

New Mexico Bird Conservation Plan Version 2.1

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New Mexico Partners in Flight

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Chapter 1 Introduction

1.1 Partners in Flight and New Mexico Partners in Flight

Increasing evidence of declines in numerous local and global bird populations has led to concern over the future of many species. Although the reasons for these declines are varied and complex, most are thought to be habitat related. Degradation, alteration, fragmentation, and loss of breeding, wintering, and migratory stopover habitat now jeopardize the long-term survival of many species. In some cases, these threats are compounded by other factors, including pollution and pesticide poisoning, biological interactions (e.g., predation and brood parasitism), and future threats posed by global climate change. Concern over these threats to both resident and migratory bird species has grown over the past few decades. By the 1990's, scientists, resource managers, and concerned citizens agreed that a broad-scale conservation initiative for neotropical migratory birds was needed. This initiative was later expanded to include all non-game landbirds (to be developed in coordination with other efforts to conserve shorebirds, waterbirds, and waterfowl).

In 1990, the National Fish and Wildlife Foundation brought together representatives from federal, state, and local government agencies, non-profit foundations and conservation organizations, private industry, and the academic community to form a broad new bird conservation partnership, appropriately named **Partners in Flight (PIF)**. PIF was conceived as a voluntary coalition of interested parties and entities dedicated to halting or reversing downward trends in bird populations. Since its inception, PIF has helped direct resources to the conservation of non-game landbirds by facilitating and coordinating cooperative efforts in conservation planning, biological research and monitoring, habitat management and restoration, outreach and education, and securing international cooperation.

The overall goals of PIF are expressed in three related concepts (Rich et al. 2004):

- **Helping species at risk.** A primary goal of PIF is to conserve species showing warning signs today, before they become imperiled and subject to federal listing and costly management recovery efforts.
- **Keeping common birds common.** Safeguarding the integrity and diversity of North America's unique ecosystems requires that all native species be maintained in healthy numbers throughout their natural ranges.
- **Voluntary partnerships for birds, habitats, and people.** Successful conservation requires the building of synergistic relationships among public agencies, private organizations and committed individuals throughout the Americas, so that energy and resources are combined, coordinated, and increased.

As a state chapter of this larger partnership, **New Mexico Partners in Flight (NMPIF)** was established in 1995 to promote and enhance conservation and management efforts for New Mexico birds and the habitats upon which they depend. Key participants in NMPIF include the U.S. Fish and Wildlife Service (USFWS), the U.S. Bureau of Land Management (BLM), the U.S. Forest Service (USFS), the U.S. Geological Survey (USGS), the National Park Service (NPS), the Department of Defense (DOD), the New Mexico Department of Game and Fish

(NMDGF), the New Mexico State Land Office (NMSLO), the New Mexico Natural Heritage Program (NMNHP), the New Mexico Audubon Society and its chapters, The Nature Conservancy, Hawks Aloft, Inc., and various university and independent researchers and other dedicated individuals.

NMPIF seeks to apply the guiding principles of PIF at the state level, to address both national and state conservation needs. Seven guiding principles express the conservation philosophy and priorities of NMPIF:

- Conservation efforts should be directed towards species while they are still relatively common, thereby avoiding the costs and risks associated with species endangerment;
- The most effective conservation efforts are habitat-based, providing benefits for multiple bird species, as well as other components of biological diversity;
- Species and habitat conservation efforts can succeed only if they are based on sound science;
- Conservation of migratory species can succeed only through a comprehensive approach that addresses threats on breeding grounds, non-breeding areas, and the migratory pathways that connect them;
- Effective and practical conservation must stress the maintenance of both suitable natural conditions and compatible economic uses of natural resources;
- Conservation goals can be best achieved through broad partnerships, in which federal, state and local agencies, private conservation groups, academic researchers, industry representatives and others can work together for species and habitat protection;
- A necessary component of any conservation initiative is an informed, proactive constituency of people who are concerned about bird conservation and are willing to take voluntary action to protect birds and habitats. Such constituencies must include private landowners and other local land users.

1.2 Bird Conservation Planning

Since its inception, a major focus of PIF activities has been the production and implementation of geographically-based **Bird Conservation Plans (BCPs)**. These documents serve to summarize existing biological and conservation-related knowledge for a planning region, and provide a framework by which the general principles stated above can be translated into effective, on-the-ground strategies for habitat and species protection. BCPs are written to serve specific regions and vary in accordance with local needs, but all follow the same general approach to conservation planning. The PIF document “The Flight Plan” describes the general strategy for developing, writing, coordinating, and implementing BCPs at state, regional, and national levels. The basic steps include:

1. Identification and ranking of those species and habitats most in need of protection;

2. Description of current habitat conditions and determination of management priorities, including specific population and habitat conservation objectives;
3. Development of best management practices that will enable conservation objectives to be met for each priority habitat; and
4. On-the-ground implementation by a variety of means, including the establishment of conservation partnerships, development of traditional and innovative funding mechanisms, scientific research and monitoring, education and outreach, and policy development.

BCPs have now been written for about 60 geographic units nationwide, including physiographic areas, Bird Conservation Regions, and twelve different western states. Each BCP is a working, adaptive document that is expected to undergo repeated iterations as more information becomes available, approaches to conservation are refined, and as conditions warrant. This document, now in revised Version 2 form, is but one example.

1.2.1 The New Mexico Bird Conservation Plan

This Bird Conservation Plan was initially developed by NMPIF with input from experts and interested individuals throughout the state. In the mid-1990's, meetings were held to solicit core information on the status and trends of New Mexico birds. Many people with knowledge and experience of different New Mexico regions and habitat types contributed to this process. At roughly the same time, a technical committee within NMPIF took on the task of carrying out species assessment and priority species designation for New Mexico birds, according to PIF guidelines. All of this information, together with material from the scientific literature, was used to draft Version 1 of the New Mexico BCP. Following further expert review, an initial draft of this document was published in 1999. Various small changes continued to be made to the document in the years following.

In 2003, NMPIF decided to undertake a more substantive revision of the state BCP. The main goals of the revision process were:

- To carry out a new statewide species assessment using updated information from the Breeding Bird Survey and from the new PIF North American Landbird Conservation Plan (Rich et al. 2004). This new assessment was also intended to more closely parallel (in the criterion used for scoring vulnerability) the new system of species assessment adopted by PIF nationally for its continental plan.
- To create updated lists of priority species for conservation action or monitoring in New Mexico, distinguishing between species of national and state biodiversity concern.
- To create more substantive species accounts for all priority species.
- To carry out prioritization of habitats, as well as species, and provide additional management recommendations and biological objectives for priority habitats.

- To introduce a regional approach to conservation planning based on the state's four Bird Conservation Regions.

Various other small changes, and some significant structural reorganization of the New Mexico BCP Version 1 contents, have also been made. The result of this process is the present Version 2. Because this is a dynamic document, the process of updating and revising will be ongoing. Any additional information that will add value to this BCP, and contribute to bird conservation in New Mexico, is always welcome.

1.2.2 The PIF North American Landbird Conservation Plan

As noted above, this revised BCP incorporates information contained in the **PIF North American Landbird Conservation Plan** (Appendix A, Rich et al. 2004, also referred to as the “PIF Continental Plan”). The purpose of that document, created over a number of years by PIF partners from the USA, Canada, and Mexico, is to provide a continental perspective on North American landbird conservation. It summarizes the conservation status of 448 native landbird species, identifying those most in need of attention at continental and regional scales. It also emphasizes the need for stewardship of biome-restricted species that may not otherwise be in need of immediate conservation attention. These national and regional priorities are summarized in the PIF Watch List and stewardship species lists.

A significant feature of the PIF Continental Plan is that it provides the first systematic estimates of total population size for North American landbird species. It also assigns priority and stewardship species to categories of conservation action and monitoring need, and sets numerical population objectives on a continental scale.

The PIF Continental Plan is intended to inform and guide more detailed planning and implementation efforts at local and regional scales. In revising our state BCP, NMPIF has followed the general guidelines and philosophy expressed by the authors of the Continental Plan in the statement below:

Regional planners are naturally focused on regional objectives, but the effectiveness of landbird conservation action can be increased by linking objectives for Bird Conservation Regions [or states] to those identified here at the continental scale. For example, although this Plan represents a revised assessment of conservation vulnerability for all species of landbirds, many Species of Continental Importance are likely to have been identified through past assessments in regional plans. If not, planners should consider whether revisions to existing plans could better address the needs of these species in their area. We generally suggest that Watch List Species be afforded attention wherever they occur. We suggest that action for Stewardship Species be carefully considered in areas where these species are most common, particularly where actions taken on behalf of Watch List Species are likely to leave Stewardship Species and habitats they represent lacking in attention. Additionally, where an individual Stewardship Species has a high regional population decline, specific action may be warranted, and local objectives might appropriately be to substantially increase that Stewardship Species' population. (Rich et al. 2004).

1.2.3 Other National Bird Plans

All PIF BCPs are intended to complement the existing national conservation plans for non-landbird species: the **North American Waterfowl Management Plan**, the **National Shorebird Conservation Plan**, and the **North American Waterbird Conservation Plan**.

The New Mexico BCP differs from some of the other BCPs in explicitly adopting an all-bird focus. Included here is information not only on landbirds, but on wading birds, shorebirds, and waterfowl. These species have been included in the New Mexico species assessment and priority lists, based in part on information provided by the various national plans.

1.3 How to Use This Plan - A Quick Guide

This plan is specifically intended to serve the needs of people participating or interested in bird and habitat conservation in New Mexico: agency scientists, managers, policy makers, conservation advocates, academic and independent researchers, educators, government representatives, landowners and resource stakeholders, and concerned citizens. NMPIF particularly hopes that this plan will be consulted and cited by the authors of land use planning and resource management documents, such as USFS Forest Management Plans and BLM Resource Management Plans. Other examples of potential use include state agency, tribal, and Natural Resources Conservation Service management plans. It is through such documents that the management recommendations contained herein for “keeping common birds common” can be translated into management policy.

Different audiences may have specific questions or needs, which are addressed in different chapters of this BCP. For general orientation, the following brief overview of chapter contents may be useful.

Chapter One: Introduction. The introduction provides a brief history of PIF, a statement of PIF goals, and an overview of the bird conservation planning process. This chapter also describes NMPIF and the history of the New Mexico BCP in its current revised form.

Chapter Two: The Planning Unit. Chapter Two includes a brief historical and ecological overview of New Mexico, and lists some key contributions to present knowledge of the state’s avifauna. This chapter also introduces and describes the state’s four Bird Conservation Regions, and the 20 NMPIF-designated habitat types, which are the foundation for NMPIF’s approach to bird conservation in New Mexico.

Chapter Three: Avifaunal and Habitat Analysis. This chapter presents lists of NMPIF priority species for New Mexico. Separate lists are provided for species of general conservation concern, and species considered important to state biodiversity. Also included here are explanations of the species assessment and prioritization scheme adopted by NMPIF, and some analyses of how priority bird species are distributed across habitat types and regions. This chapter also introduces priority habitats for the state, as designated by NMPIF. The chapter concludes with a short

section describing the ongoing process of setting biological objectives for species and habitats, and lists NMPIF's broad, statewide conservation goals for New Mexico.

Chapter Four: Species Accounts. Species accounts constitute the heart of most Bird Conservation Plans. This chapter provides detailed information on the status and needs of all of New Mexico's priority bird species. Management recommendations and biological objectives are presented for all priority species.

Appendices

Appendix A. Partners in Flight North American Landbird Conservation Plan

http://www.partnersinflight.org/cont_plan

Appendix B. Partners in Flight Handbook on Species Assessment

<http://www.rmbo.org/pubs/downloads/Handbook2005.pdf>

Appendix C. Complete species assessment scores for New Mexico birds

Appendix D. Complete breeding habitat and Bird Conservation Region lists for New Mexico birds

Chapter 2 The Planning Unit

2.1 New Mexico Geography, Biogeography and Climate

Because of its size, geographic location, and topographic variation, New Mexico includes portions of several distinct biogeographic regions and contains a diversity of habitat types. Included within its borders are the southern terminus of the Rocky Mountains, the western edge of the Great Plains, the northern portion of the Chihuahuan Desert, the northern extension of the Sierra Occidental, and the southeastern edge of the Great Basin. It includes habitats ranging from Chihuahuan desert to alpine tundra, at elevations ranging from 2,800 to just over 11,000 feet.

The New Mexico landscape includes several distinct upland regions. To the north, the Sangre de Cristo Mountains represent the southernmost extension of the Rocky Mountain chain and contain the state's highest peaks. Moving south from the northwest "Four Corners" area, middle-elevation forests and cold desert uplands of the Colorado Plateau give way to the higher montane region of the Mogollon Rim along the south-central portion of New Mexico's border with Arizona. Included in this area are the San Francisco and Mogollon ranges, and the large Gila/Aldo Leopold Wilderness complex.

Perhaps New Mexico's most distinctive upland areas are its isolated "sky island" mountain ranges. Characteristic of the state's basin-and-range topography, these ranges extend from the Sandia Mountains and Mount Taylor southward in a widening band to (and up to 100 miles beyond) the Mexican border. The sky island ranges represent stepping stones of montane habitat linking the distinct biological regions of the Sierra Madre Occidental to the south and the Rocky Mountains to the north. The lower-elevation grassland and shrubland areas from which they arise constitute the only significant break in the continental mountain chain extending from the volcanic belt of southern Mexico to northern Canada. Important sky island ranges (moving generally north to south) include the Sandia, Manzano, Magdalena, San Mateo, Sacramento, Animas, and Peloncillo ranges.

The Mogollon Rim and sky island regions of central and southern New Mexico are particularly significant to avian biogeography. A large number of species reach either their northern or southern range boundary in this area, and bird communities may include unusual assemblages of species not normally found together. A second important biogeographic divide exists where the varied mountain and desert topography of the western two thirds of the state gives way to the southwestern portion of the Great Plains, in areas east and north of the Pecos River. Here, a number of species reach the eastern or western extent of their distribution.

Lowland areas (mostly plains, desert grassland, or shrubland) occur in all parts of New Mexico except for the north-central mountains and highland areas of the Mogollon Rim. Some, such as the Tularosa Basin near Alamogordo or the Jornada del Muerto north of Las Cruces, are closed basins. The Rio Grande, New Mexico's largest river, divides the state from north to south and, with its associated floodplain of riparian, wetland and agricultural habitat, serves as an important migration corridor. Two other major river systems, the Pecos and the San Juan, also drain extensive areas and contain broad floodplains. Other important drainages include the Canadian

and Dry Cimarron rivers in the east, and the Mimbres, Gila, and San Francisco rivers in the southwest.

Latitudinal and altitudinal variation produces a varied climate. Most annual precipitation is associated with the southwest monsoonal pattern and arrives in the form of local, high-intensity storms from late June through September. Mountain snows are delivered by frontal storms during the winter months, and snowfall plays a critical role in maintaining flows in the state's major river systems through the spring and early summer. Average rainfall statewide is about 15 inches, though some areas receive considerably less. Precipitation increases at higher elevations and is somewhat higher in the eastern plains than to the west (Dick-Peddie 1993).

Rain and snowfall patterns can be erratic geographically and from year to year, and are influenced by larger-scale climatic patterns. A major cause of yearly climatic variation is the El Niño - Southern Oscillation (ENSO) phenomenon, a periodic pattern of ocean warming and cooling across the central tropical Pacific which influences climate in many parts of the world. Studies using both meteorological records and tree-ring data spanning over 2,000 years have demonstrated a strong correlation between ENSO patterns and climate in the southwestern United States. ENSO effects in New Mexico are most significant during the winter months, with precipitation often 50 percent above long-term averages during an El Niño (or warm) phase, and a similar amount below normal during a La Niña event (Sevilleta LTER Research Report 1999). Tree-ring data also reveal a long history of wet and dry periods of varying magnitude and periodicity. Following decades of high precipitation during the 1980's and 1990's, New Mexico may currently be in the early phases of an extended drought, such as occurred across much of the southwestern United States in the 1950's (Grissino-Mayer 1995).

The yearly number of frost-free days varies from over 200 in the southwest, portions of the southeast, and along the lower Rio Grande Valley, to 100 around Taos and Tres Piedras. Summer high and winter low temperatures span a wide range from north to south and, to a greater degree, across local altitudinal gradients (Dick-Peddie 1993).

2.2 History of Land Use

The history of land use in New Mexico is a vast and complex topic (Crawford et al. 1993, Dick-Peddie 1993, Scurlock 1998), and only a very brief outline of changes to major habitat types is presented here. Native Americans have resided in New Mexico for centuries. Large population centers were established by "Anasazi" and ancestral Pueblo peoples for commerce and protection as early as 800 A.D., primarily in the western and northern portions of the state. Archaeological evidence indicates that terraced farming was practiced as early as 1000 A.D., and beams for buildings were cut in forests and hauled tremendous distances, as evidenced by the ruins at Chaco Canyon. However, these ancestral Pueblo communities were often abandoned after several hundred years, and most were deserted by around 1300 A.D., probably due to a combination of demographic pressures and prolonged drought.

At approximately the same time, the current Pueblo settlements began along the middle Rio Grande Valley, making this one of the oldest continuously inhabited areas of the United States.

Prior to the arrival of Europeans, Pueblo farmers practiced floodwater agriculture relying on overbank flows and surface run-off, and also limited diversions for irrigation. When Coronado's expedition reached the Middle Rio Grande in 1540, it is estimated that 25,000 acres of land were under cultivation. The Spanish colonial period, beginning in the late 1500's, brought more intensive cultivation based on ditch irrigation and floodplain clearing. Wood cutting and livestock grazing expanded throughout the colonial period, and in subsequent centuries, the grazing of large numbers of sheep, goats and cows has had a transformative effect on the New Mexico landscape.

Over the past two centuries, a combination of natural factors and increasing human impacts has greatly altered New Mexico's natural vegetative communities. Drought has been a recurrent fact of life in New Mexico since the last ice age. Tree-ring records reveal that cycles of moderate to severe drought have occurred regularly, at intervals of 2-3 decades, for centuries. Impacts of land use practices on forests, grasslands, and riparian areas are often compounded by drought.

Riparian areas in New Mexico have been greatly impacted by livestock grazing, groundwater withdrawals, and various surface water management practices. Along the state's three major river systems, the San Juan, Pecos, and Rio Grande, natural hydrological cycles have been disrupted over the 20th century by the construction of flood control dams, agricultural diversions, storage reservoirs, and levee systems. Lack of regular flooding along the Middle Rio Grande in central and northern New Mexico has inhibited the regenerative capacity of this area's signature cottonwood "bosque" habitat.

Since the 1900's, forests in New Mexico have been reshaped by a combination of factors including fire, fire suppression, grazing, and logging. Naturally occurring fire has played an important role in the ecology and evolution of forests in New Mexico. Low-intensity fires burned historically every 2-10 years in ponderosa and in lower elevation mixed-conifer forests, sparing the larger trees and clearing accumulations of dead wood and understory growth. Prior to European settlement, regularly occurring fires maintained healthy open stands of larger trees with a grass understory. Hotter, stand-replacing fires occurred with less frequency, mostly in denser forest types such as spruce-fir. Fires occurred more frequently during drought years, and were most severe when the drought was preceded by abnormally wet years, which resulted in a build-up of fuels.

Extensive commercial logging began in the early 1900's, and coincided with a decrease in fire frequency. Low-intensity, largely grass-fed fires had already become less frequent due to overgrazing in the 1890's. Fire suppression also began around this time, and by the 1940's, full fire-suppression became a statewide forestry practice. This combination of factors effectively eliminated much of the park-like forest habitat that had been the historical norm. Older and commercially valuable trees were removed, and mature forest habitat was replaced by dense thickets of young trees and extensive underbrush. High fuel loads made these areas subject to catastrophic, stand-replacing fires, which then reinitiated the cycle of dense, even-aged forest growth. Full-scale fire suppression lasted until the mid-1980's when policies of prescribed burning and thinning began to be applied.

Cattle and sheep grazing began to affect New Mexico's grasslands and forests in 1820. By 1890, very large-scale and non-sustainable grazing was common, especially in the southern half of the state. Grazing has since tapered off, but the legacy of historical grazing practices remains, particularly in the conversion of former grasslands to shrublands. Dick-Peddie (1993) notes that "reduction in grassland in New Mexico has been so pronounced that some people today question if it was ever very extensive." He goes on to cite numerous historical accounts attesting to vast and high quality grasslands extending across much of southern New Mexico in the early and mid-19th century. Grassland reduction in the last 150 years has resulted primarily in an increase in desert shrub and juniper savannah habitats.

Cities and towns in New Mexico did not experience significant growth until the 1950's. Since then, however, population centers have shown varying but consistent growth patterns. Significant population growth occurred throughout the 1970's, 1980's, and 1990's, a period of abundant rainfall by historical standards. This growth, in combination with recent drought conditions, has placed enormous pressures on the state's surface and ground water resources, and conflicts over water use and rights (including water to maintain riparian habitats and endangered species) have become common. Urban and suburban development, both around existing population centers and in rural areas, continues to eat away at remaining pieces of natural habitat. According to 2005 population estimates from the U.S. Census Bureau, the largest population centers in New Mexico are the Albuquerque area (over 600,000 people, including adjacent Rio Rancho and the North and South Valleys of Bernalillo County), Las Cruces (over 80,000 people), and Santa Fe (over 70,000 people).

2.3 History of Avifaunal Studies and Conservation

Due to its wide diversity of habitats, New Mexico has recorded the second highest number of bird species of any non-coastal state in the U.S. More than 280 species of birds breed in New Mexico, and its extensive grasslands are important areas for wintering birds. The Rio Grande serves as an important flyway for migrants. In the east, the Playa Lakes region is one of the most significant wetland habitats in the southern quarter of the Central Flyway for migrating and wintering birds.

However, not all of New Mexico's bird species have flourished. Sharp-tailed Grouse and Sage Grouse, once a part of New Mexico's breeding avifauna, were hunted by settlers and miners. By the early 1900's, both were extirpated from the state. The Aplomado Falcon, once regular throughout the Chihuahuan Desert grasslands, experienced steep population declines in the 1920's and 30's. Buff-breasted Flycatchers were also recorded with some frequency in the southwestern forests until the 1940's, when they disappeared. Only since the 1990's have these two species sporadically reappeared in New Mexico. The reasons for their declines are poorly understood but may reflect the changing landscape in the state or elsewhere on the continent.

New Mexico has a long history of ornithological study. Twenty-nine species of birds have been identified in late prehistoric kiva (Native American religious buildings) murals. Spanish expeditions recorded large numbers of cranes, geese, turkey, quail, prairie-chickens, and grouse. Anglo explorers also remarked upon these same birds. Army doctors, first attending expeditions

in the 1850's, and then stationed at established forts, were the first to systematically report on and collect birds from the state.

Ornithologists Woodhouse, Henry, and Kennerly all recorded over 170 species of birds in the state during the mid-1800's, along with seasonal occurrence data. (Scurlock 1998). Frances Merriam Bailey began ornithological study in the early 1900's while traveling with her husband. In 1928, she published her first book - *Birds of New Mexico* - on the state's avifauna. J. Stokely Ligon, after several decades of work in the state, published *New Mexico Birds and Where to Find Them* in 1961.

Following Ligon, John P. Hubbard wrote *A Checklist of the Birds of New Mexico* in 1970 and revised it in 1978. Important advances in the knowledge of and/or changes in bird distribution have occurred since then, yet the *Revised Checklist* remains a standard of knowledge for bird distribution and abundance.

Several inventories and long-term monitoring projects have taken place throughout the state. A list of some of the larger studies and monitoring projects is provided in Appendix B.

2.4 Land Ownership and Management

New Mexico totals nearly 122,000 square miles, or about 78 million acres. Approximately 34 percent of this land is managed by the federal government. The two largest management agencies, the Bureau of Land Management (BLM, over 12 million acres) and the U.S. Forest Service (USFS, over 9 million acres) together manage the majority of public lands, covering over a quarter of the state. BLM lands occur throughout New Mexico but are concentrated in the northwest and the southern third of the state. New Mexico's five largest National Forest areas include the Carson and Santa Fe National Forests in the north, the Cibola National Forest in the central part of the state, and the Gila and Lincoln National Forests in the south. Military reservations managed by the Department of Defense (DOD) constitute the majority of the remaining federally managed lands. Federally managed lands also include National Parks and Monuments managed by the National Park Service (NPS), National Wildlife Refuges managed by the U.S. Fish and Wildlife Service (USFWS), and lakes and waterways managed by the Bureau of Reclamation (BOR) and the Army Corps of Engineers (ACE).

Major federal land management units include the following:

- BLM: Carlsbad, Farmington, Las Cruces, Rio Puerco, Roswell, Socorro, and Taos Districts; and Kasha Katuwe Tent Rocks National Monument
- U.S. Forest Service: Apache, Carson, Cibola, Coronado, Gila, Lincoln, and Santa Fe National Forests; and Kiowa National Grassland
- U.S Fish and Wildlife Service: Bitter Lakes, Bosque del Apache, Grulla, Las Vegas, Maxwell, San Andres, and Sevilleta National Wildlife Refuges
- National Park Service: Aztec Ruins, Bandelier, Capulin Volcano, El Malpais, El Morro, Fort Union, Gila Cliff Dwellings, Petroglyph, Salinas Pueblo, and White Sands National

Monuments; Carlsbad National Park; and Chaco Culture and Pecos National Historical Parks

- Department of Defense: Cannon, Hollomon, and Kirtland Air Force Bases; White Sands Missile Range; Fort Bliss Military Reservation (administered by BLM and the U.S. Army); and Melrose Air Force Range

New Mexico State Trust lands form a network covering almost 12 percent of the state, or over 9 million acres. State Parks and Monuments add another (relatively small) amount of state-managed land.

State land management units include the following:

- State Parks: Bluewater Lake, Bottomless Lakes, Brantley Lake, Caballo Lake, Cimarron Canyon, City of Rocks, Clayton Lake, Conchas Lake, Coyote Creek, Eagle Nest Lake, Elephant Butte Lake, El Vado Lake, Fenton Lake, Heron Lake, Hyde Memorial, Leasburg Dam, Living Desert Zoo and Gardens, Manzano Mountains, Mesilla Valley Bosque, Morphy Lake, Navajo Lake, Oasis, Oliver Lee Memorial, Pancho Villa, Percha Dam, Rio Grande Nature Center, Rockhound, Santa Rosa Lake, Storrie Lake, Sugarite Canyon, Sumner Lake, Ute Lake, Vietnam Veterans Memorial, and Villanueva
- State Wildlife Areas - Barker, Cimarron, Milnesand, and Mescalero Sands.

Native American lands comprise approximately 10 percent of the state, or over 7 million acres. The Navajo Nation owns much of the northwestern quadrant, especially along the Arizona border. The Jicarilla and Mescalero Apaches own land in the north and southeast, respectively. Other Native American landowners include nineteen Pueblos, mainly located along the northern half of the Rio Grande: Acoma, Cochiti, Isleta, Jemez, Laguna, Nambe, Picuris, Pojoaque, San Felipe, San Ildefonso, San Juan, Sandia, Santa Ana, Santa Clara, Santo Domingo, Taos, Tesuque, Zia, and Zuni.

The remaining 44 percent of the total New Mexico land area is privately owned (Deason 1998, Public Lands Information Center).

2.5 Physiographic Areas

Many Partners in Flight Bird Conservation Plans (BCPs) are written for Physiographic Areas, which represent broad-scale units of biological and ecological similarity. While this concept works relatively well for the eastern and central portions of the U.S., it is not practical in the mountain West where topography is highly variable and patches of similar biological assemblages are separated by large expanses of land. For this reason, BCPs for the western states are generally organized by habitat type within state boundaries, rather than by Physiographic Areas.

Within New Mexico are portions of six Physiographic Areas, with acreages shown below:

1) Mexican Highlands	3.5 million acres
2) Chihuahuan Desert	15 million acres
3) Mogollon Rim	7 million acres
4) Colorado Plateau	40 million acres
5) Pecos and Staked Plains	11 million acres
6) Southern Rocky Mountains	6.5 million acres

2.6 Bird Conservation Regions

Bird Conservation Regions (BCRs) are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. A BCR mapping team comprised of experts from the United States, Mexico, and Canada assembled at the first international North American Bird Conservation Initiative workshop in 1998 to develop a consistent spatial framework for bird conservation in North America. Since their initial development, BCRs have become an important and dynamic tool for coordinating and implementing integrated, all-bird conservation.

The primary purposes of BCRs, as proposed by the mapping team in 1998 and approved in concept by the North American Bird Conservation Initiative (U.S. Committee) in 1999, are to:

- Facilitate communication among the bird conservation initiatives, including Partners in Flight and national and regional shorebird, waterbird, and waterfowl conservation plans
- Systematically and scientifically apportion the U.S. into conservation units
- Facilitate a regional approach to bird conservation
- Promote new, expanded, or restructured partnerships
- Identify overlapping or conflicting conservation priorities.

As integrated bird conservation progresses in North America, BCRs should ultimately function as the primary units within which biological issues are resolved, the landscape configuration of sustainable habitats is designed, and priority conservation projects originate. (For more information on BCRs see <http://www.nabci-us.org/bcrs.html>).

New Mexico contains portions of four BCRs, each of which extends into other states and/or Mexico. Descriptions and in-state acreages are provided below:

BCR 16 -- Southern Rocky Mountains (132,694 square kilometers, 32.8 million acres).

This is New Mexico's largest BCR segment, covering most of the northern and western two-thirds of the state. This topographically complex region includes the north-central mountains, Colorado Plateau, and central sky island ranges. Various coniferous forest types interspersed with aspen dominate higher elevations. These are replaced by pinyon-juniper woodlands on the

lower plateaus. Important birds also segregate into elevational bands: for example, Brown-capped Rosy-Finch and White-tailed Ptarmigan in alpine tundra; Flammulated Owl, Williamson's Sapsucker and Lewis' Woodpecker in coniferous forest; Virginia's Warbler in montane shrub; and Gray Vireo and Pinyon Jay in pinyon-juniper. High arid shrublands and dry upland shortgrass prairies provide critical breeding areas for Mountain Plover and Ferruginous Hawk.

BCR 18 -- Shortgrass Prairie (67,266 square kilometers, 16.6 million acres).

This BCR generally coincides with the boundary of New Mexico's eastern plains, roughly the eastern quarter of the state. It includes extensive grasslands and shrublands, and important playa wetland areas. The Shortgrass Prairie lies in the rainshadow of the Rocky Mountains, and arid conditions greatly limit the stature and diversity of vegetation. Some of the continent's highest-priority birds breed in this area, including the Mountain Plover, Long-billed Curlew, Ferruginous Hawk, and Lesser Prairie-Chicken. Playa Lakes habitat consists of numerous shallow wetlands that support many wintering ducks, migrant shorebirds, and some important breeding species, such as Snowy Plover.

BCR 34 -- Sierra Madre Occidental (27,852 square kilometers, 6.9 million acres).

Located in the southwest quadrant, New Mexico's smallest BCR segment includes the Mogollon Rim and "bootheel" mountain ranges. Southeastern Arizona and southwestern New Mexico contain only the northernmost portion of the BCR, which extends south to central Mexico. The region is characterized by a complex topography, with the presence of oak-pine, pine, and fir forests along the mountain ranges, and semi-arid scrub habitats at lower elevations. Mountain and riparian areas host a number of species at the northern limit of their distribution and are extremely important to New Mexico's avian biodiversity. In upland habitats, species of highest importance include Montezuma Quail, Elf Owl, Elegant Trogon, Strickland's Woodpecker, Grace's Warbler, Black-throated Gray Warbler, Red-faced Warbler, and Black-chinned Sparrow. Arizona Grasshopper Sparrow and wintering Baird's Sparrow and Sprague's Pipit are present in grassland and scrub habitats. Riparian areas in lowlands support many in-transit migrants, as well as breeding Thick-billed Kingbird, Southwestern Willow Flycatcher, Bell's Vireo, and Abert's Towhee.

BCR 35 -- Chihuahuan Desert (87,216 square kilometers, 21.6 million acres).

This BCR covers a large area in the southern half of the state, including desert scrub and grassland, a number of isolated mountain ranges including the Sacramento, and important riparian and wetland areas along the Rio Grande Valley. In desert scrub and grassland habitats, species of highest importance include Aplomado Falcon, Prairie Falcon, Scaled Quail, Bendire's Thrasher, and wintering Sprague's Pipit and McCown's Longspur. In montane areas, species of highest importance include Mexican Spotted Owl. In riparian areas, species of highest importance include Southwestern Willow Flycatcher, Bell's Vireo, and Lucy's Warbler.

2.7 Habitat Types

New Mexico Partners in Flight defines 20 separate habitat types within the state, based on both bird assemblages and vegetative associations. In many respects, these coincide with the principal

vegetative cover types recognized by Dick-Peddie (1993). These are broad divisions, within which a number of different sub-types may be present. Because these habitat types do not entirely coincide with any existing scheme of land cover classification, exact areas are not known. Estimated areas are provided here to reflect the overall relative distribution of habitats in the state, but may be inaccurate for some types.

The 20 habitats comprise six major categories: Grasslands, Shrublands, Non-riparian Woodlands, Forests, Wetlands, and Other.

2.7.1 Grasslands

Chihuahuan Desert Grassland (CDG). Low-elevation grasslands in the southern third of the state, extending farther north along the Rio Grande Valley. (Note this definition differs from the “Desert Grassland” of Dick-Peddie.) This habitat includes remaining areas of relatively “pure” grassland within the Chihuahuan Desert region, and much more widespread areas of “degraded” grassland with a significant shrub component. The latter habitat is expanding, while true desert grassland areas are shrinking. The mixed or ecotonal nature of much of this habitat makes it difficult to determine acreage. Based on Dick-Peddie, estimated area is 8-10 million acres. Priority species include Scaled Quail, Aplomado Falcon, and Botteri’s Sparrow.

Plains and Mesa Grassland (PMG). Low- and mid-elevation grasslands in the eastern and northern parts of the state. This habitat type includes prairie grasslands in the east and Great Basin grassland types in the north and northwest. Based on Dick-Peddie, estimated area is 20-25 million acres, making this the most widespread habitat type in the state. Priority species include Ferruginous Hawk, Mountain Plover and Long-billed Curlew.

Wet Meadow and Montane Grassland (WMG). High-elevation grasslands and parklands, mostly in the north-central uplands and Mogollon Rim. Dick-Peddie maps 257,000 acres. Priority species include Wilson’s Phalarope and Bobolink.

Alpine/Tundra (ALP). Areas above timberline, present only in the Sangre de Cristo range and on Mount Taylor and Sierra Blanca in the Sacramentos. Dick-Peddie maps approximately 79,000 acres, making this perhaps the most restricted habitat type in the state. Priority species include White-tailed Ptarmigan and Brown-capped Rosy-finch.

2.7.2 Shrublands

Chihuahuan Desert Shrub (CDS). Creosote bush-, acacia-, or mesquite-dominated shrublands of the Chihuahuan Desert, mostly in the southern third of the state, but extending north along the Rio Grande Valley and ranging in elevation from 2,800 to 4,500 feet. Dick-Peddie maps approximately 4.6 million acres. Priority species include Crissal Thrasher, Black-throated Sparrow and Varied Bunting.

Plains-Mesa Sand Shrub (PMS). Sand-shinnery and sandsage shrublands in the southeast and central parts of the state. In the southeast, this habitat extends east to the Texas state line; in central New Mexico, it extends north to areas near Santa Fe, ranging in elevation from 3,500 to 6,000 feet. Dick-Peddie maps approximately 1.7 million acres. Priority species include Lesser Prairie-Chicken and Bank Swallow.

Montane Shrub (MTS). Shrub and chaparral habitat found on hillsides in small areas throughout much of New Mexico, often located between other types of habitat, ranging in elevation from 5,500 to 8,000 feet. Dick-Peddie maps approximately 786,000 acres. Priority species include Lucifer Hummingbird, Virginia's Warbler, and Lazuli Bunting.

Great Basin Desert Shrub (GBS). Sagebrush-dominated shrublands in the northwest quadrant of the state, extending east to western Taos County and ranging in elevation from 5,500 to 7,500 feet. Dick-Peddie maps approximately 3.2 million acres. Priority species include Sage Thrasher and Sage Sparrow.

2.7.3 Non-riparian Woodlands

Pinyon-Juniper Woodland (PJW). Middle-elevation woodlands distributed throughout the state, above desert or grassland vegetation and below pine forest, ranging from 4,500 to 7,500 feet. This type includes juniper savanna at lower elevations, when juniper density is sufficient to make the habitat closer to woodland than grassland. Dick-Peddie lumps pinyon-juniper and pine-oak woodlands together and maps 10.4 million acres, plus 7.7 million acres of juniper savanna. As defined here, estimated area of this habitat type is approximately 16-17 million acres. Priority species include Gray Vireo, Pinyon Jay, and Juniper Titmouse.

Madrean Pine-Oak Woodland (POW). This woodland type is limited to the Animas and Peloncillo Mountains in the far southwest corner of New Mexico, ranging in elevation from 5,000 to 7,000 feet. Estimated area is 1-2 million acres. Priority species include Montezuma Quail, Whiskered Screech-Owl, and Black-throated Gray Warbler.

2.7.4 Forests

Ponderosa Pine Forest (PPF). Ponderosa-dominated habitat, often in association with Gambel oak, aspen, and pinyon-juniper vegetation. Found in mountain and canyon areas throughout the state at elevations of 6,000 to 9,000 feet. Dick-Peddie lumps ponderosa and mixed conifer associations and maps 6 million acres. As defined here, estimated area is approximately 3 million acres. Priority species include Flammulated Owl, Pygmy Nuthatch, and Grace's Warbler.

Mixed Conifer Forest (MCF). Mostly forests dominated by Douglas-fir, white fir, and pine species, sometimes interspersed with aspen or Gambel oak woodland. Found in all higher mountain ranges in New Mexico, generally between 7,500 to 10,000 feet. Estimated area is approximately 3 million acres. Priority species include Mexican Spotted Owl, Williamson's Sapsucker, and Red-faced Warbler.

Spruce-Fir (Subalpine) Forest (SFF). Found at higher elevations, generally from 9,500 feet to treeline, in northern mountain ranges, with small areas in the south. Mostly dominated by corkbark fir and Engelmann spruce. Dick-Peddie maps 2.3 million acres. Priority species include Blue Grouse and Boreal Owl.

2.7.5 Wetlands

Southwest Riparian (SWR). Deciduous woodland habitat along rivers in the southwestern quadrant of the state, often containing Arizona sycamore, at low and middle elevations. Includes riparian zones along the Gila, Mimbres, and San Francisco Rivers. Priority species include Bell's Vireo, Southwestern Willow Flycatcher, Lucy's Warbler, and Abert's Towhee.

Middle Elevation Riparian (MER). Deciduous woodland habitat along rivers in the southeastern, central, and northern areas of the state, generally below ~7,500 feet in elevation. Mostly dominated by cottonwood and willow associations, and/or non-native salt cedar and Russian-olive. Includes riparian zones along the Rio Grande, and the Pecos, Canadian, and San Juan Rivers, as well as numerous smaller drainages. Priority species include Yellow-billed Cuckoo, Lewis' Woodpecker, and Southwestern Willow Flycatcher.

Montane Riparian (MOR). Mixed woodland habitat along rivers or streams in upland areas, mostly above 7,000 feet in elevation, ranging from the ponderosa pine/mixed conifer belt to timberline. Includes drainages in forest habitat in all New Mexico mountain ranges, with some important differences between the southwestern highlands and areas north and east of the Mogollon Rim. Priority species include Black Swift, Veery, and Painted Redstart.

Emergent Wetlands and Lakes (WET). Include playas, lakes, and marsh areas, all of which occur infrequently throughout New Mexico. Priority species include American Bittern, Bald Eagle, and Snowy Plover.

2.7.6 Other

Cave/Rock/Cliff (CLI). Occurs throughout the state at all elevations, as a component of other habitat types. Priority species include Peregrine Falcon, Prairie Falcon, and White-throated Swift.

Agricultural Lands (AGR). Agricultural areas generally occur in association with the river valleys of New Mexico. They also include irrigated croplands that have replaced native grassland and shrubland habitat in the south and east. This category includes several distinct habitats that may be important to different species, including fruit orchards, irrigated fields, and shelter belt plantings. Total area estimated at 2-3 million acres. Elevation generally ranges from 3,500 to 7,000 feet.

Urban (URB). Includes urban and suburban areas where native vegetation has been removed. Also includes golf courses.

Chapter 3 Avifaunal and Habitat Analysis

3.1 Species Assessment and Prioritization

In preparing this Bird Conservation Plan for New Mexico, New Mexico Partners in Flight has followed the two step process of species assessment and prioritization developed by Partners in Flight (see Punjabi 2001 and the Partners in Flight Continental Plan, Rich et al. 2004). In this context, *species assessment* refers to the process of evaluating the biological vulnerability and conservation status of each species, through the application of a standardized scoring system; *species prioritization* refers to the use of assessment data to determine conservation priorities for the state. Thus, the assessment process produces a database of vulnerability scores, while prioritization produces a list of species of conservation concern, which may be further subdivided using various criteria. In general, New Mexico Partners in Flight has closely followed national Partners in Flight guidelines, with some modifications to reflect state interests and concerns.

3.1.1 Assessment

The Partners in Flight assessment process is based on a series of biologically-based measures of conservation vulnerability. For each species in the planning area, a numerical score from one (lowest vulnerability) to five (highest vulnerability) is assigned for each measure. Methods and criteria for scoring have been continually tested, reviewed, and refined since the Partners in Flight species assessment process was first developed in 1991, and the scientific credibility of the system has been acknowledged by the American Ornithologists' Union (Bissinger et al. 2000).

For the purpose of species prioritization, a variety of measures or “vulnerability factors” are considered. Some of these (breeding distribution, non-breeding distribution, and population size) are assessed “globally”, meaning they convey information about the entire species population. Others (threats to breeding populations and habitats, threats to non-breeding populations and habitats, population trend, and local area importance) may be assessed for particular geographic regions. This plan uses global and North American scores for landbirds developed by Partners in Flight and maintained in the Partners in Flight Global Scores Database; comparable scores for shorebirds, water birds and waterfowl are drawn from national plans for these taxa; and local (state or regional) scores for threat to breeding, population trend, and area importance are assigned by New Mexico Partners in Flight.

Vulnerability factors used in this plan, along with abbreviations and brief descriptions, are listed in Table 3.1 below. Additional details and specific scoring criteria for each measure are provided in Appendix B.

Table 3.1 Vulnerability factors used in species assessment

Vulnerability Factor	Description or Criteria
1 Distribution (the greater of the 2 following distribution scores)	
Global Breeding Distribution	PIF continental species assessment
Global Non-breeding Distribution	PIF continental species assessment
2 Threats (the greatest of the 3 following threat scores)	
Breeding Season Threats in North America	PIF continental species assessment
Non-breeding Season Threats	PIF continental species assessment
Breeding Season Threats in New Mexico	NMPIF state species assessment
3 Global Population Size	PIF continental species assessment
4 Local Population Trend (state or regional)	NMPIF state species assessment, using Breeding Bird Survey data
5 Importance of New Mexico to Breeding	NMPIF state species assessment, based on distribution and PIF state population estimates

3.1.2 Combined scores

In assessing vulnerability due to distribution, only the higher of the two (breeding and non-breeding distribution) global assigned scores is counted. In assessing vulnerability due to threats, only the highest of three (breeding in North America, breeding in New Mexico, and non-breeding) assigned scores is counted. This results in a set of five scoring factors for assessing vulnerability. This system is in general agreement with that adopted by Partners in Flight for species assessment nationally.

Scores for all five factors may be summed to produce a combined score that represents a single, overall metric of conservation vulnerability. Combined scores for New Mexico birds have been calculated as follows:

$$\text{Combined Score} = \text{Distribution} + \text{Threats} + \text{Global Population Size} + \text{Local Population Trend} + \text{Importance of New Mexico to Breeding}$$

Note that by this five-variable formula, the maximum possible combined score is 25 and the minimum score is 5.

3.1.3 Prioritization

New Mexico Partners in Flight has chosen to present its high priority species in two broad categories, which are further sub-divided according to degree of vulnerability.

Conservation prioritization in a state, or other management unit, may be driven by two equally important concepts. Contributing to overall species conservation, in the state and larger continental context, and contributing to maintaining state biodiversity are distinct components of the New Mexico Partners in Flight plan, and it is often difficult to prioritize between the two.

For example, many breeding species occur only as very small, peripheral populations in the state. Such species receive a low score of 1 for the vulnerability factor “Importance of New Mexico to Breeding”. In most cases, these are species for which Partners in Flight estimates that New Mexico supports less than one percent of the total breeding population. While the overall conservation status of such species may not be greatly affected by actions undertaken in New Mexico, maintaining breeding populations of these species is considered to be extremely important from a state biodiversity perspective.

To recognize and address this challenge, New Mexico Partners in Flight presents lists of species of overall conservation concern under Species Conservation (SC) and species of concern in maintaining state biodiversity under Biodiversity Conservation (BC). Within each of these two lists, species are categorized into two levels of vulnerability (Table 3.2 below). Level 1 includes species of high conservation concern in either the SC or BC category (SC1 and BC1, respectively). For the most part, these are species facing moderate to severe threats and showing unknown or declining local population trends. They are considered to be species in need of immediate conservation action. Level 2 species are considered to be of moderate or potential conservation concern in either the SC or BC category (SC2 and BC2, respectively). They show some signs of vulnerability, and may warrant careful monitoring. The Species Conservation and Biodiversity Conservation categories are established based on the vulnerability factor “Importance of New Mexico to Breeding”. The species under Species Conservation are ranked as level 1 or level 2 based on the Combined Scores (greater than 16 for level 1 and 15 or 16 for level 2). Species with a slightly lower Combined Score of 14 still qualify as level 2 if they have moderate to high state-based vulnerability, as reflected in “Breeding Season Threats in New Mexico” and “Local Population Trend” scores. Species under Biodiversity Conservation are ranked as level 1 or level 2 according to the degree of threat they face in New Mexico, as indicated by “Breeding Season Threats in New Mexico” scores; however, those with Combined Scores of 11 or less are excluded.

Table 3.2. Criteria for priority listings

Priority List	Abbreviation	Formula
Species Conservation Level 1	SC1	Importance of New Mexico to Breeding > 1 and Combined Score > 16
Species Conservation Level 2	SC2	Importance of New Mexico to Breeding > 1 and Combined Score = 15 or 16 or Importance of New Mexico to Breeding > 1 and Combined Score = 14 and Breeding Season Threats in New Mexico + Local Population Trends > 5
Biodiversity Conservation Level 1	BC1	Importance of New Mexico to Breeding = 1 and Breeding Season Threats in New Mexico > 3
Biodiversity Conservation Level 2	BC2	Importance of New Mexico to Breeding = 1 and Breeding Season Threats in New Mexico = 3 and Combined Score > 11

3.2 Stewardship Species

In addition to assessment and prioritization of vulnerable species, Partners in Flight also stresses the importance of regional responsibility for *all* species for which a significant portion of the global population occurs in the planning region. The Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004) designates **stewardship species** for very large areas designated as “avifaunal biomes”, each of which contains multiple Bird Conservation Regions. New Mexico lies at the intersection of three of these areas: the Intermountain West Avifaunal Biome (covering much of the western U.S. and southwestern Canada); the Southwest Avifaunal Biome (covering the Southwest and northern Mexico); and the Prairie Avifaunal Biome (covering the Midwest and north-central U.S.). Partners in Flight stewardship species are those with at least 50 or 75 percent (depending on biome size) of their global population occurring within one of these regions.

To identify stewardship species at the state level, New Mexico Partners in Flight consulted the Partners in Flight database of population estimates for the four Bird Conservation Region segments occurring in New Mexico. **Species with an estimated 15 percent or more of their breeding population occurring in the state are considered state stewardship species, for which New Mexico has a high conservation responsibility.** A small number of species were added to the stewardship list based on qualitative assessment of regional importance, in cases for which no numerical population estimate was available. The list of stewardship species for the state includes 16 species appearing on the SC1 or SC2 lists, and an additional 3 non-priority species.

It should be emphasized that Partners in Flight estimates of species populations and distribution by region are still being tested and refined. Efforts are currently underway to determine how best to “step down” global estimates to states and Bird Conservation Regions, and to assess the general validity of these totals based on local knowledge. As state and global population estimates are improved, percentage estimates and stewardship species lists are likely to change. However, New Mexico Partners in Flight believes the current system employed by Partners in Flight provides a solid foundation and accurately identifies the majority of species for which New Mexico bears particular conservation responsibility.

3.3 New Mexico Priority and Stewardship Species Lists

Priority and stewardship species lists for New Mexico are shown in Table 3.3. Species are arranged taxonomically (not in order of priority) within each list. A “W” following the species name indicates national Partners in Flight Watch List status. “S-NM” indicates stewardship species for New Mexico. Stewardship species that are not also conservation priority species appear on a separate list below. “NM-E” or “NM-T” signifies state endangered or threatened status, as determined by the New Mexico Department of Game and Fish, 2004 Biennial Review.

Table 3.3 New Mexico Priority and Stewardship Bird Species

Species Conservation, Level 1	Species Conservation, Level 2	Biodiversity Conservation, Level 1
Ferruginous Hawk Lesser Prairie-Chicken (W, S-NM) Snowy Plover Mountain Plover Long-billed Curlew Flammulated Owl (W) Mexican Spotted Owl (W, S-NM) Lewis's Woodpecker (W) Southwestern Willow Flycatcher (W, S-NM, NM-E) Bell's Vireo (W, NM-T) Gray Vireo (W, NM-T) Pinyon Jay (W, S-NM) Juniper Titmouse (S-NM) Bendire's Thrasher (W, S-NM) Virginia's Warbler (S-NM) Lucy's Warbler (W) Grace's Warbler (W, S-NM) Red-faced Warbler (W) Black-chinned Sparrow (W) Arizona Grasshopper Sparrow [<i>ammolegus</i>] (NM-T) McCown's Longspur (winter) (W) Total: 21	Eared Grebe Clark's Grebe Mississippi Kite Swainson's Hawk Prairie Falcon Scaled Quail (W, S-NM) Montezuma Quail Band-tailed Pigeon (W) Northern Pygmy-Owl Elf Owl White-throated Swift (W) Black-chinned Hummingbird (S-NM) Broad-tailed Hummingbird (S-NM) Williamson's Sapsucker Red-naped Sapsucker Cordilleran Flycatcher (S-NM) Cassin's Kingbird (S-NM) Loggerhead Shrike Plumbeous Vireo (S-NM) Warbling Vireo Western Scrub-Jay Western Bluebird (S-NM) Mountain Bluebird Crissal Thrasher (S-NM) Black-throated Gray Warbler Vesper Sparrow Black-throated Sparrow Sage Sparrow Lazuli Bunting Bullock's Oriole Total: 30	American Bittern Common Black-Hawk (NM-T) Aplomado Falcon (NM-E) Peregrine Falcon (NM-T) White-tailed Ptarmigan (NM-E) Common Ground-Dove (NM-E) Yellow-billed Cuckoo Boreal Owl (NM-T) Black Swift (W) Violet-crowned Hummingbird (NM-T) Lucifer Hummingbird (NM-T) Elegant Trogon (W, NM-E) Red-headed Woodpecker Northern Beardless-Tyrannulet (NM-E) Thick-billed Kingbird (W, NM-E) Bank Swallow Veery Sprague's Pipit (winter) Abert's Towhee (W, NM-T) Botteri's Sparrow Baird's Sparrow (winter) (NM-T) Yellow-eyed Junco (NM-T) Painted Bunting (W) Bobolink Total: 24
Biodiversity Conservation, Level 2		Additional Stewardship Species
Western Grebe Neotropical Cormorant (NM-T) Least Bittern Snowy Egret Golden Eagle Bald Eagle (NM-T) Northern Harrier Blue Grouse Least Tern (NM-E) Whiskered Screech-Owl (NM-T) Whip-poor-will Broad-billed Hummingbird (NM-T) Magnificent Hummingbird Costa's Hummingbird (W, NM-T) Belted Kingfisher Gila Woodpecker (NM-T) Arizona Woodpecker (W) Olive-sided Flycatcher (W) Greater Pewee Mexican Jay Bridled Titmouse		Say's Phoebe Chihuahuan Raven Cassin's Sparrow Total: 3
Mexican Chickadee Sage Thrasher Wilson's Warbler Olive Warbler Painted Redstart Summer Tanager Grasshopper Sparrow Varied Bunting (W, NM-T) Dickcissel (W) Hooded Oriole Brown-capped Rosy-Finch (W) Total: 32		

3.4 Patterns of Diversity and Vulnerability

The following sections describe some general patterns in the distribution of New Mexico's priority bird species, from taxonomic, regional, and habitat-based perspectives. Such patterns can be useful in determining underlying causes of species vulnerability, and in informing and prioritizing conservation and management efforts for species and habitats.

3.4.1 Taxonomic Patterns

Distribution of New Mexico's breeding birds by taxonomic group and priority status is shown in Table 3.4. Taxonomic divisions are by family, although in a few cases, two or more closely related and ecologically similar families have been lumped together. Families with a high degree of representation on the priority lists may be the groups from which additional priority species are most likely to emerge in the future, and managers are urged to keep an eye on the status and trends of all species in these taxa.

Overall, 38% of New Mexico's regularly breeding bird species appear on one of the four priority lists. Taxonomic groups which include three or more species overall and that show a disproportionately high degree of vulnerability (the priority species represent 50% or more of the group's member species) include grebes, falcons, grouse/quail, plovers, owls, swifts, hummingbirds, woodpeckers, vireos, and warblers. Taxonomic groups which include three or more species but that show a disproportionately low degree of vulnerability (the species in priority lists represent less than 25% of the group's member species) include waterfowl, rails, swallows, nuthatches/creepers, wrens, and finches.

As may be expected, many of the taxa with the largest number of members contain the largest number of priority species. Overall numbers of priority species are highest for sparrows (11), warblers (8), hawks (7), owls, and woodpeckers (6 each). Conversely, some taxonomic groups with a large number of members contain few, if any, priority species (e.g., geese and ducks).

Groups in which a quarter or more of the membership is considered to be of highest conservation priority in either the Species or Biodiversity Conservation categories (SC1 or BC1) include falcons, grouse/quail, plovers, owls, vireos, warblers, and sparrows. Groups with three or more species in the Species Conservation category (SC1 or SC2) include hawks, grouse/quail, owls, woodpeckers, flycatchers, vireos, warblers, and sparrows. Groups with three or more species in the Biodiversity Conservation category (BC1 or BC2) include herons, hawks, hummingbirds, woodpeckers, flycatchers, warblers, sparrows, and blackbirds.

High vulnerability is present both in groups that are highly migratory and in groups comprised of predominantly resident species. The concentration of level 1 and 2 species is somewhat difficult to interpret in terms of biological or ecological characteristics of these taxa. Most of these groups include priority members representing a variety of different habitat types. Raptors, water-associated species, gallinaceous species, woodpeckers, thrashers, foliage-gleaning insectivores (warblers and vireos), and lowland sparrows all are strongly represented, encompassing a broad range of migratory, foraging, and life history strategies.

Table 3.4 Priority status by taxonomic group.

Taxonomic Group	New Mexico Regular Breeding Species	Species Conservation Level 1	Species Conservation Level 2	Biodiversity Conservation Level 1	Biodiversity Conservation Level 2	Total Priority Species
Grebes	4		2		1	3 (75%)
Cormorants	2				1	1 (50%)
Bitterns & Herons	9			1	2	3 (33%)
Ibises	1					
Vultures	1					
Geese & Ducks	15					
Kites, Eagles & Hawks	15	1	2	1	3	7 (47%)
Falcons	3		1	2		3 (100%)
Grouse, Turkeys & Quail	8	1	2	1	1	5 (56%)
Rails, Gallinules & Coots	4					
Plovers	3	2				2 (67%)
Stilts & Avocets	2					
Sandpipers & Phalaropes	4	1				1 (25%)
Gulls & Terns	1				1	1 (100%)
Pigeons & Doves	5		1	1		2 (40%)
Cuckoos & Roadrunners	2			1		1 (50%)
Owls (including Barn Owl)	12	2	2	1	1	6 (50%)
Nighthawks	4				1	1 (25%)
Swifts	3		1	1		2 (67%)
Hummingbirds	7		2	2	3	7 (100%)
Trogons	1			1		1 (100%)
Kingfishers	1				1	1 (100%)
Woodpeckers	12	1	2	1	2	6 (50%)
Flycatchers	21	1	2	2	2	7 (33%)
Shrikes	1		1			1 (100%)
Vireos	5	2	2			4 (80%)
Jays, Magpies & Crows	11	1	1		1	3 (27%)
Larks	1					
Swallows	8			1		1 (12%)
Chickadees, Titmice, Verdins & Bushtits	7	1			2	3 (43%)
Nuthatches & Creepers	4					
Wrens	6					
Dippers	1					
Kinglets	2					
Gnatcatchers	2					
Thrushes	8		2	1		3 (37%)
Mockingbirds & Thrashers	7	1	1		1	3 (43%)
Pipits	1			1		1 (100%)
Silky-Flycatchers	1					
Warblers (including Olive Warbler)	14	4	1		3	8 (57%)
Tanagers	3				1	1 (33%)
Sparrows	23	3	3	4	1	11 (48%)
Cardinals, Grosbeaks & Buntings	8		1	1	1	3 (37%)
Blackbirds, Orioles & other Icterids	15		1	1	2	4 (27%)
Finches	10				1	1 (10%)

3.4.2 Regional Patterns

New Mexico contains portions of four Bird Conservation Regions (see section 2.6 for a description). Table 3.5 shows the total number of breeding and priority-status species within each of the state's four Bird Conservation Regions (including only the portion of those regions within New Mexico). The totals shown are for regularly-breeding species in each region; irregular or marginal breeders are not included.

Breeding species diversity is fairly consistent across Southern Rocky Mountains, Chihuahuan Desert, and Sierra Madre Occidental regions of New Mexico. Each of these regions contains roughly three-fourths of the species breeding in the state. High regional diversity is maintained in each of these areas by the presence of multiple habitats ranging from high elevation coniferous forests to arid lowlands. The portion of the Sierra Madre Occidental region in New Mexico is significantly smaller, however, and thus when area is considered, this Bird Conservation Region is certainly the most species-rich region of the state. The number of breeding species decreases somewhat in the mostly prairie Shortgrass Prairie region.

The pattern for priority species totals is similar to that of breeding species. The priority species component of regional species pools ranges from a low of 22% in the Shortgrass Prairie (Bird Conservation Region 18) to a high of 37% in the Sierra Madre Occidental (Bird Conservation Region 34). In each region, there are more species in the species conservation (SC1 and SC2) categories than the biodiversity conservation (BC1 and BC2) categories. The difference is smallest in the Sierra Madre Occidental (Bird Conservation Region 34), which contains the highest number of Biodiversity Conservation priority species.

The last two columns list numbers of species unique to a single Bird Conservation Region within New Mexico. Together, the portion of Bird Conservation Regions 16 and 34 in New Mexico contain a significant majority of the state's unique breeding and unique priority species. In this respect, these two regions may be of particular conservation importance. Note also that 13 of the 15 unique breeding species in the Sierra Madre Occidental are considered conservation priorities.

Table 3.5 Distribution of priority status for breeding species by BCR segment. Unique species are those breeding regularly in only one region.

Bird Conservation Region	Total Breeding Species	Total Priority Species	Species Conservation (SC1 & SC2) Species	Biodiversity Conservation (BC1 & BC2) Species	Unique Breeding Species	Unique Priority Species
16. Southern Rocky Mountains	223	67 (30%)	42	25	22	8
34. Sierra Madre Occidental	208	76 (37%)	41	35	15	14
35. Chihuahuan Desert	222	72 (32%)	40	32	7	3
18. Shortgrass Prairie	157	35 (22%)	22	13	4	2

3.4.3 Habitat Associations

The breeding status of New Mexico's species across habitat types was recently reviewed by New Mexico Partners in Flight. The state's avifauna includes specialist species present in only one or two habitat types, and generalists that range across many types. The set of species associated with a particular habitat type may in a loose sense be considered an avian "community", as many of these species will likely co-occur in areas where the habitat is present. However, no attempt was made to identify "typical" bird communities associated with different habitat types. Some habitats, such as Mixed Conifer Forest or Plains-Mesa Grassland, may differ markedly in species composition in different parts of the state. It should also be noted that the association of a species with a habitat type does not mean the species is likely to be present in all areas where the habitat occurs. Species known only from Guadalupe Canyon, for example, will be associated with Southwest Riparian habitat, but this habitat is distributed across a much wider area.

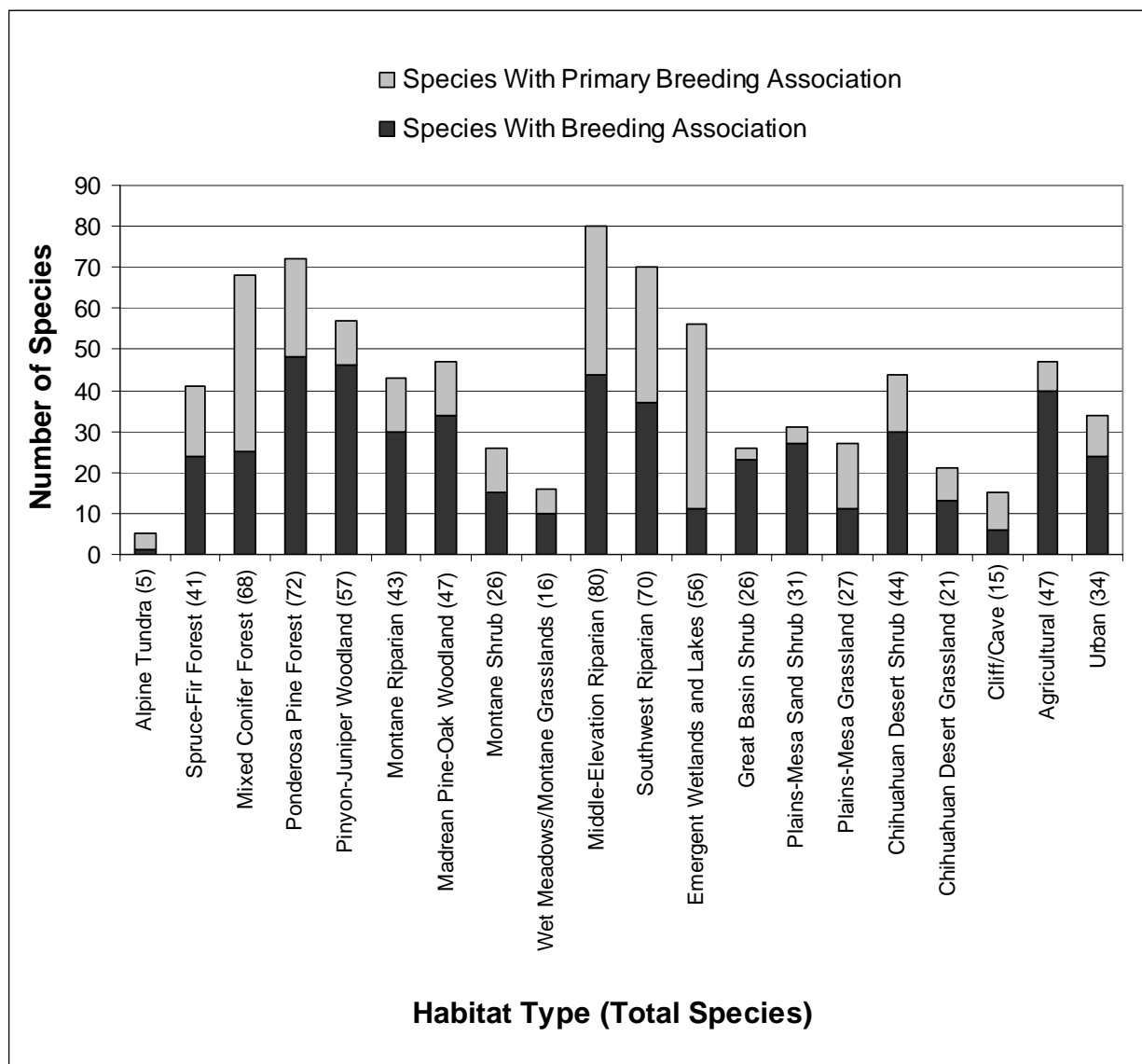
A complete list of habitat associations for all New Mexico species is provided in Appendix D. Associations for priority species are also shown in Table 3.6 below. In each case, an effort was made to identify all habitats in which the species breeds on a regular basis, and also to single out one or two "primary" habitat types with which the species is principally associated in New Mexico. Primary habitats are those which experts believe may contain a third or more of a species population in the state. Species have no primary designation if breeding is spread out fairly evenly across multiple habitat types.

As every birder knows, species often show up in areas that might not be considered the "right" habitat. Thus, habitat designations are necessarily imprecise and subjective, and are meant to serve only as a rough guide to species-habitat relationships of particular conservation importance. Additional details on habitat requirements for priority species can be found in the species accounts.

Figure 3.1 shows the distribution of New Mexico's breeding bird species across habitat types. For comparative purposes, habitats are loosely arranged from higher elevation and/or more northern types, on the left, to lower/southern types on the right. Cliff, agricultural, and urban types are separated on the far right.

Breeding species diversity in New Mexico is highest in low and middle elevation riparian areas, and in forests ranging from pinyon-juniper woodland up to mixed conifer. Shrublands and grasslands show less overall diversity, although some grassland types show strong species-habitat relationships, as indicated by a relatively high percentage of species with primary breeding associations. The same is true for wetlands, due to the many water-associated species that breed largely or exclusively in these areas. Note that agricultural and urban habitats contain moderately high species totals, though a low degree of primary association.

Figure 3.1 New Mexico breeding birds by habitat type.



3.4.4 Distribution of Vulnerability by Habitat Type

Understanding the distribution of priority and stewardship species across habitat types is essential to effective conservation planning. The identification of habitats where priority species occur in the largest numbers, or where threats are perceived to be the greatest, can help prioritize conservation management for these areas.

Several different approaches can be taken for analyzing vulnerability by habitat type, each of which may yield important but somewhat different information. This section presents the results of three such approaches. The first is a simple tally of priority species in each habitat type. This shows where the largest numbers of priority species are located. The second approach compares percentages of priority and non-priority species among habitat types. This highlights habitat

types that may be lower in overall species richness but whose breeding species tend to be more vulnerable. The third approach compares averages of species assessment scores across habitat types, regardless of priority list designation. This reveals habitats where certain indices of vulnerability, such as population trend or threat, are particularly high.

A list of habitat associations of New Mexico priority species appears in Table 3.6. Species are grouped by priority list (Species Conservation, SC, and Biodiversity Conservation, BC) and level of concern (level 1 and 2). Within each group, species are listed in taxonomic order.

Table 3.6 Habitat associations for New Mexico’s priority bird species.

Species	List	Primary Breeding Habitats	Additional Breeding Habitats
Ferruginous Hawk	SC1	PMG	PJW, GBS, PMS, AGR
Lesser Prairie-Chicken	SC1	PMS	
Snowy Plover	SC1	WET	
Mountain Plover	SC1	PMG	CDG
Long-billed Curlew	SC1	PMG	
Flammulated Owl	SC1	MCF, PPF	MPO
Mexican Spotted Owl	SC1	MCF, PPF	SFF, MOR, MPO
Lewis’s Woodpecker	SC1	PPF, MER	MOR, AGR
Southwestern Willow Flycatcher	SC1	MER, SWR	MOR
Bell’s Vireo	SC1	MER, SWR	CDS
Gray Vireo	SC1	PJW, MOS	GBS, CDS
Pinyon Jay	SC1	PJW	PPF
Juniper Titmouse	SC1	PJW	MPO
Bendire’s Thrasher	SC1		PJW, GBS, PMG, CDS
Virginia’s Warbler	SC1	PPF, MOS	MCF, PJW, MPO
Lucy’s Warbler	SC1	SWR	MER
Grace’s Warbler	SC1	PPF	MCF, MPO
Red-faced Warbler	SC1	MCF, PPF	MOR
Black-chinned Sparrow	SC1	MOS	PJW
Grasshopper Sparrow (<i>ammolegus</i>)	SC1	CDG	
McCown’s Longspur (winter)	SC1	(CDG)	(AGR)
Eared Grebe	SC2	WET	
Clark’s Grebe	SC2	WET	
Mississippi Kite	SC2	URB	AGR, MER
Swainson’s Hawk	SC2		PMG, PMS, CDG, CDS, AGR, GBS
Prairie Falcon	SC2	CLI	(Forages widely)
Scaled Quail	SC2	PMG, CDG	GBS, PMS, CDS, AGR
Montezuma Quail	SC2	PJW, MPO	PPF
Band-tailed Pigeon	SC2	MCF, PPF	SFF, MPO
Northern Pygmy-Owl	SC2	MCF, PPF	SFF, MPO
Elf Owl	SC2	MPO, SWR	
White-throated Swift	SC2	CLI	(Forages widely)
Black-chinned Hummingbird	SC2	MER, SWR	URB
Broad-tailed Hummingbird	SC2	MCF, PPF	SFF, PJW, MOR, WMG
Williamson’s Sapsucker	SC2	MCF	PPF
Red-naped Sapsucker	SC2	MCF	SFF, PPF, MOR
Cordilleran Flycatcher	SC2	MCF	SFF, PPF, MOR
Cassin’s Kingbird	SC2		PPF, PJW, MPO, MER, SWR, AGR

Species	List	Primary Breeding Habitats	Additional Breeding Habitats
Loggerhead Shrike	SC2		PJW, GBS, PMS, PMG, CDS, CDG, AGR
Plumbeous Vireo	SC2	MCF, PPF	PJW, MOR, MPO, SWR
Warbling Vireo	SC2	MCF, MOR	SFF, PPF, MER
Western Scrub-Jay	SC2	PJW	MPO, MOS, URB
Western Bluebird	SC2	PJW, MPO	PPF, MOR
Mountain Bluebird	SC2	PJW	MOR, WMG, GBS
Crissal Thrasher	SC2	PJW, CDS	MOS, MER, SWR
Black-throated Gray Warbler	SC2	PJW, MPO	
Vesper Sparrow	SC2	GBS, PMG	PJW, WMG, PMS
Black-throated Sparrow	SC2	CDS	GBS, PMS
Sage Sparrow	SC2	GBS	
Lazuli Bunting	SC2	MOS, MER	
Bullock's Oriole	SC2	MER	SWR, CDS, AGR
American Bittern	BC1	WET	
Common Black-Hawk	BC1	SWR	MER
Aplomado Falcon	BC1	CDG	
Peregrine Falcon	BC1	CLI	(Forages widely)
White-tailed Ptarmigan	BC1	ALP	
Common Ground-Dove	BC1	SWR	CDS, AGR
Yellow-billed Cuckoo	BC1	MER, SWR	AGR, URB
Boreal Owl	BC1	SFF	
Black Swift	BC1	MOR	(Forages widely)
Violet-crowned Hummingbird	BC1	SWR	
Lucifer Hummingbird	BC1	MOS, CDS	
Elegant Trogon	BC1	MOR, SWR	
Red-headed Woodpecker	BC1	MER	AGR
Northern Beardless-Tyrannulet	BC1	SWR	
Thick-billed Kingbird	BC1	SWR	
Bank Swallow	BC1	MER	PMS (Forages widely)
Veery	BC1	MOR	
Sprague's Pipit (winter)	BC1	(CDG)	
Abert's Towhee	BC1	SWR	
Botteri's Sparrow	BC1	CDG	
Baird's Sparrow (winter)	BC1	(CDG)	
Yellow-eyed Junco	BC1	MCF	PPF
Painted Bunting	BC1	MER, CDS	AGR
Bobolink	BC1	WMG, AGR	
Western Grebe	BC2	WET	
Neotropic Cormorant	BC2	WET	MER
Least Bittern	BC2	WET	
Snowy Egret	BC2	WET	MER
Golden Eagle	BC2	CLI	
Bald Eagle	BC2	MER, WET, SWR	
Northern Harrier	BC2	WET	PMG, CDS, CDG
Blue Grouse	BC2	MCF	SFF, PPF
Least Tern	BC2	WET	
Whiskered Screech-Owl	BC2	MPO, MOR, SWR	
Whip-poor-will	BC2	PPF	MCF, MPO
Broad-billed Hummingbird	BC2	SWR	
Magnificent Hummingbird	BC2	PPF, MPO	MCF, SWR
Costa's Hummingbird	BC2	MOS, CDS	SWR

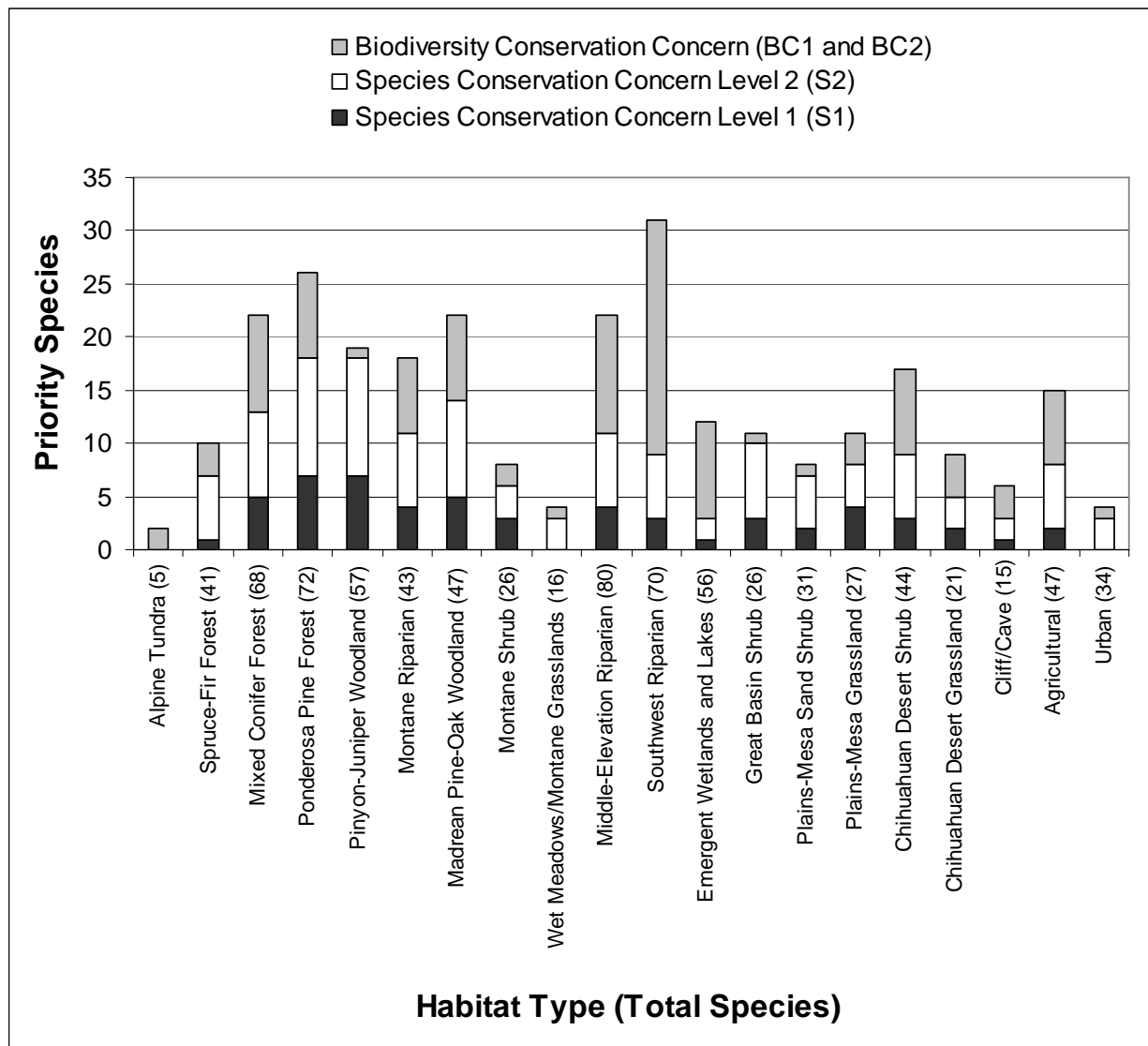
Species	List	Primary Breeding Habitats	Additional Breeding Habitats
Belted Kingfisher	BC2	MER	MOR, SWR, WET
Gila Woodpecker	BC2	SWR	
Arizona Woodpecker	BC2	MPO, SWR	
Olive-sided Flycatcher	BC2	MCF	SFF, PPF
Greater Pewee	BC2	MCF, PPF	
Mexican Jay	BC2	MPO	SWR
Bridled Titmouse	BC2	MPO, SWR	PJW
Mexican Chickadee	BC2	MCF	PPF, MPO
Sage Thrasher	BC2	GBS	
Wilson's Warbler	BC2	MOR	
Olive Warbler	BC2	MCF, PPF	
Painted Redstart	BC2	MOR	MCF, MPO, SWR
Summer Tanager	BC2	MER, SWR	
Grasshopper Sparrow	BC2	PMG	CDG, AGR
Varied Bunting	BC2	CDS	SWR
Dickcissel	BC2	PMG, AGR	
Hooded Oriole	BC2	SWR	MER, CDS
Brown-capped Rosy-Finch	BC2	ALP	

ALP Alpine Tundra; SFF Spruce-Fir Forest; MCF Mixed Conifer Forest; PPF Ponderosa Pine Forest; PJW Pinyon-Juniper Woodland; MOR Montane Riparian; MPO Madrean Pine-Oak Woodland; MOS Montane Shrub; WMG Wet Meadows and Montane Grasslands; MER Middle-Elevation Riparian; SWR Southwest Riparian; WET Emergent Wetlands and Lakes; GBS Great Basin Shrub; PMS Plains-Mesa Sand Shrub; PMG Plains-Mesa Grassland; CDS Chihuahuan Desert Shrub; CDG Chihuahuan Desert Grassland; CLI Cliff/Cave; AGR Agricultural; URB Urban.

Priority Species Totals

The number of priority species (Species Conservation Concern and Biodiversity Concern) by habitat type is shown in Figure 3.2.

Figure 3.2 Priority species by habitat type.



Overall, the pattern for priority species numbers is similar to that for all breeding species (see Figure 3.1), with a peak in riparian areas and a second peak in montane coniferous forests. Southwest Riparian contains the largest number of priority species, with 31. Note, however, that when only species on the Species Conservation list (SC1 and SC2) are considered, the pattern is somewhat different. The habitats containing the highest number of SC1 and SC2 species are Pinyon-Juniper Woodland and Ponderosa Pine Forest with 18 each and Madrean Pine-Oak Woodland with 14.

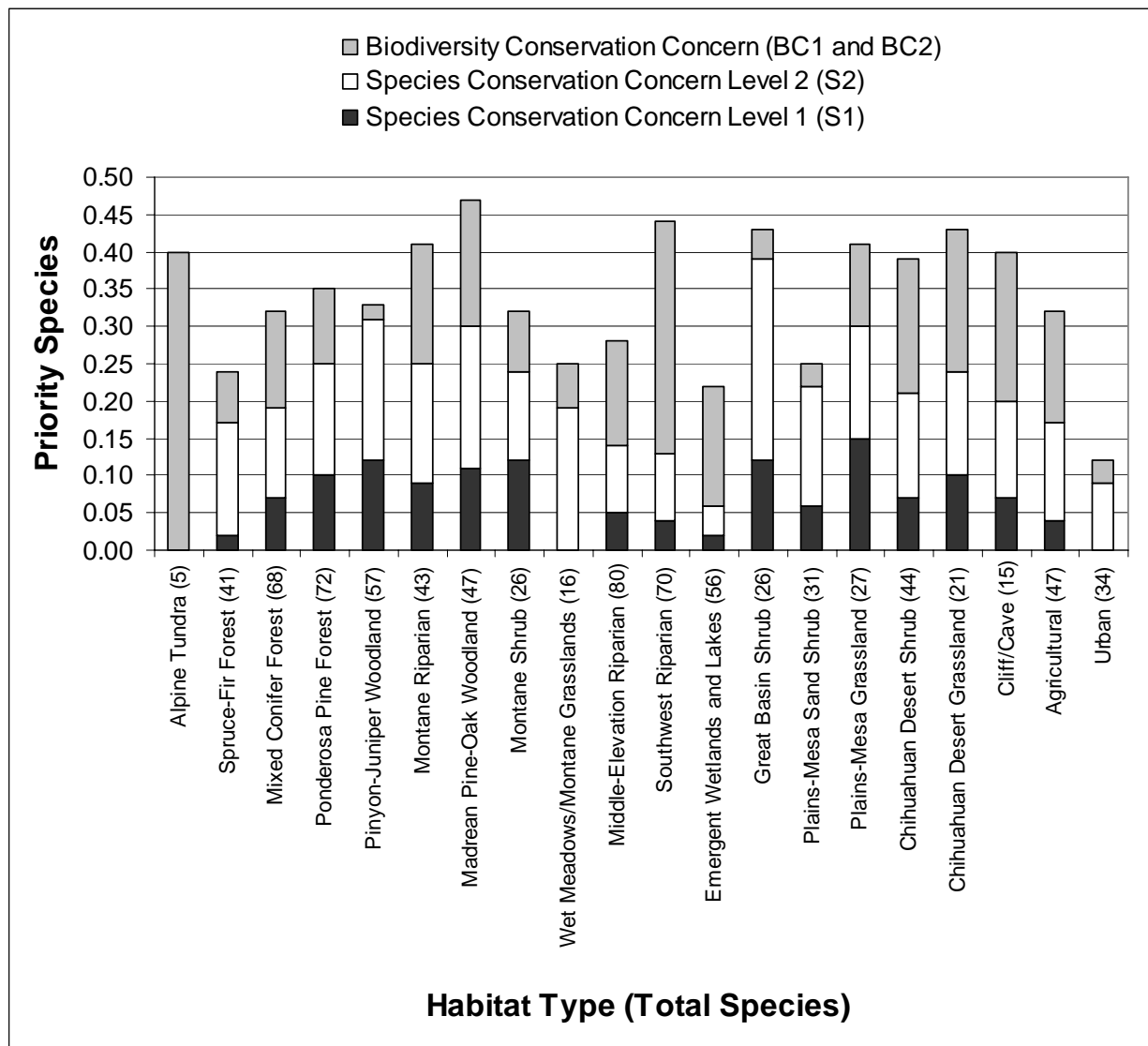
Riparian and wetland areas contain only a moderate number of SC1 and SC2 species, but far more species on the Biodiversity Conservation list (BC1 and BC2) than other habitat types. These habitats support high biodiversity and are critical to many species considered vulnerable in the state of New Mexico. It should be remembered that the New Mexico state list includes a number of Partners in Flight Watchlist species of continental importance (see Table 3.3). However, it is the state's non-riparian woodlands and dry pine forests that contain the highest numbers of species of range-wide conservation concern.

Figure 3.2 also shows that some grassland and shrubland habitats contain fairly high numbers of SC1 and SC2 species, despite the fact that overall diversity in these habitats is lower than in montane forests. This pattern is explored further in the following section.

Community Composition

Priority species (Species Conservation Concern and Biodiversity Concern) as a percentage of the total species pool for each habitat type is shown in Figure 3.3.

Figure 3.3 Priority species representation in habitat assemblages.



Priority species (all types) comprise between 22 and 47 percent of the breeding species pool in all major natural habitat types in New Mexico. Habitats with the greatest percentage of priority species include Madrean Pine-Oak Woodland (47%), Southwest Riparian (44%), Great Basin Shrub (43%), and Chihuahuan Desert Grassland (43%). Habitats with the highest percentage of Species Conservation concern (SC1 and SC2) species include Great Basin Shrub (39%), Pinyon-Juniper Woodland (31%), Ponderosa Pine Forest (25%), and Montane Riparian (25%). These high percentages indicate that although other habitats may contain more priority species,

community-wide vulnerability is greatest in several grassland, shrubland, and dry woodland habitats.

Figure 3.3 also shows that Biodiversity Conservation concern (BC1 and BC2) species constitute a significant percentage of the breeding species in Chihuahuan Desert and riparian habitats. Particularly remarkable is Southwest Riparian, for which 31% of the total breeding species are considered biodiversity priorities. It should be kept in mind here that biodiversity list species are ones for which less than 1% of the total breeding population resides in New Mexico, and which also rank highly for other vulnerability factors. That such species comprise over a quarter of the breeding birds present along southern New Mexico's rivers and streams highlights the fragile nature of riparian communities and the importance of remaining riparian habitat.

This analysis shows how species vulnerability may translate into ecological vulnerability at the community and ecosystem level. A number of habitat types in New Mexico show a significant percentage of their breeding bird species to be at risk. New Mexico Partners in Flight believes a high priority should be placed on maintaining the integrity of bird assemblages and communities in habitats where vulnerability is high. Particularly important from this perspective are habitats that might be overlooked if conservation efforts focused solely on those types containing the highest overall numbers of priority species. The importance of non-riparian woodland and riparian habitat types has already been noted. This analysis suggests that Great Basin Shrub and Chihuahuan Desert Grassland types also warrant careful attention.

Average Species Assessment Scores

Average species assessment scores for selected variables, by habitat, are shown in Tables 3.7 – 3.9. The averages are for *all* species designated as having a primary breeding affiliation with a particular habitat (not just conservation priority species). The tables present average assigned vulnerability scores for Breeding Season Threats in New Mexico, Local Population Trend, and the Combined score which is the total of all vulnerability factors. (For each factor a numerical score from 1 to 5 was assigned, with 5 indicating the highest degree of vulnerability. Species assessment and scoring are explained in detail in section 3.1.)

Table 3.7 below shows the ranking of average Breeding Season Threats in New Mexico scores by habitat, among species with a primary habitat affiliation. The number of such species is shown in parentheses. For all species across all habitats, the average Breeding Season Threats in New Mexico score is 2.37.

The local threat score reflects degree of concern over present and future breeding habitat conditions. Habitat types for which the greatest concern exists, based on species vulnerability scoring, are Chihuahuan Desert Grassland, Southwest Riparian, Pinyon-Juniper Woodland, Alpine Tundra, and Great Basin Desert Shrub.

Table 3.7 Breeding Season Threats in New Mexico scores by habitat

1.	Chihuahuan Desert Grassland (9)	3.11
2.	Southwest Riparian (34)	2.91
3.	Pinyon-Juniper Woodland (12)	2.75
4.	Alpine Tundra (4)	2.75
5.	Great Basin Desert Shrub (6)	2.67
6.	Montane Riparian (14)	2.64
7.	Montane Shrub (11)	2.64
8.	Madrean Pine-Oak Woodland (13)	2.62
9.	Plains-Mesa Sand Shrub (6)	2.50
10.	Cliff/Cave (10)	2.50
11.	Plains-Mesa Grassland (20)	2.45
12.	Ponderosa Pine Forest (25)	2.44
13.	Middle-Elevation Riparian (37)	2.38
14.	Wet Meadows and Montane Grasslands (6)	2.33
15.	Mixed Conifer Forest (43)	2.30
16.	Chihuahuan Desert Shrub (19)	2.26
17.	Emergent Wetlands and Lakes (46)	2.26
18.	Spruce-Fir Forest (17)	2.18

Table 3.8 below shows the ranking of average Local Population Trend scores by habitat, among species with a primary habitat affiliation. The number of such species is shown in parentheses. For all species across all habitats, the average LPT score is 2.73.

Table 3.8 Local Population Trend scores by habitat

1.	Great Basin Shrub (6)	4.00
2.	Pinyon-Juniper Woodland (12)	3.58
3.	Plains-Mesa Grassland (20)	3.25
4.	Chihuahuan Desert Grassland (9)	3.00
5.	Plains-Mesa Shrub (6)	3.00
6.	Cliff/Cave (10)	2.90
7.	Montane Riparian (14)	2.86
8.	Wet Meadows and Montane Grasslands (6)	2.83
9.	Spruce-Fir Forest (17)	2.76
10.	Emergent Wetlands and Lakes (46)	2.76
11.	Alpine Tundra (4)	2.75
12.	Mixed Conifer Forest (43)	2.74
13.	Ponderosa Pine Forest (25)	2.68
14.	Middle-Elevation Riparian (37)	2.62
15.	Madrean Pine-Oak Woodland (13)	2.62
16.	Chihuahuan Desert Shrub (19)	2.58
17.	Montane Shrub (11)	2.55
18.	Southwest Riparian (34)	2.53

Because habitat loss is the most common cause of population decline, local trend scores MAY reflect the condition of New Mexico breeding habitat in recent decades. However, negative trends locally may be caused by other factors, such as conditions elsewhere in the breeding range or on wintering grounds. Habitat types for which affiliated species show the most negative population trends in New Mexico and surrounding regions are Great Basin Desert Shrub, Pinyon-Juniper Woodland, Plains-Mesa Grassland, Chihuahuan Desert Grassland, and Plains-Mesa Sand Shrub. Although only six species have a primary breeding affiliation with Great Basin Desert Shrub, the very high average Local Population Trend score of 4 among these species is noteworthy. Table 3.8 also indicates that declines in grassland species are significant and widespread. The habitat types Plains-Mesa Grassland and Chihuahuan Desert Grassland include the vast majority of New Mexico grassland areas, and both rank in the top 5 in this index of species population decline.

Table 3.9 shows the ranking of average Combined Scores by habitat, among species with a primary habitat affiliation. The number of such species is shown in parentheses. For all species across all habitats, the average Combined Score is 12.28.

Table 3.9 Ranking of average Combined Scores by habitat

1.	Pinyon-Juniper Woodland (12)	16.33
2.	Great Basin Shrub (6)	15.17
3.	Plains-Mesa Sand Shrub (6)	15.00
4.	Chihuahuan Desert Grassland (9)	14.67
5.	Montane Shrub (11)	14.55
6.	Plains-Mesa Grassland (20)	13.95
7.	Ponderosa Pine Forest (25)	13.80
8.	Madrean Pine-Oak Woodland (13)	13.77
9.	Chihuahuan Desert Shrub (19)	13.53
10.	Southwestern Riparian (34)	13.15
11.	Cliff/Cave (10)	12.60
12.	Montane Riparian (14)	12.36
13.	Mixed Conifer Forest (43)	12.19
14.	Alpine Tundra (4)	12.00
15.	Middle-Elevation Riparian (37)	11.95
16.	Emergent Wetlands and Lakes (46)	11.46
17.	Wet Meadows and Montane Grassland (6)	10.50
18.	Spruce-Fir Forest (17)	10.35

The data presented in Table 3.9 may be seen as a direct translation of species assessment scoring to habitat types. The habitats shown are ranked in overall vulnerability, as indicated by the status of the species that depend on these environments for breeding. Several biases in this presentation should be noted. Habitats with higher species diversity overall are likely to have more common and non-priority species, lowering their average combined vulnerability score. Note also that Biodiversity Conservation concern species (BC1 and BC2) and other species estimated to have less than one percent of their global population present in the state receive a low score of 1 for the variable Importance of New Mexico to Breeding. Consequently, average Combined Scores

are lowered somewhat for habitats like Southwest Riparian, which contain a large percentage of such species.

Overall vulnerability scores among primary habitat affiliates are highest for Pinyon-Juniper Woodland, Great Basin Desert Shrub, Plains-Mesa Sand Shrub, Chihuahuan Desert Grassland, and Montane Shrub. Additional perspective may be provided by comparing these average scores with the criteria for priority listing used for individual species. Note that the *average* Pinyon-Juniper-affiliate, with a Combined Score of 16.33, qualifies for Species Conservation Level 1 (SC1) designation. Additionally, average affiliated breeding species for Great Basin Desert Shrub, Plains-Mesa Sand Shrub, Chihuahuan Desert Grassland, and Montane Shrub meet criteria for Species Conservation Level 2 (SC2) designation. Plains-Mesa Grassland, Ponderosa Pine Forest, and Madrean Pine-Oak Woodland have averages just below the SC2 cutoff. This analysis shows that in a number of New Mexico habitats, vulnerability of the most habitat-dependent species is not unusual, but rather the norm.

Average Combined Scores for ALL species known to breed in each habitat tend to be lower than the scores shown in Table 3.9, which only include species with a primary breeding affiliation to a given type. This may be simply because of the larger sample size when all breeding species are included; alternatively, it may suggest a correlation between habitat-dependence and vulnerability. Species for which Pinyon-Juniper is primary breeding habitat, for example, have a Combined Score average of 16.33; the average for all species breeding in Pinyon-Juniper is 12.47. The same pattern holds for 8 of the top 10 habitats in Table 3.9, although the differences between the two scores are usually less. Among 37 New Mexico landbird species for which no primary breeding affiliation was assigned, the average combined vulnerability score was 10.19. Among 197 landbird species with primary affiliations to one or more habitats, the average was 12.75.

Distribution of Vulnerability – Summary

Species groups characteristic of different habitat types show different degrees of vulnerability. The analyses presented above are intended to highlight habitats in New Mexico that have the greatest need for bird conservation. Some habitat types rank highly in all three analyses, others in only one or two. Ponderosa Pine and Mixed Conifer habitats, for example, contain some of the highest priority species totals overall, although they do not rank among the most vulnerable habitats as measured by scoring averages. Other habitats with more restricted distributions in New Mexico contain high percentages of priority species with high average scores.

Overall, habitats that stand out as showing the greatest need for conservation attention include Southwest Riparian, Chihuahuan Desert Grassland, Great Basin Desert Shrub, Pinyon-Juniper Woodland, Madrean Pine-Oak Woodland, and Ponderosa Pine Forest.

3.5 Priority Habitats

Based on the results of the avifaunal analysis, and expert opinion regarding conservation issues and opportunities in New Mexico, New Mexico Partners in Flight has divided the state's habitat

types into three levels of concern. The system used for prioritizing habitats is the same one used by the Intermountain West Joint Venture for its Coordinated Implementation Plan for Bird Conservation in New Mexico. Under this system, habitats are ranked according to three criteria: 1) importance to birds, including but not restricted to priority species; 2) degree of threat; and 3) opportunities for habitat protection, restoration and enhancement. Habitats were sorted into Highest, High, and Moderate priority categories based on combined scores for importance and threat, with opportunity scores noted. Results of the habitat ranking are shown in Table 3.10.

Table 3.10 New Mexico Habitat Rankings. The number in parentheses is the score given for conservation opportunity: 1 = high, 2 = moderate, 3 = low.

Priority A: Highest	Priority B: High	Priority C: Moderate to Low
Chihuahuan Desert Grassland (2)	Plains-Mesa Grassland (2)	Spruce-Fir Forest (3)
Southwest Riparian (1)	Meadow/Montane Grassland (2)	Cliff/Cave (3)
Middle Elevation Riparian (1)	Alpine Tundra (3)	Agricultural (1)
Emergent Wetlands and Lakes (1)	Montane Riparian (2)	Urban (1)
Madrean Pine-Oak Woodland (3)	Chihuahuan Desert Shrub (3)	
Pinyon-Juniper Woodland (2)	Plains-Mesa Sand Shrub (1)	
Ponderosa Pine Forest (2)	Montane Shrub (3)	
	Great Basin Shrub (1)	
	Mixed Conifer Forest (2)	

3.6 Developing Management Recommendations, Conservation Goals and Biological Objectives

After assessing the status of species and habitats, and setting conservation priorities, the next step in the Partners in Flight planning process is to develop detailed species and habitat accounts including management recommendations and biologically-based conservation objectives. Over time, New Mexico Partners in Flight will develop comprehensive guidelines and best management practices for individual habitat types, based on priority and opportunity as summarized in section 3.5. Management recommendations for species are drawn from the ornithological and ecological literature, aided by expert knowledge within New Mexico.

Ideally, a conservation plan should include specific, quantifiable objectives for the maintenance and/or recovery of all priority species and habitats. Such objectives provide a standard towards which conservation efforts may be applied and their success evaluated. Frequently, however, the information needed to set biologically sound and measurable recovery goals is not yet available. In such cases, carrying out the research and monitoring needed to better understand species status, requirements, and trends may itself be a primary objective. Until precise data become available, additional objectives are often expressed in broadly qualitative terms, such as maintaining known populations or reversing negative trends.

New Mexico Partners in Flight has developed a set of broad, statewide goals towards which its activities and this Bird Conservation Plan are directed. In addition, biological objectives have been developed and are being refined. Species objectives appear at the end of each priority species account in Chapter Four. We view all statements concerning biological objectives as flexible and in need of improvement in subsequent revisions of this plan. The general trend should be towards scientifically justifiable, practically achievable targets, expressed in (for example) population sizes or habitat acres.

3.6.1 Integrating State and National (or Continental) Goals and Objectives

New Mexico Partners in Flight recognizes species population objectives set by Partners in Flight in its Continental Plan (Rich et al. 2004), which may be “stepped down” to state and regional levels. We are currently working with Partners in Flight and its Western Working Group to develop protocols for stepping down national objectives, testing the accuracy of state population estimates, and determining the relative contribution each state can make towards achieving population targets. This will ultimately require improved data on species distributions and breeding population densities, and area of suitable or potentially restorable habitat statewide. As this process moves forward, the precision, utility, and achievability of conservation objectives will increase.

Our broad goals for bird conservation in New Mexico are to:

- Keep all common species reasonably common
- Keep all native species well distributed throughout their natural range
- Keep all priority species populations stable and self-sustaining
- Accomplish all of the above by maintaining or restoring sufficient quality habitat of all types.

Additional goals of New Mexico Partners in Flight are to:

- Help agencies and conservation organizations develop programs to satisfy research and monitoring needs for effective, biologically-based conservation planning
- Further the development of on-the-ground conservation projects by fostering cooperative partnerships for habitat protection and restoration
- Increase public awareness and active involvement in bird and habitat conservation through education and outreach
- Recognize and carry out New Mexico’s stewardship responsibilities for North American bird species, through cooperation in planning and implementation efforts at regional and national levels
- Continually update and revise this plan as an adaptive and incrementally improving document, based on the best available information.