

MAP # 9 - Alvord Lake Sub-basin - 5th Field HUC 1712000901 Cottonwood Creek

1 inch equals 2.25 miles

Prepared by: Bryce Mertz Date: March 2006

Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

- High and Low Elevations
- 5th Field Watersheds
- Alvord Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads

HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon
541-573-8195
www.co.harney.or.us

Alvord Lake (5th Field HUC 1712000902—Burns and Vale BLM Districts)

At 309,900 acres, this 5th field watershed is the largest in the sub-basin. The area includes part of the east face of the Steens Mountain, part of the Pueblo Mountains and the Alvord Lake area. It extends to the Trout Creek Mountains in the southeast.

Land Ownership. The Federal Government (BLM) is the majority landowner in the sub-basin (83%).

Perennial Streams. This 5th field watershed contains 161 miles of perennial streams.

PFC Assessment. Of 113.8 miles of streams assessed in the fifth field watershed, 68% were determined to be in proper functioning condition. Only 8% of stream miles assessed were determined to be in nonfunctional condition.

Elevation Extremes. 9733 feet—Steens Mountain peak, 4000 feet—Alvord Desert.

Riparian Vegetation and Rosgen Stream Types (from Oregon TMDL document, see discussion page 39-45). This watershed ranges from the Steens Mountain and the Pueblo Mountains in the west, across Alvord Lake to the Trout Creek Mountains in the southeast. The diversity of terrain includes three different ecological provinces: the East Steens Mountain Ecological Province in the west, the Pueblo Mountains Ecological Province in the southwest, and the Trout Creek Mountains Ecological Province to the southeast. The riparian vegetation and Rosgen stream type in these regions is characterized as follows:

East Steens Mountain Region Ecological Province

- A black cottonwood-Pacific willow vegetation zone lies above 5200 feet. Headwater streams can extend up to 6800 feet. Cottonwood-willow communities dominate with some aspen stands. Common species are black cottonwood, Pacific willow, quaking aspen, *Salix* spp., Scouler willow and common snowberry. The average overstory canopy height is 40 feet. Rosgen A-B channel types are dominant with variable flood-prone widths.
- A Pacific willow-black cottonwood-aspen vegetation zone lies at mid-elevation from 4260 to 5200 feet. Willow-cottonwood communities dominate with some aspen stands. Pacific willow, black cottonwood, *Salix* spp. and quaking aspen are common. The average overstory canopy height is 25 feet. Rosgen B channel types are dominant with average flood-prone widths of 30 feet.
- A mixed willow vegetation zone lies at low-elevation from 4100 to 4260 feet. Willow communities dominate. Pacific willow, coyote willow, *Salix* spp. and black cottonwood are common. The average overstory canopy height is 20 feet. Rosgen B-C channel types are dominant with 33 to 43 foot flood-prone widths.

Pueblo Mountains Region Ecological Province

- An aspen-alder-willow vegetation zone lies from 6100 to 6400 feet. Quaking aspen-willow communities dominate. Quaking aspen, alder, Scouler willow and other willows are common. The average overstory canopy height is 33 feet. Rosgen A-B channel types are dominant with variable flood-prone widths.
- An alder-cottonwood-willow vegetation zone lies at mid-elevation from 4300 to 6100 feet. Alder-cottonwood-*Salix* communities dominate. Alder, black cottonwood, *Salix* spp., Scouler willow, Lemmon's willow, chokecherry and red osier dogwood are common. The average overstory canopy

height is 28 feet. Rosgen A-B channel types are dominant with average flood-prone widths of 13 to 20 feet.

- A mixed willow vegetation zone lies at low-elevation below 4300 feet. Willow communities dominate with coyote willow being very common. The average overstory canopy height is 14 feet. Rosgen B-C channel types are dominant with 20 foot average flood-prone widths.

Trout Creek Mountains Region Ecological Province

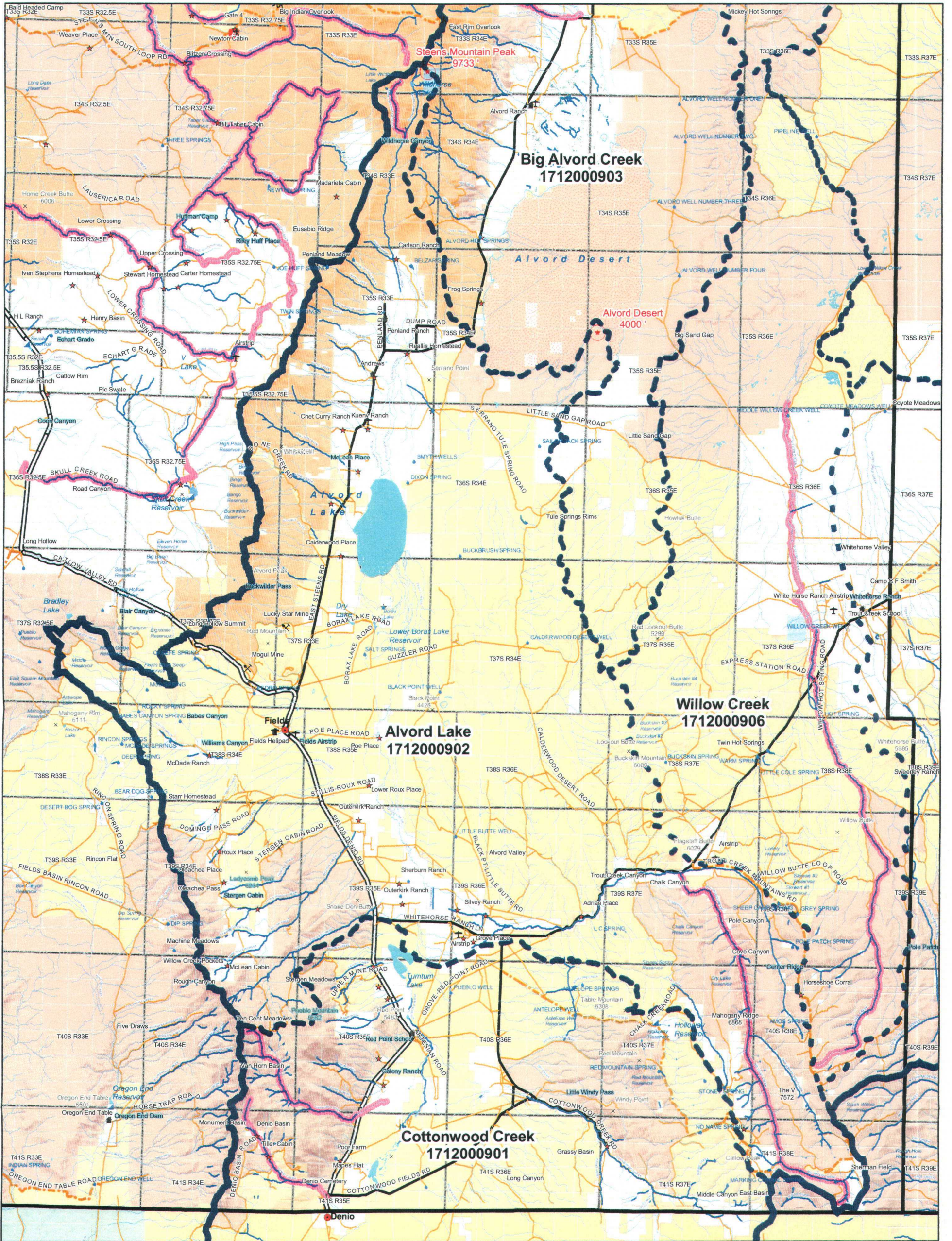
- A mesic graminoid-willow vegetation zone lies above 7218 feet. Willow communities (commonly Lemmon's willow) and a variety of mesic graminoids dominate. The average overstory canopy height is 8.5 feet. Rosgen B-E channel types are dominant with variable flood-prone widths up to 36 feet.
- An aspen-willow vegetation zone lies from 6562 to 7218 feet. Aspen-willow communities dominate. Quaking aspen, Pacific willow, Geyer willow and Lemmon's willow are common. The average overstory canopy height is 29 feet. Rosgen B channel types are dominant with average flood-prone widths of 25 feet.
- A willow-alder vegetation zone lies at mid-elevation from 4500 to 6562 feet. Willow-alder communities dominate. Mountain alder, Pacific willow, Lemmon's willow and Scouler willow are common. The average overstory canopy height is 24 feet. Rosgen B-C channel types are dominant with average flood-prone widths of 55 feet.
- A willow vegetation zone lies at low-elevation from 4240 to 4500 feet. Willow communities dominate. Coyote willow, yellow willow and Pacific willow are common. The average overstory canopy height is 18 feet. Rosgen B and C channel types are dominant with 70 foot average flood-prone widths.

Upland Vegetation. The predominant vegetation types in this 5th field watershed are big sagebrush/grasslands (46%); and salt desert shrub/grassland (30%), which is the largest area of salt desert shrub/grassland (93,100 acres) in any of the watersheds in this sub-basin. This area also has 46% of all of the mountain big sagebrush in the sub-basin (16,800 acres).

Special Management Areas. A portion (35,240 acres) of the Steens Mountain Wilderness overlaps in this watershed, and there are another 56,100 acres of wilderness study areas. Portions of three wild horse management areas overlap the watershed also, together covering 115,230 acres. The only two wild and scenic rivers designated in the Alvord Lake Sub-basin are in this watershed, Wildhorse Creek and Little Wildhorse Creek.

Areas of Critical Environmental Concern (ACEC). This watershed contains six ACECs, the Borax Lake ACEC, East Fork Trout Creek RNA, Little Wildhorse Lake RNA, Pueblo Foothills RNA, Serrano Point RNA, and Tum Tum Lake RNA, with a total acreage of 4,398.

303(d) Listed Streams. Two of this watershed's streams are listed for temperature: Big Trout Creek (RM 0-16.6), and Little Wildhorse Creek (RM 0-2.5).



MAP # 10 - Alvord Lake Sub-basin - 5th Field HUC 1712000902 Alvord Lake

1 inch equals 3.50 miles



- High and Low Elevations
- 5th Field Watersheds
- Alvord Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads



HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon
541-573-8195
www.co.harney.or.us

Prepared by: Bryce Mertz Date: March 2006
Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

Big Alvord (5th Field HUC 1712000903—Burns and Vale BLM Districts)

The 141,900 acres of this watershed includes part of the east face of the Steens Mountain, and the Alvord Desert.

Land Ownership. The federal government (BLM) is the majority landowner in this watershed (77%).

Perennial Streams. This 5th field watershed contains 59 miles of perennial streams.

PFC Assessment. Of 47.6 miles of streams assessed in the 5th field watershed, 94% were determined to be in proper functioning condition. No stream miles were determined to be in nonfunctional condition.

Elevation Extremes. 9733 feet—Steens Mountain peak, 4000 feet—Alvord Desert. The shown high elevation on Map 11 of 9600 feet is a GIS anomaly. The watershed divide goes over the Steens Mountain peak and it consequently is the high point in both HUC 1712000902 and 1712000903.

Riparian Vegetation and Rosgen Stream Types (from Oregon TMDL document, see discussion page 39-45). This watershed lies in the East Steens Mountain Ecological province. Riparian vegetation and Rosgen stream type in this province is characterized as follows:

- A black cottonwood-Pacific willow vegetation zone lies above 5200 feet. Headwater streams can extend up to 6800 feet. Cottonwood-willow communities dominate with some aspen stands. Common species are black cottonwood, Pacific willow, quaking aspen, *Salix* spp., Scouler willow and common snowberry. The average overstory canopy height is 40 feet. Rosgen A-B channel types are dominant with variable flood prone widths.
- A Pacific willow-black cottonwood-aspen vegetation zone lies at mid-elevation from 4260 to 5200 feet. Willow-cottonwood communities dominate with some aspen stands. Pacific willow, black cottonwood, *Salix* spp. and quaking aspen are common. The average overstory canopy height is 25 feet. Rosgen B channel types are dominant with average flood prone widths of 30 feet.
- A mixed willow vegetation zone lies at low-elevation from 4100 to 4260 feet. Willow communities dominate. Pacific willow, coyote willow, *Salix* spp. and black cottonwood are common. The average overstory canopy height is 20 feet. Rosgen B-C channel types are dominant with 33-43 foot flood prone widths.

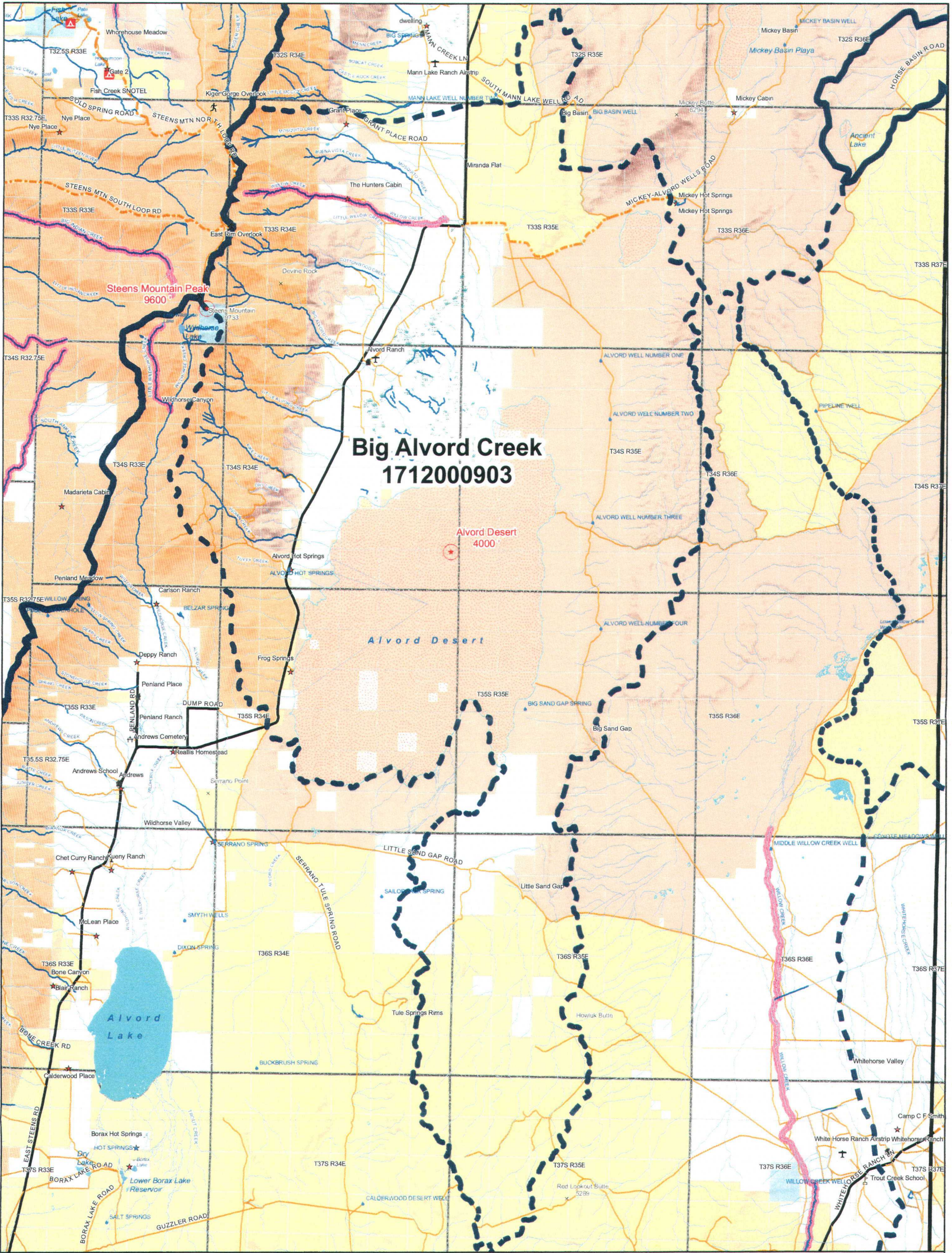
Upland Vegetation. The predominant vegetation types in this 5th field watershed are big sagebrush/grasslands (36%) and salt desert shrub/grassland (26%). This watershed also has the largest area of playa in the sub-basin (26,900 acres, 19% of the watershed).

Special Management Areas. Some 18,267 acres of the Steens Mountain Wilderness overlaps in this watershed, which also contains 67,800 acres of wilderness study areas. Two different wild horse herd management areas comprise 85,560 acres.

Areas of Critical Environmental Concern (ACEC). There are five ACECs in this watershed, the Alvord Desert ACEC, Big Alvord Creek RNA, Mickey Basin RNA, Mickey Hot Springs ACEC, and South Fork Willow Creek RNA, which together comprise 22,476 acres.

303(d) Listed Streams. One stream in this watershed is listed for temperature: Willow Creek (RM 0-5.3), flowing off the east flank of the Steens Mountain.

THIS PAGE LEFT BLANK INTENTIONALLY



MAP # 11 - Alvord Lake Sub-basin - 5th Field HUC 1712000903 Big Alvord Creek

1 inch equals 2.25 miles



Prepared by: Bryce Mertz Date: March 2006
Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

- High and Low Elevations
- 5th Field Watersheds
- Alvord Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads



HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon
541-573-8195
www.co.harney.or.us

Whitehorse Creek (5th Field HUC 1712000904—Burns and Vale BLM Districts)

This 118,500 acre watershed is in the southeast corner of the sub-basin. Whitehorse Creek and its tributaries drain the west side of the Oregon Canyon Mountains and the east side of the Trout Creek Mountains.

Land Ownership. The Federal Government (BLM) is the majority landowner in this fifth field watershed (74%). This watershed has the largest percentage of private land holdings of all the fifth field watersheds in the Alvord Lake Sub-basin (26%, 30,300 acres).

Perennial Streams. This 5th field watershed contains 84 miles of perennial streams.

Riparian Trend Assessment. Of 85 miles of streams assessed in the fifth field watershed, it was determined that the riparian trend was upward for 99%.

Elevation Extremes. 8000 feet—unnamed ridge in Trout Creek Mountains, 4120 feet—Coyote Meadows.

Riparian Vegetation and Rosgen Stream Types (from Oregon TMDL document, see discussion page 39-45). This watershed lies in the Willow-Whitehorse Ecological Province. Riparian vegetation and Rosgen stream type in this province is characterized as follows:

- An aspen vegetation zone lies at elevations from 5800 to 7000 feet. Aspen communities dominate. The average overstory canopy height is 30 feet. The riparian buffer width is 20 feet.
- A mountain alder vegetation zone lies at elevations from 5000 to 5800 feet. Mountain alder communities dominate. The average overstory canopy height is 25 feet. The riparian buffer width is 30 feet.
- A mixed willow vegetation zone lies at elevations below 5000 feet. Willow communities dominate. The average overstory canopy height is 18 feet. The riparian buffer width varies from 40-60 feet.

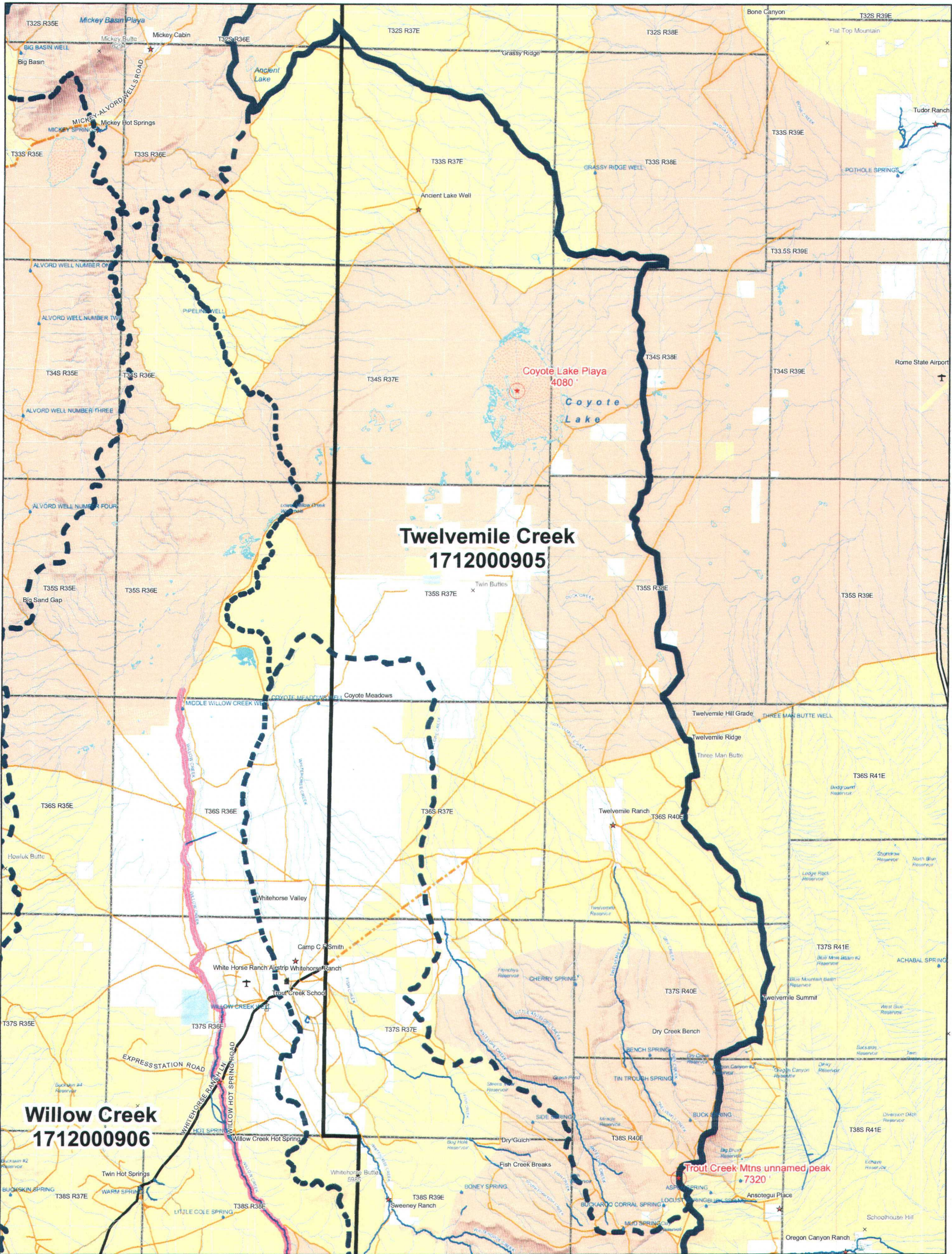
Upland Vegetation. The predominant vegetation types in this 5th field watershed are big sagebrush/grasslands (36%); and salt desert shrub/grassland (17%). This watershed also has the most quaking aspen in the sub-basin (8,100 acres, 7% of the 5th field).

Special Management Areas. Wilderness study areas comprise 63,600 acres in this watershed, and there are 5,540 acres in wild horse management areas.

Areas of Critical Environmental Concern (ACEC). The small (61 acres) Little Whitehorse Creek RNA is the only ACEC in this watershed.

303(d) Listed Streams. None

THIS PAGE LEFT BLANK INTENTIONALLY



MAP # 13 - Alvord Lake Sub-basin - 5th Field HUC 1712000905 Twelve Mile Creek

1 inch equals 2.50 miles



Prepared by: Bryce Mertz Date: March 2006

Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

- High and Low Elevations
- 5th Field Watersheds
- Alvord Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads



HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon
541-573-8195
www.co.harney.or.us

Twelve Mile Creek (5th Field HUC 1712000905—Burns and Vale BLM Districts)

The 178,100 acres of this watershed on the east side of the Alvord Lake Sub-basin include the Coyote Lake area.

Land Ownership. The Federal Government (BLM) is the majority landowner in the fifth field watershed (90%).

Perennial Streams. This 5th field watershed contains 26 miles of perennial streams.

Riparian Trend Assessment. For all 36.3 miles of streams assessed in the 5th field watershed, a riparian trend was not determined.

Elevation Extremes. 7320 feet—unnamed peak in Trout Creek Mountains, 4080 feet—Coyote Lake Playa.

Riparian Vegetation and Rosgen Stream Types (from Oregon TMDL document, see discussion page 39-45). This watershed lies in the Willow-Whitehorse Ecological Province. Riparian vegetation and Rosgen stream type in this province is characterized as follows:

- An aspen vegetation zone lies at elevations from 5800 to 7000 feet. Aspen communities dominate. The average overstory canopy height is 30 feet. The riparian buffer width is 20 feet.
- A mountain alder vegetation zone lies at elevations from 5000 to 5800 feet. Mountain alder communities dominate. The average overstory canopy height is 25 feet. The riparian buffer width is 30 feet.
- A mixed willow vegetation zone lies at elevations below 5000 feet. Willow communities dominate. The average overstory canopy height is 18 feet. The riparian buffer width varies from 40-60 feet.

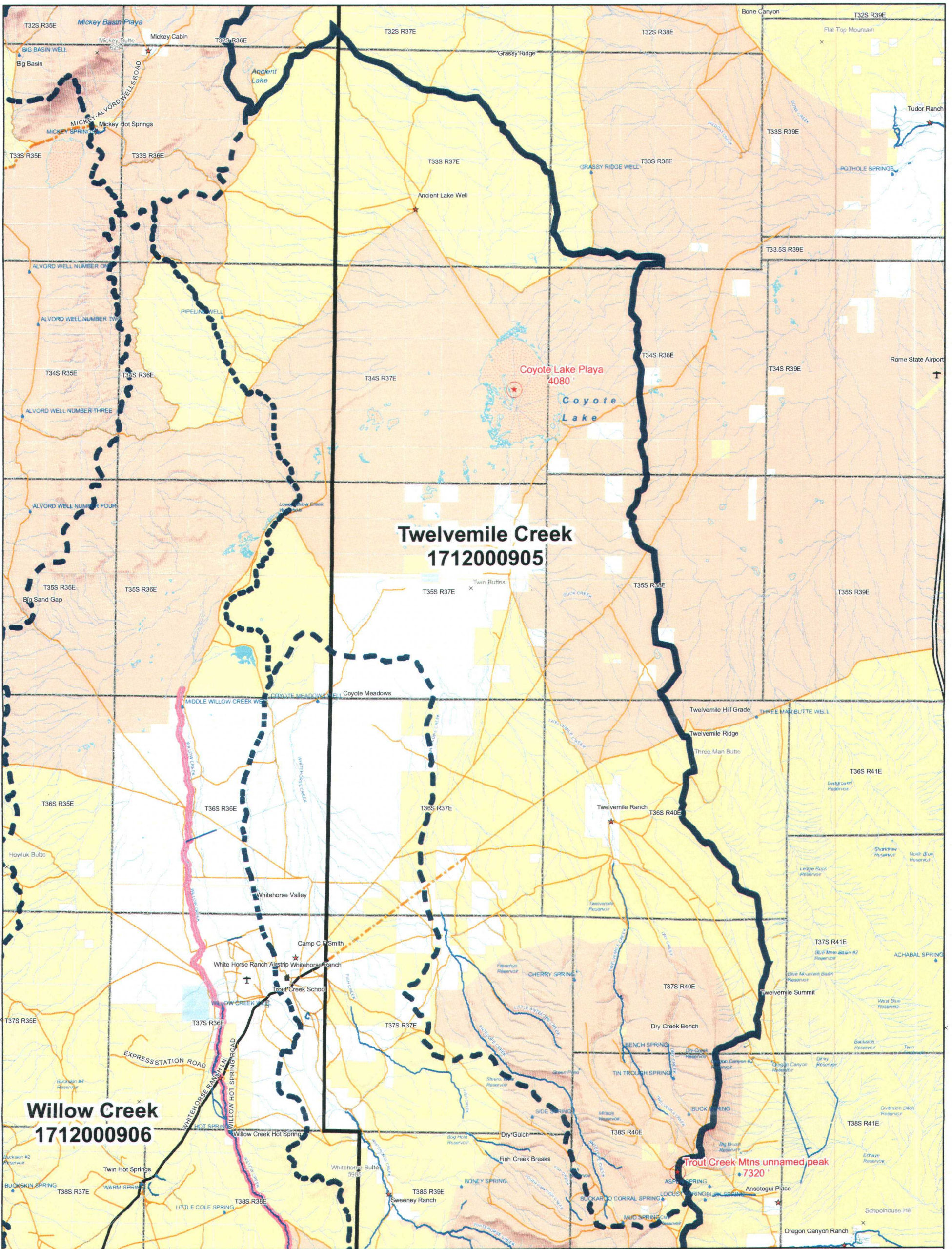
Upland Vegetation. The predominant vegetation types in this 5th field watershed are big sagebrush/grasslands (69%); and salt desert shrub/grassland (12%). This watershed is the only one containing the black sagebrush vegetative type (11,900 acres, or 7% of the 5th field watershed area). Twelve Mile Creek also has 51% of the sub-basin's native perennial grasslands (2,100 acres).

Special Management Areas. This watershed contains 89,800 acres of wilderness study area, and 122,000 acres in two wild horse herd management areas.

Areas of Critical Environmental Concern ACEC). The Dry Creek Bench RNA totals 1,592 acres in this watershed.

303(d) Listed Streams. None.

THIS PAGE LEFT BLANK INTENTIONALLY



MAP # 13 - Alvord Lake Sub-basin - 5th Field HUC 1712000905 Twelve Mile Creek

1 inch equals 2.50 miles



- High and Low Elevations
- 5th Field Watersheds
- Alvord Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads



HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon
541-573-8195
www.co.harney.or.us

Prepared by: Bryce Mertz Date: March 2006
Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

Willow Creek (5th Field HUC 1712000906—Burns and Vale BLM Districts)

This long, narrow watershed of 152,500 acres lies in the interior of the sub-basin. Willow Creek is the dominant stream that flows northerly from the Trout Creek Mountains into the Coyote Lake basin.

Land Ownership. The Federal Government (BLM) is the majority landowner in the 5th field watershed (82%).

Perennial Streams. This 5th field watershed contains 31 miles of perennial streams.

Riparian Trend Assessment. Of 29 miles of streams assessed in the fifth field watershed, the riparian trend was upward for 90%.

Elevation Extremes. 7879 feet—Chick Peak in Trout Creek Mountains, 4160 feet—Upper Willow Creek Waterhole Flats.

Riparian Vegetation and Rosgen Stream Types (from Oregon TMDL document, see discussion page 39-45). This watershed lies in the Willow-Whitehorse Ecological Province. Riparian vegetation and Rosgen stream type in this province is characterized as follows:

- An aspen vegetation zone lies at elevations from 5800 to 7000 feet. Aspen communities dominate. The average overstory canopy height is 30 feet. The riparian buffer width is 20 feet.
- A mountain alder vegetation zone lies at elevations from 5000 to 5800 feet. Mountain alder communities dominate. The average overstory canopy height is 25 feet. The riparian buffer width is 30 feet.
- A mixed willow vegetation zone lies at elevations below 5000 feet. Willow communities dominate. The average overstory canopy height is 18 feet. The riparian buffer width varies from 40-60 feet.

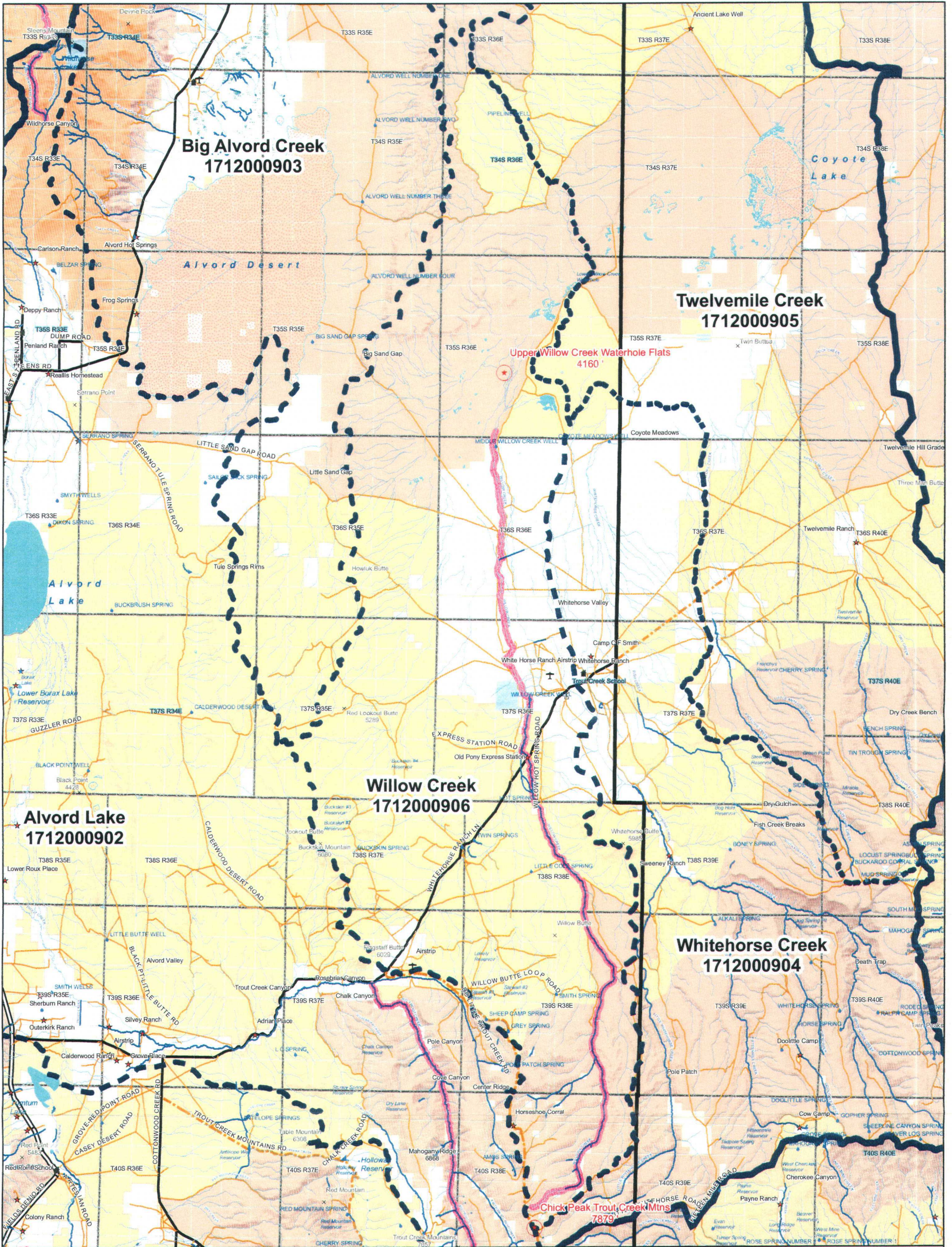
Upland Vegetation. The predominant vegetation types in this 5th field watershed are big sagebrush/grasslands (55%); and salt desert shrub/grassland (25%). This watershed also has 48% of the sub-basin's rabbitbrush/grassland communities (13,900 acres).

Special Management Areas. Wilderness study areas comprise 53,000 acres in this watershed. There are also 71,300 acres in two wild horse herd management areas.

Areas of Critical Environmental Concern (ACEC). This watershed has only one ACEC, a small portion (1,018 acres) of the Alvord Desert ACEC.

303(d) Listed Streams. The Willow Creek TMDL was drafted by ODEQ in 1999 after data collection indicated that the watershed was not meeting the state's temperature and dissolved oxygen standards. The TMDL applies to all streams in the Willow Creek watershed, including Willow Creek, Jawbone Creek and an unnamed tributary to Jawbone Creek.

THIS PAGE LEFT BLANK INTENTIONALLY



MAP # 14 - Alvord Lake Sub-basin - 5th Field HUC 1712000906 Willow Creek

1 inch equals 3.00 miles



- High and Low Elevations
- 5th Field Watersheds
- Alvord Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads



HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon
541-573-8195
www.co.harney.or.us

Prepared by: Bryce Mertz Date: March 2006
Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

Summit (5th Field HUC 1712000907—Burns and Vale BLM Districts)

This 168,400 acre watershed drains the east face of the north end of the Steens Mountain, and from the Table Mountain area to the east.

Land Ownership. The Federal Government (BLM) is the majority landowner in the 5th field watershed (88%).

Perennial Streams. This 5th field watershed contains 50 miles of perennial streams.

PFC Assessment. Of 12 miles of streams assessed in the fifth field watershed, 78% were determined to be in proper functioning condition. No stream miles were determined to be in nonfunctional condition.

Elevation Extremes. 9348 feet—northern peak of Steens Mountain, 3920 feet—Mickey Basin.

Riparian Vegetation and Rosgen Stream Types (from Oregon TMDL document, see discussion page 39-45). This watershed lies in the East Steens Mountain Ecological province. Riparian vegetation and Rosgen stream type in this province is characterized as follows:

- A black cottonwood-Pacific willow vegetation zone lies above 5200 feet. Headwater streams can extend up to 6800 feet. Cottonwood-willow communities dominate with some aspen stands. Common species are black cottonwood, Pacific willow, quaking aspen, *Salix* spp., Scouler willow and common snowberry. The average overstory canopy height is 40 feet. Rosgen A-B channel types are dominant with variable flood-prone widths.
- A Pacific willow-black cottonwood-aspen vegetation zone lies at mid-elevation from 4260 to 5200 feet. Willow-cottonwood communities dominate with some aspen stands. Pacific willow, black cottonwood, *Salix* spp. and quaking aspen are common. The average overstory canopy height is 25 feet. Rosgen B channel types are dominant with average flood-prone widths of 30 feet.
- A mixed willow vegetation zone lies at low-elevation from 4100 to 4260 feet. Willow communities dominate. Pacific willow, coyote willow, *Salix* spp. and black cottonwood are common. The average overstory canopy height is 20 feet. Rosgen B-C channel types are dominant with 33 to 43 foot flood-prone widths.

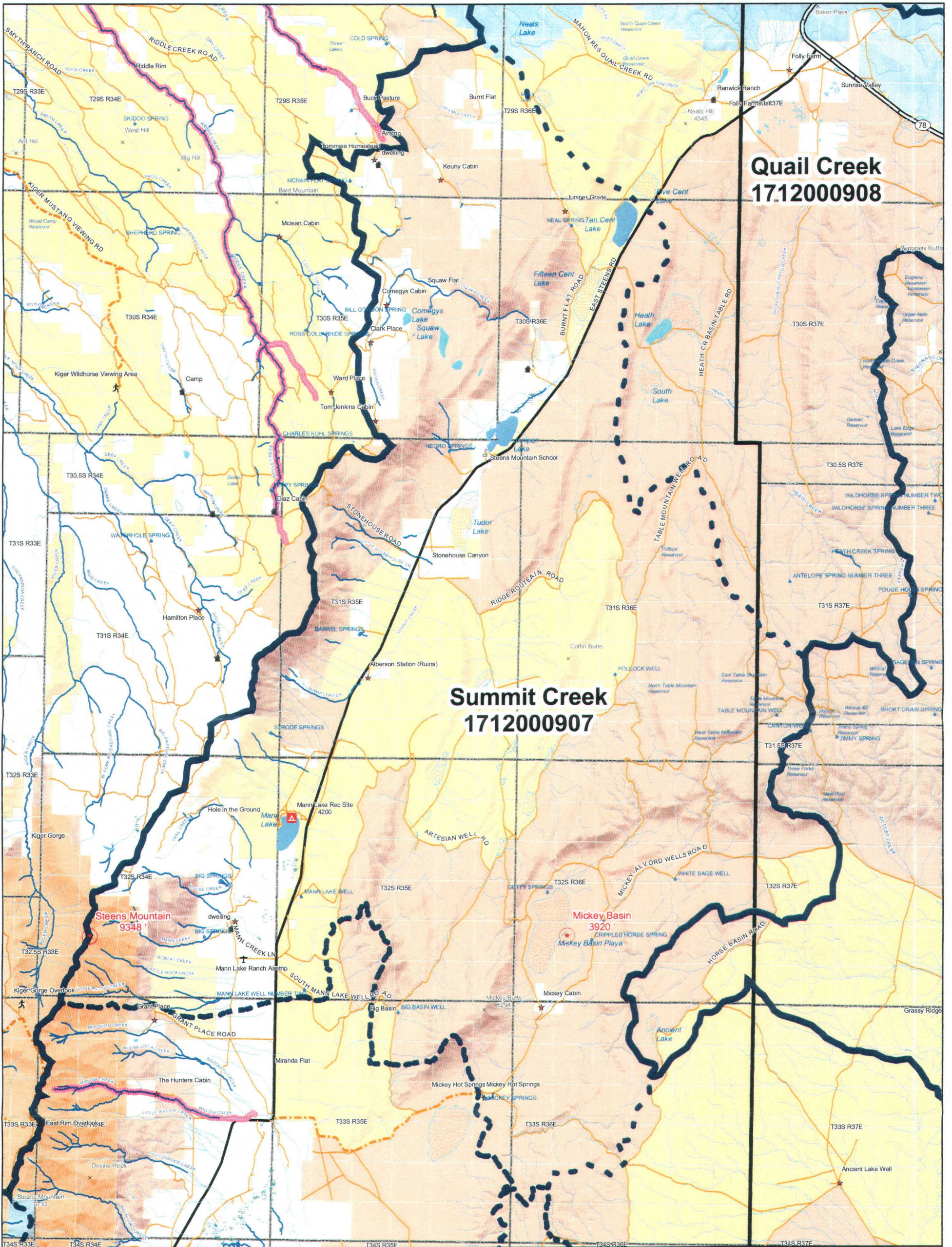
Upland Vegetation. The predominant vegetation types in this 5th field watershed are big sagebrush/grasslands (52%); and salt desert shrub/grassland (20%). This watershed is one of the two northern most watersheds (907 and 908). These two watersheds the only two in the sub-basin which have the silver sagebrush/grassland plant community (2,100 acres in this watershed). This 5th field watershed also has the largest area of juniper/sagebrush plant community (16,900 acres, or 10% of the 5th field watershed area).

Special Management Areas. Some 2,477 acres of the Steens Mountain Wilderness overlaps into this watershed, and there are 100,000 acres of designated wilderness study areas. Portions of four wild horse herd management areas cover 101,000 acres of the watershed.

Areas of Critical Environmental Concern (ACEC). Portions of the Kiger Mustang ACEC, Mickey Basin RNA and the Mickey Hot Springs ACEC comprise 18,565 acres of this watershed.

303(d) Listed Streams. None.

THIS PAGE LEFT BLANK INTENTIONALLY



MAP # 15 - Alvard Lake Sub-basin - 5th Field HUC 1712000907 Summit Creek

1 inch equals 2.25 miles



Prepared by: Bryce Mertz Date: March 2006
Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

- High and Low Elevations
- 5th Field Watersheds
- Alvard Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads



HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office, Burns, Oregon
541-573-8195
www.co.harney.or.us

Quail Creek (5th Field HUC 1712000908—Burns and Vale BLM Districts)

At 91,030 acres, the Quail Creek watershed is the smallest and most northern in the Alvord Lake Sub-basin.

Land Ownership. The Federal Government (BLM) is the majority landowner in the 5th field watershed (69%). Twenty-four percent (22,000 acres) of this watershed is state land. These 22,000 acres are 95% of all of the state land in the sub-basin. Seven percent of the watershed is private land—the lowest percentage of private land of all eight 5th field watersheds.

Perennial Streams. This 5th field watershed contains 0.8 miles of perennial streams.

PFC Assessment. None.

Elevation Extremes. 6289 feet—unnamed peak in Sheepshead Mountains, 4080 feet—Folly Farm Flat.

Riparian Vegetation and Rosgen Stream Types (from Oregon TMDL document, see discussion page 39-45). This watershed lies in the East Steens Mountain Ecological province. Riparian vegetation and Rosgen stream type in this province is characterized as follows:

- A black cottonwood-Pacific willow vegetation zone lies above 5200 feet. Headwater streams can extend up to 6800 feet. Cottonwood-willow communities dominate with some aspen stands. Common species are black cottonwood, Pacific willow, quaking aspen, *Salix* spp., Scouler willow and common snowberry. The average overstory canopy height is 40 feet. Rosgen A-B channel types are dominant with variable flood prone widths.
- A Pacific willow-black cottonwood-aspen vegetation zone lies at mid-elevation from 4260 to 5200 feet. Willow-cottonwood communities dominate with some aspen stands. Pacific willow, black cottonwood, *Salix* spp. and quaking aspen are common. The average overstory canopy height is 25 feet. Rosgen B channel types are dominant with average flood-prone widths of 30 feet.
- A mixed willow vegetation zone lies at low-elevation from 4100 to 4260 feet. Willow communities dominate. Pacific willow, coyote willow, *Salix* spp. and black cottonwood are common. The average overstory canopy height is 20 feet. Rosgen B-C channel types are dominant with 33 to 43 foot flood-prone widths.

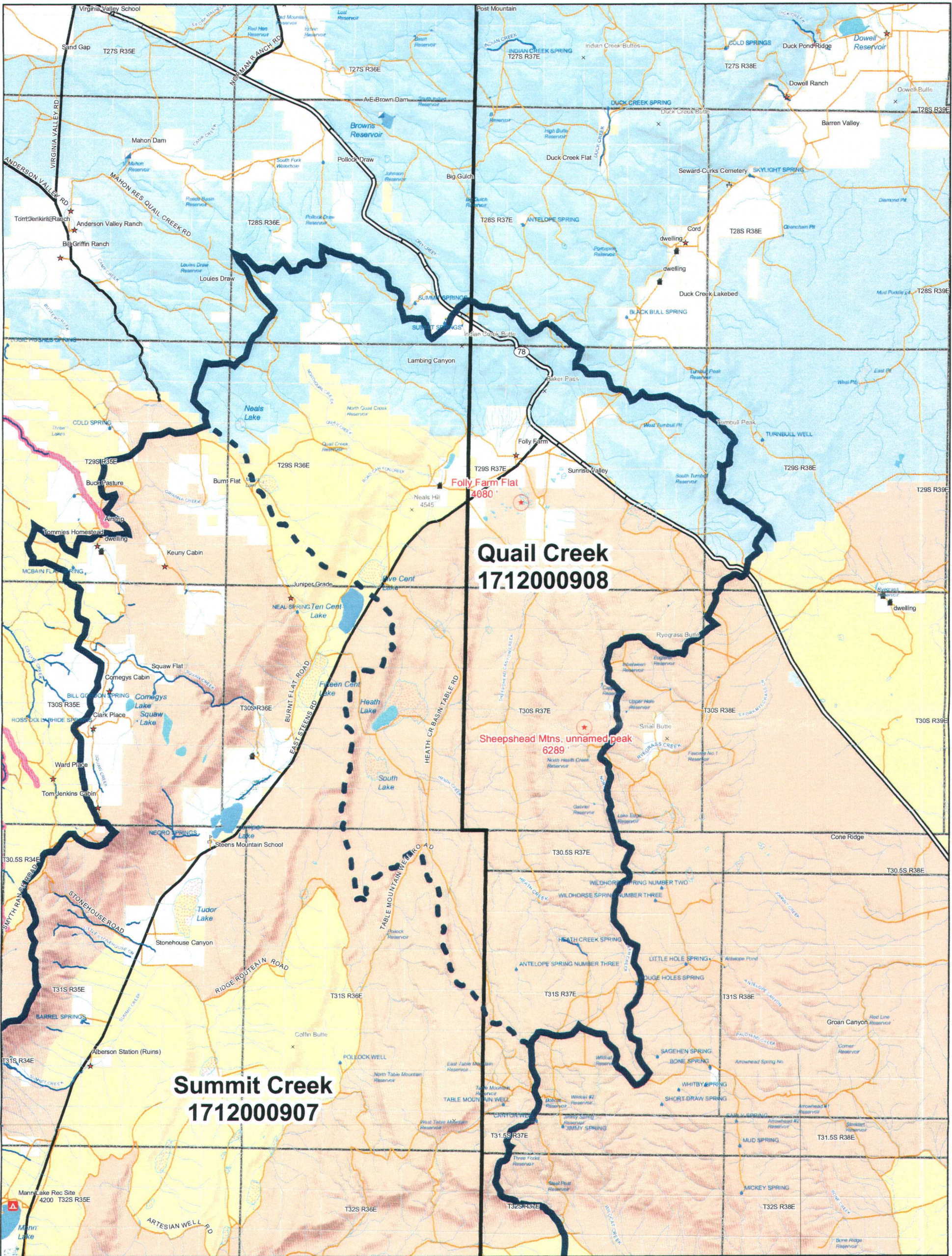
Upland Vegetation. The predominant vegetation type in this 5th field watershed is big sagebrush/grasslands (87%). This watershed is one of the two northern most watersheds (907 and 908). These two watersheds the only two in the sub-basin which have the silver sagebrush/grassland plant community (2,300 acres in this watershed). This is the only watershed in the sub-basin without the salt desert shrub/grassland plant community.

Special Management Areas. Wilderness study areas comprise 51,700 acres in this watershed, along with 67,200 acres in portions of four wild horse herd management areas.

Areas of Critical Environmental Concern (ACEC). This watershed contains only a portion of one ACEC, the Kiger Mustang ACEC (6,850 acres).

303(d) Listed Streams. None.

THIS PAGE LEFT BLANK INTENTIONALLY



MAP # 16 - Alvord Lake Sub-basin - 5th Field HUC 1712000908 Quail Creek

1 inch equals 2.25 miles



Prepared by: Bryce Mertz Date: March 2006
Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notifications.

- High and Low Elevations
- 5th Field Watersheds
- Alvord Lake Sub-Basin
- Township and Range
- Sections
- County Boundary

- BLM Land
- BLM Wilderness
- BLM Wilderness Study Area
- State Land
- Private Land
- 303D Listed Streams

- Perennial Lake
- Intermittent Lake
- Dry Lake
- Marsh
- Perennial Streams
- Intermittent Streams

- Paved Roads
- County Roads
- Arterial Roads
- Collector Roads
- Local Roads



HARNEY COUNTY GIS
In cooperation with
The Bureau of Land Management
Burns District Office; Burns, Oregon
541-573-8195
www.co.harney.or.us

Chapter 4 - Land and Resources: Use and Management

This chapter contains information on various land use and management topics not previously discussed. Many of the topics have little effect on watershed health in the Alvord Lake Sub-basin.



Photo courtesy of BLM

HISTORICAL LAND USE

Information sources and authors

Most of the text for this section was taken directly from the Andrews FEIS. A small amount was summarized and rewritten by HCWC.

Archaeological Resources

Archaeological evidence indicates that the area has been inhabited by humans for the last 10,000 years. Prehistoric occupation has been continuous, although population density and patterns of use have varied according to changing climatic cycles. Small, highly mobile family groups of hunters and gatherers were the norm during most of the year, though larger groups gathered at winter camps in the valley bottoms.

Archaeological sites, the material remains of this prehistoric presence, are a commonplace yet fragile reminder of prehistoric activity in the area. Prehistoric sites include stone flake scatters, larger more complex campsites, toolstone quarries, rock shelters and caves, rock art and rock structures such as rock rings (wickiup supports), rock cairns, and hunting blinds. Many Paiute elders and younger tribal members have continued traditional practices such as marmot hunting, root gathering, and fruit harvesting.

Fur trappers were the first Euro-Americans to visit the area in a brief foray in 1826. The next visitors came in the 1840s and 1850s. The area was settled in the 1870s and the most arable land with water was claimed shortly thereafter. By 1920 most settlers were driven away from the area by cold winters, summer frost, and drought. Historic sites in the area include wagon roads, homesteads, the town site of Andrews, Basque sheep camps with carved aspen, Rose Valley Borax Works at Borax Lake, and historic trash dumps.

Paleontological Resources

Paleontological resources are defined as the fossilized remains of plants and animals. Of particular interest are vertebrate fossils such as those of camels, saber toothed cats, rhinos, mammoths, giant sloths, turtles, and horses. Fossil localities have been reported on public land in the area. Most of the finds have been exposed by wind or water erosion, and are widely dispersed. Several localities are the subject of ongoing academic research. Small exposures of Miocene sedimentary rocks are exposed at the base of the east face of Steens Mountain, west of the East Steens Road. Known locations of plant fossils are on private and public land, as well as several unexplored exposures that are likely to contain animal fossils.

Animal remains from sabertooth cats, mastodons, giant camels, small camels (llama-like), horses, and horned rodents are found in the area. A plant locality within the area yielded a flora composed of the following plants: true fir, spruce, pine, Douglas fir, juniper, cottonwoods, willow, hornbeam, barberry, serviceberry, mountain mahogany, cherry, rose, mountain ash, indigo bush, sumac, maple, buckbrush, and madrona. This flora would normally occur in a small lake environment in a slightly warmer, more temperate climate than exists in the area today.

These fossil localities, especially the known and potential localities, are highly significant because they are a window to an environment that existed millions of years ago. They are non-renewable, extremely fragile, and usually small in extent. The precise number of acres encompassed by these localities is unknown because they have not been completely described and mapped.

Cultural Resources

A cultural resource is generally defined by federal agencies as any location of human activity that occurred at least 50 years ago, and that is identifiable through field survey, historical documentation, or oral evidence. Native American traditional practice areas are a special category of cultural resources. Some cultural resources may be less than 50 years old, but have cultural or religious importance to American Indian tribes or paramount historic interest to the public.

Federal antiquity laws require consideration of cultural resource values through consultation, a process designed to encourage protection of cultural properties prior to project approval. This often necessitates intensive surveys and recording where existing data are insufficient to make an assessment. If significant sites cannot be avoided during construction activities, the adverse effects are mitigated through data recovery by excavation, surface collection, photography and recording, and analysis.

Prehistoric, or pre-Euro-American contact, cultural resources include lithic scatters, rock shelters, midden deposits, house depressions, petroglyphs, hearths, and rock alignments. Historic cultural resources include buildings and building ruins, wagon roads, irrigation ditches and associated structures, dams, and archaeological deposits such as trash scatters.

Almost all of the cultural resource inventories in the area have been for project-specific activities, rather than initiated by the Cultural Resource Program; therefore, the surveys are not necessarily in areas of highest site potential. Only seven percent of the public land in the area has been inventoried for cultural resources. Earliest inventories and site records are of poor quality and do not conform with more recently approved data standards of the State Historic Preservation Office or the BLM Cultural Resource Program.

The archaeological record in the area is extensive in terms of the numbers of sites and their antiquity. Evidence exists in the area of some of the earliest occupation in North America, 11,500 years ago. Prehistoric sites are those older than about 1850 A.D. and include the following: stone flake scatters, habitation sites, toolstone quarries, rock shelters and caves, rock art and rock structures such as rock rings

(wickiup supports), and hunting blinds. Historic sites post-date 1850 A.D. and include the following: abandoned and intact townsites, homesteads, buildings, stone or wood structures, wagon roads, military sites, and trash scatters.

Cultural resources become degraded by 1) natural processes such as erosion, 2) by human actions such as road construction, livestock grazing, rangeland development, recreation, and mechanized vehicle travel, and 3) by illegal artifact collection and excavation. The majority of archaeological sites are reported good to excellent condition in the Steens Mountain CMPA (76%) and the Andrews Management Unit (66%). Where impacts have been reported, the largest percentage by cause was illegal collecting and excavation in the CMPA (26%), and erosion in the Andrews Management Unit (32%).

Native American Traditional Practices

Prior to Euro-American settlement, the area was occupied and used by Northern Paiute bands. Many of their descendants now live on the Burns Paiute Reservation in Burns, Oregon; the Warm Springs Reservation in Warm Springs, Oregon; and the Fort McDermitt Reservation in McDermitt, Nevada.

No specific Native American traditional practice areas have been identified in the area. However, according to the Burns Paiute Tribal Cultural Resource Manager, traditional resource areas and spiritual locations are used by tribal members and known tribal historic sites do exist in the Steens Mountain area. In addition, Steens Mountain served as a hideout or refuge during and after the Bannock War of 1878. Some of the Burns Paiute Elders refer to Steens Mountain as “Old Man” and consider it a sacred site. Specific traditional practice site location information has not been released to the BLM because the tribe is concerned about data security.

Resources traditionally used in the area include a wide variety of plant and animal foods, as well as materials for making tools and shelter. Edible roots include biscuitroot, bitterroot, camas, carrots, and onions. Available in the area are seeds of goosefoot, Indian rice grass, Great Basin wild rye, and berries such as chokecherry, currants, and elderberry. Game animals include various waterfowl, trout and chub, marmots, antelope, and big horn sheep, which are found in specific habitats in the Steens Mountain area. Other game such as mule deer, waterfowl, sage-grouse, rabbit, and ground squirrel have more widespread distribution. Plants such as red osier dogwood, willow, tules, and cattails are found in riparian or marshland settings, while grasses for basketry and food seeds are encountered in upland and sand dune environments. The bands of quaking aspen on the mid-slopes of the sub-basin’s mountains are sources of posts for hide working, and mountain mahogany for bows and digging sticks grows on the rocky ridges at and above the juniper zone. Basalt and cryptocrystalline silicate toolstone sources are found at various locations in the area.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

The topics discussed in this section are generally not considered by HCWC to now have any significant effects on watershed attributes and health. However, HCWC believes maintaining good watershed health attributes will in general help reduce degradation of archeological, paleontological and cultural resources.

Issues, concerns and action items.

- Proper management for preservation of archeological, paleontological and cultural resources should be encouraged, as that management should result in positive watershed health attributes.

ENERGY AND MINERAL RESOURCES

Information sources and authors

The text for this section comes mostly from the Andrews FEIS. That document was written for an area within the Burns BLM District which includes most of, but is larger than, the Alvord Lake Sub-basin. HCWC has rewritten parts of this text to make it more specifically applicable to the sub-basin. We have left other parts intact from the original document where those parts are informative about the sub-basin in relation to the surrounding lands.

The BLM manages energy and mineral resources on federal lands in the Alvord Lake Sub-basin which have either federal surface or federal subsurface (mineral estate) ownership. There is some non-federal mineral estate ownership on land within the sub-basin. For these discussions, minerals are considered to be in three categories: locatable, leasable, and salable. See definitions for these three mineral types in the Glossary and the discussions below starting on the next page.

A Mineral Withdrawal Area was designated by the Steens Mountain Cooperative Management and Protection Act (2000) (called Steens Act hereinafter) which encompasses over 1.18 million acres and includes the entire Cooperative Management and Protection Area (CMPA) and Steens Mountain Wilderness, as well as the eastern portion of the Andrews Management Unit, a section of the Jordan Resource Area in the Vale District, and the Diamond Craters area of the Three Rivers Resource Area. The portion of the Alvord Lake Sub-basin within the Mineral Withdrawal Area is shown in Map 17, page 163.

Subject to valid existing rights, no mining or exploration will be permitted anywhere in the Mineral Withdrawal Area except at those sites specifically identified in the Steens Act as follows: Section 401(b) of the Steens Act “. . . The Secretary may permit the development of salable mineral resources, for road maintenance only, in those locations identified . . . as an existing ‘gravel pit’ within the mineral withdrawal boundaries (excluding the Steens Mountain Wilderness, WSAs, and designated segments of the National WSR System) where such development was authorized before the date of enactment of this Act.” The salable minerals sites specifically identified in the Steens Act cover 513 acres within the Mineral Withdrawal Area. There are six grandfathered mining claims covering 120 acres in the Mineral Withdrawal Area. They are outside of the Steens Mountain Wilderness, WSRs, and WSAs in the eastern part of the sub-basin. Those mining claims are undergoing a validity exam to determine valid existing rights.

No grandfathered mining claims, mineral leases, or salable mineral sites are located in the Steens Mountain Wilderness, WSRs, or WSAs except for one salable minerals source. Red Point School Materials Source is a grandfathered sand and gravel source in the Pueblo Mountains WSA and it is located approximately 15 miles south of Fields adjacent to the paved Fields-Denio Road.

Historic mining (for mercury, thundereggs, and moss agate) and prospecting (for mercury, uranium, gold, and copper) were almost entirely located in areas that are now within the Mineral Withdrawal Area and WSAs. Most of the potentially hazardous sites are within the Mineral Withdrawal Area and WSAs. Some of the potentially hazardous sites are abandoned mine shafts and adits that will be remediated after activity-level analysis and some are areas of naturally occurring levels of arsenic and mercury detected in sediment analyses by USGS that are typical of mineralized areas.

Most of the ACECs (pages 158-159) in the sub-basin are within the Mineral Withdrawal Area and are already withdrawn from locatable, leasable, and salable mineral exploration and development. Three ACECs are outside of the Mineral Withdrawal Area but inside WSAs: Dry Creek Bench, RNA, Pueblo Foothills

RNA, and East Fork Trout Creek RNA and they are open to mining claims but closed to surface disturbing exploration and development activities for locatable minerals under a notice or plan of operations; they are closed to leasable and salable mineral exploration and development activities.

Creeks that contain federally-listed threatened or endangered fish species (Lahontan cutthroat trout) outside of the Mineral Withdrawal Area are Denio Creek and Van Horn Creek. Van Horn Creek is within the Pueblo Mountains Wilderness Study Area (WSA). There are no grandfathered claims, leases, nor salable mineral sources along Van Horn Creek. Periodically there are mining claims along Denio Creek. No minerals activities, including casual use activities, may result in harm to the threatened or endangered fish or its habitat. Activities that would cause harm to habitat include water withdrawal from the creek and its tributaries and excavation operations that result in increased siltation to the creek.

As discussed in the section on special status fish (page 53) the public land around Borax Lake is within the Mineral Withdrawal Area. This legal reclassification of that land has removed the once real threat of geothermal exploration in the area and the possible consequences to the thermal properties of Borax Lake and to the Borax Lake chub.

Locatable Minerals

Locatable minerals in the area are gold, mercury, uranium, diatomite, copper, molybdenum, and sunstones. Exploration is sporadic. Currently, one exploration/mining area is active, containing sunstones. The sunstone claims are within the Mineral Withdrawal Area and are undergoing a validity exam to determine valid existing rights. In October 2001, 31 mining claims were located in the sub-basin outside of the Mineral Withdrawal Area and there was no surface disturbing activity on those claims.

The USGS reports indicate that a typical gold deposit in this area would require mining of twice as much rock to obtain half as much gold compared to a typical gold deposit in the Oregon-Idaho Graben south of Vale, Oregon, so it is unlikely that a gold mine will be developed here. It is reasonably foreseeable that there will be a relatively small amount of locatable mineral exploration, mining, and occupancy in the future that may cover up to approximately five acres per proposal and there may be five such proposals in the next 20 years.

Leasable Minerals

No oil, gas, or coal resources have been documented, and potential for oil and gas resources is low throughout the sub-basin. A Known Geothermal Resource Area (Alvord KGRA) with high potential for geothermal resources exists in the Planning Area, but the Alvord KGRA is located within the Mineral Withdrawal Area except for 332 acres northwest of Fields. Twelve deep (greater than 1000 feet) geothermal wells were drilled within the Alvord KGRA before the Mineral Withdrawal Area was designated under the Steens Act. The remainder of the sub-basin has moderate potential for geothermal resources.

Sodium mineral resources have high potential in the Alvord Lake area; Rose Valley Borax Company mined borax in that area 100 years ago. The borax mining operation lasted for ten years and shut down when sodium borate levels fell below economic levels. The Alvord Lake area is now within the Mineral Withdrawal Area. There is low potential for sodium mineral resources outside of the Mineral Withdrawal Area. Currently, there are no mineral leases in the sub-basin.

It is reasonably foreseeable that there may be leasable minerals activities on approximately 300 acres over the next 20 years. It is likely that those activities would consist of geophysical exploration and drilling wells for exploration and development of geothermal resources for direct heat applications such as heating of a business, residence, greenhouse, or swimming pool.

Salable Minerals

This group of minerals includes sand, gravel, and rock aggregate in this area. Petrified wood and obsidian are rare in the area. Demand for salable minerals is relatively low within the sub-basin. The uses that do exist are for road materials.

The Steens Act allows for development of salable mineral resources within the Mineral Withdrawal Area, for road maintenance only, at locations identified in the Steens Act. Some of those identified sites are located in exchanged land or are exhausted and in reclamation status. Within the Mineral Withdrawal Area are three designated rock aggregate sources and four sand and gravel sources that may be developed.

Large amounts of sand, gravel, and rock aggregate are available in the area, but they are generally located in visually or ecologically sensitive areas. It is BLM policy to allow development of salable mineral sources to meet demand provided that adequate measures are taken to protect the environment based on the judgment of the BLM authorized officer. It is reasonably foreseeable that the existing sand, gravel, and rock aggregate sources will be expanded over the next 20 years and approximately ten new sites will be identified for development covering approximately 40 acres each.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

With the passage of the Steens Mountain Cooperative Management and Protection Act in 2000 and the creation of the Mineral Withdrawal Area, many of the potential threats to watershed health in the sub-basin from mineral exploration were reduced or eliminated. Additionally, the potential for other mineral activity outside of the Mineral Withdrawal Area is relatively low. Activities related to mineral exploration and use in the sub-basin should not be a large threat to watershed health in the sub-basin.

Issues, concerns and action items.

- No issues, concerns or actions items were written for this section.

RANGE AND GRAZING MANAGEMENT

Information sources and authors

The text for this section is generally taken from the Andrews FEIS. The Oregon BLM Manual Supplement (1988) was used to define some terms. HCWC has altered parts of this text where appropriate to make it more directly applicable to this report and to the Alvord Lake Sub-basin.

Range and Grazing History

The Taylor Grazing Act was passed on June 28, 1934 to protect public land resources from degradation and also to provide orderly use and improvement/development of public rangelands. Following various homestead acts, the Taylor Grazing Act established a system for the adjudication of grazing privileges to livestock operators based on grazing capacity and priority of use, and for the delineation of allotment boundaries. This act also established standards for rangeland improvements and implemented grazing fees. Approximately 142 million acres of land in the western United States were placed under the jurisdiction of the Grazing Service, which became the BLM in 1946. The Federal Land Policy and Management Act (FLPMA), passed in 1976, and the Public Rangelands Improvement Act (PRIA), passed in 1978, also provide authority for the management of livestock grazing on public lands.

Prior to the 1960s, grazing policy focused on allotment boundaries and seasons of use; however, in the mid-1960s, grazing management which considered the maintenance and establishment of plant communities was implemented. This management focused on individual approaches needed for each allotment to protect and maintain plant community diversity and other resource values on public land. Livestock grazing allotments are categorized and managed according to the following three selective management categories:

- **Improve (I)** category allotments are managed to improve current unsatisfactory resource conditions and will receive the highest priority for funding and management actions upon approval of the land use plan.
- **Maintain (M)** category allotments are managed to maintain current satisfactory resource conditions and will be actively managed so that resource values do not decline.
- **Custodial (C)** category allotments include a high percentage of private lands and are managed custodially while protecting existing resource values.

Recent land use plans have developed and implemented grazing management primarily through Allotment Management Plans (AMPs) and agreements with permittees. An AMP is a documented program that directs grazing management on specified public land toward reaching goals and objectives regarding resource conditions, sustained yield, multiple use, and ranch economics. AMPs are considered to be implemented when incorporated into term grazing permits or leases and when accepted by the permittee or lessee. These AMPs are now NEPA (National Environmental Policy Act) documents which require public review before approval. Temporary non-renewable (TNR) grazing use is periodically authorized to qualified applicants when additional forage is temporarily available and the use is consistent with multiple use objectives.

The rangeland reform process of 1994 modified the grazing regulations identified in 43 CFR part 4100. A new regulation was developed in August of 1995, and is currently being implemented throughout the BLM. The regulation at 43 CFR 4180, addresses the fundamentals of rangeland health. In August 1997, the Standards for Rangeland Health and Guidelines for Livestock Grazing Management (S & Gs) for public

lands managed by the BLM in Oregon and Washington were developed in consultation with the Resource Advisory Council (RAC), Provincial Advisory Committees (PACs), American Indians, and others. The S & Gs provide the basis for assessing rangeland health.

Specific types of field indicators of rangeland health are identified for each standard. The quantitative thresholds for these indicators vary according to soil, climate, and landform, as stated in the standards. An ID Team, with participation from permittees and other interested parties, conducts assessments to evaluate the standards according to field indicators. The five standards are as follows:

Standard 1: Watershed Function—Uplands

Upland soils exhibit infiltration and permeability rates, moisture storage and stability appropriate to soil, climate, and land form.

Standard 2: Watershed Function—Riparian/Wetland areas

Riparian/wetland areas are in properly functioning physical condition appropriate to soil, climate, and land form.

Standard 3: Ecological Processes

Healthy, productive, and diverse plant and animal populations and communities appropriate to soil, climate, and landform are supported by ecological processes of nutrient cycling, energy flow, and the hydrologic cycle.

Standard 4: Water Quality

Surface water and ground water quality influenced by agency actions complies with state water quality standards.

Standard 5: Native, Threatened and Endangered and Locally Important Species

Habitats support healthy, productive, and diverse populations and communities of native plants and animals (including special status species and species of local importance) appropriate to soil, climate, and landform.

Oregon and Washington BLM act to comply with the standards above, and doing so fulfills the requirements of 43 CFR part 4180.

Range and Grazing Inventory, Evaluation and Monitoring

Various methods have been used to inventory, evaluate and monitor grazing since the passage of the Taylor Grazing Act (1934). The earliest of these methods have now been replaced. As mentioned above, in the mid-1960s, the maintenance and establishment of plant communities was emphasized in grazing management. From that emphasis, rangelands methods were developed to evaluate the effects of grazing and other land uses on plant communities.

The most widely used rangeland inventory method is the Ecological Site Inventory (ESI), a process developed in the 1970s. ESI is an inventory of present and potential vegetation on rangeland sites. It utilizes soils, the existing plant community and ecological site data to determine the appropriate ecological site for a specific area of rangeland and to assign the appropriate ecological status (seral stage). The ecological status is the present state of vegetation of a range site in relation to the potential natural community (PNC) for that site. Ecological status is classified as one of four seral stages. These are PNC, Late Seral, Mid Seral and Early Seral for plant communities which are 76-100%, 51-75%, 26-50% and 0-25% similar to PNC.

Ecological status is use-independent—i.e. the outcome does not change based on changing management or use goals. Because of this use-independence, this inventory method can be used for monitoring with repeated use. In contrast use-dependent classifications can change if land management objectives change, even though the resource may not have changed. Ecological status will not change unless there is an actual change in the resource.

In the semi-arid environment of the most Oregon rangelands, ecological status usually changes very slowly. Therefore, the minimum standard for updating ecological status is keyed to the estimated land-use planning cycle of around 15-20 years unless monitoring studies indicate the need for more frequent updating.

The ecological status of the rangelands in the Alvord Lake Sub-basin were determined in the 1980s for the Burns BLM District and in the 1990s for the Vale BLM District. These data are summarized in Table 19, page 150. These data are the same as when completed approximately 20 and 10 years ago respectively, and do not depict changes since original data collection. Trend studies have shown that the ecological status of many vegetative communities in the sub-basin have advanced to a higher seral status. In addition, due to fires and other disturbances, some areas now are in lower ecological status. The Table 19 data do not reflect all of the BLM acreages in the two BLM Districts due to various reasons of some parcels not being rated. In addition, there are differences in the way the data were collected between the Districts. Users should consider these Table 19 data amounts as approximate.

In more recent years, land management has become more site specific to deal with changing management objectives. Increasing threats, such as those brought by invasive species, plus the need to manage for special status species, have required that new monitoring and evaluation procedures be used. The development of new procedures is ongoing, and results are not available for the Alvord Lake Sub-basin in total. The monitoring data is used for periodic evaluations of management actions and active grazing authorizations in allotments. To maintain or improve public land resources, adjustments are made by agreement or decision in accordance with legislation, regulations, and policy.

Current management practices have reduced erosion in some allotments within the area. These practices include proper stocking rates for livestock, rotation of grazing, improved designs of roads, rehabilitation of severely disturbed areas, restriction of vehicles to roads and ways, and control of concentrated recreational activities. For example, after the implementation of the Pueblo-Lone Mountain AMP in 1996, which changed the season of use for livestock on the major riparian areas and meadows in the Pueblo Mountains, monitoring has shown that gullies are revegetating and wet meadows are healing.

Rangeland Improvements

As mandated in the FLPMA and the PRIA, a portion of grazing fees is to be used on range improvements for the benefit of wildlife, watersheds, and livestock management. Emergency fire rehabilitation funds have also been expended to protect resource values by converting exotic annual vegetative community types back to native and adapted non-native, perennial plant communities to improve plant community and watershed health. Livestock operators, state and federal agencies, and other cooperators have also continued to fund construction of rangeland improvement projects.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

Livestock grazing is the most widespread land use in the Alvord Lake Sub-basin. It is mandated on public lands by various federal and state laws. Control of grazing and the consequent improvement in rangeland condition began over 70 years ago with the passage of the Taylor Grazing Act in 1934. In the last 30-40 years, grazing management and the evaluation and monitoring of grazing have become more site specific, with a primary focus of maintaining healthy plant communities. This focus on healthy plant communities is compatible with, and enhances other more site specific management goals. Grazing management continues to evolve and the impacts on long-term watershed health in the sub-basin continue to decrease.

Issues, concerns and action items.

- HCWC supports the focus on healthy plant communities as the way to promote watershed health.

Table 19. Seral Stage Ratings by the Vale and Burns BLM Districts. The amounts are approximate acres.

| 5th Field Watershed | Vale Early Seral | Vale Mid Seral | Vale Late Seral | Vale Potential Native Community | Burns Early Seral | Burns Mid Seral | Burns Late Seral | Burns Potential Native Community | Totals |
|---------------------------------------|-------------------------|-----------------------|------------------------|--|--------------------------|------------------------|-------------------------|---|----------------|
| 901 | 0 | 0 | 0 | 0 | 13,800 | 49,700 | 34,200 | 2,400 | 100,100 |
| 902 | 0 | 20 | 0 | 0 | 32,200 | 137,200 | 73,600 | 4,700 | 247,720 |
| 903 | 0 | 1,200 | 0 | 0 | 9,500 | 32,400 | 31,600 | 2,700 | 77,400 |
| 904 | 3,790 | 58,600 | 11,900 | 540 | 70 | 490 | 0 | 0 | 75,390 |
| 905 | 14,900 | 57,700 | 14,700 | 240 | 10,200 | 33,600 | 22,600 | 0 | 153,940 |
| 906 | 3,000 | 72,200 | 5,100 | 5,400 | 2,300 | 9,300 | 11,200 | 0 | 108,500 |
| 907 | 0 | 110 | 0 | 0 | 20,000 | 60,400 | 61,400 | 1,400 | 143,310 |
| 908 | 250 | 14,800 | 7,200 | 0 | 8,300 | 10,500 | 19,600 | 800 | 61,450 |
| | | | | | | | | | |
| Totals | 21,940 | 204,630 | 38,900 | 6,180 | 96,370 | 333,590 | 254,200 | 12,000 | 967,810 |

THIS PAGE LEFT BLANK INTENTIONALLY

FIRE AND FIRE MANAGEMENT

Information sources and authors

This text was largely taken from the Andrews FEIC. HCWC has altered a small amount of this text and added comments where appropriate. In addition to this section, fire and its role in the ecology of juniper, cheatgrass, noxious weeds and various other individual topics is discussed in other parts of this document.



Photo HCWC

Fire has played an important role in the development of most plant communities in the area. The role that fire plays depends on the severity, intensity, and frequency of burning as well as elevation and locally influenced climatic patterns. Fire changes plant community structure and species composition, and alters site nutrient dynamics. The area has a wide variety of plant communities with varied fire histories. Approximately 90% of the fires are caused by lightning and about 10% are caused by humans. Since 1980, over 100,000 acres in the sub-basin have been burned by wildfires. A large percentage of these fires are less than ten acres in size.

Fire Ecology of Major Vegetation Types in the Planning Area

Sagebrush is the dominant vegetation type throughout the area. Big sagebrush (all three subspecies: mountain, Wyoming and basin), low sagebrush, and silver sagebrush are the most common species found. Black sagebrush may also be found in specialized habitats in the sub-basin. Silver sagebrush is the only sagebrush species found in the area that will sprout following top removal. Other sagebrush species will recolonize areas from the seed bank or by emigration from unburned areas. This process may be slow in larger burned areas because of sagebrush seed dispersal. Sagebrush seeds are extremely small and have no specialized dispersal mechanism. Seeds rarely move more than three feet from parent plant. Size and shape of burned areas become important under these conditions. Burned areas with irregular boundaries will facilitate sagebrush establishment, while large burned areas with little sinuosity to the perimeter must rely on the soil seed bank and seed transport.

Mean fire return intervals (average number of years between fire events) for sagebrush plant communities are difficult to determine because the plants are typically entirely consumed by fire and do not leave evidence that can be used to determine historical fire regimes. Until recently, the extent and dates of fires have not been recorded and post-fire succession has not been studied in detail. However, site productivity affects the fire behavior and frequency in these sagebrush stands. Sites with higher productivity (deep soils, high cover of understory grasses and forbs) will carry fire easier and more frequently than sites with low productivity. Low sagebrush can be found in areas with higher productivity. Rooting depth in these areas is often limited by a heavy clay layer. Low sagebrush is usually found on less productive sites compared to mountain, basin, or Wyoming big sagebrush. Silver sagebrush, however, may also be associated with wetland species in areas of high productivity where fire history is more likely to be related to adjacent vegetation than to characteristics of the silver sagebrush plant communities themselves. Silver sagebrush is also found in a mosaic of vegetation types; it does not occupy large areas within the Planning Area.

Juniper woodlands are the most widely distributed woodland type in the area. Ancient western juniper stands are located in rocky areas where fire return intervals are more than 150 years. Historically these stands

occupied less than 1% of the total landscape. The location of these stands provides insufficient understory vegetation to carry fire. If fires did occur, they were often limited to one or two trees and areas of less than one acre. Under certain circumstances, large fires did move across these stands, but such events were rare.

The mountain big sagebrush fire regime, where much juniper has encroached today, typically burned every 15 to 25 years, a return interval similar to other shrub communities in the arid West. Young western junipers have thin bark and are readily killed by surface fires. Fire will carry through juniper stands with grass and shrub understory. As trees mature, they displace shrub and grass vegetation, leaving little surface vegetation. The stand then becomes more susceptible to erosion due to reduction in near-surface root systems of the lower stature plants. Older stands become resistant to fire because low productivity limits available fuel. Western juniper does not sprout after fire; reestablishment is from seed dispersed by water and animals, and the trees may be slow to regenerate.

Cheatgrass is an invasive non-native annual grass that creates a fire hazard in limited parts of the area. Cheatgrass thrives in disturbed environments, especially with fine-textured soils. Past land and fire management decisions have created a condition where cheatgrass thrives. Heavy grazing, especially in the early to middle portions of the 20th century, help to provide safe sites for cheatgrass establishment. Once cheatgrass became established, it provided a continuous fuel bed in areas that historically had a discontinuous fuel bed. Fire return intervals have been decreasing (less time between fire events) in areas dominated by cheatgrass, and other introduced annuals. Cheatgrass is a more efficient competitor for soil moisture and nutrients. Native grasses, forbs, and shrubs in some cases, cannot compete with cheatgrass for these resources and are suppressed or eliminated from the plant community. Increases of cheatgrass have also altered the growth stage (phenology) calendar of the plant communities. Cheatgrass begins and completes growth earlier than the associated native vegetation. Areas dominated by cheatgrass now have the potential to burn earlier in the year than plant communities dominated by native vegetation. Earlier fires, especially if repeated every three to seven years, burn native plants when they are actively growing and most susceptible to injury. Fire does not increase cheatgrass production, but it does eliminate other plants and provides an opportunity for cheatgrass to increase at the expense of native grasses, forbs, and shrubs. Cheatgrass invasion substantially reduces biodiversity and the land's value for livestock forage and wildlife habitat. Reversal of this ecological cycle probably requires human intervention and alteration of current land management. In some areas the conversion to cheatgrass and other introduced annuals has pushed the ecological system through a threshold. Passive restoration practices in these situations will only maintain the current plant community and not move toward pre-disturbance communities.

Fire Management Needs, Status, and Alternatives

The area fire management strategy focuses on wildland fire suppression, prescribed fire, and wildland fire use for resource benefits. The wildland fire season generally runs from mid-May through mid-September, while prescribed fires are usually planned for periods before and after the wildland fire season, depending on weather conditions. Prescribed burning can be used to meet resource and fire management objectives such as stimulation of plant growth, changes in species composition, or reduction in amounts of fuels and slash. A large proportion of the plant communities within the area evolved with periodic fires. All wildland fires ignited by lighting will be evaluated. Generalized policy and procedures for fire planning, assessment, and response are guided by BLM Manual 9102.

In lower elevation sagebrush plant communities, factors such as fuel conditions, proximity to sensitive habitats or presence of introduced annuals may make prescribed fire impractical. In these areas, the Burns BLM is using a technique known as “brush beating” in which a large mower kills large sagebrush, but leaves smaller shrubs and herbaceous plants relatively unharmed. Cutting the brush in irregular shapes is another way to create a complex pattern or mosaic. The brush beating also interrupts the structure and continuity of the fuels, reducing the potential for large fires by limiting spread.

Prescribed Fires

There has been no prescribed fire on public lands to-date in the Alvord Lake Sub-basin. However prescribed fire remains a management option for future use. The following text was written mainly about nearby areas which are outside of the sub-basin. It is indicative of various factors about the potential use of prescribed fire in the sub-basin.

Prescribed fire has successfully reintroduced fire to sagebrush and aspen plant communities. These management actions are improving habitat for numerous wildlife species and are providing higher quality forage for domestic and wild herbivores. Prescribed fires have occurred primarily in the fall. Burning at this time emulated the natural fire occurrence to some degree. Wildland fires historically occurred in the late spring, summer and early fall. Prescribed burning in the fall occurred because conditions would be less severe and fires could be held in units. Recently the timing of prescribed fires has shifted toward the late summer. Burning in August and September produced fire effects closer to the historic conditions. Burning in the winter and early spring has also proven to be a good tool in areas where there are large accumulations of fuel (i.e. juniper cuts). Soils are frozen during this time of year and heat from the fire is adsorbed by the frozen soils. Prescribed burning, and other fuels reduction actions, are helping to reestablish appropriate fire regimes based on site potential and current social/political direction.

Wildland Fires

Wildland fire risk depends on the intensity and size of the wildland fire as well as the location, time of season, and time of day. Historically these ecosystems experienced a variety of fire severities and intensities. The variety of intensities and severities was controlled by changing climatic conditions across the season. Early and late in the wildland fire season, conditions were cooler and potentially wetter than during the hot dry summer months. Fires that burned at these times may have had fewer impacts than those that burned in the middle of the hot dry summer. Conditions also changed within a single day. Severity and intensity can be much higher during the middle of the burning period than during night when temperatures are lower and relative humidity is higher. However, conditions today have changed somewhat. The amount of woody vegetation across the sub-basin is greater today than 100 years ago. Increases in western juniper and sagebrush density and cover have altered the characteristics of most wildland fires. Fires today are larger in most cases than they were historically due to a simplification of the vegetation (fuels) structure. Large, catastrophic wildland fires are much more common today than 100 years ago. These fires are occurring at an increasing rate across the western United States. Impacts to plants and animals can be dramatic following these large fires. Large grazing animals, domestic and wild, may be displaced for several years following large fires. Wildlife species that depend on sagebrush for part or all of their entire life cycle will decline following burning. Severely burned landscapes lose soil, seed bank, and microflora; consequently, they are more susceptible to invasions of weedy species. Fire may also have adverse effects on recreational and visual resources. The impacts of burning on plant community processes and functions can be naturally mitigated, but social values often require rehabilitation actions be taken to assist recovery.

In case of multiple fires, suppression priority is given in decreasing order of importance to fires threatening life, property, and resources. Fires occurring within wilderness and WSAs and other environmentally sensitive areas have received full suppression responses, but these responses are generally limited, regarding the use of mechanical equipment and retardant. If a fire is likely to become large or to threaten life or property, the line officer can approve the use of mechanical equipment to assist in suppression. In that case, immediate rehabilitation occurs on all areas of ground disturbance.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

Fire plays an important natural role in the long-term ecology and health of plant communities in the Alvord Lake Sub-basin. However, with introduced species such as cheatgrass and various noxious weeds becoming more problematic in the area, fires are often undesirable in terms of both short and long-term watershed health. Our understanding of the effects of fire on the native communities is increasing. Similarly, fire control and management is becoming more sophisticated. Prescribed fires will likely become a part of management in at least parts of the sub-basin in the future. Managing for the maintenance of the native plant communities will be managing for watershed health.

Issues, concerns and action items.

- Educate the public on the roles of fire in the ecology of various areas and habitats of the sub-basin. Include in that education the reasons fires in some locations are suppressed, while fire is often purposefully used in other situations.

WILDERNESS

Information sources and authors

The text for this section is generally taken from the Andrews FEIC. HCWC has altered parts of this text where appropriate to make it more directly applicable to the Alvord Lake Sub-basin.

The Federal Land Policy and Management Act (FLPMA) directs the BLM to manage the public lands and their resources under principles of multiple use and sustained yield. The FLPMA also identifies wilderness values as part of the spectrum of public land resource values and uses to be considered in the BLM's planning, inventory and management activities. A BLM wilderness area is an area of public lands that Congress has designated for the BLM to manage as a component of the National Wilderness Preservation System in accordance with the Wilderness Act of 1964.

The only designated wilderness in the Alvord Lake Sub-basin is a portion of the Steens Mountain Wilderness, approximately 56,000 acres in HUCs 902, 903 and 907.

Wilderness Study Areas

A wilderness study area (WSA) is a parcel of public land determined through intensive inventories to meet the definition of wilderness in Section 2(c) of the Wilderness Act. Public lands were inventoried in the late 1970s and early 1980s to determine whether they contained wilderness values. Those areas found to have wilderness values were identified as WSAs and all other land was eliminated from further consideration in the wilderness review. Some of the criteria used in the wilderness inventory and study were naturalness, solitude, primitive and unconfined recreational opportunities, special features, and manageability.

All or portions of 20 WSAs are located within the sub-basin (see Table 20 below), containing about 519,790 acres. Until Congress acts on the wilderness recommendations or otherwise releases the WSAs for other purposes, they will continue to be managed in accordance with the Wilderness Study Act, the Steens Act, and other applicable laws and policies.

Table 20. BLM Wilderness Study Areas in the Alvord Lake Sub-basin.

| WSA Name | Acres |
|-----------------------|----------------|
| Stonehouse | 21,300 |
| Lower Stonehouse | 5,800 |
| Sheepshead Mountains | 42,000 |
| Wildcat Canyon | 1,100 |
| Heath Lake | 21,200 |
| Table Mountain | 38,500 |
| West Peak | 8,600 |
| East Alvord | 22,200 |
| Winter Range | 11,900 |
| Alvord Desert | 144,100 |
| Mahogany Ridge | 27,300 |
| Red Mountain | 15,700 |
| Pueblo Mountains | 41,700 |
| Rincon | 1,600 |
| High Steens | 8,000 |
| Willow Creek | 29,800 |
| Disaster Peak | 1,800 |
| Fifteen Mile Creek | 50,300 |
| Oregon Canyon | 690 |
| Twelve Mile Creek | <u>26,200</u> |
| Total | 519,790 |
| WSAs by HUC | Acres |
| 901 Cottonwood Creek | 38,000 |
| 902 Alvord Lake | 56,100 |
| 903 Big Alvord | 67,800 |
| 904 Whitehorse Creek | 63,600 |
| 905 Twelve Mile Creek | 89,800 |
| 906 Willow Creek | 53,000 |
| 907 Summit | 100,000 |
| 908 Quail creek | 51,700 |

Source: BLM GIS

Other Parcels with Wilderness Characteristics

Four additional areas have been identified as having wilderness characteristics: Alvord Desert (2,033 acres), Bridge Creek (1,526 acres), High Steens (629 acres), and Lower Stonehouse (2,176 acres). All four parcels with wilderness characteristics are adjacent to existing WSAs. All four parcels are also within the Mineral Withdrawal Area.

The Alvord Desert parcel is natural and, when considered with the Alvord Desert WSA, has outstanding opportunities for solitude and primitive and unconfined recreation. The vegetation is primarily big sagebrush, perennial grasses, and annual grasses with some salt desert shrubs. The parcel is within kit fox and bighorn sheep habitat, is pronghorn antelope winter range, and is part of the Alvord-Tule Spring-Coyote Lake HMA

for wild horses. The Alvord milkvetch, a BLM tracking species, is found in the parcel. There are no range improvements inside this parcel. There are three two-track roads in the northern half of the parcel.

The Bridge Creek parcel is natural and, when considered with the Bridge Creek WSA, has outstanding opportunities for solitude and primitive and unconfined recreation. This parcel is within the CMPA. The vegetation is primarily juniper with some mountain big sagebrush, quaking aspen, and low sagebrush. The parcel is within elk and deer winter range. The section of Little Bridge Creek in the parcel was rated at PFC. Range improvements inside the parcel include three pit reservoirs, a fence along the north boundary, and an old fence along the south boundary. There are also several two-track roads into the parcel from the east and south boundaries.

The High Steens parcel is natural and, when considered with the High Steens WSA, has outstanding opportunities for solitude and primitive and unconfined recreation. This parcel is within the CMPA. Vegetation is primarily native perennial grassland with quaking aspen stands. The parcel contains habitat for Preble's shrew and Sierran springbeauty. The section of McCoy Creek in the parcel was rated at PFC. There are no range improvements associated with this parcel. There are two two-track roads in the parcel.

The Lower Stonehouse parcel is natural and, when considered with the Lower Stonehouse WSA, has outstanding opportunities for solitude and primitive and unconfined recreation. This parcel is within the CMPA. Vegetation is primarily big sagebrush and grasses with juniper, mountain big sagebrush, and quaking aspen. The lower elevations are deer winter range, while the higher slopes are bighorn sheep habitat. There are no special status plant or animal species. Range improvements include a fence along the east boundary. There is one two-track road in the parcel and a pack trail across the western portion.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

Wilderness and wilderness study areas have long-term watershed health value due to their protected status, making them potentially important locations for watershed health research.

Issues, concerns and action items.

- Improve public awareness of the Steens Mountain Wilderness and the 20 wilderness study areas in the sub-basin.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Information sources and authors

The text for this section is generally taken from the Andrews FEIC. HCWC has altered parts of this text where appropriate to make it more directly applicable to the Alvord Lake Sub-basin.

Areas of Critical Environmental Concern (ACECs) are parcels of public land that require additional management attention to protect special features or values. ACECs may be established to protect important historic, cultural, or scenic values; fish, wildlife, or other natural resources; or human life and safety. Resource Natural Areas (RNAs) are a specific type of ACEC that always contain natural resource values of scientific interest and are managed primarily for research and educational purposes. Outstanding Natural Areas are another specific type of ACEC that exhibit outstanding scenic splendor, natural wonder or scientific importance.

Thirteen designated ACECs, nine of which are RNAs, are located in the sub-basin. These ACECs were designated to provide special management and protection to areas with special characteristics such as diverse ecosystems, landforms, plant communities, and critical wildlife habitat. See Map 17, page 163 for the locations of ACECs. The existing ACECs, as well as their location and size, are listed in Table 21.

Table 21. Areas of Critical Environment Concern in the Alvord Lake Sub-basin.

| 5 th Field Watersheds, Numbers and Names | | ACEC | Acres |
|--|-------------------|------------------------------|--------|
| 1712000901 | Cottonwood Creek | Pueblo Foothills RNA | 573 |
| | | Tum Tum Lake RNA | 1,124 |
| 1712000902 | Alvord Lake | Borax Lake ACEC | 760 |
| | | East Fork Trout Creek RNA | 361 |
| | | Little Wildhorse Lake RNA | 183 |
| | | Pueblo Foothills RNA | 1,851 |
| | | Serrano Point RNA | 679 |
| | | Tum Tum Lake RNA | 564 |
| 1712000903 | Big Alvord | Alvord Desert ACEC | 20,597 |
| | | Big Alvord Creek RNA | 1,676 |
| | | Mickey Basin RNA | 28 |
| | | Mickey Hot Springs ACEC | 0.3 |
| | | South Fork Willow Creek RNA | 175 |
| 1712000904 | Whitehorse Creek | Little White Horse Creek RNA | 61 |
| 1712000905 | Twelve Mile Creek | Dry Creek Bench RNA | 1,592 |
| 1712000906 | Willow Creek | Alvord Desert ACEC | 1,018 |
| 1712000907 | Summit | Kiger Mustang ACEC | 17,991 |
| | | Mickey Basin RNA | 532 |
| | | Mickey Hot Springs ACEC | 42 |
| 1712000908 | Quail Creek | Kiger Mustang ACEC | 6,850 |

Source: BLM GIS

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

Some ACECs, especially RNAs may have long-term watershed health value due to their protected status, making them important locations for watershed health research. Together, the 13 designated ACECs total less than 5% of the sub-basin's area.

Issues, concerns and action items.

- Improve public awareness of ACECs, their resources, management and values.

RECREATION

Information sources and authors

The text for this section is generally taken from the Andrews FEIC. This text was written for a much larger area – in many cases all of Harney County – and comparable information is generally not available for the Alvord Lake Sub-basin alone. HCWC has altered parts of this text where appropriate to make it more directly applicable to the Alvord Lake Sub-basin.

Federal agencies including the BLM, USFS, and USFWS, administer over 51% of the lands in Oregon, 70% of the lands in southeast Oregon (Harney, Malheur, and Lake Counties), and 82% of the lands in the Alvord Lake Sub-basin, making them the largest managers of outdoor recreation and land facilities in the state (Oregon Parks and Recreation Department 2000). Therefore, these agencies play a major role in providing dispersed recreation opportunities as well as resource protection of some of the state's most unique and important scenic, natural, and cultural resources. BLM recreation management objectives for the area include:



Photo courtesy of BLM

- Encourage a wide range of recreation activities in addition to hunting and fishing;
- Cooperate with development of High Desert Trail;
- Limit vehicle use in campgrounds to ingress and egress;
- Provide quality recreational opportunities for the public;
- Protect, preserve, and promote recreational resources;
- Provide facilities, information, and services to promote safety and a maximum recreational experience.

Dispersed recreation opportunities exist throughout the entire area. A State Scenic Byway/Tour Route runs through area. Although the majority of visitors to the area are from Oregon, an increasing number are from out of state and abroad. Recent publications and broadcasts featuring BLM attractions have increased visitation to the area. Sightseeing, driving for pleasure, fishing, and hunting are among the most popular types of dispersed recreation, according to the Southeast Oregon Recreation Plan for Harney, Lake and Malheur Counties. Nonmotorized boating, horseback riding, camping, hiking, wildlife viewing, and OHV use are also popular activities in the area. The Alvord Desert attracts land sailers, hang gliders, para-sailers, experimental and light aircraft of all kinds.

Recreation Activities

Hunting/Fishing. Overall hunting and fishing information is not readily available for just the Alvord Lake Sub-basin. However, information is available for the Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area, which encompasses part of the Alvord Lake Sub-basin and other areas to the west and north. That area includes all or portions of the Beatys Butte, Juniper, Steens Mountain, and Whitehorse ODFW Wildlife Management Units (WMUs). Deer, pronghorn antelope, bighorn sheep, and elk are hunted with rifle, muzzleloader, and bow in this area. During the 2000 Hunting Season in the three WMUs combined, 8,323 hunter days were spent hunting deer with a 47% success rate; 3,237 hunter days were spent hunting elk with a success rate of 13%; and 923 hunter days were spent hunting pronghorn antelope with an 87% success rate (ODFW 2002). Upland bird hunting, primarily for chukar, is a popular late fall and winter activity. Fishing is a popular activity in the area with its variety of fish species including Lahontan cutthroat trout, and several others. There are several lakes, reservoirs, and streams in the area that provide fishing as well as sightseeing, camping, hiking, and wildlife viewing opportunities.

Hiking. Several hiking trails are located in the area. The High Desert Trail, a component of the National Recreation Trails System, begins at Denio Canyon near the Nevada border south of Fields, Oregon and is 240 miles long. The High Desert Trail uses a corridor concept with no clearly defined or maintained path to follow. Hikers choose their own route with the help of a printed guide and strategically placed cairns. Portions of the trail are open year round. The corridor is cooperatively managed with the Desert Trail Association.

Camping. Camping occurs throughout the area, but primarily on the Alvord Desert; camping is mainly primitive and dispersed. The Alvord Desert playa, part of the Alvord Desert WSA, is a popular land sailing destination in the spring. At Mann Lake, camping is allowed in two areas near the shore. The recreation site has vault toilets and a boat ramp. It is located approximately 22 miles south of Highway 78 on the East Steens Road. The lake is stocked with hatchery Lahontan cutthroat trout. Boats with 12 horsepower motors or less are permitted.

Winter Recreation. The primary winter activities are cross-country skiing, snowshoeing, and limited snowmobiling. Ski and snowshoe use is not limited.

Special Recreation Permits

Special recreation permits (SRPs) are required for specific recreational uses of the public lands and related waters. They are issued as a means to manage visitor use, protect natural and cultural resources, and provide a mechanism to accommodate commercial recreational uses. The types of permits are listed below:

1. **Commercial:** Recreational use of public lands and related water for business or financial gain. Examples are scenic tours, outfitters and guides, trail rides, cattle drives, photography associated with recreational activity, and use by scientific, educational, and therapeutic or nonprofit organizations when certain criteria are met.
2. **Competitive:** Any organized, sanctioned, or structured use, event, or activity on public lands in which two or more contestants compete and either 1) participants, register, enter or complete an application for the event, or 2) a predetermined course or area is designated. Examples are OHV races, horse endurance rides, or mountain bike races.
3. **Organized Group:** Permits for noncommercial and noncompetitive group activities and recreation events. Examples include a scout campout, a large family reunion, or a school group activity.

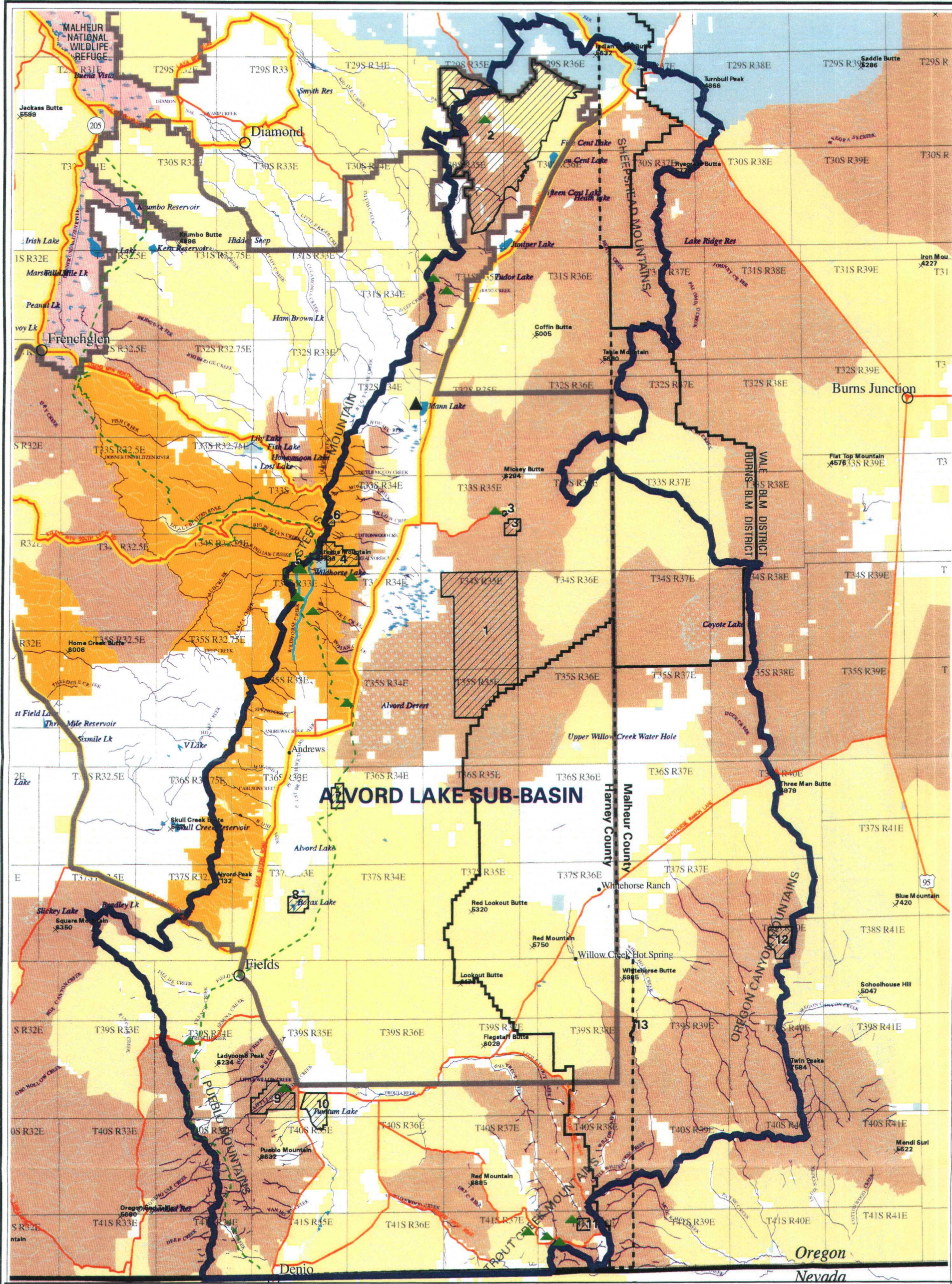
4. **Commercial Day Use:** Special commercial permit provided by the Burns BLM for use within limited locations in the area. It is a one-day permit available for commercial activities such as vehicle tours. Commercial Day Use permit stipulations are developed on a case-by-case basis.
5. **Special Area:** Officially designated by statute or Secretarial order. Examples include camping in long-term visitor areas in California and Arizona or floating many BLM managed rivers.
6. **Vending:** Temporary, short-term, nonexclusive, revocable authorizations to sell goods or services on public land in conjunction with a recreation activity. Examples are T-shirt sales in conjunction with an OHV race, a hot dog stand at a motocross event, firewood sales in a BLM campground, and shuttle services.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

With good management planning and public cooperation, recreation should have little or no negative effects on long-term watershed health in the sub-basin.

Issues, concerns and action items.

- HCWC supports the written BLM recreation management objectives for the sub-basin.



MAP # 17 - Alvord Lake Sub-basin - RECREATION and SPECIAL MANAGEMENT AREAS

- BLM Lands
- BLM Wilderness Study Areas
- BLM Wilderness
- Private Lands
- State Lands
- USFWS Lands
- Scenic Byways
- Wild & Scenic Rivers
- Desert Trail (unsigned)
- Steens Mineral Withdrawal

- Areas of Critical Environmental Concern:**
- 1 Alvord Desert ACEC
 - 2 Kiger Mustang ACEC
 - 3 Mickey Hot Springs ACEC
 - 4 Big Alvord Creek RNA
 - 5 Little Wildhorse Lake RNA
 - 6 South Fork Willow Creek RNA
 - 7 Serrano Point RNA
 - 8 Borax Lake ACEC
 - 9 Pueblo Foothills RNA
 - 10 Tum Tum Lake RNA
 - 11 East Fork Trout Creek RNA
 - 12 Dry Creek Bench RNA
 - 13 Little Whitehorse Creek RNA

▲ Mann Lake Recreation Site
 ▲ Primitive Campsites

Note: No warranty is made by Harney County or the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

See Appendix 1 for specific data disclaimers.

Scale: 1 inch = 6.0 miles

US DEPARTMENT OF THE INTERIOR
Bureau of Land Management
 Burns District, Oregon

TRANSPORTATION

Information sources and authors

The text for this section is generally taken from the Andrews FEIC. HCWC has altered parts of this text where appropriate to make it more directly applicable to the Alvord Lake Sub-basin.

The area has private, state, county, and BLM roads. Some roads are maintained to a high standard while others are more primitive routes receiving very little maintenance. Road uses include rancher access for livestock management, access to private lands, the general public seeking recreational opportunities, and agency administration. Many of the roads serve as important access routes to public lands. Since traffic control signing is limited or nonexistent along BLM roads, caution is required when traveling these routes.

Priorities for maintenance in the area are established as follows: 1) safety of users, 2) high-use roads, 3) resource protection, and 4) all other roads and routes. Road construction has been limited to upgrading segments of existing routes to improve access or alleviate maintenance or environmental problems.

OHV (off-highway vehicle) use is frequently associated with hunting, fishing, and driving for pleasure and also occurs for administrative purposes such as management of livestock and maintenance of range projects. In accordance with 43 CFR 8342.1, all public land in the area is designated as open, limited, or closed with regard to vehicle use. In an open area, all types of motorized and mechanized vehicle use are permitted at all times (43 CFR 8340.0-5(f)). The BLM designates areas as “open” for intensive OHV and mechanized vehicle use where no compelling resource protection needs, user conflicts, or public safety issues exist to warrant limiting cross-country travel. In a limited area, motorized and mechanized vehicle use is restricted at certain times, in certain areas, to designated routes, to existing routes, to certain vehicular uses, or seasonally (43 CFR 8340.0-5(g)). The BLM designates areas as “limited” where it must restrict OHV and mechanized vehicle use in order to meet specific resource management objectives. In a closed area, motorized and mechanized vehicle use is prohibited (43 CFR 8340.0-5(h)). Areas are designated as “closed” if closure to all motorized and mechanized vehicular use is required by law or designation or is necessary to protect resources, promote visitor safety, or reduce use conflicts.

OHV use of the Alvord Desert playa is managed for all legitimate public land uses as well as ORV [OHV] use. Recreation vehicles and commercial uses which do not impair the wilderness values of the Alvord WSA [sic] would be allowed until Congress makes its final determination on wilderness.” This statement is a recognition of prior OHV and mechanized vehicle use on the playa. OHV and mechanized vehicle use of the Alvord Desert playa does not cause permanent impairment of the wilderness values and does not preclude Congress from eventually designating the area as part of the national wilderness system. The BLM has allowed this use to continue based on the determination that managed OHV and mechanized vehicle use would not preclude future wilderness designation. Should the Alvord Desert playa be designated as wilderness, OHV and mechanized vehicle use would not be allowed on the playa.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

OHV use is increasing throughout the sub-basin. When that use is off designated roads, damage to the vegetation and landscape may occur with accompanying watershed health problems such as erosion, soil compaction, etc. The long-term watershed health will be effected to the degree that significant off road use occurs in non-permitted areas.

Issues, concerns and action items.

- Educate the public as to the potential effects of OHV use in non-permitted areas.
- Educate the public that different areas have various OHV use designations and that the public has access to areas of varying types of OHV use.

ECONOMIC ACTIVITY

Information sources and authors

The text and data for this section is generally taken from the Andrews FEIC. A small amount of the agricultural dollar figures are from the Oregon Agricultural Information Network (2005). The text was originally written for a much larger area – in many cases all of Harney County, and in one case the entire state of Oregon. Comparable information is generally not available solely for the Alvord Lake Sub-basin. There is also similar information available for Malheur County but that is not included as it would be repetitious and also not available solely for the Alvord Lake Sub-basin portion of that county. HCWC has altered minor parts of this text.

The BLM makes commodities available for use by the private sector. The BLM rangelands are available to private ranching concerns on a renewable permit basis. A fee is collected for each grazing head of livestock. Salable minerals sources are a small source of revenue where sand, gravel and rock aggregate are sold for use on private land and they contribute to the economy of the area where they are used on state, county, and BLM roads under a free use permit. Since there are no commercial forest lands or operations, or no locatable or leasable energy or minerals facilities in this area, these resources are not a source of economic revenue. There are many other uses of the lands in the sub-basin that generate revenue.

Wild Horses

The BLM conducts wild horse gathers approximately every three to four years. These animals are made available for adoption through the Wild Horse Adoption Program. The contractors hired to conduct the gathers, are from out of the area and the money raised through the adoption fees is sent directly back to the national program. Harney County does not see a direct economic benefit from these activities; however, there are indirect benefits associated with the rare horse breeds and the adoption activities, which attract visitors and attention to the area and lead to local spending that would not otherwise occur.

Agriculture

Agricultural activities in Harney County are not considered highly labor intensive, and are limited primarily to production of hay, forage, and livestock. Harney County agriculture focuses on the following products: 1) beef, with sales of \$50,000,000 in 2005 and 2) hay and forage, with 2005 sales of \$15,659,000 (Oregon Agricultural Information Network 2005). The highest individual agricultural sales revenue in Harney County is derived from cattle ranching, which is inextricably linked to the commodity value of public rangelands. The BLM collected an average of approximately \$145,000 annually in livestock grazing fees over the past ten years. This number is based on 107,000 AUMs at \$1.35 per AUM. The 2004 AUM was valued at \$1.43. The average number of livestock grazing public land each year is 24,500. The BLM spent \$93,680 on range improvement projects in 2002, of which 84% went to local contractors.

The 1997 Census of Agriculture stated that there were 504 farms in Harney County and that approximately 75% were owned by families or individuals. Total gross farm sales in Harney County totaled \$68,399,000 in 2005. Crop sales were \$16,562,000 and animal product sales made up the rest (\$51,837,000). The United States Bureau of Economic Analysis estimated a net farm income of \$2,716,000 for Harney County in 2000, which had gross sales of \$50,418,000. According to Harney County web site the cattle industry is counted on to provide an average of \$28,000,000 per year to the economy of the county and nearly half of the county taxes come from the ranching community (www.harneycounty.com 2003).

Fire Fighting

The fire management strategy focuses on wildland fire suppression and prescribed fire. The wildland fire season generally runs from mid-May through mid-September, while prescribed fires are usually planned for periods before and after the wildland fire season. Approximately 55 to 60 temporary firefighters are employed each year during the fire season. In addition, local contractors are hired to assist with fire suppression and prescribed fire activities. Between \$25,000 and \$275,000 is spent each year on local contracts for fire management depending on the severity of the fire season.

Land Management

Management of the lands, realty authorizations, and Right-of-Ways (ROWs) in the area have economic implications for the county and local economy. Fees are collected by the BLM for land use authorizations and ROWs. Land sales and retention and purchases can affect property tax revenues and potential commodity production; Payments in Lieu of Taxes (PILT) are paid directly to the county. The average annual fees collected for land use authorizations and ROWs are \$15,000. Property taxes collected in Harney County in 2002 totaled \$4.9 million. Harney County also received \$518,880 in PILT in 2002.

OHV Use

Off-highway vehicle (OHV) and mechanized vehicle use is a form of recreation and is often associated with hunting and fishing. No data are available on OHV and mechanized vehicle use in the area or expenditures by OHV and mechanized vehicle enthusiasts in the local economy. However, it can be assumed that these recreationists contribute to the economy through the purchase of goods and services such as gas, food, equipment, and lodging.

Hunting and Fishing

Hunting and other types of recreation also provide income to the county and local communities. According to data obtained from ODFW hunter surveys, Oregon's Mule Deer and Elk plans, and the 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (published by the USFWS), annual hunting trip-related expenditures were estimated at approximately \$3,905,312 and \$530,987 for Harney County and Steens Mountain, respectively. These expenditures include such things as transportation, food, and lodging and are based on 13,924 hunters in Harney County and 2,607 hunters in the Steens Mountain area spending 74,743 and 11,386 recreation days in Harney County and the Steens Mountain area, respectively.

Wildlife Viewing

Numbers for wildlife viewing were not available for the county; however, estimates indicate that 1,680,000 participants spent \$304,990 on trip-related expenses in 2001 in the State of Oregon.

Tourism

The tourism industry in this area is small compared to other Oregon regions; however, tourism in Harney County provides a critical monetary inflow to the economy. For people seeking outdoor recreation and solitude, public lands in Harney County have much to offer. A 2001 report prepared for the Oregon Tourism Commission, Oregon Travel Impacts, 1991-2000, estimated that travel-related spending in Harney County totaled \$18,000,000 with \$2,500,000 attributed to travelers staying in public campgrounds during 2000 (Dean Runyan and Associates 2001). Travel is responsible for 6.5% of the employment in Harney County. Updated estimates show that travel-related spending in Harney County in 2001 was \$18,300,000 and was responsible for 7.4% of employment. Travel-related spending in Harney County increased 5.2% between 1991 and 2001. Revenues from travel accounted for \$3,900,000 in earnings and 340 jobs in Harney County for 2001 (Oregon Tourism Commission 2003).

The 1994 Oregon High Desert Interpretive Center Economic Feasibility and Impact Analysis for Harney County and Burns, Oregon (Dean Runyan and Associates et al. 1994) stated that approximately 50,000 people visited both the Steens Mountain area and the Malheur NWR in 1993. Assuming visitation has remained similar between the two destinations and based on numbers determined in the Regional Economic Benefits of Ecotourism and Operations Associated with the Malheur NWR (Northwest Economic Associates [NEA] 2002), visitation to the CMPA may have been as high as 62,700 between October 1, 1999 and September 30, 2000. The NEA analysis found that visitor expenditures in Harney County amounted to over \$1,900,000; this equated to \$1,200,000 of direct spending within the county (NEA 2002).

It is likely that tourism and visitation to the area will continue to increase in the long term due to 1) population growth within a day's driving time of the area, 2) the increased publicity the Steens Mountain area is receiving, and 3) the recent designation of the Oregon High Desert Discovery Scenic Byway and Tour Routes.

Importance of topic to long-term watershed health in the Alvord Lake Sub-basin.

This topic generally has little to do with long-term watershed health in the sub-basin.

Issues, concerns and action items.

- Help educate the public as to the economic benefits of healthy watershed attributes..

THIS PAGE LEFT BLANK INTENTIONALLY

References

- Bartos, D.L. and W.F. Mueggler. 1981. *Early Succession in Aspen Communities Following Fires in Western Wyoming*. Journal of Range Management, 34:315-318.
- Bartos, D.L. and R.B. Campbell. 1998. *Decline of Quaking Aspen in the Interior West—Examples from Utah*. Rangelands, 20:17-25.
- Bond, C.E. 1974. Fishes. *Endangered Plants and Animals of Oregon: 1*. Special Report No. 205. Oregon State University Agricultural Experiment Station. Corvallis, Oregon.
- Chambers, J.C. and J.R. Miller (editors). 2004. *Great Basin Riparian Ecosystems—Ecology, Management and Restoration*. Island Press, Covelo, CA.
- Connelly, J.W. and C.E. Braun. 1997. *Long-Term Changes in Sage Grouse (Centrocercus urophasianus) Populations in Western North America*. Wildlife Biology 3:123-128.
- Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. *Guidelines for management of sage grouse populations and habitat*. Wildlife Society Bulletin, 28: 967-985.
- Crawford, J.A. and R.S. Lutz. 1985. *Sage Grouse Populations in Oregon, 1941-1983*. Murrelet 66: 69-74.
- Crawford, J.A., R.A. Olson, N.E. West, J.C. Mosley, M.A. Schroeder, T.D. Whitson, R.F. Miller, M.A. Gregg, and C.S. Boyd, 2004. *Ecology and management of sage-grouse and sage-grouse habitat*. Journal of Range Management, 57: 2–19.
- Davis, E. 2005. Personal communication. Owner, Alvord Ranch. Princeton, Oregon.
- Dean Runyon and Associates, SMH Architecture, P.C., Jean Jacques Andre Consultants, Ltd., and Stephen Dow Beckham, PhD. 1994. *Oregon High Desert Interpretive Center Economic Feasibility and Impact Analysis*. Harney County, Oregon.
- DeByle, N.V. 1985. *Animal Impacts*. In *Aspen: Ecology and Management in the Western United States*. N.V. DeByle and R.P. Winokur (editors). 115-123. USDA Forest Service General Technical Report RM-119.
- Ferns, M.L., H.C. Brooks, and J.G. Evans. 1993. *Geologic map of the Vale 30 X 60 Minute Quadrangle, Malheur County, Oregon and Owyhee County, Idaho*. Geological Map Series GMS-77, Scale 1:100,000. Oregon Department of Geology and Mineral Industries.
- Ferns, M.L., H.C. Brooks, and J.G. Evans. 1993. *Geologic map of the Mahogany Mountain 30 X 60 Minute Quadrangle, Malheur County, Oregon and Owyhee County, Idaho*. Geological Map Series GMS-78, Scale 1:100,000. Oregon Department of Geology and Mineral Industries.
- French, R.H. 1987. *Hydraulic Processes on Alluvial Fans*. Elsevier.
- Hansen, P., R. Pfister, K. Boggs, B. Cook, J. Joy and D. Hinckley. 1995. *Classification and Management of Montana's Riparian and Wetland Sites*. Montana Riparian and Wetland Association, School of Forestry, University of Montana, Missoula, MT. Miscellaneous Publication No. 54.

- Hanson, M.L., W. Bowers, and R. Perkins. 1993. *Lahontan Subbasins Fish Management Plan*. Oregon Department of Fish and Wildlife. Portland, Oregon.
- Harvey, A.M. 1997. *The Role of Alluvial Fans in Arid Zone Fluvial Systems*, In: *Arid Zone Geomorphology: Process, Form and Change in Drylands*, David S.G. Thomas (editor). 2nd edition. John Wiley & Sons Ltd. West Sussex, England.
- Jones, K.K., J.M. Dambacher, B.G. Lovatt, A.G. Talabere, and W. Bowers. 1998. *Status of Lahontan Cutthroat Trout in the Coyote Lake Basin, Southeast Oregon*. North American Journal of Fisheries Management 18: 308-317.
- Manning, M.E. and W.G. Padgett. 1995. *Riparian Community Type Classification for Humboldt and Toiyabe National Forests, Nevada and Eastern California*. USDA Forest Service, R4-Ecol-95-01.
- Maser, C., J.W. Thomas, and R.G. Anderson. 1984. *Wildlife Habitats in Managed Rangelands—The Great Basins of Southeastern Oregon*. Gen. Tech. Report PNW-172. Pacific Northwest Forest and Range Experiment Station. USDA Forest Service.
- McDonough, W.T. 1979. *Quaking Aspen Seed Germination and Early Seedling Growth*. USDA Forest Service. Research Paper INT-234. Intermountain Forest and Range Experiment Station. Ogden, UT.
- Miller, R.F., J.D. Bates, T.J. Svejcar, F.B. Pierson, and L.E. Eddleman. 2005. *Biology, Ecology, and Management of Western Juniper*. Oregon State University Agricultural Experiment Station. Technical Bulletin 152. June, 2005.
- Northwest Economic Associates. 2002. *Regional Economic Benefits of Ecotourism and Operations Associated with the Malheur National Wildlife Refuge*. Vancouver, Washington.
- Oregon Department of Fish and Wildlife. 1992-1997. *Oregon's Bighorn Sheep Management Plan*. 1992-1997. Portland, Oregon.
- _____. 2002. *Hunter Surveys 2001*. Portland, Oregon.
- Oregon Department of Environmental Quality. 2003. *Alvord Lake Subbasin Total Maximum Daily Load (TMDL) & Water Quality Management Plan (WQMP)*. December, 2003.
- Oregon Parks and Recreation Department. 2000. *Southeast Oregon Recreation Plan for Harney, Lake and Malheur Counties*.
- Oregon Tourism Commission, Salem, OR. *Oregon Travel Impacts, 1991-2001; Detailed County Estimates*. November, 2002.
- Oregon Water Resources Division. 2005. Staff e-mail correspondence, April, 2005.
- Oregon Water Resources Division. 2006. OWRD website – Water Availability Information, April, 2006.
- Pellant, M. 1996. *Cheatgrass: the invader that won the west*. Unpublished report. On file with: U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management; Interior Columbia Basin Ecosystem Management Project, 112 E. Poplar, Walla Walla, WA 99362.

- Pellant, M., P. Shaver, D.A. Pyke and J.E. Herrick. 2000. *Interpreting Indicators of Rangeland Health*, Version 3. USDI BLM, Technical Reference 1734-6, 2000.
- Rosgen, D.L. 1994. *A Classification of Natural Rivers*. Catena 22(3): 169-199.
- Rowland, M. M. 2004. *Effects of management practices on grassland birds: Greater Sage-Grouse*. Northern Prairie Wildlife Research Center. Jamestown, ND.
- Smith. 1978. As reported in: Minckley, W. L., D. A. Hendrickson, and C. E. Bond. (1986). *Geography of Western North American Freshwater Fishes: Description and Relations to Intracontinental Tectonism*. Pp. 519-613 (plus lit. cited), in C. Hocutt and E. O. Wiley, eds., *Zoogeography of Freshwater Fishes of North America*. Wiley-Interscience, NY, NY.
- U.S. Department of Agriculture/U.S. Department of Interior. 1996. U.S. Forest Service (USFS)/ Bureau of Land Management (BLM). *Status of the Interior Columbia Basin, Summary of Scientific Findings*. U.S. Department of Agriculture, Forest Service General Technical Report PNW-GTR-385, Portland, Oregon.
- U. S. Department of the Interior. 1987. USFWS. *Recovery Plan for the Borax Lake Chub, Gila boraxobius*. U.S. Fish and Wildlife Service, Portland, Oregon. 57 pp.
- _____. 1988. BLM. *Oregon BLM Manual—Supplement*. Salem, Oregon.
- _____. 1993. BLM. *Riparian area management: Process for assessing proper functioning condition for lentic riparian/wetland areas*. TR 1737-11. Denver, CO. 37 pp.
- _____. 1995a. USFWS. *Biological Opinions—Section 7 Consultation for the 1995-1996 Grazing Authorization on the Alvord and Mann Lake Allotments and Lahontan Cutthroat Trout*. U.S. Fish and Wildlife Service.
- _____. 1995b. USFWS. *Recovery Plan for the Lahontan Cutthroat Trout*. U.S. Fish and Wildlife Service.
- _____. 1998b. BLM. *Draft Southeast Oregon Resource Management Plan and Environmental Impact Statement*. Vale, Oregon. October, 1998.
- _____. 1998. BLM. *A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas*. USDI 1737-15. Denver, Colorado. 126p.
- _____. 1999. BLM. *A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas*. USDI 1737-16. Denver, Colorado. 109 pp.
- _____. 1999. USFWS. *Biological Opinions—Section 7 Consultation for the 1999-2004 Grazing Activities on the Pueblo Mountain Allotment*. United States Fish and Wildlife Service.
- _____. 2000a. BLM. *Proposed Southeast Oregon Resource Management Plan and Final Environmental Impact Statement*. Vale, Oregon. December, 2000.
- _____. 2001. BLM. *Proposed Southeast Oregon Resource Management Plan and Final Environmental Impact Statement*. Vale, Oregon. April, 2001.
- _____. 2001. USFWS. *Biological Opinions—Section 7 Consultation for Ongoing Implementation of the Pueblo-Lone Mountain Allotment Management Plan*. United States Fish and Wildlife Service.

- _____. 2003. USFWS and U.S. Department of Commerce, U.S. Census Bureau. *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. Revised March 2003. Washington D.C.
- _____. 2004. BLM. *Proposed Resource Management Plan and Final Environmental Impact Statement, Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area*, Burns Oregon, 2004.
- Vavra, M. and F. Sneva. 1978. *Seasonal diets of five ungulates grazing the cold desert biome*, p. 435–437. In: D.N. Hyder (ed.), *Proc. First Internat. Rangeland Cong., Soc. Range Manage.* Denver, Colo.
- Wall, T.G. 1999. *Juniper Encroachment into Quaking Aspen (*Populus tremuloides*) Communities in the Northern Great Basin*. Oregon State University M.S. Thesis, Corvallis. 72 pp.
- Wall, T.G., R.F. Miller, and T.J. Svejcar. 2001. *Juniper Encroachment into Aspen in the Northwest Great Basin*. *Journal of Range Management*. 54:691-698.
- Williams, J.E. 1995. *Threatened Fish of the World: Gila boraxobius Williams and Bond, 1980 (Cyprinidae)*. *Environmental Biology of Fishes*. 43: 294.
- Williams, J.E. and C.E. Bond. 1983. *Status and Life History Notes on the Native Fishes of the Alvord Basin, Oregon and Nevada*. *Great Basin Naturalist*. 43(3): 409-420.
- Willis, M.J. 1993. *Sage Grouse in Oregon*. Oregon Department of Fish and Wildlife Research Report No. 15. 54 pp.
-

Appendix 1 – Watershed Boundary Systems, Sub-basin Reporting and Mapping Data.

Watershed boundary systems and Alvord Lake Sub-basin reporting area. There are currently two systems commonly used in Oregon to define watershed boundaries and basins. The Oregon Department of Water Resources developed one system and the other was developed at the federal level. The state system has traditionally been used by state and county entities. Its use is declining as these groups now are commonly using the federal system. At the federal level the U.S. Geological Survey (USGS) developed the Hydrologic Unit Code (HUC) system in the 1970s. That USGS system has evolved and is the national interagency standard. Its use is mandated by the Federal Geographic Data Committee (FGDC). FGDC implements the National Spatial Data Infrastructure (established by Executive Order 12906 in 1994) in cooperation with state, local and tribal governments, the academic community and the private sector.

The HUC system is used by the USDI Bureau of Land Management (BLM) and consequently it is the system used for this project. This system uses HUCs to name watersheds. In the HUC system various levels of watersheds are defined. The Alvord Lake Sub-basin is a 4th field watershed (HUC) and there are eight 5th field watersheds (HUCs) within the sub-basin (see Maps 3, and 9 through 16).

The Alvord Lake Sub-basin lies mostly (93%) in Oregon and partially (7%) in northern Nevada (see Maps 1, 2 and 9). In both states the majority of the land is federally owned and managed by the BLM. In Oregon that BLM land is managed by two BLM Districts—one based in Burns and one based in Vale.

However, the BLM in the two states do not digitized the same set of land management attributes into their geographical information systems (GIS). This makes information exchange difficult. Given the land size and information type disparities this assessment only covers the Oregon section of the Alvord Lake Sub-basin 4th field HUC. Data from the Nevada portion is not included. Please note that references to the Alvord Lake Sub-basin in this document are generally meant to address only the Oregon portion of the sub-basin. Map 3 provides acreage data for the Nevada and Oregon portions of the sub-basin.

The Burns BLM office has closely collaborated on this watershed assessment with the Harney County Watershed Council to produce maps and compile data. The Vale BLM office has also been very helpful. In general, the Burns and Vale BLM offices have similar data in their GIS systems and they easily share that electronic information. This has allowed map production for a variety of attributes across the sub-basin. In a few cases the Vale District either collected attribute data in a different manner or they do not have the same type of data as does the Burns BLM. Consequently some map attributes vary at or near the Vale/Burns District line. In addition to mapped data, both BLM Districts have supplied the HCWC with tabular and text information. Note that the Vale District land is generally in the southeast portion of the sub-basin and that it encompasses most of the 1712000904, 905 and 906 5th field watersheds. It also encompasses smaller parts of 1712000902, 903, 907 and 908.

Mapping data. The maps in this report, except Map 1 and 2 which show the entire state of Oregon, show and use USGS attributes and labels. Features are commonly displayed and named on these maps in the same ways they are on USGS maps. This is sometimes not true when HCWC goals for a map required that the USGS attributes be either turned off or altered.

The interpretation of some sub-basin features and the data that has been compiled about them requires an understanding of the USGS map-making process. The first step in that process is that aerial photos are taken of the area. Those photos are put together in composite photos in manners which reduce distortion, etc. Those composite photos are then interpreted mechanically and by humans, and the information is transferred to paper and electronic versions of the map. Many factors influence the accuracy of the final products, and ground truthing of the maps is not regularly performed.

On many of the USGS maps of the Alvord Lake Sub-basin it is well understood by local map users that some features are misidentified. A noticeable example of this is the fact that some water features in general are shown to be ‘wetter’ than they really are. At least two lakes which are considered to only be intermittent (contain water for only a part of most years) are shown to be perennial (have water year-around). Similarly, the perennial portions (have water year-around) of many streams appear to often be drawn too long, extending into stream reaches that do not have year around water. Errors such as these can easily occur when the aerial photos for a map are taken in wet years. See pages 34-38 for further discussions of perennial and non-perennial streams.

The result of this type of error is that some maps in this document show more perennial lakes and probably more miles of perennial streams than exist in the sub-basin. Users should understand that the data which we present which comes from the USGS maps, such as the miles of perennial stream length, may be inaccurate for the reasons discussed.

Specific mapping information and disclaimers. The 17 maps in the report can be divided into three groups of map types, with the following features:

- Maps 1 and 2—produced by Burns BLM (Pam Keller, GIS Coordinator, 573-4400). These statewide maps show very few features, and are intended primarily to put the Alvord Lake Sub-basin in perspective to the State of Oregon and to the other six sub-basins under the purview of the Harney County Watershed Council.
- Maps 3-8, and 17—produced by Burns BLM GIS (Pam Keller GIS Coordinator, 573-4400). These seven maps show various features for the entire sub-basin. The following discrepancies are found on many of these maps:
 - Perennial streams are shown in some map legends to be a relatively heavy blue lines, but on the maps they are shown instead as thin, purple lines.
 - Juniper and Ten Cent Lakes are shown to be perennial lakes (contain water year around), but in fact they often do not have year around water. They should be designated as intermittent lakes.
- Maps 6-16—produced by Harney County GIS (Bryce Mertz, GIS Specialist, 573-8195). These eight 5th field watershed maps were produce on the Harney County GIS system which is interactive with the Burns BLM GIS system. A consistent set of data is shown in these eight maps, unlike maps 3-8 and 17, which have various themes. Because of a larger scale, more features are shown on these maps than on 3-8 and 17, plus many features are easier to see. The perennial streams are marked both on these maps and in their legends as relatively heavy blue lines. Again though, Juniper and Ten Cent Lakes are shown to be perennial. Please note the text on page 128 about the GIS anomaly for the high elevation in the Big Alvord 5th field watershed and the displayed map data in Map 11.

Appendix 2 – Special Status Plant Species in the Alvord Lake Sub-basin. The information in the table is for the Burns BLM District only; Vale BLM data was not available.

| Common Name | Scientific Name | BLM Status | ONHP Status |
|-----------------------------|--|------------|-------------|
| alpine fescue | <i>Festuca brachyphylla</i> | T | L3 |
| alpine lily | <i>Lloydia serotina</i> | T | L3 |
| Alvord milk vetch | <i>Astragalus alvordensis</i> | T | L4 |
| Bellard's kobresia | <i>Kobresia bellardii</i> | T | L3 |
| Biddle's lupine | <i>Lupinus biddlei</i> | S | L4 |
| Bigelow's four-o'clock | <i>Mirabilis bigelovii</i> var. <i>retrorsa</i> | A | L2 |
| Cusick's draba | <i>Draba cusickii</i> | T | L4 |
| Cusick's hyssop | <i>Agastache cusickii</i> | A | L2 |
| Davidson's penstemon | <i>Penstemon davidsonii</i> var. <i>praeteritus</i> | T | L4 |
| Davis' peppergrass | <i>Lepidium davisii</i> | S | L1 |
| desert needlegrass | <i>Achnatherum speciosum</i> | A | L2 |
| desert chaenactis | <i>Chaenactis xantiana</i> | A | L2 |
| foetid sedge | <i>Carex vernacular</i> | A | L2 |
| four-wing milkvetch | <i>Astragalus tetrapterus</i> | A | L4 |
| Hayden's cymopterus | <i>Cymopterus nivalis</i> | A | L2 |
| Hayden's sedge | <i>Carex haydeniana</i> | T | L4 |
| iodine bush | <i>Allenrolfea occidentalis</i> | A | L2 |
| large-flowered chaenactis | <i>Chaenactis macrantha</i> | T | L4 |
| long-flowered snowberry | <i>Symphoricarpos longiflorus</i> | A | L2 |
| lyrate malacothrix | <i>Malacothrix sonchoides</i> | T | L3 |
| Malheur cryptantha | <i>Cryptantha propria</i> | T | L4 |
| moonwort | <i>Botrychium lunaria</i> | A | L2 |
| moss gentian | <i>Gentiana prostrata</i> | A | L2 |
| naked-stemmed phacelia | <i>Phacelia gymnoclada</i> | A | L2 |
| narrowleaf cottonwood | <i>Populus angustifolia</i> | T | L4 |
| nodding melic | <i>Melica stricta</i> | T | L4 |
| ochre-headed buckwheat | <i>Eriogonum ochrocephalum</i> ssp. <i>calcareum</i> | T | L4 |
| pinnate grapefern | <i>Botrychium pinnatum</i> | A | L2 |
| prickly poppy | <i>Argemone munita</i> ssp. <i>rotundata</i> | A | L2 |
| purple cymopterus | <i>Cymopterus purpurascens</i> | A | L2 |
| Raven's lomatium | <i>Lomatium revenii</i> | A | L2 |
| salt heliotrope | <i>Heliotropium curassavicum</i> | T | L3 |
| short-fruited willow | <i>Salix brachycarpa</i> var. <i>brachycarpa</i> | T | L4 |
| Sierra willow | <i>Salix orestera</i> | T | L3 |
| sky pilot | <i>Polemonium viscosum</i> | T | L4 |
| slender gentian | <i>Gentianella tenella</i> | A | L2 |
| slender wild cabbage | <i>Caulanthus major</i> var. <i>nevadensis</i> | S | L2 |
| Steens Mountain paint brush | <i>Castilleja pilosa</i> var. <i>steenensis</i> | S | L4 |
| thick-stemmed wild cabbage | <i>Caulanthus crassicaulis</i> | T | L4 |
| Torrey's malacothrix | <i>Malacothrix torreyi</i> | T | L4 |
| two-stemmed onion | <i>Allium bisceptrum</i> | T | L4 |
| verrucose seapurslane | <i>Sesuvium verrucosum</i> | A | L2 |
| weak-stemmed stonecrop | <i>Sedum debile</i> | T | L4 |

BLM and ONHP Status (on next page)

BLM Status

S=Sensitive—species that could easily become endangered or extinct in a state, are restricted in range, and have natural or human-caused threats to survival.

A=Assessment—species not presently eligible for official federal or state status but are still of concern and need protection or mitigation in BLM activities.

T=Tracking—species that may become of concern in the future, but more information is needed to determine status for management purposes.

E=Endangered – federally listed under the Endangered Species Act.

ONHP (Oregon Natural Heritage Program) Status

L1—taxa threatened with extinction or presumed to be extinct throughout their range.

L2—taxa threatened with extirpation or presumed to be extirpated from the State of Oregon.

L3—taxa of conservation concern that need more information to determine status.

Source: BLM, 2005.

Appendix 3 – Special Status Animal Species in the Alvord Lake Sub-basin. See the Status information at the bottom of the table. The Sub-basin Occurrence column indicates if each species is Known to use the sub-basin or just Suspected to periodically use the sub-basin.

| Common Name | Scientific Name | Status | | | | Sub-basin Occurrence |
|---------------------------------------|-----------------------------------|--------|-----|----|------|----------------------|
| | | Fed | BLM | OR | ONHP | |
| BIRDS | | | | | | |
| American white pelican | <i>Pelecanus erythrorhynchos</i> | | BA | | L2 | Known |
| bank swallow | <i>Riparia riparia</i> | | BT | | L4 | Suspected |
| black-throated sparrow | <i>Amphispiza bilineata</i> | | BT | | L2 | Known |
| Bobolink | <i>Dolichonyx oryzivorus</i> | | BT | | L4 | Suspected |
| broad-tailed hummingbird | <i>Selasphorus platycercus</i> | | BT | | L4 | Known |
| great egret | <i>Casmerodius albus</i> | | BT | | L3 | Suspected |
| Greater sage-grouse | <i>Centrocercus urophasianus</i> | SoC | BS | | L2 | Known |
| greater sandhill crane | <i>Grus canadensis ssp.</i> | | BT | | L4 | Known |
| loggerhead shrike | <i>Lanius ludovicianus</i> | | BT | | L4 | Known |
| northern bald eagle | <i>Haliaeetus leucocephalus</i> | FT | | ST | L1 | Known |
| northern goshawk | <i>Accipiter gentilis</i> | SoC | BS | | L3 | Suspected |
| olive-sided flycatcher | <i>Contopus cooperi</i> | | BT | | L3 | Known |
| peregrine falcon | <i>Falco peregrinus ssp.</i> | | BS | SE | L1 | Known |
| sage sparrow | <i>Amphispiza belli</i> | | BS | | L4 | Known |
| snowy egret | <i>Egretta thula</i> | | BA | | L4 | Suspected |
| Swainson-s hawk | <i>Buteo swainsoni</i> | | BT | | L4 | Known |
| western burrowing owl | <i>Athene cunicularia</i> | SoC | BS | | L2 | Known |
| western snowy plover (inland) | <i>Charadrius alexandrinus</i> | | | ST | L2 | Known |
| white-faced ibis | <i>Plegadis chihi</i> | SoC | BT | | L4 | Known |
| willow flycatcher | <i>Empidonax traillii adastus</i> | SoC | BT | | L4 | Suspected |
| FISH | | | | | | |
| Alvord chub | <i>Gila alvordensis</i> | SoC | BA | | L2 | Known |
| Borax Lake chub | <i>Gila boraxobius</i> | FE | | SE | L1 | Known |
| Lahontan cutthroat trout | <i>Oncorhynchus clarki</i> | FT | | ST | L1 | Known |
| MAMMALS | | | | | | |
| California bighorn sheep | <i>Ovis canadensis ssp.</i> | SoC | BT | | L4 | Known |
| fringed myotis | <i>Myotis thysanodes</i> | SoC | BT | | L3 | Suspected |
| kit fox | <i>Vulpes velox</i> | | | ST | L2 | Known |
| long-eared myotis | <i>Myotis evotis</i> | SoC | BT | | L4 | Known |
| long-legged myotis | <i>Myotis volans</i> | SoC | BT | | L3 | Known |
| pallid bat | <i>Antrozous pallidus</i> | SoC | BT | | L3 | Known |
| Preble-s shrew | <i>Sorex preblei</i> | SoC | BT | | L3 | Known |
| pygmy rabbit | <i>Brachylagus idahoensis</i> | SoC | BA | | L2 | Known |
| silver-haired bat | <i>Lasionycteris noctivagans</i> | SoC | BT | | L3 | Known |
| spotted bat | <i>Euderma maculatum</i> | SoC | BA | | L2 | Known |
| Townsend-s big-eared bat | <i>Corynorhinus townsendii</i> | SoC | BS | | L2 | Known |
| western small-footed myotis | <i>Myotis ciliolabrum</i> | SoC | BT | | L3 | Known |
| white-tailed antelope ground squirrel | <i>Ammospermophilus leucurus</i> | | BT | | L3 | Known |
| Yuma myotis | <i>Myotis yumanensis</i> | SoC | BT | | L4 | Known |

| REPTILES | | | | | | |
|------------------------------|--------------------------------|-----|----|--|----|-------|
| desert horned lizard | <i>Phrynosoma platyrhinos</i> | | BT | | L3 | Known |
| long-nosed leopard lizard | <i>Gambelia wislizenii</i> | | BT | | L4 | Known |
| Mojave black-collared lizard | <i>Crotophytus bicinctores</i> | | BT | | L3 | Known |
| northern sagebrush lizard | <i>Sceloporus graciosus</i> | SoC | BT | | L4 | Known |

Status:

Federal

| | |
|------------------------|---|
| FE=Federal Endangered | A species which is in danger of becoming extinct within the foreseeable future throughout all or a significant portion of its range. |
| FT=Federal Threatened | A species that is likely to become endangered within the foreseeable future. |
| FC=Federal Candidate: | A species for which the USFWS or NMFS have sufficient information to support a proposal for listing as Threatened or Endangered under the ESA. |
| SoC=Species of Concern | A former C2 candidate species which needs additional information in order to propose as Threatened or Endangered under the ESA. The USFWS is reviewing species information for consideration as Candidates for listing under the ESA. |

BLM

| | |
|-----------------------|--|
| BS=Bureau Sensitive: | Species that could easily become endangered or extinct in a state, are restricted in range, and have natural or human-caused threats to survival. |
| BA=Bureau Assessment: | Species not presently eligible for official federal or state status but are still of concern and need protection of mitigation win BLM activities. |
| BT=Bureau Tracking: | Species that may become of concern in the future, but more information is needed to determine status for management purposes. |

State of Oregon

| | |
|----------------------|--|
| SE=State Endangered | A species which is in danger of becoming extinct within the foreseeable future throughout all or a significant portion of its range. This species may be extirpated from its range within the state. |
| ST=State Threatened: | An animal that could become endangered within the foreseeable future within all or a portion of its range. |

ONHP (Oregon Natural Heritage Program)

| | |
|------------|--|
| L1=List 1: | Taxa that are threatened with extinction or presumed to be extinct throughout their entire range. |
| L2=List 2: | Taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. |
| L3=List 3: | Species for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range. |
| L4=List 4: | Taxa which are of concern, but are not currently threatened or endangered. |

Extirpated—no longer within the original range of the species in Oregon

Source: BLM, 2005.

Appendix 4 – Glossary and Acronym List.

ACEC: Area of Critical Environmental Concern

AMP: Allotment Management Plan

APHIS: Agricultural Plant and Animal Health Inspection Service

AUM: Animal Unit Month

Allotment: Specific portion of public land allocated for livestock grazing, typically with identifiable or fenced boundaries and permitted for a specified number of livestock for a prescribed period of time.

Allotment Management Plan (AMP): A plan for managing livestock grazing on specified public land.

Alluvial/Alluvium: Sand, clay, etc. deposited by flowing water, especially in a stream bed.

Andesite: A fine-grained igneous rock of intermediate composition composed of about equal amounts of iron and magnesium minerals and plagioclase feldspars.

Andrews FEIS: Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area Proposed Resource Management Plan and Final Environmental Impact Statement, Burns District BLM, 2004.

Animal Unit: One cow, one cow/calf pair, one horse, or five sheep.

Animal Unit Month (AUM): The forage needed to support one cow, one cow/calf pair, one horse, or five sheep for one month. Approximately 800 pounds of forage.

Aquifer: Rock or rock formations (often sand, gravel, sandstone, or limestone) that contain or carry groundwater and act as water reservoirs.

Area of Critical Environmental Concern (ACEC): Area where 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 humans from natural hazards.

BLM: Bureau of Land Management

Basalt: A dark, heavy, fine-grained silica-poor igneous rock composed largely of iron and magnesium minerals and calcium-rich plagioclase feldspars.

Basin (River): In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems.

Best Management Practices (BMPs): A set of practices which, when applied during implementation of management actions, ensures that negative impacts to natural resources are minimized. BMPs are applied based on site-specific evaluation and represent the most effective and practical means to achieve management goals for a given site.

Bureau of Land Management (BLM): Government agency with the mandate to manage federal lands under its jurisdiction for multiple uses.

BLM Assessment Species: Plant and animal species on List 2 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040) that are identified in BLM Instruction Memo OR-91-57 and are not included as federal candidate, state listed, or BLM sensitive species.

BLM Sensitive Species: Plant or animal species eligible for federal listed, federal candidate, state listed, or state candidate (plant) status, or on List 1 in the Oregon Natural Heritage Data Base, or approved for this category by the BLM State Director.

BLM Tracking Species: Plant and animal species on List 3 and 4 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040) that are identified in BLM Instruction Memo OR-91-57 and are not included as federal candidate, state Listed, BLM sensitive, or BLM assessment species.

Borax: An evaporite mineral ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$). It is the major source of boron and is generally found in alkali lake deposits. It has a variety of uses (e.g., glass and ceramics manufacturing, agricultural chemicals, chemical fluxes, fire retardant and preservative).

CFR: Code of Federal Regulations

cfs: cubic feet per second—a measure of the amount of flowing water

CMPA: Cooperative Management and Protection Area

CWA: Clean Water Act

Candidate Species: Any species included in the Federal Register Notice of Review that are being considered for listing as threatened or endangered by the US Fish and Wildlife Service.

Chalcedony: A cryptocrystalline variety of quartz (SiO_2) consisting of microscopic fibers. It exhibits a myriad of colors and patterns and is used primarily as an ornamental or gemstone. Agate, jasper and thunder eggs are varieties.

Clay: As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40% or more clay, less than 45% sand, and less than 40% silt.

Clay (Geology): A rock or mineral fragment of any composition finer than 0.00016 inches in diameter. Mineral = a hydrous aluminum-silicate that occurs as microscopic plates, and commonly has the ability to absorb substantial quantities of water on the surface of the plates.

Climax Vegetation: The stabilized plant community on a particular site. The plant cover reproduces itself and does not change as long as the environment remains the same.

Colluvium: Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Community: A group of species of plants and/or animals living and interacting at a particular time and place; a group of people residing in the same place and under the same government.

Corridor (Landscape): Landscape elements that connect similar patches of habitat through an area with different characteristics. For example, streamside vegetation may create a corridor of willows and hardwoods between meadows or through a forest.

DEQ: Oregon Department of Environmental Quality

DO: Dissolved oxygen, oxygen dissolved in water.

Deep Soil: A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Developed Recreation: Recreation that requires facilities which in turn result in concentrated use of an area; for example, a campground.

Diatomite: A soft, crumbly, lightweight, highly porous sedimentary rock consisting mainly of microscopic siliceous skeletons of diatoms (single-celled aquatic plants related to algae). It is used for filter aids, paint filler, abrasives, anti-caking agents, insecticide carriers, and insulation.

Dispersed Recreation: Recreation that does not occur in a developed recreation life; for example, hunting or backpacking.

Disturbance: Refers to events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, insects, and pathogens. Human-caused disturbances include actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

Drainage Surface: Runoff, or surface flow of water, from an area.

Duff: A generally firm organic layer on the surface of mineral soils consisting of fallen decaying plant material including everything from the litter on the surface to underlying pure humus.

EIS: Environmental Impact Statement

EPA: Environmental Protection Agency

ESA: Endangered Species Act

ESI: Ecological Site Inventory

Ecological Site Inventory (ESI): The basic inventory of present and potential vegetation on BLM rangelands. Ecological sites are differentiated on the basis of the kind, proportion, or amount of plant species.

Ecological Status: The present state of vegetation of a range site in relation to the potential natural community for that site. Four classes are used to express the degree to which the production or composition of the present plant community reflects that of the potential natural community (climax):

| Ecological Status (Seral stage) | Percent of Community in Climax Condition |
|---------------------------------|--|
| Potential natural community | 76-100 |
| Late seral | 51-75 |
| Mid-seral | 26-50 |
| Early seral | 0-25 |

Ecosystem: A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

Endangered Species: Any species defined under the ESA as being in danger of extinction throughout all or a significant portion of its range. Listings are published in the Federal Register.

Environmental Assessment (EA): One type of document prepared by federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed federal actions which are not expected to have significant impacts on the human environment.

Environmental Impact Statement (EIS): One type of document prepared by federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed major federal actions expected to have significant impacts on the human environment.

Ephemeral Stream: A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no continuous supply from melting snow or other source, and its channel is above the water table at all times.

Erosion: The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (Accelerated): Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, e.g., fire that exposes the surface.

Erosion (Geologic): Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the buildup of such landscape features as flood plains and coastal plains. Erosion is synonymous with natural erosion.

Evapotranspiration: The release and movement of moisture through evaporation from water and soil surfaces, and loss from living vegetation.

F—AR: Functional—At Risk

FEIS: Final Environmental Impact Statement

FLPMA: Federal Land Policy and Management Act

Fauna: The vertebrate and invertebrate animals of an area or region.

Federal Land Policy Management Act of 1976 (FLPMA): Law mandating that the BLM manage lands under its jurisdiction for multiple uses. Establishes guidelines for its administration; and provides for the management, protection, development, and enhancement of the public lands, among other provisions.

Feldspar: Common rock-forming minerals composed of silicate of aluminum, combined with sodium and either potassium or calcium.

Fine Textured Soil: Sandy clay, silty clay, or clay.

Fire Effects: The physical, biological, and ecological impact of fire on the environment.

Fire Intensity: The product of the available heat of combustion per unit area of ground and the rate of spread of the fire.

Fire Management Plan (FMP): A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire Regime: The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire.

Fire Return Interval: The number of years between two successive fires documented in a designated area (i.e., the interval between two successive fire occurrences).

Fire Suppression: All the work activities connected with fire-extinguishing operations, beginning with the discovery and continuing until the fire is completely extinguished.

Flood Plain: A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform build of sediment deposited during overflow and lateral migration of the stream.

Forage: Vegetation (both woody and non-woody) eaten by animals, especially grazing and browsing animals.

Forb: Any herbaceous plant not a grass or a grass-like species. Broad-leafed plants; includes plants that commonly are called weeds or wildflowers.

Fuel (Fire): Dry, dead parts of trees, shrubs, and other vegetation that can burn readily.

Functional—At Risk (FAR): Riparian/wetland areas that are in functioning condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

GIS: Geographic Information System

Geographic Information System (GIS): An information processing technology to input, store, manipulate, analyze, and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

Graben: A fault-bounded down-dropped portion of the earth's crust.

Gravel: Unconsolidated, rounded or angular fragments of rock. Usually defined as being larger than sands and smaller than cobbles, so about two millimeters to 2.5 inches.

Ground Water: Water that sinks into the soil and is stored in slowly flowing and slowly renewed underground reservoirs called aquifers.

Gully: A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

HCCWMA: Harney County Cooperative Weed Management Area

HCWC: Harney County Watershed Council

HMA: Herd Management Area

HSWCD: Harney Soil and Water Conservation District.

HUC: Hydrologic Unit Code

Habitat: A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Herd: One or more wild horse bands using the same general area.

Herd Management Area (HMA): A geographic area identified in a Management Framework Plan or Resource Management Plan for the long-term management of a wild horse herd.

Herd Management Area Plan: A plan that prescribes measures for the protection, management, and control of wild horses and their habitat on one or more HMAs, in conformance with decisions made in approved Management Framework or Resource Management Plans.

Horizon (Soil): A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes.

Hydrologic: Refers to the properties, distribution, and effects of water. “Hydrology” refers to the broad science of the waters of the earth; their occurrence, circulation, distribution, chemical and physical properties, and their reaction with the environment.

Hydrologic Unit Code (HUC): A coding system developed by the U.S. Geological Service to map geographic boundaries of watersheds of various sizes.

Hydrothermal Deposit: A mineral deposit formed by hot mineral-laden fluids.

Igneous Rock: Rock that solidified from a molten or semi-molten state. The major varieties include intrusive (solidified beneath the surface of the earth) and volcanic (solidified on or very near the surface of the earth).

Intermittent Stream: A stream, or reach of a stream, that flows for prolonged periods only when it receives groundwater discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Interior Drainage: Streams with no outlet to the sea.

Lacustrine: Of or found in or on lakes.

Leasable Minerals: Minerals that may be leased to private interests by the federal government including oil, gas, geothermal, coal, and sodium compounds.

Limestone: A sedimentary rock consisting chiefly of calcium carbonate.

Loam: Soil material that is seven to 27% clay particles, 28 to 50% silt particles, and less than 52% sand particles.

Locatable Minerals: Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

Map Unit: The basic system of description in a soil survey and delineation on a soil map. Can vary in level of detail.

Mechanical Treatment: Use of mechanical equipment for seeding, brush management, and other management practices.

Microbiotic Crust: Lichens, mosses, green algae, fungi, cyanobacteria, and bacteria growing on or just below the surface of soils.

Mineral Estate: Refers to the ownership of minerals at or beneath the surface of the land.

Mitigation: Measures designed to counteract environmental impacts or to make impacts less severe.

Monitoring: The periodic and systematic collection of resource data to measure progress toward achieving objectives.

Monitoring and Evaluation: The collection and analysis of data to evaluate the progress and effectiveness of on-the-ground actions in meeting resource management goals and objectives.

Multiple Use: Management of public land and its resources to best meet various present and future needs of the American people. This means coordinated management of resources and uses to assure the long-term health of the ecosystem.

NEPA: National Environmental Policy Act

NF: Nonfunctioning

NOAA: National Oceanographic and Atmospheric Administration

NRCS: Natural Resource Conservation Service

National Environmental Policy Act of 1969 (NEPA): Law requiring all federal agencies to evaluate the impacts of proposed major federal actions with respect to their significance on the human environment.

National Wildlife Refuge (NWR): An area administered by the U.S. Fish and Wildlife Service for the purpose of managing certain fish or wildlife species.

Naturalness (a primary wilderness value): An area that generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable.

Nonfunctioning: PFC classification of riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc.

Noxious Weed: A plant specified by law as being especially undesirable, troublesome, and difficult to control. A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or

disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

Nutrient (Plant): Any element taken in by a plant that is essential to its growth. Plant nutrients are mainly nitrogen, phosphorous, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil, and carbon, hydrogen, and oxygen obtained from the air and water.

ODEQ: Oregon Department of Environmental Quality

ODFW: Oregon Department of Fish and Wildlife

OHV: Off-highway vehicle

ONHP: Oregon Natural Heritage Program

OWEB: Oregon Watershed Enhancement Board

OWRD: Oregon Water Resources Department

Oregon TMDL: Alvord Lake Sub-basin Total Maximum Daily Load & Water Quality Management Plan, Oregon DEQ, 2003.

Organic Matter: Plant and animal residue in the soil in various stages of decomposition.

Overstory: The plants in a plant community which form the upper canopy.

PFC: Proper functioning condition

pH Value: A numerical designation of acidity and alkalinity. (See Reaction, soil)

PILT: Payments In Lieu of Taxes

PL: Public Law

PNC: Potential Natural Community

PRIA: Public Rangelands Improvement Act of 1978

Perennial: A plant that lives for three or more years.

Perennial Stream: A stream in which water is present during all seasons of the year.

Permeability: The quality of the soil that enables water to move downward through the profile, measured as the number of inches per hour that water moves downward through the saturated soil.

Playa Lake: A shallow lake that is seasonally dry. Soils on the lake bottom are usually quite alkaline.

Pleistocene: Geologic time period characterized by the rise and receding of continental ice sheets; appearance of early man, epoch of time is 50,000 to 1,000,000 years ago.

Pluvial: Referring to a period of greater rainfall.

Pluvial Lake: A lake formed during a period of exceptionally high rainfall (e.g., a time of glacial advance during the Pleistocene epoch) and now either extinct or existing as a remnant, such as Lake Bonneville.

Point Source Pollution: Pollution that comes from a single identifiable source such as a smokestack, a sewer, or a pipe.

Prescribed Burning: Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions which allow the fire to be confined to a predetermined area and at the same time to produce the fire line intensity and rate of spread required to attain planned resource management objectives.

Prescribed Fire: Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met prior to ignition. The introduction of fire to an area under regulated conditions for specific management purposes (usually vegetation manipulation).

Primary Wilderness Values: The primary or key wilderness values described in the Wilderness Act by which WSAs and wildernesses are managed to protect and enhance the wilderness resource. Values include roadlessness, naturalness, solitude, primitive and unconfined recreation, and size.

Productivity: 1) *Soil productivity*: the capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties (such as depth, temperature, water-holding capacity, and mineral, nutrient, and organic matter content). 2) *Vegetative productivity*: the rate of production of vegetation within a given period. 3) *General*: the innate capacity of an environment to support plant and animal life over time.

Proper Functioning Condition (PFC): Riparian-wetland areas achieve Proper Functioning Condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This thereby reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improves floodwater retention and groundwater recharge; develops root masses that stabilize streambanks against cutting action; develops diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and supports greater biodiversity. The functioning condition of riparian-wetland areas is a result of the interaction among geology, soil, water, and vegetation.

Public Land: Any land or interest in land owned by city, county, state or federal government.

Pumice: A glassy, rhyolitic rock exhibiting a vesicular, or frothy texture. It is generally used as a light weight aggregate and an abrasive.

RAC: Resource Advisory Council

RMP: Resource Management Plan

RNA: Research Natural Area

ROW: Right-of-way

Rangeland: Land on which the potential natural vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range Site: An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, Soil: A measure of acidity or alkalinity of a soil, expressed in pH values. Soils with pH values less than 7 are acidic and those with pH greater than 7 are alkaline.

Regeneration: The new growth of a natural plant community, developing from seed.

Research Natural Area (RNA): An area where natural processes predominate and which is preserved for research and education. Under current BLM policy, these areas must meet the relevance and importance criteria of ACECs and are designated as ACECs. An area of significant scientific interest that is designated to protect its resource values for scientific research and study.

Resource Area: The “on-the-ground” management unit of the BLM comprised of BLM administered land within a specific geographic area.

Resource Management Plan (RMP): Current generation of land use plans developed by the BLM under the Federal Land Policy and Management Act. Replaces the older generation Management Framework Plans. Provides long-term (up to 20 years) direction for the management of a particular area of land and its resources, usually corresponding to a BLM resource area.

Revegetation: Establishing or re-establishing desirable plants on areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation).

Rhyolite: A fine-grained light-colored silica-rich igneous rock composed largely of potash feldspars and quartz.

Right-of-Way (ROW): A permit or an easement which authorizes the use of public land for certain specified purposes, commonly for pipelines, roads, telephone lines, electric lines, reservoirs, etc; also, the reference to the land covered by such an easement or permit.

Rill: A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riparian Area: Area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

Rock Fragments: Rock or mineral fragments having a diameter of two millimeters or more, e.g., pebbles, cobbles, stones, and boulders.

Runoff: The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground water runoff or seepage flow from ground water.

S&Gs: Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington

SEORMP: Southeastern Oregon Resource Management Plan

SMAC: Steens Mountain Advisory Council

SRMA: Special Recreation Management Area

SRP: Special Recreation Permit

Saleable Minerals: High volume, low value mineral resources including common varieties of rock, clay, decorative stone, sand, gravel, and cinder.

Sand (Geology): A rock fragment or detrital particle between 0.0025 and 0.08 inches in diameter.

Scenic River: A river or section of a river that is free of impoundments and whose shorelines are largely undeveloped but accessible in places by roads.

Sediment: Soil, rock particles and organic or other debris carried from one place to another by wind, water or gravity.

Sedimentary: Any rock or mass deposited by wind or water.

Sensitive Species: Species identified by a Forest Service regional forester or BLM state director for which population viability is a concern either (a) because of significant current or predicted downward trends in population numbers or density, or (b) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Seral: Refers to the sequence of transitional plant communities during succession. Early-seral refers to plants that are present soon after a disturbance or at the beginning of a new successional process (such as seedling or sapling growth stages in a forest); mid-seral in a forest would refer to pole or medium saw timber growth stages; late- or old-seral refers to plants present during a later stage of plant community succession (such as mature and old forest stages).

Seral Stage: The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition. The rated departure of a plant community from a described potential natural community (PNC) for a specific ecological site. Low-seral stage is an existing plant community which is defined as 0-25% comparability to the defined PNC; Mid-seral stage is an existing plant community which has 26-50% comparability to the PNC; Late seral stage is 51-75% comparable to the PNC; PNC is an existing plant community with 76-100% comparability to the defined PNC.

Shallow Soil: A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Slope: The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, and then multiplied by 100. Thus, a slope of 20% is a drop of 20 feet in 100 feet of horizontal distance.

Soil: A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil Association: A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single soil map unit.

Soil Classification: The systematic arrangement of soils into groups or categories on the basis of their characteristics.

Soil Compaction: An increase in soil bulk density of 15% or more from the undisturbed level.

Soil Productivity: The capacity of a soil to produce a specified plant or sequence of plants under specific management.

Soil Profile: A vertical section of the soil extending through all its horizons and into the parent material.

Soil Survey: A field investigation resulting in a soil map showing the geographic distribution of various kinds of soil and an accompanying report that describes the soil types and interprets the findings.

Soil Texture: The relative proportions of sand, silt, and clay particles in a mass of soil.

Special Recreation Management Area (SRMA): An area where recreation is the principal management objective, where intensive recreation management is needed, and where more than minimal recreation-related investments are required.

Special Status Species: Plant or animal species known or suspected to be limited in distribution, rare or uncommon within a specific area, and/or vulnerable to activities which may affect their survival.

Stand: A community of trees occupying a specific area and sufficiently uniform in species, age, spatial arrangement and condition as to be distinguishable from trees on surrounding lands.

State Listed Species: Any plant or animal species listed by the State of Oregon as threatened or endangered within the state under ORS 496.004, ORS 498.026, or ORS 564.040.

Steens Act: Steens Mountain Cooperative Management and Protection Act (2000)

Stream Channel: The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Structure (Soil): The arrangement of primary soil particles into compound particles or aggregates.

Subwatershed: A drainage area of approximately 20,000 acres, equivalent to a 6th-field Hydrologic Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within a watershed (5th-field HUC), which in turn is contained within a sub-basin (4th-field HUC).

Succession: A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as "seral stages." (See Seral.)

Sunstone: A calcium-rich variety of plagioclase feldspar that exhibits a pink to red metallic shimmer when viewed perpendicular to the surface. The shimmer is caused by light reflecting off the surface of minute parallel platelets of native copper suspended in the stone.

Sustained Yield: Maintenance of an annual or regular periodic output of a renewable resource from public land consistent with the principles of multiple use.

TMDL: Total Maximum Daily Load

TNC: The Nature Conservancy

TNR: Temporary Nonrenewable

Talus: Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Terrace (Geologic): An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terrestrial: Of the land, in comparison to ‘aquatic’ which refers to objects or species which are found in water. In zoology, terrestrial is also often used to describe species that live on or in the ground, in comparison to those that fly or live in trees.

Threatened Species: Any plant or animal species defined under the ESA as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Thunderegg: An agate, opal, or chalcedony-filled nodule deposit formed in rhyolitic lavas or tuffs.

Trend: The direction of change in ecological status observed over time. Trend is described as toward or away from the potential natural community, or as not apparent.

Tuff: Volcanic ash or rock composed of compacted ash.

USDA: United States Department of Agriculture

USDI: United States Department of the Interior

USFS: United States Forest Service

USFWS: United States Fish and Wildlife Service

USGS: United States Geological Survey

Upland: Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Vale FEIS: Proposed Southeastern Oregon Resource Management Plan and Final Environmental Impact Statement, Vale District BLM, 2001.

Visual Resource Management Classifications (VRM) Class I: The objective of this classification is to preserve the existing character of the landscape. This class provides for natural ecological changes and limited management activity. The level of change should be very low and must not attract attention. Class I is assigned to those areas where a management decision has been made to preserve a natural landscape.

VRM Class II: The objective of this classification is to retain the existing character of the landscape. The level of change to landscape characteristics should be low. Management activities may be seen but should not attract the attention of a casual observer. Any changes must conform to the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. This class represents the minimum level of VRM for WSAs.

VRM Class III: The objective of Class III is to partially retain the existing character of the landscape. Moderate levels of change are acceptable. Management activities may attract attention but should not dominate the view of a casual observer. Changes should conform to the basic elements of the predominant natural features of the characteristic landscape.

VRM Class IV: The objective of Class IV is to provide for management activities that require major modification of the landscape. These management activities may dominate the view and become the focus of viewer attention; however, every effort should be made to minimize the impact of these projects by carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristic landscape.

WJMA: Wildlands Juniper Management Area

WMU: Wildlife Management Unit

WQMP: Water Quality Management Plan

WSA: Wilderness Study Area

WSR: Wild and Scenic River

Welded Tuff: A glass-rich volcanic rock that has been solidified by the welding of its glass shards through an action of heat and hot gas.

Wild River: A river or section of a river that is free of impoundments and generally inaccessible except by trail, with watersheds and shorelines essentially primitive and waters unpolluted.

Withdrawal: Withholding an area of federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area or reserving the area for a particular public purpose or program; or transferring jurisdiction over an area of federal land, other than “property” governed by the Federal Property and Administrative Services Act, as amended (40U.S.C.472) from one department, bureau, or agency to another department, bureau, or agency.