Table 1. Effects of livestock grazing and livestock removal on plant communities of the California floristic province.

Study or data source	Effect
Marty 2005	Across 72 vernal pools in California’s Central Valley, the effect of different grazing treatments on vernal-pool plant and aquatic faunal diversity were examined. After 3 years of treatment: • Ungrazed pools had 88% higher cover of exotic annual grasses and 47% lower relative cover of native species than pools grazed at historical levels (continuously grazed). • Species richness of native plants declined by 25% and aquatic invertebrate richness was 28% lower in the ungrazed compared with the continuously grazed treatments. • Release from grazing reduced pool inundation period by 50 to 80%, making it difficult for some vernal-pool endemic species to complete their life cycle. “Results show that at this central California study site, livestock grazing helped maintain native plant diversity in vernal pools.”
Gelbard and Harrison 2005	Biotic resistance associated with high native grass cover and low levels of disturbance inhibited yellow starthistle invasion at sites >1000 m from roads. • Native grass cover was strongly negatively correlated with yellow starthistle biomass. • Cover by bare ground was strongly positively correlated with yellow starthistle biomass and negatively correlated with native grass cover.
Mason and Mazer 2004	In a study of the effects of grazing on growth, reproduction, and survivorship of three native perennial grasses (*Bromus carinatus*, *Hordeum brachyantherum*, and *Nassella pulchra*) on serpentine-derived soils at Vandenberg Air Force Base in Santa Barbara County, CA:

	• Grazing promoted the highest mean seedling growth in all three species relative to complete protection from large herbivores. • Increased competition and standing litter in ungrazed treatments suppressed seedling growth more than did the temporary reduction of biomass. • In contrast to the apparent positive effects of grazing on seedling growth and reproduction, grazing reduced grass seedling survivorship. "We recommend enforcing a grazing regime in which seedlings are protected during their early growth in winter and early spring, and in which seedlings are permitted to reach a threshold size before exposure to grazing."
Bartolome et al. 2004	Grazing removal in a California Coast Range grassland site caused a shift in plant community from more annual-dominated toward more perennial-dominated vegetation. Individual perennial grass species responded differently according to genus and species: • *Nassella pulchra* (purple needlegrass) increase was greatest under spring grazing and *N. lepida* (foothills needlegrass) was greatest with grazing removal. • *Danthonia californica* (California oatgrass) had little response over time under seasonal grazing treatments, but increased with grazing removal. • "Under relatively mesic weather conditions it appears that grazing removal from Coast Range grasslands with existing native perennial grass populations can increase their cover."
Allen-Diaz 2004	In the Sierra Nevada foothills near Brown's Valley, California: • Lightly grazed sites maintained a greater diversity and evenness of plant species than heavily grazed or ungrazed sites. • Total plant cover did not differ between sites after 7 years, but after 10, moderately

	grazed sites showed significant decreases in total plant cover.
Hayes and Holl 2003	In a survey of vegetation community composition, vegetation structure, and soil chemical parameters at 25 paired grazed and ungrazed sites over a 670-km range of the coastal prairie plant community in central California: • Native annual forb species richness and cover were higher in grazed sites, and this effect was concomitant with decreased vegetation height and litter depth. • Exotic annual grass and forb cover were higher in grazed sites. • Native grass cover and species richness did not differ in grazed and ungrazed sites, but cover and species richness of native perennial forbs were higher in ungrazed sites.
Keeley et al. 2003	In blue oak savanna communities of the southern Sierra Nevada, livestock grazing increased the number of alien species and alien cover only slightly over that of sites free of livestock grazing for more than a century, indicating some level of permanency to this invasion.
Kimball and Schiffman 2003	At Carrizo Plains National Monument, California, native and alien species cover were surveyed in adjacent grazed and ungrazed areas. Researchers also established experimental plots in which plants were clipped or mulch (dead biomass) was removed. Key findings include: • Native species were negatively affected by clipping, whereas alien species were unaffected. • Growth and reproduction of the native perennial bunchgrass *Poa secunda* were reduced 1 year after clipping. • In the field, European grasses were unaffected by the removal of competitors, whereas native grasses responded positively.

	"In the grassland we studied, the strategy of livestock grazing for restoration is counterproductive. It harms native species and promotes alien plant growth."
Seabloom et al. 2003	At the UC Sedgwick Reserve, inland of Santa Barbara, California: • Mowed, burned, and rodent-disturbed plots remained dominated by exotic annuals, while unmowed and unburned plots and plots containing little rodent disturbance became dominated by seeded native perennial bunchgrasses. • Undisturbed stands of native perennial bunchgrasses resisted reinvasion of exotic annual grasses in spite of a high exotic annual seed availability. • Perennial-dominated stands were characterized by significantly lower photosynthetically active radiation, soil moisture, and extractable soil nitrate than annual-dominated stands.
Harrison et al. 2003	• On serpentine soils of the inland Coast Range, grazed sites contained higher native species richness than ungrazed sites (22.2 vs. 19.0 species/5m^2), but there was no effect of grazing on exotic species richness. • On non-serpentine soils, grazed sites contained higher exotic richness than ungrazed sites (10.3 vs. 7.1 species/5m^2); ungrazed sites also contained slightly greater native richness than grazed sites (12.0 vs. 10.6 species/5m^2). • Grazing effects were soil, species, and life-form-specific.
Gelbard and Harrison 2003	• On serpentine soils of the inland Coast Range, grazed habitats contained higher native cover (49%) than ungrazed habitats (35%), but only on neutral (flat) slopes. The number of native forb species was significantly greater in grazed (10.0/m^2) than ungrazed (6.4/m^2) sites on all slopes. • On non-serpentine soils, ungrazed habitats contained higher native cover (23%) than

	grazed habitats (14%), but only on cool slopes. The number of native grass species/m^2 was significantly greater in ungrazed than grazed habitats, but only in sites > 1000 m from roads, not 10 m or 100 m from roads.
Gelbard 2003	Remote grassland islands rarely grazed by livestock contained significantly higher cover by native grass species and lower exotic forb richness and exotic cover on both non-serpentine and serpentine soils, across a number of inland foothill locations in northern California.
Hamilton et al. 2002	At the Hastings Reservation in the central Coast Range, light grazing reduced the basal cover of *Nassella pulchra*, and grazing seemed "to have the potential to be detrimental to stand persistence."
Safford and Harrison 2001	• In roadside serpentine grasslands throughout the inner north Coast Range, ungrazed sites contained a significantly lower proportion of native species (0.48) than grazed sites (0.56) • In roadside non-serpentine grasslands, ungrazed sites contained a higher proportion of native species (0.30) than grazed sites (0.25).
Merenlender et al. 2001	• In oak woodlands at the Hopland Field Station in Medocino County, after 43 years of protection from grazing, native perennial grass abundance increased markedly between 1958 and 2000 (in particular, due to an increase in *Elymus glaucus* from 0 to > 2 plants/m^2). • In open grasslands, no trend in native grass abundance could be related to protection from grazing.
Griggs 2000	• At Vina Plains, a vernal pool/grassland complex in the northern Central Valley near Chico, livestock removal resulted in a dramatic increase in exotic grass abundance

	(especially medusahead) and dramatic reductions in many native plants, especially annual forbs. Restoring seasonal cattle grazing reversed these patterns. • Cattle grazing was carefully timed to occur during wet winter months (starting in Nov.), and to be removed in early May, before cattle would be attracted to vernal pools (and trample sensitive plants) due to drying of the remainder of the grassland.
Hatch et al. 1999	In field experiments testing the effects of fall burning and protection from livestock grazing as a means of enhancing native grasses on a coastal grassland in central California: • Foliar cover of the native *Danthonia californica* (California oatgrass) increased more under grazing than grazing exclusion and did not respond to burning. • Two other natives, *Nassella pulchra* (purple needlegrass) and *Nassella lepida* (foothill needlegrass), responded variably to treatments.
Jackson and Allen-Diaz 1998	In analyzing oak seedling, sapling and mature tree densities of *Quercus garryana* for two livestock grazing classes on the Six Rivers National Forest in Humboldt County, researchers report: • Greater oak seedling and mature tree densities for the high grazed-class and greater sapling densities for the low grazed-class. • Sapling densities were roughly double and seedling densities about 5 times mature tree densities regardless of grazed-class. We suggest that increased grazing intensity creates favorable environments for oak seedling survival, but may ultimately reduce the number of seedlings transitioning to the sapling size-class.
Dyer and Rice 1997	• At Jepson Prairie in southern Solano County, CA, *Nassella pulchra* survival was

	greatest in weeded plots, in sheep-grazed plots, and in deeper soil plots. • *N. pulchra* recruitment and growth within inland California grasslands was reduced by the adverse environment created by high densities of alien annual species. • The authors concluded that successful attempts to increase populations of *N. pulchra* through management of the grassland community must involve significant modification of the biotic environment (to reduce mulch associated with exotic annuals).
Stromberg and Griffin 1996	Relict native grasslands at the Hastings Natural History Reservation and adjacent Santa Lucia coastal range of Monterey County, California persist under many historical levels of grazing. Compared to sites where grazing was removed in 1937, grasslands currently or recently grazed by cattle show higher soil nitrogen, but reductions in cover of gopher tailings, plant species diversity, soil phosphate and sulphate.
Heady 1995	• Scattered plants and small stands of several perennial species developed in 10-15 years without grazing at the Hopland Field Station in Mendocino County, CA. • *Nassella pulchra* abundantly appeared in a pasture after restriction of sheep grazing to winter, but decreased after spring, summer and fall sheep grazing were restored.
Roche et al. 1994	In a clipping study of yellow starthistle and several native bunchgrass species, bunchgrasses resisted starthistle invasion if left unclipped.
Thomsen et al. 1993	• Goats substantially reduced starthistle flowerhead densities and selectively grazed bolting plants, but avoided rosettes, spiny plants. • Cattle reduced yellow starthistle seed production, but only when grazing was timed to its bolting stage. • Repeated sheep grazing on yellow starthistle during the rosette stage resulted in

	greater flowerhead densities in grazed paddocks than in ungrazed paddocks. The following spring, starthistle seedling density was more than four times greater in the grazed pasture than in the ungrazed pasture. • The native annual forbs, *Lupinus bicolor* (legume) and *Limnanthes douglasii*, were conspicuous components within grazed treatments, but were virtually absent from adjacent ungrazed areas.
Menke 1992	Summarized work from Jepson Prairie and Hopland Field Station exploring the use of grazing as a restoration tool: • Grazing management of native perennial grasses requires strategic application of grazing and fire to accomplish the goal of increasing native perennial grass abundance. • Time-controlled, short-duration, high intensity sheep or cattle grazing for several days in early spring removes exotic plant seed/ inflorescence and increases light availability for native grass seedlings. Grazing must be carefully timed to allow native perennial grass regrowth, flowering, and seed set before spring soil moisture is exhausted. • Dormant season high-intensity grazing to remove thatch speeds litter turnover and increases light availability for native grass seedlings.
Menke 1989	• Trampling by herbivores may be depressing productivity throughout annual grasslands via its effects on soil water status (reducing soil water capacity) and runoff (reducing infiltration). • Grazing favors forbs (e.g., *Erodium*) over grasses (e.g., *Avena, Bromus*).
Saenz and Sawyer 1986	In coastal grasslands of Redwood National Park in Humboldt County: • Greater perennial grass cover was found in grasslands grazed for a partial season as opposed to a full season.

	- A greater cover of introduced annual grasses and reduced species richness were found in sites grazed for a full season. "It is hypothesized that cropping of leaves over an extended period depletes the storage capacity of the native grasses, and can result in loss of perennials from the vegetation."
Dwire 1984	Where livestock grazing has ceased in northern California coastal prairie at Sea Ranch in Sonoma County, the author reports: - A marked increase in the abundance of two introduced perennial grasses, sweet vernal grass (*Anthoxanthum odoratum*) and velvet grass (*Holcus lanatus*) - Increased seed production, growth, and number of plants of California oatgrass (*Danthonia californica*), purple needlegrass (*Stipa pulchra*) and blue wildrye (*Elymus glaucus*) since the cessation of grazing. - A steady decline in hairgrass (*Deschampsia caespitosa* var. *holciformis*), while the abundance of reedgrass (*Calamagrostis nutkaensis*) remains unchanged in more mesic habitats.
Hanley and Page 1981	Effects of livestock grazing on habitat structure, measured in terms of relative composition of plant life forms (trees, shrubs, forbs, graminoids), were assessed for 26 Great Basin habitat types in northeastern California. Livestock grazing resulted in decreased relative abundance of herbaceous vegetation, particularly perennial bunchgrasses. This had the effect of decreasing diversity of plant life forms in the more xeric habitats and increasing diversity of plant life forms in the more mesic habitats.

Table 2. 165 Herbaceous Removal - Key Species transects conducted in the Cascade Siskiyou National Monument during 2003 and 2004.

		Percent Utilization				Survey Date						
Transect	**# of Points**	**Mean**	**Minimum**	**Maximum**	**Standard Deviation**	**Month**	**Day**	**Year**	**Easting**	**Nothing**	**Parture**	**Key Species**
113A-04-02	50	54.2	1.8	100.0	38.4	7	29	2004	548901	4658849	keene past	FEID
113A-04-U1	50	62.0	0.0	90.2	22.8	7	29	2004	548976	4658736	keene past	CAREX
1633-09-S1	50	15.0	0.0	104.2	24.1	8	10	2004	555046	4654993	dixie	CAREX
1760-1-2003	49	42.0	0.0	92.5	28.6	10	26	2003	545133	4660663	keene past	CAREX
1760-2-2003	40	50.8	0.0	92.7	24.5	10	26	2003	545197	4660874	keene past	CAREX
1761-01-U1	50	73.3	0.0	105.2	38.0	10	22	2004	545770	4660579	keene past	SCMI2
1761-03-U2	50	43.8	0.0	65.1	14.8	10	22	2004	545347	4660246	keene past	ELGL
1761-04-U3	50	37.6	0.0	75.2	24.9	10	22	2004	545154	4660101	keene past	ELGL
1761-11-U4	50	52.5	-7.2	101.5	32.8	10	22	2004	545698	4660398	keene past	ACLE8
3923-WWF	25	62.0	0.0	107.5	34.6	10	21	2004	545483	4672641	keene allot	CAREX
3927-WWF	20	23.1	-2.5	61.2	20.5	10	20	2004	557142	4674101	deadwood	ELGL
3974-WWF	34	24.8	0.0	96.9	32.8	10	21	2004	540815	4669933	keene allot	CAREX
3975-WWF	30	36.7	0.0	105.1	26.1	10	21	2004	540931	4669829	keene allot	PHPR3
4625-14-S1	35	91.7	-1.7	122.5	49.1	11	4	2004	548157	4659937	keene past	JUNCUS SPP.
4627-91-S1	50	82.0	42.0	98.0	16.3	11	4	2004	548368	4639099	keene past	SCMI2
4629-47-T1	37	53.1	0.0	96.5	28.2	10	26	2004	555651	4670100	keene allot	CAREX
4634-29-S1	50	58.4	7.6	107.7	24.2	11	5	2004	542632	4668930	keene allot	SCMI2
4637-31-S1	50	47.3	0.0	104.1	29.2	11	9	2004	542320	4669040	keene allot	SCMI2
4638-WWF	15	30.5	-5.1	98.7	34.1	11	7	2004	540600	4670008	keene allot	ELGL
4641-WWF	35	35.2	2.4	99.2	32.9	11	7	2004	540377	4671265	keene allot	SCMI2
4643-WWF	9	42.4	0.0	84.7	28.7	11	6	2004	541272	4674266	keene allot	CAREX
4650-WWF	29	32.2	0.0	98.2	36.0	10	6	2004	547310	4667160	keene allot	CAREX
4651-WWF	18	38.2	0.0	100.0	38.3	10	12	2004	547089	4667291	keene allot	CAREX
4652-WWF	15	29.6	0.2	80.2	27.6	10	12	2004	547113	4667307	keene allot	CAREX
4660-21-S1	50	10.1	-6.8	107.7	16.5	10	25	2004	549013	4669294	keene allot	SCMI2
4733-15-S1	50	42.0	-2.2	100.6	37.4	10	21	2004	544949	4662137	keene allot	CAREX
5028-WWF	44	36.1	0.0	71.3	24.0	11	7	2004	539846	4671679	keene allot	SCMI2
5037-WWF	25	39.8	-0.5	86.3	27.9	11	6	2004	541099	4675416	keene allot	CAREX
5039-03-S1	50	67.2	45.3	82.6	9.0	10	25	2004	542952	4660247	Emmigrant	SCMI2
5040-WWF	24	57.4	0.1	87.4	23.1	11	9	2004	540545	4666894	keene allot	DAGL
5830-05-S1	50	69.3	13.6	91.6	17.4	11	9	2004	542686	4660301	Emmigrant	SCMI2
5832-07-S1	50	64.8	1.8	84.4	16.1	11	21	2004	543294	4658738	keene past	SCMI2
5835-11-S1	50	97.6	-0.1	126.7	36.3	11	6	2004	554743	4654026	dixie	SCMI2
5836-12-S1	50	66.2	1.9	126.7	30.1	11	6	2004	554758	4653975	dixie	SCMI2
5838-13-S1	26	51.8	13.5	99.5	31.7	11	6	2004	554811	4653796	dixie	CAREX
5843-16-S1	50	45.9	-0.9	93.5	29.1	10	26	2004	548454	4659028	keene past	CAREX
5843-16-S3	50	45.5	-0.2	95.7	31.4	10	26	2004	548394	4659050	keene past	CAREX
5845-24-S1	50	41.6	-2.3	97.9	41.5	8	9	2004	548339	4660350	keene past	SCMI2
585-01-U2	50	57.7	1.3	101.6	37.0	7	26	2004	550431	4653281	Agate Flat	CAREX
585-03-U3	50	28.7	0.0	72.3	14.0	7	26	2004	549932	4653563	Agate Flat	FEID
585-08-08-U1	50	76.9	0.0	183.8	59.1	7	22	2004	549137	4653415	Agate Flat	JUNCUS SPP.
5850-35-S1	50	54.3	4.0	97.0	29.5	11	5	2004	542752	4668713	keene allot	CAREX
5851-36-S1	50	43.4	2.0	80.8	19.5	11	5	2004	542160	4669346	keene allot	ELGL
5852-WWF	31	20.4	2.5	69.5	19.6	11	7	2004	540305	4673064	keene allot	CAREX
5854-WWF	48	64.8	9.8	96.1	22.6	11	6	2004	541122	4675381	keene allot	CAREX
5855-WWF	24	34.4	0.2	74.3	26.0	11	6	2004	541122	4675272	keene allot	PHPR3
5859-44-S1	20	59.6	4.0	97.8	34.9	11	6	2004	554818	4653791	dixie	CAREX
5906-46-S1	50	45.7	-0.1	103.7	32.9	11	4	2004	554241	4672360	deadwood	CAREX
6103-WWF	21	43.8	0.7	100.8	25.9	10	12	2004	544942	4659477	keene past	CAREX
6104-WWF	31	24.4	-2.0	91.7	25.3	10	12	2004	545362	4661562	OR Gulch	CAREX
6105-WWF	14	41.3	0.0	98.5	31.1	10	12	2004	548742	4666953	keene allot	CAREX
6106-WWF	15	11.3	0.0	76.8	22.4	11	6	2004	540530	4675363	keene allot	CAREX
6107-WWF	27	35.3	-0.9	98.1	34.7	11	6	2004	540473	4675480	keene allot	SCMI2
6109-WWF	14	59.6	19.8	80.0	17.6	11	7	2004	539936	4671665	keene allot	SCMI2
6117-WWF	15	18.3	1.2	63.8	19.2	10	13	2004	541787	4669557	keene allot	CAREX
6120-WWF	17	54.5	11.2	100.5	24.3	10	21	2004	540172	4670542	keene allot	PHPR3

Table 2. (Continued)

		Percent Utilization				**Survey Date**						
Transect	**# of Points**	**Mean**	**Minimum**	**Maximum**	**Standard Deviation**	**Month**	**Day**	**Year**	**Easting**	**Nothing**	**Parture**	**Key Species**
6121-93-S1	27	70.2	-5.4	103.9	37.8	11	8	2004	541795	4659041	Emmigrant	CAREX
6125-97-S1	32	64.4	0.0	92.3	24.7	11	8	2004	541930	4656064	Camp Creek	CAREX
6126-98-S1	47	55.9	15.2	101.2	26.9	11	8	2004	541088	4658182	Emmigrant	CAREX
6127-WWF	30	47.3	-24.4	125.4	36.6	10	13	2004	542184	4659368	Emmigrant	CAREX
6128-WWF	11	63.0	9.2	94.7	29.1	10	13	2004	543487	4657559	keene past	CAREX
6131-103-S1	50	15.6	0.0	101.9	23.9	11	14	2004	554296	4656546	Box-O	CAREX
6133-WWF	20	44.6	2.6	88.4	28.2	10	14	2004	554213	4656326	Box-O	CAREX
6140-WWF	18	25.7	6.3	45.0	11.4	10	20	2004	551983	4671484	keene allot	CAREX
6141-WWF	15	54.8	7.9	101.7	38.3	10	20	2004	553222	4671863	keene allot	CAREX
6142-WWF	28	66.9	16.6	99.5	26.3	10	20	2004	554178	4672455	deadwood	CAREX
623-01-S1	37	49.6	0.0	112.6	34.7	11	5	2004	546120	4661920	keene past	CAREX
626-02-S1	50	35.5	0.0	74.9	16.3	10	21	2004	546462	4662148	keene past	CAREX
629-WWF	48	39.0	-6.1	98.5	27.4	10	14	2004	554808	4653067	dixie	Holcus?
989-06-U4	50	51.6	-15.7	161.4	24.1	8	4	2004	543500	4656586	Camp Creek	ELGL
989A-02-U1	50	81.8	0.0	139.4	45.1	11	21	2004	544936	4656852	Camp Creek	SCMI2
989A-05-U3	50	80.3	17.1	109.1	18.4	11	21	2004	543861	4656823	Camp Creek	ACLE8
989A-2-2003	46	49.5	9.0	96.8	20.3	10	22	2003	544328	4656966	Camp Creek	ACLE8
989A-4-2003	20	43.8	9.0	80.8	22.4	10	22	2003	543492	4656607	Camp Creek	ACLE8
AGF2-11-U2	50	26.6	0.8	82.7	18.1	7	25	2004	551760	4651817	S. Pasture	FEID
AGFL-04-U1	50	26.8	-15.6	93.5	23.2	7	25	2004	551486	4652680	Agate Flat	ACLE8
AGFL-05-U2	50	64.3	25.1	111.5	24.3	7	25	2004	551274	4652901	Agate Flat	DACA3
BECR-ER-1	50	23.9	0.6	47.8	9.6	9	23	2004	548516	4670156	keene allot	DACA3
BECR-ER-2	50	22.7	0.9	52.3	11.7	9	23	2004	548521	4670085	keene allot	DACA3
BH-1	50	50.0	-12.4	97.3	29.8	11	9	2004	547261	4667501	keene allot	DACA3
CH-1	50	58.5	22.9	77.6	14.9	11	15	2004	545953	4668323	keene allot	PHPR3
CLAY-02-U1	39	63.8	17.5	91.5	17.0	11	11	2004	542677	4658317	Emmigrant	SCMI2
CLAY-03-U2	50	50.0	3.4	90.2	24.8	11	11	2004	542797	4658090	Emmigrant	CAREX
CLAY-03-U3	49	70.9	38.0	98.8	12.8	11	11	2004	542848	4658106	Emmigrant	ACLE8
CLAY-05-U4	50	71.7	40.6	98.8	11.5	11	11	2004	542712	4657594	Emmigrant	ACLE8
CLAY-1-s1	50	58.4	23.8	90.2	15.7	11	11	2004	542772	4657789	Emmigrant	CAREX
CLAY-4 s-1	50	39.3	2.1	90.2	19.1	7	20	2004	542772	4657789	Emmigrant	CAREX
GH-O	50	97.5	35.6	126.0	24.5	11	7	2004	542736	4659232	Emmigrant	DACA3
HOBL-01-U4	50	31.5	0.0	92.5	22.0	8	3	2004	542708	4660333	Emmigrant	SCMI2
HOBL-02-U3	50	65.3	1.9	81.1	21.9	11	9	2004	542453	4660573	Emmigrant	PHPR3
HOBL-05-U1	100	61.0	0.0	92.4	25.8	11	9	2004	542156	4660166	Emmigrant	AGROPYRON REF
HOBL-05-U2	50	68.0	7.1	90.2	19.6	11	9	2004	542101	4660179	Emmigrant	AGROPYRON REF
JE45-01-U1	50	40.0	0.0	103.4	39.5	7	22	2004	552959	4652378	N. Pasture	FEID
JECU-1-2003	28	53.2	0.0	121.7	33.7	10	18	2003	556399	4666774	Buck Mt.	FEID
JECU-2-2003	50	10.8	0.0	25.4	6.3	10	18	2003	555117	4666627	Buck Mt.	FEID
JEN3-03-U1	25	42.9	-3.4	100.6	41.5	7	21	2004	553719	4652790	N. Pasture Riparian	FEID
JEN3-05-U2	50	23.3	-3.1	100.6	27.6	7	21	2004	554011	4652894	N. Pasture Riparian	FEID
JEN3-08-U3	47	22.6	-4.8	62.7	16.7	7	21	2004	553803	4653010	N. Pasture Riparian	FEID
JH-0	50	81.1	24.9	90.2	14.8	11	12	2004	542230	4659480	Emmigrant	PHPR3
KECR-04-U1	50	50.1	2.9	101.5	29.6	10	21	2004	546517	4661762	keene past	ACLE8
KECR-05-U3	50	47.9	0.0	131.8	59.4	10	21	2004	546696	4661737	keene past	CAREX
KECR-05-U5	50	43.9	5.4	101.5	25.9	10	21	2004	546676	4661720	keene past	ACLE8
KECR-12-U4	50	16.1	0.0	48.9	8.9	8	5	2004	545852	4661884	keene past	CAREX
KECR-12-U6	50	49.1	0.0	89.3	25.0	10	21	2004	545864	4661857	keene past	CAREX
KM-D	50	52.4	0.0	89.2	22.1	11	13	2004	546323	4661763	OR Gulch	ACLE8
KM-J	50	37.2	1.1	91.9	24.3	11	13	2004	546405	4661835	keene past	PHPR3
L. KEENE-A	50	93.6	30.7	126.1	26.1	11	15	2004	551087	4660170	keene past	ELGL
L.KEENE	50	46.0	0.0	104.7	28.2	11	15	2004	550970	4660159	keene past	DACA3
LH1-ER-1	50	14.0	0.1	36.3	7.2	9	21	2004	541521	4665809	keene allot	DACA3
LH2-ER-1	50	27.1	0.2	96.1	19.1	9	21	2004	541705	4665994	keene allot	DACA3
LRSP-1-2003	46	64.3	30.4	91.7	15.3	8	28	2003	546219	4668174	keene allot	CAREX
LS-A	49	73.8	0.0	126.0	26.5	8	5	2004	550116	4653481	Agate Flat	DACA3

Table 2. (Continued)

		Percent Utilization				Survey Date						
Transect	**# of Points**	**Mean**	**Minimum**	**Maximum**	**Standard Deviation**	**Month**	**Day**	**Year**	**Easting**	**Nothing**	**Parture**	**Key Species**
LS-B	50	41.3	17.4	82.9	13.1	8	5	2004	550080	4653497	Agate Flat	ACLE8
MARA-ER-1	50	48.8	-0.1	97.7	27.5	10	11	2004	542572	4659474	Emmigrant	DACA3
MARD-ER-1	50	33.3	0.1	145.2	40.9	10	11	2004	542456	4659448	Emmigrant	DACA3
MILL CRK-C	50	24.6	2.6	93.1	15.1	11	13	2004	545563	4658894	keene past	ACLE8
MILL CRK-E	50	30.3	4.2	93.1	16.9	11	13	2004	545475	4658819	keene past	ACLE8
MILL CRK-J	50	35.3	0.0	93.1	22.5	11	13	2004	545443	4658903	keene past	ACLE8
MILL-1-2003	32	39.7	4.9	79.9	23.0	8	29	2003	544113	4657804	keene past	CAREX
MILL-2-2003	43	38.6	0.0	82.7	26.7	8	29	2003	544189	4657931	keene past	CAREX
MILL-3-2003	23	54.1	0.0	73.1	24.0	8	29	2003	543835	4657727	keene past	GLST
NFH-1	50	24.5	0.0	74.1	19.8	11	14	2004	549259	4658203	keene past	DACA3
OG4-150-ER-1	50	13.7	0.0	105.4	15.4	10	16	2004	551685	4655635	OR Gulch	FEID
OG4-ER-2	50	27.7	10.8	93.5	12.4	10	16	2004	551638	4655591	OR Gulch	FEID
OGH-ER-1	50	13.2	0.0	38.4	8.2	9	24	2004	551455	4657308	OR Gulch	FEID
ORGU-03-U1	50	28.3	-0.1	97.8	18.8	7	27	2004	550239	4657491	OR Gulch	FEID
ORGU-08-U2	50	49.7	0.0	146.5	43.5	7	28	2004	550983	4656746	OR Gulch	FEID
ORGU-09-U3	50	35.4	0.0	146.5	36.2	7	28	2004	551332	4656593	OR Gulch	FEID
PALA-01-U2	50	43.2	-0.1	102.9	30.0	10	20	2004	545227	4661178	keene past	CAREX
PALA-03-U1	47	53.6	-1.2	88.7	27.8	10	20	2004	544897	4661411	keene past	CAREX
PALA-12-U3	48	61.6	0.0	149.3	53.1	10	20	2004	545194	4660883	keene past	CAREX
RAPA-03-U1	50	78.3	9.5	131.5	23.1	7	23	2004	550021	4657521	OR Gulch	DACA3
RAPA-04-U2	50	40.0	6.7	88.2	20.8	7	27	2004	550398	4657395	OR Gulch	DACA3
RAPA-05-U3	50	27.8	-13.7	101.5	21.8	7	27	2004	550620	4657336	OR Gulch	ACLE8
SFK-H	50	56.4	3.9	116.6	25.7	11	12	2004	543367	4659177	keene past	ELGL
SFK-J	50	9.7	0.0	104.1	14.7	11	12	2004	543300	4659189	keene past	ELGL
SFKC-1	50	59.1	7.6	98.9	23.3	11	12	2004	543468	4659193	keene past	ELGL
SKC1-ER-1	50	44.7	1.0	94.8	25.8	10	8	2004	544063	4660295	keene past	ACLE8
SKC2-ER-1	50	39.6	-21.0	62.3	16.3	10	8	2004	543802	4659835	keene past	ACLE8
SKC2-ER-2	50	74.7	0.0	105.4	23.1	10	8	2004	543828	4659906	keene past	ACLE8
SKOO-01-E2	50	34.0	9.5	77.3	19.4	7	22	2004	548278	4653880	Agate Flat	FEID
SKOO-02-U1	50	47.5	-3.9	101.5	35.3	7	22	2004	548000	4653870	Agate Flat	BROMUS SPP
SKOO-11-U3	50	19.5	7.8	26.3	4.2	7	22	2004	547851	4653289	Agate Flat	ACLE8
SOMN-02-U3	50	68.5	-14.5	124.1	42.0	7	26	2004	550803	4654468	OR Gulch	JUNCUS SPP.
SOMN-03-U2	50	27.1	0.0	68.8	14.9	7	26	2004	550724	4654464	OR Gulch	JUNCUS SPP.
SOMN-08-U1	50	47.1	6.3	83.7	15.5	7	26	2004	550301	4654250	OR Gulch	FEID
TRSO-04-U1	44	44.2	0.0	94.5	29.2	11	12	2004	553191	4671731	keene allot	CAREX
TRSO-12-U2	50	41.4	-1.9	96.8	29.5	11	12	2004	552386	4671207	keene allot	CAREX
UK-D	50	41.5	0.0	92.3	23.3	11	15	2004	542625	4665150	keene allot	DAGL
UOG-1	50	28.8	-9.3	61.5	16.1	8	5	2004	550579	4657375	OR Gulch	ACLE8
US-B	50	39.2	9.0	77.2	16.8	8	4	2004	547318	4655061	skookum	FEID
US-E	50	35.9	1.5	75.8	21.4	8	4	2004	547326	4655118	skookum	ACLE8
US-H	50	29.1	0.0	95.3	23.2	8	4	2004	547358	4655160	skookum	ACLE8
US-J	50	31.5	-0.7	82.3	17.3	8	4	2004	547368	4655197	skookum	FEID
WIGL-ER-1	50	37.1	-5.1	63.2	20.1	9	22	2004	547196	4670859	keene allot	AGROSTIS
WIGL-ER-2	50	62.8	43.3	106.8	14.4	9	22	2004	547317	4670809	keene allot	DACA3

Table 3. Thirty-five 7th field watersheds with average utilization scores based on Herbaceous Removal - Key Species transects conducted in the Cascade Siskiyou National Monument during 2003 and 2004.

7th Field Watershed ID	Area (Hectares)	Number Of Transects	Nimimum Score	Maximim Score	Mean Score	Standard Deviation
1165	1686.0	5	11.3	64.8	37.1	19.0
1202	1337.2	1	23.1	23.1	23.1	
1203	1090.9	2	45.7	66.9	56.3	15.0
1226	635.2	1	42.4	42.4	42.4	
1237	830.8	1	62.0	62.0	62.0	
1245	848.2	3	20.4	59.6	38.7	19.7
1260	1187.7	4	37.1	64.3	55.7	12.6
1275	736.5	4	25.7	54.8	41.5	12.0
1282	1923.4	6	24.8	57.4	39.9	13.2
1289	717.7	5	18.3	58.4	44.3	15.7
1292	850.9	1	53.1	53.1	53.1	
1316	1059.2	6	10.1	50.0	29.1	13.8
1328	1356.0	1	10.8	10.8	10.8	
1331	917.1	1	53.2	53.2	53.2	
1369	1476.0	3	14.0	41.5	27.5	13.8
1376	189.9	2	32.2	41.3	36.8	6.4
1424	990.4	1	41.6	41.6	41.6	
1428	1699.3	6	31.5	69.3	60.4	14.4
1433	1351.5	15	16.1	61.6	43.8	11.7
1499	2129.7	2	15.6	44.6	30.1	20.5
1502	709.1	13	9.7	74.7	49.4	17.2
1507	737.8	7	24.6	63.0	40.8	13.4
1511	702.4	2	46.0	93.6	69.8	33.7
1513	1068.2	13	33.3	97.5	60.6	17.7
1522	1010.4	6	24.5	91.7	54.0	22.3
1566	808.4	10	13.2	78.3	34.3	18.9
1581	1033.0	5	43.8	81.8	61.4	18.2
1587	981.0	7	19.5	47.5	33.8	8.7
1594	1116.4	1	64.4	64.4	64.4	
1597	1958.0	11	26.6	76.9	49.0	20.1
1617	36.4	1	15.0	15.0	15.0	
1623	80.8	4	51.8	97.6	68.8	20.1
1636	140.8	1	39.0	39.0	39.0	
1651	180.5	3	22.6	42.9	29.6	11.5
1639	418.6	1	40.0	40.0	40.0	

Table 4. Acres and mileage of fencing recommended for areas likely to be impacted by livestock in the Cascade-Siskiyou National Monument, southwest Oregon, by allotment, pasture, and habitat type (mixed conifer, oaks, small springs, streamside areas).

ALLOTMENT	PASTURE	Length (feet)	Miles*	Mixed Conifer Old Growth (acres)	Oak Woodlands (acres)	Spring (acres)	Stream (acres)
JENNY CREEK	NORTH PASTURE	11,591	2.20	0	302		9
	SOUTH PASTURE	10,849	2.05	0	405		
	Allotment Total	*22,440*	*4.25*	*0*	*707*	*0*	*9*
KEENE CREEK	KEENE CREEK	196,359	37.19	614	1,772	46	16
	Allotment Total	*196,359*	*37.19*	*614*	*1,772*	*46*	*16*
DIXIE	DIXIE	4,000	0.76			12	
	Allotment Total	*4,000*	*0.76*			*12*	
SODA MOUNTAIN	AGATE FLAT	29,492	5.59	0	1,803		
	CAMP CREEK	87,657	16.60	1,061	1,419		
	EMIGRANT	121,087	22.93	3,223	0		
	KEENE CREEK	190,869	36.15	5,389	542		7.2
	OLD 99	11,870	2.25	23	274		
	OREGON GULCH	29,910	5.66	818	89		
	PILOT ROCK	29,659	5.62	375	201		
	SKOOKUM	57,323	10.86	974	416		
	Allotment Total	*557,867*	*105.66*	*11,864*	*4,744*	*0*	*7*
	Total for all Allotments	***780,667***	***148***	***12,478***	***7,224***	***58***	***32***

* total includes 7 miles of additional fencing of springs and streams not included in the fenced oaks or mixed conifer polygons

Table 5. Estimated average costs and revenues to the federal taxpayer of the Bureau of Land Management's national livestock grazing program and estimated costs and revenues in the Cascade-Siskiyou National Monument.

		Source
2004 BLM Grazing Fee ($/AUM*)	$1.43	GAO (2005): 37.**
BLM Grazing Program Costs (FY04)		
BLM "Billed" AUMs	7,634,000	GAO (2005): 15.
BLM "Approved" AUMs	12,691,000	GAO (2005): 15.
BLM Grazed Acres	137,702,000	GAO (2005): 15.
BLM Direct Costs (million $)	$27.9	GAO (2005): 21.
BLM Indirect Costs (million $)	$18.7	GAO (2005): 21.
BLM Expenditures for Range "Improvements" (million $)	$11.7	GAO (2005): 21.
BLM Grazing Program Total Expenditures (FY04) (million $)	**$58.3**	
Gross Cost to Federal Treasury of BLM Grazing Program ($/AUM)	**$7.64**	
Other Federal Agency Grazing Program Costs		
Other Federal Agency Costs (million $)	$8.4	GAO (2005): 28.
Spread over:		
BLM Billed AUMs	7,634,000	GAO (2005): 15.
USFS Billed AUMs	13,685,000	GAO (2005): 15.
Other Federal Billed AUMs	744,000	GAO (2005): 17.
Total billed AUMs (FY04)	**22,063,000**	
Other Federal Agency Costs of BLM Grazing Program ($/AUM)	**$0.38**	
BLM Grazing Program Revenues		
Gross Receipts (FY04) (million $)	$11.8	GAO (2005): 31.
> Distributed to State/Local Government	$2.2	GAO (2005): 31.
> Deposited to Range "Improvement" Funds	$5.9	GAO (2005): 31.
> Net Receipts to Federal Treasury	$3.7	GAO (2005): 31.
Gross Income to Federal Treasury from BLM Grazing Program ($/AUM)	**$0.48**	

Net Loss to Federal Treasury from All Federal Grazing Programs ($/AUM)	**-$7.53**	
	Cascade-Siskiyou National Monument Grazing	
AUMs "Authorized" for Grazing	2,714	CSNM RMP/FEIS (2005): 73.***
Public Land Acres Grazed by Livestock	51,403	CSNM RMP/FEIS (2005): 73.
Average Acres per AUM	19	
Annual Gross Grazing Revenue (2006 grazing fee: $1.35/AUM)	$3,664	
> Annual Amount to State and local government (50%)	$1,832	
> Annual Amount to Range "Improvement" Funds (50%)	$1,832	
> Annual Net Amount to Federal Treasury (0%)	$0	
Annual Administrative Cost of CSNM Grazing Program (based on national averages)	**-$20,448**	

* "Annual Unit Month." The amount of forage necessary to sustain one cow and calf for one month.

** Government Accountability Office. 2005. Livestock grazing: federal expenditures and receipts vary, depending on the agency and the purpose of the fee charged. GAO-05-869. Government Accountability Office. Washington DC.

*** Bureau of Land Management. 2005. Cascade-Siskiyou National Monument Proposed Resource Management Plan/Final Environmental Impact Statement. USDI-Bureau of Land Management, Medford District. Medford, OR.

Table 6. Financial costs of fencing livestock in the Cascade-Siskiyou National Monument, southwest Oregon to avoid conflict with object of biological interest.

Assumptions

*Government Buyout Cost ($/AUM)**	$300
*OMB Discount Rate (10-year)***	5.00%
*Mitigation Fence (miles)****	148
*Cost of Fence Construction (per mile)*****	$25,000
*Annual Cost of Fence Maintenance (per mile)******	$40,000
*Projected Inflation Rate*******	3.00%

	Cost of Federal Grazing Lease Buyout	**Avoided Costs from Grazing Lease Buyout in CSNM**		
Year		***Avoided Costs of Grazing Administration***	***Avoided Costs of Fence Installation & Maintenance***	**Annual Total Avoided Costs**
1	$814,200	$20,448	$3,700,000	$3,720,448
2	$0	$21,061	$40,000	$61,061
3	$0	$21,693	$41,200	$62,893
4	$0	$22,344	$42,400	$64,744
5	$0	$23,014	$43,600	$66,614
6	$0	$23,705	$44,800	$68,505
7	$0	$24,416	$46,000	$70,416
8	$0	$25,148	$47,200	$72,348

	9	$0	$25,903	$48,400	$74,303	
	10	$0	$26,680	$49,600	$76,280	
Net Present Value (10-year Horizon) ($ millions)						$4,003,312

* *Proposed* Cascade-Siskiyou National Monument Voluntary and Equitable Grazing Conflict Elimination Act (S. 3858, 109th Congress).

** Office of Management and Budget. 2007. Memorandum for Heads of Executive Departments and Establishments, re: Guidelines and Discount Rates for Benefit-cost Analysis of Federal Programs. Circular No. A-94, Append. C, “Discount Rates for Cost-effectiveness, Lease Purchase, and Related Analyses” (Oct. 29, 1992). Revised January 2007.

*** Provided by NCCSP.

**** Assumes $40,000 year staff person to maintain fence.

***** Hunter, Howard, Assistant Monument Manager, Medford District, Bureau of Land Management, pers. comm. (Nov. 7, 2006). Hunter estimated fence construction costs at $17,000 per mile, plus $8,000 per mile for cadastral (land ownership lines) surveysm, design, contracting, administration, environmental documentation, and other costs related to fence construction and maintenance.

****** Based on recent and historic averages. Information from T. McMahon (ed.). 2006. "Annual Inflation Rate" (chart) and other data. www.inflationdata.com (updated Feb. 21, 2007).