2018 Pack Stock Use and Meadow Monitoring Summary Report

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Emeric Lake in the upper Merced River watershed.

Acknowledgments

The compilation of annual stock use records at Yosemite National Parks is a collaborative effort that succeeds only because of the cooperation of many stakeholders. We thank all of the stock users who took the time report use in 2018. We also thank all of the wilderness and RMS staff who work tirelessly to collect, enter and analyze field data in order to produce this summary report. Special thanks to Martijn Ouborg, Tim Kuhn, Joy Baccei and Melissa Booher.

Introduction

The purpose of this report is to summarize the 2018 pack stock use season in Yosemite Wilderness, in terms of reported use numbers, monitoring efforts related to meadow opening dates and residual biomass, and related management information or changes. The audience of this report is both the public (stock and non-stock users alike) and park managers. The scope of this report is focused on overnight wilderness pack stock use extending from NPS trails to camp sites, and including camp access routes, stock holding areas, and forage areas for grazing. The vast majority of saddle and pack stock use in Yosemite

Wilderness is with horses and mules. Thus this report does not address on-trail use, day use (such as supply trips for the High Sierra Camps), or use by llamas or other pack animals

Pack and saddle stock use in Yosemite predates the establishment of the park and the designation of wilderness. Stock were first used to access the Sierra Nevada Mountains during the middle of the nineteenth century for exploration, mining and logging, and subsequently for sheep and cattle grazing. Beginning in the late nineteenth century, stock were used to access the Yosemite region for recreation. Pack and saddle stock have been used for park administration from its inception, and continue to support activities such as mounted wilderness patrol, trail construction and maintenance, backcountry utilities, search and rescue, fire management, and monitoring/research project support.

The use of stock for administrative and recreational purposes is recognized as a traditional, and compatible activity in the Yosemite Wilderness. Because of the potential for impacts to park resources—including soils, plants, hydrology, wildlife, and archaeology—stock use is subject to careful management and monitoring.

Data on stock use of the Yosemite Wilderness has been collected sporadically since at least the 1930s, and concern over the potential impacts from over-grazing was expressed for the same period of time. Research and monitoring of stock-related impacts occurred through the 1990s to the present, although it was not tied to restrictions on use. Research to support a formal pack stock management framework began in 2008, culminating in the publication of Management Tools and Framework for Pack Stock Use and Meadow Monitoring in Yosemite Wilderness in 2018.

The 2018 field season continued to show that accurate and timely reporting of stock use is an important and critical tool for successful management. Implementation of Meadow Opening Dates and Residual Biomass are critical components from the pack stock framework that were added to the 2018 Commercial Use Authorization terms and conditions of use. The involvement and input from all users of pack stock in Yosemite is critical to the success of the framework for managing pack stock in the park and for the preservation and protection of Yosemite's resources and wilderness character.

Areas of Use

Between 2004 and 2009 park management solicited commercial operators to identify sites that were traditionally used. From that initial input, 304 pack stock use sites were tallied (Figure 1) but many were not verified locations or appeared as duplicate listings from multiple data sources (Gavette 2009). Results of this investigation were compiled into a Geographic Information System (GIS) database. Subsequently through the elimination of duplicate reported sites, field effort by park staff to verify locations, and meetings among commercial operators, wilderness managers and park staff (Gavette 2009, Curtis 2012) this number was reduced to 101 relevant sites (Figure 2) by 2012.

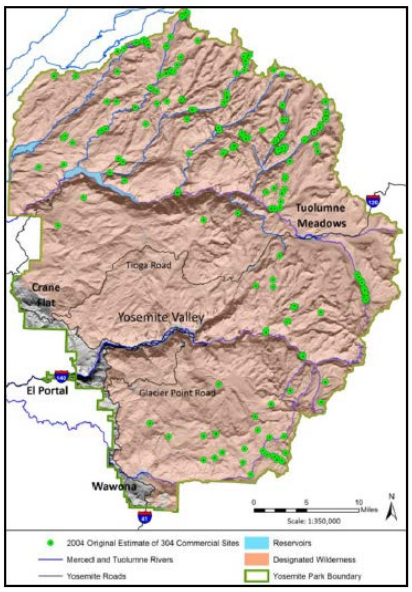

Figure 1 Map of Yosemite wilderness areas and original 304 approximate commercial site locations based on unverified data from 2004.

Figure 2 Map of Yosemite wilderness areas and 101 operator specified priority commercial stock camp sites as of 2012.

Stock Use Reporting

Three types of pack stock use occur in Yosemite Wilderness: administrative, commercial, and private recreational use. Commercial stock use includes outfitters operating under a Commercial Use Authorization and under a concession contract. The metric Stock Use Nights (SUN) is used to express the number of overnight stays by a single head of stock at a given site. For instance, 12 SUN reported for a site conveys that a site had been utilized by 12 animals for one night. Stock Use Nights does not explicitly convey grazing, as operators may elect or be required to feed stock via supplemental sources (e.g., highly-processed or fermented sources only such as pellets, rolled grains, and bagged fermented feed) rather than releasing stock in a meadow for grazing. All pack stock users in the park, including administrative, report their level of use by location to the Yosemite Wilderness Office (Visitor and Resource Protection Division). CUA holders and the concessioner also provide a summary of their annual use to the Yosemite Business Revenue Management Division for fiscal tracking. Detailed reporting by each stock use type has improved over time; general consensus agrees that reporting since 2012 has been notably more accurate than in prior years.

Since 2004, 31,514 total SUN have been reported in Yosemite Wilderness (Table 1). Since 2012, average annual reported SUN was 2,304/year. Roughly 45% of the total reported SUN since 2012 was by commercial outfitters, 37% by the concessioner, 14% by NPS administrative use, and 5% by private use (Figure 3).

Table 1. Reported stock use nights by use type since 2004 in Yosemite Wilderness.

Year	CUA	Concessioner	Administrative	Private	Total
2004	2242	*Not Reported*	0	260	**2502**
2005	1477	*Not Reported*	0	210	**1687**

2006	1418	*Not Reported*	258	234	**1910**
2007	1496	*Not Reported*	506	300	**2302**
2008	1968	*Not Reported*	500	294	**2762**
2009	850	*Not Reported*	840	178	**1868**
2010	738	*Not Reported*	420	132	**1290**
2011	555	*Not Reported*	350	157	**1062**
2012	754	249	249	134	**1386**
2013	919	679	367	156	**2121**
2014	879	1504	326	126	**2835**
2015	1734	1474	237	229	**3674**
2016	1050	1160	357	55	**2622**
2017	985	0*	232	42	**1259**
2018	865	838	412	119	**2234**
Total	**17930**	**5904**	**5054**	**2626**	**31514**

*The Park Concession Contract switched in 2017, and High Sierra Camps were not opened. Pack stock use by the concessioner did not occur to any substantial amount and reporting did not occur.

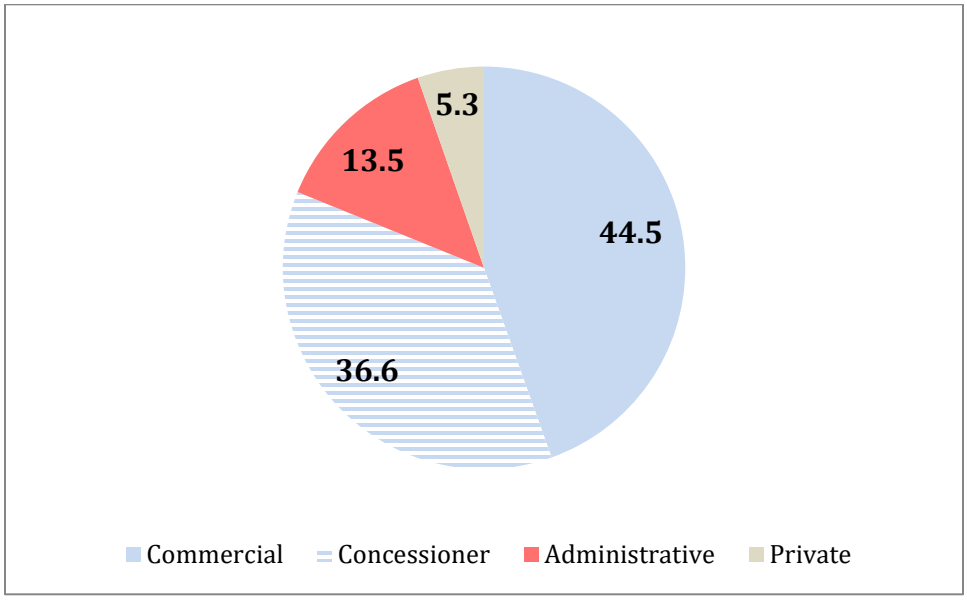

Figure 3, Proportion of total reported stock use by type, between 2012 and 2018.

Patterns of stock use have changed over time, in terms of both locations and magnitude (Figure 4). In recent years, the park has permitted approximately 10 different commercial pack stock outfitters annually to offer services within designated Wilderness at Yosemite. The type of each commercial trip (e.g., spot trip, overnight, or multiple night stay), locations, and the number of supporting stock animals are determined by the desires of the clientele (i.e., pack load and travel distance) and the business plans of individual outfitters. Commercial users submit itineraries of their scheduled trips at the start of each month throughout the season, and provide follow up reports of actual use (# of clients, # of stock, location, grazing methods, etc.) at the end of each month. The vast majority of concessioner stock use is used for resupply of the High Sierra Camps, with a minor portion fulfilling special trip hires by park visitors. Valid wilderness permits are required for all special trips including permits for both clients and guides. Administrative stock users are employed or contracted by the NPS to assist with park duties. The locations and magnitude of administrative stock use varies based on the needs of park management. Private users are typically small, non-commercial groups that use pack stock for recreational purposes.

Private stock users are required to possess a valid wilderness permit. Patterns of private stock use are sporadic and based on user preferences, and typically include fewer than 6 head of stock.

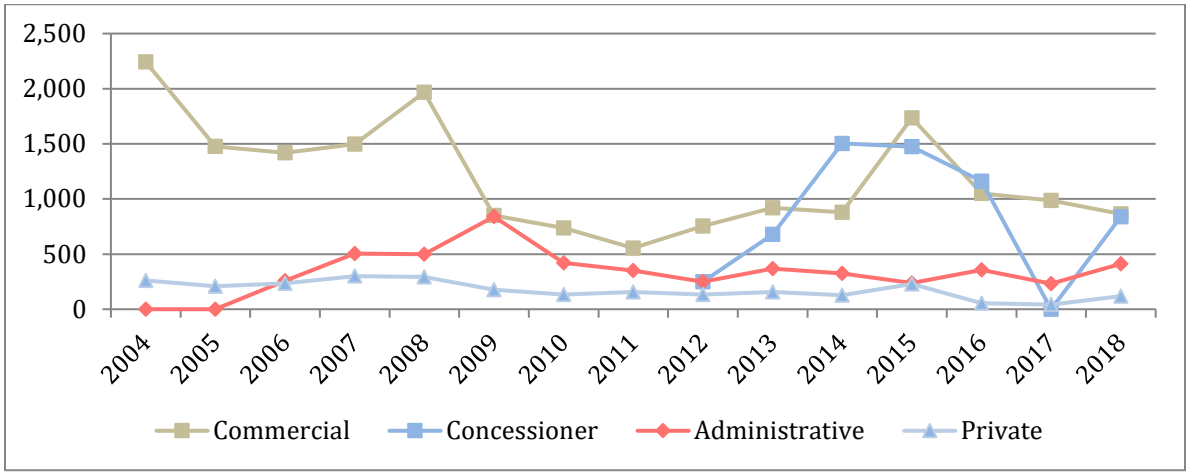

Figure 4. Reported stock use nights: Line graph of changing magnitudes of stock use between 2004 and 2016. Note, pack stock day use not included.

Meadow Opening Dates

Background

Field conditions of range-readiness for grazing vary based on site elevation, aspect, and soil dry-down characteristics, as well as other factors including water year conditions (e.g., variation in precipitation input and snow accumulation and melt rates). The water year begins in October 1st of each year. The Sierra Nevada is dominated by a Mediterranean climate where the majority of annual precipitation is accumulated as snow generally between October and April. Modelling and inference by Kuhn et al. (unpublished) classified 104 meadows into three general classes of opening dates for stock grazing (Early, Mid, and Late), which varied by three broad classes water year conditions (Dry = ≤ 50% of average, Average = 50 – 150%, and Above-average ≥ 150%). Water year conditions are based on the *April 1st* Department of Water Resources snow survey reports (see: https://cdec.water.ca.gov/snow/). For Dry years the suggested opening date is around mid-June for early class meadows, mid-July for Mid class meadows, and early-August or later for Late class meadows. For Average water year conditions a delay of two to four weeks from opening dates for Dry water years is recommended, and an additional two to four weeks for Above-average water years.

On April 1, 2018 snow water equivalent measurements equated to 58% of average, thus falling within the Average water year range. As a pilot implementation of the meadow opening dates for pack stock grazing in 2018, specific opening dates for each of 104 sites were prescribed based on results of the 2018 April 1st snow surveys, findings by Kuhn et al. (2018), and a consensus of best professional judgement among an interdisciplinary team of Resource Management Division and Resource Protection Division staff. These Forecasted Opening Dates were conveyed to the commercial operators in Appendix 4 of the 2018 Commercial Use Authorization for Stock Operators. The Forecasted Opening Dates were listed in, and also provided directly to the commercial operators during the annual meeting on May 10, 2018.

Field Methods (Validation of Forecasted Opening Dates)

When trail access to proposed meadow sites opened (the first week of June) an interdisciplinary team—including park Resources Management and Science Staff, and Wilderness Protection staff—conducted rapid assessments for purpose of validating prescribed opening date conditions at 10 popular sites along the Pacific Crest Trail. These site visits also served to train Wilderness Patrol staff in the assessment of meadow conditions for use by grazing, and application of the Soil Resistance and Plant Phenology Rapid Assessment protocol. Pack stock were not present at 7 of the 10 sites visited, whereas the full Rapid Assessment protocol was applied at 3 sites. Regardless if pack stock were incorporated into application of the Rapid Assessment, the interdisciplinary team felt confident in their assessments and results (see Table below).

Results and Findings

In general all Forecasted Opening Dates were two to three weeks earlier than the Recommended Opening Dates (Table 2) derived from the field validations, except for the Upper Kerrick-South site. Nonetheless, reported use occurred later than each Recommended Opening Date except at the Matterhorn Canyon sites where it reportedly occurred on the recommended date. In general, because of below-average water year conditions and later-timed use, we would not anticipate substantial amounts of early season use impacts at these sites. Nonetheless, a more conservative approach to estimate Forecasted Opening Dates for these sites may provide a closer approximation of Recommended Opening Dates in future years.

Photo 1 and 2. Meadow opening date's rapid assessment implementation and subsequent hoof punch depth measurement, via NPS interdisciplinary team site visits.

Table 2. Meadow Opening Dates Rapid Assessment Site Attributes and Field Review Comments

Site	Camp ID (Meadow ID)	Opening Date Class	Assessment Method	Forecasted Opening Date	Recommended Opening Date	Field Review Comments	Date of First Reported Use by Stock[1]
Upper Kerrick-North	90 (4324)	Mid	Foot	7/7	7/15	Dry Type = plants not flowering, and soils dry ("range ready"). Moist Type = plants not flowering, soils moist to saturated. Wet Type = plants not flowering, soils are inundated. Yosemite Toad tadpoles present in wetland (~100' from camp site). Mountain Yellow Legged Frog adult in slow flow channel (~100' from camp site).	7/29
Upper Kerrick-South (Sand Dune Camp)	138 (4324)	Mid	Foot	7/7	7/8	Dry Type = plants not flowering, and soils dry ("range ready"). Moist Type = plants not flowering, soils moist to saturated. Wet Type = plants not flowering, soils are inundated. Yosemite Toad tadpoles present in wetland (~100' from camp site). Large portions of meadow are wet or wet-moist types.	7/29
Jose's Camp	88 (3915)	Late	Foot	6/25	7/8	Moist Type = plants not flowering, and soil is moist.	7/29
Benson Lake	67 (3570) and 95 (3561)	Early / Mid	Foot	6/15	7/8	Forested portions of site. Dry Type = not present at site. Moist Type = Plants not flowering, and soils are moist-saturated. Wet Type = Plants are flowering, but soils are inundated. Meadow portions of site. Dry and Moist Types = not present at site. Wet Types = Plants are flowering, but soils are inundated.	7/29
Smedberg Lake	92 (3501) and 40 (3506)	Mid	Foot	6/25	7/8	Dry Type = plants not flowering, and soils dry ("range ready"). Moist Type = plants flowering, and soils are moist-dry. Wet Type = Plants are flowering, but soils are inundated.	7/31
Matterhorn Junction Camp	76 (3499)	Late	Foot	6/25	7/8	Dry Type = plants booting and flowering, and soils drying (~1 week till "range ready"). Moist Type = plants are flowering, and soils are saturated. Wet Type = plants are flowering, and soils are saturated-inundated.	7/7
Matterhorn Trail Crew Camp	91 (3466)	Mid/ Late	Foot	6/25	7/8	Dry Type = plants booting and flowering, and soils drying (~1 week till "range ready"). Moist Type = plants are flowering, and soils are saturated. Wet Type = plants are flowering, and soils are saturated-inundated.	7/7
Miller Lake	96 (3400)	Early / Mid	Foot and Stock	7/7	7/15	Dry Type = Plants are flowering-seeding, and soils appear "range ready". Moist Type = Plants not flowering, and soils are moist. Wet Type = plants are flowering, and soils are saturated-inundated. No compaction observed in either Dry or Moist Types after stock walk-through.	No Reported Use in 2018
Hook Lake	97 (3414) and 135 (3355)	Mid/ Late	Foot and Stock	6/25	7/8	Dry Type = Plants are flowering-seeding, and soils dry and "range ready". Moist Type = Plants ~1 week to flowering, and soils moist-saturated. Wet Type = Plants are flowering, soils are inundated. No compaction observed in either Dry or Moist Types after stock walk-through.	No Reported Use in 2018
Smokey Jack	113 (3207s)	Early	Foot and Stock	6/25	7/8	Dry Type = Plants are flowering-seeding, and soils dry ("range ready"). Moist Type = Plants ~1 week to flowering, and soils are saturated. Wet Type = Plants are flowering, soils are inundated. Stock	8/5

						walk-through in Moist Type = 8-10 hoof punches observed.	
[1]Notably poor year in reporting specific sites by users, rather information was generally provided as broad areas.							

Residual Biomass

Background

Monitoring of residual biomass in meadows used by pack stock at Yosemite aims to accomplish the following three goals: 1) inform preliminary grazing capacity estimates to determine *how much* (site grazing capacity) use at a given site might occur, while avoiding, reducing, or mitigating the occurrence of unacceptable impacts, 2) detect utilization of meadow forage (a proxy for grazing intensity), and 3) field-test grazing capacity model factors and assumptions for further accuracy and refinement (Jones et. al. 2018, Kuhn et. al. 2018). Residual biomass (RB) refers to the amount of forage remaining (i.e., the amount of above ground plant material present) after the season of grazing. Monitoring of residual biomass on un-grazed and grazed sites provides an efficient proxy measure of productivity and utilization (NPS 2014c). Monitoring of RB can also contribute to our understanding of plant productivity variability, available forage, and grazing capacity in meadows, and can also contribute to our understanding of meadow condition. In remote wilderness meadows, where the timing and duration of grazing is unpredictable and extensive botanical surveys are costly, monitoring of RB provides an efficient proxy measure of productivity and utilization.

The RB monitoring effort aims to field-test our grazing capacity model factors and assumptions, and inform resulting preliminary grazing capacity estimates for meadows used by pack stock in Yosemite. The combination of these monitoring data, in addition to accurately reported stock use nights by meadow site, can aid in the validation of modeled grazing capacity estimates by site, and help determine whether a meadow site has reached grazing capacity for the year. Through grazing capacity estimation, we aim to ensure appropriate grazing levels needed to maintain desired meadow ecological condition. Grazing capacity can be used as a monitoring tool by calculating the percent of capacity by site (percent of capacity = reported use / grazing capacity), where reported use and grazing capacity units are stock use nights. This could be applied in real time, during the grazing season, or post-grazing as part of the monitoring evaluation. When percent of capacity nears 100%, ideally monitoring would occur to observe meadow condition. Monitoring is the best way to ensure meadow protection and determine whether capacities can be adjusted, where there is potential to refine the model itself or to adjust site-specific capacities where needed. Post grazing season evaluation of percent of capacity may be an important factor contributing to understanding of meadow conditions (Jones et. al. 2018).

Methods

Sampling of RB occurs in meadows that typically receive grazing each year, based on average annual reported pack stock use nights (SUN), which is expressed as the number of overnight stays by a single head of stock (horse or mule) at a given site. Monitoring priority is given to sites with the highest use levels. Timing of sampling ideally occurs annually in late September, after the majority of grazing for the season has occurred, in an effort to capture the majority of grazing for that season. For sites approaching estimated capacity before the end of the use season, RB monitoring can occur any time after peak production.

Within each meadow survey site, a core (grazed) and reference (ungrazed) plot is established. Plot size is scaled based on meadow size and forageable area therefore smaller meadows will have smaller plots, with

tighter plot spacing than larger meadows. Core plots are subjectively located in areas with the greatest likelihood of grazing impacts, based on several criteria (NPS 2015). Un-grazed reference plots are located within the same meadow and in areas with comparable conditions as core site locations, whenever possible. When matching un-grazed conditions are not present within a sample meadow, alternative meadows are used as reference sites. Established plots serve as permanent monitoring sites designed for annual sampling. Plots are not permanently marked, and reference plots are not fenced with exclusion fencing to eliminate grazing.

Sampling in 2018 was conducted within the target timeframe, from mid-September to mid-October. An interdisciplinary team—including park Resources Management and Science Staff, and Wilderness Patrol staff—conducted residual biomass monitoring at four popular sites in the Tuolumne River watershed, some of which are along the Pacific Crest Trail (Photo 3). Meadows surveyed in 2018 include Upper Lyell-North and South, Dorothy Lake and Tilden Lake.

Photo 3. Residual biomass monitoring implementation via NPS staff interdisciplinary team.

Results and Findings

Forage utilization was positive for one survey meadow (Tilden Lake), where the un-grazed plot had higher residual biomass values than the grazed plot (Figures 3, and 4). Positive utilization indicates the detection of grazing. Conversely, negative utilization indicates no detection of grazing. Utilization was negative for the other survey meadows (Dorothy Lake, Upper Lyell-North, Upper Lyell-South), where grazed plots had higher RB values than un-grazed plots. Utilization values among survey meadows ranged from -1,503 lbs/acre to 110 lbs/acre.

Grazing capacity (GC) model predicted biomass values were compared with estimated field-measured RB values among survey meadows, where values did not match well. At Tilden Lake, the predicted biomass value from GC model (1,604 lbs/ac) was more than double the field-estimated value of the reference (un-grazed) plot (605 lbs/ac). At Dorothy Lake, the predicted biomass value from GC model (1,627 lbs/ac) was nearly double the field-estimated value of the reference (un-grazed) plot (876 lbs/ac). At Upper Lyell-North, the predicted biomass value from the GC model (1,124 lbs/ac) was nearly two-thirds of the field-estimated value of the reference (un-grazed) plot (1,782 lbs/ac). At Upper Lyell-South, the predicted biomass value from the GC model (1,386 lbs/ac) was about four-fifths of the field-estimated value of the reference (un-grazed) plot (1,696 lbs/ac).The site with highest utilization (Tilden Lake) had 30 SUN, and the site with lowest utilization (Upper Lyell-North) had 74 SUN.

Negative utilization values detected in survey meadows could include the following reasons: (1) Core plots may have received little to no grazing. (2) Core plots may have been monitored too early in the growing season prior to actual grazing. (3) Reference plots may have received grazing. (4) Core or reference plots are undergoing a shift in species composition. (5) Core plots may have received light grazing early in the growing season, and plants experienced rebound growth post-grazing.

Future RB monitoring will continue at sites identified in the emerging Pack Stock Management Framework (PSMF). The PSMF aims to provide an adaptive, three-tiered monitoring approach focusing on status indicators, diagnostic secondary investigations, and management effectiveness.

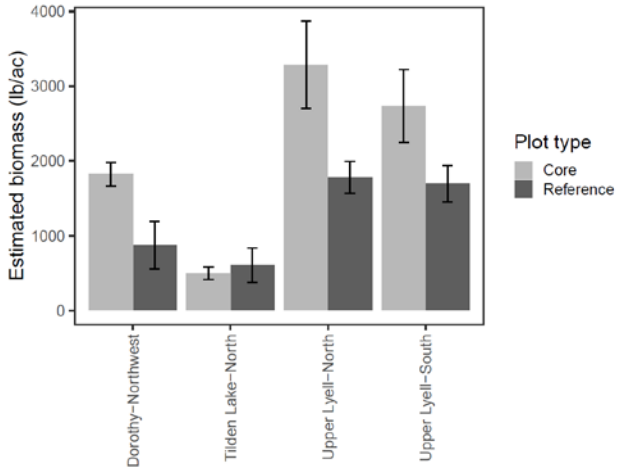

Figure 3 Estimated biomass (lb/ac) in core (grazed) and reference (un-grazed) survey meadow plots

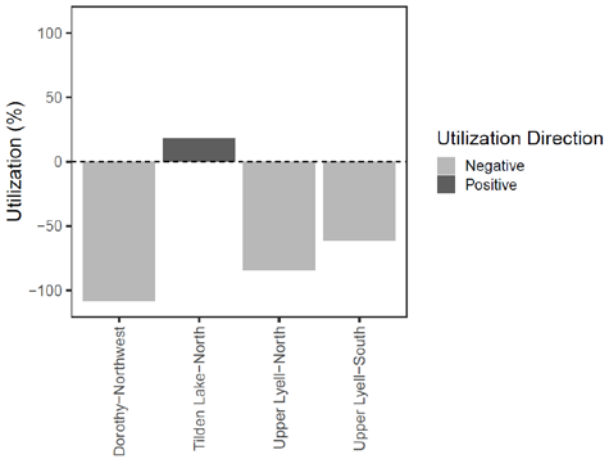

Figure 4 Percent utilization direction (negative in light grey, positive in dark grey) survey meadow plots

Future Goals

Pack Stock Management Framework (PSMF) Overarching Goals:

- Ongoing Analysis of Data
- Completion of final reports
- Pack Stock Team meetings/adjustments of MOD's and Grazing capacities as needed
- Sharing final reports/data analysis/changes to opening dates/grazing capacities with commercial operators and administrative users
- Schedule field dates/work plans for 2019

Stock Use Night Reporting Next Steps:

- Continue to improve and expand on stock use night reporting efforts, by expanding outreach efforts to inform and educate pack stock users on required reporting methods.
- Continue data and report compilation per specific sites and use types.
- Adapt monitoring efforts to match high use or sensitive meadow areas.

Meadow Opening Dates Next Steps:

- Continued interdisciplinary team annual field site visits to validate meadow readiness conditions (soil moisture and plant phenology) in relation to forecasted opening dates and water year variability.
- Continued interdisciplinary team training on meadow readiness condition evaluation (rapid assessment) protocol.
- Continued outreach to all pack stock users on meadow management and monitoring efforts by NPS.
- Data accumulation and eventual revision of forecasted dates based on trends of recommended opening dates across water year variability.

Residual Biomass Next Steps:

- Continue to improve and expand RB monitoring and SUN reporting efforts.
- Train new staff on RB monitoring protocol to allow for expansion of RB monitoring sites.
- Monitor RB at sites surveyed for meadow opening dates (MOD) to develop long-term datasets.
- Conduct monitoring in 2019 in September to optimize detection of annual utilization.
- Consider moving some reference (un-grazed) plots for more accurate comparisons.
- Continue RB monitoring at Upper Lyell-North and Upper Lyell-South annually.
- Continue comparison of RB monitoring results with predicted grazing capacity model values.
- Consider the use of remote sensing vegetation indices for comparison with RB field data.
- Work with PSMF team to develop a stock use meadow monitoring program at Yosemite NP.

References

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Appendices

Appendix 1. Commercial Use Agreement 2018 Letter Sent to Commercial Pack Stock Users regarding Yosemite National Park – Meadow Opening Dates & Grazing Capacities

In an effort to improve our wilderness stewardship plan we will be taking the opportunity over the next few years to evaluate many of the best management practices offered in our draft pack stock appendix through the Commercial Use Authorization permitting process. This effort will allow us to improve our working relationship with commercial operators and to better inform our draft management document(s). During this time we would like you to provide us feedback while we continue to develop the pack stock management plan and a monitoring program that will best protect and enhance park resources that support pack stock use in the park.

Last year we addressed meadow opening dates given the extraordinary snow pack because of the potential impacts that could have occurred. It offered a great opportunity for feedback and dialog. In an effort to continue that relationship this year we are providing you a slightly modified version of appendix C from the pack stock framework. It provides a more comprehensive list of park meadows with proposed meadow opening dates and grazing capacities.

Generally our preferred choice for grazing capacities was at 25% utilization. Through our Best Professional Judgement (BPJ) we made some adjustments and gave a brief justification/explanation. We have also made minor adjustments to Meadow Opening Date (MOD) classes based on field observations. We have included a short list of Acronyms that we have used in the table.

In the table provided in your CUA permit MOD's are expressed in terms of soil moisture in lieu of date classes (early/late). Meadow opening dates can vary 2-4 weeks from dry to average years and from average to wet years. *(This table reflects 3 week differences in opening dates between water years.)* Water year classifications are based on the snow packs water equivalency measured during April's snow survey each year (Results posted in May).

Meadow Opening date Class	*Dry Year	Avg. Year	Wet Year
Early=Dry	June 7	Jun 28	July 19
Early/Mid=Dry/Moist	June 15	July 6	July 27
Mid=Moist	June 25	July 16	Aug 6
Early Late=moist/wet	July 7	July 28	Aug 18
Late=wet	July 15	Aug 5	Aug 26

* Modest start dates; pack stock framework calls for MOD's for Early=Mid June, Mid=Mid July, Late-Early August

List of Acronyms

BPJ	Best Professional Judgment (BPJ) takes into account meadow size, observed condition, known use patterns, ecological attributes, and forage attributes.
MOD	Meadow Opening Date
GC	Grazing Capacity. GC will be monitored and adjusted as use approaches recommended levels.
SUN	Expresses the number of overnight stays by a single head of stock at a given site. Example 12 SUN reported for a site conveys that a site had been utilized by 12 animals for one night.

Appendix 2. Yosemite National Park – 2018 Preliminary Meadow Opening Dates & Grazing Capacities for the Tuolumne River Watershed.

Camp Name (Camp ID#)	Location	Elevation (ft)	Meadow Opening Date				Grazing Capacities (SUN)	Stock Use Nights Justification/Explanation
	UTME, UTMN NAD 1983 Zone 11N		Opening Date Class	Dry Year	Average Year	Wet Year		
Cathedral Lake (153)	287308, 4190987	9646	Wet	15-Jul	5-Aug	26-Aug	19	BPJ supports interim GC at Average reported stock use 2004-2017. Site elevation above 9600 no wood fires.
Beehive (4)	256205, 4208985	6555	Wet	15-Jul	5-Aug	26-Aug	40	BPJ supports interim GC at 40. No reported stock use.
Benson (67)	278422, 4211075	7585	Dry-Moist	15-Jun	6-Jul	27-Jul	115	BPJ supports interim GC at Average reported stock use 2004-2017.Forage available in forested understory (~55 acres).
Benson Lake Trail Camp Admin. Site (95)	278326, 4211181	7588	Non Meadow Moist	25-Jun	16-Jul	6-Aug	0	Meadows currently closed to grazing for resource protection. This meadow is on the south side of the Benson Lake exclusion fence. All grazing at Benson Lake should take place on the North side of the fence - see site #67 for capacity for this site.
Boundary Lake (##)	Unknown	Unknown	Non-meadow	N/A	N/A	N/A	Supp. Feed only	No Grazing Available.
Cold Caynon Smokey Jack (147)	288539, 4203962	8694	Moist	25-Jun	16-Jul	6-Aug	85	BPJ supports interim GC above average reported stock use 2004-2017.
Dorothy Lake Trail Camp Admin. Site (64)	271953, 4227235	9078	Moist	25-Jun	16-Jul	6-Aug	12	Site not evaluated. BPJ supports Interim GC of 12 (two strings). Wet meadows may be more resilient. No Reported Stock use.
Dorothy Lake East (134)	273317, 4228846	9413	Wet	15-Jul	5-Aug	26-Aug	6	25% Utilization. Limited forage area.
Dorothy Lake Southwest (101)	272853, 4228096	9393	Moist	25-Jun	16-Jul	6-Aug	73 (57+16)	Forage area is combined for camps 100 & 101
Dorothy Lake West (100)	272754, 4228263	9393	Moist	25-Jun	16-Jul	6-Aug		
Dorothy Lake Peninsula Camp (144)	273011, 4228297	9409	Moist-Wet	7-Jul	28-Jul	18-Aug	12	25% Utilization.

Glen Aulin East (32)	286867, 4198934	7802	Dry	7-Jun	28-Jun	19-Jul	29	BPJ supports interim GC at Average reported stock use 2004-2017. Limited access of stock because of blown down trees.
Glen Aulin West (32)		7802	Moist	25-Jun	16-Jul	6-Aug	29	
Grace Meadow (47)	270966, 4224946	8684	Moist-Wet	7-Jul	28-Jul	18-Aug	44	BPJ supports Interim GC of 44. No reported commercial use.
Halfmoon Meadow (103)	276154, 4197235	8891	Wet	15-Jul	5-Aug	26-Aug	12	Site not evaluated. BPJ supports Interim GC of 12 (two strings). Wet meadows may be more resilient. No Reported Stock use.
Harden Lake-East (70)	264977, 4197725	7451	Not evaluated (Moist-Wet)	7-Jul	28-Jul	18-Aug	12	Site not evaluated. BPJ supports Interim GC of 12 (two strings). Wet meadows may be more resilient. No Reported Stock use.
Hook Lake-North (97)	288599, 4208154	9403	Moist	25-Jun	16-Jul	6-Aug	25	BPJ supports interim GC above average reported stock use 2004-2017. Sensitive resources present.
Jose's Camp (88)	279740, 4215888	8980	Moist	25-Jun	16-Jul	6-Aug	46	BPJ supports interim GC above average reported stock use 2004-2017.
Lake Vernon (9)	261086, 4211105	6568	Wet	15-Jul	5-Aug	26-Aug	Supp. Feed only	No Grazing Available. Sensitive resources present.
Lake Vernon Cabin Admin. Site (140)	261555, 4211716	6598	Wet	15-Jul	5-Aug	26-Aug	120	BPJ supports interim GC at maximum reported stock use 2004-2017.
Laurel Lake (45)	254542, 4209813	6509	Wet	15-Jul	5-Aug	26-Aug	8	BPJ supports interim GC at maximum reported stock use 2004-2017.
Lower Kerrick (41)	279228, 4215118	8943	Dry	7-Jun	28-Jun	19-Jul	33	BPJ supports Interim GC of 33. No reported commercial use.
Matterhorn Canyon-Junction Camp (76)	287996, 4210104	8468	Moist	25-Jun	16-Jul	6-Aug	155	BPJ supports interium GC above average reported stock use 2004-2017. Forage area is the same for camps 76 & 91 (stock tend to concentrate at lower regardless of where camp is).
Matterhorn Canyon Trail Camp (91)	287259, 4209344	8438	Moist	25-Jun	16-Jul	6-Aug		
Matterhorn Canyon North (77)	288199, 4214521	9150	Moist	25-Jun	16-Jul	6-Aug	20	BPJ supports Interim GC of 20.
Mattie Lake (125)	285618, 4201478	9235	Wet	15-Jul	5-Aug	26-Aug	12	BPJ supports interim GC of 12. Access via off trail route greater than 1/4 mile. Group size limits 8 people, 12 head of stock.
Miguel Cabin (3)	250340, 4205193	5020	Moist	25-Jun	16-Jul	6-Aug	12	BPJ supports interim GC at maximum reported stock use 2004-2017.
Miller Lake North (96)	287453, 4207657	9482	Moist-Wet	7-Jul	28-Jul	18-Aug	35	BPJ supports interim GC above average reported stock use 2004-2017.

								Sensitive resources present.
Miller Lake South			Moist-Wet	7-Jul	28-Jul	18-Aug	20	BPJ supports interim GC of 20. Forage area is the same for south and southeast camps.
Miller Lake Southeast			Moist-Wet	7-Jul	28-Jul	18-Aug		
Miwok Lake (128)	262752, 4215267	8251	Not evaluated	N/A	N/A	N/A	Supp. Feed only	No Grazing available. Access via off trail route greater than 1/4 mile. Group size limits 8 people, 12 head of stock. Access difficult because of down trees.
Paradise Meadow Admin. Site (136)	265577, 4214417	7668	Moist	25-Jun	16-Jul	6-Aug	106	25 % Utilization
Pate Valley (69)	271988, 4201327	4350	Moist-Wet	N/A	N/A	N/A	Supp. Feed only	High potential for spread of noxious weed.
Pate Valley Trail Camp Admin. Site (##)	271988, 4201327	4357	Moist-Wet	N/A	N/A	N/A	Supp. Feed only	High potential for spread of noxious weed.
Pleasant Valley (11)	274006, 4207254	6834	Wet	15-Jul	5-Aug	26-Aug	12	BPJ supports interim GC at maximum reported stock use 2004-2017.
Rancheria Falls, New City Camp (5)	261326, 4204387	4468	Non-meadow	N/A	N/A	N/A	Supp. Feed only.	No Grazing Available. Raker Act restrictions on stock accessibility to water.
Rancheria Falls, LeConte Camp (7)	263995, 4203205	6243	Non-meadow	N/A	N/A	N/A	Supp. Feed only.	No Grazing Available. Raker Act restrictions on stock accessibility to water.
Rock Island Pass Trail Camp Admin. Site (152)	282491, 4219057	9426	Not Evaluated (Moist)	25-Jun	16-Jul	6-Aug	6	BPJ supports interim GC above average reported stock use 2004-2017. Sensitive Resources Present.
Rodger's Lake (93)	280851, 4208435	9514	Not Evaluated (Moist)	25-Jun	16-Jul	6-Aug	6	BPJ supports interim GC above average reported stock use 2004-2017.
Rodger's Meadow North (94)	279013, 4207358	8756	Moist	25-Jun	16-Jul	6-Aug	51	BPJ supports Interim GC of 51. No reported commercial use.
Slide Mountain Traiil Camp Admin. Site (43)	287095, 4219377	9344	Non-meadow (Moist)	25-Jun	16-Jul	6-Aug	6	BPJ supports interim GC above average reported stock use 2004-2017. Sensitive Resources Present.
Smedberg Lake South (92)	282181, 4210051	9239	Moist	25-Jun	16-Jul	6-Aug	52	BPJ supports interim GC at Average reported stock use 2004-2017.
Smedberg Lake Southeast (40)	282166, 4210135	9272	Moist	25-Jun	16-Jul	6-Aug		
Smedberg Lake Trail Camp Admin. Site (146)	281940, 4210464	9239	Not evaluated	N/A	N/A	N/A	Supp. Feed only.	Limited forage available; too close to lakeshore.

Smith Meadow (1)	257822, 4200809	6440	Dry-Moist	15-Jun	6-Jul	27-Jul	33	BPJ supports Interim GC of 51.
Stubblefield Trail Camp Admin. Site (66)	272718, 4215607	7753	Non-meadow (Moist)	25-Jun	16-Jul	6-Aug	6	BPJ supports interim GC at Average reported stock use 2004-2017.
Ten Lakes East (75)	279561, 4197828	9550	Non-meadow	N/A	N/A	N/A	Supp. Feed only	No forage available. No reported stock use.
Tilden Lake North (46)	271168, 4220005	8901	Moist	25-Jun	16-Jul	6-Aug	40	BPJ supports Interim GC of 40.
Tilden Lake Northeast (46)		8904	Moist	25-Jun	16-Jul	6-Aug	32	BPJ supports Interim GC of 32. This meadow is approximately 3 miles from an NPS trail. Free range grazing can occur this distance from established trails, but all other services and riding of stock by commercial operations is prohibited beyond 1/4 mile from NPS trail unless otherwise approved.
Tilden Lake-Southeast (85)	271356, 4219697	8917	Moist	25-Jun	16-Jul	6-Aug	24	BPJ supports Interim GC of 24.
Tilden Lake-Southwest (85)	270340, 4219545	8917	Moist	25-Jun	16-Jul	6-Aug	24	BPJ supports Interim GC of 24.
Tilden Lake-Northwest (86)	270340, 4219545	8901	Moist	25-Jun	16-Jul	6-Aug	8	GC based on best professional judgement. Monitor and adjust if use approaches recommended level.
Tiltill Valley Trail Camp Admin. Site (6)	263072, 4206753	5636	Wet	15-Jul	5-Aug	26-Aug	90	BPJ supports interim GC at maximum reported stock use 2004-2017.
Tim's Camp North Admin. Site (132)	267126, 4215728	7710	Moist	25-Jun	16-Jul	6-Aug	51	25% Utilization
Tim's Camp South Admin. Site (132)	(), ()	7710	Wet	25-Jun	16-Jul	6-Aug	59	25% Utilization
Twin Lakes North (48)	266672, 4224646	8934	Moist-Wet	7-Jul	28-Jul	18-Aug	36	25% Utilization.
Twin Lakes South (49)	267462, 4224256	8930	Moist-Wet	7-Jul	28-Jul	18-Aug		
Kerrick Canyon Middle (87 and 89)	274240 281120, 4213994 4219469	9160	Moist	25-Jun	16-Jul	6-Aug	50	BPJ supports Interim GC of 50. Sensitive Resources Present.

Kerrick, Upper Meadow - North (90)	282346, 4222292	9396	Moist-Wet	7-Jul	8-Aug	18-Aug	49	BPJ supports Interim GC of 49. Sensitive resources present. Stock confined to trail in closed areas. When meadows are closed to grazing stock must be fed with supplemental feed in designated holding areas. When meadows are open to grazing special conditions apply (see park compendium or CUA permit for additional details.
Kerrick, Upper Meadow - South (138)	282514, 4220757	9317	Moist-Wet	7-Jul	28-Jul	18-Aug	42	BPJ supports Interim GC of 42. Sensitive resources present. Stock confined to trail in closed areas. When meadows are closed to grazing stock must be fed with supplemental feed in designated holding areas. When meadows are open to grazing special conditions apply (see park compendium or CUA permit for additional details.
Upper Lyell Rock Camp (60)	300835, 4186326	8980	Moist	25-Jun	16-Jul	6-Aug	61	25% Utilization. BPJ supports Interim GC of 61.
Upper Lyell Peninsula Camp (124)	300870, 4186032	8973	Wet	15-Jul	25-Aug	26-Aug	188	25% Utilization. BPJ supports Interim GC of 188.
Wilma Lake East (65)	268000, 4217312	7959	Moist-Wet	7-Jul	28-Jul	18-Aug	51	BPJ supports Interim GC of 51.
Virginia Canyon, Junction Camp (37)	294876, 4213601	9327	Non-meadow Moist	25-Jun	16-Jul	6-Aug	6	BPJ supports Interim GC of 6. Drop and dunnage only for commercial operations. Overnight use may occur with limited grazing with prior approval or with supplemental feed.
Virginia Canyon, Table Camp (98)	293868, 4211382	8924	Non-meadow	N/A	N/A	N/A	Supp. Feed only	Drop and dunnage only for commercial operations. Overnight use may occur with NO grazing. Supplemental feed only.
Virginia Canyon, Roger's Camp (99)	294855, 4212532	9147	Not evaluted Moist	25-Jun	16-Jul	6-Aug	6	BPJ supports Interim GC of 6. Drop and dunnage only for commercial operations. Overnight use may occur with limited grazing with prior approval or with supplemental feed.
Virginia Canyon, Avalanche Camp (39)	292292, 4210115	8697	Moist	25-Jun	16-Jul	6-Aug	84	BPJ supports Interim GC of 84

Virginia Canyon, Castle Camp (39)	293073, 4210529	8779	Moist	N/A	N/A	N/A	Supp. Feed only	No grazing. Sensitive resources present.