SUMMER LAKE WILDLIFE AREA MANAGEMENT PLAN

October 2007

Oregon Department of Fish and Wildlife
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Executive Summary

Purpose of the Plan

This plan will guide management of Summer Lake Wildlife Area (SLWA) for the next 10 years. Purposes of this plan are:

- To provide clear direction for management of SLWA;
- To provide long-term continuity in wildlife area management;
- To communicate the Department's management priorities for SLWA to its neighbors, visitors, and the public;
- To ensure management programs on SLWA are consistent with the original mandate and purpose of the area set when first established;
- To ensure management of SLWA is consistent with Federal, State, and local natural resource plans,
- To ensure management activities address conservation priorities and recommendations described in the 2006 Oregon Conservation Strategy, and;
- To provide a basis for budget requests to support SLWA needs for staffing, operations, maintenance, and capital improvements.

Historical Background

Following droughts in the 1930s that affected most of North America, major conservation efforts both private and governmental were enacted to reverse trends of degrading and disappearing wetlands. During this time period there was a major creation and expansion of Federal refuges and State wildlife areas. As the concept of waterfowl flyway management was endorsed and developed, wildlife areas were acquired and managed as part of a larger plan focused on migratory waterfowl needs. SLWA was the first of several wetland-focused wildlife areas established in Oregon.

Summer Lake Wildlife Area was established in 1944, with primary objectives of protecting and improving waterfowl habitat and providing a public hunting area. The wildlife area is located in central Lake County along State Highway 31, 100 miles southeast of Bend and 75 miles northwest of Lakeview. The wildlife area is 18,941 acres in size at present.

Summer Lake Wildlife Area is located in the Northern Great Basin and has a significant land base well suited to support indigenous fish and wildlife species and migratory waterbirds. Wetlands and associated uplands provide habitat for a diverse array of wildlife species. Habitat types found on SLWA are of quality and quantity to make a significant contribution to wildlife and migratory waterfowl in this portion of the state.

SLWA is a popular destination for hunting, wildlife viewing and environmental education due to its geographic setting, the abundance of wildlife present and species diversity.

Planning Approach

This plan revises the original long range plan for SLWA initially adopted by the Oregon Fish and Wildlife Commission (Commission) in 1993. The 1993 plan focused on habitat goals, objectives and strategies developed to meet specific wildlife abundance targets. However, ultimately these wildlife abundance targets were sometimes not attainable due to changes in habitat and migration patterns of waterfowl in other areas of the Pacific Flyway, which is outside the control of management at SLWA.

The goals, objectives and actions (strategies) described in the 2007 revised plan were derived using an ecosystem based management philosophy. This plan takes a strong habitat based approach with description of wetland habitat types in goals and objectives following the classification scheme of Cowardin et al. (1979). Of primary importance, most actions undertaken on SLWA are for the benefit of wildlife, and public use must be compatible with the wildlife resource.

This plan describes current issues and provides actions to address them. These actions will be implemented during the life of this plan, but are subject to funding and personnel availability. The management plan will be reviewed in 2012 to gauge the progress of implementation and make necessary revisions and it will be revised in its entirety in 2017.

Summer Lake Wildlife Area Vision

The vision for Summer Lake Wildlife Area is as follows:

*Wetlands and associated upland habitats are being conserved and enhanced in the northern Summer Lake Valley through management utilizing sound stewardship measures; supporting wetland dependent wildlife and a diverse array of other wildlife and plant species for use and enjoyment by present and future generation*s.

Wildlife Area Goals

The goals for Summer Lake Wildlife Area are:

Goal 1: To protect, enhance and manage wetland habitats to benefit fish and wildlife species.

Goal 2: To protect, enhance and manage upland habitats to benefit a wide variety of wildlife species.

Goal 3: To provide a variety of wildlife oriented recreational and educational opportunities to the public that are compatible with Goals 1 and 2.

Specific objectives and strategies to implement each goal, as well as detailed rationale are provided on pages 42 to 56.

Implementation Approach

Wetland habitats on SLWA occur in both unmanaged and managed units. The latter are usually bordered by dikes with water control structures. Wildlife use of SLWA wetlands depends on both natural, and numerous man-made semi-natural habitats.

The primary action for benefiting wildlife is managing or preserving the range of habitat types that historically occurred around Summer Lake. These habitats were created and maintained by a suite of ecological processes, most importantly hydrology and fire. Management activities such as water level management (drawdowns and flooding) and vegetation manipulations (controlled burning, disking, farming, grazing, mowing) are tools SLWA staff use to maintain important ecological processes needed to create healthy habitats. Due to the wide variety of habitat use among the different wildlife species utilizing SLWA, benefits are varied. Not all species or guilds (group of species with similar habitat requirements) will see benefits at all times. In addition, recreational opportunities based on public demand and habitat capabilities, balanced with resource needs, are quite variable and specific uses will not be maximized in all cases.

The natural ecosystem of the Summer Lake Basin has been irreversibly altered since initiation of European settlement in the late 1800s. Most noticeable changes have been a major disruption of hydrology and the proliferation of invasive species. Hydrologic changes have had a profound effect on vegetative components of wetland habitats on SLWA that in turn influences wildlife and recreation use. Recently, suspected climate changes seem to have added other perturbations to this significantly altered system.

Current management direction is to provide specific habitat types or features in an attempt to meet life-history needs of specific wildlife species or guilds.

Introduction

Purpose of the Plan

This document is a plan designed to guide management of the Summer Lake Wildlife Area for the next 10 years. Oregon Department of Fish and Wildlife's management planning process for Wildlife Areas (WAs) involves development of broad goals, and formulation of specific objectives and management strategies to achieve those goals. Purposes of this plan are:

- To provide clear direction for management of SLWA;
- To provide long-term continuity in Wildlife Area management;
- To communicate the Department's management priorities for SLWA to its neighbors, visitors, and the public;
- To ensure management programs on SLWA are consistent with the original mandate and purpose of the Area, set when first established;
- To ensure management of SLWA is consistent with Federal, State, and local natural resource plans;
- To ensure that management activities address conservation priorities and recommendations described in the 2006 Oregon Conservation Strategy, and;
- To provide a basis for budget requests to support the SLWA needs for staffing, operations, maintenance, and capital improvements.

Oregon Department of Fish and Wildlife Mission and Authority

The mission of Oregon Department of Fish and Wildlife (department) is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. Oregon Department of Fish and Wildlife is the only state agency charged exclusively with protecting Oregon's fish and wildlife resources. The state Wildlife Policy (ORS 496.012) and Food Fish Management Policy (ORS 506.109) are the primary statutes that govern management of fish and wildlife resources.

Purpose and Need of Summer Lake Wildlife Area

Summer Lake Wildlife Area was established in 1944, with primary objectives of protecting and improving waterfowl habitat, and providing a public hunting area. Following droughts in the 1930s that affected most of North America, major conservation efforts both private and governmental were enacted to reverse trends of degraded and disappearing wetlands throughout the continent. During this time period there was a major creation and expansion of Federal refuges and State wildlife areas. As the concept of Flyway Management was endorsed and developed, wildlife areas were acquired and managed as part of a larger national plan focused on migratory waterfowl needs. SLWA was the first of several wetland-focused wildlife areas established in Oregon. The Federal Aid to Wildlife Restoration Act of 1937 (Pittman-Robertson Act or PR) was the major funding source used for acquisition of lands. This funding provided for initial development of SLWA's infrastructure and continues as the sole source for management activities. The project grew from 2,500 acres in 1944 to 12,818 acres in 1986. No acquisitions have occurred since that time.

The importance of SLWA to migrating waterfowl was widely recognized at its inception and during early development. Waterfowl production and providing breeding and migration habitat for other waterbirds has increased in importance during the past two decades as many populations of wetland dependent bird species had declined precipitously or have been impacted by continued wetland loss and degradation. Since the 1980s an increase in participation of and demand for non-consumptive uses of wildlife resources has occurred. This comprehensive plan acknowledges shifts in demands and management emphasis over the past 60 years and recognizes the need to provide a return to the hunting public which remains the sole funding source for development and management actions on SLWA.

Wetland loss and degradation on the North American continent and within Oregon was a major driving force in the establishment of SLWA. Prior to establishment of SLWA in 1944 major alterations to the hydrology occurred along with wetland conversion to agricultural operations thereby compromising wetland function and affecting waterbird distribution and abundance.

Wetland losses, degradations and changes in function resulted in increased need for intensive management actions on SLWA in an attempt to enhance and restore wetland habitats. Many wildlife species, both migratory and resident are dependent on wetland habitats to meet their life-cycle needs and to sustain populations at levels providing diverse opportunities for public enjoyment and utilization. In addition, active and intense management on SLWA can aid in maintenance and restoration of depressed populations, many of which are sensitive.

The Oregon Conservation Strategy (OCS), adopted in 2006, is the State's overarching strategy for conserving fish and wildlife, to help ensure that Oregon's natural treasures are passed on to future generations. The Summer Lake area is specifically described in the OCS and contains key habitats such as wetlands and salt desert scrub and key species such as black-necked stilt, long-billed curlew, snowy egret and western snowy plovers. Many habitat management activities occuring at SLWA address conservation actions recommended in the OCS and these will be identified throughout this management plan.

Statutory direction contained in the State Wildlife Policy provides the purpose and need for the department's actions and efforts on SLWA. Background information, objectives, strategies, rationale and monitoring to meet and measure progress toward goals is provided in this document. The great variety of habitats and management strategies used in the past on SLWA have contributed to a biologically diverse association of wildlife which includes at least 280 species of birds, 40 species of mammals, 15 species of reptiles and amphibians, and eight species of fish.

Summer Lake Wildlife Area Vision Statement

The vision for Summer Lake Wildlife Area is as follows:

Wetlands and associated upland habitats are being conserved and enhanced in the

*northern Summer Lake Valley through management utilizing sound stewardship measures supporting wetland dependent wildlife and a diverse array of other wildlife and plant species, for use and enjoyment by present and future generation*s.

Wildlife Area Goals and Objectives

Wildlife area goals are broad, open-ended statements of desired future conditions that convey a purpose but do not define measurable units. In contrast, objectives are more concise statements of what the department wants to achieve, how much the department wants to achieve, when and where to achieve it, and who will be responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring wildlife area accomplishments, and evaluating the success of strategies.

The goals and objectives for Summer Lake Wildlife Area are:

Goal 1: To protect, enhance and manage wetland habitats to benefit fish and wildlife species.

Objective 1.1: Manage approximately 500 acres of palustrine permanently flooded wetland habitats. Emphasis will be on maintaining productive stands of submerged aquatic vegetation such as sago pond weed.

Objective 1.2: Manage approximately 5,800 acres of palustrine semi-permanently flooded wetlands with a ratio of robust emergent vegetation (dominated by cattails and bulrushes) to open water of no greater than 3:1. These wetlands should have open water and interspersed stands of vegetation to create a mosaic of features within individual habitat management units. Water depths will generally not exceed 24 inches and open water areas will support rooted submerged aquatic plants in most locations.

Objective 1.3: Manage approximately 2,800 acres of palustrine seasonally flooded wetlands with plant coverage exceeding 80% of the area.

Objective 1.4: Manage approximately 700 acres of palustrine intermittently flooded/saturated wetlands (wet meadows).

Objective 1.5: Manage approximately 650 acres of lacustrine seasonally flooded wetlands (alkali playas) with water depths less than 6 inches and vegetation covering less than 20%.

Objective 1.6: Protect approximately 2,900 acres of lacustrine intermittently flooded alkali wetlands (alkali flats).

Objective 1.7: Protect and enhance approximately 50 acres of riverine wetlands.

Objective 1.8: Maintain and improve critical physical and functional infrastructure affecting wetland management activities.

Objective 1.9: Designate 15-35% of managed wetlands as seasonal sanctuary for waterfowl and wetland dependent wildlife.

Goal 2: To protect, enhance and manage upland habitats to benefit a wide variety of wildlife species.

Objective 2.1: Enhance, manage and protect approximately 3,100 acres of salt desert scrub habitat to benefit a wide variety of native wildlife and desired game species.

Objective 2.2: Enhance and manage approximately 270 acres of agricultural upland habitat to benefit a wide variety of native wildlife and desired game species.

Objective 2.3: Enhance, manage and protect approximately 780 acres of sagebrush steppe habitat to benefit a wide variety of native wildlife and desired game species.

Objective 2.4: Maintain and improve wildlife area facilities, structures, and equipment used to conduct habitat management and public use projects.

Goal 3: To provide a variety of wildlife oriented recreational and educational opportunities to the public that are compatible with Goals 1 and 2.

Objective 3.1: Provide hunting, trapping, and angling opportunities in a manner compatible with habitat management objectives.

Objective 3.2: Provide wildlife viewing and education/interpretation opportunities compatible with Objective 3.1.

Wildlife Area Establishment

The Summer Lake Wildlife Area was established on April 12, 1944 when the Oregon Game Commission (OGC) purchased 1,645 acres in the vicinity of the Area Headquarters and westside marshes. The following year, the size of SLWA increased over six-fold with the purchase of 6,164 acres of state lands within the meander line of Summer Lake, and through withdrawal of 4,327 acres of Bureau of Land Management Lands (BLM) by Public Land Order No. 300, turning over wildlife management responsibilities to the OGC. Those additions increased the holdings to 12,136 acres, primarily on SLWA's south and west sides. Smaller acquisitions, easements, and quitclaims were achieved throughout the early 1960s. In 1963, SLWA was expanded to the north and east when 2,545 acres were added with the purchase of the Williams Ranch. The final major purchase occurred in 1971 when the River Ranch Tract (1,404 acres) was added. Only minor additions (144 acres) have occurred in the past 35 years.

To date, SLWA consists of 18,941 acres, of which 12,818 acres are under fee title to the department, 999 acres are covered under easements, and 5,124 acres are managed

through cooperative agreements or memorandums of understanding. Acquisition costs for SLWA have been in excess of $472,000 and have been funded by Federal Aid and/or department license dollars. (See **Appendix A** for detailed acquisition history).

Description and Environment

Physical Resources

Location

Summer Lake Wildlife Area is located in central Lake County along State Highway 31, 100 miles southeast of Bend and 75 miles northwest of Lakeview.

The wildlife area consists of 32 Habitat Management Units (HMUs). (See **Appendix G** for Habitat Management Unit descriptions). Headquarters for the wildlife area is located at 53447 Highway 31 about 1.3 miles south of the town of Summer Lake. **Figure 1** shows the location and key features of Summer Lake Wildlife Area.

Climate

SLWA's location at the base of Winter Ridge results in a generally mild climate compared to the remainder of eastern Oregon. Temperature extremes range from -25ºF to 105ºF, but usually average 20-30ºF in winter and 80-95ºF in the summer. Precipitation averages approximately 12 inches per year with most of this falling during the winter months. There is seldom an accumulation of more than 5-6 inches of snow at one time. Evaporation averages 40-50 inches per year (May to October).

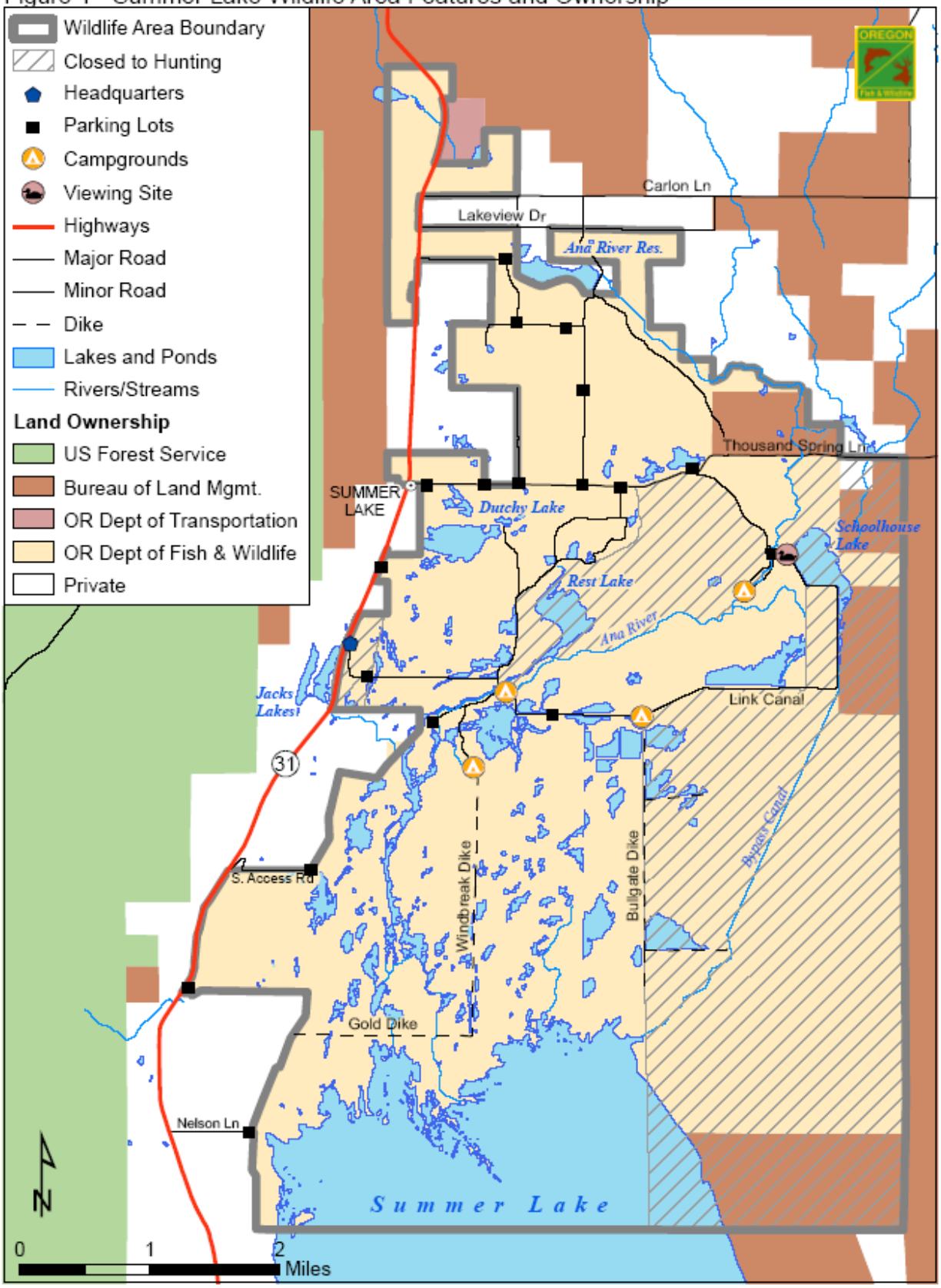
Climatic conditions seem to have changed in recent years. Based on U.S. National Weather Service data collected at SLWA Headquarters since 1958 and anecdotal recollection by long-time area residents, average winter temperatures have increased and snow cover has decreased considerably, replaced by mild or moderate spring conditions that occur much earlier in the calendar year. Hot and dry summer conditions are more prevalent, extending well into fall. Strong winds are frequent and are predominantly from the south.

The growing season is about 140 days for plants not affected by frost. There is about a 90-day frost free growing season (June through August).

Topography and Soils

SLWA is located at the north end of Summer Lake, which was formed by fault block geological activity. Summer Lake is a forty square mile alkaline lake (elevation 4,146-4,151 feet) that lies in a playa basin bounded by Winter Ridge (elevation 7,134 feet) to the west and Diablo Mountain (elevation 6,145 feet) to the east. SLWA is within the Pleistocene era lakebed of Lake Chewaucan that inundated most of Lake County over 10,000 years ago.

Figure 1 - Summer Lake Wildlife Area Features and Ownership



The topography of SLWA is relatively flat with a gradual slope from north to south. Elevation change in most of the marsh area is about 3 to 5 feet per mile. Considerable heterogeneity exists throughout the Wildlife Area and very noticeable upland ridges are prevalent, reflective of ancient lakebed shorelines or dune formation that occurred during dry cycles. Elevation on the north end of SLWA is about 4,500 feet, and at the south end, at lake level of 4,150 feet.

Soils are primarily ancient lakebed sediments of silts and sands several hundred feet in depth. Geologic research has documented layers of volcanic ash deposits from Mount Mazama, Mount St. Helens and other volcanic events. Since SLWA is in a closed basin characterized by dry climatic cycles, salts and other minerals are brought to the surface by intense evaporation, resulting in moderate to severely alkaline soil conditions. Frequent strong winds transport soil, salts and minerals throughout the basin primarily from the lakebed to the surrounding uplands. Dunes developed by wind characterize many portions of upland habitats.

Habitat Types

A majority of SLWA consists of a very shallow, managed alkaline and freshwater marsh extending to the head of Summer Lake. Approximately 3,561 acres of playas are associated with the marsh and are incapable of supporting vegetation without intensive management action. Water depths in the marsh and ponds rarely exceed 6 inches except in Ana River channel, large lakes or ponds, water transportation canals, and borrow pits along dikes. Upland habitat at the north end of SLWA is characterized by a desert shrub community dominated by black greasewood (*Sarcobatus vermiculatus*), green rabbitbrush (*Ericameria teretifolia*), big sagebrush (*Artemisia tridentata*), and other alkaline adapted shrubs, forbs, and grasses.

Due to management actions and other influences, primarily human-induced, SLWA habitats are in a continual state of change and acreage of specific habitat types vary over time, both between and within years. No threatened or endangered plant species are known or suspected to occur on SLWA. However, comprehensive surveys have not been conducted nor have plant lists been fully developed.

There are six broad habitat types found within the borders of the Summer Lake Wildlife Area. Lacustrine and palustrine wetlands are delineated into additional sub-types based on hydrology modifers (see pages 12-14). These habitat types are shown in **Figure 2**. Of these habitats, salt desert scrub, sage steppe uplands, alkali flats and wetlands are considered Key Habitats within the North Basin and Range ecoregion, as defined in the Oregon Conservation Strategy. The OCS recommends conservation actions such as improving water delivery systems and maintaining diverse wetland types, both of which are high priority activities occurring on SLWA.

Figure 2 - Habitat Types Within Summer Lake Wildlife Area

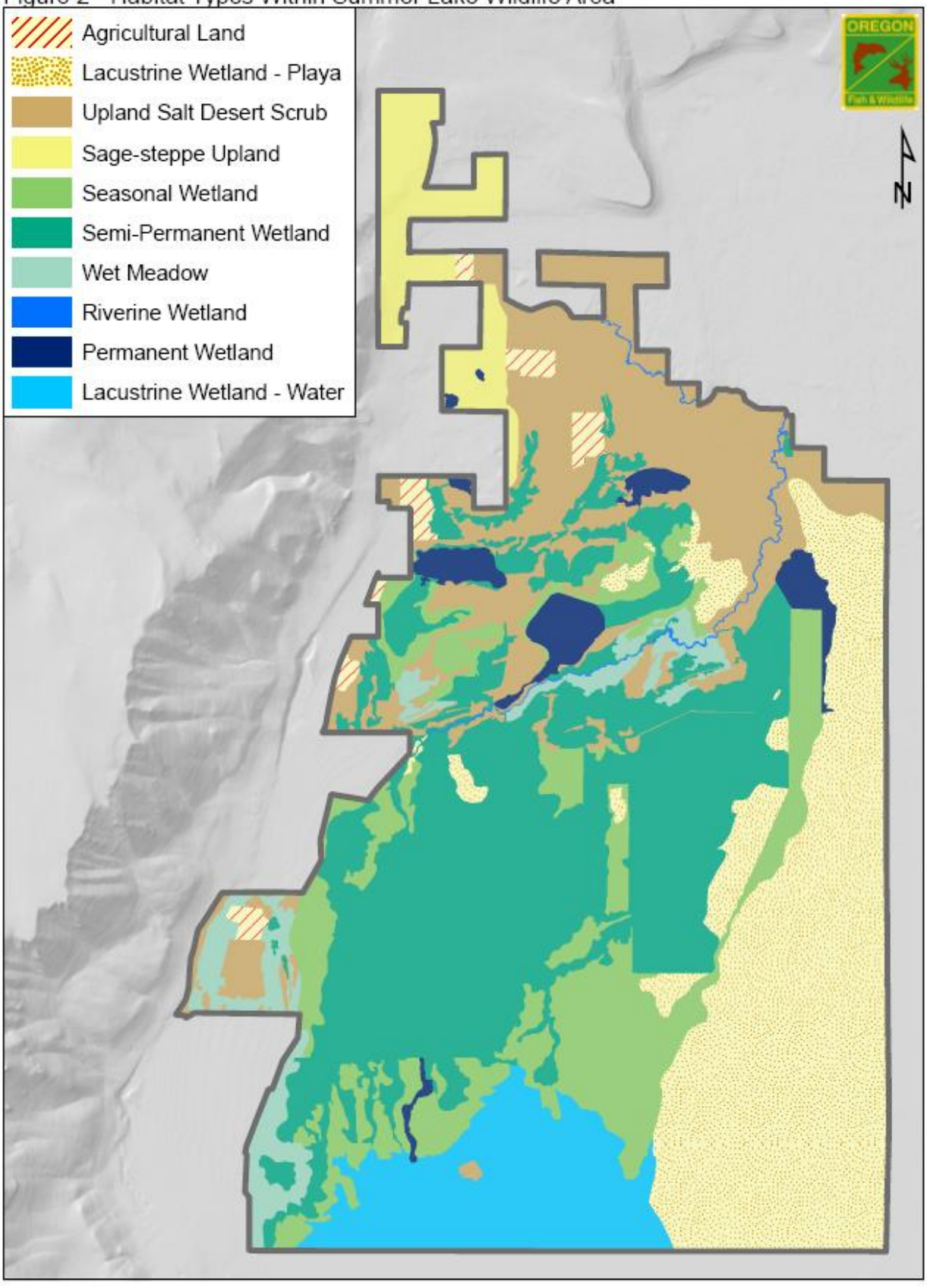


Table 1 shows the number of acres of each habitat type occurring on SLWA.

Table 1. Habitat composition on the Summer Lake Wildlife Area in 2006.

Habitat Type	Approximate Acres
Lacustrine wetlands (Lakebed and alkali playas)	
Open water - Lakebed	1,063
Intermittently flooded	2,909
Seasonally flooded	652
Total	4,624
Palustrine wetlands	
Permanently flooded	508
Semi-permanent flooded	5,880
Seasonally flooded	2,813
Intermittently flooded/saturated (wet meadow)	749
Total	9,950
Riverine wetlands	57
Sagebrush steppe uplands	784
Rock habitat	77
Salt desert scrub uplands	3,177
Agricultural uplands	272
Cereal grains	50
Tree and shrub plantings	5
Total	**18,941**

Habitat types found on SLWA are described in greater detail below.

I. Wetlands

Description of wetland habitat types follows the classification scheme of Cowardin et al. (1979). A majority of SLWA is freshwater and alkaline palustrine (non-tidal wetlands) emergent and lacustrine (pertaining to lakes or lake shores) aquatic bed wetlands. Frequently, emergent and aquatic bed plant communities create a mosaic of wetland plant types within each management unit.

Distinct from palustrine wetlands are alkali flats (lacustrine littoral unconsolidated aquatic bed wetlands). This habitat type dominates the Summer Lake lakebed outside of managed impoundments but also occurs within some managed impoundments.

Traditionally, there were riverine (pertaining to rivers) wetlands associated with Ana River but development of managed impoundments has reduced their abundance and remnants remain in the upper river area.

Within each major wetland type, variation in hydrology and topography creates important differences in plant communities and seasonal differences in wetland availability that in turn influences bird use; consequently, additional habitat descriptions are provided based on hydrology modifiers defined by Cowardin et al. (1979). While these habitat associations are described below as discrete, they represent a continuum from dry to wet and when considering topographical variation on SLWA, each may occur in close juxtaposition to others in a single habitat management unit.

IA. Palustrine wetlands

1. Permanently flooded: Permanently flooded wetlands hold water all year and are dominated by rooted aquatic vascular plants such as sago (*Stuckenia pectinata*) and other pond weeds, water butter-cup (*Ranunculus aquatilis*), water milfoil (*Myriophyllum* sp.), and widgeon grass (*Ruppia maritima*). This habitat is typically surrounded by robust tall statured emergent vegetation. Water depths range from two to six feet deep. Examples include County Road Ponds, and Dutchy, Rest and Schoolhouse lakes. Fish (primarily tui chub *(Gila bicolor ssp.)*) are usually abundant in these areas. Submerged aquatic plants, some species of aquatic invertebrates and fish rely on stable water levels and inundation in order to remain productive. Many species of wildlife (such as colonial nesting waterbirds) also capitalize on stable water levels and develop traditional use areas.

2. Semi-permanently flooded: Surface water is managed to persist throughout the growing season. These wetlands are dominated by emergent plants such as bulrushes ((*Schoenoplectus* spp.) and (alkali, American three-square, hardstem, river, and softstem)), broad and narrow-leafed cattail (*Typha latifolia* and *Typha anguistifolia*), seaside arrow grass (*Triglochin maritime*), Baltic and other rushes (*Juncus* spp.), and various sedges *(Carex* spp.*)*. Water depths range from 2-3 inches up to 2-3 feet. Usually this habitat is rich in submerged aquatic plant growth harboring immense and diverse invertebrate communities. Forage fish (primarily tui chub) are sometimes abundant. These sites vary in productivity, capability and wildlife use depending on depth and permanency of water levels. In some areas, collection of irrigation run-off and the inability to dewater these sites create almost permanently flooded conditions. Submerged aquatic and some emergent plants, some species of aquatic invertebrates and fish rely on stable water levels and inundation in order to remain productive. Many species of wildlife also capitalize on stable levels and develop traditional use areas.

This habitat type provides foraging sites for a diverse array of wetland dependent and wetland obligate wildlife species, both migrants and residents. A large number of species will use these wetlands as breeding, brood rearing and molting habitat.

Tall statured emergent vegetation within this community has expanded dramatically in recent years, taking advantage of low and receding water levels that allow for seedling development on exposed mudflats or rhizome growth of individual clones. Associated open water areas and use by some species of wildlife have been reduced as a consequence of this expansion.

3. Seasonally flooded: Surface water is present for extended periods, fall through winter and especially early in the growing season. As summer progresses, with increases in evapotranspiration and reduced water deliveries due to irrigation season diversions these wetlands will dry. Saltgrass (*Distichlis spicata*), spikerushes *(Eleocharis* sp.*)*, alkali grass (*Puccinella* sp.), foxtail barley (*Hordeum jubatum*), suaeda *(Suaeda depressa)* and a wide variety of other grasses, sedges, rushes and forbs are common. Sometimes medium statured emergents (alkali and American three-square bulrush and arrowgrass) are found in this wetland type. These sites vary in productivity, capability and wildlife use depending on depth, timing and rate of receding water levels as well as amounts of vegetation present. Within this habitat type there are sometimes extensive areas of mud flats with little or no vegetation present. Mud flats are sometimes intermittently inundated with water as levels fluctuate due to management actions or wind. This habitat supports abundant invertebrate populations providing food to a wide variety of wildlife species.

4. Intermittently flooded/saturated (wet meadow): This habitat community is primarily created and maintained by flood irrigation practices. Irrigation starts in late spring and sheet flow of water across fields maintains saturated soil conditions that favor establishment of a plant community dominated by native and high-forage value grasses such as meadow foxtail *(Alapecurus pratensis)*, creeping wildrye *(Elymus triticodies)* , green fescue *(Festuca viridula)* and a wide variety of native sedges and rushes. Periodic flooding and drying occurs throughout the growing season. In late summer selected areas are mowed in a mosaic pattern with vegetation removed to increase habitat diversity. Mowed sites as well as idle fields are irrigated into early fall (early September) resulting in flooded and/or saturated conditions. Cycles of irrigation and drying produce diverse as well as abundant populations of aquatic and terrestrial invertebrates, providing a wide variety of food for waterbirds. Dabbling ducks, shorebirds and sandhill cranes *(Grus canadensis)* forage in this habitat extensively. Idle fields contain abundant residual vegetation that provides dense nesting cover for many species of dabbling ducks and other ground nesting birds. Winter precipitation causes flooded and saturated conditions lasting into early spring providing foraging sites for migrants and returning resident breeding species.

IB. Lacustrine wetlands (Open water/Lakebed and alkali flats)

1. Aquatic bed: These wetlands are the lakebed of Summer Lake proper. The unconsolidated mud bottom sometimes supports emergent and submergent aquatic plants where freshwater influences permit plant growth. Open water is

very shallow as Ana River and run-off from palustrine wetlands fan out across broad deltas in this topographically flat basin. In these areas significant waterbird foraging occurs by a wide variety of species on vegetation and associated invertebrates. In dry years, the lake can recede to very low levels and significant portions of this habitat become dry. At varying lake levels and during extreme weather events (heavy precipitation and strong winds) considerable portions of the aquatic bed become intermittently or seasonally flooded. Invertebrates can be abundant in this habitat. The relatively shallow water depth and unconsolidated mud bottom are frequently affected by strong winds causing considerable turbidity which reduces algae and phytoplankton productivity by blocking sunlight and disrupting photosynthesis. This in turn affects the productivity of macro invertebrates, such as alkali fly *(Ephydra hians)* larva and brine shrimp *(Artemia salina)* that are commonly found in alkaline waters. As a consequence, lacustrine wetlands of SLWA do not provide abundant food resources when compared to other nearby lacustrine systems such as Abert Lake. Isolation, open water and shallow depth provide secure and disturbance free roosting and loafing sites for a wide variety of waterbirds.

2. Intermittently flooded (depicted collectively with seasonally flooded as Playa in Figure 2.): These wetlands are dry most years, but with a shallow water table. Occasionally, during severe winter storms when Summer Lake level is high, wind blown water floods these areas. Localized thunderstorms will sometimes cause extensive surface flooding and puddling but saturation is very brief. These sites are characterized by extensive salt accumulations brought to the soil surface by evaporation. These areas are devoid of vegetation but macro invertebrates such as Tabidid flies are prolific. Western snowy plovers *(Charadrius alexandrinus)* make extensive use of these habitats to nest and forage. Other waterbirds will roost or loaf here taking advantage of the lack of vegetation and security from ground based predators.

3. Seasonally flooded (depicted collectively with intermittently flooded as Playa in Figure 2.): Typically these wetlands are dry late spring into early fall. They are flooded when water deliveries to other managed wetlands begin in early fall and as evaporation rates decrease and late growing season/winter precipitation increases. During high water cycles when Summer Lake covers an extensive area of the basin, the size and duration of flooding increases dramatically. Spring migrants make extensive use of these wetlands, while fall use is dependent on cool temperatures (lower evaporation rates) and wet weather patterns.

IC. Riverine wetlands

From its outflow at Ana Reservoir down to River Campground, Ana River retains features of its historic topography with a well defined channel, dominated by submerged rooted aquatic vegetation, unconsolidated bottom, and a narrow border of emergent vegetation. Below River Campground the river flows into and through a large impounded palustrine semi-permanent wetland (Gold Dike HMU) before discharging into Summer Lake below Gold Dike.

II. Uplands

IIA. Salt desert scrub:

This habitat type is the most extensive upland and occurs throughout the wildlife area, sometimes interspersed in and surrounded by large wetlands areas. Black greasewood, rabbitbrush and spiny hopsage (*Atriplex spinosa*) are common shrubs on found on nearly all sites. Basin big sagebrush sometimes occurs in more favorable soil locations. Trees are exceptionally rare consisting of native western juniper (*Juniperus occidentalis*) and planted cottonwoods (*Populus trichocarpa*), willows (*Salix* spp.) and other species around former homestead sites. Introduced shrubs have been planted and cultured around homestead sites to enhance cover and food production for wildlife. Saltgrass, perennial ryegrass (*Lolium perenne*), basin wildrye (*Elymus cinereus*), a wide variety of introduced and native grasses, as well as a very diverse array of forbs occur as understory ground cover. Soils are moderately to severely alkaline and silty in structure. This habitat type occurs as a lakebed relic, sometimes as ancient shorelines and in many areas has been modified by wind action to form dunes. Many areas have been altered through brush removal, farming, grazing and planted livestock forage (crested wheatgrass (*Agropyron cristatum*)) or cover (tall wheatgrass (*Agropyron elongatum*)) grass species. A wide variety of invasive weeds are found in this habitat. Large unaltered blocks of this habitat exist along Ana River Canyon and dune areas, supporting a wide variety of native wildlife species. Ground nesting birds and other wildlife make extensive breeding season use of this upland habitat type, especially in sites adjacent to wetlands. Dense nesting cover has been cultured in several sites and receives heavy use by a variety of duck species. A wide variety of native species meets their lifecycle needs in this habitat type as well as desired introduced game birds (ring-necked pheasants (*Phasianus colchicus*)).

IIB. Sagebrush steppe:

This habitat type is largely unaltered and occurs at higher elevations surrounding the basin. Basin big sagebrush and bitterbrush are the primary shrub species present. A wide variety of native grasses, predominantly bluebunch wheatgrass (*Pseudoroegneria spicata)*, Idaho fescue (*Festuca idahoensis*) and native forbs are found in the understory. Trees are generally rare and in low density with the exception of western juniper that is invading several sites due to the modified fire regimes. Wildfire modified considerable acres of this type in 2002 but natural recovery is underway and most native species are returning. Recent plantings of native species are accelerating this recovery. Noxious and invasive weeds occur occasionally but are largely absent from this habitat type.

1. Rock: Volcanic outcrops, rock slides and scree slopes occur in sagebrush steppe uplands providing unique habitat for several wildlife species. Cobble shoreline beaches from Lake Chewaucan exist in the extreme northwest portion of the Wildlife Area and an excavated pit serves as a source of gravel and rock for dike and road surfacing.

IIC. Agriculture:

Several upland areas were cleared, leveled and extensively farmed by homestead ranches prior to department acquisition. Irrigation and soil amendments modified harsh growing conditions and grain and hay crops were produced. Flood and sprinkler irrigation systems remain and are utilized to produce wildlife food and cover crops in several locations.

1. Cereal grains: Small cereal grains such as barley (*Hordeum vulgare*), cereal rye (*Secale cereale*), triticale (*Triticosecale rimpaui*) and wheat (*Triticum aestium*) are currently farmed on an annual basis.

2. Tree and shrub plantings: Introduced deciduous tree and shrub species have been planted in plots throughout the agricultural uplands to provide food and cover for many species of wildlife. Species diversity is enhanced because of the variety of habitat features provided by these plantings.

Description of Management Units

Summer Lake Wildlife Area consists of 32 habitat management units (HMUs). These units have been delineated based on historic uses, physical features or boundaries, vegetation types, current or past management activities and water sources Appendix G. describes these management units in further detail.

Summer Lake and wetlands on SLWA are primarily fed by Ana River which has a current year-round flow of 80-90 cubic feet per second (cfs). Ana River arises from a series of springs situated below and impounded by Ana Reservoir, located about six miles north of Summer Lake proper. Rate of groundwater discharge from Ana River springs has generally declined during the past several decades. Based on Oregon Water Resources Department (OWRD) information this decline will likely continue in the future due to drought cycles and continued home development in the basin. Other small springs and seeps plus three artesian wells historically provided an additional 10-25 cfs, and are similarly affected by declining groundwater resources. Hydrological studies conducted by OWRD in the 1950s demonstrated connection of several nearby artesian wells with the Ana River. More recently, a connection between groundwater pumping in the Fort Rock/Christmas Valley/Silver Lake areas has been demonstrated to affect the discharge of Ana River and artesian wells in the northern part of Summer Lake basin. Due to the small size of the watershed, runoff from snow melt and overland flow is slight except during major precipitation events.

Water quantity and flow are generally constant due to groundwater sources and total about 100 cubic feet per second within and surrounding SLWA. Ana River provides the majority of this water and flows through the interior of SLWA in a northeast to southwest direction. Additional inflow from artesian wells and springs runs to SLWA primarily from the north and west.

Irrigation season diversions (May to September) by Summer Lake Irrigation District amounting to 55-60% of the total Ana River flow, significantly affects wetland

development potential on SLWA. Irrigation run-off flows towards and sometimes to the north and west sides of SLWA. Due to individual private landowner management actions these flows have been quite variable between and within irrigation season over the past 15 years. Irrigation diversion reduction (about 50%) during the latter part of breeding season (mid-June through July) and subsequent increases of flows in Ana River create other challenges and opportunities. Changes in Ana River flow (by as much as 50%) during breeding season (May through August) due to manipulations for irrigation, as well as runoff from adjacent private lands, significantly affect the department's ability to manage habitat on the wildlife area.

Periodic storms and precipitation events can deliver significant quantities of run-off of generally low quality (very fine and alkali salt laden silts). Historically, sumps were probably formed during these extreme weather events and caused overtopping of existing channel banks, cutting of new channels and filling natural depressions. These sumps continue to function as ponds and open water features or mudflats when water deliveries are curtailed due to irrigation and Wildlife Area management or environmental actions.

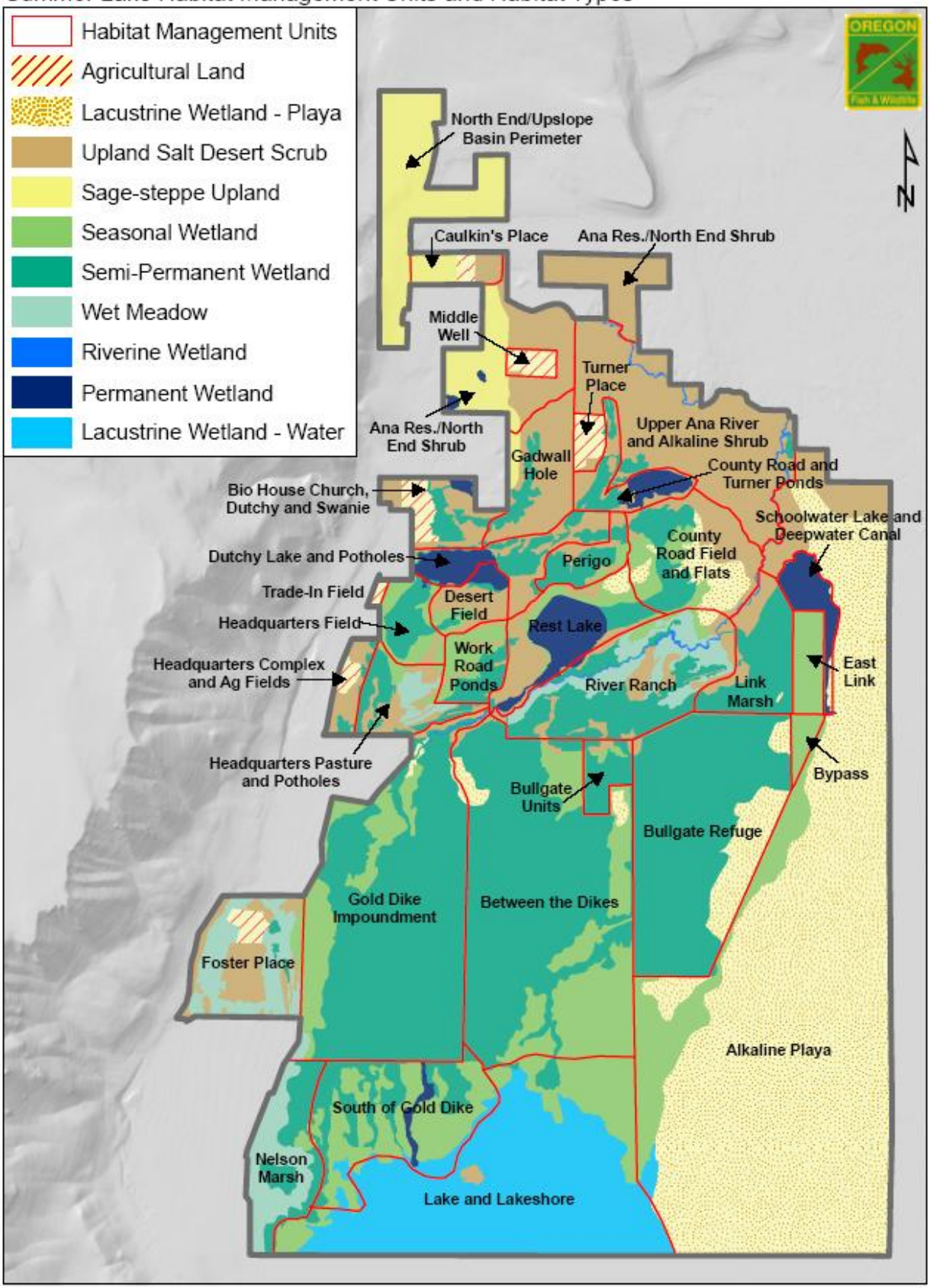
In Summer Lake Basin, it is important to understand the connection between (adjacent, in-line and nearby Habitat Management Units (HMUs) associated with water distribution, timing and volume. Nearly all SLWA wetlands function as an in-line flow-through system. Some units are dependent upon adjacent ones and receive water only when adjacent units are at or near capacity. In many cases, units are tied to one another in terms of water delivery as it affects habitat quality and quantity as well as management capability. Actions in one HMU can affect adjacent ones. Some units have multiple sources of water delivery and drainage that can be utilized depending on the location of management activities. Immense evapotranspiration losses as well as extreme weather events are very important considerations affecting management options on the Wildlife Area.

The cornerstone to attainment of SLWA's wetland goal and of primary focus for this plan's habitat objectives is Summer Lake's meanderline area. The meanderline area covers lands formerly within the original surveyed (1874) lake bed of Summer Lake and represents historic natural pre-settlement/pre-major alteration conditions in the basin. Contained within this area is about 6,160 acres of wetlands covered under a water right certificate allowing year round diversion of 60 cfs for marsh restoration and enhancement. Several HMUs are contained within this area. **Figure 4** shows locations of HMUs.

Biological Resources

Wetland dependent or wetland obligate wildlife, primarily birds, is the major wildlife resource on SLWA. Over 250 species of birds have been recorded on SLWA, and over 100 species are confirmed breeders. Comprehensive inventory data for mammal,

Summer Lake Habitat Management Units and Habitat Types



amphibian and reptile (herptile) species on SLWA is lacking, but it is estimated that at least 40 mammal and 15 herptile species may be present. Invertebrate occurrence and abundance has not been inventoried and is unknown. However invertebrates are a significant forage resource for SLWA fish and wildlife.

See **Appendix B** for a list of wildlife species.

Birds

Birds are the most important and dominant component at SLWA in terms of abundance and species diversity. Waterfowl and shorebirds are major species complexes utilizing SLWA. Breeding season use by these birds has expanded dramatically over the past 25 years in response to wetland habitat management activities. Migration use has changed in terms of timing and peak numbers of individuals over time, but remains significant and of critical importance to Pacific Flyway waterbirds. Habitat management activities and improvement projects have been designed with wildlife diversity as a focus and essentially all species utilizing SLWA have benefited. SLWA plays an important and balanced role in meeting life-cycle needs for a wide variety of species that are lacking on surrounding developed lands in the basin.

Waterfowl

SLWA has significant breeding populations of ducks (13 species represented) and Canada geese *(Branta canadensis*) that are important to Pacific Flyway waterfowl populations. Populations nesting on SLWA are estimated at:

- Western Canada goose 300-400 pairs
- Mallard *(Anas platyrynchos)* 2,000-3,000 pairs
- Cinnamon teal *(Anas cyanoptera)* 1,500-2,000 pairs
- Gadwall *(Anas streptera)* 2,000-2,500 pairs
- Redhead *(Aythya americana)* 200-300 pairs

The diverse habitat base at Summer Lake supports these breeding species and others which is an important contribution to continental waterfowl population goals set in the North American Waterfowl Management Plan and supports conservation efforts under the Intermountain West Joint Venture. Equally important is the provision of secure late semi-permanent wetlands that provide considerable molting habitat for local and regional duck populations, especially mallards. Annual duck banding operations have documented, mallards banded within breeding season in California's Central Valley using SLWA's wetlands for molting and as a post-breeding season dispersal area. Recoveries and recaptures of ducks and Canada geese banded at SLWA over the past 10 years reveal a very significant contribution to harvest in nearly all Pacific Flyway states and Canadian provinces.

SLWA supports immense populations of migrant ducks and geese numbering in excess of 5 million waterfowl use days (WUDs) annually. Of special significance, and aiding in meeting the Department's commitment to Flyway Management plans and the North American Waterfowl Management Plan, are the following populations:

• Lesser Snow Geese *(Chen caerulescens*): Significant numbers of both Wrangel Island and Western Canadian Arctic Populations (WIP and WCA, respectively) of lesser snow geese historically used SLWA during spring and fall migrations. Over 4 million waterfowl use days (WUD) of white geese occur during migration. An unknown proportion of the Central Canadian Arctic Population (CCA) of Ross' goose *(Chen rossii)* use occurs simultaneously with WIP and WCA snow goose use. Recently, this use has declined along with a concomitant reduction in populations. Traditionally, WIP snow geese were equally divided between northern (coastal NW Washington and SW British Columbia) and southern (California) wintering segments. WIP snow geese using SLWA are associated with the southern segment. It appears there has been an increase in the northern wintering segment and increased survival rate for this group of birds. Southern segment birds have decreased or remain static and survival rates are lower when compared to the northern segment. Based on recent research, WCA populations have shifted migration corridors and no longer stage as they previously did, making only brief or infrequent stops, with frequent overflights directly to wintering areas in California. The decline in fall snow goose use on SLWA is primarily due to the change in migration behavior of the WCA population. WIP geese are no longer staging in large numbers during the fall and overflights to California are common despite food resources (alkali and American three-square bulrush) remaining abundant, and habitat conditions favorable. Spring migration use remains very strong with peak populations four to five times greater than those occurring in fall. This suggests habitat conditions and food resources are not limiting lesser snow goose use of SLWA wetlands.

• Tule greater white-fronted goose *(Anser albifrons elgasi)*: A significant proportion of the Tule greater white-fronted goose population (2,000-2,500) stages on the wildlife area during spring and fall. SLWA serves as a major stopover for this subspecies as they move from breeding areas in the Lower Cook Inlet region of Alaska to wintering sites in the Sacramento Valley and Delta regions of California. Length of stay is 2-3 weeks in fall and 1-2 months in spring. Departure from the SLWA fall seems to be based on behavior clues that are poorly understood since preferred food resources (alkali and American three-square bulrush) remain abundant and habitat conditions (permanent and semi-permanent wetlands open and ice-free) are good.

• Cackling *(Branta hutchinsii)* and Pacific greater white-fronted geese (*A. albifrons frontalis)*. Lesser numbers of cackling and Pacific greater white-fronted geese (0.25-0.5 million WUDs) also use SLWA.

• Swan use of the SLWA occurs during fall, winter, and spring. Over 0.4 million tundra swan *(Cygnus columbianus)* WUDs occur annually.

- The Rocky Mountain Population (RMP) Trumpeter Swan Plan recognizes Summer Lake as a significant site for translocated migrant and resident trumpeter swans *(Cygnus buccinator).* SLWA provides suitable breeding habitat as well, but nesting has not occurred to date. There is considerable wintering use of SLWA by translocated and migrant trumpeter swans and their broods. This increasing winter use is a result of an early 1990's range expansion project

involving several Federal and State partnerships. Between 30 and 50 trumpeter swans winter on SLWA wetlands.

Shorebirds

SLWA supports significant populations of breeding and migrant shorebirds. Common breeding species are estimated as follows:

- American avocet (*Recurvirostra americana*) 300-350 pairs
- Western willet (*Catoptrophorus semi-palmatus*) 40-50 pairs
- Black-necked stilt (*Himantopus mexicanus*) 75-100 pairs
- Wilson's phalarope (*Phalaropus tricolor*) 75-100 pairs
- Killdeer (*Chardrius vociferus*) 200-300 pairs
- Wilson's snipe (*Gallinago delicata*) 200-300 pairs
- Western snowy plover 20-30 pairs
- Long-billed curlew (*Numenius americanus*) 10-20 pairs
- Spotted sandpiper (*Actitis macularia*) 5-10 pairs

Breeding American avocet and western willet have been a focus of past USGS research describing connectivity of shorebird populations in the northern Great Basin. Breeding and post-breeding birds are very transient throughout northern Great Basin wetland complexes. SLWA habitats play an important role in this connectivity and hosts large aggregations of post-breeding and migration staging American avocets.

Spring and fall migration use of SLWA by shorebirds is estimated to be 0.5-1.0 million use days, primarily by:

- Long -billed dowitcher (*Limnodromus scolopaceus*)
- Long-billed curlew
- American avocet
- Western Willet
- Black-necked stilt
- Killdeer
- Dunlin (*Calidris alpina*)
- Western (*Calidris mauri*), Least (*C. minutilla*), Pectoral (*C. melanotus*), and Baird's (*C. bairdii*) sandpiper
- Wilson's and red-necked (*Phalaropus lobatus*) phalarope
- Semi-palmated (*Charadrius semipalmatus*) and snowy plover

Spring use on SLWA is dictated largely by weather patterns and can be either brief or protracted as different species or groups move through the region. Pre-migration physical condition is influenced by weather conditions and probably affects staging population size and length of stay. Generally, good to excellent habitat conditions coincide with spring migration time periods. Within managed portions of SLWA, drawdowns, caused by management action or increased evapotranspiration, expose mudflats which produce favorable foraging conditions that extend well into the breeding season.

Fall use is generally protracted, beginning as early as late June and extending into October as non-breeding and unsuccessful breeders return from northern breeding locales en route to southern wintering areas. Weather and climatic patterns significantly affect this use. During wet cycles when Summer Lake retains water through the summer, shorebird use is large in magnitude and duration. Conversely during periods of extended drought, Summer Lake is largely dry and suitable habitat conditions are provided only on SLWA's managed wetlands.

Colonial Nesting Waterbirds

A colony of nesting waterbirds has historically occurred on a series of small natural islands (Gull Islands) at the head of Summer Lake and recent estimates are as follows:

- California gull (*Larus californicus*) 500-750 pairs
- Ring-billed gull (*Larus delawarensis*) 500-750 pairs
- Double-crested cormorant (*Phalacrocorax auritus*) 20-25 pairs
- Caspian tern (*Sterna caspia*) 5-35 pairs
- American white pelican (*Pelecanus erythrorhynchos*) 5-10 pairs

Colonial nesting waterbirds find suitable conditions on Gull Islands during wet cycles when the islands are surrounded by deep water providing security from disturbance and access by mammalian predators. During dry periods when lake levels are low a land bridge or very shallow water conditions negate this security, and breeding does not occur. Recent, pioneering by nesting Caspian terns and double-crested cormorants has occurred within managed wetlands in Gold Dike and E. Link HMUs.

American white pelican have nested on SLWA in recent times (1995). It is suspected that historically a breeding population existed in most years when adequate lake levels were available. At present, sporadic breeding and extensive spring and summer use occurs. Post breeding dispersal and feeding assemblages of several hundred American white pelicans are common.

Great (*Ardea alba*) and snowy egret (*Egretta thula*) and white-faced ibis (*Plegadis chihi*) were first documented to breed on SLWA in 1991 and nesting occurred into the mid-1990s. These species (along with black-crowned night-herons (*Nycticorax nycticorax*)) utilized robust tall emergents found in Bullgate Refuge, Dutchy Lake, Potholes, Gold Dike, and Link Marsh HMUs. Nesting by these species has not been observed over the past 5-7 years.

• Forster's terns (*Sterna forsteri*) nest in dispersed sites throughout SLWA, and there is estimated to be 20-25 pairs.

• Black terns (*Chlidonias niger*) historically nested on SLWA, but recently none have been detected. They occur as common spring and fall migrants yearly.

• Western (*Aechmophorus occidentalis*)/ Clark's(*A. clarkia*) (30-40 pairs) and eared grebes (*Podiceps nigricollis*) (25-30 pairs) nest in small colonies at Dutchy Lake, Gold Dike Impoundment and Rest Lake.

Other Waterbirds

Greater sandhill cranes (*Grus canadensis tabida*) are regular breeding species on SLWA that have increased in abundance from 15-17 pairs 10 years ago to over 20 pairs at present. Cranes found on SLWA are part of the Central Valley Population, recognized and receiving considerable management attention by the Pacific Flyway. This population is listed as a threatened species in California and endangered in Washington. Movements between Summer Lake and Malheur National Wildlife Refuge (NWR) have been documented by marked individuals, illustrating interconnection and importance of locally produced sandhill cranes to the population as a whole. Observations of marked birds in other popular wildlife viewing areas (Lower Klamath NWR, state and federal refuges in California and Washington) demonstrate the importance and significant contribution of the Area's breeding population.

SLWA provides habitat to several species of secretive marsh birds such as American coots (*Fulica americana*), and pied-billed grebes (*Podilymbus podiceps*) which are common breeding species. Migration use is very heavy, especially by American coots. Rails (Virginia (*Rallus limnicola*) and sora (*Porzana carolina*)) appear to be very abundant throughout SLWA wetlands during spring through fall months. Habitat for yellow rails (*Coturnicops noveboracensis*) probably exists on SLWA, but comprehensive surveys for rails have not been conducted. American bitterns (Botarus lentiginosus) are common breeding species. Migration use by this species is unknown and wintering use is minor.

Passerines

Passerine species are very numerous during migration periods, utilizing wetlands as well as tree and shrub components of upland habitats found on SLWA. Over 50 species are known to breed on the Wildlife Area.

Upland game birds

California quail *(Callipepla californica*) are very numerous especially in upland habitats at the north end of SLWA.

There is a small breeding population of ring-necked pheasants, but loss of habitat on surrounding property and pressure from predators such as house cats limit the population. Pheasant abundance on SLWA is also limited by lack of adequate winter forage and cover.

Mammals

Furbearers present include beaver (*Castor canadensis*), bobcat (*Lynx rufus*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), and raccoon (*Procyon lotor*). Muskrat are especially numerous throughout SLWA wetlands. This species provides considerable habitat benefits through vegetation clipping and house construction, but

sometimes causes major problems in dikes and levees due to burrowing activity and den construction.

Species that occur in good numbers include coyote (*Canis latrans*), striped skunk (*Mephitus mephitus*), long-tailed weasel (*Mustela frenata)*, Nuttall's cottontail (*Sylvilagus nuttallii*), yellow-bellied marmot (*Marmota flaviventris*), Belding's and California ground squirrels (*Spermophilus beecheyi* and *Citellus beldingi*), small microtines and mice (species occurrence or abundance is unknown).

Species that occur but are less numerous include black-tailed jackrabbits (*Lepus californicus*), pocket gophers (*Thomomys townesendii*), kangaroo rats (*Dipodomys ordii*), porcupine (*Erithizon dorsatum*), chipmunks (*Eutamius* spp), woodrats (*Neotoma* sp.), feral cats (*Felis domesticus*) and cougar (*Felis concolor*).

Three bat species have been confirmed on SLWA including the long-eared Myotis (*Myotis evotis)*, little brown Myotis (*Myotis lucifugus*) and the Yuma bat (*Myotis yumanensis*). These bats forage extensively and have a maternity roost at the Headquarters Complex.

Silver-haired bat (*Lasionycteris noctivagans*) and long-legged Myotis (*Myotis volans*), hoary bat (*Lasiurus cinereus*) and big brown bat (*Eptesicus fuscus*), were captured at Picture Rock Pass (2-3 miles to the north) and are believed to forage on SLWA. The Townsend's big-eared bat (*Crtynorhinus townsendii*), pallid bat (*Antrozus pallidus*) and western small-footed Myotis are suspected to utilize SLWA for foraging and roosting but have not been documented. Fringed Myotis (*Myotis thysanodes*) and California Myotis (*Myotis californicus*) are primarily forest dwellers that utilize snags and tree cavities for roosting. Because Winter Ridge is immediately adjacent to SLWA it is believed these bats may utilize SLWA for foraging.

Other mammals of note:
• White-tailed antelope squirrel (*Ammospermophilus lecurus*) occurs in small numbers on the north end of SLWA.
• A small population (50) of mule deer (*Odocoileus hemionus*) inhabits SLWA and surrounding private lands year round. Depending on wintering conditions, deer numbers can increase to over 200 along the west side and north end of SLWA.

Amphibians and Reptiles
Native species of snakes, lizards and frogs are plentiful on the area, as are introduced bullfrogs *(Rana catesbeiana)*.
• Long-toed salamanders *(Ambystoma macrodactylum)* occur on SLWA.
• Bullfrogs (date of introduction unknown) have expanded dramatically along the west side of the valley. Recently, additional expansion has been noted into interior marsh areas extending along Ana River above the River Ranch.
• Pacific tree frogs (*Pseudacris regilla)* are numerous and can be found scattered throughout SLWA.

• Great Basin spade-foot toads (*Scaphiopus intermontanus*) are found primarily at the north end of SLWA but abundance is unknown.
• Western toads *(Bufo boreas)* are extensive in their distribution and fairly abundant.
• Western fence *(Sceloporus occidentalis)*, northern sagebrush (*Sceloporus graciosus graciosus*), leopard (*Crotaphytus wislizenii*), side-blotched (*Uta stansburiana*), and desert horned lizards (*Phryosoma platyrhinos*) and Western skinks *(Eumeces skiltonianus)* are known to occur.
• Garter *(Thamnophis sirtalis)*, gopher *(Pituophis melanoleucus)*, rattlesnake *(Crotalus viridis)* and night snakes *(Hypsiglena torquata)*, and racers (*Coluber constictor)* can be found on SLWA.

Fish
Summer Lake Tui chub (*Gila bicolor* ssp.*)* historically inhabited Ana River and associated springs. However, chemical treatment projects to improve the recreational fishery and illegal introductions, of primarily Goose Lake tui chubs (*Gila thalassinus*) as bait fish have impacted this population in Ana River and reservoir. A third species, Summer Basin tui chub were located in a few isolated springs in Summer Lake Basin in 1993, but have not been found on SLWA or adjoining waters. Tui chubs (Goose Lake tui chubs x Summer Lake tui chubs) inhabit nearly all the waters of SLWA from Ana Reservoir to the head of the Summer Lake. They are sometimes spatially and temporally abundant providing a very important forage base for a wide variety of fish, mammals and waterbirds. Tui Chub captured while electro shocking Ana River have ranged in size from ½ inch to 10 inches in total length.

Sterile hybrid bass (white and striped bass cross (*Morone chrysops X Morone saxatilis*) fingerlings were first introduced into Ana Reservoir in 1982. Ana Reservoir is stocked with 2,000 fingerling hybrid bass approximately every two years. Annual inventory of hybrid bass in Ana Reservoir indicates age classes from 6 inches to 20 pound plus fish are present. The state record 18.5 pound hybrid bass was caught at Ana Reservoir. This trophy hybrid bass fishery makes Ana Reservoir one of Lake County's most popular fishing destinations. Fishing occurs year round with the most productive fishery occurring in late winter and early spring.

Catchable (8-12") rainbow trout (*Oncorhynchus mykiss* ssp.) are stocked in Ana Reservoir during spring and summer months, while fingerling rainbow trout are stocked in Ana River below the dam. Surplus brood trout when available have been stocked into Ana River and Ana Reservoir. This system has been stocked since the early 1940s and no natural spawning of trout is known to occur. Ana Reservoir provides a year round fishery for stocked rainbow trout, since springs beneath the reservoir keep water ice free and at a temperature above freezing during winter months.The majority of the recreational angling occurs between Ana Reservoir and River Ranch Campground. The hatchery trout fingerlings released into the Ana River reach harvestable size in approximately one growing season. Size range of trout in the Ana River range between the fingerling plants (approximately 3") up to fish over 20".

- Both hybrid bass and rainbow trout have been observed lower in the river, but the extent of the fishery is estimated to be only four miles below the reservoir.

- Translocated Warner suckers (*Catostomus warnerensis*) exist in a closed basin constructed ditch system (no connection to Ana River) terminating in two ponds that are maintained by artesian well flow. They exist as a translocated population, brought to SLWA in 1991 to be held prior to transfer to a propagation facility. While being held, they successfully spawned and numbers are now estimated to be 100-200 fish.
- White sturgeon *(Acipenser transmontanus*), escapees from a private fish farm north of and adjacent to SLWA, have been caught in Ana River.
- Largemouth bass *(Micropterus salmoides)* and bluegill *(Lepomis macrochirus)* inhabit a small watercourse near Headquarters Complex downstream from private ponds. The extent of their distribution into SLWA wetlands is unknown. No largemouth bass or blue gill have been observed during electro fishing or while conducting snorkel surveys.
- In 1993, California pit roach *(Hesperoleucas symmetricus)*, believed to have been introduced as bait fish, were discovered in Ana River.

Species of Conservation Concern

There are several species of federal or state concern that are present at least part of the year on SLWA (**Table 2**). These include northern goshawk (*Accipiter gentiles*), burrowing owl (*Athene cunicularia)*, ferruginous hawk (*Buteo regalis)*, Swainson's hawk (*Buteo swainsoni)*, greater sage grouse (*Centrocercus urophasianus)*, western snowy plover*,* olive-sided flycatcher (*Contopus cooperi)*, snowy egret, willow flycatcher (*Empidonax trailii adastus)*, greater sandhill crane, black-necked stilt, yellow-breasted chat (*Icteria virens)*, Franklin's gull (*Larus pipixcan),* Lewis' woodpecker (*Melanerpes lewis),* long-billed curlew, American white pelican*,* Summer Basin tui chub*,* Warner sucker, pallid bat*,* Townsend's big-eared bat, pygmy rabbit (*Brachylagus idahoensis)*, fringed myotis, long-legged myotis and northern sagebrush lizard

Many of these species are summer residents (western snowy plover, willow flycatcher, greater sandhill crane, black-necked stilt, Lewis' woodpecker, long-billed curlew, Warner sucker and northern sagebrush lizard) and breed on SLWA, some in good numbers. Others are former breeding species (burrowing owl and snowy egret) or ones breed in nearby habitats with a high likelihood of becoming or returning as breeding species (ferruginous hawk, Swainson's hawk and greater sage grouse). They utilize SLWA habitats during migration time periods and throughout the breeding season.

Several species (northern goshawk, olive-sided flycatcher, yellow breasted chat, Franklin's gull and the bat species) utilize SLWA habitats during migration time periods to forage and roost.

Several species discussed above are also Strategy Species as defined in the 2006 Oregon Conservation Strategy, identified in Table 2. Key Species are Strategy Species with a special emphasis within a conservation opportunity area. The OCS prescribes conservation activities to be implemented that contribute to the overall health of strategy habitats and species. SLWA's diverse habitat management actions, activities and

programs contribute to the conservation of OCS species in the North Basin and Range Ecoregion.

Table 2. Federal- or State-listed Endangered, Threatened, Candidate and Species of Concern animals and plants potentially present on Summer Lake Wildlife Area.
(Federal Status: C–Candidate; E–Endangered; SC–Species of Concern; T–Threatened
State Status: C – Critical; E – Endangered; T – Threatened; S – Sensitive V – Vulnerable
Oregon Conservation Strategy (OCS) Strategy Species present - x, Key Species - X)

Common Name	Scientific Name	Federal Status	State Status	OCS
Amphibians				
Western toad	*Bufo boreas*		SV	x
Birds				
Northern goshawk	*Accipiter gentiles*	SC	SC	
Burrowing owl	*Athene cunicularia hypugaea*	SC		
Ferruginous hawk	*Buteo regalis*	SC	SC	x
Swainson's hawk	*Buteo swainsoni*		SV	x
Greater sage grouse	*Centrocercus urophasianus*	SC		
Western snowy plover	*Charadrius alexandrinus nivosus*	T (coastal)	T	X
Olive-sided flycatcher	*Contopus cooperi*	SC	SV	
Snowy egret	*Egretta thula*		SV	x
Willow flycatcher	*Empidonax trailii adastus*		SV	
Greater sandhill crane	*Grus canadensis tabida*		SV	x
American bald eagle	*Haliaeetus leucocephalus*		T	
Black-necked stilt	*Himantopus mexicanus*		NR	X
Yellow-breasted chat	*Icteria virens*	SC	SC	
Franklin's gull	*Larus pipixcan*		SP	x
Lewis' woodpecker	*Melanerpes lewis*	SC		
Long-billed curlew	*Numenius americanus*		SV	X
American white pelican	*Pelecanus erythrorhynchos*		SV	x
Fish				
Summer Basin tui chub	*Gila bicolor ssp.*	SC	SS	X
Warner sucker	*Catostomus warnerensis*	T	T	x
Mammals				
Pallid bat	*Antrozous pallidus*	SC	SV	x
Townsend's big-eared bat	*Crtynorhinus townsendii*	SC	SC	x
Pygmy rabbit	*Brachylagus idahoensis*	SV	SV	x
Fringed myotis	*Myotis thysanodes*	SC	SV	
Long-legged myotis	*Myotis volans*	SC	SV	x
Reptiles				
Northern sagebrush lizard	*Scelopsus graciosus graciosus*	SC		

Non-Native Species

Non-native wildlife on SLWA includes invasive pest species such as European starling, bullfrog and house sparrow. These species compete with cavity nesting native species. Game birds such as ring-necked pheasants have been introduced and are managed to provide hunting opportunities. Naturally reproducing populations now occur and are augmented by translocation of wild birds. Feral cats exert considerable predation

pressure on native bird species as well as introduced game birds. House mice occur at Headquarters Complex, probably introduced from Western Oregon.

The occurrence and distribution of non-native plants species is unknown since comprehensive surveys have not been conducted. However, a large number of non-native plants are present on SLWA. The origin of most is unknown, but some desirable species continue to be utilized and have been cultivated in agricultural and other upland areas as well as in pastures and meadows. Many non-native plant species appear to be beneficial as forage or cover as evidenced by wildlife use and do not appear to have serious deleterious effects on habitat.

Several species of noxious weeds found on SLWA are listed in **Table 3**. Most noticeable and of great concern are: knapweeds (diffuse, Russian and spotted), poison hemlock, Mediterranean sage, perennial pepperweed, white top, and thistles (bull, Canada, musk and Scotch). Many of these species displace native vegetation and/or are of limited value to wildlife. Noxious weed control efforts involve chemical spraying, mowing and hand pulling or chopping as an annual activity focused on these species.

Table 3. Noxious weeds (Department of Agriculture B List) found on Summer Lake Wildlife Area. (*Invasive plants identified in 2006 Oregon Conservation Strategy)

Common Name	Scientific Name	Occurrence
Bull thistle*	*Cirsium vulgare*	Abundant
Buffalo bur	*Solanum rostratum*	Rare
Canada thistle	*Cirsium arvense*	Abundant
Diffuse knapweed*	*Centaurea diffusa*	Rare
Dodder	*Cuscuta* spp	Rare
Field bindweed	*Convolvulus arvensis*	Uncommon
Mediterranean sage	*Salvia aethiopis*	Uncommon
Musk thistle	*Carduus nutans*	Uncommon
Perennial pepperweed*	*Lepidium latifolium*	Common
Poison hemlock	*Conium maculatum*	Common
Puncturevine	*Tribulus terrestris*	Rare
Quackgrass	*Agropyron repens*	Uncommon
Russian knapweed	*Acroptilon repens*	Common
Scotch thistle*	*Onopordum acanthium*	Rare
Spotted knapweed*	*Centaurea maculosa*	Rare
Whitetop*	*Cardaria draba*	Uncommon

Monitoring

Annual program activities are in place to monitor wildlife populations, habitat use and other features. Wildlife response to habitat developments is a major objective of most surveys. Data are collected by administrative units and in some cases, specific localities, habitats or vegetative types based upon survey objectives. Population data are used to monitor effectiveness of population management plans, especially for selected waterfowl species. Data are analyzed, maintained on site, and reported to

department program managers, Pacific Flyway Council Study Committees, and to interested publics.

Waterfowl and other waterbirds
Routine surveys include duck and goose pair surveys, waterbird nesting, and brood surveys. Waterfowl population surveys are completed weekly during fall through spring months to document migrant bird use of SLWA, meet Pacific Flyway management plan objectives and provide information to Area users. Special waterfowl surveys (Flyway-wide dark and white goose surveys, Tule goose surveys, collar observation data, age ratio data, telemetry, Winter Waterfowl Inventory) are coordinated with the Pacific Flyway Study Committee to monitor specific populations as per species management plans.

Special surveys for breeding spring and fall shorebirds, snowy plover (an OCS Key Species) and colonial waterbird have been conducted annually but are frequently incomplete due to funding, conflict with other activities and staffing shortages.

A coordinated Pacific Flyway banding project was initiated in 1991 and continues to date. About 2,500 ducks are banded annually at SLWA. Banding data are used by USFWS for flyway duck harvest, survival analysis and for hunting season regulation recommendations. Monitoring and reporting of neck-collared waterfowl and band encounter/recovery data are collected and reported.

Other Wildlife
Threatened and sensitive species are recorded during periodic wildlife population surveys. Muskrat house counts are conducted annually to assess status of muskrat populations. Furbearer harvest data is collected annually. Breeding bird surveys are conducted to document and monitor passerines and other nongame bird species. Predator observations recorded to establish population indices.

Upland Game Birds
Upland game bird production surveys are conducted to document those populations.

Big Game
Mule deer trend and herd composition surveys are conducted to document populations and habitat use.

Fish
Game fish populations are monitored through creel and stream surveys by Oregon State Police (OSP) and department fisheries personnel. Redband trout populations are monitored annually through the use of boat electro-shocking and snorkel techniques. Non-game fish species abundance is monitored by department fisheries personnel annual trapnet surveys in Ana Reservoir.

Wildlife Diseases
Minor outbreaks or individual birds afflicted with avian cholera, botulism and lead

poisoning occur annually and are monitored by wildlife area staff. Wildlife which appear to be sick are sent to the department's wildlife veterinarian for status determination and subsequent disease testing as necessary.
West Nile Virus was recently confirmed in a dead American white pelican found on SLWA. SLWA staff monitors for key species and samples are submitted to Oregon State University's Veterinary Diagnostic Laboratory for analysis.

The department is currently testing waterfowl on SLWA for Avian Influenza. This testing follows recently developed statewide and national testing protocols.

Vector Control
SLWA is not covered by a Vector Control District, Oregon Department of Agriculture or other monitoring efforts.

Vegetation
Limited vegetation mapping has been conducted to document habitat types. Fine scale mapping and surveys are planned to document distribution, changes in abundance and composition of various species and/or habitat types. An inventory of noxious weed distribution is in place and updated annually.

Water Use
Water use for irrigation and wildlife habitat management is monitored monthly through an extensive flow and water level measurement program. Use reports are prepared annually and forwarded to the department's Engineering Section for submission to Oregon Water Resources Department.

Public Use
Hunter use and harvest data are collected and reported on an annual basis, maintaining over 50 years of trend data. Data is collected to monitor hunter participation and success. Hunter participation and harvest is determined through return of mandatory individual daily check in and check out permits which must be carried on the hunter while on SLWA.

Observations of hunter performance by area personnel during hunting season are collected to document changes in hunter behavior and ethics through time. Wildlife viewing and other non-consumptive use is estimated monthly from SLWA staff observations.

Cultural Resources

The Paiute Tribe was the primary Native American Nation indigenous to this area. In addition other tribes utilized SLWA's favorable climate and abundant natural resources for food procurement. Many species of vegetation provided food and shelter. Waterbirds, fish and mammals on SLWA were suspected to be very abundant during most of the year with the exception of winter. Campsites as evidenced by house -pits, petroglyphs, and tool manufacturing sites are located throughout SLWA and in uplands

surrounding the basin, confirming significant use of SLWA's wetlands. Lithic points and other artifacts can be found scattered throughout the marsh area.

In the late 1800s, European settlement began with the homesteading of the area and development of a livestock industry. Livestock grazed in the drier upland areas while native marsh and meadow vegetation was irrigated and cut for hay. In the early 1920's, major developments were undertaken to divert water for irrigation purposes, causing major changes to the natural hydrology and lake ecosystem. At the same time climatic and other changes were occurring resulting in reduced discharges from Ana River and the size of Summer Lake.

Agricultural use of Ana River reduced flows (25-30%) resulting in the diminishment of Summer Lake which became dry more often causing a reduction in salinity, and no doubt a change in aquatic species composition. The reduced size of Summer Lake allowed for the development of hay culture of native and high-value forage vegetation on land formerly within the normal meander line. Homesteaders diked many areas and water was spread over the land creating seasonal wetland habitat managed primarily for livestock forage production and pasture. In other areas, wetland drainage and fill activities were undertaken to establish managed hay fields and/or grazing pastures. Irrigation runoff from the westside of the valley onto SLWA created additional habitat but severely reduced flows to the Summer Lake and historic marsh areas.

As SLWA was developed, emphasis on department-owned lands was shifted from livestock production towards wildlife habitat management. The existing infrastructure developed under private ownership was augmented and additional areas were diked. Water control structures installed to regulate and disperse flows to create favorable wildlife habitat. Considerable time and effort was put into the development of cover and feeding areas for wildlife. Agricultural fields were cleared, leveled, with cover and food crops cultured, especially on acquired homesteads. Livestock grazing and haying continued on lands containing developed meadow habitat and associated historically grazed uplands.

In the early 1980s, habitat management on SLWA shifted away from food crop culture, haying, and grazing to marsh management and waterfowl production. These same techniques are currently utilized, but emphasis is now directed towards all wetland dependent wildlife.

Social Environment

Demographics

SLWA is located near the unincorporated town of Summer Lake, in Lake County. Lake County is one of the slowest growing areas in Oregon. Census figures indicate approximately 7,400 residents live in Lake County.

Land Use

Summer Lake Wildlife Area is surrounded by predominantly agriculture and rural

residential land uses. **Figure 3** shows the land uses which border the Wildlife Area.

Infrastructure

Developments/Facilities

Major facilities development occurs primarily at SLWA's Headquarters Complex (see **Table 4**). It consists of three residences, maintenance and equipment shop, six-car garage, two storage sheds, office/hunter check station/bunkhouse, barn, two granaries, and two other small utility buildings. An additional residence, housing the Lake District Assistant Wildlife Biologist is located 1.3 miles north of the Headquarters Complex. At River Ranch campground, a large barn with two small outbuildings is used for informational and educational meetings and programs. Most structures at Headquarters Complex and River Ranch Barn meet federal criteria of cultural and historical significance due to dates of construction. The office/check station includes a public information lobby, accessible restroom and parking area, as well as a graveled parking area. The domestic drinking water spring development and pumphouse, 30,000-gallon capacity water storage tank and distribution pipeline are situated under deed easement on private land adjacent to and west of SLWA Headquarters Complex.

Four primitive campgrounds each with vault toilets, picnic tables and trash barrels are located within the interior of SLWA. Potable water is not available at campgrounds but is provided at Headquarters Complex via two frost-free hydrants. Two roads under easement south of Headquarters Complex provide access across private land from Oregon Highway 31 to the west side of SLWA. Three additional access sites/roads on the north end of department-owned lands provide access from Highway 31 to the interior. In addition to the four campgrounds and five access areas, 14 designated parking areas provide access to SLWA habitats. One parking area serves as a boat launch into the lower Ana River.

The wildlife area has 25 miles of boundary and livestock pasture fence.

Table 4. Facilities and Developments on the Summer Lake Wildlife Area.

Development Type	Location/Tract Name(s)
Viewing areas	Schoolhouse Lake Viewing Station
Campground/Picnic areas (3-8 tables each)	Bullgate, River, River Ranch, Windbreak
Public restrooms (13 total, 2 ADA accessible)	Headquarters (1 ADA accessible) and each campground (River CG with ADA accessible) and 2 major access areas (Nelson Lane and South Access).
Access Areas (3 major with parking, 2 with public restrooms	Nelson Lane, O'Leary Access and South Access
Parking areas (19 total)	Scattered locations across the W.A
Maintenance Shop (2)	Headquarters Complex
Gas House	Headquarters Complex
Headquarters office	Headquarters Complex

Bunkhouse	Headquarters Complex
Equipment shed	Headquarters Complex
Storage buildings (3)	Headquarters Complex
Hay barns	Headquarters Complex and River Ranch
Four residences	Headquarters Complex (3), Bio. House (1)
Host site	Headquarters Complex – 4 pads
Fences (25 miles total)	Various boundary and pasture across entire Area.
Bridges (Six foot bridges)	River Ranch (1) and along Link Canal (5)
Tree and shrub plots (9 total)	Church Field (1), Dutchy Field (1), Headquarters Ag. Field (1), Middle Well (1), Turner Place (2), Swanie Field (3)
Orchards (3 total)	Bio. House, Headquarters Complex, Turner Place

Water Rights

The department holds several Oregon Water Resources Department water right certificates and permits for a majority of SLWA's wetlands. These are critical to meeting SLWA goals and objectives as well as complying with the department's mission. Summer Lake Irrigation District (SmLID) has the senior and only non-department water right for Ana River. That permit involves 46 cfs (approximately 50% of the river flow) during irrigation season (May 1–September 30). SLWA is a major interest in the SmLID with 547.1 acres of the 1841.6 acres under irrigation (29.7%) and 13.7 cfs of the 46 total. Most department-held water rights are for wildlife or marsh restoration uses outside of, as well as during irrigation season. Most important, is Certificate #22005 (priority date of 1949) for diversion rate of 60 cfs yearlong for the use of marsh restoration and enhancement on 6139.6 acres on lands within the meanderline of Summer Lake. Three artesian wells on SLWA have wildlife use and irrigation use water rights.

A vested water right application for the River Ranch tract (25 cfs on 750 acres) has been submitted to Oregon Water Resources Department. Should this claim be accepted in the adjudication process, it would become the senior water right for waters of Ana River.

Appendix D shows State and Summer Lake Irrigation District water rights which are currently held on SLWA.

Easements/Access Agreements

Four powerline (all to Surprise Valley Electrification Corporation) and one telephone (buried cable to Telephone Utilities of Eastern Oregon) rights-of-way exist on SLWA. Generally, the rights-of-way are providing service to the SLWA facilities (Headquarters Complex and pumps) or are situated along the exterior boundary. Interior portions of the marsh are free from powerlines or underground cables. The department holds two rights-of-way for access across the SmLID canal.

Four easements are in effect involving SLWA operations. The Headquarter Complex domestic drinking water supply involves use (pumphouse, electrical service, and water distribution lines) and storage (steel tank) of water from a spring located on private land. This same easement covers the water distribution across property owned by The Lodge at Summer Lake. Terms of the easement require the department to maintain the water delivery system and supply The Lodge at Summer Lake and an adjacent parcel (partitioned from the original Summer Lake Lodge property) with domestic drinking water. Oregon Department of Human Services, Health Services, Drinking Water Program rules and regulations guide management of this transient non-community water system (PWS ID# 4191135).

Two road easements provide recreational (during waterfowl hunting seasons) and administrative accesses from Highway 31 across private land (Pennington Ranch Trust at South Access, and 24 Ranch, Inc. at Nelson Lane) to the westside of SLWA.

Approximately 4,327 acres of Bureau of Land Management (BLM) lands were withdrawn by Public Land Order No. 300 in 1945 from all forms of appropriation under public land laws and reserved for wildlife management use by the department. Two Memorandums of Understanding (MOUs) are in effect with the BLM (Lakeview District), involving 560 acres of land adjacent to SLWA along the northeast exterior boundary. Subject to certain conditions, these MOUs give the department management authority on these lands. BLM reserves grazing rights on one parcel. The other parcel is designated Wilderness Study Area and BLM stipulates constraints on certain land management activities in order to protect wilderness attributes until the U.S. Congress acts to either release these lands to other uses or designates it as wilderness.

Other agreements include:
1) The Rosebud/Edmunds Well Habitat Management Plan and MOU is in effect as part of a coordinated effort between the department, Lakeview District BLM and the privately owned and operated (non-profit) Edmunds Well Wildlife Sanctuary to manage wetlands as a complex in the north part of Summer Lake Basin.

2) A grazing use exchange agreement is in effect with a private landowner. The department provides grazing and hay on another part of the area in exchange for non-grazing use of 40-80 acres of riparian land within the Summer Lake meander line.

3) Grazing permit agreements for three permittees involving 1,500-1,600 Animal Unit Months (AUMs) on 1,200 acres are in effect annually.

4) Haying permit agreements are in effect in three areas (Foster Place, Middle Well and River Ranch) and involve mowing and vegetation removal in the form of hay on 200-250 acres annually.

Appendix E lists the easements and access agreements occurring on the Summer Lake Wildlife Area.

Land Acquisition and Adjustment

It is the policy of the department to only acquire land or interests in lands, including easements and leases, from willing sellers, consistent with statutory authority and the department's mission. Acquisitions and adjustments must be for conservation of fish and wildlife and their habitats and to provide fish- and wildlife-oriented public use for educational and recreational purposes. Land adjustments would allow for the sale, trade or exchange of land with willing landowners to enable the department to consolidate wildlife area boundaries.

There are three categories of lands that may be considered for acquisition. These include: 1) Significant or unique habitats, especially those beneficial to threatened or endangered sensitive species; 2) Sites, or access to sites that provide wildlife-related recreational opportunities; and, 3) Properties to facilitate the performance of the Department's mandated duties (e.g., storage and warehouse, feeding barns, etc.).

At present land uses on adjacent private land are compatible with most SLWA management activities. No inholdings exist within the present day exterior boundaries. No major acquisitions have occurred since 1971 and none are anticipated in the forseeable future.

At present, private lands provide significant migration habitat for a variety of waterbirds. Nesting and brood rearing habitat effectiveness on those properties is variable due to crop irrigation, haying, livestock grazing and is dependent on timing and intensity of those land uses.

Public Use

Public Access

The majority (65%) of SLWA remains open to public access year-round. Seasonal motor vehicle access restrictions are in place during spring (March 15) through early fall (August 15) to provide protection to migrating, breeding, brood rearing and molting waterbirds. Hunting access is restricted on about 35% of the Area during fall hunting seasons. Hunting use is quantified through the requirement of daily hunting permits. Non-consumptive visitor use is difficult to accurately assess due to several points of entry and the lack of a permit or registration program.

Hunting, Trapping, and Angling

Hunting and angling are very popular recreational activities enjoyed on SLWA (see **Table 5**).

Providing public hunting opportunity was a major objective for the acquisition of SLWA, and revenues derived from hunting related expenditures are the sole funding source for SLWA operations Hunter use increased steadily from when SLWA was established (1944) through the late1990s. Over the past seven years hunter numbers have been declining at an average rate of 7.6% per year. Average hunter use days (6,310) during

this time period are 3.1% below above the long-term (58 years) average. Reduced waterfowl use and hunting success on SLWA as well as social and societal factors may be affecting hunter participation.

SLWA provides a hunting experience which is unique for managed waterfowl areas in Oregon. It is still relatively free from intensive regulations (no quotas, reservations, or designated blinds), and hunters are allowed to camp and hunt daily throughout the season. Hunting occurs in a largely natural versus intensively managed setting. Waterfowl (especially snow geese and ducks), upland game, doves, and deer are the primary species hunted. Access for disabled hunters is good due to an extensive distribution of camping and parking areas. Dikes and associated uplands generally provide firm substrate for wheelchair use.

- About 65% of SLWA (12,000 acres) is open to hunting. Other key areas are maintained as refuges or sanctuaries where access is generally not allowed. Refuges are necessary to meet migration needs for many species. Should refuge areas be eliminated, birds would probably migrate out of the region to wintering areas or locations with reduced disturbance.

- Management of the hunt program is a major activity during hunting season. On average, about 6,500 hunter days are recorded annually with 7,900 waterfowl, coots, snipe, and upland game harvested. Collection of data on hunting activity, success and species composition of game harvested is conducted by SLWA staff during the season.

- Four campgrounds, five major access areas, 18 parking areas, one boat launch, 12 vault toilets, trash barrels, roads, trails, footbridges, are maintained throughout the year.

- Signing of boundaries and displays at Headquarters Complex, campgrounds and major access areas provide information to hunters.

- Considerable information is disseminated to the hunting public via the telephone and personal contact.

- Fishing occurs primarily along the upper four miles of the Ana River. Fishing use days on SLWA is estimated at 900.

- Ana Reservoir receives heavy fishing pressure for stocked rainbow trout and hybrid bass. The reservoir is owned by the Summer Lake Irrigation District (SmLID), but is surrounded by department lands. Major access roads traverse SLWA adjacent to Ana Reservoir.

- Fisheries related work on SLWA is conducted by department fisheries staff. Consistent with USFWS Federal Aid requirements, no SLWA staff time is currently expended on fisheries related projects.

- Trapping is permitted on a closely controlled basis to meet recreation objectives and to achieve population controls for selected species, especially muskrats, coyotes, mink, raccoon, and striped skunks. Muskrat harvest quotas are based on historical population indices and dike damage. Limited trapping (approximately 100 use days annually) occurs outside of waterfowl hunting season and prior to nesting season (March 15). Restrictions on trapping seasons at SLWA have been enacted to reduce potential conflicts between user groups, prevent undue harassment to wintering and migrating wildlife and to prevent impacts to nesting waterbirds.

- Annually over the past 10 years, an average of 660 muskrats has been harvested. Mink harvest ranges from 5 to 30 per year, with catch of other species usually less than 10 per species each year.

Table 5. Estimated Annual Hunting, Trapping and Angling Use Days on Summer Lake Wildlife Area.

Activity	Estimated Annual Use Days
Hunting	6,500
Big Game	50
Waterfowl	5990
Upland Game	350
Unprotected Wildlife	10
Trapping	100
Angling	900
Total	**7,500**

Non-consumptive

The SLWA is open to public access year around. Wildlife viewing, hiking and photography are popular on the area (see **Table 6**).

Table 6. Estimated Annual Non-consumptive Use Days on the Summer Lake Wildlife Area.

Activity	Estimated Annual Use Days
Wildlife Viewing	5,000
Photography	500
Hiking	100
Camping	1,000
Other miscellaneous (e.g. picnicking)	500
Total	**7,100**

Wildlife viewing use has increased dramatically during the past 10 years. Non-consumptive use is estimated to be 7,100 visitor use days annually. Viewers and other non-consumptive users utilize the same infrastructure that serves the hunting public, and during the non-hunting season a much larger portion of SLWA is open or available for use.

Wildlife viewing is largely unregulated with a wide array of opportunities available. Other than vehicular access, at present there are few restrictions on visitor use of SLWA.

- Campgrounds and other public use facilities are maintained.
- A driving tour loop has been established, but is closed three days prior to and during waterfowl hunting seasons (usually 107 days). Major dikes are closed to motor vehicle access (other travel permitted) from March 15 to August 15, to reduce disturbance during waterbird breeding season.
- A viewing blind has been constructed to provide non-consumptive viewing opportunities during hunting seasons.
- An informational register containing wildlife sightings, maps and other information is maintained at the Headquarters Complex.
- The office facility serves as an informational outlet when personnel are present, and informational contacts in the field are frequent.
- Campground Hosts and other volunteers have been utilized to provide additional assistance to visitors.
- The Audubon Christmas Bird Count, waterfowl banding, and numerous special tours and slide programs are conducted annually.
- Refuge or sanctuary areas are not in effect during non-hunting seasons.
- Demand for uses not compatible with wildlife management is low, and is prohibited or discouraged to prevent such use patterns from becoming established.
- Off road vehicle use is prohibited.
- Demand for field dog trials and trap shooting is virtually nonexistent due to the isolated nature of the area and distance from population centers.

Educational/Interpretive

The SLWA is used by a variety of educational groups including local and distant school districts, colleges, universities, various Scouting groups and Elderhostel groups. Educational groups can use the area on their own or arrange for guided tours by Department staff. Informational talks and slide shows are presented to many groups upon request and in conjunction with special projects.

Objectives and Strategies

Objectives and Strategies

As stated previously, objectives are concise statements of what the department wants to achieve, how much the department wants to achieve, when and where to achieve it

and who will be responsible for the work. Objectives derive from goals and provide the basis for determining strategies. Strategies describe the specific actions, tools, techniques or a combination of these elements used to meet an objective.

Goals, objectives and strategies in the plan were derived from following an ecosystem based management philosophy. Of primary importance, most actions undertaken on SLWA are for the benefit of wildlife, and public use must be compatible with wildlife resources. The primary action for benefiting wildlife is managing or preserving the range of habitat types that historically occurred around Summer Lake. These habitats were created and maintained by a suite of ecological processes, most importantly hydrology and fire. Management activities such as water level management (drawdowns and flooding) and vegetation manipulations (controlled burning, disking, farming, grazing, mowing) are tools SLWA staff use to maintain important ecological processes needed to create healthy habitats. Due to the wide variety of habitat use among the different wildlife species utilizing SLWA, benefits are varied. Not all species or guilds of species will see benefits at all times. In addition, recreational opportunities based on public demand and habitat capabilities, balanced with resource needs, are quite variable and specific uses are not maximized in all cases.

Wetland habitats on SLWA occur in both unmanaged and managed units. The latter are usually bounded by dikes with water control structures. Wildlife use of SLWA wetlands depends on both natural, and several man-made semi-natural habitats. The natural ecosystem of the Summer Lake Basin has been irreversibly altered since initiation of European settlement in the late 1800s. Most noticeable changes have been a major disruption of hydrology and the proliferation of invasive species. Hydrologic changes have had a profound effect on vegetative components of wetland habitats on SLWA that in turn influences wildlife and recreation use. Recently, suspected climate changes seem to have added other perturbations to a significantly altered system. Current management direction is to provide habitat types or features in an attempt to meet the life-history needs of specific wildlife species or guilds.

When analyzing the effectiveness of our efforts to manage habitat to benefit a particular species or guild, it is important to keep in perspective the myriad other factors out of our control that regulate wildlife populations, especially migratory waterbirds. The condition of wintering and breeding habitats influences populations to a much greater extent than migration staging areas. Habitats in those areas have undergone significant change and continue to be altered and/or enhanced. Throughout the Pacific Flyway, weather patterns affect distribution of waterbird populations, by influencing migration pattern and timing, as well as habitat use on SLWA.

Objectives and strategies emphasize maintenance and more intensive management of existing developments. Approximately 50% of SLWA has been developed to date with little emphasis placed on new development.

The following objectives and strategies are based on the three goals described earlier. They identify the management activities and priorities of Summer Lake Wildlife Area

Management Plan:

(Goal 1: To protect, enhance and manage wetland habitats to benefit fish and wildlife species.)

A substantial portion of the Pacific Flyway waterfowl population passes through the Great Basin of the Intermountain West to wintering areas in California, Central America and South America. Many of these same species along with others make return migrations to breeding areas in Alaska, Canada and arctic Russia. The diversity of food resources in wetlands play an important role in replenishing or building energy reserves depleted or necessary during migration for a variety of species. In some cases energy is being stored in preparation for the physiological demands of breeding season. SLWA is an important area for migrating waterfowl in the Great Basin which occurs within the boundaries of the Intermountain West Joint Venture. Joint Ventures are based on a cooperative approach to conservation by forming broad partnerships consisting of individuals, corporations, conservation organizations, and local, state, provincial, and federal agencies. These groups work together to protect, restore, and enhance wetlands and associated upland habitats in specific geographic regions.

Life history events of migration, molt, pair formation, and pre-breeding fat storage are undertaken by waterfowl and a diversity of habitat types can meet the needs of a wide variety of species. Habitat management at SLWA has historically provided this variety and active management is necessary to enhance, maintain and restore. Permanent, semi-permanent and seasonal wetlands produce large amounts of natural foods in the form of seeds, foliage, tubers, and invertebrates that provide a diverse diet for a variety of waterfowl species.

Canada geese and 13 species of ducks breed on SLWA. This population is important to conservation of Pacific Flyway waterfowl populations. Additionally, locally produced waterfowl constitute a major proportion of waterfowl harvested by hunters early in the season. Waterfowl produced at SLWA are harvested in virtually every state and province in the Pacific Flyway. SLWA's relatively stable and productive wetland base plays a critical role in providing habitat for many species of molting waterfowl that breed in more ephemeral habitats elsewhere in the Pacific Flyway. The protective cover, security afforded by large blocks of wetland habitats, and abundance and variety of food resources available on SLWA provide ideal conditions during this energetically demanding and critical time period in the life cycle of waterfowl.

The diversity of wetland habitats on SLWA meets the entire range of breeding season requirements for a variety of waterfowl species (e.g. Canada geese to ruddy ducks (*Oxyura jamaicensis*)). Strategies employed by the SLWA staff will support many wetland habitat conservation actions to benefit priority waterfowl species identified in Pacific Flyway Management Plans.

Shorebirds make extensive use of the Great Basin, migrating to wintering areas in California and Central and South America. Many of these fall migrant species along with others make return migrations in spring to breeding areas in Alaska, Canada and

arctic Russia. Immense concentrations of shorebirds can occur during brief time periods. The diversity of food resources in wetlands play an important role for a variety of shorebird species in replenishing or building energy reserves depleted or necessary during migration. In some cases, energy is being stored in preparation for the physiological demands of breeding.

SLWA is an important area for migrating shorebirds in the Great Basin. Recent research has revealed extensive connectivity of wetland use by shorebirds in the western Great Basin during post-breeding dispersal and migration staging. SLWA hosts large aggregations of many species during fall months and due to reliable water availability, plays an important role in this drought prone region. A variety of habitat types at SLWA is available to meet the life history needs of shorebirds for migration, molt and pre-breeding fat storage. In addition, the diversity of wetland vegetation present results in structural cover and detritus that supports an abundant diversity of invertebrates providing food to a wide array of shorebird species.

SLWA wetlands provide breeding habitat to nine shorebird species with a wide range of nesting and brood rearing requirements being met. These range from intermittently flooded lacustrine wetlands for snowy plovers to intermittently flooded/saturated palustrine wetland favored by nesting Wilson's phalaropes and Wilson's snipe. Dense or extensive emergent vegetation in portions of SLWA results in reduced use by many shorebird species.

Strategies employed by the SLWA staff will support many wetland habitat conservation actions to benefit priority shorebird species identified in the OCS, such as western snowy plovers, black-necked stilt and long-billed curlew. Alkali flats, an OCS Strategy Habitat, are of particular management concern on SLWA.

Over 25 species of other waterbirds or wetland dependent and wetland obligate wildlife utilize wetland habitats on SLWA. Life cycle demands and needs of breeding season, post breeding dispersal and migration are met for many species in the diverse habitats found on SLWA. These species forage extensively across all wetland types to build body reserves for migration, roost in shallow ponds or tall emergent vegetation or hunt prey. Again, wetland habitat management strategies will meet spatial and temporal needs of OCS priority species found in this priority habitat of the Northern Basin and Range Ecoregion.

Palustrine wetlands

Objective 1.1: Manage approximately 500 acres of palustrine permanently flooded wetland habitats. Emphasis will be on maintaining productive stands of submerged aquatic vegetation such as sago pond weed.

Rationale: This habitat type is important to diving ducks during migration and to a wide variety of waterbirds such as grebes, terns and waders throughout the breeding season and during migration. Submerged aquatic plants generally fill the entire water column

and harbor immense and diverse populations of invertebrates. Summer Basin tui chub are abundant in permanent wetlands and provide food to many species of waterbirds. Stable water levels are important for the maintenance of fish and some invertebrate species. However, productivity of submerged aquatic plants diminishes over time due to continual flooding, and periodic drawdowns or drying are desirable to maintain habitat quantity and quality. Infrastructure limitations and the influence of springs, perennial stream courses and irrigation run-off present challenges to effective management of these important habitats.

> **Strategy 1.** Regulate water to provide stable to slowly receding levels to improve food availability, maintain submerged plant growth, fish and invertebrate populations. Periodic drawdowns of selected permanent wetlands on a time interval or cycle of approximately once every 8-10 years will consolidate soils through oxidation and will accelerate decomposition of organic matter thereby enhancing site productivity. Work will include monitoring and adjusting wetland water levels year round with special emphasis during drawdowns time periods.

Objective 1.2: Manage approximately 5,800 acres of palustrine semi-permanently flooded wetlands with a ratio of robust emergent vegetation (dominated by cattails and bulrushes) to open water of no greater than 3:1. These wetlands should have open water and interspersed stands of vegetation to create a mosaic of features within individual habitat management units. Water depths will generally not exceed 24 inches and open water areas will support rooted submerged aquatic plants in most locations.

Rationale: Along with permanently flooded, the semi-permanently flooded wetlands comprise what is commonly referred to as freshwater marsh. A wide variety of migrant bird species take advantage of the diversity of food resources in these wetlands. Diving ducks and swans utilized open water areas to forage on submerged aquatic plants. Arctic nesting geese make extensive use of American three square and alkali bulrush roots and tubers during migration. Seeds from both annual and perennial plants provide an abundant source of food to a wide variety of migrants as well as breeding species.

This habitat type is important for many species of breeding waterbirds including ducks, geese, waders, secretive marsh birds, colonial nesting waterbirds and wetland dependent passerines. Robust emergent vegetation provides nesting substrate for many species and cover for broods and molting waterfowl. Open water areas with submerged aquatic bed vegetation provide important foraging areas for all species, especially broods. Small fish, aquatic and emergent insects and other invertebrates provide additional food for breeding and migrating waterbirds.

Currently, the ratio of robust emergent vegetation to open water and interspersion of these habitat features is not ideal in some HMUs. A desired outcome will be interspersed robust emergent vegetation versus clumped or monotypic stands. Consequently, several strategies in this plan will address infrastructure modifications and habitat manipulations to improve and manage habitat diversity.

Timing of drawdowns can have immense effects on vegetation diversity, germination and productivity. A variety of dates will be explored to determine the most efficient strategy to meet vegetation density, diversity and interspersion objectives.
Ground and vegetation disturbing activities such as disking, herbicide use, mowing and prescribed fire can result in an intricate mosaic of habitat features and increased habitat diversity. These activities will require dry conditions in order to operate heavy equipment. Those conditions may be met only through multiple year drawdowns, without seasonal flooding. Extended periods of dry conditions will mimic natural and historically occurring drought cycles. When combined with subsequent ground and vegetation disturbing activities increased stress to and reduced vigor of dense tall emergent vegetation will occur. Hunting and viewing access and opportunities will be enhanced long-term. However, during management actions and activities, Area users will experience short -term loss of opportunity in accustomed or traditional site-specific locations.

Strategy 1. Regulate water to provide timely flooding and receding levels to improve food availability, maintain or enhance emergent and submergent plant growth and invertebrate populations. Work will include monitoring and adjusting wetland water levels year round with special emphasis during fall and spring migration peaks. It will occur across the entire Area annually in conjunction with and complimenting other strategies.

Strategy 2. Utilize moist soil and marsh management methods to enhance habitat diversity, improve open water to vegetation ratios and interspersion thereby increasing waterfowl foraging opportunities. This will result in successional set back of overly dense tall emergent vegetation stands and will foster availability and growth of desirable native wetland plant species. It will occur on 500-2,000 acres annually. Work will entail drawdown and drying, on an annual or longer term interval coupled with vegetation and soil disturbance using burning, disking, herbicides, mowing and plowing.

Strategy 3. Utilize livestock grazing annually to enhance habitat diversity, food availability and waterbird foraging opportunities. Work will entail monitoring timing and duration of grazing, as well as maintenance of temporary and/or permanent fences to control livestock in traditional or target areas. Periodic or cyclic (once every 5-10 years) grazing will be utilized to invigorate decedent stands of vegetation and to enhance productivity where feasible.

Strategy 4. Utilize integrated pest management to control invasive plant species, focusing on noxious weeds within and adjacent to wetland areas. Work will entail monitoring, searching for and treating infestations utilizing best management practices and techniques.

Objective 1.3: Manage approximately 2,800 acres of palustrine seasonally flooded wetlands with plant coverage exceeding 80% of the area.

Rationale: This habitat type usually occurs at higher elevations within larger units managed as semi-permanent wetlands. Water levels recede naturally as evapotranspiration occurs or as manipulated through active management action. Sometimes seasonally flooded wetlands occur summer through early fall months as a result of run-off from adjacent irrigated lands. When overtly managed this altered water regime can result in considerable production of desirable plant species. If not, adverse impacts can occur through nest flooding and invasive plant proliferation.

Seasonally flooded wetlands are important for breeding avocets and stilts. The shallow water habitat provided by seasonal wetlands provides foraging conditions for many species of wetland bird including rails, bitterns, and dabbling ducks. Timing of drawdown in spring months will make invertebrates available to migrating and breeding waterbirds.

Early summer drawdown creates excellent germination conditions for many species of important wetland plants such as Suaeda, red goosefoot and smartweeds. Reflooding these areas in late summer and early fall provide abundant food for fall migrating waterbirds. Depending on drawdown date seasonal flooded wetlands may be less valuable as brood rearing areas for many early nesting species, but are high quality brood rearing habitat for late nesting species.

Strategy 1. Regulate water to provide timely flooding and receding levels to improve food availability, maintain desirable emergent plant growth and invertebrate populations. Work will include monitoring and adjusting wetland water levels year round with special emphasis during fall and spring migration peaks.

Strategy 2. Utilize moist soil and marsh management methods to enhance habitat diversity and waterfowl foraging opportunities through ground disturbance (summer disking) to encourage annual food plant production. Work will entail drawdown and drying, on an annual or longer term interval coupled with vegetation and soil disturbance using burning, disking, herbicides, mowing and plowing.

Strategy 3. Utilize livestock grazing to enhance habitat diversity, food availability and waterbird foraging opportunities. Work will entail monitoring timing and duration of grazing, as well as maintenance of temporary and/or permanent fences to control livestock in target areas. Periodic or cyclic (once every 5-10 years) grazing will utilized where feasible to invigorate decedent stands of vegetation and to enhance productivity.

Strategy 4. Utilize integrated pest management to control invasive plant species, focusing on noxious weeds within and adjacent to wetland areas. Work will entail monitoring, searching for and treating infestations utilizing best management practices and techniques.

Objective 1.4: Manage approximately 700 acres of palustrine intermittently flooded/saturated wetlands (wet meadows).
Rationale: Wet meadow habitat is created and maintained primarily through flood irrigation practices. Irrigation is necessary to maintain productivity and vegetative structure of these wetlands. Timing of irrigation is critical to reduce impacts to ground nesting birds from flooding. This habitat is used extensively by breeding sandhill cranes, Wilson's phalaropes, Wilson's snipe, dabbling ducks, northern harriers and short-eared owls. Site productivity and habitat use by key wildlife species is enhanced through vegetation removal (grazing or haying) that increases habitat diversity, food production and availability. Spring flooding of grazed, hayed and idle wet meadows provide and abundance and diversity of food to a wide variety of waterbirds. Hunter access and opportunities are enhanced in mowed wet meadow habitats.

Strategy 1. Regulate water to provide timely flooding and receding levels to improve food availability, maintain plant growth and invertebrate populations. Work will entail monitoring and adjusting water deliveries to provide optimum vegetative growing conditions balanced with the needs of ground nesting birds.

Strategy 2. Utilize livestock grazing annually to enhance habitat diversity and productivity, waterfowl foraging opportunities and food availability. Work will entail monitoring timing and duration of grazing, as well as maintenance of temporary and/or permanent fences to control livestock in traditional or target areas. Periodic or cyclic (once every 5-10 years) grazing will utilized to invigorate decedent stands of vegetation thereby enhancing productivity.

Strategy 3. Provide shallowly flooded mowed meadow habitat as foraging sites for waterfowl and sandhill cranes. Work will entail planning and directing vegetation removal by permittees. Flood irrigation will be managed during summer months to support vegetation growth and site productivity. Water deliveries will be monitored and adjusted during fall and spring flooding periods to coincide with peak waterbird use.

Strategy 4. Utilize integrated pest management to control invasive plant species, focusing on noxious weeds within and adjacent to wetland areas. Work will entail monitoring, searching for and treating infestations utilizing best management practices and techniques.

Lacustrine wetlands

Objective 1.5: Manage approximately 650 acres of lacustrine seasonally flooded wetlands (alkali playas) with water depths less than 6 inches with vegetation covering less than 20%.

Rationale: Flooding exposed alkali playas in spring and subsequently maintaining water at depths less than six inches for several months provides breeding habitat for two key shorebird species at SLWA; American avocet and black-necked stilt. Spring

flooding also creates foraging conditions for spring migrating shorebirds and waterfowl. Subsequent late summer and fall drawdowns make invertebrate foods available to fall migrants.

> **Strategy 1.** Regulate water to provide timely flooding and receding levels to improve food availability, maintain emergent plant growth and invertebrate populations. Work will include monitoring and adjusting wetland water levels year round with special emphasis during fall and spring migration peaks.

Objective 1.6: Protect approximately 2,900 acres of lacustrine intermittently flooded wetlands (alkali flats).

Rationale: Exposed alkali flats are important breeding habitat for western snowy plovers. Most of this habitat type occurs outside of the managed impoundments where water conditions are dictated by localized summer rains and conditions on Summer Lake.

> **Strategy 1.** Regulate vehicle use year-round to prevent damage to these habitats and disturbance to nesting snowy plovers. Work will entail signing at key entry sites to these areas as well as monitoring for compliance.

Objective 1.7: Protect and enhance approximately 50 acres of riverine wetlands.

Rationale: Riverine wetlands occuring along Ana River play a vital role in supplying high quality water deliveries to other wetland habitats. These habitats are important to many species of wetland dependent and wetland obligate wildlife. Riverine habitats support fish and a variety of invertebrates. Wildlife diversity is maintained through habitat enhancement and protective actions.

> **Strategy 1.** Protect and enhance riverine wetlands from adverse impacts (such as unauthorized OHV use or grazing) and disturbance. Improve adjacent riparian vegetation and reduce erosion through plantings of woody vegetation along the wetland edge. Work will entail monitoring riverine habitats to ensure adverse effects do not occur. Plant desirable and native trees and shrubs along the wetland edge to improve habitat diversity and reduce erosion run-off from adjacent uplands.

Objective 1.8: Maintain and improve critical physical and functional infrastructure affecting wetland management activities.

Rationale: Physical infrastructure is essential for water level management and subsequential habitat management across all wetland types. Such infrastrucure includes dikes and levees, culverts, flashboard risers, other water control structures and rock spillways. Functional infrastructure is necessary for water delivery for flood and drainage purposes. It includes canals, channels and ditches.

Most wetland habitat objective and strategies rely on effective, efficient and timely water level manipulations. This capability is critical and necessary to affect nearly all habitat enhancement and management actions. Improving SLWA's water delivery system is an important conservation action recommendation specifically described in the OCS.

Vegetation response and subsequent desired wildlife use are tied to water levels, more specifically to the timing of drawdowns and flooding. Infrastructure maintenance and improvement will ultimately enhance and improve wetland condition and function. These actions will assist in meeting direction and goals of Intermountain West Joint Venture, Pacific Flyway Species Population management, and other state, local or federal agency implementation plans involving wetland management and protection. Coordination with appropriate agencies and organizations will occur.

> **Strategy 1.** Maintain and improve physical infrastructure through annual maintenance. Work will include using heavy equipment to stabilize and repair erosion damage, repair burrowing rodent damage on dikes and levees, replace and repair flashboard riser structures, grade dike tops and mow vegetation. Culverts and other water control structures will be repaired, replaced and improved as necessary.
>
> **Strategy 2**. Maintain and improve functional infrastructure through annual maintenance of canals, channels, ditches and water control structures. Work will include using heavy equipment to remove accumulated silt and invasive vegetation, monitoring water flows/distribution and removing debris and obstructions.
>
> **Strategy 3.** Redesign flashboard riser and culvert locations in areas as appropriate to improve drainage and flooding of wetland units. Work will include using heavy equipment to install additional or relocate existing structures.

Objective 1.9: Designate 15-35% of managed wetlands as seasonal sanctuary for waterfowl and wetland dependent wildlife.

Rationale: A fundamental consideration for management of any wildlife species is to provide food, water, and sanctuary. Wetland dependent wildlife is sensitive to disturbance during critical time periods of breeding, molting and migration. This is particularly important for waterfowl, both "resident" birds and migrating populations during hunting season. The physical demands of wildlife during migration and daily movements within staging areas require they have access to suitable locations for food and rest. Wildlife that do not have access to sanctuary areas during critical time periods are subject to a variety of disturbances that increase energetic costs, change distribution, prevent use of important habitats and force migration to wintering areas earlier than is desired or necessary.

Reduction of wetland habitat throughout the country has increased spatial distribution of available sites for wildlife sanctuary and has raised the importance of providing

sanctuary on designated wetland management areas. Providing areas of sanctuary on SLWA will provide direct benefit to wildlife utilizing the sites in addition to providing access to food resources nearby. Public access to historic and traditional sanctuary areas on SLWA may need to be considered when significant portions of HMUs traditionally open for hunting and viewing are out of production as part of the department's moist soil management activities.

Strategy 1. Designate selected HMUs as seasonal (during hunting seasons) or year-round sanctuary for protection of wildlife. Sites will be selected annually based on suitability to support wildlife as well as logistical and operational considerations, such as habitat management actions and hunting programs. Work will include posting information signs and public notification through educational and informational means.

Strategy 2. Implement seasonal access restrictions as necessary to protect migrating and breeding wetland dependent or obligate wildlife. Work will entail posting information signs at key entry sites that restricts motor vehicle or foot travel early spring through early fall annually.

(Goal 2: Protect, enhance and manage upland habitats to benefit a wide variety of wildlife species.)

Upland habitat is made up of salt desert scrub, sagebrush steppe and agricultural areas. Although much of the uplands have been altered through brush removal, farming, grazing and planted livestock forage, there still exists large unaltered blocks of uplands at higher elevations surrounding the basin, along Ana River Canyon and in dune areas. Uplands support a wide variety of native wildlife species. Ground nesting birds and other wildlife make extensive breeding season use of uplands, especially in sites adjacent to wetlands. Dense nesting cover has been cultured in several sites on SLWA and receives heavy use by a variety of duck species. A variety of native bird species meets their lifecycle needs as well as desired introduced game birds such as pheasant.

Many of the management strategies described below occur in salt desert scrub habitat and will meet the spatial and temporal needs of OCS priority species found in this priority habitat of the Northern Basin and Range Ecoregion.

Objective 2.1: Enhance, manage and protect approximately 3,100 acres of salt desert scrub habitat to benefit a wide variety of native wildlife and desired game species.

Rationale: Salt desert scrub is the most extensive upland habitat found on SLWA. Black greasewood and other alkaline adapted shrubs, grasses (especially saltgrass) and forbs dominate this habitat type. It was the primary site for early homesteading and private ownership in the Northern Summer Lake Valley. Significant amounts of these

habitats were altered or converted to croplands to support agricultural or livestock grazing operations prior to the department's acquisition.

Altered habitat can be reclaimed or intensively managed to restore or enhance productivity and wildlife use. Many wildlife species forage on the wide variety of seeds, vegetation and invertebrates found in this habitat type. A wide variety of breeding wildlife species (primarily passerines) occur in this structurally diverse and species rich vegetation.

Salt desert scrub habitat occurs adjacent to and within palustrine wetlands, and as a result receives considerable breeding use by ground nesting waterbirds. Dense nesting cover adjacent to wetland habitats is ideal for many waterfowl species, providing structure and protection from predation and disturbance. Newly hatched broods have greatly reduced exposure to predation as they travel to wetlands. Significant portions of this habitat are in a near natural, undisturbed condition and are utilized by a wide variety of native wildlife species. Salt desert scrub habitat meets essential life history functions for a variety of wildlife species including foraging, nesting, brood rearing and escape cover.

Motor vehicle and off highway vehicle use on an extensive network of roads and trails is resulting in erosion and heavy sedimentation loads into Ana River. This affects wetland units further downstream where sediments are filling open water areas. Many roads and trails are non-essential for access and unnecessary disturbance of many species of wildlife can be significant.

Strategy 1. Manage and enhance dense nesting cover in close association to wetland habitats for waterfowl and other ground nesting wetland dependent wildlife. Work includes the use of controlled burning and/or periodic grazing to maintain site productivity. Broadcast seeding or farming with tractors and implements will be conducted if necessary to enhance cover species diversity.

Strategy 2. Seed crested wheatgrass plantings with a desirable mix of forb and grass species. Work will include the use of controlled burning and/or periodic grazing to reduce vigor of existing plantings. It will be followed with broadcast seeding or farming with tractors and implements to establish desirable vegetation.

Strategy 3. Utilize integrated pest management to control invasive plant species, focusing on noxious weeds. Work will entail monitoring, searching for and treating infestations utilizing best management practices and techniques.

Strategy 4. Utilize livestock grazing to enhance and restore plant vigor and productivity to decadent stands of nesting cover. Work includes implementing rotational grazing during the fall and winter months.

Strategy 5. Maintain and construct roost and nest structures. Work includes identifying areas where roosting or nesting habitat is deficient with subsequent construction and placement of structures.

Strategy 6. Develop travel management plan for Upper Ana River Canyon/alkaline shrub HMU to lessen impacts of motor vehicle and OHV use. Work includes the identification and sign posting of a core network of access roads. Heavy equipment will be used to close, improve and maintain roads to reduce erosion. Non-essential roads and off road trails would be physically (with barriers) or administratively (through signing) closed to all motor vehicle use.

Objective 2.2: Enhance and manage approximately 270 acres of agricultural upland habitat to benefit a wide variety of native wildlife and game species.

Rationale: This habitat type occurs as a result of conversion of native salt desert scrub and sagebrush steppe habitats by previous private landowners. Agricultural crops can ameliorate limiting habitat features and increase the carrying capacity of these sites to benefit a wide variety of native wildlife and desirable game species. Small cereal grains, forbs and tree and shrub planting provide abundance of food for many species. Tree and shrub features are limited in the area and additional plantings will provide habitat to enhance wildlife diversity. Other features can be developed to further increase carrying capacity and expand distribution and habitat use for many species.

Strategy 1. Maintain food and cover crop plantings on 50-75 acres. Work includes farming with tractors and implements to accomplish soil preparation, planting and culture of food and cover crops. Irrigation of crops will be utilized in several locations.

Strategy 2. Maintain existing tree and shrub plots. Work includes planting to replace mortalities, competitive vegetation management, fertilization and irrigation.

Strategy 3. Develop additional tree and shrub plots at homestead sites and other agricultural areas where this type of habitat is limited. Work includes identifying appropriate sites, soil preparation, planting and irrigation as well as protection from browsing or girdling by mammals.

Objective 2.3: Protect, enhance and manage approximately 780 acres of sagebrush steppe habitat to benefit a wide variety of native wildlife and desired game species.

Rationale: This habitat occurs along the upslope perimeter of the N. Summer Lake Basin. Big sagebrush and bitterbrush are commonly occuring shrubs. A wide variety of native grasses and forbs are found in this plant association. It has remained largely undisturbed from most land uses and practices. Encroachment by western juniper is occurring on many sites due to the suppression of periodic wildfire. Many endemic

wildlife species are found in this unaltered natural habitat. Protection, enhancement and management of vegetation communities and habitat features will maintain biological diversity. Perpetuation of those habitats in a natural and productive state should assure the presence and use by a diversity of wildlife.

Strategy 1. Enhance and restore native vegetation diversity and abundance lost due to the Winter Fire of 2002. Work will entail broadcast seeding native forbs and grasses and hand planting native shrubs.

Strategy 2. Monitor and treat invasive plant and noxious weed infestations. Work will include searching for and treating invasive plants and noxious weeds utilizing appropriate best management practices. Western juniper seedlings and small trees will be removed by hand cutting.

Strategy 3. Develop additional or enhance existing catchment structures to improve distribution of wildlife water sources. Work includes repair of earthen dams and spillways on existing upland ponds and construction of wildlife guzzlers.

Objective 2.4: Maintain and enhance SLWA facilities, structures, and equipment used to conduct habitat management, public use projects and other administrative functions.

Rationale: Facilities, structures and equipment are integral to the overall operation of SLWA. Infrastructure and equipment must be maintained and kept in good working order to accomplish habitat and wildlife management projects and to provide public use opportunities. Infrastructure includes the Headquarters Complex, associated residences and buildings. Equipment includes heavy equipment, dump trucks, tractors, agricultural implements, vehicles, ATVs, trailers, boats and shop tools.

Strategy 1. Maintain current Headquarters Complex including 11 buildings, 4 residences, 1 host site and associated utility infrastructure. Work will include carpentry and repair, improvement of storage, landscape maintenance, and general facility structural maintenance and improvement.

Strategy 2. Conduct annual property inventories and maintain operational integrity of facilities, structures, equipment and vehicles. Work will include conducting and reporting inventories, scheduled maintenance of all equipment/vehicles and completing repair and upgrades as necessary.

Strategy 3. Continue irrigation and water management practices to meet wildlife area habitat goals and objectives. Work includes exercising water rights, monthly measurement or estimates and annual reporting of authorized water rights use on SLWA to Oregon Water Resources Department.

Strategy 4. Continue proactive Project Administration actions and activities to address easement, property boundary encroachment and other issues affecting or impacting SLWA operations. Work will include identifying issues, preparing briefing documents and soliciting outside and internal assistance where appropriate**.**

(Goal 3: To provide a variety of wildlife oriented recreational and educational opportunities to the public which are compatible with Goals 1 and 2.)

The department and SLWA staff strives to balance the biological needs of fish and wildlife which use the Area's habitats with the varied recreational and educational desires of the public. In order to meet habitat management objectives, however decisions must be made to control both consumptive and non-consumptive public uses, either temporally or spatially, to minimize impacts to wildlife. Annual review of the area's hunting program and regulations, maintenance of refuge areas, limiting vehicle access, maintaining parking areas and campgrounds, posting signs and developing informational literature are among many of the strategies described below which support and encourage recreational objectives.

Objective 3.1. Provide hunting, trapping, and angling opportunities in a manner compatible with habitat management objectives.

Rationale: The SLWA is funded entirely by hunter dollars through the Federal Aid to Wildlife Restoration Act (Pittman Robertson) (75%) and hunting license receipts (25%). Hunting is a major public activity at SLWA during fall through winter months. Because SLWA is in a remote location camping is allowed in designated sites in order to accommodate hunters and anglers from throughout Oregon and adjacent states. Camping is a convenience but also provides a unique experience to Area users.

SLWA's consumptive use program provides a diversity of opportunities and aesthetic benefits that are very important to preserve the hunting, angling and trapping legacy for future generations of Oregonians. Appropriate hunter behavior and shooting effectiveness are critical to the the hunting experience and equitable use and enjoyment of hunting resources by all area users. User complaints have voiced concerns regarding poor hunter behavior and a decline in effectiveness. Observational data collected by SLWA and OSP staff confirm the need for improvement. Educational and informational approaches will be actively pursued and regulatory approaches will be explored.

Hunting has occurred in traditional areas with very little sanctuary or refuge boundary modification since the SLWA's inception. The most recent changes occurred in 1987. Habitat management objectives may necessitate the need to move or rotate sanctuary areas and open new hunting areas when large-sized HMUs are taken out of production for marsh and moist soil management habitat enhancement activities.

Trapping of furbearers and predatory mammals is a traditional recreational activity, and is used to reduce burrowing damage to dikes and water control structures and manage populations of predatory mammals on SLWA.

Strategy 1. Continue daily hunt programs that include mule deer, mourning dove, Wilson's snipe, coot, pheasant, quail, and waterfowl hunting (youth waterfowl and general duck and goose hunting seasons) opportunities. Work will include providing recommendations for seasons, program opportunities and procedures to department staff on an annual basis.

Strategy 2. Maintain access roads, campgrounds, parking areas, informational kiosks, hunter check station, fencing and boat access sites as part of the hunt program.

Strategy 3. Conduct waterfowl counts and monitor wildlife population levels, distribution, and use patterns. Maintain database for comparative analysis. Report results to staff and provide information to SLWA users. Work includes weekly counts, data analysis and recording, and reporting results via telephone recording, web-site and posted hard copies.

Strategy 4. Continue and expand hunter education and informational programs to improve hunter behavior and effectiveness. Work includes continued participation in The Cooperative North American Shotgunning Education Program (CONSEP), providing shotgun skill clinics and field contacts by department and OSP representatives. Education and information regarding shooting skills and distance estimation will be provided verbally through hunter contacts, on kiosks at campgrounds and in the Headquarters Complex. Distance estimation silhouettes will be maintained at campgrounds.

Strategy 5. Develop regulatory approach to address persistent hunter behavior and effectiveness problems through the revocation of daily hunting permits. Work includes development of Administrative Rules, procedures and dissemination of information to SLWA users.

Strategy 6. Continue to provide access and SLWA information to the public through web page postings, brochures, maps, signing and hunting regulation booklets.

Strategy 7. Evaluate the potential for improving SLWA's disabled hunter access program.

Strategy 8. Continue hunter permit system for tracking hunter use and success on SLWA. Annually monitor hunting use to assess and possibly revise Wildlife Area hunting regulations to enhance the quality and safety of the hunting program.

Strategy 9. Develop and maintain relationships with hunting constituent groups/organizations to assist with SLWA management.

Strategy 10. Continue to permit furbearer and predatory mammal trapping for administrative (damage control), biological (population management) and recreational purposes.

Strategy 11. Continue to designate sanctuaries and access restrictions to provide for biological needs of waterfowl, to accommodate habitat enhancement actions and permit orderly and equitable utilization during hunting seasons.

Strategy 12. Periodically translocate desirable game (e.g. ring-necked pheasants) and native (California quail) wildlife to SLWA to augment existing populations and hunting opportunities.

Objective 3.2. Provide wildlife viewing and education/interpretation opportunities compatible with Objective 3.1.

Rationale: Non-consumptive recreation and education activities constitute a large portion of the public's use of the Area. These activities are highly desirable by the public and demand is increasing. Agency mission is to protect Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. Non-consumptive use must be managed to assure compatibility with Goals 1 and 2. Increased educational and informational efforts will enhance enjoyment while affording protection for the resource. SLWA will seek to expand opportunities for interpretation and environmental education that will foster visitors' appreciation, understanding, and stewardship of fish and wildlife species and their associated habitats. Currently, SLWA is maintained entirely by funds generated from hunters, through Federal Aid and hunting license revenue. In order to meet continued maintenance and management needs it will be necessary to explore additional funding or support sources. Methods to estimate the number and identify the origin of SLWA users will be developed.

Strategy 1. Maintain existing public facilities during the non-hunting period to provide opportunities for non-consumptive users. Work includes maintenance of campgrounds, viewing blind, kiosks, parking areas and posting signs.

Strategy 2. Continue to provide SLWA information to the public through web page postings, weekly recreational reports, other media publications, bird checklists, brochures, maps, regulations, and species backgrounders.

Strategy 3. Develop Campground Host/Volunteer program to maintain and enhance non-consumptive use programs and other Wildlife Area needs.

Strategy 4. Provide guidance and support to educational institutions including school, civic groups, conservation entities and state/federal agencies.

Strategy 5. Develop process to monitor public use. Methodology will be developed for various portions of SLWA to more accurately document public uses and the origin of Area users.

Strategy 6. Manage non-consumptive use consistent with biological needs of wildlife and SLWA's hunting program.

Strategy 7. Develop and/or expand internship programs with colleges and universities to support education, management, inventory and monitoring needs.

Strategy 8. Continue conservation, educational and informational programs involving habitat and population management for selected wildlife species (Caspian terns and trumpeter swans) in conjunction with other state and federal conservation efforts.

Plan Implementation

Funding

Since its inception in 1954, funding for operation and maintenance of the SLWA has been accomplished through annual federal grant agreements under the Federal Aid to Wildlife Restoration (WR) Program. This program was created with the passage of the Pittman- Robertson (PR) Act in 1937. The PR Act authorizes the U.S. Fish and Wildlife Service to cooperate with the States, through their respective State fish and wildlife departments, to fund wildlife restoration projects. Eligible types of projects include restoration, conservation, management, and enhancement of wild birds, wild mammals and their habitats, and providing for public use and benefit from these resources. Funding for WR is derived from a federal excise tax on the sale of firearms, ammunition, and archery equipment. Funding is then apportioned to states based on a mathematical formula of area of the state in square miles (50%) and total number of hunting licenses sold annually (50%). Under the program no state may receive more than 5%, nor less than 0.5% of the total money available.

To be eligible, States must have assented to the provisions of the PR Act and passed laws for the conservation of wildlife that include a prohibition against the diversion of license fees paid by hunters for any other purpose than the administration of the State fish and wildlife department. Another major requirement is that states have to contribute up to 25% of the total grant cost using non-federal funds, since federal participation is limited to 75% of eligible costs incurred under a grant. The Department provides its 25% cost share from annual license and tag revenues.

Over the past five years, funding for the operation and maintenance of the SLWA has averaged approximately $250,000 annually. To implement many of the proposed actions and achieve the objectives and goals of this plan, the department will need additional funding and staff to undertake several types of projects including: upgrades of existing facilities, habitat improvement, construction of new facilities or amenities

(educational/orientation kiosks and interpretive signs), and species and habitat monitoring.

Staffing / Organization

The Oregon Department of Fish and Wildlife manages sixteen wildlife areas throughout the state. The wildlife areas encompass approximately 200,000 acres and are found in all four department administrative regions. Summer Lake Wildlife Area is located in the High Desert Region. One full-time Manager 2**,** one full-time Fish and Wildlife Technician 2, one full-time Fish and Wildlife Technician 1 and one seasonal (8 month) Fish and Wildlife Technician 1 currently staff SLWA.

Compliance Requirements

The Summer Lake Wildlife Area Management Plan was developed to comply with all Federal and State laws, Oregon Revised Statutes (ORSs), Oregon Administrative Rules (OARs), and department policies. Full implementation of all components of this plan will require compliance with laws, regulations, rules, and policies listed in **Appendix F**.

Partnerships

A number of other state, federal, and local agencies and interest groups assist with management activities on SLWA. These partners play an important role in helping the department achieve its mission and attain SLWA goals. The department will continue to rely on these and other partners in the future to help implement this plan and provide input for future updates. This plan identifies projects that provide new opportunities for existing or new partners. There is great potential for more public participation and assistance in management of SLWA, given its proximity to population centers such as Bend and Lakeview. The department welcomes and encourages more public participation in the administration of Summer Lake Wildlife Area.

Adaptive Management

This plan provides for adaptive management of SLWA. Adaptive management is a flexible approach to long-term management of resources that is directed by the results of ongoing monitoring activities and latest data. Management techniques and strategies are regularly evaluated in light of monitoring results, new scientific understanding, and other new information. These periodic evaluations are used over time to adapt both management techniques and strategies to better achieve the Wildlife Area goals.

Monitoring is an essential component of adaptive management in general, and of this plan in particular; specific monitoring strategies have been integrated into goals and objectives described in this plan whenever possible. Habitat management activities will be monitored where possible to assess whether the desired effects on wildlife and habitat components have been achieved.

Plan Amendment and Revision

Wildlife area management plans are meant to evolve with each individual wildlife area, and as such each plan will be formally revisited after 5 years and updated every 10 years. In the meantime, however, the department will be reviewing and updating this

plan periodically (at least as often as every 5 years) based on the results of the adaptive management program. This plan will also be informally reviewed by SLWA staff while preparing annual work plans. It may also be reviewed during routine inspections or programmatic evaluations. Results of any or all of these reviews may indicate a need to modify the plan. Goals and objectives described in this plan will not change until they are re-evaluated as part of the formal plan revision process. However, strategies may be revised to better address changing circumstances or due to increased knowledge of the resources on the Wildlife Area. If changes are required, the level of public involvement and associated compliance requirements will be determined by the department.

References

Cowardin , L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979 Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U.F.Fish and Wildlife Service, Washington, D.C. 103 pp.

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Appendix A. Land Acquisitions and Adjustments Involving the Summer Lake Wildlife Area

Date	Acres	Action	Cooperator
4-12-44	16.75	Acquired from	Pennington, Jess and P.
4-12-44	20.25	Acquired from	Nelson, Ed and Muriel
4-12-44	320.00	Acquired from	Williams, Carl and J.
4-12-44	65.80	Acquired from	Williams, Carl and J.
4-12-44	160.00	Acquired from	Williams, F.H. and M.
4-14-44	6.18	Acquired from	Harris, L.W. and Thelma
4-17-44	186.41	Acquired from	Williams, Leonard and V.
4-17-44		Quitclaim	Williams, F.H. and M.
4-18-44	194.27	Acquired from	Kimes, B. and Newman
5-01-44	6.11	Acquired from	Ewings, Ruby F. and Carl
5-25-44	508.64	Acquired from	Williams, Carl and Jessie
1-19-45	6,163.89	Acquired from	State Land Board
3-28-45	160.93	Acquired from	Kimes, B. and Newman
4-12-44	6.53	Acquired from	Foster, J.G. and Maybelle
3-16-56		Quitclaim	Foster, J.G. and Maybelle
10-15-47	160.00	Acquired from	Guinee, Tim
4-08-48	12.10	Acquired from	Elder, Lester E. and Zilla
7-11-49	80.00	Acquired from	Raymond, F.E. and Kate
3-17-50	2.80	Acquired from	Williams, Carl and Jessie
4-10-56	74.27	Acquired from	Kittredge, Maude and Wm.
6-14-56	-40.33	Adjustmen/exchange	Kittredge, Maude and Wm>
6-30-57	6.18	Acquired from	Harris, Dean et al
4-23-59	455.00	Acquired from	Foster, James and Maybelle
5-16-60	40.00	Acquired from	Lewis, Minnie and John
5-04-60	120.00	Acquired from	Lake County
8-17-60	3/8 interest	Acquired from	Lofgren, Gertrude
10-03-60		Quitclaim	Lofgren, Gertrude
6-21-63		Quitclaim	Gibbs, Barbara and Ray
6-21-63		Quitclaim	O'Conner, David and Julia
06-21-63	26.14	Acquired from	O'Conner, David and Julia
6-25-63	2,545.00	Acquired from	Albertsen, A.E. and Alice
6-26-63		Quitclaim	Western States Development Co.
8-27-64	1.25	Acquired from	Harris, H.C. and Charlotte
8-09-65	-4.08	Sold to	State Highway Division
3-07-67	-40.00	Traded to	Carlon, Roy R.
3-17-67	52.00	Traded from	Carlon, Roy R.
11-15-68	-38.00	Sold to	Oregon Dept. of Transportation
4-02-71	1,404.44	Acquired from	Nicol, Donovan
12-06-76	-53.55	Traded to	Oregon Dept. of Transportation
12-20-76	37.77	Traded from	Oregon Dept. of Transportation

8-09-82	80.00	Acquired from	Watts, Anne
12-12-86	80.00	Acquired from	Grothaus, Molly M.
Total	**12817.90**		

Appendix B. Plant Species Known to Occur on Summer Lake Wildlife Area

ALISMATACEAE
Water Plantain *(Alisma plantago aquatica L.)*

AELUROPODEAE
Inland saltgrass (*Distichlis spicata*)

ANACARDIACEAE
Skunkbush sumac (*Rhus aromatica)*

APIACEAE
Desert parsley (*Lomatium sp*.)
Great Basin lomatium (*Lomatium simplex nutt*.)
Nevada desert parsley (*Lomatium nevadense wats*.)
Poison hemlock (*Conium maculatum* L.)
Water hemlock (*Cicuta douglasii*)
Water parsnip (*Berula erecta huds*.)

ASTERACEAE
Big sagebrush (*Artemisia tridentate*)
Bull thistle (*Circium vulgare*)
California malacotherix (*Malacotherix calif*.)
Canada thistle (*Circium arvense*)
Coast tarweed *(Madia sativa)*
Common burdock (*Arctium minus)*
Common cocklebur *(Xanthium strumarium)*
Common dandelion (*Taraxicum officianale*)
Diffuse knapweed (*Centaurea diffusa*)
Douglas rabbitbrush (*Chrysothamnus vicidiflorus)*
Field camomile (*Anthemis arevensis*)
Gray horsebrush (*Tetradymia canescens*)
Gray rabbitbrush (*Chrysothamnus nauseosus*)
Gray's tetradymia (*Tetradymia glabrata*)
Great Basin goldenrod (*Solidago spectabilis*)
Greater swamp senecio (*Senecio hydrophilus Nutt*.)
Western groundsel (*Senecio intergerrimus*)
Gum plant (*Grindelia nana*)
Hall's aster (*Aster chilensis ssp. Halli Nees*.)
Hawksbeard (*Crepis* sp.)
Hoary chaentactis (*Chaenactis douglaasii. var achilleafolia*)
Horseweed (*Conyza Canadensis Cron*.)
Intermountain pyrrocoma (*Pyrrocoma lanceolata*)
Lance-leaved Microsis (*Microseris lancinata Shultz*)
Low everlasting (*Antennaria dimorpha Nutt*.)
Low meadow erigeron (*Erigeron loncchophyllus Hook*.)
Marsh aster (*Aster lanceolatus, ssp. Hesperius Gray*.)
Mule ears (*Balsamorhiza sagittata*)
Musk thistle (*Carduus nutans*)
Pineappleweed *(Matricaria matricarioides)*
Prickly lettuce (*Lactuca serriola*)
Prickly sow thistle (*Sonchus asper L*.)
Purple aster *(Machaeranthera canescens)*
Rayless alkali aster (*Aster brachyactis Blake*)
Red-seeded dandelion (*Taraxicum laevigatum willd*.)
Remote-leaved thistle (*Circium remotifolium*)
Russian knapweed (Centeraurea repens)
Scotch thistle (*Onopordum acanthium*)
Small flowered daisies (*Erigeron sp*.)
Spike weed (*Latia/ Hemizonia sp*.)
Spiny horse brush (*Tetrademia spinosa*)
Spotted knapweed (*Centaurea maculosa*)
Tall stephanomeria (*Stephanomeria virgata*)
Torrey's malacothrix (*Malacothrix torreyii*)
Western goldenrod (*Solidago occidentalis*)
Western salsify *(Tragopogon dubius)*
White-stem rabbitbrush (*Chrysothamnus nauseosus*)
Wild lettuce (*Lactuca virosa*)
Wild sunflower (*Helianthus annuus*)
Wooly sunflower (*Eriphyllum lanatum*)
Yarrow (*Achillea millefolium* L.)
Yellow goats beard (*Tragopogon major*)

ASCLEPIADACEAE
Showy milkweed (*Asclepias speciosa*)

AZOLLACEAE
Water fern (*Azolla mexicana*)

AVENEAE
Timothy (*Phleum pretense*)

BERBERIDACEAE
Tall Oregon-grape *(Berberis aquifolium)*

BETULACEAE
Water birch (*Betula occidentalis*)

BIGNONIACEAE
Siberian elm (*Ulmus pumila*)

BORAGINACEAE
Bristly pectocarya (*Pectocarya setosa Gray*.)
California heliotrope (*Heliotropium canvolulaceum var. calif*.)
Hen's tooth *(Lithopermum ruderale)*
Seaside fiddle-neck *(Amsinckia intermedia)*
Small forget-me-not (*Myosotis laxa*)
Small fiddle neck (*Amsinckia intermedia*)
Western gromwell (*Litospermum ruderale Dougl*.)

BRASSICACEAE
Bladder-pod (*Lesquerlla* sp.)
Blue mustard (*Chorispora tenella DC*.)
Clasping pepperweed (*Lepidium perfoliatium*)
Crisped thelypodium (*Thelypodium crispum*)
Desert smelowskia (*Smelowskia fremontii Watts*.)
False flax (*Camelina microcarpa Andrz.)*
Flixweed (*Descrainia Sophia webb*.)
Hairy cress (*Cardaria pubescens Roll*.)
Holboells rock cress (*Arabis Holboellii horum*)
Nevada tansy mustard (*Descurinia paradise Shultz*.)
Penny cress (*Thlaspe arvense L*.)
Perennial thelypodium (*Thelypodium flexuosum Robbins*.)
Perennial pepperweed (*Lepidium latifolium*)
Tumble mustard (*Sisymbrium altissimum*)
Vernal whitlow grass (*Draba verna L*.)
Yellow cress (*Rorippa obtuse Nutt*.)
Yellow pepper grass (*Lepidium perfoliaum L.)*

CARYOPHYLLACEAE
Long-stalked starwort (*Stellaria longipes*)

CAPPARACEAE
Tall bee plant (*Cleome lutea*)

CAPRIFOLIACEAE
Bush honeysuckle (*Lonicera involucrate*)
Snowberry *(Symphoricarpos albus)*
Mountain snowberry *(Symphoricarpos mollis)*

CHENOPODIACEAE
Black greasewood (*Sarcobatus vermiculatus*)
Fourwing saltbush (*Atriplex canascens*)
Lamb's quarters (*Chenopodium strictum*)
Nuttall's monoepis (*Monopelis nuttalliana)*
Nuttall's saltbrush (*Atriplex nuttallii*)
Pursh's sea blight (*Suaeda depressa*)
Red goose foot (*Chenopodium rubrum*)
Red monolepis (*Monolepis pusilla*)
Shad scale saltbush (*Atriplex confertifolia*)
Spiny hopsage (*Atriplex spinosa*)
Tumbleweed (*Salsola tragus)*

CHLORIDEAE
Sloughgrass, Cordgrass (*Spartina pectinata*)

CHLOROPHYCEAE
Green algae

CONVOLVULAEAE
Field bindweed (*Convolvulus arvensis*)
Field dodder (*Cuscuta campestris*)

CORNACEAE
Western red dogwood (*Cornus californica*)

CYPERACEAE
Broad-leaved cattail *(Typha latifolia)*
Narrow-leaved cattail *(Typha anguistifolia*)
Hardstem bulrush (*Scirpus acutus*)
Softstem bulrush *(Scirpus validus)*
River bulrush *(Scirpus olenyi)*
Alkali bulrush (*Scirpus paludosus*)
American three-square bulrush (*Scirpus americanus*)
Small-seed bulrush *(Scirpus microcarpus*)
Seaside arrowgrass (*Triglochin maritime*)
Creeping spikerush (*Eleocharis palustris*)
Beaked spikerush (*Eleocharis rostellata*)
Grummond's rush (*Juncus drummondii*)
Baltic rush (*Juncus balticus*)

Nevada bulrush (*Scirpus nevadensis*)
Sedge (*Carex* sp.)
Sedge (*Carex aboriginum*)
Sedge (*Cyperus* sp.)

DIPSACACEAE
Common teasel (*Dipsacus sylvestris*)

EUPHORBIACEAE
Ridge–seeded spurge (*Euphorbiaceae glyptosperma*)

ELAEGNACEAE
Canadian buffalo berry (*Sheperdia canadensis*)
Russian olive (*Elaegnus angustifolius*)

ERAGROSTEAE
Alkali sacaton (*Sporobolus airoides*)

EQUISETACEAE
Scouringrush horsetail (*Equisetum hyemale*)

FABACEAE
Alfalfa (*Medicago sativa*)
Aslike clover (*Trifolium hybridum*)
Hanging pod milk vetch (*Astragulus stenophyllus*)
Honey locust (*Robinia pseudo-acacia*)
Hop clover (*Trifolium procumbens*)
Lemmon's milk vetch (*Astragulus lemmonii)*
Long-leaved astragulus (*Astragulus reventus*)
Purple milk vetch (*Astragulus* sp.)
Pursh's milk vetch (*Astragalus purshii*)
Siberian pea shrub (*Caragana arborescens*)
White sweet clover (*Melilotus alba*)
Yellow sweet clover (*Melilotis officinalis*)
Rose clover *(Trifolium hirtum)*
Red clover *(Trifolium pretense)*
Tomcat clover *(Trifolium willdensoii)*
Owl clover
Strawberry clover
Subterranean clover *(Trifolium subterranean)*
Elegant lupine *(Lupinus lepidus)*
Bicolor lupine *(Lupinus bicolor)*
Hairy vetch *(Vicia villosa)*

GERANIACEAE
Red-stem filaree or stork's bill (*Erodium cicutarium)*

GROSSULARIACEAE
Golden currant (*Ribes aureum*)
Squaw currant (*Ribes cereum*)

HALORAGIDACEAE
Mare's tail (*Hippuris vulgaris*)
Water milfoil (*Myriophyllum* sp.)

HYDRANGEACEAE
Mock orange *(Philadelphus lewisii)*

HYDROPHYLLACEAE
Narrow leaf phacelia (*Phacelia linearis*)
Varied leaf phacelia (*Phacelia heterophylla*)

IRIDACEAE
Wild iris (*Iris missouriensis*)
Camas *(Camassi quamash)*

JUNCAGINACEAE
Seaside arrow grass (*Triglochin maritime*)

JUGLANDACEAE
Black walnut (*Jugland* sp.)

LAMIACEAE
Horehound (*Marrubium vulgare*)
Mediterranean sage (*Salvia aethiopis*)
Water horehound (*Lycopus lucidus*)
Peppermint (*Mentha piperita*)
Self-heal *(Prunella vulgaris)*

LEMNACEAE
Duckweed *(Lemna minor)*
Water-meal *(Wolfia borealis)*

LILIACEAE
Cats ear (*Callochortus lyallii*)
Death camas (*Zygadenus paniculatus*)
Green-banded mariposa (*Calochortus macrocarpus*)
Sand lily (*Leucocrinum montanum)*
Star flowered seal (*Smilacina stellata*)
Mariposa lily (*Calochortus macrocarpus*)

LINACEAE
Blue flax (*Linum* sp*.)*
Western flax *(Linum lewisii)*

LOASACEAE
Blazing star (*Mentzelia laevicaulis*)
White stemmed mentzelia (*Mentzelia albicaulis*)

MALVACEAE
Round leaved mallow (*Malva rotundifolia*)

ONAGRACEAE
Desert evening primrose (*Oenothera caespitesa*)
Pallid epilobium (*Boisduvalia pallidum*)
Small flower evening primrose (*Camissonia minor*)
Tansy leaved evening primrose (*Oenothera tanacetifolia*)
Willow herb (*Epilobium* sp.)
Fireweed *(Epilobium anguatifolium)*
Winecup clarkia *(Clarkia purpurea)*

PAPAVERACEAE
Poppy (*Argemone* sp.)

POACEAE
Cheatgrass *(Bromus tectorum)*
Bulbous blue grass (*Poa bulbosa*)
Common reed or phragmites (*Phragmites communis)*
Green fescue (*Festuca viridula*)
Salt grass (*Distichlis spicata*)
Sandburg bluegrass *Poa secunda)*
Meadow foxtail (*Alapecurus pratensis*)
Smooth brome (*Bromus inermis*)
Chess *(Bromus secalinus)*
Hairy chess (*Bromus commutatus*)
Pine bluegrass *(Poa nevadensis)*
Perennial ryegrass (*Lolium perenne*)
Ripgut brome *(Bromus rigidus)*
Orchardgrass (*Dactylis glomerata*)
Rabbitfoot polypogon (*Polypogon monspeliensis*)
Witch grass (*Panicum capillare*)
Reed canarygrass *(Phalaris arundinacea)*
Barnyardgrass *(Echinochloa crus-galli)*
Tufted hairgrass *(Deschampsia cespitosa)*
California oatgrass *(Danthonia californica)*
Lemmon's needlegrass *(Acnatherum lemmonii)*
Idaho fescue *(Festuca idahoensis)*
Tall fescue *(Festuca* spp*)*

POTAMOGETONACEAE
Fennel-leaf or Sago pondweed (*Potamogeton pectinatus*)
Floating pondweed (*Potamogeton natans)*
Horned pondweed (*Zannichellia palustris*)

POLYGONACEAE
Curly dock (*Rumex crispus)*
Erect knotweed (*Polygonum erectum*)
Western dock (*Rumex occidentalis*)
Wire stem erigonum (*Eriogonum vimineum*)

POLYMONIACEAE
Cut-leaved gilia (*Gilia inconspicua*)
Long-leaved phlox (*Phlox longiflolia*)
Naked stemmed gilia (*Gilia leptomeria*)
Spotted persicarya (*Polygonum perisicarya*)
Trailing phlox *(Phlox adsurgens)*
Needle-leaf navarretia *(Nararretia intertexa)*

PRIMULACEAE
Gluax, sea-milkwort (*Glaux maritime*)

RANUNCULACEAE
Bur buttercup (*Ranunculus testivulatus*)
Barren-ground larkspur (*Delphinium depaupertum*)
Desert buttercup (*Ranunculus cymbalaria*)
White water buttercup (*Ranunculus aquatilis*)
Water crowsfoot (*Ranunculus* sp.)

ROSACEAE
Antelope bitterbrush (*Purshia tridentate*)
Apple (*Malus* sp.)
Apricot (*Prunus* sp.)
Bitter brush (*Purshia tridentate*)
Cherry (*Prunus* sp.)
Common chokecherry *(Prunus virginiana)*
Common wild rose (Rosa nutkana)
Curlleaf mountain mahogany (Cercocarpus ledifolius)
Klamath plum (Prunus subcordata)
Oregon crab apple (Malus fusca)
Peach (Prunus sp.)
Pear (Pyrus sp.)
Plum (Prunus sp.)
Silver weed (Potentilla anserina)
Small burnett (*Sanguissorba* sp.)
Utah serviceberry (*Amelanchoir utahensis*)

Woods rose (*Rosa gymnocarpa*)

RUBIACEAE
Catchweed bedstraw (*Galium aparine*)

SALICACEAE
Catalpa (*Catalpa* ssp *scop.*)
Golden willow (*Salix alba*)
Narrow leafed willow *(Salix exigua)*
Pacific black willow *(Salix lucida lasiandra)*

SAXIFRAGACEAE
Lava fringe cup (*Lithophragma rupicola*)

SCROPHULARIACEAE
American speedwell (*Veronica americana*)
Annual paintbrush (*Castilleja exilis*)
Common monkey flower (*Mimulus guttatus*)
Common mullein (*Verbacum thapsus*)
Desert paintbrush (*Castilleja chromosa*)
Field penstemon (*Penstemon oreocharis*)
Small flowered collinsia (*Collinsia parviflora*)

SOLANA
Matrimony vine (*Lycium barbarum*)

SOLANACEAE
Buffalobur nightshade (*Solanum rostratum*)

STIPEAE
Indian ricegrass (*Oryzopis hymenoides*)

TRITICEAE
Creeping wildrye (*Elymus triticoides*)
Crested wheatgrass (*Agropyron cristatum*)
Foxtail barley (*Hordeum jubatum*)
Barley (*Hordeum vulgare*)
Basin wild-rye (*Elymus cinereus*)
Mediterranean barley *(Hordeum marinum)*
Medusahead rye *(Taeniatherum caput-medusae)*
Beardless wheatgrass (*Agropyron inermis*)
Elmers wheatgrass (*Agropyron elmeri*)
Perennial ryegrass (*Lolium perenne*)
Cereal rye (*Secale cereale*
Wheat (*Triticum aestium*)
Bluebunch wheatgrass *(Agropyron spicatum)*
Largo tall wheatgrass *(Agropyron elongatum)*
Alkali muhlenbergia
Lemmons alkaligrass (*Puccinella* sp.)
Triticale (*x. Triticosecale*)

VALERIANACEAE
Rosy plectritis (*Plectritis conjesta*)

VIOLACEAE
Northern bog violet (*Viola nephrophlla*)

ZYGOPHYLLACEAE
Puncture vine (*Tribulus terrestris*)

Appendix C. Wildlife Species Known to Occur on Summer Lake Wildlife Area

Occurrence: Abundant = A, Common = C, Uncommon = U, Rare = R

Species	Occurrence	Species	Occurrence
Birds		Hammond's flycatcher (*Empidonax hammondii*)	U
Red-throated loon (*Gavia stellata*)	R	Dusky flycatcher (*Empidonax oberholseri*)	U
Pacific loon (*Gavia pacifica*)	R	Gray flycatcher (*Empidonax wrightii*)	U
Common loon (*Gavia immer*)	R	Black phoebe (*Sayornis nigricans*)	R
Red-necked grebe (*Podiceps grisegena*)	R	Say's phoebe *(Sayornis saya)*	C
Horned grebe *(Podiceps auritus)*	U	Ash-throated flycatcher *(Myiarchus cinerascens)*	U
Eared grebe *(Podiceps nigricollis)*	C	Eastern kingbird *(Tyrannus tyrannus)*	U
Western grebe (*Aechmophorus occidentalis*)	C	Western kingbird *(Tyrannus verticalis)*	C
Clark's grebe (*Aechmophorus clarkii*)	U	Northern shrike *(Lanius excubitor)*	U
Pied-billed grebe *(Podilymbus podiceps)*	C	Loggerhead shrike *(Lanius ludovicianus)*	C
American white pelican (*Pelecanus erythrorhynchos)*	C	Warbling vireo *(Vireo gilvus)*	C
Double-crested cormorant *(Phalacrocorax auritus)*	C	Cassin's vireo *(Vireo cassinii)*	U
American bittern (*Botaurus lentiginosus)*	C	Steller's jay *(Cyanocitta stelleri)*	C
Great blue heron *(Ardea herodias)*	C	Blue jay *(Cyanocitta cristata)*	R
Great egret (*Casmerodius albus)*	C	Western scrub jay *(Aphelocoma coerulescens)*	U
Snowy egret *(Egretta thula*)	U	Gray jay (*Perisoreus canadensis*)	R
Cattle egret (*Bubulcus ibis*)	R	Pinyon jay (*Gymnorhinus cyanocephalus*)	U
Green heron (*Butorides virescens)*	R	Clark's nutcracker (*Nucifraga columbiana*)	R
Black-crowned night heron (*Nycticorax nyctricorax)*	C	Black-billed magpie (*Pica hudsonia)*	C
White-faced ibis *(Plegadis chihi*)	C	Common raven (*Corvus corax*)	A
Tundra swan *(Cygnus columbianus)*	C	American crow (*Corvus brachyrhynchos*)	U
Trumpeter swan (*Cygnus buccinator*)	C	Horned lark (*Eremophilia alpestris)*	U
Whooper swan (*Cygnus cygnus*)	R	Northern rough-winged swallow *(Stelgidopteryx serripennis)*	C
Canada goose (*Branta canadensis)*	A	Bank swallow (*Riparia riparia*)	C
Cackling goose (*Branta hutchinsii*)	R	Violet-green swallow (*Tachycineta thalassina*)	U
Brant (*Branta bernicula*)	R	Tree swallow *(Tachycineta bicolor)*	C
Greater white-fronted goose (*Anser albifrons)*	C	Cliff swallow *(Hirundo pyrrhonota)*	C
Ross's goose (*Chen rossii*)	U	Barn swallow *(Hirundo rustica)*	C
Snow goose (*Chen caerulescens*)	C	Juniper titmouse (*Baeolphus ridgwayi*)	R
Wood duck (*Aix sponsa*)	U	Mountain chickadee (*Parus gambeli*)	C
Mallard (*Anas platyrhynchos)*	A	Bushtit (*Psaltriparus minimus*)	U
Gadwall *(Anas strepera)*	A	Red-breasted nuthatch *(Sitta canadensis)*	U
Northern pintail (*Anas acuta*)	C	White-breasted nuthatch *(Sitta carolinensis)*	U
American wigeon *(Anas americana)*	C	Pygmy nuthatch (*Sitta pygmaea*)	U
Eurasian wigeon (*Anas penelope*)	U	Brown creeper *(Certhia americana)*	U

Species	Occurrence	Species	Occurrence
Northern shoveler *(Anas clypeata)*	C	Bewick's wren *(Thryomanes bewickii)*	U
Cinnamon teal *(Anas cyanoptera)*	C	House wren *(Troglodytes aedon)*	C
Blue-winged teal (*Anas discors*)	U	Winter wren (*Troglodytes troglodytes*)	U
Green-winged teal *(Anas crecca)*	C	Marsh wren *(Cistothorus palustris)*	A
Canvasback *(Aythya valiseneria)*	C	Rock wren (*Salpinctes obsoletus*)	U
Redhead *(Aythya americana)*	C	Canyon wren (*Catherpes mexicanus*)	U
Ring-necked duck *(Aythya collaris)*	C	American dipper (*Cinclus mexicanus*)	R
Greater scaup *(Aythya marila)*	U	Golden-crowned kinglet *(Regulus satrapa)*	U
Lesser scaup *(Aythya affinis)*	C	Ruby-crowned kinglet *(Regulus calendula)*	U
Long-tailed duck (*Clangula heymalis*)	R	Blue-gray gnatcatcher (*Polioptila caerulea*)	U
Surf scoter (*Melanitta perspicillata*)	R	Townsend's solitaire *(Myadestes townsendi)*	U
Black scoter *(Melanitta nigra*)	R	Mountain bluebird *(Sialia currusoides)*	C
White-winged scoter (*Melannita fusca*)	R	Western bluebird *(Sialia mexicana)*	U
Common goldeneye *(Bucephala clangula)*	C	Varied thrush *(Ixoreus naevius)*	U
Barrow's goldeneye (*Bucephala islandica*)	U	American robin *(Turdus migratorius)*	A
Bufflehead (*Bucephala albeola*)	C	Swainson's thrush *(Catharus ustulatus)*	R
Hooded merganser (*Lophodytes cucullatus*)	C	Hermit thrush *(Catharus guttatus)*	U
Common merganser (*Mergus merganser*)	C	Northern mockingbird (*Mimus polyglottos*)	R
Red-breasted merganser (*Mergus serrator)*	R	Brown thrasher *(Toxostoma rufum)*	R
Ruddy duck *(Oxyura jamaicensis)*	C	Sage thrasher (*Oreoscoptes montanus*)	C
Turkey vulture (*Cathartes aura*)	C	European starling *(Sturnus vulgaris)*	A
Northern harrier *(Circus cyaneus)*	A	American pipit *(Anthus rubescens)*	U
White-tailed kite (*Elanus leucurus*)	R	Bohemian waxwing (*Bombycilla garrulous*)	R
Sharp-shinned hawk (*Accipiter striatus*)	C	Cedar waxwing (*Bombycilla cedrorum*)	U
Coopers hawk *(Accipiter cooperii)*	C	Northern parula (*Parula Americana*)	R
Northern goshawk (*Accipiter gentilis*)	U	Orange-crowned warbler *(Vermivora celata)*	U
Red-shouldered hawk (*Buteo lineatus*)	U	Nashville warbler *(Vermivora ruficapilla)*	U
Swainson's hawk (*Buteo swainsoni*)	C	Yellow warbler *(Dendroica petechia)*	C
Red-tailed hawk *(Buteo jamaicensis)*	A	Magnolia warbler (*Dendroica magnolia*)	R
Ferruginous hawk *(Buteo regalis*)	U	Black-throated blue warbler (*Dendroica caerulescens)*	R
Rough-legged hawk *(Buteo lagopus)*	C	Yellow-rumped warbler (*Dendroica coronata*)	C
Golden eagle (*Aquila chrysaetos*)	C	Black-throated gray warbler *(Dendroica nigrescens)*	U
Bald eagle *(Haliaeetus leucocephalus)*	C	Townsend's warbler *(Dendroica towensendi*)	U
Osprey *(Pandion haliaetus)*	C	American redstart (*Setophaga ruticilla*)	R
Merlin *(Falco columbarius)*	U	MacGillivray's warbler *(Oporornis tolmiei)*	U
American kestrel *(Falco sparverius)*	A	Common yellowthroat *(Geothlypis trichas)*	C
Prairie falcon (*Falco mexicanus*)	C	Wilson warbler *(Wilsonia pusilla)*	U

Species	Occurrence	Species	Occurrence
Peregrine falcon *(Falco peregrinus)*	C	Yellow-breasted chat *(Icteria virens)*	R
California quail *(Callipepla californica*)	A	Western tanager *(Piranga ludoviciana)*	U
Chukar (*Alectoris chukar*)	U	Black-headed grosbeak *(Pheucticus melanocephalus)*	C
Ring-necked pheasant (*Phasianus colchicus)*	C	Lazuli bunting *(Passerina amoena)*	U
Greater sage grouse (*Centrocercus urophasianus*)	R	Spotted towhee *(Pipilo erythrophthalmus)*	C
Wild turkey *(Meleagris gallopavo)*	R	Green-tailed towhee (*Pipilo chlorurus*)	U
American coot *(Fulica americana)*	A	Sage sparrow *(Amphispiza belli*)	C
Virginia rail *(Rallus limicola)*	C	Black-throated sparrow (*Amphispiza bilineata*)	U
Sora *(Porzana Carolina)*	C	American tree sparrow (*Spizella arborea*)	R
Sandhill crane *(Grus canadensis)*	C	Brewer's sparrow (*Spizella breweri*)	C
Black-bellied plover *(Pluvialis squatarola)*	U	Chipping sparrow *(Spizella passerina)*	U
American golden plover *(Pluvialis dominica)*	R	Savannah sparrow *(Passerculus sandwichensis)*	C
Semi-palmated plover *(Charadrius semipalmatus)*	U	Vesper sparrow *(Pooecetes gramineus)*	C
Snowy plover (*Charadrius alexandrinus*)	C	Lark sparrow *(Chondestes grammacus)*	C
Killdeer (*Charadrius vociferous*)	C	Harris sparrow *(Zontrichia querula)*	R
American avocet *(Recurvirostra Americana)*	C	Golden-crowned sparrow *(Zonotrichia atricapilla)*	U
Black-necked stilt *(Himantopus mexicanus)*	C	White-throated sparrow *(Zonotrichia albicollis)*	U
Greater yellowlegs *(Tringa melanoleuca)*	C	White-crowned sparrow *(Zonotrichia leucophrys)*	C
Lesser yellowlegs *(Tringa flavipes)*	U	Fox sparrow *(Passerella iliaca)*	C
Solitary sandpiper *(Tringa solitaria*)	U	Song sparrow *(Melospiza melodia)*	A
Willet *(Cataptrophorus semipalmatus*)	C	Lincoln's sparrow *(Melospiza lincolnii)*	C
Spotted sandpiper *(Actitis macularia)*	C	Dark-eyed junco *(Junco hemalis)*	A
Whimbrel (*Numenius phaeopus*)	R	Lapland longspur (*Calcarius lapponicus*)	R
Long-billed curlew (*Numenius americanus*)	C	Western meadowlark *(Sturnella neglecta)*	C
Hudsonian godwit *(Limosa haemastica*)	R	Brown-headed cowbird *(Molothrus ater)*	C
Marbled godwit *(Limosa fedoa)*	U	Yellow-headed blackbird *(Xanthocephalus xanthocephalus)*	C
Ruddy turnstone (*Arenaria interpres)*	R	Tri-colored blackbird *(Agelaius tricolor)*	U
Wandering tattler *(Heteroscelus incanus*)	R	Red-winged blackbird *(Agelaius phoeniceus)*	A
Red knot (*Calidris canutus)*	R	Brewer's blackbird (*Euphagus cyanocephalus*)	A
Sanderling (*Calidris alba)*	R	Common grackle (*Quiscalus quiscula*)	R
Dunlin *(Calidris alpine*)	C	Great-tailed grackle (*Quisclus mexicanus*)	R

Species	Occurrence	Species	Occurrence
Curlew sandpiper (*Calidris ferruginea*)	R	Bullock's oriole *(Icterus bullockia)*	C
Pectoral sandpiper (*Calidris melanotos*)	U	Baltimore oriole (*Icterus galbula)*	R
Baird's sandpiper (*Calidris bairdii*)	U	Evening grosbeak *(Coccothraustes vespertinus)*	C
Western sandpiper (*Calidris mauri*)	C	Gray-crowned rosey-finch *(Leucosticte tephrocotis*)	R
Semi-palmated sandpiper (*Calidris pusilla*)	R	Purple finch *(Carpodacus purpureus)*	U
Least sandpiper (*Calidris minutilla)*	C	Cassin's finch (*Carpodacus cassinii*)	U
Ruff (*Philmachus pugnax*)	R	House finch *(Carpodacus mexicanus)*	C
Stilt sandpiper (*Calidris himantopus*)	R	Red crossbill *(Loxia curvirostra*)	U
Long-billed dowitcher (*Limnodromus scolopaceus)*	C	Common redpoll (*Carduelis flammea*)	R
Short-billed dowitcher *(Limnodromus griseus)*	U	Pine siskin *(Carduelis pinus)*	C
Wilson's snipe *(Gallinago gallinago)*	C	Lesser goldfinch *(Carduelis psaltria)*	U
Wilson's phalarope (*Phalaropus tricolor*)	C	American goldfinch *(Carduelis tristis)*	C
Red phalarope (*Phalaropus fulicaria*)	R	House sparrow *(Passer domesticus)*	A
Red-necked phalarope (*Phalaropus lobatus)*	U	**Amphibians and Reptiles**	
Long-tailed jaeger (*Stercorarius longicaudus*)	R	Long-toed salamander *(Ambystoma macrodactylum)*	R
Parasitic jaeger (*Stercorarius parasiticus)*	R	Great-basin spadefoot (*Scaphiopus intermontanus*)	U
Little gull (*Larus minutus*)	R	Western toad *(Bufo boreas)*	C
Bonaparte's gull (*Larus philadelphia*)	U	Pacific treefrog *(Pseudacris regilla)*	C
Franklin's gull (*Larus pipixican)*	U	Bullfrog *(Rana catesbeiana)*	C
Mew gull (*Larus canus)*	R	Leopard lizard (*Crotaphytus wislizenii*)	U
Ring-billed gull *(Larus delawarensis*)	C	Western fence llizard *(Sceloporus occidentalis)*	C
California gull *(Larus californicus*)	C	Sagebrush lizard (*Sceloporus graciosus*)	C
Herring gull *(Larus argentatus)*	R	Side-blotched lizard (*Uta stansburiana*)	U
Sabine's gull (*Xerna sabini*)	R	Desert horned lizard (*Phryosoma platyrhinos*)	U
Black-legged kittiwake (*Rissa tridactyla*)	R	Short-horned lizard (*Phrynosoma douglassi*)	U
Caspian tern *(Sterna caspia)*	C	Western skink *(Eumeces skiltonianus)*	U
Common tern (*Sterna hirundo*)	R	Rubber boa *(Charina bottae)*	U
Forster's tern *(Sterna forsteri)*	C	Racer *(Coluber constictor)*	C
Black tern *(Chlidonias niger)*	U	Gopher snake *(Pituophis melanoleucus)*	C

Mourning dove *(Zenaida macroura)*	A	Common garter snake *(Thamnophis sirtalis)*	C
Eurasian collared-dove (*Streptopelia decaocto*)	R	Western terrestrial garter snake *(Thamnophis elegans)*	C
Rock dove *(Columba livia)*	U	Night snake *(Hypsiglena torquata)*	R
Band-tailed pigeon *(Columba fasciata)*	R	Western rattlesnake *(Crotalus viridis)*	C
Barn owl *(Tyto alba)*	C	**Mammals**	
Long-eared owl (*Asio otus*)	U	Vagrant shrew (*Sorex vagrans)*	U
Short-eared owl (*Asio flammeus*)	U	Trowbridge's shrew (*Sorex trowbridgii)*	U
Great horned owl *(Bubo virginianus)*	C	Little brown bat (*Myotis lucifugus*)	C
Barred owl *(Strix varia)*	R	Long-eared Myotis (*Myotis evotis)*	C
Northern saw-whet owl (*Aegolius acadicus*)	U	Yuma Myotis (*Myotis yumanensis)*	U
Burrowing owl *(Athene cunicularia)*	U	Black-tailed jackrabbit *(Lepus californicus)*	C
Western screech owl *(Otus kennicottii)*	U	Yellow-bellied marmot *(Marmota flavivenentris)*	C
Northern pygmy owl *(Glaucidium gnoma)*	U	Antelope ground squirrel (*Ammospermophilus lecurus*)	U
Common poorwill (*Phalaenoptilus nuttalii*)	U	Belding ground squirrel (*Citellus beldingi*)	C
Common nighthawk *(Chordeiles minor)*	C	California ground squirrel *(Spermophilus beecheyi)*	C
Vaux's swift *(Chaetura vauxi)*	C	Desert chipmunk (*Eutamias minimus*)	U
White-throated swift (*Aeronautes saxatalis*)	U	Western gray squirrel *(Sciurus griseus)*	R
Anna's hummingbird (*Calypte anna*)	R	Townsend's pocket gopher (*Thomomys townsendii*)	U
Black-chinned hummingbird *(Archilochus alexandri*)	C	Ord kangaroo rat (*Dipodomys ordii*)	U
Calliope hummingbird *(Stellula calliope)*	C	Beaver *(Castor canadensis)*	U
Broad-tailed hummingbird (*Selasphorus platycercus*)	R	White-footed deer mouse *(Peromyscus maniculatus)*	C
Rufous hummingbird *(Selasphorus rufus)*	C	Dusky footed wood rat (*Neotoma fuscipes*)	U
Belted kingfisher *(Ceryle alcyon)*	U	Meadow vole (*Microtus oregoni*)	C
Acorn woodpecker *(Melanerpes formicivorus)*	R	Muskrat *(Ondatra zibethicus)*	A
Lewis woodpecker *(Melanerpes lewis)*	U	House mouse *(Mus musculus)*	R
Williamson's sapsucker (*Sphyrapicus thyroideus*)	R	Porcupine *(Erithizon dorsatum)*	R
Red-breasted sapsucker (*Sphyrapicus ruber*)	C	Coyote *(Canis latrans)*	A
Red-naped sapsucker (*Sphyrapicus nuchalis*)	U	Raccoon *(Procyon lotor)*	A
Downy woodpecker (*Picoides pubescens*)	U	Mink *(Mustela vison)*	C
Hairy woodpecker (*Picoides villosus)*	C	Long-tailed weasel *(Mustela frenata)*	C
Black-backed woodpecker (*Picoides arcticus*)	R	Badger *(Taxidea taxus)*	R
White-headed woodpecker (*Picoides albolarvatus*)	R	Striped skunk *(Mephitis mephitis)*	A
Northern flicker *(Colaptes auratus)*	A	Western spotted skunk *(Spilogale gracilis)*	U
Pileated woodpecker *(Dryocopus pileatus)*	R	Cougar (*Felis concolor)*	R
Olive-sided flycatcher *(Contopus borealis)*	U	Bobcat *(Lynx rufus)*	C

Western wood-pewee *(Contopus sordidulus)*	C	Elk *(Cervus elaphus*)	R
Cordilleran flycatcher (*Empidonax occidentalis*)	U	Mule deer (*Odocoileus hemionus*)	C
Willow flycatcher *(Empidonax traillii)*	U	Pronghorn (*Antilocapra americana*)	U
Least flycatcher (*Empidonax minimus*)	U	Bighorn (*Ovis canadensis)*	R
		Nuttall's cottontail (*Sylvilagus nuttallii*)	C

Appendix D. State and Summer Lake Irrigation District Water Rights on Summer Lake Wildlife Area

State Water Rights

Tract	Priority Date	Acres	Rate
Summer Lake Meanderline	1949	6,163.89	60.0 cfs
Turner Place	1945	63.7	1.59cfs
Headquarters Domestic Water	1950	n/a	0.1 cfs
Middle Well	1955	31.2	0.39 cfs
Foster Place Ponds	1962	2.0	0.15 cfs
Foster Place Ponds	1962	2.3	2.3 acre ft.
River Ranch, Link Marsh	1982	750.60	43.0 cfs
Headquarters, Work Road Potholes	1982	228.0	2.0 cfs
Bullgate Refuge and Units	1982	688.0	10.1 cfs
Sulfur Well Ponds	1982	2.0	0.45 cfs
Westside marsh across private land	1982	346.0	8.0 cfs
Lower Sulfur Well Pond	1982	4.0	2.0 cfs
East Turner Ponds	1982	336.0	1.2 cfs
Bullgate Refuge and Units	1983	688.0	15.0 cfs
West Turner Ponds	1985	25.0	1.0 cfs
East Turner Ponds	1986	19.0	2.23 cfs

Summer Lake Irrigation District Water Rights (1918 priority date)

Tract	Acres
W. of Turner Place	84.8
Dutchy and Swanie Fields	39.3
Trade-In Field	6.9
Headquarters Field/ Work Rd. Ponds	74.7
Pennington Inholding	33.3
Foster Place	308.1

Appendix E. Easements and Access Agreements on Summer Lake Wildlife Area

Easements

Principles	Purpose	Date	Acres
Graves, Ruth and Frank	Domestic Water Supply	6-28-49	68.00
Summer Lake Irrigation Dist.	Access	7-02-49	<1.0
Pennington, Pearl and Jess	ODFW/ Public access	2-21-57	2.10
Summer Lake Irrigation Dist.	Access	8-08-57	<1.0
O'Conner, David and Julia	ODFW/Public access	6-21-63	2.30
Surprise Valley Elec. Corp	Powerline	6-10-64	<1.0
Surprise Valley Elec. Corp	Powerline	2-17-67	<1.0
Surprise Valley Elec. Corp	Powerline	6-12-68	<1.0
Surprise Valley Elec. Corp	Powerline	7-28-71	<1.0
Telephone Utilities of Eastern Oregon	Telephone line	5-31-89	<1.0

Access Agreements

Principles	Purpose	Date
O'Conner, David and Julia	ODFW/Public Access	3-17-63
Bureau of Land Management	ODFW/Public Access	4-14-67

Appendix F. Legal Obligations Influencing Management of the Summer Lake Wildlife Area

Federal Laws

Federal Aid in Wildlife Restoration Act
Pittman- Robertson Act of 1937
The Endangered Species Act of 1973, as amended
National Historic Preservation Act
National Environmental Policy Act
Americans with Disabilities Act

Oregon Revised Statutes

ORS 496.012 Oregon's Wildlife Policy
ORS 496.138 General Duties and Powers; Rulemaking Authority
ORS 496.146 Additional Powers of the Commission
ORS 496.162 Establishing seasons, amounts and manner of taking wildlife; rules
ORS 496.992 Penalties

Oregon Administrative Rules

Division 008 - Department of Fish and Wildlife Lands
- 635-008-0015 Agreements to Restrict Motor-propelled Vehicles
- 635-008-0040 Forage Removal from State Lands
- 635-008-0050 Fish and Wildlife Commission to Post and Enforce Rules
- 635-008-0155 Summer Lake Wildlife Area

Division 011 - Statewide Angling Regulations
- 635-011-0050 Procedure of Promulgation of Angling Regulations
- 635-011-0100 General Rule

Division 051 - General Game Bird Regulations
- 635-051-0000 Purpose and General Information
- 635-051-0065 State Wildlife Area Regulations

Division 065 - Game Mammal General Seasons and Regulations
- 635-065-0001 Purpose and General Information
- 635-065-0625 Regulations on State Wildlife Areas, Refuges and Special Areas

Pacific Flyway and Species Plans

Appendix G. Description of Habitat Management Units on the Summer Lake Wildlife Area

Introduction

This document describes physical features and management strategies for 32 Habitat Management Units (HMUs) on Summer Lake Wildlife Area (SLWA). These HMUs have been delineated based on historic uses, physical features or boundaries, vegetation types, current or past management activities and water sources. Wildlife and public use of these areas, as well as alternative management strategies will be described.

To understand how HMUs function towards meeting goals and objectives of the Wildlife Area it is important to have an appreciation of the inter-relationship between units, especially related to abundance, timing and distribution of water in Summer Lake Basin. Nearly all SLWA wetlands function as a constant flow through system, behaving in some ways similar to flood plain wetlands. There are exceptions during run-off events which are primarily dictated by water manipulations at the Wildlife Area. In many cases habitat units are tied to one another in terms of water delivery. This affects habitat quality and quantity, as well as management capability. Actions in one unit can affect adjacent units.

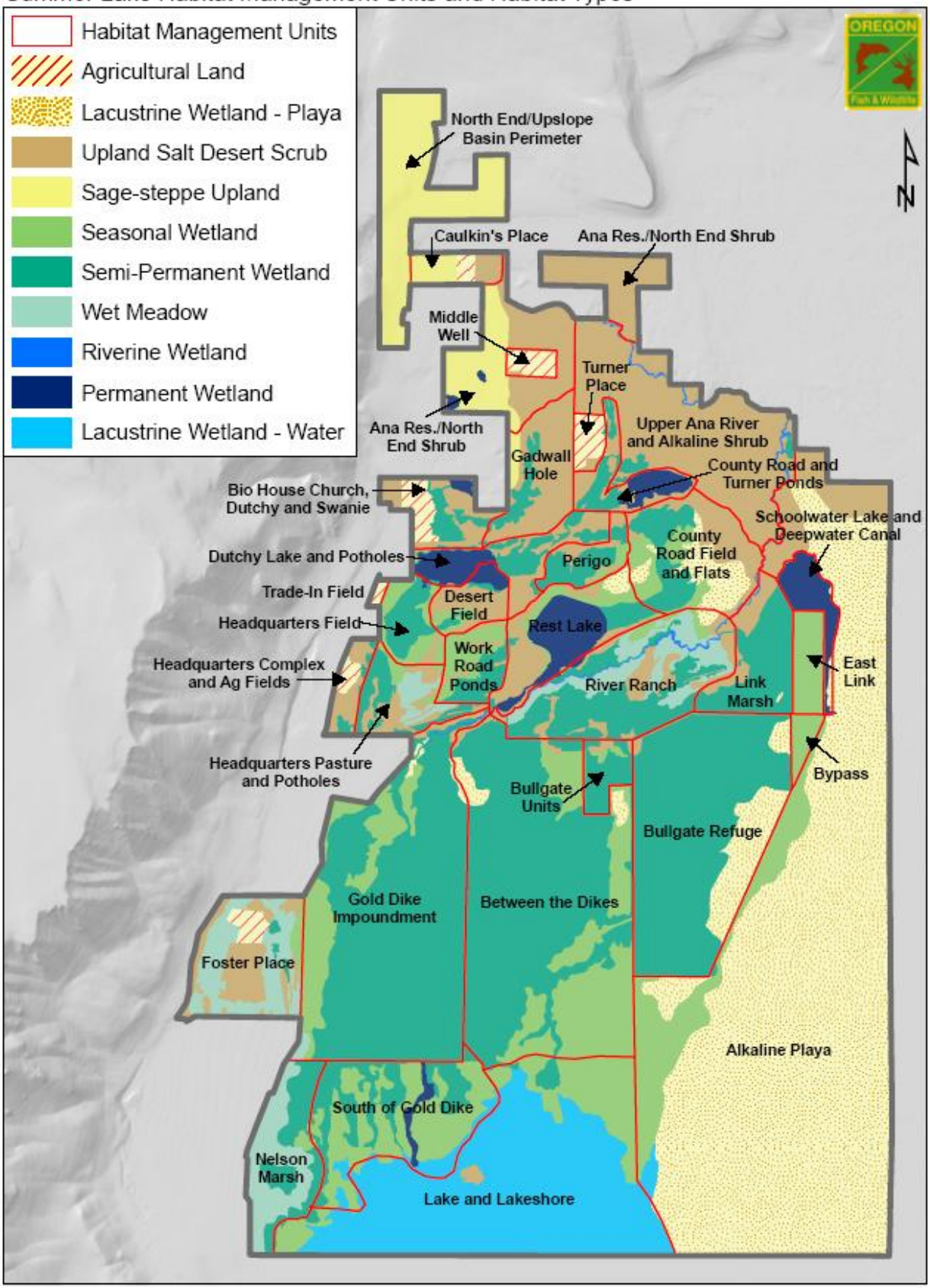
Historically, sumps on SLWA were probably formed during extreme weather events that resulted in overtopping of existing channel banks and filling of natural depressions. When water distribution varies due to natural or management actions these sumps continue to function on the Area as ponds, open water features or mudflats.

Manipulation of Ana River flows during irrigation season (May to September) for agricultural development in the basin has a significant affect on wetland management at SLWA. Approximately 55-60% of total Ana River discharge is removed from the stream on an annual basis. Flow fluctuations in Ana River during the latter part of breeding season (mid-June through July) create management challenges. Irrigation run-off from adjacent private lands onto SLWA during the peak of breeding season (mid-May-early June) also pose challenges and provide additional opportunities for habitat management.

Precipitation in Summer Lake Basin averages 12 inches annually, with evapotranspiration losses averaging 40-50 inches. Such weather extremes play an important role in water management at the Wildlife Area.

Wetland habitats inside the meanderline of Summer Lake are the cornerstone to attainment of SLWA's habitat related goals and objectives. The meanderline covers lands formerly within the original surveyed (1874) lake bed of Summer Lake and represents historical pre-settlement/pre-major alteration natural conditions. Contained within this area is approximately 6,300 acres of wetlands. Several HMUs are contained within this habitat type.

Summer Lake Habitat Management Units and Habitat Types



Gold Dike Impoundment

Background

Gold Dike Impoundment is a 1,800 acre (2.8 sq. mi.) unit of predominantly palustrine semi-permanent wetlands which are in good hemi-marsh condition. The northwest portion of the unit is densely vegetated with hardstem bulrush and cattail. Alkali and American three-stem bulrush are well distributed throughout the southern portions of the unit. The westside of the unit has seasonally flooded wetlands with vegetation consisting primarily of saltgrass, foxtail barley and alkali grass.

Over 30 manmade islands were constructed in the mid-1980's throughout the interior and southern portions of the unit. However, many have disappeared through erosion and muskrat burrowing.

Three main (0.5 mi.) and 3 minor (300-900 ft.) lateral dikes are located and extend west into the interior of the unit off the upper half of Windbreak Dike. These dikes capture and disperse flows creating open water areas on the north side of each dike.

The Ana River is the primary source of water flowing through the center of the unit. Substantial irrigation run-off from private land and the Foster Place Unit to the west is collected during late May through early September. This unit supplies water to Nelson Marsh, South of Gold Dike, Lake and Lakeshore HMUs via eight water control structures dispersed along Gold Dike.

The unit is an important goose production area due to the prevalence of tall emergent vegetation surrounded by open water. Most of the Area's goose broods are reared in this HMU. Abundant populations of invertebrates provide food resources for early growth and development of goslings. Shoreline margins provide high quality browse for both goslings and adults undergoing molt. Quality duck brood habitat is available, which is an important feature, since portions of the adjacent Foster Place HMU are managed for dense nesting cover for ducks. Abundant submerged aquatic vegetation and associated populations of invertebrates provide high protein food needed by broods and molting adults. High quality duck molting habitat is present due to its isolation (enhanced by vehicle travel restrictions), availability of invertebrates, good water depth associated with the Ana River channel and an abundance of tall emergent cover for escape and security. Extensive stands of alkali and American three-square bulrush provide important sources of food to migrant waterfowl, especially tule white-fronted and snow geese.

Migrating and wintering swans make heavy use of this area due to the abundance of submerged aquatic plants and open water found in the southern half of the unit. This unit is an important sandhill crane production and roosting area. Its value to cranes is enhanced due to its proximity to the Foster Place, where several crane nesting territories are present. Shorebirds make extensive use of the unit for breeding and foraging, especially in seasonally flooded wetlands along the western edge of the unit. During late summer when evaportranspiration rates are high and natural drawdown

occurs, extensive mudflat and shallow water foraging areas are created to accommodate postbreeding and migrant shorebirds. Some annual food plants occur in these seasonal wetlands but are not extensive in abundance or distribution.

Colonial nesting waterbirds have utilized dense tall emergent stands and islands for breeding in the recent past (early 1990s). This unit has been identified in the *Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary EIS* (2006) as a potential site where tern breeding habitat will be enhanced by island construction.

The entire unit is a very popular and productive waterfowl hunting area. Hunting access is good via Windbreak Campground and South Access areas. A unique hunting opportunity for boating access via the Canoe Launch is provided at the north end on Ana River.

Management Strategies

This unit will be managed for semi-permanent and seasonal wetland habitat for several consecutive years on a rotational basis (6-10 years). In two consecutive years of the rotation, it will be drawn down and held as dry as possible in the first year and into early fall of the 2nd year. This will allow nutrient cycling to enhance productivity and control of robust tall emergent vegetation, utilizing a variety of techniques that require dry site conditions. Habitat management activities will focus on attaining or maintaining hemi-marsh conditions, and may include controlled burning, disking, grazing, herbicide application, mowing and other manipulations of vegetation. The desired outcome will be to maintain productive ratios of open water to robust tall emergent vegetation. This will provide over water nesting features, brood rearing, molting and migration maintenance habitat.

When portions of the unit are dry, water control structures will be maintained, repaired and/or replaced, dikes will be maintained to repair rodent burrowing and erosion damage. Additional water control structures may be installed to improve flow and water delivery to adjacent HMUs (South of Gold Dike and Between the Dikes). Canals may be constructed to capture and redirect irrigation run-off along the west boundary to improve water management capabilities. Nesting islands for Caspian tern management can be constructed at this time as well.

During draw down years, some wildlife habitat features will be reduced throughout a majority of the unit. Most breeding and migrant use will be reduced in the short term. Substantial wildlife use will continue to occur on the west half of the unit due to perennial flows in Ana River and substantial irrigation season run-off. It is expected that most wildlife use will shift to other HMUs to compensate for this temporary habitat loss. During these years hunting opportunities will be adversely affected due to reduced waterfowl and waterbird food production as well as a delay in fully flooded conditions early in the hunting season (October) of the 2nd year following management actions. When this unit is drawndown, the adjacent and interconnected South of Gold Dike unit

will also be affected due to a lack of water. Presently, water is delivered to this unit only when Gold Dike Impoundment is managed at near full water levels.

South of Gold Dike

Background

South of Gold Dike consists of 500 acres (0.8sq. mi.), that is a mix of palustrine semi-permanent and seasonally flooded wetlands. A majority of the wetland plants are saltgrass and other alkaline adapted grasses and forbs, but extensive stands of alkali and American bulrush are found around pond margins and channels where water is flowing. Very little tall emergent vegetation is present, and is confined to the extreme west side adjacent to Nelson Marsh and along the lower Ana River.

Lower Ana River flows south on a direct course to Summer Lake, supplying water to the Lake and Lakeshore HMU. This area functions as a permanent wetland. No water is diverted from Ana River to other portions of the South of Gold Dike HMU. Water is supplied from Gold Dike Impoundment HMU via 5 water control structures at various locations along the 1.3 mile long Gold Dike.

During wet cycles and high water levels at Summer Lake, a majority of the HMU will be naturally flooded, especially when storm systems accompanied by strong winds from the southwest push the lake against Gold Dike. During these times South of Gold Dike is similar to a lacustrine wetland.

Seasonally flooded wetlands occur when water levels recede naturally as summer evapotranspiration rates exceed inflow of Ana River. Prior to this drawdown, water levels are maintained into early June to prevent nest site drying and/or flooding during breeding season.

Waterfowl and shorebird use is heavy during migration, especially in spring when extensive flooded conditions exist. This area serves as very important pre-breeding habitat for migrant and resident ducks.

Canada goose brood rearing use of the area is heavy in most years. Shorebird nesting and post breeding dispersal use by shorebirds and other waterbirds is extensive due to shallow water conditions, a mosaic of vegetation and seasonally occurring drawdowns. Snowy plovers nest in discrete pockets of alkaline playa within the interior of the unit and along its boundary with Lake and Lakeshore HMU.

Several sandhill crane nesting territories exist in adjacent Nelson Marsh, Gold Dike Impoundment and Between the Dikes HMUs. Brood rearing and post breeding use of the area by cranes is heavy.

Fall and winter cattle grazing of the western portion of this area and nearby Nelson Marsh has enhanced waterfowl and waterbird use during spring migration as well as

winter months. Grazed areas are also used heavily by foraging sandhill cranes during the breeding season.

The entire unit is within the managed public hunt area but use is somewhat light due to distance from major access areas.

Management Strategies

This HMU will be managed as semi-permanent to seasonally flooded wetlands in conjunction with adjacent Gold Dike Impoundment. Both areas will be managed following the same rotation schedule.

With the exception of water level management, few habitat management activities are anticipated in this subunit. Controlled burning will be utilized to enhance habitat suitability for waterfowl and waterbirds. Rock check dams may be installed in locations where channels have downcut in order to rehabilitate channelized areas of Ana River and avoid dewatering of shallow ponds and seasonally flooded wetlands.

During drawdown years, most wildlife habitat features of South of Gold Dike will be impacted. Breeding and migrant use will be compromised in the short term. It is expected that most wildlife use will shift to other HMUs to compensate for this temporary loss of habitat.

Hunting opportunities will be adversely affected in the short-term during drawdown years due to reduced waterfowl and waterbird food production in the unit. Areas of the unit suitable for hunting will also be affected during drawdown years since fully flooded conditions will be absent early in the hunting season (October). However, hunting opportunities will be improved in the long-term due to enhanced habitat productivity and waterfowl use.

Nelson Marsh

Background

This 400 acre (0.6 sq. mi.) area is a mix of palustrine semi-permanent and intermittently flooded/saturated (wet meadow) wetlands. Gold Pond is a major water feature of the unit. It is surrounded by stands of robust tall emergents. Those stands remain dense along the entire water course flowing south through the interior of the unit. Peripheral areas of the HMU are well vegetated with stands of medium statured emergents, predominantly grasses, rushes and sedges. Where the unit borders South of Gold Dike, Lake and Lakeshore units, vegetation consists primarily of saltgrass. Extensive stands of alkali and American three square bulrushes are found along watercourses.

Nelson Marsh receives water from spring fed flows primarily from private land. These flows are collected in ditches and channeled to three major distribution points along the westside of the HMU. Wet meadow features of the Marsh are a result of run-off from private lands, which is heavy during irrigation season and largely uncontrolled as it

spreads across most of the unit. Water is also supplied from Gold Dike HMU via a water control structure situated in the southwest corner of that unit.

Foraging waterbirds utilize this area heavily during spring migration. This area serves as very important pre-breeding habitat for migrant and resident ducks. Tall emergent vegetation and Gold Pond provide important breeding and brood rearing habitat for Canada geese. Ducks nesting overwater and in upland sites found within the HMU and on adjacent private land make extensive use of the area. Impacts to ground nesting birds, especially early season breeders in meadow areas can occur due to nest flooding. Early nesting is discouraged by vegetation removal through grazing during the preceding fall and winter. Later nesting species will utilize new growth and are able to select areas where irrigation season flooding does not occur or situate nests above water levels.

Several sandhill crane nesting territories are found in the unit and brood rearing and post-breeding use by cranes is heavy.

Shorebird breeding, post breeding use by shorebirds and other waterbirds is extensive in this unit due to shallow water conditions, a mosaic of vegetation and seasonally occurring drawdowns. Snowy plovers nest near Hot Spring Island located in the southwest corner of the unit.

The entire HMU is within the managed public hunt area. Nelson Lane provides access to this far corner of SLWA but currently hunter use is fairly light.

Management Strategies

Management of this unit will focus on existing habitat management actions of livestock grazing and controlled burning to enhance breeding and migration habitat.

Fall and winter grazing enhances waterfowl and waterbird foraging use of the unit during spring migration as well as winter months.. Grazed areas are also used heavily by breeding and brood rearing sandhill cranes. Grazing will reduce residual vegetation in low areas which discourages early ground nesting species that may be vulnerable to nest flooding from irrigation run-off. Periodic (once every five years) controlled burning will reduce residual robust tall emergent vegetation and improve foraging conditions. Increased migrant waterbird foraging opportunities will occur in burned areas.

Management actions will reduce cover for over water nesting species in the short term. Stand vigor and brood habitat will be improved in the long term in these sites. Hunting opportunities should be enhanced through improved access into formerly dense stands of tall emergents and increased waterfowl food production.

Between the Dikes

Background

This 2,000 acre (3.1 sq. mi.) area consists primarily of palustrine semi-permanent wetlands with significant seasonally flooded wetlands along the south and east edges of the unit. In the northwest corner and along the upper half of Windbreak Dike dense and robust tall emergent vegetation is present. This vegetation is especially prevalent surrounding River Campground Pond, along Avey Channel and along upper Windbreak Dike on the west side of the unit. Interior and southern areas of the unit are heterogeneous mixtures of tall, medium and short statured emergent vegetation that grades into extensive short statured emergent vegetation as it meets the north shore of Summer Lake.

Numerous small shallow ponds are interspersed throughout the unit, especially early in the year before evapotranspiration rates increase. The south boundary of this unit is somewhat indistinct due to fluctuating lake levels and the creation of vegetative deltas formed as water flows into Summer Lake from the north.

Five main (0.5 mile long each) lateral dikes extend east off Windbreak Dike. Three minor lateral dikes extend west off Bullgate Dike. These dikes capture and disperse flows creating open water areas on the north side of each lateral dike. In the northeast corner of the unit is a distinct area, which contains four subunits known as “Bullgate Units” Each subunit is surrounded by dikes and contain water control structures. NE Bullgate Unit is 30 acres is size, NW Bullgate Unit is 28 acres, Center Bullgate Unit is 14 acres, and S Bullgate Unit is 13 acres in size. The NE Bullgate Unit is densely vegetated with robust tall emergents, while the other units are largely open water with tall emergent vegetation on the fringe.

Between The Dikes Unit receives water at several major water control structures situated along Headquarters Road diverted from Ana River via Link Canal. These control structures are found at Bullgate Campground, Avey Channel, and Corner Pond (2 headgates). Water can also be supplied to the HMU from Ana River at River Campground. Diversions there occur only when river levels are high and Corner Pond levels are low.

The adjacent River Ranch HMU, when flooded, supplies water into Corner Pond and Lower Link Canal, contributing additional water to the northwest portion of the unit. Two water control structures permit flow from Bullgate Refuge into the eastside of the unit. They are located near the East Bullgate Lateral and at the northwest corner of Swan Pond. They function only when Bullgate Refuge is in near fully flooded conditions. At Bullgate Campground, water flows first into the Bullgate Units and is then distributed west (through structures in each of NW, Center and South Bullgate Units) and south along Bullgate Dike through a structure (NE Bullgate Unit). Water generally flows south-southwest from points of diversion and provides considerable inflow to Lake and Lakeshore Unit.

The unit is a very important waterbird (especially waterfowl) production and migrant foraging area. This is due to the prevalence of numerous ponds and associated emergent vegetation used for nest sites. Abundant invertebrate populations provide high quality food resources for all waterbirds. Shoreline margins of ponds provide high quality browse for Canada goose goslings and adults undergoing molt. Abundant submerged aquatic vegetation and associated invertebrate populations provides protein needed by duck broods and molting adults. Extensive stands of alkali and American three-square bulrush provide important forage resources to migrant waterfowl especially tule white-fronted and snow geese.

Migrant and wintering swans make extensive use of this area due to the abundance of submerged aquatic plants found in the numerous shallow ponds and water channels. Shorebirds utilize shallow semi-permanent wetland edges and seasonally flooded wetlands for breeding habitat and for foraging. Snowy plovers nest along the southern margin of the unit where it joins the Lake and Lakeshore unit. During late summer when evaportranspiration rates are high and natural drawdowns occur, extensive mudflat and shallow water foraging areas are created around ponds and in former shallowly flooded vegetation. This provides extensive foraging habitat for post breeding and migrant shorebirds.

Between the Dikes Unit is a very popular and productive waterfowl hunting area. Hunting access is relatively easy via Bullgate and Windbreak Dikes and their associated lateral dikes penetrating the interior from the Area's three major campgrounds (Bullgate, River and Windbreak). Many hunters perceive it as a prime best area to hunt due to its proximity and boundary with Bullgate Refuge, Lake and Lakeshore units because of waterfowl concentrations found there. Wildlife viewing is also popular in this unit for similar reasons and because of the Wildlife Viewing Loop located along the northern edge.

Management Strategies

Between the Dike Unit will be managed for semi-permanent and seasonal wetland habitat for consecutive years on a rotational basis (6-10 years). In two consecutive years of the rotation, it will be drawn down and held as dry as possible in the first year continuing on into early fall of the 2nd year. Utilizing a variety of techniques that require dry site conditions will allow nutrient cycling to enhance productivity of the unit, in addition to reducing density of robust tall emergent vegetation.

Habitat management activities utilized to attain or maintain hemi-marsh conditions may include, controlled burning, disking, grazing, herbicide application, mowing and other manipulations of vegetation. The desired outcome will be to maintain productive ratios of open water to robust tall emergent vegetation. This will provide over water nesting features, brood rearing, molting and migration habitat for waterbirds.

When dry, dikes associated with this unit will be maintained to repair rodent burrowing and erosion damage. Water control structures will be maintained, repaired and/or replaced. Additional water control structures may be installed to improve water delivery to and from adjacent HMUs (Gold Dike Impoundment and Bullgate Refuge). Rock check dams may be installed in locations where channels have downcut in order to rehabilitate channelized areas and avoid dewatering of shallow ponds and seasonally flooded wetlands.

Bullgate Units will be managed to provide moist soil food plants with irrigation water and drawdowns to stimulate preferred food plants while retarding non-desirable vegetation. Dikes will be maintained to repair rodent burrowing and erosion damage. Water control structures will be maintained, repaired and/or replaced during drawdown periods. Additional water control structures and canals may be constructed to improve water delivery and drainage in Bullgate Units. Independent water management capability for each of the Bullgate Units will be essential to the production of desired food plants.

During drawdown years, most wildlife habitat features will be impacted. Breeding and migrant bird use will diminish in the short term. It is expected that most wildlife use will shift to other HMUs to compensate for this temporary loss of habitat. During these years hunting opportunities will be adversely affected due to reduced waterfowl and waterbird food production as well as a delay in fully flooded conditions early in the hunting season (October) of the 2nd year following management actions.

Lake and Lakeshore

Background

This 1,600 acre (2.5 sq. mi.) area functions as a shallow lacustrine wetland. In most years wetlands occur as aquatic beds, but are sometimes only seasonally or intermittently flooded. Northern portions of the unit sometimes occur as semi-permanent or seasonally flooded palustrine wetlands. In this case, medium and short statured emergent vegetation develops and expands via deltas formed as a result of inflow from Between the Dikes, South of Gold Dike HMUs and Bypass Canal. Submerged aquatic vegetation can be prolific in many of the vegetated delta areas as well. However, emergent vegetation is rarely persistent and is frequently removed through ice and storm scouring when lake levels are high.

The boundary with adjacent HMUs is sometimes indistinct and quite variable. It is dependent upon the amount of inflow and over winter lake levels.

Water is supplied to this unit via Ana River and through runoff from adjacent HMUs. In addition to Ana River, five control structures release water from Gold Dike Impoundment Unit as it flows across South of Gold Dike Unit and into Lake and Lakeshore Unit. No control structures impede or regulate flow from Between the Dikes Unit into this unit. Bullgate Refuge has three control structures which provide water to the unit, about 0.5-0.75 mi. away through Swan Pond dike and across the Alkaline Playa unit. Bypass

Canal is sometimes a major source of inflow to the unit when water is delivered to the extreme northeast portion of Summer Lake.

Lake and Lakeshore Unit is very important habitat to a wide variety of breeding, migrant and post breeding waterbirds. Many species feed in vegetation deltas where they occur. Tule white-fronted and snow geese use these areas extensively during migration periods. Shorebird breeding occurs there as well, but is quite vulnerable to nest flooding caused during storms when wind blows water into these areas. Snowy plovers use this unit for foraging and brood rearing, especially in locations where fresh water enters the lake. Large concentrations of waterbirds congregate in this de facto sanctuary area due to its remoteness, security from disturbance, fresh water inflow and abundance of food.

The entire area is open to hunting but is difficult to access due to remoteness from parking and camping areas (about 2 ½ miles). Remoteness combined with large numbers of birds resting on Summer Lake can result in very productive hunting opportunities. Viewing use of this area is light due to distance from access areas.

Management Strategies

Management of this unit is interconnected to actions in adjacent units, involving water delivery and weather patterns associated with Summer Lake. Bypass Canal can play an important role in management of the unit. In most years, water is delivered in late June to early July via the canal to the northeast corner of the Lake in order to prevent nest flooding in adjacent managed units. Increased inflow to Lake and Lakeshore Unit does not adversely affect shorebird nesting there since it is dispersed across a wide and flat area without affecting lake levels. Timing of inflow from Bypass Canal is excellent since it provides considerable foraging habitat for post-breeding and migrant shorebirds congregating in the area at this time. During drought years this portion of Summer Lake provides important critical habitat to significant numbers of migrant waterbirds. This area further attracts and sustains migrant waterbirds in late summer subsequent to irrigation season due to increased inflow, reduced evapotranspiration rates and plant senescence.

Recreational opportunities are largely unaffected by limited habitat management actions undertaken in this unit.

Bullgate Refuge

Background

Bullgate Refuge Unit is a 1,300 acre (2.0 sq. mi.) area, the majority of which is palustrine semi-permanent wetland. Lacustrine intermittently and seasonally flooded wetlands occur on eastern portions adjacent to Bypass Canal. Bullgate Refuge and Swan ponds are major water features of this unit. Robust tall emergent vegetation occurs in the north and west portions of the unit, especially along Bullgate Dike and Link Canal. The proportion of open water area in the unit has been diminishing due to

encroachment from this vegetation. The southern portion of the unit is vegetated predominately with medium and short emergent vegetation, but significant stands of tall emergent vegetation is expanding along pond margins and water channels. East Bullgate Lateral dike extends across the interior of the unit with five control structures regulating water levels in the north half of the unit.

Ana River water is supplied via Link Canal through two control structures along the north boundary of the unit. Runoff and spill from adjacent Bypass Unit can contribute a lesser amount of inflow to the area when the unit is nearly full.. Water is supplied from Bullgate Refuge Unit generally as runoff and spill to adjacent Between the Dikes and Lake and Lakeshore units. Bullgate Refuge unit must be full of water in order to maintain flooded conditions in the southeast portion of Between the Dikes Unit.

Bullgate Refuge Unit is an important waterbird production area due to the prevalence of numerous ponds and associated emergent vegetation which the birds use for nest sites. Abundant submerged aquatic vegetation and associated invertebrate populations provide high protein forage needed by broods and molting adults. Extensive stands of alkali and American three-square bulrush provide important forage resources to migrant waterfowl, especially tule white-fronted and snow geese. Use of this area is especially heavy during fall months when the unit is closed to hunting and serves as a refuge.

Due to abundance of submerged aquatic plants there is heavy use of Bullgate Refuge and Swan Ponds by diving ducks, migrant and wintering swans.

Shorebirds make extensive use of this unit for breeding and foraging especially, around the perimeter, where short emergent vegetation interfaces with alkaline playas. Snowy plover nesting and brood rearing occurs at this interface area as well. Postbreeding and migrant shorebirds are accommodated in the unit during late summer when high evapotranspiration and natural drawdown creates ponds with extensive mudflat and shallow water foraging areas.

Hunting is prohibited in the entire Bullgate Refuge unit during the fall waterfowl season. This management strategy provides a valuable benefit to hunters by concentrating waterfowl in close association to areas on SLWA open to hunting. Many hunters perceive hunting is best around the perimeter of this unit, due to the associated waterfowl concentrations. As a result, the perimeter of the unit is heavily hunted, with resultant hunter crowding, increased competition and shooting at waterfowl out of range.

Wildlife viewing use of of the area is significant since the Wildlife Viewing Loop is located along the north boundary of the unit.

Management Strategies

Bullgate Refuge will be managed for semi-permanent wetland habitat for consecutive years on a rotational basis (6-10 years). In two consecutive years of the rotation, it will

be drawn down and held as dry as possible in the first year continuing on into early fall of the 2nd.year. Utilizing a variety of techniques that require dry site conditions will allow nutrient cycling to enhance productivity of the unit, in addition to reducing density of robust tall emergent vegetation.

Habitat management activities utilized to attain or maintain hemi-marsh conditions may include, controlled burning, disking, herbicide application, mowing and other manipulations of vegetation. The desired outcome will be to maintain productive ratios of open water to robust tall emergent vegetation. This will provide over water nesting features, brood rearing, molting and migration habitat for waterbirds.

When dry, dikes associated with this unit will be maintained to repair rodent burrowing and erosion damage. Water control structures will be maintained, repaired and/or replaced.

During drawdown years, most wildlife habitat features will be impacted. Due to its connection with Between the Dikes, a portion of that unit will be affected as well. Breeding and migrant bird use will diminish in the short term. It is expected that most wildlife use will shift to other HMUs to compensate for this temporary loss of habitat.

During draw down years, most wildlife habitat features will be compromised in the entire unit. Most breeding and migrant use will be compromised in the short term. It is expected that most wildlife use will shift to other HMUs to compensate for this temporary loss.

While no hunting occurs in this unit, opportunities adjacent to it may be adversely affected in the short-term due to reduced waterfowl use in this refuge. Very little food will be available and dry conditions will make the refuge less desirable to waterfowl. Conversely, benefits should occur long-term with improved habitat conditions and food production that will result in increased waterfowl use of the refuge.

River Ranch

Background

River Ranch Unit is a 700 acre (1.1 sq. mi.) area that is a complex mosaic of palustrine semi-permanent, seasonally flooded, intermittently flooded/saturated (wet meadow) palustrine wetlands, riverine wetlands, alkali playas and other uplands. Robust tall and medium emergent vegetation is especially prevalent in the south and west portions of the unit. About 20-30% of the unit is managed as wet meadow habitat. Vegetation removal (haying) occurs in this unit on an annual basis.

Ana River flows through the center of the unit and supplies the majority of water for habitat management activities. This reach of Ana River is very low gradient and is difficult to contain in channel during high flows due to silt accumulation and deteriorated stream banks.

Ana River supplies water to both north and south portions of the unit. In addition, the southeastern portion of the unit receives runoff from adjacent Link Marsh Unit, as well as water from Link Canal via a headgate structure at the southeast corner of River Ranch unit.
County Road Field and Flats Unit contributes water to the northeast portion of this unit. Runoff from River Ranch Unit provides water to adjacent Between the Dikes Unit and Rest Lake Unit or can be regulated back into Ana River to flow downstream to Gold Dike Impoundment. During fully flooded conditions water can be supplied to Link Marsh Unit from the southeast corner of the unit.

Corner Pond is a major open water feature in this unit. The surface area of Corner Pond has been reduced in recent years the expansion of robust tall emergent vegetation. Other large ponds exist at the south end of the unit along lower Link Canal. These ponds are maintained through diverted flows from Ana River and also suffer from encroaching robust tall emergent vegetation. Effective water management in the entire unit has been compromised by combination of silt accumulation in Ana River and a degraded and deteriorated water delivery system. Water retention and delivery capabilities within this unit are very important to management activities in Gold Dike Impoundment and Between the Dikes units, especially when enhancement activities are undertaken in those locations.

River Ranch Unit is an important sandhill crane production area, due to presence of numerous ponds, associated tall emergent vegetation and managed wet meadow habitat. Ground nesting birds make extensive use of upland ridges scattered throughout the unit. Extensive stands of alkali and American three-square bulrush and mowed areas provide important forage resources to migrant waterfowl, especially tule white-fronted and snow geese. Shorebirds and secretive marshbird use of the unit for breeding and foraging is heavy.

Drawdown of wetland habitat in the unit occurs during late spring and summer months creating significant mudflat and shallow water foraging areas around ponds and wet meadow habitat. Irrigation of the unit in early summer prior to mowing and then in late summer following mowing provides large areas of foraging habitat for a wide variety of waterbirds. Foraging raptors also make extensive use of mowed areas.

A majority of the unit is a very popular and productive waterfowl hunting area. The portion of the unit north of Ana River is part of the Rest Lake/County Road Field refuge area.. The unit also abuts a portion of Bullgate Refuge to the south creating a hunt area between the 2 refuges and is in a major waterfowl flight corridor. Access to the unit is very good via 3 major campgrounds, along Ana River and Alkali Dike/Greasewood Ridge. Mowed wet meadow areas provide excellent opportunities for hunters using large goose decoy spreads. Viewing use occurs along the south boundary since it abuts the Wildlife Viewing Loop.

<u>Management Strategies</u>

A majority of River Ranch Unit is managed as wet meadow and semi-permanent palustrine wetlands for consecutive years on a rotational basis (6-10 years).

Two distinct drawdown and flood up periods occur annually in the unit. Flooded semi-permanent wetlands are maintained in Corner Pond and along lower Link Canal. Irrigation and vegetation removal (mowing) of wet meadows provides additional habitat diversity and hunting benefits.

Management of this unit is complex due to an ineffective water delivery system. However, maintenance and improvement actions are currently underway which will dramatically improve water management over the entire unit. Levees and low elevation dikes will be constructed to afford more efficient water level management. Dikes and Ana River banks will be maintained to repair rodent burrowing and erosion damage.

During draw down years the entire unit will be dewatered and held as dry as possible in the first year and into early fall of the 2nd year. This will allow for nutrient cycling to enhance productivity and control of robust tall emergent vegetation. Once this initial work is completed, about 20% of this unit will be drawn down annually and vegetation managed more intensively using a wide variety of techniques.

Habitat management activities to be utilized may include burning, disking, grazing, herbicide application and mowing. The desired outcome will be to maintain a diversity of habitat types as well as productive open and over water nesting features, brood rearing, molting and migration habitat. Wet meadow habitat will be provided during drawdown and flooding periods timed to prevent deleterious impact to ground nesting birds.

During drawdown years, most wildlife habitat features will be impacted. Breeding and migrant bird use will diminish in the short term. It is expected that most wildlife use will shift to other HMUs to compensate for this temporary loss of habitat. During these years hunting opportunities will be adversely affected due to reduced waterfowl and waterbird food production as well as a delay in fully flooded conditions early in the hunting season (October) of the 2nd year following management actions.

In future years, about 20% of the unit's habitat and public use opportunities will be affected annually or until desired habitat conditions are attained.

East Link

Background

East Link Unit is a 120 acre area managed as palustrine seasonally flooded wetland. It is largely devoid of vegetation except in the extreme northeast corner and along a narrow margin of its perimeter.

Water is supplied to the unit from Ana River via Schoolhouse Lake. Two drains along East Link Dike supply runoff and spill to Link Marsh Unit. When water levels in Link Marsh unit are high, backflow to the unit can occur.

This unit provides significant shorebird foraging and breeding habitat. Breeding and brood rearing use of the unit by shorebirds can be high. When flooded, snowy plovers make good use of this unit. Waterfowl use the unit primarily for loafing and foraging. Caspian terns have nested on constructed islands within the unit.

East Link Unit is part of Schoolhouse Lake Refuge during hunting season. However, hunting use on E. Link Dike, the boundary between Link Marsh and East Link Unit, can be heavy. Wildlife viewing use of this unit is very high due to its proximity to the Area's Wildlife Viewing Loop.

Management Strategies

Management of this unit is on a rotational basis with adjacent Bypass, Link Marsh, and Schoolhouse Lake/Deepwater Canal units to provide either flooding or receding water levels coinciding with peak shorebird migration periods. East Link Unit is maintained in flooded conditions to accommodate breeding shorebird use in conjunction with adjacent units where water levels are being manipulated.

East Link Unit is managed to maintain shallow water or mudflat conditions with associated invertebrate populations. Most vegetation will be discouraged in the unit through water level management. This area has is identified in the *Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary EIS* as a potential site where tern nesting habitat will be enhanced by island construction.

During draw down years, most wildlife habitat features will be compromised in the entire unit. Most breeding and migrant use will be compromised in the short term. It is expected that most wildlife use will shift to other HMUs to compensate for this temporary loss.

During the drawdown period's dikes will be maintained to repair rodent burrowing, erosion damage and water control structures will be maintained, repaired and/or replaced.

While no hunting occurs in this unit, opportunities adjacent to it may be adversely affected in the short-term due to reduced waterfowl use in this refuge. Very little food will be available and dry conditions will make the refuge less desirable to waterfowl. Conversely, benefits should occur long-term with improved habitat conditions and food production that will result in increased waterfowl use of the refuge.

Bypass

Background

Bypass Unit is a 50 acre area managed as a palustrine seasonally flooded wetland. It is largely devoid of vegetation except along a narrow margin of its perimeter and along the north edge in association with fresh water inflow.

Water is supplied to the unit by Ana River via Bypass Canal at Link Corner. Three drains along the Bypass Dike supply runoff and spill to Bullgate Refuge Unit. Onedrain in the southeast corner of the unit returns water to Bypass Canal.
This unit provides significant shorebird foraging and breeding habitat. Breeding and brood rearing use of the unit by shorebirds, including snowy plovers, can be high. Waterfowl use the unit primarily for loafing and foraging.

Bypass Unit is part of Bullgate Refuge during hunting seasons. Wildlife viewing use of this unit is very high due to its proximity with the Area's Wildlife Viewing Loop.

Management Strategies

Bypass Unit is managed on a rotational basis with adjacent E. Link and Schoolhouse Lake/Deepwater Canal units to provide breeding habitat and flooding or receding water levels coinciding with peak shorebird migration periods.

Bypass Unit is managed to maintain shallow water or mudflat conditions with associated invertebrate populations. Most vegetation will be discouraged in the unit through water level management.

During drawdown years, wildlife habitat features will be compromised throughout most of the unit. Breeding and migrant wildlife use will be compromised in the short term. It is expected that wildlife use will shift to other HMUs to compensate for this temporary loss.

During the drawdown period's dikes will be maintained to repair rodent burrowing, erosion damage and water control structures will be maintained, repaired and/or replaced.

While no hunting occurs in this unit, opportunities adjacent to it may be adversely affected in the short-term due to reduced waterfowl use in this refuge. Very little food will be available and dry conditions will make the refuge less desirable to waterfowl. Conversely, benefits should occur long-term with improved habitat conditions and food production that will result in increased waterfowl use of the refuge.

Link Marsh

Background

Link Marsh Unit is a 300 acre area of predominately palustrine semi-permanent wetland with a salt desert scrub upland area along its west and north sides. Link Marsh and Shorebird Ponds and other smaller ponds in the north part of the unit are prominent open water features of the unit. These water bodies contain extensive submerged

aquatic plant communities and are surrounded and/or interspersed with robust and sometimes dense tall emergent vegetation. The southeast corner and northern portions of the unit consist of shallow open water interspersed with a heterogeneous mixture of short and medium emergent vegetation.

Water is supplied to the unit from Ana River via Link Creek, as well as from a ditch along the eastside of the River Ranch unit. Link Canal supplies water to Link Marsh Pond at the south side of the unit. Water can be supplied from River Ranch unit when levels there are high to the southwest corner of Shorebird Pond. Runoff and spill from E. Link Unit provides water to the east side of the unit. At high water levels, backflow into E. Link unit can occur. Water level in the unit is regulated at a structure in Alkali Dike in the southwest corner of Shorebird Pond. Runoff/spill water is delivered to the southeast portion of the River Ranch at this location. At high water levels when Link Canal water level is low, spill into Link Canal occurs via the structure on the south side of Link Marsh Pond.

Open water areas and ponds in Link Marsh provide waterfowl breeding and brood rearing habitat. These areas contain extensive beds of submerged aquatic plants supporting diverse and abundant invertebrate populations. They provide high quality brood rearing habitat and are heavily used by molting ducks because of their proximity to tall emergent vegetation..

Submerged aquatic vegetation in Link Marsh and Shorebird ponds provide food to large numbers of migrant and wintering swans. Colonial nesting waterbirds utilize robust tall emergent vegetation for nesting and have successfully bred in this unit. However, robust tall emergent vegetation is compromising habitat quality by closing in open water areas and becoming too dense.

A wide array of waterfowl including tule greater white-fronted geese feed on short and medium statured emergent vegetation on the perimeter and eastern interior of this unit. These areas, in combination with shallow water areas in the southeast corner of the unit provide important foraging habitat for shorebirds and other waterbirds. Considerable shorebird breeding occurs in this unit when it is fully flooded or slowly receding.

Link Marsh Unit is very popular during hunting season due to its proximity with River Ranch Campground and adjacent Bullgate and Schoolhouse Lake refuges. Wildlife viewing use of this unit is very high due to its border with the Area's Wildlife Viewing Loop and its proximity to River Ranch campground.

Management Strategies

Link Marsh Unit will be managed for semi-permanent wetland habitat for consecutive years on a rotational basis (6-10 years). In two consecutive years of the rotation, it will be drawn down and held as dry as possible in the first year continuing on into early fall of the 2nd.year. Utilizing a variety of techniques that require dry site conditions will allow

nutrient cycling to enhance productivity of the unit, in addition to reducing density of robust tall emergent vegetation.

Water management in Link Marsh Unit is coordinated with Bypass, E. Link, and Schoolhouse Lake/Deepwater Canal units to ensure that water levels around the perimeter of Link Marsh Unit are appropriate to optimize shorebird migration and breeding habitat.

Habitat management activities utilized to attain or maintain hemi-marsh conditions may include, controlled burning, disking, herbicide application, mowing and other manipulations of vegetation. The desired outcome will be to maintain productive ratios of open water to robust tall emergent vegetation. This will provide over water nesting features, brood rearing, molting and migration habitat for waterbirds.

When dry, dikes associated with this unit will be maintained to repair rodent burrowing and erosion damage. Water control structures will be maintained, repaired and/or replaced.

During drawdown years, most wildlife habitat features will be impacted. Breeding and migrant bird use will diminish in the short term. It is expected that wildlife use will shift to other HMUs to compensate for this temporary loss of habitat. During these years hunting opportunities will be adversely affected due to reduced waterfowl and waterbird food production as well as a delay in fully flooded conditions early in the hunting season (October) of the 2nd year following management actions.

Schoolhouse Lake and Deepwater Canal

Background

Schoolhouse Lake and Deepwater Canal Unit is a 180 acre area managed as a palustrine permanent wetland. It contains extensive stands of submerged aquatic plants. Tall emergent vegetation occurs along narrow margins of its perimeter in several places. In many locations, the shoreline of this unit is devoid of vegetation.

Water is supplied to the unit from Ana River at the Area's primary diversion north of River Ranch Campground. Schoolhouse Lake and Deepwater Canal serves as the major water delivery system for E. Link Unit, Link Canal and Bypass Canal. Link Canal subsequently supplies water to Bullgate Refuge, Between the Dikes, River Ranch and Gold Dike Impoundment units. Water entering Bypass Canal delivers water to Bypass and Lake and Lakeshore units. The entire unit is a flow through system with levels sometimes dictated by water needs of other units.

Waterfowl and other waterbird use of the unit is heavy during hunting season because it is one of the Area's major refuges.

Ana River flows diverted through this unit provide open water conditions for waterfowl throughout winter months. Migrant and wintering swans forage heavily on submerged

aquatic plants. This unit provides significant shorebird breeding and migration habitat. Breeding and brood rearing use of the unit is especially heavy by shorebirds and snowy plovers.

Wildlife viewing use of this unit is very high due to an abundance of waterbirds and it's proximity with the Wildlife Viewing Loop. Schoolhouse Lake Wildlife Viewing Station is situated on the northwest corner of the unit providing viewing access during hunting seasons when the viewing loop is closed. No hunting use occurs in this refuge area, however considerable hunting activity occurs around its perimeter in adjacent HMUs.

Management Strategies

Schoolhouse Lake and Deepwater Canal Unit is managed to maintain productive permanent wetland conditions to support resting and breeding waterbirds.

Water management in Schoolhouse Lake and Deepwater Canal Unit is coordinated with Bypass, E. Link, and Link Marsh units to ensure that water levels in Schoolhouse Lake and Deepwater Canal Unit are appropriate to optimize shorebird migration and breeding habitat.

Drawdowns and flooded conditions are also maintained to primarily to benefit breeding shorebirds. Once every 8-10 years the entire unit will be drawn down and held dry for a year. This will allow for nutrient recycling that will stimulate submerged aquatic plant growth when reflooded and to retard encroaching tall emergent vegetation. The desired management outcome is to maintain productive submerged aquatic plant growth and shallow water or mudflat conditions around a majority of the unit's perimeter.

When dry, dikes associated with this unit will be maintained to repair rodent burrowing and erosion damage. Water control structures will be maintained, repaired and/or replaced.

During draw down years, wildlife habitat features will be compromised in the entire unit during growing season. Migrant waterfowl and shorebird use will not occur in the short term, nor will any shorebird production be realized. It is expected that most wildlife use will shift to other units or areas to compensate for this temporary loss of habitat.

While no hunting occurs in this unit, opportunities adjacent to it may be adversely affected in the short-term due to a lack of waterfowl use in this refuge. Conversely, benefits should occur long-term with enhanced wetland productivity and the resulting increase in waterfowl use.

County Road Field and Flats

Background

This unit is a 430 acre area consisting of a complex mix of palustrine semi-permanent and seasonally flooded palustrine wetlands, alkaline playa and upland habitat. Salt

desert scrub habitat and a spring fed alkaline playa system are found in the south and east portions of the unit.

Water is supplied to the unit from County Road Pond overflow and spill which are spring fed and augmented by flows from the Turner Well. Springs along the eastern edge supply minor flows and inflow from River Ranch diversions can sometimes be heavy. There are no structures to regulate water within the unit and levels are dictated by inflow and levels found in Rest Lake. The entire unit drains to the southwest into Rest Lake.

The semi-permanent and seasonally flooded wetlands found in this unit are very important to migrant and breeding waterbirds. The entire unit is within the County Road Field/Rest Lake refuge and management actions attract and hold large numbers of migrant geese especially snow geese. Emergent vegetation in a portion of the unit is made more attractive to foraging waterfowl through early fall livestock grazing. Very heavy use occurs spring and fall each year. The spring fed alkaline playa area is a prominent shorebird nesting area supplying breeding habitat for 5-10 pairs of snowy plovers and several other species.

Hunting use is heavy around the perimeter of this unit, enhanced because of its refuge status. Viewing use of the northern portion of the unit is available along Thousand Springs Lane as part of the Wildlife Viewing Loop and which remains open the entire year.

Management Strategies

Management of this unit is to maintain semi-permanent and seasonally flooded wetlands through continued water delivery both from northern sources and from run-off and spill from the adjacent River Ranch in late summer, early fall and early spring. Lower (southern) portions will produce flooding and receding water levels and the associated wildlife benefits that result. Emergent vegetation will be managed when controlled burning occurs in adjacent Rest Lake and River Ranch units. Early fall grazing use will continue to provide enhanced foraging sites for migrant waterfowl and other waterbirds. The unit will provide nesting, brood rearing, and molting habitat to waterfowl, shorebirds and other waterbirds. Its importance is enhanced due to proximity to Rest Lake that provides additional brood rearing and molting habitat.

Opportunities exist to improve and provide more uniform water dispersal across the unit through the cleaning and reconstruction of a deteriorated water delivery canal around the north and east perimeter of the unit.

No significant resource or public use impacts or trade-offs are expected to occur due to management actions.

Rest Lake

Background

A 380 acre area mix of palustrine permanent, semi-permanent and seasonally flooded palustrine wetlands as well as alkaline playa and salt desert scrub uplands. Rest Lake is a major open water feature on SLWA, well vegetated with submerged aquatic plants and surrounded and interspersed with tall and medium statured emergent vegetation stands. The east portion of the unit is semi-permanent and seasonally flooded palustrine wetlands consisting of medium statured emergent vegetation, primarily alkali and American three-square bulrush. The perimeter and shoreline margin in most locations consists of short statured emergent vegetation of saltgrass and other alkaline adapted species as well as non-vegetated playa areas.

Water inflow comes to the unit from all adjacent units. County Road Field and Flats and Dutchy Lake and Potholes units provide continual flows because of their spring fed nature. During irrigation season these flows increase as runoff occurs. Diverted and spring fed water into Perigo and Work Road Ponds units overflow and spill into Rest Lake. During irrigation season deliveries to the River Ranch unit and at high Ana River levels in winter, water flows into the unit from the south. The entire unit is drained into the lower Ana River through one control structure at River Campground. This structure is utilized to regulate water level throughout the entire unit and also affects water levels in the adjacent Country Road Field and Flats unit. At high water levels, water sometimes flows into the lower Ana River through breached portions of the bank.

Rest Lake is used heavily by migrant and breeding waterbirds. The abundance of submerged aquatic plants provides food for many waterfowl and other waterbird species. Supported by the aquatic plant community are abundant invertebrate populations providing additional food resources. Medium statured emergent vegetation is interspersed with numerous opening and ponds providing foraging opportunities for many waterbirds. Use by foraging tule white-fronted and snow geese is very heavy in this unit. Waterbirds forage on fish found in open water areas and waders use openings to forage for fish and invertebrates. Breeding waterfowl make extensive use of this area primarily as brood rearing and molting areas. Nearby and adjacent to Rest Lake in other HMUs are uplands where considerable nesting occurs and broods are able to follow watercourses to the open water of Rest Lake and associated vegetation cover. Canada geese and sandhill cranes nest on muskrat houses and over water in lodged tall emergent vegetation. Rest Lake is one of three locations on SLWA where colonial nesting eared and western grebes have bred. At least 8 species of shorebirds breed in short and medium statured emergent vegetation found along shorelines and in shallow water areas in the interior of the unit.

Hunting use of this unit does not occur due to its status as a refuge. Considerable use occurs in adjacent units as waterfowl move back and forth from these sites and the refuge. Viewing use is somewhat limited by motor vehicle access restrictions (March 15 to August 15 and early October to late January). Non-motorized access to the unit is permitted except during hunting season when it is confined to the perimeter.

Management Strategies

Management direction for this unit is to maintain the wetland/upland complex on a yearlong basis and to incorporate slow drawdown to provide seasonal wetland foraging opportunities in fall. Water levels will be maintained at stable levels during breeding season. Drawdown will be initiated in late summer following the completion of waterbird brood rearing and molting activity. Periodically, once every 8-10 years the unit will be drawndown to the greatest extent possible and held at that low level for one year. Controlled burning will be utilized to ensure long term productivity and to reduce tall emergent vigor in order to attain or maintain hemi-marsh conditions. This will provide productive open and over water nesting features, brood rearing, molting and migrant foraging habitat.

Control structure and other water level management maintenance activities will occur during planned drawdowns.

During these management actions there will be a short-term loss of productivity for some species, but long-term increases will occur. Within season breeding activities and production will be reduced. Foraging opportunities will be enhanced due to removal of dense vegetation that will provide increased waterbird access to stands previously closed. Waterbird use expected to increase in adjacent units. Decreased use of the unit may affect bird use in the refuge and hunting opportunities in adjacent units but is believed to occur only in the season during management actions. Long term wildlife use of the refuge will improve in response to increased productivity which should result in improved future hunting opportunities.

Perigo

Background

This 130 acre is a mix of palustrine semi-permanent wetlands and salt desert scrub uplands. Open water ponds are well vegetated with submerged aquatic plants and have stands of tall statured emergent situated primarily along their southern margins. Tall statured emergents have recently invaded into the open water area of West Perigo Pond.

Water is supplied to the unit from run-off and spill from a water control structure on the northeast side of Bessie Lake located adjacent to the southwest corner of the unit. Flows head east from this source filling the three major ponds in the unit. Perigo Pt. and West Perigo ponds can be isolated. Middle Perigo Pond is dependent on spill from West Perigo Pond and drains into Rest Lake or overflows sending water to Big Perigo Pond. Perigo Pt. Pond receives water from the west in a minor drainage originating from springs and subsurface flows during irrigation season. All ponds except West Perigo drain south into Rest Lake through water control structures situated along Perigo Dike.

The unit is utilized heavily by migrant waterfowl especially ducks, swans, snow and tule white-fronted geese that feed on submerged aquatic plants and emergent vegetation along the pond perimeters. Breeding season use is heavy as well due to meadow-like

and upland features within the unit and its proximity to uplands and excellent nesting cover in adjacent units. Brood rearing habitat is very good in most of the unit due to abundant invertebrates and being adjacent to nesting areas. Other waterbirds utilize the unit for foraging and breeding habitat.

The entire unit is open to hunting. Access is very easy due to parking areas situated on Lake Co. Road 4-17 (Thousand Springs Lane) and dikes/roads along the perimeter. The unit adjoins the County Road Field and Rest Lake refuges that are heavily used by foraging snow geese. Combined, these features result in extensive hunter use. Viewing use is also popular due to the ease of access.

Management Strategies

Management direction is to maintain the unit as semi-permanent wetland. Habitat will be provided for several consecutive years on a cycle or rotational basis (6-10 years). In two consecutive years of the rotation, it will be drawn down and held as dry as possible in the first year and into early fall of the 2nd year. This will allow for nutrient cycling to enhance productivity and control of robust tall statured emergent vegetation utilizing a variety of techniques that require dry site conditions. Habitat management activities to be utilized to attain or maintain hemi-marsh conditions may include, controlled burning, disking, grazing, herbicide application and mowing. The desired outcome will be to maintain productive ratios of open water to robust tall statured emergent vegetation. Dike and water control maintenance and repair control activities will occur when drawdowns take place. These actions will provide improved productivity for nesting, brood rearing, molting and migration maintenance habitat in the unit.

During drawdown years, wildlife habitat features will be compromised in the entire unit during the growing season. Migrant waterfowl and other waterbird use will not occur in the short term. It is expected that most wildlife use will shift to other units or areas to compensate for this temporary loss.

Hunting opportunities will be adversely affected due to reduced waterfowl and waterbird food production during both years of management activities. Impacts will occur early in the hunting season (October) of the 2nd year due to a delay in fully flooded conditions following completion management actions. Viewing use will be similarly affected.

Dutchy Lake and Potholes Unit

Background

This 300 acre area is a mix of palustrine permanent, semi-permanent wetlands and desert salt scrub uplands. Dutchy and Bessie lakes, Greenwing teal and Merganser Hole ponds are major open water features of this unit. Tall statured emergent vegetation is found around most of the perimeter and a very dense stand is located in the southeast corner of Dutchy Lake extending east into several other ponds. Open water in many of the ponds and potholes is being lost due to invasive and robust tall statured emergent vegetation. Submerged aquatic plants are abundant and contain

immense invertebrate populations. Tui chubs are numerous in Dutchy Lake and the other ponds. Short and medium statured emergent vegetation are found in many interspaces between ponds and along portions of the Dutchy Lake perimeter. The east portion of the unit is a very heterogeneous mix of upland knolls, points and peninsulas consisting of high quality dense nesting cover.

Dutchy Lake is primarily spring fed. Considerable inflow comes into the unit from the north via the NoName and Church Lake drainage. Run-off during irrigation season contributes significant inflow during the summer. Additional springs and seeps feed ponds on the eastside of the unit. Overflow and spill from the Gadwall Hole unit drains into this unit. Water level in Dutchy Lake is regulated at a structure located in the southeast corner of the lake. Control structures in Greenwing Teal and Merganser Hole Ponds regulate levels in those areas. When Dutchy Lake is maintained at a high level, considerable water backs up into Headquarters Field and Desert Field units filling ponds in those areas. The entire unit drains into the Perigo and Rest Lake units through two structures at Bessie Lake along Work Road.

Waterbird use of the unit is very high year round. Diving ducks and other vegetation feeding species (gadwall, Am. wigeon and tundra swans) make extensive use of open water areas. Cormorants, terns and other fish eating birds forage extensively in Dutchy Lake. Waterfowl production is heavy in the unit. Canada geese and ducks nest in tall statured emergent vegetation and in residual cover of grasses, forbs and brush found in the very diverse uplands and meadow-like sites around and between ponds. A large colony of eared, Clark's and western grebes nest on Dutchy Lake using floating aquatic plants to build nest platforms. Waterbird brood use is very heavy due to an abundance of submerged aquatic plants and invertebrates.

The entire unit is within the open hunting area and receives heavy use due to easy access. Three parking areas are situated along Thousand Springs Lane within short walking distance to most of the unit. In addition, Perigo and Trade-In Field parking areas provide access to the east and south sides of the unit, respectively. Walk-in viewing use is permitted year round but use is light.

Management Strategies

Management direction is to maintain and manage the unit as permanent/semi-permanent marsh and the associated wildlife benefits. On an 8-10 year cycle the unit will be drawdown to the greatest extent possible and held at low levels most of the growing season to enhance wetland productivity. Robust tall statured emergent vegetation will be managed through controlled burning, herbicide treatments or mechanical means to maintain important open water features.

Waterbird use will be improved when drawdowns occur due to increased availability of foraging sites previously under water. Plant production and subsequent waterbird use is expected to decline in the short term. Depending on the timing of fall flooding and weather conditions invertebrate and vegetation regrowth could result in increased

waterfowl use and improved hunting success. Viewing use will be enhanced when drawdowns and flooding occurs in spring and fall, respectively.

County Road and Turner Ponds

Background

This 250 acre area is a complex mix of palustrine permanent and semi-permanent wetlands and salt desert scrub uplands. Medium and short statured emergent vegetation surrounds ponds, drainage courses and spring/seep areas. Tall statured emergents are very prevalent and dense in some ponds and along drainage courses. Upland vegetation consisting of black greasewood dominated brush and associated alkaline adapted grasses, sedges and forbs is intermixed with wetlands throughout the unit on dunes and ridges providing considerable diversity. Shorelines margins are very irregular and complex in the County Road Pond area further enhancing habitat diversity. Ponds and drainages are well vegetated with submerged aquatic plants harboring tremendous invertebrate populations.

Several springs and small seeps are scattered throughout the unit. Turner Well water flows to the constructed Turner Ponds (3) in the northwest corner of the unit. Overflow from the ponds supplies water to the west side of the County Road Pond complex. During irrigation season, ditch loss from nearby SmLID canal increases spring and seep discharges. Structures in each of the Turner Ponds and on West County Road Pond regulate water levels in the unit. Overflow and spill supplies water to the County Road Field and Flats unit via the West County Road Pond structure.

The unit is an important waterfowl production area due to the mosaic of uplands and wetlands and its location to dense nesting cover found in the Turner Place unit. Due to prolific submergent aquatic plants and associated invertebrates the unit receives heavy foraging use by a wide array of waterbirds. Tundra swans, American wigeon and diving ducks are attracted in large numbers.

The entire unit is within the open hunting area and receives considerable use. Viewing use of the unit is also high due to its location along the Wildlife Viewing Loop and easy access that provides year round public use.

Management Strategies

Management direction is to maintain permanent wetland features supporting waterbird foraging and production. Periodic habitat perturbations will be necessary to maintain productivity and will occur on an 8-10 year cycle. Growing season drawdowns of ponds will be employed to recycle nutrients and enhance aquatic plant and invertebrate productivity. Water levels will be drawndown to the greatest extent possible and held at low levels the entire growing season. Robust tall emergent vegetation will be managed through controlled burns, herbicide treatments or mechanical means to maintain open water features. Controlled burning will be utilized to enhance and improve nesting cover.

Dikes and water control structures will be maintained during drawdown periods and mechanical and chemical control of invasive tall emergents may be employed.

Wildlife production will be impacted during management actions in the short term but will increase long term due to increased productivity. Drawdowns and fall reflooding will provide considerable foraging opportunities to a wide variety of waterbirds. Submerged aquatic plant density will be reduced in fall and winter following the growing season drawdown.
Hunting opportunities may be affected during the first year following drawdowns because of decreased Viewing opportunities will be similarly affected

Gadwall Hole

Background

This 330 acre area is predominantly salt desert scrub upland habitat. It is well vegetated with dense nesting cover comprised predominantly of tall stature grasses and forbs intermixed with black greasewood. Palustrine semi-permanent wetlands exist as constructed ponds and are situated along a drainage course through the center of the unit. Open water is very limited in these ponds due to encroachment by robust tall statured emergent vegetation. Water level control is inefficient due to poorly designed dikes.

Water can be supplied from Turner Well and diverted from SmLID canal. Ditch loss from SmLID canal during irrigation season increases water levels and flows throughout the summer that sometimes confounds management actions and opportunities. The unit drains south into the Dutchy Lake and Potholes unit via a water control structure at the south end of the unit.

This unit provides dense nesting cover for a wide variety of ground nesting birds. Duck nesting use is high due to its proximity to wetlands in adjacent units. Upland game bird nesting and hiding use is very high due to excellent cover conditions throughout the unit and nearby food resources found in the adjacent Turner Place unit. Mule deer make extensive use of this area for foraging and cover.

Upland game bird hunting is very popular in this unit and it receives considerable pressure. Access is good with three parking areas situated along Thousand Spring Lane and the Turner Road. Turner Road is located on the east boundary of the unit and considerable viewing use occurs along this route from Ana Reservoir to other portions of the Wildlife Area.

Management Strategies

Management direction is to maintain productive and diverse cover conditions on an 8-10 year cycle. Decadent stands of upland vegetation will be reinvigorated through grazing and/or controlled burning. Semi-permanent wetlands will be enhanced by reducing

robust tall statured emergent vegetation density through a variety of actions. Dikes will be improved to allow full water level management. Robust tall statured emergent vegetation will be reduced by a variety of actions such as disking, herbicide application, mowing and other manipulations of vegetation. The desired outcome will be to maintain productive ratios of open water to robust tall statured emergent vegetation.

Wildlife production and use will be impacted short term due to reduced cover conditions following management actions. Actions are to occur during winter or early spring and wildlife use is expected to shift to adjacent areas. Enhanced and reinvigorated cover stands will return at by end of the first growing season.

Hunting and viewing use may be impacted in the short term, but are expected to improve by the end of the first year following management actions. This will be due to reduced cover density and wildlife use immediately following treatment. Long term benefits will result from enhanced productivity in cover stands and improved wetland conditions.

Headquarters Field

Background

This 180 acre unit consists mostly of palustrine semi-permanent and seasonally flooded palustrine wetlands. Interior portions are densely vegetated with robust tall statured emergent vegetation. Small ponds are found scattered throughout the unit but most have closed-in due to invasive tall statured emergent vegetation. Seasonally flooded wetlands consisting of short and medium statured grasses, rushes and sedges surround the semi-permanent wetlands of the interior area.

Water is supplied during irrigation season to the west side of the unit from Trade-In Field and private lands. The unit is also flooded from north to south when Dutchy Lake is regulated at a high level. When Headquarters Field is fully flooded, water backs into the adjacent Desert Field unit. Drainage at high levels is to the east and southeast towards Work Road Ponds. A control structure is located on the middle of east side of the unit. There, an old drainage ditch directs water to the northwest corner of Work Road Ponds and can regulate water levels.

The unit provides foraging and breeding habitat to a wide variety of waterbirds. Tule white-fronted and snow geese make extensive use of short emergent vegetation especially during spring migration. Canada goose, duck and sandhill crane breeding use is heavy and shorebird use occurs in seasonally flooded wetlands surrounding the perimeter of the unit.

The entire unit is within the hunting area, with access provided primarily at the Trade-In Field parking area. Hunting use is generally light. Very little viewing use occurs in spite of its location adjacent to Highway 31.

Management Strategies

Management direction is to maintain semi-permanent and seasonally flooded wetlands through water level control and other management actions. Water levels are adjusted to accommodate waterbird use during migration time period. Flooding conditions to a high level occur in early fall. Water levels are lowered in early fall to accommodate habitat enhancement actions involving grazing. Emergent vegetation is managed through livestock grazing during winter to improve habitat diversity and foraging sites. In early spring the unit is flooded to a high level that is attractive to foraging migrant waterbirds, especially snow geese. Residual tall statured emergent vegetation will managed by controlled burning, herbicide applications or other means to maintain open water features of small ponds.

Very few impacts or trade-offs to public or resource uses occur under this management direction. Actions will result in increase wetland productivity and waterbird use long term which will increase public use opportunities in the future.

Desert Field

Background

This 140 acre area is predominantly salt desert scrub upland with palustrine semi-permanent and seasonally flooded wetlands found in the lower southwest portion of the unit.

Water level and flooding is tied to the adjacent Headquarters Field and Dutchy Lake and Potholes units. When Dutchy Lake is maintained at a high level, water backs into Headquarters Field and from its east center edge into Desert Field. Irrigation season run-off from Trade-In Field unit and private land contribute water in summer.

The unit provides excellent breeding habitat for many waterbirds. Semi-permanent wetlands contain a good mix of emergent vegetation to open water, and pond bottoms support significant submerged aquatic plants. Adjacent upland habitat is well vegetated with dense nesting cover of grasses, rushes and sedges. Ground and over water nesting sites are abundant and excellent brood habitat is provided by wetland ponds rich in submerged aquatic plants and invertebrates. Habitat is good for molting ducks due to emergent vegetation utilized as cover and plentiful food necessary for feather growth. Migrant waterfowl find excellent food resources in the wetlands and use is heavy especially by ducks and geese.

The entire unit is within the open hunt area. Access is somewhat limited and use is relatively light. Very little viewing use occurs due to its isolation and motor vehicle use restrictions spring through fall on Work Road.

Management Strategies

Current management direction is to maintain the existing flood and drawdown regime. Periodic (8-10 years) habitat enhancement activities of controlled burning, disking,

herbicide treatment, mowing or other vegetation manipulations may occur. The expected outcome is to maintain desirable open water to robust tall statured emergent vegetation ratios in wetlands. Upland habitat may be planted to improve vegetation species composition and density in specific locations as necessary. Improved dense nesting cover is the desired objective.

Some habitat features would be lost in the short-term during the first year following enhancement activities. Public use affects would be minor in nature and short in duration.

Work Road Ponds

Background

This 180 acre unit consists predominantly of palustrine semi-permanent and seasonally flooded wetlands, constructed potholes and small pockets and fingers of salt desert scrub especially along the north and west borders.. Robust and dense tall statured emergent vegetation occurs in several locations where water flows into the unit and along pond margins. North and South Work Road ponds form the major water features of the unit and are connected by narrow channels. Both ponds are rich in submerged aquatic plants and harbor excellent invertebrate populations. Seasonally flooded wetlands of short and medium statured emergent vegetation occur along most of the north and west portions of the unit. American three-square bulrush is abundant along the interface with semi-permanent wetlands. A complex series of small shallow ponds with crenulated shoreline provides excellent waterbird habitat in western portions of the unit.

A ditch from the Headquarters Field unit feeds N. Work Road Pond. A chain of excavated potholes (5) are located on the north edge of the unit. A channel flowing from the southeast corner of the Headquarters Field feeds S. Work Road Pond. Headquarters Field water levels must be fairly high to provide water to S. Work Road Pond. Additional water reaches the southern portion of the unit from the adjacent Headquarters Pasture and Potholes unit. Water is collected by SmLID canal from spring sources on private land and is distributed by a ditch flowing through the Headquarters Complex. That flow is augmented by irrigation season deliveries during summer. The entire unit is regulated by a single structure on in S. Work Road Pond that delivers water to Rest Lake.

Work Road Ponds unit provide excellent habitat for breeding and migrant waterbirds. Significant duck nesting occurs throughout the unit and seasonal wetland provide excellent brood rearing habitat. The large ponds, submerged aquatic plants, good invertebrate populations and tall statured emergent vegetation border combines to very good habitat for molting ducks. Shorebird breeding and brood rearing use is also significant on portions of the unit. It is used heavily by feeding tule white-fronted and snow geese during migration.

Hunting use of the unit is not heavy in spite of its proximity to River Campground. Viewing use is generally light due to motor vehicle access restrictions along Work Road.

Management Strategies

Management direction is to maintain the unit as semi-permanent and seasonally flooded wetlands. Habitat will be provided for several consecutive years on a cycle or rotational basis (6-10 years). In two consecutive years of the rotation, it will be drawn down and held as dry as possible in the first year and into early fall of the 2nd year. This will allow for nutrient cycling to enhance productivity and control of robust tall statured emergent vegetation utilizing a variety of techniques that require dry site conditions. Habitat management activities to be utilized to attain or maintain hemi-marsh conditions may include, controlled burning, disking, livestock grazing, herbicide application and mowing. The desired outcome will be to maintain productive ratios of open water to robust tall statured emergent vegetation.

Dike and water control maintenance and repair activities will occur when drawdowns take place. These actions will provide improved productivity for nesting, brood rearing, molting and migrant foraging habitat in the unit.

During drawdown years, wildlife habitat features will be compromised in the entire unit during the growing season. Breeding waterfowl and other waterbird use will not occur in the short term. It is expected that most wildlife use will shift to other units or areas to compensate for this temporary loss.

Hunting opportunities will be adversely affected due to reduced waterfowl and waterbird food production during both years of management activities. Impacts will occur early in the hunting season (October) of the 2nd year due to a delay in fully flooded conditions following completion management actions. Viewing use will be similarly affected.

Headquarters Pasture and Potholes

Background

This 280 acre area is a complex mix of salt desert scrub uplands and palustrine semi-permanent, seasonally flooded and wet meadow wetland habitat. Tall statured emergent vegetation has closed in a majority of the pond and potholes with especially dense patches south of Headquarters Road. Islands and ridges of upland vegetation are prevalent throughout the unit, as are wet meadows. Several excavated linear ponds and a chain of ponds are found in the west portion of the unit but are largely closed in by robust tall statured emergent vegetation.

Water is supplied to the unit from a ditch flowing from SmLID canal through Headquarters Complex. The amount is greatest during irrigation season when diverted water is available. Outside of irrigation season the ditch carries spring flow arising from private land and captured by SmLID canal. Water is divided within the unit; some is directed to Long Pond and wetlands south of Headquarters Road with overflow draining

into Ana River. Water is also delivered to eastern portions of the unit through excavated chain ponds flowing towards S. Work Road Pond. An additional source of water sometimes comes to the unit from Leyva Lakes in the Headquarters Complex and Ag Fields unit. When Leyva Lakes if full, it spills to the east flooding several small wetland areas as it heads toward Long Pond. Constancy and predictability of this water is not good since it is dictated by actions on adjacent private land. As a consequence of those actions, Leyva Lakes and wetlands in Headquarters Pasture and Pothole unit are sometimes marginally flooded or dry.

Good breeding habitat is provided to waterbird species desiring dense nesting features in wetlands. Adjacent upland sites provide excellent breeding habitat as well. Brood rearing areas within the unit are limited, but the adjacent Work Road Ponds and lower Ana River fulfill that need.
Upland game birds (both ring-necked pheasants and California quail) make extensive use of upland habitat especially along the border with the Headquarters Complex and Ag Field unit where considerable food and cover is provided.

The entire unit is within the hunting area and borders the Headquarters Complex refuge to the west. Hunting use is generally light due to its location peripheral to major wetlands and waterfowl flight corridors. Parking areas are located at the west boundary with the refuge and at River Campground. Viewing use is heavy since the Wildlife Viewing Loop bisects the unit and because of its proximity to Headquarters Complex.

Management Strategies

Current management entails maintaining the unit as a waterbird production area. Decadent dense nesting cover and emergent wetland vegetation will be rejuvenated and manipulated primarily through livestock grazing on a periodic (6-8 year) basis. Other habitat manipulation actions may include controlled burning, herbicide treatment, mowing and mechanical means to maintain vegetation diversity and open water features. Disturbance induced by livestock grazing will be on about 25% of the unit annually. The desired outcome will be to reinvigorated upland cover sites, reduce robust tall statured emergent vegetation stands and increased open water in ponds.

Wildlife and public use impacts are expected to be light due to the small portion of the unit treated annually and scheduling of treatments when public use is low (late fall and winter). Wildlife use is generally low during this time as well and can shift to adjacent unit in the short-term.

Headquarters Complex and Ag. Fields

Background

This 90 acre area is predominantly salt desert scrub upland that has been used for agriculture food plantings in the past. Leyva Lakes is a small pocket of palustrine semi-permanent wetland.

The Headquarters Complex is sited in this unit, providing most of the Area's physical infrastructure. Planted trees and shrubs and a fruit tree orchard are found in association with residences on the complex. Other tree plantings are found at Leyva Lakes and on the north boundary of the unit.

As discussed earlier, the ditch from SmLID canal that delivers water to other units flows through the center of the unit. Leyva Lakes receives water from Jack's Creek, delivered across private land. Constancy and predictability of this water is not good since it is dictated by actions and use on the adjacent private land. As a consequence, Leyva Lakes are sometimes marginally flooded or dry.

Upland habitat has an excellent combination of brush, grasses and forbs that provides good nesting cover for ducks, upland game birds and other ground nesting species. Trees and shrubs provide excellent habitat for a variety of passerine species.

This unit is maintained as the Headquarters Refuge during hunting season. Viewing use can be heavy due to its association with the Headquarters Complex.

Management Strategies

Management direction has been to maintain existing habitat features found in this unit. Planting of food plots and additional trees and/or shrubs will enhance wildlife use. Decadent dense nesting cover and emergent wetland vegetation will be rejuvenated and manipulated primarily through livestock grazing on a periodic (6-8 year) basis. Other habitat management actions may include controlled burning, herbicide treatment and mowing. The desired outcome will be reinvigorated upland cover sites and reduced robust tall statured emergent vegetation through disturbance induced by grazing or other means.

Impacts to wildlife and public use are expected to be light due to the small portion of the unit treated annually and the short duration when actions occur. Hunting use will not be affected due to the unit being a refuge area and viewing use will not be affected to a large degree.

Trade-In Field

Background

This 20 acre area consists of an agricultural area presently planted to grass cover with interspersed brush. Trees and shrubs exist in portions of the unit, especially along the west boundary.

Diverted irrigation water is supplied to the unit during summer as well as delivered to the adjacent Headquarters Field unit.

A variety of wildlife species utilized the unit for nesting due to the excellent cover conditions. Limiting foraging and brood rearing occurs as well.

The unit is within the managed public hunt area and a parking area provides access to the nearby Dutchy Lake and Headquarters Field unit. Hunting and viewing use is generally light during most of the season.

Management Strategies

Current management of the unit is to provide dense nesting cover for ground nesting birds. Decadent dense nesting cover will be rejuvenated and manipulated primarily through livestock grazing on a periodic (6-8 year) basis. Other habitat management actions may include controlled burning, herbicide treatment and mowing. Food plots and additional tree/shrub plantings would enhance habitat features resulting in increase wildlife use. The desired outcome will be reinvigorated upland cover sites and development of other habitat features to maximize habitat diversity.

Wildlife and public use impacts are expected to be light due to the small size of the unit and timing of management actions to late winter and spring when public use is light.

Caulkins Place

Background

This 120 acre area consists of salt desert scrub, sagebrush steppe and agricultural upland habitat. The unit is predominantly dry with the exception of its border with Ana Reservoir and a spring fed drainage in the northeast corner of the unit. This drainage has well developed tree (willow) and extensive forb and grass cover.
Diverse habitat conditions are provided to California quail, mourning dove, mule deer, ring-necked pheasants and a wide variety of non game wildlife for nesting, brood rearing, foraging and cover.

The unit is within the managed public hunt area and receives considerable hunting use. A parking area is situated at the Caulkins Place Homestead and receives heavy angler use. Caulkins Lane access road is heavily used by anglers, hunters and viewers accessing Ana Reservoir and to other northern portions of SLWA.

Management Strategies

Management direction is to provide a diversity of habitat features for a variety of wildlife species. Farmed food and cover plots are found in the center of the unit comprising about 25 acres. Five to 10 acres are planted to small cereal grains annually. The western half of the unit was formerly seeded to crested wheatgrass and annual late fall/winter livestock grazing is utilized to maintain spring green-up conditions for foraging mule deer. The remainder of the unit is well vegetated with shrubs and grass providing excellent nesting and hiding cover adjacent to food plots. Decadent cover stands will be rejuvenated through disturbance by livestock grazing on a periodic (6-8 year) basis utilizing grazing livestock. Other habitat management actions may include controlled

burning, herbicide treatment and mowing. The desired outcome will be diverse and productive upland habitat providing food and cover for a diversity of wildlife species.

Impacts to wildlife and public use are expected to be light due to small portions of the unit treated annually and the short duration when actions occur. Hunting and viewing uses will not be affected due to the brief time period and generally low intensity of management actions.

Bio. House, Church, Dutchy and Swanie

Background

This 180 acre area is a mix of agricultural and salt desert scrub uplands and palustrine semi-permanent wetlands. A small portion of No-Name Lake, a palustrine permanent wetland is within the unit. Wetlands are dominated by dense and robust tall statured emergent vegetation that is expanding into and closing open water areas. Open water areas support excellent submerged aquatic plant growth. Agricultural portions of the unit are comprised of farmed food and cover plots. Adjacent upland areas dominated by shrub and grass cover. Several tree and shrub rows are well established and increase habitat and wildlife diversity tremendously.

Semi-permanent wetlands are found in the center of the unit supplied with water from springs originating on private land to the north. Church Lake, a major water feature is found in the southeast corner of the unit. By OWRD decree, this source of water was withdrawn from further appropriation and is to remain in the Church, Dutchy, and No Name Lake drainage outside of irrigation season. Irrigation run-off is collected in this drainage and is delivered to Dutchy Lake via two water control structures found on the south side of Church Lake.

The Dutchy and Swanie Fields are below the SmLID irrigation canal and portions receive irrigation water allowing for reliable growth of food and cover plots.

The unit provides important upland game bird cover, food and nesting habitat. Of equal importance is the use of cover plots and uplands by nesting waterfowl due to the proximity of adjacent wetlands. A residence (Bio. House) is located in the southwest corner of the unit and is surrounded by trees shrubs, orchard and a small wetland area. The Bio. House area provides important habitat diversity to a wide variety of non-game species. Cover and food plots found there support considerable upland game bird and mule deer use.

Most of the unit is within the managed public hunt area and receives considerable hunting use. A majority of this use is for upland game bird hunting as well as access to Dutchy Lake and other waterfowl hunting areas. Three parking areas situated along Thousand Springs Lane receive heavy use. Viewing use can be heavy since Thousand Springs Lane is along the north portion of the Wildlife Viewing Loop and provides access to northeast portions of the Wildlife Area. A refuge (23 ac.) surrounds the Bio house site, encompassing SLWA lands west of Hwy. 31.

Management Strategies

Current management direction is to maintain food crop plantings (10-15 acres in small plots) and cover areas for upland wildlife species to meet foraging, nesting and brood rearing needs. Development of additional tree and shrub plots will improve winter cover for upland game birds that may be a limiting factor to populations. Tall statured emergent growth is encroaching and closing in a significant portion of Church Pond that will require mechanical or chemical control actions in the future due to the inability to dry the site for heavy equipment use. On an 8-10 year cycle the unit will be drawdown to the greatest extent possible and held at low levels most of the growing season to enhance wetland productivity. Robust tall statured emergent vegetation will be managed through controlled burning, herbicide treatments or mechanical means to maintain important open water features.

Few short-term and no long-term impacts or trade-offs to wildlife or public uses are anticipated under this management strategy except during wetland drawdown years. Then, cover and forage opportunities will be reduced short-term and wildlife use will shift to other units. Public use opportunities will also be affected but are expected to increase long term in response to enhanced habitat productivity.

Turner Place

Background

This 40 acre area is predominantly agricultural upland with a fringe of salt desert scrub upland and palustrine semi-permanent wetlands.

As a former homestead site, it is a developed irrigated agriculture area containing farmed fields, a fruit orchard and planted trees and shrubs. Additional tree and shrub plots have been developed and the fruit orchard expanded taking advantage of irrigation capabilities.

Several ditches and canals carry water regulated and diverted from Turner Well. This water source is shared with the adjacent Gadwall Hole and County Road and Turner Pond units. Wheel line and sprinkler irrigation systems have been developed and provide additional opportunities for improved food and cover plot culture.

Upland game bird, mule deer and non game wildlife use is heavy in this unit due to the abundance and diversity of food and cover plantings. Managed grasses and forbs along with other upland sites provide excellent dense nesting and hiding cover for ground nesting birds. Wildlife diversity is exceptional because of trees and shrubs found at the old homestead sites, developed plots and the fruit orchard. The plots provide winter cover for upland game birds meeting a limiting factor to increased carrying capacity. Considerable waterfowl nesting occurs within the unit due to dense nesting cover and the proximity to wetland areas.

The entire unit is open to hunting and receives heavy use by upland game bird hunters. Wildlife viewing and other nonconsumptive uses is heavy due to habitat features provide by trees and shrubs and because of the unit's location along Turner Road that provides access from Ana Reservoir to Thousand Springs Lane and other portions of SLWA.

Management Strategies

Management direction will entail annual farming activities to maintain food crop plantings and cover areas for upland wildlife species to meet foraging, hiding, nesting and brood rearing needs. Because of excellent growing conditions, cover plots can become decedent and periodic (6-8) year rejuvenation through disturbance activities is necessary. Habitat management actions will include controlled burning, grazing, herbicide treatment and mowing. The desired outcome will be reinvigorated and productive upland cover sites.

Additional tree and shrub plantings can be established around the perimeter of the unit taking advantage of irrigation capabilities to increase habitat diversity.

Annual management activities will be limited to relatively small portions of the unit in any given year to provide cover and food on a continual basis. Few short-term and no long-term impacts or trade-offs to wildlife or public uses are anticipated under this management strategy.

Middle Well

Background

This 35 acre area is surrounded by the North end/alkaline shrub unit. It is a developed agriculture area managed for irrigated alfalfa hay production and other habitat features.

Water is supplied to the unit from Middle Well, a year round flowing artesian source utilized for crop production during irrigation season. Water surplus to irrigation flows in a ditch to the nearby Sulfur Well Ponds.

Forage and cover are provided to mule deer and a wide variety of upland wildlife. Tree and shrub plantings along the north edge of the field provide food and cover for many non game species and increases habitat diversity of the area. Hay production management provides for irrigation of the tree and shrub planting, a delayed first cutting to accommodate nesting, and irrigation following the final hay cutting to provide fall and winter forage. Mule deer forage on the hay crop during growing season and especially in late fall and early winter. Early season nesting occurs prior to the first crop cutting (delayed until July 1). Upland game and non game birds utilize trees and shrubs in the plots for cover and food. Periodically (5-7 years), as the alfalfa crop looses productivity, the field is replanted and a cover crop of small grains is planted during the first year providing additional wildlife food sources. Translocated Warner suckers inhabit the Middle Well ditch along the north edge of the field.

The unit is within the managed public hunt area and receives light hunting use. Viewing use can be heavy due to the unit proximity to Ana Reservoir and visitors camping there as well as its location along the Middle Well Road. Two parking areas situated in the northeast and northwest corners of the unit increase access to this and adjacent units.

Management Strategies

Management direction will be to continue the hay production that will maintain food and cover values for upland wildlife species. Additional tree and shrub plots can be established around the perimeter of the unit, taking advantage of irrigation capabilities.

Few short-term and no long-term impacts or trade-offs to wildlife or public uses are anticipated under this management strategy.

Foster Place

Background

This 435 acre area is a complex mosaic of palustrine wet meadow, semi-permanent, and seasonally flooded wetlands, salt desert scrub uplands, agricultural fields, planted cover plots and other modified (constructed potholes) sites.

Most of the unit receives irrigation water from SmLID canal that runs along the full length of the west side. Irrigation water is utilized to fill ponds and potholes, irrigate hayed meadows, and to maintain meadows during and following nesting season. Spring flow originating off Winter Ridge and within SmLID irrigation canal are diverted to southeastern areas of unit outside of irrigation season while the north half remains dry.

This unit benefits a wide variety of waterfowl, other wetland dependent and upland wildlife due to a diversity of habitat features. Semi-permanent wetlands consist of several small ponds located on the east side of the unit. Constructed potholes are dispersed throughout the unit and are surrounded by meadow and upland sites. Heterogeneity is tremendous in this unit. A food plot area is located in the north center of the unit and four grazing pastures are interspersed between cover blocks. Three of the four grazing pastures are hayed prior to winter livestock grazing on regrowth in those pastures. A hillside slope on the west side of the unit is vegetated with juniper trees, large patches of Klamath plum and other shrubs.

Numerous small ponds and constructed potholes allow for waterfowl pairs to be well distributed throughout the unit. Gold Dike Impoundment is adjacent to the unit along its entire eastern border and a tremendous amount of duck pair habitat is provided there. Brood habitat is well dispersed within the unit and all drainages flow toward excellent rearing habitat found in the Gold Dike Impoundment. These features make the unit extremely attractive to nesting ducks and nest densities are very high within the unit. Good habitat diversity has resulted in at least six sandhill crane nesting territories to be

established in the unit. Food crop plantings attract and provide excellent foraging and migration staging areas for resident and migrant cranes.

The entire area is within the managed public hunt area. Parking areas are located in the opposite corners of the unit at South and O'Leary Access areas. Hunting use in the unit is generally low. Viewing use is low as well.

Management Strategies

Management direction will be to continue to provide a wide variety of productive habitat types. Wet meadows and potholes will be managed through timely flooding during the breeding season. Dense nesting cover will be the prominent managed feature in most of the unit. Decedent cover and emergent wetland vegetation will be rejuvenated and managed primarily through livestock grazing on a periodic (6-8 year) basis. Other habitat manipulation actions may include controlled burning, herbicide treatment and mowing. Food crop plantings (for sandhill crane use) will be maintained annually on 10-15 acres. Tree and shrub planting along the west side of the unit will increase habitat diversity for a variety of wildlife species.

Few short-term and no long-term impacts or trade-offs to wildlife or public uses are anticipated under this management strategy.

Ana Reservoir/North End Shrub

Background

This is a 700 acre (1.1 sq. mi.) area of salt desert scrub and sagebrush-steppe uplands. Two small palustrine permanent wetlands exist, Upper and Lower Sulphur Well Ponds. Upland habitat north and east of Ana Reservoir is largely undisturbed from natural historic conditions. In the southwest corner of the unit, sage-brush steppe uplands are in good condition, maintaining native plant diversity. Much of the interior and western portions of the unit were converted from shrub dominated upland habitat to crested wheatgrass seedings 30 to 50 years ago. Native shrubs are increasing in density but other grasses and forbs relatively rare due to the competitive nature of the established crested wheatgrass.

Artesian well water from Middle Well flows to the Sulphur Well Ponds via a meandering ditch. Two smaller spring fed potholes surrounded by emergent vegetation in the southwest corner of the unit contain water year round. Robust tall statured emergent vegetation forms a perimeter around most of both Sulphur Well Ponds. Upper Sulphur Well Pond is losing open water due to robust tall statured emergent vegetation encroachment. Submerged aquatic plants are prolific in both ponds and support considerable diving and other duck use. California quail are dispersed widely across the unit, utilizing upland habitat for cover and food. Ground nesting birds make extensive use of native and manipulated habitats due to favorable distribution of water sources as well as a diversity of habitat features. A wide variety of non game wildlife species are found in this unit.

The entire unit is within the managed public hunting area and receives heavy hunting use, primarily for upland game birds. Access is good via major roads (Caulkins Lane, Middle Well Road, and Turner Road. Two parking areas are found in the interior of the unit as well as numerous locations surrounding Ana Reservoir. Viewing use is heavy due to the unit surrounding Ana Reservoir and because of the major access roads leading to other portions of the wildlife area.

Management Strategies

Current management direction is to provide natural food and cover and to replace crested wheatgrass monocultures with native or more desirable grass and forb species. Rotational high intensity grazing will be utilized to stress crested wheatgrass plantings followed by broadcast seeding of more desirable species. Other manipulations such as controlled burning, herbicide treatment and mowing may be utilized. The desired outcome is to have productive and diverse vegetation throughout the unit. Protection of undisturbed salt desert scrub communities is a high priority in this unit.

Few short-term and no long-term impacts or trade-offs to wildlife or public uses are anticipated under this management strategy.

Upper Ana River and Alkaline Shrub

Background

This 1,500 acre (2.3 sq. mi.) area consists predominantly of undisturbed salt desert scrub upland habitat vegetated with a diversity of native plants. A variety of non game wildlife species are found utilizing various habitat features to meet their life cycle needs. Fine alkaline silt soils are prevalent and wind formed dunes are a major feature of the unit. Soils are very fragile and prone to erosion. The unit is dry with the exception of palustrine riverine wetland habitat found along Ana River that forms the north and east boundary. Ana River meanders through a canyon in a sinuous pattern. Riverine wetlands provide considerable species diversity to this otherwise dry habitat. Banks are very unstable and prone to erosion. A complex network of roads and trails has impacted in this part of the unit are damaging fragile soils and increasing erosion. A majority of the roads are surplus to access needs and have been created by unregulated vehicle use. A large number of low elevation retention dams were constructed 40 year ago to capture run-off and sediments eroded during high intensity weather events. Many of these structures have failed and now permit fine alkaline sediments to enter Ana River and probably have caused impacts to aquatic species and a proliferation of robust tall statured emergent vegetation.

The entire unit is within the managed hunting program and hunting use is moderately high. Access is good due to the prevalence of roads along Ana River and it is a popular jump shooting area. Viewing use is minimal but angling use can be heavy especially in the upper reaches of Ana River. Illegal off-highway vehicle use occurs occasionally in this area.

Management Strategies

Management direction is to maintain natural conditions to provide wildlife habitat diversity. Enhancement activities will be focused on protecting habitat and reducing adverse impacts. An access and travel management plan will be prepared and unnecessary roads and trails will be closed to reduce soil impacts and lessen erosion. Retention dams have recently been improved and will be maintained. Native and desirable vegetation will be planted along Ana River to stabilize fragile soils and reduce bank cutting and erosion.

Upland habitat and wildlife resources will benefit due to these protection, rehabilitation and stabilization actions both in short and long term. Some public use will be impacted when unnecessary roads and trails are closed to motor vehicle travel. Habitat enhancement and increased wildlife use should occur and provide improved public use opportunities in the future.

North End/Upslope Basin Perimeter

Background

This 700 acre (1.1 sq. mi.) area consists of sagebrush-steppe upland habitat. It occurs around the perimeter of the basin and was once the shoreline boundary of the Pleistocene Lake Chewaucan. A diverse community of native plants occurs in this unit. Western juniper, bitterbrush, sagebrush, native bunchgrasses and forbs are prevalent in the north portion of the unit. Juniper seedlings are invading sagebrush communities at an alarming rate. A major portion of the unit was altered by wildfire in 2002. Developments and management alterations are confined to the development of a catchment pond and a small gravel pit in the northwest corner. Gravel continues to be extracted and utilized on dike, levee and road maintenance throughout the Wildlife Area.
No perennial water sources are found within the unit and run-off catchment/retention in basins is ephemeral.

Many sagebrush-steppe obligate wildlife species are found in this unit. Mule deer and California quail use make extensive use of this area year round.

Public use is moderate and access is good due to its location along Hwy. 31. Three (3) parking areas are found in dispersed locations along the unit boundary.

Management Strategies

Management direction for the unit is to maintain and/or enhance existing conditions to provide naturally occurring upland habitat for a diversity of wildlife. Native vegetation will be planted in burned areas to accelerate recovery. Invasive juniper will be managed to maintain productive and existing native shrub communities. Hand or mechanical removal will be utilized in the short-term and other techniques (controlled burning and

herbicide treatments) may be considered in the future once burned areas have recovered sufficiently.

Few short-term and no long-term impacts or trade-offs to wildlife or public uses are anticipated under this management strategy.

Alkaline Playas

Background

A 3,571 acre (5.6 sq. mi.) unit consisting of predominantly lacustrine intermittently and seasonally flooded wetlands situated along the east side of SLWA. It is the relic lakebed of Lake Chewaucan that covered nearly all of Summer Lake Basin during the Pleistocene. A majority of lacustrine wetlands in the unit are devoid of vegetation. Along the northwest edge, salt desert scrub uplands are found along Ana River. Palustrine seasonally flooded wetlands occur along the Bypass Canal and where water drains from Bullgate Refuge.

Flooding of the playa and soil saturation occurs during severe weather events when strong winds drive the lake up and into these areas. Occasional events of high intensity precipitation cause flooding and pooling in many areas.

Emergent vegetation occurs along Bypass Canal where flowing water creates conditions to sustain emergent and submerged vegetation.

Waterfowl utilize the entire area for loafing and foraging occurs along the Bypass Canal. Snowy plovers utilize this area extensively. Nesting, brood rearing and post breeding/pre-migration staging is provided, especially along Bypass Canal and other water interfaces. Other shorebirds utilize Alkaline Playa wetlands when flooded conditions occur.

The entire unit is within the Bullgate and Schoolhouse Refuge, so hunting use does not occur. Viewing use occurs along the boundary with other units since the Wildlife Viewing Loop is in close proximity to the unit. A major potion of the unit is BLM land and designated as the Diablo Mountain Wilderness Study Area (WSA). Cooperative agreement allows ODFW management of recreational use on those lands.

Management Strategies

Management direction is to protect this unit from disturbance and maintain it in a natural condition.

Few short-term and no long-term impacts or trade-offs to wildlife or public uses are anticipated under this management strategy.