HARNEY LAKE RESEARCH NATURAL AREA

Supplement No. 9[1]

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The Research Natural Area described in this supplement is administered by the Fish and Wildlife Service of the U.S. Department of the Interior as part of the Malheur National Wildlife Refuge. Fish and Wildlife Service Research Natural Areas are administered through Area Offices; scientists wishing to use the Harney Lake Research Natural Area should contact both the Area Manager (U.S. Fish and Wildlife Service, 4620 Overland Road, Boise, Idaho 83705) and the Refuge Manager (Malheur National Wildlife Refuge, P.O. Box 113, Burns, Oregon 97720); the Refuge Manager supervises management activities at the Refuge and coordinates scientific work on the Research Natural Area. For brief observational visits, permission may be obtained from the Refuge Manager.

Harney Lake Research Natural Area is a part of a Federal system of such tracts established for research and educational purposes. Each Research Natural Area constitutes a site where natural features are preserved for scientific purposes and natural processes are allowed to dominate. The main purposes are to provide:

1. Baseline areas against which effects of human activities can be measured;
1. Sites for study of natural processes in undisturbed ecosystems; and
2. Gene pool preserves for all types of organisms, especially rare and endangered species.

The total Federal system is outlined in "A Directory of the Research Natural Areas on Federal Lands of the United States of America."3 In Oregon and Washington, of the 64 Federal Research Natural Areas that have been established, 45 are described in "Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators,"4 along with details on management and use of such tracts; 8 have been described in supplements to the guidebook; this is the ninth supplement.

The guiding principle in management of Research Natural Areas is to prevent unnatural encroachments, activities which directly or indirectly modify ecological processes on the tracts. Neither logging nor uncontrolled grazing is allowed, for example, nor is public use which threatens significant impairment of scientific or educational values. Management practices necessary for maintenance of the ecosystem may be allowed.

Federal Research Natural Areas provide a uniquely valuable system of publicly owned and protected examples of undisturbed ecosystems which are available to the scientific community. Research can be conducted with minimal interference and reasonable assurance that investments in long-term studies will not be lost to logging, land development, or similar activities. A scientist wishing to use a

'Supplement No. 9 to "Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators," by Jerry F. Franklin, Frederick C. Hall, C. T. Dyrness, and Chris Maser (USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, 498 p., illus., 1972). The guidebook is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for $4.90; stock number 001·001·00225-9.

'Mr. Copeland is a consulting ecologist, Portland, Oregon.

'Federal Committee on Ecological Reserves. 1977. A directory of the Research Natural Areas on Federal Lands of the United States of America. 280 p. USDA For. Serv., Washington, D.C.

'See footnote 1.

Research Natural Area assumes the responsibility to:

1. Obtain permission from the appropriate administering agency before using the area;5
2. Abide by the administering agency's regulations governing the use of the natural area, including specific limitations on the type of research, sampling methods, etc.; and
3. Inform the administering agency on the progress of the research, published results, and disposition of collected materials.

The purposes of these limitations are simple-to insure that the scientific and educational values on the tract are not impaired, to accumulate a documented body of knowledge about the tract, and to avoid conflict between studies. Research on Research Natural Areas must be essentially nondestructive; destructive analysis of vegetation is generally not allowed, nor are studies requiring extensive modification of the forest floor or extensive excavation of soil. Collection of plant and animal specimens should be restricted to the minimum necessary for provision of voucher specimens and other research needs; under no circumstances should collecting significantly reduce the population level of a species. Collecting must be carried out in accordance with State and Federal agency regulations.

'There are five agencies cooperating in this program in the Pacific Northwest (each agency differs slightly in its requirements): Forest Service in the U.S. Department of Agriculture; Bureau of Land Management, Fish and Wildlife Service, and National Park Service in the U.S. Department of the Interior; and the U.S. Department of Energy.

HARNEY LAKE RESEARCH NATURAL AREA

A large, shallow, intermittent, internally drained alkaline lake, remnant of a larger Pleistocene lake, with alkali desert and sagebrush steppe vegetation, cold and hot springs, marshlands, sand dunes, and abundant avifauna.

The Harney Lake Research Natural Area (RNA) was established on March 4, 1975, to exemplify southeast Oregon alkaline lakes (playas) and associated vegetation and wildlife (fig. HL-l). Most of the 12 100-ha (30,000-acre) RNA consists of the 11 300-ha (28,000-acre) lake itself.[6] An 809-ha (2,000-acre) strip of land surrounding the lake, within the RN A, includes habitat for snowy plovers, avocets, white pelicans, terns, and migrating ducks and geese. Many raptors, including golden and bald eagles, use the Natural Area at least seasonally. Active nests of golden eagles are located in and adjacent to the RNA. On the observed and tentative lists for Harney Lake, 33 birds and 13 mammals are listed as rare, threatened, or endangered.

Harney Lake is in Harney County, southwest of Burns, in the Malheur National Wildlife Refuge of the Fish and Wildlife Service, U.S. Department of the Interior. It is located in Tps. 25, 26, 27, and 28 S., Rs. 29, 30, 31, and 32 E., Willamette meridian (lat. 43°15' N.; long. 119°10' W.). It is bounded on the north by the Double O Road (county) and the Refuge boundary, on the east by sand dunes, on the south by the Refuge seasonal trail, and by internal Refuge fencing on the west (fig. HL-2). The entire RNA is fenced.

Access and Accommodations

Harney Lake RNA is located 40 km (25 mil south of Burns, Oregon (fig. HL-2). The area is reached by traveling east from Burns on State Highway 78 for 3.2 km (2 mil, turning south on State Highway 205 and traveling for 34 km (21 mil, and turning west onto the Double O Road and traveling approximately 10 km (6 mil. Vehicular access to the area is either by the Double O Road or the Refuge seasonal trail on the south side of the lake (fig. HL-3).

Access to the RNA is by written permit only. Overnight camping is prohibited. Camping, dormitories, and limited laboratory facilities are available at the Malheur Field Station, 8 km (5 mil west of the Refuge headquarters. Information on these facilities may be obtained by writing: Director, Malheur Field Station, P.O. Box 989, Burns, Oregon 97720. Commercial accommodations are available in Burns.

Envi ron ment

Harney and Malheur Lakes and several smaller lakes are remnants of a vast Pleistocene lake that occupied much of the Malheur Basin (Baldwin 1976). Surrounding Harney Lake are geomorphic surfaces varying in age from accreting sand dunes to Miocene and Pliocene tuffs and flows. Terrace sediments deposited at the shoreline of the ancient lake adjoin the present southern shore; various sediments from the lakebed form much of the western and northern shores. Sand dunes on the east and northeast shores and igneous and sedimentary plateaus on the south shore are less extensive, geomorphic surfaces within the RNA.

Harney Lake has no outlet. It receives water from the overflow of Malheur Lake, from Silver Creek, which drains southeastward from the southern Blue Mountains, and from a number of springs in and adjacent to the lake on the south and east sides (fig. HL-l). Data from a 1931 study of precipitation and tree growth in the Harney Basin suggested that extreme fluctuations in water levels have been characteristic for at least the last two centuries (Piper et al. 1939). The fluctuating surface of the lake has not persisted long enough at any level to cut a prominent beach. The lake is presently a vast body of very shallow water in wet periods and a similarly vast alkali flat in dry periods.

6Much of the background information is derived from a report by Susan Saul in 1974; on file at Malheur National Wildlife Refuge Headquarters, Harney County, Oregon.

Most of the springs in and adjacent to the lake are small, but a few produce enough water to maintain permanent ponds. The largest are at the eastern end of the lakebed. Temperatures of the springs vary from 21°C (70°F) to 42°C (108°F) (Piper et al. 1939). The hottest spring at Harney Lake, Harney Hot Spring, is on private land adjacent to the RNA boundaries at the southeast corner of the lake. Its temperature is 68°C (154°F) (Waring 1965).

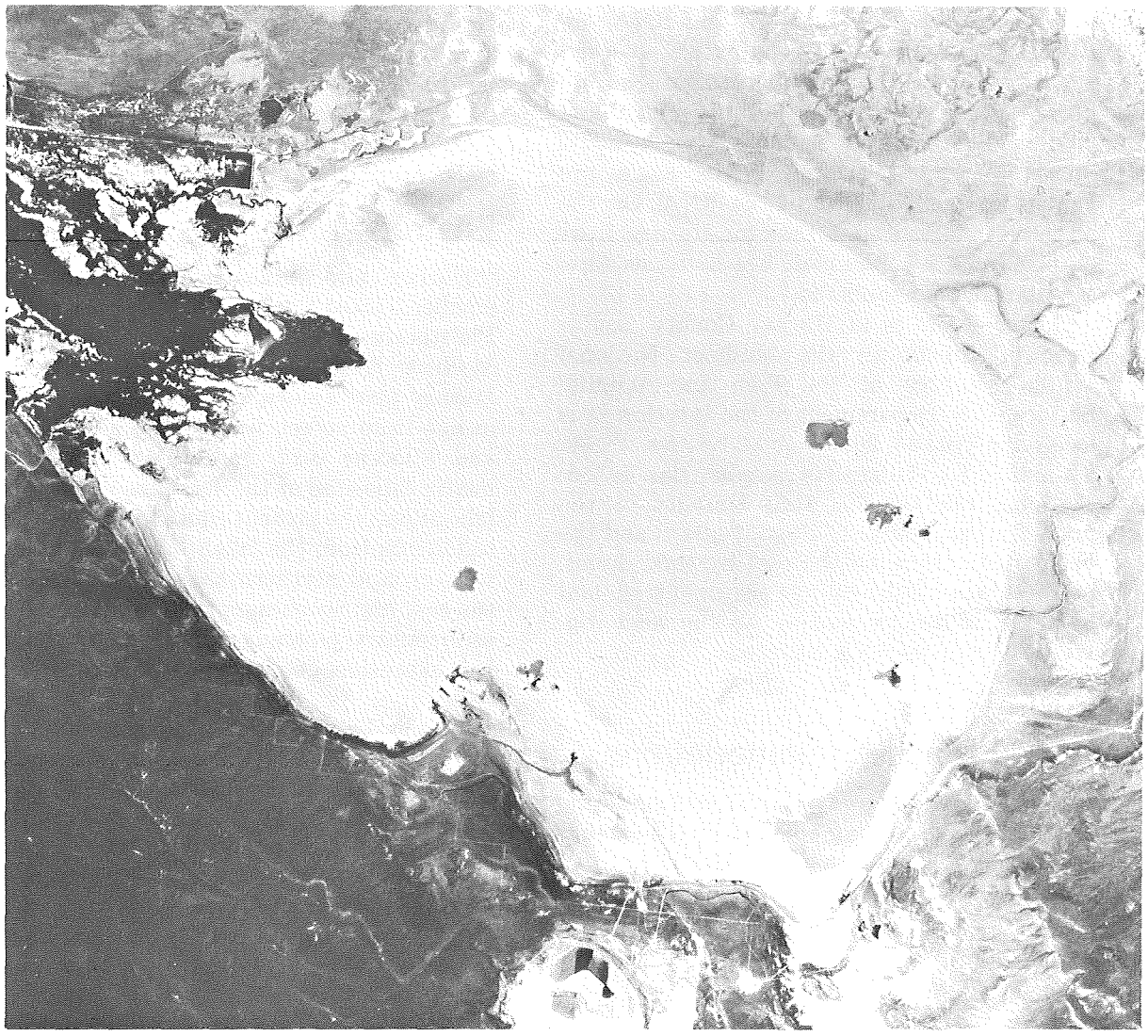

Figure HL-1.—Aerial view of Harney Lake. Silver Creek and lakebed wetlands are dark. (Photo from color infrared NASA U-2 original taken June 28, 1974; courtesy U.S. Fish and Wildlife Service.)

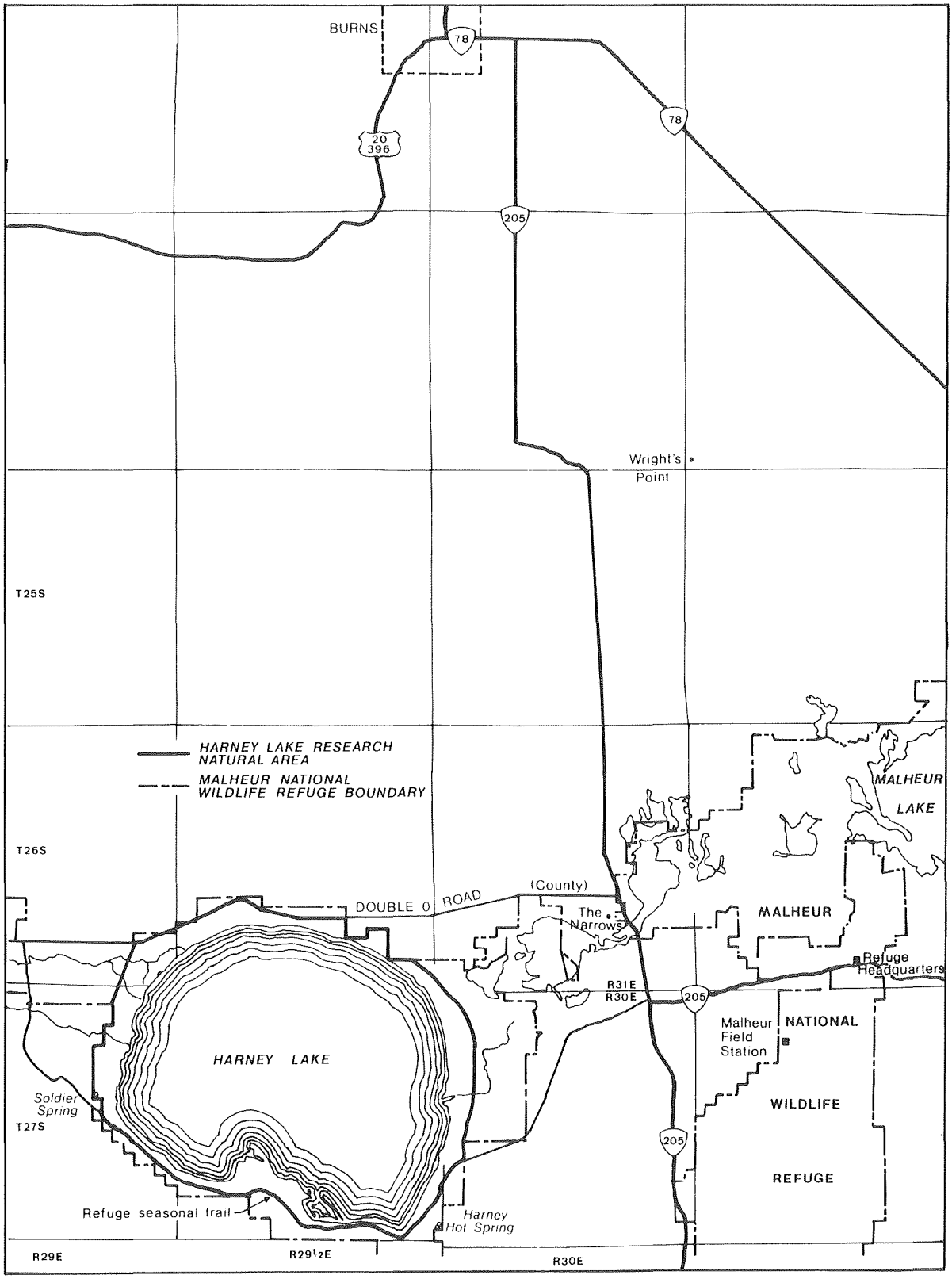

Figure HL-2.—Location of Harney Lake south of Burns, Harney County, Oregon.

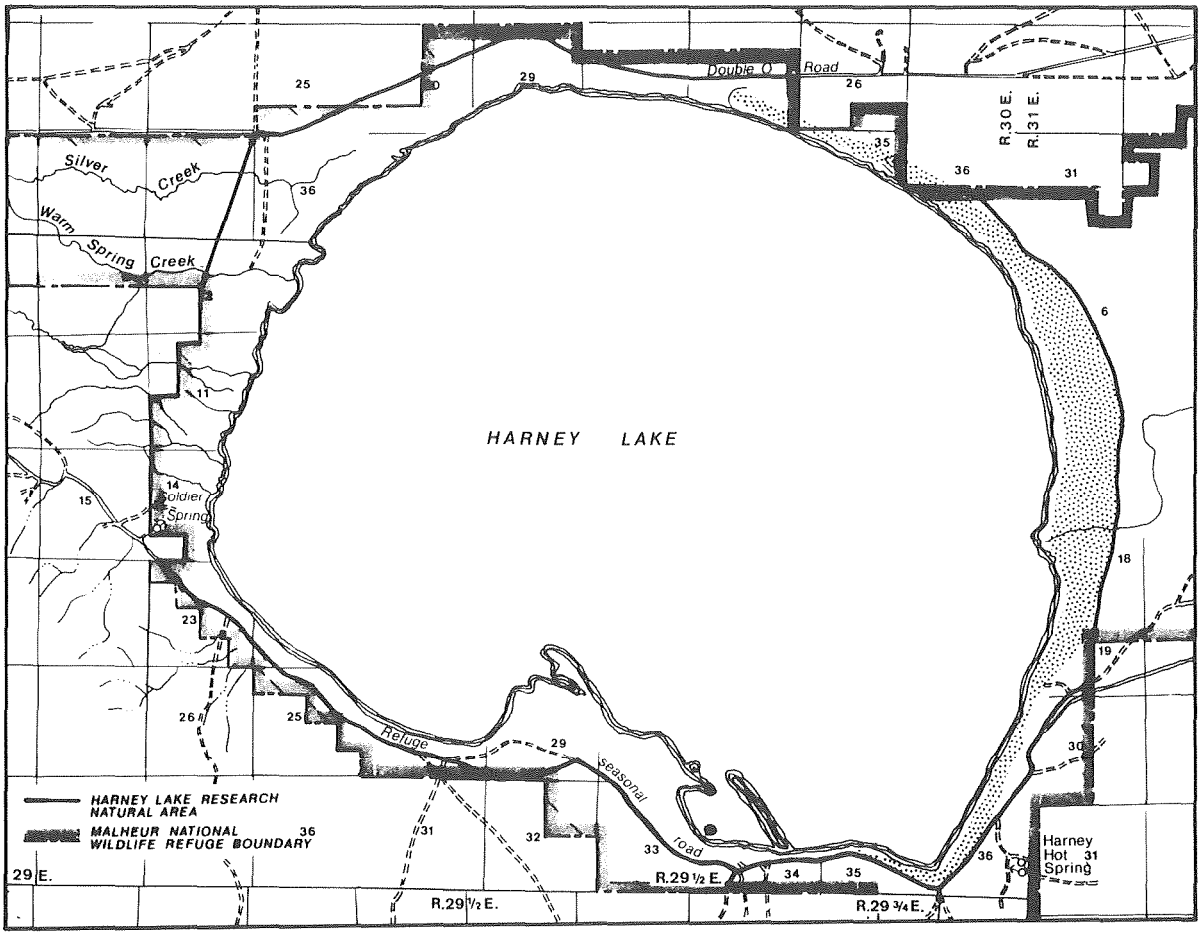

Figure HL-3.—Harney Lake Research Natural Area, Harney County, Oregon.

Climate

The semiarid climate is typical of cooler portions of the intermountain west. Precipitation occurs mainly from November through January; a smaller peak occurs in May and June. Summers are hot, dry, and mostly cloudless, with drought periods of 1 to 3 months not uncommon. Climatic data for the period 1966-73 are from the Double 0 Refuge Substation, located 6 miles west of the RN A:

Mean annual temperature	8.7°C (47.7°F)
Mean January temperature	-1.1°C (30.0°F)
Mean July temperature	20.2°C (68.4°F)
Mean January minimum temperature	-6.5°C (20.3°F)
Mean July maximum temperature	31.3°C (88.3°F
Mean annual precipitation	276 mm (10.9 in)
Mean annual snowfall	426 mm (16.8 in)

Soils

The soils in the Harney Basin have been mapped by the field reconnaisance method (State Water Resources Board 1969). Soil characteristics are related to the distinctive characteristics of the four major substrate types: the present lakeshore, former lake terraces and sediments, upland volcanic formations, and sand dunes. Soluble salts are concentrated in sediments of the evaporating lakes, resulting in substantial alkali in many soils.

The northeastern, eastern, and southeastern shores of Harney Lake consist of both vegetated and nonvegetated sand dunes. A few of the dunes reach 5 to 7 m (16 to 23 ft) in height.

The south shore of Harney Lake consists of silty, well-drained soils on nearly level lake terraces underlain by somewhat consolidated lacustrine sediments and deep, moderately well-drained, alkaline soils derived from mixed alluvium. Loamy, shallow, very stony, well-drained soils over basalt, rhyolite, or welded tuff adjoin the southwestern shore of Harney Lake. These soils occur on gently undulating to rolling lava plateaus; steep, faulted, dissected terrain is common. The soils are mildly alkaline.

The western shore of Harney Lake has shallow to moderately deep, somewhat poorly drained, strongly alkaline soils containing a hardpan. They are formed in lake terrace sediments.

The northwestern shore of Harney Lake consists of deep, somewhat poorly drained, alkaline soils on nearly level basin terraces and stream bottomlands. Surface color may range from white, with a salt crust, to a grayishbrown with spots of "black alkali." Soil textures range from coarse silt loam to a very fine sandy loam and loam. They are strongly alkaline and light colored.

Beyond the sand dunes on the northeastern side of the lake are deep, somewhat excessively drained soils, formed from wind-sorted lake sediments and alluvium. The landform is nearly level to gently sloping with undulating microrelief. These soils occur in areas of aeolian deposits on the leeward sides of old, dry lakes and stream bottoms. They are mildly alkaline and light colored.

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Vegetation

Significant changes in substrate, alkalinity, and moisture occur over short distances at Harney Lake. These changes produce a complex, intergrading mosaic of plant communities. These can be broadly classified by Kuchler's (1964) system into Type 40 (Saltbush-Greasewood *(A triplex-Sarcobatus)),* Type 55 (Sagebrush Steppe *(ArtemisiaAgropyron)),* and Type 49 (Tule Marshes *(Scirpus-Typha)).* The tract is located in the desert shrub vegetation region (Franklin and Dyrness 1973).

The 11 300-ha lakebed is mainly devoid of vegetation (fig. HL-l). Bulrush communities *(Scirpus* spp.) surrounding small springs in the southern and eastern portions are the exceptions. In these areas, viscid bulrush is the dominant species in the deepest water: it supports emergent vegetation. It is replaced in successively shallower water by other bulrush species *(Scirpus olneyi, S. maritimus, S. neuadensis).* Associated species include alkali saltgrass and graceful arrow grass *(Triglochin concinnum* var. *debile).*

Most of the vegetation rings the lake between the shoreline and the RNA boundary. Distinct geomorphic surfaces influence patterns of vegetation. Rough estimates of the area of the geomorphic surfaces found in the RN A are:

Geomorphic surface	Hectlll'es	Acres
Lakebed	11 300	28,000
Ancient lakebed sediments and lakeshore terraces	445	1,100
Present lakeshore (vegetated portions)	160	400
Sand dunes	120	300
Upland volcanic formations	80	200

In a rangeland reconnaissance of the Malheur National Wildlife Refuge in 1961, Rouse mapped broad vegetation types and related them to the geomorphic surfaces. [7]

'Rouse, Charles. Range survey of the Malheur National Wildlife Refuge, 1961. Unpublished data; maps and tables available at Refuge Headquarters.

Rouse's results and this report are related to the same geomorphic surfaces (table HL-1). This report includes additional communities, refinements of other communities, and some changes of names to reflect the cover of black greasewood.

A colorful, dark-green, light-green mosaic of alkali saltgrass and Nevada bulrush carpets much of the highly alkaline lakeshore. Cover averages 30-40 percent in the alkali saltgrass-Nevada bulrush mosaic on the white to gray, crusty alkaline soil. Associated species include rushes, sedges, graceful arrow grass, alkali weed *(Nitrophila occidentalis),* clasping peppergrass *(Lepidium perfoliatum),* and, rarely, fox-tail barley.

The adjacent former lakebed sediments and lakeshore deposits support a series of black greasewood communities, in which this shrub is either dominant or codominant with shadscale, spiny hopsage, or big sagebrush. The black greasewood/alkali saltgrass (fig. HL-4) and the black greasewood/sea blite communities occupy much of the lower lake terrace and near-shore lakebed sediments. Cover of associated species in these communities is typically quite low. Associated species in the black greasewood/alkali saltgrass community include tall green rabbitbrush *(Chrysothamnus uiscidiflorus),* sea blite, alkali weed, Nuttall's alkali grass *(Puccinellia nuttalliana),* graceful arrow grass, and clasping peppergrass. The community co dominated by sea blite is found on lower lake terrace sediments along the southeastern shore. Associated species include alkali weed, bottlebrush squirreltail, alkali saltgrass, and shad scale.

Farther inland, on the south side of the lake, a second ancient lakeshore terrace, 8-10 m above the first, supports a shadscale-black greasewood community. Shadscale (20 percent) and black greasewood (15 percent) provide most of the cover. Scattered associates include sea blite, bud sagebrush *(Artemisia spinescens),* green rabbitbrush, bottlebrush squirrel tail, alkali saltgrass, and cheatgrass brome *(Bromus tecto rum).* Toward the lake on this same terrace along the sou theastern shore, small areas are encountered where shadscale drops out of the shadscale-black greasewood community and bottlebrush squirrel tail becomes the primary associate in a black greasewood/bottlebrush squirrel tail community. Associated species are sea blite and an unidentified mustard. On the northeastern shore, sandy lakebed sediments adjacent to the dunes support a black greasewood-spiny hopsage community (fig. HL-5). Cover values are: black greasewood, 15 percent; spiny hopsage, 7 percent; sea blite, 2 percent; plus small amounts of shadscale, bottlebrush squirrel tail, green rabbitbrush, red sage *(Kochia americana),* and clasping peppergrass.

The dunes on the eastern and northeastern shores are partly stabilized. A black greasewood-spiny hopsage/Indian ricegrass community (fig. HL-6) is found on the older, stabilized surfaces. Black greasewood and spiny hopsage again average 15 and 7 percent cover. Cover for Indian ricegrass is 2 to 3 percent; cheatgrass and alkali saltgrass, 1 percent; and bottlebrush squirrel tail, less than 1 percent. The exclusive early colonizer on unstable dune surfaces is black greasewood (fig. HL-7).

On the south side of the lake are two communities dominated by big sagebrush. The big sagebrush-black greasewood community is on well-drained lakeshore terrace sediments. Cover values average 15 percent for big sagebrush and black greasewood; 10 percent for green rabbitbrush; 2 to 3 percent for spiny hopsage, shadscale, and alkali saltgrass; and less than 1 percent for cheatgrass, clasping peppergrass, and bottlebrush squirrel tail. The big sagebrush-shadscale community (fig. HL-8) occupies the shallow soils of rimrocks and the slopes below them. Cover averages 20 percent big sagebrush; 15 percent shadscale; 2 to 3 percent giant wildrye *(Elymus cinereus),* cheatgrass, and Thurber's needlegrass *(Stipa thurberiana);* and lesser amounts of bottlebrush squirreltail, Sandberg's bluegrass *(Poa sandbergii),* and bud sagebrush.

The marshland at Harney Lake is small compared with that found elsewhere on the Refuge. It is dominated by various species of bulrush (fig. HL-9). Monospecific stands of viscid bulrush are found in deep water. This species is replaced in shallower water by Olney's bulrush, three-square *(S. americanus),* and Baltic rush *(Juncus balticus* var. *balticus).*

Seacoast bulrush and Nevada bulrush assume dominance in shallow water. Nevada bulrush, as mentioned, covers extensive areas of the moist alkaline lakeshore. Graceful arrow grass, Nuttall's alkali grass, and creeping spikes edge *(Eleocharis palustris)* are wetland species commonly associated with the bulrushes.

Figure HL-4.—Black greasewood/alkali saltgrass community on alkaline lakeshore.

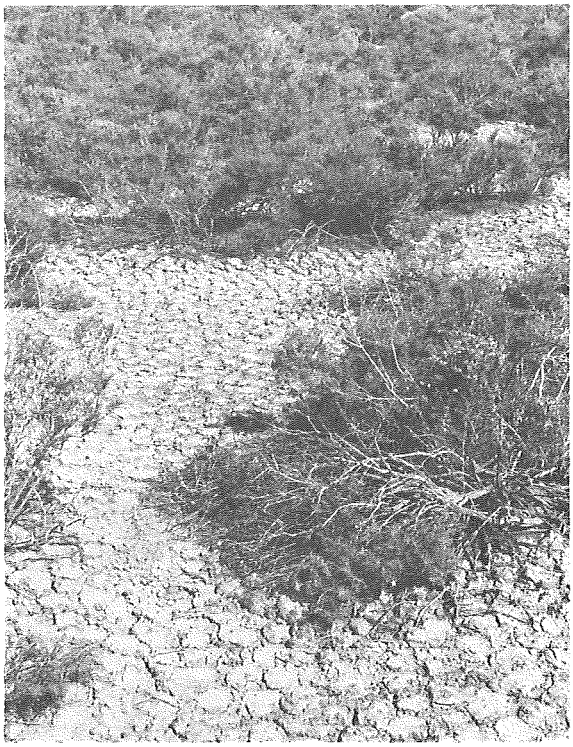

Figure HL-5.—Black greasewood-spiny hopsage community on ancient lakebed sediments.

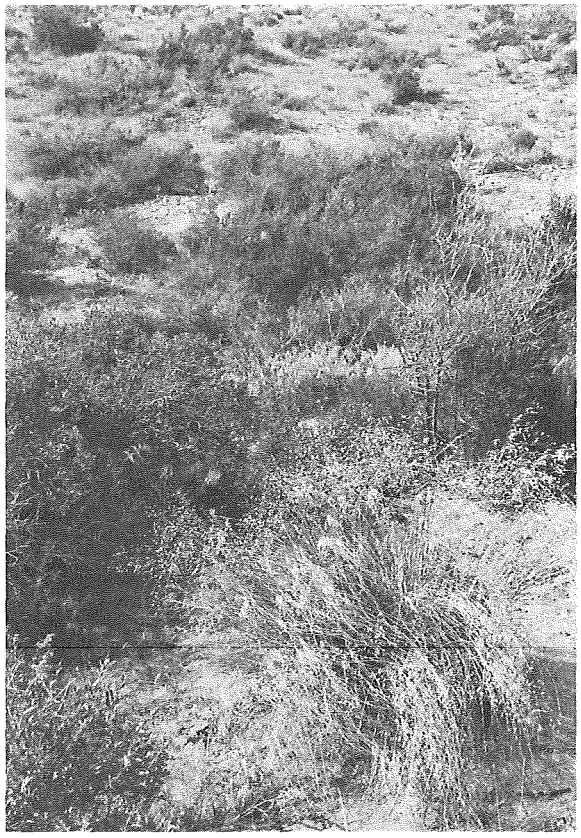

Figure HL-6.—Black greasewood-spiny hopsage/Indian ricegrass community on sand dunes at northeast end of lake.

Figure HL-7.—Black greasewood, the earliest colonizer of active dune surfaces.

Figure HL-8.—Big sagebrush-shadscale community on south side of Harney Lake.

Figure HL-9.—Bulrush communities at the West end of Harney Lake along Silver Creek.

Fauna

Birds are the best documented animals at Harney Lake. Observations in the Malheur area began in the 1870's, and annual censuses have been carried out by the Refuge since the 1940's. Data on species and status are summarized in table HL-2. Although Harney Lake is limited in diversity of habitat and extent of wetland, many birds are permanent or transient residents, including some not commonly found in wetter parts of the Refuge. Harney Lake is an important nesting and resting area for migratory birds; nesting is almost exclusively limited to shorebirds. The vast expanse of open water protects a set of sand islands from coyotes and other predators, particularly in wet years. These protected nesting areas and an abundant invertebrate food supply are critical to the breeding success of Caspian terns *(Sterna caspia),* white pelicans *(Pelecanus erythrorhynchos),* snowy plovers *(Charadrius alexandrinus),* and other species that favor more open nest sites.

Harney Lake continues to be an important resting area for thousands of ducks and geese during spring and fall migration. Since the mid-1960's, the lake has not filled as often as before. Factors involved include diversion of water, changes in the bottom topography of Malheur Lake, and water pumped for irrigation. Effects of the lower supply of water are not well understood but may include lowered nesting success of the above species and shifts of some migratory species, such as the shoveler, to other areas in the Pacific flyway. [8]

Recent research on the mammals of the Refuge (Feldhamer 1977) is combined with field data from classes at the Malheur Field Station in the summary of mammal species

[8] Personal communication from Carroll Littlefield. Malheur National Wildlife Refuge.

(table HL-3). Some of Feldhamer's traplines were located within the RNA and some in similar habitat near the Double 0 Ranch to the west. The sand dunes provide particularly good habitat for small mammals. The Ord kangaroo rat *(Dipodomys ordi),* chisel-toothed kangaroo rat *(D. microps),* Townsend ground squirrel *(Spermophilus townsendi),* Belding ground squirrel (8. *beldingi),* and the locally rare northern grasshopper mouse *(Onychomys leucogaster)* are some of the mammals inhabiting the dunes.

Among the animal species known or expected to use the RN A are 33 bird and 13 mammal species of special concern [9] (tables HL-l and HL-2). Many of these are migrant or wide-ranging species whose habitat needs are partially satisfied at Harney Lake. Nesting species of concern include golden eagles, snowy egrets, sandhill cranes, prairie falcons, and snowy plovers. White pelicans and Caspian terns have nested in the past. The Malheur shrew, Merriam's shrew, and northern grasshopper mouse are mammals of concern found or expected within the RN A. Migrant species of concern include Swainson's hawks, bald eagles, black-necked stilts, western bluebirds, and water pipits.

Grazing has taken place at Harney Lake for many years, and the impact in some areas is substantial. After 1976, fencing excluded cattle from all but a small portion of the RNA at the western end of the Refuge; that portion was fenced in 1978.

, Species of special concern are species considered rare, threatened, or endangered-either in Oregon or throughout their range-by the authorities cited in tables HL-1 and HL-2.

Research

Considerable unpublished data on birds and mammals can be obtained at Refuge Headquarters, including Feldhamer's (1977) mammal survey. In addition, field data from biology classes can be obtained by contacting the Malheur Field Station. Baldwin[10] discussed the geologic history of Harney Basin and recommended designation of Harney Lake as a national natural landmark. No published research is available.

The RN A supports many plant associations, termed plant communities in this supplement. There are excellent opportunities at Harney Lake RN A and at nearby Stinking Lake RN A for study of the relationships of species and substrate composition and the disturbance caused by grazing. Compilation of information on the above communities and on secondary succession after cessation of grazing would be aided by the emplacement of permanent vegetation transects.

Additional opportunities for research include: (1) limnological studies in springs of different temperatures, (2) studies of the biology of populations of the small mammals of the sand dunes, (3) studies of primary succession on the sand dunes, and (4) studies of the hydrology and waterfowl relationships. The Refuge is planning research on hydrology and water birds and on the nesting populations of snowy plovers. ,,

"Baldwin, Ewart. 1973. Evaluation of Harney Basin, Harney County, Oregon for eligibility for registered natural landmark. Unpublished report to the National Park Service; copy on file at Forestry Sciences Laboratory, Corvallis, Oregon.

IIFor details, contact the Refuge Manager.

Table HL-1.—Plant communities and geomorphic surfaces at Harney Lake

Geomorphic surface	Plant communities	
	Rouse 1961[1]	This report
Lakeshore	Alkali saltgrass (*Distichlis stricta*)	Alkali saltgrass-Nevada bulrush mosaic (*Distichlis stricta-Scirpus nevadensis*)
Ancient lake terraces and lakebed sediments	Black greasewood (*Sarcobatus vermiculatus*)	Black greasewood/alkali saltgrass (*Sarcobatus vermiculatus/ Distichlis stricta*)
	Alkali saltgrass-black greasewood (*Distichlis stricta-Sarcobatus vermiculatus*)	
	Sea blite (*Suaeda nigra*)	Black greasewood/sea blite (*Sarcobatus vermiculatus/ Suaeda nigra*)
	Black greasewood-saltbrush (*Sarcobatus vermiculatus-Atriplex confertifolia*)	Shadscale-black greasewood (*Atriplex confertifolia-Sarcobatus vermiculatus*)
	Black greasewood-spiny hopsage (*Sarcobatus vermiculatus-Atriplex spinosa*)	Black greasewood-spiny hopsage (*Sarcobatus vermiculatus-Atriplex spinosa*)
		Black greasewood/bottlebrush squirreltail (*Sarcobatus vermiculatus/ Sitanion hystrix*)
		Big sagebrush-black greasewood (*Artemisia tridentata-Sarcobatus vermiculatus*)
Sand dunes	Black greasewood (*Sarcobatus vermiculatus*)	Black greasewood-spiny hopsage/ Indian ricegrass (*Sarcobatus vermiculatus-Atriplex spinosa/Oryzopsis hymenoides*)
		Black greasewood (*Sarcobatus vermiculatus*)
Volcanic rim		Big sagebrush-shadscale (*Artemisia tridentata-Atriplex confertifolia*)
Wetlands	Rush (*Juncus* spp.)	Bulrush (*Scirpus acutus, S. olneyi, S. americanus, S. maritimus, S. nevadensis*)
	Sedge-foxtail barley (*Carex* spp.-*Hordeum jubatum*)	Not seen as communities
	Nevada bluegrass (*Poa nevadensis*)	

[1]Rouse, Charles. Range survey of the Malheur National Wildlife Refuge, 1961. Unpublished data on file at Malheur National Wildlife Refuge headquarters.

Table HL-2.—List of observed and tentative avian species for the Harney Lake Research Natural Area[1]

Order	Scientific name	Common name	Status
		OBSERVED AVIAN SPECIES	
Podicipediformes	*Podiceps nigricollis*	Eared grebe	Migrant
	Podilymbus podiceps	Pied-billed grebe	Migrant
Pelecaniformes	*Pelecanus erythrorhynchos*	White pelican[2 3 4 5]	Summer visitor; has nested
Anseriformes	*Olor buccinator*	Trumpeter swan[2 4 5]	Summer visitor
	Olor columbianus	Whistling swan	Migrant
	Branta canadensis	Canada goose	Resident
	Chen caerulescens	Snow goose (dark phase)	Rare migrant
	Chen caerulescens	Snow goose (light phase)	Migrant
	Chen rossii	Ross' goose	Migrant
	Anas platyrhynchos	Mallard	Migrant
	Anas acuta	Pintail	Migrant
	Anas strepera	Gadwall	Migrant
	Anas americana	American widgeon	Migrant
	Anas clypeata	Northern shoveler	Migrant
	Anas cyanoptera	Cinnamon teal	Migrant
	Anas carolinensis	Green-winged teal	Migrant
Falconiformes	*Cathartes aura*	Turkey vulture	Migrant and summer resident
	Circus cyaneus	Marsh hawk	Migrant and summer resident
	Buteo lagopus	Rough-legged hawk	Winter visitor
	Buteo jamaicensis	Red-tailed hawk	Migrant
	Buteo swainsoni	Swainson's hawk[2 3 4 5]	Migrant
	Aquila chrysaëtos	Golden eagle[4]	Resident
	Haliaeetus leucocephalus	Bald eagle[2 4 5 6 7]	Migrant
	Falco mexicanus	Prairie falcon[2 3 4 5 8]	Resident
	Falco sparverius	American kestrel	Migrant
Galliformes	*Lophortyx californicus*	California quail	Resident
	Phasianus colchicus	Ring-necked pheasant	Resident
Ciconiiformes	*Ardea herodias*	Great blue heron	Migrant and summer resident
	Casmerodius albus	Great egret[2 5]	Migrant and summer resident
	Egretta thula	Snowy egret[2 5]	Migrant and summer resident
	Nycticorax nycticorax	Black-crowned night heron	Migrant and summer resident
	Botaurus lentiginosus	American bittern	Summer resident
Gruiformes	*Grus canadensis*	Sandhill crane[2 4 5]	Summer resident
	Rallus limicola	Virginia rail	Summer resident
	Porzana carolina	Sora	Summer resident
	Fulica americana	American coot	Migrant

Table HL-2.—List of observed and tentative avian species for the Harney Lake Research Natural Area[1]—Continued

Order	Scientific name	Common name	Status
Charadriiformes	*Recurvirostra americana*	American avocet	Migrant and summer resident
	Himantopus mexicanus	Black-necked stilt[2 4 5]	Migrant
	Squatarola squatarola	Black-bellied plover	Migrant
	Charadrius alexandrinus	Snowy plover[2 3 4 5 7 9]	Summer resident
	Charadrius semipalmatus	Semipalmated plover	Migrant
	Charadrius vociferus	Killdeer	Migrant and summer resident
	Numenius americanus	Long-billed curlew[4 9]	Migrant
	Limosa fedoa	Marbled godwit	Migrant
	Catoptrophorus semipalmatus	Willet	Migrant
	Tringa melanoleuca	Greater yellowlegs	Migrant
	Tringa flavipes	Lesser yellowlegs	Migrant
	Limnodromus scolopaceus	Long-billed dowitcher	Migrant
	Calidris melanotos	Pectoral sandpiper	Migrant
	Calidris canutus	Red knot	Migrant
	Calidris alpina	Dunlin	Migrant
	Calidris bairdii	Baird's sandpiper	Migrant
	Calidris minutilla	Least sandpiper	Migrant
	Calidris mauri	Western sandpiper	Migrant
	Steganopus tricolor	Wilson's phalarope	Migrant
	Lobipes lobatus	Northern phalarope	Migrant
	Capella gallinago	Common snipe	Migrant and summer resident
	Larus californicus	California gull	Migrant; has nested
	Larus delawarensis	Ring-billed gull	Migrant; has nested
	Larus pipixcan	Franklin's gull[2 5]	Summer visitor
	Larus philadelphia	Bonaparte's gull	Migrant
	Sterna forsteri	Forster's tern[4]	Migrant and summer resident
	Sterna caspia	Caspian tern[2 4 5]	Migrant and summer visitor; has nested
	Chlidonias niger	Black tern	Migrant and summer visitor
Columbiformes	*Zenaida macroura*	Mourning dove	Migrant and summer resident
Strigiformes	*Asio flammeus*	Short-eared owl	Migrant and summer visitor
	Tyto alba	Barn owl	Migrant
	Athene cunicularia	Burrowing owl[2 3 4 9]	Summer resident
Caprimulgiformes	*Chordeiles minor*	Common nighthawk	Summer resident
	Phalaenoptilus nuttallii	Poor-will[2 5]	Summer resident

Table HL-2.—List of observed and tentative avian species for the Harney Lake Research Natural Area[1]—Continued

Order	Scientific name	Common name	Status
Piciformes	*Colaptes auratus*	Common flicker	Migrant
Passeriformes	*Tyrannus verticalis*	Western kingbird	Migrant
	Sayornis saya	Say's phoebe	Migrant and summer resident
	Empidonax wrightii	Gray flycatcher	Migrant; has nested
	Eremophila alpestris	Horned lark	Resident
	Petrochelidon pyrrhonota	Cliff swallow	Migrant and summer resident
	Pica pica	Black-billed magpie	Migrant
	Corvus corax	Common raven	Resident
	Salpinctes obsoletus	Rock wren	Summer resident
	Catherpes mexicanus	Canyon wren	Summer resident
	Telmatodytes palustris	Long-billed marsh wren	Summer resident
	Oreoscoptes montanus	Sage thrasher	Summer resident
	Turdus migratorius	American robin	Migrant
	Sialia mexicana	Western bluebird[3 4]	Migrant
	Sialia currucoides	Mountain bluebird	Migrant
	Regulus calendula	Ruby-crowned kinglet	Migrant
	Anthus spinoletta	Water pipit[2 5]	Migrant
	Lanius ludovicianus	Loggerhead shrike	Resident
	Lanius excubitor	Northern shrike	Winter resident
	Sturnus vulgaris	Starling	Migrant
	Vermivora celata	Orange-crowned warbler	Migrant
	Dendroica coronata	Yellow-rumped warbler	Migrant
	Geothlypis trichas	Common yellowthroat	Summer resident
	Wilsonia pusilla	Wilson's warbler	Migrant
	Sturnella neglecta	Western meadowlark	Migrant and summer resident
	Xanthocephalus xanthocephalus	Yellow-headed blackbird	Migrant
	Agelaius phoeniceus	Red-winged blackbird	Migrant and summer resident
	Euphagus cyanocephalus	Brewer's blackbird	Migrant and summer resident
	Molothrus ater	Brown-headed cowbird	Migrant and summer resident
	Icterus galbula	Northern oriole	Migrant
	Pipilo erythrophthalmus	Rufous-sided towhee	Migrant
	Passerculus sandwichensis	Savannah sparrow	Migrant and summer resident
	Pooecetes gramineus	Vesper sparrow	Migrant
	Chondestes grammacus	Lark sparrow	Migrant and summer resident

Table HL-2.—List of observed and tentative avian species for the Harney Lake Research Natural Area[1]—Continued

Order	Scientific name	Common name	Status
	Amphispiza bilineata	Black-throated sparrow[2 5]	Rare summer resident
	Amphispiza belli	Sage sparrow	Summer resident
	Junco hyemalis	Dark-eyed junco	Migrant
	Spizella arborea	Tree sparrow	Winter visitor
	Spizella passerina	Chipping sparrow	Migrant
	Spizella breweri	Brewer's sparrow	Migrant and summer resident
	Zonotrichia leucophrys	White-crowned sparrow	Migrant
	Paserella iliaca	Fox sparrow	Migrant
	Melospiza lincolnii	Lincoln's sparrow	Migrant
	Melospiza melodia	Song sparrow	Migrant
	TENTATIVE AVIAN SPECIES		
Podicipediformes	*Aechmophorus occidentalis*	Western grebe	Migrant
	Podiceps auritus	Horned grebe[2 5]	Migrant
Pelecaniformes	*Phalacrocorax auritus*	Double-crested cormorant	Migrant and summer resident
Anseriformes	*Anser albifrons*	White-fronted goose[2 5 8]	Migrant
	Anas discors	Blue-winged teal	Migrant
	Aix sponsa	Wood duck	Migrant (seen within 0.5 mi)
	Aythya americana	Redhead[4]	Migrant
	Aythya valisineria	Canvasback	Migrant
	Aythya collaris	Ring-necked duck[2 5]	Migrant
	Aythya affinis	Lesser scaup[2 5]	Migrant
	Bucephala clangula	Common goldeneye	Migrant
	Bucephala albeola	Bufflehead[2 5]	Migrant
	Oxyura jamaicensis	Ruddy duck	Migrant
	Mergus merganser	Common merganser	Migrant
Faliconiformes	*Accipiter cooperii*	Cooper's hawk[3 4]	Migrant
	Accipiter striatus	Sharp-shinned hawk	Migrant
	Accipiter gentilis	Goshawk[4]	Migrant (rare)
	Buteo regalis	Ferruginous	Migrant
	Falco peregrinus	Peregrine falcon[2 4 5 6 7 8]	Migrant
	Falco columbarius	Merlin	Migrant
Galliformes	*Centrocercus urophasianus*	Sage grouse	Summer visitor
Ciconiiformes	*Plegadis chihi*	White-faced ibis[2 3 4 5 9]	Summer visitor
Charadriiformes	*Tringa solitaria*	Solitary sandpiper	Migrant
	Actitis macularia	Spotted sandpiper	Migrant
	Calidris alba	Sanderling	Migrant (rare)
	Stercorarius parasiticus	Parasitic jaeger	Migrant (rare)
	Larus argentatus	Herring gull	Migrant (rare)
Strigiformes	*Bubo virginianus*	Great horned owl	Resident
	Nyctea scandiaca	Snowy owl	Rare winter visitor

Table HL-2.—List of observed and tentative avian species for the Harney Lake Research Natural Area[1]—Continued

Order	Scientific name	Common name	Status
Apodiformes	*Selasphorus rufus*	Rufous hummingbird	Migrant
Coraciiformes	*Megaceryle alcyon*	Belted kingfisher	Migrant and summer visitor
Piciformes	*Asyndesmus lewis*	Lewis' woodpecker[3 4]	Migrant
	Sphyrapicus varius	Yellow-bellied sapsucker	Migrant
	Dendrocopos villosus	Hairy woodpecker	Migrant
	Dendrocopos pubescens	Downy woodpecker	Migrant
Passeriformes	*Tyrannus tyrannus*	Eastern kingbird	Migrant
	Myiarchus cinerascens	Ash-throated flycatcher	Migrant
	Hirundo rustica	Barn swallow	Migrant
	Tachycineta thalassina	Violet-green swallow	Migrant
	Iridoprocne bicolor	Tree swallow	Migrant
	Stelgidopteryx ruficollis	Rough-winged swallow	Migrant
	Riparia riparia	Bank swallow[4]	Migrant
	Corvus brachyrhynchos	Common crow	Migrant
	Troglodytes aedon	House wren	Migrant
	Myadestes townsendi	Townsend's solitaire	Migrant
	Dendroica petechia	Yellow warbler	Migrant
	Oporornis tolmiei	MacGillivray's warbler	Migrant
	Piranga ludoviciana	Western tanager	Migrant
	Passerina amoena	Lazuli bunting	Migrant
	Carpodacus mexicanus	House finch	Migrant
	Chlorura chlorura	Green-tailed towhee	Migrant
	Zonotrichia atricapilla	Golden-crowned sparrow	Migrant

[1]List courtesy of Carroll D. Littlefield, Malheur National Wildlife Refuge. Species considered rare, threatened, or endangered are footnoted.

[2]Dyrness, C. T., Jerry F. Franklin, Chris Maser, and others. 1975. Research Natural Area needs in the Pacific Northwest: A contribution to land-use planning. USDA For. Serv. Gen. Tech. Rep. PNW-38, appendix VI.

[3]Arbib, Robert. 1976. The blue list for 1977. Am. Birds 30(6):1031-1039.

[4]White-Swift, E. G. 1978. The blue list for 1978. Oreg. Birds 4(1):51-53.

[5]Marshall, David B. 1969. Endangered plants and animals of Oregon. III. Birds, Spec. Rep. 278, 23 p. Oreg. State Univ. Agric. Exp. Stn.

[6]U.S. Department of the Interior, Fish and Wildlife Service. 1977. Endangered and threatened wildlife and plants. Fed. Regist. 42(135), July 14.

[7]Oregon Department of Fish and Wildlife. 1977. Oregon's threatened or endangered wildlife. 13 p. Portland, Oreg.

[8]U.S. Department of the Interior, Fish and Wildlife Service. 1973. Threatened lists. *In* Threatened wildlife of the United States. Resour. Publ. 114.

[9]U.S. Department of the Interior, Fish and Wildlife Service. 1973. Status undetermined lists. *In* Threatened wildlife of the United States. Resour. Publ. 114.

Source of names: American Ornithologist's Union Check-List of North American Birds. 5th ed. 1957; and supplements (particularly 1973 and 1976).

Table HL-3.—List of observed and tentative mammals for the Harney Lake Research Natural Area[1]

Order	Scientific name[1]	Common name
Insectivora	*Sorex preblei*[2 3]	Preble's shrew
	Sorex vagrans	Vagrant shrew
	Sorex merriami[2 3]	Merriam shrew
Chiroptera	*Myotis lucifugus*	Little brown myotis
	Myotis yumanensis	Yuma myotis
	Myotis evotis[2]	Long-eared myotis
	Myotis thysanodes[2 3]	Fringed myotis
	Myotis volans[2]	Long-legged myotis
	Myotis californicus	California myotis
	Myotis leibi[2]	Small-footed myotis
	Lasionycteris noctivagans[2]	Silver-haired bat
	Pipistrellus hesperus[2 3]	Western pipistrelle
	Eptesicus fuscus	Big brown bat
	Lasiurus cinereus[2 3]	Hoary bat
	Plecotus townsendi	Townsend's big-eared bat
	Antrozous pallidus[2]	Pallid bat
Lagomorpha	*Sylvilagus idahoensis*[2 3]	Pygmy rabbit
	Sylvilagus nuttalli	Nuttall's cottontail
	Lepus californicus	Black-tailed jack rabbit
Rodentia	*Eutamias minimus*	Least chipmunk
	Marmota flaviventris	Yellow-bellied marmot
	Ammospermophilus leucurus	White-tailed antelope squirrel
	Spermophilus townsendi	Townsend's ground squirrel
	Spermophilus beldingi	Belding's ground squirrel
	Spermophilus lateralis	Golden-mantled ground squirrel
	Thomomys townsendi	Townsend's pocket gopher
	Thomomys talpoides	Northern pocket gopher
	Perognathus longimembris	Little pocket mouse
	Perognathus parvus	Great Basin pocket mouse
	Microdipodops megacephalus	Dark kangaroo mouse
	Dipodomys ordii	Ord kangaroo rat
	Dipodomys microps	Chisel-toothed kangaroo rat
	Castor canadensis	Beaver
	Reithrodontomys megalotis	Western harvest mouse
	Peromyscus maniculatus	Deer mouse
	Peromyscus crinitus	Canyon mouse
	Onychomys leucogaster[2]	Northern grasshopper mouse
	Neotoma lepida	Desert woodrat
	Neotoma cinerea	Bushy-tailed woodrat
	Microtus montanus	Montane vole
	Microtus longicaudus	Long-tailed vole
	Lagurus curtatus[2 3]	Sagebrush vole
	Ondatra zibethicus	Muskrat
	Mus musculus	House mouse
	Erethizon dorsatum	Porcupine

Table HL-3.—List of observed and tentative mammals for the Harney Lake Research Natural Area[1] —Continued

Order	Scientific name[1]	Common name
Carnivora	*Canis latrans*	Coyote
	Procyon lotor	Raccoon
	Mustela erminea	Ermine
	Mustela frenata	Long-tailed weasel
	Mustela vison	Mink
	Taxidea taxus	Badger
	Spilogale putorius	Spotted skunk
	Mephitis mephitis	Striped skunk
	Felis concolor[3]	Mountain lion
	Lynx rufus	Bobcat
Artiodactyla	*Cervus elaphus*	Elk
	Odocoileus hemionus	Mule deer
	Antilocapra americana	Pronghorn

[1]This is a listing of the mammals known to be in the Malheur National Wildlife Refuge. Not all species are to be expected at Harney Lake RNA. For information on specific locations, consult George Feldhamer's thesis (Feldhamer 1977) and data from the Malheur Wildlife Refuge and Malheur Field Station. Species considered rare, threatened, or endangered are footnoted.

[2]Dyrness, C. T., Jerry F. Franklin, Chris Maser, and others. 1975. Research Natural Area needs in the Pacific Northwest. USDA For. Serv. Gen. Tech. Rep. PNW-38, appendix VI.

[3]Olterman, James H., and B. J. Verts. 1972. Endangered plants and animals of Oregon. IV. Mammals. Spec. Rep. 364, 47 p. Oreg. State Univ. Agric. Exp. Stn.

Source of names: Jones, J. Knox ,Jr., Dilford Carter, and Hugh H. Genoways. 1975. Revised checklist of North American mammals north of Mexico. Occas. Pap. 28, 14 p. Mus. Tex. Tech. Univ.

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