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U.S. Shorebird Conservation Plan

Intermountain West Regional Shorebird Plan

Version 1.0

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Intermountain West Regional Report

EXECUTIVE SUMMARY

The Intermountain West (IMW) is a huge region, stretching from Canada to Mexico and from the Rocky Mountains to the Sierras and Cascades. The six Bird Conservation Regions (BCRs) of the IMW include an array of habitats from saline sinks to alpine streams. Eleven species of shorebirds regularly breed in the IMW, and 23 additional species are annual migrants. Two IMW sites (Great Salt Lake, UT and Lahontan Valley, NV) are recognized by Western Hemisphere Shorebird Reserve Network (WHSRN) as Hemispheric Sites, and two other IMW sites (Mono Lake and Salton Sea, CA) are classified as International Sites. A number of additional IMW sites surpass WHSRN International Site requirements (e.g., Lake Abert and Summer Lake, OR).

The IMW is North America's most important region for breeding Snowy Plovers, American Avocets, Black-necked Stilts and Long-billed Curlews. Up to 90% of the world's adult Wilson's Phalaropes molt/stage in the IMW's hypersaline lakes prior to migrating to South America. The IMW also hosts very large numbers of migrant Red-necked Phalaropes, Long-billed Dowitchers, Western Sandpipers and Marbled Godwits. The region, too, is the nation's most important for wintering Mountain Plovers.

The Great Basin, one of the six BCR's in the IMW, stands out as enormously important for both breeding and migrating shorebirds. Of particular importance are the large hypersaline lakes, e.g., Great Salt Lake, UT; Lake Abert, OR and Mono Lake, CA, and the salt lake/playa associated marshes of Utah, Oregon and Nevada.

The most important issue facing shorebird conservation in the IMW is the very great human-driven competition for water. Finding ample high quality fresh water will be the greatest challenge faced by future shorebird conservation interests. The IMW plan addresses this and other issues through five goals and associated objectives and strategies. These goals are: (1) Habitat Management. Maintain and enhance diverse landscapes that sustain thriving shorebird populations by working to protect, restore and manage shorebird habitat. (2) Monitoring and Assessment. Acquire information on shorebird distribution and abundance needed for shorebird conservation, by developing monitoring and assessment programs responsive to local, regional and national needs. (3) Research. Gather new information to facilitate shorebird conservation. This information will deal with the ecology of salt lakes and playas, major shorebird predators, and shorebird species of special conservation concern. (4) Outreach. Develop an informed and supportive constituency for long-term shorebird conservation through implementation of region-wide outreach programs. (5) Planning. Achieve regional cooperation for shorebird conservation by developing a process to facilitate planning among states and agencies, and working toward integration of shorebird concerns with land management plans.

Perhaps a million shorebirds breed in the IMW, and millions of additional shorebirds migrate annually through the area. No inland region of North America is more important to maintenance of the continent's shorebird populations than the IMW. The hiring of a full time shorebird biologist/coordinator to work with the IMW shorebird group and the IMW joint venture in implementing the IMW shorebird plan is our most urgent priority.

INTRODUCTION

The Intermountain West Region (IMW) and its six constituent Bird Conservation Regions (BCRs) include a vast inland area from the Rocky Mountains to the Sierras/Cascades and from Canada to Mexico. The area is the annual home of approximately a million breeding shorebirds and several million transients. Most of North America's Snowy Plovers (*Charadrius alexandrinus*), American Avocets (*Recurvirostra americana*), Black-necked Stilts (*Himantopus mexicanus),* and Long-billed Curlews (*Numenius americanus)* breed in the IMW. Huge numbers of transients, including up to 90% of the world's adult Wilson's Phalaropes (*Phalaropus tricolor*), and very large numbers of Red-necked Phalaropes (*P. lobatus*), Long-billed Dowitchers (*Limnodromus scolopaceus*), Western Sandpipers (*Calidris mauri*) and Marbled Godwits (*Limosa fedoa*) use the IMW wetlands. The majority of the world's Mountain Plovers (*Eupoda montana*) winter in the southern parts of the IMW. This IMW report describes the ubiquitous and diverse shorebird resources of the region and the beginnings of a plan designed to maintain these resources for the 21st century and beyond. The plan describes management, research, monitoring, outreach and planning activities planned for the next five years.

1. DESCRIPTION OF INTERMOUNTAIN WEST

A. Shorebird Habitats

The diverse shorebird habitats of the IMW include: (1) large saline lakes primarily of importance to post-breeding and migrant shorebirds, (2) complex freshwater marshes of great importance to breeding and migrating shorebirds, (3) vast upland areas near wetlands providing critical breeding habitat to several species, and (4) agricultural fields that serve both as breeding and foraging sites. Additional shorebird habitat is provided periodically by (5) a vast array of ephemeral wetlands and playas, (6) numerous man-made impoundments and (7) riparian areas. Table 1 lists many of the regional wildlife refuges with management for shorebirds.

A 1. Large Saline Lake Habitat. Great Salt Lake (see Appendix I for complete description) stands out as probably the most important inland shorebird site in North America, easily surpassing on single days the Western Hemisphere Shorebird Reserve Network (WHSRN) Hemispheric Site requirement for 500,000 shorebirds annually. Other large saline lakes in the region surpass the annual requirement of 100,000 shorebirds for status as a WHSRN International Site, e.g. Salton Sea, CA (see Appendix II); Lake Abert, OR (see Appendix III); Summer Lake, OR (see Appendix IV) and Mono Lake (see Appendix V). The Lahontan Valley, NV, wetlands (see Appendix VI), already classified as a Hemispheric Site by WHSRN, is a complex of saline playas and freshwater marshes and pools. Large saline lakes that in some years surpass the 20,000-shorebird minimum necessary for classification as Regional WHSRN Sites include Honey Lake, CA (see Appendix VII); Goose Lake, CA/OR (see Appendix VIII); and Alkali Lakes, CA. Harney Basin and Klamath Basin, areas of comparable importance to shorebirds, are considered under complex wetlands (see Appendices IX and X). Part of American Falls Reservoir, ID, is a WHSRN Regional Site. Owens Lake, CA, may again become an important shorebird site with the Los Angeles PM 10 dust abatement project to be completed by 2001, wherein the dry lake surface will be shallow flooded and/or covered with vegetation. This will be addressed under goals (See Appendix XI).

a. Breeding on saline lakes. Perhaps the majority of North America's Snowy Plovers breed at Great Salt Lake (approx. 10,000). Snowy Plovers also breed in small to large numbers (>100) at many saline lakes elsewhere in the Great Basin and in the other Bird Conservation Regions

(BCRs) of the IMW. A total of approximately 14,000 to 16,000 breeding Snowy Plovers occur in IMW. Saline lakes, too, are important breeding sites for American Avocets. Seven other shorebird species breed in association with the region's saline lakes, usually near freshwater inflows: Black-necked Stilt, Long-billed Curlew, Wilson's Phalarope, Spotted Sandpiper (*Actitis macularia*), Killdeer (*Charadrius vociferus*), Willet (*Catoptrophorus semipalmatus*) and Common Snipe (*Capella gallingo*).

b. Molting/Staging/Feeding on saline lakes. Saline lakes provide critical food resources to migrating/molting Wilson's and Red-necked Phalaropes. Nearly all of the adult Wilson's Phalaropes in the world stage at these lakes, primarily Great Salt Lake, Lake Abert and Mono Lake, prior to migrating to South America (Colwell and Jehl, 1994). Very large numbers of American Avocets, the majority of the world's population, use these lakes, especially Great Salt Lake, as post-breeding molting/foraging sites. Black-necked Stilts and Marbled Godwits gather in large numbers at Great Salt Lake. Many other species occur at the hypersaline lakes in moderate to large numbers, Western Sandpipers being the most abundant.

c. Wintering on large saline lakes. The only saline lake with a substantial wintering shorebird population is the Salton Sea. One winter survey of this area found 28,000 shorebirds with eight species considered abundant (Shuford et al. 1999).

A 2. Marshes and Lake/Marsh Complex Habitat. Large freshwater marshes of importance to a variety of breeding shorebirds and numerous migrant species are associated with a number of the major saline lakes and playas including Great Salt Lake, UT (e.g. Bear River Marshes), Carson Lake, NV (Lahontan Valley wetlands), Summer Lake, OR, Harney Basin, OR and Honey Lake, CA. Complex freshwater wetlands, not associated with saline lakes/playas, include the Warner Valley, OR, Lower Klamath NWR, CA and the extensive dispersed wetlands of the Devil's Garden Ranger District of Modoc National Forest, CA. Many of the freshwater wetlands are composed of managed impoundments.

a. Breeding on marshes and lake/marsh complexes. A high proportion of the world's American Avocets and Black-necked Stilts breed in the wetlands of the IMW, especially in the saline lake associated marshes of the Great Basin. Moderate numbers of Wilson's Phalaropes and Willets and lesser numbers of other species also breed in these marshes.

b. Migrating/Staging on marshes and lake/marsh complexes. Large numbers of Long-billed Dowitchers and peep, primarily Western and Least Sandpipers (*Calidris minutilla*), and lesser numbers of many species, stop at Great Basin marshes for short stays.

A 3. Upland Area Habitat. Throughout the Great Basin, and to a lesser extent in the northern Rocky Mountains, uplands associated with wetlands and riparian areas provide critical nesting habitat for shorebirds, especially Long-billed Curlew and Willet and to some extent for most of the breeding shorebirds of the region. Mountain Plovers nest in arid upland areas with low vegetation. Historically, Upland Sandpipers (*Bartramia longicauda*) bred in small numbers in the grasslands of eastern Oregon, eastern Washington (now apparently extirpated), northern Idaho (status questionable) and western Montana (status questionable) [Paulson, 1993].

A 4. Agricultural Field Habitat. Hay fields are used by shorebird species, for foraging sites (e.g., Long-billed Curlew and Killdeer) and for nesting (e.g., Killdeer, Wilson's Phalarope, and Long-billed Curlew). Killdeer nest in association with agriculture wherever freshwater is available. Mountain Plovers, Long-billed Curlews and Killdeer winter in large numbers in the Imperial Valley of California. On the lower Colorado River in Arizona, modest numbers (in the 100's) of avocets, stilts,

Least Sandpipers, and Wilson's Phalaropes use the flooded agricultural fields. Adjacent dry plowed fields have wintering Mountain Plovers in the 200s (B. Howe, pers. comm.).

A 5. Ephemeral Wetlands/Playa Habitat. The IMW is an area typified by enormous inter-annual variation in available water. In some years vast inland water areas give the appearance that glacial lakes Lahontan and Bonneville are being reconstituted, in other years ephemeral wetlands are dry and devoid of life. In wet years, ephemeral wetlands sometimes host huge numbers of shorebirds, especially American Avocets and Western Sandpipers (Neel and Henry, 1997).

A 6. Manmade Impoundment Habitat. Impoundments include reservoirs constructed for recreation, electric power generation, flood control, irrigation storage and sewage treatment. In the Great Basin, examples of such impoundments include Jay Dow, Sr. Wetlands adjacent to Honey Lake, CA, Summer Lake Wildlife Area, OR, and Warner Wetlands, OR. Wherever water conditions are such that invertebrate populations are great, and where shoreline drop-off is gradual, such wetlands are likely to attract moderate to substantial numbers of shorebirds (for example Long-billed Dowitcher and Western Sandpiper). Lake Lowell and American Falls, ID, reservoirs are notable examples of reservoirs important for fall migrants. A portion of the American Falls Reservoir is designated by WHSRN as a reserve of regional importance.

A 7. Riparian Area Habitat. Modest numbers of shorebirds of many species migrate along and/or breed in association with riparian areas of the IMW. These areas are particularly important to Spotted Sandpipers. An undetermined but at least moderate number of American Avocets, Black-necked Stilts, Least Sandpipers and Wilson's Phalaropes migrate along the Colorado River corridor, using undisturbed sandbars and mudflats.

B. Bird Conservation Regions

The IMW Shorebird Planning Unit consists of six Bird Conservation Regions (BCR): the Great Basin, Northern Rockies, Southern Rockies, Sonoran-Mohave Desert, Arizona-New Mexico Mountains, and Chihuahuan Desert**.** It encompasses all of Nevada, Utah, Idaho and Arizona; eastern parts of Washington, Oregon and California, and western parts of Montana, Wyoming, Colorado, New Mexico and Texas. General descriptions of the six BCRs follow. Sites significant for shorebird populations, are described in Appendices I-XI.

B 1. Great Basin BCR. This extremely important region includes the interior drainage systems of Nevada (entire state except extreme south), western Utah, eastern California, southeastern Oregon, and southern Idaho.. The Great Basin BCR also includes areas of northeastern Oregon, eastern Washington, and southern Idaho that are outside of the Great Basin proper, thus extending beyond the true hydrological Great Basin. The region is characterized by north-south mountain ranges interspersed with broad, relatively flat valleys, mostly at elevations of 4000-5000 feet. Sagebrush occurs in valleys, pinyon-juniper woodlands occur at mid-elevations, and more boreal conifers occur at higher elevations. Precipitation occurs primarily as snow with water available for wetlands derived primarily from snowmelt. The area includes numerous small and large wetlands, a number of which are among the most important on the continent for shorebirds: Great Salt Lake, UT; Lahontan Valley, NV; Lake Abert/Summer Lake/Harney Basin, OR and Mono Lake, CA (See appendices I-XI). Other wetlands in the area may be of slightly lesser import to shorebirds but are very heavily used by other wetland bird species, e.g. Klamath Basin/Goose Lake, CA-OR (breeding wintering and transient

waterfowl); Eagle Lake, CA (breeding grebes); Alkali Lakes, CA (breeding Snowy Plovers); Pyramid Lake, NV and Clear Lake, CA (breeding White Pelicans, *Pelecanus erythrorhynchos,* and other colonial waterbirds); Walker Lake, NV (transient Common Loon, *Gavia immer*); Ruby/Franklin Lake, NV (breeding and transient waterfowl), Gray's Lake, ID (breeding Sandhill Crane, *Grus canadensis*) and Bear Lake, ID (breeding White-faced Ibis, *Plegadis chihi* and Franklin's Gull, *Larus pipixcan*). Numerous areas are of moderate importance to breeding and transient shorebirds. Thousands of ephemeral wetlands and streams, and numerous man-made lakes occur in the region. The Great Basin is not important as a wintering area for shorebirds.

B. 1. a. Shorebirds Breeding in the Great Basin

Snowy Plover. Perhaps the majority of North American Snowy Plovers breed in the Great Salt Lake region (Page et al 1991). Other large populations occur at various sites in California, Oregon and Nevada (Page et al.1991; Paton, 1997; Paul et al. 1999).

Long-billed Curlew. *A* common breeding bird throughout the northern half of the Great Basin. The area is extremely important for maintenance of the world's population.

American Avocet. Perhaps up to half of the individuals of this species breed in the Great Basin, and an even higher proportion of the continental population use the area for post-breeding molting/staging. Huge numbers (over 300,000 in a single year) occur in post-breeding gatherings at Great Salt Lake, Lahontan Valley and in southern Oregon (Neel and Henry, 1997; Paul et al 1999b; Warnock et al. 1998).

Black-necked Stilt. Probably over half of all Black-necked Stilts breed in the Great Basin. The entire region is important, but Great Salt Lake alone may be home to half of the individuals of this species breeding in the United States.

Other species. Substantial numbers of five other shorebird species breed in the Great Basin: Killdeer, Willet, Spotted Sandpiper, Wilson's Phalarope and Common Snipe. Upland Sandpipers breed in small numbers outside the hydrological Great Basin, but within the Great Basin BCR.

B. 1. b. Stopover Importance of the Great Basin

Enormous numbers of shorebirds stage in and/or pass through the Great Basin.

Wilson's Phalarope. Hundreds of thousands stage/molt at Great Salt Lake in late summer (max. count =500,000, Jehl 1988, Paul et al. 1999a). Tens of thousands stage annually at Mono Lake, CA; Lake Abert, OR and in the Lahontan Valley, NV.

Red-necked Phalarope. Numbers at Great Salt Lake may be hundreds of thousands (max. count= 280,000, Paul 1986, Paul et al. 1999a). Tens of thousands occur at Mono Lake, CA and Lake Abert, OR in late summer.

American Avocet. Hundreds of thousands stage/molt at Great Salt Lake in late summer/early fall with maximum counts of 300,000 (Paul et al. 1999a).

Long-billed Dowitcher. Huge numbers (up to 100,000) seen in Lahontan Valley, NV in some springs. Abundant transient throughout region where freshwater wetland complexes occur, especially near GSL (>32,000).

Marbled Godwit. Tens of thousands stage at Great Salt Lake in late summer (up to 30,000 in a day at Great Salt Lake, Shuford et al. 1994).

Western Sandpiper. Large numbers are seen in some springs throughout the Great Basin, up to 67,000 in spring in Lahontan Valley, NV (Neel and Henry 1997). Equally large numbers, 88,000, are infrequently seen at Great Salt Lake in late summer (Paul et al. 1999b).

Least Sandpiper. Abundant in some springs at various locations in the Great Basin. One flock of 8000 recorded (L.W.Oring pers. obs.)

B.2. Northern Rocky Mountain BCR. This is an area characterized by low lying desert flats surrounded by rugged, boreal mountain ranges. Numerous small wetlands occur in the mountains and thousands of stream/river valleys exist as well as natural and man-made lakes. Sewage lagoons near many urban areas also host numerous shorebirds. The area is of some importance for breeding of several shorebird species and of modest importance to numerous species of transients.

B. 2. a. Shorebirds Breeding in the Northern Rocky Mountains

Mountain Plover. The breeding range of this species extends into the northern Rocky Mountain region in Montana and Wyoming.

Long-billed Curlew. Small to moderate numbers of curlews breed in the northern rockies of Idaho, Montana and Wyoming.

Other species. Populations of the following species also breed in the Northern Rocky Mountain BCR: Snowy Plover, Killdeer, American Avocet, Black-necked Stilt, Willet, Spotted Sandpiper, Upland sandpiper (very few), Wilson's Phalarope and Common Snipe.

B. 2. b. Shorebirds Migrating through the Northern Rocky Mountains

In addition to 11 species breeding in the northern Rocky Mountains, 23 species occur annually as migrants, six in moderate numbers and 17 in small to very small numbers (Table 2)

B.3. Southern Rocky Mountain BCR This area includes cool desert surrounded by high mountain ranges primarily covered with coniferous trees – Pinyon-Juniper at low elevations, Ponderosa Pine at mid-elevations and other pines, fir and spruce at higher elevations. Numerous small wetlands occur in the form of montane streams and man-made impoundments. The area has a modest shorebird breeding bird diversity and modest usage by transient shorebirds.

B. 3. A. Shorebirds Breeding in the Southern Rocky Mountains

Mountain Plover. Small to moderate numbers breed in the Southern Rocky Mountains of Utah, Colorado, New Mexico and possibly Arizona. In 1994, 125 birds were seen in New Mexico during the breeding season at 23 different sites. Up to 100 have been found in some years at single sites (Los Lunas, Valencia County).

Long-billed Curlew. Small numbers breed in the southern Rocky Mountains of Utah, Colorado, Arizona and New Mexico.

Other species. Small populations of the following species breed in the Southern Rocky Mountain BCR: Snowy Plover, Killdeer, American Avocet, Black-necked Stilt, Willet, Spotted Sandpiper, Wilson's Phalarope and Common Snipe.

B. 3. b. Shorebirds Migrating through the Southern Rocky Mountains

In addition to the 10 species breeding in the southern Rocky Mountains, 24 species occur annually as migrants, six in moderate numbers and eighteen in small to very small numbers (Table 2).

B.4. Arizona-New Mexico Mountains BCR.

This area encompasses high elevation mountain lakes and reservoirs that during low precipitation years create excellent shoreline mudflats for fair numbers of migrant shorebirds. However, the importance of this area to shorebird populations is not well known. Willcox Playa in AZ and Lordsburg Playa in NM have shorebirds in modest numbers. The Sulfur Springs Valley, AZ, is a consistent wintering site for Mountain Plovers and Snowy Plovers.

B. 4. a. Shorebirds Breeding in the Arizona-New Mexico Mountains

The Willcox Playa region (Cochese Co.) has the area's only regular breeding population of American Avocets and a few pairs of nesting Snowy Plovers. A few pairs of Mountain Plovers and Long-billed Curlews breed near Springerville, Apache County, AZ. A few Mountain Plovers breed in Catron County, NM.

B. 4. b. Shorebirds Migrating through the Arizona-New Mexico Mountains

The area's high elevation lakes and reservoirs host moderate numbers of transients, especially in low precipitation years. The Willcox Playa region and wastewater ponds near Willcox support 100's of spring and fall transients, the most common species being Black-necked Stilt, American Avocet, Western Sandpiper, Least Sandpiper, Long-billed Dowitcher and Wilson's Phalarope.

B. 4. c. Shorebirds Wintering in the Arizona-New Mexico Mountains

Since at least the early 1900's, Mountain Plovers have been wintering in the Sulphur Springs Valley of Cochise County, AZ. From 1978-1999, 15-250 individuals wintered in agricultural fields near Elfrida, AZ, at approximately 4200 feet. Modest numbers of Snowy Plovers also winter in this area.

B.5. Sonoran-Mohave Desert BCR. This region artificially combines two physiographic areas differing substantially in climate and biota. The Mohave, in common with the Great Basin, has a dominance of winter precipitation (though in the Mohave it is rain) and is characterized by both internal and external (via Colorado River) drainage systems. Warmer than the Great Basin, the Mohave has a greater diversity of plants and certain animal groups, especially reptiles. As with the Great Basin, soils tend to be saline and playas are common. Dominant widely spaced shrubs include various cacti, yucca (incl. Joshua Tree) creosote bush and sage species. The Sonoran is a subtropical desert, lower in altitude and lusher than the Mojave. The Sonoran Desert has only external drainage. Precipitation occurs during two periods of the year—from widespread winter rains and local, late summer monsoon rains. Dominant plants include a variety of large cacti, e.g. saguaros and organ pipe, and subtrees such as palo verde. Two-thirds of the Sonoran Desert is in Mexico. The Sonoran-Mohave Desert region of the U.S. is primarily of importance for transient and wintering shorebirds. It is the only area in the IMW with a substantial number of overwintering shorebirds. Substantial numbers of Snowy Plovers breed in the Colorado River Delta part of the Sonoran-Mohave Desert and at numerous sites elsewhere in the BCR. Shorebird habitat in this region is largely riparian, ephemeral or man-made.

B. 5. a. Shorebirds Breeding in the Sonoran Mohave Desert

Snowy Plover. The most important shorebird breeding population in this desert area is the Snowy Plover population at Salton Sea (Page et al. 1991).

B. 5. b. Shorebirds Migrating through the Sonoran Mohave Desert

Up to 130,000 birds have been recorded in spring and 100,000 in fall at Salton Sea (Shuford et al. 1999). Tens of thousands of stilts, avocets, Long-billed Dowitchers and Western Sandpipers, and thousands of Marbled Godwits, Least Sandpipers, Wilson's and Red-necked Phalaropes, Long-billed Curlews and Willets are among the transients recorded at Salton Sea (Shuford et al. 1999). Hundreds of individuals of these species migrate through the lower Colorado River valley.

B. 5. c. Shorebirds Wintering in the Sonoran Mohave Desert

Up to 28,000 overwintering shorebirds have been recorded at Salton Sea including up to 10,000 Long-billed Dowitchers and thousands of Black-bellied Plovers (*Pluvialis squatarola*), Black-necked Stilts, American Avocets, Willets, Marbled Godwits and Western Sandpipers. The Imperial Valley is perhaps the most important overwintering site for Mountain Plovers in the world with up to 2072 being recorded in a single winter, a number that constituted 61% of a comprehensive California survey. In a

second year only 755 birds were recorded, 35% of those found in California (Shuford et al. 1999). As many as 7500 Long-billed Curlews winter in Imperial Valley (Shuford et al. 1999). The lower Colorado River Valley has wintering populations of Mountain Plovers (40-200 in recent years, high of 340 in 1978). Plovers begin to arrive in September-October, peak in January-February, and are largely gone by early March. Fallow or leveled agricultural fields including sod farms are used.

The Colorado River Valley also has high/moderate numbers of wintering Spotted Sandpipers (e.g., the national high count of 84 in 1977). In addition, several thousand individuals of 12 species or more overwinter. Two Christmas counts, Parker-Colorado River and Phoenix, regularly report 1000+ shorebirds, with the only species with >100+ individuals being, Killdeer, Least Sandpiper and Long-billed Dowitchers.

6. **Chihuahuan Desert BCR**. This desert region occurs in the U. S. in southwest Texas, southern New Mexico and a very small part of SE Arizona at elevations of 1000-5000 feet, but primarily at 3500-4200 feet. The Chihuahuan Desert is characterized by hot summers, cool winters with numerous freezing nights, and late summer monsoon precipitation totaling 7.8 to 12 inches. The relatively high precipitation, calcareous soils and cool winters promote grasses, yuccas and agaves. Creosote bush and tarbush often are the most dominant shrubs in the landscape. The area hosts modest numbers of transient shorebirds of numerous species and small numbers of overwintering and breeding shorebirds of several species (Table 2). Shorebird habitat in this region is largely riparian, ephemeral or man-made (Mellink, 1997).

C. Major shorebird issues in the Intermountain West Region

Issue 1. Water Quantity and Quality

A. Salinities in large Great Basin hypersaline lakes: Great Salt Lake (GSL), Lake Abert (LA) and Mono Lake (ML). These lakes plus the saline sinks of Lahontan Valley have hemispheric importance for American Avocets (GSL, LV, LA), Wilson's Phalaropes (GSL, LV, LA, ML), Red-necked Phalaropes (GSL, LA, ML) and are very important for numerous other species including Marbled Godwit (GSL) and Black-necked Stilt (GSL). Each of the three large hypersaline lakes faces environmental alteration including, but not limited to, man-induced water level manipulations that can cause reduced or increased salinities beyond the tolerance of brine flies and brine shrimp, brine shrimp harvest, mineral extraction and/or contamination.

B. Water quality in Salton Sea and Lahontan Valley. Both of these wetland areas have at times experienced large-scale dieoffs of waterbirds. Causes range from botulism to cholera to heavy metals to unknown contaminants or infections. Each site annually is home to hundreds of thousands of shorebirds of many species. Water quality in these areas is a major IMW issue.

C. Playa lake ecology. There is a serious lack of knowledge regarding the current and potential contribution of playa lakes, both large and small, to shorebird conservation. Playa lake ecological function needs to be studied and remote lakes need to be surveyed by air to assess their importance to shorebirds. These remote lakes include, but are not limited to, Willcox Playa and Sulphur Springs, AZ; Lordsburg Playa, NM; and Continental, Gridley, Summit and Crooks Lake, NV.

Issue 2. Maintenance and enhancement of populations of three upland species of special concern: Long-billed Curlew, Mountain Plover and Upland Sandpiper.

A. Long-billed Curlew. It is imperative to develop survey protocols and carry out region-wide censusing for breeding curlews. Further, we need to develop management plans together with private land owners for habitat maintenance and development in order to guarantee the well being of the large but yet unquantified Great Basin breeding populations. Finally, long-term studies of reproductive success need to be established.

B. Mountain Plover. Small populations of Mountain Plovers are known to breed in the Rocky Mountains (Ellison and White, In Press) and in the Arizona and New Mexico Mountains. Exploratory efforts designed to locate additional small populations should continue. In particular, white-tailed prairie dogs (*Cyonomys gunnisoni*) should be located and the vicinity of their "towns" searched for plovers.

C. Upland Sandpiper. An endemic Pacific northwest population of Upland Sandpiper is now practically extirpated, with perhaps as few as six pairs remaining. This population should be listed under the Endangered Species Act, and a recovery plan developed.

Issue 3. Depredation of Eggs and Young.

Human induced increases in predation are a severe problem for breeding shorebirds in the IMW (L. W. Oring, pers. obs.). It is highly desirable that research be initiated that focuses on the primary predators, i.e. canids, mustelids, corvids and larids and their interactions with breeding shorebirds. Our knowledge of causes of predation and of means to ameliorate the problem (i.e., management to reduce predation) is paltry.

Issue 4. Regional Coordination.

In the IMW, as elsewhere, shorebird interests are negatively affected by lack of integrated waterbird management in determining water use priorities, and by lack of interagency regional planning in setting management priorities. The Intermountain West Joint Venture will provide an opportunity to address shorebird habitat needs and integrate shorebird management and habitat projects on a landscape scale. (See Goal 5: Planning and its associated strategies).

There is a need for:

A. Bird Conservation Regions to set priorities for their contribution to continental bird conservation and for states to identify how they can contribute to these priorities.

B. Water management to be on a regional basis, e.g., watershed or lake basin.

C. Management decisions to integrate needs of all wetland biota.

D. Coordination of planning efforts with other bird conservation initiatives, e.g., Partners-in-Flight.

E. Coordination of implementation activities with IMW Joint Venture.

Issue 5. Agriculture-Shorebird Interface.

A. Grazing Management. There is a need to experimentally explore alternative grazing practices and to document shorebird use of and breeding success in habitats co-inhabited with cattle. This is particularly important with regard to Long-billed Curlew.

B. Haying Practices. In the Harney Basin, Oregon, the private hay fields of the Silvies Floodplain appear to support more than 5,000 breeding shorebirds (inferred by Paullin et al. 1977. These authors state that young shorebirds are especially vulnerable to mortality from hay cutting. They state that one mower operator estimated that he killed 400-600 birds

between July 1 and 13, and that "based on operator's description the most common bird killed was Wilson's Phalarope. Other birds killed were long-billed curlews, soras, common snipe, and blackbirds." They further state: "The greatest impact of mowing was on shorebirds. Unlike ducks the shorebirds, and especially the Wilson's phalarope, tend to remain in hay meadows to feed after hatching. Consequently, even the earlier nesting species are vulnerable to mowing. The young shorebirds that are not killed are exposed to predators and in 1976 California and ring-billed gulls killed most of the 'survivors' within a few feet of the mowers. The rate of mortality declined throughout the haying season as more birds fledged and it appeared that the critical period for mowing mortality in 1976 was the first two weeks in July." Hay cutting begins as early as mid-June on the Silvies Floodplain and other native hay meadows in eastern Oregon, which likely causes even higher rates of shorebird mortality. A related problem affecting shorebird survival in hayfields is early de-watering. Water is drained from hayfields about three weeks before mowing commences. This action reduces food supplies and tends to concentrate young birds near remaining water, increasing their vulnerability to predators (Ivey, pers. comm.).

Issue 6. Wintering Sites.

IMW breeding shorebirds winter primarily in western Mexico (Sinaloa, Sonora, Nayarit, Baja) or California. Maintaining both the quantity and quality of wetlands in these areas is vital to IMW shorebirds (Engilis et al. 1998). Threats are serious. Development of shrimp farming in Sinaloa has caused drainage and serious degradation of coastal wetlands. Development of agriculture in Sinaloa is causing freshening of brackish wetlands and shorebird flats are getting choked with vegetation. Extension of utilities (water and electricity) to Sinaloa beaches may lead to extensive development at the expense of shorebirds. Water extraction from the Colorado River has essentially destroyed the Colorado River Delta, which historically was as important to shorebirds as any estuarine site on the West Coast. Even in its greatly degraded state, the delta has very large overwintering populations; hence anything that can be done to improve water quantity and quality there is important. Baja California has extensive coastal resort development and expansion of various development activities continues, affecting shorebird winter habitat. California faces major development problems including possible expansion of the San Francisco airport further into the all-important San Francisco Bay. Agricultural run-off and related nutrient enrichment of the Salton Sea appears to be wreaking havoc with the sea's biota.

2. SHOREBIRD SPECIES OCCURRENCE IN INTERMOUNTAIN WEST

A. Regional Shorebird List

In Table 2, shorebirds of the IMW are ranked by Bird Conservation Region and in total for the IMW. The rankings include 5 = critically important; 4 = very important; 3 = important; 2 = slightly important; and 1 = unimportant. Importance of the region for breeding, wintering and migrating birds is noted. The overall IMW score is equal to the highest score for any of the six BCRs. Intermountain sites where peak counts exceed 5000 in more than half the years are listed in Table 3.

B. BCR lists (see B1-6 above and Appendices I-XI).

C. Priority Shorebirds

The highest ranked species (**5**), include birds of four types: (a) species ranked of top conservation concern by the U.S. Shorebird Plan and where a high proportion of the North American population breeds in the IMW region (Snowy Plover, Long-billed Curlew); (b) common species where the IMW region is the primary breeding area (American Avocet, Black-necked Stilt); (c) common species where a high proportion of the total population is transient in IMW (Wilson's Phalarope, Long-billed Dowitcher); and (d) species ranked of top concern by the U.S. Shorebird Plan because IMW includes a large proportion of the population in winter (Mountain Plover). There are four additional transient species ranked (**4**) i.e., very important in the IMW: Marbled Godwit, Western Sandpiper, Least Sandpiper and Red-necked Phalarope.

D. Shorebird Guilds

This is not an especially useful concept for breeding shorebirds. For example, while most would consider Wilson's Phalarope a pelagic/aquatic gleaner, much of their breeding season foraging is on adult stages of insects in terrestrial environments. Similarly, Long-billed Curlews in the breeding season primarily glean insects in the uplands – behavior totally different from their dominant foraging techniques during migration and in some wintering habitats.

During the post-breeding season the guild concept may have some value in that three species, American Avocet and two phalarope species feed primarily in open water environments by scything (American Avocet) or by gleaning (Wilson's Phalarope, Red-necked Phalarope). Transient Marbled Godwits are primarily aquatic probers. Most other species are too variable in their feeding habits for this concept to be of value.

3. INTERMOUNTAIN WEST REGIONAL GOALS

The regional goals (summarized in Table 4) are discussed for those species of high conservation value ranked 5 (critically important) or 4 (very important) as shown in Table 2. Goals and objectives relating to shorebirds should be incorporated into Intermountain West Wetland Joint Venture Implementation Plans to foster a partnership approach to conservation.

1. HABITAT MANAGEMENT GOAL:

Maintain and enhance diverse landscapes that sustain thriving shorebird populations.

Objective 1. (Habitat) Compile an up-to-date regional inventory of existing sites that currently support or have the potential to meet shorebird needs by the end of 2001.

Strategies:

a. Create a working group made up of representatives from state, federal and private organizations.
b. Develop a comprehensive inventory of existing shorebird sites along with their current resource value and resource potential arrayed by state and Bird Conservation Regions (BCRs).

Objective 2. (Habitat) Develop Best Management Practices (BMP) for the maintenance of shorebird habitats by the end of 2001.

Strategies:

a. Maintain an up to date compendium of existing wetland habitat maintenance practices, adding new practices as applied research develops them.
b. Working with the cooperating agencies and organizations, prepare a prioritized list of habitat maintenance needs annually and provide input into State and federal budget processes.
c. Recognizing the connectivity of the important shorebird sites through the region, coordinate site-specific management activities between sites to ensure that shorebird needs are met within the region annually.
d. Develop and distribute habitat management guidelines for impoundment designs that maximize shorebird habitat whenever possible.
e. Monitor heavy metal and other contaminant levels on key shorebird sites. Implement management strategies that reduce or eliminate the negative effects of contamination.
f. Support the removal of tamarisk, whitetop, and other invasive exotic plants from important shorebird sites.
g. Monitor local impacts of predation on shorebird production. Apply local predator control measures where predation rates exceed recruitment/replacement rates.

Objective 3. (Habitat) Develop a five-year action plan for the restoration and enhancement of shorebird habitats in the Intermountain West Region by the end of 2001.

Strategies:

a. Identify and prioritize key shorebird migration, breeding and wintering areas within the region.
b. Develop a process to integrate restoration and enhancement action for shorebirds into existing or new waterfowl and wetland management plans in the region.
c. Where lacking, develop integrated restoration and enhancement and associated actions that involve multiple agencies and organizations at the regional and flyway scale.
d. Identify important riparian areas, wet meadows and low-stature grasslands by BCR and state that are important to production of priority species dependent on these habitats (examples include: Long-billed Curlews, Wilson's Phalaropes).

Objective 4. (Habitat) Initiate action on the top ten recommendations of the five-year action plan by 2005.

Strategies:

a. Prepare and annually update a prioritized list of habitat restoration and enhancement project needs and provide input into state and federal budget processes.
b. Expand the use of state and federal grants for habitat restoration and enhancement to shorebird habitats where needed. Examples include: NAWCA, state habitat stamp funds, Sikes Act, etc.)
c. Conserve and protect the hydrological integrity of ephemeral wetlands through habitat improvements and improved water management techniques.

Objective 5. (Habitat) Identify sites that need additional protection by the end of 2001.

Strategy: Perform risk analysis on prioritized site list developed above.

Objective 6. (Habitat) Initiate action to secure additional protection for all sites identified in Objective 5 by 2005.

Strategies:

a. Work cooperatively with private, state and federal interests in developing site-specific management plans for key shorebird habitats associated with saline lakes in the region.
b. Facilitate development and implementation of management strategies that will help conserve, protect, and enhance large blocks of upland habitat adjacent to strategically important saline and freshwater wetlands.
c. Encourage the inclusion of Best Management Practices for shorebirds in the restoration of Owens Lake or other saline lakes as opportunities arise.
d. Develop strategies that will help ensure protection of water quality.
e. Acquire water rights in key shorebird habitats to ensure long-term protection of the area.
f. By state and BCR, develop a list of unprotected habitats and sites that can be protected through acquisition or conservation easements.
g. Work with state and federal agencies, land trusts and conservation organizations (e.g., The Nature Conservancy), in setting priorities for use of Land and Water Conservation funds and other funding sources for protecting key shorebird habitats.

Objective 7. (Habitat) Develop a private lands extension plan that addresses shorebird needs by 2001.

Strategies:

a. Identify key areas of private land within the region that are important for shorebird conservation.
b. Develop "best management practices" for shorebird production on private lands. Provide these "BMP's" to agricultural extension and landowner assistance programs.
c. Working cooperatively with partner organizations, develop outreach and educational materials targeted at private landowners that own and manage important shorebird habitats.
d. Recognize private landowners that implement conservation measures and management actions on their lands for shorebird conservation.
e. Enhance shorebird production on private lands through conservation easements and cooperative agreements with landowners.

2. MONITORING AND ASSESSMENT GOAL:

Acquire information on shorebird distribution and abundance needed for shorebird conservation.

In this section, monitoring refers to long-term programs to track population size at the national, regional, or local level. Monitoring requires an infrastructure consisting of people, protocols, and equipment. Assessment refers to short-term programs that use the monitoring infrastructure to address management issues such as determining which of several areas hosts the most birds or whether a manipulation attracts birds to the manipulated area. Research uses a different, or at least additional, infrastructure.

The goal includes such efforts as estimating and tracking population size, documenting shorebird use of stop-over sites, and determining how shorebird use of an area is affected by a management action.

Objective: (Monitoring and Assessment) Develop and implement a cooperative monitoring and assessment plan for breeding and migratory shorebirds that is responsive to local, regional, and national needs by 2001.

Strategies:

A Monitoring and Assessment Committee of the IMW Shorebird Working Group will be created with overall responsibility for achieving the Monitoring and Assessment Objective. It will meet at least annually, prepare annual work plans, and prepare an annual report summarizing its activities. Three general strategies are identified below by which the Committee will achieve the Monitoring and Assessment Objective.

a. Support the National Shorebird Plan (NSP).
    i. Secure the cooperation of federal and state agencies, conservation organizations, and scientific institutions in supporting the NSP.
    ii. Implement monitoring and assessment programs developed by the NSP and adopted by the IMW Shorebird Working Group.
    iii. Coordinate funding proposals, as requested by cooperators, for regional-level programs
    iv. Facilitate two-way communication between regional participants and National Shorebird Plan administrators regarding monitoring techniques and protocols.
b. Coordinate Regional Monitoring and Assessment Programs.
    i. Develop and implement cooperative programs to monitor distribution and abundance of all IMW priority species and to carry out regional assessment projects as requested by the cooperators.
    ii. Develop consensus on species and areas to be surveyed; parameters to be estimated; and responsibilities for design, field work, analysis, and reporting.
    iii. For breeding populations, enlist cooperation from neighboring regions as necessary.
    iv. Insure that approved projects are carried out and that results are provided to interested parties at the local, regional, and national level.
c. Assist Local Managers with Their Monitoring and Assessment Needs.
    i. Maintain an understanding of the needs and plans of local managers and other parties interested in shorebird conservation.
    ii. Identify regional projects to be sponsored by the Monitoring and Assessment Committee.
    iii. Assist with design, analysis and reporting, as requested and feasible, on selected projects.
    iv. Insure that projects coordinated by the Monitoring and Assessment Committee are completed and reported in a satisfactory manner.

3. RESEARCH GOAL: Acquire new information that facilitates shorebird conservation.

New knowledge is essential to the conservation and management of IMW shorebirds. The ecology of saline and hypersaline lakes as well as ephemeral playas is poorly understood, as is the physiology of the shorebirds using them. Little is known of the decision making shorebirds employ in deciding when to move and how long to stay at a particular site. The Mountain Plover and Long-billed Curlew populations are so poorly studied in the IMW that we lack even a crude estimates of population

sizes, let alone measures of annual or lifetime reproductive success. Long-term studies of these species must be initiated. This will be accomplished with the following objectives and strategies:

Objective 1. (Research) Develop and implement research projects on shorebird ecology.

Strategies:

a. Initiate studies of saline lake ecosystems, especially as regards algae and invertebrate productivity.
b. Initiate studies of the ecology of ephemeral playas.
c. Initiate studies of shorebird-predator interactions.

Objective 2. (Research) Develop and implement the study of shorebird behavior and physiology.

Strategies:

a. Expand knowledge of the salt tolerance and stress physiology of shorebirds.
b. Expand knowledge of shorebird natal and adult dispersal, including analysis of the importance of interconnected wetlands.
c. Increase knowledge of Long-billed Curlew and Mountain Plover breeding populations and reproductive success in IMW.
d. Develop emergency protocols for saving the endangered, endemic Upland Sandpiper population in Oregon.

Objective 3. (Research) Develop and implement studies of the shorebird-agriculture interface in the IMW.

Strategies:

a. Quantify the impact of agricultural practices, e.g. grazing, irrigation, dewatering, mowing, etc. on shorebird breeding success.
b. Continue to study the impact of agricultural practices on wintering shorebirds, especially Mountain Plover and Killdeer.

4. OUTREACH GOAL:

Develop an informed and supportive constituency for long-term shorebird conservation.

There is a lack of public understanding of the Intermountain West Region's importance to the life history of Pacific Flyway shorebird populations. Often the most important habitats for shorebirds are misunderstood or perceived as wastelands. Agencies often identify shorebird conservation as a secondary target in management schemes and frequently there is a lack of knowledge of shorebirds and shorebird habitat management practices. There is a paucity of environmental education curricula pertaining to shorebird ecology and management; and the value of shorebirds to our quality of life. With these perceptions and lack of knowledge, funding for shorebird management and research often sits low on the priority list of organizations responsible for wildlife conservation.

Objective 1. (Outreach) Identify specific audiences to be addressed through an outreach program by the end of 2000.

Strategies:

a) Assess human impacts to shorebirds and their habitats and select outreach audiences accordingly.

b) Identify human populations in proximity to important shorebird habitats and develop best-case strategies to inform and educate them concerning natural community values and needs.
c) Identify the land stewards of important shorebird habitats and introduce shorebird management and conservation into their land use practices.
d) Identify the formal and informal education organizations associated with shorebird areas. Work to incorporate the Sister Schools program, Project Wildlife, or other programs of importance to shorebirds into the curriculum or activities of these organizations.

Objective 2: (Outreach) Develop shorebird conservation messages for the outreach strategies and publics identified in Objective 1 by 2001.

Strategies:

a. Consider cause and effect when developing issue messages pertaining to human impacts on shorebird habitat.
b. Develop messages that take people from knowledge to action in the conservation of shorebirds.
c. Develop Best Management Practices for land managers responsible for shorebird breeding and migratory habitat.
d. Develop delivery systems (vehicles) appropriate to each message and audience identified. Use professional Information and Education staff to assist in this process.

Objective 3: (Outreach) Secure funding for shorebird conservation and outreach programs by the end of 2002.

Strategies:

a. Develop a regional shorebird conservation budget with justification.
b. Develop an understanding of shorebird conservation needs within appropriate governing and non-government bodies.
c. Identify potential stakeholders to provide funding.
d. Use association with the National Shorebird Plan Steering Committee, State Wildlife agencies, the North American Bird Conservation Initiative, the Pacific Flyway Council, Intermountain West Joint Venture, and others to gain funding for regional shorebird conservation.
e. Develop a funding strategy through the outreach component of the Regional Plan.

Objective 4. (Outreach) Implement a regional shorebird outreach program with strategies for specific audiences and resource needs by 2003.

Strategies:

a. Develop implementation strategies in cooperation with existing agency and non-government public relations, information and education groups.
b. Use interstate or intrastate I&E programs to tie local and state programs together in the outreach plan (i.e. Project Wild, WET, American Association of Conservation Informationists etc.)
c. Identify individual(s) to represent outreach on the regional shorebird working group.

5. PLANNING GOAL: Achieve regional cooperation for shorebird conservation.

In this section, planning refers to coordinated design and writing of strategies to achieve shorebird conservation. The goal includes such efforts as development of shorebird objectives and integration of objectives into land management planning efforts for on-the-ground implementation.

Objective 1. (Planning) Fund an Intermountain West Regional Shorebird Coordinator position by January, 2002.

Strategy:

Regional Shorebird Coordinator would be responsible for providing contact and coordination to effect the achievement of IMW Shorebird Plan goals and objectives. Regional Coordinator would monitor and support the activities of working group sub-committees, provide regional liaison to national funding and coordination initiatives, chair or otherwise strongly participate in the Nongame Bird Study Committee proposed in Objective 3.

Objective 2. (Planning) Coordinate shorebird planning with other migratory bird initiatives (NAWMP, NACWP, PIF) through 2005.

Strategies:

a. Create formal liaison between the Intermountain West Shorebird Working Group and Partners in Flight state working groups within the region.
b. Provide technical support and direction during the implementation of conservation strategies for shorebirds identified as PIF Priority Species.
c. Support the funding and coordination activities of the North American Bird Conservation Initiative (NABCI).

Objective 3. (Planning) Integrate shorebird habitat projects into Intermountain West Joint Venture (IWJV) Implementation Plans as they are prepared or revised through 2005.

Strategies:

a. Support the implementation functions of IWJV. Continue to participate in the expanded scope of IWJV initiatives as they benefit shorebirds.
b. Develop a priority list of shorebird habitat projects and work cooperatively with IWJV to secure funding and support.

Objective 4. (Planning) Develop a collaborative process for shorebird conservation between states, federal agencies and other countries by January 2001.

Strategies:

a. Call for representatives from state wildlife agencies, National Wildlife Refuges, other federal land management agencies, non-governmental organizations involved in land management, and colleges and universities to participate in committee activities.
b. Develop an annual assessment process that predicts habitat conditions at key shorebird sites, develops regional conservation strategies, and makes annual conservation recommendations to the appropriate land management agencies.
c. Consider using the Flyway Study Committee format as a model to create a coordinated shorebird management working group.

d. Consider an organizational structure modeled after Partners In Flight with regional and state level working groups.
e. Develop and initiate a series of state-level workshops designed to inform state and federal agencies, conservation organizations and interested publics in the overall purpose of the National Shorebird Plan with emphasis on the Intermountain West Region.
f. Develop cooperative training and workshops designed to transfer technical information and skills needed to effectively manage shorebird habitats.
g. Link into existing communication sources whenever possible to facilitate coordination and communication between and among partner organizations in the region.

Objective 5. (Planning) Develop a plan to integrate Intermountain West Shorebird Plan into local, regional, national and international planning for federal land management agencies, state and federal wildlife agencies, and flyways by the end of 2001.

Strategies:

a. Identify land management plans that affect significant shorebird sites.
b. Identify planning cycles for significant shorebird sites existing under land management plans. Target shorebird management input for appropriate plan revision dates whenever possible; request land use plan revisions when absolutely necessary.

4. HABITAT REPORT

See Habitat Management Goal above. The diverse habitats of the IMW are discussed in various ways throughout this report. Further elaboration, awaits the hiring of the IMW Shorebird Coordinator. The primary managed wetlands of the IMW are listed in Table 1.

5. INTERMOUNTAIN WEST REGIONAL RESEARCH AND MONITORING NEEDS

See Monitoring and Assessment Goal and Research Goal above.

6. FUNDING NEEDS TO MEET REGIONAL GOALS

Staffing: Senior Shorebird Scientist to work with IMW Joint Venture $140k
Fostering implementation of plan goals
(incl. benefits, overhead and expenses).

Projects**…….**$300k

Total .. **$440k/year**

7. REGIONAL MANAGEMENT

The IMW regional group proposes to have a regional shorebird coordinator who will be part of the IMW shorebird working group and who will serve on the IWJV technical committee. We propose that regional issues (e.g., multi-state) be coordinated through the aegis of the IWJV.

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Appendix I. Key Shorebird Areas of the Inter-Mountain West

GREAT SALT LAKE, UT Don Paul

The Great Salt Lake (GSL) is the largest saline lake in North America and the fourth largest in the world (approx. 128.7 km long, 2,414.1 km2, 4.0 m deep). The GSL Ecosystem encompasses 7,800 km, which includes 161,880 ha of wetlands in addition to other associated uplands and drainage systems. The GSL is a terminal lake of recent geologic time (approximately 13,000 years old), a remnant of the pluvial Pleistocene lake, Bonneville. As a terminal lake it has many of the distinguishing characteristics of closed basin lakes including unique, morphologic, hydrologic, chemical and biologic attributes. Each of these characteristics contributes to the lake's value to shorebirds. The sediment filled basin depression produced a shallow lake with a flat bottom suitable for wading birds. A hydrology driven by evaporation outflow causes constantly shifting shorelines, maintaining open shoreline habitat. The lack of surface outflow results in the concentration of minerals through evaporation. Subsequently, the GSL has salinity ranging from 20 ppt to 260 ppt. In the South Arm, the largest portion of the lake, the salinity averages approximately 120 ppt. This condition produces a unique limnology with a relatively simple ecosystem that drives low species diversity but high productivity and discrete trophic relationships. At 120 ppt salinity, the GSL produces large populations of brine shrimp and alkali flies. In the absence of in-lake predators, these invertebrates are available to the avifauna including shorebirds. This condition, in association with the extensive lacustrine wetlands surrounding the GSL, provides for one of North America's most important shorebird habitats.

The GSL has been modified by constructed dikes and now consists of four systems differing in salinity. There are eight state wildlife management areas and one USFWS refuge located within the lake basin. There is an array of additional government wetland projects in the area and numerous nonprofit and duck club properties border the lake.

Shorebirds

The GSL has shorebird occurrence during all seasons except winter. There are 23 species that occur at the GSL with reasonable regularity, 13 of which breed in the arctic or sub-arctic and 10 of which breed on the prairies or in the Inter-Mountain West. Eleven other species have been recorded on rare occasions. The GSL ecosystem has spring, summer and fall counts in excess of 500,000 shorebirds on a regular bases. Great Salt Lake waterbird counts totaling 6.1 and 7.6 million for 1997 and 1998 respectively were made by a team of agency and non-agency cooperators. Counts were made every ten days at specific locations around the GSL between June and mid September, 1997 and late April to late September, 1998. Shorebirds represented approximately 1.5 and 1.9 million of these observations for the two consecutive years. The GSL Waterbird Survey (GSLWS) consistently produces conservative results as all habitat is not covered and observations are not made throughout the entire period of occurrence. Results are reported as numerical data, not statistical extrapolation.

Breeding. Seven species of shorebirds breed at the GSL. Of these the American Avocet, Black-necked Stilt, Snowy Plover, Killdeer, Willet and Long-billed Curlew breed in significant numbers. Nesting estimates of breeding adult American Avocets and Black-necked Stilts from the 1997/98 GSLWS were 53,233 and 41,829 respectively. An occurrence estimate of 10,000 Snowy Plovers at the GSL was made for two separate years in the 1990s (Paton 1997).

Migration.. In addition to the estimated 1.5 to 1.9 million shorebirds detected in the GSLWS, an all-lake, one day aerial survey is conducted annually for Wilson's Phalarope. Peak

populations occur at the GSL in late July. Estimates in excess of 500,000 have been made at the GSL (Jehl and Paul, unpubl.).

Concerns

The GSL sits next to Utah's main population center of 1.5 million people. This urban area, so close to the lake and important wetland areas, is a harbinger of both challenges and opportunities to sustainable shorebird conservation. Mostly there are challenges. In 1997 an effort was initiated by a cadre of wildlife and conservation professionals to develop a long term GSL waterbird conservation strategy with emphases on shorebirds. This effort was strengthened through a grant that allowed the development of a GSL Shorebird Needs Assessment and is being followed up in the development of a GSL Shorebird Management Plan. This plan has identified, to date, a vision statement which describes a desired future condition for the GSL ecosystem. There are many concerns ranging from understanding how and where shorebirds occur on the landscape to water rights and distribution issues. Some major issues are: Urban encroachment on wetlands and the habitat loss associated with it, water needs, salinity maintenance, avian disease, shoreline conservation and public awareness.

In the draft of this plan, the working group identified five categories that each address concerns and opportunities relating to shorebird conservation:

1. **Habitat Utilization**
   - Temporal and spatial distribution of shorebirds
   - Habitat Selection
2. **Resource Protection**
   - Insect control (including agricultural pest control)
   - Resource quality protection
   - Prevention of and emergency response to environmental hazards
   - GSL contaminants
3. **Habitat Management**
   - Management of managed areas (WMAs) for waterfowl and shorebirds (including management considerations beyond impoundments)
   - Land protection priorities
   - Water rights
   - Water distribution
   - Habitat restoration
   - Man-made changes (i.e. causeway)
   - Lake level fluctuation/salinity
   - Management planning and use
   - Habitat mitigation
   - Habitat enhancement
   - Habitat maintenance
4. **Research**
   - Salinity
   - Halophyte ecology (brine shrimp and brine fly)
   - Disease issues
   - Trophic level population trends
5. **Education, Outreach and Planning**
   - Public access issues

Cultural resources issues
Community outreach, education and participation
GSL ecosystem message
Sustainable economic development
Planning coordination

Other Species

Populations of a number of non-shorebird waterbird species are of regional, national and hemispheric importance: California Gull, Eared Grebe, American White Pelican, White-faced Ibis, Franklin's Gull, Western and Clark's Grebe, Double-crested Cormorant, Snowy and Cattle Egret, Cinnamon Teal, Redhead, Tundra Swan and Forester's Tern. Extensive flights of waterfowl use the area and one of the nations largest populations of wintering American Bald Eagles is located at the GSL.

Appendix II. Key Shorebird Areas of the Inter-Mountain West

SALTON SEA Lewis Oring

The Salton Sea is the second largest saline lake in North America (56 km. long, 15-24 km. wide, 932-984 sq. km. Surface aread, mean depth 9.5 m., max. depth 15.5 m.). The lake was created in 1905 when an irrigation canal ruptured, allowing the Colorado River to fill the Salton Trough, an extension of the Gulf of California. The lake basin includes not only the large open lake but brackish marshes and, at the south end, sand and mudflats, barnacle beaches and freshwater marshes of the Salton Sea National Wildlife Refuge and the Wister Unit of the Imperial Wildlife Area , CA. Dept. Fish and Game. Shorebirds also use the extensive agricultural fields of the Coahella Valley and, particularly, the Imperial Valley. The area is home to a large and diverse community of waterbirds at all times of the year.

Shorebirds

The sea has both spring and fall counts in excess of 100,000, and winter counts of approximately 30,000. Total shorebirds using the area per year almost certainly exceeds 250,000 (Shuford et al. 1999).

Breeding. The primary breeding shorebird species are Snowy Plover and Black-necked Stilt. The Snowy Plover population of up to 200 individuals is of great regional importance (Page and Stenzel 1981, Shuford et al. 1999).

Migration. More than 100,000 individuals have been counted in April, with average of four counts=90,000 and in August with average of four counts=85,000 (Shuford et al. 1999). Species where counts exceeded 10,000 individuals included, in order of declining abundance, Western Sandpiper, Long-billed Dowitcher, American Avocet and Black-necked Stilt.

Winter. Up to 28,000 shorebirds have been counted in December (average of two counts 24,100). Most abundant species exceeding 1000 individuals, in order of declining abundance were, American Avocet, Long-billed Dowitcher, Black-necked Stilt, Western Sandpiper, Least Sandpiper, Willet and Marbled Godwit. The adjacent Imperial Valley agricultural area is home to as many as 2179 wintering Mountain Plovers, up to 61% of those wintering in California (B. Barnes in CDFG unpubl. data and K. Hunting in Shuford et al. 1999) and up to 7500 Long-billed Curlews (Shuford et al. 1999).

Concerns

Following recent massive bird die-offs, there is heightened concern re: the integrity of the Salton Sea ecosystem. Fatal disease outbreaks have involved botulism, fowl cholera, Newcastle's disease and salmonellosis. It is not clear how serious this disease risk is for shorebirds, which to date have not experienced major die-offs. Ominous threats may involve Imperial Valley water management. Transfer of water rights to San Diego is a threat that could seriously impact water level, shoreline integrity and, ultimately the suitability of the Salton Sea ecosystem for shorebirds. Similarly, water conservation measures in agricultural areas may reduce their value to shorebirds.

Salinity. Salinity has increased from 3 to over 40%. The radical increase has raised fears for bird health and suggests that the large fish populations typical of the lake are at severe risk. Continued escalation of salinity poses risks for young birds (Rubega and Robinson 1997) and increases the likelihood of a shift to a brine fly/brine shrimp invertebrate base. Such a shift

would accompany a fundamental change in the lake as it became hypersaline and of primary value to phalaropes and Eared Grebe.

Selenium. Elevated levels high enough to cause embryo toxicity have been found in a variety of birds including breeding Black-necked Stilts (Setmire et al. 1993).

Boron. Elevated levels in breeding stilts may be associated with slow growth rates (Setmire et al. 1993).

Organochlorines. The Imperial Valley, including the Salton Sea, has the highest DDE levels in California (Setmire et al. 1993). Elevated DDE levels among Black-crowned Night Herons at Ruby Lakes, NV, and White-faced Ibis at Carson Lake, NV, have been linked to wintering in this area and the area just to the south in Mexico (Henny and Blus 1986; Henny and Herron 1989). High DDE levels in Black-necked Stilt eggs are believed responsible for egg shell thinning (Setmire et al. 1993).

Other Species

Populations of a number of non-shorebird species are of national importance: Eared Grebe, American White Pelican, White-faced Ibis, Ruddy Duck and Black Tern (Shuford et al. 1999). A number of colonial species breed at Salton Sea including Double-crested Cormorant, Cattle Egret, Gull-billed Tern, Caspian Tern and Black Skimmer. Other species of conservation concern include Burrowing Owl, Fulvous Whistling-Duck, Least Bittern, Wood Stork, Yuma Clapper Rail and Black Rail. Large numbers of ducks and geese winter in the Imperial Valley. If the lake becomes hypersaline it will be of no value to fish-eating birds.

Authors consulted:

Anderson 1999; Hager & Garcia 1988; McCloskie 1970; Patten 1999; Schroeder et al. 1993; Setmire et al. 1990; and USFWS 1997 a, b, 1998.

Appendix III. Key Shorebird Areas of the Intermountain West

Lake Abert, OR Susan Haig

Lake Abert in south-central Oregon is one of only three hypersaline lakes in the Intermountain West and encompasses over 49,000 acres of the lake and associated wetlands. It is administered by the BLM and is the largest saline lake in the Pacific Northwest. At a high point in 1984, the lake covered 155 km^2 and had a salinity of ~25% (Jehl 1994). Water for Lake Abert comes from the Chewaucan River which flows into the Chewaucan Marsh at the south end of the lake, and then terminates in the lake. The importance of the lake to waterbirds primarily stems from the high density of brine shrimp and brine flies. For example, commercial harvesters removed ~20 tons in 1990. This density of invertebrates makes the lake a most significant pre- and post-breeding site for waterbirds. The total waterbird use is estimated to be 3.25 million bird use days per year (BLM 1995). Thus, Lake Abert is ranked as a hemispheric site under the Western Hemisphere Shorebird Reserve Network and has been declared an Area of Critical Environmental Concern (ACEC) by the BLM.

Shorebirds

Breeding. Lake Abert's main contribution to shorebirds in the IMW is as a staging area, thus there are breeding shorebirds but not in large numbers (with the exception of Snowy Plovers where approximately 100-300 may breed). Common breeders include: Snowy Plovers, Killdeer, American Avocets, and Willets.

Migration. Lake Abert is a major postbreeding location for American Avocets (Warnock et al. 1998, Plissner et al. 1999, in press), Wilson's Phalaropes (Jehl 1988) and Red-necked Phalaropes (Jehl 199). The American Avocets staging at Lake Abert readily move to Summer Lake and may return on a daily basis, or may spend all of one year at one lake and then all the next at the other. Thus, the connectivity of the sites is critical to consider (Plissner et al. 1999, in press). At some times, Lake Abert has the second-largest concentration of Wilson's Phalaropes in the U.S. Numerous other shorebirds pass through as well.

Winter. Few to no shorebirds overwinter here.

Concerns

Much of the land surrounding Lake Abert is used for grazing, thus there is concern over cattle trampling breeding sites as well as the lakeshore which make it difficult for shorebird chicks to walk. The cattle also concentrate near the freshwater in-flows to the lake which compromises water quality and water availability for shorebirds. Other threats to the lake include international interests to farm the brine shrimp as well as proposals to develop sodium mineral resources.

Other Species

Lake Abert (including the Chewaucan Marsh) is a critical resource for numerous waterbird species on migration in the Intermountain West. In particular, over 15,000 Eared Grebes use the lake on fall migration and thousands of Ruddy Ducks and Shovelers occur as well (Jehl 1994).

Authors consulted: Warnock et al. 1998, Plissner et al. 1999, Plissner et al. In press, Intermountain West Joint Venture Implementation Plan for Habitat Conservation in Eastern Oregon, Jehl 1994.

Appendix IV. Key Shorebird Areas of the Intermountain West

Summer Lake, OR Susan Haig

Summer Lake is a 300 km^2 saline lake with adjacent freshwater marshes and springs, and extensive alkali flats along the shore. The lake is relatively shallow (average depth is <2 m), hence the lake size may vary as much as 25% seasonally and may dry up during extreme drought. The lakeshore is composed of alkali beaches and a sagebrush/rabbitbrush habitat. It does not provide extensive shorebird habitat. Rather, birds use the lake itself for staging. There is cattle grazing and haying along the west and south shores. The north end of the lake is bordered by series of freshwater impoundments that stem from the Ana River. The Oregon Department of Fish and Wildlife manages this area, Summer Lake Wildlife Area (SLWA), for recreation, hunting, and waterbird conservation. The 18,677 acres of wetland at SLWA are primarily shallow alkaline and freshwater marsh interspersed with alkali-dominated uplands and playas. Shorebirds tend to breed in the impoundments and later move to the lake for extended periods of post-breeding/staging.

Shorebirds

Shorebird use of Summer Lake and SLWA exceeds 1 million use days per year with peak daily counts of over 100,000 shorebirds during fall migration

Breeding. SLWA provides habitat for all 9 breeding shorebirds in the Great Basin. Productivity is usually not high due to predation from coyotes, ravens, harriers, and Great Horned Owls as well varying water regimes that benefit different species in different years. There is scattered shorebird breeding on Summer Lake but not in large numbers.

Migration. Summer Lake is an important pre- and post-breeding staging area for American Avocets. Peaks of 50,000 birds have been reported at one time. Often these birds have come from Abert Lake and may return to Abert or Goose Lakes during the season. Or they may use one lake one year an another the next (Warnock et al. 1998, Plissner et al. 1999, in press)

Winter. Shorebirds do not use either SLWA or Summer Lake in the winter.

Concerns

Grazing and haying are concerns around the edge of Summer Lake. Water needs for irrigation is a serious topic of concern for local residents and wildlife managers.

Other Species

Summer Lake and SLWA are one of the most important wildlife areas in the state of Oregon. As such, they are used by over 260 avian species including large populations of staging, breeding, and wintering waterfowl, geese, and swans. SLWA is an important staging area for Wrangel Island Snow Geese and Tule White-fronted Geese. Over half of the world's Tule Geese stage at SLWA each fall. Total use by migratory waterfowl exceeds 5 million use-days for ducks and 4 million use-days for white geese (ODF&W 1993). SLWA provides breeding habitat for 20,000 ducks and 400 Canada Geese. The area is also an important breeding/feeding area for American White Pelicans, Double-crested Cormorants, Black-crowned Night Herons, Common Egrets, White-faced Ibis, Caspian Terns, Ring-billed Gulls, and California Gulls.

Authors consulted:

Warnock et al. 1998, Plissner et al. 1999, Plissner et al. In press, Intermountain West Joint Venture Implemetation Plan for Habitat Conservation in Eastern Oregon.

Appendix V. Key shorebird areas of the Intermountain West

MONO LAKE, CA Joseph R. Jehl, Jr.

Mono Lake is a large (180 km^2), hypersaline (70-90o/00) and highly alkaline (ph 9.9) lake at the western edge of the Great Basin in central California. It is bordered mainly by barren alkali flats and sandy beaches, with scattered lagoons and a few freshwater marshes. Small freshwater seeps are dotted irregularly around the lake. The lake is under the control of the U. S. Forest Service. The shore is managed by the California State Parks.

From the 1940 to 1980s, streams feeding the lake were diverted to provide water to the City of Los Angeles, and the lake level dropped. This was a matter of concern and resulted in extensive studies of all aspects of the lake and its ecology. For a description of the Mono Lake ecosystem, see National Academy press 1987.

Shorebirds

Breeding. There are few breeding shorebirds. The alkali flat/seep system provides excellent habitat for Snowy Plover. Page and Stenzel (1981) reported 384 birds there in 1980, making Mono Lake one of the largest breeding populations in California. A few pairs (10-20) of American Avocets breed in years when secure island habitat is available. Success, however, is generally poor as the islets often are inundated as the lake rises in response to runoff from the Sierra Nevada. Spotted Sandpipers and Killdeer breed in low numbers.

Migration. Because Mono Lake has no fish, it can develop high abundances of aquatic invertebrates, specifically brine shrimp (*Artemia monica*) and alkali flies (*Ephedra hians*), which provide food for the large numbers of migratory shorebirds that use the lake in late summer and fall. Principal among these are Wilson's Phalaropes, which molt/stage at Mono Lake in preparation for a non-stop flight to South America. Peak numbers are attained in late July, estimated at up to 70,000. In recent years, 20,000-40,000 has been more usual (Jehl 1988, 1999). About 98% of the Wilson's that use Mono Lake are adults. As there is little turnover among these migrants, peak numbers provide a good index to the total numbers using the lake. Jehl (1988) estimated the local stagers to comprise about 14% of the world population. This is one of a few species of shorebirds known to feed on brine shrimp, which comprises the majority of its diet.

Red-necked Phalaropes are also abundant at Mono Lake late July to early October, with peak numbers of 20,000-30,000 (Jehl unpubl.). This species uses the lake as a stopping point en route to wintering areas in the Pacific Ocean. Their diet consists almost exclusively of brine flies. The migration of this species is protracted, and there are differences in the timing of different age classes (adults and juveniles occur in large numbers). Although the species has been well studied locally (Jehl 1984, Rubega and Inouye 1994), we have no data on length of stay or turnover times. However, the birds do not molt heavily at Mono Lake nor do they lay on heavy fat deposits characteristic of long distance migrants. Thus, it is likely that individuals stay for just 10-14 days, and that the total number of red-necks using the lake in fall approximates 50,000-100,000.

Concerns
Maintenance of salinities suitable for alkali fly and brine shrimp reproduction is important to the lake's suitability as a feeding area for shorebirds.

Other Species
Mono Lake is an important breeding site for California Gulls. In fall, huge numbers of Eared Grebes (sometimes in excess of 1 million) and very large numbers of Ruddy Ducks stage at Mono Lake.

Authors Consulted
Jehl 1984, 1988, 1999; Page and Stenzel 1981; Patten et al, 1987; Rubega and Inouye 1994.

Appendix VI. Key Shorebird Areas of the Inter-Mountain West

LAHONTAN VALLEY and HUMBOLDT SINK, NV Larry Neel

Lahontan Valley is situated in western Nevada approximately 60 miles east of Reno. Because it serves as the terminus of the Carson River, it has historically provided a rich array of diverse wetlands, supporting literally hundreds of thousands of wetland-dependent birds. Three major wetland sites comprise the bulk of the critical habitat today – Carson Lake (7500 acres), Stillwater Marshes/Carson Sink (23,000 acres of managed wetlands; up to 200,000 acres of water when the Sink is full), and Humboldt Sink (28,000 acres of managed wetlands, including most of the Sink). All three provide a diversity of wetland types, and all have the capability of providing expansive acreage of shallow flooded playa and mudflat. The Canvasback Gun Club adjacent to Stillwater NWR is intermittently important for shorebirds, especially during drought.

Shorebirds

Together, the three major wetland sites have supported spring and fall counts in excess of 100,000. Total shorebirds using the area per year has exceeded 200,000 (unpublished data, NDOW and Stillwater NWR; Thompson, 1986).

Breeding. The primary breeding shorebirds are American Avocet (4,000-5,000 pairs), Black-necked Stilt (1000 pairs), Killdeer (900 pairs), Snowy Plover (300 pairs), Wilson's Phalarope (100 pairs), and Long-billed Curlew (50 pairs) All nesting pair figures are estimated from Neel and Henry (1996).

Migration. Spring counts have exceeded 100,000 for Long-billed Dowitcher and 60,000 for Western/Least Sandpipers. Late summer/fall counts have exceeded 60,000 for Wilson's Phalaropes and American Avocet and 8,000 for Black-necked Stilts.

Winter. Lahontan Valley is not an important wintering site for shorebirds.

Concerns

Agricultural Diversions

Water from the Truckee River drainage was introduced into the Carson River drainage below Lahontan Dam in 1915 as part of the ambitious Newlands Project, the first project authorized and implemented under the Reclamation Act of 1902. However, agricultural diversions combined with federal restrictions aimed toward the efficient use of those diverted waters resulted in steadily declining wetland acreage and quality until 1990, when the Truckee-Carson Settlement Act (Title II, Public Law 101-618) recognized the Lahontan Valley Wetlands as an important and legitimate use of the waters within the Newlands Project. This landmark legislation authorized the purchase of water rights from willing sellers within the irrigation project for transfer to three specific wetland areas – Stillwater National Wildlife Refuge, Carson Lake (also designated for transfer to the State of Nevada as a Wildlife Management Area), and the Fallon Paiute-Shoshone Tribal Wetlands (approximately 900 acres near Stillwater NWR). To date, 24,000 acre-feet of water have been purchased by the U.S. Government and 8,100 acre-feet by the State of Nevada as a result of that authorization. This act authorized the acquisition of sufficient water to maintain a long-term average of 25,000 acres of wetlands in Stillwater National Wildlife Refuge, Carson Lake and the Fallon Paiute-Shoshone Tribal wetlands. Because flows in the Carson and Truckee rivers, which feed these wetlands, are dependent upon snow melt in the Sierra Nevada, actual acreage varies greatly both seasonally and annually.

Contaminants

Biological concerns have been identified relative to a variety of environmental contaminants in wetlands of the Lahontan Valley and the lower Humboldt River basin (Hoffman et al. 1990, Hallock and Hallock 1993, and Tuttle et al. 1996). Contaminants concerns are primarily the result of hydrologic modification of the stream channels and wetlands in the lower hydrographic basins, the discharge of agricultural drainage to wetlands, and the historic release of mercury to the Carson River and its tributaries from precious metal mining (in particular, release during the Comstock Load era from Virginia City, NV). As a result, dissolved solids and several trace elements (e.g., arsenic, boron, chromium, copper, mercury, selenium, and zinc) have become concentrated in wetlands. Concentrations in water sediment, food chain organisms, and/or avian eggs and tissues commonly exceed potentially toxic levels. With concentrations in food chain organisms (i.e., fish, invertebrates, vegetation) exceeding dietary and tissue concentrations associated with behavioral effects, histopathology, reduced reproduction, and/or reduced survival in avian species, mercury represents the greatest hazard to avian species in Lahontan Valley.

The acquisition of higher quality water for wetland management is expected to benefit wetlands and wetland-dependent species in Lahontan Valley. Benefits may be enhanced if water is managed to restore natural hydrologic processes. As such, concerns with dissolved solids and several trace elements are expected to be reduced. However, these measures are not expected to mitigate concerns with mercury. Conversely, the discharge of high volumes of Carson River water to wetlands may exacerbate existing contaminated conditions. Ongoing research by the U. S. Environmental Protection Agency, the U. S. Geological Survey and the U. S. Fish and Wildlife Service is designed to seek management measures which will reduce the mercury risk to fish, wildlife and their habitats in the Lahontan Valley.

Predation

Breeding shorebirds in Lahontan Valley are vulnerable to a wide complement of predators, including coyotes, Common Ravens, gulls, Northern Harriers, Black-crowned Night Herons, and others. Concern has been raised by wildlife managers and researchers, but conclusive studies quantifying the actual effects are lacking and management to ameliorate predation is largely unimplemented.

Other Species

The Lahontan Valley wetlands are also important for breeding waterfowl, especially Cinnamon Teal and Redheads. The complex hosts one of the three most important White-faced Ibis breeding colonies in the Great Basin, and at times is the largest of the three (9,000 breeding pairs in 1997). Other breeding species include Mallard, Gadwall, Canada Goose, Ruddy Duck, Great Egret, Snowy Egret, Cattle Egret, Great Blue Heron, Black-crowned Night-Heron, Double-crested Cormorant, Forster's Tern, Black Tern, Caspian Tern, California Gull, Eared Grebe, Western Grebe and Clark's Grebe. The Lahontan Valley wetlands also serve a vital function as shallow-water feeding areas for American White Pelicans from the breeding colony on Anaho Island in Pyramid Lake (up to 13,000 birds), as well as feeding grounds for up to 3,000 nesting pairs of California Gulls from Anaho Island and islands in Lahontan Reservoir.

Authors Consulted

Hallock and Hallock 1993, Hoffman et al. 1990, Tuttle et al. 1996

Appendix VII. Key Shorebird Areas of the Inter-Mountain West

HONEY LAKE, CA Lewis Oring

Honey Lake is a large playa lake (23,000 acres) just southeast of Susanville, Lassen Co., CA. The lake is fed primarily by snow melt via the Susan River from the north and Long Valley Creek from the south. Hot springs flow into the lake along the east shore at Amedee. Water levels fluctuate greatly in accord with snow accumulations. The lake has been dry several times this century including 1990-1992. Salinity varies inversely with volume. Large, managed freshwater marshes exist at the north end of the lake (Honey Lake Wildlife Management Area, California Dept. Fish and Game) and at the south (Jay Dow, Sr. Wetlands, University of Nevada, Reno). Several hunting clubs also manage wetlands and the Sierra Army Depot (DOD) has extensive lake-flooded wetlands in high water years.

Shorebirds

The area is of import to transient and breeding shorebirds. No shorebirds overwinter. Peak transient counts are between 20,000 and 30,000. Approximately 1000 pairs of shorebirds of 9 species breed annually (Oring pers. obs.).

Breeding. The most abundant breeding shorebird is the American Avocet (approx. 500 pairs). Killdeer, Black-necked Stilt and Willet are abundant breeders, Long-billed Curlew and Wilson's Phalarope are locally common. Snowy Plover counts have declined radically from a historic high of approximately 100 pairs (Page et al. 1991) to as few as two pairs in 1997-99 (Oring pers. obs.). To what degree the decline reflects the current high lake levels will be determined during the next drought period when lake levels drop.

Migration. Abundant transients include Western and Least Sandpiper, Wilson's and Red-necked Phalarope and Long-billed Dowitcher, all of which occur in the thousands on single days. Flocks of both Western and Least Sandpipers of up to 8000 have been recorded (Oring pers.obs.).

Concerns

The primary problems at Honey Lake are low reproductive success, due to predation of both eggs and young, and insufficient water with which to manage wetlands in summer.

Predation. In some years, reproductive success of shorebirds is negligible. In two years of intensive nest monitoring, it was estimated that **no** American Avocet or Black-necked Stilt chicks fledged; and in another year, 83% of unenclosed Killdeer nests were depredated (Oring pers.obs.). There is a serious need for cost effective management that can increase reproductive success.

Water. Availability of water for management is a limiting factor for shorebird reproductive success and for use of the basin by transients. There is a need for a lake basin approach to water management. Huge undeveloped opportunities exist on Sierra Army Depot (DOD), and there is a need for deep water storage of spring runoff that can later be used for shallow water management.

Contaminants are not known to be a problem at Honey Lake. Se, B and DDE levels are low. However, birds, especially American Avocets, may be importing DDE from areas further south, e.g. Salton Sea and Mexico.

Other Species

Honey Lake is an important waterfowl breeding, staging and over-wintering site. At times tens of thousands of Snow Geese are present in the area. Modest numbers of a wide variety of waterbirds breed and migrate through the area. Hartson Reservoir in the Honey Lake Wildlife Management Area hosts large numbers of breeding Ring-billed Gulls, California Gulls, Cattle Egrets, Snowy Egrets, and Black-crowned Night Herons.

Appendix VIII. Key shorebird areas of the Intermountain West

GOOSE LAKE, CA/OR Susan Haig

Goose Lake is an expansive (~480 km^2), but shallow, alkali lake that bridges the central-eastern California and Oregon borders. While extensive, the lake is susceptible to serious evaporation during even brief times of drought. Marshes on private land to the north and other surrounding habitats significantly extend the utility of the areas to numerous waterbird species, although most of these wetlands have been converted or modified for agricultural use. The last hardstem bullrush marsh in Goose Lake Valley is found on private land just to the north of the lake. This property was recently under consideration for purchase by U.S. Fish and Wildlife Service but the deal did not go through.

Shorebirds

Breeding. Contrary to other major lakes in the area which are primarily post-breeding areas (e.g., Summer Lake and Lake Abert), shorebirds use Goose Lake as a breeding area. Shorebirds such as American Avocets, Willets, and Killdeer nest on the south end of the lake and mostly likely produce more chicks than Abert and Summer Lakes combined. This may be explained by lower salinity, access to fresh water, and island habitats that make it difficult for mammalian predators to reach nests.

Migration. Goose Lake is a significant staging area for a number of shorebirds, particularly American Avocets and Willets. Over 10,000 American Avocets have been counted in the area (Warnock et al. 1998). Often shorebirds that use Goose Lake during non-breeding periods move to Summer and Abert Lakes as well (Plissner et al. 1999, in press).

Winter. Shorebirds do not use Goose Lake in the winter.

Concerns

As in other lakes in the area, cattle grazing around the perimeter causes damage to the alkali crust and cattle tend to muck up the freshwater inflows. In periods of drought, they can reach most parts of the lake--including islands that generally are protected from mammals, and destroy breeding habitat. A related problem lies with ranchers haying during various stages of the breeding season. Haying not only takes away breeding habitat but nests and chicks can be destroyed in the process. Finally, purchasing the wetland habitat on the north end of the lake would provide much-needed security for the vast number of waterbirds using it.

Other Species

Goose lake and the wetlands to the north are primary breeding areas for Canada Geese, Sandhill Cranes, and a number of waterfowl species. This is also an important breeding area for Clark's Grebes, and in recent years, White-faced Ibis have bred in the marshes to the north. During post-breeding periods, Tundra Swans use the area as a major staging area and the lake has supported wintering populations of over 10,000 Canada Geese. Finally, Goose Lake provides critical habitat for Goose Lake Redband Trout and a number of other native fishes.

Authors consulted: Warnock et al. 1998, Plissner et al. 1999, Plissner et al. In press, Intermountain West Joint Venture Implemetation Plan for Habitat Conservation in Eastern Oregon.

Appendix IX: Key Shorebird Areas of the Inter-Mountain West

HARNEY BASIN, OR Gary Ivey

The Harney Basin is located in northern Harney County, in southeast Oregon and includes the privately-owned Silvies Floodplain and Warm Springs Valley plus the 186,000-acre Malheur National Wildlife Refuge. The area provides a great diversity of wetland types, from very fresh wet meadow habitats to hypersaline playas and mudflats; and it supports a great variety of wetland birds. The private wetlands encompass about 100,000 acres in wet years and are primarily flood-irrigated native hay fields which provide habitat for spring migrant and breeding shorebirds. Malheur Lake is the terminus of the Silvies and Blitzen rivers and is a large freshwater marsh, averaging 40,000 acres including extensive shoreline shorebird habitat. Conditions for shorebirds are highly variable depending on water levels which fluctuate greatly with precipitation and evaporation. Harney Lake is a hypersaline sink of about 30,000 acres supporting an abundance of brine flies, which attract nesting Snowy Plovers and migrant shorebirds. Numerous playa wetlands are located around Harney Lake and in the Double-0 Unit of the refuge. The Double-0 Unit is managed for nesting and migrating shorebirds.

Shorebirds

Together, these wetland sites have supported spring and fall counts in excess of 35,000 individuals. Total shorebirds using the area per year has exceeded 50,000 individuals (unpublished data, Malheur NWR).

Breeding. The primary breeding shorebirds are Wilson's Phalarope (2,800 pairs), American Avocet (1,000 pairs), Willet (850 pairs), Common Snipe (850 pairs), Killdeer (700 pairs), Long-billed Curlew (550 pairs), Spotted Sandpiper (500 pairs), Black-necked Stilt (100 pairs), and Snowy Plover (80 pairs). All nesting pair figures are estimated from Paullin et al. (1977) with the exception of the Snowy Plover (unpublished data, Malheur NWR).

Migration. Fall counts have exceeded 22,000 for Western Sandpipers, 14,000 for Wilson's Phalaropes and 10,000 for Long-billed Dowitchers.

Wintering. Harney Basin is not an important wintering site for shorebirds.

Concerns

Habitat Management on Private Lands

A major problem facing breeding shorebirds in the area is the scarcity of summer water in many areas, limiting survival of broods. Private landowners typically dewater their wetlands in mid June and begin cutting hay in late June. This practice causes broods to move long distances to water and makes them more vulnerable to predators. Also, the actual cutting of hay often kills young shorebirds. Developing informative information and incentives for using more compatible practices would reduce the problem. Restoration of wetland basins and development of impoundments with manageable water sources and secure water rights on public and private lands would also enhance shorebird production.

Contaminants

Based on reconnaissance studies conducted in the area, contaminants are not a concern in the Harney Basin (Rinella and Schuller 1992)

Predation

Breeding shorebirds in Harney Basin are vulnerable to a wide complement of predators, including coyotes, mink, Common Ravens, gulls, Northern Harriers, Black-crowned Night

Herons, and others. Concern has been raised by wildlife managers and researchers, but conclusive studies quantifying the actual effects are lacking.

Other Species

The Harney Basin Wetlands are also important for breeding waterfowl, especially Cinnamon Teal and Redheads. The area supports a high percentage of breeding Central Valley population of Greater Sandhill Cranes, and also hosts one of the most important White-faced Ibis breeding colonies in the Great Basin, (10,000 breeding pairs in 1998). Other common breeding birds in Harney Basin Wetlands include Eared Grebe, Western Grebe, Clark's Grebe, Pied-billed Grebe, Trumpeter Swan, Canada Goose, Mallard, Gadwall, Green-winged Teal, American Wigeon, Northern Shoveler, Northern Pintail, Canvasback, Ruddy Duck, Double-crested Cormorant, American White Pelican, Great Egret, Snowy Egret, Cattle Egret, Great Blue Heron, Black-crowned Night Heron, American Bittern, Forster's Tern, Black Tern, Caspian Tern, California Gull, Ring-billed Gull, Franklin's Gull, Sora, and Virginia Rail.

Appendix X: Key Shorebird Areas of the Inter-Mountain West

KLAMATH BASIN CA/OR Dave Shuford

The Upper Klamath Basin of northern California and southern Oregon historically held 350,000 acres of wetlands. Today this total has been greatly reduced by conversion of wetlands primarily to agricultural lands. Despite this loss, the Klamath Basin still hosts about 80% of the Pacific Flyway population of waterfowl during migration and large numbers of other wetland-dependent species during migration and breeding. Of the remaining wetlands, most lie within the various units of the Klamath Basin Refuge Complex. Of these, Lower Klamath National Wildlife Refuge (NWR) is the most productive overall and hosts the largest numbers of shorebirds. Tule Lake NWR is of lesser importance overall and supports smaller numbers of shorebirds. Shorebirds have also begun to use two wetland restoration sites – Agency Lake Ranch and Wood River Wetland – created in the 1990s adjacent to Agency Lake, Oregon.

Historically, Lower Klamath Lake was comprised of about 55,000 acres of marsh and 30,000 acres of open water (Akins 1970). Lower Klamath NWR currently has 22,000 acres of wetlands, of which 12,000 to 16,000 acres are seasonally flooded and 5,000 to 9,000 acres are permanently flooded marshes (USBR 1998). Since the early to mid-1980s, seasonal wetlands in summer have been increased by about 2,000 acres (10-20%), while the extent of farm fields on the refuge has been reduced from about 8,000 to 4,000 acres (D. Mauser pers. comm). Managing for early successional marshes involves rotating fields between farming and marshes. Historically, Tule Lake fluctuated in size from about 55,000 to 110,000 acres between extremes of dry and wet cycles (Akins 1970). Today, habitats at Tule Lake NWR consist of about 17,000 acres of croplands, 640 acres of experimental wetlands, and 13,000 acres of return-flow sumps (USBR 1998). The sumps are primarily open water dominated by submergent marsh plants and periodic and extensive blooms of filamentous algae; smaller areas consist of tall stands of tules and cattails.
Agency Lake Ranch (Bureau of Reclamation) and the Wood River Wetland (Bureau of Land Management) consist of up to 7,000 and 3,000 acres of seasonal wetlands, respectively.

Shorebirds

Pacific Flyway Project shorebird surveys at Lower Klamath NWR from 1990 to 1995 found an average of 9,447 individuals in spring (n = 6; min.-max. = 2,330-27,233) and 1,281 in fall (n = 6; min.-max. = 300-2,427) (PRBO unpubl. data). PRBO surveys at Agency Lake Ranch on 20 September and 12 October 2000 found 5,157 and 2,933 shorebirds, respectively; the September total was dominated by Long-billed Dowitchers (94%) and in October by small sandpipers (63%, mostly Leasts).

Breeding. Although population estimates are unavailable, the refuge probably supports one of the largest breeding populations of Black-necked Stilts (and perhaps American Avocets) in the Intermountain West. Other species of shorebirds that breed in the Klamath Basin, in much smaller numbers, are the Snowy Plover, Killdeer, Willet, Long-billed Curlew, Common Snipe, and Wilson's Phalarope.

Migration. Key species of shorebirds during spring and fall are Black-necked Stilt (nearing 1,000 in spring and 650 in fall), American Avocet (exceeding 1,400 in spring and 760 in fall), Western Sandpiper/Least Sandpiper/Dunlin (exceeding 23,000 in spring and 1,800 in fall), and Long-billed Dowitcher (exceeding 2,300 in spring and 4,800 in fall). Most of these shorebirds

occur on seasonally flooded wetlands, but large numbers occasionally use irrigated agricultural fields.

Winter. The Klamath Basin is not an important wintering site for shorebirds.

Effective Shorebird Management Practices

Shorebird management in the Klamath Basin currently focuses on providing suitable habitat during spring migration by drawing down seasonal marshes from about 1 April to mid-July (D. Mauser pers. comm.). Early successional stages of marshes attractive to shorebirds are maintained by vegetation management techniques, such as burning and discing marsh vegetation, and by farming-wetland rotation. Grazing is allowed in spring to keep vegetation height low for upland nesting species, such as the Long-billed Curlew and Willet. Conversely, leasees on pasture and hay fields are not allowed to irrigate from 1 April to 1 June to reduce the risk of flooding nests of these species. Drawing down wetlands or maintaining shallow water for shorebirds is not practiced in the Klamath Basin in fall, thereby reducing the risk of botulism outbreaks in waterfowl and other species (D. Mauser pers. comm.).

Concerns

High Quality Water Availability

In the context of a vast loss of the Klamath Basin's historic wetlands, the main concern for shorebirds and other waterbirds is the availability of high quality water for remaining wetlands (D. Mauser pers. comm.). The Klamath (reclamation) Project was established in 1905 with the goal of irrigating as much of the Klamath Basin below Upper Klamath Lake as was practical. From inception to 1994 the Project's water priorities in order of importance were agriculture, refuges, lakes, and rivers. Under this scenario water availability to refuges was only an issue during years of extreme drought, such as 1992 and 1994. An administrative opinion in 1995 shifted Project priorities to endangered species (lakes and rivers), tribal trust (lakes and rivers), agriculture, and refuges. Because of a reduction in water availability (>50% of total water previously available now allocated to Endangered Species Act compliance, Apr-Sep) and a low priority for remaining water, severe impacts are predicted for Lower Klamath NWR (USBR 1998). This will especially affect water availability in summer and fall (D. Mauser pers. comm.). The refuge also suffers from poor water quality via hyper-eutrophication from excess input of nutrients from agricultural runoff.

Exotic Plants

The spread of exotic plant species in the Klamath Basin poses threats to shorebirds and other wetland-dependent species by crowding out more productive (native or non-native) species and changing plant community structure. The spread of perennial pepperweed *(Ledium latifolium)* in particular is reducing the suitability of upland nesting habitat for curlews and willets and replacing low-growing saltgrass on islands used by nesting stilts and avocets (D. Mauser pers. comm). Other exotic plant species posing problems in the region are Canada thistle *(Cirsium arvense)*, poison hemlock *(Conium maculatum)*, cheat grass *(Bromus tectorum)*, and fireweed summercypress *(Kochia scoparia)*.

Other Species

Lower Klamath NWR is the most important stopover area for migratory waterfowl in the Pacific Flyway in both fall and spring (peak 1.8 million in fall 1997) and supports one of the densest breeding

populations of waterfowl in the National Wildlife Refuge system (USBR 1998). Dabbling ducks are the predominant species using seasonal and permanent wetlands, but diving ducks, swans, and geese also occur in large numbers. In spring 1992, Lower Klamath NWR held close to 50% of the Pacific Flyway total of Tundra Swans and since the early 1990s has held over 50% of mid-winter numbers of Canvasbacks. Lower Klamath is one of the most important staging areas for Sandhill Cranes in the Pacific Flyway in fall, when numbers sometimes exceed 1,000 birds. Clear Lake and Lower Klamath NWRs support California's two primary breeding colonies of American White Pelicans and Clear Lake NWR holds one of the state's largest colonies of California and Ring-billed gulls. Lower Klamath NWR holds one of the largest breeding colonies of White-faced Ibis in California (peak 4100 pairs in 1994). Klamath Basin refuges also support a variety of other breeding waterbirds, including Eared, Western, and Clark's grebes, Double-crested Cormorants, Least and American bitterns, Black-crowned Night-Herons, Snowy and Great egrets, Great Blue Herons, Virginia Rails, Soras, Franklin's Gulls, and Caspian, Forster's, and Black terns. In addition, the Klamath Basin also supports the largest wintering population of Bald Eagles in the lower 48 states, sometimes exceeding 1,000 individuals; eagles are attracted to the area's large numbers of waterfowl (USBR 1998).

Authors consulted
Akins (1970) and U.S. Bureau of Reclamation (1998).

Appendix XI: Key Shorebird Areas of the Inter-Mountain West

OWENS LAKE, CA Michael Prather

Owens Lake, California is a nearly dry playa lake located in the southern end of the Owens Valley at the terminus of the Owens River. Its elevation is approximately 3,600 feet. The lake nearly dried between 1913 and 1924 due to water diversion by the City of Los Angeles. Today water reaches the lake in small amounts from a dozen or more springs and artesian wells as well as from the Owens River. These wet areas hatch large numbers of brine flies that provide a food source for shorebirds. After winter rain or snow, a large freshwater pool sometimes forms, lasting into spring. A large brine pool covers the western portion of the lakebed. Higher ground forms a crescent from the northern edge to the east and southern shore. It is this higher ground that is the source of wind blown dust that has generated considerable concern relative to human health.

Ownership of the lakebed is almost entirely by California State Lands; a narrow strip at the river terminus is owned by Los Angeles. U. S. Borax holds a lease from the state to mine trona (soda ash) totaling 16,000 acres in the southwest corner of the lake.

Shorebirds

Breeding. The lake is one of the most important breeding areas in California for Snowy Plover. Breeding individuals number 100-200 in most years, but were as high as 478 in 1978. Other breeders include small numbers of American Avocet, Black-necked Stilt, Killdeer, Common Snipe and, in 1998, one nest of Long-billed Curlew produced two fledglings (Page pers. obs.).
Migration. Western and Least sandpipers are the most numerous species at Owens Lake. Flocks of over 5000 have been recorded, and over 20,000 spring and fall transients have been recorded (Prather pers. obs.). Late summer/fall numbers of American Avocets reach 1000. Dunlin occur in groups of 200 or more. Smaller numbers of many species are recorded.
Winter. Dunlin in groups over 200 have overwintered at Owens Lake. Dozens of American Avocets and small numbers of Greater Yellowlegs, Western and Least sandpipers also are found.

Concerns

Several of the artesian water sources are located on adjacent private property. The water then flows out onto the lake's state lands. Potential development of water bottling businesses or other commercial activity could disrupt flow. Los Angeles is under an order from the U. S. Environmental Protection Agency to bring PM 10 dust into compliance by 2006. Los Angeles is currently studying groundwater pumping potential so as to minimize their use of aqueduct water. Potential exists for altering ground water levels and altering spring flow. Shallow flooding pilot projects have attracted birds, but use of ground water may have negative results. Los Angeles hopes to grow managed vegetation (*Distichilis*) in the future to reduce the amount of water needed for dust abatement. In the near term, flooding large new areas may attract an increasing number of water birds. Spring grazing in state owned marshes may affect nesting Common Snipe and Long-billed Curlew.

Other Species

Though many species of waterbirds use Owens Lake in small to moderate numbers, including up to perhaps 1000 ducks at a time, the lake's greatest importance to waterbirds is through its providing breeding habitat for Snowy Plovers and habitat for transient peep.

Table 1
Managed Shorebird Sites of the Intermountain West

SITE	RESPONSIBLE AGENCIES
California	
Clear Lake NWR	USFWS
Lower Klamath NWR	USFWS
Tule Lake NWR	USFWS
Honey Lake	CDFG; US Army; BLM
Idaho	
Bear Lake NWR	USFWS
Camas NWR	USFWS
Deer Flat NWR	USFWS
Gray's Lake NWR	USFWS
Minidoka NWR	USFWS
Camas Prairie WMA	IDFG
Ft. Boise WMA	IDFG
Market Lake WMA	IDFG
Mud Lake WMA	IDFG
Payette River WMA	IDFG
American Falls Res	BOR
Nevada	
Charles Sheldon NWR	USFWS
Pahranagat NWR	USFWS
Ruby Lake NWR	USFWS
Stillwater NWR	USFWS
Artesia Lake WMA	NDOW
Carson Lake	NDOW; TCID
Franklin Lake WMA	NDOW
Humboldt WMA	NDOW
Key Pittman WMA	NDOW
Kirch WMA	NDOW
Mason Valley WMA	NDOW
Overton WMA	NDOW
Railroad Valley WMA	NDOW
Scripps WMA	NDOW
Continental Lake	BLM
Gridley Lake	BLM
Massacre Lakes	BLM
Quinn Lakes	Fort McDermitt Indian Res
Oregon	
Malheur NWR	USFWS
Klamath Wildlife Area	ODFW
Ladd Marsh Wldlf Area	ODFW
Summer Lake Wildlf A	ODFW
Goose Lake	BLM; USFS?
Lake Abert	BLM
Utah	
Bear River NWR	USFWS
Fish Springs NWR	USFWS
Ouray NWR	USFWS

SITE	RESPONSIBLE AGENCIES
Utah cont.	
Browns Park WMA	UDWR
Clear Lake	UDWR
Desert Lake	UDWR
Farmington Bay	UDWR
Harold Crane	UDWR
Harold Slough	UDWR
Ogden Bay	UDWR
Powell Slough	UDWR
Public Shooting Grounds	UDWR
Salt Creek	UDWR
Spring Creek	UDWR
Timpie Springs	UDWR
Arizona	
Bill Williams NWR	USFWS
Cibola NWR	USFWS
Havasu NWR	USFWS
Imperial NWR	USFWS
New Mexico	
Bosque del Apache NWR	USFWS
San Andres NWR	USFWS
Washington	
Columbia NWR	USFWS
Little Pend Oreille NWR	USFWS
McNary NWR	USFWS
Toppenish NWR	USFWS
Turnbull NWR	USFWS
Banks Lake Wildlife Area	WRA
Crab Creek Wildlife Area	WRA
Indian Dan WRA	WRA
N. Columbia Basin WRA	WRA
Seep Lakes Wildlife Area	WRA
S. Columbia Basin WA	WRA
Sunnyside Wildlife WRA	WRA
Wahluke WRA	WRA
Montana	
Lee Metcalf NWR	USFWS
Red Rock Lakes NWR	USFWS
Freezeout Lake WMA	MFWP
Wyoming	
National Elk Refuge	USFWS
Seedskadee NWR	USFWS
Colorado	
Brown's Park NWR	USFWS

Table 2
Intermountain West Conservation Values for Species Seen Annually in the Region

Species	INTERMOUNTAIN WEST						LIFE CYCLE STAGE	IMW OVERALL SCORE
	GB	NR	SR	SMD	ANM	CD		
Black-bellied Plover	2	1	1	4	1	1	MW	4
American Golden-Plover	1	1	1	1	1	1	m	1
Snowy Plover	5	2	2	5	2	2	MW**B**	5
Semipalmated Plover	3	1	1	3	1	1	MW	3
Killdeer	3	2	1	1	1	1	MWB	3
Mountain Plover	2	5	5	3	3	2	mW**B**	5
Black-necked Stilt	5	3	3	4	2	2	MW**B**	5
American Avocet	5	3	3	4	1	2	MW**B**	5
Greater Yellowlegs	3	3	3	3	2	1	MW	3
Lesser Yellowlegs	2	2	2	2	2	2	mw	2
Solitary Sandpiper	2	2	3	1	1	1	m	3
Willet	4	3	2	3	1	1	MW**B**	4
Spotted Sandpiper	3	3	3	3	2	2	MW**B**	3
Upland Sandpiper	1	1	1	1	1	1	mb	1
Long-billed Curlew	5	4	3	5	2	2	MW**B**	5
Whimbrel	1	1	1	1	1	1	m	1
Marbled Godwit	4	1	1	4	1	1	MWb	4
Ruddy Turnstone	1	1	1	1	1	1	m	1
Red Knot	1	1	1	1	1	1	m	1
Sanderling	1	1	1	1	1	1	m	1
Semipalmated Sandpiper	1	1	1	1	1	1	m	1
Western Sandpiper	4	2	2	4	2	1	**M**W	4
Least Sandpiper	4	2	2	4	2	2	**M**W	4
White-rumped Sandpiper	1	1	1	1	1	1	m	1
Baird's Sandpiper	1	1	1	1	1	1	m	1
Pectoral Sandpiper	1	1	1	1	1	1	m	1
Dunlin	2	1	1	2	1	1	MW	2
Stilt Sandpiper	1	1	1	1	1	2	m	1
Short-billed Dowitcher	1	1	1	1	1	1	m	1
Long-billed Dowitcher	5	2	2	4	2	2	**M**W	5
Common Snipe	3	3	2	2	2	1	MWB	3
Wilson's Phalarope	5	3	1	4	2	2	**M**B	5
Red-necked Phalarope	4	1	1	3	1	1	**M**	4
Red Phalarope	1	1	1	1	1	1	m	1

Key: GB=Great Basin, NR=Northern Rockies, SR=Southern Rockies/CO, SMD=Sonoran & Mojave Deserts, ANM=AZ & NM Mtns., CD= Chihuahuan Desert

M=migrant,impt; W=wintering, impt; B=breeding, impt; Bolding=very important; lower case letters= minor importance

5=critically important; 4=very important; 3=important; 2=slightly important; 1=unimportant

Table 3
Intermountain West Shorebirds Sites
with Greater than 5000 Shorebirds in More than Half the Years Counted

SITE	Approximate peak numbers in thousands
CALIFORNIA	
SALTON SEA	**100-250**
Mono Lake	**50-100**
GOOSE LAKE (CA/OR)	30-50
KLAMATH BASIN (CA/OR)	20-30
Honey Lake	20-30
Alkali Lakes	10-20
Piute Ponds	10-20
Owens Lake	10-20
Butte Valley Wildlife Area	5-10
Lyneta Wild Rice Area	5-10
San Jacinto Wildlife Area	5-10
IDAHO	
Lake Lowell	10-20
American Falls Reservoir	5-10
NEVADA	
LAHONTAN VALLEY	**100-250**
Humboldt WMA	30-50
OREGON	
Lake Abert	**50-100**
SUMMER LAKE	30-50
HARNEY BASIN	30-50
Warner Wetlands	10-20
UTAH	
GREAT SALT LAKE	**250-1000**

Key:
>250 = **BOLD, CAPS, UNDERLINED ;** 100-250 = **BOLD, CAPS;** 50-100 = **Bold;**
30-50 = CAPS, UNDERLINED; 20-30 = CAPS; 5-20 = lower case letters.

Table 4.
Summary of Goals for the Intermountain West Shorebird Plan

Habitat Management:	Maintain and enhance diverse landscapes that sustain thriving, well-distributed shorebird populations.
Monitoring and Assessment:	Acquire information on shorebird distribution and abundance for shorebird conservation.
Research:	Acquire new information that facilitates shorebird conservation.
Outreach/Education:	Develop an informed and supportive constituency for long-term shorebird conservation.
Planning:	Achieve regional cooperation for shorebird conservation.

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