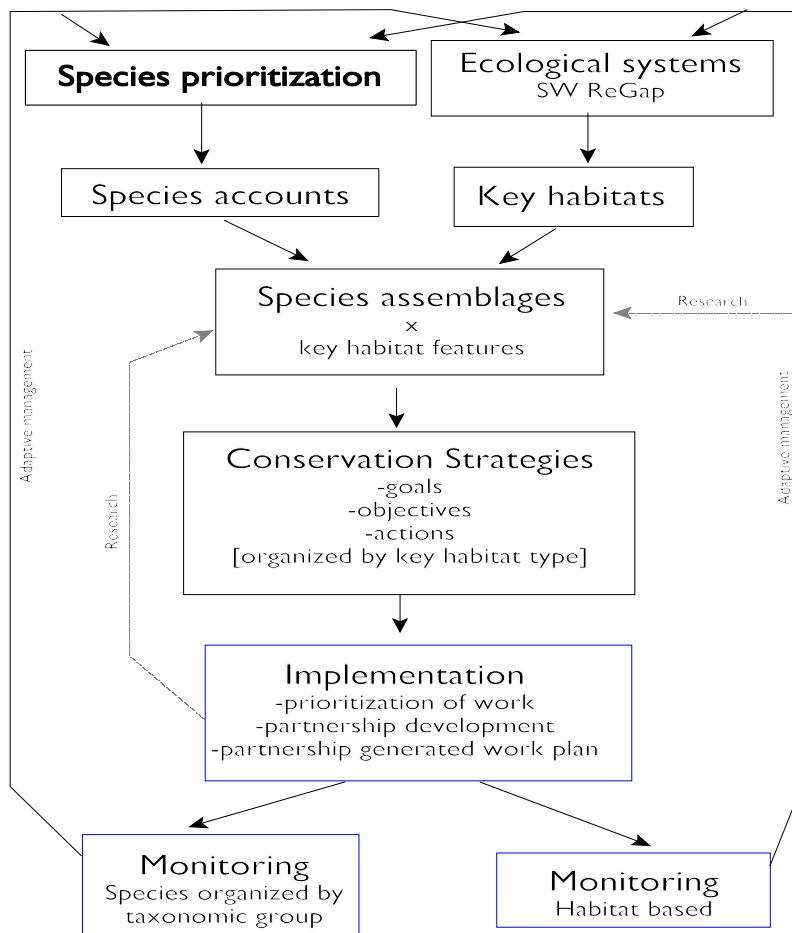
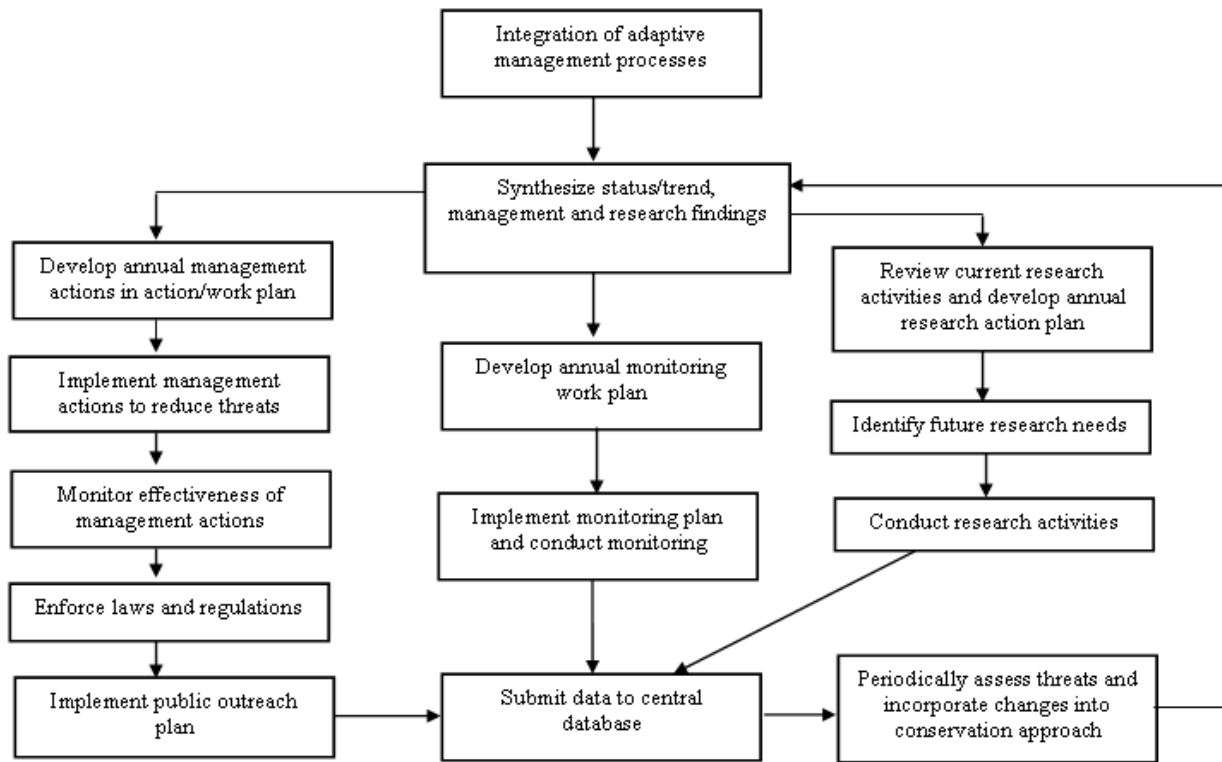


## Implementation, Effectiveness Monitoring, and Adaptive Management

The previous section outlined 27 conservation strategies organized and presented by Key Habitat Type. The sum total of work presented in the Conservation Strategies section represents our best-effort projection of the complete task-at-hand necessary to achieve comprehensive species conservation in the State of Nevada. The availability of resources will limit our ability to achieve the entire suite of objectives as written. Different working groups will pursue different priorities, but one of the keys to successful comprehensive wildlife conservation will be to ensure that the broad range of taxonomic groups and habitat concerns are covered by one working group or



another. It will be the task of Nevada’s wildlife conservation partnership (with roles and opportunities for ALL stakeholders) to evaluate the 27 strategies, set priorities, design and implement action plans, monitor progress, and evaluate the results. The following discussion suggests how Nevada’s conservation community might work together to achieve successful implementation of the CWCS. Most of the implementation strategies suggested in this section are constructed from working examples already in place in the state. Very little here will be new, original thought of the CWCS Development Team; rather, we propose to present these suggestions as a synthesis of considerable conservation initiative already in motion that can be focused toward a more coordinated achievement of the comprehensive wildlife conservation task. Emphases will be placed on 1) prioritizing the work and breaking the Conservation Strategies down into



**Figure 37.** Schematic diagram illustrating the conceptual process of adaptive management for the Nevada CWCS.

achievable work elements (setting quantifiable objectives); 2) Describing the key processes for integrating CWCS into the major delivery mechanisms, including federal agency land use planning, county and tribal conservation programs, and private lands extension and assistance; 3) suggested strategies for applying conservation action and monitoring conservation effectiveness through the monitoring of population responses of the Species of Conservation Priority; and 4) suggested collaborative models for collectively analyzing data, assessing results, and setting new implementation direction based on our knowledge of the results.

### Work Prioritization and Setting Quantifiable Objectives

The Nevada CWCS Development Team is mobilized for action beyond delivery of this document through an extension of the partnership contract toward CWCS Implementation. Upon ratification of the Nevada CWCS, it will become the immediate task of the Nevada CWCS Implementation Team to sit down with the 27 Conservation Strategies, sort them in order of

priority, and break them down into their achievable work elements. The achievement of these tasks will need to be informed by the wealth of ongoing conservation action resulting from existing initiatives and working groups. Wildlife conservation stakeholders will need to be provided opportunities to contribute to and review the prioritization process, but we propose that the bulk of the work of processing CWCS into prioritized work plans might be performed by the CWCS Implementation Team with liaison to working groups and stakeholders at appropriate points in process and product development.

#### Prioritization

A successful prioritization process might look like this:

Synthesis of priorities from existing plans and working groups.

1. Identification of gaps in Species of Conservation Priority or Key Habitats inadequately covered by existing efforts.
2. Ranking of issues/existing priorities based on the relative critical need for action, informed by

species status and/or habitat condition as influenced by threats.

- a. This would require a more detailed threats analysis that might very well need to be performed concurrently with a more rigorous focal areas analysis, as issues in certain geographic locales might be heightened in priority by the combined effects of geography and threat.
3. Assessment of ongoing action addressing the identified issues. Effective or ineffective?
  - a. Effective – Is the conservation strategy in place progressing well enough that new resources might be deployed elsewhere?
  - b. Ineffective – Does ongoing action need to be supplemented with new resources?
4. Ranking of actions based on effectiveness evaluation – Triage
  - a. Is it more important that we shore up an ineffective strategy with new resources?
  - b. Or must we let an ineffective strategy limp along because the need to address a new issue is more critical?
5. Partnership review of prioritization results.
  - a. Check in with existing working groups. Let them know how the priority list is likely to influence their activities. Give them an opportunity to review assumptions and decisions and provide feedback.
  - b. Stakeholder group review – industry, agencies, conservation organizations, etc. – Periodic review by open invitation; likely a broad distribution of draft products to partnership list augmented by stakeholder discussion groups with open invitation.

### **Setting Quantifiable Objectives – “How much by when?”**

Once priorities have been identified, then the question of “How much by when?” must be answered in order to advance annual work plans and budget requests. In the case of CWCS, quantifiable objectives generally must be developed in close collaboration with field experts, usually scientists and land managers. The CWCS Implementation Team would facilitate meetings with field experts to reduce the work load into “chewable chunks” based on the expert group’s

assessment of the difficulty of the task, the opportunities to make something happen, and the nature of the measurable elements necessary to project targets and measure success. Again, objectives and targets would need to be informed by existing plans and working groups, and would likely be set at continental, regional, or statewide scales, then stepped down to the local level for project development. Local projects would be evaluated with respect to their contribution toward the achievement of objectives at one of the broader scales; in the case of CWCS, most likely the statewide scale.

Objectives that actually facilitate plan implementation success are expressed in terms of the units of measurements to be used to monitor response. Because of this, objective-setting and monitoring design are best developed hand in hand. For discussions of how specific species planning initiatives will be consulted to inform objectives development for the different taxonomic groups of wildlife, please refer to the “Applying Conservation Action” discussion to follow.

As with prioritization, it is critically important that statewide objectives be clearly and succinctly communicated to partners and stakeholders. Active working groups need to be apprised of statewide or rangewide (species) objectives and allowed feedback based on their perceptions of how the proposed objectives influence their activities. Stakeholders must be allowed to investigate the assumptions behind the computations, ask questions, and provide feedback. The simpler and more straightforward the assumptions and computations behind an objective, the easier it is to communicate, understand, and buy into. The CWCS Implementation Team would maintain the necessary liaison with working groups and sponsor stakeholder review and discussion groups.

## Key Partnerships and Implementation Mechanisms

Once evaluated and prioritized, projects do not just “go on the ground” because the funding was secured and the spirit is willing. Project implementation, particularly habitat manipulation, must be programmed into existing land use planning structures, whether they be federal, state, tribal, or private. While there are as many planning structures out there as there are land management partners, the Nevada CWCS Development Team has identified several major planning processes, or implementation mechanisms, if you will, that are particularly key to the success of this Strategy. It is impossible to describe all of the potential partnerships and implementation mechanisms that might be activated during the life of the Strategy, so the Team hopes that by describing these key implementation mechanisms in considerable detail, readers can develop a sense of the general preferred approach to integrating CWCS objectives and strategies into appropriate land use planning structures. Please keep in mind that these integration “models” are only being proposed as the “preferred method” from the viewpoint of the CWCS Development Team, and do not necessarily represent any endorsement or official sanction from any of the partners featured. The details of these collaborations may need to be adjusted in order to achieve consensus within all agencies featured. Those dialogues have already started with most of the featured entities, and consensus will be pursued over the earliest months of implementation past ratification of the CWCS.

It is important to note that the overall spirit in which these integration models are proposed is one of “customer service”. The featured partner’s need for scientific services would be evaluated and a framework for the provision of those services to the partner would be constructed. This service-oriented approach to collaboration is expected to result in the co-development and co-ownership of conservation objectives, as opposed to the more notorious “regulator-project proponent” paradigm that has fueled so much conflict and distrust over the last 30 years.

## National Wildlife Refuge Comprehensive Conservation Plans

NDOW and FWS have been close partners in refuge management in Nevada for almost six decades. For instance, the Stillwater National Wildlife Refuge was originally named the Stillwater Wildlife Management Area and was co-managed by NDOW and FWS until the Truckee-Carson Settlement Act of 1990 transferred ultimate management authority distinctly to the FWS. Today, Stillwater NWR and NDOW still cooperate very closely in the areas of water procurement and management for Stillwater and the Carson Lake Wetlands, the two primary wildlife wetlands within the Lahontan Valley Wetlands complex. The management of non-migratory game animals on the Sheldon NWR and the Desert National Wildlife Range is also very much a cooperative venture between the two agencies. Therefore, it is very important that the two agencies act as partners in the development of Refuge Comprehensive Conservation Plans (CCP’s), a System-wide planning process sparked by the passing of the National Wildlife Refuge Management Act of 1997. To date, the Stillwater NWR CCP is the only completed CCP in the state (2002). The CCP process is currently underway for the Desert NWR Complex (see Page 16), while Sheldon NWR was scheduled to begin its CCP process in 2005 and Ruby Lakes NWR is scheduled for 2011.

The pathways for CWCS input into CCP development would include that of providing scientific support to the development of various alternatives considered. CWCS would primarily assist in the identification of key wildlife ecological processes for priority management attention and the development of projected species outputs associated with various management scenarios resulting in different habitat acreages and management schemes. While objectives in the Stillwater CCP appear to be almost wholly habitat-based, CWCS could assist in the interpretation of habitat-based management objectives into wildlife population outputs that would contribute to statewide, regional, and continental population objectives. CWCS could assist in the analysis of the impacts of various visitor services alternatives, and through the development of best management practices, inform the process of selecting the visitor management strategy best suited for each Refuge. CWCS could also assist in

the development and coordinated implementation of Refuge monitoring strategies, particularly with respect to coordinating Refuge monitoring methods and priorities with statewide, regional, or continental monitoring frameworks.

### **CWCS and USFS Forest Plans and BLM Resource Management Plans**

Resources addressed in USFS Forest Plans and BLM Resource Management Plans include wetland and riparian resources, wild horses, biological diversity, forage production, forest health, watershed conditions, wildlife habitats, recreation, and invasive weeds, among others. Currently in Nevada, the BLM Resource Management Plan process is in renewal, and both the Humboldt-Toiyabe and Lake Tahoe Basin Management Unit Forest Plans are in revision. During implementation, opportunities exist to provide CWCS guidance and recommendations into these plan revisions. During implementation, a mechanism to build CWCS and BLM RMP coordination will be further developed through BLM and CWCS Implementation Team collaboration with opportunities for input by wildlife conservation partners and stakeholders. In the same manner, a mechanism to build CWCS and USFS Forest Plan coordination will be further developed through Forest Service and CWCS Implementation Team collaboration, with input from partners and stakeholders encouraged. Key to success in meeting the overall intent of Nevada's CWCS will be the commitment within land use plans to the monitoring and adaptive management actions identified.

### **CWCS and Tribal Lands Conservation**

With the availability of Tribal Wildlife Grant (TWG) funds, sister program to State Wildlife Grants, the opportunities to build effective wildlife conservation programs on tribal lands in Nevada are better than ever before. It appears there is also a unique opportunity for the Nevada CWCS Implementation Team to provide valuable services to tribal conservation programs through planning assistance and coordinated scientific support. While the details of collaboration are still being worked out, it was evident from the discussion of the August 26, 2005 workshop sponsored by the Nevada Indian Commission that the desire to collaborate and share expertise among tribal

conservation managers around the state was high. Six tribal programs were represented, and the following management priorities were identified:

- Wildlife strategy for big game management
- Wetland restoration
- Invasive species (i.e. saltcedar removal)
- Wetland grazing plan development
- Management of nesting migratory birds
- Biological program development – hire biologists; buy equipment, etc.
- Resource inventory – reptiles, amphibians, and small mammals specifically mentioned
- Native plants
- Reservoir fisheries management
- Greater Sage-grouse conservation and land acquisition
- Off-highway vehicle encroachment
- Pipeline revegetation - best management practices being implemented for revegetation and recruitment of native plant species
- Spring habitat restoration – endemic fishes
- Reintroduction of Lahontan Cutthroat Trout into native waters
- Endangered butterflies

When asked what types of CWCS services or products tribal conservation programs might find beneficial, the following concepts were projected:

- Communication! Communication! Communication! A high premium was placed on keeping the dialogue open between agencies and tribal conservation managers; learning the conservation program contacts, copying all CWCS correspondence to them, and building working relationships between individuals that demonstrated commitment to follow through.
- An environmental listserve is already being maintained by the Pyramid Lake Paiute Tribe's environmental management program. This was identified as a key communication tool to build the collaborative framework, and the possibility for a shared maintenance role for the Nevada Indian Commission was discussed.
- The opportunity to hold an annual tribal conference that focuses on transfer of knowledge from CWCS and other wildlife conservation planning efforts to tribal program managers, with the first one projected for as early as November,

2005.

- Provision of technical assistance – population assessment; biological training; program development and design.

These are all services that can be provided or facilitated by the CWCS Implementation Team, and it is certain that as this dialogue continues, more ideas will come forth and an effective tribal conservation collaborative process can be developed that provides collective support while recognizing the needs of individual tribes to pursue their own conservation objectives. This has to rank with the most exciting of all the developments of the CWCS planning process that have materialized just from sitting down and talking about what could be done on “the big scale”.

### **CWCS and County Resource Planning**

Over the last decade, Nevada’s counties have expanded their role in the management of wildlife resources within their boundaries considerably beyond their traditional involvement of participation in the County Advisory Boards To Manage Wildlife that provide assistance, guidance, and local input into the management and harvest of game and sport fish. Two major conservation planning structures have facilitated the growth of county wildlife conservation planning – habitat conservation planning (HCP’s), largely driven by concerns about the mutual impacts upon one another of urban/industrial development and endangered species conservation, and Greater Sage-grouse planning within its range. All signals indicate that county involvement in local wildlife conservation planning will increase over the CWCS planning period. The success of the local implementation model developed for the Governor’s Greater Sage-grouse Conservation Strategy and the phenomenon of county-proposed “land bills” that identify federal lands suitable for disposal to private development will continue to drive county interest in addressing their “own” wildlife conservation issues. Other key county planning processes for which wildlife conservation support could be provided include county master plans and public lands policy plans. In addition to maintaining working relationships with county planners, CWCS products and services could also be made available to Public Land Use Advisory Committees (PLUAC’s).

CWCS is uniquely positioned to provide comprehensive wildlife planning and implementation services to county planning processes through the integration of species-based objectives and strategies into HCP’s, sage grouse habitat restoration, and other issues certain to develop over time. It is also the intent and purview of CWCS to develop products and services that will assist local planning groups with the assessment, monitoring, and conservation of Species of Conservation Priority. The CWCS Implementation Team can develop the support services and products and conduit them into local planning processes through the field personnel of the CWCS partnership (NDOW, NNHP, The Nature Conservancy, Lahontan Audubon Society). Because there are other county planning processes that would also benefit from CWCS products and services (Quality of Life Plans, other open space and recreation plans, etc.), it is important that the CWCS Implementation Team build direct lines of communication to the various county planning departments very similar to the tribal conservation support model described above. The Nevada Division of State Lands has invested much program development into the facilitation of county planning, and NDSL stands to be a critically important partner in the transfer of CWCS knowledge and support into the county planning community. The delivery of this county-state collaborative model should be recognized as the result and primary achievement of NDSL’s investment into the development of CWCS through the Question One Bond Planning Grant that pulled the CWCS Development Team together in the first place.

### **Private Lands/Natural Resources Conservation Service**

Much of the conservation focus in Nevada in the last 30 years has been directed toward public lands, mainly because public lands make up approximately 87 percent of the Nevada land base; yet some of the most important wildlife habitats, most notably lowland riparian habitats that not only support the species directly dependent on lowland riparian but also provides secondary support to many species from the adjacent uplands, are predominantly in private ownership. The current shift of management focus toward the management of larger land systems (the “watershed” is currently a popular land management unit being discussed) is revealing a need to incorporate

the wildlife values contributed by private lands into the overall management scenario because these private lands contributions are often critical to and inextricable from the wildlife population needs of the larger landscape.

The USDA Natural Resources Conservation Service (NRCS), assisted by Conservation Districts, has a long history of providing land conservation services to private landowners, primarily agriculturalists. NRCS maintains a suite of resource conservation assistance programs, several of which have already been described elsewhere in the document (Wildlife Habitat Incentives Program – WHIP; Environmental Quality Incentives Program – EQIP; Wetlands Reserve Program – WRP; Conservation Security Program – CSP). There are now also private lands assistance programs available through the U.S. Fish and Wildlife Service (FWS) and Federal Aid that are being administered either directly by FWS (Partners For Fish And Wildlife) or through the Nevada Department of Wildlife (Landowner Incentives Program). All of these programs focus on essentially the same customer base, and all have the potential to become highly successful in Nevada, where financial support for the maintenance of wildlife values on private land is a relatively undeveloped concept, particularly if the three agencies can successfully synergize their efforts into a coordinated support network drawing on a wide variety of funding sources ably maximizing the unique features of each. We suggest that the Nevada CWCS can help catalyze this interagency network through the provision of scientific support into the various internal planning systems. Potential services provided to the network include identification of key species and ecological processes supported by private lands into both the Nevada WHIP Plan (in development) and CSP, tailored for specific watersheds as they are approved for program action on an annual basis.

## Applying Conservation Action

The overarching goal permeating Nevada’s CWCS is to maintain healthy, self-sustaining populations of Nevada’s Species of Conservation Priority and their habitats. Implementation of Nevada’s CWCS objectives and actions will support maintaining Nevada’s biodiversity, but it is critical to recognize the importance of monitoring our success and adjust our priorities and actions as objectives are achieved or new

priorities are identified (i.e., adaptive management). Monitoring of Nevada’s CWCS is comprised of two tiers: CWCS monitoring and species/habitat monitoring.

Conservation strategies outlined in Nevada’s CWCS must be executed before its success can be realized. This may seem intuitive, but in order to demonstrate the effectiveness of Nevada’s CWCS, we’ve established indicators for monitoring which include tracking the creation or continuation of multidisciplinary teams, documenting funding for Nevada CWCS projects, and evaluation of community support through polling and/or levels of involvement in CWCS implementation. Success of Nevada’s CWCS will be measured by these indicators plus the assessment of strategy implementation. Although the CWCS is a 10-year plan, its evaluation and revisions will be ongoing and integral in the establishment and tracking of priorities for species and their habitats in Nevada. Plan reviews and revisions will be coordinated with Federal, State, and local agencies and Indian tribes that manage Nevada's land and water in addition to administering programs that significantly affect the conservation of Nevada's Species of Conservation Priority and their key habitats. Partner and stakeholder input will also be solicited during the review and revision process.

The second monitoring component of Nevada’s CWCS relates directly to biodiversity health, and the status of problems facing species and their habitats. Feasibly, it is unrealistic that any state would monitor all of their species individually, and it’s unlikely this tact could be justified as a requirement for ensuring biodiversity health. Nevada’s CWCS provides a strategic framework for accomplishing species and habitat goals, and their success can be directly measured through monitoring conservation objectives outlined in the strategies. The next phase of the CWCS planning process will involve prioritizing strategies, setting quantitative habitat and species objectives, designing research and monitoring programs, and partnering to set up on the ground implementation. Measuring the success of attaining species and habitat objectives will be an iterative, adaptive process that evolves and changes, as necessary, with new information and increased knowledge of species and their habitats.

It’s important to note that there are existing efforts in

place (mostly species based) that are being adopted by Nevada's CWCS. In general, these efforts have gone to great lengths to establish priorities and have set target objectives for species populations. We see Nevada's CWCS as an opportunity to pull together all of these existing efforts, not reinvent the wheel and devise new objectives at the expense of neglecting priority data gaps. We felt that simply referencing these efforts in this document was inadequate and have stitched them together in order to demonstrate a starting point for species conservation which, as you will see, is not in its infancy. The following discussion outlines the progress that has already been made for species conservation planning in Nevada and is intended to illustrate how these processes are integrated into Nevada's CWCS objectives and effectiveness monitoring.

The following conservation applications are grouped by logical taxonomic group to demonstrate how species conservation is likely to proceed from the collaborative setting of objectives through the design and application of projects through the likely species monitoring schemes to collaborative evaluation and application adjustment. NDOW and the members of the CWCS Development Team possess primary responsibility to monitor habitats only on lands under their direct stewardship (NDOW Wildlife Management Areas and TNC preserves); therefore, the Team has not developed detailed habitat monitoring frameworks in this discussion, recognizing the authorities and primary responsibilities of the land management agencies to perform this critically important task. The design of habitat monitoring strategies will differ among agencies and is considered an element of Phase II of Nevada CWCS development and implementation. For habitat monitoring approaches on NDOW's Wildlife Management Areas, the reader is encouraged to refer to each of the completed WMA Coordinated Management Plans, available at NDOW's website <http://www.ndow.org>.

## **Terrestrial**

### **Birds**

Conservation planning for birds at the continental and regional/state level is considerably advanced compared to other terrestrial species planning. Four major bird initiatives have continental plans in place (Partners In Flight North American Land Bird Conservation Plan;

North American Water Bird Conservation Plan; U.S. Shorebird Conservation Plan; and North American Waterfowl Management Plan) and Nevada is currently covered by a complete suite of regional/state plans associated with those initiatives (Intermountain West Joint Venture Habitat Conservation Plan; Nevada PIF Bird Conservation Plan; Intermountain West Shorebird Conservation Report; Intermountain West Water Bird Conservation Plan). These bird conservation plans provide guidance and support to statewide or local conservation strategy by identifying species priorities, setting conservation goals and objectives, and providing technical support through the development of best management practices using up-to-date science. The bird conservation initiatives are also very active in the identification of potential funding opportunities and linkage of potential partnerships. Bird conservation strategies in Nevada's CWCS were structured to link with the four bird conservation initiatives and contribute their conservation achievements toward regional and continental priorities and objectives.

### **Land Birds**

#### **Setting Conservation Objectives**

The PIF North American Land Bird Conservation Plan has used the best population databases available (including 30 years of Breeding Bird Survey data) to assess population status and trend for 448 species of land birds that occur north of Mexico. From this massive population assessment, PIF has developed population estimates, directional species population objectives and species population conservation targets based on 30-year trend. These population estimates, objectives, and targets have been "stepped-down" to the state level (Rosenburg 2004), and provided to the states for support in CWCS development. These support materials will be used in Nevada when quantifiable objectives for Species of Conservation Priority will be set during the Phase II implementation process.

Since the PIF population estimates and targets were generated from the "top down", that is, from a continental database parsed by state based on each state's contribution to the whole, it will be necessary to cross-check the numbers with a "bottom-up" habitat inventory that computes the potential number of breeding territories available using habitat type acreage

(SW ReGAP) and local breeding density estimates (GBBO 2005). Nevada's projected contribution to the continental objectives for land birds will be accepted when the habitat inventory demonstrates a coarse capability in Nevada for meeting those objectives. Continental objectives will need to be adjusted when habitat capability cannot be demonstrated and the creation of new suitable habitat is not feasible. Nevada CWCS conservation objectives for Priority Species will be based on our projected capability to either create new suitable habitat or increase densities in occupied habitat through habitat improvement.

## Project Development and Implementation

Bird conservation projects will be designed to meet the State's most pressing bird conservation needs and prioritized by an integration of local and continental priorities. Species with significant downward trends that have been assigned directional objectives in the PIF North American Land Bird Conservation Plan (NABCP) of "100 percent increase" and "50 percent increase" will likely receive priority for project development in Phase II implementation. Those species are listed below by ecoregion:

Priority Species from the PIF NABCP with directional objectives of "increase 50 or 100 percent" (in 30 years) that occur in Nevada.

### Great Basin and Columbia Plateau - Bird Conservation Region 9

Species	PIF Objective	Primary Key Habitat
Blue Grouse	increase 100%	Intermountain Conifer Forests and Woodlands
Brewer's Sparrow	increase 100%	Sagebrush
Greater Sage-grouse	increase 100%	Sagebrush
Olive-sided Flycatcher	increase 100%	Intermountain Conifer Forests and Woodlands
Pinyon Jay	increase 100%	Lower Montane Woodland
Rufous Hummingbird	increase 100%	Alpine and Tundra
Short-eared Owl	increase 100%	Marshes
White-throated Swift	increase 100%	Cliffs and Canyons
Willow Flycatcher (adastus)	increase 50%	Intermountain Rivers and Streams

### Mojave - Bird Conservation Region 33

Arizona Bell's Vireo	increase 100%	Mojave Rivers and Streams Mojave Mid-Elevation Mixed Desert
Bendire's Thrasher	increase 100%	Scrub
Black-chinned Sparrow	increase 50%	Lower Montane Chaparral
Brewer's Sparrow	increase 100%	Lower Montane Chaparral Intermountain Conifer Forests and
Grace's Warbler	increase 50%	Woodlands
White-throated Swift	increase 100%	Cliffs and Canyons
Willow Flycatcher (extimus)	recovery plans	Mojave Rivers and Streams

### Sierra Nevada - Bird Conservation Region 15

Blue Grouse	increase 100%	Sierran Conifer Forests and Woodlands
Olive-sided Flycatcher	increase 100%	Sierran Conifer Forests and Woodlands
Rufous Hummingbird	increase 100%	Alpine and Tundra
Spotted Owl	recovery plans	Sierran Conifer Forests and Woodlands
Tricolored Blackbird	increase 100%	Marshes
White-throated Swift	increase 100%	Cliffs and Canyons
Willow Flycatcher (brewsteri)	increase 50%	Sierran Rivers and Streams

A short list of local priority species added from the Nevada PIF Bird Conservation Plan might include:

Northern Goshawk	300 nesting pairs	Aspen Woodland
Ferruginous Hawk	stable/increasing	Lower Montane Woodland
Lewis's Woodpecker	stable/increasing	Intermountain Rivers and Streams
Bobolink	stable/increasing	Wet Meadows

Of course, these will not be all the species prioritized for conservation effort in Phase II implementation, but if actions from the key habitat strategies were prioritized according to this list of priority bird species, the first-order projects designed in Phase II might include:

- Restore degraded sagebrush to healthy range condition
- Science-based pinyon-juniper management strategy that maintains high quality pinyon-juniper wildlife habitat while manipulating its distribution in sites where it has encroached into sagebrush soil sites
- Riparian habitat restoration
- Securing more water for wetlands
- Retain old growth/late successional stage forest
- Aspen stand regeneration

High priority wildlife research and inventory needs for this list of birds identified in Nevada's CWCS include:

- Distribution and population status of *brewsteri* and *adastus* subspecies of Willow Flycatcher
- Habitat suitability models for sagebrush birds
- Extent of Brewer's Sparrow breeding in Mojave habitats
- Rufous Hummingbird breeding status in Nevada
- Statewide Blue Grouse population assessment
- Inventory White-throated Swift breeding colonies statewide
- Pinyon Jay nest colony site selection/seed caching strategies
- Population assessment for Bendire's Thrasher
- Integration of Northern Goshawk nesting territory maintenance into aspen regeneration strategy.

### Monitoring, Adaptive Management, Partnerships

Land bird monitoring is already in place in Nevada via the National Breeding Bird Survey and the Nevada Bird Count. In addition to long-term population monitoring, the Nevada Bird Count is designed to focus some of its resources on the investigation of bird/habitat relationships with the eventual objective

of constructing habitat suitability models for key species adequately monitored by the survey. These habitat suitability models will have habitat states and transitions built into them so that land managers will have the ability to predict multi-species population responses to land management actions, as well as the capability to make assumptions about habitat health by assessing the bird community found on the site in question.

Birds are relatively easy to monitor when compared to other taxa, and for this reason it makes sense to incorporate bird monitoring protocols in measuring the effectiveness of habitat improvement projects. Quantitative assessment tools are already being developed using density information from the Nevada Bird Count to assist biologists and land managers in communicating the projected bird population benefits of habitat improvement projects (e.g., a 4,000 hectare sagebrush improvement project that increased Brewer's Sparrow breeding density from 10 birds per 40 hectares to 20 birds per 40 hectares would add 1,000 new pairs of Brewer's Sparrows to the population). Bird monitoring supported by these same quantitative assessment tools is one of the best available biometric tools for project effectiveness monitoring after projects have been implemented.

The Nevada Bird Count is multi-agency funded and scientific oversight to the program is provided by Nevada Partners In Flight, which is also supported by all the major resource agencies, conservation organizations, and academic institutions in the state. The Intermountain West Joint Venture will play a key role in building the funding partnerships necessary to effect large-scale habitat improvement on behalf of bird conservation in the state. County planning teams with multi-agency support, whether focusing on Greater Sage-grouse in the north or on multi-species conservation in the south, will be the major implementers of habitat improvement on the ground.

## Water Birds and Shorebirds

### Setting Conservation Objectives

Population sizes for water birds and shorebirds have not been estimated at the continental level with any great degree of precision, and state population estimates have not been calculated and “stepped down” as have land birds. Population estimates and breeding population targets for water birds have been generated in the Intermountain West Waterbird Conservation Plan (IMWWCP), and they can be refined at the state level with proper coordination between monitoring efforts, which is the aim of Great Basin Bird Observatory’s Aquatic Bird Count (GBBO 2004). Shorebird breeding population estimates will be very difficult to generate, but migration populations at key staging sites may be estimable with a concerted inventory effort over a complete ten-year drought cycle. Such data are available for the Lahontan Valley Wetlands where peak migration shorebird counts have

been conducted since 1986.

Population estimates for shorebirds and water birds will be generated using local data and CWCS conservation objectives constructed upon implementation of Nevada’s CWCS and will be based on a calculated capability of either hitting 10-year peak projections (because of the cyclic nature of Nevada wetlands) or of pushing the 10-year peak to some higher level based on projected habitat improvement.

### Project Development and Implementation

Again, for aquatic birds, bird conservation projects will be designed to meet the State’s most pressing bird conservation needs and prioritized by an integration of local and continental priorities. Priority Species identified as of High or Moderate Concern (Water Bird Plan) or of High or Moderate Importance (Shorebird Plan) in the Intermountain West are listed in the table below.

Water Bird and Shorebird Priority Species for all ecoregions in Nevada.

	IMWWCP Objective
Water Birds	
High Concern	
Greater Sandhill Crane	TBD
California Gull	4200
Franklin's Gull	10
Black Tern	550
Eared Grebe	
Western Grebe	80
Snowy Egret	600
American White Pelican	12620
Common Loon	1000
Yuma Clapper Rail	TBD
Moderate Concern	
Forster's Tern	190
Black-crowned Night	
Heron	910
Least Bittern	TBD
White-faced Ibis	12230
Clark's Grebe	450

TBD – To be determined

Shorebirds	
High Importance	
Snowy Plover	breeding
Black-necked Stilt	breeding

American Avocet	breeding
Long-billed Curlew	breeding
Long-billed Dowitcher	migratory

Moderate Importance	
Black-bellied Plover	migratory
Willet	breeding
Marbled Godwit	migratory
Western Sandpiper	migratory
Least Sandpiper	migratory
Red-necked Phalarope	migratory

Key habitat strategies for Marshes, Desert Playas and Ephemeral Pools, Lakes and Reservoirs, Intermountain Rivers and Streams, and Mojave Rivers and Streams are most relevant to the conservation of these species. Key research and inventory needs identified in Nevada’s CWCS include:

- Determination of wintering grounds of Common Loons staging at Walker Lake
- Statewide population assessment of Least Bittern
- Statewide population assessment of Yuma Clapper Rail

### Monitoring, Adaptive Management, and Partnerships

Monitoring for water birds and shorebirds will occur throughout a network of important sites via the Aquatic Bird Count administered by Great Basin Bird Observatory. Conservation targets for species will be developed for each site and accumulated into statewide targets, which in turn will be contributed to coordinated wetland bird objectives at the regional level as a coordinated wetland bird management network is developed for the Intermountain West (Intermountain West Shorebird Report 2000). Unlike land birds, area-density calculations for wetland birds are not useful in measuring site productivity or project performance. Conservation effectiveness will be measured on a site-by-site basis in terms of total birds using the site and will likely have to be adjusted for consideration of climatic cycles. For example, sites or projects will be evaluated in terms of increases in peak bird numbers, increases in bird numbers at the low point in the climatic cycle, or possibly in the “flattening” of the oscillations between lows and highs through the increased stability of available habitat. Aquatic bird monitoring schemes will need to be somewhat flexible to accommodate the irregular nature

of breeding shorebird populations – a rotation scheme that tries to put breeding population surveys on a fixed interval is not flexible enough to catch the most important breeding years, which can crop up with very little notice, but are generally coincidental with high water years.

The aquatic bird partnership is similar to that of land birds through multi-agency support of GBBO and Nevada Partners In Flight. An aquatic bird monitoring working group was convened by NDOW and GBBO in 2002 and has been working on implementation of the Nevada Aquatic Bird Count since then. This aquatic bird working group consists of NDOW biologists, USFWS refuge biologists, USFS, BLM, and University of Nevada staff. The full-scale project has yet to be implemented, but progress toward full implementation has been steady since the group’s inception. The Intermountain West Joint Venture will play a key role in wetland and riparian habitat improvement through NAWCA grant projects and IWJV Cost-Share grants. Habitat improvement will go on the ground through the efforts of staff from National Wildlife Refuges, Nevada Wildlife Management Areas, BLM, Forest Service, Bureau of Reclamation, Natural Resources Conservation Service, Nevada State Parks, and county working groups.

### Waterfowl

#### Setting Conservation Objectives

Waterfowl population sizes are closely monitored by the states and the federal governments of the U.S., Canada, Mexico, and Russia. Population estimates are generated through established consultation structures called Flyways. Nevada participates as a member of the Pacific Flyway Council and its technical arm, the Pacific Flyway Study Committee. The 2004 update of

the North American Waterfowl Management Plan presents continental population estimates and objectives for all duck species and goose populations and objectives are presented by flyway. The NAWMP is expected to refine its adaptive management element in its next iteration, and it is expected to serve as a guide to the setting of local CWCS population objectives during Phase II implementation.

### **Project Development and Implementation**

Project development for the attainment of waterfowl objectives will be predominantly wetland based; therefore it is easily integrated with the water bird/shorebird project development approach. Waterfowl habitat improvement projects are less likely to be driven by individual species objectives than group-based – e.g. dabbling ducks, diving ducks, geese and swans – although individual species breeding objectives such as Cinnamon Teal in montane meadows might be identified to integrate waterfowl habitat improvement with other initiatives such as Greater Sage-grouse conservation.

### **Monitoring, Adaptive Management, and Partnerships**

Waterfowl monitoring in Nevada consists of four aerial surveys that are connected to the continental survey strategy – December swan surveys, mid-winter inventory, goose pair surveys, and duck pair surveys. Survey results are forwarded to the U.S. Fish and Wildlife Service through the Pacific Flyway.

### **Mammals**

Conservation planning for game mammals has been in place at NDOW for over 50 years because of the intensive demands of harvest management. For the purposes of CWCS, mule deer and bighorn sheep conservation strategy will follow the course set by existing management plans updated on an as-needed basis. The mammal Species of Conservation Priority classified as “furbearers” in Nevada Administrative Code (northwestern otter, ringtail, kit fox) have not received priority planning emphasis in the past. Collaborative conservation planning for nongame mammals in Nevada has taken a significant step forward with the completion of the Nevada Bat Conservation Plan, but planning for other species is lacking or in rudimentary stages of development.

### **Mule Deer**

NDOW is entering into a major conservation initiative with its partners to improve habitat for mule deer. This initiative represents the logical program progression from findings reported in the recent NDOW Biological Bulletin, “Nevada’s Mule Deer Population Dynamics: Issues and Influences” (Wasley, 2004). The initiative will focus on improvement and restoration of montane shrub types that occur in the following CWCS key habitats:

- Sagebrush
- Lower Montane Woodland
- Lower Montane Chaparral
- Aspen Woodlands

### **Project Development and Implementation**

Comprehensive wildlife community structure and ecology for the montane shrub communities included in the Lower Montane Woodland and Lower Montane Chaparral key habitats has not been well-studied. Habitat evaluation and project development will be part of the mule deer discussion and will be driven predominantly by mule deer habitat needs.

The mule deer conservation strategy will be constructed as a separate process from CWCS, but

CWCS can contribute to the montane shrub conservation effort by introducing the *comprehensive* wildlife conservation picture to the discussion. CWCS support for mule deer conservation planning could include documenting the value of montane shrub communities to Species of Conservation Priority and integrating that knowledge into the conservation strategy for the rejuvenation of those ecological systems. Key habitat strategies from the CWCS include:

- Inventory condition and trend of serviceberry stands; implement active regeneration management
- Comprehensive ecological study of lower montane chaparral systems
- Permit natural fire events to rejuvenate lower montane chaparral
- Integrate chaparral objectives into pinyon-juniper management strategy
- Maintain vigorous, productive stands of mountain mahogany; prioritize mountain mahogany stands

for protection against fire events

- Organize an aspen working group to develop aspen conservation strategy.

Key research actions from the CWCS include:

- Comprehensive study of mountain mahogany ecology
- Habitat capability models for serviceberry and lower montane chaparral species.

Key CWCS species for conservation objectives and monitoring might include:

- Mule deer
- Brush mouse

### **Monitoring, Adaptive Management, and Partnerships**

Mule deer response to montane brush management strategies will be monitored through established survey protocols administered by NDOW's Game Bureau funded by traditional Federal Aid sources. Species of Conservation Priority monitoring will include the array of comprehensive monitoring protocols either already in place or in development (statewide small mammal survey grid). Project effectiveness assessment will likely implement small mammal surveys if suitable biometric indices can be developed from small mammal survey methodology.

The montane shrub/aspen conservation partnership will include NDOW, state and federal land management agencies, with a key leadership role played by the Forest Service as primary steward of aspen and some montane shrub ecological systems. The funding partnership should include the sportmen's conservation organizations such as the Mule Deer Foundation and Rocky Mountain Elk Foundation, and the mining industry. Project monitoring and research can be accomplished by NDOW and the University of Nevada. Although a detailed discussion of the role of integration with bird-based planning would be confusing, CWCS would also contribute a strengthened partnership for the conservation of these montane brush habitats by introducing participatory roles for the Intermountain West Joint Venture in project funding and Great Basin Bird Observatory in performance monitoring by linking the conservation strategy to bird conservation objectives for the featured habitats.

### **Bighorn Sheep**

NDOW's Bighorn Sheep Management Plan was completed in 2001 and currently guides conservation action for bighorn sheep in the state. Readers are asked to refer to that plan for bighorn sheep conservation strategy.

### **Bats**

The final draft of the Nevada Bat Conservation Plan is complete and is expected to be ratified through multi-agency endorsement sometime in July, 2005. The Nevada Bat Conservation Working Group has worked diligently on this effort since 2000. The Plan crafts conservation strategy for all 22 species of bats found in Nevada, of which 14 are Species of Conservation Priority in CWCS. While CWCS will strive to integrate the objectives and actions of the Nevada Bat Plan into its overall conservation approach, it appears that CWCS can also advance the objectives of the Nevada Bat Plan through the construction of a set of conservation strategies that progress from baseline inventory to conservation action.

Bats delineate into four basic groups based on their roost behaviors – subterranean roosters (mines and caves); forest roosters (conifer, woodland, riparian); cliffs/talus roosters; and man-made structure roosters (buildings and bridges). These four roosting groups can then be divided into three basic strategy groups because man-made structures can be included in a subterranean conservation strategy – subterranean/structure; forest; cliffs/talus.

### **Subterranean/Structure Conservation Strategy**

California leaf-nosed bat

little brown myotis

fringed myotis

western small-footed myotis

cave myotis

Allen's big-eared bat

Townsend's big-eared bat

pallid bat

## Inventory

The first step toward an objectives-based conservation strategy for subterranean and man-made structure sites is to conduct a comprehensive statewide survey of caves, mines, and structures in Nevada. The framework for structuring such an inventory would include the mapping efforts and GIS layers of Nevada Department of Minerals and Nevada Bureau of Mines and Geology. The focus of the inventory would be the identification of the key roosting sites – maternity, hibernacula, lekking, and migratory staging – across the state for the entire suite of bat Species of Conservation Priority in this strategy group.

## Selection of the Monitoring Network

Roost sites would be prioritized in order of importance to each species (roost size, percent of total inventoried population), and care would be taken to include the key sites for each species so that all are significantly part of the monitoring strategy. An important conservation action at that point would be to secure these priority roost sites through bat-friendly closures so that their long-term conservation could be tenable for long-term monitoring. An integrated monitoring protocol that combines the various strengths of the array of techniques – acoustic (ANABAT), exit counts, net capture, and internal roost counts – would then be applied to the priority network of sites.

## Setting Population Objectives

Upon implementation of the monitoring network, quantifiable conservation objectives could then be set by species for the cumulative populations of the site network, with a baseline objective of “no decline” and after management action points are identified, percentage increases in total population by species. In this instance, the very act of bat-friendly closure could be expected to produce an increase by site over time, as unprotected sites continue to experience disturbance and closure and displaced bats find the protected sites.

## Research and Conservation Action

Once the key roost sites are secured, research investigations can be initiated to find the key habitat elements and foraging sites associated with each roost. This knowledge can then be used to develop a conservation strategy for each roost that includes treatments of habitat intended to improve conditions.

Species response to conservation actions can be documented through the monitoring protocol, and conservation objectives can be adjusted based on findings.

## Forest/Woodland/Riparian Conservation Strategy

western red bat

western yellow bat

long-eared myotis

hoary bat

## Inventory

Because of the dispersed nature of forest-roosting bats, a site-based comprehensive inventory will be more difficult to achieve than one for subterranean sites. An inventory of forest-roosting bats will require the implementation of a stratified random sample of suitable habitat (conifer forest, lower montane woodland, aspen, riparian) with an initial acoustic survey assessment followed by capture net work at selected water sources. Captured bats will be fitted with radios and tracked to their roosts.

## Habitat Suitability Models For Roosting Habitat

Upon delineation of the key forest-roosting sites as identified by the bats themselves, key roosting landscapes would be identified and prioritized for each species. Habitat suitability models will be constructed for roosting habitat in all the pertinent key habitats.

## Conservation Action and Performance Monitoring

Barring significant unforeseen advances in technology, it is not likely that forest bat monitoring will be able to produce reliable trend results through this CWCS planning period; therefore, the conservation strategy for forest bats will rely on the translation of the habitat suitability models into habitat management strategies implemented through BLM Resource Management Planning and Forest Service Forest Plan processes. The provision of suitable roosting habitat on all priority landscapes will have to suffice for conservation action. Conservation success will be measurable only in terms of persistent species presence in a selected

management area. Roosting sites are expected to shift with time as habitat conditions transition from one state to another, and as bat populations respond to an array of ecological factors, some of which are not forest-habitat-related. Long-term monitoring is likely to occur at some appropriate interval using the same integrated protocol described above. Shifts in site priority will be documented and conservation action will be adjusted appropriately.

### **Cliffs and Talus Conservation Strategy**

- big free-tailed bat
- long-eared myotis
- pallid bat
- spotted bat

### **Inventory**

Cliffs and cliff complexes are fairly easy to identify and target for a statewide inventory, but talus slopes, like pinyon-juniper habitat, are much more extensive and dispersed across the landscape, so the Cliffs and Talus inventory strategy will require a two-phase approach, proposing a comprehensive statewide inventory of cliffs and a stratified random sample of talus slopes. Survey protocol will be similar to the forest bat strategy – integrated use of acoustic survey equipment to determine presence, capture net activity to determine rough population demographics, and radio telemetry to track individuals back to their roosts.

### **Selection of the Monitoring Network**

Important roost sites would be identified and prioritized for each species. These sites would form the basis of a cliffs/talus monitoring network where the integrated monitoring protocol would be implemented on a regular basis at some appropriate interval.

### **Conservation Action and Performance Monitoring**

As the important cliff and talus roost sites are identified, they can be proposed for priority management in the appropriate land management agency land use planning process. Priority management for these sites should start with fairly passive strategies such as no more than identifying the priority areas on RMP or Forest Plan maps, with a consensus-based progression of protective measures developed to address elevating levels of disturbance or threat. Key

human activities to be monitored are rock-climbing activity and decorative rock removal. Conservation action triggers should be identified to initiate appropriate protective action based on intensity of the threat. Performance monitoring would be similar to the forest bat strategy – persistent presence being the key biometric.

### **Partnerships in Bat Conservation**

The Nevada Bat Working Group is made up of biologists from state and federal agencies, university biologists, and private consultant biologists. Key to the success of the three bat conservation strategies are the involvement of Nevada Department of Minerals and the Nevada Bureau of Mines and Geology; federal agency staff in minerals, recreation planning, range and forestry; spelunking and rock-climbing clubs; the Nevada Mining Association and individual mines. Monitoring protocols are likely to remain under the leadership of NDOW, Nevada Natural Heritage Program, university researchers and key private consultant biologists.

### **Small Mammals**

With the exception of the recent concern expressed for the status of the pygmy rabbit, small mammals (rodents, lagomorphs, shrews) have received very little conservation planning focus in Nevada despite Nevada's rather rich small mammal natural heritage. Since E. Raymond Hall's *Mammals of Nevada* was published in 1946, small mammal conservation in Nevada has not progressed much further than basic biology and natural history, some habitat relationships work, and some distribution verification and local site monitoring. Much of the taxonomic verification of Hall's original classifications using up-to-date genetics analysis has been left to do, or if it has been performed, the results have pretty much stayed within the academic universe and have not been translated into needed conservation action. Several endemic subspecies identified by Hall have been perpetuated on "species of concern" lists through the now-defunct FWS Category II process into the present day agency sensitive species lists and now on to CWCS Species of Conservation Priority. Current status of these subspecies is largely unknown, both population status and distribution as well as genetic autonomy based on current knowledge. Contributing to this state of

taxonomic confusion, there is the concern for the status of sixteen species that are fragmented into geographically isolated sub-populations with diminishing opportunity for genetic transfer between populations (Brussard et al 2000). Not all of these species occur on the current Species of Conservation Priority list, but eventually, the conservation needs of all sixteen species will likely have to be addressed. The list of Species of Conservation Priority that are fragmented or subspecies that are isolated from other populations occurs below:

- montane shrew
- American pika
- Fish Spring pocket gopher
- San Antonio pocket gopher
- desert pocket mouse
- Ash Meadows montane vole
- Pahranagat Valley montane vole
- Wyoming ground squirrel (*nevadensis*)
- Humboldt yellow-pine chipmunk
- Hidden Forest Uinta chipmunk
- Palmer's chipmunk
- western jumping mouse

Of these, two (Ash Meadows montane vole and Hidden Forest Uinta chipmunk) may be extinct. In addition, two possible subspecies of dark kangaroo mouse described by Hall (Desert Valley dark kangaroo mouse and Fletcher dark kangaroo mouse) which are not isolated subpopulations, but have persisted in sensitive species lore without much coming to light recently as to their true taxonomic status are also in need of taxonomic verification. The construction of a small mammal conservation strategy for Nevada must start with a concerted effort to update the status of these little-known subspecies, make definitive statements as to that status, then apply the correct measure of conservation concern and action to the “surviving” species to ensure their persistence into the future.

### **Inventory**

Single species investigations will have to be initiated for the following species:

- Fish Spring pocket gopher
- San Antonio pocket gopher

- Ash Meadows montane vole
- oPahranagat Valley montane vole
- Humboldt yellow-pine chipmunk
- Hidden Forest Uinta chipmunk

The basic strategy for these species will be to initiate a focused effort on finding the species, determining its status, collecting tissue material for genetic analysis, and determining sub-population viability. If a species cannot be found in its historic range after a concentrated search effort, it will be declared extinct and no further program time will be expended on it, nor will NDOW request special consideration or mitigation on behalf of the species in land use proposals and planning. Species found extant will be prioritized for conservation action based on the severity of their conservation risk.

### **Conservation Action and Monitoring**

Species found to be extant will be evaluated for the degree of conservation protection they will require to maintain population viability, and proper recommendations to adjust their conservation status under Nevada Administrative Code will be made. Conservation plan development will then proceed through population viability analysis, identification of current and potential suitable habitat, identification of conservation partnerships, and the development of a collaborative action plan. Key habitat types of particular importance to this group of species as a whole include:

Intermountain Rivers and Streams

Grasslands and Meadows

Intermountain Coniferous Forest and Woodlands

Mesquite Bosques and Desert Washes

Conservation objectives will be set, appropriate strategies will be implemented, and monitoring will occur as needed as a function of conservation plan development.

## Other Single Species Investigations

American pika  
pygmy rabbit  
mountain beaver

The three species listed above will also require single-species investigations, but more is known about their current status in Nevada, so they do not fit the previous strategy. Conservation needs and actions for these species are fairly well laid out in the key habitat strategies and species accounts, and will not be recounted here.

## Statewide Small Mammal Monitoring Network

It is believed that the remainder of small mammals of Conservation Priority can be inventoried and monitored via a statewide small mammal monitoring network using an integrated array of capture techniques. Some of these species do have very localized ranges, but are not expected to be particularly hard to capture if network transects are stratified in such a way as to include their restricted ranges or habitats.

## Conservation Objectives and Project Development/Implementation

Difficulty in developing population estimates or densities for these species is anticipated; therefore, one of the major objectives of the small mammal monitoring effort will be to develop a reliable biometric index (or indices) that can be generated from trap grid data. Conservation objectives will then be developed from the index. Habitat improvement projects will be designed to meet the life history needs of the suite of Conservation Priority species occurring at the site and applied through the appropriate land use planning venues, likely bundled into landscape treatments with Species of Conservation Priority from other taxonomic groups.

## Monitoring, Adaptive Management, and Partnerships

A permanent grid of small mammal monitoring sites is expected to be maintained to document presence, statewide population demographics, and shifts in distribution. Site-specific monitoring on treated landscapes will be measure project effectiveness while

also contributing to the statewide database.

To date the partnership for the conservation of small mammals is in its very early stages. The Nevada Natural Heritage Program has been very successful in convening a small working group of mammalogists to refresh Natural Heritage scores (2003) and to provide expert input into the mammal assemblages used in this CWCS (2005). It would appear this mammals working group, which exhibits considerable dual membership with the Nevada Bat Working Group, is the logical group to convene to provide expertise and leadership to the small mammal conservation effort. NDOW, BLM, Forest Service, Fish and Wildlife Service, University of Nevada staff from both major campuses and some satellite campuses, NNHP, USGS-BRD, Southern Nevada Water Authority biologists, and biological consultants are just a few of the regular attendees. Implementation partnerships with state and federal land managers and private landowners assisted by NRCS and FWS Conservation Planning Tools will be required to put small mammal conservation on the ground.

### **“Carnivores” (+ Northern Flying Squirrel)**

Sierra Nevada red fox  
kit fox  
ringtail  
American marten  
northwestern river otter  
northern flying squirrel

This group of small to mid-sized carnivores and northern flying squirrel can fit into a single conservation strategy through similarity of monitoring technique. All have fairly large ranges that encompass a variety of habitats and habitat elements. Four of the six species are classified in Nevada Administrative Code as “furbearers”, although none of that four contribute significantly to the trapping economy in Nevada. American marten are “closed season”, and have not been trapped legally in Nevada in years. Open seasons for river otters still occur on the Humboldt River system. Kit fox is the most frequently trapped of the group, and a few ringtails are incidentally trapped each season. The existence of the Sierra Nevada red fox in Nevada is a subject of debate; very little evidence exists even dating back to the baseline surveys of E.R. Hall.

Of the six species, kit fox is the easiest to visually observe, being somewhat more diurnal in its habits, but with the possible exception of river otter, this group of species will probably be best monitored using nocturnal baited camera stations, making them a logical suite for study. Espinosa (2002) successfully documented American marten and northern flying squirrel visitation to camera stations in the Carson Range, and the method has great promise for ringtail, kit fox, and Sierra Nevada red fox. River otters have been successfully documented via riverbank tracking surveys (Bradley 1986).

### **Inventory**

Baited camera station surveys would be implemented in the expected ranges of these species to document distribution and rough relative abundance. Live trapping efforts for radio tracking would yield some population demography data and would allow home range and habitat use study of radioed animals.

### **Conservation Strategy**

The conservation needs of these species are not very well understood at this time, so conservation strategies for each species would vary with the details of the knowledge gained from inventory and radio-tracking. A concerted effort in potential Sierra Nevada red fox habitat would result in either discovery of the species or a statement of extirpation that would then be reflected in NDOW input to land use proposals and planning. The American marten is suspected to be the next most restricted species of the group. Conservation of this species would likely entail assessment of potential suitable habitat using the latest habitat suitability models, a calculation of the number of potential territories in the Carson Range, followed by efforts to document presence/absence in all potential territories. A rough population size might be projected based on the findings, and population viability analysis would be applied to determine the feasibility of maintaining Carson Range habitat in marten-capable condition. Any PVA of American marten in Nevada would have to consider linkage to California populations as a source.

A similar habitat-suitability approach could also be applied to monitoring kit fox, ringtail, and northern flying squirrel. By applying suitable habitat parameters to GIS analysis, a potential habitat map for each

species could be generated and parsed into potential territories using an expert-generated “average” territory size. These “territories” then could be searched or passively observed for dens (or nests) and activity and a species “atlas” could be populated with information over time. At some point, centers of population activity could be identified and possibly even rough density estimates could be generated from which rough trend estimates could be derived. Conservation action could then be developed from that information. The degree of importance of proceeding toward conservation strategy development would vary by species and would be influenced by the observed rate of change in suitable habitat associated with human uses, fire regime or climate change.

### **Partnership**

The partnership to implement the conservation strategy for small carnivores/flying squirrel would include NDOW biologists from both the Game and Wildlife Diversity Bureaus, mammal experts from the mammals working group described above, the Nevada Trappers Association and other sportsmen’s organizations, state and federal land management agencies, and tribes.

### **Reptiles**

As a taxonomic group, reptiles have received the least amount of planning emphasis and are among the hardest for which to develop adaptive management strategy because of the difficulty of inventorying and monitoring them. The exception in Nevada, of course is the desert tortoise, the listing of which as “threatened” under the federal Endangered Species Act in 1990 initiated massive planning efforts that culminated in the development of the Clark County Multi-Species Habitat Conservation Plan, the current archetype of local collaborative conservation planning in the state. The ongoing permitted activity of commercial collection of most species of reptiles should require that adequate population monitoring protocols be in place to assess the capability of the resource to sustain harvest. The Nevada reptile program has consisted of a single biologist assigned primarily to reptiles in the entire state since 1985, and the demanding conservation priorities of the desert tortoise have overwhelmed this position since even before the 1990 listing, effectively forestalling the

development of a responsive reptile monitoring and conservation program. While some progress has recently been made, the identification of nineteen reptile Species of Conservation Priority in CWCS represents the movement forward of a comprehensive reptile program which is long overdue.

### **Comprehensive Inventory**

- western banded gecko
- desert iguana
- Great Basin collared lizard
- long-nosed leopard lizard
- desert horned lizard
- desert night lizard
- long-tailed brush lizard

Despite the common perception that a walk in the desert typically produces “lizards scurrying every which way”, reptiles as a group may be the most difficult terrestrial vertebrates to inventory and monitor. NDOW recently found a walking transect survey protocol based on visual observations to be inadequate because the surveys were labor-intensive and detection rates were low for all but the most common lizard species (NDOW 2003). Nighttime road surveys conducted in the spring after emergence have produced better results for nocturnal species, but have their implementation limitations, as well. Currently NDOW is testing a pitfall trap methodology on a limited scale to see if this methodology can produce more efficient detection rates worthy of the program and staff time expenditure. Other survey protocols may have promise, including walking or driving “berm” surveys that mimic commercial collectors’ primary collection protocol – that of driving unpaved roads and collecting off the rocks and raised grader berm along the road margin. An integrated survey protocol using road surveys, pitfall traps, and habitat stratified visual surveys is expected to produce the most comprehensive results. From the integrated survey, an index will be derived that will reliably serve as a trend indicator to inform management action.

### **Single-species Investigations**

- common chuckwalla
- greater short-horned lizard
- pygmy short-horned lizard
- Gilbert's skink

- Sierra alligator lizard
- Panamint alligator lizard
- banded gila monster
- Sonoran mountain kingsnake
- Sonoran lyre snake
- western diamondback rattlesnake

To accumulate the knowledge necessary to construct adequate conservation strategy for any of these species will require considerable focused effort on each individual species. Inventory protocol will have to be specifically devised and considerable search time will have to be dedicated. These investigations are more likely to be conducted as focused academic studies for Master’s or Doctorate candidates. The highest priority species for such study at this time appear to be common chuckwalla, banded gila monster, western diamondback rattlesnake and Sonoran mountain kingsnake. For instance, a priority research need for common chuckwalla exists to measure population response to commercial collection activity on Nevada sites using unharvested sites in California as study controls. Focused single-species investigations of the rest of this contingent may have to wait for issues of habitat loss, disease, or other concerns to elevate their conservation priority to the point of initiating action. In the meantime, information can be gathered from the literature and chance encounters that may be useful in constructing suitable habitat models that may give the reptile conservation partnership some currency with which to negotiate for coarse-scale habitat management on behalf of general reptile population health.

### **Partnership**

The partnership developing around reptile/amphibian conservation is Partners in Amphibian and Reptile Conservation (PARC), modeled after the successful Partners In Flight multi-agency initiative. Participants include staff from NDOW, federal land management agencies, National Park Service, the University of Nevada system, and others. Planning seems to be in a relatively preliminary stage, but it is hoped that CWCS can provide some incentive for this partnership to develop its program in Nevada. Developing working relationships with the commercial collectors is also paramount to devising functional collaborative conservation action for reptiles.

## AQUATIC SPECIES

All known extant aquatic wildlife species (fish, amphibians, mollusks, crustaceans) are listed in the Plan (see Appendices B through E and H). All but insects were subject to the aquatic ranking process described in Appendix A, and most were assigned to Tiers 1 through 4 (those with minimal data were unranked). Those in Tiers 1 and 2 were classified as Species of Greatest Conservation Priority. The SGCP aquatic species are identified in each key habitat as are goals, objectives, and actions key to their conservation.

The vast majority of Nevada's federally listed species are aquatic (fishes), and these listed species naturally rise to the top as aquatic species of greatest conservation priority (ASGCP). Therefore, there are species that are not included in ASGCP that nevertheless are of conservation concern, either because of a dearth of information regarding their conservation status, or because current conservation efforts need to be continued to keep their status from deteriorating (the latter were given "Stewardship" status).

All extant native aquatic wildlife species (Tiers 1 - 4, Stewardship, and unranked) will be addressed in more detail in NDOW's Native Aquatic Wildlife Plan that is currently under development. That plan will tier off the CWCS, and will include much more detail on proposed management of Tier 3 & 4 aquatic species and those lacking enough data to be ranked. Aquatic insects, which are not under NDOW's jurisdiction, will not be addressed under that plan, but are for the most part included in area management plans (e.g. Ash Meadows species). In addition, NNHP provides location information to

conservation, planning, development, land management, and research entities.

It is important to acknowledge that although many species did not get included in the two highest tiers because their conservation needs were deemed less than the listed species, by their very nature all aquatics are the most closely tied of all Nevada's wildlife to its most threatened resources, water. Most are impacted by the same factors that have caused so many Nevada fish species to become listed. Many of these species lack sufficient information to determine their true conservation need, and need further evaluation in order to minimize the potential that they will also someday be listed.

Given the current limited funding available even for Nevada's listed species, limited activities are targeted specifically to aquatic Tier 3 and 4 and unranked species. Key habitat strategies are intended to provide some level of protection for these species, but their conservation status still needs to be evaluated periodically to determine if protection is being achieved. For some of these species there is such a dearth of information that some targeted information gathering is required to even begin to determine status. Some of these species exist in habitat niches that may not be sampled during standard surveys for priority species and/or may not be easily detected using standard sampling gear and methods.

Brief descriptions of plans for acquiring information about species for which adequate abundance and/or distribution data is unavailable are included below by species group along with more detailed descriptions for species of conservation priority.

## Fishes

Significant conservation planning efforts exist for fishes in Nevada, although the majority of these are focused on species which are already under Federal or State protected status. This does mesh well with the focus of priority conservation species in the CWCS effort as there is a close parallel between existing protected status and high conservation need ranking in the species evaluation process for fishes. As would be expected from the typically sporadic and isolated distribution of aquatic habitats and associated fish species assemblages in Nevada's arid environment, conservation planning for aquatic species tends to be focused on individual species or assemblages, and their discrete and spatially isolated habitats, which is in contrast to the more regional approach which can be taken for some terrestrial species groups such as land birds. Although there are significant similarities in the threats and stressors to fishes across the state, such as invasive species and habitat alteration, which has allowed some commonalities between these individual conservation planning efforts, there has been little ability or need to link these efforts into larger regional approaches because of the uniqueness of conservation requirements for each aquatic system and species assemblage. However, the majority of these efforts share key partners and participants, which has encouraged the exchange of information and strategies across species and habitats to the benefit of individual conservation efforts. An important output of the Nevada CWCS in this regard is its focus on key habitats and the need for coherent and implementable statewide partnership based strategies for habitat protection and restoration. To the extent that this strategy approach will encourage broad based benefits to aquatic habitats, existing and future individual fish conservation efforts will be enhanced.

### Endemic Fishes

#### Setting Conservation Objectives

For the majority of fish species of conservation need, conservation objectives are defined at some level by existing recovery plans and documents, or have been developed by individual recovery teams or partnership-based recovery implementation teams (RITs). For many of these species, recovery plans produced by the

FWS are outdated or do not provide a level of detail adequate to direct recovery and conservation implementation, and individual RIT teams and working groups have developed recovery implementation plans and ecosystem conservation strategies which address priority conservation needs encompassing, where feasible, the full species assemblages within aquatic habitats where the priority species occur. Some gaps do occur in this coverage of available conservation planning, primarily due to limits on existing funding to support planning efforts, but to the extent that this guidance is available the Nevada CWCS is linked to and defers to those existing efforts for species- or system-based conservation objectives. Where adequate conservation planning does not yet exist, the development of partner-based RIT and working groups and the formulation of those conservation strategies is a key action captured within the CWCS aquatic key habitat descriptions.

#### Project Development and Implementation

Specific conservation actions are identified in existing recovery and conservation planning for the majority of fish species of conservation need, where they are included under existing Recovery Team, RIT and conservation working group processes. An important element of these ongoing efforts has been the attempt to focus where feasible on actions and strategies to address threats and stressors affecting species assemblages and habitats on a broader system level, such as habitat fragmentation and invasive species, which will maximize benefits to a wide variety of endemic fishes rather than just select individual species of highest concern. Nevada CWCS key habitat sections for aquatic habitat types also identify important areas of focus for needed conservation actions, and in some cases identify gaps in this coverage where additional future efforts are needed to develop a structure for project definition and implementation, particularly for species or species assemblages and habitats which are not well covered by these existing conservation processes.

#### Monitoring, Adaptive Management and Partnerships

Monitoring programs are in place for the majority of fish species of conservation need, generally conducted as status and trend assessments on an annual or

biennial basis using methods and protocols developed by NDOW or partner working groups on an individual species or assemblage basis. Where gaps exist in this monitoring network, strategies to develop additional system-based conservation implementation teams are intended to address this deficiency. These implementation groups also serve a critical role by periodic, generally at least annual, review of conservation activities and status which provides an adaptive process to modify implementation actions and strategies for species efforts as required.

Existing partnerships for fish conservation efforts, although largely subdivided into individual working RITs and sub-groups by the unique and isolated distribution of aquatic habitats and their associated species assemblages, are significant and broad based. Although leadership for individual conservation programs varies, with FWS responsible for formal recovery team processes and RIT teams mostly under the guidance of NDOW, federal agencies including BLM, the US Forest Service, and USGS-BRD, and state and local partners including NNHP, conservation organizations and landowners play key roles on individual teams, particularly for the design and review of conservation strategies and in the implementation of conservation actions.

### **Nonnative Sport Fishes**

Planning for important nonnative sport fisheries is similarly well advanced, although this is focused primarily on the development and implementation of Fisheries Management Plans developed for individual waters or species. These documents emphasize development of specific management actions and direction to manage important sport fisheries under a framework of management emphasis as trophy waters, general and urban fisheries, or other categories defined by fishery potential and public demand and desires. Of particular importance in Nevada is the integration of planning for native endemic and nonnative sport fish resources. Historic ignorance of the potential conflicts between these resources has significantly and negatively impacted Nevada's endemic sport and non-game fishes. Current fisheries management planning processes insure that potential conflicts will be minimized and allow more effective management of sport fish resources in companion with the aggressive

implementation of essential conservation actions for endemic fish species.

### **Amphibians**

Although interest exists for amphibian species at the continental and regional level, through efforts such as the Declining Amphibian Population Task Force and Partners in Amphibian and Reptile Conservation (PARC), these groups serve primarily as a coordination and information-sharing resource rather than as a mechanism to set guidance for conservation actions and objectives. Although some Nevada amphibian species have regional distributions which extend beyond our borders, much like fishes amphibian conservation efforts in Nevada are focused on a local level directed by the isolated distribution of their habitats and the corresponding spatial focus of conservation efforts on individual amphibian population centers. The primary tool used to date to direct and consolidate these efforts has been the development of the Conservation Agreement and Strategy, with four individual CACS documents in place (or near completion) directing individual partner working group conservation efforts for Columbia spotted frog, Amargosa toad, and the relict leopard frog. In part because of a perception of less need for aggressive conservation implementation, which is reflected somewhat in the relative priority ranking of amphibian species through this planning process, other endemic amphibian species in Nevada have received minimal attention for conservation planning. To the extent that those planning needs for additional amphibian species are not addressed in key habitat conservation strategies in this document, identification and implementation of a conservation planning structure for them will need to be developed as part of our CWCS phase II design and implementation.

### **Setting Conservation Objectives**

The four CACS documents for Columbia spotted frog, Amargosa toad and relict leopard frog were developed through a partnership process and define conservation objectives and strategy approaches for those species in substantial detail. Other amphibian species in Nevada do not have similar guidance available other than detailed generically at the key habitat level through this process, and development of appropriate conservation objectives for them will be an important component of

our CWCS phase II process, including completion of a more detailed Native Aquatic Species Plan, and establishment of a northern leopard frog working group and conservation plan.

### **Project Development and Implementation**

Specific conservation actions are identified in the existing CACS documents for included amphibian species, with collaborative work group processes established to direct implementation. Those CACS strategies are relatively recent in development and are undergoing periodic, annual review to determine the need to modify or develop new projects for specific species programs. For other amphibian species of concern, little effort has occurred to develop specific projects or implementation strategies to effect conservation, primarily because of the absence of active conservation processes which include them at a species-specific level. Although some efforts are anticipated addressing conservation needs for the southwestern toad through the Clark County MSHCP, identifying and prioritizing conservation needs at an action level for other conservation need species will be an important output direction from the Nevada CWCS, the Native Aquatic Species Plan (in development), the projected northern leopard frog working group and conservation plan, and subsequent phase II development of this plan.

### **Monitoring, Adaptive Management and Partners**

Structured monitoring programs are in place for those amphibian species included in CWCS programs, but with the exception of southwestern toad through the Clark County MSHCP are limited for other amphibian species to incidental and occasional efforts. Because of this some gaps exist in distribution and status information which makes adequate assessment of conservation status for those amphibians difficult. Addressing those information needs will need to be an important focus of future efforts. Existing conservation efforts (CWCS and CCMSHCP) include a strong adaptive management component with periodic review of conservation efforts and efficacy, but this will need to be included as a component for other species through the development of more structured conservation programs. Significant partnerships already exist for those species included in the CWCS and

CCMSHCP processes, including federal and local government partners. Structured monitoring programs for other amphibian species will be addressed during development of the northern leopard frog conservation plan and in the Native Aquatics Species Plan, but implementation of these activities will be dependent on funding availability.

### **Shellfish**

Little documentation or planning currently exists for most native shellfish species in Nevada, with the exception of native aquatic gastropods.

### **Aquatic Gastropods**

#### **Setting Conservation Objectives**

The aquatic gastropods have the most complete distribution information of all the aquatic priority conservation species (APCS), though only a fraction of potential habitats have been surveyed. The majority of the APCS gastropods are located on BLM lands. Conservation objectives for those species are defined by “A Guide to Managing, Restoring, and Conserving Springs in the Western United States”; U.S. Dept. of the Interior, BLM Technical Reference 1737-17.

#### **Project Development and Implementation**

A working group should be established to contribute expertise, pool data, and develop and implement a management plan for Nevada springs (springs already addressed under other management plans will be noted in the plan).

An inventory and biological evaluation of springs and their condition should be undertaken to provide more complete status information for management planning.

Because many key springs are in a degraded condition, one of the key projects will be to restore degraded springs and associated riparian areas. Identify factors affecting site potential and adjust land uses to allow for natural spring and springbrook recovery

#### **Monitoring, Adaptive Management and Partnerships**

These issues will be addressed once the working group is established; an implementation schedule will be developed, including monitoring progress and adapting management as needed. Partners should include at a minimum BLM ( the major landowner for aquatic

gastropod habitat), Don Sada, (Nevada aquatic gastropod expert), NDOW, and the US Forest Service, another major landowner.

## **Bivalves**

### **Setting Conservation Objectives**

Less than a dozen records are readily available for native freshwater mussel distribution, although anecdotal and historic records indicate that approximately 6 species occur or have occurred in Nevada. The California floater has a Nevada Natural Heritage Program state ranking of Critically Imperiled and is ranked from Vulnerable to Critically Imperiled throughout its range. It is dependent on fish during an important phase in its life history, and its fate is therefore linked with that of fish and fish habitats. No targeted surveys have been documented for freshwater mussels in Nevada. Conservation objectives will be detailed in the Native Aquatics Species Plan, but the main initial objective is to better determine current distribution.

### **Project Development and Implementation**

Conservation strategies identified for key habitats and for fish that share these habitats are the main emphasis for bivalve conservation given available funding. Other bivalve projects will be designed to improve bivalve sighting information and fish host data. The Northwest Freshwater Working Group is developing plans, educational programs, and other conservation strategies for freshwater mussels, including the 6 putative Nevada bivalve species. These tools will be used for bivalve conservation project development and implementation in Nevada where possible.

### **Monitoring, Adaptive Management and Partnerships**

Monitoring of the effectiveness of efforts to increase knowledge of bivalve species distribution will be measured through annual assessments of documented records. This feedback will allow for better assessment of conservation status and potential need for intensified conservation planning.

Existing partnerships for bivalve conservation actions are the Northwest Freshwater Working Group. Other potential partners would include land management agencies, other governmental entities, and the general

public (through outreach/reporting strategies). Many of the current partnerships for other aquatic species could be extended to include bivalves.

## **Crustacea**

Nevada crustacea can be broken into three major taxa: the classes Malacostraca (crayfish, amphipods, scuds, etc.), Ostracoda (ostracods), and Branchiopoda (fairy, clam, and tadpole shrimp). Most crayfish species found in Nevada are non-native.

### **Setting Conservation Objectives**

No crustacea are currently on the Aquatic Species of Conservation Priority list; there is very little information readily available for native crustacea. The first step therefore will be to learn more about what species occur in Nevada and their distribution so that their conservation status can be evaluated.

### **Project Development and Implementation**

Species experts and potential partners will be determined in large part through literature searches and networking (listserves, etc.). Some experts have already been identified through these processes; they will be consulted to assist with providing life history information and developing a list of conservation concerns.

### **Monitoring, Adaptive Management and Partnerships**

Partnerships will be developed as described above; monitoring and adaptive management strategies may be developed once conservation status is clarified

## **CWCS Adaptive Management Strategy**

It should be evident from the preceding implementation and integration strategies that much of the adaptive management analysis that will occur for CWCS will occur as built-in features of existing plans into which CWCS will be integrated. This leaves only the task of discussing how CWCS itself will be updated and adjusted according to results, changing issues and conditions, and increased knowledge from implementation and research. The Nevada CWCS is designed to be a ten-year plan, so complete evaluation and revision is scheduled to occur on a ten-year

rotation.

Because issues and conditions can change so quickly in natural resource management, the Nevada CWCS Development Team believes a five-year partner review would best serve the Nevada wildlife conservation partnership need to keep its strategy current and on-track. This would likely involve the distribution of a five-year CWCS accomplishment report to the extended wildlife conservation partnership with an invitation to provide comment and feedback to NDOW or the CWCS Implementation Team. Significant changes in conservation challenges, opportunities, or species status would be noted and a directional adjustment suggested if necessary, but full revision of the existing plan would not be invited for another five years.

Since the process for determining Species of Conservation Priority has proven to be much more plastic and difficult to maintain consensus than originally perceived, it is recommended that the Species of Conservation Priority process receive an annual review with opportunity for the species expert groups to check in with new information and perspective. As part of the CWCS Implementation Team, the Nevada Natural Heritage Program would be a key partner in the species prioritization review process. It is possible that new methods for ranking species might be utilized by the process to keep it current with the science of species prioritization.

As habitat inventory and assessment techniques improve, they will be implemented into CWCS at each opportunity. Since its most recent delivery in 2004, however, the Southwest ReGAP habitat inventory is expected to maintain its currency in Nevada throughout most of the first planning period. The supplementation of Southwest ReGAP with the LANDFIRE ecological condition assessment is an exciting prospect, and will give land managers

significant analytical power with which to determine appropriate conservation action.

## **Collaborative Structures for Guidance of CWCS Implementation**

As discussed in the “Prioritization” section of this chapter, there are several models of collaborative guidance for CWCS implementation available to NDOW. The next phase of CWCS development and implementation is already on track to be performed by the current CWCS Development (Implementation) Team, and the long-term need for such a close-support team throughout the life of the plan will be assessed as part of that next phase of analysis. It is possible that the individual partners included in the Implementation Team might change from time to time as needs change through the ten-year planning period. As the Team builds support structures to the six major partner planning processes and others, new skills such as meeting facilitation might be necessary.

With regard to the facilitation of partner/stakeholder guidance into CWCS implementation over the life of the plan, agency coordination could easily take place under the auspices of the Nevada Biodiversity Initiative, which receives the participation of all the major land management and wildlife management agencies in the state. To further facilitate input and guidance from the larger partner/stakeholder community, NDOW could choose to commission a standing working group structured similarly to the Governor’s Sage Grouse Conservation Team, or it could choose to convene stakeholder meetings at appropriate intervals and events through the planning period. These ultimate oversight structures will be evaluated and a model selected as part of the next phase of CWCS design.



## Conservation Education and Watchable Wildlife

In terms of human population, Nevada is one of the fastest growing states in the nation, with three of its most populous cities in the top 20 nationwide for growth. Coupled with this rapid growth is an attendant loss of wildlife habitat, environmental contamination, and introductions of exotic species. Residents must be educated about the necessity of protecting habitat and one of the state's most important natural resources, its wildlife. Our residents, both native and new, need additional information to be able to better understand the complex issues that fish and wildlife face in this day of increased development and decreased habitat.

In order to meet the needs of the public, three wide-ranging approaches must be developed and funded in Nevada: a statewide Kindergarten-12<sup>th</sup> grade Wildlife Education curriculum for use in the schools; a statewide Watchable Wildlife program that provides opportunities for urban dwellers to enjoy interpretive wildlife trails in a natural area near their metropolitan center; and a pro-active Outreach program that informs the public about sensitive and threatened species and the eco-systems in which they live.

### Setting Conservation Objectives

Some Conservation Education actions for CWCS are already identified within the Key Habitat Conservation Strategies described previously in this plan. Priorities for these actions will be determined by the CWCS Implementation Team. These actions will be incorporated into the biennial and annual work programs of the Nevada Department of Wildlife's Conservation Education Bureau. The Conservation Education Bureau will work in partnership with counties, local governments, tribal governments, non-profit groups, and state and federal resource partners to support these communication actions. In addition, these objectives will be communicated within a variety of interagency planning processes, including the ongoing Refuge Planning, U.S. Forest Service, and BLM planning processes.

In addition to the Conservation Education actions already designated in this plan, NDOW's Conservation Education Bureau in September 2005 initiated a planning process for the agency's Wildlife Education program. This program plan, which is being developed with input from the public, stakeholders, and various partners, will set goals, objectives and actions for the agency's Wildlife Education program for the next five years. On parallel, the Conservation Education Bureau's Strategic Plan is being revised to update existing goals, objectives and strategies in line with the agency's all encompassing Comprehensive Strategic Plan. Both of these planning elements provide opportunities for enhanced outreach and education about Species of Conservation Priority.

In particular, the Wildlife Education plan will develop the strategies and actions necessary to implement the CWCS Education Objectives identified in this plan. The Conservation Education Bureau Strategic Plan will develop the strategies and actions necessary to implement CWCS Outreach Objectives identified in this plan. The Outreach, Watchable Wildlife, and Wildlife Education Objectives are described below.

## CWCS Outreach Objectives

Nevada's tremendous population growth both strains its natural resources and creates the need for outreach to the burgeoning population. According to the U.S. Census Bureau, Clark County grew by 5.5% in 2002, and 2.6% in 2003, with an average of 6,470 new residents each month in 2003. Demographics show that 56 % of the population is white, 23% are Hispanic, and 8.6 % are African American. New approaches are necessary to communicate with these new audiences and inform them about the challenges facing wildlife and wildlife habitat in their new home state.

Benefits of outreach include:

- Increase in broad-based support for conservation efforts
- Increase in support for public funding mechanisms (including tourism)
- Increased understanding of urgent conservation and human impact issues
- Changes in behavior to preclude negative impacts to wildlife and wildlife habitat

A successfully implemented public outreach program will engender recognition of the value of wildlife as an important quality of life component, enhance public understanding of the interconnectedness of wildlife and the ecosystems upon which they rely, and engender support for wildlife and the programs that support wildlife.

Communications strategies depend upon the outreach need, and would include targeted personal outreach to key groups, mass-media outreach through print, television, and radio, and signage, among others. The following CWCS Outreach Objectives would be addressed:

**Habitat Loss/Destruction.** Urbanization, population growth, and increased use of Nevada's outdoors put the entire state at risk for habitat loss. As the suburbs expand outward in the northern part of the state, mule deer and black bear habitat has been converted to suburban neighborhoods with highway corridors, and schools. OHV trails in the Duck Creek Basin alone, near Ely, in Eastern Nevada, has increased 65% since 1977, with more than 225 km (140 miles) of new routes in that one area. (Jolynn Worley, personal

communication.) Deer, elk, antelope and sage grouse are affected.

In Las Vegas, in the south, suburbs and a burgeoning human population create extensive networks of roads across sensitive desert habitats. Fragile sand dunes, and unique desert hot springs home to endemic fishes and aquatic species found nowhere else in the world, are threatened by development, agricultural uses, and other human activity. Mesquite-catclaw habitat in southern Nevada is disturbed during gravel excavation, affecting burrowing owls, reptiles, and desert rodents, and other wildlife.

Communications to increase understanding of these issues will help gain public support for changes in behavior, and may facilitate increased understanding of wildlife needs as part of local government planning efforts. The identified outreach goals will be:

- Increased public knowledge of the impacts specific activities have upon wildlife and wildlife habitat
- Change behavior to alter OHV use in sensitive areas
- Increased monitoring and input into local government planning processes to support planning for wildlife.

**Sensitive Species.** Nevada ranks third highest nationwide in the percentage of species at risk, with the fourth highest percentage of fish and third highest percentage of amphibians at risk in the U.S. Clark County, home to 70 percent of Nevada's population ranks second in the nation among US metropolitan counties in number of species imperiled by development. Many residents are completely unaware of the number of animals and lack knowledge in what can be done for these species. More educational programs to familiarize the public with the value of wildlife on the list of species of greatest conservation priority are sorely. As people learn more about the life history and habitat needs of these sensitive species, they'll be more prepared, and more likely to get involved in decisions affecting those species. People need to know the consequences of extinction and what they can do to help prevent it. The following sensitive species and ecosystem issues will be addressed in some detail in the outreach programs:

## Endemic Fishes

Razorback Sucker and speckled dace, Virgin River chub and Virgin River spine dace, warm springs pupfish, White River desert sucker

- Increase public knowledge of species life history
- Increase understanding of issues human impacts, from recreation, habitat fragmentation, urbanization, and dewatering have upon the fish species
- Increase understanding of how exotic competitors, such as mosquito fish, guppies, mollies, cichlids affect native habitats and species.

## Mollusks and other Aquatic Species

Volunteers and public to provide inputs on mollusk and amphibian populations

Increase awareness of Aquatic Nuisance Species and their impacts on state waters

Increase awareness of issues related to releasing pets and problems with exotic releases

## Bats

Spotted bats, Allis Big-eared bat, big free-tailed bat, California leaf-nosed bat, fringed myotis

- Increase understanding and appreciation of bats
- Increase understanding of the importance of mines and caves for bat species
- Build partnerships to support bats and bat conservation in the state
- Support bat education in the schools with video and brochure.

## Mesquite/Bosque Ecosystem

- Increase understanding of the value of the mesquite-catclaw environment for a number of ground dwellers including burrowing owl, western diamondback snake and desert tortoise.

## Sage Brush Ecosystem

Sage sparrow, sage brush vole, Brewer's sparrow, mule deer, greater sage-grouse.

- Increase public understanding of the value and importance of the sage brush ecosystem.

## Wetlands, playas and Springs Ecosystems

- Increase public understanding of the value and importance of wetlands, playas and springs in Nevada.

## CWCS Wildlife Education Objectives

Long-range wildlife education will consist of a comprehensive K-12 public school curriculum designed to form attitudes of responsible wildlife resource stewardship. This effort must start in the primary years with continual reinforcement at each grade level. Currently there are no state statutes or funding mechanisms in place to support conservation education. An appropriate education program must be designed and aligned with the Nevada State curriculum standards, with emphasis on usability for the classroom teacher. The curriculum materials must be constructed so that teachers view it as a tool to help them meet their identified district and state standards rather than another requirement to fit into their day. The goals of this Wildlife Education program are:

- Develop life-long interest in state wildlife, and interest in stewardship ethic
- Increase student understanding of the states' wildlife species and the ecosystem where they live
- Provide opportunities for student use of hands-on wildlife kits that support the scientific method of inquiry
- Produce public school graduates prepared to understand issues and make responsible science-based wildlife management decisions.

## Watchable Wildlife CWCS Objectives

A Watchable Wildlife program is a crucial element in the Nevada Department of Wildlife's efforts to inform the people of Nevada about their wildlife resources and, in turn, build support for its conservation. With the rapid influx of an average of nearly 80,000 new residents per year since 1990, according to the 2000 U.S. Census, and over 91 percent of residents living in urban areas, much of Nevada's population is unaware of the area's wildlife, ways to enjoy it, and the impacts they have on it. Therefore, there is a need to offer opportunities for viewing and learning about Nevada's natural wildlife resources. A fully equipped Watchable Wildlife program that enables the public to facilitate their own learning at interpretive trails and information kiosks and viewing platforms. In this way, NDOW could offer additional opportunities to view and enjoy

wildlife in both rural and urban environments.

Currently, NDOW is affiliated with several facilities near urban areas throughout the state including the Oxbow Nature Study Area, Verdi Wildlife Education Center and Washoe Lake Wetlands, which provide information through the use of kiosks in a natural setting. Kiosks are also being planned and developed for seven Wildlife Management Areas across the state. Wildlife viewing festivals are currently held in the City of Fallon (Spring Wings Bird Watching Festival) and with the City of Hawthorne's annual Loon Tour. In addition, the agency recently supported development of a statewide birding map with the Lahontan Audubon Society.

Opportunities to expand the state's watchable wildlife program could be entered into with partners at the federal, state, county and city level. Signage, kiosks, seminars, and clinics in these areas would provide increased information and education to the public statewide on wildlife-related issues, techniques for viewing wildlife, feeding birds, and landscaping to encourage or discourage wildlife visitors. These components would be promoted using newspaper articles, radio, and print media.

Ultimately, economic benefits to the state from watchable wildlife could be tremendous. According to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, over \$250 million was spent in Nevada on wildlife watching trips and equipment, indicating a real interest in watchable wildlife. A Watchable Wildlife program would prove beneficial in the following ways:

- Increase in broad-based support for conservation efforts
- Increase in support for public funding mechanisms (including tourism)
- Increased understanding of urgent conservation and human impact issues.

## Implementation

Implementation of the Conservation Education actions

for a statewide Watchable Wildlife, comprehensive Kingdergarten-12 Wildlife Education program, and Outreach efforts for the identified Conservation Strategies will be effected through regional staff, and through resource partners across the state. A number of resource agencies already work cooperatively on planning efforts, such as the Cooperative Resource Management subcommittee on information (Nevada Resource Outreach Network). This group is already in existence, and meets monthly to share information about resource activities around the state and develop communications strategies on key issues. Most recently, sage grouse have risen as a key issue, and the group is currently focused on developing a statewide sage grouse communications strategy in support of the Governor's Sage Grouse Team's implementation efforts. In the past members of the CRM PIO group have worked out outreach efforts Leave No Trace messaging. In the future, additional emphasis on Proper and Ethical Use of OHVs is identified. This is one of the key outreach objectives in the CWCS, and can be met through this collaborative communications partnership.

Partners and collaborative communications efforts are essential if conservation planning is to be effective. To date state and federal agencies in the state have provided good information and communications on joint efforts, in particular, BLM, US Fish and Wildlife Service, U.S. Forest Service, and Natural Resource.

## Effectiveness Monitoring

Public surveys through the agency's Comprehensive Strategic Planning Process, which occurs every five years, and through regional survey approaches, such as the Western Association of Fish and Wildlife Association's recent survey on public attitudes about "Wildlife Values in the West, 2004" will be used to identify whether key communications goals are being met. In addition, online survey mechanism, focus group surveys via telephone and print, and regional focus groups, will be applied to identify that outreach, education and watchable wildlife goals and objectives are being met.

## List of Abbreviations and Acronyms

ACEC: Area of Critical Environmental Concern	DPS: Distinct Population Segment
AGF(D): Arizona Game and Fish Department	DRI: Desert Research Institute
ANS: Aquatic Nuisance Species	ESA: Endangered Species Act
AOU: American Ornithological Union	GAP: Gap Analysis Program
ASU: Arizona State University	GBBO: Great Basin Bird Observatory
ATCAS: Amargosa Toad Conservation Agreement/Strategy	GHABCOM: Global Habitat Comments
ATWG: Amargosa Toad Working Group	HCP: Habitat Conservation Plan
BBS: Breeding Bird Survey	IUCN: The International Union for the Conservation of Nature and Natural Resources (World Conservation Union)
BCT: Bonneville Cutthroat Trout	LCRMSCP: Lower Colorado River Multi-species Conservation Plan
BLM: Bureau of Land Management	LCT: Lahontan Cutthroat Trout
BOR: Bureau of Reclamation	LMB: Largemouth Bass
BSS: Big Spring Spinedace	LTBMU: Lake Tahoe Basin Management Unit
CARA: Conservation and Reinvestment Act	MDEI: Mojave Desert Ecosystem Initiative
CAS: Conservation Agreement/Strategy	MRREIAC: Muddy River Regional Environmental Impact Alleviation Committee
CBC: Christmas Bird Counts	MSCP: Multi-species Conservation Plan
CCAA: Candidate Conservation Agreement with Assurances	MSHCP: Multi-species Habitat Conservation Plan
CR: Colorado River	NAS: Naval Air Station
CWCS: Comprehensive Wildlife Conservation Strategy	NBI: Nevada Biodiversity Initiative
DAPTF CA/NV: Declining Amphibian Population Task Force, California/Nevada Chapter	NDOW: Nevada Department of Wildlife
DFC: Desert Fishes Council	NDSP: Nevada Division of State Parks
DOD/DOI: Department of Defense/Department of the Interior	NESF: Northeastern Subpopulation Spotted Frog
DOE: Department of Energy	NESFCAS: Northeastern Subpopulation Spotted Frog Conservation Agreement/Strategy

NESFTT: Northeastern Subpopulation Spotted Frog Technical Team	SNWA: Southern Nevada Water Authority
NFH: National Fish Hatchery	SWG: State Wildlife Grant
NFHTC: National Fish Hatchery and Technology Center	SW PARC: Southwest Chapter of Partners in Amphibian and Reptile Conservation
NFWG: Native Fish Work Group	TNC: The Nature Conservancy
NGO: Non-Governmental Organization	TRPA: Tahoe Regional Planning Agency
NNHP: Nevada Natural Heritage Program	TSF CAS: Toiyabe Subpopulation Spotted Frog Conservation Agreement/Strategy
NPS: National Park Service	TSFTT: Toiyabe Subpopulation Spotted Frog Technical Team
NRA: National Recreation Area	TU: Trout Unlimited
NRCS: Natural Resource Conservation Service	UDWR: Utah Division of Wildlife Resources
NTS: Nevada Test Site	UNR: University of Nevada, Reno
NWFMWG: Northwest Fresh Mussel Working Group	UNLV: University of Nevada, Las Vegas
NWR: National Wildlife Refuge	USBR: United States Bureau of Reclamation
OHV: Off-Highway Vehicle	USDA: United States Department of Agriculture
ORV: Off-Road Vehicle	USFS: United States Forest Service
PARC: Partners in Amphibian and Reptile Conservation	USFWS: United States Fish and Wildlife Service
PARC A & R HMG: Partners in Amphibian and Reptile Conservation Amphibian & Reptile Habitat Management Guidelines	USGS: United States Geological Survey
Q1: Question 1 Conservation Bond and Resource Protection Grant Program	USGS-BRD: United States Geological Survey, Biological Resources Division
PIF: Partners in Flight	VR: Virgin River
RIT: Recovery Implementation Team	VRRMRP: Virgin River Resource Management and Recovery Program
RLF CAS: Relict Leopard Frog Conservation Agreement/Strategy	WMA: Wildlife Management Area (Nevada Department of Wildlife)
RLFCT: Relict Leopard Frog Conservation Team	YCT: Yellowstone Cutthroat Trout
RT: Recovery Team	
SHA: Safe Harbor Agreement	
SMP: Species Management Plan	

## Glossary

**alluvial fan:** A deposit of rocks, sand, gravel, and finer materials that has been laid down by water as it flows from a mountainous area on to a plain.

**AOU (American Ornithologists' Union):** The oldest and largest organization in the New World devoted to the scientific study of birds. The recognized arbiter of lumping, splitting, and naming of bird species in North America.

**biogeography:** The study of the geographical distributions of organisms, their habitats and the historical and biological factors which produced them.

**commensalism:** a mutually beneficial relationship between organisms of different species.

**edaphic:** Influenced by the nature of the soil.

**endemic:** Native to, and restricted to, particular geographical region.

**habitat suitability model:** a description of physical factors, often quantified numerically, that describe the habitat preferred by a species.

**halophytic:** tolerant of saline conditions.

**hibernaculum:** a shelter occupied during the winter by a dormant animal. Plural: hibernacula.

**lentic:** pertaining to static or slow moving open water.

**lotic:** pertaining to fast-moving water habitats, such as streams and rivers.

**mesic:** characterized by the presence of moderate water.

**orographic:** pertaining to relief factors such as hills, mountains, plateaux, valleys and slopes.

**seral:** of, relating to, or constituting an ecological sere (a series of ecological communities formed in ecological succession).

**stochasticity:** referring to patterns resulting from random factors.

**Urostyle:** a spikelike bone, a downward extension of the vertebral column. Its presence is evidence that primitive frogs probably had tails.

**xeric:** characterized by aridity.

**xerophytic:** tolerant of arid conditions.



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