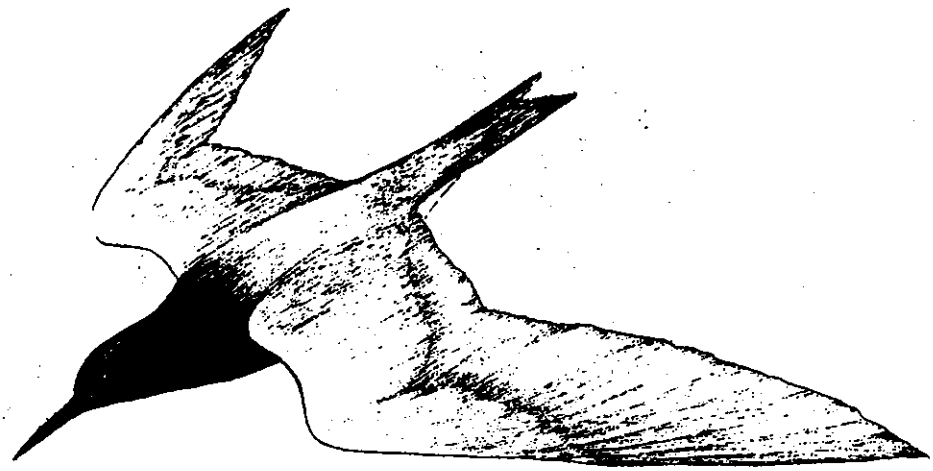
# Nevada Partners In Flight

## Bird Conservation Plan




***Written by***

***The Nevada Partners In Flight Working Group***

***Edited by Larry A. Neel***

***Artwork by Susan Sprague***


*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.*

Terry R. Crawforth, Administrator
Nevada Division of Wildlife

Forest Supervisor
Humboldt-Toiyabe National Forest
USDA Forest Service

Robert D. Williams, Field Supervisor
Nevada Fish and Wildlife Office
U.S. Fish and Wildlife Service

C. Richard Tracy, Director
Biological Resources Research Center
University of Nevada, Reno

Robert V. Abbey, State Director, Nevada
U.S. Department of Interior
Bureau of Land Management

Graham Chisholm, State Director
Nevada Chapter
The Nature Conservancy

# 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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# HABITAT TYPE: MONTANE RIPARIAN

## General Description

Riparian areas are often described as those sites having soils and the presence of abundant water which can support a localized, water-dependent vegetation that frequently contrasts with the surrounding landscape. Riparian areas are most often associated with streams, lakes, and wetlands, but may also occur on some upland sites if microsite conditions influenced by topography, elevation, and precipitation produce sufficient soil moisture to support the vegetation types. Most montane riparian systems, largely due to landform characteristics and the amount of energy flowing through them, are the least static habitats on Nevada's landscapes. Riparian systems are subject to dynamic changes that are controlled on the large scale by climate and meteorological events. Equilibrium through the lifespan of a human being is tenuous at best.

Mountain riparian sites as described in the U.S. Fish and Wildlife Service GAP analysis include cottonwood (*Populus* sp.), aspen (*Populus tremuloides*), alder (*Alnus* sp.), birch (*Betula* sp.), willows (*Salix* sp.), wild rose (*Rosa woodsii*), and red-osier dogwood (*Cornus sericea*) located in areas generally occurring in Nevada's mountain ranges in and above the alluvial fans of all major valleys. The GAP estimated 53,480 hectares of mountain riparian habitat which probably included snowbank aspen, and 122,000 hectares of aspen habitat in Nevada. The gross area of montane riparian habitat is likely underestimated due to the scale and accuracy limitations of the GAP methodology. Furthermore, many difficulties have been discovered in the separation of specific habitat types within the gross area, so the figures reported here give the reader only a rough idea of what actually exists. Types in the GAP mountain riparian category are similar to those described by Manning and Padgett (1995). They classified riparian communities as dominated by coniferous trees, tall deciduous trees, low deciduous trees, non-willow shrubs, low willows, tall willows, and herbaceous vegetation. (Conifer, aspen, and meadow types are described in other sections.) According to Forest Service estimates (1992), approximately 132,000 hectares of aspen, 8,400 hectares of cottonwoods, and 12,060 hectares of riparian woodlands (non-timber) are present in Nevada.

## Physical Characteristics

Montane riparian habitats occur throughout Nevada on most of its mountain ranges. Annual precipitation and temperature ranges reflect Nevada's extremes – from less

than 12 to over 75 cm of precipitation per year and from -30 to well over 100 degrees Fahrenheit in temperature. Riparian vegetation generally follows the saturation zone of a stream course, spring outflow, or catchment basin. Mature plant heights can range from less than five feet for tundra willow to 90-100 feet tall for riparian conifers. Left undisturbed, deciduous riparian habitats 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.

***Dominant Plant Species***

Manning and Padgett (1995) delineated 21 herbaceous riparian community types. These 21 types can be roughly grouped into six general categories. Tall, deciduous-tree dominated types include cottonwoods and aspen. Understories range from dense birch, willows, rose, and dogwood to forb and/or grass dominated stands. Cottonwood and aspen sites are found throughout the state from 5,000 to 8,500 feet elevation. The structural diversity of these cottonwood and aspen sites are important for birds and other wildlife.

Low deciduous tree-dominated types are represented by alder and birch. These sites generally occur along narrow high-gradient stream corridors with well-aerated and young soils. Both species represent early seral types. Alder is found in the Sierra Nevada and scattered sites across northern Nevada to the Columbia River Basin in northeastern Elko County. It typically ranges between 5,600 and 8,400 feet elevation. Structural diversity is often provided by an associated tall willow, red-osier dogwood, wild rose, or other shrub layer. All alder sites provide habitat for a variety of birds and other wildlife. Birch is present in central, eastern, and southern Nevada between 6,200 and 8,300 feet elevation. Understories can range from dense shrubs to open forbs- and/or grass-dominant. Structural diversity is provided by dogwood, rose, and willow.

Tall willow-dominated types are primarily associated with streams and occur across a wide elevational range from 4,700 to 10,200 feet. Tall willow types provide important habitat for birds and other wildlife. Willows and associated understory are critical for streambank protection and habitat integrity in highly erodible alluvial soils.

Low willow-dominated types are found in subalpine zones in Nevada and are common in the Ruby Mountains and the East Humboldt Range in eastern Nevada as well as the Sierra Nevada. They are often large riparian complexes in glacial U-shaped valleys ranging from 8,000 to 10,500 feet elevation. These areas are wet with organic soils and have a short growing season. Low willow sites are often densely vegetated and have limited understory; however, some sites contain more forbs and grasses. Shrubby

cinquefoil sites are small in extent and found in the higher elevations from 8,500 to 8,800 feet adjacent to or in association with low willow sites.

Non-willow shrub-dominated types include rose and red-osier dogwood. Rose (*Rosa woodsii*) sites occur throughout the state from 5,200 to 8,200 feet elevation. Rose can exist as a productive midstory plant in willow sites, or sometimes it exists as the dominant species on sites subjected to long-term heavy grazing. Co-dominant shrub species are big sage (*Artemisia tridentata*) and chokecherry (*Prunus virginiana*). These sites sometimes represent succession away from riparian conditions due to a lowered water table, or are characteristic of the ecotone between riparian and upland types. The rhizomatous roots of wild rose provide streambank stabilization in unstable soils, while the bush provides cover and forage for birds and other wildlife. Red-osier dogwood sites are common across Nevada from 5,500 to 8,800 feet elevation. Willow species are common associates. Vegetative expression is often dense, limiting streamside disturbance.

Coniferous tree-dominated types include white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), Jeffrey pine (*P. jeffreyi*), limber pine (*P. flexilis*), Englemann spruce (*Picea englemannii*), subalpine fire (*Abies lasiocarpa* ), and Rocky Mountain juniper (*Juniperus scopulorum*) as dominant vegetation in the riparian zone. Elevations are from 5,200 to 8,800 feet. Understories are typically comprised of meadow, cottonwoods, birch, dogwood, or many of the other types delineated by Manning and Padgett (1995). These sites occur primarily in the Sierra Nevada and in eastern Nevada scattered from Jarbidge to Great Basin National Park. The structural diversity provided by tall conifers, deciduous trees and shrub layers provide habitat to many avian species and are important for biological diversity.

***Historic and Current Conditions***

The subject of the historic and current condition of riparian areas of the West has been much debated and has generated much controversy and conflict. Many statements have been made by creditable experts with considerable experience to the effect that western riparian systems have been significantly degraded since the arrival of Europeans on the landscape 200 years ago, particularly through improper livestock grazing. Actually, most of these statements referring to pre-settlement conditions have been based on intuitive observation but lack empirical data to give them scientific weight. In Nevada, serious attempts to quantitatively inventory the condition and potential of the state's riparian areas have only begun to gain momentum in the last decade. These efforts have resulted from a shift of the overall debate from trying to affix blame to a growing collective desire by all affected parties to better understand

how these systems function. There is more desire than ever before to effect positive change on the landscape through consensus and pooled resources and expertise.

From the end of the Pleistocene until approximately 1850, a riparian habitat in Nevada maintained itself in a constantly shifting equilibrium, with the rate of change subject to the long-term effects of changing climate, and was vulnerable to the violent changes associated with stochastic events such as storms, floods, and fire. Fire historically played a role in maintaining aspen sites, inducing clone regeneration and reducing competition from invading conifers. Large ungulates did not exist on the Nevada landscape in densities sufficient to significantly impact the vegetative expression of a riparian habitat. Where beaver were present (and there is much debate over exactly where beaver occurred in the state as well as the nature and intensity of their impacts), they exerted their own set of impacts and influences, both positive and negative, on watersheds. Overstories were removed and mid-stories were thinned. Beaver dams slowed water flow and raised water tables which may have ameliorated the catastrophic effects of fire on riparian vegetation, but also periodically blew out and initiated incision events up and downstream. Plant communities probably tended toward climax over the long-term, with periodic drastic removal via flood and fire, after which the entire process began again.

It is generally accepted that improper grazing occurring over a forty-year period roughly between 1880 and 1920 accelerated degradation processes on many riparian systems in the West, resulting in the loss of wildlife habitat on both high- and low-elevation ecosystems (Chaney et al. 1990). In addition, mining activities such as hydraulic ore removal and dredging have degraded floodplains and stream beds, causing streams to headcut and otherwise alter their courses. Recreational activities such as off-road vehicle travel and camping, along with road-building have also contributed to what is perceived as an overall degradation of habitat quality in the twentieth century. The suppression of fire over the past 60 years has removed an important agent of change from many riparian aspen systems which, in concert with ungulate grazing, has contributed to the progression of stands toward mature, non-regenerative conditions.

Although much has been learned about the nature and importance of riparian habitats, and efforts to relieve human pressures on them have increased in the last thirty years, an unknown percentage of Nevada's montane riparian habitats are still at risk because the historical land uses listed above have not yet been adjusted to sustainable levels.

### *Opportunities For Conservation*

Healthy riparian habitats provide values and benefits far in excess of the small percentage of Nevada's total area which they represent. Riparian habitats serve as highly productive oases or islands in Nevada's relatively sere landscape. Opportunities exist to improve sites that are in poor ecological condition, and the desire to effect successful change has never been greater. Concerns were generated largely by the challenges of complying with the Clean Water Act of 1977. Processes to determine Proper Functioning Condition (USDI-BLM 1995) are presently being implemented to inventory stream conditions across Nevada while developing a common language by which all stakeholders of riparian habitats can seek common ground from which to begin the process of stream habitat restoration. Land managers are learning more about site conditions, ecological site potentials, and improvement opportunities which will in time be translated by land management agencies into watershed restoration and better overall ecosystem health. Under this approach, desired future conditions "above" Proper Functioning Condition will require a balancing of many priorities from a wide range of users and advocates. The challenge lies in providing "Properly Functioning Bird Habitats" while still providing forage for livestock, camp sites, and landscape access all at sustainable levels.

Recently, several major specific restoration projects have been initiated that can serve as models for action. The State of Nevada purchased The Bruneau River Ranch in 1995 for its wide variety of wildlife and fisheries values. Attendant to that purchase was the retirement of a grazing privilege and a subsequent redistribution of remaining grazing privileges that resulted in the easing of grazing pressure across an entire watershed. In 1991, a cooperative project among the BLM, Forest Service, Nevada Division of Wildlife, and affected private parties was initiated to consolidate public land holdings in the upper Mary's River drainage. Private land holdings within the basin were exchanged for other real estate outside the basin and a fence was constructed around the newly consolidated watershed to allow it to recover to excellent condition. Habitat response to both these projects has been phenomenal, and presently stand as testimony to what can be achieved with creative partnership-building among agencies, landowners, and advocacy groups.

### *Priority Bird Species*

The following species have been prioritized for management attention by the Nevada Working Group:

*Obligates*

Wilson's Warbler
MacGillivray's Warbler

*Other*

Cooper's Hawk
Northern Goshawk
Calliope Hummingbird
Lewis's Woodpecker
Red-naped Sapsucker
Orange-crowned Warbler
Virginia's Warbler
Yellow-breasted Chat

## *SPECIES PROFILE 1. MONTANE RIPARIAN*

### *WILSON'S WARBLER*
*Wilsonia pusilla*

### *Distribution*

The Wilson's Warbler breeds from northern Alaska across Canada to southern Labrador and Newfoundland south to southern California, central Nevada, northern Nevada, and northern New Mexico in the western U.S. As a breeder it avoids the Great Plains and the Midwest. Its range in the eastern U.S. extends south as far as Maine, Vermont, and New Hampshire. In Nevada, the Wilson's Warbler is listed in Alcorn (1988) as a "common summer resident in the higher valleys and mountain ranges. Three races are reported: *W. p. pileolata* which breeds in the state, and *W. p. pusilla* and *W. p. chryseola*, both of which migrate through Nevada.

### *Habitat*

The Wilson's Warbler breeds in riparian habitats associated with montane forests in northern Nevada. The nest is placed on or near the ground in dense thickets of willows, aspen, rose, or dogwood within mixed conifer or subalpine forests (Ryser 1985; Bent 1953; Stewart 1973).

### *Physical Factors*

In Nevada, the Wilson's Warbler ranges between 5,000 and 9,000 feet elevation (Linsdale 1936). The effects of topography, slope, and aspect are unknown.

### *Landscape Factors*

Late successional stages of riparian shrubs are necessary to provide a structure that is dense enough to represent suitable nesting habitat (Stewart 1973). In an oak-bay-laurel habitat in Marin County, California, Stewart reported 24 territories averaging 0.5 hectares and ranging between 0.2 and 1.3 hectares in size.

### *Special Considerations*

The Wilson's Warbler's preference for dense, mature riparian shrubs and trees may render it vulnerable to livestock grazing, excessive or abusive recreational activities, or willow removal to "increase water yield". The Wilson's Warbler is insectivorous, gleaning insects from riparian foliage or hawking them from the air. Breeding populations in Nevada are very small, disjunct, and as such may be especially vulnerable to local habitat changes. Nevada may actually be more important to the Wilson's Warbler through the habitat it provides during migration than it is as a breeding state.

### *Associated Species*

| | |
|---|---|
| Warbling Vireo | Fox Sparrow |
| Broad-tailed Hummingbird | Blue Grouse |

### *Priority Considerations*

Declining population trends have been documented in adjacent states (Sauer et al. 1998). It is generally regarded that montane riparian sites are at risk throughout Nevada from a wide range of commercial and recreational uses. For the Wilson's Warbler, these threats manifest themselves through the reduction of structural vegetative diversity in the upper reaches of the watershed often dominated by aspen. Very little is known about the actual population status, breeding distribution, or habitat preferences of Wilson's Warblers in Nevada. In addition, Wilson's Warblers utilize Nevada's lowland riparian habitats extensively during migration, making conservation of lowland as well as montane riparian habitats particularly critical to the species.

***OBJECTIVE: Maintain stable or increasing population trends for Wilson's Warbler by 2004 in montane riparian habitats from 5000-9000 feet in northern Nevada, with particular emphasis on five population centers -- the Sierra Nevada, the Ruby Mountains-East Humboldt Range, the Jarbidge Mountains, the Snake Range, and the Toquima-Monitor-Toiyabe Ranges.***

***Strategy:*** Manage for dense willow components and aspen mid-stories in suitable stands through habitat protection, restoration, and enhancement where opportunities exist.

**Action:** Evaluate the effectiveness of management activities related to the maintenance of foliage density and their effects on riparian songbird nesting.

**Action:** Determine Wilson's Warbler population response to habitat changes effected by a recent management action designed to bring land uses into sustainable levels at Proper Functioning Condition.

**Action:** Determine to what extent, if any, Wilson's Warbler habitat must exceed Proper Functioning Condition to maintain a self-sustaining or source population.

**Action:** Look for opportunities through land use planning processes to preserve and create suitable Wilson's Warbler breeding and migration habitat.

***Strategy:*** Determine population trends in the five priority areas delineated in the objective.

**Action:** Establish point count, MAPS, or other suitable monitoring methodologies in the five priority areas.

***Assumptions - Research and Monitoring Needs***

The Wilson's Warbler objective assumes that sustainable populations of Wilson's Warblers exist in the five priority areas delineated. Appropriate monitoring methodologies must be established in these areas to confirm the objective as achievable. The importance of Nevada's montane riparian habitats to migrating

Wilson's Warblers has been logically suggested but hardly quantified. Appropriate methodologies directed at quantifying this importance should be initiated.

### *Opportunities*

The present consensus effort to determine Proper Functioning Condition (PFC) for Nevada's montane riparian systems is an admirable start toward long-term maintenance of healthy bird habitats. It must be recognized that PFC may in some cases be adequate for the maintenance of bird habitats, while in other cases it may be inadequate. It will be the responsibility of the advocates for bird habitats to determine what those relationships are, as well as to represent the integration of quantifiable objectives into the consensus effort to initiate positive changes in those habitats. In the case of Wilson's Warbler, the challenge will be to maintain a dense willow component in aspen or conifer overstory above 5,000 feet elevation.

### *Further Reading*

Stewart 1973.

## *SPECIES PROFILE 2. MONTANE RIPARIAN*

### *MACGILLVRAY'S WARBLER*
*Oporornis tolmei*

### *Distribution*

The MacGillivray's Warbler ranges across the western U.S. and Canada including the Great Basin. Austin (1968) reported breeding in the Spring Mountains. It is a summer resident in most mountain ranges (Alcorn 1988). Linsdale (1936) reported the species in 11 Nevada counties including Clark, Nye, and Lincoln.

### *Habitat*

The MacGillivray's Warbler nests one to five feet from the ground in dense riparian willow and alder at the edges of meadow, coniferous or mixed woods (Dobkin 1992). It is found in canyons near streams, in thickets on north-facing slopes, in thick secondary growth following a fire or logging, or in dense undergrowth of an aspen grove (Ryser 1985). Johnson (1973) reported that MacGillivray's Warblers nested in at least two

places in mixed thickets of chokecherry, wild rose, and cottonwoods along a stream in Sawmill Canyon, between 6600 and 6800 feet in the Quinn Canyon Mountains (Alcorn 1988). Voget (pers. comm.) reported MacGillivray's Warblers nesting in thick stands of ceanothus along the Jarbidge River between 7,500 and 8,000 feet elevation. In clear cuts in Oregon, MacGillivray's Warblers were associated exclusively with shrub cover (Morrison 1981). Dense understory is required. Nests are located on or near ground.

***Physical Factors***

MacGillivray's Warblers occur in Nevada between 4800 and at least 8200 feet elevation. Topography, slope, and aspect seem not to be a factor except as they affect the distribution and health of riparian habitats.

***Landscape Factors***

Dobkin and Wilcox (1984) found that occupied patch size preference varied between east slope and west slope canyons. In east slope canyons, MacGillivray's Warblers were equally attracted to patches less than or greater than 1000 hectares. In west slope canyons, MacGillivray's Warblers preferred patch sizes greater than 1000 hectares to those less than 1000 hectares three to one.

Riparian habitats are inherently narrow, necessitating a lowered sensitivity to "edge" on the part of the species that use it. Nevertheless, below some threshold width, riparian habitats will begin to lose species (Stauffer and Best 1980). While MacGillivray's Warblers spend much of their foraging effort in the edge between riparian and brush habitats, breeding success requires concealment of the nest in thick vegetation.

In a Wyoming study, Salt (1957) reported densities in birds per 40 hectares as 10 in a willow/sedge swamp; 30 in a flatland aspen stand; and 85 in scrub/meadow. Territory size has not been determined.

***Special Considerations***

MacGillivray's Warblers were found to be insensitive to campgrounds in dense riparian areas in Bear River Range of the Wasatch Mountains, Utah (Blakesley and Reese 1988). The Breeding Bird Survey trend data (1966-1996) indicate declines in breeding bird populations in northwestern Nevada.

***Associated Species***

Song Sparrow
Yellow Warbler
Lincoln's Sparrow
Warbling Vireo
Dark-eyed Junco

***Priority Considerations***

Breeding Bird Survey data indicate a slight decreasing trend for the Sierra Nevada. MacGillivray's Warblers are not adequately surveyed in the Great Basin and Columbia Plateau regions to determine trend to any extent. It is generally regarded that montane riparian sites are at risk throughout Nevada from a wide range of commercial and recreational uses. For MacGillivray's Warbler, the challenge may be in maintaining dense stands of willow and alder with sufficient understory to conceal nests.

***OBJECTIVE: Maintain stable or increasing population trends for MacGillivray's Warblers in riparian habitats ranging between 4800 and 8200 feet elevation through 2004, with particular emphasis on six priority population centers – the Sierra Nevada, northern Humboldt County, the Egan-Schell Creek Ranges, the Ruby Mountains-East Humboldt complex, the White Mountains of Esmarelda County, and the Monitor-Toquima-Tolyabe Range complex of central Nevada.***

***Strategy:*** Manage for a dense willow component in suitable riparian stands through protection, enhancement, and restoration.

**Action:** Evaluate the effectiveness of management activities related to the maintenance of foliage density and their effects on riparian songbird nesting.

**Action:** Determine MacGillivray's Warbler population response to habitat changes effected by a recent management action designed to bring land uses into sustainable levels at Proper Functioning Condition.

**Action:** Determine to what extent necessary, if any, MacGillivray's Warbler habitat must exceed Proper Functioning Condition to maintain a self-sustaining or source population.

**Action:** Look for opportunities through land use planning processes to preserve and create suitable MacGillivray's Warbler breeding and migration habitat.

***Strategy:*** Determine population trends in the six priority areas delineated in the objective.

**Action:** Establish point count, MAPS, or other suitable monitoring methodologies in the six priority areas.

**Action:** Determine if the Dobkin and Wilcox study (1984) is repeatable; replicate methods in the same study area and document changes in population, habitat conditions, etc.

### *Assumptions - Research and Monitoring Needs*

The MacGillivray's Warbler objective assumes that sustainable populations of Wilson's Warblers exist in the six priority areas delineated. Appropriate monitoring methodologies must be established in these areas to confirm the objective as achievable. The importance of Nevada's montane riparian habitats to migrating MacGillivray's Warblers has been logically suggested but hardly quantified. Appropriate methodologies directed at quantifying this importance should be initiated.

### *Opportunities*

The present consensus effort to determine Proper Functioning Condition (PFC) for Nevada's montane riparian systems is an admirable start toward long-term maintenance of healthy bird habitats. It must be recognized that PFC may in some cases be adequate for the maintenance of bird habitats, while in other cases it may be inadequate. It will be the responsibility of the advocates for bird habitats to determine what those relationships are, as well as to represent the integration of quantifiable objectives into the consensus effort to initiate positive changes in those habitats. In the case of MacGillivray's Warbler, the challenge will be to maintain dense willow stands with a thriving understory of grasses and forbs suitable to conceal nests.

### *Further Reading*

Dobkin and Wilcox 1984.
Pitocchelli 1995

## *SPECIES PROFILE 3. MONTANE RIPARIAN*

### *WILLOW FLYCATCHER*

*Empidonax traillii brewsteri*
*Empidonax traillii adastus*

### *Distribution*

Two subspecies of Willow Flycatcher, *Empidonax traillii brewsteri* and *E. t. adastus* occur within the Sierra Nevada mountain range. Both are listed by the state of California as endangered, and both are considered sensitive species within Region 5 of the U.S. Forest Service. The Willow Flycatcher breeds from central British Columbia eastward to Nova Scotia and southward to northern Baja California, the southwestern U.S., Arkansas and the southern Appalachians. It winters from southern Mexico to Panama (A.O.U. 1999). Three subspecies are found west of the Rocky Mountains. Dark brownish *brewsteri* occurs from the Pacific Northwest south through the west slope of the Sierra Nevada. The intermediately-colored *adastus* occurs from the Rocky Mountains through the intermountain region into the east slope and higher elevations of the Sierras. The pale grayish *extimus* occurs within the southern portions of Nevada and the southwestern states (Browning 1993) and is treated separately in this document.

Of the two subspecies which are found within the Sierra Nevada, *brewsteri* breeds from Fresno County northward and from the Pacific coast to the Sierra Nevada crest. Its status in Nevada is unknown. While the range of *adastus* extends eastward throughout the Great Basin, most of the known breeding populations occur within the Sierra Nevada in isolated mountain meadows up to 8,000 feet elevation (Serena 1982; Harris et al. 1987). Marginal habitat may exist above 8,000 feet (Flett and Sanders 1987). Due to the lack of survey information, the status of this subspecies is poorly understood within the Great Basin. The entire breeding population within the Sierra Nevada is estimated at 200 pairs (California Dept. Fish and Game 1991). The portion of that estimate that occurs in Nevada is unknown. Willow Flycatchers, presumably *adastus*, have been documented during the breeding season on the Little Humboldt between Chimney Reservoir and Paradise Valley and on Big Cottonwood Creek above and below Paradise Valley (Nevada Division of Wildlife, unpublished data). Another population of Willow Flycatchers is known to exist on the upper Mary's River in Elko County.

### *Habitat*

Riparian deciduous shrubs or trees such as willows and alder are essential components on Willow Flycatcher territories (Sanders and Flett 1989; Harris et al. 1987). In mountain meadows within the Sierra Nevada, willow thickets interspersed with open spaces are typically utilized, and large, contiguous willow thickets are avoided. Within mountain meadow situations, the nests of this species are typically placed at the edges of vegetation clumps situated near streams (Valentine et al. 1988; Sanders and Flett 1989). Nests are placed within riparian deciduous shrubs which are at least 6.6 feet high, with vertical foliar density of approximately 50 to 70 percent, and with 3.3 feet of cover above the nest (Harris et al. 1987). With respect to subspecies *adastus*, a trend has been noted that meadow systems are at a minimum 8.0 hectares in extent and are characteristically broad and flat (Verner 1995).

### *Physical Factors*

All known breeding territories have water present in the form of running water, standing pools, or saturated soils during the early stages of pair formation and breeding. Both subspecies are mostly found between 4,500 and 8,000 feet elevation, although a few pairs may reside above 8,000 feet.

### *Landscape Factors*

In an eastern Washington scrub habitat, King (1955) found a breeding density of 9.2 to 14 pairs per 40 hectares. Territory size information for the western states is lacking. The preferred foraging technique for Willow Flycatchers is that of hawking larger insects by waiting on exposed perches and capturing insects in flight (Ettinger and King 1980; Sanders and Flett 1989). This foraging method is better suited to willow and shrub thickets interspersed with open spaces and may contribute to the avoidance of large contiguous thickets.

### *Special Considerations*

Willow Flycatchers arrive on their breeding territories in early May when the males begin singing. Nesting occurs between late May and late July, and the primarily monogamous pair lays an average of three to four eggs in an open cup nest placed about 1.5 to 10 feet high in a willow or other riparian deciduous shrub (Stein 1963; Zeiner et al. 1990). Females construct nests by weaving bark strips, dried grass and leaves into the forks of shrubs or small trees. Only the female incubates over a period of about 12 days. Both parents feed the chicks which fledge after 12 to 15 days (USDA

Forest Service 1991). While the duration of the pair bond is for one season, adults may pair again in succeeding years and will renest after a failed attempt. (Walkinshaw 1966).

In addition to hawking, Willow Flycatchers will also aerially glean insects from trees, shrubs, and other herbaceous vegetation. Their diet includes wasps, bees, beetles, flies, moths, and butterflies (USDA Forest Service 1991).

Breeding populations of Willow Flycatcher in many areas are presumed to have been reduced by the degradation and loss of riparian habitats. Verner (1995) reported that demographically unstable remnants of *adastus* persist within the Sierra Nevada montane meadow habitats and that *brewsteri*, which once occurred throughout the river systems of the central portions of California is more endangered than *adastus*.

Within the Sierra Nevada, loss of suitable habitat primarily from livestock grazing is probably the major factor resulting in the species' decline (Verner 1995). Excessive cattle grazing and trampling in willow stands can cause "highlining" of individual plants. This occurs when there are few or no green leaves or stems left on the lower portion of the plant. Willow thickets so modified become characterized by an umbrella-shaped structure. Willows with less than 40 percent foliage cover are unsuitable for Willow Flycatcher nesting (Fowler et al. 1991). Excessive grazing pressure on woody vegetation prohibits the establishment of seedlings and creates an even-aged, non-reproducing community (Kauffman et al. 1983; Carothers 1977; Crouch 1979).

Brown-headed Cowbird nest parasitism has also contributed significantly to Willow Flycatcher declines throughout most of its range. The exception appears to be within the higher elevations of the Sierra Nevada where the nesting cycles of the two species do not appear to overlap significantly (Sanders and Flett 1989; Harris et al. 1987). Brown-headed Cowbird populations increase with aggregations of livestock.

While improper livestock grazing and cowbird parasitism appear to be the two main causes of Willow Flycatcher decline in the western U.S., other factors which could contribute to the degradation of riparian habitats include improper logging practices, dam construction and use of pesticides (USDA Forest Service 1991). The spraying of willows with herbicides to increase water yield or grass area has likely also had a negative effect.

***Associated Species***

Lazuli Bunting
Song Sparrow
Yellow Warbler
Black-headed Grosbeak

***Priority Considerations***

The "northern" subspecies of Willow Flycatcher have exhibited a slight decline in the Basin and Range physiographic region between 1966 and 1996, although the trend since 1980 may be increasing. Population trends have exhibited a slight decline in the Columbian Plateau region since 1980, and a greater decline (13.3 percent) in the Sierra Nevada (Sauer et al. 1998). None of these declines is considered to be statistically significant.

It is generally regarded that montane riparian sites are at risk throughout Nevada from a wide range of commercial and recreational uses. In the case of the Willow Flycatcher, land uses that de-water floodplains may be as destructive as those that remove nesting cover.

***OBJECTIVE: Maintain three viable populations of Willow Flycatchers (Empidonax traillii adastus) in northern Nevada riparian habitats – one in the Sierra Nevada; one in Paradise Valley, Humboldt County extending upstream on the Little Humboldt to Chimney Reservoir; and one in the Mary's River watershed in Elko County.***

***Strategy:*** In the Sierra Nevada and the Mary's River drainage, maintain a clumpy, disjunct mature willow distribution interspersed with open areas on meadows where soil saturation lasts well into the Willow Flycatcher breeding period.

**Action:** Identify presently occupied Willow Flycatcher habitat as well as potential habitat on Sierra Nevada and Mary's River meadows.

**Action:** Delineate opportunities and strategies for the preservation and maintenance of Willow Flycatcher habitat through land use planning processes.

**Action:** Provide information to land managers regarding the importance of managing for and retaining a willow thicket component on mountain meadows.

**Action:** Advocate the inclusion of *E. t. adastus* on the U.S. Forest Service Region 4 Sensitive Species List to increase focus on the species inside the agency.

***Strategy:*** In Paradise Valley, maintain a liberal distribution of mature copses of willow/buffaloberry on irrigated pastures interspersed with open areas where irrigation is likely to enhance ground saturation through the Willow Flycatcher breeding period.

**Action:** Identify presently occupied Willow Flycatcher habitat along the Little Humboldt through Paradise Valley as well as potential habitat.

**Action:** Work through established private lands consultation programs such as the Natural Resources Conservation Service and University of Nevada Extension services to encourage private landowners to maintain healthy Willow Flycatcher habitat on their lands through education and habitat management incentives.

***Strategy:*** Target the four following areas to survey for Willow Flycatcher presence: the Humboldt River from Deeth to Halleck, the Humboldt River from Beowawe to Dunphy, the Owyhee River, and Goose Creek in northeastern Elko County. Assess these areas for Willow Flycatcher habitat suitability.

**Action:** Survey the target areas for Willow Flycatchers.

**Action:** Conduct habitat suitability analyses on the riparian habitats of the target areas.

**Action:** Determine if habitat suitability for Willow Flycatchers can be achieved on the target areas through land use planning and appropriate habitat improvement strategies.

***Assumptions - Research and Monitoring Needs***

The Willow Flycatcher objective assumes that viable populations presently exist at the three viable population target areas. Continued habitat occupation should be verified by continuing monitoring with point counts or other appropriate monitoring schemes, particularly in those areas where the U.S. Forest Service has already established monitoring. Demographic parameters should be determined and a population viability analysis conducted for both sites.

***Opportunities***

The U.S. Forest Service has already taken large steps through its land use planning process to prevent the further decline of Willow Flycatchers in the Sierra Nevada. Specific habitat guidelines for Willow Flycatchers should be identified in the Sierra Amendment of the Toiyabe-Humboldt Forest Plan presently under revision, as well as integrated throughout its implementation. For working with the private landowners of the Little Humboldt, The U.S. Natural Resources Conservation Service and University of Nevada Agricultural Extension Service have established long-term working relationships, and are the proper agencies through which wildlife conservation objectives can be achieved on private lands. Several incentive programs aimed at the maintenance of good floodplain health and productive wildlife habitats on private lands exist within these agencies and are linked with others such as Nevada Division of Forestry's Stewardship Program.

***Further Reading***

Fowler et al. 1991
Sanders and Flett 1989
Serena 1982
Valentine, et al. 1988
Walkinshaw 1966

## SPECIES PROFILE 4. MONTANE RIPARIAN

### *COOPER'S HAWK*
*Accipiter cooperii*

#### *Distribution*

The Cooper's Hawk breeds from southern Canada across the entire U.S. to northwestern Mexico. It winters from the central U.S. to Costa Rica. In Nevada, Cooper's Hawks are known to breed in riparian habitats in all counties.

#### *Habitat*

Cooper's Hawks seem to prefer deciduous and mixed forest or open woodlands. Areas where woodlands tend to occur in patches, groves, or as well-spaced trees are typically used. Riparian woodlands, semiarid woodlands, and mixed groves often support Cooper's Hawks. They rarely occur in dense forest, but when they do, they are often near forest edges such as along clearings or meadows, streams, or lake edges. In Oregon, Cooper's Hawks were found in 50-80 year-old forest with trees greater than 58 cm dbh. In the Sierra Nevada, Cooper's Hawks inhabit digger pine-oak cover types, ponderosa/ Jeffrey pine, and blue oak woodlands. In Nevada, 76 percent of documented nests occurred in aspen, 12 percent in cottonwood, and six percent in conifers, willow, or birch (Gary Herron, pers. comm.)

Habitat suitability index models for Cooper's Hawks in coniferous forest (Zeiner et al. 1990) specify that vegetative structure within a nest site should be at least 21 to 49 feet high. Tree canopy cover should be at least 41 to 69 percent, slope no greater than 49 percent, and the nest stand should be no more than three kilometers from water and 1.6 km from an opening (of undefined size). Nests are usually placed high in a conifer just below the crown (10.7 to 16.4 meters) for protection from direct sunlight and predators. Some nests are built upon clumps of mistletoe. Open flying space is important in the mid- and lower understory levels. Snag density information is lacking but snags are deemed important for providing habitat for prey, plucking posts, and fledgling flying skills development.

#### *Physical Factors*

Cooper's Hawks have been found nesting in Nevada from 4,000 feet elevation (Mason Valley, Lyon County) up to at least 9,000 feet. Cooper's Hawks migrate downslope or

go further south for the winter, where they often are found in urban settings. Most nests are located within relatively close proximity to water (<1 kilometer), occur on slopes under 49 percent, and are most often located on north and east aspects.

***Landscape Factors***

Cooper's Hawks need patches greater than 10 hectares of undisturbed habitat for breeding. In addition, an average of about 290 hectares of suitable foraging habitat is needed to support reproductive efforts. Fragmentation and the reduction in quality and availability of nest stands may force the smaller accipiters such as Cooper's Hawks to relinquish optimal forest stands to the larger, dominant Northern Goshawk. Cooper's Hawks readily utilize edge habitats along meadows, streams, and clearings for foraging. It also appears they will inhabit either perimeter or deep forests as long as the canopy and overstory are thin enough to permit flying. Especially dense forests are not suitable foraging habitat.

Home ranges are relatively large, ranging from 100 to 400 hectares in size. Pairs often reunite and return to the same nest site they used the previous year, typically building a new nest within 100 meters of the old one.

***Special Considerations***

Fire poses the greatest natural disturbance regime to Cooper's Hawk habitat, although in forested habitats such as the Sierra Nevada, timber harvest has the largest impact. Improper grazing is also known to reduce the quality of riparian habitats and may result in the deterioration or loss of nesting habitat that could affect reproductive success for Cooper's Hawks. Management practices aimed at killing avian pests can reduce prey availability and may cause secondary poisoning.

***Associated Species***

American Robin
Northern Flicker
Bullock's Oriole
Yellow Warbler

***Priority Considerations***

The Cooper's Hawk has been selected for priority focus by the Nevada Working Group because of multiple threats to its habitat and because limited Breeding Bird Survey

data has documented a significant decline in its population in the Sierra Nevada province (-17.5 percent between 1966 and 1996; p = 0.04).

***OBJECTIVE: Reverse a declining trend of Cooper's Hawk populations throughout their range in Nevada by 2004.***

***Strategy:*** Manage mid-elevation riparian habitats to exhibit multi-storied vegetative layers including a mature overstory of aspen or tree willow for nesting, a well-developed midstory of willow and other shrubby trees, and a productive understory of grasses and forbs.

**Action:** Inventory sites with mature tree overstory. Evaluate for midstory and understory.

**Action:** Implement grazing strategies that encourage multi-storied vegetative development.

**Action:** Prioritize active Cooper's Hawk territories for action, then delineate expansion habitat and move toward achieving habitat objectives there.

***Strategy:*** Update the Nevada Division of Wildlife raptor nest site database. Update status and trend projections for the state.

**Action:** Initiate regular periodic inventory, both ground and aerial survey, into annual work programs in each region of the state.

**Action:** Search the Breeding Bird Atlas database presently being compiled for new information regarding Cooper's Hawk nest sites. Include newly-identified areas in regular inventory.

***Assumptions - Research and Monitoring Needs***

The Cooper's Hawk objective for montane riparian habitats assumes a declining trend throughout its range in Nevada, when actually such a trend has only been documented for the Sierra Nevada. Status and trend for breeding Cooper's Hawks should be updated throughout its range in the state. In many areas of the state, the Nevada Division of Wildlife raptor nesting database generated in the 1970's and 1980's is now

becoming rather dated. Territory occupancy should be monitored and adjustments made to the estimates of statewide population.

***Opportunities For Conservation***

The present consensus effort to determine Proper Functioning Condition (PFC) for Nevada's montane riparian systems is an admirable start toward long-term maintenance of healthy bird habitats. It must be recognized that PFC may in some cases be adequate for the maintenance of bird habitats, while in other cases it may be inadequate. It will be the responsibility of the advocates for bird habitats to determine what those relationships are, as well as to represent the integration of quantifiable objectives into the consensus effort to initiate positive changes in those habitats. In the case of the Cooper's Hawk, the challenge will be to maintain well-developed multi-storied riparian habitats with mature trees for nesting and a productive midstory and understory to support an abundant preybase. The Great Basin Bird Observatory will continue to be particularly helpful in providing trained volunteers for the purpose of updating inventory on a wide array of nesting species, including Cooper's Hawk.

***Further Reading***

Herron et al. 1985.
Hoffman 1998.
Zeiner et al. 1992

## *SPECIES PROFILE 5. MONTANE RIPARIAN*

***CALLIOPE HUMMINGBIRD***
*Stellula calliope*

***Distribution***

The Calliope Hummingbird breeds in the higher mountains from British Columbia and Alberta south through the Pacific states east to Utah and western Colorado. In Nevada, it is a common summer resident at higher elevations from the Sheldon NWR and the Sierra Nevada on the western edge of the state, east to Jarbidge in Elko County, and south to Lee Canyon in the Spring Mountains, Clark County.

### *Habitat*

Timossi (in USDA Forest Service 1994) reports that this species prefers montane forest types as well as wet meadow and riparian habitat types. In California, ponderosa pine, montane hardwood, montane hardwood-conifer, mixed conifer, Douglas fir, montane riparian, aspen, red fir, Jeffrey pine, lodgepole pine, subalpine conifer, eastside pine, pine-juniper and residential-park types appear to be important habitats. These habitat relationships suggest that in Nevada the Sierra conifer and mountain riparian types are likely to be the most important habitats for Calliope Hummingbirds.

Timossi (in USDA Forest Service 1994) indicates open forest stands with canopy closures less than 40 percent and ages ranging from sapling to medium-large trees are important nesting habitat. Since Calliope Hummingbirds depend on nectar for food, a good ground cover of flowering plants in or near nesting areas is likely an important habitat factor. Calliope Hummingbirds nest in trees from 50 ft to over 120 ft tall with the nest on the lowermost living branch (Weydemeyer 1927).

### *Physical Factors*

Calliope Hummingbirds are found at higher elevations than other hummingbirds (Johnsgard 1983). In California, they nest above 7,800 feet up to 11,500 feet (USDA Forest Service 1994), preferring mesic climates in montane forest types where they nest in habitats with temperature range of 33 to 77 degrees Fahrenheit (Calder and Calder 1994). In California, Calliope Hummingbirds are rarely found below 3,900 ft in elevation. Nesting typically occurs between 9,800 and 11,500 ft in the Sierra Nevada (Johnsgard 1983). In central Nevada, they are known to nest at 7,000 feet and probably lower. Calliope Hummingbirds typically nest near streams with the nest often on branches overhanging the water (Weydemeyer 1927) There is no information indicating the importance of topography, slope, or aspect as habitat factors.

### *Landscape Factors*

The Calliope Hummingbird apparently prefers nesting in naturally fragmented habitats containing a variety of seral stages near open areas. It seems to prefer edge habitats near wet meadows and shrub areas (USDA Forest Service 1994). There is no information available to indicate minimum patch size but up to four male territories have been recorded in a 2.4-hectare plot (Bent 1940).

***Special Considerations***

The abundance of flowering plants for foraging appears to be an important limiting factor. This species does not appear to be sensitive to human disturbance nor is it subject to brood parasitism. Both males and females establish territories. Male territories are associated with foraging areas while female territories are associated with the nest site (USDA Forest Service 1994). The species is promiscuous. The male plays no role in nest building or care of young. Females appear to show nest site fidelity between years (Johnsgard 1983). There is no information available on population size or trend in Nevada, although slight declines have been reported in BBS data for the Sierra Nevada.

***Associated Species***

Fox Sparrow
Warbling Vireo
Cassin's Finch

***Priority Considerations***

It is generally regarded that montane riparian sites are at risk throughout Nevada from a wide range of commercial and recreational uses. In the case of the Calliope Hummingbird, maintenance of a suitable wildflower component in the montane riparian zone is necessary to sustain foraging birds. Unfortunately, the protocol for the random establishment of Breeding Bird Survey routes implemented at the onset of that venerable monitoring project resulted in a dearth of routes that sample montane riparian habitats in Nevada. Added to an insufficient coverage of routes is the general difficulty encountered in observing hummingbirds using the BBS methodology. Combined, these factors have resulted in a lack of status and trend information for the Calliope Hummingbird in the state.

***OBJECTIVE: Maintain stable or increasing populations of Calliope Hummingbirds through 2004 in areas throughout their present range in Nevada.***

***Strategy:*** Maintain a productive wildflower component in montane riparian zones and wet meadows above 7,000 feet elevation.

**Action:** Maintain a variety of soil moisture profiles in montane riparian meadows, ranging from the drier ecotone with upland types to the wettest saturated soils in seeps and along stream courses to maintain a high diversity of flowering plants.

**Action:** Develop and implement "Best Management Practices" for the maintenance of healthy, diverse, and stable riparian meadows.

***Strategy:*** Develop and implement adequate monitoring programs to determine Calliope Hummingbird status and trend.

**Action:** Since Breeding Bird Surveys do not adequately monitor Calliope Hummingbirds in Nevada, implement a supplemental point count monitoring program for montane riparian bird species above 7,000 feet elevation.

***Assumptions - Research And Monitoring Needs***

The Calliope Hummingbird objective makes the assumption that population trend can be determined for the species. Point count or other monitoring methodologies should be established in montane riparian habitats above 7,000 feet elevation to determine trend for the entire group of priority species which rely on this habitat.

***Opportunities***

The present consensus effort to determine Proper Functioning Condition (PFC) for Nevada's montane riparian systems is an admirable start toward long-term maintenance of healthy bird habitats. It must be recognized that PFC may in some cases be adequate for the maintenance of bird habitats, while in other cases it may be inadequate. It will be the responsibility of the advocates for bird habitats to determine what those relationships are, as well as to represent the integration of quantifiable objectives into the consensus effort to initiate positive changes in those habitats.

The U.S. Forest Service will be charged with a vital responsibility in the management of Calliope Hummingbirds in Nevada, since much of this species' habitat exists on Forest Service lands in the Sierra Nevada and on many mountain ranges from the center of the state eastward above 7,000 feet elevation. The Forest Service will be looked to for innovative montane riparian habitat management strategies either through existing Standards and Guidelines, or if necessary, through inventory and consensus processes parallel to PFC. In the instance of the Calliope Hummingbird, good riparian system

management must result in the maintenance of stable, thriving montane meadows associated with structurally diverse shrub or tree habitat components in the higher elevation drainages.

***Further Reading***

Calder and Calder 1994
Weydemeyer 1927

## *SPECIES PROFILE 6. MONTANE RIPARIAN*

### *LEWIS'S WOODPECKER*
*Melanerpes lewis*

***Distribution***

The Lewis's Woodpecker ranges throughout the western United States, southwestern Canada and northwestern Mexico, pushing northward for the summer and southward for the winter. In Nevada, it is a resident breeder in isolated pockets mainly in the northern half of the state, including the Carson Range, the Santa Rosa Mountains in Humboldt County, and the Ruby Mountains, East Humboldt Range, and Jarbidge Mountains in Elko County (Alcorn 1988). This species vacates the northeastern portion of the state during the winter months.

***Habitat***

During the breeding season, this species prefers open habitats that facilitate its foraging behavior of hawking for insects. Scattered trees and/or snags are necessary for nesting. Open or park-like ponderosa pine, burned-over stands of Douglas fir, mixed conifer, pinyon-juniper, riparian and oak woodlands are preferred nesting areas (USDA Forest Service 1994). Furthermore, this species prefers areas with a grassy and bushy understory; "Open forests... allow the development of an understory that supports terrestrial insects" (DeGraff et al. 1991 *in* USDA Forest Service 1994). In the Ruby Mountains, Lewis's Woodpeckers nest in riparian aspen trees surrounded by sagebrush. During the winter months, Lewis's Woodpeckers switch to a diet of acorns, piñon nuts and other fruits; therefore they move to oak-based or orchard habitats for the season. This species tends to be nomadic and travels in groups to follow good seed crops in winter.

The Lewis's Woodpecker's preferred canopy closure is sparse (Bock 1970), though it is reported that it will use a variety of canopy closures for cover (USDA Forest Service 1994). The understory needs to be brushy and thick, as much as 50 percent cover (Sousa 1983). Snags are a necessary component, preferred for nesting. Snag density was reported as 471.5 snags/hectare in a burn with an average snag height of 8.3 meters (Carter 1996).

***Physical Factors***

The Lewis's Woodpecker can be found breeding at elevations of 2,000 to 8,500 feet (Bent 1939). No data were found on this species' dependence on water, nor on topography, slope, or aspect.

***Landscape Factors***

Territories for the Lewis's Woodpecker appear to be tied more to food availability than to specific habitat needs. No data on configuration of patches were found. This species may prefer edge in riparian habitat, trees for nesting, and open areas for foraging. Edge does not appear to be important in pine savannah or wildfire burn areas (USDA Forest Service 1994). Lewis's Woodpeckers will use burned areas readily. Successional stage does not appear to be a factor except as it affects snag availability. Lewis's Woodpeckers prefer to nest near streams.

***Special Considerations***

Like the Red-headed Woodpecker of the eastern and midwestern United States, the Lewis's Woodpecker mostly forages for insects on the wing during the summer months. It will forage for insects on trunks and branches of trees, in brush and on the ground as well. In late fall, the bird switches to fruits and berries, completing the transition to acorns, piñon nuts and other fruits for the winter. It will cache these food items for use in that season, and defends its stores vigorously. Lewis's Woodpeckers do not seem to be sensitive to direct human disturbance (USDA Forest Service 1994) and are able to utilize areas disturbed by humans through logging and burning practices. Brood parasitism does not appear to be a factor, though there may be competition for nesting cavities with European starlings (Sousa 1983 *in* USDA Forest Service 1994). Predation does not seem to be a major problem for the Lewis's Woodpecker (USDA Forest Service 1994). The species is monogamous with both parents incubating and caring for the young. They appear to be somewhat colonial, for reasons which require further study. The Lewis's Woodpecker is a primary excavator, providing suitable sites for other cavity-nesting bird species.

***Associated Species***

| | |
|---|---|
| Northern Flicker | Green-tailed Towhee |
| Swainson's Thrush | American Robin |
| Hermit Thrush | Dusky Flycatcher |
| Fox Sparrow | Western Wood-pewee |

***Priority Considerations***

The distribution and habitat preferences of the Lewis's Woodpecker in Nevada are poorly understood. There is undocumented concern among biologists that Lewis's Woodpeckers no longer occur in the range and densities they did two decades ago. There is further unquantified concern that Lewis's Woodpeckers are missing from areas that appear to be identical to the areas which they currently occupy. According to BBS analyses, Lewis's Woodpeckers have exhibited an eight percent decline in the Sierra Nevada province and a five percent decline in the Columbian Plateau province between 1966 and 1996. Neither figure is statistically significant. Because its preferred habitats are considered to be at risk, and because its status in Nevada is poorly understood, the Lewis's Woodpecker has been selected as a Priority Species for this plan.

***OBJECTIVE: Maintain stable or increasing populations of Lewis's Woodpeckers in all present occupied areas through 2004, with particular emphasis on three population centers – the Sierra Nevada, the Santa Rosa Mountains, and the Ruby Mountains.***

***Strategy:*** Manage for multi-aged, multi-storied montane riparian vegetative communities in occupied Lewis's Woodpecker habitats.

**Action:** Maintain snags and provide for snag recruitment in montane riparian overstories, particularly aspen or cottonwood.

**Action:** Maintain a productive grass and shrub understory to produce the insects Lewis's Woodpeckers prefer for food.

**Action:** When appropriate, use prescribed burning to rejuvenate stagnant riparian stands, thus providing burned snags, reviving the grass and shrub understories, and initiating overstory regeneration.

***Strategy:*** Determine statewide population trend for Lewis's Woodpecker. Survey for unknown population centers. Determine status and trend for the three target populations.

**Action:** Initiate point counts or other appropriate monitoring methodologies in the target areas.

**Action:** Expand search areas for Lewis's Woodpeckers.

***Assumptions - Research and Monitoring Needs***

The Lewis's Woodpecker objective assumes that stable or increasing population trend can be achieved at least on the three target areas. Population trends need to be determined statewide through point counts or other appropriate methodologies. Breeding Bird Survey coverage is not adequate to provide those trends. Habitat assessments should be conducted in the target areas to determine habitat status and trend. More research should be conducted relative to Lewis's Woodpeckers' specific habitat preferences in Nevada. Detailed observations of food habits and preferred insect taxa and species should be conducted to facilitate better definition of habitat management goals and objectives.

***Opportunities***

Much of presently occupied Lewis's Woodpecker habitat seems to occur on National Forest lands. The Forest Service will be looked to for innovative montane riparian habitat management strategies either through existing Standards and Guidelines, or if necessary, through additional inventory and concensus processes parallel to PFC. In the instance of the Lewis's Woodpecker, management strategies must result in the maintenance of dynamic, multi-aged, multi-storied montane riparian habitats in occupied habitats, while striving to restore additional drainages to these conditions for the purpose of expanding Lewis's Woodpecker distribution beyond its present limits.

***Further Reading***

Bock 1970.
Sousa 1983.
USDA Forest Service 1994
Zeiner et al. 1990

## *SPECIES PROFILE 7. MONTANE RIPARIAN*

### *RED-NAPED SAPSUCKER*
*Sphyrapicus nuchalis*

#### *Distribution*

The Red-naped Sapsucker ranges from southeastern British Columbia south along the Rocky Mountains to the Big Bend region of Texas and from the Sierra Nevada east across Nevada and Utah to the eastern edge of the Rocky Mountains in Colorado. In Nevada, the Red-naped Sapsucker is mostly a resident from just east of the Sierra Nevada eastward across the state and is found in all counties.

#### *Habitat*

The Red-naped Sapsucker builds its nest almost exclusively in cavities occurring in riparian tree communities, usually near open water. Live trees that are infested with fomes rust are most desired for nest sites. In a study in Sierra County, California (probably on Red-breasted Sapsuckers, *S. daggetti*, which were subsequently recognized as a separate species), nest tree heights ranged from 2.4 to 38.1 meters (mean = 20.4 meters), and nest tree diameter ranged from 21.6 cm to 167.6 cm (mean = 83.8 cm). Canopy coverage appears not to matter. A midstory of willows, alder, water birch, (*Betula occidentalis*), or younger age classes of aspen is preferred, where sap wells are maintained for feeding. Red-naped Sapsuckers forage in mountain mahogany stands in proximity to riparian zones. They are also found in low densities in lowland gallery cottonwood stands on the larger river systems of western Nevada.

#### *Physical Factors*

The presence of water as it affects the health of the riparian overstory and midstory has a positive effect on sapsucker distribution. Otherwise, sapsuckers seek out riparian habitats wherever they are found and do not seem to be affected by topography, slope, or aspect. Nesting pairs range from a few at 4200 feet elevation to 8700 feet and above, with the bulk of distribution in the aspen zone above 5,000 feet.

#### *Landscape Factors*

Foraging territories range from 0.6 to 6.0 hectares and average about 3.2 hectares. Breeding densities can be quite high in limited habitat; one 2.4-hectare aspen clone

was found to harbor six active sapsucker nests, and was also being shared with three other woodpecker species. Territories can be linear or polygonal, depending on patch shape and/or the availability of adjacent habitats (i.e. mountain mahogany). Overstory and midstory successional stage tends toward late and mature (greater diameters for nest construction and sap well maintenance).

***Special Considerations***

Red-naped Sapsuckers are considered a "keystone species" in their avian communities. They are primary excavators, providing cavities for many other bird species which require them. Another valuable service rendered to the bird community by Red-naped Sapsuckers occur through their maintenance of free-flowing sap wells. These wells are readily visited by hummingbirds, warblers, chickadees, and other species both for the sweet sap and the ants which they attract. The Red-naped Sapsucker's diet predominantly consists of sap and insects with a small amount of berries, fruits, and tree cambium mixed in at appropriate seasons. Cowbird parasitism does not appear to be a problem.

***Associated Species***

Northern Flicker
Hairy Woodpecker
Downy Woodpecker
Yellow Warbler
Hermit Thrush
Cooper's Hawk

***Priority Considerations***

Breeding Bird Survey trend analyses have reported a thirteen percent decline for Red-naped Sapsuckers in the Basin and Range province between 1966 and 1996. A fourteen percent decline has been reported in the same province for the last decade. Neither figure is statistically significant (Sauer et al. 1998). It is generally regarded that montane riparian sites are at risk throughout Nevada from a wide range of commercial and recreational uses. In the case of the Red-naped Sapsucker, the challenge will be to maintain montane riparian vegetation in a multi-aged, multi-storied expression providing cavity-bearing trees and snags, and healthy mid-stories of willow or alder with sufficient stem diameters to facilitate sap well drilling and maintenance.

***OBJECTIVE: Maintain stable or increasing populations of Red-naped Sapsuckers throughout their range in Nevada through 2004.***

***Strategy:*** Manage for multi-aged, multi-storied montane riparian vegetative communities in occupied Red-naped Sapsucker habitats.

**Action:** Maintain snags and provide for snag recruitment in montane riparian overstories, particularly aspen or cottonwood.

**Action:** Maintain mature midstory stands of willow and alder, with a liberal occurrence of stems and trunks over 7.5 cm in diameter for sap well drilling and maintenance.

**Action:** Maintain mature mountain mahogany stands on uplands adjacent to riparian zones.

***Strategy:*** Determine the statewide population trend for Red-naped Sapsuckers.

**Action:** Initiate point counts or other appropriate monitoring methodologies in areas of Red-naped Sapsucker occurrence.

***Assumptions - Research and Monitoring Needs***

In western Nevada, the Red-naped Sapsucker is replaced in the high Sierra Nevada by the Williamson's Sapsucker, and in the lower Sierra Nevada extending as far east as the Wassuk Range by the Red-breasted Sapsucker. It is assumed that these two species operate in much the same ecological niche as does the Red-naped, except that the riparian systems in which these other two species are found occur in different upland habitat matrices. Management strategies suggested for the Red-naped Sapsucker are assumed to be, in a general sense, relevant for the other two species. For the Red-breasted Sapsucker, management strategies for the upland matrix should address pinyon-juniper and Jeffrey pine. Similar considerations should be made for the Williamson's Sapsucker relative to their use of the red fir matrix. Further research should be focused on determining the specific differences in life history and habitat use between the three species which affect management strategies. Breeding Bird Survey coverage is not sufficient at this time to monitor Red-naped Sapsucker trends. A point count network sufficient to monitor the entire high-elevation montane riparian bird community is necessary to fill the knowledge gaps associated with these species in Nevada.

***Opportunities***

The present consensus effort to determine Proper Functioning Condition (PFC) for Nevada's montane riparian systems is an admirable start toward long-term maintenance of healthy bird habitats. It must be recognized that PFC may in some cases be adequate for the maintenance of bird habitats, while in other cases it may be inadequate. It will be the responsibility of the advocates for bird habitats to determine what those relationships are, as well as to represent the integration of quantifiable objectives into the consensus effort to initiate positive changes in those habitats.

Management responsibility for Red-naped Sapsucker habitat is shared by the U.S. Forest Service and the Bureau of Land Management. Each will be looked to for innovative montane riparian habitat management strategies either through existing Standards and Guidelines, or if necessary, through inventory and consensus processes parallel to PFC. In the instance of the Red-naped Sapsucker, good riparian system management must result in the maintenance and recruitment of cavity-bearing trees and snags in the overstory coupled with a thriving, mature midstory of willows or alder with advanced stem diameters. Some attention must also be directed toward habitat matrix management, since the western sapsucker species group represents an avian link between riparian habitats and their adjacent upland matrices.

***Further Reading***

Fleury 1998

## *OTHER PRIORITY SPECIES: MONTANE RIPARIAN*

***ORANGE-CROWNED WARBLER***
*Vermivora celata*

***YELLOW-BREASTED CHAT***
*Icteria virens*

These two warbler species occur in montane riparian habitats in addition to the habitats in which they are profiled. The Nevada Working Group determined that objectives and strategies for Wilson's Warbler, MacGillivray's Warbler, and Virginia's Warbler were sufficient to also meet the needs for these species. For a species profile of Orange-crowned Warbler, please refer to the Aspen habitat section. For a species profile of Yellow-breasted Chat, please refer to the Mesquite/Catclaw habitat section.

## *HABITAT MANAGEMENT SUMMARY: MONTANE RIPARIAN*

Where opportunities exist, the main thrust for montane riparian habitat management will be toward multi-storied, richly diverse vegetative corridors. An ideal stretch of healthy montane riparian bird habitat would typically include a mature overstory of tree willow or aspen capable of supporting accipiter nesting and cavity-nesting, a dense midstory of shrubby willow species, alder, or birch capable of supporting a diverse community of nesting passerines, and a vigorous understory comprised of a diverse array of grass and forb species, including wildflowers. While the ideal riparian stretch would include all these layers through the same floodplain segment (truly multi-layered), it is recognized that microsite conditions sometimes preclude true multi-layering in a riparian corridor; therefore, a healthy, properly functioning stream that provides healthy segments of each component, whether layered or closely contiguous will sufficiently provide most riparian bird habitat needs. These opportunities will exist most often where montane riparian habitats are already intact and can be preserved and managed at a high level of productivity through existing or slightly modified management practices. A high priority will be placed on identifying and preserving intact montane riparian systems.

The Nevada Working Group acknowledges and supports the current efforts of riparian habitat management experts to achieve consensus among stakeholders regarding the concept of "properly functioning condition" (PFC) of riparian systems. Streams that are not currently functioning properly under the present accepted evaluation criteria should receive adjustments in management practices which will allow them to at least recover to PFC. The Nevada Working Group is aware that its ultimate goals for healthy montane riparian bird habitats exist somewhere beyond PFC. The achievement of these goals on streams currently being brought up to PFC standards will be engaged in the next level of debate between stakeholders. For this planning period, advocates of healthy riparian bird habitats need to provide realistic models of "desired future conditions" to land managers with streams in PFC which will be ready to take to the next level of productivity.

While desired habitat conditions for Willow Flycatcher (*Empidonax traillii adastus*) would appear on the surface to conflict with the "ideal" habitat model presented above, such is not actually the case. Opportunities to create and/or maintain Willow Flycatcher habitat exist on wet meadows where microsite conditions conform willow growth to large, clumpy thickets, and conditions are not conducive to the formation of a significant overstory, or a long contiguous shrubby corridor. Occupied habitat has been largely identified in the Sierra Nevada, and potential sites for range expansion

should also be easy to identify if they have not already. Occupied habitat has not been completely documented in the interior of Nevada, although certain occupied sites are known and have been identified for priority action in this plan.

# 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 | Great Blue Heron |
| Western Grebe | Great Egret |
| Eared Grebe | Black-crowned Night Heron |
| Double-crested Cormorant | 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.