Chapter 3. Affected Environment

Introduction

This chapter describes the existing physical, biological, cultural, social, and economic characteristics of the Surprise Field Office planning area, representing 1,220,644 acres in four counties in northwestern California and northeastern Nevada. The affected environment defines the baseline of existing conditions from which possible impacts of the plan alternatives may be analyzed. The majority of the data was provided by the BLM Surprise Field Office; federal, state, county, and local agencies; various organizations; and other public and private sources. Data includes published and unpublished reports, maps, and geographic information system (GIS) information.

The planning area lies on the extreme western end of the Great Basin and encompasses the eastern slope of the Warner Mountains. The climate is typified by cold dry winters with snowfall as the principal precipitation, brief springs, and extended hot summers with fall rains. There are no incorporated cities within the field office area. The principal highways that access the area are State Route 299 and State Route 447.

Dominant vegetation types include grasslands, Great Basin shrubs, sagebrush, mixed sage–western juniper, western juniper, conifer, and riparian formations. Large animal species that characterize the area include deer, elk, pronghorn antelope, mountain lion, coyote, and black bear; wild horses and burros are also present. Principal uses of the lands include livestock grazing, developed agriculture, forestry, mineral extraction, and recreation.

3.1 Air Resources

The proposed project site is located in Modoc County in California and Washoe County in Nevada. Modoc County lies in the Northeast Plateau Air Basin (NPAB). The NPAB includes Siskiyou, Modoc, and Lassen Counties. The Modoc County Air Pollution Control District has jurisdiction over air quality issues throughout Modoc County. It administers air quality regulations developed at federal, state, and local levels. The Washoe County Air Quality Management Division in Nevada is responsible for air quality in the county.

3.1.1 Climate and Topography

Weather in northern California is dominated by the position of the Eastern Pacific high pressure cell that is normally located off the coast of North America. Due to the positioning of this cell, an almost unbroken chain of winter storms occurs in the study area, and a bulk of the precipitation in the study area occurs during this winter storm period. Weather systems in the region usually result in strong winds and unstable air masses, providing for good dispersion conditions. During fair weather periods, stable air conditions prevail throughout the region.

During spring, the movement of the Pacific high pressure cell results in a decline of precipitation in the project vicinity. Spring conditions are rarely warm and dry, due to unstable conditions that result in rain and snow. Dry, warm conditions are characteristic of the summer months, although thunderstorms are not uncommon. The transitional period between summer and winter/spring is generally characterized by cool, clear days and evening temperatures that drop below freezing.

The existing air quality conditions in the Surprise Field Office area are reflected by monitoring data collected in the region. Air quality monitoring data for 1999 through 2001 for monitoring stations in Modoc County are presented in Table 3.1-1; monitoring data for 2000 through 2002 for monitoring stations in Washoe County are presented in Table 3.1-2. See tables at end of this section.

As shown in Table 3.1-1, the Surprise Field Office area has experienced violations of the state PM10 standards during the last 3 years. The federal and state governments have established ambient air quality standards for six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 micrometers (PM_{10}), and lead (Pb). The California and federal ambient air quality standards are summarized in Table 3.1-3; Nevada's ambient air quality standards are summarized in Table 3.1-4. O_3 and PM_{10} are generally considered to be regional pollutants because they or their precursors affect air quality on a regional scale. Pollutants such as CO, NO_2, SO_2, and Pb are considered to be local pollutants because they tend to accumulate in the air locally. Particulate matter (PM_{10} and $PM_{2.5}$) is also considered to be a localized pollutant. In the Surprise Field Office area, particulate matter is the primary pollutant of concern. During the summer months, when wildfires and prescribed burns are a significant source of airborne particulate matter, frequent dry periods can result in infrequent instances of mixing and ventilation, resulting in higher levels of particulate matter. During the winter months, particulate matter from wood-burning stoves and furnaces used for heating frequently results in increased levels of airborne particulate matter. It is during these times that air quality is less likely to meet state and federal attainment status. Table 3.1-5 summarizes the state and federal attainment designations for Modoc County; Table 3.1-6 summarizes state and federal attainment designations for Washoe County.

Table 3.1-1 Ambient Air Quality Monitoring Data at the West 4th Street Monitoring Station, Alturas CA. (1999-2001)

Pollutant Standard	1999	2000	2001
Particulate Matter (PM_{10})			
Maximum 24-hour concentration ($\mu g/m^3$)	94.0	79.2	66.6
Second highest 24-hour concentration ($\mu g/m^3$)	73.4	58.8	47.0
Average geometric mean concentration ($\mu g/m^3$)	22	17	16
Average arithmetic mean concentration ($\mu g/m^3$)	26	22	19
Number of Days Standard Exceeded[a]			
CAAQS 24-hour (>50 $\mu g/m^3$)[b]	30	18	6
NAAQS 24-hour (>150 $\mu g/m^3$)[b]	0	0	0
Particulate Matter ($PM_{2.5}$)			
Maximum 24-hour concentration ($\mu g/m^3$)	40.0	38.0	35.0
Second highest 24-hour concentration ($\mu g/m^3$)	27.0	37.0	32.0
Average arithmetic mean concentration ($\mu g/m^3$)	7.9	8.5	7.6
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>65 $\mu g/m^3$)[c]	0	0	0

Notes:
CAAQS = California ambient air quality standards.
$\mu g/m^3$ = Micrograms per cubic meter.
NA = Not applicable.
NAAQS = National ambient air quality standards.

[a] The number of days above the standard is not necessarily the number of violations of the standard for the year.

[b] Calculated exceedances are based on measurements taken every 6 days.

[c] Calculated exceedances are based on measurements taken every 3 or 6 days, depending on the time of year and the site's monitoring schedule.

Sources: California Air Resources Board 2003, U.S. Environmental Protection Agency 2003.

Table 3.1- 2 Ambient Air Quality Monitoring Data for Washoe County (2000–2002)

Pollutant Standard	2000	2001	2002
Ozone (O_3) - Incline			
Maximum 1-hour concentration (ppm)	.077	.087	.083
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	0	0	0
Ozone (O_3) – Lemmon Valley			
Maximum 1-hour concentration (ppm)	.083	.080	.083
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	0	0	0
Ozone (O_3) – Reno			
Maximum 1-hour concentration (ppm)	.082	.098	.096
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	0	0	0
Ozone (O_3) – Reno3			
Maximum 1-hour concentration (ppm)	0	0	.098
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	NA	NA	0
Ozone (O_3) - South Reno			
Maximum 1-hour concentration (ppm)	.097	.099	.094
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	0	0	0
Ozone (O_3) – Sparks			
Maximum 1-hour concentration (ppm)	.087	.091	.098
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	0	0	0
Ozone (O_3) – Mustang			
Maximum 1-hour concentration (ppm)	.087	.088	.053
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	0	0	0
Ozone (O_3) – Toll Road			

Pollutant Standard	2000	2001	2002
Maximum 1-hour concentration (ppm)	.086	.095	.086
Number of Days Standard Exceeded[a]			
NAAQS 1-hour (>0.12 ppm)	0	0	0
Carbon Monoxide (CO) - Galletti			
Maximum 8-hour concentration (ppm)	3.25	5.30	4.44
Maximum 1-hour concentration (ppm)	6.8	7.88	7.31
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
Carbon Monoxide (CO) - Incline			
Maximum 8-hour concentration (ppm)	1.18	2.02	1.44
Maximum 1-hour concentration (ppm)	2.36	4.45	2.11
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
Carbon Monoxide (CO) – Lemmon Valley			
Maximum 8-hour concentration (ppm)	2.39	2.76	2.55
Maximum 1-hour concentration (ppm)	5.01	4.67	4.53
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
Carbon Monoxide (CO) - Reno			
Maximum 8-hour concentration (ppm)	4.05	3.76	5.04
Maximum 1-hour concentration (ppm)	5.54	5.85	6.48
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
Carbon Monoxide (CO) – Reno3			
Maximum 8-hour concentration (ppm)	0	0	3.61
Maximum 1-hour concentration (ppm)	0	0	6.14

Pollutant Standard	2000	2001	2002
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	NA	NA	0
NAAQS 1-hour (≥35 ppm)	NA	NA	0
Carbon Monoxide (CO) - South Reno			
Maximum 8-hour concentration (ppm)	2.14	2.37	2.31
Maximum 1-hour concentration (ppm)	4.02	4.97	3.41
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
Carbon Monoxide (CO) - Sparks			
Maximum 8-hour concentration (ppm)	5.44	5.23	4.79
Maximum 1-hour concentration (ppm)	7.63	8.16	7.20
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
Carbon Monoxide (CO) - Toll Road			
Maximum 8-hour concentration (ppm)	1.27	1.98	1.17
Maximum 1-hour concentration (ppm)	3.08	2.46	2.06
Number of Days Standard Exceeded[a]			
NAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
Particulate Matter (PM10) - Galletti			
Maximum 24-hour concentration ($\mu g/m^3$)	100	113	97
Second highest 24-hour concentration ($\mu g/m^3$)	96	108	93
Average arithmetic mean concentration ($\mu g/m^3$)	42	45	43
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 $\mu g/m^3$)[b]	0	0	0
Particulate Matter (PM10) - Incline			
Maximum 24-hour concentration ($\mu g/m^3$)	35	136	64
Second highest 24-hour concentration ($\mu g/m^3$)	34	52	31
Average arithmetic mean concentration ($\mu g/m^3$)	16	17	21

Pollutant Standard	2000	2001	2002
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 μg/m^3)[b]	0	0	0
Particulate Matter (PM10) - Reno			
Maximum 24-hour concentration (μg/m^3)	109	92	74
Second highest 24-hour concentration (μg/m^3)	79	88	60
Average arithmetic mean concentration (μg/m^3)	31	34	33
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 μg/m^3)[b]	0	0	0
Particulate Matter (PM10) - Reno3			
Maximum 24-hour concentration (μg/m^3)	NA	NA	66
Second highest 24-hour concentration (μg/m^3)	NA	NA	51
Average arithmetic mean concentration (μg/m^3)	NA	NA	28
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 μg/m^3)[b]	NA	NA	0
Particulate Matter (PM10) - South Reno			
Maximum 24-hour concentration (μg/m^3)	84	112	45
Second highest 24-hour concentration (μg/m^3)	58	64	44
Average arithmetic mean concentration (μg/m^3)	25	26	22
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 μg/m^3)[b]	0	0	0
Particulate Matter (PM10) - Sparks			
Maximum 24-hour concentration (μg/m^3)	68	78	60
Second highest 24-hour concentration (μg/m^3)	65	72	59
Average arithmetic mean concentration (μg/m^3)	27	26	29
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 μg/m^3)[b]	0	0	0
Particulate Matter (PM10) - Sun Valley			
Maximum 24-hour concentration (μg/m^3)	69	81	81
Second highest 24-hour concentration (μg/m^3)	69	80	61
Average arithmetic mean concentration (μg/m^3)	27	31	31

Pollutant Standard	2000	2001	2002
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 μg/m^3)[b]	0	0	0
Particulate Matter (PM_{10}) - Toll Road			
Maximum 24-hour concentration (μg/m^3)	45	144	57
Second highest 24-hour concentration (μg/m^3)	43	54	48
Average arithmetic mean concentration (μg/m^3)	21	20	20
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>150 μg/m^3)[b]	0	0	0
Particulate Matter ($PM_{2.5}$) – Reno			
Maximum 24-hour concentration (μg/m^3)	38	46	32
Second highest 24-hour concentration (μg/m^3)	36	42	27
Average arithmetic mean concentration (μg/m^3)	8.9	9.8	9.1
Number of Days Standard Exceeded[a]	0	0	0
Particulate Matter ($PM_{2.5}$) – Incline Village			
Maximum 24-hour concentration (μg/m^3)	14	15	NA
Second highest 24-hour concentration (μg/m^3)	13	14	NA
Average arithmetic mean concentration (μg/m^3)	5.5	4.7	NA
Number of Days Standard Exceeded[a]			
NAAQS 24-hour (>65 μg/m^3)[c]	0	0	0

Notes: CAAQS=California ambient air quality standards.

NA=Not applicable.

NAAQS=National ambient air quality standards.

[a] The number of days above the standard is not necessarily the number of violations of the standard for the year.

[b] Calculated exceedances are based on measurements taken every 6 days.

[c] Calculated exceedances are based on measurements taken every 3 or 6 days, depending on the time of year and the site's monitoring schedule.

Sources: State of Nevada Department of Conservation and Natural Resources 2003, U.S. Environmental Protection Agency 2003.

Table 3.1- 3 Ambient Air Quality Standards Applicable in California

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria	
			California	National	California	National	California	National
Ozone	O_3	1 hour	0.09	0.12	180	235	If exceeded	If exceeded on more than 1 day per year
		8 hours	NA	0.08	NA	157	NA	If fourth highest 8-hour concentration in a year, averaged over 3 years, is exceeded at each monitor within an area
Carbon monoxide	CO	8 hours	9	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year
(Lake Tahoe only)		8 hours	6	NA	7,000	NA	If equaled or exceeded	NA
Nitrogen dioxide	NO_2	Annual average	NA	0.053	NA	100	NA	If exceeded on more than 1 day per year
		1 hour	0.25	NA	470	NA	If exceeded	NA
Sulfur dioxide	SO_2	Annual average	NA	0.03	NA	80	NA	If exceeded
		24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than 1 day per year
		1 hour	0.25	NA	655	NA	If exceeded	NA
Hydrogen sulfide	H_2S	1 hour	0.03	NA	42	NA	If equaled or exceeded	NA
Vinyl chloride	C_2H_3Cl	24 hours	0.01	NA	26	NA	If equaled or exceeded	NA
Inhalable particulate matter	PM_{10}	Annual geometric mean	NA	NA	20	NA	If exceeded	NA
		Annual arithmetic mean	NA	NA	NA	50	NA	If exceeded at each monitor within area
		24 hours	NA	NA	50	150	If exceeded	If exceeded on more than 1 day per year

Pollutant	Symbol	Average Time	Standard (parts per million) California	Standard (parts per million) National	Standard (micrograms per cubic meter) California	Standard (micrograms per cubic meter) National	Violation Criteria California	Violation Criteria National
	$PM_{2.5}$	Annual geometric mean	NA	NA	12	NA	If exceeded	NA
		Annual arithmetic mean	NA	NA	NA	15	NA	If 3-year average from single or multiple community-oriented monitors is exceeded
		24 hours	NA	NA	NA	65	NA	If 3-year average of 98th percentile at each population-oriented monitor within an area is exceeded
Sulfate particles	SO_4	24 hours	NA	NA	25	NA	If equaled or exceeded	NA
Lead particles	Pb	Calendar quarter	NA	NA	NA	1.5	NA	If exceeded no more than 1 day per year
		30-day average	NA	NA	1.5	NA	If equaled or exceeded	NA

Table 3.1- 4 Ambient Air Quality Standards Applicable in Nevada

	Nevada Standards[a]			National Standards[b]		
Pollutant	Averaging Time	Concentration	Method[d]	Primary[c, e]	Secondary[c, f]	Method[d]
Ozone	1 hour	235 µg/m^3 (0.12 ppm)	Chemiluminescent	235 µg/m^3 (0.12 ppm)	Same as primary	Chemiluminescent
Ozone-Lake Tahoe Basin, #90		195 µg/m^3 (0.10 ppm)				
Carbon monoxide less than 5,000 feet above mean sea level	8 hours	10,000 µg/m^3 (9.0 ppm)	Nondispersive infrared	10 mg/m^3 (9.0 ppm)	None	Nondispersive infrared
Carbon monoxide at or greater than 5,000 feet above mean sea level		6,670 µg/m^3 (6.0 ppm)				
Carbon monoxide at any elevation	1 hour	40,000 µg/m^3 (35 ppm)		40 mg/m^3 (35 ppm)		
Nitrogen dioxide	Annual arithmetic mean	100 µg/m^3 (0.05 ppm)	Chemiluminescent	100 µg/m^3 (0.05 ppm)	Same as primary	Chemiluminescent
Sulfur dioxide	Annual arithmetic mean	80 µg/m^3 (0.03 ppm)	Ultraviolet fluorescence	80 µg/m^3 (0.03 ppm)	None	Pararosaniline method
	24 hours	365 µg/m^3 (0.14 ppm)		365 µg/m^3 (0.14 ppm)		
	3 hours	1,300 µg/m^3 (0.5 ppm)		None	1,300 µg/m^3 (0.5 ppm)	
Particulate matter as PM_{10}	Annual arithmetic mean	50 µg/m^3	High-volume PM10 sampling	50 µg/m^3	Same as primary	High-volume PM_{10} sampling
	24 hours	150 µg/m^3		150 µg/m^3		
Particulate matter as $PM_{2.5}$	Annual arithmetic mean			15 µg/m^3	Same as primary	Low-volume $PM_{2.5}$ sampling
	24 hours			65 µg/m^3		

Nevada Standards[a]				National Standards[b]		
Pollutant	Averaging Time	Concentration	Method[d]	Primary[c, e]	Secondary[c, f]	Method[d]
Lead (Pb)	Quarterly arithmetic mean	1.5 µg/m^3	High-volume sampling, acid extraction, and atomic absorption spectrometry	1.5 µg/m^3	Same as primary	High-volume sampling, acid extraction, and atomic absorption spectrometry
Visibility	Observation	Insufficient amount to reduce prevailing visibility to less than 30 miles when humidity is less than 70%	Observer or camera			
Hydrogen sulfide	1 hour	112 µg/m^3 [h] (0.08 ppm)	Cadmium hydroxide stractan method			

Notes: All values are corrected to reference conditions. As used in this section:
(a) "µg/m^3" means micrograms per cubic meter.
(b) "ppm" means part per million by volume.

These standards of quality for ambient air are minimum goals and it is the intent of the state environmental commission in this section to protect the existing quality of Nevada's air to the extent that it is economically and technically feasible.

[a] These standards must not be exceeded in areas where the general public has access.

[b] These standards, other than those for ozone and those based on annual averages, must not be exceeded more than once per year. The ozone standard is attained when the expected number of days per calendar year with a maximum hourly average concentration above the standard is equal to or less than 1.

[c] Concentration is expressed first in the units in which it was adopted and is based on a reference temperature of 25º C and a reference pressure of 760 mm of mercury. All measurements of air quality must be corrected to a reference temperature of 25º C and a reference pressure of 760 mm of Hg (1,013.2 millibars); ppm in this table refers to ppm by volume, or micromoles of regulated air pollutant per mole of gas.

[d] Any reference method specified in accordance with 40 Code of Federal Regulations (CFR) Part 50, or any reference method or equivalent method designated in accordance with 40 CFR Part 53, may be substituted.

[e] National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health

[f] National secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a regulated air pollutant.

[g] Prevailing visibility means the greatest visibility that is attained or surpassed around at least half of the horizon circle but not necessarily continuous sectors.

[h] The ambient air quality standard for hydrogen sulfide does not include naturally occurring background concentrations.

Source: State of Nevada, Bureau of Air Quality 1990–2001 Trend Report, Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality Planning.

Table 3.1-5 Attainment Status for Criteria Pollutants of Concern in the Modoc County Air Pollution Control District

Particular Matter Less Than 10 Micrometers		Particulate Matter Less Than 2.5 Micrometers		Carbon Monoxide		Ozone	
Federal	State	Federal	State	Federal	State	Federal	State
Unclassified	Non-attainment	Unclassified	NA	Unclassified/ attainment	Unclassified	Unclassified/ attainment	Attainment

Note: NA = Not applicable.

Table 3.1- 6 Attainment Status for Criteria Pollutants of Concern in the Washoe County Air Quality Management Division

Particular Matter Less Than 10 Micrometers		Particulate Matter Less Than 2.5 Micrometers		Carbon Monoxide		Ozone	
Federal	State	Federal	State	Federal	State	Federal	State
Serious non-attainment	NA	Unclassified/ attainment	NA	Moderate non-attainment	NA	Marginal non-attainment	NA

Note: NA = Not applicable.

3.1.2 Air Quality Pollutants

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections; ozone can cause substantial damage to vegetation and other materials. It is a severe eye, nose, and throat irritant. Ozone also attacks synthetic rubber, textiles, plants, and other materials—and can cause extensive cell damage and leaf discoloration in plants.

Ozone is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include reactive organic gases (ROG) and oxides of nitrogen (NOx), react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates increase when the intensity of ultraviolet light and air temperature increase, ozone is primarily a summer air pollution problem. The ozone precursors ROG and NOx are emitted by stationary combustion engines and mobile sources, such as construction equipment.

Carbon Monoxide

CO essentially has no effect on plants and materials but can significantly affect human health. It is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter, when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also emit more CO at low air temperatures.

Particulate Matter

Particulates can damage human health and retard plant growth. Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Particulates also reduce visibility and corrode materials.

Emissions of particulate matter are generated by a wide variety of sources, including agricultural activities, industrial emissions, dust suspended by vehicle traffic and construction equipment, and secondary aerosols formed by reactions in the atmosphere.

3.1.3 Trends

Information provided by BLM staff indicates that the following activities contribute to emissions in the Surprise Field Office area (Whitcome pers. comm.):

- Wildfires (beyond management control),
- Prescribed fires (piles and broadcast),
- Heavy equipment use,
- Road construction and maintenance,
- Reservoir construction and maintenance,
- Chainsaw use on fuels and fire projects, and
- Field work by BLM employees (e.g., vehicles and all-terrain vehicles).

BLM activities would continue to generate emissions of criteria pollutants, particularly inhalable particulate matter. The substantial generation of particulate matter, particularly from wildfires and prescribed fires, is anticipated to result in a detrimental effect on air quality in the region.

3.2 Cultural Resources and Paleontology

Basque Cairn

The overall archaeological sensitivity of the Surprise Field Office area is generally considered high. Archaeological sites in the Surprise Field Office area are diversified and are typical of prehistoric and historic sites throughout the Great Basin. Prehistoric site types found in the Surprise Field Office area include large obsidian and chert quarries; temporary resource-exploitation camps; and sites associated with extended habitation, hunting, petroglyphs, and pictographs.

The most prevalent historic site types in the Surprise Field Office area are associated with ranching and farming. Only 7% of the Surprise Field Office area has been inventoried for cultural resources. This survey work, completed in the 1970s, documented 946 sites—some of which are eligible for listing in the National Register of Historic Places (NRHP). Recently, efforts have been made to incorporate new and recorded sites into the archaeological GIS database. To further identify data gaps, a Class I overview is being prepared that will synthesize cultural resources data from all available resources. The greatest effects on cultural resources in the area are from grazing, as well as continued surface collection and looting of archaeological sites. Because of the fragile and non-renewable nature of cultural resources, such activities destroy any remaining cultural or scientific information they may still possess. Without increased protection of cultural sites, such losses are likely to continue.

Unless otherwise noted, this discussion is condensed from the Tuledad-Home Camp Grazing Final EIS (1976), the Cowhead-Massacre Grazing Final EIS (1980), and Raven's Northeastern California chapter in *California Archaeology* (Moratto 1984).

3.2.1 Prehistoric Context

Prehistoric archaeological resources are the non-renewable physical remnants of past human activity that occurred before written history began to document events. Prehistoric archaeological resources are the only traces of thousands of years of past human activity across the landscape, up to the time of contact with Euro-American settlers. These resources encompass all artifacts and places altered by human activity and—to varying degrees—they reveal the ideas, activities, and lifeways of the humans who created or used them.

Throughout the Great Basin, aboriginal cultures in the prehistoric period shared some fundamental similarities in technology, subsistence economies, and many aspects of social organization. Linguistic groups tended to be very large, and the distribution of certain items of material culture spanned vast distances.

The region was occupied largely by hunter-gatherer bands whose subsistence focused on the seasonal exploitation of a diverse set of plant and animal foods. Because populations shifted throughout the year, in response to the seasonality of foods, several microenvironments were visited in a seasonal round. Land use and settlement patterns were geographically extensive. Many groups were observed to follow this pattern in the historic period (Steward 1938) and this behavior is inferred to have had a long tenure in the Great Basin.

In certain favorable settings, (especially lake margins rich in food resources such as, marsh plants and waterfowl) abundance and reliability of resources allowed intensive exploitation, which at times led to relatively stable settlement patterns and diminished seasonal movement. Lakeside orientation was observed for the Pyramid Lake Paiute in historic times (Loud and Harrington 1929), and archaeological confirmation of the pattern has been forthcoming in recent years from several Great Basin locales (Bedwell 1970; Heizer and Napton 1970).

Archaeological research in the Surprise Field Office area indicates that ethnographically observed land-use patterns have had a relatively stable history over most of the period of human occupancy. O'Connell (1975) specifically tested the endurance of the pattern in the Surprise Valley through a program of excavations and site surveys, and concluded that only in the earliest defined prehistoric phase (4,500–2,000 BC; 6,450–3,950 BP) is there evidence of a pattern of social organization significantly different from what characterizes the rest of the sequence. Large semi-subterranean earth lodges—implying relatively large communal groups—are replaced at the end of the Menlo Phase by smaller brush enclosures—indicating a major shift in the structure of human relationships (O'Connell and Ericson 1974). The overall patterns of land use, settlement, and subsistence, however, undergo little change through subsequent millennia, and are similar to the patterns of semi-permanent winter villages and summer settlements observed historically in the Surprise Valley. While unquestionably there were minor developments in the exploitation of plants and animals—some probably conditioned by climate change—the basic adaptive strategy appears to have been relatively stable over the past 6,500 years.

As it is currently understood, the Surprise Valley sequence does not reflect the total span of human occupancy of the Surprise Field Office area. Artifacts identified during archaeological survey, and observed in private collections, indicate a possible affiliation with the western Pluvial Lakes Tradition of 11,000–8,000 BP (Bedwell 1970; Hester 1973); research in surrounding areas points to a much longer time depth than is apparent in the Surprise Valley record (Layton 1970; McGonagle 1974 McGonagle, Roberta Lee, Time and Space Distributions of Prehistoric Occupation of the High Rock lake Locality, Northwest Nevada. December 1974. Ann Arbor, Michigan; Clewlow 1968). Layton (1972) has furthered a sequence (based largely on obsidian hydration dating) that begins as early as 12,600 BP and is only 10 miles outside the Surprise Field Office area.

The Great Basin climatic regime has undergone demonstrable fluctuations since the end of the Pleistocene (Antevs 1948; Davis and Elston 1972). Because many of these fluctuations are presumed to have significantly affected the productivity of local microenvironments (and therefore their suitability for human exploitation), the specific adaptive strategies played out in an area as large as the Surprise Field Office area likely underwent many modifications over time. Reconstruction of these adjustments in human ecology and spatial patterning, however, can be done only through programs of archaeological research that is designed specifically to protect them. To date, this type of research has not been performed in the area outside the Surprise Valley.

3.2.2 Previous Archaeological Research

Limited excavations in the High Rock Sub-Unit (Layton 1970, 1972), and on private lands in Surprise Valley (O'Connell 1971, 1975; O'Connell and Hayward, 1972; O'Connell, J.F. and P.S. Hayward, Altithermal and Medithermal Human Adaptations in Surprise Valley, Northeastern California, in D.D. Fowler (ed.) Great Basin Cultural Ecology: A Symposium, Desert Research Institute Publications in the Social Sciences No. 8, Pp. 25-42.) defined a general chronological framework for prehistory and both studies were accompanied by intuitively based site surveys.

However, no sustained research had ever addressed objectively the question of where sites were located in the Surprise Field Office area with relation to environmental zones. Accordingly, BLM surveys in 1977 approached this question from the perspective of several independent ground reconnaissance studies. Of the total public land base, 4.4% was surveyed (35,137 acres). Of this, 14,080 acres (1.8% of the Surprise Field Office area) were surveyed in the context of a stratified random sample, designed to allow probabilistic statements on the distribution of sites relative to pre-grazing biotic communities. Additionally, a focused survey designed to collect specific categories of data explored 4,089 acres of spring-based settings and 9,848 acres of canyonlands and lake margins were treated with intensive scrutiny. Independent BLM project-related intensive surveys of 7,120 acres provided a foundation for testing site occurrence predictions generated by the probabilistic sample.

To date, BLM staff has recorded 946 sites—the majority of which were identified as a result of the above surveys. In each case, data were collected on location, size, artifact constituency, time markers, condition, and further research potential. As a result, many sites and districts have been identified as eligible for NRHP listing.

3.2.3 Ethnographic Context

Ethnographic data collected in the historic period (Kelly 1932) indicate that in the Surprise Field Office area, the Surprise Valley Paiute (*Gidutikadu*)—the only well-described Northern Paiute group inhabiting the Surprise Field Office area—pursued a lifeway with winter settlements consisting of nuclear villages on the valley floor, and spring and summer involving at least a partial fractioning of group size, movement of some of the population to seasonal base camps, and exploitation of upland plant foods and game.

The eastern and southern portions of the Surprise Field Office area were occupied in the historic period by the poorly documented *Kamodokado* (Stewart 1966), another subgroup of Northern Paiute whose lifeway is inferred to have been comparable to the Surprise Valley pattern. Certainly the more arid climate and scarcer water sources were less likely than the Surprise Valley lakes to support a semi-sedentary lacustrine subsistence.

3.2.4 Historic Context

History tells us that the first Euro-American to witness Surprise Valley was a member of the John Work Expedition of 1832 (Hedel, et. al. 1981). It is unknown as to whether there was any contact between the members of the Work expedition and local natives. However, ten years later the first known contact between Euro-Americans and the Northern Paiute occurred between Captain John C. Fremont and a band of Northern Paiute. It was during Capt. Fremont's expedition of 1842 that he encountered a group of Native Americans dwelling in sagebrush huts (Fremont 1846) in Long Valley, Nevada. Fremont's brief encounter is mentioned as occurring on December 28, 1842. No further contacts with whites is known to have occurred until three years later, in 1846, when the Applegate brothers crossed over the Warner Mountains in search of an easier route into Northern California for wagon trains coming from the East. It is suggested (Layton 1977) that the Applegate brothers were also looking for an escape route for Americans should war break out with the British over Oregon Territory. Later, Peter Lassen extended the trail southward along the Pitt River to access California. The Lassen-Applegate trail passes through the Surprise Field Office management area ascending from High rock Canyon to the Massacre lake Basin, dropping into Long Valley, then crossing over Forty-Nine Pass down into Surprise Valley, and finally climbing the Warner Range at Fandango Pass.

Regardless of the necessity of the trail, once the eastward wagon trail was established thousands of emigrants began pouring into California and Oregon via the Lassen-Applegate trail. It is estimated that between 7,000 and 9,000 people traveled the Applegate trail in 1849. The vast number of emigrants and livestock traveling this route had significant impacts on the natural resources along the trail. Annual forbs and grasses were over grazed, and game was depleted reducing the availability of food sources for the local inhabitants of the area and for other emigrants yet to arrive. By the year 1850 the Applegate-Lassen trail received little use.

Little attention was paid to Surprise Valley by the emigrants passing through until 1863, when severe drought conditions in Central California lead a number of cattle ranchers to re-locate to Surprise Valley because of the available grass and open range. In 1865 the U.S. Army established Fort Bidwell, located just north of present day Cedarville, in Surprise Valley, to help protect settlers from "hostile" Indians. By 1867 the population of Surprise Valley had reached 500 persons. Both sheep and cattle ranching continued to be the main economic industry. By 1874 the valley boasted of three sawmills, a number of dairies, a saloon, a hotel, blacksmith shops, and a number of other commercial interests. A number of cold, hard winters between 1874 and 1890 resulted in a 33% loss of the cattle population, which forced ranchers to make changes to their grazing strategy. "Hay Ranching" became the focus of many of the ranchers following the severe winters. Ranchers would turn out their livestock for summer grazing in the higher elevations and forested lands, and use the rich meadowlands in the valley for growing hay for the winter months. An economic setback for the valley came in 1892 when the Army withdrew its troops from Fort Bidwell. The old fort was later converted into an Indian school and hospital (Hedel et. al. 1981).

In addition to the lure of its native forage, the area bore several travel routes. Four major avenues crossed the area before the turn of the century:

- The Lyons Sheep Trail brought sheep from the Sacramento Valley to the Midwest;
- The Ardizzi and Olcese Sheep Trail brought sheep from the southern portion of the Sacramento Valley and connected with the Lyons trail at Duck Flat;
- The Madeline-Duck Flat Stagecoach Road joined Duck Flat with the National City & Otay railhead at Madeline; and
- A military trail descended Express Canyon and joined the Lyons Sheep Trail and the Madeline-Duck Flat Stagecoach Road at Tuledad Canyon.

During the later part of the 19th century, vast cattle and sheep operations such as the Miller and Lux partnership and the Laxague brothers' sheep industry ran their livestock throughout the Nevada and California deserts. By the time of the First World War the Laxagues began to purchase land within Surprise Valley to establish a home base. This was not well accepted by the local cattlemen who bought out the Laxague operation. The movement of sheep with large bands became difficult with the adoption of the Taylor Grazing Act in 1934 so many sheepmen turned to raising cattle and haying once again (Hedel, et. al. 1981).

From the more favorable population centers of Fort Bidwell, Lake City, Cedarville, and Eagleville a gradual infiltration of the arid lands to the south and east began. Between 1865 and 1923, numerous homesteads were patented, many of which continue today as private holdings.

One such settlement located to the south in the Tuledad Canyon/Duck Flat vicinity was the town of Reiderville, located in Lower Surprise Valley. Reiderville was a population nucleus for some time numbering almost 80 registered voters among its residents. Reiderville provided the Duck Flat residents with needed services such as a store, school, saloon, and a brothel. Reiderville and Duck Flatt suffered from the drought years of 1923 and 1924, as did many agricultural ventures in the arid west, and were abandoned shortly thereafter.

Surprise Valley also participated in the mining industry, albeit briefly. Local legend has it that in 1870, a scout from fort Bidwell discovered gold in the Warner Mountains immediately west of the fort. The scout was supposedly killed before the ore could be relocated and confirmed by others. A fifteen-year-old sheepherder named Peter Lorenzen rediscovered the ore again in 1905. The mine was eventually named the "High Grade", and a small community was established near the mine. During the most productive period of the mine the town of High Grade had a Post Office, bar and restaurant, a general store, and a hotel. The mine eventually closed in 1938 (Pease 1965; Edwards 1999).

3.2.5 Factors Currently Affecting Cultural Resources

Historically, two factors have altered the integrity of cultural resources— particularly archaeological resources—in the Surprise Field Office area and continue to do so in the present, accounting for the current condition of many of these sites:

1) ***Overgrazing and reduction of vegetation.*** The reduction of vegetative cover and associated erosion has visibly affected open sites—both those confined to surface scatters and those with vertical deposits. In many instances, soil erosion and slope wash have contributed to lateral displacement and downslope consolidation of surface scatters occurring in terrain of greater then 5% slope. They also have accelerated the attrition of the upper levels of deeper deposits. Throughout the area, the contents of sites are being exposed on the surface and their contexts are being washed away. The tendency of wind action to remove loosened fine, dry silts, and clays augments this erosional process. A striking example was documented in the 1970s at a spring system on the east side of lower Surprise Valley where a large occupation site (the constituents, location, function, and soil conditions of which indicated that at one time it had contained vertical deposits) were reduced to a single level as a result of livestock-induced erosion. As a result, 6,000 years of prehistory were compressed into a 0.5-inch film on the surface. Because no long-term monitoring program exists, it is not possible to quantify the degree to which overgrazing has accelerated the impacts of natural erosion. Cave deposits do not offer a valid comparison because they tend to be free from both natural and livestock-related impacts. Excavated village sites in Surprise Valley (O'Connell 1971, O'Connell and Ambro 1968)—one of which has lain within an intensively used fenced cattle enclosure for half a century—are disturbed only in the upper 6 inches of their deposits. This is likely a result of well-compacted soils and relatively level terrain. In contrast, a site located north of the Surprise Field Office area along Badger Creek experienced a similar intensity of cattle use. However, it lies on a 15% slope and an abundance of its artifacts (except for heavier pieces of stone) have become consolidated in a narrow strip at the bottom of the slope. Identical sites that have not been subjected to intensive cattle grazing do not exhibit this effect. Over 50% of the sites recorded are experiencing deterioration associated with the effects of erosion.

2) ***Vandalism.*** The looting of archaeological sites through vandalism, surface collection of artifacts, and in some instances—particularly at villages, base camps and caves—excavation has been a favored recreational activity in the Surprise Field Office Area for several decades. As a result, the features and data that would make a site eligible for NRHP listing have been obliterated. Cave sites experience the greatest amount of disturbance: at least 24 known caves in the Cowhead-Massacre Subunit have been vandalized and looted; several petroglyph sites have been vandalized with graffiti. A large Surprise Valley village site on private land is the only site in the Surprise Field Office area that has been better protected. One important cave site has been completely excavated illegally by collectors; 10 others exhibit at least partial looting. A major village site on the west side of Duck Flat that lies mostly on private land has been the focus of intense looting for at least 20 years. As a result, approximately 24% of the original deposit remains intact. Although no other habitation site appears to have suffered so severely, about 30 others are known to have been partially excavated or surface-collected. The intensity of surface collecting cannot be adequately quantified; however, local collections are sizeable and the testimony of collectors indicates that few easily accessible and recognizable sites have escaped attention.

   The activities of rock hounds have inadvertently affected the condition of archaeological sites in a similar manner. The vicinities of Tuledad Canyon and the Cottonwood Creek basin are rich in well-known deposits of agate and petrified wood and experience intensive collecting activity. Because these minerals were used prehistorically for stone implements, their sources often functioned as quarry sites. Every agate outcrop and major deposit of nodules encountered in the 1976 survey exhibits extensive quarrying activity. In their pursuit of these materials, rock hounds inadvertently remove valuable archaeological data (especially cores and quarry blanks); through digging they also disturb the context of archaeological sites.

3.3 Economic Conditions

The Surprise Field Office area encompasses portions of Lassen and Modoc Counties in California, and Washoe, and Humboldt Counties in Nevada. Socioeconomic and fiscal conditions within the counties could change in response to changes in management emphasis or activities within the field office, such as changes in timber harvest, grazing, mineral extraction, and recreation.

Socioeconomic variables that could be affected by Proposed Management Actions include population, employment, and income. Fiscal conditions include changes in county revenues attributable to changes in payment of in-lieu of taxes and federal revenue sharing from sale of timber, grazing fees, and mineral extraction, and sales taxes associated with increased recreation.

3.3.1 Population

The 2000 population of Lassen and Modoc Counties ranked 47th and 56th, respectively, among the 58 California counties. The population of Washoe and Humboldt Counties ranked 2nd and 9th, respectively, among the 17 Nevada counties. Between 1990 and 2000, population increased in Lassen, Humboldt, and Washoe Counties and decreased by 2% in Modoc County (Table 3.3-1). Population growth in Lassen County was greater than the California statewide average of 14%. Washoe County has the greatest population of the four counties (339,500) followed by Lassen County (33,828).

The population density of Lassen, Modoc, Humboldt, and Washoe Counties were 7.4, 2.4, 1.7, and 53.5 persons per square mile, respectively. The population densities of Lassen and Modoc Counties were below the California statewide average of 217.1. The population density of Washoe County was much greater and the population density of Humboldt County was much less than Nevada statewide average of 18.2 persons per square mile (U.S. Bureau of the Census 2004a, b). Projections indicate that the populations of Lassen, Humboldt, and Washoe Counties are expected to increase through 2020 (Table 3.3-2). Population growth is expected to be greatest in Washoe County. The population of Modoc County is expected to grow through 2010 and then slightly decline by 2020.

3.3.2 Employment and Income

Total employment in the six counties ranged from a high of 171,700 in Washoe County to a low of 3,600 in Modoc County (Table 3.3-3). This reflects employment provided in the Reno-Sparks area of Washoe County and the rural character of Modoc County. The public administration and education, health, and social services sectors are important employment sectors in each of county. Government employment accounted for 43, 33, 18, and 13% of total employment within Lassen, Modoc, Humboldt, and Washoe Counties, respectively.

Generally, the education, health and social services; arts, entertainment, and recreation; and public administration sectors experienced the greatest growth in employment. Conversely, employment in the agriculture, forestry, fishing, and mining; manufacturing; and transportation generally declined.

Table 3.3-1 Population of Lassen, Modoc, Humboldt, and Washoe Counties; California and Nevada (1970–2000)

County	1970	1980	Change (%)	1990	Change (%)	2000	Change (%)
Lassen	14,690	21,661	+46%	27,598	+27%	33,828	+23%
Modoc	7,469	8,610	+15%	9,678	+12%	9,449	-2%
Humboldt	6,375	9,434	+48%	12,844	+36%	16,106	+25%
Washoe	121,068	193,623	+60%	254,667	+32%	339,486	+33%
California	19,953,134	23,667,902	+19%	29,760,021	+26%	33,871,648	+14%
Nevada	488,738	800,493	+64%	1,201,833	+50%	1,998,257	+66%

Sources: U.S. Bureau of the Census 1995a, b; 2004a, n.

Table 3.3-2 Population Projections for Lassen, Modoc, Humboldt, and Washoe Counties; California; and Nevada (2000–2020)

County	2000	2010	Change (%)	2020	Change (%)
Lassen	33,828	36,954	+9%	38,232	+4%
Modoc	9,449	9,547	+1%	9,295	-1%
Humboldt	16,106	16,518	+3%	17,098	+4%
Washoe	339,486	398,033	+17%	439,284	+10%
California	33,871,648	39,246,767	+16%	43,851,741	+12%
Nevada	1,998,257	2,690,078	+35%	2,910,958	+8%

Sources: California Department of Finance 2004; Nevada State Demographer's Office 2002.

Table 3.3-3 Employment Sectors for Lassen, Modoc, Humboldt, and Washoe Counties (1990 and 2000)

Employment Sector	Lassen		Modoc		Humboldt		Washoe	
	1990	2000	1990	2000	1990	2000	1990	2000
Agriculture, forestry, fishing, and mining	958	691	755	660	1,850	1,726	2,993	1,292
Construction	521	578	196	251	620	559	9,519	13,008
Manufacturing	726	342	273	135	275	252	10,438	12,903
Wholesale trade	207	129	90	129	146	109	6,110	7,361
Retail trade	1,423	1,117	626	343	1,047	854	23,254	20,332
Transportation and warehousing	519	326	208	212	384	419	11,995	10,344
Information	-	141	-	29	-	123	-	4,184
Finance, insurance, and real estate	246	303	166	79	162	103	8,993	10,584
Professional, scientific, and management	456	431	193	107	442	268	21,190	15,966
Education, health, and social services	1,352	2,329	543	925	671	1,014	18,479	27,041
Arts, entertainment, recreation, accommodation, and food services	111	700	34	200	233	924	13,573	34,406
Other services	999	339	224	198	155	241	8,403	6,858
Public administration	1,710	2,735	227	367	415	425	5,787	7,447
Total	8,843	10,161	3,535	3,635	6,400	7,017	140,734	171,723

Sources: U.S Census 2004b–e, v, w, ab, ac.

Decreases in employment in these sectors most likely reflect declines in the forest products industry; and the increases in the other sectors reflect a shift to more service-oriented employment—most evident in the California counties.

Unemployment rates for the six counties ranged from a high of 6.7% in Modoc County to a low of 3.4% in Washoe County (US Census 2004c, e, o, w, 2000ac). The California statewide unemployment rate was approximately 4% in 2000.

Per capita income for the four counties ranged from a high of approximately $24,300 in Washoe County to a low of $14,700 in Lassen County (Table 3.3-4). Income levels have increase in each county from 1990 levels. Increases have ranged from a low of 17% in Lassen County to a high of 57% in Modoc County. Although income levels have increased in all counties, only income levels in Washoe County are greater than the statewide average of $22,000.

Table 3.3-4 Per capita Income Levels for Lassen, Modoc, Humboldt, and Washoe Counties; California and Nevada (1990 and 2000)

County	1990 Income	2000 Income	Change
Lassen	$12,626	$14,749	+17%
Modoc	$10,971	$17,285	+57%
Humboldt	$13,544	$19,539	+44%
Washoe	$16,365	$24,277	+48%
California	$16,409	$22,711	+38%
Nevada	$15,214	$21,989	+45%

Source: US Census 2004c, e, j, k, o, w, aa, ac, ad.

3.3.3 County Revenues

Lassen County

During fiscal year 2000–2001, Lassen County received approximately $43,434,000 in revenues and transfer payments (California State Controller 2003). Property taxes accounted for $2.9 million of the 2000–2001 revenues. Sales taxes totaled approximately $733,000, and lodging taxes totaled approximately $43,000. Payments from other governmental agencies accounted for the largest share of county revenues. Payments from other state agencies and the Federal Government totaled approximately $19.9 million and $8 million, respectively (California State Controller 2003).

Lassen County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. The payments are based on population and acreage of federal lands within the county. Approximately 1,640,000 acres of land in Lassen County are under federal ownership, of which 1,009,000 are managed by BLM (U.S. Bureau of Land Management 2004s). During fiscal year 2000–2001, Lassen County received a $996,000 in-lieu of taxes payments (U.S. Bureau of Land Management 2004b). In-lieu of taxes payments based on BLM lands was estimated to total approximately $608,000 in 2001. In-lieu of taxes payments accounted for 1.4% of the county's total 2001 revenues.

Lassen County also receives payments from the Federal Government in the form of revenue sharing. Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within California totaled $203,000 in 2002 (U.S. Bureau of Land Management 2002). The revenues paid to Lassen County are not a substantial portion of the total county revenues.

Modoc County

During fiscal year 2000-2001, Modoc County received approximately $24,421,000 in revenues (California State Controller 2003). Property taxes accounted for $2.2 million of the 2000–2001 revenues. Sales taxes totaled approximately $236,000, and transient lodging taxes totaled approximately $20,000. Payments from other governmental agencies accounted for the largest share of county revenues. Payments from other state agencies and the Federal Government totaled approximately $10.4 million and $5.9 million, respectively (California State Controller 2003).

Modoc County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. The payments are based on population and acreage of federal lands within the county. Approximately 1,695,000 acres of land in Modoc County are under federal ownership, of which 272,400 are managed by BLM (U.S. Bureau of Land Management 2004s).
During fiscal year 2000–2001, Modoc County received a $259,000 in-lieu of taxes payments (U.S. Bureau of Land Management 2004b). In-lieu of taxes payments from BLM lands was estimated to total approximately $42,000 in 2001. In-lieu of taxes payments accounted for less than 1% of the county's total 2001 revenues.

Modoc County also receives payments from the Federal Government in the form of revenue sharing. Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within California totaled $203,000 in 2002 (U.S. Bureau of Land Management 2002). The revenues paid to Modoc County are not a substantial portion of the total county revenues.

Humboldt County

During fiscal year 2002–2003, Humboldt County received approximately $8,594,000 in General Fund revenues (Humboldt County 2003). Intergovernmental revenues accounted for just over $4.9 million of the 2002–2003 revenues, followed by property taxes at $1.3 million.

Humboldt County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. Approximately 4,964,200 acres of land in Humboldt County are under federal ownership, of which 4,318,500 are managed by BLM (U.S. Bureau of Land Management 2004a). During fiscal year 2000–2001, Washoe County received a $714,023 in-lieu of taxes payments (U.S. Bureau of Land Management 2004b). In-lieu of taxes payments from BLM lands was estimated to total approximately $621,000 in 2001. In-lieu of taxes payments represents a substantial proportion of the county's general fund revenues.

Humboldt County also receives payments from the Federal Government in the form of revenue sharing. Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within Nevada totaled approximately $14,074,700 in 2002 (U.S. Bureau of Land Management 2002). Approximately $13.7 million of the total for 2002 was generated from the sale of lands. The revenues paid to Humboldt County are not a substantial portion of total county revenues.

Washoe County

During fiscal year 2001–2002, Washoe County received approximately $329,674,000 in revenues (Washoe County 2003). Ad valorem taxes, including property taxes, accounted for $122 million of the 2001-2002 revenues. Consolidated taxes, including sales taxes, accounted for $76.6 million of the 2001–2002 revenues.

Washoe County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. Approximately 2,909,244 acres of land in Washoe County are under federal ownership, of which 2,638,342 are managed by BLM (U.S. Bureau of Land Management 2004a). During fiscal year

2000-2001, Washoe County received a $1,509,213 in-lieu of taxes payments (U.S. Bureau of Land Management 2004b). In-lieu of taxes payments from BLM lands was estimated to total approximately $1.4 million in 2001. In-lieu of taxes payments accounted for less than 1% of the county's total 2001 revenues.

Washoe County also receives payments from the Federal Government in the form of revenue sharing. Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within Nevada totaled approximately $14,074,700 in 2002 (U.S. Bureau of Land Management 2002). Approximately $13.7 million of the total for 2002 was generated from the sale of lands. The revenues paid to Washoe County are not a substantial portion of total county revenues.

3.4 Energy and Minerals

Hog Ranch Mine

The Federal Government's policy for mineral resource management, as expressed in the Mining and Minerals Policy Act of 1970, reads: "Foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security, and environmental needs." BLM has an essential role in contributing to an adequate and stable supply of mineral and energy resources, while continuing to sustain the land's productivity for other uses and its capability to support biodiversity goals.

The energy and minerals program on BLM-administered land in the Surprise Field Office area includes three categories of minerals: leasable minerals, locatable minerals, and saleable minerals.

3.4.1 Leasable Minerals

Leasable mineral resources, including oil, gas, geothermal and some solid mineral resources such as coal and oil shale are obtained from the BLM-administered lands by leasing. The 1920 Mineral Leasing Act (as amended), the 1970 Geothermal Steam Act, and 43 CFR Parts 3100 and 3200 govern oil, gas, and geothermal leasing. These laws provide for the leasing of the public mineral estate by a prospector or a corporation, provided that the lands are open for mineral leasing and not reserved or withdrawn for other purposes. Site-specific stipulations are included in any oil and gas or geothermal environmental assessment prior to the issuance of any lease. Upon receipt of a plan of development, site-specific surveys must be completed to eliminate or mitigate any adverse impacts.

Oil and gas exploration is encouraged; however, the potential for leasable minerals is very low throughout the Surprise Field Office area. There are no existing oil and gas leases in the field office area. Active oil and gas exploration or production is not expected to occur in the Surprise Field Office area in the future.

Although geothermal leasing is encouraged, activity is sporadic to nonexistent. A number of energy companies have expressed interest in the Surprise Field Office area and have conducted low-level analyses of the geothermal potential. None of these efforts has resulted in a lease application. Continued interest and activity in geothermal energy is anticipated throughout the field office area, especially in the Surprise–Lake City KGRA. Under present and future energy needs and predicted government support, the known and potential geothermal resources are expected to spur future interest and activity in the Surprise Field Office area (whether on lands administered by USFS, BLM, or the Bureau of Indian Affairs). High-temperature geothermal sources for power generation and lower-temperature sources for agricultural and recreation purposes will be tested for potential production. There is a high potential for at least one proposed geothermal production facility in the Surprise Field Office area in the future.

3.4.2 Locatable Minerals

Locatable minerals are minerals for which mining claims can be located, such as precious and base metals and some non-metallic minerals that are not classified as "common variety." Locatable minerals include rare and uncommon mineral types, such as gold, silver, copper, lead, and zinc, and some varieties of stone, pumice, and cinder deposits with distinct and special properties making them commercially valuable for use in manufacturing, industrial, or processing operations.

In determining a deposit's commercial value, the following factors may be considered: quality and quantity of the deposit, geographic location, accessibility to transportation, and proximity to market or point of use. The General Mining Law of 1872 (as amended) provides the rights to prospect for valuable minerals, and to locate and develop mining claims on public domain lands open to mineral entry. A mining claim is considered real property that is protected by constitutional rights. Active mining claims are limited to annual assessment and sporadic exploration activities, which are governed under the Mining Law of 1872. Notices and plans of operation for mining activities are processed according to regulations.

BLM administration of mining claims is covered under the 43 CFR 3809, Surface Management of Public Lands under U.S. Mining Laws. Prospectors can claim and develop locatable minerals on areas open to mineral location. BLM approval is not needed if proposed operations would disturb 5 acres or less per year, but notification is required. Operators proposing to disturb more than 5 acres per year are required to submit a plan of operation; BLM must then prepare an environmental analysis for the proposed action.

Present management direction with respect to locatable mineral development allows for exploration consistent with the protection of other resource values and encourages mineral exploration and development on all public lands, except those withdrawn through specific decisions for each sub-unit. Furthermore, where their development is consistent with other environmental and resource values, present management discourages closure of lands known or suspected to contain identified sub-economic minerals from exploration or location.

Potential locatable minerals in the Surprise Field Office include mercury, gold, silver, and zeolites. The now closed and reclaimed Hog Ranch surface gold mine was the major mining activity in the Surprise Field Office area and included exploration, development, production and reclamation. Exploration activity is expected to continue in and around the former mine area.

Other locatable mineral activity is expected to be sporadic and primarily focused on areas of known mineral occurrences (i.e., existing claims). Activity would be oriented toward exploration and would fluctuate with the price of gold and other commodities. Technological breakthroughs and uses for rare minerals may spur speculative mineral exploration activities. Technological advances (geochemistry and geophysics) pertaining to exploration may lead to high-risk exploration activity under the unmineralized volcanics and Quaternary basins within the Surprise Field Office area. The probability of another major mine is considered minimal; however, the potential impact of a mine on the Surprise Field Office area would be large in terms of workloads, areas withdrawn from multiple use, and access.

3.4.3 Saleable Minerals

Saleable minerals such as pumice, cinders, decorative stone, and sand and gravel may be purchased or acquired by use permits from BLM. Sand, gravel, and flat rock are the primary saleable minerals in the Surprise Field Office. Present management encourages free use permits for materials and material sales for aggregates to meet public demand. Aggregate material is provided to support BLM, state, county, and city projects. Sales of sand and gravel have been static; Lassen, Modoc and Washoe Counties have historically been the dominant users. Occasional permits are granted to regional and local construction companies and private individuals. Decorative stone collection has occurred, for commercial and private purposes, at a low level.

Saleable mineral production is expected to increase as sources close to areas of growth will face a stricter state and local regulatory environment. Sand and gravel demand is expected to increase because of the lower permitting fees and costs of materials on BLM-administered land, despite the added transportation costs.

Demands for building stone are likely to increase dramatically as local sources are depleted, premium prices are paid in urban areas, and low fees are charged by BLM. Increased transportation costs likely would be offset by present and future demand and high profit margins.

Increased usage by Modoc County is not anticipated. Washoe County has indicated the desire to increase the area covered by environmental assessments to facilitate possible expansion of a number of existing pits. The Nevada Department of Transportation has identified and is actively assessing 18 areas on BLM-administered land for future sand and gravel sources, in anticipation of assuming maintenance responsibility for County Road 447 and instituting a major upgrade of the route.

3.4.4 Restrictions

BLM-administered lands are generally open to mineral exploration and development under 43 CFR 3000-3800. Lands that are closed or withdrawn from some or all mining uses are known as "exclusion" areas. There are two types of closures to mineral leasing and mineral material disposal: discretionary and nondiscretionary. Discretionary closures are management-level decisions to close lands to mineral leasing and disposal; nondiscretionary closures are formal withdrawals by Congress or the Secretary of the Interior. Withdrawals of land from locatable mineral entry can occur only through nondiscretionary actions by Congress or the Secretary of the Interior.

Discretionary closures may apply in ACECs, research natural areas (RNAs), WSAs, and where mining is incompatible with other management objectives or land uses. Nondiscretionary closures occur in wilderness areas or areas withdrawn for other purposes. WSAs are non-discretionally withdrawn from mineral leasing (43 CFR Subparts 3100.0-3 and 3201.11) but are open to locatable mineral entry, with restrictions to prevent impairment of the area's suitability for inclusion in the Wilderness System (43 CFR Subparts 3802.1-5).

The Surprise Field Office area manages five WSAs. These WSAs would be managed as wilderness until Congress determines their final designation. Accordingly, no new mineral or energy activities would be allowed until the wilderness decision is made. (Locatable mineral claim staking and exploration activities are allowed providing they do not include any surface disturbance.) Except for pending decisions on the existing WSAs and potential conditions applied to future (ongoing) acquisitions, there are no indications that future mineral withdrawals would occur during the life of this RMP.

On lands open to mineral development and exploration, additional restrictions may apply to protect natural resources and mitigate conflicts with management objectives and other land uses. Such restrictions also would apply in "avoidance" areas, including ACECs, WSAs, and RNAs not listed as closed to mineral operations. Restrictions may also apply to protect visual resources, significant archeological sites, wildlife, and habitat components. All applicable restrictions would be attached to mining notices, plans of operations, leases, permits, and contracts.

Some areas are closed to surface occupancy (no surface occupancy [NSO]) for fluid mineral leasing operations. Under this type of restriction, drilling to explore, test, or produce fluid mineral resources may not occur from the surface. Mineral leasing may still occur, provided that the operator angle drills to the resource from an adjacent area where surface occupancy is allowed.

3.4.5 Factors Affecting Future Development

Key factors affecting future resource and use conditions include:

- Mineral and energy commodity prices.

- Technological advances in the use of common and rare minerals.
- Technological advances in exploration techniques.
- Energy demands and changing dependencies on fossil fuels.
- Legislative and regulatory changes that support or oppose energy and minerals activities.
- Acceptance of existing or future WSAs as wilderness areas.
- Continued stringent regulations at the state and local levels, pushing mineral extraction activities into more remote (federal) locations in response to increased demand.

3.5 Environmental Justice

3.5.1 Environmental Justice Overview

The BLM resource management planning process incorporates environmental justice considerations. In doing so, the planning process addresses any adverse human health or environmental impacts affecting minority and low-income populations to a greater extent than the general population in these areas.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from the execution of federal, state, local, or tribal programs and policies.

Meaningful involvement means that (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health, (2) the public's contribution can influence the regulatory agency's decision, (3) concerns of all participants involved will be considered in the decision making process, and (4) decision makers must seek out and facilitate the involvement of those potentially affected.

3.5.2 Current Conditions

Minority Populations in the Surprise Field Office Area

For environmental justice assessment purposes, key minority populations are those where either: (1) the minority population of the affected area exceeds 50%, or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. The Surprise Field Office area is composed of Lassen and Modoc Counties in California, and Humboldt and Washoe Counties in Nevada. The minority population breakdown by county is shown in Table 3.5-1.

Three environmental justice minority groups have been identified in the Surprise Field Office area: the American Indian and Alaska Native group, the Asian group, and the Native Hawaiian and other Pacific Islanders group. The American Indian and Alaska Native group accounts for 3.0% of the Surprise Field Office area compared to 1.3% and 1.0% of Nevada and California, respectively. The Asian group represents 4.6% of the Surprise Field Office area, which is slightly higher than the 4.5% average in Nevada. The percentage of this group in Washoe County, NV is 5.2%; percentages in other counties in both California and Nevada do not exceed the statewide averages. The Native Hawaiian and other Pacific Islander group represent 0.7% of the Surprise Field Office area, which is higher than the 0.3% average in California. Lassen County, CA (0.6%) and Washoe County, NV (0.7%) account for the higher average in the field office area.

Table 3.5-1 Population Characteristics of Lassen and Modoc Counties in California, and Humboldt and Washoe Counties in Nevada (2000)

Geographic Area (Total Population)	White	Hispanic or Latino (any race)	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other Race
Lassen County, CA (33,828)	83.3% (28,169)	13.8% (4,681)	9.1% (3,081)	4.6% (1,572)	1.1% (382)	0.6% (194)	4.1% (1,402)
Modoc County, CA (9,449)	88.6% (8,374)	11.5% (1,088)	1.0% (90)	5.8% (552)	1.0% (93)	0.2% (17)	6.4% (607)
Humboldt County, NV (16,106)	86.1% (13,860)	18.9% (3,040)	0.7% (118)	5.1% (814)	0.9% (153)	0.1% (23)	10.4% (1,667)
Washoe County, NV (339,486)	83.2% (282,610)	16.6% (56,301)	2.6% (8,810)	2.7% (9,070)	5.2% (17,660)	0.7% (2,525)	9.1% (30,747)
Surprise Field Office area	83%	16.3%	2.7%	3.0%	4.6%	0.7%	8.6%
State of Nevada (1,998,257)	75.2%	19.7%	6.8%	1.3%	4.5%	4.0%	8.0%
State of California (33,871,648)	59.5%	32.4%	6.7%	1.0%	10.9%	0.3%	16.8%

Notes: The Surprise Field Office area numbers were extrapolated by combining the data available for all counties in the planning area. Race is typically broken out two ways. The Hispanic information is typically separate because Hispanics can be of any race. The Hispanic information is presented in combination with the other racial information in the above table.
Source: U.S. Census Bureau, Census 2000, DP-1 Profile of General Population Characteristics: 2000, Modoc and Lassen Counties, California. Source: U.S. Census Bureau, Census 2000, DP-1 Profile of General Population Characteristics: 2000, Humboldt and Washoe Counties in Nevada.

Low-Income Populations in the Surprise Field Office Area

To determine the location of low-income populations, economic characteristics of the counties in the field office area were analyzed (Table 3.5-2). The Census Bureau sets the income threshold to determine poverty level. If the total income for an individual falls below the relevant poverty threshold, that individual is classified as being "below the poverty level" (U.S. Census Bureau 2003b). Within the state of California, 10.6% of the total population was below the poverty level in 2000 (U.S. Census Bureau 2003c). Within the state of Nevada, 7.5% of the total population was below the poverty level in 2000**.** In Lassen and Modoc Counties in California, a larger-than-average percentage of the population was living below the poverty line; while Humboldt and Washoe Counties in Nevada indicated a lower-than-average percentile. Income percentiles in Modoc County were lower than the State averages for all levels of income.

Table 3.5-2 Economic Characteristics of Lassen and Modoc Counties in California, and Humboldt and Washoe Counties in Nevada (2000)

County	Median Household Income	Median Family Income	Per Capita Income	% of Families below Poverty Level
Lassen, CA	$36,310	$43,398	$14,749	11.1
Modoc, CA	$27,522	$35,978	$17,285	16.4
Humboldt, NV	$47,147	$52,156	$19,539	7.7
Washoe, NV	$45,815	$54,283	$24,277	6.7
Statewide – Nevada	$44,581	$50,849	$21,989	7.5
Statewide – California	$47,493	$53,025	$22,711	10.6

Source: U.S. Census Bureau, DP-3, Profile of Selected Economic Characteristics: 2000, (All Counties) California. State information from the same source– link is <http://factfinder.census.gov/servlet/QTTable?_ts=88407972930>.

All identified income levels (median household, family, and per capita) in the Surprise Field Office area typically fell below the State averages in 2000. A higher percentage of families in the field office area were living below the poverty level than the State average. Especially high percentages were living below the poverty level in Lassen and Modoc Counties—11.1% and 16.4 %, respectively.

Tribal Governments in the Surprise Field Office Area

Three federally recognized tribal governments are in the Surprise Field Office area: the Fort Bidwell Reservation (Fort Bidwell, Modoc County, CA), the Cedarville Ranchería Community Council (Alturas, Modoc County, CA), and the Fort McDermitt Paiute and Shoshone Tribe (McDermitt, NV) (Van Oruum pers. comm.). Tribal land ownership accounts for less than 1% of the land in the Surprise Field Office area (4,253 acres of 2,432,624 total acres).

3.6 Fire and Fuels

Fire and fuels on lands administered by the Surprise Field Office have been affected by active and passive management actions since prehistoric times. Vegetation and fuel type are two primary descriptors of fire and fuel resources. Fuel in the natural environment includes both live vegetation and materials such as dead branches, needles, seeds, and cones. These fuels provide the structure that, under appropriate conditions, supports fire across the landscape. The vegetation and fuel are affected by other elements of the environment, such as precipitation, temperature, soils, and seasonal fluctuations.

3.6.1 Fuels Buildup and Ecosystem Alteration

When trying to determine the effects of post-European human influence and management on the fire and fuels resource, the characterization of the fire regime condition class is an important index. A historical fire regime is defined by the natural patterns of frequency, predictability, seasonality, intensity, duration, and scale with which fire historically passed through the habitat

Fire regimes have been classified into the five groups that are summarized in Table 3.6-1.

Table 3.6-1 Fire Regime Classifications

Classification	Fire Return Interval	Severity	Habitat Examples
Group I	0–35 years	Low	Ponderosa pine, other long-needle pine species, and dry-site Douglas-fir
Group II	0–35 years	Stand replacement	Drier grasslands, tallgrass prairie, and some Pacific chaparral ecosystems
Group III	35–100+ years	Mixed	Interior dry-site shrub communities, such as sagebrush and chaparral ecosystems
Group IV	35–100+ years	Stand replacement	Lodgepole pine and jack pine
Group V	>200 years	Stand replacement	Temperate rain forest, boreal forest, and high-elevation conifer species

Sources: Hardy et al. 2001, Schmidt et al. 2002.

A corollary descriptor of fuel conditions addresses a fire regime's degree of deviation from historical conditions. The condition classes described below also measure general wildfire ecosystem risk.

Condition Class 1: Fire regimes in this condition class are mostly within historical ranges. Vegetation composition and structure are intact. The risk of losing key components of the ecosystem from fire is low.

Condition Class 2: Fire regimes in this condition class have been moderately altered from their historical range, either by increasing or decreasing the fire frequency. The risk of losing key components of the ecosystem from fire is moderate.

Condition Class 3: Fire regimes in this condition class have been significantly altered from their historical return intervals. Vegetation composition, structure, and diversity have been substantially modified. The risk of losing key components of the ecosystem from fire is high (Hardy et al. 2001, Schmidt et al. 2002).

The concepts of fire regime and condition class require an understanding of historical (pre-European) conditions to facilitate measurement of the departure from those conditions. Although methodologies exist to arrive at PNV groups, these have not been determined for the Surprise Field Office area at a useful scale. Therefore, the conditions of the various vegetation communities listed below are based on current vegetation and extrapolated information from personal observation and historical photos.

An important factor to describe conditions is the fuel loading and fuel model. This measurement takes into account the variety of available fuels within given fuel types. For example, forest stands may be very clean and open with little down material or may contain decades of dead branches and a thick understory of smaller trees. Such diverse conditions would indicate different fire behavior and characteristics.

3.6.2 Fire Ecology of Major Vegetation Types

3.6.2.1 Vegetation Zones

Vegetation throughout the Surprise Field Office area is dominated by mature stands of big and low sagebrush, and by areas of juniper woodlands in the western part of the field office area. Vegetation is highly variable and is influenced by elevation, aspect, climate, and soil conditions. The existing vegetation can be grouped into four broad categories.

- Vegetation on low-lying alluvial fans and lake terraces, and adjacent to playas in a precipitation zone of 6–10 inches. This group consists of shadscale, bud sage, greasewood, inland saltgrass, and alkali seepweed.
- Vegetation on intermediate alluvial fans and lake terraces in a precipitation zone of 8–10 inches. This group includes Wyoming and basin big sagebrush, spiny hopsage, and rabbitbrush; the understory is generally dominated by cheatgrass, but some areas support perennial grass.
- Vegetation on upland terraces, alluvial fans, mountain plateaus, and mountain slopes in a precipitation zone of 10–16 inches. This group includes mountain big sagebrush, low sagebrush, antelope bitterbrush, serviceberry, snowberry, curl-leaf mahogany, aspen, Idaho fescue, bluebunch wheatgrass, needlegrass, and many annual and perennial forbs.
- Vegetation in the mountainous uplands in a precipitation zone of 16 or more inches. This group includes ponderosa pine, Jeffery pine, white fir, curl-leaf mountain mahogany, and aspen thickets with an understory of mountain big sage, perennial grasses, and forbs.

  Table 3.6-2 shows the distribution of precipitation zones by watershed in the Surprise Field Office area.

Table 3.6- 2 Distribution of Precipitation Zones by Watershed in the Surprise Field Office Area

Watershed	Zone 1 6–10 inches	Zone 2 8–10 inches	Zone 3 10–16 inches	Zone 4 16+ inches	Other
Guano	1%	6%	91%	1%	1%
Massacre Lakes	9%	23%	57%	4%	7%
Smoke Creek Desert and Thousand-Virgin	1%	36%	58%	2%	3%
Surprise Valley	6%	17%	70%	5%	2%
Warner Lakes	1%	3%	86%	8%	2%
Field office area (whole)	3.6%	17%	72.4%	4%	3%

The four precipitation zones influence the composition of vegetation communities and fuel structure. The zones correlate with fire occurrence, frequency, and behavior, and are good indicators for fire and fuels planning. Vegetation communities also substantially influence fire behavior and the ecological function of fire. Both the zone and the community play a role in determining the appropriate fire and fuels management strategy. Individual vegetation communities occur across multiple precipitation zones. Vegetation communities are described below.

3.6.2.2 Vegetation Communities

Aspen/Riparian

Fire is not usually considered a key ecosystem component in these areas, although many riparian and wetland plants are fire-adapted species. These communities are usually small (but vital) habitat components of the vegetation communities discussed below. Generally, vegetation response to the presence of water or increased soil moisture creates conditions that act to inhibit the spread or reduce the severity of fire. Across the landscape, riparian communities often create breaks in fire spread. In some riparian systems, fire suppression has created fuel loads that exceed the surrounding habitat and consequently put the riparian area at higher risk than the surrounding community. Fire can act as the disturbance agent within aspen stands; some level of disturbance is an important component of aspen regeneration. Fire also reduces the encroachment of conifers, which over time can replace aspen stands. The fire regime of aspen/riparian communities is considered to be Group III with regard to frequency and severity. Fire managers do not give these communities a specific condition class rating, but they must be considered when looking at the larger vegetation type or hydrologic unit.

Conifer/Juniper Woodlands

A few areas (Zone 4) of pine, fir, and/or cedar occur in the Surprise Field Office area. These stands most typically occur on the Modoc National Forest. Many of these stands are located on boundaries between BLM land and National Forest System or private timber lands. Many of these conifer communities historically experienced frequent low-intensity fire (fire regime Group I) or less frequent stand-replacing fire (fire regime Group IV). Because these areas have generally missed several fire return intervals, and a wildfire probably would result in severe fire effects on major species, the areas are rated as Condition Class 3.

Juniper is a complex management issue for BLM. The species is widely scattered throughout the field office area (Zones 3 and 4). Most juniper issues involve either stand density or encroachment into adjacent habitats. The factors most frequently attributed to the increase in both area and density of juniper are climate, the introduction of livestock (1860s–1870s), postindustrial increases in carbon monoxide, and the reduced role of fire.

Prior to fire suppression and grazing, juniper probably occurred in two main stand types. One was an old-growth stand condition with very infrequent, stand-replacing fires (fire regime Group IV); these stands would have occurred on rocky, shallow soils with limited accumulation of fine fuels. Another stand type was juniper savanna, with younger trees at a low density (<30% crown closure) across the landscape and a more dominant shrub, herbaceous, and grass understory; these stands would have occurred on deeper soils and experienced more frequent mixed-severity fires (fire regime Group III). A continuum of stand types would have existed along with the various seral stages; however, these two stand conditions probably dominated. During the last 130 years, within the Intermountain West, both juniper and pinyon pines have increased their distribution and density (Miller and Tausch 2001).

On many sites that would have supported low-density juniper woodland, juniper has expanded to greater than 30% crown closure. This is considered a successional phase that, under presettlement conditions, would not have occurred or would occur very rarely. In these areas, understory vegetation declines to the point where little if any surface vegetation is left, and there are substantial areas of bare ground. These sites have missed several fire return intervals and are losing key ecosystem components. A wildland fire in these sites could result in further degradation of the system and negatively affect soils. Therefore, these sites are rated as Condition Class 3.

Juniper with less than 30% crown closure is often found associated with other communities, such as mountain big sagebrush. Depending on influencing factors (especially soil characteristics), such sites might reflect historical conditions, in which case the community would be considered Condition Class 1. However, such sites can also reflect sagebrush vegetation into which juniper has encroached. In this situation, one or several fire return intervals have been missed. Wildland fires in such areas can result in both positive and negative effects; such areas are rated as Condition Class 2. These successional sites can also develop into Condition Class 3.

Low Sagebrush Communities

In low sagebrush communities (Zones 2 and 3), natural fire return intervals are historically 100 years or more, due to the shallow, rocky soils and sparse ground fuels. Because there is a lack of surface fuel continuity, fires tend to burn in a mosaic pattern with mixed severity, a fire regime characterized as Group III. Exceptions are where exotic annuals have invaded or where an unusually wet spring provides an above-normal crop of grasses and forbs sufficient to carry fire through the site.

Within the Surprise Field Office area, most low sagebrush communities are considered to be functioning within historical fire return intervals, and pose little risk of major disturbance or invasion by exotic grasses and weeds. These areas could be rated as Condition Class 1. (It should be noted that these types of low-risk areas are probably among the best locations for wildland fire use [WFU] in future planning efforts. As part of WFU planning, habitats would need to be evaluated for importance to wildlife.)

Basin/Wyoming Big Sagebrush Communities

These communities occur within Zones 2 and 3. NorCal fire managers agree that these are probably the most at risk sites in the field office. This is also the vegetation type that has been, or is at risk of being, invaded by exotic annuals such as cheatgrass and medusahead grass. In some cases, sagebrush has been nearly eliminated from sites and exotic grasses dominate.

Historically, fire return intervals for Wyoming big sagebrush were from 50 to 100 years, corresponding to fire regime Group IV (Miller et al. 2001); but much debate still occurs over fire return intervals in the Basin big sagebrush types (Welch and Criddle 2003). Invasion by flammable exotics has dramatically shortened fire return intervals, in some cases to every 1 to 2 years. This can lead to complete conversion of sites from Wyoming big sagebrush communities to exotic annual grasslands. Consequently, these communities are rated as Condition Class 3**.**

Mountain Big Sagebrush Communities

This community occurs within Zones 3 and 4. Historically, this community type would have burned with moderate frequency and mixed severity (fire regime Group III). In most watersheds, these communities have missed one or more fire return intervals. Some are at risk of invasion of exotic weeds and grasses following a wildfire, which could easily result in a type conversion to these annual exotics. Fire in these converted communities burns quickly and with a low intensity. The fire regime in such communities would be frequent stand-replacing fires (fire regime Group II). The invasion of exotic annual grasses can accelerate this cycle, creating communities that could burn every season. Native species, on the other hand, typically burn but then experience several years of fire resistance because of high live fuel moisture, lack of fuel continuity, and very small amounts of dead material. As these components alter over time, the community becomes more fire prone. A fire occurring too early in this cycle can be damaging to the native grasses and to the sage communities they inhabit. Many of the current juniper stands may have become established recently in historical mountain big sagebrush communities. Due to the expanse of juniper and exotic grasses, this plant community is at great risk of loss and consequently has been rated as Condition Class 3. Wildland fires can result in both positive and negative effects in terms of plant and wildlife species. Important species in this community are aspen, mountain brush species, and curlleaf mountain mahogany.

Salt Desert Shrub

This type typically occurs on poorly drained areas, such as flats, playas, undrained catchment areas, and the base of draws or fans, where salts tend to accumulate and clay content is often high. This community occurs mainly in Zone 1. Fires in this zone are infrequent and tend to be small. The mean fire interval is about 40 years, with high variation and mixed severity (fire regime Group III). When saltgrass is present, the light fuels can be contiguous. Saltgrass production is highly variable in relation to moisture availability, and flammability of shrubs varies depending on drought. Grazing of the grassy fuels by large ungulates can substantially influence fire mosaic patterns in this type because, in moist years, these areas may produce green forage when upland forage has cured out. So few fires have occurred in this vegetation type that historical fire effects are largely unknown. Alterations in the habitat due to grazing may play a higher role than missed fire intervals, and areas of this type would likely be rated Condition Class 2.

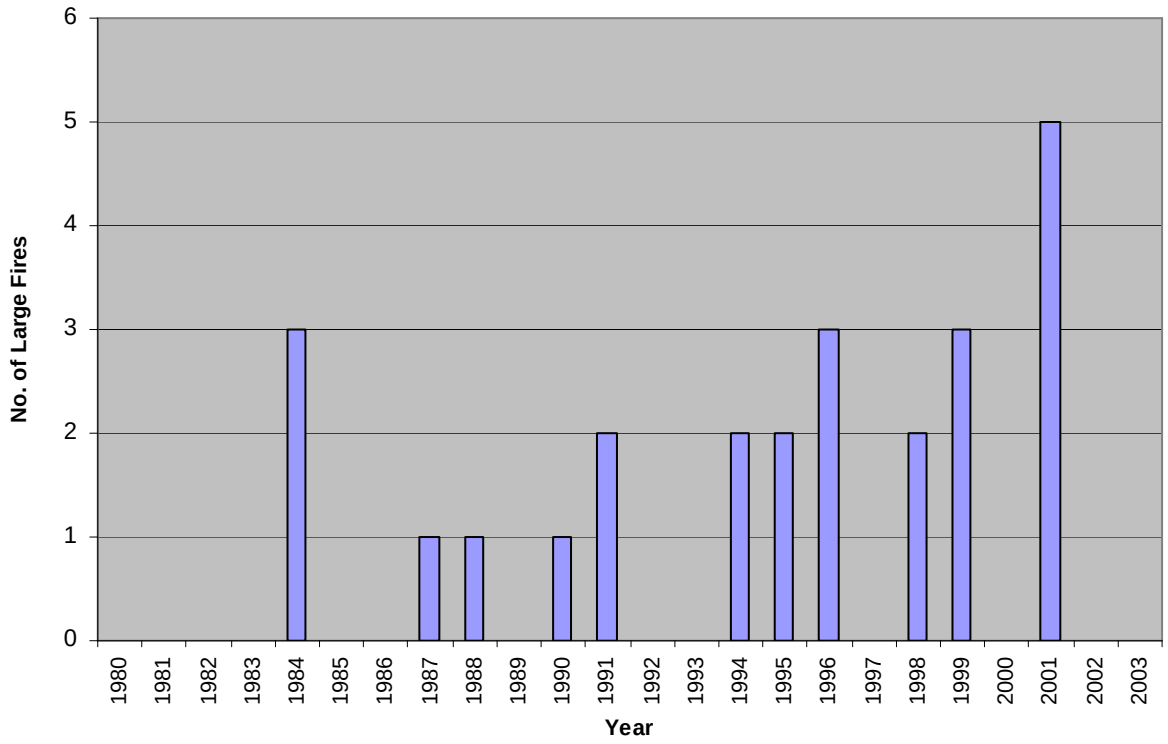
3.6.3 Fire History

Fire frequency and type (lightning or human caused), as well as past fire sizes and locations on the landscape, provide important information pertaining to past management and future planning efforts.

Over the last 24 years, the number of fires larger than 100 acres has ranged from 0 to 5 per year (Figure 3.6-3), depending on many weather-related variables and, to a lesser extent, the availability of fire suppression resources. An average of 2,500 acres per year, or 0.02% of the entire 9,648,679-acre field office area, burns annually as a result of larger fires.

Most of the fires that occur are small. Of the 277 fires that have occurred on BLM-administered lands within the last 20 years (an average of 13 fires per year) in the Surprise Field Office area, over 80% have been controlled at less than 10 acres. Of these, 10 (75%) were caused by lightning and 3.5 (25%) were human-caused. This has implications for both the timing and placement of fire occurrences. Lightning ignitions generally occur from June to early September and can occur in more remote locations where access is difficult. Lightning storms are often accompanied by little or no rainfall. In these events, wildland fires can spread quickly and cover substantial area, burning hundreds or thousands of acres in a single burning period. Wet lightning storms can produce several fires, but these are often much smaller. Human-caused fires tend to occur in areas that are accessible for fire suppression but can occur during periods of extreme fire conditions.

Figure 3.6-3 Number of Large Fires (>100 acres) by Year in the Surprise Field Office Area (1980–2003)



3.6.4 Fire Management

Fire suppression involves using resources (e.g., aircraft, engines, and crews) to contain and control fires. The costs associated with suppression are determined by the type of resources used and the length of time they are attached to a given incident.

Direct Protection Areas

The State of California and major federal land management agencies entered into a wildland fire protection agreement several years ago to improve interagency cooperation, achieve objectives common to all agencies, provide a functionally integrated fire protection system, share fire resources, and make the best use of tax dollars.

In California, state responsibility areas (SRAs) are lands for which the State is responsible for wildland fire protection under California Public Resource Code (PRC) Sections 4125 to 4127. These lands are often referred to as state and private lands. National Forest lands for which USFS is responsible, National Park lands for which the National Park Service is responsible, and public lands for which BLM is responsible, are referred to as federal responsibility areas (FRAs).

These SRA and FRA lands are often intermingled or adjacent, and wildland fires on one type present a threat to the lands on the other.

To help resolve the management and fiscal complexities of wildland fires burning across intermingled and adjacent SRA and FRA lands, the federal and state fire protection agencies have developed the concept of direct protection areas (DPAs). Within these DPAs, federal and state agencies assume fire protection responsibility for the lands of another agency, along with their own. The agencies also, as nearly as possible, represent the other agencies interests and objectives. Consequently, each agency must possess the recognition, knowledge, and understanding of each other's mission objectives, policies, and authorities.

DPAs have delineated boundaries, or dividing lines, between lands that will be provided wildland fire protection by state or federal agencies, regardless of ownership within those areas. DPA boundaries are established by mutual consent between federal and state agencies. Existing protection organizations and facilities, response times, land ownership patterns, values to be protected, and pertinent statutes and regulations are considered when determining the location of the DPA boundaries. Boundaries often follow easily definable features, such as highways, roads, rivers, or well-defined ownership lines. DPA boundaries can be reevaluated. When the need for a change is identified, the affected BLM units and offices recommend the change to state-level administrators/directors for approval.

3.6.5 Suppression Strategies

Full Suppression

Full suppression is a response where wildland fire ignitions are aggressively fought with the least cost and least acres burned philosophy, using a full array of management actions available unless site-specific restrictions apply (e.g., WSAs and ACECs). Firefighter and public safety is the number one priority. Under this strategy, a fire that is achieving resource objectives (i.e., reducing fuels or restoring fire-dependent ecosystems) and is not causing resource damages or threatening public health or safety would still be required to be aggressively suppressed.

Appropriate Management Response

An appropriate management response (AMR) on wildland fires emphasizes firefighter and public safety; however, fires are prioritized based on values to be protected commensurate with cost.

Allocations designated for AMR will receive a suppression response in the event of a wildfire ignition, but "the response to a wildland fire is based on an evaluation of risks to firefighter and public safety, the circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to be protected. The evaluation must also include an analysis of the context of the specific fire within the overall local, geographic area, or national wildland fire situation." (Review and Update of the 1995 Federal Wildland Fire Management policy, January 2001, page 35.)

AMR is formulated by risk assessment, objectives, environmental and fuel conditions, and other constraints. Suppression objectives are based on the maximum allowable acres per ignition (at various fire intensity levels). Critical suppression areas, such as wildland-urban interface, recreation sites, critical habitat, cultural sites, unstable soils, and ACECs are predetermined and full suppression constraints are used in these areas. An AMR could include aggressive suppression on one portion of a wildland fire while monitoring another portion of the same fire. Another AMR could be simply monitoring a wildland fire.

Wildland Fire Use

WFU is not technically a suppression strategy; a naturally ignited fire is used to achieve specific resource goals for designated areas. WFU areas are pre-identified areas where wildland fire will be used to protect, maintain, and enhance resources—and as nearly as possible—be allowed to function in its natural ecological role. Use of fire is based on the approved Fire Management Plan and follows specific prescriptions contained in operational plans. Areas designated as a WFU area are expected to have a wider range of conditions that would still result in a non-resource damaging fire. These areas typically have missed fewer fire return intervals and therefore have less of a fuel buildup and have not been substantial altered ecologically.

3.6.6 Post Fire-Burned Area Stabilization, Rehabilitation and Restoration

The Emergency Fire Rehabilitation Handbook (H-1742-1) (U.S. Bureau of Land Management 1999) outlines the process for implementing emergency fire rehabilitation projects following wildland fires and WFU. Emergency fire rehabilitation funds may be used to:

- Protect life, property, soil, water, and vegetation resources;
- Prevent unacceptable onsite or offsite damage;
- Facilitate meeting land use plan objectives and other federal laws; and
- Reduce the invasion and establishment of undesirable or invasive vegetation species.

As a part of wildland fire incidents, the management team develops and implements burned area emergency stabilization and rehabilitation (BAER). The BLM BAER policy, found in the Supplemental Emergency Stabilization and Rehabilitation Guidance (Draft 11/02), the Interim Interagency BAER Handbook, and the Departmental Manual 620 DM3 (Draft 12/03), outlines procedures for writing and implementing Emergency Stabilization (ES) and Rehabilitation (R) Plans. The ES and R Plans are separate documents. The new policy, Handbook and Manual will replace the BLM handbook 1742 (July 1999).

Emergency stabilization (such as seeding to prevent erosion or the establishment of invasive plants) are actions taken within 1 year of a wildland fire to stabilize the site, prevent unacceptable degradation to natural and cultural resources, and minimize threats to life or property resulting from wildland fire. Rehabilitation (tree planting, invasive plant treatments, fence replacement) includes actions taken within 3 years of a wildland fire to repair or improve lands unlikely to recover from wildland fire, or to repair or replace minor facilities damaged by fire.

3.6.7 Wildland Urban Interface

Most of the human development in the Surprise Field Office area consists of scattered homes, ranches, and their associated outbuildings. They are considered wildland urban interface (WUI) and wildland urban intermix. These areas are at risk during wildfire events, and consequently influence fire and fuels management.

There are several exceptions to the above description. The Surprise Valley is the most populated of the watersheds in the Surprise Field Office area; most of the WUI fuel reduction projects take place there. The watershed encompasses four of the "communities at risk," as designated in the Federal Register: Eagleville, Cedarville, Lake City, and Fort Bidwell—with a combined population of approximately 1,500. Current projects entail creating fuel breaks for each community to afford protection in the event that a wildfire ignited in forested habitat at higher elevations.

Massacre Lakes is the second most populated of the watersheds. Several large ranches in this watershed are surrounded by BLM lands. Although these ranches are not included in the Federal Register as communities at risk, they are included in the WUI program as the Long Valley Communities. In addition, several large ranches in the Warner Lakes watershed are surrounded by BLM lands. Although these ranches are not included in the Federal Register as communities at risk, they are included in the WUI program as the Cowhead Communities.

3.7 Forestry

Forest resources in the Surprise Field Office area are comprised of forestlands and woodlands. Forestlands are areas dominated by commercial timber species. In the Surprise Field Office area, these species include Jeffrey pine, ponderosa pine, sugar pine, Washoe pine, white fir, and incense cedar. Forestry and Woodlands are areas with at least 6% canopy cover and forested primarily with juniper, aspen, mountain mahogany, and other non-commercial species. Forestland, characterized by at least 10% canopy cover, is subdivided into commercial forestland capable of producing ≥ 20 cubic feet per acre per year and low-site forestland producing < 20 cubic feet per acre per year. Low-site forests generally occur where commercial forestland grades into juniper woodland. These forests are composed of scattered ponderosa pine, Jeffrey pine, and western juniper.

There are approximately 681 acres of forestland and 118,745 acres of woodland and low-site forestland in the Surprise Field Office area. Acreage in each watershed in the field office area is shown in Table 3.7-1.

Table 3.7-1 Forestland and Woodland Area by Watershed in the Surprise Field Office Area (acres)

Watershed	Forestland	Woodland and Low Site Forestland
Guano	0	5,121
Madeline Plains	444	3,707
Massacre Lakes	0	52,877
Smoke Desert North	0	0
Surprise Valley	190	17,898
Warner Lakes	47	39,142
Total	**681**	**118,745**

Forestland owned and administered by BLM constitutes a small fraction of the Surprise Field Office area. The majority of forested land (i.e., forestland and woodland) is on the Modoc National Forest. Forestland comprises approximately two-thirds Jeffrey pine and ponderosa pine, and approximately one-third white fir. Washoe pine is also present. Stands are multi-aged, although there is a large component of even-aged trees in most stands. Many stands originated after logging and fires in the late 1800s and early 1900s.

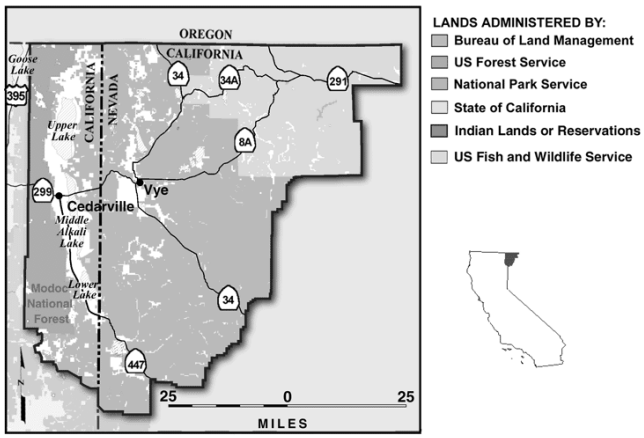
Timber sales have not occurred on the 681 acres of productive forestland in the Surprise Valley, Madeline Plains, and Warner Lakes watersheds for at least 30 years; however, some fuels treatments have been performed. This acreage has been set aside from the timber production base for wildlife, cultural, and scenic values. Revenue from BLM-administered woodlands is primarily from woodcutting sales (approximately 30 permits per year).

The woodlands and low-site forestlands are managed primarily for fuelwood and fencepost removal; these areas also are used for recreation, hunting, scientific research, and wildling collection (e.g., mushrooms, juniper berries, evergreen boughs, pinecones, and lichen).

The small areas of ponderosa pine and fir stands on BLM-administered lands in the Surprise Field Office area contain an accumulation of fuels. There are several ongoing hazardous fuels reduction projects. In addition, prescribed fire projects in juniper-invaded big sagebrush communities are proposed to enhance wildlife habitat and improve forage (see "Fire and Fuels").

Wildfire, blowdown, insects, and disease affect the condition of forestlands and woodlands. When substantial damage occurs, woodcutting is encouraged and biomass sales might be considered. Currently, no biomass operations, besides woodcutting removal, are ongoing in the Surprise Field Office area.

3.8 Lands and Realty



The Surprise Field Office administers approximately 1,220,644 acres of land within Modoc and Lassen Counties in northern California, and Washoe and Humboldt Counties in Nevada (Table 3.8-1). Surprise Field Office lands are mostly contained in one large contiguous block, with smaller parcels scattered throughout the field office area.

Other federal, state, and local government landholders within the field office boundary include the U.S. Forest Service (Modoc National Forest), the States of California and Nevada, Native American tribes, and the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area. Private lands account for approximately 416,404 acres within the field office boundary.

Table 3.8-1 Land Ownership in the Surprise Field Office Area

Ownership	Acres
U.S. Bureau of Land Management, Surprise Field Office	1,220,644
U.S. Forest Service	241,636
States of California and Nevada	1,236
Indian land	4,253
U.S. Fish and Wildlife Service	548,451
Private	416,404
Total	**2,432,624**

In managing the public lands under its jurisdiction, BLM provides for disposal, acquisition, adjustment, and use of land resources. BLM may, through its management framework plans (MFPs) or land use plans (LUPs), identify specific areas that may be suitable for land tenure adjustment (LTA). LTAs are, nevertheless, administered by the field office on a case-by-case basis in response to public demand or at the initiative of BLM in order to meet its land management objectives. Prior to taking action on an LTA, BLM must determine whether the adjustment would comply with FLMPA criteria, conduct an environmental analysis, and evaluate the consistency of the action with the appropriate MFP or LUP. The Cowhead/Massacre MFP encourages LTAs where these actions accrue multiple-use benefits to the public (Decision 14).

3.8.1 Retention/Acquisition Areas

Broad areas of BLM-administered land may be identified by the field office for retention and intensive management in accordance with the resource management goals and objectives of the field office. These areas are referred to as retention/acquisition areas. Large areas designated for acquisition in a regional sense have not been identified in the Surprise Field Office area.

Parcels identified for acquisition are specific to areas with known unique characteristics, areas necessary to ensure public access for recreation, and parcels targeted to solidify holdings within or adjacent to the national conservation area. Other acquisitions are considered when specific proposals are offered to BLM by private individuals.

The Cowhead/Massacre MFP includes several directions for acquisition of lands:

- Acquire private lands near Massacre Lakes and Hanging Rock Canyon whenever possible (Decision 11 [Sub-Unit 2]). No acquisitions have occurred per this decision.
- Acquire private lands at Cedarville and Leonard Hot Springs whenever possible (Decision 15 [Sub-Unit 3]). No acquisitions have occurred per this decision.
- If possible, acquire Crooks Lake North and Cowhead Southeast (Decision 11 [Sub-Unit 4]). No acquisitions have occurred per this decision.
- Acquire access to and use of part of Lake Annie shoreline, if possible (Decision 12 [Sub-Unit 4]). No acquisitions have occurred per this decision.

One land acquisition is in progress in the Surprise Field Office area, using funds generated through the Southern Nevada Public Land Management Act (SNPLMA). The Home Camp package is approximately 17,000 acres within and surrounded by a large block of BLM-managed lands. In the near future, two other land packages will be nominated in Round 5 of SNPLMA:

- The Bright-Holland land package contains Wall Canyon and various smaller parcels surrounded by BLM lands as part of a 23,000-acre acquisition within the Surprise, Eagle Lake, and Winnemucca Field Office areas. This proposed acquisition is within a large block of BLM-managed lands and is adjacent to lands offered in the Home Camp package.
- The Whitehead Property consists of 300 acres of spring-fed riparian habitat on the east side of Surprise Valley. This property will be submitted to SNPLMA separately from the Bright-Holland package.
- Retention areas are generally larger expanses of public lands with smaller private inholdings or areas with special management considerations or significant resources. They are often portions of and, in some cases, all of specific existing management areas. Special management areas where public lands would be retained include wilderness study areas (WSAs), areas of critical environmental concern (ACECs), resource natural areas (RNAs), ROWs, and other special management areas. The Surprise Field Office area encompasses five WSAs.

BLM-administered lands in the WSAs would continue to be retained and managed as wilderness until a final decision on wilderness designation is made by Congress.

Other lands in the field office area may be retained as custodial lands for resource values, including lands currently identified for disposal, should environmental review prior to disposal reveal any significant resource values that would warrant retention.

3.8.2 Disposal Areas

Although the Surprise Field Office's current MFPs and LUPs in some cases do identify specific parcels for sale, not all disposal parcels have undergone site-specific clearances, which may reveal unique resources or other environmental conditions that require those lands to be retained in a custodial status. The criteria for such determinations are found under Section 203 of FLPMA.

The Cowhead/Massacre MFP includes a decision to provide for a sanitary landfill site east of Middle Lake for the town of Cedarville (Decision 14 [Sub-Unit 3]). Landfills at Lake City and Eagleville have fulfilled the needs of Surprise Valley, and the landfill east of Cedarville has been closed by Modoc County.

Land disposal or exchange decisions in the Tuledad/Home Camp MFP are described below.

- Consider exchanging scattered parcels near deeded lands to allow agricultural development (parcels identified in Duck Flat) (Lands – Decision 2). Limited exchanges have occurred for agricultural development and land consolidation by BLM.
- Designate 2,509 acres of BLM-administered lands as potentially suitable for disposal and consider an additional 280 acres as potentially suitable for disposal if the public sector shows interest at fair market value. An additional 539 acres would be deferred from consideration for disposal until monitoring by the Nevada Department of Wildlife determines the values of these lands for migrating antelope. Pending the results of this research, the area may be dropped from further consideration for disposal. (Amendment to MFP dated 11/03/83) (Lands – Decision 4). Limited disposals have occurred in the Duck Flat area.

3.8.3 Rights-of-Way

A right-of-way grant is an authorization to use a specific piece of public land for certain projects, such as roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time. In general, right-of-way applications are initiated by the public to address a need for access across BLM-administered lands. Other uses, such as communications facilities, require a right-of-way (lease) for use of public land.

A right-of-way (ROW) grant is an authorization to use a specific piece of public land for certain projects, such as roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time. In general, ROW applications are initiated by the public to address a need for access across BLM-administered lands. Other uses, such as communications facilities, require an ROW (lease) for use of public land.

ROWs are processed on a case-by-case basis. Although applicable Management Framework Plans (MFPs) designate utility corridors, communication sites, and existing route upgrades and improvements, these ROW authorizations are subject to NEPA compliance prior to approval. Through the NEPA environmental analysis process, the ROW request may be either denied or substantially affected or altered to avoid impacts on other resources

3.8.4 Utilities

Existing utility ROWs are shown on the Master Title Plats available in the Surprise Field Office.

There are five power-line ROW corridors in the Surprise Field Office area. Los Angeles Water and Power maintains an existing ROW through the Surprise Field Office area for a 750-kilovolt transmission line. This ROW is approximately 75 miles long and is the main utilized corridor through the Surprise Field Office area. No additional requests for use of this corridor have occurred.

The four remaining ROW corridors are undeveloped. The first extends along the east side of the Surprise Valley and runs from north to south. A second ROW is designated near Barrel Springs, and a third corridor extends east to west through Forty-Nine Pass to connect with an existing transmission line in Long Valley.

These three corridors total approximately 112 linear miles. A fourth corridor approximately 25 miles long extends southeast along Highway 447 and then runs from east to west.

3.8.5 Telecommunications

Management of communication sites has recently changed with the inception of the 1996/1997 regulations governing communication sites on USFS and BLM management public lands. Any new or renewed ROW (lease) for a communication site will be managed under the new regulations (43 CFR 2800).

Fox Mountain and Forty-Nine Mountain are the main government and commercial communication sites. Current management plans state that communication development at these two locations should be encouraged to satisfy communication needs before developing additional sites. No additional expansion has been proposed, at least at Forty-Nine Mountain. Additional sites exist at Hays Canyon Peak, Little Hat Mountain, and Mahogany Mountain. Hays Canyon Peak is the original repeater site for BLM, but the site is no longer used. No interest has been generated in establishing a government or commercial communication site at this location. Existing MFPs indicate a potential need for additional communications facilities on Mahogany Mountain and Little Hat Mountain, but at present there are no requests for communications development at these sites. If the need arises, Mahogany Mountain would be developed by installing a small repeater site powered by solar panels. Little Hat Mountain would only be developed only after other sites had reached capacity.

3.8.6 Trends and Forecasts

ROW applications continue to be filed as private landowners seek to ensure access to residences and lands surrounded by BLM-administered land for management and economic growth purposes.

An increase in ROW applications occurred when the Black Rock/High Rock NCA was designated, due to local uncertainty concerning the requirement to provide access to private holdings. Private landowners wanted to ensure access (and potential bank loans for purchase and sale) by the granting of ROWs.

Focus on energy resources and, in particular, renewable energy sources on public lands has increased. Interest in wind energy is currently focused in the southern Warner Mountains, which straddle BLM and USFS management lands. One application for wind energy assessment is on file awaiting response by the applicant to the proposed Category 5 Cost of Recovery evaluation. Other potential wind energy applicants have initiated discussions and potentially are preparing plans of operation. Wind energy ROW concerns are focused on visual degradation and disruption of wildlife migration.

Biomass energy production has not been discussed by potential producers in the Surprise Field Office area but may be considered in the near future.

There is recurring discussion and a proposal to pave County Road 8A from the California/Nevada border to the maintenance station at Vya. Construction and maintenance would take place within the existing disturbance and easement.

Renewed discussion and potential actions of paving and re-aligning the route from Fort Bidwell to the Oregon border would affect BLM-administered lands to the extent of new road construction and heavy equipment and traffic usage.

There has not been an increased demand for additional communication sites in the Surprise Field Office area. The existing, identified communication sites and utility corridors appear to be adequate for any future growth.

Increased interest in Surprise Valley proper, with access demands rising dramatically, will lead to an upswing in ROW applications. With the probable utilization of identified utility corridors for renewable energy sources, and perceived secure access to private inholdings, the ROW process needs to be approached from an overall, future-looking resource plan. Planning of ROWs should take into account potential growth (sales) and acquisition to determine whether a potential ROW may have a broader impact or can be modified to allow for other future access.

Existing, designated corridors will provide for any anticipated growth (wind, geothermal, and biomass). Existing corridors are under-utilized at present and are adequate for future needs. NEPA compliance has not been initiated for the non-utilized corridors. Visual resource issues will become a major factor in establishing and utilizing unused corridors and wind energy ROWs.

The Lake City – Surprise Valley Known Geothermal Resource Area (KGRA) is the one designated geothermal resource area in the Surprise Field Office area. If the KGRAs are re-evaluated in the near future, this area probably will expand to the south. Expansion of the KGRA may drive the need for additional ROWs.

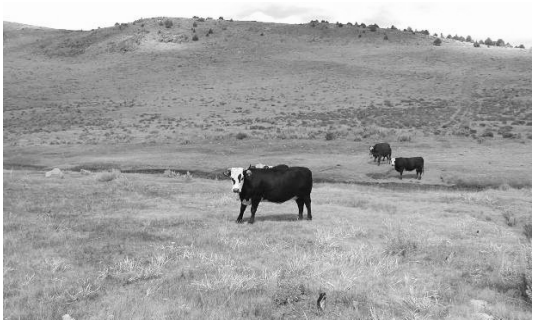
The existing utilized sites at Fox and Forty-Nine Mountains will be maintained, with any potential commercial growth confined to these two areas. As communications continue to be upgraded to satellite systems, the pressure for on-the-ground sites will diminish. The Little Hat Mountain, Mahogany Mountain, and Hays Canyon Peak designated communication sites will be potential sites for BLM repeater sites, if needed.

The existing state and county transportation network will continue to accommodate the amount of traffic and the anticipated destinations of the public. Road upgrades and general maintenance will be managed within the existing resource plans.

BLM roads, tracks, and trails in the Surprise Field Office area will become a center of controversy. Discussions of closing roads, confinement of OHV vehicle usage to specific areas, and closing BLM lands to cross-country vehicular travel will generate much debate as a national policy is formed.

3.9 Livestock Grazing

3.9.1 Historical Setting



The Surprise Field Office is located in an area that has been grazed by livestock for more than 100 years. Excessive livestock grazing from the late 1800s to the 1930s altered plant composition and productivity on substantial portions of the lands currently managed by the Surprise Field Office. The impacts of heavy grazing are exacerbated by effective fire suppression. Many of the Field Office's fire dependent ecosystems have not burned in over 100 years. As a result, some of the key rangeland issues we face today, including vegetation change and soil loss, are the legacy of earlier mismanagement. The introduction and establishment of invasive annual grasses (primarily cheatgrass) which began during 1930's and 1940's has had a dramatic negative affect on native plant communities by displacing and limiting recovery of the potential plant community.

Improved livestock management began following the passage of the Taylor Grazing Act in 1934. Livestock numbers were again reduced during the adjudication period of the 1960s. Livestock numbers were reduced during the adjudication to levels that could be sustained and that allowed for maintenance of wildlife forage and habitat conditions. Today, livestock grazing use adjustments are based on the interpretation of monitoring data and rangeland health assessments.

3.9.2 General Management Approach

Grazing resources and livestock use are characterized according to three broad categories of information: the grazing animals, the management that controls their movements, and the range resources supporting grazing activities. Animals are described by species, age, numbers, breeding arrangements, herd sizes, herd sex ratios, and food preferences. Management is described by how and when animals are brought to BLM-administered land, the numbers turned out, the methods for controlling their movements, and how and when the animals are removed. These descriptors are defined in the grazing permits held by permittees. BLM rangeland is divided into grazing allotments, which are further divided into pastures. Within the allotments, animal movements are controlled through the use of pasture fences, drift fences, and locations of water sources. Permits are valid for 1–10 years, but permit conditions can be changed on an annual basis in response to BLM monitoring of range condition. Grazing resources also are affected by management practices when grazing animals are not present.

Range resources that support grazing activities are comprised of vegetation as well as components such as water, minerals, and cover. The carrying capacity for grazing animals of a particular given area of rangeland, described in terms of animal unit months (AUMs), consists of the number of animals that can be supported by the range while meeting required standards. The relative composition and quality of forage species, in concert with animal food preferences, contributes to quantification of the carrying capacity (Heady 1975).

Rangeland and livestock are managed by establishing discrete allotments and issuing livestock permits for grazing on these allotments. Allotment management plans (AMPs) are developed based on the site conditions, including the availability of water and forage and other resource sensitivities within each allotment.

AMPs are developed in a process that is compliant with NEPA, and management decisions in AMPs are consistent with the management decisions in the appropriate RMP. Basic permit conditions are established based on the provisions of the AMPs and are adjusted annually, as needed, to reflect current rangeland conditions and resource issues. Permits are generally issued for 10 years.

3.9.3 Current Livestock Grazing Conditions

All of the BLM-administered lands within the Surprise Field Office area are presently included in grazing allotments. A total of 92,465 AUMs are available for permitted animals on these allotments.

A total of 59 grazing permits are distributed among 51 permittees in the field office area. Most of the permits in the Surprise Field Office area specify a period of use from April to September; however, some allow use in March, October, November, and the winter period. The Surprise Field Office area currently supports 89,627 cattle AUMs, 2,671 sheep AUMs, and 176 horse AUMs. When additional forage becomes available on a sustained yield basis, suspended AUMs can be appointed to permittees.

A grazing permittee may request voluntary relinquishment of grazing preference and permit for their BLM allotment, and thereby initiate action by BLM to allocate these AUMs for another use. Voluntary relinquishment of a grazing allotment, resulting in the elimination of livestock use, would only occur if the following steps are taken:

1. A written request for voluntary relinquishment must be initiated by the permittee and submitted for BLM approval.
2. BLM must prepare a land use plan amendment, subject to protest, in accordance with 43 CFR 1610.5-2. The plan amendment would be approved only upon consideration of the following criteria:
   - Other uses of the land,
   - Terrain characteristics,
   - Soil, vegetation, and watershed characteristics,
   - The presence of undesirable vegetation, including significant invasive weed infestations, and
   - The presence of other resources that may require special management or protection, such as Special Recreation Management Areas (SRMAs), or Areas of Critical Environmental Concern (ACECs).
3. BLM would then issue a grazing decision in accordance with 43 CFR 4160.1, subject to appeal rights. This grazing decision would be based on a site-specific environmental review, consultation with affected parties, and other required procedures.
4. BLM would identify the land as unavailable for grazing and manage the land according to the amended land use plan.

Rangeland Health Assessment Determinations

In the Surprise Field Office, Rangeland Health Assessments are conducted in compliance with Interagency Technical Reference 1734-6, Interpreting Indicators of Rangeland Health, developed by Pellant, Shaver, Pyke, and Herrick in 2000. The Rangeland Health Standards are based on Upland Soils, Streams, Water Quality, Riparian/Wetlands, and Biodiversity conditions, as described in the Susanville Resource Advisory Council (RAC) section of the Rangeland Health Standards and Guidelines for Northeastern California and Northwestern Nevada Final Environmental Impact Statement (FEIS) of April 1998, in compliance with 43 Code of Federal Regulations Subpart 4180 (43 CFR 4180). Rangeland Health Assessment Determinations are point in time assessments of rangeland health, as determined by an interdisciplinary team of experienced BLM staff specialists, based on all available data.

Rangeland health assessment (RHA) determinations rate grazing allotments according to the following four categories:

- Category 1 – Areas where one or more standards are not being met, and significant progress is not being made toward meeting the standard(s) and current livestock grazing is a significant contributor to the problem.
- Category 2 – Areas where all standards are being met or significant progress is being made toward meeting the standard(s).
- Category 3 – Areas where the status for one or more standards is not known, or the cause of the failure to meet the standard(s) is not known.
- Category 4 – Allotments where one or more of the standards are not being met and significant progress is not being made toward meeting the standards due to causes other than (or in addition to) livestock grazing activities. (Those allotments where current livestock grazing is also a cause for not meeting the standards are included in Category 1, in addition to this category)

There are 17 Guidelines that are associated with the five Rangeland Health Standards. Guidelines 1-15 and guideline 17 are intended to apply at all times and, where appropriate, to all areas of the public lands. If one or more of the Rangeland Health Standards are determined to not be met, and progress is not being made towards meeting the Standard(s) as a result of current livestock grazing practices, then the appropriate portions of guideline #16, limiting livestock utilization, are applied.

RHA determinations have not been made on 20 of the 49 allotments managed by the Surprise Field Office (as reflected by Category 3 allotments on Table 3.9-1). Examples of other factors affecting rangeland health in the Surprise Field Office area include juniper encroachment, historical livestock grazing, noxious weed encroachment, and roads in riparian zones. Table 3.9-1 shows the numbers and acreages of the allotments by RHA category.

Table 3.9-1 Grazing Allotments by Rangeland Health Assessment Category

Rangeland Health Assessment Category	Acres	Number of Allotments
1	333,332	5
2	773,025	22
3	324,258	20
4	348,160 (including 333,332 in Category1)	7 (including five in Category 1)
Total	**1,445,443**	**49**

Historically, all allotments were placed in selective management categories. Based primarily on current rangeland condition, the three approaches are improve (I), maintain (M), and custodial (C). The criteria for applying each of these approaches are as follows:

- Improve – Allotments generally have the potential for increasing resource production or conditions, but are not producing at that potential. There may be conflicts or controversy involving resource conditions and uses, but there are realistic opportunities to enhance resource conditions.
- Maintain – Allotments are in satisfactory resource conditions and are producing near their potential under existing management strategies. There are little or no known resource use conflicts or controversies.

- Custodial – Allotments usually consist of relatively small acreage or parcels of public land. They are often, but not always, intermingled with larger amounts of non-federally owned lands. There should be no known resource conflicts involving use or resource conditions. Typically, opportunities for positive economic returns from public investments are limited on these lands.

BLM selectively directs funds, monitoring emphasis, and management efforts where they will be the most effective. The major emphasis for development is the "improve" category allotments. Table 3.9-2 shows the acreages of grazing allotments in each of the management categories.

Table 3.9-2 Grazing Allotments by Management Category

Management Category	Acres
Improve	1,379,176
Maintain	41,590
Custodial	24,677

3.9.4 Current Livestock Management

All of the BLM-administered lands within the Surprise Field Office area are presently included in grazing allotments. Within these allotments, 92,465 AUMs are available for permitted animals. Permits currently allow for approximately 17,000 cattle, 5,000 sheep, and 34 horses.

Beginning with the original MFPs in the late 1970's and early 1980's, the primary objective for livestock grazing management has been to maintain or improve the condition class of the upland vegetation. Management to meet this objective has been accomplished by the development of grazing systems that allow vegetation to receive periodic rest, shortened periods of use, deferment of use, and varied seasons of use. Implementation of these systems has included pasture fences and water developments, to assist with livestock control and distribution, and utilization limits on key forage species. Subsequent to the original MFPs, additional management objectives have developed, including riparian, aspen, and other special wildlife habitat management; sensitive plant and animal species management; and a wide variety of recreational management. Livestock management to meet these objectives has included a wide variety of livestock management techniques, including site specific exclosure fencing to eliminate livestock grazing from special habitats, seasonal use restrictions, livestock herding and salting requirements, and additional utilization and mechanical impact limits on important upland and riparian communities.

Management on BLM-Administered Land

Present management includes turning out the permitted number of livestock onto designated pastures within an allotment and removing them according to the annual permit conditions. Animal distribution and movements are controlled by fencing, water distribution, or active herding measures. Livestock are moved in and out of allotments and between pastures by trucks or overland "drives."

Management on Adjacent Land

Alternative, or off-season, pastures are obtained by USFS allotments, leased private lands, home ranches, or out-of-area pastures or feedlots. Presently, approximately 50% of the stock permitted on BLM lands are pastured offsite in the surrounding area, and the rest are pastured in the Sacramento Valley. This proportion varies from year to year as a result of changing range and market conditions. Herd sizes range from 2 to 1,870 cows and from 1,000 to 3,000 sheep. Family and small business owners control approximately 95% of the herd using BLM-administered land; the remainder is under the control of corporate entities.

3.9.5 Observed Trends

Range Conditions

BLM is enhancing range conditions by controlling animal numbers, regulating season of use, regulating duration of use, and periodically resting rangelands as part of the livestock management systems and following catastrophic events, such as fire. Monitoring of livestock management activities is conducted in accordance with accepted BLM techniques, as described in BLM and interagency technical references and handbooks.

Forage production and availability naturally fluctuate annually in the Surprise Field Office area. Drought conditions can trigger alteration of annual permit conditions. Natural or management-associated processes that are considered to move rangeland health away from the desired conditions include:

- Encroachment of juniper into sagebrush, riparian, and mountain brush communities;
- Sheet erosion and pedestalling (loss of soil except where held as "pedestals" by the roots of individual plants)
- Increasing competition from noxious weeds and other non-native species
- Decline of watercourse health
- Decline of riparian area health and functioning
- Trampling of soils and stream banks by livestock, and impacts from trails or roads along the drainages and in the riparian areas
- Decline in important forage shrub species as a result of drought
- Wildfire

Several species of non-native annual brome grass species (cheatgrass, etc.); have established on most of the mid and low elevation portions of the Surprise Field Office area. Livestock management systems and ecosystem restoration efforts are designed to control and reduce the extent and dominance of these species; however, they will never be completely eliminated from the communities where they currently exist. As a result, most of these ecological sites will never be completely restored to historic (pre-European settlement) conditions.

Grazing Management

BLM and permittees have committed to improving public lands so that livestock forage and ranching can be sustained. Despite inherent difficulties, many local ranchers have changed grazing methods and have begun using new grazing strategies, which have shown dramatic improvement in maintaining the quality of rangeland. In addition, the quality and extent of riparian and sensitive upland vegetation types have increased because of these new and innovative grazing management techniques, which include shorter grazing seasons, modified spring grazing/summer grazing, and intensive management in riparian areas or pastures.

Enhancement management of streams and riparian areas through creation of livestock exclosures and riparian pastures, and intensive livestock management programs (e.g., redesigned fence configurations, frequent pasture moves, changes in season of use, and herding) have reduced effects of livestock concentration in sensitive areas—resulting in improved rangeland conditions.

Maintenance of greater amounts of residual plant material (vegetation that remains ungrazed at the end of the grazing season) in upland and riparian habitats has enhanced watersheds by improving water infiltration and reducing soil erosion, and allowing increased seedling establishment to increase ground cover.

Although these improvements have been positive, some areas continue to require management changes. The riparian and upland assessments have identified areas that need attention if rangeland health is to be sustained (see Section 3.15, “Vegetation”).

3.10 Recreation and Visitor Services

The Surprise Field Office area provides a wide variety of recreation activities for the public, including dispersed primitive camping, hiking, fishing, photography, rock hounding, fossil collecting, mountain biking, horseback riding, wild horse viewing, wildlife viewing, and sightseeing. The recreational values provided by the Surprise Field Office area include solitude, quietness, scenery, the perception of rugged untamed country, and limited signing. The peak seasons of use are spring, summer, and fall. Memorial Day and Fourth of July holiday weekends and the opening day of various hunting seasons (antelope, deer, and upland game) receive the highest number of visitors. Fishing activities, one of the highest uses, takes place throughout the fall.

Visitor use, livestock grazing, and natural processes are the primary factors affecting recreation resources in the Surprise Field Office area. Camping in the area remains dispersed, limiting visitor impacts to specific resources. Existing Management Framework Plans for the Surprise Field Office area include provisions to acquire easements or right-of-ways to desirable camping areas on private lands; however, these rights have not been acquired because there is little demand for additional camping opportunities. Natural weathering adversely affects signs and facilities. Limited budgets have been unable to keep up with the backlog of needed road maintenance, and erosion continues to affect these resources. In some cases, livestock use negatively affects the visual and recreational qualities enjoyed by visitors.

Warner Lakes Watershed

The northernmost portion of the Barrel Springs Back Country Byway traverses the Warner Lakes watershed. See Map REC-1.

Guano Watershed

The northwestern portion of the Guano watershed contains the Sheldon Contiguous Wilderness Study Area (WSA), and the southwestern section of the watershed contains part of the Massacre Rim WSA (see Section 3.11, Special Management Areas, and Map WSA-1).

Badger Creek and the associated Bitner Ranch, located in the Guano watershed, have been nominated as an Area of Critical Environmental Concern (ACEC) based on the area's cultural resource and wildlife values. A management plan for the ACEC will be prepared; the plan will provide for public interpretive areas focused on cultural and wildlife resources.

Surprise Valley Watershed

In the SFO area, the Surprise Valley watershed receives the most recreational users per year. The Fee Reservoir area supports developed camping, managed through a cooperative agreement between BLM and Modoc County. There are seven developed camping sites at Fee Reservoir, a new well, a boat ramp, handicapped-accessible toilets, parking, and a boat turnaround. See MAP REC-1.

Bare Creek and Newland Reservoir are popular fishing areas located in this watershed. Wild horse viewing is also very popular. The watershed provides access, through Emerson and Granger Canyons, to recreation areas located on Forest Service lands in the Warner Mountains.

A major portion of the Barrel Springs Back Country Byway traverses the watershed; signing for the byway tour is located at the mouth of Cedar Canyon and along Highway 299 (CA)/8A (NV), and County Road 1. Finally, the South Warner Contiguous WSA is located in this watershed (see Section 3.11, Special Management Areas; see Maps REC-1 and WSA-1.).

Massacre Lakes Watershed

The Barrel Springs Back Country Byway and the Buckhorn Back Country Byway traverse the Massacre Lakes watershed. There are also three WSAs in this watershed: Massacre Rim, Wall Canyon, and Buffalo Hills (see Section 3.11, Special Management Areas, and Maps REC-1 and WSA-1).

Madeline Plains Watershed

A portion of the Buckhorn Back County Byway traverses the area, and much of the Buffalo Hills WSA is located here (see Section 3.11, Special Management Areas, Map REC-1).

Smoke Creek

Recreational uses of the Smoke Creek watershed are similar to those in other watersheds in the SFO area.

3.11 Soil Resources

The primary indicators for soil resources are Soil/Site Stability and Hydrologic Function. These indicators are part of BLM's Land Health Assessment (LHA), and are used to assess soil health in the context of BLM's Standards and Guidelines (S&Gs) requirements. The LHA data is maintained in the Surprise Field Office. The LHA uses 12 indicators to rank Soil/Site Stability and Hydrologic Function into five categories: (1) slight to no deviation from what would be expected on a reference site, (2) slight to moderate deviation, (3) moderate deviation, (4) moderate to extreme deviation, and (5) extreme deviation. For consistency with other assessments, ratings 1 and 2 are considered to be in *Properly Functioning Condition* (PFC), rating 3 is considered *Functional at Risk*, and ratings 4 and 5 are *Non-Functional*.

Soil/Site Stability ratings reflect the capacity of a representative site to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water. Hydrologic Function reflects the capacity of the site to capture, store, and safely release water from rainfall, runoff, and snowmelt (where relevant); to resist a reduction in this capacity; and to recover this capacity following degradation.

3.11.1 Geographic Relationships and Distribution of Soils in Major Land Resource Areas

Soils in the Surprise Field Office area are mapped under two different soil surveys. The Surprise Valley-Home Camp Area, California and Nevada Soil Survey issued in 1974 include soils mapped in portions of Modoc and Lassen County in northeastern California and Washoe County in northwestern Nevada. This soil survey covers the western and southern portion of the Field Office Area and is currently being updated to modern soil survey standards. The Washoe County, Nevada, North Part Soil Survey issued in 1999 includes soils mapped in the northwestern Washoe County, Nevada. This soil survey covers the remaining northeastern portion of the Field Office Area.

Major Land Resource Areas (MLRAs) are geographically associated land resource units (LRUs). LRUs are geographic areas, usually several thousand acres in extent, which are characterized by a particular pattern of soils, climate, water resources, and land uses. A unit can be one continuous area or several separate nearby areas.

LRUs are the basic units from which MLRAs are determined. They are also the basic units for state land resource maps. They are coextensive with state general soil map units, but some general soil map units are subdivided into LRUs because of significant geographic differences in climate, water resources, and land use (U.S. Department of Agriculture 2003.)

The Surprise Field Office area falls within four MLRAs identified by the U.S. Department of Agriculture (USDA): MLRAs 21, 22, 23, and 24 (Earth System Science Center 1998). Most of the Surprise Field Office area is located within MLRA 23.

MLRA 21 – Klamath and Shasta Valleys and Basins – California and Oregon (35,350 km^2/13,650 mi^2)

MLRA 21 is located in the western part of the Surprise Field Office area. The dominant soils are Xerolls, Aquolls, Aquepts, Aquents, Xererts, Albolls, and Argids. These soils have a mesic or frigid temperature regime. Soils in basins and on floodplains and terraces are Andaquepts (Tulana series), Argialbolls (Goose Lake series), Pelloxererts (Pitts series), Durargids (Trosi series), Halaquepts (Lolak series), Natrargids (Rumbo series), Durixerolls (Bieber series), Haploxerolls (Mottsville series), Argixerolls (Trojan, Galeppi, and Drews series), and Haplaquolls (Ramelli and Deven series). Soils on upland plateaus and mountains are Argixerolls (McQuarrie series), Haplargids (Casuse and Saralegui series), Chromoxererts (Karcal series), and Durargids (Packwood series). Large areas of rock outcrop are on the plateaus and in the mountains.

MLRA 22 – Sierra Nevada Range – California and Nevada (65,190 km^2/26,170 mi^2)

MLRA 22 is located on a small section in the eastern slopes of the Warner Mountains in the western part of the Surprise Field Office area. The dominant soils are Xerults, Humults, Xeralfs, Xerolls, Ochrepts, Umbrepts, Andepts, Orthents, Psamments, and Boralfs. These soils have a mesic, frigid, or cryic temperature regime, depending largely on elevation. Soils at an elevation below 3,900–4,900 feet are Haplohumults (Sites and Aiken series), Haploxeralfs (Secca, Holland, and Cohasset series), Xerochrepts (Chaix and Maymen series), Haploxerults (Josephine and Mariposa series), Vitrandepts (Iron Mountain and Jiggs series), and Haploxerolls (Shaver series). Soils at higher elevations are Xerorthents (Dinkey series), Xeropsamments (Corbett and Toiyabe series), Cryopsamments (Cagwin series), Cryoboralfs (Fugawee series), Cryumbrepts (Meeks series), Cryochrepts (Umpa series), Cryandepts (Meiss and Waca series), and Dystrandepts (Windy series). Large areas of rock land are scattered throughout the area and on broad expanses on ridge crests and peaks above the timberline (7,900 to 8,900 feet). Soils in mountain valleys are Haploxerolls (Oak Glen series), Xeropsamments (Elmira series), Haploxeralfs (Inville series), Humaquepts (Chummy series), and Cryaquents. Soil survey information is lacking for extensive areas.

MLRA 23 – Malheur High Plateau – California, Nevada, and Oregon (73,050 km^2/28,210 mi^2)

MLRA 23 encompasses the majority of the Surprise Field Office area. Most of the soils are Argids or Orthids. They are shallow to moderately deep, with a medium-textured to fine-textured subsoil and a frigid or mesic soil temperature regime. Nearly level to sloping, well-drained Durargids and Durorthids have a duripan and are on lake terraces and fans. Somewhat poorly drained Durorthids in low areas are commonly saline and sodic. Sloping to steep well-drained to excessively drained, shallow, stony Xerolls are on uplands.

MLRA 24 – Humboldt Area – Nevada and Oregon (37,310 km^2/14,400 mi^2)

MLRA 24 is located in the extreme southeastern section of the Surprise Field Office area. The dominant soils in valleys are Argids, Orthids, Orthents, Aquolls, and Psamments, which have a mesic temperature regime; the dominant soils on mountains are Xerolls, Borolls, and Orthids, which have a frigid or cryic temperature regime. These soils have mixed or montomorillonitic mineralogy. Soils in this area formed principally in mixed parent materials. Durargids (Cherry Spring and Boulflat series), Naduargids (Golconda series), Natrargids (Beowawe and Tomera series), Camborthids (Orovada and Rad series), Durorthids (Blackhawk and Bliss series), Torripsamments (Goldrun series), and Torriorthents (Valmy and Benin series) are on alluvial fans, stream and lake terraces, and floodplains. Haplaquolls (Humboldt and Ryepatch series) are on wet stream floodplains. Cryoborolls (Spinlin and Winevada series), Argixerolls (Gosumi and Sonocan series), and Camborthids (Mullyon series) and areas of rock outcrop are on mountain slopes and upland basins.

3.11.2 Assessment of Soil Condition and Present Management of Soil Resources

The LHA indicators are part of BLM's Land Health Assessment (LHA), and are used to assess soil health in the context of BLM's Standards and Guidelines. The two summary ratings, Soil/Site Stability and Hydrologic Function, and the 12 indicators were reviewed for the following discussion. The 12 LHA indicators are listed below.

1. Rills
2. Water flow patterns
3. Pedestals and terracettes
4. Bare ground
5. Gullies
6. Wind scour, blowout/depositional
7. Litter movement
8. Resistance to erosion
9. Soil loss or degradation
10. Plant community composition/distribution relative to infiltration and runoff
11. Compaction
12. Litter Amount

Soils are in relatively good condition in the Surprise Field Office area. Of the 30 allotments and 58 LHAs completed to date, 6 allotments are not meeting the upland soil standard and 24 allotments are currently meeting the upland soil standard. Of the 58 LHA for Soil Stability, 94% were determined to be in PFC, 4% in Functioning at Risk and 2% Non-Functional. For Hydrologic Function, 93% were determined to be in PFC, 5% in Functioning at Risk, and 2% Non-Functional.

Current management practices, such as proper stocking rates for livestock, grazing rotation, periodic rest from grazing, maintaining wild horse herd management areas (HMAs) at appropriate management levels (AMLs), juniper reduction, improved road design, restricting vehicles to existing roads and trails, and rehabilitating disturbed areas, have reduced erosion effects and improved soil conditions.

Management practices may affect the ability of soil to maintain productivity by influencing disturbances such as displacement, compaction, erosion, and alteration of organic matter and soil organism levels. When soil degradation occurs in semi-arid, high desert regions, natural processes are slow to return site productivity. Prevention of soil degradation is more cost and time effective than remediation or waiting for natural process to occur.

3.11.3 Overall Trends in the Surprise Field Office Area

Soils in the Surprise Field Office area are generally in relatively good condition. Under current management, soil productivity and stability on most sites will remain in good condition or will gradually improve, depending on the site. Current field office policy is to remove the affecting activities following wildfire or prescribed burning until such time that the site (including the soil resource) is making progress toward PFC, and the reintroduction of activities would not impede the site from achieving PFC. This policy ensures continued soils improvement. The few sites that are in degraded condition will continue to be so without a change in management.

The natural factors listed below affect soils in the Surprise Field Office area:

- Wildfires,
- Wind events,
- Floods, and
- Noxious weeds.

The management-related factors listed below affect soils in the Surprise Field Office area:

- Wildfire suppression activities,
- Livestock management,
- Wild horse management,
- Fuels management,
- Noxious weed management,
- Recreation/OHV management, and
- Mineral exploration/mining.

Western juniper encroachment is severely affecting the soils in the western portion of the Surprise Field Office area by replacing natural sagebrush steppe ecosystems and crowding out pine forests and aspen groves. Juniper encroachment stems from fire suppression over the last 150 years. Juniper encroachment affects soils in riparian areas by competing with woody species such as willow and elderberry. Increasing juniper canopy is affecting soils in the uplands by shading out grasses and sagebrush, thus decreasing the extent of forage as well as soil stability.

3.12 Special Designations–Areas of Critical Environmental Concern

BLM uses several designations to identify areas that require special management to protect resources or provide unique recreation opportunities. The designations include areas of critical environmental concern (ACECs), back-country byways, historic trails, wilderness study areas (WSAs) prior to being declared Wilderness by Congress) and wild and scenic rivers (WSRs). Maps CR-1 (ACECs), WSA-1, and WSR-1 illustrate these areas in the Surprise Field Office, which are described in the following text.

Petroglyph in Massacre Rim ACEC

ACECs are areas designated by a federal land management agency in which special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards.

At present there are no ACECs in the Surprise Field Office area. However, three areas have been nominated as ACECs: Massacre Rim, Rahilly-Gravelly, and Bitner. The proposed Massacre Rim and Rahilly-Gravelly ACECs have been fully evaluated and meet the criteria for designation as an ACEC, but they have not yet been designated.

The decisions set forth in the Wilderness Recommendations for the Eagle Lake-Cedarville Study Areas (1987) called for the designation of an ACEC 48,783 acres in size within the Massacre Rim WSA. The purpose of the Massacre Rim ACEC was to protect and enhance archaeological resources and the potential for a bighorn sheep reintroduction.

The Lakeview Field Office nominated the Rahilly-Gravelly ACEC during their recent RMP process. Nine hundred and fifty-seven acres of the proposed ACEC are located in Nevada, within the Surprise Field Office area. The Final Record of Decision recommended that the California State Director of BLM consider for designation and management the 957 acres of the Rahilly-Gravelly ACEC/RNA during land use planning efforts by the Surprise Field Office. The Lakeview Resource Area recommends the Rahilly-Gravelly area as an ACEC/RNA based on cultural, wildlife, and botanical values.

The second ACEC nomination is for the Bitner Ranch area and the associated Badger Meadow system. The proposed ACEC is approximately 1,921 acres in size and is located on the eastern border of the Massacre Rim WSA. The Bitner Ranch has been nominated for its cultural resource and wildlife values. This area is also an important summer sage-grouse habitat.

3.13 Special Designations–Scenic and Backcountry Byways

The northernmost portion of the Barrel Springs Back-Country Byway is located in the Surprise Field Office area. This byway is approximately 93 miles long. The byway begins in Cedarville and travels across Middle Alkali Lake to Nevada. The byway travels across Mosquito Lake to the volcanic uplands in the northern section of the management area. It then descends down into Surprise Valley near Fee Reservoir. The final portion of the byway passes through the historic towns of Fort Bidwell and Lake City, ending in Cedarville. The northern portion of the byway that is located within this watershed provides access to a popular hunting and wood cutting area.

The Buckhorn Back-Country Byway begins on Highway 447 at the edge of Duck Flat, about 40 miles northeast of Gerlach, Nevada. The single-lane, gravel road climbs to a high plateau of sagebrush-covered, undulating hills and intermittent lakes. Travelers can see the peaks of the South Warner Mountains to the north. The byway ends at Ravendale on Highway 395, between Susanville and Alturas, California. There are good opportunities for wild horse viewing here.

3.14 Special Designations–Wilderness Study Areas

WSAs are designated by a federal land management agency as having wilderness characteristics. The Wilderness Act of 1964 defines a wilderness as an area where the earth and its community of life are untrammeled by people and where people are visitors who do not remain. The act further defines a wilderness as:

"An area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed to preserve its natural conditions and that:

- Generally appears to have been affected primarily by the forces of nature with the impact of people substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- Has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in unimpaired condition; and
- May also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Five WSAs are located in the management boundaries of the Surprise Field Office (Table 3.14-1). Portions of three WSAs (Sheldon Contiguous, South Warner Contiguous, and Massacre Rim) have been recommended for Wilderness designation. Final designation rests with Congress.

Table 3.14-1 Extent and Recommendations for Wilderness Study Areas in Surprise Field Office

Name of Area (WSA Number)	Total Acres in WSA	Acres Recommended for Wilderness Designation	Acres Not Recommended for Wilderness Designation
Sheldon Contiguous (CA-020-1012)	23,700	748	22,952
South Warner Contiguous (CA-020-708)	4,330	1,161	3,169
Massacre Rim (CA-020-1013)	101,290	22,464	78,826
Buffalo Hills (CA-020-619)	7,956[a]	0[a]	7,956[a]
Wall Canyon (CA-020-805)	46,305	0	46,305
Total	**183,581**	**24,373**	**159,208**

WSA = Wilderness study area.

[a] Surprise Field Office portion of the Buffalo Hills (CA-020-619) WSA.

3.15 Special Designations–Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended) provides that Wild and Scenic River considerations be made during federal agency planning. To comply with the act, an eligibility determination for rivers and streams in the Surprise Field Office area was completed in 2003. Rivers and streams were evaluated with respect to the eligibility requirements for inclusion in the National Wild and Scenic Rivers System (NWSRS). To be eligible, a river or stream segment must be free-flowing and must have an outstandingly remarkable value in at least one of the following areas: scenic, recreational, geological, fish, wildlife, historic, cultural, ecological, riparian, botanical, hydrological, or scientific study.

Of the 47 streams within the field office area, the staff from the Surprise Field Office identified three streams: Rock Creek (in the Warner Valley watershed), Silver Creek (in the Surprise Valley watershed), and Wall Canyon Creek (in the Massacre Lakes watershed) to evaluate for potential eligibility for Wild and Scenic River status. After the evaluation process was completed, none of the three streams met the eligibility requirements; and no additional streams were identified as potentially eligible through the public scoping process. Twelvemile Creek was evaluated by the Lakeview Resource Area and was determined to meet eligibility requirements.

Rock Creek

Rock Creek is characterized by a broad, open creek bed in rolling terrain along its upper reaches and a deeply incised channel along the last few miles of its course. Evidence of human activities in the area consists of livestock operators, 2 miles of fenced enclosure, and power lines and maintenance roads. Recreation consists of petroglyph viewing adjacent to the Barrel Springs Back Country Byway and other limited hiking and sightseeing activities. No trail development is indicated. Although terrestrial animals common to the high desert region have been observed (including western sage-rouse), no crucial habitat (including that for fish species) has been identified.

Silver Creek

Silver Creek flows through canyon areas typical to eastern slopes of the Warner Mountains. Some areas have very diverse and dense vegetative growth, and others have been thinned by beaver activity. Much of the stream is vegetated with thick riparian growth and undercut banks that provide excellent trout habitat. Recreation is generally limited to fishing.

Wall Canyon Creek

Wall Canyon Creek is approximately 3 miles long and flows from Nolan Ranch before opening into a large meadow. The area is characteristic of the region, with talus slopes, a meandering river, and herbaceous riparian vegetation recovering from past grazing. Wildlife such as sage-grouse, chukar, antelope, and raptors are common. The canyon has a population of the Wall Canyon sucker, a BLM sensitive species. Water flows year-round; and recreation is characterized by fishing, chukar hunting, and wildlife viewing.

Twelvemile Creek

The Lakeview Resource Area (in Lakeview, Oregon) adjoins the Surprise Field Office area along the Oregon, California, and Nevada borders. The two offices operate under a Memorandum of Understanding (SUS-8000-2) that provides for the Surprise Field Office to manage most resource programs for a small area in southern Oregon, while the Lakeview Resource Area manages most resource programs for two small areas in northeastern California and northwestern Nevada. Part of Twelvemile Creek extends into northeastern California and northwestern Nevada, in the Surprise Field Office area.

By agreement between the California State Director and the Surprise Field Manager and the Oregon State Director and the Lakeview Resource Area Manager, the Lakeview RMP will include a description and analysis of Twelvemile Creek Wild and Scenic River that extends into northeastern California and northwestern Nevada. However, the final decision whether to designate Twelvemile Creek as a Wild and Scenic River will be made by the California State Director during the Surprise Field Office RMP/EIS process.

The Lakeview Proposed RMP and Final EIS (January 23, 2003) recommended that approximately 2.2 miles on the California and Nevada portion of Twelvemile Creek would be administratively suitable for potential designation by Congress as a Wild and Scenic River, with a tentative classification as recreational. Management guidelines and standards for the recreational classification (listed in Appendix J3 of the Lakeview Resource Management Plan, 2004 RMP/EIS) would be followed while awaiting a determination by Congress. Under a recreational designation, public use and access could be regulated, recreation facilities could be established within the stream corridor, forest practices would be allowed, mining could occur subject to existing regulations, ROWs (e.g., for transmission lines and pipelines) would be avoided or restricted to existing ROWs, and motorized uses would be permitted on land and water. Recreation and OHV (motorized uses) uses within the Twelvemile Creek area are relatively low and the effects of these activities on the fisheries outstandingly remarkable values are negligible. With the exception of 90 acres, all 6.6 miles (0.25 mile on either side of the stream) of the Twelvemile Creek corridor is in public ownership.

3.16 Travel Management

Off-highway vehicles (OHVs) include motorcycles, all-terrain vehicles (ATVs), and four-wheel drive vehicles. Presently, OHV activity is allowed on BLM-administered lands only in areas where it has been determined that the activity will not adversely affect resources. Monitoring the effects of OHV use on heritage or cultural resources, soil loss on trail systems, and impacts on fish and wildlife are used to assess impacts of OHV use.

The current designations for OHV use areas on BLM-administered lands are as follows.

- **Open Areas** allow for all types of vehicle use, at all times, anywhere in the area.
- **Limited Areas** are restricted at certain times, in certain areas, or to certain vehicle use. Examples include seasonal limitations, requirements to use only existing roads and trails, and requirements to use only designated roads and trails.
- **Closed Areas** are areas where OHV use is prohibited.

OHV travel is restricted to existing roads and trails within the Tuledad/Home Camp Planning Unit and the WSAs. All other areas in the field office area are open to OHV use.

A route inventory was completed during summer of 2004 which identified 1,944 miles of existing roads and trails on public land in the Surprise Field Office area. Designations of Open, Limited, or Closed will be applied to approximately 1,220,664 acres of public land; some roads may be proposed for closure.

Transportation

Major improved transportation networks or public highways managed by counties and the California Department of Transportation (Caltrans) and Nevada Department of Transportation (NDOT) in the Surprise Field Office area have been established for many years. These highways and roads have been authorized by numerous Acts of Congress, including the Act of 1866 (Revised Statute [RS] 2477), FLPMA, and a wide variety of Federal Aid Highway Acts under the administration of the Federal Highway Administration. Specifics of the authorizations for individual highways can be found on the Master Title Plats.

Limited improved dirt roads are maintained by the county and BLM to permit access within Nevada and California. These include Route 8A, Route 34, and the Barrel Springs Byway. A road inventory is currently being conducted by BLM. Road information is maintained by BLM, the counties, and the state road departments.

Paved state and county highways include Route 1 in California and Route 447 in Nevada. These main roadways consist of approximately 108 linear miles of BLM-administered lands in the Surprise Field Office area.

Numerous well-established, casual-use roads cross public lands in the Surprise Field Office area. Although these casual-use roads may be construed by the public as a major roadway network, these roads are actually defined by regulation as activities involving practices that do not ordinarily cause any appreciable disturbance or damage to the public lands, resources, or improvements. These roads, therefore, do not require an ROW grant or temporary use permit. There are approximately 1,400 linear miles of well-established county or BLM-maintained and casual-use roads across public lands in the Surprise Field Office area.

RS 2477, Section 8 of the 1866 Mining Act, granted an ROW for the construction of highways across public lands not reserved for public uses. Although RS 2477 was repealed with passage of FLPMA in 1976, highways constructed before FLPMA have valid existing rights. RS 2477 contained no process for notifying the federal government of ROWs or for documentation in the public land records. Thus, the number and location of RS 2477 ROWs in the Surprise Field Office area are not known.

Under BLM policies, all existing public roads, trails, and tracks will remain open to public motorized use unless specifically closed for documented, specific resource protection needs. Such closures will be effective upon final publication of a legal closure notice in the Federal Register.

With respect to access ROWs, the Cowhead/Massacre MFP states that miscellaneous ROWs within Subunits 2 through 4 should be allowed, consistent with environmental concerns, as needs are identified by local government, citizens groups, and individuals (Decision 13).

3.17 Vegetation

The vegetation component of the affected environment addresses vegetation communities (upland, wetland, and riparian communities), special-status plant species, and noxious weeds. These three vegetation resource categories are described separately below. This information provides the existing environmental context, or background, for environmental changes caused by proposed management actions. Additional information that relates to vegetation resources (primarily vegetation communities) is also provided in the "Fire and Fuels," "Water Resources," "Forestry," and "Grazing" sections.

Curlleaf mountain mahogany (*Cercocarpus ledifolius*)

3.17.1 Vegetation Communities and Associations

The majority of the Surprise Field Office area falls within, or is similar to, the Modoc Plateau Region of the Great Basin Province described in the Jepson Manual, Higher Plants of California (Hickman 1993). The area includes virtually all of the Massacre watershed, as well as portions of 7 other watersheds. Annual rainfall in the area ranges from 6 to 16 inches and is a primary influences on the vegetation communities. A vegetation community is the basic unit of vegetation (Daubenmire 1968), representing an assemblage of vegetative species that are ecologically interrelated. The lands administered by the Surprise Field Office support 21 vegetation communities in eight vegetation types, described in the following subsections. Map Veg-1 shows the general locations of these vegetation types. Table 3-17.1 lists each vegetation type with the associated vegetation communities, and gives its acreage in the field office area. Because western and Utah juniper and curlleaf mountain mahogany grow in combination with sagebrush species, the acreages for these two species are included in the sagebrush-dominated communities. Of these communities, juniper in combination with big sagebrush and low sagebrush occurs on 83,607 acres, and mountain mahogany in combination with big sagebrush and low sagebrush occurs on 19,588 acres.

A vegetation association refers to a plant formation presenting a uniform gross appearance of a kind of vegetation, ignoring its taxonomic composition (Daubenmire 1968). For the purposes of discussion, the vegetation communities in the Surprise Field Office area have been grouped into three vegetation associations, including forest and woodland, shrub, and herbaceous.

3.17.1.1 Forest and Woodland Associations

The forest and woodland association is characterized by the predominance of trees, which are defined in Sawyer and Keeler-Wolf (1995) as woody plants with tall final heights—commonly with one stem (trunk) from the base. Five forest and woodland vegetation communities have been identified in the Surprise Field Office area. Some of the communities are dominated by species that can take either a shrub or tree form. Such communities are included here because most of these species have potential to achieve tree structure under supportive environmental situations. Approximately 681 acres of forestland and 118,745 acres of woodland and low-site forestland are located in the Surprise Field Office area.

Forest and woodland vegetation communities found in the Surprise Field Office area:

- Curlleaf mountain mahogany (*Cercocarpus ledifolius*)
- Utah juniper (*Juniperus osteosperma*),
- Western juniper (*Juniperus occidentalis*),
- Aspen (*Populus tremuloides*)

- Timber (White fir, Ponderosa Pine, and other conifer species)

Table 3.17-1 Total Acreages of Vegetation Communities and Other Cover Types Mapped in the Surprise Field Office Area

Vegetation Type and Other Cover Types	Total Acres[a]
Timber (including white fir and pine communities)	1,188
Aspen/big sagebrush communities	2,300
Sage-dominated communities (including mountain, Wyoming, and basin big sagebrush, low and Lahontan low sagebrush, black sagebrush, early sagebrush, and rubber rabbitbrush communities. The majority of the western juniper, Utah juniper, and curlleaf mountain mahogany communities are found in combination with these sagebrush dominated communities)	1,073,928
Salt desert shrub communities (including black greasewood, saltbush/herbaceous, horsebrush, and iodinebush communities)	84,401
Seasonally wet communities	16,926
Antelope bitterbrush communities	13,512
Winterfat communities	139
Herbaceous and grassland communities (including basing wildrye communities)	9,077
Unvegetated areas: rock/bare ground/water/playa	11,377
No data or undefined polygon	10,079
Total	1,222,927

[a] Acres are rounded approximations from geographic information systems; as a result, they exceed the 1,220,644 total acres in the field office.

3.17.1.2 Curlleaf Mountain Mahogany Communities

Approximately 7,095 acres of this type are found on BLM-administered lands in the Surprise Field Office area. Mahogany stands are small and limited in distribution. In the Surprise Field Office area, mahogany grows in combination with big sagebrush, and with a mixture of big and low sagebrush.

Curlleaf mountain mahogany grows on rocky ridges and steep slopes with thin soil. This plant can form nearly closed single-dominant species communities or be a secondary component in other tree-dominated communities (Sawyer and Keeler-Wolf 1995). Curlleaf is intolerant of fire. Because the species' seeds have low establishment success in the shallow, rocky soils in which the plant grows, plant reproduction rates are slow. Rabbits, rodents, and mule deer feed on mahogany seedlings—further reducing reproductive success.

Mahogany is a valuable, though sparse and difficult to access, fuel wood and private harvesting of dead mahogany is currently allowed, although there is little demand**.** Mahogany is also a sparse, but valuable forage plant for livestock and wildlife, and mahogany stands provide shade and resting cover for livestock and wildlife.

3.17.1.3 Aspen Communities

In the Surprise Field Office area, 2,300 acres of aspen occur in combination with big sagebrush. Two types of aspen stands are present. One type occurs in snow pockets along rims where snow lasts into spring and provides greater soil moisture than in surrounding soils occupied by sagebrush communities. The second type is associated with seeps, springs, and riparian communities. Aspen is adapted to a much broader range of environments than most plants found associated with it and is one of the few plants able to grow in all mountain vegetational zones, from subalpine tundra to the basal plains (Daubenmire 1943). Aspen reproduces vigorously by root suckers following fire. Grazing has contributed to the variability of aspen forests: the lush undergrowth of aspen forests is considered excellent summer range. More than a century of grazing (frequently intense in the late 1800s and early 1900s) has left its mark in both pronounced and ill-defined alterations in species composition and production (Mueggler 1988). In the Surprise Field Office area, aspen is considered a sparse but valuable forage plant for livestock, and aspen stands provide shade and resting cover for livestock. Currently, about 20 acres of aspen stands in six separate locations have been fenced to exclude livestock use.

3.17.1.4 Utah and Western Juniper Communities

Approximately 83,607 acres of juniper-dominated communities are in the Surprise Field Office area, of which the majority (86%) occurs in combination with low sagebrush and the remainder in combination with big sagebrush.

Juniper woodlands have large ecological amplitudes and occupy a variety of parent materials, soils, topographic positions, and climates. This woodland community can occupy and dominate many different plant cover types. Adding to the spatial complexity of these woodlands are their temporal dynamics. Many juniper woodlands are in various stages of succession from early to late development. The stage of woodland development affects fuel loads, wildlife habitat, management operations, cost of conversion, and response to treatment.

There has been an increase in both the distribution and density of juniper across the Intermountain West, starting in the late 1800s. Juniper has encroached into sagebrush shrub steppe communities since European settlement, due in large part to reductions in the amount of wild fire as a result of fire suppression and livestock grazing. As trees gain dominance and shrubs and herbaceous vegetation decline, fuel structure changes, which contributes to significant increases in the length of mean fire return intervals. These have changed from 12 to 25 years prior to European settlement to more than 100 years today (Miller and Tausch 2001). Increasing densities of juniper on non-historic juniper woodland sites is responsible for increasing soil erosion and loss of sagebrush steppe, riparian, aspen, and timber-dependent wildlife habitat.

Where closed-canopy fire-resistant juniper stands have replaced productive shrub communities, the risk of catastrophic crown fires increases. These fires are infrequent, but they become large, they burn during the hottest and windiest conditions, and they produce extreme fire behavior. Suppression of these fires is dangerous. Due to the lack of herbaceous and shrub understories, and soils damaged by the unusually hot burning conditions, exotic species are frequently the only vegetation capable of establishing on the post-fire sites.

In the past, juniper woodlands have been treated to control their expansion. However, wildlife and environmental concerns, and different perceptions of the intrinsic values of these environments, have recently limited treatment of woodlands—including the use of prescribed fire. During the early to middle stages of development, when these woodlands contain understories of native shrubs and herbs, they can successfully be treated by various methods—particularly by fire. However, once communities become tree-dominated woodlands, treatment becomes difficult and expensive (Miller and Tausch 2001).

Factors most frequently attributed to the increase in both density and area of juniper are fire suppression, changes in climate, increased domestic grazing, and post-industrial increases in atmospheric carbon dioxide (CO_2). Fire is considered to be the most important factor in maintaining shrub steppe communities and open juniper savannas prior to Eurasian settlement. A wet period, from 1850 to 1916, with milder temperature and greater precipitation coincided with the peak period of woodland establishment in much of the Great Basin. The introduction of livestock during the 1860s through the early 1900s also coincided with the expansion of juniper woodlands. Grazing reduces the fine fuel loads that significantly altered the fire regime. With fewer natural fires, there was an increase in shrub density and cover that provided a greater number of sites for tree establishment by sheltering seedlings from grazing. Rising levels of CO_2 also have been cited as causing the increase in woody species throughout the West. However, increased levels of CO_2 do not correspond with the initial increases in juniper woodland. It may be that elevated CO_2 levels are accelerating canopy expansion of juniper woodlands (Miller and Tausch 2001).

Not all juniper woodlands are thought to be of recent occurrence and the result of expansion into sagebrush shrub steppe habitat. In Romme et al. (2003), the authors describe the fire history, stand structure, and natural fire regime in old-growth pinyon-juniper forests (trees > 400 years old) of Mesa Verde National Park in southwestern Colorado. This description is used as a case study to demonstrate that some pinyon-juniper vegetation has not changed substantially in the last century and therefore is not in need of thinning or burning to achieve ecological objectives.

Approximately 17,456 acres of historic juniper woodlands are estimated to occur in the Surprise Field Office area. In addition there are approximately 100,000 acres of juniper with a canopy cover of greater than 5% that have encroached into sagebrush-steppe communities.

An additional 336,000 acres in the Surprise Field Office area that currently support timber, big sagebrush, bitterbrush, mountain mahogany, ephemeral riparian, aspen, and productive low sagebrush communities are at risk of being encroached on by juniper and will ultimately be converted to juniper woodlands. At the current rate of expansion (about 650 acres per year), without treatment and in the absence of natural fire regimes, it is estimated that about 13,000 additional acres will undergo some level of juniper encroachment within 20 years. Juniper woodlands with canopy cover greater than 20% contain relatively few old trees, suggesting that these sites were once shrub communities with some junipers present. Because of a combination of factors (Tausch et al. 1993), including active fire suppression, ungulate grazing that lowers the competitive capabilities of the shrub/grass community, reduction of effective precipitation over the last 13,000 years, and increased CO_2 levels in the atmosphere (Morrison 1991), junipers have the potential to actively replace existing shrub/grass communities, particularly in Zone 3 (see description of “Vegetation Zones” later in this section).

3.17.1.5 White Fir and Pine Communities

Approximately 1,188 acres of white fir and pine occur in small pockets on the highest elevations of the Surprise Field Office area. While these communities occupy very few acres, they are important because of the diversity of wildlife species habitat they provide. Due to the small size of these communities, and due to the high elevations and frequently steep slopes these communities occur on, there is little potential for these communities to produce marketable timber.

3.17.1.6 Shrub Associations

Shrubs are defined by Sawyer and Keeler-Wolf (1995) as woody plants with relatively short ultimate heights, commonly with two or more stems from the base. A total of 16 shrub type vegetation communities have been identified in the Surprise Field Office area. Various species and subspecies of sagebrush are dominant components of many of the shrub vegetation communities.

Mountain big sagebrush communities occur on deep, well-drained soils, normally above 5,000 feet. Mountain big sagebrush communities are maintained by a fairly frequent fire return interval of between 15 and 40 years. Mountain big sagebrush is killed by fire. Therefore, more frequent fire can result in loss of mountain big sagebrush communities. However, less frequent fires can result in mountain big sagebrush communities being replaced by juniper dominated communities. (Burkhardt & Tisdale, 1976; Miller & Rose, 1995; Miller, Svejcar, & Rose, 2000) In addition, there is some evidence that mountain big sagebrush germination is stimulated by fire (Champlin, 1982).” (Burkhardt, Wayne J.; Tisdale, E. W. 1976. Causes of juniper invasion in southwestern Idaho. Ecology. 57: 472-484. [565]; Miller, Richard F.; Rose, Jeffery A. 1995. Historic expansion of Juniperus occidentalis (western juniper) in southeastern Oregon. The Great Basin Naturalist. 55(1): 37-45. [29339]; Miller, Richard F.; Svejcar, Tony J.; Rose, Jeffrey A. 2000. Impacts of western juniper on plant community composition and structure. Journal of Range Management. 53(6): 574-585. [36578]; Champlin, Mark R. 1982. Big sagebrush (Artemisia tridentata) ecology and management with emphasis on prescribed burning. Corvallis, OR: Oregon State University. 136 p. Dissertation. [9484])

Basin big sagebrush communities can occupy the deepest soils, normally lower in elevation than mountain big sagebrush. The presence of this subspecies has generally been considered indicative of productive ranges because it often grows in deep, fertile soil (Blaisdell et al. 1982, Collins 1984). Basin big sagebrush was once the most abundant shrub in North America on lowland ranges, which have since been converted to agriculture. Stands in which the understory has been overgrazed to the extent that the perennial grass understory is lost are highly vulnerable to invasion by annual grass, and to crossing the threshold to an annual grass-dominated community.

Due to historic removal of the perennial herbaceous vegetation in many of the basin wildrye communities, basin big sagebrush has encroached into and is now the dominant species on many acres of what should be basin wildrye sites (See the Herbaceous and Grassland Associations section below).

Wyoming big sagebrush communities normally occur at elevations below 5,000 feet on shallower, droughtier soils than amenable to the other two big sagebrushes. Although Wyoming big sagebrush can occur in combination with the other two big sagebrush subspecies, it occupies the poorer, drier, shallower soils. It is the shortest of big sagebrushes found in this area, normally reaching only 3–4 feet (Blaisdell et al. 1982). Historically, fire return intervals for Wyoming big sagebrush were from 50 to 100 years, corresponding to fire regime Group IV (Miller et al. 2001); but much debate still occurs over fire return intervals in the Basin big sagebrush types (Welch and Criddle 2003). Invasion by flammable exotics has dramatically shortened fire return intervals, in some cases to every 1 to 2 years. This can lead to complete conversion of sites from Wyoming big sagebrush communities to exotic annual grasslands. Sites are reestablished from seedbanks, seeds produced by remnant plants, and seeds from adjacent plants. Because fuels are discontinuous in Wyoming big sagebrush communities, mosaic burn patterns often prevail, leaving remnant plants that provide seed (Bushey 1987).

Fire does not stimulate germination of soil-stored Wyoming big sagebrush seed, but neither does it inhibit its germination (Champlin and Winward 1982). Fire intervals in Wyoming big sagebrush communities appear to have ranged from 10 to 110 years or more. Recovery to 20% canopy cover after a burn may take more than 40 years (Young and Evans 1989, Winward 1991). Because Wyoming big sagebrush occupies drier soils and sites, historical overgrazing has removed most of the perennial grass understory. Following the removal of perennial grasses, cheatgrass easily invaded the understory. With a cheatgrass understory, Wyoming big sagebrush is highly susceptible to increased fire frequency, resulting in cheatgrass domination of sites and the alteration of Wyoming big sagebrush communities to annual grass-dominated communities (Young and Evans 1989).

Low, Lahontan, early, and black sagebrush and rubber rabbitbrush communities occur at elevations ranging from 4,500 to 7,200 feet on very shallow, primarily clayey soils. Low sagebrush communities seldom burn when situated within mixed big sagebrush/low sagebrush stands. Under very extreme fire conditions, this type will burn and requires longer recovering than big sagebrush. If overgrazed, low sagebrush communities are susceptible to cheatgrass invasion. On heavy clay soils, and particularly in rubber rabbitbrush communities, medusahead frequently invades following fire, overgrazing, or other soil disturbance (Blaisdell et al. 1982).

Antelope bitterbrush communities generally occur in complex association with big and low sagebrush communities. They are tolerant of a wide variety of soil textures, though they generally occur on deeper soils or soils with higher water holding capacities that are neither saline nor alkaline. Bitterbrush is adapted to a wide variety of communities, including some with very short natural fire return rates. However, bitterbrush is killed by hot fires, particularly on more marginal sites. Bitterbrush response to fire varies widely based on soil type, soil moisture, plant moisture, fire temperature, plant growth form, and time of year. The most highly productive bitterbrush communities, generally on coarse, well-drained soils, will immediately sprout or begin to regenerate from seed following fire. However, most of the bitterbrush communities in the Surprise Field Office area are not well suited to bitterbrush. Bitterbrush on these communities may not recover from the effects of fire for 15 to 30 years, or more, particularly following hot summer fires when there was little soil or plant moisture. Artificially restoring bitterbrush into communities following fire, whether seeding or planting seedlings, is expensive and unpredictable. As a member of the rose family, bitterbrush communities tolerate, and may actually require a level of disturbance (mechanical, such as browsing and trampling, fire, etc.) to be maintained. In the absence of disturbance, bitterbrush may become decadent and non-reproductive. Bitterbrush leaves and stems are palatable to a wide variety of species, including most large ungulates. Seedlings and young plants are particularly palatable to livestock, deer, and antelope, and they are particularly vulnerable to over utilization. Flowers and seeds are produced on the previous year's stem growth. Bitterbrush reproduction is highly dependant on wildlife populations. Seeds are vulnerable to insect damage and are consumed by many species of birds and rodents.

However, seedlings generally arise from deeply planted rodent caches. Therefore, if rodent and/or bird populations are unusually high, or if seed production is unusually low, the annual seed production may be completely consumed, no seed will be cached, and no seedlings will be produced. On the other hand, if the rodent population is too low, seeds may not be adequately cached and few seedlings will be produced. Black greasewood, saltbush, horsebrush, winterfat, and iodinebush communities occur on the lowest elevations of the Surprise Field Office area (generally below 5000') and at some higher elevations around ephemeral lakebeds. These communities are tolerant of the saline and alkaline soils that form when water ponds on and evaporate off of the flats on and around enclosed basins.

The majority of these communities are not prone to fire because they generally do not produce sufficient vegetation to support fire. However, when fire does occur, the majority of the communities are fire tolerant and the dominant shrub species recover quickly. Altogether, these communities should occupy approximately 84,540 acres in the Surprise Field Office area.

However, due to historic removal of the perennial herbaceous vegetation in many of the basin wildrye communities, black greasewood has encroached into and is now the dominant species on many acres of what should be basin wildrye sites (See the Herbaceous and Grassland Associations section below).

Although each of the species and subspecies of shrubs respond differently to fire, in general disturbance affects each of the shrub type vegetation communities in approximately the same way, as discussed here. Disturbance means the occurrence of a significant change in the resource base (i.e., an alteration of the plant community away from a stable state, and a compositional change in both plant species and life histories). The key functional elements of any disturbance are its timing (seasonality), intensity (resource loss), abiotic resources available (water and nutrients), biotic resources available (species and their attributes), frequency (recovery interval between disturbances), and regime (connectivity to other disturbances in time and space) (Sousa 1984).

Grazing and fire tend to raise issues surrounding ecological uncertainty: whether these disturbances will produce a feedback that enforces the stability of the present community or whether they will promote transitions to a more or less desired community. Given the present state of the sagebrush steppe ecosystem, key questions center on how to influence shrub communities through the presence or absence of grazing and fire. The effects on vegetation and soils caused by overgrazing, high-frequency fires, and other factors (such as uncontrolled OHV use) may be rather obvious (Blaisdell et al. 1982, Bunting et al. 1987, Vavra et al. 1994). Less obvious are the effects on other biota. Judicious grazing practices and prescribed fires are associated with varying degrees of uncertainty regarding short-term and long-term outcomes. These degrees of uncertainty can be expected because the key functional elements of disturbance vary widely through time. Further, in the presence of a highly variable climate, they function as a disturbance regime rather than as independent events (Eddleman and Doescher 1999).

Current anthropogenic influences in the sagebrush steppe, such as grazing, fire, and recreation, are not perpetuating the original plant community composition. West (1999) estimated that less than 1% of the sagebrush steppe remains in its original condition. Rather, there is a system in which disturbances cause several very different changes in species composition. First, disturbances may enhance the competitive ability of one dominant species (sagebrush) and reduce the competitive ability of the other dominant species (perennial grass). Second disturbance may cause the loss of the original dominants. In all both cases, one or all of the original dominants are required to function in the ecosystem like the dynamic disturbance-adapted species such as cheatgrass; however, the dominants are not well adapted to this role.

3.17.1.7 Herbaceous and Grassland Associations

By definition, herbaceous plants lack woody stems above ground. They may be annual or perennial, and include aquatic species, forbs, and grasses. (Sawyer and Keeler-Wolf 1995.) Often, herbaceous vegetation is considered in the context of being the lowest structure of an understory to trees or shrubs. In this document, the herbaceous types and communities discussed represent the overstory or compose the dominant structure of the stand. Herbaceous and grassland vegetation types are most obvious in association with dry meadows, and with small areas of wet meadows associated with springs and seeps at all elevations. The predominant herbaceous community in the field office area is basin wildrye grassland. Approximately 9,077 acres of herbaceous-dominated vegetation occurs in the Surprise Field Office area, of which 55% is salt influenced.

Most native herbaceous species found on the Modoc Plateau and in the Great Basin are capable of withstanding fire effects unless the fire burns very hot and kills the grass at the crown and roots. Herbivory by livestock and wild horses, if not properly managed, can overuse herbaceous plants, resulting in their removal from the stand. This adverse effect can result in replacement of native perennial herbaceous species with invasive annuals and/or shrub species.

Basin wildrye communities associated with ephemeral lakebed systems are particularly susceptible to spring grazing by livestock, wild horses, and wildlife. In the Surprise Field Office area, historic grazing practices which resulted in large numbers of livestock being pastured in the early spring in basin wildrye communities has resulted in large portions of these communities being replaced by basin big sagebrush and black greasewood dominated communities. OHV impacts on herbaceous dominated communities are generally negligible; however, constant travel on identical tracks can remove the vegetation, creating opportunities for erosion or for invasive annuals to move into the site.

The persistence of annual grasses (primarily medusahead and cheatgrass) is expected to continue whether or not livestock grazing occurs. This persistence is attributable primarily to the ability of annual plants to produce seed every year, store many years of seed in surface litter and soil, and germinate earlier than the remaining perennial plants. The invasion and dominance of annuals was accelerated by the loss or reduction of native perennial bunchgrass/shrub communities. Many factors contributed to the introduction of annuals, but frequent wildfire and previous intensive livestock grazing (both cattle and sheep) have been the primary causes.

Tightly controlled livestock grazing, prescribed fire, and seeding of native plants—coupled with full suppression of high-intensity wildfires—can slow, and in some cases reverse, type-conversion to exotic annual grasslands. The experience of BLM technical staff indicates that annuals will persist, but that it is possible to slow or reduce their spread by applying grazing management strategies in the surrounding areas. BLM staff members have focused their efforts on designing a grazing strategy that recognizes areas where annuals dominate a plant community or site as well as areas where annuals are a minor component. Improvement has been observed in both situations, evidenced by increased vigor and seed production of native perennial plants.

BLM has prioritized its efforts by stabilizing and improving the native plants that surround disturbed areas. Improvement in surrounding areas has created a natural barrier that has slowed the spread of annuals. BLM recognizes that many past and present factors stimulate and retard the spread of annuals, but efforts appear to have had some positive influence.

3.17.1.8 Riparian/Wetland Communities

Nationwide, riparian-wetland areas comprise less than 9% of the total land base, and they are the most productive and highly prized resources on BLM-managed public lands. Riparian-wetland areas play a significant role in restoring and maintaining the chemical, physical, and biological integrity of the nation’s water. Wildlife species use riparian areas proportionately more than any other type of habitat. In addition, riparian areas are highly prized for their economic values and other uses, which include livestock grazing, various recreational uses (e.g., hiking, fishing, photography, biking, and birding), Native American cultural uses, and as educational destinations for students. A properly functioning riparian zone provides fish and wildlife habitat, protects water quality, stabilizes stream banks, aids groundwater recharge, assists in flood control, provides aesthetic values, allows for wildlife and livestock grazing, and provides recreational opportunities. The habitat islands provided by springs and seeps are especially important since they often provide the only habitat diversity in an otherwise uniform high desert ecosystem.

Riparian and wetland communities generally occur along the edges of and within creeks, lakes/playas, springs/seeps, and irrigation canals. Riparian vegetation depends on the channel type, duration of water availability, soil type and depth, climate, and management history. Because of their proximity to water, the plant species present in riparian areas are different from species found in the adjacent uplands: they can tolerate wet or saturated soil conditions that upland plants cannot. Sedges, rushes and, in some cases, willows dominate streams with deeper soils and longer-lasting water. Boulder-dominated streams have pockets of vegetation that may be grass and shrub dominated. As water availability decreases, herbaceous vegetation will shift from sedges to grasses. Riparian areas along the eastern slopes of the Warner Mountains in lower-elevation sites often have water birch and willows as the predominant woody vegetation. Willows and dogwood dominate higher sites and confined canyon streams in lower reaches of the area often have ponderosa pine as a structural feature. In the remaining portion of the field office area there are several species of willow, sedges, rushes, and grasses, some more dependent on moisture than others.

The role vegetation plays in stream condition is dependent on channel type. Certain channel types depend on vegetation to protect the stream banks in high-flow events. The structure and type of vegetation are also critical to wildlife and fish. Trees such as aspen, cottonwood and some taller willows supply vertical structure for neo-tropical migrant birds. As trees become old and decay, they provide habitat for cavity nesters. The structure also provides shade to the stream that helps to cool the water.

Leaves from deciduous species supply nutrients to the riparian and aquatic system as a food source for aquatic macro invertebrates and therefore for the fish.

BLM's Riparian-Wetland Initiative for the 1990s (U.S. Department of the Interior 1991) establishes national goals and objectives for managing riparian-wetland resources on public lands. The initiative's chief goals are to: (1) restore and maintain riparian-wetland areas so that 75% or more are in properly functioning condition (PFC) by 1997; and (2) achieve an advanced ecological status, except where resource management objectives (e.g., Desired Plant Community) require that an earlier successional stage be present to provide the most habitat diversity for wildlife, fish, and watershed protection. The Riparian-Wetland Initiative for the 1990s also contains a strategy to focus management on the entire watershed. Knowing the condition of the watershed is an important part of assessing whether a riparian-wetland area is functioning properly.

The Surprise Field Office completed Riparian Functional Assessments (RFAs) using Water Source Inventory data in 1993 and actual on-the-ground assessment from 1995 to 2002. The RFA team consisted of BLM Wildlife Biologist, Rangeland Management Specialist, Watershed Specialist and seasonal Archeological Technician and Biological Technician.

A total of 558 miles of perennial and intermittent streams were assessed for PFC. Of the miles surveyed, 11 percent were in Properly Functioning Condition, 77 percent were Functional-at-Risk with either an upward or no apparent trend, 9 percent were Functional-at-Risk with a downward trend, and 3 percent were Nonfunctional. A total of 10,097 acres of riparian-wetland areas were assessed for PFC. Of the acres surveyed, 13 percent were in Properly Functioning Condition, 79 percent in Functional-at-Risk with either an upward or no apparent trend, 6 percent were Functional-at-Risk with a downward trend , trace were Nonfunctional and 2 percent were Unknown.

Livestock grazing is managed in riparian areas by controlling the season-of-use, controlling the amount of use, or by exclusion. Existing livestock exclosures total approximately 5,500 acres. Controlling the season of use usually involves grazing riparian areas in spring and then removing the livestock to allow the vegetation has sufficient soil moisture to re-grow through summer. This allows the vegetation to develop adequate cover to protect the stream banks from flooding the following spring.

If vegetation that controls floods is removed too late in the year, subsequent floods may erode stream banks. Late-season grazing not only removes stream bank cover, which increases erosion; but often also leads to extensive browsing of willows, cottonwoods, and aspen as grazing shifts from drying herbaceous vegetation to the remaining green, woody vegetation. Late-season grazing should be limited to light or moderate use of riparian vegetation, especially willows. The critical element of riparian management is to reserve enough cover to protect stream banks from high-flow events. Exclusion of grazing allows for full stream bank protection from grazing impacts. Riparian vegetation is then only limited by site potential.

3.17.1.9 Dry Lakebed/Alkali Playa Community

This community occurs in ephemeral lake basins that are usually of light, fine-textured, poorly drained soils. They are usually closed drainage basins in which salts have accumulated. The areas are typically devoid of vegetation, except for scattered saltgrass. They are often inundated during the wet winter, drying in summer. Vegetation communities found along the edges of lake basin communities are described in the prior discussion of "Shrub Associations" in this section.

3.17.2 Special-Status Plant Communities

The Natural Heritage Division (NHD) of the California Department of Fish and Game (CDFG) has established a list of plant communities in California that are considered rare. Three of these community types, or plant associations (as defined in the Vegetation Classification and Mapping Program [California Department of Fish and Game 2003]), occur or are suspected to occur in the Surprise Field Office area. The priority plant community types are Great Basin Grassland, Modoc Great Basin Cottonwood-Willow Riparian Forests, and Modoc Great Basin Riparian Scrub.

3.17.3 Vegetation Zones

The 21 vegetation communities described in the Surprise Field Office have been grouped into four broad zones based on soils, landform, elevation, and precipitation. Within each of these zones, the vegetation communities are characterized by the primary shrub, grass, and/or tree species that occur in the communities. These zones are Salt Desert Shrub, Low-Elevation Sagebrush Steppe, Mid-Elevation Sagebrush Steppe, and High-Elevation Mountain Brush and Timber. Within each of these zones, riparian/wetland communities also exist and are distributed throughout the range of elevation and precipitation zones. Although the riparian/wetland communities are related to the factors characteristic of the four zones, they are more closely related to microhabitat factors, such as topography, size of the watershed, and available water, and therefore can occur in any of the four zones.

3.17.3.1 Zone 1 – Salt Desert Shrub, 6–10" Precipitation

This zone occurs below 6,000 feet on low-lying areas, such as basin floors, lake plains, alluvial fans, and axial stream floodplains, and on the low hills and slopes surrounding these areas. The soils in these areas have elevated levels of salinity and alkalinity, and are dominated by vegetation that tolerates saline and alkaline soils.

This zone of vegetation occurs in the lowest elevations of the Surprise Field Office area around areas that were homesteaded and farmed. The communities were used as fall-winter-spring pasture for livestock. As a result, much of the herbaceous understory was removed from the communities soon after European settlers arrived. Some sites, which should support communities dominated by Great Basin wildrye, currently support greasewood, big sagebrush, and other desert shrub-dominated communities—with cheatgrass and annual forb understories. Very few of these lowest-elevation salt desert shrub communities are in late seral or potential natural communities.

Returning these sites to their potential would require expensive and risky management, including chemical or mechanical brush disturbance, cheatgrass and annual forb control, long-term rest from spring grazing by livestock and wild horses, and rigorous fire suppression until perennial herbaceous species are well established. Where a natural seedbank no longer exists, seeding of native perennial forbs and grasses may be necessary. Where communities have been converted to cheatgrass and/or annual forbs for extended periods of time, soil amendment may be necessary. Some of these sites have been type converted and no longer have the potential to be returned to historical conditions.

Vegetation communities in Zone 1 are:

- Basin and Wyoming big sagebrush (*Artemisia tridentata* spp. *tridentata* and *Artemisia tridentata* spp. *wyomingensis*)
- Saltbush (*Atriplex confertifolia, Atriplex torreyi, Atriplex falcate*) and bud sagebrush (*Artemisia spinescens*)
- Winterfat (*Krascheninnikovia lanata*)
- Black greasewood (*Sarcobatus vermiculatus*) (black greasewood-dominated communities are found on the seasonally ponded flats around the large enclosed basins)
- Horsebrush (*Tetradymia*)
- Iodinebush (*Allenrolfea occidentalis*)

Current livestock grazing in this zone generally occurs annually in early spring (March/April) or late fall (November/December), as part of season-long grazing permits in conjunction with higher elevation summer range. Dry vegetation limits summer/early fall use.

Fire suppression is a high priority in this zone; however, due to the lack of herbaceous understory on most of these sites, few fires occur in this zone and fuel management is not a high priority.

3.17.3.2 Zone 2 – Low-Elevation Sagebrush Steppe, 8–10” Precipitation

This zone occurs below 6,000 feet on low hills, side slopes, and low-elevation plateaus. Soils are well drained and not influenced by salt or alkali.

Heavy spring grazing by domestic livestock soon after European settlement removed the herbaceous understory of most of these communities. Perennial grass communities within this zone were converted to big sagebrush-dominated communities. Improved livestock management, including periodic rest and deferred use, have resulted in improved conditions on many of the ecological sites within this zone. However, cheatgrass, shrub dominance, and some juniper encroachment are preventing or slowing recovery on these sites.

Vegetation communities within Zone 2 are:

- Lahontan sagebrush (*Artemisia arbuscula* spp. *longicaulis*),
- Black sagebrush (*Artemisia nova*),
- Big sagebrush (*Artemisia tridentata*),
- Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*),
- Basin big sagebrush (*Artemisia tridentata* spp. *tridentata*), and
- Utah juniper (*Juniperus osteosperma*).

Current livestock grazing in this zone generally occurs in spring and early summer. Larkspur limits earlier spring use, and dry vegetation and lack of water limit late summer and fall grazing.

Fire suppression and fuels management are high priorities in this zone because of the potential for cheatgrass dominance, and because this zone contains the majority of the developed private lands that would be threatened by fire. Suppression response time for this zone is generally quick due to the presence of well-traveled roads.

3.17.3.3 Zone 3 – Mid-Elevation Sagebrush Steppe, 10–16" Precipitation

This zone occurs between 4,500 and 8,000 feet, although most of these sites are between 5,500 and 7,000 feet. It occupies the largest portion of the Surprise Field Office area and is composed of a complex mosaic of soil types and aspects.

The low sagebrush sites are generally stable, although the amounts of palatable grass species have been reduced in the more productive communities. The churning of the clay in these soils and the presence of large rocks and cobbles in many of the soils reduce both the positive and negative effects of management activities.

The big sagebrush and antelope bitterbrush communities vary widely in condition, as a result of site potential (elevation, soil depth, soil type, and effective moisture) and management. In general, sites that have received annual spring/early summer livestock use have reduced amounts of perennial herbaceous vegetation and increased amounts of cheatgrass and annual vegetation. Sites that have received annual late season use support browse stands with poor form class and reproduction where they occur near water. Juniper is encroaching from true juniper woodland sites into a great many of the big sagebrush communities, especially on the western and northern portions of the field office area. These communities have the most potential to respond (both positively and negatively) to livestock, fuel, and fire management.

Vegetation communities in Zone 3 are:

- Low sagebrush (*Artemisia arbuscula*)
- Lahontan sagebrush (*Artemisia arbuscula* spp. *longicaulis*)
- Early sagebrush (*Artemisia arbuscula* spp. *longiloba*)
- Black sagebrush (*Artemisia nova*)
- Big sagebrush (*Artemisia tridentata*)
- Basin big sagebrush (*Artemisia tridentata* spp. *tridentata*)
- Mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*)
- Rubber rabbitbrush (*Ericameria nauseosa*)
- Western juniper (*Juniperus occidentalis*)
- Utah juniper (*Juniperus osteosperma*)
- Basin wildrye (*Leymus cinereus*)
- Antelope bitterbrush (*Purshia tridentata*)

Current livestock grazing in this zone occurs from mid spring to late fall, depending on the allotment. As the center of summer use areas for livestock, wild horses, and big game, this zone frequently receives high levels of utilization on riparian, upland herbaceous, and browse. Water is often not a limiting factor for grazing in this zone; consequently, many allotment management plans prescribe extended periods of hot-season use here.

Fire suppression priority varies in this zone. The lower elevations prone to cheatgrass and near private structures are a high priority for suppression and active fuels management. The higher elevations are a lower priority for fire suppression, and fuels management is conducted mostly for firefighter safety and wildlife habitat improvement. However, when fires occur in this zone, they are actively suppressed.

3.17.3.4 Zone 4 – High-Elevation Mountain Brush and Timber

This zone occurs on the very highest elevations (generally above 7,000 feet) and extreme north-facing slopes, and represents a very small portion of the field office area.

The sites in this zone are generally in good condition. Soils are very productive (although cold); and the sites are frequently steep, rocky, or inaccessible to livestock. Exceptions to this are areas where livestock have "camped" in mahogany, aspen, and timber stands, as well as areas where juniper has heavily encroached from adjacent woodlands.

Vegetation communities in Zone 4 are:

- White fir (*Abies concolor*),
- Low sagebrush (*Artemisia arbuscula*),
- Mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*),
- Curlleaf mountain mahogany (*Cercocarpus ledifolius*),
- Whitebark pine (*Pinus albicaulis*), and
- Quaking aspen (*Populus tremuloides*).

Current livestock grazing is limited to summer in this zone. Late-melting snow packs limit access in spring until late June in most years, and cold weather generally moves livestock downhill out of this zone in September.

Fire suppression and fuels management are high priorities in this zone where it occurs along the east-facing slopes of the Warner Mountains. Otherwise, these areas are a low priority, although fires are actively suppressed whenever they occur. Cheatgrass and most other noxious weeds are not a major concern in this zone, and few private structures are near this elevation. Fire response time can be lengthy, and often requires air support to suppress these fires.

3.18 Noxious Weeds and Invasive Species

Scotch thistle

Many nonnative plant species have been introduced, usually from southern Europe and central Asia, either deliberately for some former purpose or accidentally (for example, as contaminants in stock feed or seed). In the Surprise Field Office area, 28 nonnative species have been designated as "noxious," a legal status conferred by agencies on plant species that pose economic or ecological threats to agriculture, fish and wildlife, public health, or navigation.

Noxious or invasive species are now widely recognized worldwide as posing threats to biological diversity, second only to direct habitat loss and fragmentation. Noxious weeds are known to alter ecosystem functions such as nutrient cycles, hydrology, and wildfire frequency, out-compete and exclude native plants and animals, and hybridize with native species. All natural communities are susceptible to invasion by noxious weeds especially following some kind of disturbance. The presence and abundance of noxious weeds in an ecosystem are highly dynamic, subject to changes in the local environment from both natural and man-made influences. The noxious weeds considered problematic in certain areas, as well as their locations, acreages, and priority for control can change in a short time period (within 2 years) as new noxious weeds are located, acreage of infested lands increases or decreases, and management priorities change.

The trends of noxious weeds in a particular watershed are measured in terms of the number, status, net acreage, and/or gross acreage of the weeds occupying a certain area. For noxious weeds, a positive trend would include a reduction in any one of these factors. The ultimate goal of the Surprise Cooperative Weed Management Area (CWMA) is to eradicate or control noxious weeds from the lands administered by the Surprise Field Office. For all of the watersheds within the CWMA, many of the infestations are located along transportation corridors. This confirms the principal vector for introduction is likely vehicles or maintenance equipment and allows inventory and control to be utilized in appropriate areas (i.e., highway and county road right-of-ways, areas with heavy use of equipment or use by vehicles). Some invasive species such as cheatgrass and medusahead have also spread due to major disturbances such as wildfires.

Possible changes in the condition of noxious weeds are difficult to predict because of the complex interaction of natural processes and management influences. There is a consensus that in the absence of continued inventory, coordination of weed treatments, and a yearly evaluation of each weed program, the continued spread of noxious weeds will occur. Certain noxious weeds have already reached a high level of infestation in adjoining areas and are considered to be "too common to control". Without an emphasis on continued inventory and control, there is a high potential for other noxious weeds to increase dramatically and to ultimately become "too common to control" as well. A Memorandum of Understanding has provided an avenue for each land manager bordering BLM managed lands, the opportunity to coordinate all weed treatments. It is anticipated that the condition of noxious weeds on lands administered by the Surprise Field Office will continue to improve with the cooperation from adjoining CWMAs, local working groups such as Resource Conservation Districts, livestock permittees and other state and federal agencies.

The Surprise Field Office is conducting an extensive noxious weed inventory on land administered by BLM, USFS, USFWS, and the Bureau of Indian Affairs; state and county road ROWs; and adjoining private lands within the Surprise Cooperative Weed Management Area (CWMA). Inventory, control, mapping, and eradication of noxious weeds are a high priority. All lands have been inventoried for the presence of noxious weeds, with several emphasis areas inventoried two or three times since 1997. The Surprise Field Office is using the Montana Weed Mapping Handbook standards to map and display weed populations, applying Arc Map GIS technology. Data on noxious weed occurrences in the field are collected as a single point, a line, or an area. All noxious weed information is shared annually with adjoining CWMAs and both California and Nevada state noxious weed databases.

To date, 1,054 noxious weed locations have been recorded by a global positioning system (GPS) from 1997 through 2002. The locations comprise the major infestations known to occur within the Surprise CWMA on both public and private lands. Table 3.18-1 provides a summary of the known noxious weed sites and the watersheds in which they occur.

Table 3.18-1 Summary of Known Noxious Weeds in the Surprise Field Office Area

Noxious Weed Species	Watershed[a]	Number of Points	Number of Lines	Number of Areas
Bull thistle (*Cirsium vulgare*)	Surprise Valley	7	1	–
	Massacre Lake	6	–	–
	Smoke Creek Desert	2	1	–
Canada thistle (*Cirsium arvense*)	Warner Lakes	8	1	–
	Surprise Valley	7	–	–
	Massacre Lake	6	–	–
	Smoke Creek Desert	1	–	–
Dyer's woad (*Isatis tinctoria*)	Surprise Valley	6	–	–
Mediterranean sage (Salvia aethiopis)	Surprise Valley	2	–	–
Medusahead (*Taeniatherum caput-medusae*)	Surprise Valley	2	–	2
	Massacre Lake	2	1	–
Perennial pepperweed (*Lepidum latifolium*)	Surprise Valley	7	–	–
	Massacre Lake	54	7	–
	Smoke Creek Desert	1		
Russian knapweed (*Acroptilon repens*)	Surprise Valley	2	–	–
	Smoke Creek Desert	2	–	–
Scotch thistle[b] (*Onopordum acanthium*)	Surprise Valley	16	–	–
	Madeline Plains	3	–	–
	Smoke Creek Desert	12	–	1
Whitetop (Hoary Cress) (*Cardaria draba*)	Massacre Lake	2	1	–
Yellow starthistle (*Centaurea solsistialis*)	Surprise Valley	–	1	2

[a] No noxious weed occurrences are recorded from the Guano watershed.
[b] Several large patches of scotch thistle are known to occur on lands adjacent to the Surprise Field Office area.

3.19 Special-Status Plants

Special-status plants are defined as:

- Species listed or proposed for listing as threatened or endangered under the federal ESA (Title 50, Code of Federal Regulations [CFR], Section 17.12 for listed plants; and various notices in the Federal Register for proposed species)
- Species that are candidates for possible future listing as threatened or endangered under the federal ESA (67 FR 40657)
- Species that are federal species of concern (i.e., former USFWS C1 or C2 candidates)
- BLM-designated sensitive and special-interest species
- California state-listed species
- California Native Plant Society List (CNPS) List 1B species (plants that are rare, threatened, or endangered in California and elsewhere)
- Northern Nevada Native Plant Society Watch List species

No ongoing monitoring or surveys for the purpose of discovering new occurrences of special-status plants is being conducted in the Surprise Field Office area. Some occurrences of special-status plants have been monitored in the past, specifically those occurrences associated with the Hog Ranch Mine; however, these have not been monitored recently. Without exception, surveys for special-status plants conducted by Surprise Field Office staff are associated only with proposed surface-disturbing activities.

Based on the most current data, five special-status plants are known to occur in the Surprise Field Office area. An additional 10 species are also suspected to occur in the field office area. Table 3.19-1 contains a list of these species, with information on their regional distribution, local occurrence, legal status, habitat requirements, and threats to their populations.

Table 3.19-1. Special-Status Plants Known or Suspected to Occur in Surprise Field Office Area

Plant Name	Status[1]	Occurrence in FO	Locations[2]	Quads/ Geographic area[3]	Habitat	Threats	Needs	Current-Relevant Information
Astragalus tiehmii Tiehm's milk-vetch Fabaceae	NNPS W	Known (38 sites)	Cottonwood Cr. basin w. of Hog Ranch.	Badger Mt. SE, Butte Sp, Chest. Lyons Sp, Fox Mt, Hart Mt, Mahogany Mt, Nut Mt, Yellow Hills W.; Hum, Was	Grows on white ashy outcrops in sagebrush scrub hills.	None known but watch grazing practices. Could be impacted by livestock concentrations. Mining activity. Potential for OHV impacts.	Continued to inventory for. Ocular monitor occurrences regularly for potential impacts. This is a short lived per. and population #s can vary greatly. In some years many seedlings can occur.	Nevada only. Found on lacustrine deposits associated with prostrate & Crosby's buckwheat.
Cryptantha schoolcraftii Schoolcraft's cryptantha Schoolcraft catseye Boraginaceae	NNPS W Formerly CNPS 1B	Known (56 sites)	Cottonwood Cr. basin w. of Hog Ranch, e. & w. of Duck Flat, & Butcher Flat area. Newly located in CA in Tuledad Canyon Near NV state-line.	Badger Mt. SE, Butte Sp., Chest. Lyons Sp, Duck Lake, Hart Mt, Juniper Sp, Leadville, Mahogany Mt, Nut Mt, Wall Canyon Reservoir, Yellow Hills W, 673D Mod (CA); Hum, Was (NV)	Grows on white ashy outcrops in sagebrush scrub hills.	None known but watch grazing practices. Could be impacted by livestock concentrations. Mining activity. Potential for OHV impacts.	Continue to inventory for in both CA & NV. Ocular monitor occurrences regularly for potential impacts.	Occurrences in California and Nevada. Jepson Manual combined this sp with *C. sobolifera* with no justification. See Brittinia 38(2): 104. 1986.
Eriogonum crosbyae Crosby's buckwheat Polygonaceae	NNPS W	Known (40 sites approx.)	Cottonwood Cr. basin w. of Hog Ranch, Butcher Flat area, and High Rock Canyon. Also in OR.	Badger Mt. SE, Butte Sp., Chest. Lyons Sp, Fox Mt., High Rock. Lake, Leadville, Mahogany Mt., Nellie Sp. Mt., Nut Mt., Yell. Hills W. Hum, Was; OR	Grows on white ashy outcrops and gravelly clay sites in sagebrush scrub hills.	Not grazed by livestock but could be impacted by trampling. Has been some damage from rodent activity - eating roots. Mining activity. Potential for OHV impacts. One population w. of Grass Valley Ranch has halogeton present.	Continue to inventory for in NV. Ocular monitor occurrences regularly for potential impacts. Eradicate halogeton from Grass Valley population.	Occurs in Nevada and Oregon.

Plant Name	Status[1]	Occurrence in FO	Locations[2]	Quads/ Geographic area[3]	Habitat	Threats	Needs	Current-Relevant Information
Galium glabrescens ssp. *modocense* Modoc bedstraw Rubiaceae	CNPS 1B	Known (8 sites)	E. slope of Warner Mtns, Twelvemile Creek area, Lake Annie, Granger Creek, Milk Creek, west of Cedarville.	673B, 690B, 707C, 724A Mod	Gravelly slopes and near rock outcrops in sagebrush/juniper.	None apparent but may be grazed by sheep and possibly some livestock grazing.	Continue to inventory for in CA. Ocular monitor occurrences, especially at Twelvemile Creek for possible impacts.	Occurs on Warner Mountains. Potential habitat on higher peaks with talus slopes in Washoe Co.
Ivesia rhypara var. *rhypara* Grimy ivesia Rosaceae	NNPS W	Known (3 sites)	S. of Yellow Rock Canyon. 3 separate populations here, only w. NV known occurrences.	Mahogany Mt. Elk, Hum, Was; OR	Barren gravelly to rocky clay sites in sagebrush scrub.	None apparent. Some impact has occurred on steep slopes from erosion from heavy rains.	Continue to inventory for in NV. Ocular monitor for potential impacts at least biennially.	Near Yellow Rock Canyon, NV
Astragalus geyeri var. *geyeri* Geyer's milk-vetch Fabaceae	CNPS 2	Suspected	North and east side Honey Lake Valley. Also Washoe Co.	Las, Inyo, Mono; NV, OR +	Sandy areas in sagebrush scrub.	Livestock trampling in early spring & summer. Rodents eat plant.	Continue inventory for. This is an annual so numbers can fluctuate greatly.	Uncommon, potential habitat.
Eriogonum microthecum ssp. *schoolcraftii* Schoolcraft's buckwheat Polygonaceae	No status at present, proposed List CNPS 1B; NNPS Watch List.	Suspected	Bird Canyon and Fort Sage Mtns, ELFO. Also on Seven Lakes Mtn., Washoe Co (Carson City BLM)	602C, 602D; NV	Coarse, well drained gravelly to sandy loams from decomposed granite in big sage, rabbitbrush, horsebrush (W/ juniper in NV)	No known threats.	Inventory for in SFO; expect to find on sandy soils of granitic origin.	Newly described species to be published in Brittonia in fall 2004. Specimens in BLM ELFO herbarium.

Plant Name	Status[1]	Occurrence in FO	Locations[2]	Quads/ Geographic area[3]	Habitat	Threats	Needs	Current-Relevant Information
Eriogonum prociduum Prostrate buckwheat Polygonaceae	NNPS W CNPS 1B	Suspected	Near top of Hays Canyon on private lands, NV. Warner Mtns.	Hays Canyon, NV. CA-690B, 690C, 707C, 724B Las, Mod; Was; OR	Dry barren rocky slopes and flats usually in sagebrush scrub (low and mtn big sage). Soils from tuff or rhyolite.	Not grazed by livestock but livestock trampling could impact. Potential for OHV impacts.	Continue to inventory for in CA and NV. Ocular monitor occurrences regularly for potential impacts. Try to acquire private land at Hays Canyon occurrence and fence to protect. Could also try for a Conservation Easement.	Unique habitat: Occurs on BLM and Modoc NF.
Eriogonum umbellatum var. *glaberrimum* Green buckwheat Polygonaceae	CNPS 1B	Suspected	Along the slopes of the Warner Mtns from Davis Creek to Ft. Bidwell. None known on BLM.	708A,724B 726B Mod, Sis; OR	Sandy or gravelly sites in sagebrush scrub and montane coniferous forests.	None known. Could possibly be grazed by livestock.	Continue to inventory for within habitat range.	Potential Habitat in Alturas and Surprise FO's on lower slopes of the Warner Mountains
Galium serpenticum ssp. *warnerense* Warner Mtns bedstraw Rubiaceae	CNPS 1B	Suspected	Warner Mtns, mostly w. slope. None known on BLM.	724B,725A Mod; OR	Steep talus slopes around bases of rocks.	Probably grazed by livestock.	Continue to inventory for especially on steep slopes east of Warner Mountains.	Potential Habitat on eastern slopes of Warner Mountains and in the Granite Range, NV
Loeflingia squarrosa var. *artemisiarum* Sagebrush loeflingia Caryophyllaceae	CNPS 2	Suspected	E. edge of Madeline Plains between Buckhorn & Horne Ranch Rds. Flats e. of Herlong.	602A,656C Las, Iny, (Kern, LA) NV, OR, WY	Moist sandy area in sagebrush/ rabbitbrush scrub.	Very small annual plant. Any spring or early summer surface activity could impact population. Changes in moisture regime may also impact.	Continue to inventory for. Ocular monitor known BLM occurrences biennially.	East edge of Madeline Plains between Buckhorn and Horne Ranch Roads.

Plant Name	Status[1]	Occurrence in FO	Locations[2]	Quads/ Geographic area[3]	Habitat	Threats	Needs	Current-Relevant Information
Lomatium roseanum Adobe parsley Apiaceae	NNPS W	Suspected	None known to occur in SFO but suspected. Occurs on the Sheldon NWR & also se OR. Possibly CA.	Hum?, Was; OR	Probably dry open rocky clay flats and slopes in sagebrush scrub.	Probably grazed to some extent by sheep and cattle.	Be aware of plant and continue to inventory for. Resolve nomenclature (*L. hendersonii*?)	Good habitat in NE part of Surprise FO
Oryzopsis exigua Little ricegrass Poaceae	CNPS 2	Suspected	Upper slope of Observation Peak & Mt Dome, CA.	656C,730C Las, Sis; NV, OR +	Rocky outcrops in sagebrush steppe	Could be impacted by livestock grazing but known occurrences are not currently grazed.	Continue to inventory for.	To be looked for on talus slopes of basalt outcrops & on lava fields of steep slopes.
Phacelia inundata Playa phacelia Hydrophyllaceae	NNPS W CNPS 1B	Suspected	NW Nevada.	Sheldon National Wildlife Refuge NV,OR	Moist alkaline playas and meadows and seasonally inundated areas with clay soils.	Trampling by livestock. Changes in hydrologic conditions of habitat.	Continue to inventory for.	Sheldon National Wildlife Refuge; top be expected in rest of FO with similar habitat.
Potentilla basaltica Black Rock potentilla Rosaceae	CNPS 1B NNPS T; Federal Candidate	Suspected	Occurs at Soldier Meadows (Black Rock/ Emigrant trails NCA) in NV.	Washoe, NV	Moist usually alkaline meadows in sagebrush scrub.	Competition from other riparian species. Excluded from livestock, WH&B, and OHV's.	Be aware of plant and continue to inventory for.	Only 2 occurrences in Nevada. Inventory for in alkaline clayey meadows and outflow streams below thermal springs.

Plant Name	Status[1]	Occurrence in FO	Locations[2]	Quads/ Geographic area[3]	Habitat	Threats	Needs	Current-Relevant Information
Thelypodium howellii var. *howellii* Howell's thelypodium Brassicaceae	CNPS 1B	Suspected	Known from Rodeo Flat and eastern edge of Madeline Plains.	656A,656C	Moist alkaline meadows and flats in sagebrush steppe, also associated with silver sagebrush and saltbush.	Could be potentially impacted by livestock grazing and habitat manipulation.	Continue to inventory for. Occasionally monitor occurrences biennially for potential impacts. Relocate Madeline Plains occurrences.	Known from Rodeo Flat and east edge of Madeline Plains. Potential habitat elsewhere.

1. California source: California Natural Diversity Data Base, CA Dept of Fish & Game January 2007. CNPS = California Native Plant Society, CNPS 1B & 2 = status for species; NNPS = Nevada Native Plant Society 2005 list, NNPS W = NV watch species, NNPS T = NV threatened, NV CE = critically endangered, species threatened with extinction in Nevada. (Nevada Natural Heritage Program, 2005). 2. Locations refer only to the locations within NORCAL East.

2. Locations refer only to the locations within the Alturas, Eagle Lake, and Surprise Field Office boundaries.

3. Quads mean USGS topographic maps or quadrangles and are only those in or near BLM lands. Quad numbers from CNPS Inventory, 2001.

3.20 Visual Resources

Visual resources are scenic features of the landscape that include land, water, vegetation, structures, and other objects. BLM uses a visual resources management (VRM) classification system during planning activities to manage the quality of the landscape and assess the level of potential impacts on visual resources resulting from development activities. These classes, Class I through Class IV, are developed through an inventory process and are based on the visual quality of an area, the sensitivity of the landscape to change, and the distance from which the landscape is viewed. Existing VRM Classes are shown in Table 3.20-1.

Table 3.20-1 Visual Resources Management Inventory in the Surprise Field Office Area

VRM Class	Acres
I	0
II	40,046
III	128,019
IV	1,052,579

The visual landscapes in the Surprise Field Office are varied and diverse, ranging from the Surprise Valley and the Warner Mountains to the west, to open grasslands/sagebrush basins, to forest-covered higher elevations.

The values available and sought by recreation users in the Surprise Field Office area primarily focus on solitude; quietness; visual scenery; and the ability to perceive rugged, untamed country with few people or human impacts. Achieving a satisfactory recreation experience often depends on being able to participate in activities in the desired visual setting.

The Barrel Springs and Buckhorn back-country byways and the Lassen-Applegate Historic Trail in the field office area rely on the visual setting as a key component of the recreation opportunity experience associated with these attractions.

3.21 Water Resources

Cottonwood Creek

The following discussion gives a general overview of the Surprise Field Office area water resources and regulations pertinent to the resource.

3.21.1 Climate and Precipitation

The Surprise Field Office area is generally a high desert climate, with mild summers and cold winters. Precipitation is mainly in winter months and falls as either rain or snow. The 10-year, 24-hour precipitation quantity ranges between 1.6 inches in the eastern portions of the study area to 5.0 inches in the western portions. The 100-year, 24-hour precipitation quantity ranges between 2.4 and 6 inches (Western Regional Climate Center 1973). Condensation of moist air masses (produced by the forced ascent of warm air into cooler regions because a mountain range lies in its path) from the southwest cause's precipitation in excess of 32 inches to fall annually in the Warner Mountains and about 6 inches annually along the California-Nevada border.

3.21.2 Surface Water Hydrology

For this discussion, the Surprise Field Office area has been divided into seven watersheds: Surprise Valley, Guano, Upper Pit, Massacre Lake, Warner Lakes, Madeline Plains, and Smoke Creek Desert.

Although BLM has compiled the Water Source Inventory database containing information on water quantity, very little additional information has been collected on water quantity on BLM-administered lands in the Surprise Field Office area. Reservoir capacities are known, but little monitoring of their levels has been conducted. Few surface water bodies in the Surprise Field Office area have permanent gauging stations, and no historical flow records were available for this report. However, flows in Surprise Field Office area streams were measured during low flow (i.e., summer and fall months) in 2002 and 2003. Flows are most likely significantly higher in streams unaltered by reservoirs during spring due to snowmelt and higher precipitation; therefore, the flows reported herein may be considered conservative. Flows taper off rapidly as summer and fall approach, and when precipitation is slight and snow is gone. Flows coming out of reservoirs may not fit this pattern and do not reflect the natural hydrology of the watershed.

3.21.2.1 Water Diversions and Hydrologic Modification

BLM has traditionally developed various forms of direct diversion in association with its livestock grazing program. Developments for the benefit of wildlife range from the development of guzzlers to wetlands and reservoirs. Subtle changes in surface water conditions have occurred over many decades as a result of roads and past heavy livestock use. Relatively large irrigation dams have been built under permit on public lands as well.

3.21.2.2 Surprise Valley Watershed

The Surprise Valley watershed encompasses approximately 471,800 acres within the planning area. The area is mostly in Modoc County, but a portion extends into northeastern Lassen County. The watershed lies east of the crest of the Warner Mountain Range and extends for about 15 miles to the Nevada state line. From the Oregon state line, the watershed extends south for about 73 miles.

Within the Surprise Valley watershed are twenty four monitoring stations on thirteen streams and two springs: Barber Creek, Bare Creek, Bud Brown Spring, Bull Creek, Birch Creek, Cedar Creek, Cole Creek, Eagle Creek, Emerson Creek, Granger Creek, Milk Creek, North Creek, Rock Spring, Sand Creek, and Silver Creek.

Surface Water Hydrology

Surprise Valley is a closed basin in which streams primarily enter Upper Alkali Lake, Middle Alkali Lake, and Lower Alkali Lake. Evaporation at the lake surface results in complete drying in most years. Discharge in watershed streams ranged from 0.05 cfs at Cole Creek on August 23, 2002 to 36 cfs at Emerson Creek on May 29, 2003.

BLM administers a limited amount of land along the lower portion of the Warner Range. While the Warner Mountains supply the majority of the surface water to the watershed, only those streams in the southern portion of the range are significantly affected by BLM management. These drainages include the Bare and Silver Creek system, the Cole and Emerson Creek system, and Barber Creek.

On the east side of Surprise Valley, most of the larger drainages are intermittent. Typically, they evaporate or infiltrate into the alluvium without supplying surface water to the Alkali lakes.

Trends

The Surprise Valley watershed has fifteen study streams with twenty-four water quality stations on Barber Creek, Bare Creek, Bud Brown Spring, Bull Creek, Birch Creek, Cedar Creek, Cole Creek, Eagle Creek, Emerson Creek, Granger Creek, Milk Creek, North Creek, Rock Spring, Sand Creek, and Silver Creek. Of these, Bull Creek and Birch Creek were dry in 2002 and were not sampled in 2003.

Temperature. Bare, Barber, Cedar, Cole, Emerson, Milk, North, Sand, and Silver Creeks and Rock Spring had maximum daily water temperatures exceeding 20ºC in HY 2002 or 2003 as recorded by Hobo temperature loggers.

Dissolved Oxygen. Within the Surprise Valley watershed, DO measurements ranged from a minimum of 5.3 mg/l to a maximum of 11 mg/l. All samples from streams in California met the Lahontan Basin objective of 3 mg/L for warm water habitats as well as the 4 mg/l objective for the coldwater habitat. Seventeen out of seventy samples did not meet the 8 mg/L objective for coldwater spawning. Whether these are due to human controllable factors or not has not been determined. Eighteen of the 79 samples fell below the Lahontan Basin standard of no less than 80% saturation. Of the streams sampled in Nevada, all DO samples were above the standard.

Turbidity and Suspended Sediment. Turbidity ranged from 0.29 NTU to 148 NTU with a median of 10 NTU and a mean of 15 NTU. Three out of 70 values were substantially above 40 NTU; these were measured on Cole, Barber, and Milk Creeks. Twenty-three out of seventy samples had turbidity values above the visual detection limit of 15 NTU.

Suspended sediment ranged from 0.76 to 730 mg/L with a median of 30 mg/L and a mean of 68 mg/L. Generally, suspended sediment concentrations were not analyzed on samples with turbidities less than 10 NTU.

Nutrients. Nitrate-nitrogen samples ranged from non-detection to 0.92 mg/L with a median of 0.03 mg/L and a mean of 0.10 mg/L. Phosphate-phosphorous ranged from 0.03 mg/L to 0.66 mg/L with a median value of 0.23 mg/L and a mean value of 0.25 mg/L. Two samples from the water quality stations in Nevada exceeded the indicator standard. These were measured at Rock Spring and upper Sand Creek.

Coliform. Fecal coliform ranged from 0 colonies/100ml to a maximum value of "too numerous to count" (TNTC) measured at lower Bare Creek on 9/24/03. The sampling frequency was far lower than the required five per month. The analysis includes all samples during 2002 and 2003. The geometric mean for stations in California is 9 colonies/100mL (zeros were assigned a value of one, five values of "greater than 100" were given a value of 300, and one value of "too many to count" was given a value of 400 in order to calculate the geometric mean). Nine out of sixty-five samples, or 14%, exceeded 75 colonies/100mL; all of these occurred in the Bare Creek, Barber Creek, and Sand Creek watersheds. The geometric mean for stations in Nevada is 8 colonies/100mL, and none of the sites exceeded 400 colonies/100mL.

3.21.2.3 Guano Watershed

The Guano watershed encompasses approximately 59,800 acres within the planning area and is identified by those drainages that flow toward Guano Valley in Oregon. This area is in Washoe County, Nevada, and lies east of the Warner Lakes watershed, south of the Oregon border, west of the Sheldon NWR, and north of the Smoke Creek watershed.

Surface Water Hydrology

The primary drainage in the watershed is Badger Creek, an intermittent stream that flows through Bitner Meadows north to Swan Lake and continues on to Guano Valley in Oregon. Typically, Badger Creek flows past Bitner Meadows only during the high spring runoff period. Only one monitoring station is located in the watershed, on Badger Creek. Discharge estimates in Badger Creek were 0.2 cfs on September 11, 2002, 0.4 cfs on October 21, 2003, and 0.6 cfs on July 7, 2003. Differences in these estimates can be attributed to the uncertainty in determining discharge from visual estimation.

Trends

As mentioned above, there is one water quality station on Badger Creek at Bitner Spring that was sampled in 2002 and 2003.

Temperature. Point observation water temperatures on three occasions were 16°C on 10/21/03, 18°C on 7/7/03, and 19°C on 9/11/02. The recorded small temperature variation is consistent with spring discharge.

Dissolved Oxygen. Three DO measurements were recorded in 2002 and 2003: 4.8 mg/L, 5.4 mg/L, and 6.1 mg/L. Whether these are due to human controllable factors or not has not been determined.

Turbidity and Suspended Sediment. Turbidity ranged from 3.4 NTU to 9.1 NTU with a median of 6.8 NTU. None of the samples had turbidity values above the visual detection limit of 15 NTU. Suspended solids were not measured on Badger Creek because all of the samples had turbidity values below 10 NTU. Generally, suspended sediment concentrations were not analyzed on samples with turbidities less than 10 NTU.

Nutrients. Nitrate-nitrogen samples ranged from 0.20 mg/L to 0.38 mg/L with a median of 0.35 mg/L. Phosphate-phosphorous ranged from 0.23 mg/L to 0.65 mg/L with a median value of 0.27 mg/L.

Coliform. Fecal coliform ranged from 0 colonies/100ml to a maximum value of 37 colonies/100mL. There were three fecal coliform samples taken from Badger Creek whose values were 38 colonies/100 mL on 10/21/03, 96 colonies/100 mL on 7/7/03, and 124 colonies/100 mL on 9/11/02. The geometric mean for three Badger Creek samples is 77 colonies/100mL. None of the samples exceeded 400 colonies/100 mL.

3.21.2.4 Upper Pit Watershed

The Upper Pit watershed encompasses approximately 7,400 acres within the planning area and is generally identified by those drainages that flow off the western slopes of the South Warner Mountains into the Pit River. The area is in Lassen County, California, and lies west of the Warner Mountain crest. The watershed joins the Madeline Plains watershed to the south.

Surface Water Hydrology

The watershed is situated along the northwest fringe of the Great Basin section of the Basin and Range Physiographic Province. The only main drainage in the watershed is Selic Creek, a perennial stream that flows into Clarks Valley and joins Cedar Creek in the Alturas Field Office area. BLM administers less than half the land in the Upper Pit watershed.

In the Upper Pit watershed, there are two sampling stations on one stream, Selic Creek, which was sampled in 2002 and 2003. Discharge estimates in Selic Creek ranged from 0.2 cfs at lower Selic Creek on August 21, 2002 to 2 cfs also at lower Selic Creek on June 25, 2003.

Trends

In the Upper Pit watershed, there are two water quality stations on one stream, Selic Creek. Both stations were sampled once in 2002 and twice in 2003.

Temperature. Point observation water temperature ranged from 7°C at lower Selic Creek on 9/17/03 to 17°C at upper Selic Creek on 6/26/03. Seasonal temperature data was collected using Hobo thermographs at both upper and lower Selic Creek stations. The minimum temperature at the lower station was 5.8°C on 7/1/03, and the maximum temperature was 20.9 on 7/20/03. The minimum temperature at the upper station was 4.7°C on 9/14/03, and the maximum was 19.5°C on 7/31/03.

Dissolved Oxygen. Within the Upper Pit watershed, DO measurements ranged from a minimum of 79% saturation to a maximum of 93% saturation. One measurement from lower Selic Creek on 8/21/02 had a DO value below 80% saturation. Whether these are due to human controllable factors or not has not been determined.

Turbidity and Suspended Sediment. Turbidity ranged from 1.9 NTU to 5.6 NTU with a mean of 4.2 NTU. None of the samples had turbidity values above the visual detection limit of 15 NTU. Suspended solids were not measured on Selic Creek because all of the samples had turbidity values below 10 NTU. Generally, suspended sediment concentrations were not analyzed on samples with turbidities less than 10 NTUs.

Nutrients. Nitrate-nitrogen samples ranged from 0.04 mg/L to 0.15 mg/L with a mean of 0.09 mg/L. Phosphate-phosphorous ranged from 0.11 mg/L to 0.4 mg/L with a median value of 0.15 mg/L and a mean value of 0.20 mg/L.

Coliform. Fecal coliform ranged from 0 colonies/100ml to a maximum value of 37 colonies/100mL. The geometric mean for all Upper Pit samples is 4 colonies/100mL. The median value for the watershed is 4 colonies/100 mL.

3.21.2.5 Massacre Lake Watershed

The Massacre Lake watershed encompasses approximately 766,800 acres within the planning area and is generally identified by those drainages that flow toward Duck Lake, Massacre Lake, and Long Valley. The area is mostly in Washoe County, Nevada, but a small portion extends into northeastern Lassen County, California. The watershed lies within the central third of the Surprise Field Office area, averages approximately 20 miles wide, and is approximately 75 miles long. Surveyed streams and springs in the watershed are Big Spring, Bordwell Creek, Cherry Creek, Cottonwood Canyon, Lost Creek, Mountain View Creek, Pryor Spring, and Wall Canyon Creek.

The watershed is situated along the northwest fringe of the Great Basin section of the Basin and Range Physiographic Province. BLM administers the majority of the land in the Massacre Lake watershed.

Surface Water Hydrology

The Massacre Lake watershed is in the rain shadow of the Warner Mountains. Most streams and lakes are intermittent. The most significant perennial stream is the Wall Canyon and Mountain View Creek system.

In the Massacre Lake watershed, twenty monitoring stations on eight springs and streams were sampled in 2002 and 2003: Big Spring, Bordwell Creek, Cherry Creek, Cottonwood Spring (Board Corral), Lost Creek, Mountain View Creek, Pryor Spring, and Wall Canyon Creek. Of these, the stations at Bordwell Creek and Lost Creek were dry during 2002 and 2003. Discharge in these streams ranged from 0.01 cfs at the lower Cherry Creek site 349 on July 2, 2003 to 13 cfs at the Wall Canyon Creek site 304 on August 28, 2002.

Trends

The Massacre Lake watershed has twenty monitoring stations on eight springs and streams that were sampled in 2002 and 2003: Big Spring, Bordwell Canyon Creek, Cherry Creek, Cottonwood Spring (Board Corral), Lost Creek, Mountain View Creek, Pryor Spring, and Wall Creek. Of these, the stations at Bordwell Canyon Creek and Lost Creek were dry during 2002 and 2003. Discharge in these streams ranged from 0.01 cfs at the lower Cherry Creek site 349 on 7/2/03 to 13 cfs at the Wall Creek site 304 on 8/28/02.

Temperature. Point observation water temperature ranged from 7.7°C at Mountain View Creek on 10/15/03 to 28°C at Wall Creek on 6/10/03. Fourteen out of 41 point observations exceeded 20°C. Seasonal water temperature data was also collected using Hobo temperature loggers at Big Spring and Wall Creek. Fifty-six out of 98 days of record at Big Spring exceeded 20°C, which had a maximum daily temperature of 24°C on 7/14/03. Eighty-nine out of 98 days of record exceeded 20°C at Wall Canyon Creek where a maximum daily temperature of 27°C on 7/29/03.

Dissolved Oxygen. Within the Massacre Lake watershed, DO measurements ranged from a minimum of 5.9 mg/l to a maximum of 13 mg/l. Only one sample from Wall Creek on 7/17/02 was below 6.0 mg/L. Whether these are due to human controllable factors or not has not been determined.

Turbidity and Suspended Sediment. Turbidity ranged from 1.6 NTU to 65 NTU with a median of 16 NTU and a mean of 19 NTU. Twenty-three out of 41 samples had turbidity values above the visual detection limit of 15 NTU.

Suspended sediment ranged from 3.4 to 536 mg/L with a median of 53 mg/L and a mean of 119 mg/L. Generally, suspended sediment concentrations were not analyzed on samples with turbidities less than 10 NTUs.

Nutrients. Nitrate-nitrogen samples ranged from non-detection to 0.88 mg/L with a median of 0.11mg/L and a mean of 0.16 mg/L. Phosphate-phosphorous ranged from non-detection to 1.51 mg/L with a median value of 0.21 mg/L and a mean value of 0.30 mg/L. Thirteen out of 38 phosphate measurements exceeded 0.30 mg/L at Cherry Creek, Wall Creek, Cottonwood Spring, and Mountain View Creek.

Coliform. Fecal coliform ranged from 0 colonies/100ml to a maximum value of TNTC measured at middle Cherry Creek on 9/15/03. The median value for the Massacre Lake watershed was 43 colonies/100 mL. The geometric mean of all samples was 34 colonies/100 mL. Out of 37 samples, at least three and possibly as many as ten samples exceeded 400/100ml. Some uncertainty results from six imprecise values of "100-plus", one value of TNTC, and one value of "300-plus." These samples occurred at Bordwell Canyon Creek, Cherry Creek, Cottonwood Spring, Mountain View, Pryor Spring, and Wall Creek.

3.21.2.6 Warner Lakes Watershed

The Warner Lakes watershed encompasses approximately 104,800 acres within the planning area and is generally identified by those drainages that flow north toward Warner Valley in Oregon. This area is located in Washoe County, Nevada, and Modoc County, California. The watershed lies east of the Warner Mountains, north of Upper Alkali Lake, and west of Guano Valley.

The watershed is situated along the northwest fringe of the Great Basin section of the Basin and Range Physiographic Province. BLM administers most of the lands in the watershed.

Surface Water Hydrology

While the Warner Mountains supply the majority of the surface water to the watershed, only those streams in the northern portion of the range are significantly affected by BLM management. These drainages include Cowhead Slough, Horse Creek, Little Coleman Creek, Rock Creek, and Twelvemile Creek.

In the Warner Lakes watershed, twelve water quality stations on six springs and streams were sampled in 2002 and 2003: Barrel Spring, Cowhead Slough, Horse Creek, Little Coleman Creek, Rock Creek, and Twelvemile Creek. Of these stations, Barrel Spring was dry in 2002 and was not sampled in 2003. Discharge in these streams ranged from 0.03 cfs at upper Horse Creek site 321 on July 25, 2002 and on June 3, 2003, to 71 cfs at Twelvemile Creek on June 2, 2003.

Trends

In the Warner Lakes watershed, there are twelve water quality stations on six springs and streams that were sampled in 2002 and 2003: Barrel Spring, Cowhead Slough, Horse Creek, Little Coleman Creek, Rock Creek, and Twelvemile Creek. Of these stations, Barrel Spring was dry in 2002 and was not sampled in 2003. Discharge in these streams ranged from 0.03 cfs at upper Horse Creek site 321 on 7/25/02 and on 6/3/03 to 71 cfs at Twelvemile Creek on 6/2/03.

Temperature. Point observation water temperature ranged from 5.5°C at upper Cowhead Slough on 10/17/03 to 24°C at Twelvemile Creek on 7/23/02. Six out of twenty point observations exceeded 20°C, at Little Coleman Creek, Horse Creek, and Twelvemile Creek. Seasonal water temperature data was also collected using Hobo temperature loggers at lower and middle Horse, Little Coleman Creek, and Cowhead Slough. Eight-seven out of 98 days of record exceeded 20°C at middle Horse Creek, which had a maximum daily temperature of 26°C on 7/20/03. Ninety-two out of 98 days of record exceeded 20°C at lower Horse Creek, which had a maximum daily temperature of 29°C on 7/22/03.
Sixty-two out of 63 days of record exceeded 20°C at Little Coleman Creek, which had a maximum daily temperature of 29°C on 7/22/03.

Dissolved Oxygen. Within the Warner Lakes watershed, DO measurements ranged from a minimum of 5.6 mg/l to a maximum of 12 mg/l. Three samples from upper Cowhead Slough on 7/22/02 fell below the Lahontan COLD SPAWN beneficial use objective of 8.0 mg/L. However, this stream was intermittent in 2002 and 2003. Of the Nevada streams, only lower Rock Creek had a DO value of less than 6.0 mg/L on one occasion. Whether these are due to human controllable factors or not has not been determined.

Turbidity and Suspended Sediment. Turbidity ranged from 1.4 NTU to 44 NTU with a median of 9.2 NTU and a mean of 13 NTU. Eight out of 26 samples had turbidity values above the visual detection limit of 15 NTU.

Suspended sediment ranged from 7.5 to 82 mg/L with a median of 28 mg/L and a mean of 36 mg/L. Generally, suspended sediment concentrations were not analyzed on samples with turbidities less than 10 NTUs.

Nutrients. Nitrate-nitrogen samples ranged from nondetection to 0.31 mg/L with a median of 0.02 mg/L and a mean of 0.07 mg/L. The five values above 0.1 mg/L occurred on upper and lower Little Coleman Creek and one occurrence on middle Horse Creek. Phosphate-phosphorous ranged from 0.03 mg/L to 0.43 mg/L with a median value of 0.17 mg/L and a mean value of 0.20 mg/L. Five out of 21 phosphate measurements in Nevada exceeded 0.30 mg/L at lower and upper Little Coleman Creek and lower and upper Horse Creek. The site at lower Cowhead Slough also exceeded 0.30 mg/L.

Coliform. Fecal coliform ranged from 0 colonies/100ml to a maximum value of "100-plus" measured at lower Little Coleman Creek on 7/14/03. The median value for the Warner Lakes watershed was 9 colonies/100 mL. The geometric mean of all samples was 8 colonies/100 mL. The geometric mean for all Nevada site samples is 9 colonies/100mL. Out of 17 samples, only one sample with a value of "100+" might have exceeded 400/100ml. The geometric mean of all Cowhead Slough samples is 3 colonies/100mL, and no sample exceeded 40 colonies/100mL.

3.21.2.7 Madeline Plains Watershed

The Madeline Plains watershed encompasses approximately 28,000 acres within the planning area and is a closed basin generally identified by those drainages that flow toward the Madeline Plains. The area is mostly in Lassen County, California, but also extends into Washoe County, Nevada. A small portion of the watershed lies within the southwestern Surprise Field Office area. Surveyed streams in the Madeline Plains watershed are Alaska Creek, Quaking Aspen Creek, Boot Lake Creek, and Red Rock Creek.

The watershed is situated along the northwest fringe of the Great Basin section of the Basin and Range Physiographic Province. Most streams are intermittent and do not reach the valley floors. BLM administers less than half the land in the Madeline Plains watershed.

Surface Water Hydrology

In the Madeline Plains watershed, seven monitoring stations on four streams were sampled in 2002 and 2003: lower and upper Boot Lake Creek; lower, middle, and upper Alaska Creek; Red Rock Creek; and Quaking Aspen Creek. Of these stations, Red Rock Creek was dry in 2002 and 2003, and Quaking Aspen Creek was dry in 2002. Discharge estimates in these streams ranged from 0.02 cfs at Boot Lake Creek on October 23, 2003 to 4 cfs at lower Alaska Creek on June 30, 2003.

Trends

In the Madeline Plains watershed, there are seven monitoring stations on four streams that were sampled in 2002 and 2003: lower and upper Boot Lake Creek; lower, middle, and upper Alaska Creek; Red Rock Creek; and Quaking Aspen Creek. Of these stations, Red Rock Creek was dry in 2002 and 2003, and Quaking Aspen Creek was dry in 2002. Discharge estimates in these streams ranged from 0.02 cfs at Boot Lake Creek on 10/23/03 to 4 cfs at lower Alaska Canyon Creek on 6/30/03.

Temperature. Point observation water temperature ranged from 7°C at lower Alaska Creek on 10/23/03 to 17°C at upper Alaska Creek on 8/27/02. Seasonal temperature data was collected using Hobo thermographs at lower Boot Lake Creek, lower Alaska Creek, middle Alaska Creek, and upper Alaska Creek.

Dissolved Oxygen. Within the Madeline Plains watershed, DO measurements ranged from a minimum of 66% saturation to a maximum of 92% saturation. Two samples, one from lower Boot Lake Creek on 8/9/03 and another from upper Boot Lake Creek on 7/1/03, had DO values below 80% saturation. Whether these are due to human controllable factors or not has not been determined.

Turbidity and Suspended Sediment. Turbidity ranged from 1.4 NTU to 79 NTU with a median of 3.7 NTU and a mean of 12 NTU. Three out of 14 samples had turbidity values above the visual detection limit of 15 NTU.

Suspended sediment ranged from 30.8 to 286 mg/L with a median of 106 mg/L and a mean of 140 mg/L. Generally, suspended sediment concentrations were not analyzed on samples with turbidities less than 10 NTUs.

Nutrients. Nitrate-nitrogen samples ranged from 0.01 mg/L to 0.41 mg/L with a median of 0.05 mg/L and a mean of 0.10 mg/L. Phosphate-phosphorous ranged from 0.05 mg/L to 0.43 mg/L with a median value of 0.25 mg/L and a mean value of 0.23 mg/L.

Coliform. Fecal coliform ranged from 0 colonies/100ml to a maximum value of 175 colonies/100mL measured at lower Boot Lake Creek on 8/9/02. The geometric mean for all Madeline Plaines samples is 7 colonies/100mL. The median value for the watershed is 5 colonies/100 mL. Out of fourteen samples, only one had a value that exceeded 75/100ml.

3.21.2.8 Smoke Creek Desert Watershed

The Smoke Creek Desert watershed encompasses approximately 182,600 acres within the planning area and is generally identified by those drainages that flow toward High Rock Lake. The area administered by the Surprise Field Office is mostly in Washoe County, Nevada, with a small portion in Humboldt County, Nevada. It lies within the eastern third of the Surprise Field Office area. BLM administers the majority of the land in the watershed.

Surface Water Hydrology

The Smoke Creek Desert watershed is in the rain shadow of the Warner Mountains. Most streams and lakes are intermittent.

In the Smoke Creek Desert watershed, four monitoring stations on three springs and streams were sampled in 2002 and 2003: Cottonwood Creek, upper and lower Cottonwood Canyon, and Hanging Rock Canyon. Of these stations, lower Cottonwood Canyon was dry in 2002 and 2003.

Discharge estimates in these streams ranged from 0.01 cfs at Hanging Rock Canyon on July 7, 2003 to 0.3 cfs at upper Cottonwood Canyon on June 16, 2003.

Trends

In the Smoke Creek Desert watershed, there are four monitoring stations on three springs and streams that were sampled in 2002 and 2003: Cottonwood Creek, upper and lower Cottonwood Canyon, and Hanging Rock Canyon. Of these stations, lower Cottonwood Canyon was dry in 2002 and 2003.
Discharge estimates in these streams ranged from 0.01 cfs at Hanging Rock Canyon on 7/7/03 to 0.3 cfs at upper Cottonwood Canyon on 6/16/03.

Temperature. Point observation water temperature ranged from 12°C at upper Cottonwood Canyon on 10/9/03 to 24°C at upper Cottonwood Canyon on 6/5/03. Two out of nine point observations exceeded 20°C; these were at Cottonwood Creek and Cottonwood Canyon.

Dissolved Oxygen. Within the Smoke Creek Desert watershed, DO measurements ranged from a minimum of 4.9 mg/l to a maximum of 10 mg/l. Only one sample from upper Cottonwood Canyon on 6/5/03 had a DO value below 6.0 mg/L. Whether these are due to human controllable factors or not has not been determined.

Turbidity and Suspended Sediment. Turbidity ranged from 1.7 NTU to 27 NTU with a median of 13 NTU and a mean of 13 NTU. Four out of nine samples had turbidity values above the visual detection limit of 15 NTU.

Suspended sediment ranged from 28 to 56 mg/L with a median of 52 mg/L and a mean of 47 mg/L. Generally, suspended sediment concentrations were not analyzed on samples with turbidities less than 10 NTUs.

Nutrients. Nitrate-nitrogen samples ranged from 0.01 mg/L to 0.64 mg/L with a median of 0.46 mg/L and a mean of 0.39 mg/L. Phosphate-phosphorous ranged from 0.04 mg/L to 0.59 mg/L with a median value of 0.13 mg/L and a mean value of 0.20 mg/L. Two out of nine phosphate measurements exceeded 0.30 mg/L at Hanging Rock Canyon and at upper Cottonwood Canyon.

Coliform. Fecal coliform ranged from 0 colonies/100ml to a maximum value of “500-plus” measured at upper Cottonwood Canyon on 6/5/03 and at Cottonwood Creek on 6/16/03. The geometric mean for all Nevada site samples is 20 colonies/100mL. The median value for the Smoke Creek Desert watershed was 24 colonies/100 mL. Out of eight samples, two had a value of “500-plus” that exceeded 400/100ml.

3.21.3 Water Quality

Water quality in the Surprise Field Office area is discussed in terms of water quality indicators and water bodies listed as impaired. Primary indicators used for management of impacts on water resources are temperature, nutrients, fecal coliform, turbidity, sediment, dissolved oxygen (DO), and stream channel condition. Indicators were chosen based on the Standards and Guidelines, which are discussed further in Section 4.8. A summary of water quality conditions for key streams and springs is given by watershed in Table 3.17-1 (Table at end of section).

Impaired Water bodies

No water bodies designated as impaired in Section 303(d) are located in the Surprise Field Office area.

3.21.4 Groundwater

In BLM-managed areas, groundwater is found in defined aquifers as well as in areas without such aquifers. Defined aquifers in the region mainly consist of weathered and fractured basalt, other volcanic deposits, and alluvial and lake deposits. In undefined areas, subsurface formations tend to be more highly consolidated and tend to have lower yields. Groundwater in these areas is often found in fractures or weathered portions of rock between consolidated materials. Groundwater yields from fracture systems depend on the extent of fracturing, the connectivity between the fractures, and the transmissivity of the fractures (California Department of Water Resources 2003). Groundwater serves as a source for some surface water bodies. Because groundwater is not used as a municipal or industrial water source within BLM-managed areas, it is not discussed in further detail.

3.21.5 Regulatory Setting

The majority of the Surprise Field Office is in Nevada; however, portions of the field office are in California.

State of California

The State Water Resources Control Board (SWRCB), and its nine regional water quality control boards (RWQCBs) are responsible for regulation of water quality and water rights in California. SWRCB signed an MOU with BLM in 1993 to ensure the coordination of nonpoint source policies and activities, and to pursue the development of a Management Agency Agreement (MAA) and Water Quality Management Plan (WQMP) for nonpoint source pollution control on BLM lands. The MAA with BLM has not been completed.

The Surprise Field Office area falls within the jurisdiction of the Lahontan RWQCB (Region 6). This RWQCB has adopted a Basin Plan to implement plans, policies, and provisions for water quality management in its region. Beneficial uses of surface waters are identified and described in the Basin Plan. In addition, the Basin Plan identifies water quality objectives for the protection of the beneficial uses of the basin.

Beneficial Uses and Water Quality Objectives

Beneficial uses define the resources, services, and qualities of the aquatic system that are the ultimate goals of protecting and achieving high water quality. Beneficial uses of waters in the Surprise Field Office area generally include municipal supply, agricultural supply, groundwater recharge, contact and non-contact water recreation, warm and cold spawning and freshwater habitat, and wildlife habitat.

The RWQCB has set water quality objectives for all surface waters in their basin concerning bacteria, biostimulatory substances, chemical constituents, color, DO, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. Also, specific objectives for concentrations of chemical constituents are applied to bodies of water based on their designated beneficial uses.

Beneficial uses of all groundwater in the project area have been designated as follows: municipal and domestic supply, agricultural supply, industrial supply, and freshwater habitat. Water quality objectives applicable to all ground waters have been set for bacteria, chemical constituents, radioactivity, and tastes and odors.

State of Nevada

Nevada Water Pollution Control Law

Water pollution control in Nevada is guided by the Nevada Revised Statutes (laws) and Nevada Administrative Code (regulations), under Sections 445A.300 through 445A.730. The Nevada Division of Environmental Protection (NDEP) is responsible for administration of these laws and regulations, which provide state authority to protect water quality for public use, wildlife, existing industry, and agriculture, and the beneficial economic development of the state. NDEP defines waters of the state to include surface watercourses, waterways, drainage systems, and underground water. NDEP administers the National Pollutant Discharge Elimination System (NPDES) permits for surface storm water discharges but also requires that discharges into subsurface waters be controlled if a potential for contamination is present. NDEP requires a zero-discharge permit for projects with potential to contaminate groundwater.

Table 3.21-1 Water Quality Conditions for Key Streams in the Surprise Field Office Area

Stream	Meets State Standard		Meets Beneficial Use Needs	Meets Standards and Guidelines[a] Water Quality Criteria
	Lahontan Basin Plan (California)	Nevada		
Surprise Valley Watershed				
Bare	No (FCOL, DO)	-	Probably yes. Rainbow and brown trout may be affected as it barely fails to meet coldwater and spawning criteria. Reservoir affects flow.	Probably yes. FCOL increases downstream.
Barber	No (FCOL)	-	Yes	Probably yes, although PO_4 doubles across BLM administered land.
Bud Brown Spring	No (PO_4)	-	Yes	Probably yes. Heavy wild horse use.
Cedar	No (DO)	-	Probably yes. Rainbow and brown trout may be affected as it barely fails to meet coldwater and spawning criteria.	Probably yes. Creek is well shaded, but next to Highway 299.
Cole	No (DO)	-	Probably yes. Fails coldwater and spawning criteria, but is probably too shallow for fish.	Yes
Eagle	No (DO, one occurrence of 79%)	-	Yes. Maybe suitable for trout; none observed.	Probably yes. FCOL and turbidity increased 2002 to 2003.
Emerson	Yes	-	Yes	Yes
Granger	Yes	-	Yes No fish observed.	Yes

Table 3.21-1 Water Quality Conditions for Key Streams in the Surprise Field Office Area

Stream	Meets State Standard		Meets Beneficial Use Needs	Meets Standards and Guidelines[a] Water Quality Criteria
	Lahontan Basin Plan (California)	Nevada		
Surprise Valley Watershed (continued)				
Milk	Yes	-	Probably yes. Barely fails coldwater and spawning criteria but no fish observed.	Probably yes. Turbidity increased between 2002 and 2003.
North	No (FCOL, DO)	-	No. Rainbow and brown trout may be affected as it barely fails to meet coldwater and spawning criteria.	Probably yes. FCOL improves, but NO_3 and turbidity increased between 2002 and 2003.
Rock Spring	No (PO_4)	No (PO_4)	Probably yes	Probably yes
Sand	No (FCOL, DO)	No (Temp, PO4)	No. Fails to meet coldwater and spawning criteria. Speckled dace observed.	Probably. FCOL improved in upper to middle reaches but declined in middle to lower reaches between 2002 and 2003. Lower site is bad because it is on a water gap.
Silver	No (FCOL, DO)	-	No. Rainbow and brown trout may be affected as it fails to meet coldwater and spawning criteria. Reservoir regulates flow. Brown and rainbow trout observed.	No. FCOL, turbidity, NO_3, PO_4 increase between upper and lower reaches, because of livestock use at the lower site.
Guano Watershed				
Badger Creek (Bitner Spring)		No (DO, PO_4 one occurrence >0.3mg/L)	Probably yes	Probably yes. FCOL, PO_4, and DO improved between 2002 and 2003, but turbidity increased (always 15 NTU).

Table 3.21-1 Water Quality Conditions for Key Streams in the Surprise Field Office Area

Stream	Meets State Standard		Meets Beneficial Use Needs	Meets Standards and Guidelines[a] Water Quality Criteria
	Lahontan Basin Plan (California)	Nevada		
North Fork/South Fork Upper Pit River Watershed				
Selic Creek	Probably yes. (DO: one measurement of 79%)	-	Yes	Probably yes. PO_4 gets worse downstream. FCOL gets worse downstream, although improved between 2002 and 2003.
Massacre Lake Watershed				
Big Spring	-	No (FCOL, one occasion, and temp)	Probably no	Probably no. Between 2002 and 2003, FCOL increased but PO_4 decreased; temp exceeds 20 °C. Heavily trampled by livestock.
Bordwell Canyon Creek	-	Dry	Dry	Dry
Cherry Creek	-	No (PO_4, maybe FCOL, temp)	Probably no. Middle site exceeds 30 °C frequently.	Probably no. Between 2002 and 2003, improved FCOL in upper and lower sites, but middle site worsened. PO_4 worsened in the upper to middle reaches.
Cottonwood Creek	-	No (PO_4, FCOL)	Probably yes	Probably no. FCOL worsened between 2002 and 2003.
Lost Creek	-	Dry	Dry	Dry

Table 3.21-1 Water Quality Conditions for Key Streams in the Surprise Field Office Area

Stream	Meets State Standard		Meets Beneficial Use Needs	Meets Standards and Guidelines[a] Water Quality Criteria
	Lahontan Basin Plan (California)	Nevada		
Massacre Lake Watershed (continued)				
Mountain View Creek	-	No (PO_4, maybe FCOL)	Probably yes. Wall Canyon sucker, a BLM species of concern, may be affected.	Probably yes. FCOL, DO, and PO_4 improved between 2002 and 2003.
Pryor Spring	No (DO, FCOL)	-	Probably yes	Probably no. FCOL shows little if any improvement between 2002 and 2003. Heavily trampled, wild horses observed.
Wall Canyon Creek	-	No (PO_4, maybeFCOL, temp)	Probably yes. Brown trout and Wall Canyon sucker, a BLM species of concern, may be affected.	Probably yes. DO increases downstream, FCOL decreases generally downstream, and PO_4 generally increases downstream.
Warner Lakes Watershed				
Barrel Springs	Dry	-	Dry	Dry
Cowhead Slough	No (DO)	-	No. Fails to meet coldwater and spawning criteria; and Cowhead Lake tui chub and Warner sucker have been found above upper site in 1992. Intermittent stream.	Probably yes. FCOL improved between 2002 and 2003. Lots of trailing by livestock at site.
Horse Creek	-	No (PO_4, temp)	Yes. Failed coldwater and spawning criteria on only one occasion at very shallow upper site. Speckled dace present.	Yes. DO and FCOL generally improves downstream.
Little Coleman Creek	-	No (PO_4, temp)	Probably yes	Probably yes. DO improved between 2002 and 2003, FCOL varies widely.

Table 3.21-1 Water Quality Conditions for Key Streams in the Surprise Field Office Area

Stream	Meets State Standard		Meets Beneficial Use Needs	Meets Standards and Guidelines[a] Water Quality Criteria
	Lahontan Basin Plan (California)	Nevada		
Warner Lakes Watershed (continued)				
Rock Creek	-	No (DO 5.8 once)	Probably yes. Trout observed.	Yes. FCOL improves between 2002 and 2003.
Twelvemile Creek	-	No (Temp 24 °C once)	Probably yes.	Yes
Madeline Plains Watershed				
Alaska Creek	Yes	-	Probably yes. Barely fails coldwater and spawning criteria, which may affect trout.	Yes. FCOL improves between 2002 and 2003.
Boot Lake Creek	No (DO, FCOL)	-	Probably yes. Too shallow for fish. Reservoir regulates flow.	Probably yes. FCOL improved between 2002 and 2003.
Quaking Aspen Creek	Yes (one sample)	-	Yes	Yes
Red Rock Creek	Dry		Dry	Dry
Smoke Creek Desert Watershed				
Cottonwood Creek (Fox Mountain)	-	No (FCOL, temp)	Probably yes.	Probably not. FCOL worsened between 2002 and 2003.
Cottonwood Canyon Creek	-	No (DO, FCOL, PO_4, temp)	Probably yes. Extremely shallow.	Probably not. FCOL of 500+ 6/5/03. Heavy livestock use.
Hanging Rock Canyon	-	No (PO_4)	Probably yes.	Yes. FCOL 0.

Notes: DO = Dissolved oxygen.
FCOL = Fecal coliform.
NO_3 = Nitrate.
NTU = Nephelometric turbidity unit.
PO_4 = Phosphate.
Temp = Temperature.

[a] Based on U.S. Bureau of Land Management (1999).

3.22 Wild Horses and Burros

Wild, free-roaming horses have a long history of occurrence on lands administered by the Surprise Field Office. Wild horse populations are characterized by their genetic predecessors, animal numbers, sex and sex ratios, and herd descriptors—such as average size, age classes, and foal crop (number of foals/total population). No burros occur with the Surprise Field Office Area, but the resource is nonetheless referred to as Wild Horses and Burros.

3.22.1 Herd Management Areas

Wild horse herds are designated and managed according to the areas, in which they occur, referred to as herd management areas (HMAs). In the Surprise Field Office area, wild horses are managed in 9 HMAs. Table 3.22-1 shows the locations of these HMAs. The High Rock HMA is entirely contained within the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area (NCA), as are portions of the Fox-Hog, Nut Mountain, and Wall Canyon HMAs. Management direction for the High Rock HMA is established in the Resource Management Plan for the NCA. Some of the HMAs contains significant amounts of privately owned land (43,854 acres). Where these private lands are not fenced, wild horses have access to the private lands.

The appropriate number of wild horses for an HMA, referred to as the appropriate management level (AML), is established through an analysis of forage and water conditions, in consideration of other competing uses (i.e., livestock and wildlife). The AML is a standard used, following horse censuses, to determine whether excess animals must be removed ("gathered"). AMLs in the Surprise Field Office HMAs are generally described as ranges, with the high end of each range being the AML.

The present combined AML level for the nine HMAs on lands managed by the Surprise Field Office is 417 to 670 animals. Herd size estimates in October 2005 show herd levels at 1,245 horses, indicating that the number of horses present substantially exceeds the aggregated AML. Horse populations in 2005 were exceeding the AML in seven of the nine HMAs (Table 3.22-1). Individual band size ranges from 7 to 14 animals. There may be variation of the ratio of males to females between the herds, but the overall ratio is approximately 1:1. Assuming an average foaling rate of 20%, which is typical for these herds, the herds managed by the Surprise Field Office would have produced approximately 321 foals in 2004.

3.22.2 Management of the Animals

Control of animal numbers is the principal ongoing management action for horses in the Surprise Field Office area. In addition, baseline genetic data are being collected that will be used to refine current herd management. Animal movement and distribution are controlled by fencing and the distribution of watering sources, but decisions regarding these facilities are generally made through allotment management plans (AMPs) for livestock management.

Horses generally need to be gathered on a 3 to 4-year schedule to control animal levels; however, funding limitations have not allowed this schedule to be met. The need to gather animals is determined when monitoring indicates that populations exceed the AML. During gathers, animals are selected for return to the HMA or are determined to be excess and placed into the adoption program or put into long-term holding.

Table 3.22-1 Wild Horse Herd Management Areas

Herd Management Area	Herd Number	Acres of BLM-Managed Lands (Other Lands)	Initial Appropriate Management Levels (No. of Animals)	Estimated Population (October 2005)
Bitner	CA-267	53,672 (6,081)	15–20	69
High Rock HMA	CA-264[a]	94,497 (91)	78–120	360
Nut Mountain	CA-266	40,214 (1,789)	30–55	145
Carter Reservoir	CA-269	23,423 (2,349)	25–35	84
Coppersmith	CA-261	73,547 (13,273)	50–75	65
Massacre Lakes	CA-268	39,890 (4,004)	25–35	106
Buckhorn	CA-262	76,780 (9,388)	59–85	224
Fox Hog	CA-263	97,018 (4,646)	120–220	125
Wall Canyon	CA-265	41,051 (2,233)	15–25	67
Total		**540,092 (43,945)**	**417–670**	**1,245**

[a] Management direction for this HMA is within the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area RMP.

Herd sizes in the Surprise Field Office area appear generally to exceed AMLs and to be increasing at a rate of approximately 20% per year. Wild horse numbers appear to be limited principally by water availability and winter forage. If there are no significant changes in climatic patterns, livestock permit conditions, or gather activities, significant changes in herd characteristics or dynamics are not anticipated.

3.23 Wildlife and Fisheries

The following discussions summarize vegetation communities in the Surprise Field Office area and each habitat type's relative importance to biodiversity and the representative wildlife species that occur there. No vegetation mapping currently exists for lands in the Surprise Field Office area. Habitat types and potential habitat associations available to wildlife were derived from soil surveys. These associations were then fit into community types as shown in Tables 3.23-1 and 3.23-2, (see tables below and at end of this section) primarily using information from Maser and Thomas 1986, but also Mayer and Laudenslayer (1988) and O'Neil et al. (2001). Because soils were used to predict vegetation, effects of fires or other human management are not depicted. Acreages in Table 3.23-2 include private lands, which currently account for approximately 23% of the land base in the Surprise Field Office area.

Wildlife habitat types on lands managed by the Surprise Field Office are dominated by sagebrush, with another 5% in antelope bitterbrush and snowbrush ceanothus shrub types (Table 3.23-2). Western juniper has invaded—or likely could soon invade—an estimated 151,000 acres, or 10% of the BLM-administered lands in the field office area; however, only about 1% of the land area is actually typed as true juniper woodlands. Other uncommon but important habitats are listed in Table 3.23-2. Some of these habitats, including aspen woodland, may be somewhat underrepresented in acreage estimations because of their small size.

3.23.1 Habitats

White Fir

Small stands of white fir habitats in the Surprise Field Office area are located along the base of the Warner Mountains. These serve as important thermal cover for large mammals such as mule deer and elk; cover for bat species such as the Yuma myotis; and foraging and nesting habitat for many birds such as red-breasted nuthatch, golden-crowned kinglet, yellow-rumped warbler, brown creeper, western tanager, and mountain chickadee. Many white fir stands in the Warner Mountains, especially at the lower elevations, are currently experiencing heavy die-offs due to overstocking, lack of fire, and recent droughts in northeastern California.

Ponderosa Pine

There is very little ponderosa pine habitat on BLM-administered lands in the Surprise Field Office. Ponderosa pine is an important habitat used for nesting by bald eagles and, to a lesser extent, golden eagles. Bald eagles use large ponderosa pine trees for nesting and roosting, and at least one pair is known to roost regularly in pine in the Surprise Field Office area. This habitat also supports bitterbrush and other browse species important to mule deer and elk in migration areas. It serves as habitat for several bat species and as foraging and nesting habitat for the white-headed woodpecker, mountain chickadee, and many other bird species.

Ponderosa pine has a higher tolerance to drought and fire than white fir. It currently is in little danger of being lost, except possibly through catastrophic fire where it is found in proximity to juniper woodlands or near drought-killed stands of white fir.

Table 3.23-1 Terrestrial Plant Communities and General Wildlife Habitat Types

Plant Community Type	General Wildlife Habitat Type Used in This Document	Source Information[a]
Tree-Dominated Plant Communities		
White fir	White fir	WHR, WHRSO
Ponderosa pine	Ponderosa pine	WHR, WHRSO
Western juniper/big sagebrush/bearded bluebunch wheatgrass Western juniper/big sagebrush/Idaho fescue	Western juniper	SEO
Quaking aspen/mountain big sagebrush Quaking aspen/grass	Quaking aspen	SEO
Shrub-Dominated Plant Communities		
Curlleaf mountain mahogany/mountain big sagebrush/bunchgrass Curlleaf mountain mahogany/mountain snowberry/grass Curlleaf mountain mahogany/Idaho fescue (bunchgrass) Curlleaf mountain mahogany/bearded bluebunch wheatgrass/Idaho fescue	Curlleaf mountain mahogany/shrub and bunchgrasses	SEO
Basin big sagebrush/bunchgrass Mountain big sagebrush/bunchgrass (Thurber's and western needle grasses or needle and thread) Wyoming big sagebrush/bunchgrass Threetip sagebrush/bunchgrass Mountain silver sagebrush (stream margins)/bunchgrass Bolander silver sagebrush (alkali lake margins)/ bunchgrass Snowbrush ceanothus Antelope bitterbrush	Tall sagebrush/ bunchgrass (includes rubber rabbitbrush). Also antelope bitterbrush and snowbrush ceanothus	WHR, WHRSO, SEO
Low sagebrush/bunchgrass Early sagebrush/bunchgrass Black sagebrush/bunchgrass	Low sagebrush/ bunchgrass	SEO
Shadscale saltbush/bunchgrass Winterfat	Shadscale saltbush/ bunchgrass and winterfat	SEO
Black greasewood/grass	Black greasewood/grass	SEO
Grass/Forb-Dominated Plant Communities		
Permanent wet meadows Seasonally wet meadows	Permanent and seasonally wet meadows	SEO
Subalpine big sagebrush/bunchgrass Subalpine bunchgrass	Subalpine bunchgrasses	SEO

[a]SEO = Wildlife Habitats in Managed Rangelands - the Great Basin of Southeastern Oregon (Maser and Thomas 1986).

WHR = A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988).

WHRSO = Matrixes for Wildlife-Habitat Relationships in Oregon and Washington (O'Neil et al. 2001).

Western Juniper

Western juniper is substantially expanding its range and density along the northern and western lands in the Surprise Field Office area. In some areas where livestock grazing has reduced herbaceous cover sufficiently, juniper seedlings have established due to diminished competition and fire suppression. Native juniper stands often serve as important thermal and hiding cover and forage for mule deer, and also provide some hiding cover for pronghorn antelope and elk. Juniper berries are an important food source for wintering birds, especially Townsend's solitaire, mountain bluebird, American robin, and cedar waxwing. Breeding birds associated with this habitat include Swainson's hawk, juniper titmouse, and gray flycatcher. Ferruginous and red-tailed hawks, and golden and bald eagles roost on and hunt from juniper perches. Some of the myotis bat species found in the Surprise Field Office area may also roost in juniper.

Throughout the field office area, juniper is considered an invasive species on those sites that are not historical juniper woodland sites. The invaded sites are characterized by deeper soils and often are located below rim rock or along riparian areas. Where present long enough, juniper may increase to the point of excluding important brush, grass, and forb components. Such encroachment has reduced habitat extent and quality for species that depend on or prefer open grassland and shrub habitats, including such important species as the Greater sage-grouse and pronghorn (see individual species discussions below) and has reduced the availability of herbaceous forage for deer and other species. Because of the extensive expansion of juniper, there has been increased interest in removing juniper to enhance or restore important wildlife habitat (sagebrush, bitterbrush) and to reduce fuel loads. Most recently, the Surprise Field Office has removed juniper from riparian areas, aspen stands, and mahogany stands, and near residences in the Surprise Valley.

Quaking Aspen

Quaking aspen exists as scattered stands and clumps that are often, but not always, associated with dry and wet meadows and rim rock. Mule deer forage in aspen and use it as thermal and hiding cover. These stands are important to elk as foraging and calving grounds. Aspen supports high densities of breeding birds, including some species that prefer or are found primarily in aspen stands. Species in aspen areas include northern goshawk, Cooper's hawk, orange-crowned warbler, warbling vireo, tree swallow, house wren, bluebirds, sapsuckers, and woodpeckers. Several bat species use very old and decaying aspen for roosting and nursery colonies.

Many aspen stands have been degraded though long-term extensive livestock use and fire suppression in the Surprise Field Office area. Most stands in the field office area are of low quality, with few saplings and only one or two age classes. Recently, this habitat type has received more management attention. Cool fires and mechanical thinning of juniper have invigorated many stands, and several have been fenced to exclude cattle. In other cases, livestock grazing has been changed or used in conjunction with burning and tree felling to help restore aspen stand age class and structure.

Curlleaf Mountain Mahogany

This habitat occurs across the landscape, generally at mid-elevations and may exist as dense shrub habitats either in association with rock or very near to it. Depending on the fine scale habitat association (Table 3.23-2) this habitat may be found on any aspect and in association with several shrubs and bunchgrasses. Mountain mahogany is an important forage and thermal cover for mule deer, bighorn sheep, and many other mammals and birds and is often used as an intermediate, spring or fall, habitat by deer and bighorn sheep. Mule deer and bighorn sheep fawn and lamb among these habitats.

Because it often occurs with other large shrubs such as mountain big sagebrush, it is important as providing additional vertical and horizontal structure in the environment which is very important in maintaining high species diversity of birds and small mammals, such as Say's phoebe, sage thrasher, lesser goldfinch, western harvest mouse, and the least chipmunk. A species of recent concern with the California Department of Fish and Game and which is fairly well associated with this habitat is the common porcupine

In areas where it is associated with rock this habitat is fairly safe and generally occurs as mature stands mixed with juniper. In many locations these stands are very dense and value as forage has been reduced. In many areas where the topography is flatter, this habitat has been used heavily by sheep and cattle in the past and in some areas lost due to fire. Mountain mahogany does not survive fire well and can be burned easily on high productivity sites. Currently, this species has received some treatment to increase production of new growth and to make the sites more fire resistant. Most of this has occurred in important deer transition ranges.

Big Sagebrush, Snowbrush Ceanothus, and Antelope Bitterbrush

Taller sagebrush habitats make up most of the acreage on the Surprise Field office (Table 3.23-2). Big sagebrush is extremely important for wintering Greater sage-grouse and mule deer. Both these species and pronghorn use sagebrush types as fall forage. Sage-grouse use the taller sagebrush species, and antelope bitterbrush to some extent as hiding cover and sage-grouse almost exclusively nest at the base of big sagebrush plants. Residual grasses at least 18 cm (7 in) in height from the last years growing season are considered important for successfully hiding sage-grouse nests. Pygmy rabbit use particular micro-sites within big sagebrush. These sites must have deeper soils, approximately 50 cm (20 in) or greater, that allow this rabbit to burrow. Due to being on higher productivity soils and the varied plant associations sagebrush is found with, this habitat can be very susceptible to wildfires. In the past, it was common practice to remove sagebrush in favor of seeding grasses for livestock. The Surprise Field Office converted several thousand acres of sagebrush to crested wheatgrass in antelope winter and yearlong ranges.

Ceanothus species are considered very important browse and cover for deer, elk, and rabbits as well as for many small birds including the California quail. This habitat occurs at higher elevations, mixed with sagebrush and bunchgrasses in deer and elk summer ranges. Most of these habitats appear to be in good condition except where they occur near water.

Bitterbrush is one of the most important fall forages for mule deer in northeastern California and northwestern Nevada. Other animals that make use of this habitat include California quail, gray flycatcher, green-tailed towhee, squirrels, and chipmunks. In many cases where it occurs it has been heavily impacted by livestock resulting in hedged plants that are both difficult for wildlife to use and have reduced palatability (taste) and nutrition. Bitterbrush also does not tolerate fire well and in areas of wildfire is generally lost for at least several decades.

Current management for these habitats centers on appropriate management of livestock. With the Greater sage-grouse and other sagebrush obligate species now receiving more attention, type conversions of sagebrush have been halted and habitat projects and range management now consider this important wildlife habitat. Bitterbrush stands are managed specifically by monitoring this important species and setting standards for no more than moderate utilization.

Low Sagebrush

Low sagebrush is highly nutritious and palatable forage. Pronghorn antelope, mule deer, and sage-grouse prefer this forage and often wait to migrate until heavy snows force them to move onto less palatable plants (e.g., big sagebrush). In late winter/early spring, sage-grouse use strutting grounds in low sage habitats. Low sagebrush is very important to pronghorn antelope, as this species is adapted to areas with low vegetation that enables a better view of potential predators. Large raptors often hunt in this habitat because it affords a good view of prey and, depending on the site, few obstructions for low-level flight. Low sagebrush often occurs in association with gravels or boulders and therefore is fairly tolerant of fire, except during droughts or where close to taller sagebrush species. Current management of this habitat focuses on appropriate management of livestock.

Winterfat and Shadscale

Winterfat and shadscale habitats were grouped mainly on structural similarities and the lack of information for individual communities. Although only small amounts of winterfat are found in the field office area, this species is very palatable to game and livestock and can withstand fairly heavy grazing. Shadscale is much more abundant, is found in association with playa lakes, and is considered important forage on winter ranges of big game. In heavily grazed shadscale stands, cheatgrass is often abundant. No active management of this habitat takes place beyond fire suppression and adhering to the Standards and Guidelines for grazing. Playa and shadscale habitats are potential habitat for the Carson wandering skipper, a federally endangered butterfly, but this species is not known to occur on lands managed by the Surprise Field Office.

Black Greasewood

Black greasewood can be one of the taller shrub communities and in that capacity can provide excellent nesting cover and food for birds and small mammals. On lands managed by the Surprise Field Office black greasewood often occurs as a mid-height shrub rarely any taller than about (4ft). If the habitat is in good condition and plants relatively tall, black greasewood habitat can be used as thermal cover for big game species. Black greasewood is not considered, however, good forage for big game. Northern junco, Townsend's solitaire, and mountain bluebird are known to use this habitat. Pygmy rabbit use this habitat as well, however, probably not to any great extent. Rodents found in this habitat include the chisel-toothed kangaroo rat, Great Basin pocket mouse, various ground squirrels, and Townsend's pocket gophers. Bats species found on the field office are thought to only infrequently use this habitat except possibly in areas which have water. In areas of heavy grazing, it has been reported that black greasewood may replace sagebrush. Current management focuses on appropriate management of livestock.

Permanent and Seasonally Wet Meadows

Permanent and seasonally wet meadows habitats are especially important in desert environments. They provide an important source of water for most wildlife. Meadows also provide important foraging habitat for mule deer, elk, pronghorn antelope, and bighorn sheep. Depending on the availability of shrubs for cover, these habitats serve as important birthing grounds for large game. Many songbirds nest fairly close to or within meadow systems. This habitat type is also very important to bats and bank swallows, which feed on the abundant flying insects taken over wet meadows and open riparian areas. Wet meadows provide nesting habitat for greater sandhill crane, Wilson's phalarope, willet, and yellow rail—as well as many species of duck. Drier meadows provide habitat for many of the rodents found in the Surprise Field Office area, including deer mouse, Townsend's pocket gopher, and long-tailed meadow mouse.

Meadow habitat is highly favored by domestic sheep, cattle, and wild horses. In most cases, meadows have been and are the most heavily affected habitat on lands managed by the Surprise Field Office. In several cases, wet meadow systems have been dewatered due to erosion and subsequent lowering of the water table.

In other cases, riparian vegetation has been slowly replaced with upland species such as sagebrush due to the lowering of the water table. In the most severe cases, small meadows and springs have been converted to muddy watering holes. In some meadows, juniper invasion is also a threat. Current management of this habitat involves changing grazing practices, fencing out livestock, providing offsite water for livestock, treating noxious weeds, and removing juniper.

Subalpine Bunchgrass

Mule deer, pronghorn antelope, bighorn sheep, and occasionally elk use subalpine bunchgrass habitat, which can easily be damaged by excessive livestock use. This habitat makes up the least amount of potential habitat in the field office area, and little is known of its current state.

Playa

Playa habitat may account for up to 74,000 acres of BLM-administered land in the Surprise Field Office area. Because playas may hold water, ownership of this habitat is a complex issue as adjacent landowners own lakeshore up to the high water mark. Water levels vary greatly from year to year depending on the amount of precipitation and spring runoff. Ownership is mixed between private and state, and federal ownership. Depending on winter conditions and the location of springs, local playas can support a large number of waterfowl and shorebirds, including Canada goose, mallard, American avocet, killdeer, and marbled godwit. These species feed on brine and tadpole shrimp, clams, and various flies and mosquitoes produced in the shallow waters of playas. The edges between playas and perennial springs produce abundant vegetation and substrates for feeding, cover, and nest-building materials.

Dunes

Sand dunes, particularly those partially stabilized with vegetation, are important habitat for a variety of vertebrate wildlife (Maser and Thomas 1986). Dunes are generally associated with wind erosion of old lakebeds such as playas. Many rodents and lizards inhabit this habitat, as well as a surprising variety of songbirds. Due to this variety, many species feed in this habitat, including raptors, coyotes, bobcats, foxes, and weasels. Short-eared owls, spotted bats, horned lizards, and pygmy rabbits are known to use this habitat for feeding and reproduction. The extent of dunes is difficult to estimate because a large portion is found on private lands near dry and intermittent lakes. Publicly owned areas of this habitat type are limited in the Surprise Field Office area; however, large areas of this habitat are found along the perimeters of Lower, Massacre, West, and Alkali Lakes.

3.23.2 Federal Threatened and Endangered Species (including Proposed and Candidate Species)

The following paragraphs describe the current status and distribution of wildlife species that are known or suspected to occur in the Surprise Field Office area and have been listed or are candidates for listing as threatened or endangered under the federal Endangered Species Act (ESA). These species are included because they have been identified for protection and management within the Surprise Field Office area. Species status and habitat relationships are summarized in Table 3.23-3 (see table at end of this section.).

Carson Wandering Skipper

Habitat for the Carson wandering skipper, a federally endangered butterfly (*Pseudocopaeodes eunus obscurus*), is alkaline-tolerant grasslands (saltgrass) or alkaline-intolerant nectar sources near salt grass habitats. The larval host plant for this subspecies is saltgrass (*Distichlis spicata*); it is believed that the species produces only one brood per year, during June to mid-July. Other important habitat requirements may be elevations less than 5,000 feet, open areas near water or springs, and geothermal activity.

Potential habitat for this species is believed to exist in the field office area; however, no known surveys have been conducted in the field office area for this recently listed butterfly. Potential habitats may exist at the edge of playa lakes or other intermittent lakes found in the field office area (USDI, FWS 2002).

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is federally listed as threatened, although it is proposed for delisting. Suitable habitat for bald eagles includes large trees for perching and nesting near lakes and large rivers. Polite et al. (1990) stated that 87% of bald eagle nest sites in California are within 1 mile of water and that bald eagles require "large bodies of water or free-flowing streams with abundant fish. . ." Bald eagles primarily forage on fish, waterfowl, and carrion. Foraging sites are usually within 12 miles of bald eagle roosts (Shimamoto and Newman 1981).

The following information was excerpted from the Pacific Bald Eagle Recovery Plan (U.S. Fish and Wildlife Service 1986) and from Lehman (1979). Nest stands are more likely to be active if they are located a short distance from a persistent water source. Nest stands have from 20% to less than 40% canopy cover. Nest trees are often situated upslope from a water body in an exposed, prominent position—which allows for visibility in all directions. Nest tree height ranges from 76 to 150 feet, and the average diameter is 43 inches diameter at breast height (dbh). In California, 71% of the trees used are pine.

Noise and potential harassment of eagles from management activities are management concerns. In a model that assesses the effects of disturbance on breeding bald eagles, researchers found that eagle responses near active nests were greatest from pedestrian activities and lowest from aircraft flights (Grubb and King 1991). They also found that the distance from human disturbance was an important factor and recommended that a minimum buffer of 600 meters be instituted around breeding bald eagles. Although bald eagles have been seen in the Newland Reservoir/Boot Lake area during the nesting season, no nests have been located despite several opportunistic searches over the past few years.

Pygmy Rabbit

The pygmy rabbit (*Brachylagus idahoensis*) is not federally listed, California state-listed, or a BLM sensitive species but, because declines have been attributed to conversion of deep-soil sagebrush habitat to agricultural and managed grasslands, it is given special attention. In response to a petition to federally list the pygmy rabbit under the Endangered Species Act, on May 20, 2005, the USFWS published a non-substantial 90-day finding in the Federal Register, which means the petitioners did not provide substantial information to demonstrate that listing the species is appropriate at this time.

Pygmy rabbits are dependent on sagebrush, primarily big sagebrush (*Artemisia tridentata*) growing in deeper soils. Soil types can be loamy to ashy loams, and burrows are generally found greater than 20 inches deep. Burrows tend to occur in areas with few bunchgrasses and with overall shrub cover ranging from 21 to 36%. Pygmy rabbit burrows are almost always under big sagebrush and only rarely in the open. In some instances, they are known to use the old burrows of badger and marmots, as well as other natural cavities in rock or in the ground. Their winter diet consists of sagebrush and their spring and summer diet is augmented with grasses and forbs (Csuti and O'Neill 1997, Washington Department of Fish and Wildlife 1995).

Until recently there were only a few documented sightings of the species on lands managed by the Surprise Field Office. Several historical and current sightings have been verified in the Massacre Lake watershed, and a recent field office wide survey in 2006 detected more than 40 active pygmy rabbit burrows on the Surprise Field office area. Burrows were concentrated in the east half of the field office area, from its northern to southern boundaries. Because there is little information on historical populations, trends cannot be determined at this point.

Warner Sucker

The Warner sucker (*Catostomus warnerensis*) is federally listed as threatened. Warner suckers are found in streams and lakes that feed to or are located in the Warner Valley, Oregon. The described habitat for this species is slow-moving water in substrates that provide longer pools greater than 4.5 feet deep, with abundant vegetation along its banks, submersed and floating vegetation, undercut banks, root wads or boulders, and large beds of aquatic macrophytes (usually greater than 70% of substrate covered) (U.S. Fish and Wildlife Service 1998). Warner sucker spawning is influenced by temperature and water flows, and takes place over sand or gravel beds in slow pools. During 2002 surveys in the Warner Lakes watershed, U.S. Geological Survey (USGS) Biological Services Division biologists found one specimen of a Warner sucker on private lands in the East grazing allotment. The single specimen of the Warner sucker was found in waters with Cowhead Lake tui chub. This may indicate that these species use similar habitats, at least for portions of their life histories.

Biological opinions for the North Cowhead and Nevada Cowhead allotments have been issued by USFWS for grazing effects on Warner sucker. Proposed management actions for the Warner sucker include early season and rest/rotation grazing, minimum end-of-season stubble height requirements, and vegetation and stream temperature monitoring. Management measures are aimed at improving riparian habitat along watercourses in both allotments. Although critical habitat has been designated, no critical habitat for this species occurs on BLM-administered land in the Surprise Field Office area.

There is no information on historical populations of this species in the Surprise Field Office area, and it is difficult to interpret the finding of only one specimen in the 2002 surveys. The habitat appears to be of moderate quality. No future surveys are currently planned.

3.23.3 California State-Listed and BLM Sensitive Species

Species status and habitat associations for the California state-listed and BLM sensitive species are described below (see Table 3.23-3).

Swainson's Hawk

The Swainson's hawk (*Buteo swainsoni*) is listed as threatened under the California Endangered Species Act (CESA). Swainson's hawks nest in juniper and individual conifer and hardwoods (Woodbridge et al. 1995), especially along agricultural fields and also will roost on the ground if no trees are available (England et al. 1997). Nests are often located in low-density stands of trees. Open areas of meadows or croplands are used for foraging (England et al. 1997). This raptor feeds on small rodents, rabbits, snakes, and arthropods either by catching them in the air or jumping along the ground (England et al. 1997). Swainson's hawk territories have been documented in the Surprise Field Office area, but these were not on BLM-administered lands.

There are no data on population size nor is there monitoring of known pairs. No known formal surveys have been conducted for Swainson's hawks; however, the former Surprise Field Office biologist had records of nests in the Surprise Valley on private lands. Swainson's hawk populations are thought to be declining in northeastern California (California Department of Fish and Game 2002).

Greater Sandhill Crane

Greater sandhill cranes (*Grus canadensis tabida*), listed as threatened under CESA, nest mainly in wetlands—especially along margins of shallow water, where the birds assemble a nest of floating materials. Nesting also has been documented on islands. When feeding, this subspecies prefers open areas in croplands and meadow habitats, in dry and wet (preferred) habitats.

Sandhill cranes feed on roots, tubers, grasses, grains in croplands, earthworms, mice, snakes, frogs, crayfish, and various insects; they also will take fruits and berries if available (Tacha et al. 1992).

Although no cranes have been found nesting on BLM-administered lands, they are known to nest in wet grassy private pastures in the Surprise Valley and at the base of 49 Mountain east of Surprise Valley. They may nest in other locations in the Surprise Field Office area.

Willow Flycatcher

The willow flycatcher (*Empidonax traillii*) is state listed as endangered. Willow flycatchers are found in larger riparian and wet meadow systems from 2,000 to 8,000 feet, and generally nest in large willow thickets over or near slow-moving water (Sedgwick 2000, Harris et al. 1987). One summer of survey in the 1990s did not detect this species in the Surprise Field Office area, although at least one sighting is known from the Warner Mountains to the west. Optimum habitats for this species do not exist on public lands in the Surprise Field Office area; the larger wet meadow systems are privately owned. Several areas may provide suitable habitat, including the Rock and Horse Creek drainages in the north; and the Barber, Selic, and Alaska Creek drainages in the south.

Bank Swallow

The bank swallow (*Riparia riparia*) is listed as threatened under the CESA. Bank swallows build their nests on vertical to near-vertical riverbanks, cliffs, bluffs, and road cuts. Their nests are dug into cliff faces near the top of the face and often near a source of water such as a stream or lake or in a riparian area. Cliff substrate is generally of a fine-textured or sandy soil. Locally, bank swallow nesting habitat can be found in stream systems with the deep incised channel associated with past excessive livestock use and heavy spring runoffs. This species feeds primarily on insects it "hawks" over open wet meadows and other riparian areas. In migration, this species flocks with other swallows over many open habitats. (Garrison 1999.)

There are scattered, local breeding colonies of bank swallows in Modoc County (Airola 1980). It is possible that some colonies are established near BLM-administered wetlands in the Surprise Field Office area. Bank swallows have been detected during the Surprise Valley route of the Breeding Bird Survey, but no colonies were found. There is no information on the current or historical population status or trends for bank swallows in the Surprise Field Office area.

California Bighorn Sheep

California bighorn sheep (*Ovis canadensis californiana*) is state listed as threatened. Habitat for bighorn includes steep, rocky terrain for escape cover and bedding opportunities that are adjacent to open vegetation for foraging and water. Due to predation issues, high-quality bighorn sheep habitat (steep areas) generally is within ¼ mile of water. This species can be found in a variety of habitats, including big and low sagebrush, juniper woodland edges, perennial grasslands, and bitterbrush. Although woodlands areas can be used, the species prefers low-growing vegetation to better detect predators.

Several distinct populations of California bighorn sheep exist on lands administered by the Surprise Field Office. All of these sheep have been reintroduced since the late 1980s, and they are currently expanding into suitable habitats. All of the reintroduced California bighorn sheep in the Warner Mountains to the west and adjacent to the Surprise Field Office died from disease in the late 1980s, apparently due to contact with domestic sheep. On BLM lands managed by the Surprise Field Office, there are several areas of potential habitat (steep, rocky areas without domestic sheep) where there are no sheep; however, water availability is low to non-existent in these areas. In recent years, the lack of water in bighorn ranges has forced a few bighorn sheep to cross over to the Warner Mountains.

Current information from the Nevada Department of Wildlife (NDOW) shows populations of this popular game animal to be on the increase although limited to some degree by water availability and interaction with domestic sheep.

Northern Sagebrush Lizard

The northern sagebrush lizard (*Sceloporus graciosus graciosus*) is on BLM's list of sensitive species. Northern sagebrush lizards are widely distributed in the Great Basin and Intermountain regions (Stebbins 2003). Habitat is usually sagebrush-dominated, but sagebrush lizards can be found in open forests of juniper, ponderosa pine, and lodgepole pine. They forage on small arthropods, especially ants and beetles. They often bask in the sun for thermo-regulation on the ground, in low branches, and on rocks. Eggs are laid in small holes dug a few centimeters deep in loose soil at the base of shrubs. Northern sagebrush lizards hibernate in crevices and small rodent burrows. They are not known to need free water and are important prey species for some snakes and predatory birds. (Nussbaum et al. 1983)

Northern sagebrush lizard is common in most terrestrial habitats in the region; however, little to no quantified data is available related to the lizard's presence on BLM-administered lands in the Surprise Field Office area. No surveys have been conducted for sagebrush lizard or its habitats in the field office area.

Ferruginous Hawk

The ferruginous hawk (*Buteo regalis*) is a BLM sensitive species. Ferruginous hawks inhabit open grasslands, sagebrush flats, desert scrub, and juniper woodland fringes. During winter, small populations are found locally at lower elevations. They often nest in lone trees but may also nest in low cliff faces, buttes, cut banks, shrubs, or other natural or human-made elevated structures. They hunt for rabbits, ground squirrels, and mice—and occasionally birds, reptiles, and amphibians (Bechard and Schmutz 1995).

There are a few historical records of this species during the breeding season and one record of a pair nesting in northern Lassen County for several years during the 1980s and 1990s (the only breeding record for California), as well as a record of a pair in the Surprise Valley east of Eagleville in June 2003 (Sterling pers. comm.). Ferruginous hawk is an uncommon winter visitor and migrant through northeastern California. It has been documented in both the Surprise and Guano watersheds in the Surprise Field Office area. No formal surveys have been conducted for ferruginous hawks in the field office area.

Golden Eagle

The golden eagle (*Aquila chrysaetos*) is on BLM's list of sensitive species. Golden eagles nest on cliffs, although a few use large trees (Menkens and Anderson 1987). They are long-lived and loyal to their territories (Steenhof et al. 1997). A study by BLM biologists in northeastern California showed that jackrabbits and cottontail rabbits comprised over 90% of the biomass consumed by golden eagles during the breeding season (Bloom and Hawks 1982).

Approximately 22–35 golden eagle territories are located on land managed by the Surprise Field Office, including four known nesting sites in the Warner Lakes watershed, 2–3 sites in the Guano watershed, 2–5 sites in the Surprise Valley watershed, 14–23 sites in Massacre Lake watershed, and 2–4 sites in the Smoke Creek Desert watershed. Management for this species includes only designating limited operating periods (LOPs) during the nesting season around known active nests. Surveys of nest sites conducted from 1975 to 1979 and in 2002–2003 found annual variability in occupancy (Table 3.23-4). Additional occupied nests likely could be found with additional survey effort. Currently, the Surprise Field Office biologist estimates that approximately 50% of the nests within the Surprise Field Office area are active.

Table 3.23-4 Golden Eagle Breeding Survey Results for the Surprise Field Office Area

Year	Number of Nests Surveyed	Number of Active Nests	Percentage Active	Number of Nests with Nestlings	Number of Young
1975	3	1	0.33	unknown	unknown
1976	16	12	0.75	unknown	30 fledged
1977	35	27	0.77	unknown	30 fledged
1978	36	26	0.72	unknown	41 fledged
1979	36	22	0.61	unknown	30 fledged
2002	47	17	0.36	11	17 nestlings observed
2003	20	7	0.35	6	6 nestlings observed

Greater Sage-Grouse

Greater sage-grouse (*Centrocercus urophasianus*) is on BLM's list of sensitive species. Greater sage-grouse is heavily dependent on sagebrush habitats and is considered a sagebrush obligate species. On BLM lands in the Surprise Field Office area, historical and active strutting grounds (known as leks) are located primarily in low sagebrush habitats. Sage-grouse inhabit sagebrush stands throughout the year. Leks are often located in open areas surrounding sagebrush (Connelly et al. 2000). Sage-grouse most often nest successfully under sagebrush shrubs associated with tall grass cover (Gregg et al. 1994).

Residual grasses at least 7 inches (18 centimeters) in height from the previous year's growing season are considered critical for successfully hiding sage-grouse nests. Although many nests have been found in lower-quality habitats, these are almost always unsuccessful due to nest abandonment and predation. Sage-grouse raise their broods in wet meadow and riparian habitats, where the young can forage on the abundant insects that are a critical component to their diet during their first few weeks of life (Schroeder et al. 1999).

Survey efforts between the mid 1990s and the present in the Surprise Field Office area have found active historical leks and several previously unknown active leks. The population of sage-grouse (about 500) in the Warner Lake watershed is one of the largest in northeastern California. In the Guano watershed, important summer brood-rearing areas for this species are on top of the Bitner Tables and along Badger Creek in the Bitner Ranch meadow area. In the Surprise Valley watershed, the lek at Fee Reservoir is one of the three largest leks in the Surprise Field Office area. Although weather has sometimes drastically affected annual survey efforts, as recently as 2006, field work showed that the Surprise Field Office has approximately 50 active leks. Because most areas of the field office are only now being regularly surveyed, it is difficult to ascertain any loss or gains in historic lek numbers with great certainty. Recent surveys however indicate that the number of leks appears to be stable, although bird attendance varies annually.

Burrowing Owl

The burrowing owl (*Athene cunicularia*) is a BLM sensitive species. In northeastern California, burrowing owls are summer residents of open grasslands and sagebrush stands. This small owl primarily roosts and nests in the burrows of ground squirrels and other small mammals, and hunts from low perches where it may pounce on insects and small rodent prey. Burrows and shrubs are important to this species for thermo-regulation. Ground squirrels provide many of these burrows in much of the species ranges, and rodent-eradication campaigns often lead to abandonment of the area by burrowing owls. In areas where burrows are scarce, human-made structures such as pipes, culverts, and nest boxes have been used for nesting (Haug et al. 1993).

Burrowing owls are known only from a few sightings on the Surprise Field Office, in the Massacre Lake watershed around Duck Lake and in the Surprise Valley west of Pinto Peak. Except for a recent observation on BLM lands in 2007, most observations have been in association with culverts. The species likely has declined in northeastern California, as there are very few records in Modoc County since the mid-1980s; all of these in the Surprise Valley. The cause of the species' decline in Modoc County is unclear, although ground squirrels have been poisoned in the past on private lands and are currently heavily hunted seasonally

Juniper Titmouse

The juniper titmouse (*Baeolophus ridgwayi*) is listed as a BLM sensitive species. Juniper titmice are rare to uncommon in the Surprise Field Office area (Cicero 1996 and 2000). They are found primarily in juniper woodlands mixed with sagebrush and other shrubs, and with large, mature juniper trees that provide nest sites in natural cavities (Cicero 2000). Juniper titmice forage on arthropods gleaned from twigs, branches, and the bark of trees; they also eat berries (Cicero 2000). There is little information about this species in the Surprise Field Office area; however, a substantial amount of potentially suitable habitat is present in the area.

BLM Sensitive Bats

A variety of bat species, including BLM sensitive Yuma myotis (*Myotis yumanensis*), long-eared myotis (*Myotis evotis*), small-footed myotis (*Myotis ciliolabrum*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), and Townsend's western big-eared bat (*Plecotus townsendii*) may be found throughout the field office area due to a high amount of suitable habitat. Rock outcrops, canyon cliffs, and trees provide roosting and maternity habitats

Yuma Myotis. Yuma myotis inhabit open woodlands and forests with streams, stock tanks, and ponds over which they feed and drink. They roost in buildings, bridges, mines, caves, and crevices, as well as abandoned swallow nests. These sites also are used for maternity colonies. This species has a relatively poor urine-concentrating ability and must therefore drink water regularly. Winter habitat is poorly understood, but apparently this species hibernates. (Altenbach, J.S.,W. Amy, P.V. Bradley, P.E. Brown, K. Dewberry, D.B. Hall, J. Jeffers, B. Lund, J.E. Newmark, M.J. O'Farrell, M. Rahn, R.E. Sherwin, C.R. Tomlinson, J.A. Williams. 2002. Nevada Bat Conservation Plan. Nevada Bat Working Group. Austin, Nevada. 2006)

Long-Eared Myotis. Long-eared myotis are found primarily in juniper and higher-elevation coniferous forests. Long-eared myotis feed along open habitat edges, in open areas, and over water. They avoid highly arid areas and are closely associated with water, as this species has a relatively poor urine-concentrating ability. Nursery colonies and roost sites consist of buildings, crevices, snags, and the spaces under bark. Caves are used primarily as roost sites. The long-eared myotis forage on beetles, moths, spiders, and flies over water, trees, and shrubs. This species does not migrate, but little is known of its winter hibernation habits (Nevada Bat Conservation Plan, Nevada Bat Working Group, 2006).

Small-Footed Myotis. Small-footed myotis occur in a variety of habitats, including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. Summer and winter ranges appear to coincide. Often seen foraging over water and trees, these bats prey on aerial moths, flies, beetles, and bugs. Small maternity colonies are found in buildings, caves, and mines. These sites, as well as bridges and bark crevices can be used for roosting. Often seen drinking water soon after emerging, small-footed myotis prefer humid roost sites. They have a high tolerance for cold and can be found in drafty sites less tolerable to other myotis.

The species is known to hibernate and often can be found feeding or roosting with other bat species(Nevada Bat Conservation Plan, Nevada Bat Working Group, 2006). This bat species is most

common in woodland habitats but is also known to use Great Basin shrub habitats, uncommon in arid grasslands. Long-legged myotis feed fairly low to the ground 3-5 m (10-15 ft) over water, close to trees and cliffs and in woodland openings. It takes flying insects but chief prey species are moths. Cover is found in rock crevices, buildings, under bark, in snags, mines, and caves. Trees are probably the most important day roosts, caves and mines are only used at night. This species usually forms nursery colonies numbering several hundred, usually under bark or in hollow trees. Occasionally it will use crevices or buildings for this purpose. This species also has poor urine concentrating ability and must therefore drink water regularly.

Long-Legged Myotis. This bat species is most common in woodland habitats but is also known to use Great Basin shrub habitats, uncommon in arid grasslands. Long-legged myotis feed fairly low to the ground 3-5 m (10-15 ft) over water, close to trees and cliffs and in woodland openings. It takes flying insects but chief prey species are moths. Cover is found in rock crevices, buildings, under bark, in snags, mines, and caves. Trees are probably the most important day roosts, caves and mines are only used at night. This species usually forms nursery colonies numbering several hundred, usually under bark or in hollow trees. Occasionally it will use crevices or buildings for this purpose. This species also has poor urine concentrating ability and must therefore drink water regularly.

Pallid Bat. Pallid bats occur in a variety of habitats, including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. They prey primarily on large arthropods on the ground, including beetles, crickets, and centipedes, but also will take moths in flight. Their day roosts include trees, rock outcrops, mines, caves, buildings, and bridges. At night, they roost primarily under bridges, and in caves and mines. They do not migrate and sometimes awake from hibernation during winter to forage and drink (Nevada Bat Conservation Plan, Nevada Bat Working Group, 2006).

Spotted Bat. Spotted bats occur in a variety of habitats, including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. They are closely associated with cliff faces, where they primarily roost. They sometime roost during winter in caves and have been documented roosting in buildings. Spotted bats prey on moths and other flying insects, most often over canyons, riparian vegetation, or open meadows and shrubland. They are not known to congregate as they often forage and roost alone. They do not migrate and sometimes awake from hibernation during winter to forage and drink (Nevada Bat Conservation Plan, Nevada Bat Working Group, 2006).

Townsend's Western Big-Eared Bat. Townsend's western big-eared bats occupy a variety of habitats, including late-seral stage forests and riparian areas. Foraging habitats are varied, but they primarily prey on moths. These bats roost exclusively in caves, mines, and buildings. Caves need to meet specific microclimatic conditions for successful roosting, and this species is very susceptible to disturbance (Campbell and MacFarlane 2000). Potential habitats for this species include almost all vegetation types; however, the presence of caves, mines, buildings and other human-made structures is essential (Nevada Bat Conservation Plan, Nevada Bat Working Group, 2006).

Potential roosting and reproduction habitats (e.g., small caves, habitable mines, and other human-made structures) have not been inventoried in the Surprise Field Office area. Because potential habitat for this species includes almost all vegetation types, quantifying acres of potential habitat for the species is difficult. This bat could forage over literally tens of thousands of acres, depending on the presence of caves and other features.

Wall Canyon Sucker

The Wall Canyon sucker (*Catostomus murivallis.*) is listed by BLM as sensitive. Although habitat preferences have not been identified, the fish is known to inhabit the Wall Canyon and Mountain View creek systems. Important habitats are probably similar to those of the Warner sucker. This fish is currently found in warm to cool waters of these systems; spawning pairs have been found in deep pools in Wall Canyon Creek (Flores pers. comm.). Adult suckers have been observed using boulders and aquatic vegetation as cover, and juveniles have been observed feeding over vegetation clumps (Chappell pers. comm.). Wall Canyon sucker was first found in higher abundance in very turbid waters with heavily silted streambeds and in unvegetated banks that were damaged by livestock. When the season of use was changed due to heavy livestock use, the riparian and aquatic habitat, and the water quality improved in Wall Canyon Creek; however, competition with nonnative brown trout that had been planted in the system increased concurrently. Brown trout now almost exclusively inhabit the best-quality waters in the system, except for a few small areas that are probably protected by stretches of warm water that form barriers to the coldwater trout.

Predation by introduced brown trout is currently a problem for Wall Canyon sucker. NDOW surveyed for suckers in the early to mid-1980s and again in 1999, and documented a severe population decline during that time. Shortly thereafter, brown trout were removed through use of electroshock as a short-term emergency measure to prevent the extinction of the Wall Canyon sucker. Additional surveys since (Nevada Department of Wildlife unpublished data) have shown that the population appears secure, but only in the very upper sections of Wall Canyon Creek. Most of this species original habitat is now occupied by brown trout.

3.23.4 Ungulates

The principal ungulate (big game) species that require management consideration in the Surprise Field Office area are mule deer, Rocky Mountain elk, pronghorn antelope, and California bighorn sheep. Habitat relationships for these big game species are summarized in Table 3.23-3.

Mule Deer

Mule deer (*Odocoileus hemionus*) inhabit early to intermediate successional forests and brushlands, and prefer a mosaic of various-aged vegetation that provides woody cover, meadow and shrubby openings, and free water (Zeiner et al. 1990). For thermo-regulation, deer use heavy shrub and tree cover—as well as southern topographic aspects during winter and northern aspects during summer. Deer require adequate supplies of highly digestible, succulent forage for optimal growth and productivity (Anderson and Wallmo 1984). Foraging habitat is a limiting factor for mule deer in northeastern California, but BLM lands managed by the Surprise Field Office provide important transition or intermediate ranges (California Department of Fish and Game 1998). These ranges are important to deer preparing for fawning in spring and preparing for winter by gaining weight. They include bitterbrush, mountain mahogany, and juniper habitats as well as dense groundcover of forbs.

Mule deer migrate through the Warner Lakes watershed. Deer habitat mainly comprises spring and fall range, although some summer range is apparently present at higher elevations. Some of these deer are part of the Warner Mountain deer herd. Two major deer routes traverse the gentle slopes and valley that link Nevada with Oregon and California.

In NDOW's Hunt Unit 011 that overlaps the Gauno watershed, mule deer populations have been steadily increasing since the mid-1990s. However, population levels have fluctuated on the Sheldon NWR to the east. Most of the deer in the Surprise Valley watershed are part of the Warner Mountain deer herd. Summer and fall habitats for mule deer are found in the Warner Mountains, Coppersmith Hills, and Hays Range. Most winter habitats for these deer are found in Surprise Valley, Duck Lake, or the Modoc Plateau. In the Massacre Lake watershed, some of the major summer and fall habitats for mule deer are found at the higher elevations northwest of Massacre Lakes, around Bald Mountain Canyon, southwest of Home Camp, in the Hays Range, and between Wall Canyon Creek and Cherry Creek. Wintering areas include lower-elevation, south-facing slopes in the vicinity of these sites. The Warner Mountain deer herd uses the Madeline Plain watershed for spring to summer range and as a migration corridor.

Long-term studies show that overall deer numbers are slightly down in California and slightly increased in Nevada. In some watersheds, juniper expansion has caused a major decline in shrub reproduction and health. High-density juniper is the most important limiting factor in high-quality deer forage.

Rocky Mountain Elk

Rocky Mountain elk (*Cervus elaphus nelsoni*) are generally found in heavily timbered areas with dense understories of brush, where they eat a wide variety of plants including grasses, forbs, and shrubs. Woodlands serve as important thermal and hiding cover. In the Surprise Field Office area, elk occupy juniper, aspen, and pine woodlands that are close to wet meadows. In high-quality elk habitat, water is usually available within 2 miles (3.2 km). During winter, elk consume snow for their water needs. Dense, brushy areas close to water are used as calving grounds. Elk require relative seclusion from humans, but management is needed to prevent their overpopulation. Although no records exist for sightings of elk in the Warner Lakes watershed, elk have been reported in the Crooks Lake area to the south, in Twelvemile Creek to the north, and around the Yellow Peak area to the east. Some apparent elk sign was recently found in the Rock Creek area of the Nevada Cowhead allotment. Only a few elk are thought to use this watershed; however, this is expected to change as vegetation management continues to improve upland and riparian conditions.

In the Surprise Valley watershed, elk travel throughout the Warner Mountains; and a large herd resides around Fandango Pass, both outside BLM-administered lands. Recent sightings of elk have been noted just above Cedarville and around Lake Annie.

Pronghorn Antelope

During pre-settlement, pronghorn antelope (*Antilocapra americana*) was one of the most abundant game species in California; by 1923, however, only about 1,000 remained due to "adverse land use and unregulated hunting" (Pyshora 1977). Pronghorn prefer open rangeland types that support a variety of vegetative types. Areas with low shrubs typify summer habitat, with a diversity of native grasses and forbs (Gregg et al. 2001). They do not appear to depend on open water, if there is sufficient moisture in the vegetation (Reynolds 1984, O'Gara 1978). Although browse is the dominant food ingested, forbs are an important source of protein and minerals (Pyshora 1977). Pronghorn and other large and small game benefit from management that favors increases in forb cover.

In the Warner Lakes watershed, pronghorn frequent the open flats and occasionally move through heavy juniper stands at lower elevations—particularly northeast of Cowhead Lake from Cowhead Slough east toward Coleman Valley. Two major pronghorn routes traverse the gentle slopes and valley that link Nevada with Oregon and California. Pronghorn may kid in the Crooks Lake area.

The Sheldon NWR east of the Guano watershed manages habitat primarily through the use of prescribed fire and supports an estimated pronghorn population of more than 3,500.

The pronghorn population in the Guano watershed (Hunt Units 011 and 033) appears to be steadily increasing from their previous low levels in the late 1990s.

In the Surprise Valley watershed, pronghorn inhabit the area around Snake Lake from summer to fall, and the area around Cowhead Lake and Fee Reservoir from early spring through summer. There may be kidding areas around Snake Lake, Fee Reservoir, and Cowhead Lake and on the western base of 49 Mountain.

In the Massacre Lake watershed, pronghorn inhabit Long Valley, Duck Lake, and the Massacre Lakes areas throughout the year. NDOW considers the Massacre Lakes area an important kidding area for pronghorn.

3.23.5 Sagebrush Ecosystem

Mosaics of various seral stages of sagebrush and bunchgrass habitats characterize the healthy sagebrush ecosystems that support many of the wildlife species in the Surprise Field Office area, including big game and upland game and many species of reptiles, rodents, raptors, and songbirds. Numerous Nevada BLM sensitive species are sagebrush-dependent. These species are declining throughout much of Nevada due to the transformation of millions of acres of sagebrush to cheatgrass and other invasive plant communities. This transformation is induced by fire, especially during drought years.
Within the Surprise Field Office area, such large-scale transformation of sagebrush has not happened because few fires have occurred, and none have reached a scale as large as those in the Winnemucca and other Nevada BLM Field Office areas.

3.23.6 Native and Nonnative Fish and Aquatic Species

In summer 2003, stream habitat conditions were assessed for 16 streams in the Surprise Field Office area. Fish were surveyed in the streams in California but not in Nevada. The results of these assessments indicate that most streams lacked sufficient qualities to be rated as good-quality stream habitat for coldwater fish.

Approximately 75% of the riffle-rubble of a streambed should be free from sedimentation in streams supporting native fishes (Maser and Thomas 1986). Heavy sediments do not allow sufficient oxygen to pass through gravels to oxygenate fish eggs and reduce the suitability of a stream to produce healthy populations of instream macro invertebrates that adult fish feed on. The average sedimentation in the surveyed streams was found to be 27.7%, with a range between 5.3 and 97%.

Most streams also lacked sufficient numbers of high-quality pools for fish habitat. Pool class ratings ranged from 1 to 5, with 1 having the most favorable attributes that includes sufficient size, depth, amount, and type of pool cover. The average pool class rating was 3.9, with an average stream rating between 3 and 5. Most streams rated were located in the Warner Mountains; however, two longer stream reaches rated were Sand Creek and Wall Canyon Creek. Sand Creek supports only speckled dace (*Rhinichthys osculus*) while Wall Canyon Creek has native Wall Canyon sucker (*Catostomus* sp.), speckled dace, and redside shiner (*Richardsonius balteatus)*, and nonnative cuttbow (hybrid cutthroat x rainbow trout (*Oncorhynchus clarkii x mykiss)* and brown trout (*Salmo trutta)* A 50:50 mix of riffle-to-pool habitat generally is considered good for supporting fish populations. Pools are used for resting; to avoid danger; and as a habitat to escape warmer, shallower water.

Riffle habitat produces higher oxygen concentrations and therefore tends to support more numerous, diverse, and often larger macro invertebrates. In the stream reaches surveyed, about 43% of the habitat was rated as pools. This number must be taken cautiously for two reasons: (1) surveys took place over several months, during which time water flows changed dramatically for some streams; and (2) different streams naturally have different pool-to-riffle ratios based on geology, topography, and availability of instream substrates (e.g., logs and boulders).

Table 3.23-3 provides a breakdown of potential and known occupied waters for special-status fish species in the Surprise Field Office area. All of these fish are warm water species and include Warner sucker (*Catostomus warnerensis*), and Wall Canyon sucker (*Catostomus murivallis*). Because these special-status species have been surveyed intensely, good distribution information or population estimates are available for them (Scoppettone and Rissler 2002, 2003). Most of the occupied habitat for the above three species is on private lands (61%), while the remaining 39% are public lands. Of the approximately 45–52 miles of total habitats (potential and occupied) for these species, only about 22.5–28.7 miles are potential habitat, and only about 12.5 miles are on public lands administered by the Surprise Field Office. Because these species prefer slower water, especially in pools, very little additional habitat likely would be available for these species unless additional habitat (pools) was created by blasting, dredging, or managing water flows for a longer period of time.

Due to time and budget constraints, not all streams on BLM-administered lands were surveyed for the presence of fish and habitat. No mileage data are available for occupied or potential habitat for most fish species, although speckled dace appear to be present in all fourth-level watersheds in the Surprise Field Office area. Coldwater fish species are mainly found on the eastern slopes of the Warner Mountains but can also be found as planted populations in some reservoirs, especially in Wall Canyon reservoir. In the coldwater streams of the Warner Mountains, fish species include planted Eagle Lake rainbow trout, introduced brown trout, and a native redband trout (*Oncorhynchus mykiss* spp.*)*. Approximately 16 miles of coldwater public streams support recreational fishing. Approximately 3 miles of additional perennial stream habitat on BLM-administered lands in the Warner Mountains are believed to lack fish and are inaccessible to the public. The Wall Canyon system supports recreational fishing for introduced brown, planted rainbow, and hybrid cuttbow trout. Within this system, there is public access to about 19 miles of perennial streams. Due to past overgrazing, however, only about 7 miles of these streams are capable of supporting recreational fishing (mainly brown trout). Other small systems have the potential for coldwater fisheries but are surrounded by private property and are therefore inaccessible to the public (e.g., Sand Creek).

One of the primary problems with maintaining healthy fish populations in the field office is the lack of control on water flows. Many fisheries are associated with large, private irrigation reservoirs upstream. BLM has no jurisdiction over water flows that are associated with agriculture in the Surprise Valley or at the Duck Lake Ranch (Wall Canyon system). These sporadic flows depend on the private irrigation operation downstream. With flows not following the natural timing of runoff, fish spawning behavior and food availability may be compromised to the point where healthy populations are no longer viable.

3.23.7 Native Wildlife

Upland Gamebirds

Upland gamebirds in the Surprise Field Office area include the native Greater sage-grouse (*Centrocercus urophasianus*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), and some blue grouse (*Dendragapus obscurus*)—and the nonnative chukar (*Alectoris chukar*) (see "Nonnative Wildlife and Invasive Species"). The species most hunted is chukar, and sage-grouse are hunted only in Nevada. Most habitats for California quail, blue grouse, and mourning dove exists along the eastern slopes of the Warner Mountains on private lands. There is no information on the population trends of these upland gamebird species.

Other Terrestrial Wildlife

Appendix G shows known vertebrate species occurrence on lands managed by the Surprise Field Office based on data from earlier BLM land use plans, field notes, large-scale bird surveys, and local knowledge. Most taxa, including invertebrates, have not been surveyed or have been surveyed only at very low levels. These taxa may exist in high numbers and varieties, but there are no supporting data.

3.23.8 Nonnative Wildlife and Invasive Species

Turkey

Wild turkeys (*Meleagris gallopavo*) are not known to currently inhabit lands managed by the Surprise Field Office. There are, however, reintroduced turkeys adjacent to BLM lands on private lands in Surprise Valley and on lands managed by the U.S. Forest Service.

Chukar

Chukar is probably the most popular game bird within the Surprise Field Office. This species makes extensive use of cheatgrass and is often found in association with cheatgrass on steep talus slopes near water. NDOW has managed for chukar in the Surprise Field Office mainly by the placement and maintenance of guzzlers (artificial water sources) specifically designed for small gamebirds. NDOW has set up 14 of these guzzlers in the Surprise Field Office area, all in the southern and southeastern portions of the field office. Chukar populations are currently thriving in the field office area.

3.23.9 Invasive Species

No nonnative wildlife and fish species have been identified as management issues for native wildlife in the Surprise Field Office Area. The nonnative European starling has potential to compete for nest sites with some native species. The brown-headed cowbird, an obligate parasitic nester that is native elsewhere in North America, has expanded its range only recently into the region. The cowbird has affected nesting success of some species in northern California, at least locally (Airola 1985).

A number of nonnative warm water and coldwater sportfish and the bullfrog have been established in waters on BLM-administered lands (see "Native and Nonnative Fish and Aquatic Species"). Many of these waters have been created or modified by impoundments on public and private lands, and by water use practices that favor nonnative species. Nonnative species have potential to compete with and prey upon native species of fish and amphibians in these waterbodies.

Table 3.23-2 Wildlife Community Types in Watersheds of the Surprise Field Office (acres)

Watershed	White fir	Ponderosa pine	Western juniper	Quaking aspen	Curlleaf mountain mahogany/Shrub and Bunchgrasses	Tall sagebrush/ Bunchgrass (includes rubber rabbitbrush)	Snowbrush ceanothus	Antelope bitterbrush	Low sagebrush/Bunchgrass	Winterfat	Shadscale saltbush/Bunchgrass	Black greasewood/Grass	Permanent and seasonally wet meadows	Subalpine bunchgrasses	Barren	Playa	Rock	Total
Warner Lakes	166		4,228	504	1,428	34,020		2,467	40,726			846	256	255				84,896
Upper Pit	312	38			217	6,220		23	63				440					7,313
Massacre Lakes			10,164	1,859	1,892	411,022	183	24,539	223,753	138	9,566	61,279	14,000	31	13	15,193	15,730	789,362
Madeline Plains	334	1	317		1,413	14,988		3,964	2,825				1,847				1,127	26,816
Surprise Valley	480		4,577	958	2,102	116,840		52,340	72,786		35,536	18,421	18,508	174				322,722
Smoke Creek Desert			36		1,496	187,345	460	15,007	127,133			257	564	13			4,878	337,189
Total acres	1,292	39	19,322	3,321	8,548	770,435	643	98,340	467,286	138	45,102	80,803	35,615	473	13	15,193	21,735	1,568,298
Percentage total acres by habitat	0.1	<0.1	1.2	0.2	0.5	49.1	<0.1	6.2	29.8	<0.1	2.9	5.2	2.3	<0.1	<0.1	1	1.4	100

Note: Wildlife community types were derived using digitized soils data to predict potential natural vegetation for the Surprise Field Office. Potential vegetation communities were then assigned to existing wildlife matrixes (See Table 3.23-1). "Barren", "Playa", and "Rock" fell out in the soils/vegetation analysis, however, only "Playa" was found dealt with as a separate wildlife habitat in the referenced matrixes.

Table 3.23-3 Special-Status Species, Important Game Species, and Their Habitats in the Surprise Field Office

Species	Special Classification[a]	Habitat														
		Streams	White Fir	Ponderosa Pine	Western Juniper	Quaking Aspen	Curlleaf Mountain Mahogany	Tall Sagebrush/Antelope Bitterbrush/Snowbrush Ceanothus	Low Sagebrush	Black Greasewood	Shadscale/Winterfat	Wet Meadows[b]	Subalpine Bunchgrasses	Barren	Playa	Rock
Bald eagle	FT	X	X	X											X	
Pygmy rabbit	FP				X			X	X	X	X					
Swainson's hawk	ST	x			X	X	X	X	X	X	x	x	x		X	
Bank swallow	ST	X	x		x	X	X	X	x	x		X	X		X	
Greater sandhill crane	ST	X										X				
California bighorn sheep	ST	X		X	x	x	X	X	X	x	X	X	X		X	
Golden eagle	BLM	x	X	X	X	X	X	X	X	X	X	X	X		X	
Ferruginous hawk	BLM				X	X	x	X	X	X	X	x	x		X	
Burrowing owl	BLM	x			x			X	X	X	X	X	x		X	
Greater sage-grouse	BLM	X			x		x	X	X	x	x	X			X	
Juniper titmouse	BLM			x	X											
Pallid bat	BLM	X		X	X			X								X
Spotted bat	BLM	X			X			X			X					X
Long Eared myotis	BLM	X	X	X	X		X	X	X	X	X				X	
Small-footed myotis	BLM	X		X				X							X	
Yuma myotis	BLM	X	X	X	X		X	X	X	X	X				X	
Townsend's w. big-eared bat	BLM	X	X	X				X								
Northern sagebrush lizard	BLM		X		X		X	X	x	X					X	
Mule deer	None	X	X	X	X		X	X	X	X	X	X	X		X	
Rocky Mountain elk	None	X	x	X	X	X	X									
Pronghorn antelope	None	x		X	X		X	X	X	X	X				X	
Warner Sucker	FT	Potential habitat in Cowhead Slough and Barrel Springs system, possibly in Rock and Horse Creeks – approximately 13 miles with 0.5 miles inhabited (private lands).														
Wall Canyon Sucker	BLM	Potential habitat in Wall Canyon, Mountain View, and Bordwell creeks – approximately 25 miles with 8.0 miles inhabited.														

Notes: Barren and rock habitats were identified via the soils/vegetation analysis (Table 3.23-2) but were not included in source wildlife-habitat matrices documents. Antelope bitterbrush, snowbrush ceanothus, and winterfat were combined based on similarity in structure and species occurrences (see text).

Bold "**X**" indicates higher habitat importance for each species.

[a]Special Classification:

FE = Federally endangered.
FP = Federally petitioned.
FPE = Federally proposed endangered.
ST= State threatened.
BLM = BLM sensitive species.

[b]Includes permanent and seasonally wet meadows.

Sources: Maser and Thomas 1986, Mayer and Laudenslayer 1988, O'Neill et al. 2001.