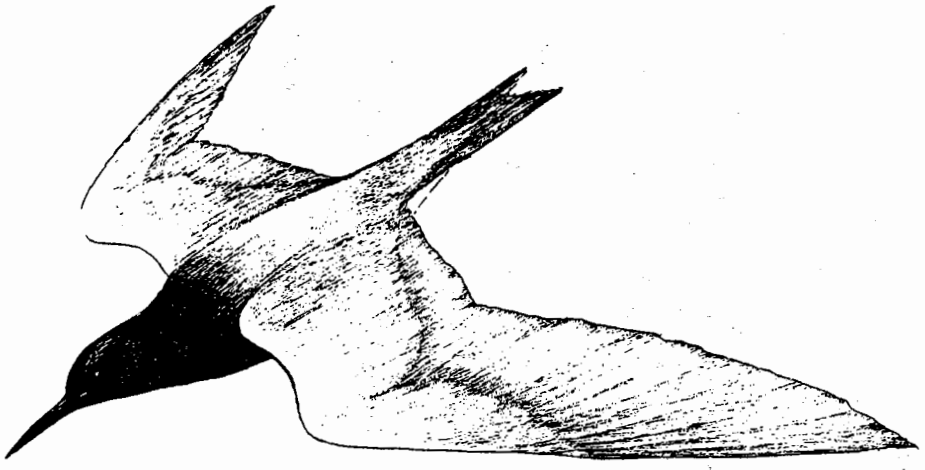
Nevada Partners In Flight

Bird Conservation Plan



Written by

The Nevada Partners In Flight Working Group

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November 29, 1999

SIGNATURE PAGE

WHEREAS *it is recognized that the National Partners In Flight effort has focused needed attention upon the many difficult challenges to the long-term conservation of North America's birdlife and*

WHEREAS *it is recognized that Partners In Flight has brought together a wide array of federal and state agencies, conservation organizations, and research institutions both nationally and internationally to address these conservation challenges through a series of regionally-focused conservation plans and*

WHEREAS *we the undersigned acknowledge and appreciate the seven-year collaborative effort involving personnel from all our organizations to create this Nevada Partners In Flight Bird Conservation Plan which details specific courses of action to "keep Nevada's common birds common", reverse the trends of declining bird populations, and avoid whenever possible the costly and contentious process of endangered species listing,*

THEREFORE *we the undersigned do wish our signatures to demonstrate our organizations' endorsement of the concepts, goals, and objectives of this Nevada Partners In Flight Bird Conservation Plan.*

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EXECUTIVE SUMMARY

On April 1 1993, The Nevada Working Group of Partners In Flight held its inaugural meeting with the intent to create a cooperative, multi-entity planning process to address management concerns for the birds of Nevada, particularly those species not traditionally subject to other long-term management processes (species other than hunted waterfowl and game birds). Over the next six years, The Nevada Working Group diligently pressed forward to the task. A priority list of 46 species was developed, and descriptions for 15 major habitat type classifications in the state were written. Although long-term population data specific to Nevada were lacking for most of the priority species, population objectives were set for all species, with the level of accountability in each objective determined by the nature and amount of data available for the species. Species objectives were nested within the major habitat types, with some species receiving multiple objectives in multiple habitat types. Appurtenant to each objective, strategies outlining how the objective could be achieved were developed. These strategies most often addressed habitat management activities, but sometimes monitoring strategies were outlined where data collection processes were historically inadequate, and public awareness strategies were outlined when public awareness was deemed to be a critical element of a species' conservation. Strategies incorporated a list of "Actions", or discrete activities which, if implemented, could reasonably be expected to contribute positively toward the attainment of the objective.

A total of 63 objectives were set by the Nevada Working Group. These objectives ranged in complexity from "maintain present occurrence and distribution" to "stabilize a decreasing population trend" to "maintain 1,200 nesting pairs", depending on the nature of data available for each species. Most objectives set the year 2004 as their target date. During that year, review of the group's performance toward achieving its objectives will occur and objectives will be adjusted according to new information. Three objectives were set for a 2010 target date because that more realistically reflected the expectation of the work at hand.

Because so little long-term population data exist for most species in Nevada, much of the next five years will be spent devising, funding, and implementing adequate monitoring programs for the bulk of this document's priority species. Monitoring alone, however, contributes little toward the achievement of population objectives. Monitoring will only measure progress. In order to achieve most of its population objectives, the Nevada Working Group has focused on public land planning processes and cooperative projects with private landowners as the main vehicles of implementation. Where opportunities exist to create new habitats, such as the restoration of Argenta Marsh, the Nevada Working Group plans to coordinate its efforts with other national and regional entities to effect positive change on a larger scale than would be possible were each entity striving independent of one another. Where habitat models exist, these will be incorporated into land use plans and their performance will be monitored.

Where models are needed but do not exist, efforts to construct models with Nevada-specific information will ensue. Where projects change the face of the land, the Nevada Working Group plans to devise and implement reasonable, achievable mitigation strategies to minimize the loss of a particular resource, with a strong intent to enhance rather than reduce the resource whenever possible. Where a lack of public awareness is hindering the conservation of a resource, efforts to enhance public understanding and support for Nevada's avian treasures will become a major priority.

The Nevada Working Group is pleased to present its Bird Conservation Plan for the next five years of work. We invite you to join us in making it happen.

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ACKNOWLEDGEMENTS

A work of this magnitude is nearly always the result of the collaboration of many persons with a wide range of skills and expertise. In addition to the authors listed on pages 8 and 9, the editor relied on the knowledge and expertise of the persons listed below, either to review portions of the document, to provide historical background, to provide specific knowledge about birds and/or habitats, or to work through any number of knotty problems that arose during the compilation and presentation of what follows. For their cheerful assistance and support, the editor wishes to take this opportunity to express his deepest heartfelt thanks to:

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HABITAT TYPE: LOWLAND RIPARIAN

General Description

Lowland riparian habitats are those associated with the floodplains of Nevada's major river systems occurring below 5,000 feet elevation in the northern half of the state and below 4,000 feet in the southern half. Those river systems are the Humboldt, the Truckee, the Carson and the Walker Rivers in the north, and the Colorado River and its tributaries in the south. Habitat conditions supported by these lowland floodplains are lush in stark contrast to the arid landscapes through which they course. Total lowland riparian habitat area in Nevada is estimated at 57,344 hectares (Nevada GAP).

Physical Characteristics

Nevada's major river systems drain vast landscapes and typically course for over 160 km across otherwise barren landscapes. Floodplains vary in width from a few hundred feet in the instance of the restricted canyons of the Truckee and the Virgin to over six kilometers in width as in the Carson Valley near Minden, or on the Humboldt River near Battle Mountain.

The Humboldt River drains most of northeastern Nevada from the southwestern foot of the Jarbidge Mountains and the western foot of the Ruby Mountains over 467 km to the Humboldt Sink south of Lovelock. Major tributaries include the Mary's River from its source to Deeth (truly the northern headwaters of the Humboldt), the Reese River draining from Toiyabe Dome north to where it enters the Humboldt at Battle Mountain, and the Little Humboldt which drains the watersheds near the Humboldt-Elko county line northeast of Paradise Valley, through Paradise Valley to the Humboldt at Winnemucca.

The Truckee, Carson, and Walker Rivers drain the east slope of the Sierra Nevada from Reno to well south of Topaz Lake. These rivers drain into terminal basins left by Pleistocene Lake Lahontan – the Truckee into Pyramid Lake north of Fernley; the Carson into the Carson Sink north of Fallon; the Walker into Walker Lake just north of Hawthorne.

In southern Nevada, the Virgin River enters Nevada from Arizona at Mesquite and courses approximately 402 km to where it enters Lake Mead east of Overton. The Colorado River constitutes the southern border for the state of Nevada from the northern tip of Iceberg Ridge to where the states of Nevada, Arizona, and California

converge at the Fort Mohave Indian Reservation. From Iceberg Ridge to Davis Dam at Laughlin, the Colorado has cut an awesome major canyon that is completely flooded by the lakes behind Hoover and Davis Dams – Lake Mead behind Hoover Dam and Lake Mohave behind Davis Dam. The narrow canyons between Hoover Dam and the upper end of Lake Mohave proper – Black Canyon and Windy Canyon – are not wild, free-flowing stretches, but rather are highly affected by the backflow of Davis Dam and the outflow of Hoover Dam.

Another of the Colorado's tributaries that warrants mention is the Muddy River drainage through Moapa Valley. Although much of the Muddy's flow is supplied by a complex of thermal springs in northeastern Clark County known as Warm Springs, the drainage is also connected to two extremely long, intermittent wash systems that reach far into the hinterlands of Nevada. Meadow Valley Wash drains a watershed from some 48 km north of Panaca through Caliente to the confluence at Glendale. The White River runs from Preston, some 40 km southeast of Ely through Lund and Sunnyside to Pahranagat Valley, where its name is changed to Pahranagat Wash before it joins Meadow Valley Wash at Glendale to become the Muddy. Flows of this system are predominantly subsurface, with surface inundations occurring naturally at Sunnyside (now mostly part of the Kirch Wildlife Management Area) and in Pahranagat Valley, where extensive wetland habitat is divided between Nevada's Key Pittman Wildlife Management Area and the Pahranagat National Wildlife Refuge. A stretch of riparian habitat survives on this system between Crystal Springs and Pahranagat NWR, and significant riparian habitat exists along the Muddy River from Moapa to Overton.

Annual precipitation and temperature ranges for Nevada's lowland riparian habitats reflect Nevada's extremes – from less than 12 to more than 76 cm of precipitation per year and from -30 to over 120 degrees Farenheit in temperature. Riparian vegetation is distributed according to different plant species' affinity for water and the extent to which the river's flow is distributed across its floodplain. Flood flows introduce periodic change into floodplain communities by removing overstory and scouring and exposing seed beds where new generations of shade-intolerant trees and other plants establish, catch sediments, and build new floodplain. Mature plant heights can range from less than five feet for greasewood to 90-100 feet tall for Fremont cottonwoods. Left to their own natural disturbance regimes, deciduous riparian habitats can attain a complex, multi-layered vertical structure with an intermittent to continuous overstory, a midstory that is often dense and impenetrable, and an understory rich in grasses and forbs. Another expression of cottonwood overstory is called *gallery forest*, where the canopy has become enough impenetrable to light it effectively shades out the midstory, creating a tall-stemmed, high-canopied forest that can stretch across the floodplain for hundreds of meters.

Dominant Plant Species

Lowland riparian habitats in Nevada, with the exception of the Humboldt River, are typically dominated by Fremont cottonwood (*Populus fremontii*). This fast-growing deciduous poplar attains huge sizes at maturity – up to 29 meters in height, with trunks often greater than 183 cm diameter at breast height (dbh), and crowns that can spread over 37 square meters in area. Under favorable conditions, cottonwood forests are capable of presenting a crown overstory more or less solid for 200 meters or more across a floodplain. Cottonwoods are soft-wooded and subject to heart rot fungus which make it a prime provider of cavities for bird nesting.

Several species of willow are found on Nevada's major river floodplains, including sandbar willow (*Salix exigua*), arroyo willow (*S. lasiolepis*), red willow (*S. laevigata*), and shining willow (*S. lucida,* which includes *lasiandra*, also known as whiplash willow). Sandbar willow, also known locally as "coyote" willow, forms thick stands of limber, multi-stemmed plants, while the other types more often form individual trees with single trunks and stiff, weight-bearing twigs. Gooding's willow (*S. gooddingii*), a large tree mostly prevalent in southern Nevada, extends its range as far north as Churchill County, where it is found on the lower Carson River.

Buffaloberry (*Shepherdia argentea*) is present on all the northern Nevada river systems, with particularly robust stands still extant on the Walker River north of Yerington and the Little Humboldt in Paradise Valley. Buffaloberry grows in thick-stemmed, inpenetrable thickets up to ten to twelve feet high and as much as five to ten yards thick. In southern Nevada, the lowland riparian community includes velvet ash (*Fraxinus velutina*), desert willow (*Chilopsis linearis*), seep willow (*Baccharis salicifolia* and others), mesquite (both *Prosopis glandulosa* and *P. pubescens*), quailbush (*Atriplex lentiformis*), and wolfberry (*Lycium spp.*).

Tamarisk (*Tamarix ramosissima*), also known as saltcedar, is an exotic riparian tree that has invaded all of Nevada's river systems to varying degrees. Another aggressive exotic invader present on Nevada's rivers is Russian olive (*Elaeagnus angustifolia*), a small tree that grows up to 20 feet high. These exotics have replaced the native midstory on many stretches of Nevada's rivers. Tamarisk now dominates much of the Virgin River, Muddy River, and lower Meadow Valley Wash floodplains. In the north, tamarisk has made considerable inroads up the Humboldt. Russian olive is particularly prevalent on the Carson River below Dayton.

Meadows of grasses, sedges (*Carex spp.*) and rushes (*Juncus spp.*) are predominant on much of the floodplain of the Humboldt River and its tributaries, while occurring on

shorter, more disjunct stretches of the other northern Nevada river floodplains. Creeping wildrye (*Elymus triticoides*) is one of the most important meadow grasses. Other types that may occur on a lowland floodplain include saltgrass (*Distichlis spicata*), greasewood (*Sarcobatus vermiculatus*), sagebrush (*Artemisia tridentata*), wildrye (*Elymus cinereus*), and in southern Nevada, arrowweed (*Pluchea sericea*) and saltgrass.

Historic and Current Conditions

Nevada's lowland riparian habitats are its most productive and among its most drastically altered. Historically, lowland floodplains were living components of the river itself – transporting water, dissipating energy and sediments, and cycling nutrients through many concurrent food chains. Rivers periodically flooded, streambanks and floodplains were scoured, and sediment deposits were rearranged. These periodic scourings prepared seedbeds for cottonwood seedlings to replenish the overstory. Willows regenerated on new point bars and linear sediment bars. Where floodplains were flat, channels wound tortuously across them, dissipating erosive energy and sustaining lush wet meadows and mature riparian shrub and tree layers through subbing of the slowed current into the surrounding soils.

At the coming of Europeans in the 1820's, the Humboldt River was not a cottonwood ecosystem. It was full of beaver, and willow and buffaloberry provided its dominant overstory layer while vast, marshy meadows coursed much of its length. The Truckee River did support stretches of gallery cottonwood forest, and ornithologist Robert Ridgway found it teeming with bird life, including Yellow-billed Cuckoos, when he surveyed it in 1868. The Carson River was likely very similar to the Truckee. Anecdotal accounts of the early settlers of Mason Valley describe a river floodplain too wet for cottonwoods – the Walker likely was similar in appearance to the Humboldt where it traversed Smith Valley and Mason Valley. According to the journals of the early trappers, beaver were scarce to nonexistent in the Truckee, Carson, and Walker systems (Cline 1963; Leonard 1978).

The Colorado River cut through hundreds of feet of rock as it passed by Nevada, and historically supported very little floodplain. Sandbars formed in the wider passages of the canyons where cottonwood and willow established in restricted thickets. These isolated communities likely shifted over time, and the woody debris produced by them played a dynamic role in the establishment of point bars by jamming portions of the canyon and backing flows. Sediments dropped behind the logjams, and given enough time, new groves appeared on the new point bars. Before the invasion of tamarisk, the Virgin River riparian corridor likely supported coyote willow interspersed with patches of

riparian forest comprised of Fremont cottonwood, Gooding's willow, green ash (*Fraxinus pennsylvanica*), Arizona sycamore (*Platanus wrightii*), and box elder (*Acer negundo*) (BIO/WEST, Inc. 1997). Upper terraces of the floodplain likely expressed a mosaic of screwbean mesquite and honey mesquite, arrowweed, and big saltbush along with meadows of salt-tolerant grasses such as Alkali sacaton and saltgrass.

With the settling of the West, beginning around 1850, Nevada's lowland riparian rivers underwent serious changes. Domestic livestock were brought in and from the beginning were often concentrated on the lowland floodplains, which were the most productive habitats Nevada had to offer. Permanent settlement began on the Carson River at Genoa, and soon the "backflow" from the California Gold Rush was filling the eastern Sierra river floodplains and later the Humboldt's with immigrant farmers who knew what to do with good soil and running water. Much of the Walker River floodplain was plowed for crops and extensive irrigation networks were established to divvy up and redistribute the water. The Humboldt, Truckee, Carson, and Virgin Rivers were initially groomed for irrigated pasture, but except for the extensive irrigation networks dug into the floodplain, change was negligible.

The gold strikes in western Nevada in the 1860's spelled the first grievous changes for any of Nevada's lowland rivers. Using mercury to separate the precious gold from its ore, a veritable battery of mills sprung up on the Carson River over the next twenty years and spilled thousands of tons of contaminated wastes into the river. These wastes were incorporated into the sediments and migrated downstream toward the unbelievably productive marshes in Lahontan Valley. Timber harvest from the eastern Sierra was sent down the Truckee to the sawmills above present-day Reno. These sawmills filled the Truckee with a deluge of sawdust and other mill waste that, while mostly organic and lacking the long-term contamination potential of mercury, began to change the productivity and nature of the Truckee from that time on.

In 1902, a Nevada U.S. Senator, Francis G. Newlands, was instrumental in getting the Reclamation Act passed, which authorized the newly formed U.S. Reclamation Service to divert and impound water on the major river systems in the West for the purposes of increasing arable lands through irrigation. Not surprisingly, Nevada found itself in line for the very first federal reclamation project, named after Senator Newlands, to be constructed in the Carson River system. Because the Carson watershed could not be counted upon to deliver reliable annual water volume to support the size of project that was envisioned, a massive ditch was cut across watersheds to empty diverted Truckee River water into the Carson River, and Derby Dam was constructed in the Truckee above its Big Bend at Wadsworth. In 1911, construction began on Lahontan Dam on the Carson at the end of the Truckee Canal spillway. When Lahontan Dam was

completed in 1915, the era of the Federal Water Project had begun. Within 20 years, Rye Patch Dam had plugged the Humboldt north of Lovelock and water was being delivered to the Lovelock Project. Walker River farmers enhanced their water delivery options with the construction of Topaz Dam on the west fork in 1921 and Bridgeport Dam on the river's east fork in 1924. Downstream, the Paiute tribe at Schurz installed Weber Dam in 1935 to sustain their own agricultural venture, and the deed was complete. The relationship of every major river in northern Nevada with its terminus – each of which supported vital migratory bird resources -- was profoundly changed, likely for the duration of mankind.

As with most all major changes of landscape, the modifications of Nevada's major rivers did not produce solely negative impacts on Nevada's bird life. For an account of species that thrive today in Nevada's agricultural centers as well as suggested strategies for their conservation, please refer to the "Agricultural Lands" section.

In the south, a different yoke was planned for the mighty Colorado. Concerns raised by the flooding of the Salton Sea in southern California during the years 1905 to 1907 and a thriving public works initiative conceived to keep America's workers employed and out of the bread lines facilitated the construction of Hoover Dam at the river's entrance into Black Canyon. One of mankind's greatest technological achievements, Hoover Dam – 726 feet high and 1,244 feet across – was completed in 1936, and the entire Boulder Basin was flooded from the top of Black Canyon upstream clear to Iceberg Canyon. A significant stretch of Virgin Canyon where it enters the Colorado at Overton was also inundated. Downstream, Davis Dam, near the present city of Laughlin was completed in 1953 and inundated the canyon as far upstream as the Chalk Cliffs. Today, no stretch of the Colorado as it passes Nevada functions under its natural hydrological regime. Downstream from Davis Dam to the southern tip of Nevada, the Colorado flows at the bidding of federal watermasters through a highly modified channel to service extensive agricultural lands converted from the natural floodplain vegetation types.

The Virgin River from Mesquite to its inundation by Lake Mead has been subjected to much less drastic structural modification, but much of its floodplain around Mesquite has at one time or another been converted to crop production. The Virgin's natural riparian vegetation has been significantly compromised by the invasion of tamarisk, although much of the river south of Riverside maintains a wide floodplain with braided channels and supports a large diversity of native species, particularly willows. The remaining natural habitats near Mesquite may soon be vulnerable to real estate development.

Plugging and inundating significant stretches of Nevada's major rivers was hardly enough to satisfy man's progress through the twentieth century. The remaining wild stretches of river were found to often misbehave and otherwise afflict or impede progress. After the completion of Rye Patch Dam in 1935, the U.S. Government began purchasing irrigation rights to the waters of the Humboldt from long-established users upstream for the purpose of transferring the use of that water downstream to the Lovelock Project. In order to "prove" to the State Watermaster that purchased waters had indeed been removed from their traditional delivery points on the floodplain between Battle Mountain and Valmy, a series of "channel improvement" projects were initiated that resulted in the Argenta Ditch, effectively draining Nevada's most productive riverine marsh complex around 1936, and an aggressive string of meander cuts that straightened the river channel as far downstream as the White House Ranch below Valmy. The downcutting that ensued as a result of these activities induced the river to abandon regular contact with much of its floodplain through this stretch, resulting in habitat degradation and loss of productivity.

On the Truckee, periodic flooding threatened the road bed of the Southern Pacific Railroad in the canyon between Sparks and Wadsworth. A significant channel-straightening project was initiated in the 1960's, meanders were cut by both the rail bed and the new Interstate Highway, and levees to deflect flow away from these structures were installed. The gravels deposited in the canyon over centuries were coveted in Reno for construction, and several massive gravel extractions took place on its floodplain up and downstream from the Tracy Power Plant. A couple of active pits were catastrophically acquired and flooded by the river channel during the floods of 1996-97 when extraction activities did not reserve due respect for the river's destructive energies. Now, where productive floodplain once provided riparian habitat for migratory songbirds, there lies a string of open in-channel lakes of questionable productivity. Gravel operations have also impacted stretches of the Humboldt River's floodplain around Elko.

A boom of residential development on the floodplains of the Carson and Walker Rivers in the north and the Colorado below Davis Dam in the south has put increased pressure on water engineers to take action to prevent these rivers from exercising the natural processes necessary to maintain productive riparian habitats. Channel dredging, streambank armoring, levees, and other channel "improvements" are only going to be required with increasing frequency as land prices continue to rise and the population of northern Nevada continues to increase.

The general result of all this mucking about in Nevada's major floodplains has been disrupted stream flow, drowning and elimination of riparian habitat upstream of dams,

interdicted vegetation responses to the scouring and subbing influences of water moving in natural rhythms down the system, invasion of undesirable exotic plants, and an ultimate degeneration of riparian habitat quality. As the urban thirst for water grows, the challenge of the next century could very well be that of preserving the integrity of Nevada's major river systems for the resource values they produce on their very own floodplains.

Opportunities For Conservation

While modification to Nevada's lowland river habitats has been extensive, the prospect for the future is quite encouraging. The general hydrological knowledge of the average long-time land user along Nevada's river floodplains is higher – there is more respect for a river's natural processes and more desire (at least among agriculturalists that have fought rivers all their lives) to allow a river to behave naturally than there was fifty years ago. Government assistance programs such as administered by the U.S. Natural Resource Conservation Service have shifted their emphasis in the last twenty years away from structural modification of river channels toward maintenance of natural habitats and processes. The State of Nevada Stewardship Program administered by the Division of Forestry provides monetary and technical assistance to private landowners interested in restoring quality habitats on their lands.

The public at large is also generally more knowledgeable about rivers and their needs. Water and power needs are now more likely to be weighed against the impacts of impoundment and controlled release on a river's natural productivity. Considerable public interest has been focused recently on the restoration of Nevada's damaged floodplains. Of particular interest at this time among a growing consortium of conservation and sportsmen's groups is the restoration of Argenta Marsh on the Humboldt near Battle Mountain. Regional cooperative planning efforts such as the Intermountain Waterfowl Venture are gaining momentum through the pooling of the technical expertise of government agencies and a gathering of many funding sources, federal, state, and private, to focus on regional priorities and bring bigger projects to fruition than each single entity would be capable of realizing itself with its own limited resources. As more of these types of regional planning efforts (and Partners In Flight is certainly one) sharpen their focus and link together more and more to address matters of common concern, the power of the interested public to effect positive change on the ground will grow to unprecedented proportions.

Conservation bonds such as were approved and initiated in 1988 have resulted in the purchase and preservation of critical lowland riparian habitats such as the Carson River Ranches between Fort Churchill and Lahontan Dam. Both the Nevada Division

of Wildlife and the U.S. Fish and Wildlife Service will have opportunities through their water purchase programs in the Lahontan Valley to acquire riparian lands along the lower Carson River. These lands are prime for riparian restoration even considering that much of the property's irrigation potential will be removed.

The Nature Conservancy has invested considerable time and resources into building consensus for the restoration of the lower Truckee River. This has resulted in riparian restoration projects being initiated downstream from Wadsworth, and more floodplain restoration in the watershed is planned.

In 1995, a group of concerned citizens of Moapa Valley formed the Muddy River Regional Environmental Impact Alleviation Committee. The purpose of the group is to adopt a pro-active approach to the improvement of the riparian habitat along the Muddy River. With the assistance of numerous partnerships from local, county, state, and federal entities, this group has initiated the Muddy River Habitat Restoration Project, an ambitious attempt to remove tamarisk along a portion of the Muddy River and revegetate with native species. To date, at least 1,000 native trees have been planted along the river, and avian abundance and species richness have already shown signs of improvement (Cris Tomlinson pers. comm.). This is an outstanding example of community involvement in riparian habitat restoration efforts.

It is the probable fate of this era to watch Nevada's arable lands become more valuable as residential and commercial property than they are for agricultural purposes. As population pressures continue to mount on the state's premium lands, the ability of biologists and bird advocates to work with county and local governments with respect to floodplain development issues will become critical to the long-term preservation and maintenance of lowland riparian habitats. Residential and commercial development within floodplains create situations which are intolerant of a river's need to exercise its natural processes. With development comes war with the river, waged with bulldozers, concrete and fill. Over time, the river may lose a few battles, but in the end it always wins the war at great expense and loss of property, dignity, and sometimes life. Vibrant, healthy migratory bird habitats are products of vibrant, healthy river systems. Anything less should be unacceptable.

Priority Bird Species

The following species have been prioritized for management attention by the Nevada Working Group. "Obligates" are species that are found only in the habitat type described in this section. "Others" are Priority Species that can be found in this habitat type, but use other habitat types as well.

Obligates

Yellow-billed Cuckoo
Southwestern Willow Flycatcher
Bank Swallow
Bell's Vireo
Blue Grosbeak

Other

Lewis's Woodpecker
Ash-throated Flycatcher
Phainopepla
Western Bluebird
Virginia's Warbler
Lucy's Warbler
Yellow-breasted Chat

PRIORITY SPECIES 1. LOWLAND RIPARIAN

SOUTHWESTERN WILLOW FLYCATCHER

Empidonax traillii extimus

Distribution

The Willow Flycatcher is one of eleven species of the genus *Empidonax* found in North America. Empidonax flycatchers are renowned for their physical similarities and, thus, for the difficulty in identifying individuals in the field (Phillips et al. 1964; Peterson 1990; Tibbitts et al. 1994). *Empidonax traillii* is further divided taxonomically into five subspecies (AOU 1997). Breeding territory for the Southwestern Willow Flycatcher extends from extreme southern Utah and Nevada, south through Arizona, New Mexico, southern California, and west Texas to extreme northern Baja California and Sonora, Mexico (Unitt 1987). The Southwestern Willow Flycatcher is a neotropical migrant, wintering in Mexico, Central America, and possibly in northern South America (Peterson 1990; Tibbitts et al. 1994). In Nevada, the Southwestern Willow Flycatcher is found in isolated pockets of the Colorado River drainage, including Las Vegas Wash, the Virgin River above Lake Mead, the Muddy River, Pahranagat Valley, and Meadow Valley Wash. Also Ash Meadows

Habitat

Southwestern Willow Flycatchers nest in riparian habitat characterized by a dense stand of intermediate-sized shrubs or trees such as willows (*Salix* sp.), *Baccharis*,

buttonbush (*Cephalanthus* sp.), box elder (*Acer negundo*), or tamarisk (*Tamarix* sp.), often with an overstory of scattered larger trees such as cottonwood or willows.

The Southwestern Willow Flycatcher is a riparian obligate occurring in habitats characterized by dense stands of intermediate-sized vegetation, usually with water or moist soil present beneath the canopy. A compact cup nest is constructed in a fork or horizontal branch approximately one to 7.5 meters above ground, typically within dense vegetation. The U.S. Fish and Wildlife Service (1997) has identified five general habitat types utilized by nesting Southwestern Willow Flycatchers, including:

1. Monotypic, dense stands of willow (often *S. exigua* or *S. geyeriana* above 7,000 feet elevation in Arizona) 2.7 to 6 meters in height with no distinct overstory; difficult to penetrate; vertical foliage density uniformly high (>60 percent) from ground to canopy.

2. Monotypic, dense stands of saltcedar (tamarisk) 3.6 to 10.6 meters in height forming a nearly continuous, closed canopy (i.e., no distinct overstory); vertical foliage density increases with height; canopy density uniformly high (approx. 90 percent); difficult to penetrate.

3. Dense stands of mostly Goodding's willow 3.6 to 12.2 meters in height characterized by trees of different size classes, a distinct overstory, subcanopy strata, fallen but living trees creating dense tangles difficult to penetrate.

4. Dense mixtures of native broadleaf trees and shrubs including cottonwood, willows, box elder, ash, buttonbush, and stinging nettle, characterized by a distinct overstory of cottonwood or willow with subcanopies and a dense understory of mixed species also difficult to penetrate.

5. Dense mixtures of native broadleaf trees and shrubs as in Number 4 above mixed with exotics such as saltcedar or Russian olive in the understory; dense ground-level tangles difficult to penetrate sometimes interspersed with small openings.

Physical Factors

The Southwestern Willow Flycatcher inhabits lowland riparian habitats below 4,000 feet elevation; other than that, effect of slope, aspect, and topography are unknown.

Presence of water or moist soil is a necessary component of suitable nesting habitat; in fact, it seems to be the single most influential criterion among known nest sites. Temperature and humidity may influence pair distribution, but specific data are lacking.

Landscape Factors

Other site characteristics may be important; however, most are poorly understood. Occupied habitat patch size and shape can vary significantly, with areas as small as 0.6 hectares being utilized (Sogge et al. 1995). It appears, however, that linear habitats only one or two trees wide do not provide suitable nesting habitat for Southwestern Willow Flycatchers (U.S. Fish and Wildlife Service 1997).

Special Considerations

Southwestern Willow Flycatchers may begin arriving on breeding territory as early as late April and may continue to be present until August (R. McKernan pers. comm.). Migration routes are not completely known but do include drainages where breeding populations have not been documented in Arizona (U.S. Fish and Wildlife Service 1997). Other subspecies, including *E. t. brewsteri* and *E. t. adastus* probably utilize identical migration corridors.

They may begin nesting in late May and continue through July (Tibbitts et al. 1994; R. McKernan pers. comm.). Typically, Southwestern Willow Flycatchers raise one brood per year but have been documented to produce more than one brood during a season (Whitfield 1990; R. McKernan pers. comm.). Brood parasitism by Brown-headed Cowbirds has been documented throughout the range of the Southwestern Willow Flycatcher and has been blamed for reducing flycatcher breeding success (Unitt 1987; Brown 1988; Rosenberg et.al. 1991; Sogge et al. 1993; Muiznieks et al. 1994; U.S. Fish and Wildlife Service 1997).

Other factors, including parasitism, predation, prey preferences and abundance, and population dynamics (e.g., site fidelity, distribution of breeding populations, dispersal, demography) are not fully understood and may affect breeding success. Studies are ongoing in an effort to further quantify habitat quality.

Associated Species

Vermilion Flycatcher
Western Kingbird
Bewick's Wren
Yellow Warbler
Bullock's Oriole
Lesser Goldfinch

Priority Considerations

The Southwestern Willow Flycatcher was listed as "Endangered" under the Endangered Species Act on February 27, 1995. Rangewide, the total population of Southwestern Willow Flycatchers has probably declined to approximately 300-500 pairs (USFWS 1993). The species is not abundant enough to register on Breeding Bird Survey data for the Mojave Desert region; however, considerable effort to survey new populations has transpired since the 1995 listing. These efforts are ongoing and new data may affect the previous population estimate. Historical potential breeding habitat for the Southwestern Willow Flycatcher has declined by as much as 97 percent in Arizona (Latta et al. 1999). For these reasons, the Nevada Working Group has selected the Southwestern Willow Flycatcher as a priority species in Nevada's conservation planning efforts.

OBJECTIVE: Establish between 40 and 50 successful breeding pairs in suitable habitat in the state of Nevada by 2010.

Strategy: Restore, enhance, and protect suitable Willow Flycatcher habitat on the Colorado River and its tributaries, on federal and state lands as well as through partnerships with private landowners.

Action: Work through public land planning processes to establish standards and guidelines that call for Willow Flycatcher detection surveys prior to any tamarisk or willow removal on federal or state lands.

Action: Encourage the voluntary standard protocol of detection surveys before tamarisk or willow removal on private lands. Work through federal assistance and stewardship programs to address Willow Flycatcher habitat needs in agency-assisted habitat improvement projects.

Action: Working through consensus with state and federal agencies and private landowners, target unoccupied tamarisk stands for rehabilitation into native plant communities more typical of historic Willow Flycatcher habitat.

Action: When opportunities exist, acquire breeding habitat from willing sellers via land exchange, purchase, or conservation easement.

Strategy: Increase survey efforts in known and potential habitat.

Action: Provide protocols, training, and survey tapes to all affected agency biologists and interested biological consultants.

Action: Train volunteers and coordinate survey efforts as part of a single-purpose activity.

Action: Coordinate survey efforts between agencies and maintain survey data in a central database accessible to local biologists.

Strategy: Monitor Brown-headed Cowbird brood parasitism in existing Southwestern Willow Flycatcher territories. Be ready to take serious action if brood parasitism reaches unsustainable levels.

Action: Initiate selective Brown-headed Cowbird trapping programs in areas with occupied Southwestern Willow Flycatcher territories.

Action: If selective trapping on breeding territories is inadequate, initiate Brown-headed Cowbird control around centers of concentration, i.e., dairies near Mesquite, feedlots, winter pastures.

Assumptions - Research and Monitoring Needs

The Southwestern Willow Flycatcher objective assumes that a total population goal of 40 to 50 pairs is achievable in Nevada. Current habitat analyses should continue toward a goal of comprehensive habitat assessment and survey. Unoccupied potential habitats should be targeted for population expansion. Current species surveys should continue to sharpen their focus on the production of a population estimate, an estimate of annual reproduction, recruitment, and prospects for expansion.

Opportunities

The Bureau of Reclamation has invested considerable resources into Southwestern Willow Flycatcher ecology and population assessment. The knowledge amassed by biologists as a result of this investment is the most comprehensive, concentrated

resource regarding the species to date. Critical to the success of the effort to maintain and expand Nevada's current Southwestern Willow Flycatcher population will be the establishment of cooperative conservation strategies with the private landowners that control significant portions of the species' habitat. Partnerships must include attractive incentives to create "win-win" collaborations between agencies and landowners. The State of Nevada Stewardship Program administered by Nevada Division of Forestry is a successful model and source of funding and expertise toward achieving that end.

The Clark County Multiple Species Habitat Conservation Plan represents a bold effort by county government to take shared responsibility of the sustained conservation of wildlife within its borders. Acting as a central clearing house for the prioritization of needs and the distribution of available mitigation funds, The Clark County Habitat Conservation Committee will continue to operate on the front line of habitat conservation in a heavily challenged region. Keeping the needs of the Southwestern Willow Flycatcher at the top of the priority list for mitigation funds in the short term should be a primary focus of Nevada Partners In Flight.

Management strategies designed to benefit the Southwestern Willow Flycatcher will also benefit Blue Grosbeak, Yellow Warbler, Yellow-breasted Chat, and Bell's Vireo – all species considered for prioritization by Nevada Partners In Flight.

Further Reading

Brown 1988
Sogge, Tibbitts, and Sferra 1993
Sogge, Van Riper, and May 1995

SPECIES PROFILE 2. LOWLAND RIPARIAN

WESTERN YELLOW-BILLED CUCKOO

Coccyzus americanus occidentalis

Distribution

Western Yellow-billed Cuckoos historically bred throughout the western United States, north to southern British Columbia. Currently, they are confirmed breeders in disjunct riparian habitats in California, Arizona, New Mexico southward into northern Mexico. They winter in tropical deciduous and evergreen forests of northern South America

south to northern Argentina (Ehrlich, et al. 1988). In 1987, an estimate placed the number at 475-675 breeding pairs remaining in the western U.S. (Laymon and Halterman 1987). The number in Mexico was unknown, but is not assumed to exceed the number in the western U.S.

In Nevada, the historic status of the Western Yellow-billed Cuckoo is poorly documented although there is evidence it was a breeder along the Truckee and Carson River and in southern Nevada along the Colorado and Virgin Rivers. In the past decade there have primarily been sporadic sightings of single birds from a number of sites in the state. These birds are presumed to represent migrants. The only consistent set of recent sightings in Nevada is on a stretch of the Carson River. There have been almost annual reports of individual birds seen and heard from between 1986 and 1997 (Larry Neel pers. comm.). The most recent documentation of Yellow-billed Cuckoos breeding in Nevada was a pair at Beaver Dam Wash (Lincoln County) in 1979 (Kingery 1979).

Habitat

The Yellow-billed Cuckoo is a riparian obligate species which requires dense cottonwood-willow forested tracts of at least 16.8 hectares including a minimum of 3.0 hectares of closed-canopy broadleaf forest (Laymon and Halterman 1987). Gaines (1974) indicated that the riparian habitat needs to be at least 100 meters wide. Optimal habitat is greater than 80 hectares and wider than 580 meters (Laymon and Halterman 1989). Foraging occurs mostly in the cottonwood canopy, but nests are situated almost entirely in willows; therefore, and multistoried vegetation structure is required (Laymon and Halterman 1987).

Physical Factors

Presently, the only potential Yellow billed Cuckoo habitats in Nevada occur in lowland riverine cottonwood forests below 4,500 feet elevation. Water is required to maintain viable habitat. Flood scouring regenerates cottonwood forest.

Landscape Factors

Gaines (1974) reported average home ranges of 10 hectares per pair in a riparian woodland in the Sacramento Valley. A wide band of cottonwood canopy closure is required, as is a healthy midstory of willow, where nesting occurs.

Special Considerations

Western Yellow-billed Cuckoos are one of the latest arriving summer breeding migrants. They arrive during the first week of June in Arizona, by late June in Northern Nevada, and depart by late August. Cuckoos feed on a variety of large invertebrates and on occasion amphibians and small reptiles (Ehrlich 1988; Nolan and Thompson 1975). They forage primarily in cottonwoods. Yellow-billed Cuckoos are asynchronous hatchers laying an average of three eggs per nest (Fleury 1994) and may have the ability to vary clutch size in conjunction with food availability. They can produce two and occasionally three clutches during years of high prey abundance (Fleury 1994).

There has been a drastic reduction in breeding range within the past 70 years due to riparian habitat alteration or destruction (Laymon and Halterman 1987). Western Yellow-billed Cuckoos are listed as endangered on several state wildlife lists and as of this writing, had been petitioned for protection under the U.S. Fish and Wildlife Service Endangered Species Act. Habitat loss of both migratory and breeding habitat is thought to be the primary reason for the decline of this species. Alteration of water flows has had a negative impact on riparian systems. Fleury (1994) lists the possible secondary causes of decline to habitat fragmentation, pesticide bioaccumulation, pesticide impacts on prey, and invasion of non-native species. Large contiguous blocks of cottonwood-willow riparian forest are more valuable than smaller fragmented patches of habitat.

Associated Species

Yellow Warbler
Summer Tanager

Priority Considerations

As of this writing, the Western Yellow-billed Cuckoo has been petitioned for protection under the Endangered Species Act. A "ninety-day finding" is still pending. The Yellow-billed Cuckoo has disappeared as a breeding species from all sites in Nevada where it was ever known to breed. Suitable habitat for Yellow-billed Cuckoos scarcely persists in Nevada. One site on the Carson River is deemed suitable and has supported single individuals several summers since 1988. Other stretches of Nevada's cottonwood riparian forests are depleted of both canopy coverage and midstory. Despite seemingly impossible challenges, the Nevada Working Group has selected the Yellow-billed Cuckoo for priority focus in the conservation plan.

OBJECTIVE: Establish two breeding pairs of Yellow-billed Cuckoos in Nevada by 2010.

Strategy: Maintain and increase large contiguous blocks of multi-storied cottonwood-willow forest wherever opportunities exist.

Action: Target the following sites for evaluation of habitat restoration potential: the Virgin River from Mesquite to Lake Mead; Meadow Valley Wash south of Caliente; the Colorado River below Davis Dam; the Carson River from Dayton to Lahontan Reservoir; the Truckee River below Wadsworth.

Action: Initiate cottonwood overstory restoration on Carson River Ranches State Park from Lahontan Reservoir to Fort Churchill.

Action: Continue cottonwood recruitment flows on the Truckee River and initiate other measures (adjustment to grazing treatments, etc.) to support restoration efforts.

Action: Utilize existing private lands habitat consultation/assistance programs to restore cottonwood/willow habitat on targeted sites through partnerships with willing landowners.

Strategy: Evaluate the extent and potential impacts of pesticide use in or adjacent to lowland riparian habitats.

Action: Monitor pesticide residues in common songbird species closely associated with Yellow-billed Cuckoos. Determine if effect levels exist which might be impeding reproductive potential.

Action: Determine if pesticide use is achieving an effect level in the reduction of preferred insect prey of Yellow-billed Cuckoo and other associated species.

Strategy: Survey all remaining suitable habitat for nesting Yellow-billed Cuckoos.

Action: Coordinate survey efforts among agency biologists, research biologists, and bird clubs to effectively survey all remaining suitable habitat.

Action: Focus Endangered Species Act funding (Section 6) toward additional Yellow-billed Cuckoo surveys in potential habitat.

Strategy: Investigate the feasibility of assisted recolonization of Yellow-billed Cuckoo pairs into suitable habitat.

Action: Evaluate the challenges posed by the prospect of capturing, relocating, and establishing breeding pairs of migratory songbirds.

Action: Evaluate the feasibility of augmentation of existing populations through captive breeding techniques.

Assumptions - Research and Monitoring Needs

The Yellow-billed Cuckoo objective assumes that there is the potential in Nevada to establish two breeding pairs into suitable habitat in the next ten years. Barring the discovery of any existing breeding pairs, the obstacles to achieving the establishment of even one breeding pair are intimidating. In the United States, there has not yet been an opportunity to resort to such severe recovery techniques as trap-and-transplant and captive breeding for migratory songbirds. In the instance of waterfowl species recovery, techniques have been fairly straightforward in their approach and strongly supported by the long history of husbandry techniques in the poultry industry. For raptor species recovery, an intense interest and participation from the falconry community proved vital to the advancement of successful captive propagation technology. Songbirds (including non-passerines such as the Yellow-billed Cuckoo) seem to pose a myriad of new problems for a recovery strategy that has been so successful as to have become taken for granted. Such an approach could be justified only if the western population of Yellow-billed Cuckoos as a whole were suddenly found to be in "emergency-room" crisis. That does not yet seem to be the case; yet laying the groundwork now to achieve success with artificial population augmentation techniques for songbirds does seem to make sense. By working out the many problems before the emergency recovery of any songbird species becomes necessary, conservationists would put themselves in a position of great advantage once a catastrophe occurs.

Opportunities

In the meantime, there is much to be gained in Nevada by building new suitable habitat to receive projected population expansion sometime in the future. By re-establishing multi-storied cottonwood/willow forests on Nevada's lowland river floodplains, conservationists can be assured that they are benefitting a host of species with habitat

preferences similar to the cuckoo's. These habitats have the potential to support bird communities among the most diverse and most exciting in the state. All the necessary elements seem to be in place to assist Nevada State Parks in expanding what appears to be suitable Yellow-billed Cuckoo habitat on the Carson River Ranches property while impacting only a minimum of special interests. This project should be moved forward immediately. Habitat restoration efforts on the lower Truckee River have produced encouraging results, but time must now be allowed to work its magic on areas that have been adjusted. Mature habitats are still fifty years away. In the meantime, initiation of vegetative recovery should continue up and down the river. Restoration efforts on southern Nevada floodplains will be starting much from the same deteriorated condition as the Truckee. Landowner partnerships will need to be crafted and a regional vision must ensue if restoration efforts are to succeed. Considerable potential habitat for the Yellow-billed Cuckoo exists south of Caliente in Meadow Valley Wash. Surveys are needed to assess the habitat values of this stretch. Opportunities to restore habitat via the development of Clark County Wetlands Park may also exist in the Las Vegas Wash area where a Yellow-billed Cuckoo was sighted in the summer of 1998.

Further Reading

Fleury 1994
Laymon and Halterman 1989

SPECIES PROFILE 3. LOWLAND RIPARIAN

ASH-THROATED FLYCATCHER
Myiarchus cinerascens

Distribution

The Ash-throated Flycatcher ranges from northern Oregon, east to western Colorado and northern Texas, and south to El Salvador. In Nevada it is a summer resident from Clark County northwest to Pyramid Lake and northeast to the Ruby Mountains.

Habitat

The Ash-throated Flycatcher uses a wide range of habitats in Nevada, from yucca to riparian woodlands to pinyon-juniper. They require natural or created cavities for

nesting. Ash-throated Flycatchers nest in open sparse Joshua trees to moderately dense mesquite-ash-cottonwood-willow riparian to moderately dense pinyon-juniper. Understory includes yucca, creosote bush, saltbush, riparian shrubs, sagebrush and desert almond. Occupied nests in cavities ranging from 3 to 20 feet off the ground have been reported.

Physical Factors

Ash-throated Flycatchers range in elevation from 2,000 to about 6,000 feet. Water is present in some riparian areas, but is not required. Topography varies with habitat type, from flat valleys to moderately steep slopes.

Landscape Factors

Ash-throated Flycatchers use large, contiguous habitats of Joshua tree and pinyon-juniper, as well as smaller linear riparian habitats. They require openings in the habitat or edges for flycatching. In Arizona, Hensley (1954) reported territory size as 2.9 hectares in desert washes and 9.9 hectares in open desert. In riparian habitat in the Sacramento Valley, Gaines (1977) reported a breeding density of 22 to 57 breeding males per square kilometer. This seemingly huge number is misleading due to the linear nature of suitable riparian habitat.

Special Considerations

Ash-throated Flycatchers feed mostly on insects caught in the air or gleaned, occasionally some small fruits. They would be affected by human disturbance that removes trees with cavities. These flycatchers are rarely parasitized by Brown-headed Cowbirds.

Associated Bird Species

Northern Flicker
Vermilion Flycatcher
Northern Mockingbird
Yellow Warbler
Yellow-breasted Chat
Bullock's Oriole
Summer Tanager

Priority Considerations

Limited Breeding Bird Survey data indicate a stable or increasing trend for the Ash-throated Flycatcher in all the physiographic regions found in Nevada (Sauer et. al.

1998). The Ash-throated Flycatcher is actually a species capable of exploiting a broad range of habitat types as long as nest cavities are available. It does, however, serve the purposes of the Nevada PIF planning effort for lowland riparian habitats by representing the needs of cavity-nesting birds in these habitats in both the northern and southern regions of the state. The species has been selected as a Priority Species by the Nevada Working Group because it effectively represents lowland riparian habitats which have been in decline in Nevada over the past century. New and severe challenges to these habitats in the future generate serious concern among conservationists.

OBJECTIVE: Maintain stable or increasing populations of Ash-throated Flycatcher breeding pairs throughout the lowland riparian habitats of Nevada through 2004.

Strategy: Maintain and enhance mature stands of mesquite, ash, cottonwood, willow, and buffaloberry to provide nesting cavities and an adequate prey base.

Action: Implement tamarisk control and native plant community re-establishment on suitable sites.

Action: Discourage the propagation of Russian olive on Nevada's lowland floodplains in favor of native willow species.

Action: Avoid large-scale removal of buffaloberry except on a scheduled rotation designed to maintain stand vigor at a scale that does not impact present habitat suitability.

Action: Utilize existing private lands habitat consultation/assistance programs to restore natural habitats on lowland riparian sites through partnerships with willing landowners.

Action: Utilize the Clark County Multiple Species Habitat Conservation Planning process to prioritize and fund lowland riparian habitat restoration projects.

Strategy: Monitor Ash-throated Flycatcher population trends through established monitoring protocols.

Action: Continue Breeding Bird Surveys and expand coverage.

Assumptions - Research and Monitoring Needs

The Ash-throated Flycatcher objective assumes that stable or increasing populations are achievable for the species in Nevada. Standard monitoring protocols should be continued to verify this assumption. This objective also assumes that Ash-throated Flycatchers adequately represent a cohort of lowland riparian bird species and their habitat requirements. Further research should be conducted to determine if other cavity-nesting, lowland riparian species with more restricted ranges such as Western Bluebird or Lucy's Warbler have more restrictive habitat requirements that would warrant a separate set of objectives and strategies for them.

Opportunities

It is likely that the opportunities for habitat improvement listed under the Yellow-billed Cuckoo objective will also benefit Ash-throated Flycatchers. One particular project warrants specific mention. Plans to restore sections of the lower Carson River presently being discussed by Stillwater National Wildlife Refuge personnel would greatly benefit Ash-throated Flycatcher and Western Bluebird – both of which occur in limited numbers along the river below Fallon. It is hoped that tamarisk control will release fertile floodplain lands toward the re-establishment of native willow and cottonwoods. Russian olive control may be necessary in a secondary treatment if response to tamarisk removal is not adequate.

Further Reading

Hensley 1954.

SPECIES PROFILE 4. LOWLAND RIPARIAN

BANK SWALLOW
Riparia riparia

Distribution

The Bank Swallow is distributed around the world. In North America, it breeds from Alaska east to southern Labrador, south to northern California, northern Nevada, Utah,

northern New Mexico, southeast to northern Alabama and northeast to New Jersey. In Nevada, the Bank Swallow breeds from Washoe County east to Ruby Lakes NWR, south to Mason Valley in Lyon County. Breeding further south is poorly documented.

Habitat

Occurrence and distribution appears to be less dependent upon vegetation than suitable soil substrates for nest excavation. Bank Swallows are usually found near water where insect prey is abundant and they are generally regarded as a riparian species, although a dependence on riparian vegetation has not been demonstrated. Bank Swallows have been found over a wide range of habitat types and conditions, with preference for abundant insect concentrations. Suitable foraging habitat includes cropland and pasture, herbaceous range lands, forests, open water, and wetlands.

Physical Factors

Bank Swallows are most common in lowland habitats throughout their range but are known to nest up to about 7,500 feet elevation. Nest colonies are typically found in close association with water which may be due in part to a greater abundance of insects and bank soil moisture conditions for nest digging. Nesting colonies most often occur in banks, vertical cliffs, or bluffs with fine textured or sandy soil. Sand and gravel pits have also been used. Nesting colonies tend to occur most often on north and east aspects, west aspects to a lesser extent, and least frequently on south aspects. Soil moisture and/or suitable banks may be factors in colony orientation. Although Bank Swallows can utilize a variety of edge habitats, aspect is probably the most important factor in determining nesting suitability. Floods and erosion can serve both to destroy suitable habitat and/or existing nests or create additional habitat by exposing bare soils.

Landscape Factors

Bank Swallows have a patchy distribution in suitable habitat. Because they are colonial, territory size is mostly irrelevant. Nest densities in colonies may exceed several hundred in suitable habitat. During the breeding season, most foraging occurs within about 1.6 km of the nest colony.

Special Considerations

Bank Swallows are completely insectivorous, ingesting large quantities of flies, beetles, and mayflies. They tend to be solitary feeders. Males form a monogamous pair bond

but also mate promiscuously within the colony. Young are tended by both adults and typically return to the same colony or a nearby colony to breed. Previous success seems to be important, since few birds return to colonies that had many nest failures the previous year. Site fidelity increases with age and past breeding success.

Bank Swallows appear to be sensitive to human disturbance. Bank stabilization efforts for flood and erosion control work against Bank Swallows by destroying existing habitat and reducing potential for new habitat. Pesticide use and other management practices that reduce insect availability negatively impact Bank Swallows. Brood parasitism does not appear to be a problem, although nests are sometimes commandeered by House Sparrows. Nests are considered relatively inaccessible and safe from predators, but some eggs and adults are preyed upon by rats, skunks, house cats, snakes and some raptors. American Kestrels have been observed picking off young swallows at their burrow entrances.

Associated Species

Northern Rough-winged Swallow
Spotted Sandpiper
Belted Kingfisher
American Dipper

Priority Considerations

The Bank Swallow was identified by the Nevada Working Group as a species that may warrant concern in the Group's first efforts to prioritize species (Reed et al. 1996). The reasons given were "population declines in other states" and "uncertainty in Nevada". Since 1996, more data have become available. Some analyses showing a general increase in Bank Swallow numbers in Nevada based on limited Breeding Bird Survey data. A 24.2 percent decrease in the Columbia Plateau region was reported for the thirteen-year period between 1966 and 1979, but trends of the last decade were up slightly for that same region.

It seems as if Bank Swallow populations in Nevada are not in serious decline at this time; however, their colonial nesting ecology may make them vulnerable to local catastrophes and perturbations. The placement of Bank Swallow colonies in sandy banks of highly variable structural integrity makes the long-term maintenance of any single colony always tenuous. Bank Swallow colonies may be vulnerable to indiscriminate recreational activities, sand and gravel mining, land development, and blatant acts of vandalism by the uneducated. Because the Nevada Working Group

believes this vulnerability may be of a significant nature, objectives and strategies for Bank Swallow management are presented here.

OBJECTIVE: Maintain stable or increasing populations of Bank Swallows throughout Nevada through 2004.

Strategy: Protect known Bank Swallow colony sites.

Action: Survey and map all known Bank Swallow colony sites. Categorize each colony site with regard to size, persistence over time, and imminent and potential threats.

Action: Inform land management agencies, private landowners, and the general public about Bank Swallow distribution, ecology, and issues.

Action: Increase recognition of Bank Swallow colonies in areas of high recreational use. Exploit "Watchable Wildlife" potential of highly visible colonies.

Strategy: Monitor contaminant residue loading in Bank Swallow colonies which occur on contaminated soils - i.e., the mercury residues in the Carson River system.

Assumptions - Research and Monitoring Needs

The Bank Swallow objective assumes that present Bank Swallow populations are at least stable in Nevada. A relatively simple effort to atlas known Bank Swallow colonies will provide an important first step toward verifying that assumption. Bank Swallows are somewhat unique among their North American cousins – their colonies can be large with much swirling about much like Cliff Swallow colonies, but since they occur in sandy banks and not on man-made structures, there is much less potential for negative human concerns over waste excretion, etc. In Nevada, colonies occur on the banks of rivers or reservoirs where boating recreation is prominent. By getting the public excited about Bank Swallow colonies, the potential for long-range, volunteer population monitoring is excellent.

Although some baseline contaminant monitoring in Bank Swallow blood and tissue has been initiated along the Carson River below Dayton, not much is known about whether or not the mercury-contaminated sediments are transferring significant loads to either parent or young Bank Swallows that reside in them. Periodic monitoring is probably warranted to determine if Carson River populations are being exposed to undue risk.

Opportunities

The development of a Bank Swallow colony atlas and concurrent educational campaign presents an enjoyable opportunity for bird advocates, land management agencies, private landowners, and the general public to build positive partnerships which engender trust, shared responsibility, and increased effectiveness that can be expected to grow into more effective bird conservation on an ever-broadening scale.

Further Reading

Petersen 1955.

SPECIES PROFILE 5. LOWLAND RIPARIAN

BLUE GROSBEAK
Guiraca caerulea

Distribution

The Blue Grosbeak ranges from southern California north to North Dakota east to the Atlantic coast and south to Panama. In Nevada, it is a summer resident from the Colorado River north to Mason Valley in Lyon County, with isolated pairs summering as far north as the lower Truckee River in Washoe County and the Humboldt River below Winnemucca.

Habitat

Dominant riparian species in southern Nevada habitats include screwbean mesquite, willow, cottonwood, ash, and tamarisk with an understory of saltbush, baccharis, and other riparian shrubs. In northern Nevada, the Blue Grosbeak tends to follow the distribution of buffaloberry (*Shepherdia argentea*) in the broader river floodplains.

Blue Grosbeaks prefer dense to moderately dense riparian tree canopy and midstory cover with sparse to dense shrub layer understory. They nest in a twig fork or among stems from 15 cm to 4.5 meters off the ground.

Physical Factors

Blue Grosbeaks are most common in low elevation, flat valley bottom riparian areas below 4,000 feet elevation. Water is usually present in the riparian habitats of Nevada, but it is not a major factor for the species in most of its breeding range.

Landscape Factors

Blue Grosbeaks use riparian areas from about 0.8 hectares to hundreds of hectares in size. They use both large contiguous areas and linear riparian areas. They will use riparian habitats with young to old-growth trees if vegetation is dense to moderately dense. Foraging habitat includes weedy fields and brushy areas after breeding, and before migration. Territory size and breeding density data are lacking for the western U. S., but one breeding territory in South Carolina occupied 6.1 hectares (Odum and Kuenzler 1955).

Special Factors

The Blue Grosbeak's diet consists of insects, seeds, and occasionally fruit. The potential for human disturbance is high due to limited riparian habitat in Nevada that is highly valued for agricultural, livestock grazing, and recreational uses. Blue Grosbeaks are frequent Brown-headed Cowbird hosts. Males have individual territories during the breeding season. These birds may form flocks after the breeding season, feeding in grain fields and grasslands. Blue Grosbeaks are fairly common in low elevation riparian habitats but in low numbers due to limited riparian habitats in southern Nevada.

Associated Species

Western Kingbird
Bewick's Wren
Bullock's Oriole
Blue-gray Gnatcatcher
Brown-headed Cowbird
Northern Mockingbird
Verdin
Crissal Thrasher
Yellow Warbler

Priority Considerations

It was stated above that management strategies for Southwestern Willow Flycatcher would be sufficient to benefit and maintain Blue Grosbeak populations. This is true in southern Nevada where the two species occur together, but the range of the Blue Grosbeak extends much farther north than that of the Southwestern Willow Flycatcher, reaching as far north as the Humboldt River at Winnemucca. In addition, Breeding Bird Survey data analyses report a slight decline in Blue Grosbeak occurrence in the Basin and Range region over the thirty-year period between 1966 and 1996, with a marked increase in downward trend over the most recent decade. A population decline has also been reported for the Mojave region over the thirty-year period. Because of reported declines, differentiated distribution, and because habitat management issues do persist with regard to the Blue Grosbeak's northern haunts, it seemed prudent to create a separate set of objectives and strategies for the species.

OBJECTIVE: Maintain stable or increasing populations of Blue Grosbeaks throughout their range in Nevada through 2004.

In addition to the strategies and actions listed under Southwestern Willow Flycatcher, add:

Strategy: Maintain thriving buffaloberry stands mixed with cottonwood and/or willow stands on lowland river floodplains.

Action: Avoid large-scale removal of buffaloberry except on a scheduled rotation designed to maintain stand vigor at a scale that does not impact present habitat suitability.

Action: Determine the environmental requirements and life history of buffaloberry, as well as the species' recovery potential from fire and other perturbations.

Strategy: Initiate monitoring protocols sufficient to document status and trend of the Blue Grosbeak in Nevada.

Action: Evaluate the efficacy of present monitoring efforts; add monitoring stations as appropriate

Assumptions - Research and Monitoring Needs

The Blue Grosbeak objective assumes that present populations of Blue Grosbeaks in Nevada have undergone recent declines. Population status and trend should be documented through focused monitoring efforts, or in concert with monitoring protocols for associated species. Habitat use and preferences of Blue Grosbeaks should be investigated more closely, testing hypotheses that address the observed but unquantified relationship between Blue Grosbeaks and buffaloberry. Buffaloberry habitat type dynamics have never been closely studied. Such work is long overdue.

Opportunities

A large portion of the remaining wild buffaloberry habitat on the Walker River floodplain in Mason Valley occurs on the Mason Valley Wildlife Management Area, owned and operated by the Nevada Division of Wildlife. Managers of this first-class wildlife landscape have long lamented the tendency of buffaloberry to outlive its usefulness, growing into massive thickets of dead material with low vigor and low percentage of live stems. While the cover values of huge thickets of buffaloberry are highly attractive to a wide array of wildlife species, concerns over the long-term landscape health of the buffaloberry type are legitimate and should be addressed. Observations after wildfires seem to indicate that buffaloberry is a quite aggressive root sprouter after fire, and post-treatment growth appears to be quite rapid. Much thought and planning should be invested in designing a buffaloberry habitat renovation schedule that at once invigorates stands with new growth while not significantly impacting the landscape with respect to the migratory birds and other wildlife species which depend on it for sustenance.

Other major buffaloberry communities occur on the Little Humboldt near Paradise Valley and on scattered portions of the Humboldt from Rye Patch Reservoir to Elko. Partnerships with private landowners will be vital to the maintenance of these valuable wildlife habitats over the long term. For the time being, farmers and ranchers on the Humboldt system have a generally benign view toward buffaloberry, welcoming its thermal cover values during the calving season. Any significant shift in land use in these communities toward more intensive agriculture, residential or commercial development could put these stands at risk, and must be mitigated through regional planning and education.

Further Reading

Bent 1968

OTHER PRIORITY SPECIES - LOWLAND RIPARIAN

VIRGINIA'S WARBLER
Vermivora virginiae

YELLOW-BREASTED CHAT
Icteria virens

The habitat needs of these species in the lowland riparian habitat type are adequately addressed in the habitat objectives and strategies for the Southwestern Willow Flycatcher, Yellow-billed Cuckoo, and Blue Grosbeak. For a species profile of the Virginia's Warbler, please refer to the Montane Riparian habitat section. For a species profile of Yellow-breasted Chat, please refer to the Mesquite/Catclaw habitat section.

LEWIS'S WOODPECKER
Melanerpes lewis

PHAINOPEPLA
Phainopepla nitens

WESTERN BLUEBIRD
Sialia mexicana

LUCY'S WARBLER
Vermivora luciae

The habitat needs of this suite of species in the Lowland Riparian type are adequately addressed in the Lowland Riparian habitat objectives and strategies for the Ash-throated Flycatcher. For a Species Profile of the Lewis's Woodpecker, please refer to the Montane Riparian habitat section. In terms of Phainopepla needs, mature stands of lowland riparian mesquite would provide host to mistletoe, the berries of which comprise the Phainopepla's chief preferred food item. For a Species Profile of Phainopepla, please refer to the Mesquite/Catclaw habitat secton. Lucy's Warblers are cavity nesters which require mature stands of mequite or other woody shrubs and trees. For a Species Profile of Lucy's Warbler, please refer to the Mesquite/Catclaw habitat section.

HABITAT MANAGEMENT SUMMARY: LOWLAND RIPARIAN

Most of the strategies and objectives outlined for priority bird species found in lowland riparian habitat throughout Nevada are associated with maintaining and increasing the amount of native riparian habitat available for breeding. By devising conservation actions that will provide for continual regeneration of native riparian plant communities, the majority of the priority bird species will be provided for.

Certain priority species utilize early successional stands of native riparian habitat. Others utilize more mature stands of riparian habitat. Thus, any planned conservation action should provide areas that are protected from disturbance and other areas that undergo disturbances timed to coincide with natural regeneration processes. In areas that have been altered to such a degree that natural regeneration is no longer appropriate, artificial methods, such as plantings, will be recommended.

Non-native habitat can also provide important habitat for some priority species. It is important to initiate surveys prior to undertaking any restoration activity. It is also important to note that, in many areas, non-native plant species will become established during native plant restoration projects. In these areas, it may not be practical to attempt to maintain a 100% native plant community. The goal, in these areas, should be to re-establish a native plant component within the stand.

One priority species that is not dependent on native riparian vegetation is the Bank Swallow. Bank Swallow threats are associated with human disturbance. Conservation strategies and objectives for other priority species should not affect Bank Swallow populations.

Cowbird trapping has been cited as a potential action for several priority species. Studies need to be undertaken to evaluate the potential success of any trapping program. This includes surveying prior to any trapping effort being undertaken as well as a post-trapping survey for all priority species affected by cowbird parasitism.

HABITAT TYPE: WETLANDS AND LAKES

General Description

By far the majority of Nevada lies within the Great Basin, a physiographic region of North America characterized by its interior drainage and lack of outlet to any ocean. The average visitor to Nevada's Great Basin desert is likely to be put off by its seemingly endless expanse of barren alkali playas, greasewood flats, and dry, rocky mountain ranges. However, it is easy for the casual interstate traveler to overlook the effects of the very interior drainage that gives the region its name and defining character. Runoff from the Sierra Nevada on its western margin and from all its interior mountain ranges gravitates to a vast array of valley bottoms and hardpan flats, where it collects in the regions of lowest elevation and evaporates into the air or soaks into the ground. Depending on soil characteristics and volume and flow regime of the water source, these natural basins express a wide variety of wetland types, among which are Nevada's most productive and diverse biotic communities. The Nevada GAP estimated 105,563 hectares of emergent marsh, 183,747 hectares of open water, and 758,020 hectares of playa in the state.

The strategic location of Nevada's perennial and ephemeral wetlands render them of particular importance to the avian migration of the Western Hemisphere. Not only do over one hundred thousand birds (ducks, geese, shorebirds, and wading birds) nest in the Great Basin, but hundreds of thousands more use Great Basin wetlands as migratory stopovers and staging sites where fat reserves are replenished during the epic annual journeys between winter ranges south of the Mexican border to nesting ranges spanning from Nevada to the rim of the Arctic Ocean.

Nevada's portion of the Great Basin is fed by four major river systems – the Humboldt, the Truckee, the Carson, and the Walker – and one lesser system, the Quinn. These systems all empty into the mostly dessicated bed of ancient Lake Lahontan, a physiographic basin which first began filling with fresh water between the Ice Ages of the Pleistocene. The four major rivers reach their termini within a triangle approximately 153 km long on two of its sides and 64 km across its northern side. The Truckee River creates Pyramid Lake, a huge, deep desert lake approximately 48 km northeast of Reno. The Walker River ends at Walker Lake, another deep desert lake of steadily increasing salinity north of Hawthorne. The Humboldt River reaches the Humboldt Sink, an expansive alkali pan just southwest of Lovelock, where it creates wetlands which fluctuate from centimeters deep to over four meters deep, depending on the snowpack and runoff volume of the Humboldt watershed. The Carson River

empties into Nevada's most extensive complex of palustrine wetlands in Lahontan Valley. Here lay the Stillwater National Wildlife Refuge at the end of the Carson's northeastern most reach, and Carson Lake at its extreme southeastern reach. The Lahontan Valley wetland complex is world-renown for its importance to migratory waterfowl, shorebirds, and waders, and received worldwide recognition in 1988 when it was included as a site of hemispheric importance into the Western Hemispheric Shorebird Reserve Network.

The Quinn River transports a low volume of water over an amazingly flat stream course, such that very little of its flow reaches its terminus in the Black Rock Desert in any volume sufficient to overcome the permeability of the soils and the insatiable evaporation rate of its terminal landscape. Accordingly, no significant wetland exists at the end of the Quinn. Because of its interminably slow flow, however, the Quinn does periodically supply a highly productive in-stream riverine marsh where it intersects and consumes the King's River at the south end of King's River Valley west of Orovada.

In northeastern Nevada, the Ruby Marshes are fed by runoff from the Ruby Mountains on the west and the East Humboldt Range on the east. A vast expanse of extremely fresh water permanent wetland is sustained by several high-volume freshwater springs existing on the Ruby Valley floor. Another playa that often expresses a significant area of emergent wetland, Franklin Lake, exists on the Ruby Valley floor north of and physiographically disjunct from the Ruby Marshes. Another extensive wetland complex sustained by valley floor springs lies in the Warm Springs Ranch in Independence Valley southeast of Wells.

Many other Great Basin playas provide seasonal wetlands of varying character, quality, and periodic longevity. Some of the more diverse and noteworthy of these include: Railroad Valley in Nye County; Massacre Lakes, Duck Flat, and Washoe Lake in Washoe County; Artesia Lake in Lyon County; and Snow Water Lake in Elko County.

The major wetland complex of the Colorado drainage in southern Nevada lies in the Pahranagat Valley south of Alamo. Here the subsurface flows of the White River meet the northernmost reaches of the Sheep Range fault blocks, effectively impeding its flow and forcing it to pool up in the south end of the valley where it forms an extensive emergent marsh. Other sites along the White River where it pools into significant wetlands include the old Sunnyside Ranch south of Lund, now known as the Kirch Wildlife Management Area, and what is now known as the Key Pittman Wildlife Management Area near Hiko. The State of Nevada also manages a wetland complex where the Muddy River enters Lake Mead south of Overton.

The Amargosa River system of southern Nevada forms two relatively small, but biologically important wetland complexes – one through the town of Beatty and one at Ash Meadows north of Death Valley. These small complexes support several endemic fishes and an endemic amphibian, the Amargosa toad. Of lesser importance to migratory water birds, the Ash Meadows National Wildlife Refuge that has been commissioned to protect these unique biological resources represents an important protected preserve for many species of Mojave Desert songbirds. A wetlands complex largely sustained by sewage effluent occurs in the Las Vegas Wash.

The extreme southern rim of the Columbia Plateau laps over the Nevada border from the north in Humboldt and Elko Counties. Several in-stream riverine wetlands exist in the Owyhee River drainage which exits Elko County into Idaho, including Sheep Creek Reservoir, the Petan Ranch, the Spanish Ranch, Sunflower Flat, and the upper end of Duck Valley. Other significant wetlands occur in the Upper Bruneau Meadows and at the confluence of Shoshone Creek and Salmon Falls River.

Man-made reservoirs have been incontrovertible features on the landscape of the American West for almost a century now. Although the creation of these reservoirs has necessitated a series of habitat value tradeoffs both in the way of inundated riparian habitats and wetlands affected by altered water management downstream, many of them are quite prolific fish producers, and as such have created significant summering, wintering, and migratory staging sites for fish-eating birds such as Common Loon, Western and Clark's Grebe, Double-crested Cormorant, and American White Pelican. Probably the most significant reservoir in the state relative to bird use is Lake Mead on the Colorado River behind Hoover Dam. Although its vast size renders it practically impossible to economically survey, Lake Mead may provide staging and wintering habitat for many of the Western and Clark's Grebes in the western U.S. Other man-made reservoirs supporting significant bird resources include Lahontan Reservoir on the Carson River, Rye Patch and South Fork Reservoirs on the Humboldt River, and Wildhorse Reservoir on the Owyhee River.

Physical Characteristics

The term "wetlands" is a generic reference to a wide variety of plant communities that form on soils that remain moist or saturated through a significant portion of a year. The length and extent of soil saturation or inundation is key to the type of vegetation a site will express. A single site often carries the seed and root stocks to exhibit very different plant communities depending on the extent and duration of water on the site over a particular time. In a simple Nevada model, the playa is the basic typical wetland substrate. Playas are flat, and form at the very lowest elevation of a basin or valley. A

playa began its formation at the instant in geologic time when runoff from the surrounding landscape gravitated to it and began accumulating on it. Soils and minerals are brought in with the water and precipitated out with settling and evaporation until a fine-grained, relatively impermeable layer of sodic clay is lain down, effectively sealing the site from rapid percolation of water from the surface to subsurface aquifers. The playa begins to hold water at the surface over longer and longer periods until the seeds of palustrine plants, borne on the wind or the feathers or fur of birds and mammals are germinated and a wetland community is established.

Playas can accumulate prodigious concentrations of salts from the water, to the point that they become quite hostile to plant establishment, remaining barren of almost all vegetative encroachment through most of the year. When dry, these salt flats are freshened by the wind which removes the lighter salt particles off the surface. Some palustrine plants are quite amazing in their ability to colonize and persist in spite of these harsh physical and chemical site conditions.

Dry playas are often barren of vegetation from their center out to their outer margins, where saltgrass, pickleweed, or stunted greasewood can maintain a foothold on the fresher soils. When soils are kept moist but short of saturation over several weeks or months, Baltic rush, smartweed, sedges, and spikerushes emerge, in progressive order of wetness. This community is usually less than 60 cm tall, but can become quite dense in the absence of disturbance. With prolonged saturation comes more substantial emergent vegetation in the form of cattails, hardstem bulrushes, and alkali bulrushes (known locally as "nutgrasses"). These plants range from one to three meters tall and can grow so thick as to render a site impenetrable. With long-term inundation comes the submergent plant community, most often one of the pondweeds (*Potomogeton* spp.), but sometimes wigeon grass in more saline conditions, and sometimes arrowhead in fresher conditions. These submergent plants can build to such thick mats that they finally break the water's surface and present a structure sufficient to support the nests of marsh birds such as Black Terns, Eared Grebes, Black-necked Stilts, and American Avocets.

When a marsh goes dry after having achieved the full multi-storied expression described above, the submergent plants disappear quickly and assume dormant stages in the substrate. The bulrushes and cattails can persist in cured form for a year or two, or until significant breakdown occurs through intrusion by large mammals or wind. These cured stands of dry emergents can then fill with amazing densities of meadow voles and other rodents, making them prime hunting areas for raptors, including Short-eared Owls, Northern Harriers, Red-tailed Hawks, Ferruginous Hawks, and in winter, Rough-legged Hawks.

These same vegetative expressions can also be achieved in the floodplains of rivers and creeks where currents are not so strong as to keep the plants and reproductive stocks swept away. Oxbows, formed when stream channels finally abandon old meanders, are prime sites for wetland formation. Other floodplain wetlands can form where flows are slow and sheet-like rather than confined to a channel. Floodplain wetlands usually exhibit more permeable soils with a constant, if slow, flow of water passing through rather than standing in place.

Nevada's permanent lakes are primarily either terminal basins or man-made. Because of the natural occurrence of minerals and salts in their watersheds, Nevada's lakes and reservoirs are natural sumps for the transport and collection of a variety of salts, heavy metals and other dissolved solids. Basins are typically deep, such as Lake Tahoe and Pyramid Lake, although some lakes and reservoirs have extensive shallow littoral zones on their upper ends (Walker Lake, Wildhorse Reservoir, and others at different times) which can be exploited by waterfowl and shorebirds for their food resources.

Dominant Plant Species

The dominant emergent species of persistent wetlands are cattail (*Typha* spp.), hardstem bulrush (*Scirpus acuta*), and alkali bulrush (*Scirpus maritimus*). Prominent submergents include sago pondweed (*Potomogeton pectinatus*), horned pondweed (*Zannichellia palustris*), wigeon grass (*Ruppia maritima*), water buttercup (*Ranunculus* sp.) and arrowhead (*Sagittaria* sp.). Moist soil inhabitants include Baltic rush (*Juncus* sp.), smartweeds (*Polygonum* sp.), sedges (*Carex* sp.), flatsedges (*Cyperus* sp.), and spikerushes (*Eliochorus* sp.). Saltgrass (*Distychlis stricta*), willows (*Salix* sp.) and greasewood (*Sarcobatus vermiculatus*) often thrive on the margins of playas and floodplain wetlands.

Many plant species found today in Nevada's wetlands are not indigenous to North America, but two of relatively recent invasion deserve special mention because of the threat they pose to marsh diversity and productivity – the tamarisk (*Tamarix* sp.) and tall whitetop (*Lepidium sp.*). These highly aggressive competitors have already invaded and compromised several of Nevada's key wetland and floodplain sites. Tamarisk, also known as saltcedar, forms a small tree much like willow in growth form, but much less desirable to North American songbirds than willow. Tamarisk is quite salt-tolerant, and is prone to overtake salty playas after prolonged flooding kills and removes normal emergent vegetation, then is followed by prolonged drought. Tall whitetop is a robust herbaceous plant that grows up to two meters high and forms dense, monotypic stands of spinescent stalks that repel entry and eliminate understory competition. While not tolerant of prolonged inundation or higher salinities, tall

whitetop does threaten to replace many more desirable species on moist soil sites and wetland margins.

Historic and Current Conditions

Nevada has not undergone significant physiographic change since the Pleistocene, when its naturally-formed basins began filling with the freshwater melt of the receding Ice Ages. During that time, two major lakes formed in northern Nevada. Lake Lahontan stretched from Desert Valley north of Winnemucca as far south as Walker Lake north of Hawthorne. This lake inundated all the valleys of Pershing and Churchill Counties, Pyramid Lake, the Black Rock, San Emidio, and Smoke Creek Deserts, and reached as far west as Honey Lake just across the border in California. At its peak, Lake Lahontan was 268 meters deep at its deepest point. It filled and dessicated a number of times in rapid geological time, but it has not filled significantly in the last 10,000 years. Its remnants that persist today include Honey Lake, Pyramid Lake, Humboldt Sink, Carson Sink and Carson Lake, and Walker Lake. At the same time, Lake Bonneville was filling the basins of the eastern Nevada border stretching north to south from Montello to Baker. Both systems were active long enough to develop separate parallel strains of cutthroat trout. Lake Lahontan developed endemic tui chub and the endangered cui-ui, a Pleistocene sucker that exists only in Pyramid Lake, while Lake Bonneville's endemic fishes include the Utah chub and the Bonneville sculpin. While a portion of extreme northwestern Nevada drains northward into what was ancient Lake Alvord, hardly any of that lake's inundation zone extended into Nevada.

Pleistocene humans found these ancient lakes and the wetlands that formed with their periodic dessication to be bountiful oases, supplying their year-round needs of food and raw textile materials. Almost everything that moved in or on the lakes was eaten – from the freshwater mussels in the littoral muds to the coots that skittered across the surface. Cattails and bulrush were harvested and used almost completely. Tubers and seeds were eaten; leaves and stems were stripped to their fibers and woven into baskets, sandals, and clothing. Nevada's wetlands provided good living within a matrix of sere, unforgiving desert and range.

European settlers initially passed over Nevada's interior wetlands, deeming them foul and unfit for civilized living – inhospitable hazards to be circumvented on the way to the lands of milk and honey in California. As the prime lands of California filled and settlement began to backflow into Nevada, the eyes of empire rested on the waters flowing in the rivers of the Great Basin, and plans ensued immediately to put those waters to "beneficial use". Without a thought toward the impacts such an action would have on the terminal habitats, a dam was built in the Truckee River and a ditch cut to

divert water over into Lahontan Valley to supplement the slightly less than reliable Carson River flow as it was harnessed to succor the West's first irrigated lands project in 1911. This action initiated the dessication of Winnemucca Lake, site of a highly productive shallow wetland that sometimes reached 26,000 hectares in size. Pyramid Lake also began to recede, losing almost 21 meters of depth by 1981.

During the heyday of agricultural water diversion, the wetlands at the end of the Carson River waxed fat on the increased flow through the system, benefiting particularly from the water that was released through Lahontan Dam to generate electrical power during the winter months. When winter power releases were curtailed in 1967, and the federal government began to shift its emphasis in trust responsibilities away from the irrigation project toward the Pyramid Lake Indian Tribe and the cui-ui, now listed as endangered under the Endangered Species Act, the re-allocation of water between all conflicting interests threatened to dry up the Lahontan Valley wetlands completely. By the mid-1980's, death knells were sounding for these once flourishing marshes when the sites were found to be significantly contaminated with heavy metal residues, deposited there during decades of leaching agricultural lands and dumping the drain waters into the wetlands.

A coalition of concerned biologists, hunters, and environmentalists formed to save the gravely threatened wetlands. The coalition fought bravely to establish wildlife habitat as a beneficial use of water under state law, raised money to buy water rights from willing sellers within the irrigation project for transfer to the wetlands, and convinced the federal government that walking away from the Lahontan Valley wetlands was not an acceptable solution to simplifying the "rat's nest" of public trust conflicts and problems. The efforts of the coalition culminated in the passage of The Truckee-Carson Settlement Act, a sweeping reform bill sponsored by Senator Harry Reid in 1990. This landmark legislation authorized the purchase of water rights from willing sellers within the project to sustain an average of 10,000 hectares of wetlands in Lahontan Valley, distributed proportionally between the Stillwater National Wildlife Refuge, Carson Lake, and wetlands of the Fallon Paiute-Shoshone Tribes. The bill also provided direction for Stillwater NWR past the expiration of the multiple-partner management agreement it had operated under since 1948, and authorized the transfer of Carson Lake from federal to state ownership for the expressed purpose of management as a state wildlife area. Although many of the details of implementation of the 1990 legislation are still being worked out, the Lahontan Valley wetlands have enjoyed an increase in both legal and public standing as a result of the efforts of a dedicated, diverse band of conservationists. The future looks bright with regard to the long-term preservation of these critical wildlife showpieces.

The Humboldt Irrigation Project, centered in the Lovelock Valley, was born when Rye Patch Dam was completed on the Humboldt River in 1935. This effectively cut the wetlands of the Humboldt Sink from the natural flow regime of its source river. Like Lahontan Valley, fresh water receipts to the wetlands were largely traded for drain flows, with a corresponding decline in water quality, and a similar buildup of contaminants in the playa substrates. The area has been managed by Nevada Division of Wildlife and its predecessors as a wildlife area since 1954, with minimal structural development.

Upstream, the Humboldt Project manifested itself in a different way. Starting in 1934, several ranches from Battle Mountain almost to Golconda were bought by the federal government for the purpose of transferring their diversionary water rights downstream to the Lovelock Project. Claiming that the State of Nevada had required them to prove collection of those water rights off the properties in question, the Bureau of Reclamation initiated a massive channel modification project on those properties which was dubbed the "Battle Mountain Channel Rehabilitation and Betterment Project". This resulted in an eight-kilometer gash that effectively drained what was known as the Argenta Swamp, at the time, Nevada's largest in-stream marsh. Currently, negotiations are under way between conservation advocates, the State of Nevada, the Bureau of Reclamation, and the Pershing County Water District to explore the cooperative restoration of a portion of the marsh that was lost.

In Mason Valley near Yerington, the two forks of the Walker River came together and historically tended a broad, marshy floodplain complete with a labyrinth of sloughs, oxbows, and alternate channels braided through richly fertile bottomland soils stretching the length of the valley from the confluence of the East and West forks to the river's exit from the valley east of Wabuska. Recognizing a fertile valley bottom when they saw one, European settlers began to turn the sods of Mason Valley at about the same time as the settlement of Carson Valley (1850's), making it one of Nevada's oldest agricultural communities. When the Walker River Irrigation District, a private cooperative, completed construction of Bridgeport Reservoir on the East Fork and Topaz Reservoir on the West Fork, the systematic conversion of Mason Valley into a carefully controlled, productive agricultural center was complete.

In 1955, the Nevada Fish and Game Commission (now the Nevada Division of Wildlife) purchased the last largely undeveloped tract of natural floodplain habitat in the valley, the Mason Valley Ranch, site of one of the major base ranches in the vast Miller and Lux cattle empire of the 1880's. Upon purchase, some of the sloughs on the property with more regular water flow were developed into managed wetland units using sportsman's money, and today, in addition to its stretch of natural riparian and

floodplain habitats, the Mason Valley Wildlife Management Area regularly offers up to 23,200 hectares of palustrine marsh habitat for nesting and migrating water birds (Huffman Report 1998).

The diversion of water out of the Walker River for agricultural irrigation both in Mason Valley and on the Walker River Paiute Indian Reservation initiated Walker Lake into a slow decline that to this day threatens the long-term viability of its considerable fishery. Besides the Walker Lake strain of Lahontan cutthroat trout, prized by fisherman for its size and flavor, Walker Lake also produces an overwhelming biomass of tui chub and Tahoe suckers which in turn feed a myriad of fish-eating birds. As lake level declines, the concentration of salts increases dangerously close toward the threshold beyond which Walker Lake's fishery can no longer naturally sustain itself. That threshold has already been crossed for Lahontan cutthroat trout, which remain in the lake due solely to the artificial propagation efforts of the Nevada Division of Wildlife.

The major surface wetlands of the mostly subterranean White River in southeastern Nevada have likewise been preserved for public use by state and federal wildlife agencies. The old Sunnyside Ranch south of Lund was purchased by the state of Nevada and is now known as the Wayne Kirch Wildlife Management Area. Another state-owned wildlife management area, known as the Key Pittman WMA is situated south of Hiko. The U.S. Fish and Wildlife Service owns and manages the Pahranagat National Wildlife Refuge south of Alamo. The White River changes names below the refuge to Pahranagat Wash, and is later joined by Meadow Valley Wash, to form the Muddy River, which empties into Lake Mead at Overton. Here, in the floodplain of the uppermost inundation line of Lake Mead, a constructed wetland known as Overton WMA is owned and operated by Nevada Division of Wildlife.

Opportunities For Conservation

In many respects, the battles to preserve Nevada's significant wetlands are old and many have been resolved. The preservation of several of Nevada's more significant in-stream wetlands (Mason Valley WMA, the White River properties, Alkali Lake in Lyon County, etc.) has been effected through purchase with sportsmen's user fees. Other properties (Franklin Lake, Ash Meadows NWR) have been purchased by The Nature Conservancy and transferred to public ownership. Ducks Unlimited played a critical role in the preservation and development of the marshes in Railroad Valley. Although far from complete, the restoration and preservation of the Lahontan Valley wetlands (Stillwater NWR and Carson Lake) through the purchase of water rights from willing sellers is ongoing and progressing well. As stated above, negotiations between water users, the federal government, and a coalition of conservation and sportsmen's groups

are presently shaping the future of a partially restored Argenta Marsh, probably the most exciting wetlands restoration prospect to come along since the Truckee-Carson Settlement Act. The Wetland Reserve Program administered by the U.S. Natural Resources Conservation Service provides federal assistance to private landowners wishing to restore wetlands on their property. Other opportunities to preserve significant wetland sites will continue to arise with the passage of time as long as the public places high value on the natural outputs of these limited but disproportionately important habitats.

Presently, the most severe and problematic water conservation issue centers around efforts to save Walker Lake. Because water rights on the Walker River system are privately owned and administered, sweeping environmental legislation similar to the Truckee-Carson Settlement Act will be impossible without consensus of all the stakeholders. In recent years, the specific importance of Walker Lake as both a state and international resource has become better understood, and all stakeholders are presently engaged in serious negotiations to devise solutions equitable and acceptable to all. In the meantime, a string of high-precipitation years starting with 1994 have given the lake a temporary respite from the brink of death.

In southern Nevada, several wetland enhancements have been proposed for the Las Vegas Wash as part of a Wetland Park planning effort. This denuded system has been altered as a result of flooding and increased effluent flows from recent population growth of the Las Vegas area. The major enhancements will be erosion control structures that will slow flows and eventually create emergent wetlands. Funding for development has been a limitation and several planning groups have been formed to address this and other local concerns.

Priority Species

Obligates

White-faced Ibis
Snowy Plover
American Avocet
Black Tern

Other

Sandhill Crane
Long-billed Curlew
Short-eared Owl

SPECIES PROFILE 1. WETLANDS AND LAKES

WHITE-FACED IBIS
Plegadis chihi

Distribution

The White-faced Ibis is encountered as a non-breeder over most of the wetlands of the western U.S. from central Oregon east to central Minnesota, southeast to Nebraska, southwest to southern California, Baja California and the Sea of Cortez. A disjunct population inhabits the Gulf Coast from the mouth of the Mississippi in Louisiana west to the mouth of the Rio Grande in Texas. In the West, the White-faced Ibis breeds in disjunct colonies varying in size from a few pairs to 10,000 plus scattered across the western U.S. from Lower Klamath Lake on the Oregon-California border as far south at times as the Salton Sea in extreme southern California; several of the large wetland complexes of the Great Basin, including Lahontan Valley, Humboldt Sink, and Ruby Lakes NWR in Nevada, Malheur NWR in central Oregon, and the Bear River marshes in northern Utah; and various and sundry other sites scattered throughout its range east to Minnesota and Nebraska.

Habitat

White-faced Ibis prefer to nest in flooded stands of hardstem bulrush, but will use other types of flooded emergent marsh vegetation, including cattail, alkali bulrush, and even flooded willows and tamarisk in a pinch. They feed primarily in flooded wetlands, although the prevalence of irrigated agricultural lands through much of their historic habitat has effected a shift to foraging for earthworms in flooded crop fields (Bray 1988) as a primary foraging technique.

Physical Factors

White-faced Ibis nest colonies must be flooded underneath throughout the nesting period to discourage mammalian predators, primarily coyotes and feral dogs and cats. Conversely, once nests are constructed (typically 60 cm or less above the water's surface), water levels must not be allowed to rise to the point of flooding the nests. Often on managed wetlands, water level stability must be actively manipulated to avert abandonment in either extreme. White-faced Ibis prefer flooded fields and shallow wetland units for feeding.

Landscape Factors

For nesting, White-faced Ibis prefer mature, fully-structured emergent marsh vegetation stands capable of supporting substantial nest platforms. Emergent marshes suitable for nesting must also be associated with shallow-water wetlands or flooded agricultural fields for nesting. Ibis will commute long distances between nest colonies and feeding areas (48 km plus as the ibis flies). Although they do display considerable adaptability when drought renders traditional colony sites unfit and creates alternate sites in other places, White-faced Ibis tend to show strong fidelity to certain important colony sites. One important conservation strategy for the species has been the preservation and active management of these preferred sites, including Carson Lake, Nevada, Malheur NWR, Oregon, and Bear River Marshes, Utah.

Special Considerations

Adults feed primarily on aquatic macroinvertebrates, drowning earthworms, crayfish and freshwater mollusks when available. Bray (1988) documented the ibis gullet as capable of transporting as many as 100 red earthworms back to the nest in a single trip. The incubation period is 21-22 days and fledging occurs 35-42 days after hatching, requiring stable water levels under the colony of 65-70 days minimum from nest initiation, which usually occurs around May 1. Predation of eggs and young by avian predators can be high even during fully-flooded nesting seasons, while mammalian predation to any significant degree usually results in colony abandonment and failure. Pesticide loading in White-faced Ibis tissues have resulted in some eggshell-thinning, documented by Henney and Herron (1989) in Lahontan Valley. Pesticide residues persist twenty years after the banning of DDT in the United States, and reproductive potential was estimated to be decreased by as much as 20 percent at some sites.

Associated Bird Species

American Bittern
Great Egret
Snowy Egret
Cattle Egret
Black-crowned Night Heron
Marsh Wren
Common Yellowthroat
Yellow-headed Blackbird

Priority Considerations

The White-faced Ibis has received priority management status in Nevada for over 25 years. Biologists became quite concerned for the long-term viability of Nevada's

breeding population, critical to the maintenance of the Great Basin population, during the 1970's when drought and elevated levels of DDE residues in tissues and eggshells threatened to severely curtail production. Annual nesting pair populations in Nevada have fluctuated from zero to over 9,000 pairs between 1974 and 1998. Carter (1998) estimated that as high as 59 percent of all the world's White-faced Ibis nest somewhere in the Great Basin province. Because of continued concern over nesting population viability, as well as the Great Basin's importance to the maintenance of the world's White-faced Ibis population, the Nevada Working Group has selected the White-faced Ibis as a species of priority focus for the purposes of this planning effort.

OBJECTIVE: Maintain an annual average of 4000 nesting pairs of White-faced Ibis at suitable sites throughout the state through 2004.

Strategy: Maintain suitable nesting habitat on an annual basis at the following sites: Carson Lake, Stillwater NWR, Humboldt WMA, and Ruby Lakes NWR.

Action: Maintain suitable habitat for 3,000 nesting pairs at Carson Lake; provide suitable habitat for 1,000 nesting pairs distributed across the remaining three sites as opportunities exist.

Action: Suitable nesting habitat is described as mature stands of hardstem bulrush flooded at a constant depth between 30 and 60 cm from April 15 through August 15. Alkali bulrush and cattail can serve as suitable nesting habitat when stem densities are high enough to support nest platforms and such vegetation is selected by nesting birds.

Action: Continue to purchase water rights from willing sellers for wetlands management.

Action: Continue to monitor water quality and contaminant residues in tissues and eggs. Explore ways to reduce contaminant ingress into important nesting sites.

Action: Participate in standardized nesting colony census with other major Great Basin nesting population site managers.

Action: Coordinate annual habitat management objectives of the important colony sites in Nevada with other important Great Basin sites i.e. Bear River, Malheur, Lower Klamath, etc. Review annual reproduction performance and plan at an ecoregional scale.

Action: Coordinate management and monitoring activities of Nevada's major colony sites with national colonial waterbird planning efforts likely to be developed through the five-year planning period.

Assumptions - Research and Monitoring Needs

The White-faced Ibis objective for wetland habitats in Nevada assumes that a five-year average of 4,000 nesting pairs can be maintained across the major nesting sites in the state. Long-term average between 1984 and 1994 was a little over 3,200 pairs. The western Nevada peak was bumped up to over 9,000 pairs in 1997, and prospects for a higher five-year average seem better than they were through the drought of 1988-93. Prime water has been purchased for both Carson Lake and Stillwater NWR, enhancing habitat managers' ability to provide stable habitat conditions throughout the nesting period. The nesting pair target is optimistic, and will require reaching beyond the previous 15-year performance.

The need for regional coordination between states and land management agencies is great. Standardized census methods performed by all stewards of the major colony sites on a regular basis are warranted. Better facilitation of the transfer of information between major colony stewards would serve to better prepare specific stewards in years when their site might need to increase its burden of responsibility for annual production as other sites anticipate unsuitable nesting conditions affected by drought or flooding.

Opportunities

Several ecosystem planning efforts regarding wetlands, shorebirds, and colony-nesting birds are either well under way or in the beginning stages. As a result, communication between the various major Great Basin wetland site stewards is increasing. The potential for coordinated resource management of non-hunted bird species across state and administrative boundaries seems better than ever before.

Further Reading

Booser and Sprunt 1980
Bray 1988
Earnst, et. al.1998
Henney and Herron 1989
NDOW 1974-98
Ryder 1967

SPECIES PROFILE 2. WETLANDS AND LAKES

SNOWY PLOVER

Charadrius alexandrinus

Distribution

The Snowy Plover is found worldwide. In North America, Snowy Plovers are resident on the Pacific Coast from southern Washington south to Baja California and on Gulf Coast from Mexico to Florida panhandle. They breed locally in the interior of Oregon, California, Nevada, Utah, New Mexico, Kansas, Oklahoma and Texas. In Nevada, Snowy Plovers breed on alkaline playas from the Oregon border south through Washoe, Humboldt, Pershing, Churchill, Lyon, and Mineral counties, east into Lander and Eureka Counties, southeast to Railroad Valley in Nye County, and northeast to Franklin Lake in Elko County.

Habitat

Almost nothing but saltgrass (*Distychlis* spp.) and pickleweed (*Salicornia* spp.) will grow on the hyperalkaline playas Snowy Plovers call home. For the plovers, the barer the better. Snowy Plovers prefer unvegetated salt flats where they and brine flies are the only life that stirs. Heavy saltgrass growth is shunned, as is all other shrub and herbaceous growth along the less hostile playa margin. Eggs are laid in bare scrapes in loose alkali dust, on hardpan, or on bare cobble. The nest may be faintly demarked by pebbles and thinly lined with feathers and saltgrass.

Physical Factors

Snowy Plovers must have access to some water, but not much. Its preferred playas occur in valley bottoms between 3,000 and 4,500 feet elevation and range from faintly bowl-shaped to perfectly flat. Soils are lacustrine or palustrine and alkaline to hypersaline. Water quality must be capable of sustaining brine flies and/or brine shrimp. Artesian wells that provide a small volume of permanent water can enhance a playa's suitability as Snowy Plover habitat.

Landscape Factors

Habitat suitability fluctuates with precipitation patterns. Snowy Plovers have been known to stray as far as 1.4 km from water; therefore, suitable habitat is defined by the area of unvegetated playa that interfaces with a water source that will be traversed by the birds. When playas are full from saltgrass rim to saltgrass rim following years of high precipitation and runoff, they are unsuitable for Snowy Plovers. Suitability increases as standing water recedes, then a playa becomes unsuitable again at the point after dessication at which brine flies die off. Playa suitability can vary significantly within year between regions. Playas scattered across a broad regional landscape providing a variety of water conditions are likely to meet yearly breeding needs. More study is needed on breeding site flexibility in the interior population, although it is suspected to be quite facilitative.

Special Considerations

Snowy Plovers feed on brine flies (*Ephydra* spp.), brine shrimp (*Artemia* spp.), chironimid worms, cladocerans, and other invertebrates. Young are precocial; nests and young are susceptible to predation by coyotes, corvids, and gulls. Hydrologic integrity of playa bottoms must be preserved – intermittently threatened by precious mineral dredging or livestock water development. On many wetlands managed for wildlife, playas occur at the end of the system, where their water budgets can be extremely high, thus rendering playas as low-priority habitats in annual water management plans. Water availability to playas can be affected by agricultural and urban diversions. Populations in Nevada and Oregon are generally thought to be in decline, but the discovery of a large population at Great Salt Lake, Utah in the last decade makes population trend analysis difficult. More long-term monitoring including Great Salt Lake will be necessary to determine if Great Basin population is static or in overall decline.

Associated Species

American Avocet

Priority Considerations

Limited Breeding Bird Survey data indicate a 125 percent increase in Snowy Plover populations in the Great Basin between 1966 and 1996 (Sauer et al. 1998). It is hard to know how much of this increase is due to better survey techniques and the discovery of the Great Salt Lake population. In Nevada, breeding populations have declined since the monumental baseline survey work of Herman (1988; NDOW 1993). The Great Basin province is estimated to provide as high as 50 percent of the western Snowy Plover breeding population. Because its numbers are perceived to be on the decline in Nevada, and because of the relative importance of our area to the western breeding population, the Nevada Working Group has selected the Snowy Plover as a species of priority focus for the purposes of this planning effort.

OBJECTIVE: Maintain a Snowy Plover breeding population of 900 adults distributed across all suitable habitat in Nevada through 2004, with special emphasis on Stillwater NWR and the Carson Sink.

Strategy: In coordination with other wetland management objectives, provide the maximum extent of wet alkaline playa habitat possible through active water management where appropriate and through the protection of natural site integrity where water management is not possible.

Action: On managed wetlands, prioritize at least one major alkaline playa unit per year for water to support Snowy Plover breeding throughout the breeding season.

Action: On unmanaged playas, preserve natural water regimes through protection of playa bottom from mineral exploration and extraction and stock pond development.

Action: Determine the extent of nest loss to recreational vehicle use on playas. Prevent recreational vehicle use on important breeding sites during the nesting season.

Action: Conduct standardized, periodic censuses of all documented potential breeding sites using professional and volunteer help specially trained in Snowy Plover observation.

Action: Coordinate management and monitoring activities with other Great Basin states. Develop a Great Basin breeding population estimate.

Action: Coordinate planning, management, and monitoring efforts with the National Shorebird Conservation Plan, a planning process now in progress.

Assumptions - Research and Monitoring Needs

The breeding adult population estimate of 900 birds was derived from the U.S. Fish and Wildlife Service's "Management Guidelines for the Western Snowy Plover" (1984). A 1980 census documented 969 breeding adults in Nevada (Herman et. al.1988). The USFWS Management Guidelines set a management objective of 90 percent of all birds and suitable sites. The Nevada Working Group objective rounds 872 (90 percent of 969) up to 900 birds for the sake of simplicity. While this would be an optimistic target indeed for only the sites censused by the Herman team, the target takes into account the existence of several important eastern and central Nevada sites not censused by the Herman team. By including all documented sites in the target formula, the target is more realistically attainable.

Better data on loss of nests and young to predation and wildlands recreation are needed. The effects of contaminant loading in tissues and eggs are also probably warranted. Snowy Plovers are particularly challenging to census due to both the expanse and severity of their preferred habitat, as well as the difficulty of observing them in their preferred haunts. The members of the Herman team achieved a rare level of specialized acuity in their several years of pursuit of Snowy Plovers across the saltpans of the Great Basin. It may be desirable and necessary to encourage members of that team to spend some time specially training biologists and volunteers to conduct censuses that might approach the comprehensiveness and precision of the 1980 expedition for comparative purposes over time.

Opportunities

The assemblage of a skilled citizen-scientist corps such as is ongoing by the Great Basin Bird Observatory will be paramount to gaining the necessary survey coverage to adequately assess population status and trend. The purchase of water rights from

willing sellers for the Lahontan Valley wetlands will increase land managers' ability to deliver water to the high-demand tertiary salt pans with time.

Further Reading

Herman et. al.1988
Herron, et. al.1991
Page and Stenzel 1991
USFWS 1984

SPECIES PROFILE 3. WETLANDS AND LAKES

AMERICAN AVOCET

Recurvirostra americana

Distribution

The American Avocet breeds along the California coast as far north as San Francisco, extending across the interior through Arizona, Nevada, central Oregon, portions of central Washington, Utah, extending east across northern Colorado to the Great Plains, where its breeding range extends from southern Saskatchewan to south Texas. In Nevada, American Avocets breed on marshes and playas throughout the state.

Habitat

American Avocets utilize a wide variety of shallow water habitats, including flooded pastures, managed wetland units, alkaline playas, river deltas, gravel bars, and the shallow shore zones of permanent lakes. Nesting is most likely to occur in flooded saltgrass pastures, where either a nest is built up of grass and other vegetation, or a depression in the mud is lined with feathers and grass. Nesting also occurs on gravel and mud bars and in flooded wetland units where submergent vegetation grows sufficiently thick to support a nest spun out of the submergent material itself. Avocets prefer to feed in flooded units and shallow lakes teeming with aquatic invertebrates.

Physical Factors

American Avocets are never found very far from water. Their preferred wetland haunts occur in valley bottoms between 3,000 and 4,500 feet elevation and range from faintly

bowl-shaped to perfectly flat. Soils are typically lacustrine or palustrine and alkaline to hypersaline. Avocets tend to be more tolerant of inferior water quality than just about any Great Basin shorebird save the Snowy Plover (Rubega and Robinson 1997).

Landscape Factors

American Avocets are typically colonial nesters in abundant habitat, but will nest as solitary pairs in limited habitat. The reproductive urge of this species is strong, and limited nesting can occur during drought when wetlands have receded to the last permanent mudhole (Albarico 1993). Pairs defend small territories around themselves when feeding (up to 0.1 hectares), and defend small territories around their nests, tolerating neighbors to just outside a two -meter radius (Gibson 1971). Post-breeding dispersal in the Great Basin is quite extensive and can involve wetlands separated by hundreds of miles being visited multiple times in a single season (Robinson and Oring 1996, 1997)

Special Considerations

American Avocets feed on brine flies (*Ephydra* sp.), brine shrimp (*Artemia* sp.), chironimid worms, cladocerans, and other aquatic invertebrates. Young are precocial; nests and young are susceptible to predation by just about every predator on the marsh, including coyotes, corvids, gulls, night herons, harriers, buteos, and falcons. In well-developed colonies, Avocets display cooperative nest defense ranging from communal distractive flight displays to active predator pursuit and harassment. As a result, nesting pairs in colonies typically enjoy greater reproductive success than do solitary pairs.

Associated Species

Black-necked Stilt
Killdeer
Wilson's Phalarope

Priority Considerations

Limited Breeding Bird Survey data indicate a five percent decline in American Avocet populations in the Basin and Range province between 1966 and 1996 (Sauer et al. 1998). It has been estimated that 53 percent of the world's breeding population of American Avocets is found in the same Basin and Range province (Sauer et al. 1998). Because populations seem to be in slight decline and because Nevada comprises such a significant portion of the Basin and Range province which is critically important to the

maintenance of the world's breeding population, the Nevada Working Group has selected the American Avocet for priority focus for the purposes of this planning effort.

OBJECTIVE: Maintain a breeding population of 5,000 pairs of American Avocets distributed across all suitable habitat in Nevada through 2004.

Strategy: Maintain suitable nesting habitat, including flooded saltgrass pasture, thick mats of submergent vegetation, islands, etc. to support up to 3,000 nesting pairs in the Lahontan Valley wetlands of Churchill County, and 2,000 nesting pairs or more in aggregate over the rest of the state.

Action: Continue to buy water rights from willing sellers for implementation of wetland habitat objectives and strategies.

Action: Plan to keep at least one saltgrass pasture per major wildlife management area or refuge flooded at a constant depth between five and fifteen centimeters between April 15 and August 1 annually. During years of full water allocation or better, provide adequate nesting habitat for 1500 pairs of American Avocets each at Carson Lake and Stillwater NWR.

Action: Monitor predation of eggs and chicks. Take remedial action if predation levels exceed 50 percent nest success.

Action: On unmanaged wetland sites, implement management actions designed to minimize disturbance of significant nesting colonies by livestock, motorized recreation, and other human activities.

Action: Implement survey methods designed to yield an accurate nesting population estimate statewide. Coordinate survey between agencies and conduct on an appropriate regular interval.

Action: For migratory avocets, provide at least one unit per major management area in a mature state of invertebrate growth and gradual drawdown in each the spring (April 1 - May 10) and late summer migratory periods (August 1 - September 30).

Action: Research ways to provide unit drawdown in August without initiating significant avian botulism outbreaks.

Action: Coordinate management and monitoring activities with other Great Basin states. Develop a Great Basin breeding population estimate.

Action: Coordinate planning, management, and monitoring efforts with the National Shorebird Conservation Plan, a planning process now in progress.

Assumptions - Research and Monitoring Needs

The American Avocet breeding population target of 5,000 pairs is derived from Stillwater NWR and other Lahontan Valley wetland reports and documents. As late as 1968, Stillwater NWR reported 6,000 breeding pairs of American Avocets. In the nomination letter to include the Lahontan Valley wetlands in the Western Hemispheric Shorebird Reserve Network (1986), biologists estimated a breeding population of 1,000 pairs of American Avocets during that year's flood conditions. It is believed that with increasing stability of water receipts through water rights purchases and orders, a considerable percentage of the 1968 figure could be recovered. Other signficant breeding sites outside Lahontan Valley would be expected to contribute up to 2,000 nesting pairs in aggregate statewide. At this time, the target does not seem unreasonable.

Opportunities

Estimating breeding populations of nesting shorebirds is difficult and requires significant single-minded effort. To date, there has not been a pressing need to derive comprehensive nesting population estimates for American Avocets or Black-necked Stilts. This lack of need is expected to dissipate as wildlife planning matures on its many fronts. The need to set realistic targets to then be coordinated among all the other many wetland-based outputs on an annual basis will only become more acute in the immediate future.

The art of creating optimum shorebird feeding habitat has developed new tenets in the last decade (Helmers 1992). While habitat managers are fairly confident they have the knowledge and tools to create highly functional migratory staging habitats, the spectre of avian botulism continues to confound these efforts in late summer. Intensive research is required to push water level management to the thin margin of safety such that southbound shorebirds may be afforded the best refueling resources possible without placing them and other waterfowl at undue risk of death by botulism. Identifying

the edge of the "envelope" will require creative thinking, some degree of latitude to widely experiment, and a lack of fear of failure. Such an endeavor could also require extensive pubic involvement and education to prevent negative public backlash to experimentation results.

Further Reading

Alberico 1993
Gibson 1971
Helmers 1992
Robinson et al. 1997

SPECIES PROFILE 4. WETLANDS AND LAKES

BLACK TERN
Chlidonias niger

Distribution

The Black Tern inhabits both Eurasia and North America. Its North American range extends from central British Columbia to northern Ontario, south to northern Nevada across to Kentucky. In Nevada, the Black Tern nests on shallow lakes and wetlands from Sheldon NWR to Ruby Lakes NWR south to Mason Valley WMA in western Nevada. It winters south of the U.S. border.

Habitat

The Black Tern prefers marshes in very fresh water, typically characterized by cattail (*Typha* sp.) and/or spikerush (*Eliochorus* sp.), but can also be found in more saline marshes typified by hardstem bulrush (*Scirpa acuta*) and submergent pondweeds such as sago pondweed. Black Terns seem to especially prefer spikerush marshes such as those typically found in the Modoc region of northeastern California. Distribution can shift as wetland conditions change.

Physical Factors

The Black Tern is suspected to be quite sensitive to water quality and pesticide accumulation. Freshwater marshes of the preferred water chemistry occur in the areas

of primary water delivery on managed wetlands such as Carson Lake and Stillwater NWR. Where salts and dissolved solids begin to accumulate in the terminal reaches of these wetland systems, the Black Tern may feed on aquatic insects in their emergent phases, but tend to avoid salty water when nesting. Preferred nesting conditions can occur on slow-moving river systems such as portions of the Quinn River, or on playas with volcanic substrates such as is found in northern Washoe County (Mosquito Lake; Duck Flat).

Landscape Factors

The freshwater marshes Black Terns prefer occur naturally along the northwestern edge of the state in north Washoe County where playa bottoms are higher in elevation, receive mostly fresh runoff, and often have volcanic substrates. Other suitable nesting sites are usually created by a flush of very fresh water through river channel marshes or the primary delivery areas of terminal wetlands. At Ruby Lakes NWR, fresh water is supplied both by snowmelt and spring outflow in the marsh itself. Black Terns nest in loose colonies. Distance between nests within colonies at Eagle Lake, California (Gould 1974) averaged 8.5 meters apart and varied from 3.6 to 30.5 meters apart.

Special Considerations

The Black Tern feeds on insects which it takes while on the wing either from the air, water, or ground. It will feed on tiny fishes and crustaceans when available. It typically nests in loose colonies in marshes, using floating vegetation, downed tules, or muskrat houses as platforms. Three eggs are laid between May and August and incubated 21 to 22 days. Nest and chick defense by the parents is vigorous. Young fledge 21 to 28 days after hatching. Black Terns live up to 17 years.

Formerly more common in Lahontan Valley, the Black Tern is presently most common on the western edge of the Great Basin in northeastern California and at Ruby Lakes NWR. More study of its sensitivity to water quality and pesticides is probably warranted.

Associated Species

Black-necked Stilt
Least Bittern
American Bittern
Franklin's Gull
Forster's Tern

Priority Considerations

No Breeding Bird Survey data exist for Black Terns in the Basin and Range province, and BBS data for the Columbia Plateau is contradictory and inconclusive (Sauer et al. 1998). The best current information for the species exists in Shuford (1998). In his status assessment, Shuford reported that the species had exhibited a 61 percent decline in the U.S. and Canada between 1966 and 1996, with most of the decline occurring in Canada. Shuford reported that populations stabilized after 1980 and the trend actually seemed to have reversed somewhat in the 1990's. Shuford concluded that, since population declines had leveled off and the species was still found in most of its former range, listing as Threatened or Endangered in either Canada or the U.S. was not warranted. Still, because anecdotal reports from many of its past areas of concentration in Nevada suggest an unmeasured decline, and because national concern for the species remains high, the Nevada Working Group has selected the Black Tern for priority focus for the purposes of this planning effort.

OBJECTIVE: Maintain a stable or increasing population trend of breeding Black Terns in Nevada by 2004.

Strategy: Initiate priority management actions for breeding Black Terns at the following important population centers -- Ruby Lakes NWR, Stillwater NWR, Carson Lake. Determine if other important breeding sites exist and initiate priority management activity on newly defined sites where possible.

Action: Initiate intensive monitoring of nesting activity and productivity on priority management sites.

Action: Collect baseline contaminant residue information from as many nesting colonies across the state as possible.

Action: Conduct a comprehensive statewide survey of potential nesting sites using professional and volunteer personnel. Create an atlas of significant breeding sites in Nevada.

Action: Where significant nesting sites are found on private lands, initiate negotiations with land owners for the purpose of creating conservation easement agreements to protect nesting sites.

Action: Initiate intensive habitat preference investigations for the purpose of developing a viable habitat model for use by wetland managers.

Assumptions - Research and Monitoring Needs

The Black Tern objective for wetland habitats assumes that Black Tern populations have declined or are declining in Nevada. Specific status and trend information for Black Terns in Nevada should be generated before adjusting management strategies. The objective assumes that Black Terns prefer ultra-fresh wetland habitats and may be susceptible to contaminant loading. Research and monitoring specific to contaminant presence in Black Tern eggs and tissues should be conducted to verify or refute this perception. The objective assumes that there may be (but not likely) other wetland sites in Nevada more important to Black Tern breeding than Ruby Lakes and the Lahontan Valley wetlands. A specific statewide survey of potential sites is critical to the formation of a successful long-range plan to sustain the Black Tern as a breeding species in Nevada.

Opportunities

The assemblage of a skilled citizen-scientist corps such as is ongoing by the Great Basin Bird Observatory will be paramount to gaining the necessary survey coverage to adequately assess population status and trend. The purchase of water rights from willing sellers for the Lahontan Valley wetlands will increase land managers' ability to provide the freshwater marshes necessary to facilitate Black Tern nesting.

Further Reading

Shuford 1998

SPECIES PROFILE 5. WETLANDS AND LAKES

AMERICAN WHITE PELICAN

Pelecanus erythrorhyncos

Distribution

The American White Pelican breeds in widely scattered colonies across the northwestern U.S. east to Minnesota, north to central Saskatchewan and Alberta. In

the Great Basin, large colonies occur at Anaho Island in Pyramid Lake, Nevada and on islands in the Great Salt Lake, Utah. Sporadic breeding occurs at Honey Lake, California and Carson Sink, Nevada.

Habitat

White Pelicans nest only on islands that are strictly isolated from land predators. Deep lakes with large islands fill the bill. White pelicans forage for fish in shallow lakes and wetlands where their cooperative dip-feeding techniques can be deployed to best advantage. White Pelicans will commute long distances daily between nesting islands and suitable foraging areas. In Nevada, the distance from Pyramid Lake to Walker Lake, some 145+ km as the pelican flies, is traversed daily or semi-daily without trepidation. Daily commutes to Lahontan Valley (97 km) and the Humboldt Sink (64 km) are more typical.

Physical Factors

White Pelican nest islands must be completely protected by landscape from land predators (basically, surrounded by deep water). Foraging areas typically range between 30 and 60 cm deep. On deep water (over 60 cm), cooperative herding and dipping techniques become useless, at which time individual birds have limited success pirating lost fish from loons and cormorants. Water quality must be sufficient to support fish life.

Landscape Factors

Nest islands must be within commuting distance of productive shallow fishing grounds. Ninety kilometers is a typical commute distance, but commutes up to 145 km will be made when necessary. Again, nest islands must be completely surrounded by terrain (or water) untraversable by land predators.

Special Considerations

While White Pelicans sometimes haul prodigiously large fish (i.e. huge adult carp) to the nesting grounds, they typically thrive on schools of immature carp and tui chub less than 20 cm long. When pressed or when opportunity presents itself, White Pelicans will utilize high biomasses of tiny fishes such as mosquitofish. White Pelicans are skilled soarers and rely on thermal air currents for long-distance travel. During times of extended drought, White Pelican populations are susceptible to die-offs, initiated by a combination of factors, including starvation and heavy parasite loading. Some death to

avian botulism occurs annually, but pelicans are not nearly as susceptible as are ducks. Local nesting populations typically cycle through boom-and-bust, with active colonies fluctuating from zero to over 6,000 nesting pairs in just two or three years.

Associated Bird Species

Common Loon	Great Blue Heron
Western Grebe	Great Egret
Clark's Grebe	Black-crowned Night Heron
Double-crested Cormorant	California Gull

Priority Considerations

Because of the relative scarcity of suitable nesting sites, American White Pelicans will always be considered by biologists to be somewhat vulnerable to environmental change, whether natural or man-induced. The Great Basin is estimated to support 18 percent of the world's breeding American White Pelicans (Carter et. al.1998). Because Nevada comprises most of the Great Basin province, and because American White Pelicans are particularly appropriate indicators of lake health and productivity, they have been selected by the Nevada Working Group for priority focus for the purposes of this planning effort.

OBJECTIVE: Maintain an average of 4,500 nesting pairs of American White Pelicans at Anaho Island in Pyramid Lake, Nevada through 2004.

Strategy: Maintain the protection and viability of the Anaho Island nest site through adequate water level management of Pyramid Lake such that a land bridge from Pyramid Point to Anaho Island would never be exposed. Maintain a variety of shallow fishing sites within easy commuting distance of Anaho Island, including but not limited to: the Truckee River delta; Humboldt Sink; Stillwater NWR; Carson Lake; Lahontan Reservoir; Walker Lake.

Action: Preserve the permanent nongame fisheries of Pyramid Lake, Walker Lake and Lahontan Reservoir. Actively manage the cyclic nongame fisheries of Humboldt Sink, Stillwater NWR, and Carson Lake.

Action: Continue to consult with Fallon Naval Air Station regarding low-altitude jet training routes. Keep training routes out of heavy pelican commuter lanes.

Assumptions - Research and Monitoring Needs

The White Pelican objective of 4,500 nesting pairs was derived from the yearly averages of the past two decades (1980's and 1990's). Peak attendance has ranged as high as 6,500 pairs in the last 15 years. Extended drought is the only anticipated factor which could curtail the attainment of the stated objective through 2004. Monitoring of the nest colony is a standard work program item for Stillwater NWR personnel, and no supplementation of that effort is anticipated.

Opportunities

Successful management of the American White Pelican resource in western Nevada is considerably less complex than rocket science as long as the general integrity of the landscape is preserved. The pelicans have been "doing their thing" since well before Early Man first appeared on their shores, and there is every indication that they will continue to do so given a modicum of space in which to operate and thrive.

Further Reading

Anderson 1982
Knopf and Kennedy 1980
USFWS 1950-98
USFWS 1984

SPECIES PROFILE 6. WETLANDS AND LAKES

CLARK'S GREBE
Aechmophorus clarkii

Distribution

The Clark's Grebe breeds in two largely disjunct geographic populations. One subpopulation's range is roughly concomitant with the Great Basin, extending from

central Oregon east to the Idaho-Wyoming border, south to Grand Junction, Colorado and Green River, Utah, west to the Sierra Nevada (western Nevada). The other subpopulation follows the Great Plains along the Rocky Mountain Front from the Colorado-New Mexico border north through eastern Colorado, Wyoming, and Montana to roughly the international border with Canada. In Nevada, Clark's Grebe breeds on most suitable wetland habitats throughout the state, and winters in sizeable concentrations on Walker Lake and Lake Mead.

Habitat

Clark's Grebes are in most respects identical in habitat preference to Western Grebes, seeking out their breeding sites in shallow wetlands with fully-developed emergent and submergent vegetation communities and abundant populations of small fish. Clark's Grebes build their nests on a platform woven from cattails and bulrush which may be piled above water level from the submergent substrate, or may float while attached to a sturdy clump of emergent vegetation. Clark's and Western Grebes convene in large, loosely associated flocks on Nevada's deep lakes during migration and winter, where they probe the depths for small fish. On the lakes, no vegetation is necessary – open water being their safety and refuge.

Physical Factors

Clark's Grebes require water of sufficient quality to sustain small fish. Since their nesting cycle can be delayed until quite late in the summer (some pairs initiating nesting after August 1), Clark's Grebes require stable water conditions that last well into November, sometimes almost to freeze-up.

Landscape Factors

Clark's Grebes are semi-colonial nesters, ranging from isolated pairs to colonies of 100 pairs or more. They will nest in association with Western Grebes. Wetland unit size and prey abundance seem to dictate colony size.

Special Considerations

While much less abundant than Western Grebes range-wide, in western Nevada, breeding Clark's Grebes usually outnumber breeding Western Grebes anywhere from a 60-40 to a 90-10 split. So far as is known, no attempt to derive a total population estimate of Clark's Grebes alone has been attempted.

Associated Bird Species

Common Loon
Western Grebe
Eared Grebe
Double-crested Cormorant
Great Blue Heron
Great Egret
Black-crowned Night Heron
Forster's Tern

Priority Considerations

Because it has been regarded as a separate species for such a short time, the basic status and trend information regarding the world population of Clark's Grebes has yet to be collected. Water bird management aimed toward the species has basically been of a generic nature to benefit both species of *Aechmophorus* grebes, with little need or incentive to individually address either species. Because so little is known about the species' population parameters, and because it is suspected that the Great Basin accounts for a sizeable percentage of the world's breeding population, the Clark's Grebe has been selected by the Nevada Working Group for priority focus for the purposes of this planning effort.

OBJECTIVE: Maintain stable or increasing populations of breeding Clark's Grebes throughout their range in Nevada through 2004.

Strategy: Within managed wetlands, maintain units of semi-permanent marsh with well-developed emergent and submergent plant communities, abundant populations of small fish, and relatively stable water levels from May 1 through November 15.

Action: Monitor nest phenology and adjust water plans to accommodate nesting underway through to fledging date.

Action: Initiate coordinated census to derive a total breeding pair estimate for Nevada.

Action: Coordinate annual habitat management objectives of the important colony sites in Nevada with other important Great Basin sites e.g., Bear River, Malheur, Lower Klamath, etc. Review annual reproduction performance and plan at an ecoregional scale.

Action: Coordinate management and monitoring activities of Nevada's major colony sites with national colonial waterbird planning efforts likely to be developed through the five-year planning period.

OBJECTIVE: Maintain important staging and wintering bodies of water to accommodate as much as 90 percent of the Great Basin Clark's Grebe subpopulation through 2004.

Strategy: Maintain abundant fish populations in Walker Lake, Lake Mead, and other bodies of water that might be identified as important staging and wintering sites during the planning period.

Action: Conduct periodic censuses of staging and wintering waters using professional and volunteer personnel.

Assumptions – Research and Monitoring Needs

The Clark's Grebe objectives for Nevada's wetlands and lakes assume that stable or increasing breeding populations are achievable for the species in Nevada. More information regarding basic population ecology and connectivity of the various subpopulations is necessary to fine-tune management objectives in the next round of planning; however, except for the long-term viability of the Walker Lake fishery, few pressing issues seem to be affecting the well-being of this species.

Opportunities

The accumulation of purchased water rights for the Lahontan Valley wetlands will increase opportunities for wetland managers to provide optimum breeding habitats.

Further Reading

Storer and Nuechterlein 1985

SPECIES PROFILE 8. WETLANDS AND LAKES

LONG-BILLED CURLEW
Numenius americanus

Distribution

The Long-billed Curlew breeds on the western Great Plains from eastern New Mexico, Colorado, the Dakotas and Montana to southern Saskatchewan and Alberta; also the Great Basin from central Nevada, northwestern Utah, southern Idaho, eastern Oregon and Washington north to southern British Columbia. It winters in the Central Valley of California, along the Texas Gulf Coast, and in Florida. In Nevada, the Long-billed Curlew is a confirmed breeder at Sheldon NWR in northern Washoe County, Ruby Lake NWR in Elko County, Lahontan Valley in Churchill County, and Fish Creek Ranch in Eureka County.

Habitat

Long-billed Curlews prefer closely cropped grasslands, pastures, wet or dry meadows (but usually associated with water), either on the fringe of a marsh or in a meadow or broad riverine floodplain such as the Humboldt River. Brooding habitat is improved by intermittent patches of tall, dense foliage (>20 cm high; <1 hectare in size; approximately five percent of the total area) for escape cover and feeding habitat for chicks (Jenni et al. 1982). Non-breeding feeding areas include irrigated pastures and croplands, shallow wetlands, and newly plowed fields.

Physical Factors

The Long-billed Curlew seeks out flat areas that seasonally or perennially collect water from 3,500 feet elevation on central Nevada valley floors to well over 6,000 feet in montane meadows. Available water can be alkaline, salty or fresh.

Landscape Factors

Breeding territories are established by the last week in April. In a Utah study, Long-billed Curlew nests were spaced no closer than 457 meters apart. Brood home ranges varied between 176 hectares and 464 hectares in Idaho (Jenni, et al. 1982). Long-billed Curlews respond positively to moderate to heavy grazing (Jenni, et al. 1982).

Special Considerations

Curlew chicks forage for terrestrial insects. The openness of their preferred habitat makes curlews vulnerable to nest and chick predation by canines and corvids. Some authors suggest that the species has declined in its nesting range as grassland has been converted to agriculture.

Associated Species

Horned Lark
Western Meadowlark
Willet
Killdeer
Common Snipe

Priority Considerations

The Long-billed Curlew continues to be a species of elevated national concern, although trends seem to be static in the Basin and Range and Columbian Plateau provinces. Because of continued nationwide concern for this species, the Nevada Working Group has selected the Long-billed Curlew for priority consideration in this plan.

Objective: Maintain current breeding distribution and densities for Long-billed Curlews in northern and central Nevada through 2004.

Strategy: Maintain closely cropped pasture lands associated with wetlands, wet meadows, or vegetated playas as part of an overall landscape management strategy designed to provide biological diversity on a spatial or temporal scale.

Action: In appropriate areas, graze pastures down to stubble heights less than 20 cm (eight inches), with scattered patches of residual vegetation greater than 20 cm for the duration of nesting and brooding (May 1 to July 15). This allows for general freedom of movement of adults with their extremely long bills, while also providing escape cover for broods.

Action: Where appropriate, place Long-billed Curlew nesting sites on a rotational schedule that allows for periodic site recuperation and the achievement of other, possibly conflicting wildlife outputs. Manage rotations and outputs at a landscape scale.

Strategy: Determine distribution and breeding densities of Long-billed Curlews throughout their range in Nevada.

Action: Analyze Breeding Bird Atlas data for nesting distribution.

Action: Conduct pair density surveys at the majority of nesting sites. Calculate a breeding pair population estimate based on coordinated survey data.

Assumptions - Research and Monitoring Needs

The Long-billed Curlew objective for wetlands assumes that the present distribution and breeding density of Long-billed Curlews in the state are sufficient to maintain healthy, self-sustaining populations. For the purposes of contributing to the national status and trend picture for this species, a comprehensive survey should be conducted and a breeding pair estimate calculated for the state.

Opportunities

Management for Long-billed Curlews tends to conflict with several wildlife management paradigms that operate from a frame of reference that overgrazing by livestock is generally detrimental to wildlife. For this reason, sometimes it is difficult for wildlife managers to embrace the Long-billed Curlew as a "flagship" species of concern. The interjection of Long-billed Curlew management objectives into a landscape management scheme requires range and wildlife managers to work together in designing closely-monitored grazing treatments aimed at achieving multiple commodity and wildlife outputs deployed over both spatial and temporal scales. This encourages land managers to look at their landscape as more than a one-output-year-after-year system. With time, this expanded approach to landscape management should lead to systems functioning more naturally, greater biodiversity distributed over space and time, and a deeper understanding of the landscape itself.

SPECIES PROFILE 9. WETLANDS AND LAKES

SHORT-EARED OWL
Asio flammeus

(For a Species Profile of Short-eared Owl, please refer to the Montane Parkland habitat section.)

OBJECTIVE: Maintain present occurrence and distribution of breeding short-eared owls in suitable habitat throughout their range in nevada through 2004.

Strategy: Maintain residual stands of emergent marsh vegetation through natural or man-induced dry cycles for the purpose of building vole populations into abundant food sources, particularly during the breeding season from March 1 through July 1.

Action: Whenever possible, allow residual stands of bulrush/cattail to stand on dry units through the breeding season without the implementation of mechanical breakdown or fire.

Action: Highlight recognition of dry cycling as one of the natural processes of wetland management complete with its own unique wildlife outputs.

Action: Survey and identify significant winter roosts receiving repeated annual use. Document in a winter roost atlas and negotiate appropriate protection measures for long-term viability of these sites.

Assumptions – Research and Monitoring Needs

The Short-eared Owl objective for wetlands assumes that the present occurrence and distribution of breeding Short-eared Owls is sufficient to maintain healthy, self-sustaining populations in Nevada. The Nevada Working Group recognizes the periodic nature of Short-eared Owl breeding and wishes to emphasize the concept of taking advantage of favorable conditions when Nature presents them. Significant winter roosts often occur in agricultural areas. Local publicity coupled with responsible viewer ethics could develop sites into nature tourism points of interest of considerable value to local communities.

Opportunities

The opportunity to inform farmers and other landowners about the importance of their lands to Short-eared Owls, whether wintering or breeding, may exist through cooperative extension programs.

Further Reading

(See Species Profile under Montane Parkland habitat section.)

OTHER PRIORITY SPECIES: WETLANDS AND LAKES

SANDHILL CRANE
Grus canadensis

While Sandhill Cranes are often encountered in wetlands as described in this section, the management principles for each are not significantly different in wetlands than they are for lowland floodplain lands under agricultural production. For Species Profiles, objectives, strategies, assumptions and opportunities, please refer to the Agricultural Lands habitat section.

HABITAT MANAGEMENT SUMMARY: WETLANDS AND LAKES

Within the profession of wildlife management, wetland habitat management likely stands as the most intensely studied, most highly developed of disciplines with regard to techniques of manipulation and output. Most of the strategies and techniques suggested in this plan are techniques already familiar to most wetland habitat managers. Wetland biologists are highly trained in the principles of water level management and the deployment of vegetative manipulation tools such as spraying and livestock grazing. New understanding is also developing regarding the processes which influence contaminant deposition and ways to manage them.

Beyond a facultative knowledge of the "nuts and bolts" of wetland habitat manipulation, however, the keys to successful wetlands habitat management in Nevada lie in accepting and understanding three very important principles. One is the cyclic nature of the variety of wetland habitat types possible at any one site. Wetlands are highly dynamic, and many wetland breeding birds exhibit breeding and survival strategies

which are adapted to and capable of exploiting short-term habitat conditions. While wildlife professionals have amassed a formidable body of knowledge regarding wetland habitat manipulation and management, in the Great Basin wetland habitat managers all too often find their best-laid plans overwhelmed and thwarted by the larger climatic cycles in play. It may be unrealistic for wetland managers in the Great Basin to expect to provide all types of bird habitats on all landscapes all the time. It may be more important for managers to understand where they are in the wetland cycle for their particular site, what the particular wildlife outputs are for this particular habitat expression, and what is likely next or in the near future regarding habitat expression on this site given the likely progression of climatic projections. Most artificial schemes designed to thwart or otherwise rearrange natural wetland rhythms generally meet with failure or pay prices in arrears somewhere down the line.

The second principle of understanding of primary importance to wetland managers in the Great Basin is to recognize the connectivity of wetland sites throughout the region as demonstrated by the birds themselves. Most Great Basin wetland breeding birds are highly mobile and seemingly maintain "knowledge" of wetland conditions on a broad regional scale. As wet and dry climatic conditions affect different portions of the region in different ways, wetland breeding birds seem to have an uncanny knack for finding the suitable habitat which will satisfy their needs. In addition, juxtaposition of a variety of wetland habitat types is also important. American White Pelicans breeding on an island in a deep terminal lake need shallow wetlands full of fish to facilitate their "herd and dip" feeding behavior. Clark's Grebes nesting in shallow tule marshes need deep terminal lakes full of fish for staging and refueling during migration. American Avocets nesting in freshly flooded saltgrass pastures are attracted to supersaline playas for feeding on a specialized, but highly prolific invertebrate fauna. Understanding that wetland birds are reacting to wetland sites on a broad geographic scale should inspire wetland managers scattered across the region to coordinate their management efforts more closely with one another, with special attention paid to the population status and trend and breeding needs of several of the species highlighted in this plan. Successful management of wetland birds on a broad geographic scale will require cooperative problem-solving and a pooling of knowledge and resources hitherto unattempted except for a very select few high-profile species.