United States Department of the Interior

NATIONAL PARK SERVICE
Southeast Utah Group
Arches and Canyonlands National Parks
Hovenweep and Natural Bridges National Monuments
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IN REPLY REFER TO

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May 10, 2013

Memorandum

To: Superintendent, Southeast Utah Group

From: Chief, Division of Resource Stewardship & Science, Southeast Utah Group M.E. Miller

Subject: Closures of Climbing Routes to Protect Sensitive Wildlife in Arches National Park

National Park Service (NPS) policy is to protect and maintain the natural distribution and abundance of plant and animal species that are native to park ecosystems. If particular park uses or activities are determined to have actual or potential adverse effects on the distribution and/or abundance of native animals or plants, 36 CFR 1.5 authorizes the park Superintendent to impose limits or close areas of the park to those uses or activities for purposes of natural resource protection. The purpose of this memo is to address the need for imposing temporary closures of climbing routes in Arches National Park as a means of protecting nesting raptors and lambing bighorn sheep. Specifically, this memo (1) describes the current situation with rock climbing in the park as it relates to raptors and desert bighorn sheep, (2) compares alternative approaches to accomplishing the management objective of minimizing effects of climbing activities on sensitive wildlife, and (3) recommends a systematic approach to imposing and terminating precautionary closures of climbing routes to protect nesting raptors and lambing bighorn sheep. This memo and recommendation are timed to coincide with the pending completion and implementation of the park's Climbing and Canyoneering Management Plan.

Current Situation

Raptors

Many raptors that occur in Arches nest on rock ledges or in crevices naturally found in association with the prominent sandstone cliffs and spires for which the park is known. Examples of cliff-nesting raptors in the park include peregrine falcons, red-tailed hawks, golden eagles, and great-horned owls. As a group, raptors are considered especially sensitive to disturbance by human activities because of their low reproductive rates and specific habitat requirements for nesting and foraging (Romin and Muck 2002). Disturbance and flushing of raptors during the breeding season are of particular concern because of the potential to adversely impact reproductive success of nesting pairs and eventually to cause long-term declines in local populations (Romin and Muck 2002, and citations therein).

A significant number of rock-climbing routes in the park occur on geologic features where past surveys have documented the presence of previously occupied raptor nests or of raptors exhibiting apparent breeding behaviors. The extent of the issue is illustrated by the fact that at least 53 of 146 known

climbing routes are located within spatial buffers[1] recommended by the U.S. Fish and Wildlife Service (USFWS) for protection of nesting raptors. Where climbing routes occur in close proximity to nest sites or within nesting territories that encompass several alternative nest sites, there is a high potential for climbing activity during the nesting season to disrupt nesting and adversely affect reproductive success of breeding pairs. In the past, some climbing routes in the park have been temporarily closed to minimize risks to nesting raptors, but there has been no systematic approach to imposing and terminating closures on an annual basis.

Desert Bighorn Sheep

In conjunction with a regional-scale bighorn sheep restoration effort (Singer and Gudorf 1999), desert bighorn sheep were reintroduced to the park in the mid-1980s through the translocation of animals captured from the Island in the Sky District of Canyonlands National Park. Although quantitative trend data are lacking, field observations by park staff suggest that the total number of sheep occurring in Arches has declined considerably since the mid-1990s when there may have been up to 100 sheep in the park. Factors that may have contributed to this apparent decline include emigration to surrounding habitats outside the park; low recruitment attributable to recent drought conditions; and mortality attributable to predation, disease, and/or other causes.

Research conducted at Island in the Sky in the early 1990s examined behavioral responses of sheep to people in vehicles, on bicycles, and on foot (Papouchis et al. 2001). Findings indicated that bighorn sheep were significantly more sensitive to hikers (greater frequency, time duration, and distance of flight response) than to other forms of human activity. Authors of the study hypothesized that greater sensitivity to hikers was attributable to the fact that most of the hiker encounters were associated with off-trail hiking and that such encounters occurred in locations that were less predictable than those with vehicles and bicycles on roads. The study also found that female groups fled significantly greater distances in spring than during other seasons, suggesting greater sensitivity to disturbance during the lambing season when flight from hikers could adversely impact lamb survival through effects on the physiological condition of lambing or lactating ewes, or by forcing ewes and lambs into suboptimal habitats where lambs might be less able to escape predation (Papouchis et al. 2001).

In Arches, 10 climbing routes occur on cliffs located in areas where previous surveys have documented the occurrence of lambing bighorn sheep. Eight of these 10 routes also are found within spatial buffers for raptor nest sites. To access these routes, climbers must hike off-trail and traverse areas where there is the potential to encounter ewes pre- or post-lambing, trigger flight responses, and alter habitat-use patterns in a manner that could adversely impact lamb survival. In spite of the research results summarized above, in the past there has been no systematic program of imposing closures in spring to protect sheep from disturbance by off-trail hiking in historic lambing areas.

[1] Due to raptor sensitivity to disturbance, and because they are protected by provisions of the federal Migratory Bird Treaty Act and other federal and state laws, the Utah Field Office of the U.S. Fish and Wildlife Service has prepared guidelines to assist managers in protecting raptors (Romin and Muck 2002). Central to these guidelines are seasonal and spatial buffers (i.e., time periods when human activities are restricted within specified distances from nest sites or territories) that are designed to provide managers with a consistent framework for evaluating and mitigating potential impacts of human activities on nesting raptors. Buffers are species specific and can be implemented in modified form following consideration of local patterns in breeding phenology, site-specific habitat characteristics, the type and duration of the human activity, and the degree to which breeding pairs have become habituated to existing human activities (Romin and Muck 2002).

Alternative Management Approaches

There are three primary approaches to minimizing potential impacts of climbing activities on sensitive nesting raptors and lambing bighorn sheep. These are described briefly below, ordered from least restrictive to most restrictive of park uses[2].

A. Limited ad hoc *Closures*

The least restrictive approach is to close climbing routes only when surveys have confirmed that habitats in close proximity to routes are occupied by nesting raptors or lambing bighorn sheep. This approach approximates the current management regime, although in the past it has been inconsistently applied with respect to raptors and infrequently or never applied with respect to sheep. Given the large number of climbing routes with potential wildlife conflicts, the limited availability of qualified staff for conducting surveys, the range of resource stewardship needs facing the park, and thus the range of competing demands on staff time, it is my judgement that it is not currently possible to complete the extensive survey work that would be necessary to confirm habitat occupancy and impose route closures before ongoing climbing activities might already have impacted nesting raptors or lambing sheep.

B. Extensive Precautionary Closures with Habitat-Clearance Surveys

An alternative approach that is more protective of sensitive wildlife than the previous approach is to automatically impose precautionary closures at the beginning of each nesting / lambing season and to terminate closures on a route-specific basis only after surveys have confirmed that the relevant nesting or lambing habitats are *not* occupied for the season. For routes with potential raptor conflicts, closure dates would be based on USFWS guidelines for seasonal buffers (Romin and Muck 2002), adjusted as necessary based on local nesting phenology. Routes with potential bighorn sheep conflicts would be closed automatically on 1 April. Routes that have potential conflicts both with nesting raptors and with bighorn sheep would be closed on the earliest of the two dates. Closures would remain in effect until surveys confirmed associated habitats to be unoccupied by nesting raptors or lambing sheep for the season. If habitat-clearance surveys cannot be completed due to staffing limitations or other management constraints, then closures would remain in effect until the end of the seasonal buffer period for nesting raptors (Romin and Muck 2002), until 31 August for bighorn sheep, or until the later of the two dates where both are relevant. Survey efforts would be prioritized according to relative levels of route usage and survey expense. That is, popular routes with high levels of climbing use and routes that are easily accessible would be identified as higher priorities for habitat-clearance surveys than routes that are used relatively little and routes characterized by difficult or costly access.

Although this approach places greater restrictions on park use, it is my professional judgement that it is a more effective means of protecting sensitive wildlife species from potential adverse impacts due to climbing. In addition, it is specifically tailored to current and expected future staffing limitations and is sufficiently flexible to account for variable workloads and changing priorities.

C. Extensive Precautionary Closures without Habitat-Clearance Surveys ("hard closures")

A third alternative is to automatically impose precautionary closures at the beginning of the nesting or lambing season, but to forego habitat-clearance surveys. Closures would remain in place and not be terminated until the end of the seasonal buffer period for nesting raptors or until 31 August for bighorn sheep. This approach is most restrictive of climbing use and can be described as a "hard closures"

[2] See Appendix to this memo for an examination of hypotheses and potential errors associated with these alternative approaches.

approach. Although this approach is more protective of sensitive wildlife than the first alternative, it may be difficult to justify except under conditions of extreme staffing limitations or other management constraints, or unless there is strong evidence to indicate that hard closures are required to prevent significant adverse impacts on wildlife.

Recommended Action – Implement Extensive Precautionary Closures and Habitat-Clearance Surveys

Because I judge Alternative B to be more protective of sensitive wildlife than Alternative A and more justifiable under current conditions than Alternative C, I recommend implementation of Alternative B effective immediately in 2013.

Proposed Closures for 2013

Table 1 lists 24 climbing routes in Arches that are proposed for closure in 2013, effective immediately upon authorization. Routes would remain closed until such time as habitat-clearance surveys determine associated raptor nests and/or bighorn sheep habitat to be unoccupied for the season, or until the termination date listed in the table. The list was compiled first by comparing known locations of bighorn sheep lambing habitat and spatial buffers associated with known raptor nesting territories or nests with locations of known climbing routes in GIS (geographic information system). This GIS exercise resulted in a list of 53 routes that were located within raptor spatial buffers, eight routes that fell both within raptor buffers and bighorn sheep lambing habitat, and two routes that fell within lambing habitat alone. From this list of 55, the list of 24 proposed closures was developed by identifying those climbing routes that are known to be in very close proximity to historic nest sites or territories and that are not screened from nests by topographic features. In addition, the list of proposed closures includes all routes found within lambing habitat with the exception of one that is directly adjacent to a heavily used bicycle trail and thus is unlikely to cause additional disturbance to bighorn sheep. This initial list will be subject to revision in future years based on new information and further detailed examination of specific climbing routes in relation to specific nest sites or lambing areas.

The Division of Resource Stewardship and Science will work with the Divisions of Interpretation and Visitor and Resource Protection to ensure that the public is notified of closures and subsequent changes in the status of closures pending results of habitat-clearance surveys over the course of the season.

Future Plans

Prior to the 2014 season, detailed standard operating procedures for program implemention will be developed by a contractor with a scope of work prepared by NPS. Procedures will be specified for revising the closure list, conducting habitat-clearance surveys, managing associated data, and preparing reports.

Table 1. List of 24 climbing routes proposed for closure in 2013, organized by area of the park and the named geologic feature with which they are associated. Effective date is based on typical nesting phenology for raptors (Romin and Muck 2002) or lambing phenology for sheep. Termination date indicates the maximum duration of the proposed closure based on nesting or lambing phenology. Closures will be terminated earlier if habitat-clearance surveys determine the associated habitat(s) to be unoccupied for the season. All dates are 2013 with the exception of the effective closure date for Industrial Disease, which refers to 2012. Based on local nesting phenology, the proposed closure date for protection of peregrine falcons has been adjusted by one month from 1 Feb to 1 Mar.

Park area	Feature name	Route name	Effective date	Termination date	Justification
Arches Entrance	The Pickle	The Pickle	1 Apr	31 Aug	Within bighorn sheep lambing habitat
Devils Garden	Devil Dog Spire	Industrial Disease	1 Dec	30 Sep	Close proximity to great-horned owl nest
Garden of Eden	Ham Rock	Harkonnen Castle (Dune)	15 Mar	15 Aug	Close proximity to red-tailed hawk nest
Highway 191	N/A	Canyonlands by Night	1 Mar	31 Aug	Within peregrine falcon nesting territory and bighorn sheep lambing habitat
		El Secondo			
		The Coup			
	Chron's Wall	Crohn's Odyssey	1 Mar	31 Aug	Within peregrine falcon nesting territory
		Left Route			
		Project One			
		Project Two			
Klondike Bluffs	N/A	Klondike Bluffs Crack	1 Mar	31 Aug	Close proximity to peregrine falcon and golden eagle nests
	The Bouquet	Route One			
		Route Two			
	The Marching Men	Cuddlebunny Tower	1 Mar	31 Aug	Close proximity to peregrine falcon nest
		False Start			
		North Marcher			
		Sand Hearse			
		Unknown Marching Men			
Highway 128 (River Road)	Goose Island	Fun Ramp	1 Mar	31 Aug	Within peregrine falcon nesting territory and bighorn sheep lambing habitat
		The Hyaena			
		Trail of the Navajo			
	Milano Tower	Pop Tarts			
	N/A	Escape Route			
Windows	Tonka Tower	Tonka Tower	15 Mar	15 Aug	Close proximity to red-tailed hawk nest

Literature Cited

Papouchis, C. M., F. J. Singer, and W. B. Sloan. 2001. Responses of desert bighorn sheep to increased human recreation. The Journal of Wildlife Management **65**:573-582.

Romin, L.A., and J.A. Muck. 2002. Utah field office guidelines for raptor protection from human and land use disturbances. U.S. Department of Interior, Fish and Wildlife Service, Salt Lake City, UT. 42 p.

Singer, F. J. and M. A. Gudorf. 1999. Restoration of bighorn sheep metapopulations in and near 15 national parks: Conservation of a severely fragmented species. Volume I: Planning, problem definition, key findings, and restoration. U.S. Geological Survey Open File Report 99-102. USGS Midcontinent Ecological Science Center, Fort Collins, CO. 96 p.

Appendix: Hypotheses and Potential Errors Associated with Alternative Management Approaches

A. Limited ad hoc *Closures*

- Null hypothesis: Habitat unoccupied.
- Type I error: Rejecting a null hypothesis that is in fact true – i.e., falsely judging an unoccupied habitat to be occupied and wrongly closing the route.
- Probability of a Type I error: Low, if surveys are designed and implemented properly by qualified staff. Error impacts climbing use rather than wildlife.
- Type II error: Failing to reject a null hypothesis that is in fact false – i.e., failing to detect occupancy when the habitat is in fact occupied, and wrongly leaving the route open.
- Probability of a Type II error: High due to the large number of routes relative to staff availability and workload (i.e., limited staffing and realities of occupancy surveys together indicate low power to detect and reject a false null hypothesis). Error has potential adverse impacts on wildlife rather than climbing use.

B. Extensive Precautionary Closures with Habitat-Clearance Surveys

- Null hypothesis: Habitat occupied.
- Type I error: Rejecting a null hypothesis that is in fact true – i.e., failing to detect occupancy when the habitat is in fact occupied, and falsely opening the route.
- Probability of a Type I error: Low, if surveys designed and implemented properly. Error has potential adverse impacts on wildlife rather than climbing use, but probability is low.
- Type II error: Failing to reject a null hypothesis that is in fact false – i.e., falsely determining an unoccupied habitat to be occupied and wrongly leaving a route closed to climbing use.
- Probability of a Type II error: Low, if surveys designed and implemented properly. Error impacts climbing use rather than wildlife.

C. Extensive Precautionary Closures without Habitat-Clearance Surveys ("hard closures")

- Null hypothesis: Habitat occupied.
- Type I error: Rejecting a null hypothesis that is in fact true – i.e., failing to detect occupancy when the habitat is in fact occupied, and falsely opening the route.
- Probability of a Type I error: Zero, since no habitat-clearance surveys will be conducted and all routes will remain closed until the end of the nesting / lambing season. Error has potential adverse impacts on wildlife rather than climbing use, but the probability is zero.
- Type II error: Failing to reject a null hypothesis that is in fact false – i.e., falsely determining an unoccupied habitat to be occupied and wrongly leaving a route closed to climbing use.
- Probability of a Type II error: High (nearly certain), since no habitat-clearance surveys will be

conducted and all routes will remain closed until the end of the nesting / lambing season. Error is nearly certain and impacts climbing use rather than wildlife.