. (1996) Horse riding in National Parks: a management view. *Australian Parks and Recreation* **26**, 45-47.
- Wace N. (1979) Assessment of dispersal of plant species — the car-borne flora in Canberra. *Proceedings of the Ecological Society of Australia* **10**, 167-186.
- Watson A. E., Niccolucci M. J. and Williams D. R. (1994) The nature of conflict between hikers and recreational stock users in the John Muir Wilderness. *Journal of Leisure Research* **26**, 372-385; cited in Harden (1996).
- Weaver T. and Dale D. (1978) Trampling effects of hikers, motorcycles and horses in meadows and forests. *Journal of Applied Ecology* **15**, 451-457.
- Weaver T., Dale D. and Hartley E. (1979) The relationship of trail condition to use, vegetation, user, slope, season and time. In: *Recreational Impact on Wildlands*. (ed. T. Ittner) pp. 94-100. USDA Forest Service Publication R-6-001-1979.
- Weaver V. and Adams R. (1996) Horses as vectors in the dispersal of weeds into native vegetation. *Proceedings of the Eleventh Australian Weeds Conference*. pp. 383-397.
- Whinam J. and Comfort M. (1996) The impact of commercial horse riding on sub-alpine environments at Cradle Mountain, Tasmania, Australia. *Journal of Environmental Management* **47**, 61-70.
- Whinam J., Cannell E. J., Kirkpatrick J. B. and Comfort M. (1994) Studies on the potential impact of recreational horseriding on some alpine environments of the Central Plateau, Tasmania. *Journal of Environmental Management* **40**, 103-117.
- Wilson J. P. and Seney J. P. (1994) Erosional impact of hikers, horses, motorcycles, and off-road bicycles on mountain trails in Montana. *Mountain Research and Development* **14**, 77-88.
- Wyatt A. (1992) Annual review of horse riding within Kuringai National Park and Davidson State Recreation Area, North Metropolitan District. Unpublished report to NSW National Parks & Wildlife Service; cited in Gibbs (1993).

Enclosure 35



Velvet Grass in the Kern Canyon

What is velvet grass and why is it important?

Velvet grass (*Holcus lanatus*) is a perennial bunchgrass native to Europe with velvety gray-green leaves. It is a highly invasive species because it produces a large amount of seed and rapidly colonizes disturbed ground. Estimates of seed production range from 850 to 240,000 seeds per plant. The grass dominates habitats by forming dense patches with impenetrable root mats, making it impossible for other seeds to get started. Velvet grass prefers seasonally wet locations, but its seeds survive droughts and hot summers. It has been found in Yosemite National Park in conditions ranging from standing water to extremely hot and dry upland habitat. It has already reached almost untreatable proportions in other parks in California, such as Point Reyes National Seashore.



Velvet grass was introduced to North America in pasture seed mixes, and it has been quietly invading mid-elevation meadows in the Kern Canyon for several years. Velvet grass has the potential to completely take over and replace most of the plants in meadows, wetlands, and riparian areas. These ecosystems are critical for habitat protection, native species diversity, biomass, productivity and scenic vistas.

What is the NPS doing about velvet grass in the Kern Canyon?

Velvet grass was discovered in the Kern Canyon in 2005 in the two pastures at Kern Ranger Station and at Lower Funston Meadow. A single patch found at Upper Funston Meadow was removed. A coordinated effort to control velvet grass through hand pulling started in these sites in 2006 and 2007. Surveys also reveal numerous populations on USFS lands south of the Kern Ranger Station.

In 2008, we will focus efforts on controlling these populations in the park while striving to maintain the remaining wildlands in a weed-free condition. We will continue to handpull velvet grass in the Kern pastures and Lower Funston Meadow, while closely monitoring the rest of the canyon for any new introductions. This year some dense patches of velvet grass, totalling $\frac{1}{2}$ acre, will be treated with an aquatically-approved herbicide called Aqua Neat. This herbicide contains glyphosate, the same active ingredient found in Roundup. It is among the safest herbicides for humans and the environment. Through vigilance, we hope to stop the spread of this invasive weed while controlling the established populations. In the long term, we hope to be able to eradicate this plant from park lands.

Special grazing restrictions in the Kern Canyon in 2008

The Sequoia-Kings Canyon Wilderness is one of the most pristine 'weedless' wildlands in California. With your help, we will be able to keep it that way. Because velvet-grass seeds are known to travel through the gut of horses and pack animals, and can also be readily transported by catching a ride on animals and people, special grazing restrictions are in place for 2008.

Special grazing restrictions in the Kern Canyon in 2008 (continued)

- **Kern Ranger Station Pastures.** The two Kern Ranger Station pastures are restricted to administrative use only. Park stock may graze here in the early season, prior to velvet grass beginning to flower. Once velvet grass has begun to flower, the two pastures will be closed to all grazing.
- **Lower Funston Meadow.** Grazing at Lower Funston Meadow will also be limited to the early season, prior to the onset of velvet-grass-flower formation. Starting then, it will be closed to all grazing. Animals may be held and fed, but may not enter the meadow.
- **Upper Funston Meadow.** Upper Funston Meadow will be open to grazing by all parties in the early season, pending opening by the area ranger. Once the velvet grass begins to flower, the meadow will be closed to grazing by parties entering the park from the south, where velvet grass is abundant. Stock users who have grazed their animals in meadows south of Sequoia National Park on US Forest Service (USFS) lands will be required to hold and feed their animals after velvet grass has begun to flower. Stock approaching Upper Funston Meadow from the west, north, or east (without passing through USFS lands south of the Kern Ranger Station) may continue to graze in Upper Funston Meadow.

How can I help?

Visitors to the Kern Canyon (and throughout our public lands) can help prevent the spread of this invasive weed, and introduction of other non-native plants, by observing a few key precautions.

If you are traveling with pack stock:

- Groom your animals thoroughly before riding on public lands to remove any weed seeds that may be 'riding' on your animals;
- If you are feeding your animals hay, make sure that it is certified as weed-free;
- If you carry feed for your animals, we recommend using pellets, as the heat treatment used in processing kills most weed seeds;
- Feed your animals on a tarp or mat to prevent seed from being spread; be sure and shake it out into the fire pit before you leave, not on the ground or in the meadow.

When traveling by foot:

- All visitors are encouraged to be weed aware. Take care to clean boots, clothing, and equipment of all weed seeds before visiting public lands.

Where can I get more information?

If you are visiting the Kern Canyon, please stop by and visit with the Kern Ranger, who will be happy to answer any questions you may have about the area, including the velvet grass control project.

For information about weed control and prevention, contact Athena Demetry, Restoration Ecologist, at Sequoia and Kings Canyon National Parks at 559-565-4479. You may also contact the Wilderness Office at 559-565-3766, or visit www.nps.gov/seki/planyourvisit/wilderness.htm for more information about visiting the Sequoia-Kings Canyon Wilderness.

Thank you for your efforts and support to keep parklands wild and healthy!

Enclosure 36



United States Department of the Interior



NATIONAL PARK SERVICE
Sequoia and Kings Canyon National Parks
47050 Generals Highway
Three Rivers, California 93271
(559) 565-3341

IN REPLY REFER TO:

N1617

November 20, 2009

Julia A. Olson
Wild Earth Advocates, P.C.
2985 Adams St.
Eugene, OR 97405

Dear Ms. Olson:

Thank you for communicating your concern regarding the parks' use of herbicides to control invasive plants. Enclosed you will find pesticide use reports for the invasive plant management program's use of herbicides in 2006, 2007, and 2008. The report for calendar year 2009 will be completed in January. The projects for which herbicide was used in 2009 include:

1. Reed canarygrass (*Phalaris arundinacea*) control in Grant Grove and Wilsonia meadows, and a very small patch in Sugarloaf Meadow. Herbicide: 1.5% Rodeo (glyphosate)
2. Italian thistle (*Carduus pycnocephalus*) control in the Middle Fork of the Kaweah. Herbicide: 2/3 pints/acre Transline (clopyralid)
3. Annual weed control (including *Bromus tectorum* and *Ranunculus testiculatus*) at the Cedar Grove commercial pack station, government pack station, and construction staging area, to prevent transport to wilderness sites. Herbicide: 0.75% Roundup (glyphosate).
4. Velvet grass (*Holcus lanatus*) control in two pastures of the Kern Canyon. Herbicide: 1.5% Aqua Neat (glyphosate)
5. Cheatgrass (*Bromus tectorum*) control near Sugarloaf Meadow. Herbicide: 4 oz./acre Matrix (rimsulfuron).

These projects were categorically excluded from the National Environmental Policy Act (NEPA) under section 3.4E(2): "restoration of noncontroversial native species into suitable habitats within their historic range and elimination of exotic species" (43 CFR § 46.210 and 516 DM 12). This categorical exclusion has been approved by the Superintendent for routine work for the Division of Natural Resources. Annual work plans are reviewed yearly to determine if proposed actions fall within the programmatic document, or require separate environmental documentation. For your information, this year, separate compliance for a wilderness herbicide application of Matrix to cheatgrass (see more details below) was required and approved under categorical exclusion (3.4E(2)). Currently, the invasive plant management program 2010 annual work plan is being reviewed by park staff to determine the appropriate level of compliance. We expect this work to fall within a categorical exclusion. We do not currently have an established schedule for writing an invasive plant management plan for the park. Until we have a plan in place, we will continue to conduct small scale invasive plant management activities, using a variety of techniques, in

TAKE PRIDE[®]
IN AMERICA 

accordance with National Park Service Management Policies (2006) and the overall goals for protecting native vegetation and managing invasive species as established by our 2007 General Management Plan.

The scientific papers you reference study the effects of Roundup, a formulation of glyphosate that includes a POEA surfactant, on aquatic organisms. Roundup is not registered for use in aquatic sites and is not used in Sequoia and Kings Canyon National Parks in or adjacent to aquatic sites, for the very reason that the POEA surfactant used in Roundup is highly toxic to aquatic organisms. For applications near water, we use a formulation of glyphosate that is registered for use in aquatic sites, such as AquaNeat or Rodeo, with the addition of a surfactant that is registered for use in aquatic sites. Reflecting our increased understanding of surfactant toxicities, we used the surfactant R-11 in 2008, the lower-toxicity Competitor in 2009, and will likely switch to the lowest-toxicity Agri-Dex in 2010 based on recommendations from toxicity studies (Smith et al. 2003, enclosed). These applications are much less toxic and pose little risk to amphibians (Trumbo 2005 and Trumbo 2006, enclosed).

Sequoia and Kings Canyon National Parks' herbicide use is currently very limited and is only one part of our toolbox of control methods. In the Kern Canyon velvet grass control project, glyphosate applications were made to less than one acre in two very high-density infestations. Our most frequent control method for this project is hand-pulling. We also use the "tarping" technique, where black fabric is applied over plants for two growing seasons to deprive them of light, as an alternative to herbicide in high-density velvet grass sites. In the two high-density infestations where herbicide was applied, tarping was not appropriate because it would be highly visible to wilderness users. In the Grant Grove/Wilsonia reed canarygrass control project, we are using herbicide on approximately 3 acres, tarping on 1 acre, and repeat mowing on 1 acre.

Contrary to your impression, Sequoia and Kings Canyon National Parks has a strong weed prevention program. We were one of the early parks to formulate and implement policy on weed prevention (see enclosed Management Directive 38, "Preventing Introduction and Spread of Invasive Plants"), our staff helped lead the Pacific West Region's workshop to formulate recommended Best Management Practices for weed prevention, and we are looking ahead to SEKI's next round of improving our weed prevention practices. We agree with you that preventing introductions of non-native plants is the best means of protecting native plant communities from the impacts of invasive plants.

Finally, I'd like to emphasize that our use of herbicide is always considered against the threat posed by the invasive plant and against the efficacy of other available control methods. Velvet grass has the ability to dominate wilderness meadows, one of the parks' most highly valued plant communities. These parks are fortunate that velvet grass is limited to only 40 gross acres, with the Kern Canyon only one of two wilderness sites (the other of less than a dozen plants near Roaring River). By contrast, Yosemite estimates that it has 1,000 acres of velvet grass. We increased our efforts this year, using a 12-person crew, so that we could treat all of the infestations and keep the velvet grass problem from growing to unmanageable levels.

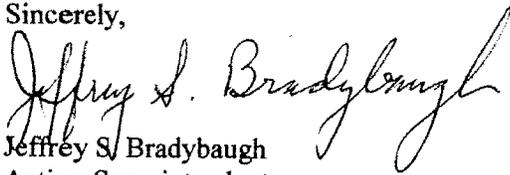
The second wilderness application we made this year was to a single, 1.6-acre patch of cheatgrass (at one percent cover) in an upland site adjacent to Sugarloaf Meadow. This is the only known cheatgrass location in the entire 68,110 acre Roaring River/Sugarloaf watershed, and crews have been searching the watershed since 2004. Since this watershed retains a relatively natural fire regime, keeping it free of cheatgrass is one of our highest priorities. By eradicating the cheatgrass when the patch is small, we prevent the fire-cheatgrass positive feedback loop which causes more frequent fire, more cheatgrass, more frequent fire, ad infinitum, to a level where it is no longer manageable. Crews used a selective herbicide, Matrix, to treat this patch in September 2009. In 2008, we conducted a pilot hand-pulling effort on 5 percent of the population and estimated that hand-pulling would require a 10-person crew for one week of work, and hand-pulling is not an effective treatment for anything but very small patches of cheatgrass.

Such a crew would also require stock or helicopter support, would damage native vegetation through trampling, and would pose a significant risk of spreading cheatgrass seed to other areas. In this case, a selective herbicide like Matrix or Plateau, which can be applied in the fall just before germination, was the most effective means to treat this critical small population.

As a final example of our decision process, bull thistle (*Cirsium vulgare*) is one of our more widespread invasive plants in the wilderness, and crews have been treating it with hand tools since 2001. Removing these plants with shovels is a very effective method and does not cause a lot of additional disruption to surrounding native plants. We have never needed to consider herbicides for this species in natural areas.

If you would like more information about the use of herbicides in the invasive plant management program, please feel free to directly contact Restoration Ecologist Athena Demetry at (559) 565-4479 or athena_demetry@nps.gov.

Sincerely,



Jeffrey S. Bradybaugh
Acting Superintendent

Enclosures: Smith et al. 2003, Trumbo 2005, Trumbo 2006, 2006 – 2008 Pesticide Use Reports, MD-38

Cc: Charisse Sydoriak, Nancy Hendricks, Athena Demetry

Enclosure 37

Sequoia and Kings Canyon National Park

National Park Service
U.S. Department of the Interior



Velvet Grass in the Kern River Canyon

What is velvet grass and why is it important?

Velvet grass (*Holcus lanatus*) is a perennial bunchgrass native to Europe with velvety gray-green leaves. It is a highly invasive species because it produces a large amount of seed and rapidly colonizes disturbed ground. Estimates of seed production range from 850 to 240,000 seeds per plant. The grass dominates habitats by forming dense patches with impenetrable root mats, making it impossible for other seeds to get started. Velvet grass prefers seasonally wet locations, but its seeds survive droughts and hot summers. It has been found in Yosemite National Park in conditions ranging from standing water to extremely hot and dry upland habitat. It has already reached almost untreatable proportions in other parks in California, such as Point Reyes National Seashore.



Velvet grass was introduced to North America in pasture seed mixes, and it has been quietly invading mid-elevation meadows in the Kern Canyon for several years. Velvet grass has the potential to completely take over and replace most of the plants in meadows, wetlands, and riparian areas. These ecosystems are critical for habitat protection, native species diversity, biomass, productivity and scenic vistas.

What is the NPS doing about velvet grass in the Kern Canyon?

Velvet grass was discovered in the Kern Canyon in 2005 in the two pastures at Kern Ranger Station and at Lower Funston Meadow. A single patch found at Upper Funston Meadow was removed. A coordinated effort to control velvet grass through hand pulling started in these sites in 2006. Surveys also reveal numerous populations on USFS lands south of the Kern Ranger Station.

In 2009, we will focus efforts on controlling these populations in the park while striving to maintain the remaining wildlands in a weed-free condition. A 12-person crew will treat velvet grass in the Kern pastures and Lower Funston Meadow by hand-pulling and tarping (placing black fabric over the infestation). We will closely monitor the rest of the canyon for new introductions. Some dense patches of velvet grass, up to one acre, will be treated with an aquatically-approved herbicide called Aqua Neat. This herbicide contains glyphosate, the same active ingredient found in Roundup. It is among the safest herbicides for humans and the environment. Through vigilance, we hope to stop the spread of this invasive weed while controlling the established populations. In the long term, we hope to be able to eradicate this plant from park lands.

Special grazing restrictions in the Kern Canyon in 2009

The Sequoia-Kings Canyon Wilderness is one of the most pristine 'weedless' wildlands in California. With your help, we will be able to keep it that way. Because velvet-grass seeds are known to travel through the gut of horses and pack animals, and can also be readily transported by catching a ride on animals and people, special grazing restrictions are in place for 2009.

- **Kern Ranger Station Pastures.** The two Kern Ranger Station pastures are restricted to administrative use only. Park stock may graze here in the early season, prior to velvet grass beginning to flower. Once velvet grass has begun to flower, the two pastures will be closed to all grazing or electric fence used to exclude stock from infested areas.

Continued on other side

Special grazing restrictions in the Kern Canyon in 2009 (continued)

- **Lower Funston Meadow.** Lower Funston Meadow will be closed to grazing by all parties, as it is too wet to allow grazing prior to flowering by velvet grass. Animals may be held and fed, but may not enter the meadow.
 - **Upper Funston Meadow.** Upper Funston Meadow will be open to grazing by all parties in the early season, pending opening by the area ranger. Once the velvet grass begins to flower, the meadow will be **closed to grazing by parties entering the park from the south**, where velvet grass is abundant. Stock users who have grazed their animals in meadows south of Sequoia National Park on USFS lands will be required to hold and feed their animals after velvet grass has begun to flower. Stock approaching Upper Funston Meadow from the west, north, or east (without passing through USFS lands south of the Kern Ranger Station) may continue to graze in Upper Funston Meadow.
-

How can I help?

Visitors to the Kern Canyon (and throughout our public lands) can help prevent the spread of this invasive weed, and introduction of other non-native plants, by observing a few key precautions.

If you are traveling with pack stock:

- Groom your animals thoroughly before riding on public lands to remove any weed seeds that may be 'riding' on your animals;
- If you are feeding your animals hay, make sure that it is certified as weed-free;
- If you carry feed for your animals, we recommend using pellets, as the heat treatment used in processing kills most weed seeds that may be present;
- Feed your animals on a tarp or mantly to prevent seed from being spread; be sure and shake it out into the fire pit before you leave, not on the ground or in the meadow.

When traveling by foot:

- All visitors are encouraged to be weed aware. Take care to clean boots, clothing, and equipment of all weed seed before visiting public lands.
-

Where can I get more information?

If you are visiting the Kern Canyon, please stop by and visit with the Kern Ranger, who will be happy to answer any questions you may have about the area, including the velvet grass control project.

For information about weed control and prevention, contact Athena Demetry, Restoration Ecologist, at Sequoia and Kings Canyon National Parks at 559-565-4479. You may also contact the Wilderness Information Office at 559-565-3766, or visit: www.nps.gov/seki/planyourvisit/wilderness.htm for more information about visiting the Sequoia-Kings Canyon Wilderness.

Thank you for your efforts and support to keep parklands wild and healthy!

Enclosure 38

Memo

8/11/91

To: District and Backcountry Rangers

From: Chief Ranger

Subject: Appendices/Figures in existing Backcountry/Stock Use Plans

The first purpose of this note is to extend sincere thanks to those of you who commented on the first draft of the Wilderness Plan. Many of the backcountry rangers, in particular, gave a lot of effort in providing some truly outstanding feedback. Each of you corrected different mistakes and offered some different kinds of thoughts and comments. A great many of your recommendations have been incorporated in a "final draft" that I'm now taking to the outside world with personal visits to groups and individuals who have some emotional stake in the whole thing, ie. key commercial and private packers, Peter Browning?, environmental groups, and even the Regional Director. Hopefully, personal discussion will keep folks from jumping to incorrect conclusions and jeopardizing the process with over-reaction.

Now what I need from you folks is input on the appendices. Obviously, a very important element of the plan is the specific restrictions that we'll spend the winter developing. Attached is a copy of the Table of Contents for the Plan, which includes a list of appendices that are identified in the body of the Plan. Several of these appendices will be revised or done here. But the majority must represent the input of our backcountry experts.

Please begin by reviewing the appendices in the existing plans. Make written recommendations about how each of them should be changed - and rationale why!! A key one for me is the concept of restricting stock to "maintained" trails, even if the maintenance is limited and primitive. That means that certain of the existing unmaintained trails now listed as open to stock travel will either have to receive some maintenance, or be abandoned and closed to stock travel. I suspect that the trails through Woods Lake and into Sixty Lakes Basin are clearly going to remain open and must therefore receive some rehabilitation and even major work. Others, such as Cartridge Pass, should be removed from any maintenance inventory and closed to stock - it's virtually impassable now anyway. So please give this one some thought.

In any case, the more detailed info/logic that you can present about all of these appendices the better off we'll be this winter.

Thanks again for all your help.



Cary



Enclosure 39

David Graber
09/26/2000 12:14 PM
MDT

To: Susan Spain/DENVER/NPS, Elaine Rideout/DENVER/NPS, Don Fox
cc: Randy F. Coffman
Subject: Accessibility and saddle stock

Susan, Elaine, and Don--

FYI:

Last spring, after the issue of stock as a means of providing park (esp. backcountry) access for people with disabilities was surfaced by Backcountry Horsemen of California, I asked our backcountry rangers to provide me some estimate of use of stock by people with disabilities. I got a fair bit of feedback, all of it consistent: People with evident disabilities do not use stock in these parks. Moreover, the commercial operators generally decline to provide accomodation for insurance reasons and because they don't have the resources. Attached is an example of the communications I received.



- stock-disability.PDF

Enclosure 40

establish a voluntary labeling regime for unidirectional digital cable television receivers and related digital cable products that meet certain technical specifications. This regime would include testing and self-certification standards, as well as consumer information disclosures to purchasers of such receivers and products. Compliance may also require multichannel video programming distributors to encode certain commercial audiovisual content to prevent or limit its copying and prohibit the use of selectable output controls. Cable operators with systems of 750 MHz or greater activated channel capacity may be required to support operation of unidirectional digital cable products on digital cable systems and to ensure that navigation devices utilized in connection with such systems have an IEEE 1394 interface and comply with specified technical standards. While these requirements could have an impact on consumer electronics manufacturers and multichannel video programming distributors, it remains unclear whether there would be a differential impact on small entities. We seek comment on whether the burden of these requirements would fall on large and small entities differently.

32. *Steps Taken to Minimize Significant Impact on Small Entities, and Significant Alternatives Considered.* The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.

33. As indicated above, the FNPRM seeks comment on whether the Commission should adopt or revise rules relating to the creation of a cable "plug and play" standard for digital cable television receivers and other digital cable television consumer electronics equipment in order to facilitate the DTV transition. This regime may require may require the manufacture of digital cable television receivers and other digital cable television consumer electronics equipment. Consumer electronics manufacturers may be required to establish a labeling regime for

unidirectional digital cable television receivers and related digital cable products that meet certain technical specifications. This regime would include testing and self-certification standards, as well as consumer information disclosures to purchasers of such receivers and products. Compliance may also require multichannel video programming distributors to encode certain commercial audiovisual content to prevent or limit its copying and prohibit the use of selectable output controls. Cable operators with systems of 750 MHz or greater activated channel capacity may be required to support operation of unidirectional digital cable products on digital cable systems and to ensure that navigation devices utilized in connection with such systems have an IEEE 1394 interface and comply with specified technical standards. However, we welcome comment on modifications of the proposals if based on evidence of potential differential impact on smaller entities. In addition, the Regulatory Flexibility Act requires agencies to seek comment on possible small entity-related alternatives, as noted above. We therefore seek comment on alternatives to the proposed rules that would assist small entities while maintaining the compromise reached in the Memorandum of Understanding.

34. *Federal Rules Which Duplicate, Overlap, or Conflict with the Commission's Proposals.* None.

Federal Communications Commission.

Marlene H. Dortch,

Secretary.

[FR Doc. 03-948 Filed 1-15-03; 8:45 am]

BILLING CODE 6712-01-P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition To List the Sierra Nevada Distinct Population Segment of the Mountain Yellow-legged Frog (*Rana muscosa*).

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding for a petition to list the Sierra Nevada distinct population segment of the mountain yellow-legged frog (*Rana muscosa*) under the

Endangered Species Act of 1973, as amended. After review of all available scientific and commercial information, we find that the petitioned action is warranted, but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Upon publication of this 12-month petition finding, this species will be added to our candidate species list. We will develop a proposed rule to list this population pursuant to our Listing Priority System.

DATES: The finding announced in this document was made on January 10, 2003. Comments and information may be submitted until further notice.

ADDRESSES: You may send data, information, comments, or questions concerning this finding to the Field Supervisor (Attn: MYLF), Sacramento Fish and Wildlife Office, U.S. Fish and Wildlife Service, 2800 Cottage Way, Room W-2605, Sacramento, California 95825. You may inspect the petition, administrative finding, supporting information, and comments received, during normal business hours by appointment, at the above address.

FOR FURTHER INFORMATION CONTACT: Peter Epanchin, Susan Moore, or Chris Nagano at the above address (telephone, (916) 414-6600; fax, (916) 414-6710).

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the List of Threatened and Endangered Species that contains substantial scientific and commercial information that listing may be warranted, we make a finding within 12 months of the date of the receipt of the petition on whether the petitioned action is: (a) Not warranted, or (b) warranted, or (c) warranted but that the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether any species is threatened or endangered, and expeditious progress is being made to add or remove qualified species from the List of Threatened and Endangered Species. Section 4(b)(3)(C) of the Act requires that a petition for which the requested action is found to be warranted but precluded shall be treated as though resubmitted on the date of such finding, *i.e.*, requiring a subsequent finding to be made within 12 months. Such 12-month findings are to be published promptly in the **Federal Register**.

Taxonomy

Camp (1917) described the mountain yellow-legged frog as two subspecies of *Rana boylei*: *R. b. sierrae* in the Sierra Nevada, and *R. b. muscosa* in southern California. On the basis of the similar morphological (body structure) characteristics of the two subspecies, the small number of sites where both were found, and breeding experiments, *R. b. muscosa* and *R. b. sierrae* were split from the *R. boylei* group and combined under a single species, *R. muscosa* (Zweifel 1955). Genetic studies also have concluded that *R. muscosa* and *R. boylei* are distinct species (Case 1978; Davis 1986; Green 1986a, 1986b; Hillis and Davis 1986; Macey *et al.* 2001).

Description

The body length (snout to vent) of the mountain yellow-legged frog ranges from 40 to 80 millimeters (mm) (1.5 to 3.25 inches (in)) (Jennings and Hayes 1994). Females average slightly larger than males and males have a swollen, darkened thumb base (Wright and Wright 1949; Stebbins 1951; Zweifel 1955, 1968). Dorsal (upper) coloration in adults may be variable, exhibiting a mix of brown and yellow, but it also can be grey, red, or green-brown, and usually patterned with dark spots (Stebbins 1985; Jennings and Hayes 1994). These spots may be large (6 mm (0.25 in)) and few, smaller and more numerous, or a mixture of both (Zweifel 1955). Irregular lichen or moss-like patches (to which the name *muscosa* refers) also may be present on the dorsal surface (Zweifel 1955; Stebbins 1985). The belly and undersurfaces of the hind limbs are yellow or orange, and this pigmentation on the abdomen may extend forward to the forelimbs (Wright and Wright 1949; Stebbins 1985). This species may produce a distinctive mink or garlic-like odor when disturbed (Wright and Wright 1949; Stebbins 1985). Although the species lacks vocal sacks, it can make both terrestrial and underwater vocalizations, which have been described as a flat clicking sound (Zweifel 1955; Stebbins 1985; Ziesmer 1997). The mountain yellow-legged frog has smoother skin, generally heavier spotting and mottling dorsally, and darker toe tips than the foothill yellow-legged frog (*R. boylei*) (Zweifel 1955; Stebbins 1985).

Eggs of the mountain yellow-legged frog are laid in globular clumps, which are often somewhat flattened, roughly 2.5 to 5 cm (1 to 2 in) across (Stebbins 1985). When eggs are close to hatching, egg mass volume may average 198 cubic cm (78 cubic in) (Pope 1999a). Eggs

have three firm jelly-like transparent envelopes surrounding a grey-tan or black vitelline (egg yolk) capsule (Wright and Wright 1949).

The larvae (tadpoles) of this species generally are mottled brown in dorsal coloration with a golden tint and a faintly-yellow venter (underside) (Zweifel 1955; Stebbins 1985). Total tadpole length reaches 72 mm (2.8 in), its body is flattened, and the tail musculature is wide, about 2.5 centimeters (cm) (1 in) or more, before tapering into a rounded tip (Wright and Wright 1949). The mouth has a maximum of 7 labial (lip) tooth rows (2–3 upper and 4 lower) (Stebbins 1985). Larvae often take 2 to 4 years or more to reach metamorphosis (transformation from larvae to frogs) (Wright and Wright 1949; Cory 1962b; Bradford 1983; Bradford *et al.* 1993; Knapp and Matthews 2000).

Range

The mountain yellow-legged frog is restricted to two disjunct areas in California and a portion of Nevada. One area is in the Sierra Nevada and the other area is in the San Gabriel, San Bernardino, and San Jacinto mountain ranges of southern California (Los Angeles, San Bernardino, Riverside, and San Diego counties) (Zweifel 1955; Jennings and Hayes 1994). The southern California population is isolated from the Sierra Nevada population by the Tehachapi mountain range, with a distance of about 225 kilometers (km) (140 miles (mi)) between the two populations.

In the Sierra Nevada, the historic distribution of the mountain yellow-legged frog was more or less continuous from the vicinity of La Porte in southern Plumas County southward to Taylor and French Joe Meadows in southern Tulare County (Jennings and Hayes 1994). Records for this species in the Sierra Nevada document its occurrence on the east and west sides of the crest in all major drainages from Plumas to Tulare counties, with a single record from Kern County (Zweifel 1955; Jennings and Hayes 1994; Knapp 1996). Except for historic populations in extreme western Nevada in Washoe and Douglas counties, on Mt. Rose near Lake Tahoe, possibly Edgewood Creek, and elsewhere around Lake Tahoe, the species is confined to California (Zweifel 1955). The elevational range for the mountain yellow-legged frog in the Sierra Nevada ranges from approximately 1,370 meters (m) (4,500 feet (ft)) at San Antonio Creek, near Dorrington in Calaveras County, to over 3,650 m (12,000 ft) at Desolation Lake in Fresno County, though populations

typically are encountered in the upper half of that elevation range (Zweifel 1955; Mullally and Cunningham 1956; Stebbins 1985).

Habitat Requirements

Mountain yellow-legged frogs rarely are found more than 1 m (3.3 ft) from water (Stebbins 1951; Mullally and Cunningham 1956; Bradford *et al.* 1993). At the lower elevations in the Sierra Nevada, the species usually is associated with rocky stream beds and wet meadows surrounded by coniferous forest (Zweifel 1955; Zeiner *et al.* 1988). At higher elevations, the species occupies lakes, ponds, tarns, and streams (Zweifel 1955; Mullally and Cunningham 1956; Stebbins 1985). The borders of alpine (above treeline) lakes and montane (mountain) meadow streams used by mountain yellow-legged frogs are frequently grassy or muddy; this differs from the sandy or rocky shores that are inhabited by the amphibian in lower elevation streams (Zweifel 1955). Adults typically are found sitting on rocks along the shoreline, usually where there is little or no vegetation (Mullally and Cunningham 1956). Although the species may use a variety of shoreline habitats, both larvae and adults are less common at shorelines which drop abruptly to a depth of 60 cm (2 ft) than at open shorelines that gently slope up to shallow waters of only 5–8 cm (2–3 in) deep (Mullally and Cunningham 1956; Jennings and Hayes 1994). Mountain yellow-legged frogs also use stream habitats, especially in the northern part of their range. Streams utilized by adults vary from those having high gradients with numerous pools, rapids, and small waterfalls, to those with low gradients with slow flows, marshy edges, and sod banks (Zweifel 1955). Aquatic substrates vary from bedrock to fine sand, rubble (rock fragments), and boulders (Zweifel 1955). Mountain yellow-legged frogs seem to be absent from the smallest creeks, probably because these have insufficient depth for adequate refuge and overwintering habitat (Jennings and Hayes 1994).

Both adults and larvae overwinter for up to 9 months in the bottoms of lakes that are at least 1.7 m (5.6 ft) deep; however, overwinter survival may be greater in lakes that are at least 2.5 m (8.2 ft) deep, under ledges of stream or lake banks, or in rocky streams (Bradford 1983; V. Vredenburg *et al.* (in press)). In some instances, frogs have been found to overwinter in underwater bedrock crevices between 0.2 m (0.7 ft) and 1 m (3.3 ft) below the water surface (Matthews and Pope 1999) and the use

of such crevices appears to allow them to survive in shallower water bodies that freeze to the bottom in winter (Pope 1999a). In lakes and ponds that do not freeze to the bottom in winter, mountain yellow-legged frogs may overwinter in the shelter of bedrock crevices as a behavioral response to the presence of introduced fishes (V. Vredenburg *et al.* (in press)).

Adult mountain yellow-legged frogs breed in the shallows of ponds or in inlet streams and are often seen on wet substrates within 1 m (3 ft) of the water's edge (Zweifel 1955). Adults emerge from overwintering sites immediately following snowmelt and will move over ice to get to breeding sites (Pope 1999a; V. Vredenburg in litt. 2002). Mountain yellow-legged frogs in the Sierra Nevada deposit their eggs underwater in clusters, which they attach to rocks, gravel, vegetation, or under banks (Wright and Wright 1949; Stebbins 1951; Zweifel 1955; Pope 1999a). Clutch size varies from 15 to 350 eggs per egg mass (Livezey and Wright 1945; V. Vredenburg *et al.* (in press)). In laboratory breeding experiments, egg hatching times ranged from 18 to 21 days at temperatures ranging from 5 to 13.5 Celsius (°C) (41 to 56 Fahrenheit (°F)) (Zweifel 1955). Field observations are similar (Pope 1999a).

The time required to develop from fertilization to metamorphosis is believed to vary between 1 and 4 years (Storer 1925; Wright and Wright 1949; Zweifel 1955; Cory 1962b; V. Vredenburg *et al.* (in press)). Since larvae must overwinter at least two or three times before metamorphosis, successful breeding sites are located in, or connected to, lakes and ponds that do not dry in the summer, and that are sufficiently deep so as to not completely freeze through in winter (Bradford 1983). Larval survival to metamorphosis is possible in lakes that do not dry out during the summer. Knapp and Matthews (2000) found the number of larvae was larger in fishless water bodies deeper than 2 m (6.5 ft). Bradford (1983) found that mountain yellow-legged frog die-offs sometimes result from oxygen depletion during winter in lakes less than 4 m (13 ft) deep. However, larvae may survive for months in nearly anoxic (oxygen-deficient) conditions when shallow lakes are frozen to the bottom. Recent studies have reported populations of mountain yellow-legged frogs overwintering in lakes less than 1.5 m (5 ft) deep that were assumed to have frozen to the bottom, and yet healthy frogs were documented to emerge the following July (Matthews and Pope 1999; Pope 1999a). Radio telemetry indicated that

the mountain yellow-legged frogs were utilizing rock crevices near shore, crevices, holes, and ledges where water depths ranged from 0.2 m (0.7 ft) to 1.5 m (5 ft) (Matthews and Pope 1999). The granite surrounding these overwintering habitats may insulate the mountain yellow-legged frogs from the extreme winter temperatures, providing that there is an adequate supply of oxygen either in the water or air (Matthews and Pope 1999).

Larvae maintain a relatively high body temperature by selecting warmer microhabitats (Bradford 1984). During winter, larvae remain in warmer water below the thermocline (thermally stratified water); after spring overturn (thaw and thermal mixing of the water), they continue to behaviorally modulate their body temperature by daily movements: during the day, larvae move to warm, shallow, nearshore water, and during the late afternoon and evening, they retreat to the warmer waters off shore (Bradford 1984).

The time required to reach reproductive maturity is thought to vary between 3 and 4 years after metamorphosis (Zweifel 1955). Longevity of adults is unknown, but adult survivorship from year to year is very high, so they are undoubtedly long-lived amphibians (Matthews and Pope 1999; Pope 1999a). Although data currently are limited, evidence exists that mountain yellow-legged frogs display strong site fidelity and return to the same overwintering and summer habitats from year to year (Pope 1999a).

In aquatic habitats, mountain yellow-legged frog adults typically move only a few hundred meters (few hundred yards) (Matthews and Pope 1999; Pope 1999a), but distances of up to 1 km (0.62 mi) have been recorded (V. Vredenburg *et al.* (in press)). Adults tend to move between selected breeding, feeding, and overwintering habitats during the course of the year. Though adults are typically found within 1 m (3.3 ft) of water, overland movements of over 65 m (215 ft) have been recorded (Pope 1999a); the furthest reported distance of a mountain yellow-legged frog from water is 400 m (1,300 ft) (V. Vredenburg *et al.* (in press)). Almost no data exist on the dispersal of juvenile mountain yellow-legged frogs away from breeding sites (Bradford 1991). However, juveniles that may be dispersing to permanent water have been observed in small intermittent streams (Bradford 1991). Mountain yellow-legged frog population dynamics are thought to have a metapopulation structure (Bradford *et al.* 1993; Drost and Fellers 1996; Knapp and Matthews 2000). In describing the metapopulation concept, Hanski and

Simberloff (1997) stated: “* * * the two key premises in this approach to population biology are that populations are spatially structured in assemblages of local breeding populations and that migration among the local populations has some effect on local dynamics, including the possibility of population reestablishment following extinction.”

Adult mountain yellow-legged frogs are thought to feed preferentially upon terrestrial insects and adult stages of aquatic insects while on the shore and in shallow water (Bradford 1983). Feeding studies on Sierra Nevada mountain yellow-legged frogs are limited. Remains found inside the stomachs of mountain yellow-legged frogs in southern California include a wide variety of invertebrates, including beetles, ants, bees, wasps, flies, truebugs, and dragonflies (Long 1970). Larger frogs take more aquatic true bugs (insects in the taxonomic order Hemiptera) probably because of their more aquatic behavior (Jennings and Hayes 1994). Adult mountain yellow-legged frogs have been observed eating Yosemite toad (*Bufo canorus*) and Pacific treefrog (*Pseudacris regilla*) larvae (Mullally 1953; Zeiner *et al.* 1988; Pope 1999b; Feldman and Wilkinson 2000) and can be cannibalistic (Heller 1960). Mountain yellow-legged frog larvae graze on benthic detritus, algae, and diatoms along rocky bottoms in streams, lakes, and ponds (Bradford 1983; Zeiner *et al.* 1988). Larvae have also been observed cannibalizing conspecific (of the same species) eggs (Vredenburg 2000). In addition, larvae have been seen feeding on the carcasses of dead metamorphosed frogs (V. Vredenburg *et al.* (in press)).

Status

The distribution of the Sierra Nevada mountain yellow-legged frog is restricted primarily to publicly managed lands at high elevations, including streams, lakes, ponds, and meadow wetlands located on national forests, including wilderness and non-wilderness on the forests, and national parks. Approximately 210 known mountain yellow-legged frog populations (or populations within metapopulations) exist on the national forests within the Sierra Nevada, though not all of these populations may be reproducing successfully. In the national parks of the Sierra Nevada, there are 758 known sites with mountain yellow-legged frogs, most of which occur within 59 different basins that have multiple breeding populations that are connected hydrologically, so that populations in each basin function as

metapopulations). Within these 758 sites, 330 populations exist for which we have evidence of successful reproduction. Overall, we estimate that 22 percent of the remaining mountain yellow-legged frog sites within the Sierra Nevada are found within the national forests (including those with and those without evidence of successful reproduction), while 78 percent are found within the national parks (including those with and those without evidence of successful reproduction). These percentages represent the number of sites within the national forests and the national parks of the Sierra Nevada; they do not represent the number of individuals present at each site. The methods for measuring the numbers of populations and metapopulations in the national forests and the national parks have not been standardized and, therefore we must use caution when we compare national forests numbers to national park numbers. However, the remaining populations of mountain yellow-legged frogs are more numerous and larger in size in the national parks than in the national forests.

National forests with extant populations of mountain yellow-legged frogs include the Plumas National Forest, Tahoe National Forest, Humboldt-Toiyabe National Forest, Lake Tahoe Basin Management Unit (managed by the U.S. Forest Service (USFS)), Eldorado National Forest, Stanislaus National Forest, Sierra National Forest, Sequoia National Forest, and Inyo National Forest. National parks with extant populations of mountain yellow-legged frogs include Yosemite National Park, Kings Canyon National Park, and Sequoia National Park.

Grinnell and Storer (1924) first observed declines of mountain yellow-legged frog populations. Since then, a number of researchers have reported that the mountain yellow-legged frog has disappeared from a significant portion of its historic range in the Sierra Nevada (Hayes and Jennings 1986; Bradford 1989; Jennings and Hayes 1994; Bradford *et al.* 1994a; Jennings 1995, 1996; Stebbins and Cohen 1995; Drost and Fellers 1996; Knapp and Matthews 2000). The observed declines of mountain yellow-legged frog populations in the 1970s were small relative to the declines observed during the 1980s and 1990s. Rangelwide, it is estimated that mountain yellow-legged frog populations have undergone a 50 to 80 percent reduction in size (Bradford *et al.* 1994a; Jennings 1995; Stebbins and Cohen 1995; Drost and Fellers 1996; Jennings 1996; Knapp and Matthews

2000). The most pronounced declines have occurred north of Lake Tahoe in the northernmost 125 km (78 mi) portion of the range, and south of Sequoia and Kings Canyon National Parks in Tulare County in the southernmost 50 km (31 mi) portion, where only a few populations remain (Fellers 1994; Jennings and Hayes 1994). Based on available USFS survey and observation data, there appear to be very few or no known large populations north of the Plumas National Forest.

Mountain yellow-legged frogs historically occurred in Nevada on the slopes of Mount Rose in Washoe County and probably in the vicinity of Lake Tahoe in Douglas County (Linsdale 1940; Zweifel 1955; Jennings 1984). In 1994 and 1995, mountain yellow-legged frog surveys were conducted by Panik (1995) at 54 sites in the Carson Range of Nevada and California, including eight historic locations; no mountain yellow-legged frogs were observed. A few scattered and unconfirmed sightings were reported in Nevada in the late 1990s, but any populations remaining in this State are likely to be extremely small and the species is thought to be extirpated from Nevada (R. Panik, Western Nevada Community College, *in litt.*, 2002).

The number of extant populations of the mountain yellow-legged frogs in the Sierra Nevada is greatly reduced. Remaining populations are patchily scattered throughout nearly all their historic range (Jennings and Hayes 1994; Jennings 1995, 1996). At the northernmost portions of the range in Butte and Plumas counties, few populations have been seen or discovered since 1970 (Jennings and Hayes 1994). Declines have also been noted in the central and southern Sierra (Drost and Fellers 1996). In the southern Sierra Nevada (Sierra, Sequoia, and Inyo National Forests; and Sequoia, Kings Canyon, and Yosemite National Parks), there are relatively large populations (*e.g.*, breeding populations of over 20 adults) of mountain yellow-legged frogs; however, in recent years, some of the largest of these populations have been extirpated (Bradford 1991; Bradford *et al.* 1994a; R. Knapp, Sierra Nevada Aquatic Research Laboratory, *in litt.* 2002). Mountain yellow-legged frog populations are more numerous and larger in size in the national parks of the Sierra Nevada than in the surrounding USFS lands (Bradford *et al.* 1994a; Knapp and Matthews 2000).

Between 1988 and 1991, Bradford *et al.* (1994a) resurveyed sites known historically (between 1955 and 1979) to have contained mountain yellow-legged frogs. They resurveyed 27 historic sites

on the Kaweah River, a western watershed within Sequoia National Park, and did not detect mountain yellow-legged frogs at any of these locations. They resurveyed 21 historic sites within the Kern, Kings, and San Joaquin River watersheds in Sequoia and Kings Canyon National Parks, and detected mountain yellow-legged frogs at 11 of these sites. Frogs were detected at three locations out of 24 historic sites outside of Sequoia and Kings Canyon National Parks. Rangelwide, their resurvey effort detected mountain yellow-legged frogs at 14 of 72 historic sites, representing an 80 percent population decline. On the basis of these results, Bradford *et al.* (1994a) estimated a 50 percent population decline in Sequoia and Kings Canyon National Parks, with more pronounced declines elsewhere in the mountain yellow-legged frog's range.

Drost and Fellers (1996) surveyed for mountain yellow-legged frogs at sites documented by Grinnell and Storer (1924) in the early part of the 20th Century. The frog was reported to be the most common amphibian where they surveyed in the Yosemite area (Grinnell and Storer 1924). Drost and Fellers (1996) repeated Grinnell and Storer's 1924 survey and reported mountain yellow-legged frog presence at only 2 of the 14 sites where this animal had been previously detected. These two positive sightings consisted of a single larva at one site and a single adult female at another site. Drost and Fellers (1996) identified and surveyed 17 additional sites with suitable mountain yellow-legged frog habitat, and these surveys resulted in the detection of three additional populations.

For the 86 historically occupied mountain yellow-legged frog sites documented between 1915 and 1959 and resurveyed by Bradford *et al.* (1994a) and Drost and Fellers (1996), an 80 percent decline occurred in the number of historical frog populations. Of the 86 historic sites, only 16 remained occupied at the time of resurvey.

Knapp and Matthews (2000) surveyed more than 1,700 high elevation (averaging 3,400 m (11,150 ft)) lakes and ponds in the Sierra National Forest's John Muir Wilderness Area and in Kings Canyon National Park, encompassing a total of approximately 100,000 hectares (ha) (247,000 acres (ac)). They found a strong negative correlation between introduced trout and the distribution of mountain yellow-legged frogs. In the summer of 2002, Knapp (*in litt.* 2002) resurveyed 302 water bodies determined by 1995 to 1997 surveys to be occupied by mountain yellow-legged frogs, and

resurveyed 744 of over 1,400 sites where frogs were not previously detected. Knapp found no change in status at 59 percent of these sites, but found that 41 percent of the sites had gone extinct, while 8 percent of previously unoccupied sites were colonized. These data indicate an extinction rate that is 5 to 6 times higher than the colonization rate within this study area. This high rate of extinction over a 5- to 7-year time frame suggests the species may become extinct within a few decades (assuming that the rate of extinction and recolonization observed over this time period accurately reflects the long-term rates). The documented extinctions appeared to occur nonrandomly across the landscape, are spatially clumped typically, and involve the disappearance of all or nearly all mountain yellow-legged frog populations in a watershed (R. Knapp *in litt.* 2002). The colonization sites also appeared to be nonrandomly distributed, occurring primarily in watersheds with large mountain yellow-legged frog populations (R. Knapp *in litt.* 2002).

A recent review of the current status of 255 previously documented mountain yellow-legged frog locations (based on Jennings and Hayes (1994)) throughout its historic range concluded that 83 percent of these sites are no longer occupied by this species (Davidson *et al.* 2002). Each national forest and national park is discussed individually below.

Lassen National Forest: Historically, mountain yellow-legged frogs occurred on the Lassen National Forest within multiple watersheds, including Butte Creek, the West Branch Feather River, and the Middle Fork Feather River (M. McFarland, *in litt.* 2002). The last confirmed mountain yellow-legged frog sighting on the Lassen National Forest was made in 1966 in the area of Snag Lake in the West Branch Feather River watershed. Since 1993, the Lassen National Forest has conducted or funded informal and formal systematic amphibian surveys to assess the relative distribution and abundance of amphibian species, including the mountain yellow-legged frog. On the Lassen National Forest, mountain yellow-legged frogs have not been detected or confirmed during any of these surveys (M. McFarland *in litt.* 2002).

Plumas National Forest: Based on resurvey efforts, Jennings and Hayes (1994) noted that the mountain yellow-legged frog was extirpated at a number of locations in the Plumas National Forest. As survey efforts continue by the Plumas National Forest, more mountain yellow-legged frog populations are being

documented. However, most of the estimated 55 populations are small, consisting of only a few individuals (T. Hopkins, USFS, pers. comm., 2002). The species appears to have disappeared from a significant number of historic locations, and the abundance of the species at known sites appears to be quite low.

Tahoe National Forest: Mountain yellow-legged frogs were present historically throughout the Tahoe National Forest and the surrounding areas of Sierra, Nevada, and Placer counties. Jennings and Hayes (1994) conclude that, based on their re-surveys of historic locations, 1992, the species had been extirpated in a number of locations by 1992.

The Tahoe National Forest has been conducting some amphibian surveys. Approximately four or five extant populations exist in which mountain yellow-legged frog breeding has been documented (A. Carlson, USFS, pers. comm. 2002). Extant mountain yellow-legged frog populations on the Tahoe National Forest have been observed in both stream and pond habitats. One extant breeding population inhabits an old mining tailing pond that has been restored naturally to a forested wetland condition with an abundance of bankside and emergent vegetation (A. Carlson, pers. comm. 2002). The largest Tahoe National Forest population observed in recent surveys consists of fewer than 10 individuals. The species appears to have disappeared from a significant number of historic locations within the Tahoe National Forest and is in low abundance where it still persists (A. Carlson, pers. comm. 2002).

Lake Tahoe Basin Management Unit: Historic sightings of the mountain yellow-legged frog in the Lake Tahoe Basin Management Unit are numerous, indicating that the species was abundant in the Lake Tahoe area (J. Reiner, USFS, pers. comm. 2002). Today, only one known population of mountain yellow-legged frogs remains on this national forest, although in 1997, the USFS saw evidence of limited breeding in the Desolation Wilderness (J. Reiner, pers. comm. 2002; J. Reiner and M. Schlesinger, USFS, *in litt.* 2000). The known population is small, as some adults were seen in 1999 but were not detected during 2002 surveys, though larvae were detected. The habitat at this site is a meadow and stream complex that is large (approximately 24 ha (60 ac)) and in good condition (J. Reiner, pers. comm. 2002).

Humboldt-Toiyabe National Forest: Only the westernmost portion of the Humboldt-Toiyabe National Forest is within the historic range of the

mountain yellow-legged frog (Stebbins 1985). A distributional map of mountain yellow-legged frogs produced by Jennings and Hayes (1994) indicates historic collections of this species within the Humboldt-Toiyabe National Forest in California. Resurveys of locations where mountain yellow-legged frogs occurred indicate that the species had become extirpated by 1992 at a number of locations in Humboldt-Toiyabe National Forest (Jennings and Hayes 1994). Surveys in California are ongoing. Approximately four populations (all in California) exist on this national forest (C. Milliron, California Department of Fish and Game (CDFG), *in litt.* 2002; L. Murphy, USFS, pers. comm. 2002). Chytrid fungus (see Factor C, Disease, below) has been documented at one of these populations (C. Milliron, *in litt.* 2002).

Eldorado National Forest: The mountain yellow-legged frog is distributed across the Eldorado National Forest with populations or metapopulations (multiple breeding populations within the same basin that have hydrologic connectivity between them) within the headwaters and headwater tributaries of several watersheds, including the Rubicon River, the South Fork American River, the North Fork Cosumnes River, and the North Fork Mokelumne River (J. Williams, USFS, *in litt.* 2002).

Numerous surveys for mountain yellow-legged frogs have been conducted on this national forest by the USFS, the CDFG, and several contractors between 1990 and 2002. Reproducing populations have been found at a variety of locations in high elevation areas of this national forest. Surveys for amphibians within the Eldorado National Forest in 1992 resulted in no detections of mountain yellow-legged frogs, though this may be a function of the limited area and habitat type that was surveyed (Martin 1992). Jennings and Hayes (1994) indicate both extirpated populations and extant populations on the Eldorado National Forest. Intensive surveys by CDFG and USFS in 2001 and 2002 resulted in an estimated 18 extant populations or metapopulations of mountain yellow-legged frogs on the Eldorado National Forest, although both the mean number of populations and population size are generally low relative to historic reports (J. Williams, *in litt.* 2002). Currently, approximately four populations exist with between 25 and 50 mountain yellow-legged frogs; these are the largest populations on the Eldorado National Forest (J. Williams, *in litt.* 2002).

Stanislaus National Forest: A 1992 survey (Martin 1992) in the Stanislaus National Forest located mountain yellow-legged frogs at only 2 of 16 locations surveyed, and at these locations, the numbers of adults detected were small (under five). Jennings and Hayes (1994) indicate that the species has been extirpated from a number of historic locations. There are approximately 80 extant populations of mountain yellow-legged frogs on the Stanislaus National Forest; of these, only about 8 appear to have more than 10 adults, and only 2 populations are known to have 25 to 30 adults (L. Conway, USFS, pers. comm. 2002).

Yosemite National Park: From 1914 to 1920, Grinnell and Storer conducted a biological survey along a transect across the Sierra Nevada. They documented mountain yellow-legged frogs at 14 sites throughout Yosemite National Park and noted the species was abundant in this area. Numerous frogs were found in lakes and streams at high elevations (Grinnell and Storer 1924). "Hundreds of frogs" were found at Young Lake and frogs were "very numerous" at Westfall Meadow (Camp 1915, as cited in Drost and Fellers 1994). Large numbers of specimens were collected; for example, 25 were taken at Vogelsang Lake (Grinnell 1915, as cited in Drost and Fellers 1994).

The mountain yellow-legged frog was documented at several additional locations in Yosemite National Park from 1957 to 1960 (Heller 1960). At Johnson Lake, Mullally and Cunningham (1956) reported a mountain yellow-legged frog population decline between 1950 and 1955, though they did not quantify the decline. They attributed this decline to the unusually long and cold winter of 1951–1952. Some of Yosemite's "densest aggregations of frogs ever noted" by Mullally and Cunningham (1956) were in lakes near Ostrander Lake south of Glacier Point; they attributed the absence of frogs in Ostrander Lake to the presence of non-native trout.

Between 1988 and 1991, Bradford *et al.* (1994a) randomly selected and surveyed four mountain yellow-legged frog populations documented in Yosemite between 1955 to 1979. Although they did not resurvey all of the mountain yellow-legged frog populations previously reported from within the park, they reported that the four resurveyed populations were extirpated (Bradford *et al.* 1994a). In 1992 and 1993, Drost and Fellers (1996) revisited 38 of the original 40 sites surveyed by Grinnell and Storer from 1914 to 1920, and surveyed other sites with potential mountain yellow-legged

frog habitat. The mountain yellow-legged frog had declined by approximately 80 percent from the locations documented by the 1924 study (Drost and Fellers 1996). A distribution map of mountain yellow-legged frogs produced by Jennings and Hayes (1994) also documents extinctions and indicates a population decline of this species from Yosemite National Park. Colwell and Beatty (2002) surveyed 35 lakes with appropriate mountain yellow-legged frog habitat within the Tuolumne and Merced River drainages of Yosemite National Park in 1992 and 1993; only 3 lakes were found to have mountain yellow-legged frogs.

Currently in Yosemite National Park, 251 mountain yellow-legged frog sites exist, most of which occur within 23 different basins that have multiple breeding populations with habitat that is connected hydrologically, so that the populations in each basin function as a metapopulation (R. Knapp *in litt.* 2002). Six sites have populations with over 100 adult mountain yellow-legged frogs each, 1 site has a population with between 51 and 100 adults, and 41 sites have populations between 10 and 50 adults each. In addition, 203 sites have fewer than 10 adults each. Of the 251 mountain-yellow legged frog sites in the park, evidence of breeding has been found in 71 populations.

Inyo National Forest: Jennings and Hayes (1994) document the extirpation of some mountain yellow-legged frog populations from the Inyo National Forest. In 1994, 15 known locations had mountain yellow-legged frog populations (Parker 1994). Currently, 7 basins within the Inyo National Forest have known extant mountain yellow-legged frog populations or populations that function as metapopulations (C. Milliron, *in litt.* 2002). Some of these populations are stable, consisting of several hundred individuals representing all age classes (L. Sims, USFS, *in litt.* 2002). Chytrid fungus (see Factor C, Disease, below) has been documented at an additional population location that is now extinct (C. Milliron, *in litt.* 2002).

Sierra National Forest: In 1955, Mullally and Cunningham (1956) reported encountering mountain yellow-legged frogs along Paiute Creek "very sparingly" at approximately 2,300 m (7,700 ft), with frogs becoming more abundant at higher elevations. The "densest populations" were found above 3,050 m (10,000 ft) in the Humphrey's Basin area, and a "great many, including tadpoles" were noted at and near Pine Creek Pass, with frogs also seen at Golden Trout and Desolation Lakes.

Jennings and Hayes (1994) indicated that the mountain yellow-legged frog has become extirpated at a number of historical locations in the Sierra National Forest. Knapp and Matthews (2000) report on mountain yellow-legged frog population declines associated with fish stocking within the John Muir Wilderness Area of the Sierra National Forest (see Factor C, Disease, below). In 1995 and 1996, Knapp and Matthews (2000) surveyed 669 lakes, ponds, and other water bodies in the John Muir Wilderness Area. Mountain yellow-legged frog adults were found in 4 percent of these water bodies, and frog larvae in 3 percent (Knapp and Matthews 2000). In 2002, Knapp conducted resurveys at the 28 water bodies that had been occupied by mountain yellow-legged frogs in 1997, and also at 118 of the 641 sites where frogs were not detected in 1997. Knapp found no change in mountain yellow-legged frog status at 39 percent of these 28 previously occupied water bodies, but found that the frogs at 61 percent of the 28 previously occupied sites had gone extinct, while colonization had occurred at 10 percent of 118 previously unoccupied sites (R. Knapp *in litt.* 2002).

Although not all potential mountain yellow-legged frog habitats have been surveyed within the Sierra National Forest, approximately six subwatersheds have extant metapopulations (H. Eddinger, USFS, *in litt.* 2002). These subwatersheds are in the upper headwaters of the South Fork Merced River, South Fork San Joaquin River, and North Fork Kings River. They include the Mono Creek Basin, the Bear Creek Basin, the Paiute Creek Basin, the Humphreys Creek Basin, the Big Creek Basin, and the Dinkey Creek Basin.

Sequoia and Kings Canyon National Parks: Relatively few records exist for mountain yellow-legged frog prior to 1955 in the Sequoia and Kings Canyon National Parks. From 1955 to 1979, the species is known to have occurred in at least 21 sites scattered throughout Sequoia and Kings Canyon National Parks, although historic abundance is not known (Bradford *et al.* 1994a). In 1978–1979, the headwaters of seven creek systems were surveyed for mountain yellow-legged frogs in the national parks. Frogs were found at 27 sites greater than 200 m (660 ft) apart (Bradford *et al.* 1994a). A distributional map of mountain yellow-legged frogs produced by Jennings and Hayes (1994) indicates numerous historic sightings and collections of the species within both national parks, as well as numerous extinctions. The species was already noted to have disappeared from

approximately half of previously occupied locations in Sequoia and Kings Canyon Parks by the late 1980s (Bradford *et al.* 1994a). On the basis of surveys, Bradford *et al.* (1994a) estimate that mountain yellow-legged frogs have been extirpated from half of their historic locations in Sequoia and Kings Canyon National Parks. For example, Fellers (1994) surveyed in Sequoia and Kings Canyon National Parks and did not detect the mountain yellow-legged frog in the Kaweah watershed where the species was located historically.

In 1997, Knapp and Matthews (2000) surveyed 1,059 lakes, ponds, and other water bodies in Kings Canyon National Park. Mountain yellow-legged frog adults were found in 31 percent of these water bodies, and frog larvae in 20 percent (Knapp and Matthews 2000). Some significant frog populations remain in Sequoia and Kings Canyon National Parks, but extensive declines have been described. In 2002, Knapp (*in litt.* 2002) resurveyed 274 water bodies occupied by mountain yellow-legged frogs in 1997, and he also resurveyed 626 of the 785 sites where frogs were not detected in 1997. Knapp found no change in status at 60 percent of the 274 previously occupied sites, but found that 39 percent of the 274 previously occupied sites had gone extinct, while colonization had occurred at 7 percent of 626 previously unoccupied sites.

Currently in Sequoia and Kings Canyon National Parks, 507 mountain yellow-legged frog sites are known, most of which occur within 36 different basins that have multiple breeding populations that are hydrologically connected, so that the populations within each basin function as a metapopulation. Fifty-four sites have populations of more than 100 adult mountain yellow-legged frogs, 25 sites have populations between 51 and 100 adults, 132 sites have populations between 10 and 50 adults, and 296 sites have fewer than 10 adults. Of the 507 mountain yellow-legged frog sites in Sequoia and Kings Canyon National Parks, breeding evidence has been found at 259 populations (R. Knapp *in litt.* 2002).

Sequoia National Forest: Jennings and Hayes (1994) indicate that the mountain yellow-legged frog has been extirpated from a number of historical locations in the Sequoia National Forest. Mountain yellow-legged frogs were collected on several historic locations of the Kern Plateau in Sequoia National Forest (Jennings and Hayes 1994). Today, two known extant populations exist on the Sequoia National Forest (S. Anderson, USFS, *in litt.* 2002).

All of the recent mountain yellow-legged frog sightings from the Sequoia National Forest have been of single frogs or very small populations. In 1992, mountain yellow-legged frogs were not detected during amphibian surveys conducted at 17 sites in Sequoia National Forest (Martin 1992). The species appears to be severely reduced in numbers and range in the Sequoia National Forest.

Distinct Vertebrate Population Segment

Under the Act, we must consider for listing any species, subspecies, or, for vertebrates, any distinct population segment (DPS) of these taxa if there is sufficient information to indicate that such action may be warranted. To implement the measures prescribed by the Act, we, along with the National Marine Fisheries Service (National Oceanic and Atmospheric Administration-Fisheries), developed a joint policy that addresses the recognition of DPSs for potential listing actions (61 FR 4722). The policy allows for a more refined application of the Act that better reflects the biological needs of the taxon being considered, and avoids the inclusion of entities that do not require the Act's protective measures.

Under our DPS Policy, we use two elements to assess whether a population segment under consideration for listing may be recognized as a DPS. The elements are: (1) the population segment's discreteness from the remainder of the species to which it belongs; and (2) the significance of the population segment to the species to which it belongs. If we determine that a population segment being considered for listing is a DPS, then the level of threat to the population is evaluated based on the five listing factors established by the Act to determine if listing it as either threatened or endangered is warranted.

Discreteness. Under our DPS Policy, a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following two conditions: (1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or (2) it is delimited by international governmental boundaries within which significant differences in control of exploitation, management of habitat, conservation, status, or regulatory mechanisms exist. The proposed DPS, the Sierra Nevada mountain yellow-legged frog, is based on the first

condition, the marked separation from other populations.

The range of the mountain yellow-legged frog is divided by a natural geographic barrier, the Tehachapi Mountains, which geographically isolates the populations in the southern Sierra Nevada from those in the mountains of southern California. The distance of the geographic separation is about 225 km (140 mi). The geographic separation of the Sierra Nevada and southern California mountain yellow-legged frogs was recognized in the earliest description of the species by Camp (1917), who treated specimens from the two areas as separate subspecies of *R. boylei*. Camp (1917) described the two subspecies based on differences in their biogeography and morphology.

Ziesmer (1997) analyzed vocalizations of mountain yellow-legged frogs from 86 locations in Alpine and Mariposa counties in the Sierra Nevada, and vocalizations of mountain yellow-legged frogs from 23 locations in the San Jacinto Mountains of Riverside County in southern California. The vocalizations of Sierra Nevada frogs differed from those of southern California frogs in pulse rate, harmonic structure, and dominant frequency. Ziesmer (1997) concluded that the differences in vocalization supported the hypothesis that mountain yellow-legged frogs from the Sierra Nevada and southern California may represent separate species.

Genetic analyses support the discreteness of the mountain yellow-legged frog populations in southern California from those in the Sierra Nevada. In an allozyme (genetic) study that compared mountain yellow-legged frogs from the central Sierra Nevada with those from southern California, a fairly significant genetic difference was found between the two populations (D. Green, McGill University, *in litt.* 1993). However, because there were no frog samples from the southern Sierra Nevada for comparison, it was not clear whether the difference reflected two ends of a cline (a character gradient), or distinctions between the Sierra Nevada and southern California populations. Thus, because the data set was incomplete, Green (*in litt.*, 1993) interpreted the results cautiously.

A phylogenetic analysis of mitochondrial deoxyribonucleic acid (DNA) sequences of the mountain yellow-legged frog was performed throughout its distribution (Macey *et al.* 2001). This study concluded that there are two major genetic lineages of the mountain yellow-legged frog (inclusive of the Sierra Nevada populations and

the southern California populations), with populations in the Sierra Nevada falling into three distinct groups and the fourth being the southern California population (Macey *et al.* 2001). Though three genetic lineages of mountain yellow-legged frogs have been identified in the Sierra Nevada, more genetic sampling is needed to delineate specific boundaries of the three genetic lineages before they are treated or managed as separate units (Macey *et al.* 2001). Therefore, this finding treats the three genetic lineages of the mountain yellow-legged frog in the Sierra Nevada as one DPS, discrete from the mountain yellow-legged frog DPS in southern California.

The biogeographic fragmentation within the Sierra Nevada population of mountain yellow-legged frogs occurs between Kings Canyon National Park and a region slightly north of Yosemite National Park, allowing for the central and northern Sierra Nevada populations to share more genetic similarities than the southern Sierra Nevada and southern California populations (Macey *et al.* 2001). In fact, this study indicates that the southern Sierran group (largely in Fresno County) may be more closely related to the southern California mountain yellow-legged frogs than with those in the central and northern Sierra Nevada (Macey *et al.* 2001). This research suggests that the initial divergence between the northern and southern populations of mountain yellow-legged frogs occurred 2.2 million years before present. Within each of these groups, Macey *et al.* (2001) have detected a similar pattern of divergence that suggests the northern Sierra Nevada and central Sierra Nevada mountain yellow-legged frog populations diverged 1.5 million years before present, and the southern Sierra Nevada and the southern California mountain yellow-legged frog populations diverged from each other approximately 1.4 million years before present. Today, these 4 groups are isolated by arid valleys; this isolation is most pronounced between southern California and the southern Sierra Nevada. The biogeographic pattern of genetic divergence as detected in the mountain yellow-legged frogs of the Sierra Nevada has also been observed in four other reptiles and amphibians, suggesting a common event that fragmented their ranges (Macey *et al.* 2001).

Sierran frogs and southern California mountain yellow-legged frogs also differ ecologically in the types of aquatic habitat they occupy. Mountain yellow-legged frogs in southern California are typically found in steep gradient streams, even though they may range

into small meadow streams at higher elevations (Zweifel 1955; Mullally 1959). In contrast, Sierran frogs are most abundant in high-elevation lakes and slow-moving portions of streams (Zweifel 1955; Mullally and Cunningham 1956), habitat that is distinct from the canyons of southern California's arid mountain ranges, which are inhabited by the southern California DPS of the mountain yellow-legged frog.

Significance. Under our DPS Policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. This consideration may include, but is not limited to: (1) Evidence of the persistence of the discrete population segment in an ecological setting that is unusual or unique for the taxon; (2) evidence that loss of the population segment would result in a significant gap in the range of the taxon; (3) evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

We have found substantial evidence that all but one (there are no introduced populations of mountain yellow-legged frogs outside of its historic range) of these significant factors are met by the population of mountain yellow-legged frogs in the Sierra Nevada. Furthermore, it is significant because a major reduction in abundance of the species as a whole would occur if the Sierra Nevada population were extirpated. The extinction of the Sierra Nevada population of the mountain yellow-legged frog would result in the loss of a genetic entity, a reduction in the geographic range of the species, a loss of the species persistence in a setting ecologically unique relative to the ecological setting of the southern California population, and a reduction in the number of breeding populations. As discussed above, the Sierra Nevada population appears to be genetically distinct from the southern California population of mountain yellow-legged frogs. The mountain yellow-legged frogs of the Sierra Nevada comprise the main distribution of the species at the northern and central limits of the species' range. Loss of the Sierra Nevada population would be significant as it would eliminate the species from the majority of its range and would reduce the species to fewer than 10 small isolated sites in southern California (50

FR 44382). The geographic isolation of the Sierra Nevada population from the mountain yellow-legged frogs in southern California prevents genetic interchange between these populations.

Conclusion. We evaluated the Sierra Nevada population of the mountain yellow-legged frog to determine whether it meets the definition of a DPS, addressing discreteness and significance as required by our policy. We conclude that the Sierra Nevada population of the mountain yellow-legged frog is discrete from the southern California population, on the basis of their geographic separation, differences in vocalization, differences between their habitats, and apparent genetic differences. We conclude that the Sierra Nevada population of the mountain yellow-legged frog is significant because the loss of the species from the Sierra Nevada would result in a significant reduction in the species' range and its population numbers, and would constitute the loss of a genetically discrete population that differs markedly from the southern California population of mountain yellow-legged frogs. Because the population segment meets both the discreteness and significance criteria of our DPS policy, the Sierra Nevada portion of the mountain yellow-legged frog's range qualifies for consideration for listing. An evaluation of the level of threat to the DPS based on the five listing factors established by the Act follows.

Previous Federal Action

On February 10, 2000, we received a petition, dated February 8, 2000, from the Center for Biological Diversity and Pacific Rivers Council to list the Sierra Nevada population of the mountain yellow-legged frog as endangered. The petitioners stated that the Sierra Nevada population of the mountain yellow-legged frog qualifies for listing under our DPS Policy. On October 12, 2000, we published a 90-day finding on that petition in the **Federal Register** (65 FR 60603) concluding that the petition presented substantial scientific or commercial information to indicate that the listing of the Sierra Nevada population of the mountain yellow-legged frog may be warranted; we also requested information and data regarding the species.

This 12-month finding is made in accordance with a court order which requires us to complete a finding by January 10, 2003 (*Center for Biological Diversity and Pacific Rivers Council v. Norton and Jones*) (No. C 01-2106 SC). This notice constitutes the 12-month finding for the February 10, 2000, petition.

Summary of Factors Affecting the Species

Section 4 of the Act and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act describe the procedures for adding species to the Federal lists. We may determine a species (which is defined in section 3 of the Act as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature) to be endangered or threatened because of one or more of the five factors described in section 4(a)(1) of the Act. These factors, and their application to the Sierra Nevada DPS of the mountain yellow-legged frog (mountain yellow-legged frog), are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* A number of hypotheses, including habitat loss, have been proposed for recent global amphibian declines (Bradford *et al.* 1993; Corn 1994; Alford and Richards 1999). Habitat destruction, however, does not appear to be the primary factor leading to the decline of the mountain yellow-legged frog. The mountain yellow-legged frog occurs at high elevations in the Sierra Nevada, which have not had the types or extent of large-scale habitat conversion and disturbances which have occurred at lower elevations (Bradford *et al.* 1993; Knapp 1996; Knapp and Matthews 2000). Large scale habitat conversion has not been identified within the range of this species; thus, direct habitat destruction or modification associated with intensive human activities, as measured by urban or agricultural land use within the mountain yellow-legged frogs' range, has not been implicated in the decline of this species (Davidson *et al.* 2002). However, other human activities have played a role in the modification of mountain yellow-legged frog habitat. These include livestock grazing, non-native fish introductions (*see* Predation, Factor C, below), timber management, road construction and maintenance, recreation, water diversions, fire management activities, and introduction of environmental contaminants (*see* Other, Factor E, below). These activities have modified habitat in ways that have fragmented and isolated mountain yellow-legged frog populations, and thereby, may have caused or contributed to the decline of this DPS (Bradford *et al.* 1993).

Grazing

Grazing of livestock in Sierra Nevada meadows and riparian areas (aquatic

ecosystems and adjacent upland areas that directly affect them) began in the mid-1700s with the European settlement of California (Menke *et al.* 1996). Following the gold rush of the mid-1800s, grazing rose to a level that exceeded the carrying capacity of the available range and caused significant impacts to meadow and riparian ecosystems (Meehan and Platts 1978; Menke *et al.* 1996). From 1870 to 1908, within the range of the mountain yellow-legged frog in the high Sierra Nevada, meadows were converted to summer rangelands for grazing cattle, sheep, horses, goats, and in some areas pigs; however, the alpine areas were mainly grazed by sheep (Beesley 1996; Menke *et al.* 1996). This practice resulted in the degradation of these extremely sensitive areas (Menke *et al.* 1996).

In general, livestock grazing within the range of the mountain yellow-legged frog was at a high but undocumented level until the establishment of national parks (beginning in 1890) and national forests (beginning in 1905). Within established national parks, grazing by cattle and sheep was replaced by that of packstock, such as horses and burros. Within established national forests, the amount of livestock grazing was gradually reduced and better documented, and the types of animals shifted, with reductions in sheep and increases in cattle and packstock. In general, livestock grazing within the national forests has continued with gradual reductions since the 1920s, except for an increase during World War II. Continuing decreases, motivated by concern towards resource protection, conflicts with other uses, and deteriorating range conditions, continued from the 1950s through the early 1970s but still exceeded sustainable grazing capacity in many areas (Menke *et al.* 1996; University of California (UC) 1996a). Grazing management that is more sensitive to riparian areas has been implemented and continues to increase since the 1970s (UC 1996a).

Packstock grazing is the only grazing currently permitted in the Sierra Nevada national parks. Packstock grazing also is permitted in national forests within the Sierra Nevada. However, there has been very little monitoring of the impacts of packstock use in this region (Menke *et al.* 1996). Use of packstock in the Sierra Nevada increased since World War II as a result of increased road access and increases in leisure time and disposable income (Menke *et al.* 1996). Demand for packstock use and recreational riding in the Sierra Nevada are projected to

increase as California's human population increases (USFS 2001).

Observational data indicate livestock negatively impact mountain yellow-legged frog populations by altering frog habitat and trampling individuals (R. Knapp, *in litt.* 1993a, 1993b, 1994, 2002; Jennings 1996; A. Carlson, pers. comm. 2002; USFS 2002; V. Vrendenburg, *in litt.* 2002).

Livestock grazing causes changes in wetland systems, including meadows, streams, and ponds; modifies mountain yellow-legged frog habitat by removing overhanging banks that provide shelter; and contributes to the siltation of breeding ponds. Pond siltation may decrease the survivorship of overwintering larvae, subadults, and adult mountain yellow-legged frogs as the overwintering habitats need to be deep enough so that the entire water column does not freeze and underwater caves and crevices are available (Bradford 1983; Pope 1999a).

Grazing of livestock in riparian areas impacts vegetation in multiple ways, including: soil compaction, which increases runoff and decreases water availability to plants; herbage removal, which promotes increased soil temperatures and evaporation rates at the soil surface; and direct physical damage to the vegetation (Kauffman and Krueger 1984; Cole and Landres 1996; Knapp and Matthews 1996). Streamside vegetation protects and stabilizes streambanks by binding soils to resist erosion and to trap sediment (Chaney *et al.* 1990). A study by Kauffman *et al.* (1983) indicated that livestock grazing may have weakened the streambank structure through trampling and removal of vegetation, thereby promoting conditions for erosion. Removal of vegetative cover within mountain yellow-legged frog habitat decreases available habitat, exposes frogs to predation (R. Knapp, *in litt.* 1993b), and increases the threat of dessication (Jennings 1996). Grazing may result in changes to vegetation composition, resulting in an increased density of forested stands and the expansion of trees into areas that were formerly treeless (Cole and Landres 1996).

Livestock grazing can cause a nutrient loading problem due to urination and defecation in or near the water, and can elevate bacteria levels in areas where cattle are concentrated near water (Meehan and Platts 1978; Stephenson and Street 1978; Kauffman and Krueger 1984). The nutrient status of streams can markedly influence the growth of microflora and microfauna and directly and indirectly affect many other characteristics of the stream biota

(Lemly 1998). Growth of filamentous bacteria on the bodies and gills of aquatic insects has been documented in association with nutrient loading in livestock use pastures, along with significantly lower densities of insects at downstream sites. In laboratory and field studies, aquatic insects with this bacterial growth experienced extensive mortality. This indicates that elevated bacteria levels associated with livestock use can negatively influence stream insect populations (Lemley 1998). Adverse effects to aquatic insects within the range of the mountain yellow-legged frog could result in a lowered prey availability, possibly increasing intraspecific competition for limited resources.

Throughout the range of the mountain yellow-legged frog in the Sierra Nevada approximately 79 currently active grazing allotments exist on USFS-administered lands. Of these grazing allotments, at least 29 have extant mountain yellow-legged frog populations within them. An estimated 13 percent of the approximately 210 known mountain yellow-legged frog populations, or populations that function as metapopulations, on Sierra Nevada national forests occur within active grazing allotments. Many of the mountain yellow-legged frog populations in the Sierra Nevada that occur within active grazing allotments are small. These populations may be more vulnerable to extirpation as a result of grazing-induced habitat modification, and if extirpated they might not be recolonized in situations where they are isolated from other populations and lack habitat connectivity to potential source populations.

In the 60-Lakes Basin of Kings Canyon National Park, packstock use is regulated in wet meadows to protect mountain yellow-legged frog breeding habitat in bogs and lakeshores from trampling and associated degradation (V. Vredenburg, *in litt.* 2002; H. Werner, NPS, *in litt.* 2002).

Recreation

Recreation is the fastest growing use of national forests. As such, its impacts on the mountain yellow-legged frog are likely to continue and to increase (USDA 2001). Recreational activities take place throughout the Sierra Nevada and have significant negative impacts on several plant and animal species and their habitats (USDA 2001a). To further recreational opportunities and angling success, non-native trout stocking programs in the Sierra Nevada started in the late 19th Century (Bahls 1992; Pister 2001). Trout stocking throughout the

range of the mountain yellow-legged frog has contributed to the decline of this species (see Predation, Factor C, below). The recreational impact of anglers at high mountain lakes has been severe in the Sierra Nevada, with most regions reporting a level of use greater than that which the fragile lakeshore environments can withstand (Bahls 1992).

Recreation may threaten all life stages of the mountain yellow-legged frog through direct disturbance resulting from trampling by humans, packstock, or vehicles, including off-highway vehicles; harassment by pets; and associated habitat degradation (Cole and Landres 1996; USFS 2001). Studies have not been conducted to determine whether recreational activities are contributing to the decline of the mountain yellow-legged frog, and recreation has not been implicated as a cause of major decline of the mountain yellow-legged frog.

Dams and Water Diversions

Dams and water diversions have altered aquatic habitats in the Sierra Nevada (Kondolf *et al.* 1996). Numerous reservoirs have been constructed within the range of the mountain yellow-legged frog. These include Huntington Lake, Florence Lake, Lake Thomas A. Edison, Saddlebag Lake, Convict Lake, Cherry Lake, and other reservoirs associated with Hetch Hetchy, Upper and Lower Blue Lakes, Lake Aloha, Silver Lake, Hell Hole Reservoir, French Meadow Reservoir, Lake Spaulding, and others. The extent of the impacts that these projects have had on the mountain yellow-legged frog is not known. The construction of dams probably has affected mountain yellow-legged frogs in the Sierra Nevada by altering their habitat and movements, and also by altering the distribution of predators (reservoirs are often stocked with non-native fish species that incidentally prey on mountain yellow-legged frogs (See Predation, Factor C, below)). Mountain yellow-legged frogs cannot live in or move through the exposed shorelines created by reservoirs, nor can they successfully reproduce in these environments with predatory fishes unless there are shallow side channels or disjunct pools that are free of predatory fishes (Jennings 1996).

Dams may alter the temperature and sediment load of the rivers they impound (Cole and Landres 1996). Dams, water diversions, and their associated structures can alter the natural flow regime with unseasonal and fluctuating releases of water, create habitat conditions unsuitable for native amphibians both upstream and

downstream of dams, and act as barriers to movements by dispersing juvenile and migrating adult amphibians (Jennings 1996). Where dams act as barriers to mountain yellow-legged frog movement, they would effectively prevent genetic exchange between populations and the recolonization of sites. Water diversions that remove water from mountain yellow-legged frog habitat may adversely impact breeding success and adult survivorship if the diversion results in a lowering of the water level to the extent that the entire water column freezes in the winter, or to the extent that the habitat is rendered dry. These factors are likely to have contributed to the decline of mountain yellow-legged frogs and probably continue to pose a risk to the species.

Roads and Timber Harvest

Any activity that severely alters the terrestrial environment, including road construction and timber harvest, is likely to result in the reduction and extirpation of amphibian populations in the Sierra Nevada (Jennings 1996). Most of the mountain yellow-legged frog populations are in areas such as national parks or designated wilderness areas where timber is not harvested (Bradford *et al.* 1994a; Drost and Fellers 1996; Knapp and Matthews 2000). Some of these populations, and others outside of these areas, are located at too high an altitude for timber to be harvested, so this activity is not expected to affect the majority of extant mountain yellow-legged frog populations. There are some mountain yellow-legged frog populations in areas where timber harvests have occurred in the past and others where it may occur in the future. There are also roads within the range of the mountain yellow-legged frog; however, neither of these factors has been implicated as an important contributor to the decline of this species (Jennings 1996).

Fire Management Activities

Mountain yellow-legged frogs are generally found at high elevations in wilderness areas and national parks where vegetation is sparse and fire suppression activities are implemented infrequently. Potential impacts to the species resulting from fire management activities include: Water drafting (taking of water) from occupied ponds and lakes, resulting in direct mortality or rendering the habitat unsuitable for reproduction and survivorship; construction of fuel breaks either by hand or heavy equipment, potentially resulting in erosion and siltation of habitat; fire suppression with water applications or fire retardants; and

increased human activity in the area, potentially disrupting mountain yellow-legged frog behavior.

Fire retardant chemicals contain nitrogen compounds and/or surfactants (a subset of chemical additives usually used to facilitate application). Laboratory tests of these chemicals have shown that they can cause mortality in fishes and aquatic invertebrates by releasing surfactants and ammonia when they are added to water (Hamilton *et al.* 1996), and similar effects are likely on amphibians. Therefore, if fire retardant chemicals were dropped in or near mountain yellow-legged frog habitat, they could have negative effects on individuals.

In some areas within the range of the mountain yellow-legged frog, long-term fire suppression has changed forest structure and conditions where fire severity and intensity are higher (McKelvey *et al.* 1996). Prescribed fire has been used by land managers to achieve various silvicultural objectives, including the reduction of fuel loads. In some systems, fire is thought to be important in maintaining open aquatic and riparian habitats for amphibians (Russel *et al.* 1999). But severe and intense wild fires may reduce the ability of amphibians to survive such a fire. However, amphibians display adaptive behavior that may minimize mortality from fire, by taking cover in wet habitats or taking shelter in subterranean burrows, though the moist and permeable skin of amphibians increases their susceptibility to heat and desiccation (Russel *et al.* 1999). Neither the direct nor indirect effects of prescribed fire or wildfire on the mountain yellow-legged frog have been studied, but because the species generally occupies high elevation habitat, fire is not a likely risk to this species in much of its range.

In summary, historic grazing activities likely modified the habitat of the mountain yellow-legged frog throughout its range. Although grazing pressure has been significantly reduced from historic levels, grazing may continue to contribute to localized degradation and loss of suitable habitat, negatively affecting mountain yellow-legged frog populations. The effects of recreation, dams, water diversions, roads, timber harvests, and fire management activities on the mountain yellow-legged frog are not well studied, and though they may have negatively affected mountain yellow-legged frogs and their habitat, they have not been implicated as primary factors in the decline of this species (Bradford *et al.* 1993; Bradford *et al.* 1994a; Jennings 1996; Knapp and Matthews 2000). However, recreation,

dams, water diversions, roads, timber harvests, and fire management activities may be factors of secondary importance in the decline of the mountain yellow-legged frog and the modification of its habitat (Jennings 1996).

B. Overutilization for commercial, recreational, scientific, or educational purposes. There is no known commercial market for mountain yellow-legged frogs, nor are there documented recreational or educational use for mountain yellow-legged frogs, although it is likely that they have been handled by curious members of the public, used as bait by anglers, and collected as pets. The mountain yellow-legged frog does not appear to be particularly popular among amphibian and reptile collectors; however, Federal listing could raise the value of the animals within wildlife trade markets and increase the threat of unauthorized collection above current levels (K. McCloud, Service, pers. comm. 2002). Even limited interest in the species could pose a serious threat to this animal.

Scientific research may cause stress to mountain yellow-legged frogs through disturbance, including disruption of the species' behavior, handling individuals, and injuries associated with marking and tracking individuals. Scientific research has also resulted in the death of numerous individuals through the collection of museum specimens (Zweifel 1955; Jennings and Hays 1994). However, this is a relatively minor threat. Of greater concern are researchers contributing to the spread of pathogens via clothing and sampling equipment as they move between water bodies and populations (Bradford 1991; Bradford *et al.* 1994a; Fellers *et al.* 2001). Given the uncertainty surrounding the potential for researchers to contribute to the spread of pathogens, researchers have begun to implement equipment sterilization procedures between survey sites (H. Eddinger, *in litt.* 2002; R. Knapp, *in litt.* 2002; V. Vredenburg, *in litt.* 2002). For further discussion concerning the threat of disease, see Factor C below.

C. Disease or predation.

Predation

Native predators of mountain yellow-legged frogs include the mountain garter snake (*Thamnophis elegans elegans*), valley garter snake (*T. sirtalis fitchii*), Brewer's blackbird (*Euphagus cyanocephalus*), Clark's nutcrackers (*Nucifraga columbiana*), coyotes (*Canis latrans*), and black bear (*Ursus americanus*) (Camp 1917; Grinnell and Storer 1924; Mullally and Cunningham 1956; Bradford 1991; Jennings *et al.*

1992; Feldman and Wilkinson 2000; V. Vredenburg *et al.* (in press)).

Predation by introduced trout is the best-documented cause of the decline of the Sierra Nevada mountain yellow-legged frog, because it has been repeatedly observed that non-native fishes and mountain yellow-legged frogs rarely co-exist (Grinnell and Storer 1924; Needham and Vestal 1938; Mullally and Cunningham 1956; Cory 1962a, 1963; Bradford 1989; Bradford and Gordon 1992; Bradford *et al.* 1993, 1994a, 1998; Drost and Fellers 1996; Jennings 1996; Knapp 1996; Knapp and Matthews 2000; Knapp *et al.* 2001; V. Vredenburg *et al.*, (in press); USFS undated). The body of scientific research on the distributions of introduced trout and mountain yellow-legged frogs over time has conclusively demonstrated that introduced trout have negatively impacted mountain yellow-legged frogs over much of the Sierra Nevada (Bradford 1989; Bradford *et al.* 1993, 1994a, 1998; Knapp 1994, 1996; Drost and Fellers 1996; Knapp and Matthews 2000; Knapp *et al.* 2001). Mountain yellow-legged frogs and trout (native and non-native) do co-occur at some sites, but these co-occurrences probably are mountain yellow-legged frog populations that would have negative population growth rates in the absence of immigration (Bradford *et al.* 1998; Knapp and Matthews 2000). Non-native fish stocking programs have been recognized to have negative ecological implications because non-native fish eat native aquatic flora and fauna, including amphibians and invertebrates (Bahls 1992; Erman 1996; Matthews *et al.* 2001; Pilliod and Peterson 2001; Schindler *et al.* 2001; Moyle 2002).

Prior to extensive trout planting programs in the late 19th Century through the present, most streams and lakes in the Sierra Nevada at elevations above 1,800 m (6,000 ft) were without fishes. The distributions of several native fish species occur in lower-elevation aquatic habitats around the Sierra Nevada (Knapp 1996; Moyle *et al.* 1996; Moyle 2002). The only major exception to the 1,800 m (6,000 ft) elevational limit for fishes within the range of the mountain yellow-legged frog in the Sierra Nevada was the upper reaches of the Kern River where native fish such as the Little Kern golden trout (*Oncorhynchus mykiss whitei*) evolved (Moyle 2002). Natural barriers prevented fish from colonizing the higher elevation headwaters of the Sierra Nevada watershed (Moyle *et al.* 1996).

With the Gold Rush and its associated increase in human habitation, habitat alteration, fish distribution and species

composition began to change dramatically in high elevation lakes and streams (Moyle *et al.* 1996). Some of the first practitioners of trout stocking in the Sierra Nevada were the Sierra Club, local sportsmen's clubs, private citizens, and the U.S. military (Knapp 1996; Pister 2001). As more hatcheries were built and distribution of non-native fish became better organized under State agency leadership, trout continued to be planted for the purpose of increased angler opportunities and success (Pister 2001). After World War II, the method of transporting trout to be stocked in high elevation areas changed from packstock to aircraft, which allowed stocking in more remote lakes and in greater numbers. It was at this point that CDFG began managing the bulk of the program, as it does today (Knapp 1996; Pister 2001).

Brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), and other trout species assemblages have been planted in most streams and lakes of the Sierra Nevada (Knapp 1996; Moyle 2002). National forests in the Sierra Nevada have a higher proportion of lakes with non-native fish occupancy than do national parks (Knapp 1996). This is primarily because the NPS adopted a policy that greatly reduced fish stocking within their jurisdictional boundaries in the late 1970s. Fish stocking was terminated altogether in Sierra Nevada national parks in 1991 (Bahls 1992; Knapp 1996).

Knapp's (1996) review of previous trout distribution estimates and other available data on trout distribution in the Sierra Nevada indicated that approximately 63 percent of lakes larger than 1 ha (2.5 ac) contain one or more non-native trout species, and as many as 85 percent of lakes larger than 1 ha (2.5 ac) within national forests currently contain fish. Lakes larger than 1 ha (2.5 ac) within Sierra Nevada national parks were estimated to have from 35 to 50 percent non-native fish occupancy, a 29 to 44 percent decrease since fish stocking was terminated (Knapp 1996). Though data on fish occupancy in streams is lacking throughout the Sierra Nevada, Knapp (1996) estimated 60 percent of the streams in Yosemite National Park were occupied by trout, despite the curtailment of stocking practices over 25 years ago. Grinnell and Storer (1924) observed that fish stocking in Yosemite National Park "nearly or quite eliminates the (mountain yellow-legged) frogs."

The most spatially comprehensive study of introduced fish and mountain yellow-legged frog distributions included an analysis of large landscapes

affected by different fish stocking regimes, watersheds with differing trout distributions, and individual water bodies with varying fauna assemblages (Knapp and Matthews 2000). The Knapp and Matthews (2000) study on the effects of introduced fishes on the mountain yellow-legged frog in the Sierra and Inyo National Forests' John Muir Wilderness indicated 65 percent of water bodies 1 ha (2.5 ac) or larger were stocked with fishes on a regular basis up through the time of the study. Over 90 percent of the total water body surface area in the John Muir Wilderness in the Sierra and Inyo National Forests is occupied by non-native trout (Knapp and Matthews 2000). All fish stocking was terminated in 1977 in the adjacent Kings Canyon National Park. Knapp and Matthews (2000) surveyed all lakes and ponds, more than 1,700 water bodies, for fishes and mountain yellow-legged frogs. They concluded that a strong negative correlation exists between introduced trout and mountain yellow-legged frogs across the landscape, the watersheds, the individual water bodies of the study area, and possibly throughout the Sierra Nevada (Knapp and Matthews 2000). Consistent with this finding are the results of an analysis of the distribution of mountain yellow-legged frog larvae that indicates that the presence and abundance of larvae are reduced dramatically in lakes that have fish as compared with lakes that were never stocked with fish (Knapp *et al.* 2001).

Several aspects of the mountain yellow-legged frog's life history may exacerbate its vulnerability to predation and extirpation by non-native trout (Bradford 1989; Bradford *et al.* 1993; Knapp 1996; Knapp and Matthews 2000). Mountain yellow-legged frogs are aquatic and are found mainly in lakes. This increases the probability that they will encounter non-native fishes whose distribution has been greatly expanded throughout the Sierra Nevada as a result of fish stocking. The multiple-year larval stage of the mountain yellow-legged frog necessitates their use of permanent water bodies that are deep enough so as not to freeze, and so that overwintering adults can avoid oxygen depletion when the water is covered by ice (Mullally and Cunningham 1956; Bradford 1983; Knapp and Matthews 2000). This further restricts larvae to water bodies suitable for and frequently inhabited by fishes (Knapp 1996) and isolates mountain yellow-legged frogs to fishless marginal habitats (Bradford *et al.* 1993; Knapp and Matthews 2000).

Mountain yellow-legged frog populations have also been extirpated at some fishless bodies of water (Bradford

1991; Drost and Fellers 1996). An explanation suggested for recent mountain yellow-legged frog population declines from fishless waters in the Sierra Nevada is the isolation and fragmentation of remaining populations by introduced fishes in the streams, which once provided the mountain yellow-legged frog with dispersal and recolonization routes (Bradford 1991; Bradford *et al.* 1993). Based on a survey of 95 basins within Sequoia and Kings Canyon National Parks, Bradford *et al.* (1993) calculated that the introduction of fishes into the study area resulted in approximately a ten-fold decrease in hydrologic connectivity between populations of mountain yellow-legged frogs. Knapp and Matthews (2000) believe that this has generally restricted mountain yellow-legged frogs to extremely isolated and marginal habitat. Trout influenced the isolation and fragmentation of mountain yellow-legged frog populations and metapopulations, making them more vulnerable to extirpation from random events (such as disease) than large, unfragmented metapopulations (Wilcox 1980; Hanski and Simberloff 1997; Bradford *et al.* 1993; Knapp and Matthews 2000). Given the metapopulation structure of the mountain yellow-legged frog, these isolated population locations may have higher extinction rates than colonization rates because trout prevent successful recolonization and dispersal to and from these sites (Bradford *et al.* 1993; Blaustein *et al.* 1994a; Knapp and Matthews 2000). In addition, amphibians may not recolonize unoccupied sites following local extinctions because of physiological constraints; the tendency for amphibians, including the mountain yellow-legged frog, to move only short distances; and high site fidelity (Blaustein *et al.* 1994a).

Knapp and Matthews (2000) suggest that the predation of mountain yellow-legged frogs by fishes as observed by Grinnell and Storer (1924), and the documented declines of the 1970s (Bradford 1991; Bradford *et al.* 1994a; Stebbins and Cohen 1995), are not the start of the mountain yellow-legged frog's decline, but rather the end of a long decline that started soon after fish introductions to the Sierra Nevada began in the mid-1800s. Knapp and Matthews (2000) note that metapopulation theory (Hanski 1997) predicts this type of time lag from habitat modification to population extinction.

Fish-induced declines of the mountain yellow-legged frog may be reversed in some locations with an

intensive and focused effort to restore fishless conditions (Knapp and Matthews 1998, 2000; Knapp *et al.* 2001). Removing fish from lakes with an adjacent source population of mountain yellow-legged frogs can result in the rapid recolonization of the lake by the species and, over time, may result in recovery to conditions similar to lakes that had never been stocked (Knapp *et al.* 2001; Briggs *et al.* 2002; R. Knapp, *in litt.* 2002). Trout removal from several lakes has been successfully accomplished in the Sierra National Forest's John Muir Wilderness. This has resulted in the natural recolonization and initial recovery of mountain yellow-legged frogs in one of the lakes where trout were removed (R. Knapp, *in litt.* 2002). In the other two lakes within this basin where trout were removed, mountain yellow-legged frogs were successfully reintroduced, and there is evidence of reproduction in these translocated populations (R. Knapp, *in litt.* 2002). Sequoia and Kings Canyon National Parks have initiated a mountain yellow-legged frog restoration project which employs gill nets and electrofishing to remove fish from select lakes and adjacent stream segments at sites with little to no human visitation (NPS 2001). However, because of the cumulative effect of past mountain yellow-legged frog population declines (upwards of 80 percent in the 20th century), and ongoing population declines caused by disease or other factors, the recolonization of lakes restored to fishless conditions will grow less likely as the number of viable source populations of mountain yellow-legged frogs dwindles (Knapp *et al.* 2001).

The best-documented cause of the decline of the mountain yellow-legged frog is the introduction of non-native fish (Bradford 1989; Bradford *et al.* 1993; Knapp and Matthews 2000). In summarizing the effects of non-native fish on the mountain yellow-legged frog, it is important to recognize that: (1) The vast majority of the range of the mountain yellow-legged frog did not evolve with any species of fish as this frog predominantly occurs in water bodies above natural fish barriers; (2) water bodies throughout the range of the mountain yellow-legged frog have been intensively stocked with non-native fish, and where stocking has terminated, self-sustaining fish populations continue to persist; (3) the multiple year larval stage of the mountain yellow-legged frog prevents successful recruitment to populations that co-occur with non-native fish because when water bodies ice over in winter, larvae

are forced from shallow margins of lakes and ponds into deeper unfrozen water where they are vulnerable to predation by non-native fish; (4) adult mountain yellow-legged frogs that co-occur with non-native fish are vulnerable to predation when they are exposed to these fish, such as when adult mountain-yellow legged frogs overwinter at the bottom of deep water bodies; and (5) the introduction of non-native fish has fragmented mountain yellow-legged frog habitat, isolated populations from each other, and generally restricted remaining mountain yellow-legged frog populations to marginal habitats, thereby increasing the likelihood of localized extinctions without the possibility of recolonization.

Disease

There have been recent reports from around the globe of disease- and pathogen-related population declines and mass die offs of amphibians (Bradford 1991; Blaustein *et al.* 1994b; Alford and Richards 1999). Mountain yellow-legged frogs are susceptible to diseases such as red-leg disease, caused by the bacterial pathogen *Aeromonas hydrophila*. This pathogen can cause localized population crashes (Bradford 1991). Bradford (1991) suggested that one such outbreak was a result of overcrowding within the mountain yellow-legged frog population. Though it is opportunistic and successfully attacks the immunosuppressed individuals, this pathogen appears to be highly contagious, affecting the epidermis and digestive tract of otherwise healthy amphibians (Shotts 1984; Carey 1993; Carey and Bryant 1995). Grinnell and Storer (1924) reported red-legged disease had infected some mountain yellow-legged frog populations in Yosemite National Park.

In California, chytridiomycosis (*Batrachochytrium dendrobatidis*), more commonly known as chytrid fungus, has been detected in nine amphibian species, including the mountain yellow-legged frog (Fellers and Green, pers. comm., as cited in Briggs *et al.* 2002; R. Knapp, Sierra Nevada Aquatic Research Laboratory, University of California at Santa Barbara, pers. comm. 2002). Fellers *et al.* (2001) report the presence of several bacteria and chytrid fungus in larval and recently metamorphosed mountain yellow-legged frogs from sites within the Sierra Nevada. Chytrid fungus affects the keratinized (horny epidermal tissue) mouth parts and epidermal tissue of larvae and metamorphosed mountain yellow-legged frogs (Fellers *et al.* 2001). Though little is known about its life history in

the Sierra Nevada, chytrid fungus has a simple asexual life cycle, and chytrids can generally withstand adverse conditions such as freezing or drought (Briggs *et al.* 2002). A research effort is underway to study the dynamics of this pathogen and the mountain yellow-legged frog within the Sierra Nevada (Briggs *et al.* 2002). Whether adult frogs acquire this fungus from tadpoles or whether the fungus is retained through metamorphosis is unknown. However, the mountain yellow-legged frog may be especially vulnerable to infections of chytrid fungus as all life stages of the mountain yellow-legged frog share the same habitat nearly year round, facilitating the transmission of this fungus to individuals at different life stages within a population (Fellers *et al.* 2001). Survey results from 2000 in Yosemite and Sequoia-Kings Canyon National Parks indicate 24 percent of the mountain yellow-legged frog populations show signs of chytrid infection (Briggs *et al.* 2002). In mountain yellow-legged frogs, chytrid fungus has been observed to result in overwinter mortality and mortality during metamorphosis (Briggs *et al.* 2002). Effects of chytrid fungus on host populations of the mountain yellow-legged frog are variable, ranging from extinction, persistence with a high level of infection, to persistence with low levels of infection (Briggs *et al.* 2002). Studies of the microscopic structure of tissue and other evidence suggests chytrid fungus caused many of the recent extinctions in the Sierra National Forest's John Muir Wilderness Area and in Kings Canyon National Park, where 41 percent of the populations went extinct between 1995 and 2002 (R. Knapp, *in litt.* 2002).

Chytrid fungus affecting wild frog populations was not documented until the late 1990s. Since then, it has been reported in amphibian populations worldwide (Fellers *et al.* 2001). We do not know how long the mountain yellow-legged frog populations have been exposed to chytrid fungus. Red-leg disease is typically a secondary infection following a chytrid infection. If this was also the case in the early 1990s, then it would suggest that what Grinnell and Storer (1924) actually were seeing was chytrid infections (R. Knapp, *in litt.* 2002). During a visual examination of mountain yellow-legged frog tadpoles preserved between 1993 and 1999, abnormalities attributed to the chytrid fungus were detected on 14 of 36 specimens and no abnormalities were detected on any of the 43 tadpole specimens collected between 1955 and 1976 (Fellers *et al.* 2001). This indicates

that chytrid fungus infections may be a recent pathogen to affect the mountain yellow-legged frog, although visual detections of chytrid-like abnormalities may be neither longlasting nor attributable to this fungus (Fellers *et al.* 2001; V. Vredenburg, *in litt.* 2002). Since at least 1976, chytrid fungus has affected adult Yosemite toads (Green and Kagarise Sherman 2001). The Yosemite toad is sympatric with the mountain yellow-legged frog (their ranges overlap). Therefore, it is possible that this pathogen has affected both of these amphibian species since at least the mid-1970s. Chytrid fungus is only a recently detected pathogen in amphibian populations; this may be an emerging infectious disease. How it has been transmitted to the mountain yellow-legged frog is unclear (Briggs *et al.* 2002).

Saprolegnia is a globally distributed fungus that commonly attacks all life stages of fishes (especially hatchery reared fishes), and has recently been documented to attack and kill egg masses of western toads (*Bufo boreas*) (Blaustein *et al.* 1994b). This pathogen may be introduced through fish stocking or it may already be established in the aquatic ecosystem. Fishes and/or migrating or dispersing amphibians may be a vector for this fungus (Blaustein *et al.* 1994b; Kiesecker *et al.* 2001). *Saprolegnia* has not been reported in the mountain yellow-legged frog; however, if hatchery fishes are vectors of this disease, it may have been introduced via fish stocking into historically occupied mountain yellow-legged frog habitat.

No viruses were detected in the specimens of mountain yellow-legged frogs that Fellers *et al.* (2001) analyzed for chytrid fungus. In Kings Canyon National Park, Knapp (pers. comm. 2002) found mountain yellow-legged frogs showing symptoms preliminarily attributed to a ranavirus. Mechanisms for disease transmission, including viruses, to the mountain yellow-legged frog remain unknown. However, Mao *et al.* (1999) isolated identical iridoviruses from wild co-occurring populations of the threespine stickleback (*Gasterosteus aculeatus*) and the red-legged frog (*Rana aurora*), indicating that infection by a given virus is not limited to a single species, and that iridoviruses can infect animals belonging to different taxonomic classes. This suggests that if virus-hosting trout are introduced into mountain yellow-legged frog habitat, they may be a vector of amphibian viruses.

Whether amphibian pathogens in the high Sierra Nevada have always coexisted with amphibian populations

or if their presence is a recent phenomenon is uncertain (Fellers *et al.* 2001). The susceptibility of amphibians to pathogens may have recently increased in response to anthropogenic (human-caused) environmental disruption (Carey 1993; Blaustein *et al.* 1994b; Carey *et al.* 1999). This hypothesis suggests that environmental changes may be indirectly responsible for certain amphibian dieoffs by immune system suppression of larval or postmetamorphic amphibians to the extent that they are not resistant to diseases (Carey 1993; Blaustein *et al.* 1994b; Carey *et al.* 1999). Pathogens such as red-leg disease, which are present in fresh water and in healthy organisms, may erupt, potentially causing localized amphibian population dieoffs when the immune system of individuals within the host population are suppressed (Carey 1993; Carey and Bryant 1995). Wind-borne pesticides from upwind agriculture potentially contribute to contaminant concentrations that may be high enough to compromise amphibian immune systems (Carey 1993; Carey *et al.* 1999; Daszak *et al.* 1999). Recreationists may contribute to the spread of pathogens between water bodies and populations via clothing and fishing equipment. Given the uncertainty surrounding the potential for researchers to contribute to the spread of pathogens, they have begun to implement equipment sterilization procedures between survey sites (H. Eddinger, *in litt.* 2002; R. Knapp, *in litt.* 2002; V. Vredenburg, *in litt.* 2002).

A compounding effect of disease-caused extinctions of mountain yellow-legged frogs is that recolonization may never occur, because streams connecting extirpated sites to extant populations now contain introduced fishes, which act as barriers to frog movement within metapopulations. This isolates the remaining populations of mountain yellow-legged frogs from each other (Bradford 1991; Bradford *et al.* 1993).

In summary, mountain yellow-legged frogs are vulnerable to multiple pathogens, whose effects range from population persistence, with low levels of infection within populations, to extinction of entire populations. Little is understood about these pathogens, making disease difficult to manage without a better understanding of their life histories and modes of transmission. Red-leg disease and chytrid fungus have been identified as having potentially catastrophic effects (localized extinction) on mountain yellow-legged frog populations. Though chytrid fungus was only recently discovered to affect amphibians (including the mountain

yellow-legged frog), chytrid currently appears to have the highest rate of infection relative to other pathogens in mountain yellow-legged frog populations. The negative consequences of chytrid infection to mountain yellow-legged frog populations may be exacerbated by the fragmentation and isolation of remaining mountain yellow-legged frog metapopulations and populations due to non-native fish introductions. This is because there may not be an adjacent mountain yellow-legged frog population with habitat connectivity that is able to recolonize an area following a pathogen-caused extinction event.

D. *The inadequacy of existing regulatory mechanisms.* Existing regulatory mechanisms that could provide some protection for the mountain yellow-legged frog in the Sierra Nevada include: (1) Federal laws and regulations; (2) State laws and regulations; and (3) local land use processes and ordinances. However, these regulatory mechanisms have not prevented non-native fish introductions, pathogen outbreaks, and habitat modifications, all of which result in population declines of mountain yellow-legged frogs in the Sierra Nevada.

Federal

In response to the overgrazing by livestock of the available rangelands from the 1800s to the 1930s and the subsequent years of the Dust Bowl, Congress passed the Taylor Grazing Act in 1934. This was an effort to stop the damage to the remaining public lands from overgrazing and soil depletion, to provide for an order to grazing on public lands, and to attempt to stabilize the livestock industry using these lands (Meehan and Platts 1978; *Public Lands Council et al. v. Babbitt Secretary of the Interior et al.* (167 F. 3d 1287)). Although passage of the Taylor Grazing Act resulted in reduced grazing in some areas, it did not reduce grazing severity, as use remained high, and it did not allow regeneration of many meadow areas (Beesley 1996; Menke *et al.* 1996; *Public Lands Council et al. v. Babbitt Secretary of the Interior et al.* (167 F. 3d 1287)). The Taylor Grazing Act of 1934, as amended, did initiate some grazing reform, possibly lessening impacts of livestock grazing on many species and populations of wild plants and animals, including the mountain yellow-legged frog and its habitat. However, it does not have any provisions specific to the protection of either the mountain yellow-legged frog or its habitat.

The Multiple-Use Sustained-Yield Act of 1960 (MUSY), as amended, provided

direction that the national forests be managed using principles of multiple use and to produce a sustained yield of products and services. Specifically, MUSY gives policy that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, wildlife, and fish purposes. Land management for multiple uses has inherent conflicts. However, MUSY directs resource management not to impair the productivity of the land while giving consideration to the relative values of the various resources, though not necessarily in terms of the greatest financial return or unit output. This act provides direction to the USFS that wildlife (which includes the mountain yellow-legged frog), is a value that must be managed for, though discretion is given to each national forest when considering the value of the mountain yellow-legged frog relative to the other uses for which they must manage. MUSY does not have any provisions specific to the protection of either the mountain yellow-legged frog or its habitat.

The Federal Land Policy and Management Act of 1976 (FLPMA), as amended, gives management direction to the Bureau of Land Management; however, its application is to all Federal lands, including those managed by the USFS. FLPMA includes a provision requiring that 50 percent or \$10,000,000 per year, whichever is greater, of all moneys received through grazing fees collected on Federal lands (including the USFS-administered lands within the range of the mountain yellow-legged frog) be spent for the purpose of on-the-ground range rehabilitation, protection, and improvement. This includes all forms of rangeland betterment such as fence construction, water development, and fish and wildlife enhancement. Half of the appropriated amount must be spent within the national forest where such moneys were derived. FLPMA provides for some rangeland improvements intended for the long-term betterment of forage conditions and resulting benefits to wildlife, watershed protection, and livestock production. Land improvements initiated pursuant to FLPMA may have benefitted the mountain yellow-legged frog and its habitat; however, some mountain yellow-legged frog habitat has continued to be destabilized and deteriorate due to livestock grazing on lands subject to FLPMA (R. Knapp, *in litt.* 1993a, 1993b, 1994, 2002; Jennings 1995, 1996). We are unaware of any USFS-initiated projects developed under FLPMA for the specific benefit of

the mountain yellow-legged frog, and, if the USFS has conducted such projects, what effects they have had.

The Wilderness Act of 1964 established a National Wilderness Preservation System made up of federally owned areas designated by Congress as "wilderness" for the purpose of preserving and protecting designated areas in their natural condition. Commercial enterprise, road construction, use of motorized vehicles or other equipment, and structural developments are generally prohibited within designated wilderness. Livestock grazing is permitted within designated wilderness, subject to other applicable laws, if it was established prior to the passage of this act. The Wilderness Act does not specifically mention fish stocking although it does state that it shall not affect the jurisdiction or responsibilities of States with wildlife and fish responsibilities in the national forests. Whether fish stocking is permitted under the Wilderness Act is an issue that has been debated (Bahls 1992; Landres *et al.* 2001). However, it generally has not limited fish stocking in the Sierra Nevada (Knapp 1996). Passage of the Wilderness Act has not positively affected mountain yellow-legged frog populations in wilderness areas of the Sierra Nevada as it does not prevent fish stocking (Knapp and Matthews 2000). Potentially, the Wilderness Act has helped to protect mountain yellow-legged frog habitat from development or other types of habitat conversions and disturbances; however, mountain yellow-legged frog populations have continued to decline despite its passage.

The National Environmental Policy Act of 1969 (NEPA), as amended, requires all Federal agencies to formally document and publicly disclose the environmental impacts of all actions and management decisions. NEPA documentation is provided in either an environmental impact statement, an environmental assessment, or a categorical exclusion, and may be subject to administrative appeal or litigation. The Pacific Southwest Region (Region 5) of the USFS considers the mountain yellow-legged frog a Forest Service sensitive species. Therefore, as part of USFS policy, the analysis related to planning under the National Forest Management Act of 1976 (NFMA) and conducted by the USFS to evaluate potential management decisions under NEPA includes a biological evaluation which discloses potential impacts to sensitive species at both the forest planning level and on a project-by-project basis. Under USFS policy (FSM 2620 and 2670), projects must not result

in contributing to a trend towards Federal listing of species. Despite the analyses pursuant to NEPA on all Federal actions potentially affecting the mountain yellow-legged frog in the Sierra Nevada, and analyses pursuant to both NFMA and NEPA on national forests, the species' populations have continued to decline (Bradford *et al.* 1993, 1994a; Drost and Fellers 1996; Jennings 1996; Knapp 1996).

The revised NMFA planning regulations recently proposed by the USFS (67 FR 72770) may affect the status of this policy requirement (FSM 2620 and 2670), as the underlying regulatory framework pertaining to providing for the diversity of plant and animal communities is proposed to be substantially altered from the existing regulatory requirement. The outcome of both the regulations and the related policies that tier to them is uncertain.

In the few cases where the Sierra Nevada mountain yellow-legged frog occurs in habitat occupied by species listed pursuant to the Act, the mountain yellow-legged frog may be afforded protection under this legislation. The native Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) and native Paiute cutthroat trout (*Oncorhynchus clarki seleneris*) are federally listed species, occurring predominantly in drainages on the east side of the Sierra Nevada. They co-occur with several small populations of mountain yellow-legged frogs at lower elevations on the edge of the species' range. The native Little Kern golden trout is a federally threatened species, co-occurring with the mountain yellow-legged frog in a few isolated locations in the southern Sierra Nevada (Knapp 1996; Moyle 2002). Recovery actions for these trout species, such as physical habitat protection, may benefit the mountain yellow-legged frog. For example, on the Tahoe National Forest, grazing, recreation, and other restrictions for the benefit of the Lahontan cutthroat trout and its habitat have been established. One of these measures that benefits the mountain yellow-legged frog is the establishment of a bank protection measure that allows for 10 percent bank disturbance (measured as bare ground accompanied by soil displacement and/or cutting of plant root crowns). Elsewhere the standard for bank disturbance is 20 percent (A. Carlson, *in litt.* 2002). However, the use of chemicals or electrofishing to remove non-native fish from threatened trout habitat may adversely affect mountain yellow-legged frogs present at the time of treatment. Additionally, listed native trout species

may prey on the mountain yellow-legged frog at sites where they co-occur.

The Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by NFMA, specifies that all national forests must have a land and resource management plan (LRMP). The purpose of the LRMP is to guide and set standards for all natural resource management activities for the life of the plan (10 to 15 years) on each national forest. NFMA requires the USFS to incorporate standards and guidelines into LRMPs. This has historically been done through a NEPA process, including provisions to manage plant and animal communities for diversity, based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives. The 1982 planning regulations for implementing NFMA, under which all existing forest plans were prepared and which still guide management, also required that fish and wildlife habitat on national forest system lands “* * * shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population is one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable population will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.”

In 2001, a record of decision (ROD) was signed by the USFS for the Sierra Nevada Forest Plan Amendment (SNFPA), based on the final environmental impact statement (FEIS) for the SNFPA effort and prepared under the 1982 NFMA planning regulations. The ROD amends the USFS Pacific Southwest Regional Guide, the Intermountain Regional Guide, and the LRMPs for national forests in the Sierra Nevada and Modoc Plateau. This document affects land management on all national forests throughout the range of the mountain yellow-legged frog. The SNFPA addresses and gives management direction on issues pertaining to old forest ecosystems; aquatic, riparian, and meadow ecosystems; fire and fuels; noxious weeds; and lower westside hardwood ecosystems of the Sierra Nevada.

Relevant to the mountain yellow-legged frog, the ROD for the SNFPA aims to protect and restore aquatic, riparian, and meadow ecosystems, and

to provide for the viability of its associated native species via an aquatic management strategy. The aquatic management strategy is a general framework with broad policy direction. Implementation of this strategy is intended to take place at the landscape and project levels. There are nine goals associated with the aquatic management strategy. They include: (1) The maintenance and restoration of water quality to comply with the Clean Water Act (CWA) and the Safe Drinking Water Act; (2) the maintenance and restoration of habitat to support viable populations of native and desired non-native riparian-dependent species and to reduce negative impacts of non-native species on native populations; (3) the maintenance and restoration of species diversity in riparian areas, wetlands, and meadows to provide desired habitats and ecological functions; (4) the maintenance and restoration of the distribution and function of biotic communities and biological diversity in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes); (5) the maintenance and restoration of spatial and temporal connectivity for aquatic and riparian species within and between watersheds to provide physically, chemically, and biologically unobstructed movement for their survival, migration, and reproduction; (6) the maintenance and restoration of hydrologic connectivity between floodplains, channels, and water tables to distribute flood flows and to sustain diverse habitats; (7) the maintenance and restoration of watershed conditions as measured by favorable infiltration characteristics of soils and diverse vegetation cover to absorb and filter precipitation, and to sustain favorable conditions of stream flows; (8) the maintenance and restoration of instream flows sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and to keep sediment regimes within the natural range of variability; and (9) the maintenance and restoration of the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity. If these goals are pursued and met, the mountain yellow-legged frog and its habitat could benefit. These goals, though broadly stated, include measures to reduce impacts of non-native trout predation on mountain yellow-legged frogs as well as the resulting isolation of populations. These goals, if met, would also restore mountain yellow-legged frog aquatic habitats, including meadows, fens, stream banks, and shorelines that have

been degraded by a history of livestock use.

To help meet these goals, the aquatic management strategy proposes a broad initial action to address the mountain yellow-legged frog in a conservation plan developed by the USFS with other State and Federal agencies; an effort by the USFS to do this is underway. Where known locations of mountain yellow-legged frogs occur on the national forests, critical aquatic refuges will be designated. A primary management goal for the critical aquatic refuges is to contribute to the viability and recovery of sensitive species (including the mountain yellow-legged frog) through habitat preservation, enhancement, restoration, or connectivity. Within the aquatic management strategy, critical aquatic refuges are given highest priority for evaluating how existing and proposed activities are consistent with the goals of the strategy. The aquatic management strategy directs existing and proposed activities within critical aquatic refuges to be consistent with the goals of the critical aquatic refuges. This evaluation will be made using the riparian conservation objectives and associated standards and guidelines, as defined in the ROD for the SNFPA. One such standard and guideline specific to the mountain yellow-legged frog includes the avoidance of pesticide applications from within 152 m (500 ft) of sites known to be occupied by the species.

Management standards and guidelines in the SNFPA ROD for the Yosemite toad will also benefit the mountain yellow-legged frog in areas where these two species overlap. These standards and guidelines exclude livestock from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads, or identified as essential habitat for this species in the USFS's conservation assessment for this species.

The SNFPA includes requirements for monitoring to determine how well the aquatic management strategy goals and the riparian conservation objectives have been met, and how closely management standards and guidelines have been applied.

Our review of the SNFPA FEIS and ROD indicate that full implementation of the SNFPA would benefit the mountain yellow-legged frog and its habitat. National forests affected by the SNFPA are responsible for implementing it; however, implementation is subject to funding. Also, current direction from within the USFS is to internally review the entire record (including the FEIS, the existing

ROD, public and agency comments, and the appeals and responsive statements), to evaluate primarily the effects of its implementation on grazing, recreation, and impacts to local communities (J. Blackwell, USFS, *in litt.* 2001). This review and assessment may result in proposed changes to the SNFPA and its associated documents. Therefore, the extent to which it will continue to be implemented, and the extent to which it may benefit the mountain yellow-legged frog and its habitat, remain undetermined. There is additional uncertainty because the proposed changes to the NFMA planning regulations recently issued by Forest Service (67 FR 72770) contain two options for meeting the NFMA direction to provide for the diversity of plant and animal communities, and both options would change the current regulation pertaining to forest planning to provide habitat to support viable populations.

The statute establishing the National Park Service, commonly referred to as the National Park Service Organic Act (39 Stat. 535; 16 U.S.C. 1,2,3 and 4) states that the NPS will administer areas under their jurisdiction “. . . by such means and measures as conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” The 2001 edition of NPS Management Policies (NPS D1416) further elaborates on how impacts on park resources, including native organisms, will not be allowed to the level that they would constitute impairment: “To comply with this mandate, park managers must determine in writing whether proposed activities in parks would impair natural resources. Park managers must also take action to ensure that ongoing NPS activities do not cause impairment. In cases of doubt as to the impact of activities on park natural resource, the Service will decide in favor of protecting the natural resources.” Sequoia, Kings Canyon, and Yosemite National Parks began phasing out fish stocking in 1969 and terminated this practice entirely in 1991 (Bahls 1992; Knapp 1996).

Under section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps) regulates the discharge of fill material into waters of the United States, including wetlands. Section 404 regulations require applicants to obtain a permit for projects that involve the discharge of fill material into waters of

the United States, including wetlands. Projects that are subject to regulation may qualify for authorization to place fill material into headwaters and isolated waters, including wetlands, under several nationwide permits. The use of nationwide permits by an applicant or project proponent is normally authorized with minimal environmental review by the Corps. An individual permit may be required by the Corps if a project otherwise qualifying under a nationwide permit would have greater than minimal adverse environmental impacts. However, few projects that include fill of wetlands are likely to occur within the range of the mountain yellow-legged frog.

State

The State of California considers the mountain yellow-legged frog a species of special concern, but it is not State listed as a threatened or endangered species and thus is not protected under the California Endangered Species Act.

California Sport Fishing Regulations include the mountain yellow-legged frog as a protected species that may not be taken or possessed at any time with a sport fishing license. Possession or take of the mountain yellow-legged frog is authorized under special permit from the CDFG. This gives the frog some legal protection from collecting, but does not protect it from other causes of mortality or alterations to its habitat.

The California Forest Practice rules set guidelines for the design of timber harvests on private land to reduce impacts on non-listed species. These rules have little application to the protection of the mountain yellow-legged frog because the vast majority of the species' range is on Federal land, and much of its range is too high in elevation to overlap with lands used for commercial timber harvest.

The California Department of Pesticide Regulation (CDPR) has authority to restrict the use of pesticides. The CDPR Toxic Air Contaminant (TAC) Program includes assessment of the risks posed by airborne pesticides; this assessment involves collection of air samples near sites of pesticide application and in communities near those sites. If air samples indicate that reductions in exposure are needed, mitigation measures are developed to bring about those reductions (CDPR 2001). However, the TAC program is intended primarily to protect human health, and air samples are not taken at far distant locations from application sites, like those inhabited by the mountain yellow-legged frog in the Sierra Nevada.

The California Environmental Quality Act (CEQA) pertains to projects on non-Federal lands and requires review of any project that is undertaken, funded, or permitted by a State or local governmental agency. If a project with potential impacts on the mountain yellow-legged frog in the Sierra Nevada is reviewed, CDFG personnel could determine that, although not state-listed, the frog is *de facto* an endangered, threatened, or rare species under section 15380 of CEQA. Once significant effects are identified, the lead agency has the option of requiring mitigation for effects through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA Sec. 21002). In the latter case, projects may be approved that cause significant environmental damage, such as destruction of state-listed endangered species or their habitat. Protection of listed species through CEQA is, therefore, dependent on the discretion of the agency involved. In addition, fish stocking is not subject to disclosure of its potential environmental impacts because it is exempt from CEQA under Article 19 section 15301(j). Therefore, the effects of fish stocking on the mountain yellow-legged frog are not analyzed pursuant to CEQA. Also, the vast majority of the species' range is on Federal land and is affected by Federal actions (other than the State-sponsored fish stocking) that are not subject to CEQA analysis.

Section 1603(a) of the California Fish and Game Code requires a permit from the CDFG for any activity that may alter the bed, channel, or bank of any river, stream, or lake. The permit may incorporate measures to minimize adverse impacts to fish and wildlife. Therefore, this regulation may offer some protection of mountain yellow-legged frog habitat. The extent to which this regulation has provided the mountain yellow-legged frog with protection is unknown because much of the range of this species is on federal lands where few habitat modifications subject to this permit are proposed.

The CDFG is practicing an informal policy on fish stocking in the range of the mountain yellow-legged frog in the Sierra Nevada. This policy directs that: (1) Fish will not be stocked in lakes with known populations of mountain yellow-legged frogs, nor in lakes which have not yet been surveyed for mountain yellow-legged frog presence; (2) waters will be stocked only with a fisheries management justification; and (3) the number of stocked lakes will be reduced over time. In 2001, the number of lakes stocked with fish within the range of the mountain yellow-legged

frog in the Sierra Nevada was reduced by 75 percent (C. Milliron, *in litt.* 2002; E. Pert, CDFG, pers. comm. 2002; E. Pert *et al.*, pers. comm. 2002). Water bodies within the same basin and 2 km (1.25 mi) from a known mountain yellow-legged frog population will not be stocked with fish unless stocking is justified through a management plan that considers all the aquatic resources in the basin, or unless there is heavy angler use and no opportunity to improve the mountain yellow-legged frog habitat (C. Milliron, *in litt.* 2002). This policy has not been finalized in writing (E. Pert *et al.*, pers. comm. 2002).

The CDFG is in the process of developing management plans for basins within the range of the mountain yellow-legged frog in the Sierra Nevada (CDFG 2001; C. Milliron, *in litt.* 2002; E. Pert, pers. comm. 2002; E. Pert *et al.*, pers. comm. 2002). For example, a plan has been developed, signed, and initiated for the Big Pine Creek wilderness basin in the Inyo National Forest's John Muir Wilderness (CDFG 2001), and a similar plan is proposed for the Gable Lakes basin, also in the John Muir Wilderness area of the Inyo National Forest (B. Miller, CDFG, *in litt.* 2001). The objectives of the Big Pine Creek wilderness basin plan specific to the mountain yellow-legged frog include management in a manner that maintains or restores native biodiversity and habitat quality, supports viable populations of native species, and provides for recreational opportunities that consider historic use patterns (CDFG 2001). Under this plan, some lakes are managed primarily for the mountain yellow-legged frog, with few or no angling opportunities, while lakes with high demand for recreational angling are managed primarily for that purpose (CDFG 2001). Preliminary results indicate that where the plans are being implemented, the management objective to restore mountain yellow-legged frog habitat is being achieved, and in some areas, mountain yellow-legged frog populations have responded positively (C. Milliron, pers. comm. 2002). We anticipate that the development and implementation of these basin management plans will be effective in reversing some of the negative impacts of introduced trout on mountain yellow-legged frog populations within a limited geographic area of the affected basins, providing that connectivity is restored between and within metapopulations.

Local

We are not aware of any specific county or city ordinances that provide

protection for the Sierra Nevada population of mountain yellow-legged frogs.

E. *Other natural or manmade factors affecting its continued existence.* Several other natural or anthropogenically influenced factors, including contaminants, acid precipitation, climate change and drought, and ambient ultraviolet radiation, have been implicated as a cause of amphibian declines (Corn 1994; Alford and Richards 1999). These factors have been studied to varying degrees specific to the mountain yellow-legged frog. These factors are discussed below.

The following factors make the mountain yellow-legged frog, along with other amphibians, sensitive to environmental change or degradation: its aquatic and terrestrial phases; its highly permeable skin which is exposed to substances in the water, air, and terrestrial substrate; and the position at which it feeds on the food web, depending on its life stage (Blaustein and Wake 1990, 1995; Bradford and Gordon 1992; Stebbins and Cohen 1995). Environmental contaminants have been suggested, and in some cases documented, to negatively affect amphibians by causing the following: direct mortality (Hall and Henry 1992; Berrill *et al.* 1994, 1995; Carey and Bryant 1995; Relyea and Mills 2001); immune system suppression, which makes amphibians more vulnerable to disease (Carey 1993; Carey and Bryant 1995; Carey *et al.* 1999; Daszak *et al.* 1999; Taylor *et al.* 1999); disruption of breeding behavior and physiology (Berrill *et al.* 1994; Carey and Bryant 1995; Hayes *et al.* 2002); disruption of growth or development (Hall and Henry 1992; Berrill *et al.* 1993, 1994, 1995, 1998; Carey and Bryant 1995; Sparling *et al.* 2001); and disruption of the ability to avoid predation (Hall and Henry 1992; Berrill *et al.* 1993, 1994, 1995, 1998; Carey and Bryant 1995; Relyea and Mills 2001; Sparling *et al.* 2001).

Wind-borne pesticides and the compounds that carry pesticides from upwind agriculture that are deposited in the Sierra Nevada have been suggested as a cause of measured sublethal effects to amphibians (Cory *et al.* 1971; Davidson *et al.* 2001; Sparling *et al.* 2001). In 1998, more than 97 million kilograms (215 million pounds) of pesticides reported to be used in California (CDPR 1998). Originating from the agriculture in California's Central Valley, and mainly from the San Joaquin Valley where agricultural activity is greatest, pesticides are passively transported eastward to the high Sierra Nevada where they have

been detected in precipitation (rain and snow), air, dry deposition, surface water, plants, fish, and amphibians, including Pacific tree frogs and mountain yellow-legged frogs (Cory *et al.* 1970; Zabik and Seiber 1993; Aston and Seiber 1997; Datta *et al.* 1998; McConnell *et al.* 1998; LeNoir *et al.* 1999; Sparling *et al.* 2001; Angermann *et al.* 2002). Angermann *et al.* (2002) detected elevated contaminant (polychlorinated biphenyls and toxaphene) levels in Pacific tree frog larvae within the range of the mountain yellow-legged frog, and suggested that these contaminants originate in California's Central Valley and metropolitan areas. Spatial analysis of populations of the California red-legged frog (*Rana aurora draytonii*), foothill yellow-legged frog, Cascades frog (*R. cascadae*), and the mountain yellow-legged frog in the Sierra Nevada showed a strong, statistically significant pattern of population decline associated with greater amounts of upwind agriculture (Davidson *et al.* 2002).

Cholinesterase is an enzyme that functions in the nervous system and is disrupted by organophosphorus pesticides, including malathion, chlorpyrifos, and diazinon (Sparling *et al.* 2001). Reduced cholinesterase activity and pesticide residues have been found in Pacific treefrog larvae collected in the Sierra Nevada downwind of the Central Valley (Sparling *et al.* 2001). Cholinesterase activity was significantly lower in samples from the Sierra Nevada than in samples taken from coastal California, upwind of the Central Valley. No samples were taken above approximately 1,500 m (4,900 ft) elevation (Sparling *et al.* 2001), so in this study there is limited overlap with the 1,370 to 3,650 m (4,500 to 12,000 ft) elevational range (Stebbins 1985) of mountain yellow-legged frogs. Although pesticide detections decrease with altitudinal gain, they have been detected at elevations in excess of 3,200 m (10,500 ft) (Zabik and Seiber 1993; Aston and Seiber 1997; McConnell *et al.* 1998; LeNoir *et al.* 1999; Angermann *et al.* 2002). In addition to interfering with nerve function, contaminants such as industrial and agricultural chemicals may act as estrogen mimics (Jobling *et al.* 1996), causing abnormalities in amphibian reproduction and disrupting endocrine functions (Carey and Bryant 1995; Stebbins and Cohen 1995; Jobling *et al.* 1996; Hayes *et al.* 2002), thereby having a negative effect on amphibian populations, including the mountain yellow-legged frog.

In the late 1960s, dichlorodiphenyltrichloroethane (DDT)

and its residues were detected in significant quantities in mountain yellow-legged frogs and foothill yellow-legged frogs throughout the Sierra Nevada up to an elevation of 3,660 m (12,000 ft) (Cory *et al.* 1970). The origin of this DDT is primarily attributed to agriculture in the Central Valley (Cory *et al.* 1970). DDT residues likely from agriculture in the Central Valley still appeared in Pacific treefrog larvae collected in the Sierra Nevada in the late 1990s (Sparling *et al.* 2001), more than 25 years after the use of DDT was banned in the United States. Levels of this toxicant in the mountain yellow-legged frog and foothill yellow-legged frog were significantly higher in the central Sierra Nevada, from the Tuolumne Meadows area of Yosemite National Park, north to Sonora Pass in the Stanislaus National Forest. The origin of DDT at these locations is attributed to two massive applications administered directly to this national forest and national park for pest control (Cory *et al.* 1970, 1971).

Snow core samples from the Sierra Nevada contain a variety of contaminants from industrial and automotive sources, including hydrogen ions that are indicative of acidic precipitation, nitrogen and sulfur compounds (NH₄, NO₃, SO₂, and SO₄), and heavy metals (lead, iron, manganese, copper, and cadmium) (Laird *et al.* 1986). The pattern of recent frog extinctions in the southern Sierra Nevada corresponds with the pattern of highest concentration of air pollutants from automotive exhaust, possibly due to increases in nitrification (or other changes), caused by those pollutants (Jennings 1996). The effects of contaminants on amphibians need further research (Hall and Henry 1992; Briggs *et al.* 2002). However, the correlative evidence between areas of pesticide contamination in the Sierra Nevada and areas of amphibian decline, along with evidence of an adverse physiological effect from pesticides on amphibians in the Sierra Nevada, indicates that contaminants may present a risk to the mountain yellow-legged frog and may have contributed to the species' decline (Jennings 1996; Sparling *et al.* 2001; (Davidson *et al.*, 2002).

It has been suggested that contamination from wind-borne pesticides originating from upwind agriculture, and other contaminants originating from metropolitan areas, may compromise amphibian immune systems (Carey 1993; Carey *et al.* 1999; Daszak *et al.* 1999; Angermann *et al.* 2002). An effort to test the hypothesis that contaminants originating in the San

Joaquin Valley are suppressing the mountain yellow-legged frog's immune system, thereby making it more vulnerable to disease, is underway (Briggs *et al.* 2002).

Laboratory studies have documented sublethal effects on mountain yellow-legged frog embryos at pH 5.25 (pH represents acidity on a negative scale, with 7 being neutral and lower numbers indicating increased acidity). Survivorship of mountain yellow-legged frog embryos and tadpoles was negatively affected as acidity increased (at approximately pH 4.5 or lower), with embryos being more sensitive to increased acidity than tadpoles (Bradford and Gordon 1992; Bradford *et al.* 1992). Acidic deposition has been suggested as contributing to amphibian declines in the western United States (Blaustein and Wake 1990; Carey 1993; Alfrod and Richards 1999). Other studies, however, do not support this hypothesis as a contributing factor to amphibian population declines in this area (Bradford and Gordon 1992; Bradford *et al.* 1992; Corn and Vertucci 1992; Bradford *et al.* 1994a, 1994b).

Acid precipitation has been postulated as a cause of amphibian declines at high elevations in the Sierra Nevada because waters there are low in acid neutralizing capacity, and, therefore, are susceptible to changes in water chemistry caused by acidic deposition (Byron *et al.* 1991; Bradford *et al.* 1994b). Near Lake Tahoe, at an elevation of approximately 2,100 m (6,900 ft), precipitation acidity has been documented to have increased significantly (Byron *et al.* 1991). In surface waters of the Sierra Nevada, acidity increases and acid neutralizing capacities decrease during snow melt and summer storms, though rarely does pH dip below 5.6 (Nikolaidis *et al.* 1991; Bradford and Gordon 1992; Bradford *et al.* 1998). The mountain yellow-legged frog breeds shortly after snow melt, thereby exposing its early life stages, which are most sensitive to acidification, to these conditions (Bradford and Gordon 1992). However, the hypothesis of acidic deposition as a cause of mountain yellow-legged frog declines has been rejected by field experiments that failed to show differences in water chemistry parameters between occupied and unoccupied mountain yellow-legged frog sites (Bradford *et al.* 1994b).

Extreme pH in surface waters of the Sierra Nevada is estimated at 5.0, with most high elevation lakes having a pH of greater than 6 (Bradford *et al.* 1992, 1998). Caused by oxidation of pyrite found in metamorphic and granitic rocks, a small number of lakes in the

Sierra Nevada (approximately 10) are naturally acidic (Bradford *et al.* 1998). Bradford *et al.* (1998) found mountain yellow-legged frog tadpoles to be sensitive to naturally acidic conditions, and that their distribution was significantly related to lake acidity; they were not found in lakes with a pH less than 6. By contrast, the distribution of adult mountain yellow-legged frogs was not significantly related to natural lake acidity or other chemical or physical parameters. Though acidity may have an influence on mountain yellow-legged frog abundance or distribution, it is unlikely to have contributed to this species' decline, given the rarity of lakes acidified either by natural or anthropogenic sources (Bradford *et al.* 1998).

The last century has included some of the most variable climate reversals documented, at both the annual (extremes and high frequency of El Niño (associated with severe winters) and La Niña (associated with milder winters) events) and near-decadal scales (periods of 5 to 8 year drought and wet periods) (USDA 2001b). These events may have negative effects on Sierra Nevada mountain yellow-legged frogs. Severe winters (El Niño) would force longer hibernation times and could stress mountain yellow-legged frogs by reducing the time available for them to feed and breed. Alternately, during mild winters (La Niña), precipitation is reduced. This reduction in precipitation could reduce available breeding habitat and lead to stranding and death of frog eggs and tadpoles. It could also lead to increased exposure to predatory fish by forcing frogs into fish-containing waters if fishless waters dry out.

In California, prolonged droughts are a regular occurrence to which native amphibians have adapted; even severe droughts are not expected to result in widespread population declines (Drost and Fellers 1996). However, an increase in the frequency, magnitude, and duration of droughts caused by global warming may have compounding effects with respect to populations of mountain yellow-legged frogs already in decline. In situations where other factors have resulted in the isolation of mountain yellow-legged frogs to marginal habitats, localized mountain yellow-legged frog population crashes or extirpations due to droughts may exacerbate their isolation and preclude their recolonization or immigration from other populations (Bradford *et al.* 1993; Drost and Fellers 1996).

Changes in climate that occur faster than the ability of endangered species to adapt could cause local extinctions (U.S. Environmental Protection Agency

(EPA) 1989). Analysis of the Antarctic Vostok ice core has shown that over the past 160,000 years, temperatures have varied with fluctuations in the concentrations of greenhouse gasses such as carbon dioxide and methane. Since the pre-industrial era, atmospheric concentrations of carbon dioxide have increased nearly 30 percent, methane concentrations have more than doubled, and nitrous oxide (another greenhouse gas) levels have risen approximately 15 percent. The burning of fossil fuels is the primary source of these increases. Global mean surface temperatures have increased 0.3–0.7 °C (0.6–1.2 °F) since the late 19th century (EPA 1997). Climate modeling indicates that the overall effects of global warming on California will include higher average temperatures in all seasons, higher total annual precipitation, and decreased spring and summer runoff due to decreases in snowpacks (EPA 1989, 1997). Decreases in spring and summer runoff could lead to the loss of breeding habitat for mountain yellow-legged frogs and increases in instances of stranding mortality of eggs and tadpoles.

Changes in temperature may also affect virulence of pathogens to a different degree than the amphibian immune systems are able to respond (Carey *et al.* 1999) and may make mountain yellow-legged frogs more susceptible to disease. Global warming could also affect the distribution of pathogens and their vectors, exposing mountain yellow-legged frogs (potentially with weakened immune systems as a result of other environmental stressors) to new pathogens (Blaustein *et al.* 2001). An experimental increase in stream water temperature was shown to decrease density and biomass in invertebrates (Hogg and Williams 1996); thus, global warming might have a negative impact on the mountain yellow-legged frog prey base.

Ambient ultraviolet-b (UV-B) radiation (280–320 nanometers (11.0–12.6 microinches)) has increased at north temperate latitudes in the past two decades (Adams *et al.* 2001). If UV-B radiation is contributing to amphibian population declines, the declines would likely be greater at higher elevations and at more southerly latitudes where UV-B exposure is greatest, where the thinner atmosphere allows greater penetration of UV-B (Davidson *et al.* 2001; Davidson *et al.*, 2002). In California, where there is a north-to-south gradient of increasing UV-B exposure, amphibian declines would also likely be more prevalent at southerly latitudes (Davidson *et al.*

2001; Davidson *et al.*, 2002). Melanic pigment on the upper surfaces of amphibian eggs and larvae protects these sensitive life stages against UV-B damage, an important protection for normal development of amphibians exposed to sunlight, especially at high elevations in clear and shallow waters (Stebbins and Cohen 1995). Blaustein *et al.* (1994c) observed decreased hatching success in several species of amphibian embryos (the mountain yellow-legged frog was not tested) exposed to increased UV-B radiation, indicating that this may be a cause of amphibian declines. Juveniles and adults may be exposed to increased UV-B levels as they heat themselves by basking in the sun (Stebbins and Cohen 1995). In a spatial test of the hypothesis that UV-B has contributed to decline of the mountain yellow-legged frog in the Sierra Nevada, Davidson *et al.* (2002) concluded that patterns of this species decline are inconsistent with the predictions of where UV-B related population declines would occur. Greater numbers of extant populations of this species were present at higher elevations than at lower elevations, and population decline was greater in the northern portion of the range of this species than it was in the southern portion. Though it does not appear that UV-B is a factor in the decline of the mountain yellow-legged frog, the absence of the predicted pattern for UV-B-caused decline should not be taken as proof that UV-B is not affecting the mountain yellow-legged frogs, given the potential for one or more factors that cause population declines to mask other factors (Davidson *et al.*, 2002).

Finding

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species. We reviewed the petition, information available in our files, other published and unpublished information submitted to us during the public comment period following our 90-day petition finding, and consulted with recognized mountain yellow-legged frog experts and other Federal and State resource agencies. On the basis of the best scientific and commercial information available, we find that listing the Sierra Nevada DPS of the mountain yellow-legged frog is warranted, but is precluded by higher priority listing actions.

In making this finding, we recognize that there have been declines in the distribution and abundance of the Sierra Nevada DPS of the mountain yellow-legged frog, primarily attributed to the

introduction and subsequent predation of non-native fishes, as documented in the body of scientific research on the distributions of introduced trout in relation to mountain yellow-legged frogs (Bradford 1989; Bradford *et al.* 1993, 1994a, 1998; Knapp 1994, 1996; Drost and Fellers 1996; Knapp and Matthews 2000; Knapp *et al.* 2001). Direct predation of non-native fishes on mountain yellow-legged frogs has resulted in range-wide population declines and local extirpations. Furthermore, the result of these extirpations is that the remaining populations are fragmented and isolated, making them vulnerable to further declines and local extirpations from other factors. Populations that go extinct following habitat fragmentation and populations isolation are unlikely to be recolonized due to both the isolation from, and lack of, habitat connectivity to potential source populations.

For example, in reviewing documented mountain yellow-legged frog declines over the last 5 years in Sequoia and Kings National Parks, we found a 39 percent extinction rate of the frog where fish have not been stocked since the late 1970s. In comparison, over the last 7 years in the Sierra National Forest's John Muir Wilderness Area, there has been a 61 percent extinction rate where fish stocking has continued. This high rate of extinction over a 5 to 7 year time frame suggests the species' extinction within a few decades (assuming that the rate of extinction and recolonization observed over this time period accurately reflects the long-term rates) (R. Knapp, *in litt.* 2002.).

The isolation of remaining mountain yellow-legged frog populations and habitat fragmentation as a result of non-native fish introductions has made remaining populations vulnerable to extinction from random events such as disease. Disease has only recently been recognized as an important factor in the decline of this species. It appears, however, that disease will continue to play an important role in the decline of this species. It is likely that disease, specifically chytrid fungus, has contributed to the recently observed declines in Sequoia and Kings Canyon National Parks and in the Sierra National Forests's John Muir Wilderness Area (R. Knapp, *in litt.* 2002). Although the life history and modes of transmission of chytrid fungus are not well understood, it appears that this pathogen is widespread throughout the range of the mountain yellow-legged frog within the Sierra Nevada, it is persistent in ecosystems, and it is

resilient to environmental conditions such as drought and freezing. Therefore, we conclude that all remaining yellow-legged frog populations within the Sierra Nevada are at risk to declines and extirpation as a result of infection by this pathogen.

Other factors include airborne contaminants, habitat degradation (mainly as a result of livestock grazing) and the inadequacy of existing regulatory mechanisms. Each of these factors may contribute to mountain yellow-legged frog population declines or extirpations. In addition, these factors are exacerbated by the effects that have been caused by non-native fishes, specifically the isolation of remaining mountain yellow-legged frog populations and habitat fragmentation. As noted previously, populations that go extinct following habitat fragmentation and population isolation are unlikely to be recolonized due to both the isolation from, and lack of, connectivity to potential source populations.

We conclude that the overall magnitude of threats to the Sierra Nevada DPS of the mountain yellow-legged frog is high, and that the overall immediacy of these threats is imminent. Pursuant to our Listing Priority System (64 FR 7114), a DPS of a species for which threats are high and imminent is assigned a Listing Priority Number of 3. While we conclude that listing the Sierra Nevada DPS of the mountain yellow-legged frog is warranted, an immediate proposal to list is precluded by other higher priority listing actions. During Fiscal Year 2003 we must spend nearly all of our Listing Program funding to comply with court orders and judicially approved settlement agreements, which are now our highest priority actions. To the extent that we have discretionary funds, we will give priority to using them to address emergency listings and listing actions for other species with a higher priority. Due to litigation pertaining to various listing actions, our planned work with listing funds in Fiscal Year 2003 consists primarily of addressing court-ordered actions, court-approved settlement agreements, and listing actions that are in litigation. (Also, some litigation-related listing actions already are scheduled for Fiscal Year 2004.) We expect that our discretionary listing activity in Fiscal Year 2003 will focus on addressing our highest priority listing actions of finalizing expiring emergency listings.

The Sierra Nevada DPS of the mountain yellow-legged frog will be added to the list of candidate species upon publication of this notice of 12-

month finding. We will continue to monitor the status of this species and other candidate species. Should an emergency situation develop with one or more of the species, we will act to provide immediate protection, if warranted.

We intend that any proposed listing action for the Sierra Nevada DPS of the mountain yellow-legged frog will be as accurate as possible. Therefore, we will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding.

References Cited

A complete list of all references cited is available on request from the Sacramento Fish and Wildlife Office (see ADDRESSES section, above).

Author

The primary author of this document is Peter Epanchin of the Sacramento Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT section).

Authority: The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: January 10, 2003.

Marshall P. Jones, Jr.,

Director, Fish and Wildlife Service.

[FR Doc. 03-973 Filed 1-15-03; 8:45 am]

BILLING CODE 4310-55-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 030108004-3004-01; ID 010303B]

RIN 0648-AQ28

Fisheries of the Northeastern United States; Atlantic Sea Scallop Fishery; Framework Adjustment 15

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS proposes regulations to implement Framework 15 to the Atlantic Sea Scallop Fishery Management Plan (FMP) developed by the New England Fishery Management Council (Council). This rule proposes to implement management measures for the 2003 fishing year, including a days-

at-sea (DAS) adjustment, and continuation of a Sea Scallop Area Access Program (Area Access Program) for 2003. The intent of this action is to achieve the goals and objectives of the FMP under the Magnuson-Stevens Fishery Conservation and Management Act and to achieve optimum yield in the scallop fishery. In addition, this proposed rule includes regulatory text that would codify an additional gear stowage provision for scallop dredge gear that was established by the Administrator, Northeast Region, NMFS (Regional Administrator) in 2001.

DATES: Comments must be received on or before 5 p.m., local time, on January 31, 2003.

ADDRESSES: Written comments should be sent to Patricia A. Kurkul, Regional Administrator, NMFS, Northeast Regional Office, One Blackburn Drive, Gloucester, MA 01930. Mark the outside of the envelope, "Comments on Framework 15 to the Scallop FMP." Comments also may be sent via facsimile (fax) to (978) 281-9135. Comments will not be accepted if submitted via e-mail or Internet.

Copies of Framework Adjustment 15, its Regulatory Impact Review (RIR) including the Initial Regulatory Flexibility Analysis (IRFA), and the Environmental Assessment (EA) are available on request from Paul J. Howard, Executive Director, New England Fishery Management Council, 50 Water Street, Newburyport, MA 01950. These documents are also available online at <http://www.nefmc.org>.

FOR FURTHER INFORMATION CONTACT: Peter W. Christopher, Fishery Policy Analyst, 978-281-9288; fax 978-281-9135; e-mail peter.christopher@noaa.gov.

SUPPLEMENTARY INFORMATION: On September 12, 2002, the Council adopted Framework 15 to the FMP, which proposes annual management measures for the 2003 fishing year (March 1, 2003, through February 29, 2004). Framework 15 would increase the annual DAS allocation, and extend the Area Access Program in the Hudson Canyon and Virginia Beach areas for 2003. The only modification to the measures that have been in effect for the 2002 fishing year would be an increase in the possession limit allowed to vessels participating in the Area Access Program. This increase is intended to be consistent with increasing catch rates in the area so that there is sufficient incentive for vessels to fish in these areas.

Regulations implementing Amendment 7 to the FMP (64 FR 14835,

Enclosure 41

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition to List the Yosemite Toad

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding for a petition to list the Yosemite toad (*Bufo canorus*) under the Endangered Species Act of 1973, as amended (Act). We find that the petitioned action is warranted, but precluded by higher priority listing actions. We will develop a proposed rule to list this species pursuant to our Listing Priority System (48 FR 43098). Upon publication of this notice of 12-month petition finding, this species will be added to our candidate species list.

DATES: The finding announced in this document was made on November 27, 2002. Comments and information may be submitted until further notice.

ADDRESSES: You may send data, information, comments, or questions concerning this finding to the Field Supervisor, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W-2605, Sacramento, CA 95825. You may inspect the petition, administrative finding, supporting information, and comments received, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Susan Moore at the Sacramento Fish and Wildlife Office (see **ADDRESSES** above) (telephone 916/414-6600; facsimile 916/414-6712).

SUPPLEMENTARY INFORMATION:**Background**

Section 4(b)(3)(B) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the List of Threatened and Endangered Species containing substantial scientific and commercial information that listing may be warranted, we conduct a status review and make a finding within 12 months of the date of the receipt of the petition on whether the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted but precluded from immediate proposal by other higher priority proposals. Section 4(b)(3)(C) of the Act requires that

petitions for which a requested action is found to be warranted but precluded should be treated as though resubmitted on the date of such finding, *i.e.*, requiring a subsequent finding to be made within 12 months. Such 12-month findings are to be published promptly in the **Federal Register**.

Section 4(b) of the Act states that we may make warranted but precluded findings only if we can demonstrate that: (1) An immediate proposed rule is precluded by other pending actions, and (2) expeditious progress is being made on other listing actions. Due to the large amount of litigation over critical habitat, we are working on numerous court orders and settlement agreements. Complying with these orders and settlement agreements will consume all of our listing budget for fiscal year 2003. However, we can continue to place species on the candidate species list, as that work activity is funded separately from our listing program.

Taxonomy

The Yosemite toad was originally described by Camp (1916), and given the common name Yosemite Park toad. Subsequent detections of this species indicated that its range extends beyond the boundaries of Yosemite National Park, and Grinnel and Storer (1924) referred to this species as the Yosemite toad.

Similarities in appearance of the Yosemite toad and the western toad (*Bufo boreas*) were noted by Camp (1916). Based on general appearance, structure and distribution, it appears that these two species are closely related (Myers 1942; Stebbins 1951; Mullally 1956; Savage 1958). The close relationship between *B. boreas* and *B. canorus* is also supported by studies of bone structure (Tihen 1962a,b), and by the survivorship of hybrid toads produced by artificially crossing the two species (Blair 1959, 1963, 1964).

Camp (1916), using characteristics of the skull, concluded that *Bufo boreas*, *B. canorus*, and *B. nestor* (extinct) are more closely related to each other than to other North American toads, and that these species comprise the most primitive group of *Bufo* in North America. Blair (1972) grouped *B. boreas*, *B. canorus*, black toads (*B. exsul*), and Amargosa toads (*B. nelsoni*), together taxonomically as the "boreas group."

Feder (1977) found *Bufo canorus* to be genetically distinctive based on samples from a limited geographic range. However, Yosemite toads are thought to hybridize with western toads in the northern part of their range (Karlstrom 1962; Morton and Sokolski 1978). Shaffer *et al.* (2000) performed genetic

analysis of a segment of mitochondrial DNA from 372 Yosemite toads found in Yosemite and Kings Canyon National Parks. Their data showed significant genetic differences in Yosemite toads between the two National Parks. They also found significant genetic variability within Yosemite National Park between drainages, and within both Parks between breeding sites. Their data also indicated that black toads are a subgroup within Yosemite toads rather than a separate species. Stephens (2001) examined mitochondrial DNA from 8 Yosemite toads (selected from the samples examined by Shaffer *et al.* (2000) to represent the range of variability found in that study) and 173 western toads. Stephens' data indicate that *Bufo* in the Sierra Nevada occur in northern and southern evolutionary groups, each of which include both Yosemite and western toads (*i.e.*, toads of both species are more closely related to each other within a group than they are to members of their own species in the other group). Further genetic analysis of Yosemite toads sampled from throughout their range, and from other toad species surrounding their range is needed to fully understand the evolutionary history and appropriate taxonomic status of the Yosemite toad (Stephens 2001).

Description and Natural History

Yosemite toads are moderately sized, with a snout-urostyle length (measured from the tip of the snout to the posterior edge of the urostyle, a bony structure at the posterior end of the spinal column) of 30 to 71 millimeters (mm) (1.2 to 2.8 inches (in)) with rounded to slightly oval paratoid glands (a pair of glands, one on each side of the head, that produce toxins) (Karlstrom 1962). The paratoid glands are less than the width of a gland apart (Stebbins 1985). A thin mid-dorsal (middle of the back) stripe is present in juveniles of both sexes. The stripe disappears or is reduced with age, and more quickly in males (Jennings and Hayes 1994). The iris of the eye is dark brown with gold iridophores (reflective pigment cells) (Jennings and Hayes 1994). Males are smaller than females, with less conspicuous warts (Stebbins 1951). Differences in coloration between males and females are more pronounced in the Yosemite toad than in any other North American frog or toad (Stebbins 1951). Females have black spots or blotches edged with white or cream that are set against a grey, tan or brown background color (Jennings and Hayes 1994). Males have a nearly uniform dorsal coloration of yellow-green to olive drab to darker greenish brown (Jennings and Hayes

1994). Karlstrom (1962) suggested that differences in coloration between the sexes evolved because they provide the Yosemite toad with protective coloration. The uniform coloration of the adult male matches and blends with the silt and grasses that they frequent during the breeding season, whereas the young and females with disruptive coloration tend to use a wider range of habitats with broken backgrounds; thus coloration may help conceal individual toads from predators.

Yosemite toads overwinter in rodent burrows (Jennings and Hayes 1994). They emerge from hibernation as soon as snowmelt pools form near their overwintering sites (Karlstrom 1962; Kagarise Sherman 1980; Jennings and Hayes 1994). Observed emergence times range from early May to the middle of June (Kagarise Sherman 1980).

Males form breeding choruses, and breeding begins soon after emergence (Jennings and Hayes 1994). Males call during the day and early evening (Stebbins 1951). The breeding call is a mellow long sustained trill with 10 to more than 20 notes (Stebbins 1951). Males have been observed to attack other males to prevent them from calling, to amplex (amplexus is a characteristic clasping of the female by the male during mating) other toads in trial and error search for females, and to attack amplexed pairs and attempt to take over the female (Kagarise Sherman 1980). In studies by Kagarise Sherman (1980), males that mated successfully were more likely to be larger, have arrived at breeding sites earlier, and have stayed at breeding sites longer.

Eggs are typically deposited in shallow water with silty bottoms (Karlstrom 1962). Ideal habitat for egg development is between 2–4 centimeters (cm) (0.8–1.6 in) deep, and eggs do not survive in water deeper than 6 cm (2.4 in) (David Martin, University of California, Santa Barbara, pers. comm. 2002). Eggs are deposited in gelatinous strings (Stebbins 1951; Karlstrom and Livezey 1955) which are intertwined with vegetation and buried in silt (Karlstrom 1962). Eggs are relatively large (2.1 mm (0.08 in) average diameter) and brownish black to jet black over the upper three quarters, and gray to tannish gray over the lower one quarter (Jennings and Hayes 1994). Females are estimated to deposit between 1,000 to 1,500 eggs (Kagarise Sherman 1980).

When not breeding, adults feed in meadow or moist upland habitat until they hibernate (Kagarise Sherman 1980; D. Martin, pers. comm. 2002). Although they are largely diurnal (active during the day) (Jennings and Hayes 1994),

especially while breeding, recent evidence shows that they primarily feed and move at night (D. Martin, pers. comm. 2002).

Eggs generally hatch within 3 to 6 days depending on water temperature (Jennings and Hayes 1994), although they may take over 15 days (Kagarise Sherman 1980). Tadpoles typically transform within 40 to 50 days after fertilization. Tadpoles are not known to overwinter (Jennings and Hayes 1994), although immature tadpoles have been observed well into September (Mullally 1956). Tadpoles tend to congregate (Brattstrom 1962) and use warm shallow water during the day (Cunningham 1963), then retreat to deeper water at night (Mullally 1953). The tadpoles are uniformly black, the snout is blunt, the intestines are scarcely or not at all visible, and the dorsal fin is transparent and marked with few relatively large melanophores (dark-colored pigment cells) (Stebbins 1951). Tadpoles measure 10 to 37 mm (0.39 to 1.45 in) in length (Stebbins 1951, 1985).

Newly metamorphosed juveniles are around 10 mm (0.39 in) in snout-urostyle length (Jennings and Hayes 1994). Some individuals may reproduce at 2 years of age, but growth is slow in both sexes and most individuals require more time to reach maturity (Jennings and Hayes 1994). Males have been observed to first breed at 3 to 5 years and females at 4 to 6 years (Kagarise Sherman 1980; Kagarise Sherman and Morton 1984). Females probably do not breed every year (Morton 1981). Yosemite toads are long lived, with females documented as reaching 15 years old and males 12 years old (Kagarise Sherman and Morton 1984).

Kagarise Sherman (1980) observed one female Yosemite toad move 270 meters (m) (885 feet (ft)) in 65 days and one male move 150 m (492 ft) in 9 days. Toads in her study generally moved 150 to 230 m (492 to 755 ft) each spring from their hibernation sites to their breeding sites. In studies in which toads were repeatedly located using radiotelemetry equipment (D. Martin, pers. comm. 2002), adult toads were observed to moving up to approximately 610 m (2,000 ft) in a single night. During the active season (spring-summer), females generally spend less time at, and travel further away from, breeding ponds than males (Kagarise Sherman 1980). Young of year metamorphs (young toads that have just transformed from tadpoles) probably hibernate closer to the ponds in which they were born than adult toads (Kagarise Sherman 1980). Stebbins (1951) suggested that isolation or semi-isolation of subpopulations of Yosemite toads is likely because they are unlikely

to cross large, dry, forested areas between meadows.

Adult and juvenile Yosemite toads are lie-and-wait predators. They remain motionless until a prey item approaches, then strike and capture the prey with their sticky tongues (Kagarise Sherman and Morton 1984). The examined stomach contents of Yosemite toads have included beetles, ants, centipedes, spiders, dragonfly larvae, mosquitos, and moth and butterfly larvae (Grinnel and Storer 1924; Mullally 1953). They will also prey on flies, bees, wasps, millipedes (Kagarise Sherman and Morton 1984), spider mites, crane flies, springtails, owl flies, and damselflies (Martin 1991).

Yosemite toad tadpoles graze on detritus and plant material such as algae and will also eat other items such as lodgepole pine pollen. Yosemite toad tadpoles can also be carnivorous and will eat other Yosemite toad tadpoles (see Natural Mortality, below), Pacific chorus frog (previously Pacific treefrog) (*Pseudacris regilla*, previously *Hyla regilla*) tadpoles, diving beetle larvae, and dead mammals (Martin 1991).

Habitat Requirements

Yosemite toads use meadow habitats surrounded by lodgepole pine (*Pinus contorta*) or whitebark pine (*P. albicaula*) (Camp 1916). They are most likely to be found in areas with thick meadow vegetation or patches of low willows (*Salix* spp.) (Mullally 1953). They are most often seen near water, but only occasionally in water (Mullally and Cunningham 1956), and use rodent burrows for overwintering and probably for temporary refuge during the summer (Jennings and Hayes 1994). They also use spaces under surface objects, including logs and rocks, for temporary refuge (Stebbins 1951; Karlstrom 1962). Breeding habitat includes the edges of wet meadows and slow-flowing streams (Jennings and Hayes 1994). Tadpoles have also been observed in shallow ponds and shallow areas of lakes (Mullally 1953). Moist upland areas such as seeps and springheads are important summer non-breeding habitats for adult toads (D. Martin, pers. comm. 2002).

Natural Mortality

Mountain yellow-legged frogs (*Rana muscosa*) (Mullally 1953), aquatic dragonfly larvae (Jennings and Hayes 1994), diving beetles (*Dytiscus* spp.) (Kagarise Sherman and Morton 1984), and possibly larval long-toed salamanders (*Ambystoma macrodactylum*) (Jennings and Hayes 1994) prey on the young life stages of Yosemite toads. American robins

(*Turdus migratorius*) prey on Yosemite toad tadpoles (Jennings and Hayes 1994). Garter snakes (*Thamnophis spp.*) have been observed to eat yearling Yosemite toads (D. Martin, pers. comm. 2002), and are probably the most significant predator on tadpoles and metamorphs (Karlstrom 1962; Jennings and Hayes 1994). California gulls (*Larus californicus*) and Clark's nutcrackers (*Nucifraga columbiana*) have been observed killing adult toads (Mulder *et al.* 1978; Kagarise Sherman 1980; Kagarise Sherman and Morton 1993). Cannibalism has been recorded in Yosemite toad tadpoles (Martin 1991; Chan 2001). The tadpoles have not been observed to kill each other, but they do wound each other in feeding frenzies, and have been observed eating dead tadpoles of their own species (Martin 1991; Chan 2001; D. Martin, pers. comm. 2002).

Desiccation of breeding habitat before tadpoles metamorphose is a major cause of mortality (Zeiner *et al.* 1988; Kagarise Sherman and Morton 1993; Jennings and Hayes 1994). Eggs are sometimes killed by freezing (Kagarise Sherman and Morton 1984). Fungal growth has also been observed on eggs (Kagarise Sherman 1980), but it is unclear whether the fungus causes mortality or grows after the eggs die from other causes.

Toads may die of exposure when crossing snow or ice (Kagarise Sherman 1980). Toads that emerge from hibernation early may suffer from exposure and inability to feed if there are late-season storms (Kagarise Sherman 1980).

Adult toads of either sex may drown or asphyxiate when multiple males attempt to amplex a single female. Kagarise Sherman (1980) documented the death of a single female in this manner, and found three additional females and two males that may also have died during multiple amplexus.

Historic and Current Range and Status

The historic range of Yosemite toads in the Sierra Nevada occurs from the Blue Lakes region north of Ebbetts Pass (Alpine County) to 5 kilometers (km) (3.1 miles (mi)) south of Kaiser Pass in the Evolution Lake/Darwin Canyon area (Fresno County) (Jennings and Hayes 1994). The historic elevational range of Yosemite toads is 1,460 to 3,630 m (4,790 to 11,910 ft) (Stebbins 1985).

Pre-1990 historic records of Yosemite toad localities are primarily from museum records and incidental sightings. Systematic habitat surveys looking specifically for Yosemite toad populations have only been conducted since the early 1990s. Therefore, it is

impossible to know how many populations have declined or become extinct, because we do not know how many populations originally existed. Sites first documented after 1990 are useful to illustrate the current range of the species, but are not useful in discussing its decline, due to lack of baseline data. Based on the number of historic sites that are no longer occupied (*see below*), it is possible that many populations have disappeared without ever having been documented.

Since 1990, 292 sites throughout Yosemite toads' historic range have been surveyed, and 229 sites have been confirmed to be occupied. Known Yosemite toad locations by area is based on the most comprehensive dataset on Yosemite toad localities available, which was collected by the U.S. Forest Service (USFS) for use in their conservation assessment of the species (as required by the Sierra Nevada Forest Plan Amendment (U.S. Department of Agriculture (USDA) 2001f)). This data set was compiled by the USFS and came from various sources, including University of California and California State University researchers, the California Academy of Science, the National Park Service (NPS), the U.S. Geological Survey, the California Department of Fish and Game (CDFG), and the California Natural Diversity Data Base. The following discussion on the number of Yosemite toad sites should be considered an approximation, based on best available information, because surveys are ongoing and some sites may have not yet been reported and added to the database. Also, multiple sightings in close proximity to each other have been considered as a single site for the purposes of this discussion.

The historic and current acreage of Yosemite toad habitat (wet meadows, shallow breeding waters, and moist uplands) within the historic range of Yosemite toads is unknown, although these habitats have been degraded and may be decreasing in area as a result of conifer encroachment and livestock grazing (*see Factor A below*). The vast majority of land within the range of the Yosemite toad is federally managed, with 919,011 hectares (ha) (2,270,918 acre (ac)) (99 percent of the range) on USFS, NPS, and Bureau of Land Management lands. Much of this land is within designated wilderness. The remaining land within the species' range is a mix of State, local government, and private lands.

The following known site discussion is based on the California Wildlife Habitat Relations range map, obtained as a geographic information system data

from CDFG for the species, although this map includes large areas of unsuitable habitat. However, this map is the best available range map for the species, although the species has been detected in a few locations outside its boundaries, primarily at the southern end of the range. The site specific information is based on localized studies that do not represent a comprehensive range-wide assessments of the species status.

(1) Yosemite toads are known from three sites in the southeast corner of the El Dorado National Forest where it borders with the Toiyabe and Stanislaus National Forests. Two of these three sites have been confirmed as occupied since 1990.

(2) Yosemite toads are known from 25 locations along the west side of the Toiyabe National Forest, 15 of which have been confirmed as occupied since 1990.

(3) Yosemite toads are known from 28 sites on the Stanislaus National Forest, 22 of which have been confirmed as occupied since 1990. These sites occur primarily in two groups, one on the northern edge of the forest, where it borders with the El Dorado and Toiyabe National Forests, and the other in a band extending west across the Stanislaus National Forest, from its southeast border with Yosemite National Park and the Toiyabe National Forest.

(4) Yosemite toads are known from 49 sites along the west side of Inyo National Forest, 35 of which have been confirmed as occupied since 1990.

(5) Yosemite toads are known from 91 locations throughout Sierra National Forest, of which 84 have been confirmed as occupied since 1990.

(6) Yosemite toads are known from 78 sites scattered throughout Yosemite National Park, 57 of which have been confirmed occupied since 1990.

(7) Yosemite toads are known from 18 sites throughout the northern half of Kings Canyon National Park, 14 of which have been confirmed as occupied since 1990.

It is impossible to fully determine the extent to which Yosemite toads have declined, because baseline data on the number and size of historic populations are few. The following studies, which reassess the current status of historically documented populations, give the most insight into the species' decline.

Jennings and Hayes (1994) reviewed the current status of Yosemite toads using museum records of historic and recent sightings, published data, and unpublished data and field notes from biologists working with the species. They mapped 55 historically

documented general localities throughout the range of the species where the toad had been present (based on 144 specific sites), and found that Yosemite toads are now absent from 29 of those localities, a decline of over 50 percent.

In 1990, David Martin surveyed 75 sites throughout the range of the Yosemite toad for which there are historic records of the species' presence, and found that 47 percent of those sites showed no evidence of any life stage of the species (Stebbins and Cohen 1997), a decline of about 63 percent.

Grinnell and Storer (1924) surveyed for vertebrates at 40 sites along a 143-km (89-mi) west-to-east transect across the Sierra Nevada, through Yosemite National Park, in 1915 and 1919. Drost and Fellers (1996) conducted more thorough surveys, specifically for amphibians, at 38 of those sites in 1992. They found that Yosemite toads were absent from 6 of 13 sites in which they had been found in the original survey. At sites where Drost and Fellers (1996) found Yosemite toads, the toads occurred in low numbers (only 15 total adult and juvenile toads at all sites), with documented declines in relative abundance in three of the Grinnell and Storer (1924) sites, as based on their generalized abundance categories such as rare, common, and abundant. Therefore, the species has declined or disappeared completely from at least 9 of 13 (69 percent) of the Grinnell and Storer (1924) sites.

The only long-term study on the size of a population of Yosemite toads indicates that the population has declined dramatically. Kagarise Sherman and Morton (1993) studied Yosemite toads at Tioga Pass Meadow (Mono County, California) intensively from 1971 to 1982, and made less systematic observations from 1983 to 1991. To estimate the adult population size, they captured and marked toads entering breeding pools. From 1974 to 1978, an average of 258 males entered the breeding pools. In 1979, the number of male toads began to decline, and by 1982, the number of males had dropped to 28. During the same time period, the number of females varied between 45 and 100, but there was no obvious trend in number observed. In periodic surveys between 1983 and 1991, it appeared that both males and females continued to decline, and breeding activity became sporadic. In 1990, the researchers were only able to locate one female, two males, and four to six egg masses. In 1991, they found only one male and two egg masses. The researchers also surveyed non-breeding habitat in the same area and found similar population

declines. To date, the population at Tioga Pass Meadow has not recovered (Roland Knapp, Sierra Nevada Aquatic Research Laboratory, pers. comm. 2002).

Kagarise Sherman and Morton (1993) also conducted occasional surveys of six other populations in the eastern Sierra Nevada. Five of these populations showed serious, apparently long-term, declines between 1978 and 1981, while the sixth population held relatively steady until the final survey in 1990, at which time it dropped precipitously. In 1991, E.L. Karlstrom revisited the site at which he had studied a breeding population of Yosemite toads from 1954 to 1958, just south of Tioga Pass Meadow within Yosemite National Park (Tuolumne County, California), and found no evidence of toads or signs of breeding (Kagarise Sherman and Morton 1993).

Previous Federal Action

On April 3, 2000, we received a petition to list the Yosemite toad as endangered from the Center for Biological Diversity and Pacific Rivers Council. On October 12, 2000, we announced a 90-day petition finding in the **Federal Register** (65 FR 60607) concluding that the petition presented substantial scientific or commercial information to indicate that the listing of the Yosemite toad may be warranted.

This 12-month finding is made in accordance with a settlement agreement which requires us to complete a finding by November 30, 2002 (*Center for Biological Diversity and Pacific Rivers Council v. Norton and Jones*, No. C-01-2106 (N.D. Calif.)).

Summary of Factors Affecting the Species

Section 4 of the Act and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act describe the procedures for adding species to the Federal lists. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). In the case of the Yosemite toad, the specific relationship between the potential threats under each factor and the continued decline of the species remains unclear. These factors, and their application to the Yosemite toad, are as follows:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. The following discussion presents several threats to the species' habitat or range.

Grazing

Livestock grazing began in Sierra Nevada meadow and riparian areas with

the settlement of California by the Spanish in the mid-1700s, and rose to a level that caused significant impacts in the mid-1800s following the gold rush (Menke *et al.* 1996). In general, livestock grazing within the range of the Yosemite toad was at a high, but undocumented, level until the establishment of National Parks (beginning in 1890) and National Forests (beginning in 1905) (Menke *et al.* 1996) in the Sierra Nevada area. Within established National Parks, livestock grazing was gradually eliminated, but packstock grazing was permitted and has increased over time (Menke *et al.* 1996).

Over time within established National Forests, the amount of grazing was gradually reduced, better documented, and the type of animals grazed shifted from predominantly sheep to cattle and packstock (Menke *et al.* 1996). In general, livestock grazing within the National Forests in the Sierra Nevada has continued with gradual reductions since the 1920s, except for an increase during World War II (Menke *et al.* 1996). Currently, there are numerous active and inactive livestock grazing allotments on the five National Forests that occur within the range of the Yosemite toad. Approximately 71 active and 36 inactive allotments occur across the Eldorado, Toiyabe, Inyo, Stanislaus, and Sierra National Forests (Laura Conway, Stanislaus National Forest, pers. comm. 2002; Holly Eddinger, Sierra National Forest, *in litt.*, 2002; Aimee Smith, Sierra National Forest, *in litt.*, 2002).

Since 1970, the continuing decrease in grazing permitted on the National Forests has been motivated by concern for resource protection (Menke *et al.* 1996). National Forests have conducted projects to minimize or rehabilitate areas impacted by grazing, including exclosures around some sensitive areas, erosion control structures, and replanting of riparian species.

Packstock grazing is the only grazing currently allowed in National Parks, and it is also allowed in National Forests. There has been very little monitoring of the impacts of packstock use in the Sierra Nevada, which increased after World War II due to increased road access, and increases in leisure time and disposable income (Menke *et al.* 1996). The recreational use of packstock and horsebackriding in the Sierra Nevada can be expected to increase further as human populations increase (State of California 2001; USDA 2001g).

Mule deer (*Odocoileus hemionus*) and bighorn sheep (*Ovis canadensis*) have always occurred within the habitats used by the Yosemite toad (Ingles 1965).

However, grazing by dense groups of large herbivores such as cattle and horses is not a natural situation in those habitats, and these habitats are vulnerable to degradation. Because Yosemite toad breeding habitat is shallow, that habitat is very vulnerable to changes in hydrology caused by grazing (D. Martin, pers. comm. 2002; R. Knapp, pers. comm. 2002).

Direct and indirect mortality of Yosemite toads have occurred as a result of livestock grazing. Cattle have been observed to trample Yosemite toad eggs and disturb eggs such that they fall into hoofprints or other deeper water and die. Metamorph Yosemite toads have been observed to fall into cattle hoofprints or to be defecated on by cattle, become trapped, and die, and adult Yosemite toads have been observed trampled to death in cattle hoofprints (D. Martin, pers. comm. 2002). Preliminary research data indicate that Yosemite toad tadpoles in grazed areas take longer to metamorphose and produce smaller metamorphs than those in areas being rested from grazing, presumably due to high bacteria and nutrient levels, causing low water quality in the grazed areas (D. Martin, pers. comm. 2002).

Grazing removes vegetative cover, and before/after surveys have shown reductions in the number of Yosemite toads using an area after the herbaceous cover was grazed (D. Martin, pers. comm. 2002). Grazing can also cause erosion by disturbing the ground, removing vegetation, and destroying peat layers in meadows, which lowers the groundwater table and summer flows (Armour *et al.* 1994; D. Martin, pers. comm. 2002). Consequently, this may increase the stranding and mortality of tadpoles, or make these areas completely unsuitable for Yosemite toads (D. Martin, pers. comm. 2002). Grazing can also degrade or destroy moist upland areas used as non-breeding habitat by Yosemite toads (D. Martin, pers. comm. 2002), especially when nearby meadow and riparian areas have been fenced to exclude livestock. Livestock may also collapse rodent burrows used by Yosemite toads as cover and hibernation sites, or disturb toads and disrupt their behavior.

The impacts of grazing on habitat can be inferred by observing the recovery of vegetation, ground stability, and water flow that occurs when riparian areas are fenced to exclude livestock (Kattelmann and Embury 1996). An example of this, from a drainage occupied by Yosemite toads, is provided by a study of fish habitat on Silver King and Coyote Valley Creeks (tributaries of the Carson River, Alpine County, California). In

this study, stream reaches were fenced to exclude cattle and, over time, bank stability increased and stream channels became deeper and narrower than the unfenced reaches. This indicated that streambank sloughing had been reduced and vegetation was stabilizing soils and reducing erosion (Overton *et al.* 1994; Kattelmann and Embury 1996).

Livestock grazing in the Sierra Nevada has been so widespread for so long that, in most places, no ungrazed areas are available to illustrate the natural condition of the habitat (Kattelmann and Embury 1996). Due to the long, and historically unregulated history (Menke *et al.* 1996) of livestock and packstock grazing in the Sierra Nevada, and the lack of historic Yosemite toad population size estimates, it is difficult to make a quantitative link between grazing and reductions in Yosemite toad populations. However, because of the documented negative effects of livestock on Yosemite toad habitat, and documented direct mortality of the species caused by livestock, the decline of some populations of Yosemite toad has been attributed to the effects of livestock grazing (Jennings and Hayes 1994; Jennings 1996).

Roads and Timber Harvest

Any activity that severely alters the terrestrial environment, such as road construction and timber harvest, is likely to result in the reduction and occasional extirpation of amphibian populations in the Sierra Nevada (Jennings 1996). By creating gaps in the natural vegetation, roads and harvested areas may act as dispersal barriers and contribute to the fragmentation of Yosemite toad habitat and populations. Habitat fragmentation has been shown to have a negative effect on amphibian species richness (Lehtinen *et al.* 1999). Timber harvest removes vegetation and causes ground disturbance and soil compaction, which makes that ground more susceptible to erosion (Helms and Tappeiner 1996). Much of the erosion caused by timber harvests is from logging roads (Helms and Tappeiner 1996). This erosion could damage Yosemite toad breeding habitat by lowering the water table, and drying out riparian habitats used by the species.

Prior to the formation of National Parks and National Forests, timber harvest was widespread and unregulated, but primarily took place at low elevations on the west slope of the Sierra Nevada, below the elevational range of the Yosemite toad (University of California (UC) 1996). Between 1900 and 1950, the majority of timber harvest took place on old growth forests on private land (UC 1996). The majority of

roads in National Forests of the Sierra Nevada were built between 1950 and 1990 to allow access to the forests for timber harvest (USDA 2001h). Between 1950 and the early 1990s, the USFS allowed major increases in timber harvest on National Forests and at higher elevations, and the majority of impacts on Yosemite toads probably took place during this period.

Roads may cause the potential for direct mortality of amphibians through roadkill (deMaynadier and Hunter 2000), and the possible introduction of contaminants such as petroleum products, herbicides, and pesticides. The levels of timber harvest and road construction have declined substantially since implementation of the California Spotted Owl Sierran Province Interim Guidelines in 1993, and some existing roads have been, or are scheduled for, decommissioning (USDA 2001h). Therefore, the risks posed by new roads and timber harvests have declined, but those already existing still pose risks to the species and its habitat through erosion, roadkill, and contaminant introduction.

Vegetation and Fire Management Activities

Vegetation management includes the removal of small trees and brush to reduce fuels, and to reduce competition which allows faster growth of desired tree species (Helms and Tappeiner 1996). These activities may disturb the ground and increase erosion, which could cause damage to Yosemite toad habitat through siltation and lowering of groundwater levels. Brush removal sometimes includes the use of herbicides, which may run off into Yosemite toad habitat, causing lethal or sublethal effects on individuals (*see* Factor D and E below).

Long-term fire suppression has influenced changes in forest structure and dynamics in the Sierra Nevada. In general, the fire return interval is now much longer than it was historically, and live and dead fuels are more abundant and continuous (USDA 2001c). Fire is thought to be important in maintaining open aquatic and riparian habitats for amphibians in some systems (Russel *et al.* 1999).

Fire suppression, and changes in fire frequency and hydrology, has probably contributed to the decline of Yosemite toads through habitat loss caused by conifer encroachment on meadows (Chang 1996; NPS 2002). Under natural conditions, conifers are excluded from meadows by fire and soils too saturated for their survival. But as conifers begin to encroach on a meadow, if they are not occasionally set back by fire, they

transpire water out of the meadow, reducing the saturation of the soils, and facilitating further conifer encroachment. Therefore, some vegetation treatment may be needed to maintain or restore Yosemite toad habitat.

Increases in fuel abundance have created the potential for catastrophic fires which could cause direct mortality of Yosemite toads; however, data on the direct effects of fire on Yosemite toads are lacking. Fires and mechanical fire suppression activities (such as cutting fire lines) could cause erosion and siltation that could negatively impact Yosemite toad habitat. However, amphibians in general are thought to retreat to moist or subterranean refuges and thereby suffer low mortality during natural fires (Russel *et al.* 1999).

Fire retardant chemicals contain nitrogen compounds or surfactants (soaps). Laboratory tests of these chemicals have shown that after surfactants and ammonia are released when they are added to water, they cause mortality in fish and aquatic invertebrates (Hamilton *et al.* 1996), and likely have similar effects on amphibians. Therefore, if fire retardant chemicals were dropped in or near Yosemite toad habitat, they could have negative effects on individual toads. The majority of vegetation and fire management activities take place at lower elevations, but they do pose a threat to the species when they take place within the species' elevational range.

Recreation

Recreational activities take place throughout the Sierra Nevada and can have significant negative impacts on wildlife and their habitats (USDA 2001a). Recreation is the fastest growing use of National Forests (USDA 2001f). Heavy foot traffic in riparian areas tramples vegetation, compacts soils, and can physically damage streambanks. Trails (foot, horse, bicycle, or off-highway motor vehicle) compact soil in riparian habitat, which increases erosion, replaces vegetation, and can lower the water table (Kondolph *et al.* 1996). Trampling or the collapsing of rodent burrows by recreationists, pets, and vehicles could lead to direct mortality of all life stages of the Yosemite toad. Recreational activity may also disturb toads and disrupt their behavior (Karlstrom 1962).

Dams and Water Diversion

Several artificial lakes are located in or above Yosemite toad habitat, most notably Edison, Florence, Huntington, Courtright, and Wishon Reservoirs. By

altering the timing and magnitude of water flows, these reservoirs have caused changes in hydrology which may have negatively altered Yosemite toad habitat. Changes in water flows have caused increased water levels upstream of the reservoirs, which may have reduced the suitability of shallow water habitats necessary for egg laying, or allowed the invasion of predatory fish into those habitats. Water flow changes may have contributed to the mortality of eggs and tadpoles either by stranding during low water or inundation during high water. The reservoirs themselves probably cover what was once Yosemite toad habitat. Most native Sierra Nevada amphibians cannot live in or move through reservoirs (Jennings 1996). Therefore, reservoirs represent both a loss of habitat and a barrier to dispersal and gene flow. These factors have probably contributed to the decline of Yosemite toads and continue to pose a risk to the species.

B. Overutilization for commercial, recreational, scientific, or educational purposes. There is no known commercial market for Yosemite toads. There is also no documented recreational or educational use for Yosemite toads, although it is likely that they have been handled by curious members of the public and collected as pets.

Scientific research may cause some stress to Yosemite toads through disturbance and disruption of behavior, handling, and injuries associated with marking individuals. Scientific research has resulted in the death of a few individuals through accidental trampling (Green and Kagarise Sherman 2001), irradiation where Karlstrom (1957) collected data on Yosemite toad movements by implanting them with radioactive tags, and collection for museum specimens (Jennings and Hayes 1994). Given the current reduced size and number of populations (Jennings and Hayes 1994), further collection could pose a serious threat to Yosemite toad populations.

C. Disease or predation. Prior to the stocking of high Sierra Nevada lakes with salmonid fishes, which began over a century ago, fish were entirely absent from most of this region (Bradford 1989). Introduced fish, such as rainbow and golden trout (*Oncorhynchus mykiss* ssp.), brown trout (*Salmo trutta*), and brook trout (*Salvelinus fontinalis*), have been shown to have a negative impact, primarily through predation, on native populations of Sierra Nevada amphibians, including the mountain yellow-legged frog (Bradford 1989; Knapp and Matthews 2000) and Pacific chorus frog (Matthews *et al.* 2001).

Data on the effects of introduced fish on Yosemite toads are less clear, although re-surveys of historic Yosemite toad sites have shown that the species had disappeared from several lakes where they formally bred and which are now occupied by fish (Stebbins and Cohen 1997; D. Martin, pers. comm. 2002). Drost and Fellers (1994) state that Yosemite toads are less vulnerable to fish predation than frogs because they breed primarily in ephemeral waters that do not support fish. The palatability of Yosemite toad tadpoles to fish predators is unknown (Jennings and Hayes 1994), but is often assumed to be low based on the unpalatability of western toads (Drost and Fellers 1994; Kiesecker *et al.* 1996), to which Yosemite toads are closely related. Brook trout have been observed to prey on Yosemite toad tadpoles and to "pick at" Yosemite toad eggs, which later became infected with fungus (D. Martin, pers. comm. 2002). Brook trout have been observed to swim near, but ignore, Yosemite toad tadpoles, which gives evidence towards tadpoles being unpalatable, at least in some situations. If Yosemite toad tadpoles are unpalatable to trout, some tadpoles may still be taken by trout that have not learned to avoid them yet (R. Knapp, pers. comm. 2002). The palatability of metamorph Yosemite toads to trout is also unknown, but metamorph western toads have been observed in golden trout stomach contents (R. Knapp, pers. comm. 2002).

At a site where Yosemite toads normally breed in small meadow ponds, they have been observed to successfully switch breeding activities to stream habitat containing fish during years of low water (Phil Strand, Sierra National Forest, pers. comm. 2002). Thus, drought conditions can increase the toads' exposure to predatory fish. Also, although the number of lake breeding sites used by Yosemite toads is small relative to the number of ephemeral sites, lake sites may be especially important because they are more likely to be useable during years with low water (R. Knapp, pers. comm. 2002).

The effects of introduced fish on Yosemite toads needs further study, especially palatability experiments to determine the level of predation. Because Yosemite toads primarily breed in ephemeral waters, fish are probably less of an impact on them than on amphibians that breed primarily in perennial lakes and streams. However, the observed predation of Yosemite toad tadpoles by trout (Martin 1992; D. Martin, pers. comm. 2002) indicate that introduced fish do pose a risk to the species in some situations, which may

be accentuated during drought years. Therefore, introduced fish have probably contributed to the decline of the species. As Yosemite toad populations become smaller and more fragmented, the impacts of predation may be significant.

Various diseases have been confirmed in dead Yosemite toads (Green and Kagarise Sherman 2001). Those diseases, in concert with other factors, are likely to have contributed to the decline of Yosemite toads and continue to be a risk to the species. Mass die-offs of amphibians have been attributed to: chytrid fungal infections of metamorphs and adults (Carey *et al.* 1999); *Saprolegnia* fungal infections of eggs (Blaustein *et al.* 1994); iridovirus infection of larvae, metamorphs, or adults; and bacterial infections (Carey *et al.* 1999). Humans, pets, livestock, packstock, vehicles, and wild animals may all act as disease vectors. Although it has not been observed in the Sierra Nevada, introduced fish may also serve as disease vectors to amphibians. Infection of both fish and amphibians by the same pathogen has been documented with viral (Mao *et al.* 1999) and fungal (Blaustein *et al.* 1994) pathogens.

Tissue samples from dead or dying adults and from healthy tadpoles were collected during a die-off of adult Yosemite toads at Tioga Pass Meadow and Saddlebag Lake and analyzed for disease (Green and Kagarise Sherman 2001). Several infections were found in the adults, including: chytridiomycosis (chytrid fungal infection), bacillary bacterial septicemia (red-leg disease), *Dermosporidium* (a fungal infection), myxozoan infection (parasitic cnidarians (relatives of jellyfish)), *Rhabdias* spp. (a parasitic roundworm) infection, and several species of trematode (parasitic flatworm) infection. However, no single infectious disease was found in more than 25 percent of individuals, and some dead toads showed no infection that would explain their death. No evidence of infection was found in tadpoles. The authors concluded that the die-off was caused by suppression of the immune system caused by an undiagnosed viral infection or chemical contamination that made the toads susceptible to the diagnosed infections. This seems likely considering the evidence suggesting environmental contaminants as a factor contributing to the decline of Yosemite toads (see Factor E).

Carey (1993) developed a model to explain the disappearance of boreal toads (*Bufo boreas boreas*) in the Rocky Mountains. In that model, she hypothesized that the toads were

stressed by some unknown environmental factor. This stress caused a physiological response that suppressed the immune system, which was further hindered by cold temperatures typical of the toads' high-elevation environment. The toads then died of infection by pathogens normally found in their environment. This model may fit Yosemite toad die-offs, given the close relationship between the two toads and their occupation of similar habitats.

Saprolegnia ferax is a species of water mold that commonly infects fish. This mold has been documented to cause massive lethal infection of eggs of western toads in Oregon (Blaustein *et al.* 1994). However, it is unclear whether the infection was caused by the introduction of the fungal pathogen via fish stocking, or if the fungus was already present and the eggs' ability to resist infection was inhibited by some unknown environmental factor. Subsequent laboratory experiments (Kiesecker *et al.* 2001), showed that the fungus could be passed from hatchery fish to western toads. Fungal growth on Yosemite toad eggs was observed by Kagarise Sherman (1980), but the fungal species was not determined, and it was unclear whether the fungus killed the eggs or grew on them after they died of some other cause.

D. The inadequacy of existing regulatory mechanisms. The Yosemite toad occurs on Federal, State, and private lands. Existing regulatory mechanisms do not fully protect this species or its habitat on these lands. Federal, State, and local laws have been insufficient to prevent past and ongoing losses of the limited habitat of the Yosemite toad.

Under section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (Corps) regulates the discharge of fill material into waters of the United States, including wetlands. However, 99 percent of the Yosemite toad's range is on Federal land, so few projects that include fill of wetlands are likely in these areas. Therefore, section 404 of the CWA is not likely to be relevant to the Yosemite toad in most cases.

Yosemite toads may not be taken or possessed within a National Park without a special permit from the NPS. In addition, cattle grazing, stocking of invasive fish, and most timber harvest are prohibited within National Park boundaries (NPS 2001). However, Yosemite toads have continued to decline within the National Parks in which the species occurs. This may be, in part, due to the Parks allowing such activities as packstock grazing and

recreation in Yosemite toad habitat, as well as chemical contamination of the species and its habitat from sources outside the Parks.

The Wilderness Act of 1964 calls for designated wilderness land "to be protected and managed so as to preserve its natural conditions." Timber harvest and the use of motor vehicles are generally prohibited within wilderness areas, but cattle grazing and invasive fish stocking are permitted within National Forest wilderness lands and pose a threat to the species and its habitat. The species has declined sharply (Jennings and Hayes 1994) regardless of wilderness designation in large portions of its range.

The Yosemite toad is considered a sensitive species by the USFS. Each National Forest was required to complete a Land and Resource Management Plan (LRMP) by the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976 (NFMA). Those acts require that the LRMPs provide for multiple use and sustained yield of the products and services obtained from the National Forests, including wildlife. The Sierra Nevada Forest Plan Amendment (Amendment) (USDA 2001d) amends the LRMPs of National Forests within the Sierra Nevada to address issues pertaining to: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels; noxious weeds; and lower westside hardwood ecosystems. The Amendment calls for the preparation of a conservation assessment, activity-related standards and guidelines, and conservation measures by the USFS to protect Yosemite toads and their habitat occurring in National Forests within the Sierra Nevada.

Under the Amendment to the LRMPs of National Forests within the Sierra Nevada, (USDA 2001f), the USFS is to provide the following conservation measures for Yosemite toads under: (A) Exclude livestock (including pack and saddle stock) from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads, or identified as "essential habitat" in the conservation assessment for the Yosemite toad during the breeding and rearing season (as determined locally). If physical exclusion of livestock, such as fencing, is impractical, then exclude grazing from the entire meadow until the meadow has been dry for 2 weeks. Wet meadows are defined as relatively open meadows with low to moderate amounts of woody vegetation that have standing

water and saturated soils after the first of June; if these conditions do not persist in the meadow for more than 2 weeks, allow grazing only in those portions of the meadow where dry conditions exist; (B) Monitor a sample of occupied Yosemite toad sites to assess: (1) Habitat conditions, and (2) Yosemite toad occupancy and population dynamics. Based on the monitoring data, modify or suspend grazing if Yosemite toad conservation is not being accomplished. These grazing restrictions may be modified through formal adaptive management studies, developed in cooperation with the USFS's Pacific Southwest Research Station, designed to assess the effects of grazing intensity and frequency on Yosemite toad habitat conditions and site occupancy; and (C) Conduct surveys of unoccupied suitable habitat for the Yosemite toad within this species' historic range to determine presence of Yosemite toads. Complete surveys of these areas within 3 years of January 2001. If surveys are not completed within the 3-year period, consider unsurveyed meadows as occupied habitat and apply restrictions for excluding livestock described in (A).

Conservation measures also include direction to avoid application of pesticides within 152 m (500 ft) of known Yosemite toad sites, and the removal of invasive fish from some areas of mountain yellow-legged frog habitat, which could benefit Yosemite toads if they are also using those areas (USDA 2001d). The conservation measures also set limits for grazing utilization of grasses and shrubs, livestock use and road construction in willow flycatcher (*Empidonax trailii*) habitat (which includes areas that may also be inhabited by Yosemite toads), packstock use of Yosemite toad habitat during the breeding and rearing season, and disturbance of streambanks and lakeshores. The conservation measures also recommend removing livestock gathering and handling facilities from riparian and meadow areas and providing off-stream watering devices for livestock. The Amendment also includes requirements for monitoring to review how well the objectives established by the Amendment have been met, and how closely management standards and guidelines have been applied (USDA 2001e).

The USFS has been implementing these conservation measures since 2001, but they have not yet been fully implemented. The Amendment is currently being reviewed, and it remains unknown if these measures will be changed, or if any additional protection of the Yosemite toad will be included.

Therefore, the Amendment has not yet provided sufficient protection for the Yosemite toad and its habitat, and it is not known if it will in the future. Also, the effect of the LRMPs in place on National Forests within the Sierra Nevada is unknown. Yosemite toads have continued to decline (Jennings and Hayes 1994).

The State of California considers the Yosemite toad a species of special concern, but it is not State listed as a threatened or endangered species under the California Endangered Species Act. California Sport Fishing Regulations include the Yosemite toad as a protected species that may not be taken or possessed at any time except under special permit from the CDFG. This gives the Yosemite toad some legal protection from collecting, but does not protect it from other causes of mortality or alterations to its habitat.

The California Environmental Quality Act (CEQA) requires review of any project that is undertaken, funded, or permitted by a State or local governmental agency. If a project with potential impacts on Yosemite toad were reviewed, CDFG personnel could determine that, although not listed, the toad is a *de facto* endangered, threatened, or rare species under section 15380 of CEQA. Once significant effects are identified, the lead agency has the option of requiring mitigation for effects through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA Sec. 21002). In the latter case, projects may be approved that cause significant environmental damage, such as destruction of listed endangered species or their habitat. Protection of listed species through CEQA is, therefore, dependent upon the discretion of the agency involved.

The California Forest Practice rules set guidelines for the design of timber harvests on private land to reduce impacts on non-listed species. However, these rules have little application to the protection of Yosemite toad because approximately 99 percent of the species' range is on Federal land.

The California Department of Pesticide Regulation has authority to restrict the use of pesticides. Their Toxic Air Contaminant (TAC) Program includes assessment of the risks posed by airborne pesticides by collecting air samples near sites of pesticide application and in communities near those sites. If air samples indicate that reductions in exposure are needed, mitigation measures are developed to bring about those reductions (California Department of Pesticide Regulation 2001). However, the TAC program is

intended primarily to protect human health, and air samples are not taken at far distant locations from application sites, like those inhabited by Yosemite toads.

E. Other natural or manmade factors affecting its continued existence.

Yosemite toads probably are exposed to a variety of pesticides and other chemicals throughout their range. Environmental contaminants could negatively affect the species by causing direct mortality; suppressing the immune system; disrupting breeding behavior; fertilization, growth or development of young; and disrupting the ability to avoid predation (Carey and Bryant 1995). Hydrocarbon and other contamination from oil production and road runoff; the application of numerous chemicals for agricultural production; roadside maintenance; and rodent and vector control programs may all have negative effects on Yosemite toad populations. Also, the airborne transport of pesticides as a result of drift from agricultural applications, including chlorothalonil, malathion, diazinon, and chlorpyrifos, from the Central Valley of California to the Sierra Nevada, has been documented (Aston and Seiber 1997; McConnell *et al.* 1998) in samples of air, rain, snow, lake water, and pine needles.

Cholinesterase is an enzyme that functions in the nervous system and is disrupted by organophosphorus pesticides, including malathion, chlorpyrifos, and diazinon (Sparling *et al.* 2001). Reduced cholinesterase activity and pesticide residues have been found in Pacific chorus frog larvae collected in the Sierra Nevada downwind of the Central Valley (Sparling *et al.* 2001). Cholinesterase activity was significantly lower in samples from the Sierra Nevada than from samples taken from coastal California, upwind of the Central Valley. No samples were taken above approximately 1,500 m (4,900 ft) elevation (Sparling *et al.* 2001), which barely overlaps the 1,460 to 3,630 m (4,790 to 11,910 ft) elevational range (Stebbins 1985) of Yosemite toads. However, significant amounts of pesticide residues have been documented as high as 1,920 m (6,300 ft) in Sequoia National Park, south of Yosemite and Kings Canyon National Parks (Aston and Seiber 1997; McConnell *et al.* 1998). In addition to interfering with nerve function, contaminants may act as estrogen mimics (Jennings 1996), or may otherwise disrupt endocrine function (Carey and Bryant 1995), and may have a negative effect on amphibian populations.

Dichlorodiphenyltrichloroethane (DDT) and its residues were found in frogs throughout the Sierra Nevada during the late 1960s (Corey *et al.* 1970), and those residues still appear in Pacific chorus frog larvae collected in the late 1990s (Sparling *et al.* 2001), over 25 years after DDT was banned for use in the United States.

Spatial analysis of populations of Yosemite toads shows a trend towards greater decline in populations downwind of areas of the Central Valley with more agriculture, where there is presumably more pesticide use; however this trend is not statistically significant (Carlos Davidson, California State University, Sacramento, *in litt.*, 2002).

Snow core samples from the Sierra Nevada contain a variety of contaminants from industrial and automotive sources including: hydrogen ions (indicative of acidic precipitation), nitrogen and sulfur compounds (NH₄, NO₃, SO₂, and SO₄), and heavy metals (Pb, Fe, Mn, Cu, and Cd) (Laird *et al.* 1986). The pattern of recent frog extinctions in the southern Sierra Nevada corresponds with the pattern of highest concentration of air pollutants from automotive exhaust, possibly due to increases in nitrification (or other changes), caused by those pollutants (Jennings 1996).

The effects of contaminants on amphibians needs further research (Hall and Henry 1992), and there are few, if any, studies on the direct effect of contaminants on Yosemite toads. However, we know of one study which shows that there are significant levels of contaminants that have been deposited in the Sierra Nevada, and the correlative evidence between areas of contamination in the Sierra Nevadas and areas of amphibian decline (Jennings 1996; Sparling *et al.* 2001; C. Davidson, *in litt.*, 2002), and the significant evidence of an adverse physiologic effect of pesticides on Sierra Nevada amphibians in the field (Sparling *et al.* 2001), indicate that contaminants may be a severe risk to the Yosemite toad and may have contributed to the species' decline.

Rodent control programs probably have an adverse indirect effect on Yosemite toad populations. Control of rodents that create burrows, such as ground squirrels, could significantly reduce the number of burrows available for use by Yosemite toads that require them for hibernation. Because the burrow density required to support Yosemite toads in an area is not known, the loss of burrows as a result of control programs cannot be quantified at this time. Active rodent colonies probably

are needed to sustain Yosemite toads because inactive burrow systems become progressively unsuitable over time. Loredó *et al.* (1996) found that burrow systems collapsed within 18 months following abandonment by, or loss of, the ground squirrels. Rodent control programs must be analyzed and implemented carefully in Yosemite toad habitat so the persistence of the species is not threatened. Much of the species' range is occupied by livestock, primarily cattle, and most livestock owners seek to eliminate rodent burrows because of the threat of cows breaking their legs if they accidentally step into a burrow.

The last century has included some of the most variable climate reversals, at both the annual (extremes and high frequency of El Niño and La Niña events) and near decadal scales (periods of 5- to 8-year drought and wet periods) that has been documented (USDA 2001b). These events may have negative effects on Yosemite toads. Severe winters (El Niño) would force longer hibernation times, and could stress the toads by reducing the time available for them to feed and breed. Severe winters may also depress reproductive effort. Morton (1981) theorized that fluctuations in energy storage from year to year may explain why many female Yosemite toads do not breed on a yearly basis. Alternately, during mild winters (La Niña), precipitation is reduced. This reduction in precipitation could lead to stranding and death of Yosemite toad eggs and tadpoles, a major documented source of mortality (Zeiner *et al.* 1988; Kagarise Sherman and Morton 1993; Jennings and Hayes 1994), or to increased exposure to predatory fish.

Changes in climate that occur faster than the ability of endangered species to adapt could cause local extinctions (U.S. Environmental Protection Agency (EPA) 1989). Analysis of the Antarctic Vostok ice core has shown that over the past 160,000 years, temperatures have varied with the concentrations of greenhouse gases such as carbon dioxide and methane (Harte 1996). Since the pre-industrial era, atmospheric concentrations of carbon dioxide have increased nearly 30 percent, methane concentrations have more than doubled, and nitrous oxide (another greenhouse gas) levels have risen approximately 15 percent (EPA 1997). The burning of fossil fuels is the primary source of these increases (EPA 1997). Global mean surface temperatures have increased 0.3 to 0.7 Celsius (0.6–1.2 Fahrenheit) since the late 19th century (EPA 1997). Climate modeling indicates that the overall effects of global warming on California

will include higher average temperatures in all seasons, higher total annual precipitation, and decreased spring and summer runoff due to decreases in snowpacks (EPA 1989, 1997). Decreases in spring and summer runoff could lead to the loss of breeding habitat for Yosemite toads and an increase in stranding mortality of eggs and tadpoles.

Changes in temperature may also affect virulence of pathogens to a different degree than the immune systems of amphibians (Carey *et al.* 1999), and may make Yosemite toads more susceptible to disease. An experimental increase in stream water temperature was shown to decrease density and biomass in invertebrates (Hogg and Williams 1996), thus global warming might have a negative impact on the Yosemite toad prey base.

Drought has contributed to the decline of Yosemite toads (Jennings and Hayes 1994), and the effects of climate change may also have contributed to that decline. These effects pose an ongoing, range-wide risk to the species.

Acid precipitation has been hypothesized as a cause of amphibian declines in the Sierra Nevada, because waters there are extremely low in acid neutralizing capacity, and therefore susceptible to changes in water chemistry due to acidic deposition (Bradford *et al.* 1994). Precipitation acidity in the Sierra Nevada has been documented to have significantly increased at a collection station at approximately 2,100 m (6,900 ft) elevation near Lake Tahoe (Byron *et al.* 1991). In addition to raising the acidity of water, acidic deposition may also cause increases in dissolved aluminum, because aluminum is more soluble at higher acidity. These increases in dissolved aluminum may be toxic to amphibians (Bradford *et al.* 1992). In laboratory experiments (Bradford *et al.* 1992; Bradford and Gordon 1992), high acidity and high aluminum concentrations did not have significant effects on survival of Yosemite toad embryos or newly hatched tadpoles. However, at pH 5.0 (pH represents acidity on a negative scale, with 7 being neutral and lower numbers being more acidic) and at high aluminum concentrations, Yosemite toad embryos hatched earlier and the tadpoles showed a reduction in body size. In a complementary field study of 235 randomly selected potential amphibian breeding sites (Bradford *et al.* 1994), no significant difference was found in pH between sites occupied and unoccupied by Yosemite toads. These data indicate that acid precipitation is an unlikely cause of decline in Yosemite toad

populations (Bradford *et al.* 1994). Therefore, acid deposition is considered a low risk to the species at this time, but should still be considered in conservation efforts because of the possibility of sublethal effects (Bradford *et al.* 1992), of its interaction with other factors, and the potential for more severe acidic deposition in the future.

Ambient ultraviolet-b (UV-B) radiation (280 to 320 nanometers (11.0 to 12.6 microinches)) has increased at north temperate latitudes in the past two decades (Adams *et al.* 2001). Ambient levels of UV-b were demonstrated to cause significant decreases in survival of western toad eggs in field experiments (Blaustein 1994). In a laboratory experiment (Kats *et al.* 2000), metamorph western toads exposed to levels of uv-b below those found in ambient sunlight showed a lower alarm response to chemical cues of injured toads than metamorphs that were completely shielded from UV-B. This indicates that ambient levels of UV-B may cause sublethal effects on toad behavior that may increase their vulnerability to predation. In a field experiment (Kiesecker and Blaustein 1995), the synergistic effects of exposure to ambient levels of UV-B radiation, and exposure to a pathogenic fungus (*Saprolegnia*), were shown to cause significantly higher mortality of western toad embryos than either factor alone.

Sadinsky *et al.* (1997) observed a high percentage of embryo mortality in Yosemite toads at six breeding sites in Yosemite National Park, but in a preliminary field experiment this mortality did not appear to be related to UV-B. In spatial statistical analysis of extant and extinct populations, higher elevation was shown to have a positive effect on the likelihood that populations of Yosemite toads were extant. This is counter to what would be expected if UV-B were the primary cause of decline (C. Davidson, *in litt.*, 2002), as sites at higher elevations would be expected to

receive more solar radiation due to the thinner atmosphere. The increase in UV-B at high elevations in the Sierra Nevada has not been more than 5 percent in the past several decades (Jennings 1996). These data indicate that UV-B has probably not contributed significantly to the decline of Yosemite toads and is probably currently a low risk to the species. However, as with acid precipitation, UV-B should still be considered as a risk to the species because of the potential for sublethal effects, synergistic effects with other factors, and the potential for further increases in UV-B radiation in the future.

Finding

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species. We reviewed the petition, information available in our files, and other published and unpublished information submitted to us during the public comment period following our 90-day petition finding. We also consulted with recognized Yosemite toad experts and other Federal and State resource agencies. On the basis of the best scientific and commercial information available, we find that proposing to list the Yosemite toad is warranted, but is precluded by higher priority listing actions.

In making this finding, we recognize that there have been declines in the distribution and abundance of Yosemite toads, primarily attributed to habitat degradation, airborne contaminants, and drought.

We conclude that the overall magnitude of threats to the Yosemite toad is moderate, and that the overall immediacy of these threats is non-imminent. Pursuant to our Listing Priority System (48 FR 43098), a species for which threats are moderate and non-imminent is assigned a Listing Priority

Number of 11. While we conclude that proposing to list the Yosemite toad is warranted, an immediate proposal to list is precluded by other higher priority listing actions. During fiscal year 2003, we must spend all of our Listing Program funding to comply with court orders and judicially approved settlement agreements, which are now our highest priority actions. The Yosemite toad will be added to the list of candidate species upon publication of this notice of 12-month finding. We will continue to monitor the status of this species and other candidate species. Should an emergency situation develop concerning this species, we will act to provide immediate protection, if warranted.

We intend that any proposed listing action for the Yosemite toad will be as accurate as possible. Therefore, we will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding. We are especially interested in further genetic information on the proper taxonomic status of the Yosemite toad and further information on the current range and status of the species, factors contributing to its decline, and conservation efforts.

References Cited

A complete list of all references cited is available on request from the Sacramento Fish and Wildlife Office (*see ADDRESSES* section, above).

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: November 27, 2002.

Steve Williams,

Director, Fish and Wildlife Service.

[FR Doc. 02-30800 Filed 12-9-02; 8:45 am]

BILLING CODE 4310-55-P

Enclosure 42



Special Wilderness Public Use Limits & Closures for 2011

March 1, 2011

Temporary Grazing Restrictions

Stock parties may camp in areas that are closed to grazing, but are required to either hold and feed their animals, or graze them in other open sites in the area.

- As part of a trial rest rotation system for the three primary meadows of the Evolution Valley:
 - **Colby Meadow** (33-3). This meadow is temporarily closed to grazing in 2011.
 - **McClure Meadow** (33-2) and **Evolution Meadow** (33-1) are OPEN to grazing.
- **Darwin Meadow** (33-4.3). This meadow is temporarily closed to grazing in 2011 with grazing available at the adjacent pocket meadows.
- **Upper LeConte Canyon Meadow** (39-1). This meadow is temporarily closed to grazing in 2011 due to the potential for stock impacts on mountain yellow-legged frog habitat.
- **Big Pete Meadow** (39-2). The meadow is open to grazing by private and commercial parties. Commercial users are requested to work with area ranger on grazing practices. Closed to administrative grazing.
- **Upper Vidette Meadow** (65-3). This meadow is temporarily closed to grazing in 2011.
- **Junction Meadow** (Bubbs Creek) (66-3). Due to flooding, the lower portion of Junction Meadow is closed to grazing. Grazing of the upper portion of the meadow is limited to private stock, and 50 grazing nights for the Cedar Grove Pack Station only.
- **Scaffold Meadow** (69-5.1)/**Lackey Pasture** (69-4). Lackey Pasture is open to limited public use with a 3-head, 2-night limit. The 15-head, 2-night restriction for Scaffold Meadow is defined such that these limits are combined to apply to the entirety of both Scaffold Meadow and Lackey Pasture.
- **Redwood Meadow** (77-5). The lower (north) section of Redwood Meadow is open to private and commercial grazing with a two-night limit. Commercial packers are allocated 32 grazing nights. The upper (south) portion of the meadow is open for up to 100 nights of administrative grazing.
- **Wallace Creek Waterfall Meadow** (81-2.3). This meadow is open to grazing with a 6-head, 1-night limit.
- **Upper Crabtree Meadow** (83-4). This meadow is temporarily closed to grazing in 2011.
- **Lower Crabtree Meadow** (83-5). This meadow is open for grazing in 2011, with use limited to 47 grazing nights.
- **Upper Rock Creek area**: There is a two-night grazing limit for all of the upper Rock Creek area, Nathan's Meadow and above.
- **Lower Rock Creek Lake and Stringer Meadows** (85-8). These meadows are temporarily closed to grazing in 2011.
- **Nathan's Meadow** (85-10). Due to past dry conditions, grazing will be limited to 75 nights in 2011.
- **Forester Lake Meadow** (89-5.2) and **Summit Lake Meadow** (90-18). These two meadows are temporarily closed to grazing in 2011.
- **South Fork Meadow** (Rock Camp) (90-10). This meadow will be limited to 75 grazing nights in 2011.
- **South Fork Pasture** (90-18). This meadow will be limited to 100 grazing nights in 2011.

NOTE: The special grazing restrictions that follow are in place to prevent the spread of velvet grass, an invasive weed, on the floor of the Kern River canyon (see Special Bulletin for additional information).

- **Upper Funston Meadow** (86-2). This meadow will be available for grazing to all parties only until the invasive velvet grass begins to flower on the US Forest Service lands to the south. At that time, grazing will be prohibited to all parties arriving at the meadow from the south. Parties arriving from the south (lower Kern) would need to hold and feed. Parties arriving from the west (Mineral King), north (upper Kern), or east (Cottonwood or Trail Pass) will be allowed to graze through the season.
- **Lower Funston Meadow** (86-5). This meadow will be closed to grazing in 2011. All parties camping at the meadow will need to hold and feed.

Temporary Campfire Restrictions

Special closures allow for continued recovery of the down-wood resource. Several heavily used areas are closed to campfires due to a lack of dead and down wood and damage to standing and live trees resulting from firewood scavenging. **Campfires in the Kern River Drainage:** Campfires are prohibited above 10,400'. Campfires are also prohibited in the Nine Lakes Basin and Upper Big Arroyo area above 10,000'; and within ¼ mile of the food-storage locker at Lower Crabtree Meadow on the John Muir Trail. These restrictions are in place to protect the valuable foxtail pine down-wood resource.

Temporary Food-Storage Restrictions

Effective 5/27/2011 to 10/31/2011 for the areas listed below. To preserve the natural behavior of bears and to protect visitor safety, **portable, park-allowed, bear-resistant food canisters or panniers (with the capacity to store all garbage, scent and food items) are required** for all overnight parties entering and or exiting the restricted areas below:

- **Rae Lakes Loop & Vicinity** – All area users with the exception of: Long distance through hikers on the Pacific Crest Trail with a valid wilderness permit must use portable, park-allowed, bear-resistant food canisters or panniers or camp at sites with food-storage lockers and use the lockers.
- **Dusy Basin Area** – All area users.
- **Rock Creek Area** – All area users with the exception of: Long distance through hikers on the Pacific Crest Trail with a valid wilderness permit must use portable, park-allowed, bear-resistant food canisters or panniers or camp at sites with food-storage lockers and use the lockers.

The techniques of counterbalancing or hanging food, or posting a guard to protect improperly stored food, are prohibited in the above areas. These regulations are in effect the Friday of Memorial Day weekend through October 31. Outside this time period, counter-balancing of food is only allowed when snow prevents access to food-storage lockers.

Change in Off-Trail Group Size Limits – NEW in 2011!

In 2011 the parks are enacting a new off-trail group size limit in five specific areas. As more large groups have ventured off developed trails, impacts have increased, including trampling of vegetation and erosion. In the areas listed below, groups that travel ½ mile off maintained trails are limited to no more than 8 individuals (people and stock combined).

- **Lamarck Col, Darwin Canyon and Darwin Bench Area** – west of park boundary/Sierra crest; east of John Muir Trail; south of Mt. Goethe; north of Mt. Darwin
 - **Dusy and Palisade Basin Areas** – west of park boundary/Sierra crest; east of John Muir Trail; south of Mt. Goode; north of Norman Clyde Peak
 - **Sixty Lake and Gardiner Basin Areas** – west of John Muir Trail; east of Paradise Valley trail; south of Woods Creek trail; north of Bubbs Creek trail (i.e. inside of Rae Lakes Loop)
 - **Sphinx Creek and Lakes, and Mt. Brewer Range Areas** – west of Reflection/East Lks. trail (to Mt. Jordan); east of Avalanche Pass/Cloud Cyn. trail; south of Bubbs Ck. trail; north of Kings Canyon/Sequoia Park boundary
 - **South of Mt. Whitney: Crabtree Lakes, Miter Basin, Mt. Langley, and Army Pass Areas** – west of park boundary/Sierra crest; east and north of Pacific Crest Trail; south of Mts. Russell & Young;
-

60 Lake Basin - Temporary Restriction for Stock Parties - Day Use Only

Stock travel in Sixty Lake Basin is restricted to the established trail to a point approximately 2.0 miles from the junction of the John Muir Trail with the Sixty Lake Trail, and is only permitted as a Day Use activity. This restriction keeps stock from impacting wet areas (meadows and lakeshores) thus protecting mountain yellow-legged frog breeding and egg-laying habitat. Baxter Meadow, located 6-7 miles away, is a viable alternative grazing area.

Pear Lake & Emerald Lakes Basins - Temporary Camping Limit Restriction, Trial Basis

Effective 5/15 to 9/30/2011. To reduce overcrowding, total overnight campers will be limited to 25 people per night per lake-basin at Pear and Emerald Lakes. All wilderness permits for the Lakes Trail, to Pear and Emerald Lakes, will be issued by the Lodgepole Trailhead Office. No advance reservations of permits will be taken for the Lakes Trail during the affected time period. Camping in the area will continue to be at designated camping sites only.

How to obtain additional wilderness information on Sequoia and Kings Canyon National Parks

- Visit www.nps.gov/seki/planyourvisit/wilderness.htm for general information
- Visit www.nps.gov/seki/planyourvisit/stockreg.htm for stock use regulations
- Visit www.nps.gov/seki/planyourvisit/camp_bc.htm for campfire regulations
- Visit www.nps.gov/seki/planyourvisit/canisters.htm for food-storage regulations
- Phone the Wilderness Office at 559-565-3766 for questions and to request printed material.

Thank you for your assistance in protecting the wilderness of Sequoia and Kings Canyon National Parks. If you have any questions or suggestions regarding these restrictions, please contact Gregg Fauth, Wilderness Coordinator, Sequoia and Kings Canyon National Parks, Three Rivers, California 93271; (559) 565-3137.

Enclosure 43

Bishop
4/18/93

Dale:

Based on our brief conversations regarding the Party and Stock Size Limits, and the two memos we recently received, first from the WO on March 8, and from the RO on April 9, there appear to be some incorrect perceptions of what has developed concerning this issue over the last 3 years. If you can bear with me for a bit, I want to give you an overview of what has happened, and where we are at the present time.

In November of 1989, the recreation staff officers/chief rangers of the Inyo, Sierra, Sequoia, Stanislaus, Toiyabe, Sequoia-Kings Canyon NP, and Yosemite NP put together an interagency study plan to deal with the party and stock size situation on the 7 admin units. This was based on a desire by the Forest Supervisors and Park Superintendents to obtain consistency between the units as basically the same group of users, used the same wilderness's involved. This particular initiative was only one of many that we have been dealing with as an interagency group to improve overall management of the eight or so wilderness's and 2 NP's located in the central Sierra region.

The FS's and Superintendents bought off on the study plan in March of 1990, and the staff moved forward with implementation. The study involved sending out a "Dear Friends" letter, jointly signed, to over 1200 individuals and groups, and we received 203 responses. In addition, Alan Watson, of the Intermountain Station in Missoula, was also conducting a Wilderness Visitor Study in the Central Sierra, and also did a mail survey of wilderness users in the John Muir Wilderness and Sequoia-Kings Canyon Park. Staff also surveyed about 38,000 wilderness permits in terms of past party sizes, which showed that 99% of all parties numbered 15 or less. From the results of the survey, about 76% of those surveyed wanted no more than 20 animals per party, and overall it seemed apparent that most people would not accept more than 15 people per party.

The results of the survey, and the recommendations of the staff for a party size limitation of 15 people and 25 head of stock, were bought off on by the FS's and Superintendents in March of 1991. New regulations were developed and were published in the Federal Register on April 22, 1991 as a draft, and a 45 day comment period provided. Another letter was sent out at that time to the original mailing list telling them that the draft regulations were being sent out and that responses were due by June 6, 1991.

The responses were analyzed, and the conclusion drawn was to stay with the draft numbers of 15 and 25 - the line group again bought off on the analysis by the staff and final regs were published in the Federal Register on October 23, 1991. Our decision was to use 1992 as a phase-in period and to fully implement in 1993 which we are doing.

Concerns:

DI 0010

A couple of points. First, we did not feel that it was necessary to go through the NEPA process on this as we felt it was primarily a social issue, and each of the Forest Supervisors and Superintendents have the authority to promulgate

regulations. Secondly, we felt that the value of being consistent between units was good management and politically sound as we could demonstrate to the public and both our critics and supporters that we did have our collective acts together in jointly administering the wilderness resource. Third, I personally discussed this issue with the Congressional Delegation 3 or 4 different times, and there was no concern expressed, and most gave us at-a-boys (and girls). Finally, Dick Benjamin, Paul Barker, and Ron Stewart were all aware of what we were doing, or should have been, throughout the process, as well as some of the Washington Office recreation and legislative affairs people.

In general, most of the commercial stock outfitters support the regulation, with the notable exception of Bob Tanner and Herb London, and possibly Dink Getty.

We keep hearing that the two Park Superintendents are not in agreement with the regulations. Someone, quite frankly, is blowing smoke. I specifically put this topic on the agenda when we had our 1993 winter meeting to make sure we did not want to increase number of people or stock, and it was unanimous that we proceed as agreed. I also asked if the two Superintendents were told by Stan Albright to change the numbers, and the answer was no. This makes sense as both of the Parks had to agree to an increase in stock numbers and in some cases number of people to be consistent with the new regulations - they sure as hell are not going to increase based on the lobbying of Tanner and London.

The two letters I referred to in the beginning, are obviously a response to Tanner's efforts. As far as I am concerned, since we have gone through the proper process to promulgate new regulations, that direction applies to what happens from this point forward - ours is a done deal. I see nothing in law or regulation that would require us to pull back and go through the process all over again.

Obviously, if you, Ron or the Chief direct us to back off and do NEPA and LAC, etc., we will do it and I will support it. However, you can expect a real loss of credibility with the public, and will turn what I feel is an effort that should have been commended instead of criticized, into another roll over to a minority constituent group. As an aside, I will assure you as I have Tanner and London, that if we take this through NEPA the numbers will, in all likelihood, come out lower, and all of our packers will be significantly impacted.

I'm sending a copy of this to the other Forest Supervisor's involved, and would hope that if they disagree with my recollection or assessment, that they let you know. I would also hope that you would send a copy of this to John Twiss, or Lyle Laverty or Hank Montrey if you think it is appropriate.

Dale, I appreciate your indulgence and apologize for the lack of editing, and yeah, even some of the emotion. I guess I've about had it up to the top of my bald head with lack of regional and WO support for so much of what we try to do to bring this outfit into the 21st century.

Dennis

DI 0011