

FINAL CONCEPT PAPER

**NEVADA PARTNERS IN FLIGHT ALL BIRD MONITORING
PROGRAM**

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April 2002

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SUMMARY

The purpose of the NVPIF All Bird Monitoring Program is to develop and implement a coordinated, statewide, comprehensive, long-term monitoring program that meets all of the objectives outlined in the BCP (Neel 1999). Existing monitoring programs will contribute to this effort, but the focus of the program is to develop a statewide network of point count transects that will provide coverage throughout all of the physiographic regions and habitat types covered by the BCP and generate status and trend information for all bird species breeding in Nevada. Additional monitoring efforts are proposed to cover priority species not adequately sampled by point count transects such as nocturnal species including Flammulated Owl and secretive, dispersed, and threatened and endangered species such as Long-billed Curlew and Yellow-billed Cuckoo.

This endeavor involves the cooperation and efforts of numerous federal, state, and non-profit organizations as well as volunteers. The effort and funding will be shared among partners and volunteers, but outside funding sources will also be identified for project support. This is a monumental task considering the size of the state, the relatively low number of people available to conduct surveys, and the considerable number of birds that breed in Nevada. However, this proposal outlines an attainable program that will produce indispensable information used to measure the success of bird conservation efforts in Nevada.

INTRODUCTION

Nevada has a long ornithological history dating back more than 100 years. In the 1800s, Robert Ridgway was the first ornithologist to observe and record the avifauna of Nevada (Ridgway 1877). Other expeditions through Nevada in the 1800s also provided early ornithological records. The first comprehensive ornithological records for Nevada were published by Jean Linsdale in the first half of the twentieth century (Linsdale 1936, Linsdale 1951) and two comprehensive books were published in the 1980's: Fred Ryser's *Birds of the Great Basin* (Ryser 1985) and J.R. Alcorn's *The Birds of Nevada* (Alcorn 1988). Alcorn (1988) lists 456 bird species that are known to occur, or could potentially occur in Nevada, but Nevada has no endemic species (Ryser 1985). In addition to Linsdale and Alcorn, several researchers from the Museum of Vertebrate Zoology in Berkeley, most notably led by Ned K. Johnson, also contributed to the twentieth century record of avifauna in southern Nevada (Johnson 1965, Johnson and Russell 1962, Marshall 1939). In the 1960s, Fred Ryser and Jack Knoll systematically retraced the steps of the great nineteenth-century ornithologist, Ridgway; a century after he explored the lower reaches of the Truckee River (Ryser 1985), to determine differences in bird distribution and abundance. Dr. Johnson oversaw the first bird monitoring study in Nevada, conducted from the 1930s to early 1970s (Johnson 1974, Johnson 1978), and it detected expanding ranges of Dusky Flycatcher, Plumbeous Vireo, and Cassin's Finch as well as colonization by Grace's Warbler (Johnson 1978).

In the latter half of the 20th century, bird monitoring in Nevada gained much needed momentum. Breeding Bird Surveys (BBS) have been conducted in Nevada since at least 1968 (Sauer *et al.* 2001) and consist of driving a 24.5 mi survey transect and making 50 stops at which 3 minute counts are conducted (Sauer *et al.* 2001). This survey technique has limitations in analyzing results because surveys cover a large area generally encompassing many habitat types. The national BBS route system has provided valuable information on species abundance and population trends in other states, but Nevada's Breeding Bird Survey route system and long-term database is incomplete (Sauer *et al.* 2001) and Nevada's habitat types and physiographic regions are not all represented in the sample.

The Nevada Division of Wildlife (NDOW) has also contributed much effort to bird monitoring throughout the state. In 1973, the Nevada Division of Wildlife hired its first non-game biologist who initially focused on surveying and monitoring raptors statewide (Herron *et al.* 1985). Endangered species such as the Peregrine Falcon and Bald Eagle received much attention early on. Subsequent efforts focused on Species of Concern including White-faced Ibis, Sandhill Crane, Western Snowy Plover, and Phainopepla. The Nevada Division of Wildlife has also targeted specific survey and inventory efforts toward generating baseline data sets to support the conservation of several important habitats in Nevada, including wetland areas of significant shorebird use, old growth forest in the Sierra Nevada, and riparian areas such as the Humboldt River.

A number of federal agencies have contributed to numerous conservation efforts and bird monitoring in Nevada. Notable contributions include the U.S. Forest Service's (USFS) support of riparian point counts since 1994 and their collaboration in old growth forest wildlife investigations as well as significant Willow Flycatcher investigations by the Bureau of Reclamation (BOR). The Bureau of Land Management (BLM) has conducted long-term monitoring of several raptors in eastern Nevada and Washoe County including Ferruginous Hawk, Golden Eagle, and Prairie Falcon and they have supported riparian point counts since 1994. The U.S. Fish and Wildlife Service (USFWS) contribute to many refuge monitoring programs such as American White Pelican nesting at Anaho Island since the early 1900's.

The Great Basin Bird Observatory (GBBO) was formed in 1997 to take the lead in recent bird monitoring efforts in Nevada. GBBO was launched largely as a result of the Partners in Flight (PIF) planning effort for the purpose of implementing many of the monitoring strategies of the BCP (Neel 1999). The Nevada Breeding Bird Atlas (NVBBA) was its first major project, and it has been successful in establishing a detailed distribution of all of Nevada's breeding birds. Atlas work from 1997-2000 confirmed an astonishing 240 bird species breeding in Nevada.

PARTNERS IN FLIGHT

The Nevada Partners in Flight Bird Conservation Plan (Neel 1999) outlines 63 conservation objectives established by the Nevada Working Group. Most of these objectives deal with breeding birds and address declines in bird populations from the loss of breeding and foraging habitat through land conversion and degradation, pesticide use, and other factors. The Group's ability to achieve its objectives will be evaluated in 2004 with the short-term goal of implementing the Plan's Actions several years prior to the evaluation date. The long-term goal of the project is to establish a long-term, all-bird monitoring program to track the distribution and abundance of birds breeding in Nevada. A separate winter bird-monitoring program will be established to meet the objectives outlined in the BCP for wintering birds.

The primary goal of Partners in Flight is to focus resources on habitat protection and enhancement, the improvement of monitoring and trend analysis, research, management, and education programs to maintain and enhance native, non-game land bird populations. PIF complements the successful North American Waterfowl Management Plan as well as the recently initiated Shorebird Conservation Plan (Brown *et al.* 2000). The Nevada Working Group was initiated in 1993, and Nevada's Bird Conservation Plan was completed in 1999 (Neel 1999). Since then, efforts have focused on implementing the objectives outlined in the Plan by the 2004 evaluation date.

Through Partners in Flight, many interests have come together in Nevada with bird conservation in mind. Significant participation in the Nevada Working Group has come from numerous federal, state, and non-profit organizations. A community of partners has been brought together and will continue to be maintained, including:

- *Federal groups*: the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), Bureau of Land Management (BLM), and Bureau of Reclamation (BOR);
- *State Groups*: the University of Nevada in Reno and Las Vegas (UNR and UNLV), Biological Resources Research Center (BRRC), and the Nevada Division of Wildlife (NDOW);
- *Non-profit organizations*: the Lahontan and Red Rocks Audubon Societies (LAS and RRAS) and the Great Basin Bird Observatory (GBBO); and
- A large and dedicated corps of *enthusiastic volunteers* (BBA block busters, PIF participants, LAS and RRAS volunteers, etc.).

PHYSIOGRAPHIC REGIONS AND HABITAT TYPES IN NEVADA

Nevada encompasses four physiographic regions identified by Partners in Flight as spatial units for implementing conservation efforts, monitoring birds, and analyzing results (Neel 1999, Pashley *et al.* 2000). These regions include Basin and Range, Columbia Plateau, Sierra Nevada, and Mojave Desert. The Basin and Range Region covers 83% of the land area of Nevada and 64% of the Region falls within the state. There is an obvious need for monitoring and conservation efforts in this region. The remaining three regions combined cover only 17% of Nevada, but they provide unique and important habitats in the state. The Mojave Desert is home to the majority of Nevada's human inhabitants and although it comprises only 10% of Nevada's land area, the state encompasses a third of the entire Mojave Desert. This area is of high conservation concern. The Sierra Nevada and Columbia Plateau Regions cover significantly less land area (1% and 6%) and the area contained in Nevada is a small portion of the entire Regions (1% and 5%). However, NVPIF needs to consider all regions in Nevada for long-term monitoring and conservation efforts.

Fifteen habitat types were identified by the BCP based on the vegetation classes identified by the Nevada GAP project. A detailed description of habitat types is found in the BCP (Neel 1999). The All Bird Monitoring Program will include monitoring in the following 15 habitat types:

- Agricultural Lands
- Aspen
- Cliff and Talus
- Coniferous Forest
- Lowland Riparian
- Mesquite and Catclaw Acacia
- Mojave Shrub
- Mojave Parkland
- Montane Riparian
- Montane Shrub

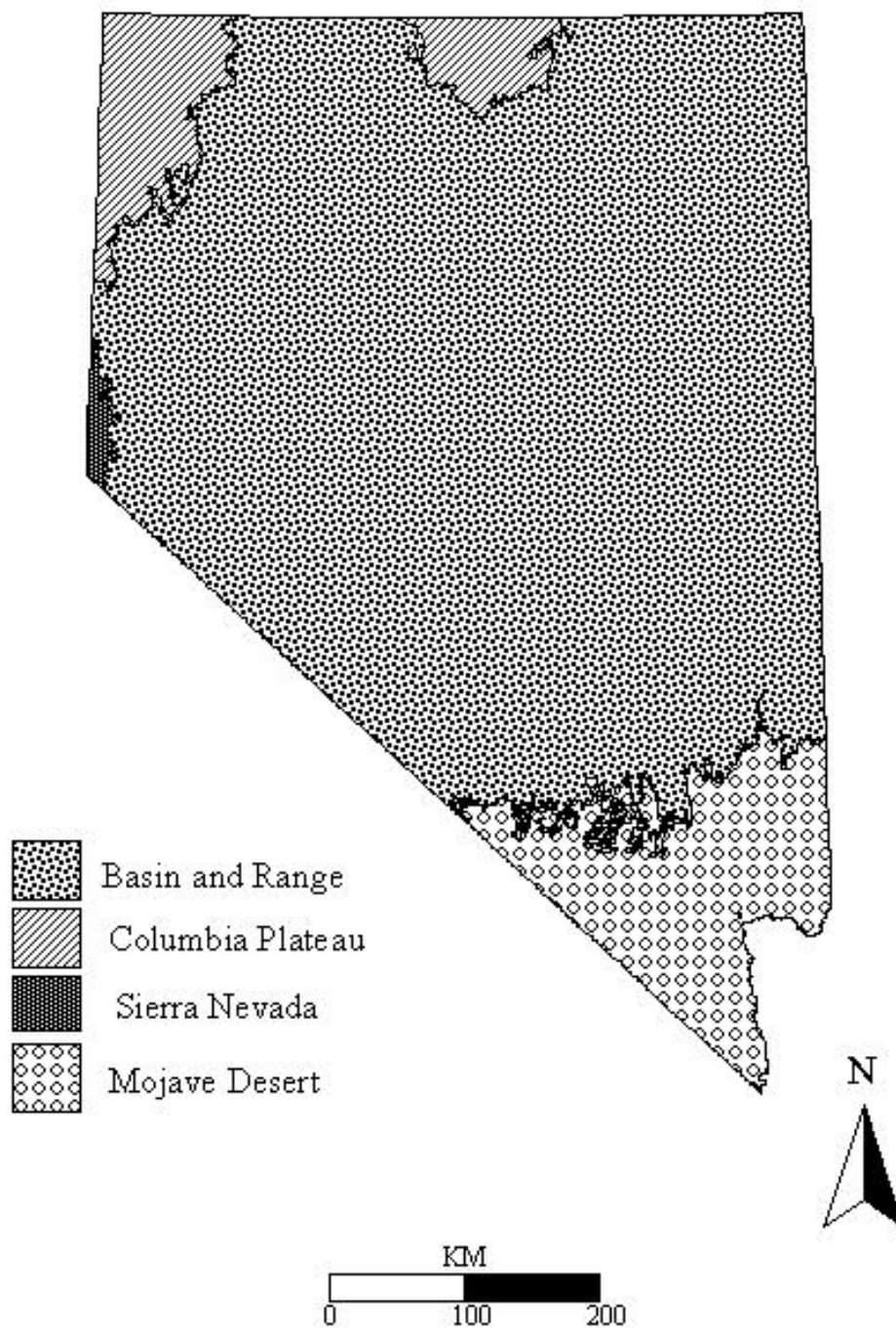
- Mountain Mahogany
- Pinyon-Juniper
- Sagebrush
- Salt Desert Scrub
- Wetland and Lakes

Basin and Range

This is by far the largest physiographic region in Nevada and covers most of the state. It lies in the rain shadow of the Sierra Nevada to the west and is south of the Columbian Plateau and north of the Mojave Desert. This region has by far the most diverse assemblage of habitat types than any other physiographic region occurring in the state. Grazing, fire, and invasive plants have all helped change the character of habitat types throughout the Basin and Range Region. Water management and use have also dramatically changed the character of this region's wetlands.

<u>Habitat type</u>	<u>Representative priority species</u>
Agricultural Lands	Ferruginous Hawk, Burrowing Owl
Aspen	Lewis's Woodpecker, Cooper's Hawk
Coniferous Forest	Flammulated Owl, Northern Goshawk
Montane Riparian	Red-naped Sapsucker, Orange-crowned Warbler
Pinyon-Juniper Woodland	Gray Vireo, Pinyon Jay, Juniper Titmouse
Sagebrush Steppe	Prairie Falcon, Greater Sage-Grouse, Sage Thrasher
Salt Desert Scrub	Loggerhead Shrike, Burrowing Owl
Wetlands and Lakes	Clark's Grebe, American White Pelican, American Avocet

Figure 1. Nevada Partners in Flight physiographic regions in Nevada.



Columbia Plateau

Arid tablelands and lava plains characterize this physiographic region, which occurs mostly in Oregon, Idaho, and Washington. The small portion of this region located in Nevada contains habitat types very similar to those found in the Basin and Range Region. Therefore, NVPIF has decided not to distinguish between these two regions for sampling purposes (see Methods section), largely because there are no species found in Nevada’s portion of the Columbia Plateau that do not also occur in the state’s Basin and Range Region.

<u>Habitat type</u>	<u>Representative priority species</u>
Coniferous forest	Calliope Hummingbird, Lewis’s Woodpecker
Sagebrush steppe	Long-billed Curlew, Gray Flycatcher, Sage Sparrow
Wetlands and Lakes	Western Grebe, Sandhill Crane

Sierra Nevada

The Sierra Nevada Mountains rise sharply from arid basins and slope gently into Lake Tahoe along the Carson Range in western NV. The vegetation at lower elevations is dominated by lodgepole pine on the east and ponderosa and Jeffrey’s pine in the Tahoe Basin. Vegetation at higher elevations includes red and white fir, spruce, and alpine tundra. Several species found in Nevada occur only in the Sierra Nevada Region such as White-headed Woodpecker and California Spotted Owl. Therefore, NVPIF recognizes the importance of monitoring birds in this region despite the very small portion occurring in the state. However, as with the Columbia Plateau Region, the Sierra Nevada will not be distinguished from other regions for sampling purposes (see Methods section). Rather, the All Bird Monitoring program will ensure that monitoring occurs in some portion of the Sierra Nevada Region in Nevada in order to monitor species not present in other regions.

<u>Habitat type</u>	<u>Representative priority species</u>
Coniferous forest	White-headed Woodpecker, Olive-sided Flycatcher
Montane Riparian	Wilson’s Warbler, MacGillivray’s Warbler
Montane Shrub	Gray Flycatcher, Calliope Hummingbird

Mojave Desert

A large portion of the Mojave Desert lies within a small portion of southern Nevada and between the Great Basin to the north and the Sonoran Desert to the south. The most common feature of this region is the occurrence of broad, sparsely vegetated plains, but there are also several important mountain ranges, and the Colorado River and its

tributaries. To ensure that this region receives the appropriate bird monitoring attention it deserves, the site selection process will first stratify Nevada by Mojave Desert to the south and Basin and Range, Columbia Plateau, and Sierra Nevada to the north. Site selection will then be further stratified by habitat type within each broad geographic area to ensure complete coverage in Nevada (see Methods section).

<u>Habitat type</u>	<u>Representative priority species</u>
Coniferous forest	Flammulated Owl, Grace's Warbler
Lowland Riparian	Willow Flycatcher, Lucy's Warbler, Blue Grosbeak
Mesquite/Catclaw	Phainopepla, Loggerhead Shrike
Mojave Shrub	Prairie Falcon, LeConte's Thrasher
Pinyon/Juniper Savannah	Gray Vireo

SURVEY NEEDS

The following are monitoring and data needs outlined in the BCP (Neel 1999), some of which are fulfilled, at least partially, by current survey efforts.

For most priority species covered in the BCP, survey and monitoring, primarily by point count, is recommended to determine their distribution, population status, and population trends. Some of the recommendations call for periodic surveys, meaning surveys conducted on a certain number of year basis, and others call for regular (yearly) or intensive (multiple efforts within a year) monitoring. Monitoring a species in a particular habitat in which it occurs is also often recommended as well as surveying in the priority areas described below. For some bird species there is currently enough survey information available to evaluate the status and trend of a species, but for most species, much more survey effort is needed. For many species, point count surveys will be sufficient to monitor status and trend, while for others alternative survey methods need to be implemented. The BCP often recommends analyzing the current survey effort in the state, by Breeding Bird Survey, MAPS station, or other survey methods currently employed, to determine where monitoring gaps occur for a species. Our knowledge of the distribution and abundance of certain species in Nevada is lacking; for these birds the BCP often recommends survey efforts to determine where a species may occur outside of its known breeding distribution. Other survey recommendations include increasing the current survey effort or simply continuing current surveys. Since the BCP recommends survey methods and effort for all 50 species covered by the Plan, there is not enough room to include all of them here. The following are examples of monitoring efforts recommended for priority species:

- Survey for Three-toed Woodpecker in potential habitat by point count to determine if they occur outside of the one known breeding population in the Snake Range in Great Basin National Park
- Monitor Short-eared Owls on a three-year interval to determine status and trend
- Survey for Flammulated Owls to determine their distribution and abundance in Nevada
- Conduct Boblink surveys by point count in the three priority areas
- Determine the status and trend for Grace's Warbler populations in Nevada
- Establish monitoring points within mesquite/catclaw and montane shrub habitats to document population trends of Loggerhead Shrike where BBS routes do not provide adequate coverage
- Determine Pinyon Jay population status and trend in at least three of the five priority areas and inventory Pinyon Jay presence in old growth pinyon stands in all of the five priority areas
- Survey and map all known Bank Swallow colony sites
- Monitor Black Tern nesting activity and productivity in priority areas and determine if other important breeding sites exist with a comprehensive, statewide survey of potential nesting sites

Existing data

The BCP recommends using Breeding Bird Atlas, Breeding Bird Survey, MAPS station, and other survey data to identify previously unknown nest sites, glean distribution and abundance data, evaluate where survey effort is lacking, compile species-specific databases, and to evaluate where coverage is inadequate. For example, the BCP recommends the following:

- Integrating Prairie Falcon monitoring with regular analysis of BBA and BBS data
- Evaluating the present occurrence of point count, Breeding Bird Survey, or other appropriate survey methodologies in Olive-sided Flycatcher, Western Bluebird, and Ash-throated Flycatcher habitats and supplement where necessary
- Evaluating Breeding Bird Atlas data for distribution and occurrence of Flammulated Owls
- Compiling Breeding Bird Atlas, Breeding Bird Survey, banding station, and incidental records into a specific White-headed Woodpecker database
- Analyzing Breeding Bird Atlas data for nesting distribution of Long-billed Curlews

Priority areas

The BCP outlined priority areas where monitoring and conservation efforts should be focused for particular species. The site selection process should ensure that these priority areas are adequately covered in the statewide point count network. For 12 priority species, monitoring is recommended in the following areas:

North Tuscarora Mountains; Independence Range; Independence Valley; Jarbidge Mountains; Mary's River; East Humboldt Range; Humboldt River; Humboldt Valley; Little Humboldt River; Sierra Nevada; Goose Creek (Elko Co.); Santa Rosa Mountains; Ruby Mountains; Ruby Valley; Ruby Lakes NWR; White Mountains (Esmeralda Co.); Flowery Range (Douglas Co.); the Toquima, Monitor, and Toiyabe Ranges (Nye Co.); the ranges of White Pine, Elko, Lincoln and Humboldt Counties; Sheep Range; Spring Mountains; Egan-Schell Creek Ranges; Snake Range; Starr Valley; Secret Valley; Stillwater NWR; Carson Sink; and Carson Lake.

Habitat studies

Aside from monitoring breeding birds, the BCP also outlines a number of habitat studies for particular species. These studies include:

- Study post-fledging Short-eared Owl habitat use
- Determine Orange-crowned Warbler habitat use and preferences in aspen
- Determine habitat relationship with breeding density of Lucy Warblers
- Study Black-throated Gray Warbler and Juniper Titmouse habitat preference
- Determine MacGillivray's Warbler response to habitat changes effected by management actions

Raptors

One of the main objectives outlined in the BCP for raptors includes updating the NDOW raptor nest database established by NDOW between 1975 and 1985. Recommended survey efforts include:

- Conduct cliff-nesting raptor surveys for species including Prairie Falcon
- Monitor nesting Swainson's and Ferruginous Hawks
- Regularly survey and monitor Cooper's Hawks and Northern Goshawks

Atlases

The BCP called for the creation of several atlases including:

- Ferruginous Hawk nest atlas for professional reference
- Burrowing Owl colony atlas that delineates areas of high breeding densities
- Bank Swallow colony site atlas
- Black Tern breeding site atlas

Other studies

The following are additional studies and survey efforts outlined in the BCP not included above:

- Study the effect of pesticide use and rodent control on breeding Swainson's Hawks

- Monitor Brown-headed Cowbird brood parasitism of Southwestern Willow Flycatcher nests
- Monitor isolated nesting concentrations of Loggerhead Shrike in montane shrub around Battle Mountain to determine basic population ecology, status and trend, and habitat use and preferences in these unique isolated populations
- Analyze the impact of varying degrees of riparian big sage removal on Gray Flycatchers
- Determine Dobkin and Wilcox's (1984) study of Black-throated Gray Warbler is repeatable and replicate methods in the same study area to document changes in population, habitat conditions, etc.

ALL BIRD MONITORING PROPOSAL

The purpose of the NVPIF All Bird Monitoring Program is to develop and implement a coordinated, statewide, comprehensive, long-term monitoring program that meets all of the objectives outlined in the BCP (Neel 1999). Existing monitoring programs will contribute to this effort, but the focus of the program is to develop a statewide network of point count transects that will provide coverage throughout all of the physiographic regions and habitat types covered by the BCP and generate status and trend information for all bird species breeding in Nevada. Additional monitoring efforts are proposed to cover priority species not adequately sampled by point count transects such as nocturnal species including Flammulated Owl and secretive, dispersed, and threatened and endangered species such as Long-billed Curlew and Yellow-billed Cuckoo.

Within this network, once established, additional opportunities to focus on more specific habitat relationship studies will be identified. The ultimate goal of the comprehensive strategy is to combine and coordinate as much of the monitoring need for Nevada into a single effort and freely share results.

The 50 priority species identified by the Bird Conservation Plan and the physiographic regions and habitat types in which each occurs in Nevada are listed in Table 1. While the Nevada PIF Working Group used these species to direct the establishment of objectives and strategies, the group has recognized that a broader, more comprehensive species monitoring strategy is expedient to implement with almost no more significant effort than that required to provide monitoring for all the targeted species. Therefore, it is the goal of this All Bird Monitoring Program to address all bird species breeding in Nevada, capturing within it priority species identified in the BCP.

The NVPIF Bird Conservation Plan (Neel 1999) also identifies conservation objectives, goals, and strategies for migrant and over wintering bird species in Nevada. These objectives will not be covered in this proposal aimed solely at breeding birds in Nevada, but will be addressed in separate migrant and wintering bird monitoring programs to be designed as complementary units of the statewide comprehensive monitoring strategy.

METHODS

SITE SELECTION

Existing monitoring efforts will determine many of the sites selected for the statewide coverage. Some sites may have to be hand-fit after the point count network has been deployed to address certain priority-area concerns. Sites in the point count network will be selected by a stratified random selection process so that there is comprehensive coverage throughout all habitat types in Nevada and all breeding birds are monitored. The site selection process will first be stratified by north and south regions, the reasons for which are described in the Physiographic Regions section above. The northern region is comprised of three physiographic regions: 1) Basin and Range (24 Million ha in Nevada, 83% of Nevada's land area), 2) Columbian Plateau (1.7M ha, 6%), and 3) Sierra Nevada (130,000 ha, 1%). The southern region is comprised of one physiographic region: the Mojave Desert (3M ha, 10%). Site selection will then be additionally stratified by the 15 habitat types outlined in the BCP, which are nearly identical to those used for the NVBBA. The purpose of the two stratifications is to provide appropriate coverage of all major habitat types within each of the two nearly distinct biomes. The site selection process will also use species distribution maps produced by NVBBA data to help determine where monitoring may be most effective for particular species.

Physiographic Regions

Physiographic regions (Figure 1) were identified based on descriptions and figures of the areas from PIF. A GIS database developed by the BRRC was used that delineates all of the basins and ranges in Nevada based on: 1) geology maps that delineate bedrock, alluvial divides, ridgelines, and sills; 2) Nevada GAP vegetation maps used to delineate plant distribution; 3) Digital Elevation Models (DEM) for elevations; 4) hydrology maps; and 5) 1:100,000 USGS maps to distinguish questionable features. This coverage, on top of a DEM of the entire intermountain west, was used to delineate physiographic regions that will be used to stratify Nevada into north and south regions to select sampling areas for the statewide, all bird monitoring program.

Habitat Types

NVPIF identified fifteen habitat types in Nevada, based on the Nevada GAP project GIS database, and their selection and detailed descriptions are provided in the BCP (Neel 1999). These habitat types are nearly identical to those used for the Nevada Breeding Bird Atlas. The site selection process described above will ensure thorough coverage of birds breeding in all of these habitat types.

SURVEY METHODS

POINT COUNTS

Point count surveys will be the primary method used to fulfill the majority of objectives for bird monitoring set forth in the BCP (Neel 1999). The point count method allows the

study of yearly changes in bird species diversity and abundance along survey transects, and to compare between transects in different habitat types. The point count method is probably the most efficient method for monitoring birds and its use is widespread throughout the world (Ralph *et al.* 1993). It is particularly useful for forested habitats and in rough terrain. Point counts involve stopping at points established at a specified distance apart along a line transect and recording all the birds seen or heard for a given amount of time at either a fixed or unlimited distance from the point. The point count transects are surveyed one or several times a year and can be walked or driven.

New point count transects will consist of ten points spaced 250 meters apart along transects (Ralph *et al.* 1995). Transects will be surveyed once per year during the breeding season starting at dawn through mid-morning. Surveys will consist of stopping for ten minutes at each point and recording all birds detected by sight or sound for an unlimited distance. The birds detected by 3 min., 5 min., and ten minute intervals will be recorded and categorized into a distance of less than 50 m, 50 to 100 m, and greater than 100 m from the observer.

Since Nevada is such a large state with so few inhabitants, particularly birders, NVPIF opted for surveying each transect only once per year facilitating the coverage of a larger geographic area while still collecting information useful in analyzing the distribution, abundance, status and trend of breeding birds in Nevada. Where negative trends or unique situations are detected, more intensive or species-specific studies should be used to follow-up these important discoveries. This sampling and monitoring philosophy is somewhat like that used for the NVBBA, but the proposed point count network will enable long-term trend analysis.

CURRENT POINT COUNT SURVEYS

Ongoing point count efforts are being implemented under a variety of methodologies all based on the basic point count principles described above. One goal of this monitoring program is to integrate methodologies for future survey efforts.

Federal Agencies

I. The Bureau of Reclamation and U.S. Geological Survey

BOR and USGS have surveyed the Virgin and Muddy Rivers in Clark County Nevada for neotropical migrants from 1997 to 2001 (Crowe *et al.* 1999) and surveys will continue for a final year in 2002. Southwestern Willow Flycatcher surveys were conducted at 12 locations along the Virgin River between Mesquite and Lake Mead and at 1 location on the Muddy River at its confluence with Lake Mead. Surveys followed a standardized protocol (Sogge *et al.* 1997). Neotropical migrant surveys were conducted along the Virgin River along 5 transects each with 5 points starting in 1998 and at an additional 30 points in 1999 (Crowe *et al.* 1999). Point count surveys were conducted in cooperation with the San Bernardino County Museum (SBCM) using recommended standardized methods presented in U.S. Forest Service Technical Report PSW-GTR-149 (Ralph *et al.*

1995). Surveys were conducted between 0.5 and 3.5 hours after sunrise and consisted of five-minute stops at each of 5 point-count stations along a one kilometer transect. Every bird detected by sight or sound was recorded within an unlimited detection distance. Surveys were conducted eight times, at approximately one-week intervals, over a two-month period during the breeding season. Focal species detected on point count surveys included Yellow-breasted Chat, Yellow-billed Cuckoo, Lucy's Warbler, and Blue Grosbeak.

II. National Park Service

- Point counts and Brown-headed Cowbird surveys in Great Basin NP and Lake Mead NRA

III. U.S. Forest Service

- Point count survey network in Lake Tahoe Basin
- Riparian point counts in Santa Rosa Mountains (with NDOW)

IV. U.S. Fish and Wildlife Service

- Clark County Habitat Conservation Plan studies

V. Bureau of Land Management

- Riparian point counts in Humboldt and Pershing Counties (with NDOW)

State Groups

I. Nevada Division of Wildlife

BLM Winnemucca District Cooperative Project

- Approximately 50 riparian point counts in Humboldt and Pershing Counties
- 12-15 transects are currently sampled each year

USFS Santa Rosa District (Humboldt-Toiyabe National Forest)

- 10-15 riparian songbird point counts in the Santa Rosa Mountains
- Currently inactive, last sampled in 1994

NDOW Eastern Region Permanent Point Count Network

- 25 point counts, five in each of five habitat types- riparian, mountain brush, pinyon/juniper/mahogany, subalpine/coniferous/deciduous forest, and alpine tundra
- Sampled sporadically since 1994

Breeding Bird Survey routes

Non-profit Groups

- I. The Nature Conservancy
 - Point count surveys on Truckee River
- II. Lahontan and Red Rocks Audubon Societies
 - Breeding Bird Survey routes

OTHER SURVEY METHODS

Other survey methods will be described as appropriate for the other components of the comprehensive monitoring network. Non-point count surveys currently conducted by partners are described below.

Federal Agencies

- I. The Bureau of Reclamation and U.S. Geological Survey
 - Bald Eagle surveys on Lakes Mead and Mojave
- II. National Park Service
 - MAPS station: Overton WMA
- III. U.S. Forest Service
 - Northern Goshawk, California Spotted Owl, Bald Eagle, and Osprey surveys in Lake Tahoe Basin
 - Flammulated Owl surveys in Spring Mountains (with GBBO)
- IV. U.S. Fish and Wildlife Service
 - Clark County Habitat Conservation Plan studies
 - MAPS stations: Ash Meadows NWR, Pahrangat NWR, and Ruby Lake NWR
 - American White Pelican surveys on Anoha Island, Pyramid Lake
- V. Bureau of Land Management
 - Greater Sage-Grouse lek surveys and studies (with NDOW)

State Groups

- I. Nevada Division of Wildlife
 - Long-billed Curlew and White-faced Ibis studies

- Greater Sage-Grouse lek surveys and studies (with BLM)
 - Ferruginous Hawk surveys (with Hawk Watch International)
 - Waterbird surveys: American Avocet, herons and egrets, Double-crested Cormorant, American White Pelican, Common Loon; in priority areas including Humboldt WMA, Humboldt River, Walker Lake, and Pyramid Lake.
 - Sandhill Crane monitoring on a five-year interval in priority areas: Ruby Valley, Independence Valley, Humboldt, Starr, and Secret Valley.
 - Bobolink surveys by point count in priority areas on the Mary's River, Humboldt River, and Little Humboldt River.
 - Phainopepla surveys in Clark County
 - Raptor surveys: Northern Goshawk, Bald Eagle, Golden Eagle, and Swainson's Hawk.
- II. Biological Resources Research Center and University of Nevada (Reno & Vegas)
- Clark County Habitat Conservation Plan studies
 - Phainopepla surveys in Clark County

Non-profit Groups

- I. Great Basin Bird Observatory
- Nevada Breeding Bird Atlas (Completed 2001; to be repeated sometime in the future)
 - Flammulated Owl surveys in Spring Mountains (with USFS).
 - MAPS stations: Little Valley (with LAS), Mary's River, and Numana and McCarren Ranch on the Truckee River (with TNC).
- II. The Nature Conservancy
- MAPS stations: Numana and McCarren Ranch on the Truckee River (with GBBO)
- III. Lahontan and Red Rocks Audubon Societies
- MAPS stations: Little Valley, and Numana and McCarren Ranch on the Truckee River (with TNC).

DATA ANALYSIS AND MANAGEMENT

Data storage and publication by BRRC

Analysis and management by GBBO and LAS

RESULTS

The results will benefit Agencies, Nevadans, birds, and other wildlife.

Results will includes public access to data and results:

- Published results (e.g. Great Basin Birds)
- Observable results, by volunteers and community
- Accessible results on BRRC, GBBO, and LAS websites
- Annual reports to contributors/partners
- Species-specific atlases of nest sites and breeding colonies

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