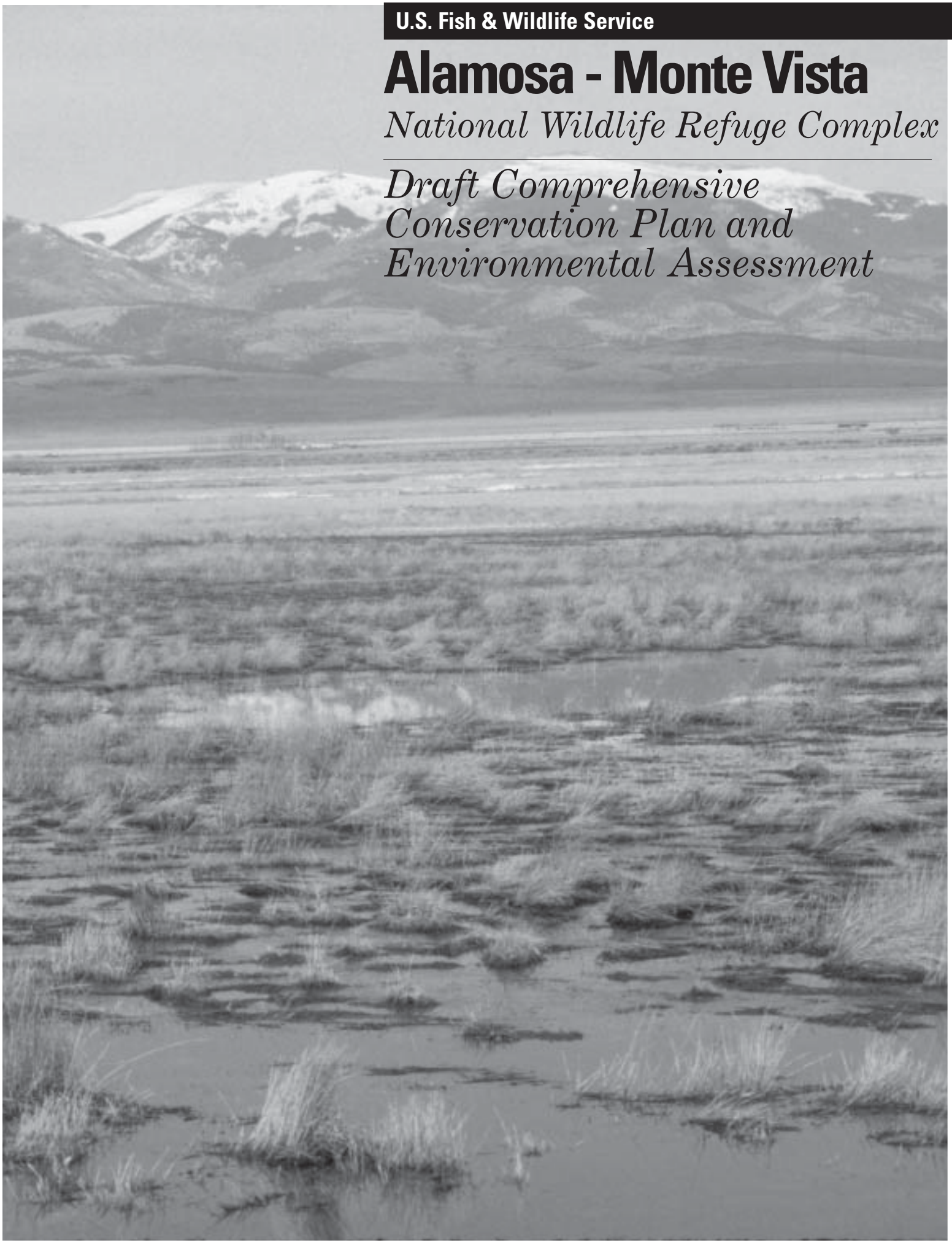
U.S. Fish & Wildlife Service

Alamosa - Monte Vista

National Wildlife Refuge Complex

Draft Comprehensive Conservation Plan and Environmental Assessment



CCPs provide long-term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

Alamosa - Monte Vista National Wildlife Refuge Complex

DRAFT COMPREHENSIVE CONSERVATION PLAN
and
ENVIRONMENTAL ASSESSMENT

Prepared by U.S. Fish & Wildlife Service

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Summary and Vision

The Monte Vista and Alamosa National Wildlife Refuges are located in the San Luis Valley (SLV), a high mountain basin located in south-central Colorado. Both Refuges were established under the Migratory Bird Conservation Act ". . . for use as inviolate sanctuaries, or for any other management purpose, for migratory birds." (16 U.S.C. 715D)

The Monte Vista NWR (14,800 acres) lies on the west side of the San Luis Valley, about eight miles south of the town of Monte Vista on State Highway 15. Monte Vista National Wildlife Refuge was approved for acquisition on June 10, 1952 by the Migratory Bird Conservation Committee. Establishing and acquisition authorities include: Migratory Bird Conservation Act of 1929, Public Land Order 2204 dated September 1960.

About 15 miles to the east is the Alamosa NWR, (11,169 acres) which is three miles east of the town of Alamosa off of State Highway 160. Alamosa National Wildlife Refuge was approved for acquisition on June 27, 1962 by the Migratory Bird Conservation Committee. Establishing and acquisition authorities include: Migratory Bird Conservation Act of 1929, Public Land Order 3899 dated December 1965.

The SLV consists of a flat and broad depression between mountain ranges converging to the north and is the first of a series of basins along the Rio Grande. The mountain ranges to the east reach altitudes over 14,000 feet and those to the west range between 13,000 and 14,000 feet. The length of the Valley from north to south is about 80 miles, and its greatest width is about 50 miles. The climate of the San Luis Valley is marked by cold winters and moderate summers light precipitation and much sunshine. This arid valley receives an average of seven inches of precipitation a year, most of which is in the form of rain in mid-summer. The growing season around the Alamosa NWR averages about 90 days. July and August are usually the only frost-free months. Winds are light except for the spring and early summer months when speeds of 40 miles per hour can commonly occur with higher gusts.

Vision

Lands of the Alamosa and Monte Vista National Wildlife Refuge Complex and those owned by our partners will be managed in a way that contributes to the migratory bird resource in the San Luis Valley to the greatest extent possible to benefit people of the Valley and the United States. Management will emphasize protection, enhancement, restoration and, where appropriate, creation of a variety of wetland and riparian habitats in this water rich, yet arid mountain valley. Local residents and visitors will view Refuge lands with a sense of pride and value their relationships and accomplishments with the U.S. Fish & Wildlife Service.

The purpose for managing habitats on the Alamosa and Monte Vista National Wildlife Refuges (Refuge Complex) is to provide healthy plant communities in a variety of successional and structural stages which best support migratory birds.

Alamosa and Monte Vista National Wildlife Refuges were established under the authority of the Migratory Bird Conservation Act ". . . for use as inviolate sanctuaries, or for any other management purpose, for migratory birds." Based on these establishment purposes, the Service has developed habitat and public use goals. The continuing achievement of these goals will fulfill the Refuges' purposes.

The goals of the CCP are:

Goal 1: *Provide short-emergent vegetation in conjunction with various hydrologic conditions for migrating and breeding water birds, raptors, and passerines on the refuge complex.*

Goal 2: *Provide short-emergent vegetation in a range of structures necessary to meet the requisites of nesting waterfowl, water birds, raptors, passerines, and the habitat needs for small mammal populations on the refuge complex.*

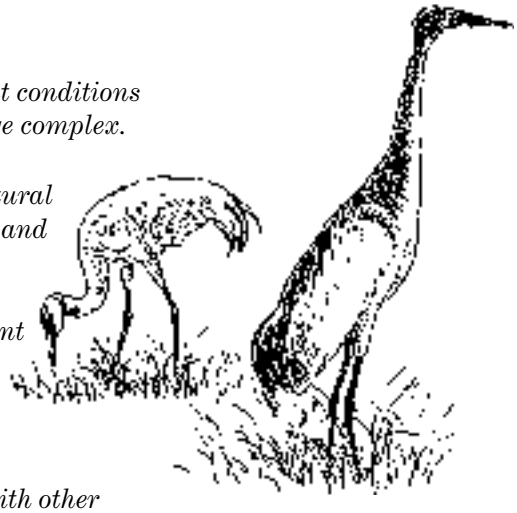
Goal 3: *Maintain areas of saltgrass in suitable condition for migrating and breeding water birds and passerines on the refuge complex.*

Goal 4: *Provide tall-emergent vegetation with other suitable habitat conditions for breeding water birds and marsh passerines on the refuge complex.*

Goal 5: *On Monte Vista National Wildlife Refuge, provide agricultural grains in adequate amounts for migrating sandhill cranes and waterfowl.*

Goal 6: *Provide submergent wetland vegetation for foraging migrant and breeding water birds, molting waterfowl, foraging raptors, aerial foraging birds, and nesting grebes and diving ducks.*

Goal 7: *Provide shallow (< 1 foot) seasonal water in conjunction with other habitat conditions for migrating and breeding water birds and aerial foraging birds.*



Sandhill cranes

Goal 8: *Enhance the Rio Grande corridor and its tributaries on Refuge lands to provide habitat for river, riparian-dependent, and other wetland species.*

Goal 9: *Provide native shrub (primarily greasewood and rabbitbrush on the Monte Vista NWR and four-wing saltbrush on Alamosa NWR) communities on the Refuge Complex for the benefit of nesting, migrating and wintering migratory birds and other wildlife species dependent upon them.*

Goal 10: *Provide native short-grass communities on the Complex but primarily on Alamosa NWR for the benefit of nesting, migrating and wintering migratory birds and other wildlife species dependent upon this habitat.*

Goal 11: *Actively participate in protecting the San Luis Valley Ecosystem (Upper Rio Grande Ecosystem) and achieving the goals contained in the North American Waterfowl Management Plan and the North American Bird Conservation Initiative (NABCI) through coordination with local, regional, and national partners.*

Goal 12: *Control noxious weeds on refuge complex roads, levees, and ditch banks to improve the quality of adjacent habitat and to slow or cease the spread of these species to neighboring private lands.*

Goal 13: *Foster understanding, appreciation, and advocacy of wetlands within the San Luis Valley Ecosystem (Upper Rio Grande Ecosystem).*

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I. Introduction

Introduction

The U.S. Fish & Wildlife Service (Service) is the principal Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats. The Service manages the 95-million-acre National Wildlife Refuge System which encompasses nearly 540 national wildlife refuges, thousands of small wetlands, and other special management areas. National wildlife refuges are established for specific purposes and provide habitats for more than 5,000 species of birds, mammals, fish, and insects.

Environmental Setting

The Monte Vista and Alamosa National Wildlife Refuges are located in the San Luis Valley (SLV), a high mountain basin located in south-central Colorado (Map 1 - Vicinity Map). The Monte Vista NWR (14,800 acres) lies on the west side of the San Luis Valley, about eight miles south of the town of Monte Vista on State Highway 15 (Map 2 - Monte Vista NWR Base Map). About 15 miles to the east is the Alamosa NWR, (11,169 acres) which is three miles east of the town of Alamosa off of State Highway 160 (Map 3 - Alamosa NWR Base Map). These refuges are located within the Upper Rio Grande Ecosystem of the U.S. Fish & Wildlife Service (Map 4 - Ecosystem Map).

The SLV consists of a flat and broad depression between mountain ranges converging to the north and is the first of a series of basins along the Rio Grande. The mountain ranges to the east reach altitudes over 14,000 feet and those to the west range between 13,000 and 14,000 feet. The length of the Valley from north to south is about 80 miles, and its greatest width is about 50 miles. The climate of the San Luis Valley is marked by cold winters and moderate summers light precipitation and much sunshine. This arid valley receives an average of seven inches of precipitation a year, most of which is in the form of rain in mid-summer. The growing season around the Alamosa NWR averages about 90 days. July and August are usually the only frost-free months. Winds are light except for the spring and early summer months when speeds of 40 miles per hour can commonly occur with higher gusts.

The San Luis Valley is part of the much larger Rio Grande Rift Zone which extends from southern New Mexico northward through the San Luis and Upper Arkansas Valleys to its northern termination near Leadville, Colorado (Map 5 - San Luis Valley). The SLV is bordered on the east by the linear Sangre de Cristo Mountains, which resulted from extensive block faulting during the Laramide Orogeny. The western side of the SLV is flanked by the San Juan Mountains, the result of extensive tertiary volcanism. In sharp contrast with the steeply faulted eastern side of the Valley floor, the Oligocene volcanic rocks of the San Juans gently dip eastward into the Valley floor where they are interbedded with Valley-fill deposits (USDI, BLM 1989).

The SLV has two major aquifers, the shallow unconfined and the deep confined. These aquifers consist mainly of unconsolidated clay, silt, sand, and gravel. The unconfined aquifer is separated from the confined aquifer by clay layers and lava flows. Wells drilled into the confined aquifer frequently produce free flowing artesian wells. Unconfined groundwater occurs throughout the Valley floor. The confined aquifer underlies most of the Valley, extending from north of Mosca south to Romeo and from Monte Vista to east of Alamosa. Both of the refuges overlay the confined aquifer. The aquifers provide water that is adjudicated for wildlife and irrigation uses on the refuges. For example, the Mumm artesian well provides about one quarter of the water used on Alamosa NWR.

History of the SLV and the Refuge Complex

For over a century, the SLV has been irrigated to produce hay, small grains (wheat and barley) and vegetables (potatoes, peas, lettuce). About 30 percent of the SLV is currently irrigated with water from the Rio Grande river and well water for agricultural purposes. The construction of over 2,000 miles of ditches and pumping of groundwater needed to support agricultural irrigation has likely diminished the quality and quantity of many naturally occurring wetland areas. We assume wetlands originally associated with creek and river systems in the Valley have been diminished by irrigation diversions by agricultural and wildlife managers. However, irrigation practices have also resulted in the creation of thousands of acres of wet meadows. These shallowly-flooded native plant meadows are usually annually hayed and grazed but still provide foraging habitat to migratory birds.

What we know about the landscape of the refuge complex prior to European settlement is primarily from descriptions provided by the first refuge manager (P. Bryant, pers comm.), settlers from the early 1900s (E. Olson, pers comm.), the original Refuge Master Plan (USFWS 1962), and the map produced by the 1874, 1875, and 1877 Wheeler expedition and the Rio Grande County Soil Survey. From these sources of information we believe that the area we now call Monte Vista NWR was largely devoid of palustrine emergent wetlands (wetlands permanently or semipermanently flooded) (wetland definitions by Cowardin, et al. 1979). When these wetlands did occur they were in the floodplains of Spring Creek, Rock Creek and possibly Cat Creek. The natural flows in these creeks have been drastically reduced in the last 50 to 150 years, and in the case of Spring Creek, almost dried completely due to the construction of irrigation canals and extensive groundwater withdrawal. Therefore, the availability of naturally palustrine emergent wetlands on the Monte Vista NWR has been reduced. Another type of wetland may have existed on the refuge prior to its establishment. Wetlands with saturated soils, perennial wetland vegetation and intermittent or temporary flooding may have occurred but they were probably dependent upon groundwater levels which were higher than current levels. These and other kinds of wetlands may have occurred. The dominant plant community is believed to have been desert salt shrubland primarily consisting of rabbitbrush, greasewood, salt grass, and alkali sacaton (Rocchi, et al. 2000). A need is recognized to continue to gather information on the extent, type, and location of historic wetlands on and near the Monte Vista NWR.

After 1882 and before the Monte Vista Refuge was established (1952), much of this shrubland habitat was converted to wet meadows for grazing and production of hay, and croplands via irrigation by private landowners. After the Refuge was established, the improvement of water management facilities began in order to emphasize wildlife habitat production on these irrigated lands. Low level levees have been built throughout the 14,800 acres to maintain irrigation of shallow water wetland vegetation, to compensate for the loss of wetland habitat throughout the SLV and to fulfill refuge purposes. The majority of these wetlands rely upon the delivery of surface water through a series of canals, ditches, and borrow areas. Water is the primary instrument to produce and maintain wildlife habitat on the Refuges, and without it, wetland-dependent wildlife would be greatly reduced in the SLV.

The Rio Grande is the largest and most significant river in the San Luis Valley, starting in the San Juan Mountains above Creede, Colorado and flowing southeast through the towns of South Fork, Del Norte (where it officially enters the SLV), Monte Vista, and Alamosa and then south to the New Mexico state line. This major river is critical not only for the people and resources of the San Luis Valley but for these same entities as it flows south through the states of New Mexico and Texas and then along the border with Mexico. Similar to other river systems in arid environments that support extensive irrigation, the Rio Grande now has an extensive network of storage dams and diversions for irrigation and other purposes along its entire length. In the SLV storage dams are located in the headwaters and upper reaches and extensive direct diversions (approximately 4,000 to 4,500 cubic feet per second sustained at peak of irrigation season) that occur between South Fork and the Alamosa NWR. These and other uses and modifications in the Rio Grande have resulted in, but are not limited to: fewer over-bank flooding events, depressed flows during the spring and early summer (runoff period), and more prolonged flows throughout the remaining of the year due to water returning to the river from irrigated lands (Gerstle 2001). These factors in combination with alterations in groundwater and aquifers have impacted the type, quantity, quality, and persistence of wetland habitats in the SLV.

The Alamosa NWR lies in the Rio Grande floodplain and is part of what was referred to as the "Alamosa Marshes," one of the largest wetland complexes in the SLV documented in the 1878 Wheeler expedition maps (U.S. Army Corps of Engineers 1878). Soon after, in the late 1800s, the area now known as the refuge was managed as cattle ranches and several irrigation ditches were established to irrigate meadows for the production of livestock forage. After this land was converted to a national wildlife refuge in 1962, similar irrigation practices were continued. These combined irrigation practices have probably resulted in water being kept longer in some wetlands than historically. Other changes in refuge habitat are the result of modifications of the Rio Grande hydrology; for example, it is speculated that flooding on the Alamosa NWR occurred more frequently and over most of the refuge. Relatively few wetland impoundments were artificially created because oxbow and other wetland depressions still existed although water was no longer naturally supplied by the Rio Grande. Few improvements were made in the original water management infrastructure used by cattle ranchers, and water is still moved through this system to irrigate wetland vegetation throughout the refuge. This plan assumes that the most dramatic changes in the Alamosa NWR have been the alteration of hydrology in the Rio Grande and the 1983 construction of the Bureau of Reclamation's Closed Basin Conveyance Channel which bisects the refuge.

This plan reflects the current stage in the evolution of management direction, perception and goals of Monte Vista and Alamosa National Wildlife Refuges. The goals of these two refuges have changed over time in response to changes in ecological and agricultural conditions, human activities and our knowledge of biology, geology, hydrology and sociology.

If history is a guide, any specific goals assigned to these refuges have a life span defined by their applicability to current conditions, and knowledge and state of the wildlife management profession. Monte Vista NWR was originally established under the Migratory Bird Treaty Act in response to local interest in protecting wintering duck habitat along Spring Creek and drawing ducks causing depredation on privately-owned grain fields onto a federally owned refuge (USFWS 1962). After almost 10 years of management as a national wildlife refuge and the resulting conversion of ranching, farming and dairy operations to dramatically less intensive, annual utilization of vegetation tremendous numbers of waterfowl started using the refuge for nesting. This coincided with growing continental concern over plummeting duck populations. Management adapted waterfowl production as a goal to meet demands of that period in time. Refuge managers also realized that of the 230,000 acres of wetlands in the San Luis Valley (USFWS 1992) only a small percentage could be managed to support dense stands of vegetation not harvested annually. This wetland type and condition has been shown to be very productive for ground-nesting water birds and was considered and important enough habitat type to reproduce on public or private lands when possible.

During this period of succession and manipulation of refuge habitats nesting conditions for several colonial water bird and other non-game water birds became favorable and important to bird conservation in Colorado. Management goals were broadened to protect and encourage these habitats.

From the time of establishment to the late 1970s, groundwater levels declined, which terminated flows in Spring Creek and other valley springs. Increasing managers focus and reliance on surface water management to maintain wetland habitat. In more contemporary times, our partners and the Service have encouraged our conservation efforts to focus on the broad array of migratory birds and, in particular, their habitats. Also, we have embraced the fact that conservation of migratory birds must take place landscape wide, not just on refuges. And it must be conducted in the context of human use, occupation and impacts to those same lands. As a consequence, the goals of Monte Vista and Alamosa National Wildlife Refuges described in this document reflect our best attempt to describe habitat and public use goals appropriate for this period of time knowing full well they will change with environmental conditions, social demands and growing knowledge.

In 1992 Monte Vista NWR was included in a lawsuit filed by National Audubon Society et al. versus Babbitt alleging the U.S. Fish & Wildlife Service had violated the National Wildlife Refuge Administration Act, the Refuge Recreation Act, the National Environmental Policy Act and the Administrative Procedures Act by allowing incompatible uses in the National Wildlife Refuge System. Monte Vista NWR was included because of its use of livestock grazing in habitat management. The U.S. Fish & Wildlife Service settled the lawsuit with the plaintiffs out of court in October 1993. The agreement as it specifically related to Monte Vista NWR required the Service to take six specific actions (see Appendix H).

This lawsuit and the resulting settlement have had a substantial influence on day-to-day operations of both refuges. As part of the settlement, it was agreed that a 5 year research study would be conducted which would evaluate habitat management tools including grazing. Dr. Leigh Fredrickson, a wetland ecologist from the University of Missouri's Gaylord Memorial Laboratory, was selected to conduct the project and research began on both Refuges in 1996. Additionally it was agreed that in the short-term there would be no cattle grazing on the Complex unless it was part of the research. The outcome of the research project is fundamentally important to all future habitat management of the refuges. Monitoring of habitat management actions is now more than just a common sense good idea but mandated especially if grazing is used as a habitat management tool.

In order to conserve migratory birds and their habitats in the San Luis Valley, refuge planning and operations are intertwined with a large number of partners that share many conservation goals. These partnerships have proven extremely productive yet equally time consuming to maintain. Two challenges now faced are how to coordinate this plan with the array of other planning efforts underway and secondly how to provide staff time to participate and in some cases lead these efforts.

Both National Wildlife Refuges in the San Luis Valley serve as imperfect models of how areas set-aside for wildlife management complement migratory bird habitat in a setting dominated by agriculture. Much needs to be learned. Our knowledge of historical and prehistorical environmental conditions is scant and largely dependent upon anecdotal and qualitative information. In this desert environment, the variety and abundance of life is influenced by the presence of water more than any other factor. This factor has likely been altered more than any other in the San Luis Valley and confounds many efforts to speculate about site specific environmental conditions.

II. Purpose of and Need for Plan

Purpose of Action

The purpose for managing habitats on the Alamosa and Monte Vista National Wildlife Refuges (Refuge Complex) is to provide healthy plant communities in a variety of successional and structural stages which best support migratory birds.

Alamosa and Monte Vista National Wildlife Refuges were established under the authority of the Migratory Bird Conservation Act ". . . for use as inviolate sanctuaries, or for any other management purpose, for migratory birds." Based on these establishment purposes, the Service has developed habitat and public use goals. The continuing achievement of these goals will fulfill the Refuges' purposes.

Need for Action

Denver Post staff writer Jim Hughs best captured the San Luis Valley's relationship with water in his article "Emotions Run Deep in the Valley," when he wrote:

> "*Sin agua no hay vida*." Ever since Spanish settlers first arrived in the San Luis Valley, this has been the undisputed motto here, a truism proven by fields whose promise is turned into reality by massive pivot sprinklers: Without water, there is no life . . . . Water here means survival for those who can get it, riches for those who control it and bankruptcy or moving trucks for those left without it. Disputes over water are frequent and often intense . . . . So common and so fierce is the push-and-pull over water rights here that it has, in many ways, become "The Issue," the defining topic central to the way valley residents think about their communities and about their relationship to the rest of the state and the West.

Social, legal, and physical influences define the environment in which the Service is attempting to provide healthy migratory bird habitat. Each of these influences require deliberate participation by refuge staff to reach migratory bird goals and refuge purposes. Tools we must employ include: use and maintenance of water rights for habitat management. Water management is a primary instrument to produce and conserve wildlife habitat on the refuges and in the San Luis Valley. These actions must be taken to perpetuate wetland-dependent wildlife in the SLV.

Purpose of and Need for Plan

The purpose of developing the Comprehensive Conservation Plan (CCP) is to provide the refuge manager and public with a 15 year management plan for the conservation of fish, wildlife, and plant resources and their related habitats, while providing opportunities for compatible wildlife-dependent recreational uses. The CCP, when fully implemented, should achieve Refuge purposes; help fulfill the Refuge System mission; maintain and, where appropriate, restore the ecological integrity of each Refuge and the Refuge System: help achieve the goals of the National Wilderness Preservation System; and meet other mandates.

NWRS Mission, Goals, and Guiding Principles

The **mission** of the System is *"to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans"* (National Wildlife Refuge System Improvement Act of 1997).

This goose, designed by J.N. "Ding" Darling, has become the symbol of the National Wildlife Refuge System.

Goals of the National Wildlife Refuge System are:

a. *To fulfill our statutory duty to achieve refuge purpose(s) and further the System mission.*
b. *Conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered.*
c. *Perpetuate migratory bird, interjurisdictional fish, and marine mammal populations.*
d. *Conserve a diversity of fish, wildlife, and plants.*
e. *Conserve and restore, where appropriate, representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems.*
f. *To foster understanding and instill appreciation of fish, wildlife, and plants, and their conservation, by providing the public with safe, high-quality, and compatible wildlife-dependent public use. Such use includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.*

There are four guiding **principles** for management and general public use of the Refuge System established by Executive Order 12996 (3/25/96):

Public Use. The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Habitat. Fish and wildlife will not prosper without high quality habitat, and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges.

Partnerships. America's sportsmen and women were the first partners who insisted on protecting valuable wildlife habitat within wildlife refuges. Conservation partnerships with other Federal agencies, State agencies, Tribes, organizations, industry, and the general public can make significant contributions to the growth and management of the Refuge System.

Public Involvement. The public should be given a full and open opportunity to participate in decisions regarding acquisition and management of our National Wildlife Refuges.

National Wildlife Refuge System Policies

To manage each refuge to fulfill the mission of the System, as well as the specific purposes for which that refuge was established.

Compatible wildlife-dependent recreation is a legitimate and appropriate general public use directly related to the mission of the system and the purposes of many refuges.

Compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management.

When a wildlife-dependent recreational use is compatible within a refuge, that activity should be facilitated, subject to such restrictions or regulations as may be necessary, reasonable and appropriate.

History of Refuges Establishment, Acquisition, and Management

Alamosa and Monte Vista National Wildlife Refuges were established under the authority of the Migratory Bird Conservation Act ". . . for use as inviolate sanctuaries, or for any other management purpose, for migratory birds." Additionally, Public Land Order 2204, dated September 19, 1960, withdrew 800 acres of public land administered by the Bureau of Land Management for inclusion in Monte Vista NWR. Public Land Order 3899, dated December, 1965, withdrew 86 acres of public land (BLM) for inclusion in Alamosa NWR. Both orders withdrew these lands from all forms of appropriation under public land laws, including mineral laws (Title 30, U.S.C., Chapter 2). However, mineral leasing laws pertaining to drilling are applicable if known geological resources, such as oil and gas, exist.

Legal and Policy Guidance

Management actions on national wildlife refuges are circumscribed by many mandates (laws, Executive Orders, etc.) the latest of which is the Volunteer and Community Partnership Enhancement Act of 1998. The regulations that affect refuge management the most are listed below.

Volunteer and Community Partnership Enhancement Act (1998): The purposes of this Act are to encourage the use of volunteers to assist in the management of refuges within the Refuge System; to facilitate partnerships between the Refuge System and non-Federal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of the resources and; to encourage donations and other contributions.

National Wildlife Refuge System Improvement Act of 1997: Sets the mission and administrative policy for all refuges in the National Wildlife Refuge System; mandates comprehensive conservation planning for all units of the National Wildlife Refuge System.

Executive Order 13007 Indian Sacred Sites (1996): Directs Federal land management agencies to: accommodate access to and ceremonial uses of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the system.

Americans With Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species; and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Archaeological Resources Protection Act (1979) as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Executive Order 11988 (1977): Requires Federal agencies to provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal government to ensure that anybody can participate in any program.

Endangered Species Act (1973): Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

National Historic Preservation Act (1966) as amended: Establishes as policy that the Federal Government is to provide leadership in the preservation of the nation's prehistoric and historic resources.

National Wildlife Refuge System Administration Act (1966): Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Fish and Wildlife Coordination Act (1958): Allows the Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorized the opening of part of a refuge to waterfowl hunting.

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gifts of areas approved by the Migratory Bird Conservation Commission.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Refuge Purpose

Alamosa and Monte Vista National Wildlife Refuges were established under the authority of the Migratory Bird Conservation Act ". . . for use as inviolate sanctuaries, or for any other management purpose, for migratory birds." Based on their establishment purposes, the Refuges have adopted a number of habitat and public use goals. The continuing achievement of these goals will fulfill the Refuges' purposes.

In addition to purposes provided by the Migratory Bird Conservation Act, the Fish and Wildlife Coordination Act Report for the Bureau of Reclamation Closed Basin Project describes the role Alamosa NWR plays in mitigating wetlands lost through construction and operation of the project. The Bureau of Reclamation has purchased 800 acre-feet of water and appurtenant land, and provides a variable amount of water out of the Closed Basin Conveyance Channel to include in the operation of Alamosa NWR as partial wetland mitigation for the Closed Basin Project.

Refuge Vision Statement

Lands of the Alamosa and Monte Vista National Wildlife Refuge Complex and those owned by our partners will contribute to the migratory bird resource of the San Luis Valley to the greatest extent possible. We will emphasize protection, enhancement, restoration and, where appropriate, creation of wetland and riparian habitat. Conservation efforts will complement the SLV ecosystem through community-based actions. Naturalness will be honored by using tools and techniques which will be as unobtrusive as practical.

Refuge Management Direction: Goals

Part of the out-of-court 1992 compatibility lawsuit settlement was the initiation of a research project to evaluate land management tools and their effectiveness in meeting Refuge goals. Therefore, updated habitat management goals were needed; and in 1996, a meeting was held to begin the process of writing appropriate and measurable goals and objectives for the Monte Vista and Alamosa NWRs (See Appendix I). Meeting attendees included non-government organizations, including litigants of the lawsuit, and representatives from State and Federal natural resource agencies.

During the first meeting, October 1996, the group decided to develop habitat-based goals versus wildlife population goals. Additionally, 11 habitat types were identified for the Complex. In order to set habitat goals and objectives, it is necessary to understand the linkage between life requisites of wildlife species and habitat dynamics. A comprehensive suite of information, such as the nutritional and cover requirements for all the species using the Complex, was not available. However, the group used field and research experience to identify major life-history events, uses of various habitat types for cranes, waterfowl, and shorebirds, and the chronology of those uses (Appendix I). Over a series of meetings, this and other information was used to develop "interim" habitat goals for the Complex. These goals have been refined by Refuge and Regional staff during this comprehensive conservation planning process and are presented below. The specific objectives for each goal are presented later in this document.

These goals will guide refuge management and decision-making over the next 15 years.

Habitat Goals

Goal 1:

Provide short-emergent vegetation in conjunction with various hydrologic conditions for migrating and breeding water birds, raptors, and passerines on the refuge complex.

Goal 2:

Provide short-emergent vegetation in a range of structures necessary to meet the requisites of nesting waterfowl, water birds, raptors, passerines, and the habitat needs for small mammal populations on the refuge complex.

Goal 3:

Maintain areas of saltgrass in suitable condition for migrating and breeding water birds and passerines on the refuge complex.

Goal 4:

Provide tall-emergent vegetation with other suitable habitat conditions for breeding water birds and marsh passerines on the refuge complex.

Goal 5:

On Monte Vista National Wildlife Refuge, provide agricultural grains in adequate amounts for migrating sandhill cranes and waterfowl.

Goal 6:

Provide submergent wetland vegetation for foraging migrant and breeding water birds, molting waterfowl, foraging raptors, aerial foraging birds, and nesting grebes and diving ducks.

Goal 7:
Provide shallow (< 1 foot) seasonal water in conjunction with other habitat conditions for migrating and breeding water birds and aerial foraging birds.

Goal 8:
Enhance the Rio Grande corridor and its tributaries on Refuge lands to provide habitat for river, riparian-dependent, and other wetland species.

Goal 9:
Provide native shrub (primarily greasewood and rabbitbrush on the Monte Vista NWR and four-wing saltbrush on Alamosa NWR) communities on the Refuge Complex for the benefit of nesting, migrating and wintering migratory birds and other wildlife species dependent upon them.

Goal 10:
Provide native short-grass communities on the Complex but primarily on Alamosa NWR for the benefit of nesting, migrating and wintering migratory birds and other wildlife species dependent upon this habitat.

Goal 11:
Actively participate in protecting the San Luis Valley Ecosystem (Upper Rio Grande Ecosystem) and achieving the goals contained in the North American Waterfowl Management Plan and the North American Bird Conservation Initiative (NABCI) through coordination with local, regional, and national partners.

Goal 12:
Control noxious weeds on refuge complex roads, levees, and ditch banks to improve the quality of adjacent habitat and to slow or cease the spread of these species to neighboring private lands.

Public Use Goal

Goal 13:
Foster understanding, appreciation, and advocacy of wetlands within the San Luis Valley Ecosystem (Upper Rio Grande Ecosystem).

Plans Affecting San Luis Valley and Management of Refuges

The Refuge Improvement Act of 1997 calls for our plans to be consistent with State plans "to the extent practicable." Therefore the following plans were consulted in an effort to be consistent with other agencies plans in the SLV.

North American Colonial Water Bird Conservation Plan - This Plan was developed to aid in fulfilling a specific mission: "to create a cohesive, multi-national, partnership for conserving and managing colonial-nesting water birds and their habitats throughout North America."

Intermountain West Joint Venture Implementation Plan - Final December 1995. The goal of the Intermountain West Joint Venture is "to strive for the long-term conservation of wetland habitats and their associated wildlife values." It does so by supporting the restoration and maintenance of migratory bird populations; fostering the protection, restoration, and enhancement of wetlands, and associated uplands; and by promoting understanding of waterfowl and wetland habitat issues, functions, and values. This Plan is a component of the North American Waterfowl Management Plan and was developed by an implementation plan committee.

Intermountain West Regional Shorebird Plan - Revised February 8, 2001. This Plan was developed to conserve shorebirds and shorebird habitat in Region 6. This Plan was developed as part of the U.S. Shorebird Conservation Plan.

Upper/Middle Rio Grande Ecosystem Plan (USFWS, Regions 2 and 6) - 1996. The Monte Vista/Alamosa NWR Complex lies within the Upper Rio Grande Valley. The Refuge staff are active partners in the ecosystem team and are the only representatives from Region 6. The Upper/Middle Rio Grande Ecosystem encompasses Federal, State, local and tribal entities. However, the purpose of this Plan is to only direct the efforts of the USFWS in an ecosystem approach for achieving its mission of fish and wildlife conservation. With input from the other programs, the main goal is "to protect, restore, and maintain viable levels of biotic diversity within the Upper/Middle Rio Grande Ecosystem."

Southern Prairie/Mountain Ecosystem Team (USFWS, Region 6) - October 27, 1999. This team does not have an official plan but has developed five priority issues for their ecosystem approach to habitat and wildlife conservation.

Whooping Crane Recovery Plan - 1994. Prepared by the Whooping Crane Recovery Team. The goal of the Plan is to provide decision-makers with direction on how to remove the whooping crane (*Grus americana*) from the endangered species category to the threatened category.

Southwestern Willow Flycatcher Recovery Plan - This Plan to recover the endangered race of the southwestern willow flycatcher is currently being written by the U.S. Fish & Wildlife Service. The draft recovery plan was released for public review in June 2001.

Management Plan of the Pacific and Central Flyways for the Rocky Mountain Population (RMP) of Greater Sandhill Cranes - July 1998. Prepared by the Subcommittee on the Rocky Mountain Population of Greater Sandhill Crane, Pacific Flyway Study Committee and Central Flyway Technical committee. The goal of this Plan is to provide an outline for managing "the RMP for numbers and distribution that will provide maximum direct benefits to the public and for the intrinsic values of the birds themselves."

USFWS, Region 6: Nongame Migratory Birds Conservation Plan - Revision March 3, 1994. This Plan is designed to aid conservation of nongame bird species in Region 6 of the USFWS. It supports the goals of the nongame migratory bird program which are to "protect and maintain all native nongame species at viable population levels, and protect their habitats."

Colorado Statewide Waterfowl Management Plan, 1989-2003. Written in 1989 by the Colorado Division of Wildlife. This Plan outlines the management and conservation needs and efforts for waterfowl in the State.

The San Luis Valley Community Wetlands Strategy - Final September 2000. Prepared by the San Luis Valley Wetlands Focus Area Committee in cooperation with the Colorado Natural Heritage Program. This strategy is an "organizational tool to identify opportunities to make wetland protection programs work better; it is a process for bringing people together to help identify specific wetlands problems and realistic, equitable, solutions that achieve future wetlands protection goals."

San Luis Valley Water Bird Plan - Final September 8, 1995. The goal of this Plan is "to provide and protect a habitat base of sufficient quality and quantity to maintain healthy viable populations of water birds in the San Luis Valley." This Plan was produced by a joint effort of the Colorado Division of Wildlife, U.S. Fish & Wildlife Service, and U.S. Bureau of Land Management.

Status Assessment and Conservation Plan for the Black Tern in North America - 1999. This document addresses the biology, management and statues of the Black Tern, which is currently listed as threatened or endangered in six states and is a species of management concern within the Intermountain West. The Plan was produced by the USFWS.

Rock Creek Heritage Project - Project Overview, July 2000. This project is a "landowner initiative" focused on protecting approximately 15,000 acres of agricultural lands in the Rock Creek watershed and lands that surround and buffer the Monte Vista NWR.

Monte Vista NWR Interim Elk Population Management Plan - March 21, 1997. This Plan outlines an "approach to dealing with a growing conflict with elk in the vicinity of Monte Vista NWR." It is a joint effort between the USFWS, Colorado Division of Wildlife, Bureau of Land Management, and U.S. Forest Service.

Los Caminos Antiguos (LCA) Partnership Agreement - February 24, 2000. The Alamosa/Monte Vista NWR Complex has joined in partnership with numerous other agencies, municipal governments and tourism and community development organizations for "collaborative leadership, sustainable funding, and support of the Los Caminos Antiguos Scenic and Historic Byway."

Great San Luis Valley Trails and Recreation Master Plan - 1998. This Plan provides tools for "preservation, protection and stewardship of our open space, wildlife habitat, parks, and trails, plus timely plans for creating recreation opportunities." It is a coalition of local, regional, State and Federal government agencies, local businesses and private citizens.

Step-Down Management Plans

Step-down management plans describe management strategies, procedures, methods, and tasks for specific resources or functions. Often these plans require compatibility determinations, environmental assessments, or other justification before they can be implemented. The preparation and execution of these plans is dependent upon funding and the availability of staff or technical expertise. Plans will be completed or revised, as needed, within 2 years of funding and necessary staff becoming available.

Plan	Completed Year Approved	Needs Revision	Need to Complete
Disease Management Plan	? - very old	X	
Fire Management	2001		
Hunting			X
Integrated Pest Management	1996		
Inventory and Population Monitoring	1964	X	
Law Enforcement			X
Predator Management	1992		
Prescribed Burning (Annual)	2001		
Public Use Management			X
Safety	?	X	
Signs			X
Habitat Management Plan			X
Water Rights (Protection and Acquisition)			X
Water Management Plan	2001		
Weed Control (Annual)	2001		

Description of Planning Process

Comprehensive conservation planning efforts for Alamosa/Monte Vista NWR began in November 1997 with a meeting of regional management and planning staff and field station employees at Alamosa/Monte Vista NWR. At that meeting, a core planning team was designated with the major responsibilities of gathering information and writing the Plan. A review team was set up to provide guidance and direction to the core planning team. A working group was also organized to provide interchange of information between Service personnel, outside agencies, and interested stakeholders of the Refuge.

On March 24 and 26, 1998, open house scoping sessions were held at the Alamosa/Monte Vista Refuge office. The open house provided participants an opportunity to learn about the Refuge's purposes, mission and goals, and issues currently facing management. People attending were provided the chance to speak with Service representatives and to share their comments.

During the planning process, the review and working groups have had access to information on objectives and alternatives being considered. Written comments have been exchanged and verbal conversations have been held. This Draft CCP/EA is the first opportunity that these groups and the public have had to review the entire planning effort and the Plan. A 30-day comment period is provided.

The CCP will guide management on the Refuge for the next 15 years. Plans are ultimately signed by the Regional Director, Region 6, thus providing Regional direction to the station project leader. A copy of the Plan will be provided to all those interested.

Habitat Protection Vision

The purpose of this section is to identify and inform the public of the Service's vision in habitat protection adjoining both Monte Vista and Alamosa Refuges. Before any action is taken by the Service in protecting additional habitat by bringing that land into the Refuge System, public input and environmental analysis will be completed. By highlighting and identifying the habitat needs of the San Luis Valley, it is the hope of the Service to continue helping our partners in protecting these valuable resources. The refuge involvement with the Service's Partners for Fish and Wildlife (PFW) program would continue. The Refuge would also continue to be an active partner in Colorado Wetlands Program led by the Colorado Division of Wildlife.

To date, existing wetlands of the San Luis Valley have been relatively unchanged by the rapid housing development that has occurred throughout much of the State. However, ranches along many smaller drainages in areas near Del Norte and Monte Vista have been recently subdivided and housing and other developments are occurring all along the Rio Grande from South Fork to Alamosa NWR. Large ranches in the Valley have been subdivided for a number of reasons, including the demographic trend in western states of people moving from urban areas to more rural settings, income from traditional ranch operation being below what is generated from sale for residential development, scenic values of the properties, and the reasonably close proximity to communities with services and vast tracts of public lands. This trend is clearly demonstrated in "Mapping and Modeling Ranchland Loss in the Intermountain West" (Ferriday and Jones 2002). This unpublished report describes a project conducted by American Farmland Trust and The Nature Conservancy that modeled and mapped conversion of "prime ranchland" to low density residential development. The model was based on the population growth and other indicators over the next 30 years. The report concludes that high mountain valleys of Colorado, including counties in the San Luis Valley, and Montana have the most threatened prime ranchland. If these trends are correct there is a significant threat to migratory bird habitat in valleys of these western states.

The next area that may be converted to residential housing is a riparian corridor which will directly impact the Monte Vista NWR. Immediately north of Monte Vista NWR is Rock Creek which originates to the west in the San Juan mountains. It enters the Refuge's north-central side and flows through the Refuge for about three miles, although the flows have been altered by irrigation. Water in the Rock Creek channel on the Refuge is entirely comprised of return flows from irrigation in the watershed.

Many of the landowners along this Creek, adjoining and to the west of the Refuge, have been approached by development interests. Currently, these lands are managed for hay and livestock production through the use of flood irrigation. This management provides extensive areas of water bird foraging and resting habitat which compliments the Refuge's habitat. There is local concern that developing the riparian corridor for residential housing will reduce its value to migratory birds, adversely impact water flows, decrease scenic values and open space, and substantially complicate refuge management by causing water and people management conflicts.

For these reasons, the Service will support the efforts of the Rock Creek Heritage Project. This community based effort, led by the American Farmland Trust, is attempting to permanently protect 15,000 acres of the Rock Creek watershed from residential development. This Creek originates on Rio Grande National Forest in the San Juan Mountains, approximately 15 miles west of Monte Vista NWR. As it runs eastward it flows across approximately 10 miles of privately owned ranches before the channel enters the north-central portion of the Refuge. Protection of this scenic watershed from development will benefit the Refuge, migratory birds and other values by:

1) maintaining current migratory bird habitat values, especially in the wetland areas below the Monte Vista Canal which are used heavily by foraging waterfowl that nest on the Refuge;
2) protecting the "Lower Rock Creek Potential Conservation Area" as identified by the Colorado Natural Heritage Program, mostly for its scattered population of the globally imperiled slender spiderflower (*Cleome multicaulis*);
3) preventing degradation of water quality before coming on to the Refuge;
4) preventing the myriad of management complications that arise from having residential areas adjacent to intensively managed wildlife areas, i.e., wildfire liability, additional smoke management concerns from prescribed fires, mosquito complaints, feral animals, etc.; and
5) preserving open space and agricultural lifestyles that contribute to the quality of life for local residents.

Several tracts that are associated with Alamosa NWR are proposed for future study as a protection strategy; they are as follows:

- The Service proposes to protect approximately 950 acres adjoining the Rio Grande and Alamosa NWR. This area makes up approximately 8 percent of the total acreage of Alamosa Refuge. The property known as the Lillpop Ranch is located at the northwest side of the Refuge within sections of 12, 13, 24. Protection of this area is directed at the riparian habitat along the Rio Grande which is essential for the life requirements of the endangered southwestern willow flycatcher. The riparian habitat would be purchased in fee-title from a willing seller.

  The southwestern willow flycatcher breeds in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands, including lakes (e.g., reservoirs). Most of these habitats are classified as forested wetlands or scrub-shrub wetlands. Habitat requirements for wintering are not well known, but include brushy savanna edges, second growth, shrubby clearings and pastures, and woodlands near water. The southwestern willow flycatcher has experienced extensive loss and modification of breeding habitat, with consequent reductions in population levels. Destruction and modification of riparian habitats have been caused mainly by: reduction or elimination of surface and subsurface water due to diversion and groundwater pumping; changes in flood and fire regimes due to dams and stream channelization; clearing and controlling vegetation; livestock grazing; changes in water and soil chemistry due to disruption of natural hydrologic cycles; and establishment of invasive nonnative plants. Concurrent with habitat loss have been increases in brood parasitism by the brown-headed cowbird *(Molothrus ater*), which inhibit reproductive success and further reduce population levels (USFWS 2001).

  If additional amounts of breeding habitat are protected within each of the identified 10 management units to support the target number of flycatchers, the southwestern willow flycatcher may be reclassified. It is the goal of the Service to remove the southwestern willow flycatcher from the list of threatened and endangered species.

- A portion of the Rio Grande is considered important nesting habitat for the endangered southwestern willow flycatcher. Protecting the Rio Grande riparian area would allow restoration of the riparian vegetative community for this species. This riparian area was recently verified as habitat for the endangered flycatcher (Owen and Sogge 1997). This eight mile stretch of Rio Grande contains riparian habitat in a range of condition, all of which is currently grazed. Different grazing management will likely benefit willow flycatcher habitat throughout this reach of the river. The western boundary of Alamosa NWR is formed, in part, by the Rio Grande. However, in some cases the river is entirely on neighboring private land, in some stretches the Refuge boundary runs down the center of the River, and in some cases portions of the riparian zone is on privately owned land. This boundary has resulted in several areas where fence maintenance is almost impossible due to constant bank erosion and regular destruction of water gaps. This condition allows the neighbors livestock to enter and graze in the riparian areas of the Refuge until discovered and moved

- Adams Lake, a productive wetland area, is about four miles west of the western boundary of Alamosa NWR. It is a privately owned semipermanent wetland. This wetland is a very important site for many species of migratory birds, especially nesting white-faced ibis (species of special concern), black-crowned night herons, snowy egrets, eared and western grebes, and several species of diving ducks. The San Luis Valley supports the largest breeding colonies of white-faced ibis in Colorado. Nesting colonies use Russell Lakes State Wildlife Management Area, Monte Vista National Wildlife Refuge, and Adams Lake. The annual use of each of these sites is dictated by water conditions in the Valley. Frequently, suitable nesting conditions will be available in only one or two of these sites in a given year. As an example, during 2000, production at Russell Lakes was substantially below normal, while noticeably better at both Monte Vista NWR and Adams Lake (refuge files). Due to the extremely low levels of runoff during the year, all sites were below average. Ibis are very sensitive to water level changes and any disturbance during the nesting period. Protection of Adams Lake and its water supply proportionally increases the probability of reproduction of white-faced ibis and continued recruitment into the population.

- Alamosa Marshes neighboring west of the Refuge proposal would protect a portion of one of the few remaining naturally occurring wetlands in the San Luis Valley. "Alamosa Marshes" were identified by the Wheeler expedition of 1873. From the map produced of this expedition, it appears these wetlands are formed by the confluence of Rock Creek, the Alamosa River and La Jara Creek with the Rio Grande. The wetlands of the current Alamosa NWR are functionally part of this extensive marsh system that stretches 15 miles southwest of Alamosa NWR and the Rio Grande. Although it is extensively grazed, it receives significant use from migratory water birds, especially for foraging and during spring migration. The potential for water bird habitat is enormous but only with modification of current grazing practices. The western boundary of this focus area is formed by a county road and is arbitrary from an ecological perspective.

- La Jara Creek focus area centers around the three miles of La Jara Creek adjoining the south end of Alamosa NWR. This reach of the Creek contains extensive stands of willow intermingled with temporary and seasonal wetlands. This project has outstanding potential for restoration of endangered southwestern willow flycatcher habitat as well as numerous species of passerine and water birds. A protective management would compliment efforts to restore the endangered flycatcher habitat along the Rio Grande. The entire property is part of a larger cattle ranch under one ownership. As with the Alamosa Marshes project, the western boundary of the proposal is ecologically arbitrary but is defined by a county road and landownership.

The Great Sand Dunes Park and Preserve Act of 2000 approved acquisition of 92,617-acre Baca National Wildlife Refuge and will convert Great Sand Dunes National Monument to Great Sand Dunes National Park. The boundary for the Baca NWR includes the 3,200-acre White Ranch. The Preliminary Project Proposal for the White Ranch was approved for inclusion into the National Wildlife Refuge System in 1996. This Ranch was purchased by the Bureau of Reclamation to mitigate wetlands lost by the construction and operation of the Closed Basin Project. Actual conversion from administration by the Bureau of Reclamation to U.S. Fish & Wildlife Service was delayed due to water management problems and unresolved questions concerning funding for maintenance and operations. Acquisition of the Baca Ranch and establishment of Baca NWR will allow the Service to better control surface water to the White Ranch, thus allowing this land to be managed for wetland mitigation. Questions regarding management funding are still under discussion. Detailed management plans for these new Refuge lands will be developed through a separate CCP process.

State or federally-owned public lands adjoining or in association with either Refuge will be evaluated for protection by the U.S. Fish & Wildlife Service if the administering agency considers the land surplus to its needs. The Bureau of Land Management has declared its holdings adjacent to Alamosa NWR as surplus to its needs. This upland habitat is not unique in the San Luis Valley but should be studied for additional protection for the more sensitive habitats on the Refuge from the impacts of possible development. In addition, the Colorado State Land Board owns approximately the same acreage adjoining the Alamosa NWR and these BLM lands. State-owned lands should also be studied for purposes of buffering sensitive Refuge habitats from adverse impacts.

Habitat Protection Vision (15 years and beyond)

The above discussion outlines habitat protection as it directly relates to operation and maintenance of the existing national wildlife refuges. In order for the U.S. Fish & Wildlife Service to maximize its effectiveness in preserving the migratory bird resource, it must look well beyond the boundaries of the existing Refuges; not just to assure protection of the 230,000 acres of wetlands in the San Luis Valley, but to be able to respond when any migratory bird or endangered species habitat type comes under threat from development, water exportation or other unforeseen threats.

Although still in a very rural setting, the San Luis Valley is not immune from the pressures of residential development that are plaguing the State of Colorado. Statistics gathered for Great Outdoors Colorado by Ciruli and Associates in 1998 (ciruli.com) indicate dramatic changes may be underway. For example, when compared to the rest of the state, the San Luis Valley experienced the most dramatic percentage increase in issuance of building permits; 1,159 percent between 1990 and 1996. This is compared to 261 percent statewide. In addition, between 1992 and 1996 the San Luis Valley experienced a 98 percent increase in the number of domestic well permits, compared with the statewide increase of 39 percent. Again, the highest percentage increase seen in the state during that period. These indicators support previously mentioned modeling efforts of American Farmland Trust and The Nature Conservancy.

These statistics reflect a residential building boom resulting from a poor agricultural economy, especially compared to the residential building industry. If these trends continue, and there is no evidence they will not, the 200,000 acres of privately owned wetlands that are not protected by the Clean Water Act and thousands of acres of riparian habitat are ultimately in jeopardy. This trend is visible along the Rio Grande from South Fork to Del Norte. In recent years, large housing developments and large areas of low density housing have impacted valuable riparian habitat. Several drainages near Monte Vista have fallen to residential development since 1996, including San Francisco Creek and Raton Creek.

The U.S. Fish & Wildlife Service will continue building partnerships and developing protection plans to minimize degradation of migratory bird and endangered species habitat. The agency can work directly with county and state governments in development of their land-use planning and will continue to work with current partners in ongoing land protection efforts. The Service encourages the public to consider how best the agency can assist in these local efforts. One option that has proven very successful in the upper mid-west is the establishment of wetland management districts. These large geographic areas encompass hundreds of thousands of acres of glaciated wetlands. The establishment of these districts allows the Service to purchase wetland easements from willing landowners and protect these valuable habitats in perpetuity. This concept can be applied to all or part of the San Luis Valley with several other benefits. The first is protection of agricultural lands, with their associated wildlife benefits, from conversion to residential, commercial or municipal uses. In addition, it gives landowners one more tool to keep family farms and ranches in the family due to the tax benefits potentially derived with sale or donation of an easement.

The U.S. Fish & Wildlife Service will assist in the Rock Creek Heritage Project, mentioned above, by any means possible within the project boundary that have high migratory bird values. This will complement the joint efforts of Ducks Unlimited, the Trust for Public Lands, Bureau of Land Management, Forest Service, Colorado Division of Wildlife, Rio Grande Water Conservation District, Rio Grande County, City of Monte Vista, Natural Resource Conservation District, Colorado State Extension Service, Colorado Cattleman's Agricultural Land Trust, Rio Grande Headwaters Land Trust, San Luis Valley Wetlands Focus Group, and approximately 12 major landowners.

Many of our partners have encouraged the Service to consider expanding its habitat protection program beyond the boundaries of the existing National Wildlife Refuges. There are numerous alternatives for this concept. The program can target a number of habitat types valley-wide or just focus on one. It could rely solely on acquisition of development rights or consider fee-title acquisition if the situation warrants. Ideally, any new habitat protection program would be able to legally tie water to the land being protected for the duration of the easement, but this presents a conflict with the Colorado State Constitution in some cases. For these and other reasons, a separate planning effort will be undertaken in the future to garner public interest and ideas for a larger easement-based habitat protection program in the Valley.

Planning Issues

As part of the comprehensive planning process, in March and April of 1998, the U.S. Fish & Wildlife Service gathered public opinions regarding the Alamosa and Monte Vista National Wildlife Refuges and how they are managed. This was done by meeting with interested groups and public agencies and by distributing an *Issues Workbook* to the people attending the Monte Vista Crane Festival or just stopping by at the Refuge headquarters. In addition, open houses were held at the Monte Vista and Alamosa Refuges to gather input and answer questions.

Although this was not a scientific survey, it still provides insight to the Refuge staff as to aspects of the Refuges and their management that concern people or give them enjoyment and satisfaction. These insights were used to prepare a Comprehensive Conservation Plan that is responsive to the public's concerns while carrying out Complex mandates and Service goals.

The following summarizes the responses to the *Issues Workbook* questions. When considering these responses, it is important to remember that they did not result from a scientifically designed workbook. Therefore, they only represent the opinions of those people who attended the Crane Festival or otherwise had some special interest in the management of the Complex.

Wildlife

The Alamosa and Monte Vista Refuges were established to provide wildlife habitat. The public fully supports this mission. Comments focused especially on threatened and endangered species, waterfowl and other water bird management, and resident species.

Ranches within the Alamosa and Monte Vista area, that included grazing on a complex of wetland and riparian vegetative resources, have been recently subdivided into housing and other developments thus reducing wildlife habitat in the vicinity of the Complex. This development is also occurring all along the Rio Grande from South Fork to Alamosa NWR. This type of development is especially severe between South Fork and Del Norte, Colorado where numerous, relatively large residential subdivisions have been established along the Rio Grande. Large ranches have been subdivided in smaller ranchetts as part of the demographic trend in western states of people moving from urban areas to more rural settings. Developers seek out these properties for their scenic value, proximity to communities with full services, and accessibility to vast acreage of public lands. Many ranchers are deciding to sell their property to developers as income from traditional ranching operations fall far below that from sale for residential development. In many cases, all or portions of existing ranches are being subdivided in order to pay inheritance tax liabilities.

Naturalness

Refuges, as islands of naturalness in areas dominated by human activities and structures, are very important to visitors. Management techniques, including structures, should be as unobtrusive as possible. Naturalness is typified by a variety of vegetation communities, open water areas, lush growth, and presence of wildlife. The Complex should consist of diverse native vegetation with special emphasis on protecting wetlands, including riparian areas. The presence of weeds diminishes the aspect of naturalness. While naturalness and natives are appreciated, the methods used to eliminate invasive exotics are not.

Water

How water is managed to accomplish wildlife and public use objectives was of concern to a number of respondents. As any place in the west, water is a major concern in the San Luis Valley. The average annual precipitation is seven inches. The Service acquired groundwater rights and rights to use water from the Rio Grande when lands were purchased for both Refuges. It also subsequently established rights under State law to use groundwater. Wells supply about 8,200 acre-feet per year to Monte Vista NWR and 1,541 acre-feet to Alamosa NWR. An average of about 8,500 acre-feet of water per year is diverted from the Rio Grande River to Monte Vista NWR, and an average of about 13,750 acre-feet is diverted to Alamosa NWR. The use of Rio Grande River water is governed by a 1939 compact between the States of Colorado, New Mexico, and Texas.

The adequacy of Service water rights to provide for wildlife is especially important to the residents of the San Luis Valley. Some residents expressed concern about whether the Refuges have adequate water and water rights to achieve wildlife habitat objectives.

There is concern that the Complex has increased the consumptive use of water. The Service continues to use water for irrigation, but the crop is now wetland vegetation rather than hay, and it is not regularly harvested. Alamosa NWR also receives water from the Closed Basin Project as mitigation for the Project's impacts to wetlands; this water provides additional water management flexibility which was not available to the landowners who originally appropriated the Complex's water rights.

Public Use

Recreational use of the Refuges is considered highly desirable, but the types and amounts of public use provided on the Complex must be compatible with the wildlife and its habitat and the purposes for which the refuges were established. Support was expressed for all the wildlife-dependent priority public uses provided for on the Complex, i.e., hunting and fishing, wildlife observation and photography, and environmental education and interpretation. However, there was an expressed need to scrutinize hunting and the Crane Festival with regard to their compatibility with wildlife. Interest was also expressed in some non-wildlife dependent activities, such as walking and biking.

Weeds

Invasive plant problems have increased annually since the 1960s. They are problematic for several reasons, and are particularly troublesome for Refuge neighbors who are required by State and local laws to control weeds on their lands. County weed districts are not authorized to enforce noxious weed laws on Refuge lands, further complicating the Refuge's relationship with some of its neighbors since they see the Refuge as a source of weeds for which they have no recourse.

A unique characteristic of refuge management is the practice of allowing the wetland plants grown during the summer to remain through the winter to provide nesting habitat for migratory birds. Frequently, this means Refuge meadows are left standing during the summer without being annually grazed or mowed. Over the decades these practices have resulted in large, robust stands of desired native plants. But, over the last 30 years, all too often, noxious weeds that benefit from the same management practices increasingly accompany these desired plants. This can, and does, decrease the quality of wildlife habitat on some Refuge units.

Biological control of undesirable plants has been used as a management tool since 1989 when 100 stem-mining weevils were initially released on Monte Vista and Alamosa Refuges to help control Canada thistle. Additional releases of gall flies and stem-mining weevils for Canada thistle control have been made, 18 in all since 1989. None of these introductions have resulted in establishing a population capable of affecting the life cycle of the weeds. No USDA approved biological controls are currently available for tall whitetop.

Some respondents expressed concern about the use of intrusive weed control methods and their appropriateness on wildlife refuges. These methods may disturb and potentially harm some wildlife, thus compromising wildlife objectives. Current management uses herbicide application and mowing, emphasizing control in areas along Refuge boundaries and water courses exiting the Refuges. In addition, preventative measures include shaping of spoil banks, seeding disturbed sites, and spraying disturbed sites to favor establishment of desirable plant communities.

Currently, experimentation with livestock, herbicides, tillage, and water manipulation is being conducted to determine the effect on seed production, stem density, and root mass of tall whitetop. Results from these investigations will enable management to better control noxious weeds without compromising the purposes for which the Refuges were established.

Elk

Since the late 1980s, increasing numbers of elk have used Monte Vista NWR. A small resident population became established on the east side of the refuge while a larger group (up to 900 animals) have started using the western 1/3 of the refuge starting with the fall hunting season on public lands adjacent to the west. Elk on the Refuge present good public viewing opportunities but also present several problems. The Colorado Division of Wildlife is extremely concerned about rapidly growing elk populations throughout the state. This is also the case in Game Management Unit 80 of which Monte Vista NWR is part. Since no recreational hunting of elk occurs on the refuge, it has become a haven for elk during the hunting season protecting a variable segment of the population from harvest. Growing numbers of elk on the refuge have resulted in increased conflicts with landowners neighboring the refuge and increased incidence of elk/vehicle collisions on State Highway 15 and several county roads crossing the refuge. The Colorado Division of Wildlife is financially liable to damage to privately owned fence and forage crops caused by elk. In addition, trails and bedding areas impact vegetation that could be used, or is being used, by ground-nesting birds. This is more of a concern on the eastern side of Monte Vista NWR where a resident population has become established in the most valuable dense nesting cover on the Refuge. Although little habitat damage has occurred by this small group it will undoubtedly become significant as the herd grows. For these reasons, the Refuge attempts to control resident and transient elk.

Some respondents expressed a desire to allow public elk hunting on Refuge lands, especially in light of the Division of Wildlife's difficulty in meeting elk harvest objectives. Other respondents expressed safety concerns including the proximity of private landowners, density of public roadways, and the presence of Refuge staff, contractors and cooperators on the land combined with the range and power of elk hunting rifles.

On the Alamosa NWR elk numbers during peak use have reached approximately 100 to 120 animals in the last few years with about 20 to 30 animals during the summer. Currently, these animals are not causing depredation problems on adjacent private lands nor habitat damage on the refuge. However, there is potential for rapid expansion of elk numbers on the Alamosa NWR, which is occurring in other areas in the San Luis Valley. The number of elk to the north (near the Great Sand Dunes National Park) and south (La Sauces area) of the Alamosa refuge are increasing and some of these animals, especially from La Sauces and Fort Garland, may begin to move onto the refuge. Consequently the refuge staff is communicating and cooperating with the Colorado Division of Wildlife (CDOW) relative to population monitoring and decisions regarding potential elk population control or dispersal methods.

Plan Amendment and Revision

The CCP will be reviewed at least annually to decide if it requires any revisions. Whenever this review or other monitoring and evaluation determine that we need changes to achieve the Complex's purposes, vision, and goals, we will modify the Plan and associated management activities. The CCP will be revised when significant new information becomes available, ecological conditions change, major Refuge expansion occurs, or when we identify the need to do so during plan review. This should occur every 15 years, or sooner if necessary.

III. Alternatives, Including the Service's Proposed Action

Description of Each Alternative

The following management alternatives were considered. They represent different ways of accomplishing the Refuge Complex's purposes and the goals laid out earlier in this document.

No Action (Current Management) Alternative

This alternative would continue current management practices. The largest distinction between the current alternative and the preferred is to change from a predominantly reactionary mode of management to a more pro-active style. Refuge management of weeds serves as an example. Invasive weeds have been an increasing problem on both refuges for 30 years. Inconsistent and low funding have resulted in short-term planning and low to no monitoring. This has resulted in a weed management program designed to mitigate annual valid concerns of County Weed Boards versus methodical, long-term planning and implementation. The current management alternative does not allow for the staff to implement control techniques or to experiment with various technique, thus promoting reactionary management.

Water Management

About 50 percent of the San Luis Valley's wetlands have been destroyed since European settlement (Hopper 1982). The SLV and Complex receive only seven inches of annual precipitation. Additionally, the aquifers underlying both Refuges and the river systems have been dramatically altered by human demand for and use of water. The refuge staff applies water to irrigate wetlands and crops, in an attempt to meet the needs of migrating and nesting birds.

Colorado has adopted the doctrine of prior appropriation for allocation of water. The United States acquired relatively senior Rio Grande and groundwater water rights and shares in ditch companies when lands were acquired for the Complex. Water rights for Complex wells were adjudicated in Water Court. Water management on the Complex is conducted in accordance with Colorado water law.

An assumption of this alternative is that approximately 95 percent of the wetlands supporting shallow emergent and semipermanent vegetation on both Refuges are created and maintained through the application of irrigation water and pumped and free-flowing artesian wells. In the Valley, water is diverted from the Rio Grande and made available to water users through canals. A system of ditches delivers water from the canals to the Refuges. Water rights owned by the United States and associated with Alamosa and Monte Vista NWRs will continue to be used to irrigate shallow water wetlands and wet meadows to replace wetlands lost over time and continue to provide wetland habitat managed specifically for wildlife in the San Luis Valley.

The Complex uses its irrigation systems much like the private landowners who preceded it. Although the intent is not hay and crop production, but rather wet meadow habitat to support wetland-dependent wildlife species. The general assumption is that, historically, wetlands were flooded with snow melt and groundwater from March through July and then dried as a function of evapotranspiration, infiltration, and surface drainage. With regard to water management, many exceptions to this historic schedule exist and deviation from that timeline occur on certain portions of the Refuges to accommodate various situations; for example, to meet the needs of certain species, compliance with state water law, control of noxious weeds, maintenance of water control infrastructure, and specific experiments to alter vegetation.

Water is to be applied, in priority order, to those Refuge wetland types most critical to the San Luis Valley Ecosystem (Upper Rio Grande Ecosystem). Valley-wide, farming and ranching practices have provided substantial quantities of grazed and hayed wetlands suitable as foraging habitat for a wide array of water birds. Consequently, little Refuge water is targeted for this habitat type. However, wetland and riparian areas with tall dense stands of cover (not heavily grazed or hayed) are assumed to be uncommon in the Valley; therefore, maintenance of these habitat types which provide critical habitat to water birds, resident mammals, resident and neotropical songbirds, and a wide array of terrestrial and aquatic invertebrates have higher priorities.

In a typical water year, numerous techniques are employed to deliver and manage water. When water rights and budgets allow, pumped and artesian well water supply water to key wetlands from mid-February to mid-April, prior to the irrigation season, for spring migrating sandhill cranes and other migrating birds as well as breeding waterfowl and water birds. This produces habitat that existed when large spring fed creeks, like Spring Creek and Diamond Creek (west of La Jara, Colorado), used to flow. From mid-April through June, canal water and pumped and artesian well water maintain wetland vegetation. Refuge managers periodically allow drought and flood cycles associated with snowpack and subsequent canal flows to create a diverse array of wetland habitats. During the period July through mid-September, pumped wells, artesian well water and Closed Basin mitigation water maintain selected wetlands for waterfowl broods and other young water birds and migrating shorebirds. Pumped and artesian wells are also used from September through November to provide habitat for fall migrating waterfowl and water birds and to provide wildlife viewing and waterfowl hunting opportunities for the public. No open water is actively maintained through water diversion on the Refuges from November to mid-February to discourage concentrating wintering waterfowl and subsequent outbreaks of avian cholera. On the Monte Vista NWR, in November through December water from the Empire and Monte Vista canals is diverted into recharge pits designed to supplement groundwater tables. This water also saturates the soil, which allows for more effective irrigation of the wet meadow habitats in the subsequent spring.

Sprinkler irrigation of the 510 cropland acres on Monte Vista NWR occurs from May through September. This results in a 40 to 60 percent savings of water over flood irrigation.

Both Refuges exist in an arid and altered environment. Maintenance of the existing water rights is fundamentally important to management of at least 95 percent of the short-emergent and semipermanent wetlands on both refuges, therefore the Complex will continue to emphasize beneficial use of water under those rights.

Rest

Availability of dense stands of wetland vegetation during the early spring months is an important component of water bird production on both Refuges. This has been documented for ducks on Monte Vista NWR (Gilbert, et al. 1996), but likely applies to other species nesting in associated habitats, such as American bittern, sora and Virginia rails, northern harriers, and short-eared owls. Production of this dense undisturbed vegetation distinguishes these Refuges and other lands managed in the Valley for water birds from the vast majority of lands in agricultural production. Although irrigation practices are fundamentally the same on agricultural lands and lands that are used by nesting water birds, utilization of resulting vegetation is dramatically different. Farmers and ranchers depend upon harvest of vegetation for their livelihood. However, successful production of water birds is primarily reliant upon stands of vegetation largely excluded from harvest. Because of this, both Refuges are important islands of nesting cover within the Valley and the flyway.

Stands of dense vegetation are achieved through careful water manipulation and rest from management practices that result in defoliation, such as grazing, fire, herbicide, and mowing. Although the use of rest has tremendous benefits for a wide variety of birds, it is not feasible nor desirable to maintain all of the Complex's wetlands in a constant densely vegetated state. In the cool climate of this mountain valley, decomposition occurs slowly and organic matter allowed to accumulate over too many years will shade the soil and suppress new growth of desired vegetation. Therefore, it is necessary to periodically disturb dense stands of vegetation to accelerate the break down of organic matter, hasten mineral cycling, and create vegetative structural diversity.

Long-term rest (more than 1 year) would continue to be used over the next 15 years. Rest periods are essential for plant revitalization and recovery, and provide plants the opportunity to store food reserves and establish root networks as well as developing adequate above ground biomass to provide cover for wildlife. Approximately 45 percent of the Complex has been rested from 4 to 7 years. Several factors, such as timing and amount of water applied, affect the length of time needed to rest or until rest is needed again.

Prescribed Burning

Prescribed burning has been used as a management tool on the Complex since 1981. Burning is primarily used to set back plant succession in wetlands and uplands and to provide a mosaic of vegetation composition and structure for wildlife species with a wide array of nesting and feeding requirements. Habitats are periodically burned to remove excessive litter buildup, stimulate vegetation growth, enhance nutrient cycling, increase soil temperatures, and control weeds. Prescribed burning is also used in some cases to reduce extremely dense or weedy vegetation so that other management tools can be used in that area. Burning, however, is used with the entire Complex and Valley in mind; it is used only when the habitat it is impacting is being adequately provided elsewhere on the Refuges or in the SLV.

Wildfires within the Complex would continue to be suppressed using the most effective methods.

Prescribed Grazing

Currently, the only cattle grazing on the Complex is part of a research effort examining various habitat management tools; this project is part of an out-of-court lawsuit settlement. In 1992, several national wildlife refuges throughout the country were sued by the Audubon Society and other non-government organizations due to concern that the refuges were being used or managed in ways that were not compatible with each refuge's particular purpose. The Monte Vista NWR was included in the lawsuit because of cattle grazing in the growing season and concern that the tool was detrimental to Refuge habitats and incompatible with the Refuge purpose, namely waterfowl production. The case was settled out of court in 1993. As part of the settlement, it was agreed that refuge managers would not use any grazing on the Complex until the completion of a 5 year research study which would evaluate habitat management tools including grazing. Dr. Leigh Fredrickson, a wetland ecologist from the University of Missouri's Gaylord Memorial Laboratory, was selected to conduct the project and research began on the both Refuges in 1996. This study will end in 2002, at which time the Refuge staff will reexamine grazing and its ability to meet Refuge goals and objectives.

From 1996 until present, cattle grazing has only occurred on the Complex to meet the needs of the research. The grazing prescription being examined in the study is similar to the one used when the Refuge was sued, a holistic grazing regime (Savory 1988). Grazing occurs during the growing season and animals are moved every 1 to 6 days to a new site. A grazed site is then rested from 25 to 35 days before it is grazed again. Sites may be grazed two to three times during May 15 to September 1. Some work examining grazing has been completed and the subsequent thesis has been written (Diebboll 1999) with manuscripts in press. The remaining research, including two more graduate studies, will end in 2002.

Farming

The farming program on the Monte Vista NWR is primarily used to provide high energy food for migrating cranes and waterfowl. However, the food and cover provided by farm fields also benefit resident wildlife such as deer, rodents and pheasants. No farming is conducted at Alamosa NWR due to a lack of suitable soils.

Farming has been used as a management tool on the Monte Vista Refuge since 1952. Initial Refuge farming involved 900 acres of cropland, annually planted with primarily small grain crops. Currently, 510 acres are farmed on a 5 year crop rotation schedule; 40 percent is planted to small grains for feed; 40 percent is planted to alfalfa to increase soil fertility and improve soil tilth, and 20 percent is left fallow to control weeds. The alfalfa is hayed twice annually to control weeds and alfalfa weevils; once in the spring after meadowlarks, waterfowl, pheasant, and other ground nesters are finished nesting, and once in the summer.

Currently, 462 of the 510 acres in the 5 year crop rotation are irrigated via sprinklers versus flood irrigation. Sprinkler irrigation eliminates the need for leveling fields prior to planting, thereby reducing soil compaction and bare soil. Each center pivot sprinkler area contains five pie-shaped fields planted to alternate crops. The 400 additional acres of cropland that were previously farmed are now planted to perennial grass/legumes and are not part of the current crop rotation. These areas are still flood irrigated about once every year to keep plants alive.

Currently, farming practices try to use organic methods whenever possible to decrease the environmental risks associated with the use of petrochemical based herbicides, pesticides, and fertilizers. Alfalfa is grown in a crop rotation to improve soil fertility, add organic matter, and fix nitrogen. Pollution of the groundwater and the surface water by agricultural chemicals is lessened. Crop predators are not poisoned; instead a balanced population of bees, butterflies, birds, and other wild animals is encouraged to limit crop depredation by pests. From 1990 to 1998 organic farming methods were solely used but they were not completely effective due to increasing invasion of noxious weeds, primarily Canada thistle and wild oats. Therefore, current management uses some agricultural chemicals. Thus, crop management now utilizes a mix of organic and non-organic agricultural practices.

Habitat Protection

The U.S. Fish & Wildlife Service acquires lands and/or interests in lands, such as easements or leases, consistent with legislation or other Congressional guidelines and Executive Orders for the conservation of fish and wildlife and to provide wildlife-oriented public use for educational and recreational purposes.

The Service's habitat protection policy is to acquire land only when other protective means (i.e., zoning or regulation to achieve program goals) are not appropriate, available or effective. When lands are to be acquired, the minimum interest necessary to reach management objectives is acquired or retained. When the Service must acquire land, it acquires fee-title (control of all property rights) only if control of lesser property rights through easements or leases will not achieve objectives.

Funding for acquisitions comes from receipts, such as Federal Duck Stamp sales, entrance fees to certain national wildlife refuges, import taxes on arms and ammunition, and appropriations under the Land and Water Conservation Fund Act.

The Refuges are located in the San Luis Valley which comprises the Upper Rio Grande Ecosystem as designated by the U.S. Fish & Wildlife Service. This Ecosystem has discernable physical limits. The Refuge Complex uses various conservation programs to protect or enhance habitat components critical to migratory water birds.

Acquisition of inholdings on Alamosa NWR would continue to be pursued as opportunities arise. Easements and fee-title acquisitions would continue to be acquired to prevent uses that degrade wildlife habitat and buffer critical habitats on the Refuge. These efforts would continue as opportunities arise and be concentrated on lands within one-half mile of the current boundaries of the Refuges in order to protect them from the adverse impacts of housing development.

The San Luis Valley of Colorado is well known for its wetland resources. The National Wetland Inventory data indicates approximately 230,000 acres of wetland habitat currently exists. Although most of these wetlands are supported by irrigation practices, they still provide valuable wildlife habitat. Currently, the U.S. Fish & Wildlife Service is an active partner in the Colorado Wetlands Program. It is a large Statewide partnership with the goal of protecting, restoring, and enhancing wetland habitat. This initiative is a voluntary approach to wetland conservation. It is aimed at conserving all biologically significant wetlands of Colorado and associated wildlife including birds, mammals, reptiles, and amphibians. The initiative was started in 1996 with the reorganization of the Colorado Division of Wildlife and the development of the Intermountain West Joint Venture of the North American Waterfowl Management Plan. In the San Luis Valley, this initiative has built on existing programs by the U.S. Fish & Wildlife Service, the Colorado Division of Wildlife, the Bureau of Land Management and The Nature Conservancy. Although much remains to be done to improve wetland management on these "conservation units," most wetland habitat in the Valley is privately owned.

No Action Alternative (Current Management) cont'd.

The Complex staff would continue to assist private landowners to manage riparian habitat and create, protect, enhance and, where appropriate, create wetlands throughout the SLV through the Partners for Fish and Wildlife Program (PFW). Partnerships would continue to be developed with entities such as the Colorado Division of Wildlife and Ducks Unlimited to supplement Service funding of the program.

Implementation of the Partners for Fish and Wildlife Program in the San Luis Valley began April 1, 1990. Since its inception in the SLV, the PFW Program has been instrumental in restoring and enhancing numerous acres of wetland and wet meadow habitat, cottonwood/willow riparian habitat, as well as associated upland habitat. Portions of the SLV support excellent habitat for breeding waterfowl and water birds. However, the vegetation and water conditions conducive to waterfowl and water bird breeding habitat (dense vegetation cover) are assumed under represented Valley. Therefore, the PFW Program has focused its attention almost exclusively on restoring and enhancing wetland/wet meadow and riparian systems to increase the habitat quality for waterfowl, water birds, passerines, and other resident wildlife species.

To date, over 220 Wildlife Extension Agreements (WEA) with landowners have incorporated over 12,000 total acres into the San Luis Valley's PFW Program. Of these, approximately 8,500 acres are wetland/wet meadow, 3,160 acres of associated uplands, and over 400 acres of cottonwood/willow riparian habitat. Landowners enter into WEAs for a minimum of 10 years, although some have signed agreements for 20 years.

The cost/benefit return of the PFW Program in the SLV has been, and continues to be, exceptional because the PFW staff constructs the majority of the projects themselves and the flat topography of the SLV is ideal. The majority of restoration and enhancement activities are accomplished for $200 to $300/wetland acre with some projects being even more cost efficient.

The PFW Program is achieving its goal of increasing production of waterfowl and water birds in the SLV. Additionally, numerous other wildlife species have benefitted from these restoration and enhancement activities. Project areas receive a lot of use by breeding and wintering raptors and prairie nesting songbirds such as western meadowlarks and vesper sparrows. Small mammals, amphibians and reptiles, as well as a suite of invertebrates, have also benefitted substantially.

The White Ranch property near Hooper, Colorado was purchased by the Bureau of Reclamation as mitigation for the Closed Basin Project with the intent of establishing this property as a National Wildlife Refuge. Although a Preliminary Project Proposal has been approved by the Director it is contingent upon adequate operation and maintenance funding from the Bureau of Reclamation and development of a water supply to meet the Bureau's wetland mitigation obligation. It has recently been slated for inclusion into the National Wildlife Refuge System through The Great Sand Dunes Park and Preserve Act of 2000. This legislation likely assures this property will become part of the 92,617 acre Baca National Wildlife Refuge. This Act will result in conversion of the Great Sand Dunes National Monument into a National Park and establish the Baca NWR with acquisition of the Baca Ranch. The White Ranch is located well within the boundaries of the Baca NWR. Detailed management plans for these new Refuge lands will be developed through a separate CCP process.

Public Use

Public access to the Refuges is provided and would continue. Monte Vista NWR has a larger network of roads open to the public, including several county roads which bisect the Refuge, and a 2.5-mile auto tour route. Alamosa NWR is a larger contiguous land base with fewer public accessible roadways, having only a 3-mile auto tour route and a spur off a county road to the Hansen Bluff overlook. Both auto tour routes are near areas regularly used by water birds and other wildlife. Two wildlife observation trails also exist on the Alamosa Refuge; a 2-mile (one way) trail along the Rio Grande and a 1-mile walk along wetland edges near the Bluff Overlook. One, short wildlife observation trail exists off of the auto tour route on Monte Vista refuge. Visitor numbers are directly related to wildlife activities such as courtship behaviors, crane staging, etc. Uses that are not wildlife-dependent are discouraged or even prohibited.

Hunting Waterfowl and small game hunting would continue to be supported and encouraged. Camping areas for hunters would be provided. Hunter numbers are not regulated except during weekends of the first split of the waterfowl season for which hunters must successfully draw a permit in a limited drawing. Contracted elk hunting occurs on the Monte Vista NWR only as a tool to manage the number of resident and transient elk using the refuge. Public elk hunting opportunities are not provided, primarily due to safety concerns and potential damage to sensitive habitat such as nesting areas. Safety concerns include the proximity of private landowners, public roads and the presence of Refuge staff on the land combined with the range and power of elk hunting rifles.

Fishing The shallow water in Refuge wetlands does not support a viable fishery. Wetlands either dry up or freeze solid annually which eliminates all fish that have entered the system. Therefore, fishing is not allowed on the Refuges. However, the Complex hosts an annual "Kids Fishing Day" event. This is a multi-agency collaboration held on the Monte Vista Refuge annually during National Fishing Week. A small (<2 acres) pond on the Refuge is stocked with trout donated by the Hotchkiss National Fish Hatchery. The event is designed to teach children the fun of fishing, angling techniques, and habitat conservation. In addition, a special-needs kids fishing day is also provided in which children with disabilities are allowed to fish the pond. After the kids events have taken place, senior citizens are allowed to fish until the wetland is dewatered (usually within one week of the Kids Fishing Day Event) and remaining fish are caught and donated to local retirement homes or netted and taken to neighboring Home Lake, a State-managed area. The event usually reaches approximately 250 to 700 children annually. Local merchants donate over $1,000 in prizes annually for this event.

Creation and management of a viable fishery on the portions of the Rio Grande flowing through the Alamosa NWR will not be pursued for a variety of reasons. The major limiting factors are the inability of this stretch of river to support native fish species due to its ephemeral flows and the disturbance to wildlife using this riparian area that would be associated with a fishery for exotic species.

Wildlife Observation The Refuge staff is an active participant in the Monte Vista Crane Festival; providing technical support, as well as providing viewing areas, conducting special tours and assisting in setting a direction for the Festival. The Crane Festival is the largest wildlife related public event in Colorado (estimated 10,000 visitors in 1999). The Crane Festival Committee, a local non-profit organization consisting of private citizens and business people, has requested greater participation and support from the Service in running this popular 3- to 4-day event.

Refuge roads and one walking trail provide easily accessible wildlife viewing.

Wildlife Photography Photography would continue to be allowed, with no additional Refuge support provided to photographers.

Interpretation A visitor contact station is part of the Complex's main office at the Alamosa NWR and is usually staffed daily during normal working hours. At Monte Vista NWR, the visitor contact station is only open seasonally and operated by the Friends of the San Luis Valley National Wildlife Refuges or by other volunteers. Self-guided auto-tour routes with interpretive signs are available to visitors on both Refuges. Additionally, on the Alamosa NWR, there is a drive to the panoramic "Bluff Overlook" which affords a magnificent view of Refuge wetlands, the Rio Grande, and the Sangre de Cristo mountains to the east.

An Outdoor Recreational Planner will be hired. Approval for this position has already been secured with the recruitment process just beginning. This person will be responsible for developing and administering interpretive environmental education and visitor services programs that will include development of a cadre of knowledgeable volunteers to staff facilities, conduct Refuge tours, and deliver interpretive talks at both Refuges. The Outdoor Recreational Planner will also pursue funding for projects such as:

- Replace and/or develop interpretive signs at both Monte Vista and Alamosa Refuges to meet FWS standards and be accessible to all users.
- Develop interpretive nature trails at the Monte Vista NWR; potential sites include Spring Creek (groundwater hydrology) and Unit 6.
- Replace and improve visitor contact area exhibits at Alamosa NWR.
- Develop interpretation for the Rio Grande nature trail at Alamosa NWR.
- Develop and implement orientation and direction signs at entrances and for all road systems on both Refuges.

It should be noted that detailed plans for expanded outdoor recreation, interpretation, and educational programs cannot be developed until the Outdoor Recreational Planner is hired and specific tasks are discussed. The above only represents ideas for what may be accomplished.

Environmental Education Volunteer and/or contractor led environmental education programs for local schools are provided, both as Refuge field trips and classroom presentations. Future funding for these programs is being severely restricted and likely will not be available in subsequent years.

Monte Vista NWR is one of several areas in the SLV where *Project Wild* outdoor classroom activities are held. Sites incorporate specific wetland habitat based curriculum. In addition, the Refuge is developing education kits designed to provide a Refuge based curriculum for use by teachers in a classroom setting. Four kits will be available addressing endangered species, wetland habitats, animal adaptations, and the Refuge Complex. These efforts have been largely put on hold until the Outdoor Recreational Planner is onboard. Educational programs will emphasize the importance of water to the functioning of the natural and economic resources of the SLV ecosystem and the importance of wetlands to wildlife and humans. Local school systems and visitors to the Valley would be the target audience. Once the ORP position is filled, the Service's participation in the *Outdoor Classroom* program and interaction with the local media will be expanded and improved. The local news media has already expressed interest in having a regular program highlighting Refuge activities and news.

Universal Access and Design Although efforts have been undertaken to make the Refuges accessible to all users, the Refuges are still short of this goal. Accessibility issues and needs will be addressed on a project-by-project basis as funding allows.

The new walking trail planned for Monte Vista NWR will be accessible to all users.

All new interpretive and educational programs will comply with the Rehabilitation Act of 1973 (Section 504) which prohibits discrimination based on disability in federally funded programs and activities. This means that program design will incorporate accommodations such as large and high contrast print, plain simple language, and inclusion of both visual and audible components.

Wherever full accessibility is not feasible, efforts will be made to provide an equivalent experience.

No Action Alternative (Current Management) cont'd.

Cultural Resources

Humans have used the land we now call Alamosa and Monte Vista National Wildlife Refuges for approximately 11,000 years. Fourteen documented prehistoric and historic archaeological sites occur on Monte Vista NWR and eleven on Alamosa NWR. All but four sites (three on Monte Vista and one on Alamosa) have been determined as non-eligible for nomination to the National Register of Historic Places. The remaining four sites require further investigation and data collection before eligibility can be determined. These sites are being protected in accordance with the National Historic Preservation Act of 1996. Extensive archaeological sites exist in the headwaters of Spring Creek on Monte Vista Refuge and along Hansen's Bluff on Alamosa Refuge.

Very little interpretation of cultural resources is available on the Refuges. Further archaeological inventories and interpretation will be carried out as funding and space allow; no specific plans exist for these efforts. Currently, levels do not allow compliance with Section 110 of the National Historic Preservation Act of 1966 as amended.

Any Native American burial sites found during the inventory or at any other time will be managed in accordance with the Native American Grave Protection and Repatriation Act of 1990.

Elk Management

Large numbers of elk on the Monte Vista refuge present several problems as described in the "Planning Issues" section. The resident population on the east side of Monte Vista refuge had grown to about 80 animals by 1995. This population was rapidly increasing and experiencing little mortality except that from collisions with motor vehicles on County Road 6 East and U.S. Highway 160. The basic problem of having a large ungulate population with no management capability is addressed by conducting a "dispersal hunt" as defined by Colorado state law. One of the goals of elk management is to keep the population of resident animals to very low levels.

Current elk management is in accordance with Colorado Division of Wildlife regulations, including experimental dispersal hunting of resident elk on Monte Vista NWR. Hunts are generally initiated once transient (wintering) elk numbers exceed 100 on the west end of Monte Vista NWR. They are conducted by a contract hunter from August 15 to February 28 and include only resident cow elk.

It should also be noted that although migratory bird habitat protection is refuge management's primary reason for limiting the elk population on Refuge lands, these actions also assist in public safety and complement the Colorado Division of Wildlife's elk management objectives.

Other elk management efforts include an agreement with the Bureau of Land Management and the Division of Wildlife to close Bronson Peak Road during the elk season to prevent a firing line along that road which can trap elk on the Monte Vista Refuge. The Service also provides logistical support to the Colorado Division of Wildlife, including staff, vehicles, and fuel. Fences are currently being removed or modified to reduce injury to elk. Farming practices have been modified to eliminate peas because they seem to attract elk to the Refuge. Refuge staff monitor elk activity on the Refuge so that they may take action as needed to discourage residency. They also conduct law enforcement to ensure that all regulations pertaining to elk are adhered to.

Public hunting will not be allowed for safety reasons. Safety concerns include the proximity of private landowners, density of public roadways and the presence of Refuge staff, contractors and cooperators on the land combined with the range and power of elk hunting rifles.

Auto pull-outs for safe elk viewing are under construction.

Proposed Alternative

Proposed Alternative

In contrast to the current management alternative this proposed alternative is designed to allow a more pro-active approach through better management planning, monitoring of actions and more consistent outreach and service to the public. An alternative such as this is necessary if the refuge operations continue to participate in the large array of resource issues currently facing wildlife in the San Luis Valley.

Under this alternative the process will continue to determine if current goals are appropriate. In the case of habitat goals information will continue to be gathered on:

1) the historic and pre-historic environmental conditions of the San Luis Valley,
2) impact of habitat management practices.
3) current needs of migratory birds and what the best role is for both refuges in providing habitat, and
4) how to better control noxious weeds and prevent their spread.

Water Management

Under this Alternative, Refuge staff would continue to utilize surface and well water to create a variety of wetland habitats on both Refuges as described under the No Action Alternative.

Additional efforts will focus on improving efficiency of water application, monitoring of water usage, better understanding of water rights, historical processes, subsurface and surface interactions, and improving knowledge of groundwater and its role in maintaining wetlands. Increased monitoring of habitat response to water application will facilitate an adaptive habitat management program.

Manipulation of water would still remain the focus of this Alternative. However, a recognized need exists to better understand the role of groundwater and its influence on wetland habitat. This information is needed for wetland management purposes and for any stream restoration projects undertaken. The restoration of stream channel and hydrology of Spring Creek on Monte Vista NWR has been contemplated. The creek bed itself has been dramatically altered. Approximately four miles of the Creek was channelized prior to Refuge establishment. In addition, dramatic alteration of groundwater, both off and on the Refuge, has resulted in the elimination of all natural flows in Spring Creek. This spring once flowed from 1 (Siebenthal, 1910) to an average of 4 cubic feet per second (Monte Vista NWR Master Plan 1962). Restoration of these natural flows is likely impossible, but, due to water supplies in groundwater recharge pits, surface water diversions and a more consistent flow in the creek are now possible.

The cost and benefit of restoring meanders in Spring Creek will be examined under this alternative. On one hand such a restoration will likely benefit wetland habitat associated with the stream channel by restoring a semblance of pre-irrigation hydrology. But these advantages must be weighed against the high cost of stream restoration and the possible consequences to downstream water users. Although such actions will not have major impacts on either the unconfined or confined aquifers of the Valley, they can positively impact localized groundwater tables and artesian wells, and increase efficiency of irrigation during the following season.

Proposed Alternative cont'd.

Acquisition of lands and/or individual water rights necessary to accomplish Refuge goals and objectives will be actively pursued from willing sellers.

The water rights for both Refuges are complex and extensive and require considerable understanding of Colorado water law and the history of agreements with adjoining landowners and other water users. Consequently, water management decisions made by the refuge manager are based upon the collective knowledge of the Refuge staff, the Colorado Division of Water Resources, the U.S. Fish & Wildlife Service Division of Water Resources. The USFWS Division of Water Resources has provided funds to contract with a private consultant to research and document water rights of the Complex, and to assist the Refuge staff in developing a water management plan that provides for the most efficient and effective use of water. Under this management alternative, a water management staff position would be added to the Refuge staff to advise the refuge manager on water usage and water rights issues. This additional position would enable the Service to better manage and document its water use to protect Refuge water rights and maximize habitat benefits.

Under this Alternative, irrigation systems in all Refuge units would be upgraded as funding allows to enable more precise and efficient management of irrigation water. Currently, wetland vegetation is maintained using flood irrigation practices where water is applied at the highest elevation of a unit from a supply ditch or well head and is allowed to flow across the unit to lower elevations. On most Refuge units, this process is relatively imprecise, extremely slow and complicated by tailwater from neighboring lands over which the Refuge has little control. In addition, it is difficult to dry most units in a timely fashion to meet biological needs. Upgrading irrigation infrastructure will facilitate more efficient application of water and will assist Refuge staff to implement a monitoring program that will eventually predict wetland habitat response to water application. Improved water delivery will allow Refuge staff to implement more precise and efficient wetting and drying of wetlands, which will allow for improved nutrient cycling, weed control (i.e., faster drying to control whitetop), and moist soil plant management.

Water use would be closely managed and monitored to improve efficiency and protect water rights. Adaptive management would be used to evaluate and manage water. Biological and management positions would be increased on staff to adequately evaluate water use and the subsequent impacts on habitat. Additionally, monitoring would provide for better management of diversions, ditches, wells, and control structures and ensure protection of water rights.

Rest

This Alternative also recognizes the benefits of rest, as discussed under the No Action Alternative. Therefore, long-term rest (more than 1 year) would continue to be used over the next 15 years.

However, a challenge facing these Refuges is the development of an adequate monitoring program that will direct management practices to meet habitat objectives. The ratio of periods of rest to disturbance in order to provide the optimum cover of vegetation for nesting ducks and other species is largely unknown for the San Luis Valley and needs to be examined. A successful program will help managers determine when areas of either Refuge need disturbance, the most effective tool to use, and when. Under this Alternative, an active adaptive management strategy would be implemented. This program would be based on monitoring of prescribed rest to document how different vegetation types respond to different rest strategies. This will allow for increasingly effective application of rest to meet habitat goals.

Prescribed Burning

As described in the No Action Alternative, prescribed burning will continue to be utilized to meet a variety of management objectives. Wildfires, under this Alternative as well, will continue to be suppressed. In addition to that described under the No Action Alternative, management would implement two new initiatives. First, formation of an interagency fire team would be pursued. This idea has been discussed among the various State and Federal land management agencies, but no action has been taken. This team would be responsible for conducting prescribed burns and suppressing wildfires on member agency lands. Secondly, refuge management would pursue the hiring of additional staff to develop a burn monitoring program and detailed burn criteria in an effort to better understand the impacts of prescribed burning and to better implement its use in meeting management objectives.

Prescribed Grazing

Future use of prescribed grazing on the Refuges will be greatly influenced by the results of research currently being conducted by Dr. Fredrickson. The Refuge staff will also continue to evaluate and monitor how effective this management tool is in meeting habitat objectives. Based on these collective and ongoing investigative efforts, the grazing methods (i.e., numbers, timing, and animals [cows, bison, goats]) that best accomplish habitat objectives will be used.

In the future, if and when grazing is used, prescriptions will delineate the location of the site to be grazed and specific objectives and purposes of the tool such as to control weeds, increase new growth, and provide a competitive advantage to certain vegetation. This site-by-site evaluation and planning will allow for maximum control and flexibility of this tool as well as ensuring that only delineated sites are affected by the tool and that all factors and interests are considered.

Prescribed grazing may also be employed in situations where a more selective vegetation impact tool is desired versus using a tool which impacts all vegetation, such as fire. Limited grazing may be used to reduce high fuel loads in some areas where fuels can be reduced without lasting damage to the understory.

As is the case with most management tools, prescribed grazing may also be used in conjunction with or as a precursor to other tools such as herbicides or intensive water management.

Farming

Under this Alternative, migrating birds would be provided with the same amount of small grain food from crops currently provided. The existing farming program operated by Refuge staff would be converted to a cooperative farming program. Farming would continue but Refuge staff would only be responsible for irrigation of the crops. The cooperating farmer would continue the crop rotation of 2 years of small grains followed by 2 years of alfalfa and then 1 year fallow. The cooperating farmer would be allowed to keep all or a portion of the alfalfa crop based on yields of the small grain crops. The current emphasis on organic farming techniques will be maintained.

Under this alternative the necessity of the farming program will be regularly evaluated. As results of ongoing and future studies become available, the size and focus of the refuge farming program will likely change.

Refuge staff would also supplement the farming program with a moist soil plant management program to diversify the types of feed available to the birds. The farming and moist soil plant programs would be monitored and managed through the adaptive management concept. Research would be encouraged to help identify the amount and kinds of high energy food sources the Refuge could and should be providing for migrating and wintering avian species.

Proposed Alternative contd.

Public Use

Under this Alternative, educating the public as to the nature and value of wetlands will focus on contrasting the intensely managed wetlands of Monte Vista NWR with the more natural aspects on the Alamosa NWR wetlands. To assure compliance with public use minimum standards, money will be targeted for projects through RONS, MMS, and partnerships. Currently, funding proposals are developed for projects that will improve the quality of visitor experiences.

Hunting Current waterfowl and small game hunting would continue to be supported and encouraged. To the extent feasible, the hunting experience would be further tailored to meet the desires of hunters using the Refuges based on periodic questioning of waterfowl hunters and other public input. It should be noted that all uses on the Refuges, including hunting, are subject to compatibility determinations. Hence, any future changes in hunting practices on the Refuges will be subject to a determination of compatibility with Refuge purposes and goals. (See Map 6 - Monte Vista NWR Hunting Map and Map 7 - Alamosa NWR Hunting Map).

Under this alternative the limited amount of camping currently available in parking lots during waterfowl hunting seasons would be continued. However, if public demand results in unmanageable numbers of campers or other associated problems the camping opportunities will be altered or discontinued.

Public elk hunting would not be allowed primarily due to safety concerns and potential damage to sensitive habitat such as nesting areas. Safety concerns include the proximity of private landowners and the presence of Refuge staff and others on the land combined with the range and power of elk hunting rifles.

Fishing Same as that described under the No Action Alternative.

Wildlife Observation Support for the Crane Festival would continue as described under the No Action Alternative. Under this Alternative, on the Monte Vista NWR, public and scientific input would be sought regarding the seasonal expansion of the auto tour route, development of wildlife observation sites at Parker Pond, and development of wildlife observation decks along County Road 3E. Opinion and information would also be sought regarding the development of an observation deck adjacent to the Refuge Headquarters at the Alamosa NWR and near the proposed visitor center and education facility at the Monte Vista NWR.

Additionally, wildlife observation blinds accessible to all users would be developed on both Refuges.

Wildlife Photography Same as that described under the No Action Alternative.

Interpretation A multi-purpose education and visitor center facility on the Monte Vista NWR is the highest educational priority for the Complex, with funding pending. Plans for hiring an Outdoor Recreational Planner and for enhanced interpretation projects would be the same as that described under the No Action Alternative. Additionally, under this Plan, the acquisition of an Assistant Outdoor Recreational Planner will be pursued. This will allow for more regular, comprehensive, and extensive interpretation and visitor services.

Also under this Alternative, the Refuge staff would implement an interpretation program centered around the cultural resources found on the Complex and around the Valley. Interpretation of past human use would focus on the theme that humans have always, and still depend upon natural resources for survival. The Refuge visitor should leave understanding: 1) how animals and plants on Refuge lands were and are used by humans; 2) what the prehistoric and historic environment was like in the San Luis Valley; and 3) although humans are farther removed from the environment today than in times past, they are no less a part of it than their prehistoric ancestors. In addition, the Refuge staff should interpret the development of agriculture in the San Luis Valley; in particular, the role and impacts of an extensive irrigation system and how that formed the foundation for the agricultural economy, bringing the visitor to the current condition today and the sustainable and compatible uses of natural resources the Refuges and agricultural users are striving for today.

Efforts would also be made towards an interagency interpretation project. This may include kiosks on each Refuge that relate prehistoric and historic sites there with other cultural sites on other public lands within the Valley and surrounding foothills. This effort will proceed as money and staffing allow and, of course, will be dependent upon participation of other land management agencies (i.e., Bureau of Land Management, Forest Service, National Park Service, State Division of Parks and Recreation).

Environmental Education Environmental education goals and programs would be the same as those under No Action with one additional item, hiring an assistant Outdoor Recreational Planner. This will allow for more regular, comprehensive, and expanded educational opportunities.

Universal Access and Design Efforts in this area would be the same as that described under the No Action Alternative with a few additional efforts. Developments would include new rest room facilities and wildlife observation blinds and/or platforms. Universally accessible hunting blinds would be built on both Refuges. All of these projects will follow the Americans with Disabilities Accessibility Guidelines.

Additionally, new interpretive signs and information boards will be written in English and Spanish.

Wherever full accessibility is not feasible, efforts would be made to provide an equivalent experience.

Cultural Resources

Archaeological work on the Complex will be expanded to include work needed to determine the eligibility of four documented sites for nomination to the National Register of Historic Places. Management under this Alternative would also include a sample archaeological inventory of Refuge lands over a 15 year period. Approximately 560 acres would be inventoried each year, for a total of 8,400 acres, one-third the total acreage of the Complex. The inventory would be designed to include both areas expected to yield finds and areas not expected to yield finds to act as a control. Further archaeological needs will be assessed upon completion of the inventory effort. Inventory efforts will proceed as resources (staffing and funding) become available.

Any Native American burial sites found during the inventory or at any other time will be managed in accordance with the Native American Grave Protection and Repatriation Act of 1990.

Elk Management

Under this Alternative, resident elk would be kept at very small numbers on Monte Vista NWR by the contract hunter under Colorado's dispersal hunt regulations. Up to 200 wintering elk will be allowed west of the Empire Canal. Refuge staff would also work with other land management agencies and the Colorado Division of Wildlife Habitat Partnership Program in the Valley to achieve broader elk management objectives that would reduce elk conflicts on the Refuge as well as numerous other conflict areas in the Valley. One objective may be reduction of hunter densities and improvement of habitat quality on public lands adjacent to Monte Vista Refuge. These efforts are to encourage elk to use those public lands. Other management techniques will be considered and evaluated under this Alternative, including the use of elk proof fencing in selected areas.

Public hunting would not be allowed for safety reasons. Safety concerns include the proximity of private landowners and the presence of Refuge staff, cooperators and contractors on the land combined with the range and power of elk hunting rifles.

Although migratory bird habitat protection is refuge management's primary reason for limiting the elk population on Refuge lands, these actions also make dispersed elk available for hunting off the Refuge, reduce the safety hazard on public roads, and reduce damage to private property.

Auto pull-outs for safe elk viewing are currently under construction.

Refuge Management Direction: Objectives and Strategies

This section outlines the objectives for each goal and then the strategies that will be used to achieve those objectives. The strategies are based on the Proposed Alternative (the CCP) and are presented in the table "Strategies and Projects for Alamosa/Monte Vista NWR Complex" following the objectives.

Habitat Goals and Objectives

Goal 1:

Provide short-emergent vegetation in conjunction with various hydrologic conditions for migrating and breeding water birds, raptors, and passerines on the refuge complex.

Rationale: Dense short emergent vegetation provides cover for nesting, wintering, and foraging avian and other wildlife species. Short-emergent vegetation occurs throughout the San Luis Valley on private lands as well as state and federally owned wildlife areas. It is associated with high water tables, along streams and as a result of irrigation practices. Most of these wetlands are on private land and managed for the production of hay and forage for cattle. As a result most the vegetation on private lands is too short (i.e., below ~ 12 inches) for most ground nesting migratory birds, but it often provides good foraging habitat for many bird species. Few places in the San Luis Valley can be managed for production of dense (measured with a Robel pole), unharvested stands of short emergent vegetation to benefit wildlife. State, federal (primarily the national wildlife refuges), non-governmental organizations and several private landowners have devoted lands to production of this habitat type and condition. The National Wetland Inventory provides the number of acres of wetland types based on water regimes in the San Luis Valley but there are no data on availability of vegetation condition; however, there is an effort to collect or compile these data. Based on the collective knowledge of wetland managers and biologists, it is believed that dense short-emergent vegetation is relatively uncommon in the Valley. Because of the tremendous use of this habitat type by migratory birds and its apparent scarcity, wildlife managers throughout the valley assume it is of high value. When dense short-emergent vegetation exists, it must be coupled with appropriate water depths at appropriate times to meet the life cycle needs of wildlife and often these conditions are achieved through the use of refuge water rights.

Objectives:

1.1 Shallowly flood 25 percent of the existing short-emergent plant community on the Complex, as a 5 year average, during February and March to begin irrigation of short-emergent plants which provide food and cover to migratory birds later in the season and to provide the habitat conditions needed by migrating sandhill cranes and waterfowl, and for breeding Canada geese for loafing and foraging.

1.2 Shallowly flood 50 percent of the existing short-emergent plant community on the Complex, as a 5 year average, during April through mid-June to support healthy short-emergent plants which provide or support plant, invertebrate, and vertebrate food sources for migrating, but primarily breeding, ducks, shorebirds, waders, rails and Canada goose broods and to attain short-emergent plant structure which provides cover to breeding, loafing, and roosting birds.

1.3 Maintain the species composition of short-emergent plant communities by limiting the encroachment of tall-emergent plants by decreasing the amount of shallow water to 30 percent of the existing acres of short-emergent vegetation, as a 5 year average, from mid-June through mid-July while continuing to provide cover and food for waterfowl broods, shorebirds, waders, rails, and others.

1.4 Maintain the health (i.e., drying for nutrient cycling) and manage species composition of short-emergent plant communities by decreasing shallowly flooded areas to 26 percent of the existing acres of short-emergent vegetation, as a 5 year average, from mid-July to September 15 while continuing to provide habitat for foraging rail and duck broods, young white-faced ibis, migrating shorebirds and post-breeding waterfowl.

1.5 Utilize recharge water, as designated by the Colorado Division of Water Resources, to begin shallowly flooding 5 percent or more of the existing short-emergent vegetation in November through December to recharge groundwater supplies and to saturate the soil for more effective irrigation of these areas the following spring.

Strategies:

- ✓ Maintain existing water rights that allow for flexibility in water application and management.
- ✓ Develop protocol to better monitor water application and impacts on habitat, primarily vegetation distribution and succession, nutrient cycling, invertebrate production, noxious weed distribution and other factors.
- ✓ Maintain and improve water management infrastructure.
- ✓ Develop protocol to quantify amount and type of wetland vegetation on Complex and assist with those efforts on a Valley-wide scale.

Goal 2:
Provide short-emergent vegetation in a range of structures necessary to meet the requisites of nesting waterfowl, water birds, raptors, passerines, and the habitat needs for small mammal populations on the refuge complex.

Rationale: Dense short emergent vegetation provides cover for nesting, wintering, and foraging avian and other wildlife species. Short-emergent vegetation occurs throughout the San Luis Valley on private lands as well as state and federally owned wildlife areas. It is associated with high water tables, along streams and as a result of irrigation practices. Most of these wetlands are on private land and managed for the production of hay and forage for cattle. As a result most the vegetation on private lands is too short (i.e., below ~ 12 inches) for most ground nesting migratory birds, but it often provides good foraging habitat for many bird species. Few places in the San Luis Valley can be managed for production of dense (measured with a Robel pole), unharvested stands of short emergent vegetation to benefit wildlife. State, federal (primarily the national wildlife refuges), non-governmental organizations and several private landowners have devoted lands to production of this habitat type and condition. The National Wetland Inventory provides the number of acres of wetland types based on water regimes in the San Luis Valley but there are no data on availability of vegetation condition; however, there is an effort to collect or compile these data. Based on the collective knowledge of wetland managers and biologists, it is believed that dense short-emergent vegetation is relatively uncommon in the Valley. Because of the tremendous use of this habitat type by migratory birds and its apparent scarcity, wildlife managers throughout the valley assume it is of high value.

Objectives:

- **2.1** Provide habitat for nesting mallard, gadwall, cinnamon teal, short-eared owl, northern harrier, marsh nesting passerines, rails, and small mammal populations by providing robust cover with a Robel reading of 12 inches or more and excluding tall whitetop on 20 percent of the existing acres of short-emergent vegetation, as a 5 year average, in April and May.

- **2.2** Provide habitat for nesting gadwall, northern pintail, northern shoveler, common snipe, Wilson's phalarope, and short-eared owl by providing moderately robust cover with a Robel reading of 6 to 12 inches on 40 percent of the existing acres of short-emergent vegetation, as a 5 year average, from May to mid-June.

- **2.3** Provide habitat for nesting Savannah sparrow, vesper sparrow, common snipe, Wilson's phalarope, and northern shoveler by providing sparse cover with a Robel reading of 6 inches or less on 15 percent of the existing acres of short-emergent vegetation, as a 5 year average, from April through July.

- 2.4 Reduce the area of short-emergent habitat on the Refuge Complex infested by noxious weeds (primarily tall whitetop, Russian knapweed, and Canada thistle) by 20 percent over the life of this plan (15 years).

Strategies:

- ✓ Maintain existing water rights that allow for flexibility in water application and management in order to provide habitat conditions conducive for short-emergent plant species to reach appropriate height and densities.
- ✓ Develop protocol to better monitor water application and other habitat management tools such as grazing and burning and their impacts on vegetation.
- ✓ Maintain and improve water management infrastructure in order to irrigate vegetation.
- ✓ Develop protocol to quantify amount and type of wetland vegetation on Complex and assist with those efforts on a Valley-wide scale.
- ✓ Map distribution of weeds on the refuge complex, continue to investigate weed control methods including integrated pest management strategies, and develop and implement monitoring methods to evaluate weed control efforts.

Goal 3:
Maintain areas of saltgrass in suitable condition for migrating and breeding water birds and passerines on the refuge complex.

Rationale: We assume flooded saltgrass provides an excellent source of aquatic invertebrates for foraging water birds and nesting habitat for some shorebirds. We also assume saltgrass in combination with various water conditions has limited availability in the San Luis Valley, yet it is a critical habitat type for migratory birds and other wildlife. It is easy to convert this habitat type to other wetland types through excessive irrigation, yet difficult to restore.

Objectives:

- **3.1** Shallowly flood 30 percent of the existing acres of saltgrass, as a 5 year average, for short periods (60 days or less) to encourage the production of invertebrates as a food source for migrating shorebirds, waterfowl, and waders in the spring (April 1 to May 30) and fall (August 15 to October 1).

- **3.2** Provide patches of sparse vegetation and bare ground on 10 percent of the existing areas of unflooded saltgrass, as a 5 year average, for nesting American avocets and killdeer.

- **3.3** Provide nesting cover with dense vegetation on 50 percent of the existing acres of unflooded saltgrass for species such as Savannah and vesper sparrows.

Strategies:

- ✓ Develop protocol and techniques for monitoring distribution of this habitat type and changes in abiotic conditions that influence this habitat.
- ✓ When appropriate protect habitat through fee-title and easement and by participating in partnerships.
- ✓ Better define wildlife use of saltgrass habitat by analysis of existing data, through literature search and additional research to test our assumptions.

Goal 4:
Provide tall-emergent vegetation with other suitable habitat conditions for breeding water birds and marsh passerines on the refuge complex.

Rationale: Tall-emergent vegetation with favorable water conditions for nesting white-faced ibis (species of management concern) and other colonial water birds, American bittern, black terns (both species of management concern) and marsh passerines is only provided on some federal, state and private lands in the San Luis Valley. The Refuges can provide stable water conditions in conjunction with other complementary habitat types such as short-emergent foraging habitat and protection from disturbance. This habitat type on the Monte Vista NWR supports the second largest colony of colonial nesting water birds in the state (Refuge files, Ron Ryder, pers comm, February, 1999). We assume that the refuges must provide some amount of this habitat type in order to support secretive marsh birds, colonial nesting birds and some waterfowl species.

Objectives:

- **4.1** Provide migrating and breeding habitat for water birds and passerines by flooding tall-emergent vegetation beginning in mid-February.

- **4.2** Maintain islands of bulrush in open water with little to no water fluctuations from May to mid-July for colonial nesting water birds, such as white-faced ibis and black-crowned night heron.

- **4.3** Provide shallow water within tall-emergent vegetation wetlands for foraging waterfowl broods; post-breeding shorebirds, waders, coots, rails, and waterfowl; molting waterfowl; and migrating shorebirds by drawing down water from mid-July to mid-September.

- **4.4** Provide habitat for mating, nesting, brood rearing, molting, and post-breeding water birds, such as colonial nesters, by maintaining a mosaic of cover/water interspersion (50/50 cattail/bulrush and open water) on 60 percent of the existing acres of tall-emergent vegetation on the Complex.

- **4.5** Explore the need for developing one additional rookery area of tall-emergent vegetation of adequate size for colonial nesting water birds.

- **4.6** Investigate and implement control method for monocultural phragmites stands on Alamosa NWR.

Strategies:

✓ Protect Parker Pond and Bowen Pond from excessive disturbance between May 1 and August 31.
✓ Maintain current annual water regime in Parker Pond and Bowen Pond. Once colonial nesting is initiated water will be held at static levels.
✓ Continue to evaluate additional protection needs to other colonial water bird nesting areas in the San Luis Valley by studying and evaluating appropriate property and through collaboration with our partners.
✓ Investigate the amount of this habitat needed to support goals of the San Luis Valley Water Bird Plan, Intermountain West Water Bird Plan and the North American Water Bird Conservation Plan.
✓ Assist in collection of data to test assumptions regarding amount and distribution of this habitat type required in the San Luis Valley.

Goal 5:
On Monte Vista National Wildlife Refuge provide agricultural grains in adequate amounts for migrating sandhill cranes and waterfowl.

Rationale: Sandhill cranes have changed how and when they use the San Luis Valley due in part to the many alterations in the quantity and quality of wintering and migratory habitat. Cranes and other wildlife have adapted to the current condition of the landscape, which is dominated by agriculture and other human practices. Historically, it is believed that there were more shallow water wetlands throughout the SLV providing a matrix of potential feeding sites (R. Drewien pers comm.). Under current conditions there may not be enough wetlands in the Valley to provide the amount of natural food required by 20,000+ cranes as there was in the past. Additionally it is postulated that historically cranes migrated through the SLV later in the spring when fewer wetlands were still frozen and thus invertebrates were more abundant (R. Drewien pers comm.). Currently cranes migrate in February when most wetlands are frozen and cannot support invertebrate populations although plant foods from the fall may still be available. Almost the entire Rocky Mountain population of the greater sandhill cranes and several thousand lesser and Canadian sandhill cranes are now dependent upon agricultural foods in the spring and fall migration. These birds must replenish fat reserves in order to complete the migration to the breeding grounds and initiate breeding efforts. Changes in agricultural practices in the past 10 to 15 years may have reduced the amount of waste grain available to migrating birds on private lands in the spring. We assume that it is not practical (there may not be sufficient amount of wetlands on the MVNWR in the early spring) to grow sufficient natural foods to feed the current flock. Therefore, the Refuge agricultural fields are necessary to provide critical food supplies in the spring, when it is limited elsewhere in the Valley.

Objectives:

- **5.1** Produce adequate agricultural grains for fall and spring migrant waterfowl and 15 percent of the fall and 85 percent of the spring sandhill crane population on the Monte Vista Refuge.

- **5.2** Work towards ensuring that 65 percent of the food required by spring migrant sandhill cranes is provided off Monte Vista Refuge.

- **5.3** Provide dense cover for resident wildlife and incidental use by foraging and nesting birds.

Strategies:

✓ Continue to assess the amount and distribution of food for Sandhill cranes in the San Luis Valley and plan refuge farming program in response to monitoring. In addition the Service will work with the agricultural community to monitor changes in farming practices that may influence food availability for sandhill cranes.

✓ Attempt to lessen crane dependence upon Monte Vista NWR farm fields in the spring. Currently, at least 85 percent of the population uses Monte Vista NWR for feeding and roosting during spring staging. We assume this concentration exposes the population to risk of catastrophic loss.

✓ Explore feasibility of increasing availability of native foods for sandhill cranes in the spring and fall.

Goal 6:
Provide submergent wetland vegetation for foraging migrant and breeding water birds, molting waterfowl, foraging raptors, aerial foraging birds, and nesting grebes and diving ducks.

Rationale: The semipermanent open water and submergent vegetation resulting from flood irrigation practices is an important habitat type found almost entirely on areas managed for wildlife. Open water is not uncommon in the valley but it is usually in water storage reservoirs associated with agriculture. Water levels in these reservoirs are not managed to promote submergent vegetation. This habitat type is used by waterfowl broods, nesting water birds (e.g. American coots and eared grebes), and foraging water birds and songbirds. Refuge managers can provide it in conjunction with submergent and tall emergent vegetation during critical times of the year and for appropriate lengths of time, as well as protect it from disturbance.

Objectives:

- **6.1** Provide habitat for foraging migrant water birds and raptors by beginning to provide semipermanent open water in mid-February.

- **6.2** Provide habitat for foraging raptors, phalaropes, migrating water birds, and aerial foraging birds by continuing to increase the area of semipermanent open water through April.

- **6.3** Provide habitat for nesting grebes and diving ducks and for foraging breeding water birds, water bird broods, and aerial foraging birds by maintaining semipermanent open water from May through mid-July.

- **6.4** Provide habitat for foraging migrating waterfowl and coots by maintaining areas of semipermanent open water on an average of 30 percent of the existing acres from mid-July until freeze-up.

Strategies:

✓ Continue water management practices that result in this habitat type.

Goal 7:
Provide shallow (< 1 foot) seasonal water in conjunction with other habitat conditions for migrating and breeding water birds and aerial foraging birds.

Rationale: Refuge management provides an unusual combination of water rights, that allow for application of water prior to the "irrigation" season that starts April 1 therefore providing migratory bird habitat in early spring. Some of the wells on Monte Vista NWR are adjudicated for wildlife as the beneficial use under Colorado law, therefore, refuge managers can provide shallow water for roosting, resting, and foraging habitat for water bird species that migrate through the Valley in the early spring (February). Relatively few areas in the San Luis Valley provide a combination of water, food and cover at this time of the year. Most (95 percent) of the Rocky Mountain Population of the greater sandhill crane roost in this wetland type on Monte Vista NWR. A total of 15,000 to 18,000 cranes comprised of these and several thousand lesser and Canadian Sandhill cranes roost on Monte Vista NWR for approximately 6 weeks each spring and fall. In addition approximately 15,000 northern pintail and 25,000 mallards use these same wetlands on Monte Vista NWR for roosting and foraging in February and March. These shallow water areas are also very important to a large array of foraging water bird species (waterfowl, waders, shorebirds, rails etc) during the breeding season as well as migration seasons.

Objectives:

- **7.1** Provide habitat for foraging and roosting sandhill cranes and migrating waterfowl by providing shallow seasonal water in February and March.

- **7.2** Provide habitat for foraging and roosting sandhill cranes; migrating and breeding waterfowl; shorebirds, white-faced ibis, and egrets; and aerial foraging birds by increasing the area of shallow seasonal water from February until May.

- **7.3** Provide habitat for foraging by breeding water birds and aerial foraging birds by further increasing areas of shallow water from May until mid-July.

- **7.4** Provide mudflats and areas of vegetation-free shallow water for foraging shorebirds and other species by allowing water to recede in semipermanent wetlands from mid-July through the end of August.

- **7.5** Provide for foraging by shorebird broods, fall migrant shorebirds, aerial foraging birds, and roosting and foraging sandhill cranes by maintaining 20 percent of the area of shallow seasonal water from late July until freeze-up.

Strategies:

✓ Maintain water rights that provide this habitat type.
✓ Maintain and improve water management infrastructure to more effectively irrigate and dewater these areas.
✓ Monitor the application of water to better understand its impact on wetland health relative to nutrient cycling, invertebrate production, plant succession, noxious weed distribution and other attributes.

Goal 8:
Enhance the Rio Grande corridor and its tributaries on Refuge lands to provide habitat for river, riparian-dependent, and other wetland species.

Rationale: Since European settlement in the Valley, many rivers and the unconfined and confined aquifers have been drastically altered (Siebenthal 1910; Natural Resources Committee Report 1938; Emery, et al. 1973; San Luis Valley Water Conservancy District 2001). These alterations of Rio Grande hydrology upstream of the Alamosa NWR include but are not limited to the building of dams, a minimum of 48 irrigation diversions, and the drilling of thousands of wells in the unconfined and confined aquifers. We assume that alterations in river flows have degraded or reduced riparian vegetation and wetlands adjacent to the entire Rio Grande corridor including those on the Alamosa NWR which lies within the river's floodplain. Consequently the wildlife dependent upon them has also been impacted. Aerial photos taken in 1940 indicate a narrowing and deepening of the Rio Grande channel south of the town of Alamosa, including the Alamosa NWR; resulting in a decrease of overbank flooding (San Luis Valley Water Conservancy District 2001) which would negatively impact riparian and floodplain wetlands. The report further describes the Rio Grande as it flows through the Alamosa NWR as sediment deficient with eroding channel banks. Riparian habitat, oxbow wetlands, sloughs, and surrounding uplands on the Alamosa NWR provided habitat for migrating, breeding, loafing and resting songbirds, waterfowl, water birds, raptors, cranes, shorebirds and other wildlife.

Riparian habitat, dominated by cottonwoods and willows, supports a large array of nesting, resting and foraging birds, including the endangered southwestern willow flycatcher. It is also one of the most degraded and limited habitat types in the western United States. Despite its limited availability, a disproportionate number of avian species depend on it (Knopf, et al. 1988). Riparian habitat in the San Luis Valley has also shown impacts by human modifications of the landscape. The Alamosa NWR has a corridor of riparian habitat along the Rio Grande as well as along old oxbows and other canals within the interior of the Refuge. A 2 year study documented more southwestern willow flycatcher territories (29) on the Alamosa NWR than on any of the other 16 study sites (Owen and Sogge 1997).

In addition to providing quality habitat, the Alamosa NWR also offers visitors an opportunity to experience a series of wetlands that are not man-made but were created by ancient river flows and activity. Because river flows have been so altered, these wetlands must be maintained by diverting water throughout the Refuge; but, this infrastructure was designed and is maintained to be as unobtrusive as possible.

Objectives:

- **8.1** On Alamosa NWR provide dense multi-layered native riparian vegetation such as willows and cottonwoods for breeding and migrating riparian obligate species, notably the southwestern willow flycatcher, yellow warblers and a host of other passerines, and other wildlife.

- **8.2** Protect the aquatic resources, such as water quality, and provide safe harbor from human disturbance within the portion of the Rio Grande that flows through the Alamosa NWR for wintering and spring staging bald eagles, fall migrating shorebirds, wintering waterfowl, and other migratory bird use.

- 8.3 Perpetuate the natural aspect of the physical and biological characteristics of the Rio Grande floodplain on the Alamosa NWR by designing and maintaining infrastructure that is as unobtrusive as possible.

- **8.4** On Monte Vista NWR assess feasibility of restoring channelized Spring Creek to a meandering streambed as it occurred historically.

- 8.5 Protect sufficient habitat for the endangered southwestern willow flycatcher through easement and fee-title acquisition, habitat improvements on Alamosa NWR and private lands through the Partners for Fish and Wildlife Program.

- **8.6** Compensate for the loss of floodplain wetlands on the Alamosa NWR by using surface and groundwater to simulate a natural hydrologic cycle (peak water application in mid-June) along the Rio Grande to enhance and maintain existing off-channel wetland basins and floodplain wetlands.

Strategies:

- ✓ Continue to evaluate riparian habitat and species needs outside of refuge complex boundaries through partnership programs and the Service's Land Protection Planning program.
- ✓ Gather and interpret hydrologic (amount and timing of flows), riparian (historic plant composition and location), and riverine (location and type of wetlands historically associated with the river) data on the Rio Grande to be used in deciding how, if, and when to potentially restore and implement riparian restoration and management. Sources of this information include the August 2001, Final Feasibility Report, Rio Grande Headwaters Restoration Project.
- ✓ Investigate feasibility and methodology for restoring riparian vegetation through use of current water rights to seasonally irrigate riparian vegetation along the Rio Grande which historically used to be maintained by overbank flooding of the river.
- ✓ Monitor noxious weed (primarily tall whitetop, Russian knapweed, Canada thistle, Eurasian water milfoil) distribution within the Rio Grande corridor and other riparian habitat and if necessary implement methods to contain and or reduce weed infestation.

Goal 9:
Provide native shrub (primarily greasewood and rabbitbrush on the Monte Vista NWR and four-wing saltbrush on Alamosa NWR) communities on the Refuge Complex for the benefit of nesting, migrating and wintering migratory birds and other wildlife species dependent upon them.

Rationale: This native vegetation type occurs on both refuges as well as an estimated 30 percent of the San Luis Valley. Although upland shrub vegetation is relatively common it is important to refuge managers to protect or maintain it on the complex because it is a historic habitat type and contribute to the biodiversity of native species.

Objectives:

- 9.1 Determine the use of these communities by wildlife, and the amount and condition (relative to species composition of understory) of appropriate habitat needed on the Refuge complex.

- 9.2 Maintain this community free of noxious weeds in uninfested areas. In infested areas reduce infestation by 40 percent of current levels over life of this plan.

  Strategies:
  - ✓ Investigate the use of this habitat type by migratory birds through literature searches, analysis of existing data and if necessary, implementation of monitoring program.
  - ✓ Investigate historic (i.e., pre-European settlement) condition of shrub land communities in the SLV for potential restoration activities on the refuge complex.

Goal 10:
Provide native short grass communities on the Complex, but primarily on Alamosa NWR, for the benefit of nesting, migrating and wintering migratory birds and other wildlife species dependent upon this habitat.

Rationale: This native vegetation type is present on both refuges but is more common and likely more naturally occurring on Alamosa NWR. Little is know about the distribution of this plant community in the San Luis Valley. On Alamosa NWR we know this habitat is used by rodents and ground nesting birds such as Savannah sparrows, vespers sparrows, meadowlarks, cinnamon teal and gadwall. To maintain biodiversity on the Complex and San Luis Valley this plant community should be maintained.

Objectives:

- 10.1 Evaluate use of this community by migratory birds and degree of infestation by noxious weeds.

- 10.2 Maintain this community free of noxious weeds in uninfested areas. In infested areas reduce infestation by 40 percent of current levels over life of this plan.

  Strategies:
  - ✓ Implement avian monitoring within short grass communities. Map the location and vegetative composition of this habitat type.
  - ✓ Implement monitoring of weed distribution and implement control methods in infested areas.

Goal 11:
Actively participate in protecting the San Luis Valley Ecosystem (Upper Rio Grande Ecosystem) and achieving the goals contained in the North American Waterfowl Management Plan and the North American Bird Conservation Initiative (NABCI) through coordination with local, regional, and national partners.

Rationale: The Refuges are part of the larger San Luis Valley and Rio Grande Ecosystems in which they interact with the biotic and abiotic processes occurring on other lands and across ownership boundaries. Therefore, it is important to work at the ecosystem level if the Refuges' and Service's goals are to be achieved. Only through partnerships can local, regional, and national conservation goals be met; no one agency has the power to do it all.

Objectives:

- **11.1** Use the *Partners for Wildlife* program to support privately-owned habitats critical to the SLV ecosystem, as identified in numerous cooperative conservation plans.

- **11.2** Support habitats critical to the SLV Ecosystem, as described under Habitat Protection Vision section.

- **11.3** Participate in and/or lead substantial Valley-wide conservation efforts especially wetland and migratory bird efforts.

Strategies:

✓ Protect habitat through fee-title and easement and by participating in partnerships.
✓ Integrate planning of refuge, Partners for Fish and Wildlife, and other SLV conservation partners.
✓ Actively participate in habitat protection partnerships in the SLV.

Goal 12:
Control noxious weeds on refuge complex roads, levees, and ditch banks to improve the quality of adjacent habitat and to slow or cease the spread of these species to neighboring private lands.

Rationale: There are areas on the refuge complex that are not necessarily habitat, such as roads, but they still impact the quality of adjacent habitats. For example, noxious weeds tend to become established in disturbed areas on roads and levees and then act as a source of infestation for adjacent habitat. These "non-habitat" areas still require various management actions in order to maintain or improve the quality of the refuge habitat as a whole.

Objectives:

- **12.1** Reduce the amount of area infested by noxious weeds on refuge complex roads, levees and ditch banks by 50 percent through integrated pest control methods including mowing, herbicide, grazing and other treatments.

- **12.2** To the extent possible, prevent weeds from becoming established on refuge complex roads, levees, and ditch banks through integrated pest control methods and other preventative measures such as seeding.

  Strategies:
  - ✓ Continue to investigate and experiment with integrated noxious weed control methods.
  - ✓ Monitor effectiveness of control efforts.
  - ✓ Map noxious weed distribution and acres on refuge roads, levees and ditch banks.

Public Use Goal and Objectives

Note: Additional rationales are given here for each objective. The Refuge staff feels this is necessary since they address different uses of the Refuges, not wildlife stewardship mandates.

Goal 13:

Foster understanding, appreciation, and advocacy of wetlands within the San Luis Valley Ecosystem (Upper Rio Grande Ecosystem).

Rationale: This effort will include providing increased and/or improved opportunities for environmental education and interpretation, wildlife viewing, and hunting; all of which are priority wildlife-dependent activities allowed and encouraged by the National Wildlife Refuge System Improvement Act of 1997.

Objectives:

- **13.1** Provide environmental education opportunities for students and teachers which enhance an understanding of wetland values in the San Luis Valley.
  Rationale: Environmental education opportunities are limited due to lack of environmental education staff. The Valley has a wealth of opportunities for environmental education. Refuge wetlands provide a unique place to explore nature and science. Wetland programs exist on other refuges and could be expanded and adapted to include the San Luis Valley environment that tie science, math, history and reading/writing skills together.

- **13.2** Provide safe sustainable waterfowl and small game hunting opportunities on Monte Vista and Alamosa NWRs.
  Rationale: Hunting at the Refuges is extremely popular due to the large number of waterfowl and small game that use the Refuges and fosters an appreciation for wetlands and associated wildlife.

- **13.3** Provide a wide variety of opportunities to view wildlife, while minimizing wildlife disturbance.
  Rationale: Compatible wildlife-dependent recreation, such as wildlife viewing, is a legitimate and appropriate general public use directly related to the mission of the National Wildlife Refuge System.

- **13.4** Continue to support a Friends group to advocate Refuge purposes and programs, raise funds, increase stakeholder involvement, and coordinate special events.
  Rationale: Supporting a Friends group is critical to the success of Refuge programs. Friends groups can often be an advocate for the Service when, by law, Service staff cannot participate in activities. Friends groups can raise money for specific Refuge purposes through grants, endowments, and other such gifts.

- **13.5** Increase visitation and enhance the quality of the visitor's experience by improving interpretive services and facilities and building an educational facility and visitor center.
  Rationale: Interpretive services and facilities are limited at the present time. An educational facility and visitor center would provide a worthwhile experience for Refuge visitors. Additional signage and interactive displays would be a benefit to both Refuges. Both Refuges are along major travel routes to three National Parks (Great Sand Dunes, Mesa Verde, and Grand Canyon). Increased visitation could be realized with the addition of a visitor center with interactive displays. Educational and informative displays could make the Refuges a destination for visitors rather than an incidental stop.

- **13.6** Educate the public as to the dependence of humans upon natural resources for survival by demonstrating:
  1) how animal and plants were used by humans on Refuge land;
  2) what the prehistoric and historic environment was like in the San Luis Valley; and
  3) although humans are farther removed from the environment, they are no less a part of it than their prehistoric ancestors.
  Rationale: The San Luis Valley has an abundance of historical sites, and cultural resources on the Refuge Complex are extensive. This resource should be tapped to ensure that the historic and pre-historic story is not lost.

Projects for Alamosa/Monte Vista NWR Complex

Refuge Operation Needs System (RONS) Projects	
Project Name/Type	**Objectives Project Will Help Achieve**
Improve Water Management/Delivery Infrastructure - Increased Maintenance Staff	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2, 8.3, 8.6,
Improve Water Planning and Management - Hire Resource Specialist	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2, 8.3, 8.4, 8.6
Enhance Wetlands - Heavy Equipment	1-all, 2-all, 3.1, 4-all, 6-all, 7-all, 8.6
Enhance Wetlands through increased Biological Staff, Construction Contracts, Services	1-all, 2-all, 3-all, 4-all, 6-all, 7-all, 8-all, 10.1, 10.3
Increase Ability to Pump Well Water	1-all, 2-all, 3.1, 4-all, 6-all, 7-all
Construct Groundwater Recharge on Spring Creek	8.4
Create Water Control Structure to Receive Winter Recharge Water	1.5
Evaluate Hydrologic Capacities of Management Units - Contract	1-all, 2-all, 3-all, 4-all, 6-all, 7-all
Restore and Maintain Riparian Corridor and Inventory Species Using It	8.1, 8.2, 8.6
Evaluate Restoration of Natural Meanders to Spring Creek	8.4
Noxious Weed Control - Increased Staff, Supplies	1-all, 2-all, 3-all, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2, 8.3, 8.6, 9-all, 10-all, 12-all
Restore Vegetative Cover on Abandoned Farm Fields	5.3
Install Wildlife Compatible Boundary Fences - Construction Contract	8.3, 13.3
Provide Agricultural Food Availability for Migrant Birds	5.1
Improve Habitat with Fire and Grazing - Hire Refuge Operations Specialist	1 - 12 (all objectives), 13.2
Monitoring/Evaluation of Management Tools - Contracted Research	1-all, 2-all, 3-all, 4-all, 6-all, 7-all, 9-all, 10.2, 12.1
Biological Monitoring / Evaluate Management Tools - Increased Biological Staff	1-all, 2-all, 3-all, 4-all, 5-all, 6-all, 7-all, 8.1, 8.2, 8.4, 8.6, 9-all, 10-all
Biological Inventories - Increased Biological Staff	1-all, 2-all, 3-all, 4-all, 5-all, 6-all, 7-all, 8.1, 8.2, 8.4, 8.6, 9-all,10-all
Upper Rio Grande Ecosystem Research Coordination - Hire Coordinator	11-all
GIS Mapping of Current Habitat Conditions	1-all, 2-all, 3-all, 4-all, 6-all, 7-all, 8-all, 9-all, 10-all, 12-all
Renew Involvement in Valley-wide Environmental Education Program, Including Partnerships With Other Agencies	13.1, 13.3, 13.4, 13.5, 13.6
Offer Additional Support for Monte Vista Crane Festival	13.4

Refuge Operation Needs System (RONS) Projects	
Project Name/Type	**Objectives Project Will Help Achieve**
In Cooperation with Friends Group, Create a Slide and/or Oral Presentation for Local Community and Service Organizations that Focuses on the Mission of the Refuges	11.4
Construct Wildlife-Viewing Pull-outs Along Some County Roads on Monte Vista NWR	13.1, 13.3, 13.5
Construct Wildlife Photography/Observation Blinds	13.1, 13.3, 13.5
In Cooperation with Friends Group, Construct Walking Trails With Interpretive Signage	13.3, 13.4, 13.5
Construct Areas for Wildlife Viewing Along Auto Tour Routes, Near Visitor Centers, and at Entrances to Walking Trails	13.3,13.5
Create Educational Displays and Interpretive Exhibits Emphasizing Topics Specific to the Refuges	13.1, 13.5, 13.6
Establish a Volunteer Program with Seasonal Housing, to Assist with Resource and Public Use	13.1, 13.3, 13.5, 13.6
Hire Outdoor Recreation Planner/Specialist	13-all
Conduct Cultural Resource Research and Inventory	13.6
Create Interactive Displays for Cultural Artifacts	13.5, 13.6

Maintenance Management System (MMS) Projects	
Project Name/Type	**Objectives Project Will Help Achieve**
Improve Water Management/Delivery Infrastructure - Repair/Replace Existing Structures	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2, 8.3, 8.6
Improve Water Management/Delivery Infrastructure - Replace Old Heavy Equipment	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2, 8.3, 8.6
Improve Habitat Quality - Replace Old Equipment	1.1, 1.2, 1.3, 1.4, 2-all, 3-all, 4-all, 6-all, 7-all, 8.1, 8.6, 9.2, 10.2
Rehabilitate or Replace Wells	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2, 8.3, 8.6
Improve/Enhance Agricultural Productivity - Repair or Replace Old Equipment	5.1, 5.3
Replace Borrow Crossings onto Refuge from County Road 3E	Safety
Construct Office and Visitor Center on Monte Vista NWR	All
Rehabilitate River Wildlife Observation Trail on Alamosa NWR	13.1, 13.3, 13.4
Resurface Hunter Access Road and Parking Areas	13.2

Additional Projects (Some may require entry into RONS or MMS)	
Project Name/Type	**Objectives Project Will Help Achieve**
Acquire Necessary Land and Water Rights (as discussed in description of Proposed Alternative)	1-all, 2-all, 3-all, 4-all, 5.1, 6-all, 7-all, 8-all, 9-all, 10-all, 11.2, 11.3
Use Cooperative Farming for Small Grains Production	5.1
Investigate Feasibility of Eliminating Agricultural Grains and Conditioning Sandhill Cranes to Use Alternative Foods	5.1, 5.2
Create User-Friendly and Interactive Site-Specific Environmental Education Curriculum, Focusing Particularly on Wetlands	13.1
Provide Comprehensive Environmental Education Packages for Instructors That Meet Colorado Model Content Standards	13.1
Create Interactive Wetlands Web-Site	13.2
Create Universally Accessible Paths and Pads into Cattail Areas for Disabled Hunter Access	13.2, 13.3
Provide Permanent Spotting Scopes in Auto Pull-Outs	13.1, 13.3
Build Observation Towers on Both Refuges to Allow Panoramic Views	13.1, 13.3
Assist Friends Group in Preparing Long-Term Goals for Refuge Support	13.4
Explore Possibility of Opening Bookstore	13.4
Obtain Grants and Endowments to Support Plans for Expanded Visitor Center and Other Facilities	13.1, 13.4, 13.5
Research Former Uses of Refuge Lands; Create Storyline of Historical, Current, and Future Uses	13.6
Create Interactive Displays Explaining How Former Uses Shaped Current Uses of Refuge Lands	13.6

Funding and Personnel Needed to Implement the Plan

Personnel

Currently, the Refuge Complex has a staff of 15 personnel; 11 full-time and 4 career-seasonal. Please see the Proposed Organizational Chart below for details on which staff positions need to be added in order to fully implement this CCP. All but one of the proposed additional positions (shaded) are currently represented in the Refuge Operation Needs database (RONS). The one remaining position will be added to RONS during the next update.

Funding

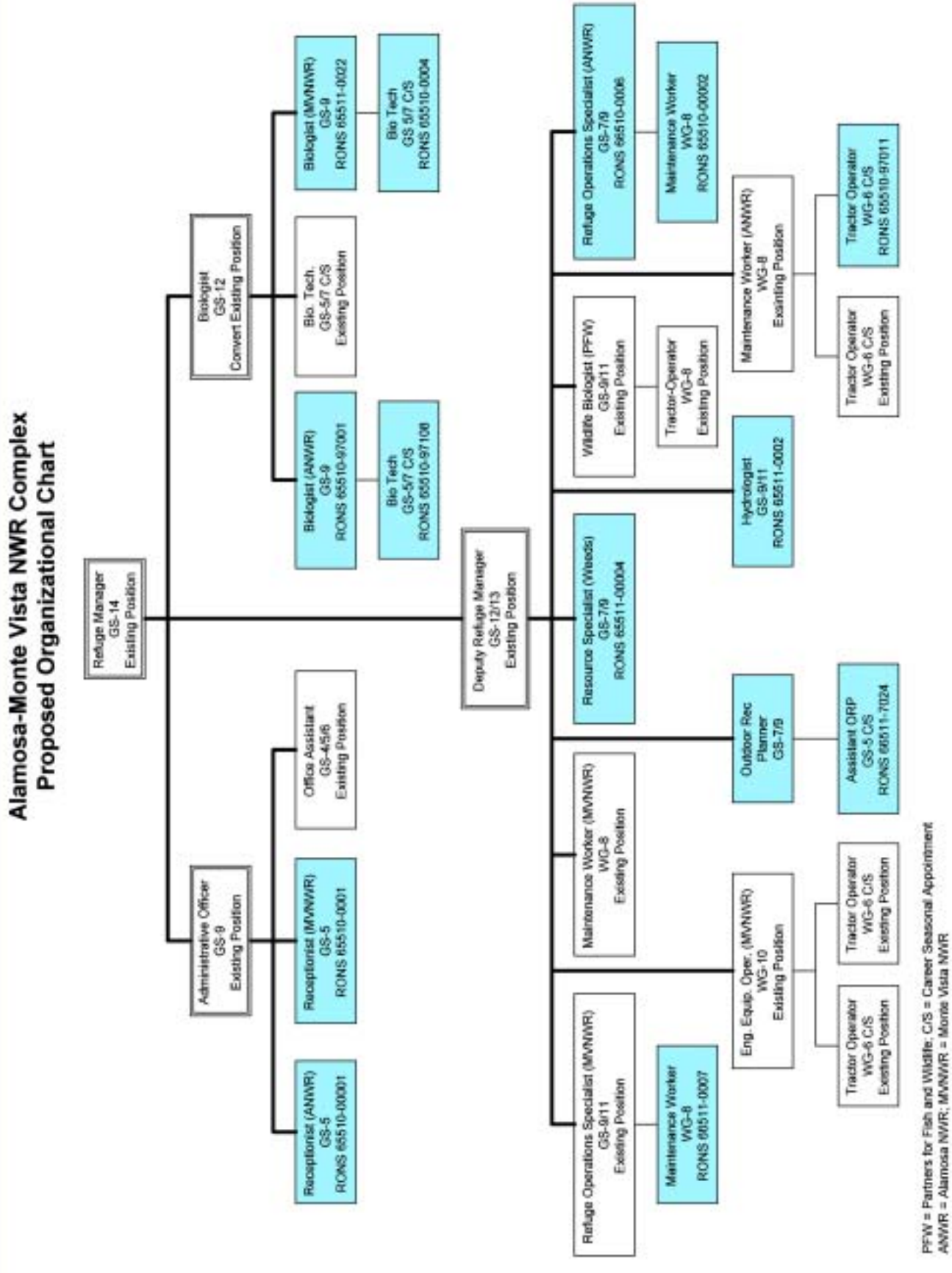
The current Refuge operations base funding is approximately $763,600, as a 5 year average from 1997 to 2001. This includes funds for salaries, administration of the Partners for Fish and Wildlife Program, and maintenance of all facilities, vehicles, and heavy equipment

Funding necessary to implement the CCP is derived from three sources. The first is the Refuge Operation Needs System (RONS). This database includes requests made to Congress for funding and staffing above the existing base budget that are needed to carry-out Refuge projects. These funds are broken-out below into "New Staff" and "RONS Projects." The second source is the Maintenance Management System (MMS). This database documents the maintenance and replacement needs for existing equipment, buildings, and other property. The third source is based on costs estimates for projects needed to implement the CCP but which are not yet reflected in RONS or MMS. These are listed below as "Additional Projects."

Estimated funds necessary to fully implement the CCP are as follows:

	1st Year/One-Time	Recurring
New Staff	**$1,419,000**	**$681,000**
RONS Projects		
Biological Monitoring/Inventory	411,000	261,000
Habitat Management/Restoration	5,245,000	413,000
Resource Protection (e.g. Law Enforcement, Cultural Resource Protection)	699,000	68,000
Public Use/Education	1,029,000	113,000
Sub-Total	**7,384,000**	**855,000**
MMS Projects		
Habitat	4,924,000	
Facilities	899,000	
Visitor Services	1,007,000	
Vehicles	260,000	
Sub-Total	**7,090,000**	
Additional Projects	**255,000**	
Total	**$16,148,000**	**$1,536,000**

The Alamosa/Monte Vista Refuge Complex has received approximately $734,200 annually, as a 5 year average from 1997 to 2001, from its partners to help fund various projects on and off the Refuge Complex. This level of funding is likely to continue as long as these funding sources remain viable and interested.



Partnership

Opportunities

A unique ecological, geographic, cultural and economic setting exists in the San Luis Valley. The boundaries of the community are distinctly defined by high mountains ranges. Both the agricultural based economy and most migratory bird habitats are dependent upon how water resources are managed. This common reliance on water resource in this discretely defined basin has resulted in development of an extensive interrelated web of partners, including the wildlife, agricultural, water, business, tourism, and environmental communities. Many of these partnerships were generated in the early 1990s by the common threat of water exportation from the San Luis Valley. At that time all water users realized that they will all ultimately lose if water exportation plans were realized. The challenge for the U.S. Fish & Wildlife Service in the San Luis Valley is not where to find partners but determining which partners are most effective in achieving shared goals.

A partial list of our partners that have contributed directly to the operation of both National Wildlife Refuges and our Partners for Wildlife Program include:

- Friends of the San Luis Valley National Wildlife Refuges
- The San Luis Valley Wetland Focus Area Committee (includes an array of local entities working towards goals of the Colorado Wetlands Initiative and the Intermountain West Joint Venture of the North American Waterfowl Management Plan)
- Colorado Division of Wildlife
- Ducks Unlimited
- Rio Grande Headwaters Land Trust
- American Farmland Trust
- Trust For Public Land
- Rock Creek Heritage Project
- San Luis Valley Coordinated Weed Program
- Adams State College
- Rio Grande Headwaters Restoration Project
- Great Sand Dunes National Monument and Preserve
- The Nature Conservancy
- Rio Grande County
- Alamosa County
- San Luis Valley Visitor Information Center
- Over 200 private landowners
- Alamosa Rural Fire Department
- Monte Vista Rural Fire Department
- Rio Grande Water Conservation District
- San Luis Valley GIS Authority
- USDA Resource Conservation and Development Program

Monitoring and Evaluation

Appropriate monitoring and evaluation are key to meeting the mission of the Complex because it provides the information needed for adaptive management; this information is used to evaluate and adjust management decisions.

The Comprehensive Conservation Plan and the habitat goals and objectives within it are the foundation for the development of the Biological Monitoring Plan and program. The program will include procedures used in the past that continue to meet management decision needs as well as new procedures which document how well management treatments are meeting the habitat goals and objectives. All procedures will be evaluated and incorporated into the program primarily based on how the subsequent results will be used in management decisions. Most Refuge monitoring is intended to detect trends and does not need to have the statistical power required in research. However, future efforts will be as quantitative and repeatable as possible, and contain an appropriate level of statistical analysis.

Each portion of the Complex is unique and does not consistently respond to habitat management activities in the same manner as other sites. Therefore, site-specific monitoring efforts are necessary. The Complex, however, is over 26,000 acres and, even though the need for consistent and long-term monitoring over the entire Complex is great, it is not feasible to do so in a detailed fashion. Therefore, monitoring efforts will have to be prioritized and stratified on a yearly basis. Effort will first go into those procedures evaluating habitat goals and objectives.

Several habitat objectives call for a certain percentage of the Complex to support certain vegetation communities and with various structural densities. These will be evaluated partially with the use of GIS habitat maps. The entire Complex cannot be mapped each year, but portions of the Refuges will be revisited annually. In those areas, plant community type and structure information will be updated. Vegetation structure will be documented by using a modified Robel pole, a procedure that is quantifiable, defendable and widely used.

The monitoring program will evaluate and consider more than just the presence of wildlife, but also examine the components of habitat. The basics of habitat, including abiotic and biotic factors such as chronology of flooding, duration of flooding, soil type, vegetation structure (living and residual), chronology of plant growth, and amount and type of foods produced, will be examined. Monitoring procedures will be appropriate for the life cycle needs of wildlife and vegetation.

In addition to habitat characteristics, other issues need to be investigated, such as the ratio of rest to disturbance and wildlife response to various habitat conditions. Some projects will have to be conducted by graduate students or with the assistance of successful grant applicants. Wildlife use surveys will continue to be conducted but in conjunction with habitat availability information, even if on a broad scale. These efforts will be assisted by GIS and ArcView technology.

Most of the monitoring work will be conducted by Refuge staff. Under the Proposed Alternative, we will have the ability to hire seasonal biological technicians and other staff which will increase the ability to monitor and the amount of the Complex which can be monitored. Some of the monitoring work will be done by trained volunteers and members of the Friends Group. Additional communication and cooperation with biologists from other San Luis Valley wetlands and wildlife management areas will assist in resolving large scale questions and testing assumptions.

Alternatives Considered, but Eliminated from Detailed Study

Three management alternatives for the Monte Vista-Alamosa Refuge Complex were considered but eliminated from further detailed analysis. They are:

No Public Access - This Plan would have eliminated all public access to the Complex with management focused solely on wildlife needs. The Service's mission is indeed "wildlife first," but this does not necessarily call for the elimination of public activities on Refuges. In fact, the Service mission encourages wildlife-dependent activities, as mandated by the Refuge Improvement Act of 1997. This Act requires that wildlife-dependent activities be considered during the Comprehensive Conservation Planning process.

No Crane Festival - This alternative would have eliminated the Crane Festival on the Monte Vista NWR. This is an annual event for which the Service cooperates with the Monte Vista Crane Festival Committee. There was some concern that the high level of visitors during the Festival was disturbing cranes and other wildlife. This alternative was ultimately eliminated from further consideration because Refuge biologists did not believe that the Festival has a significant negative impact on cranes or other wildlife. Visitors are limited to areas that are normally open to the public, namely the auto tour routes, and generally access crane viewing areas via guided bus tours conducted by Refuge staff members. In addition, the Festival provides an excellent environmental education opportunity for Refuge visitors, provides revenue for the local economy, is renown throughout the State as a wonderful wildlife experience that cannot be duplicated elsewhere, and is in keeping with the mandates of the Refuge Improvement Act of 1997 which states that wildlife-dependent activities will be considered during the Comprehensive Conservation Planning process.

No Hunting - This alternative was eliminated from further consideration because the Refuge Improvement Act of 1997 requires that wildlife-dependent activities be accommodated on Refuges, if deemed compatible with Refuge purposes and appropriate. Hunting has been deemed compatible with the purposes of the Monte Vista and Alamosa Refuges and is an appropriate use of the Refuge lands and resources.

Summary Comparison of Alternatives

	No Action Alternative	Proposed Alternative
Water Management	Partially replace wetlands lost in the SLV Maximize wildlife benefits by applying water to wetland vegetation Preserve existing water rights Irrigate 510 farm acres Irrigate dense cover on retired farmland Continue very limited monitoring water application	Same as No Action, plus: Improve water delivery infrastructure Improve water use monitoring and assess impacts to habitat Improve understanding of Refuge water rights, Colorado water law, hydrologic processes (surface and subsurface) Assess restoration of Spring Creek channel and hydrology
Rest	Some use of long-term rest	Same as No Action, plus: Monitor effects of different rest regimes
Prescribed Burning	Periodically use prescribed burning based on visual observation of habitat condition Control all wildfires	Same as No Action, plus: Pursue formation of interagency fire team Institute a monitoring program to collect quantitative data on habitat condition to better determine proper use of prescribed burning in meeting habitat objectives
Prescribed Grazing	(1995-2002) Only used to study effectiveness and utility of grazing as a habitat management tool as part of the Refuge Compatibility Lawsuit Settlement, 1993. If current research indicates grazing to have utility in reaching habitat goals and grazing practices are determined compatible with refuge purposes and National Environmental Policy Act requirements are satisfied: 1) grazing will be considered as a management tool, 2) if used a monitoring program will be implemented, 3) modify grazing program in response to information provided by monitoring.	Same as No Action Alternative:
Farming	Farm 510 acres to meet caloric and cover needs of migratory birds	Same as No Action, except: Test cooperative farming as a means to meet food needs of migratory birds, primarily Sandhill cranes.

	No Action Alternative	Proposed Alternative
Cultural Resources	Protect known archaeological sites	Protect known archaeological sites Conduct sample archaeological inventory of Refuge lands Interpret prehistoric use of refuge lands by humans demonstrating past and current dependency of humans on natural resources.
Habitat Protection	Acquire inholdings Continue to restore and enhance wetlands and cottonwood/willow riparian habitat in SLV through Partners for Wildlife Program Continue participation in Colorado Wetlands Initiative	Acquire inholdings Support Rock Creek Heritage Project. Continue to restore and enhance wetlands and cottonwood/willow riparian habitat in SLV through Partners for Wildlife Program Continue participation in Colorado Wetlands Program
Public Use	Support waterfowl and small game hunting No public elk hunting No fishing, except "Kids Fishing Day" Support and participate in Monte Vista Crane Festival Maintain auto-tour routes Construct accessible walking tour on Monte Vista NWR Hire Outdoor Recreational Planner to expand and conduct environmental education and interpretive programs Support Friends of the San Luis Valley National Wildlife Refuge	Same as No Action, plus: Construct Education and Visitor Center at Monte Vista NWR Implement cultural resources interpretation program Improve hunting experience based on periodic questioning of hunters and public input Construct fully accessible wildlife observation decks and hunting blinds Pursue interagency interpretation program for SLV and surrounding foothills Hire Assistant Outdoor Recreational Planner On Monte Vista NWR - Explore possibility of seasonal expansion of auto tour route, wildlife observation sites at Parker Road, wildlife observation decks along County Road 3E, observation deck near proposed Visitor Center On Alamosa NWR - Explore feasibility of constructing an observation deck adjacent to Refuge Headquarters New interpretive signs and information will be written in English and Spanish

	No Action Alternative	Proposed Alternative
Elk Management	Initiate dispersal hunt when wintering elk numbers exceed 100 Provide logistical support to agencies managing elk Eliminate (or keep at very small numbers) resident elk Allow up to 200 wintering elk Remove fences hazardous to elk Partner with other land management agencies to achieve broader elk management objectives for SLV	Same as No Action, plus Increase monitoring of elk numbers on both Alamosa and Monte Vista NWR

IV. Affected Environment

Geographic/Ecosystem Setting

The Monte Vista and Alamosa National Wildlife Refuges are located in the San Luis Valley (SLV), a high mountain basin located in south-central Colorado. The SLV consists of a broad depression between mountain ranges converging to the north and is the first of a series of basins along the Rio Grande. The mountain ranges to the east reach altitudes over 14,000 feet and those to the west range between 13,000 and 14,000 feet. The length of the Valley from north to south is about 80 miles, and its greatest width is about 50 miles.

The San Luis Valley is part of the much larger Rio Grande Rift Zone which extends from southern New Mexico northward through the San Luis and Upper Arkansas Valleys to its northern termination near Leadville, Colorado. The SLV is bordered on the east by the linear Sangre de Cristo Mountains, which resulted from extensive block faulting during the Laramide Orogeny. The western side of the SLV is flanked by the San Juan Mountains, the result of extensive tertiary volcanism. In sharp contrast with the steeply faulted eastern side of the Valley floor, the Oligocene volcanic rocks of the San Juans gently dip eastward into the Valley floor where they are interbedded with Valley-fill deposits (USDI, BLM 1989).

The SLV contains two types of aquifers, the shallow unconfined and the deep confined, both of which support artesian well flows. These aquifers consist mainly of unconsolidated clay, silt, sand, and gravel. The unconfined aquifer is separated from the confined aquifer by clay layers and lava flows. Unconfined groundwater occurs nearly everywhere in the Valley while confined groundwater occurs under nearly one-half of the Valley (Emery, et al. 1973).

Refuge Resources, Cultural Resources, and Public Uses

Soils and Vegetation

Monte Vista NWR

Three major soil/vegetation association groups comprise the Monte Vista NWR (USDA, SCS 1980). The extreme western edge of the Refuge is comprised of the Luhon-Garita-Travelers Association (Foothills Plant Community) which is very gently sloping to moderately steep, with well drained to somewhat excessively drained, medium textured to moderately coarse textured, deep to shallow, cobble and stony soils. The soils were formed in mixed alluvium and in residuum weathered from basalt. The vegetation is primarily winterfat, low rabbitbrush, blue grama, Indian ricegrass, ring muhly, and snakeweed.

The Hooper-Arena-San Luis Association (Salt Desert Shrub Plant Community) is intermingled throughout most of the Monte Vista NWR. This association is at the lower end of alluvial fans and on old floodplains on the valley floor. The topography is nearly level, and moderately fine textured to coarse textured soils are well to poorly drained. Soils are alkali soils and are 20 to 60 inches deep over sand and gravel. The soils formed in mixed alluvium. The vegetation on nonirrigated soils is primarily greasewood, rabbitbrush, alkali sacaton, and saltgrass.

The Torrifluvents-Torssido-Alamosa Association (Wet Meadow/Marsh/and Cropland Plant Communities) is the last association and is also intermingled throughout most of the Refuge. The landscape is nearly level floodplains and nearly level or very gently sloping alluvial fans and terraces. The soils formed in mixed alluvium. Soils are excessively to poorly drained and are moderately coarse to moderately fine textured ranging in depth from 10 to 60 inches deep over sand and gravel, on floodplains, alluvial fans, and terraces. The vegetation is primarily sedges, rushes, tufted hairgrass, slender wheatgrass, and alkali sacaton in wet meadows and cattail and bulrush in marshes. Small grains and alfalfa are recognized irrigated cropland uses for this soil association.

Alamosa NWR

Three major soil/vegetation associations also make up Alamosa NWR. More detailed descriptions of these and the many minor soil associations present on the Refuge can be found in *Colorado Field Office Technical Guide*, *Range Site Descriptions* (USDA, SCS 1975) The eastern part of the Refuge contains a narrow strip (approximately 900 acres) of Costilla-Space City Association. These soils are level to gently sloping, very permeable and coarse textured. They support a desert plant community dominated by small rabbitbrush, blue grama, Indian ricegrass and limited amounts of greasewood and alkali sacaton.

Soils in the northern 2,200 acres of the Refuge are in the Hapney-Hooper-Corlett Association. These soils are level except for a few dunes. They too are very permeable but have no pattern of surface drainage so surface water either soaks into the ground, evaporates or transpires. These soils support a native plant community primarily consisting of greasewood, rabbitbrush, western wheatgrass, alkali sacaton, inland saltgrass, blue grama and creeping wildrye.

The largest group of soils on the Refuge is the Alamosa-Vastine-Alluvial land Association. These soils comprise about 7,900 acres of the Rio Grande floodplain. They are deep, level or undulating and range from fine to coarse texture. These soils tend to be very saline due to the high water table; however, most of this area is subject to frequent spring flooding that tends to flush salt from the soil. Next to the river, these soils support a band of cottonwood trees and willows with an understory of grasses. Farther from the river and outside of the tree band these soils support wetland plants characteristic of the area, including thick stands of sedges, rushes and water tolerant grasses. Still within this association are areas less frequently flooded that support greasewood, rabbitbrush, alkali sacaton and inland saltgrass. Slender spider flower is commonly found throughout this association.

Water

Average annual precipitation in the San Luis Valley is seven inches. Sixty percent of this falls between July and August, mostly from erratic thundershowers of short duration. Wide seasonal and yearly variations in precipitation are common. Mean annual temperature is 42 degrees Fahrenheit. The average frost-free period is 100 days, from late-May or early June through early September. Summer daytime temperatures are frequently in the 80s, but rarely exceed 90 degrees Fahrenheit; nights are cool. Temperatures of minus 20 degrees to minus 30 degrees Fahrenheit can be expected each year and are common most winters. Temperatures lower than minus 40 degrees Fahrenheit are frequently recorded. High velocity winds are common, especially in the spring. Relative humidity is usually low, but evaporation rates average lower than those of many other dry regions because of the cool climate. Snow cover may be light and is sometimes lacking through much of the winter (USDI, BLM 1989).

Excluding precipitation, Alamosa and Monte Vista NWRs are affected by water from four major sources. In addition, some habitat is influenced by irrigation water applied to non-Refuge lands that flows onto Refuge lands.

Snow Melt (on the SLV floor)

In some years, surface water is directly obtained from melting snowpack. In general, however, this on-site generated water results in the saturation of the wetland soils, which allows these areas to be filled faster in the spring with water diversions. Usually, not enough direct snow melt is available to fill wetlands to capacity.

Rio Grande Water

Water in the Rio Grande headwaters is generated from snowfall in the San Juan and Sangre de Cristo Mountains. Peak river flows usually occur in June with a peak 40 year average of about 5,348 cubic feet per second (cfs) measured at Del Norte, Colorado. During some years flows in the Rio Grande are influenced by July and August Rains.

Use of Rio Grande water is governed by a 1939 compact between the States of Colorado, New Mexico, and Texas. This compact also contains water provisions for Mexico. The compact ensures an equitable amount of river water to all parties and is the basis for assessing the effects of today's river water use.

The Monte Vista Refuge receives irrigation water from the Rio Grande primarily through the Empire and Monte Vista canals and water draining off neighboring private lands. Refuge diversions from the Rio Grande average about 8,500 acre-feet. The primary use of this irrigation water is to maintain wetland vegetation throughout the Monte Vista Refuge as well as to irrigate cropland. Water delivery is facilitated by a complicated infrastructure consisting of over 30 major dikes, more than 100 smaller dikes, over 400 water control structures, and 61 miles of ditches.

Alamosa Refuge is rarely flooded by the Rio Grande due to the extensive use of water along the 48 irrigation ditch diversions upstream of the Refuge. The Rio Grande usually leaves its banks annually during the first or second week of June, flooding only a small area of riparian vegetation for a short period of time. Since the Alamosa Refuge was established, major floods (those greater than the annual activity described above) occurred in 1965, 1970, 1979, 1986, 1987, and 1995. If the Rio Grande is typical of other stream systems that are used for irrigation of arid lands, it floods less frequently due to upstream diversions but flows are prolonged after the period of summer run while irrigation water flows back to the River.

Alamosa Refuge receives irrigation water from the Rio Grande primarily from the Costilla Ditch, the San Luis Ditch, the Chicago Ditch, and the New Ditch. The Chicago and New Ditch diversions are entirely owned by the Refuge. The New Ditch Dam is the last dam on the Rio Grande in Colorado. The past 27 year average annual Refuge diversion of Rio Grande water is 13,750 acre-feet. The primary use of this water is to irrigate wetland vegetation throughout Refuge bottomlands. Water delivery is facilitated by two major dikes, 20 smaller dikes, over 200 water control structures, and 5 major canals.

In the mid-1980s, a major thrust toward recharging groundwater in the SLV was initiated. At present, from November 1 to January 1, six major irrigation companies can divert and hold Rio Grande water in their canals to assist in recharging groundwater. These winter diversions can only be made when River water is not needed to meet Rio Grande Compact obligations. The Monte Vista and Empire Canals are two of the six irrigation canals in the recharge program. In 1994, with cooperation of private landowners, the Refuges, and SLV Water Conservancy District, an old gravel pit located adjacent to Monte Vista Refuge's west boundary was equipped as a groundwater recharge pit. The overall groundwater recharge effort was a big step in supporting the economic, social, and ecological stability of the SLV.

Pumped and Artesian Well Water

Monte Vista Refuge has about 220 small (2 to 6 inch diameter casing) artesian wells. Most of these wells no longer flow; but those that do flow provide excellent small (less than one acre) wetland areas. It also contains three large (16 inch diameter casing) artesian wells. These wells, adjudicated for an average flow of about 1,800 gallons per minute (g.p.m.) each, provide water to support wetlands throughout the Refuge. In addition, the Refuge contains 21 large pumped wells with an average adjudicated flow of about 1,700 g.p.m. each which also support the Refuge's wetlands and croplands. Most of these pumped wells were artesian when first drilled; however, by the mid-1960s, most artesian flow ceased and pumps were installed on the wells to provide water for the Refuge's wetlands.

Almost all of Monte Vista Refuge's artesian wells cease flow during the summer months when maximum pumped well-use is required for irrigation both on and off the Refuge. The massive increase in pumping of groundwater in the 1960s resulted in the loss of Spring Creek, a large free-flowing spring on the Refuge. Spring Creek historically flowed up to 8,000 g.p.m., but after the mid-1960s, natural spring flows never returned. It is estimated that the decline in flow of all artesian springs in the SLV has amounted to about 22,000 acre-feet per year (Emery, et al. 1973).

The Alamosa NWR has 53 artesian wells within its boundaries. Most of these wells flow about 10 to 30 g.p.m. and create very small (less than one acre) wetlands. The Refuge also contains the largest artesian well in the SLV, the Mumm Well. This well is adjudicated for a flow of 2,860 g.p.m. with total use not to exceed 1,541 acre-feet per year. The well is about 2,000 feet deep and the water temperature is about 85 degrees Fahrenheit. The Mumm Well provides water to support wetlands throughout the southern two-thirds of the Refuge.

In the late-1960s and early-1970s, the Colorado Division of Water Resources began actively enforcing Colorado Division III Water Court well water decrees. This enforcement required landowners with only irrigation season legal decrees to restrict well flows during the nonirrigation (winter) season, which helped maintain the overall integrity of SLV aquifers.

In 1972, a moratorium for the construction of any wells, other than exempt domestic-type wells, was placed on the entire SLV for all of the confined (deep) aquifer and the areas of the unconfined (shallow) aquifer south of the hydrological divide which lays just north of the Rio Grande. In 1981, due to decreased groundwater levels, the area north of the hydrologic divide in the unconfined aquifer had a well construction moratorium placed on it as well. Therefore, since 1981, no well construction permits for new water appropriations, other than exempt domestic-types, have been issued throughout the entire SLV.

Bureau of Reclamation Closed Basin Water Project

Alamosa NWR receives some mitigation water from a U.S. Bureau of Reclamation water salvage program in the closed basin, an area north of the Rio Grande that has no water outlet. In the mid-1980s, the Closed Basin Division of the Bureau began construction on the San Luis Valley Project, authorized by Congress in 1972. The project is designed to salvage groundwater that was believed to be lost to the atmosphere and/or consumed by vegetation that did not offer a monetary benefit (greasewood) and deliver it south to the Rio Grande. Over 150 shallow pumped wells were drilled to remove water from the unconfined aquifer. Salvaged water is moved into a canal that eventually runs through Alamosa NWR and empties into the Rio Grande. This water is used to assist Colorado in meeting its water delivery obligations to downstream users (New Mexico, Texas, and Mexico). As part of the requirement to mitigate for wetlands lost through the operation of the project, the Alamosa NWR receives an annual allotment that varies depending upon level of Closed Basin Project operations. This water is used to facilitate wetland management on all but 1,500 acres of the Refuge.

Groundwater

Refuge groundwater levels range from about 6 inches to 6 feet below the surface. The high groundwater table affects overall vegetation in this high mountain desert and is partially related to the amount and timing of irrigation water applied to Refuge lands as well as lands throughout the SLV. Two major SLV groundwater drainage ditches, the Bowen and Parma Drains, flow through Monte Vista Refuge and also supply water to the Refuge. The Parma Drain terminates in Rock Creek as it flows through Monte Vista refuge. The drains were dug in the early-1900s to facilitate cropland farming by lowering high groundwater levels.

Groundwater levels in the San Luis Valley have likely changed over history as a result of surface and groundwater rights development. Very little data exists that describes this change, especially those that are site specific. A goal of Valley water regulators and managers is to provide water users a yield that can be sustained from both the confined and unconfined aquifer. The Rio Grande Water Conservation District monitors groundwater levels in the unconfined aquifer. Currently long-term concerns over dropping water tables exists in a few areas in the Valley where groundwater is not used in conjunction with surface water. This practice minimizes the amount of unconfined aquifer recharge. By 1900, over 1,000 wells had been drilled into the confined or artesian aquifer. By 1970 that number increased to over 7,000. At the time of establishment all wells on Monte Vista Refuge were free flowing due to artesian pressure, and Spring Creek was flowing from springs issuing from the west side of the Refuge. Spring Creek stopped flowing in the 1960s and the number of free flowing wells has dropped since then. In the early 1970s the State Engineer, in a successful effort to stabilize artesian pressure, placed a moratorium on new wells in to the confined aquifer. (Steve Vandiver, pers comm)

Plant Communities (Habitat Types)

The various vegetation associations found on the Complex were described and divided into 11 plant communities during the original habitat goal and objectives setting meetings in 1996. This team included a group of biologists and ecologists from the U.S. Fish & Wildlife Service, U.S. Geological Service, Colorado Division of Wildlife, representatives from non-government organizations, and Dr. Leigh Fredrickson.

Plant Communities Described During 1996 Goal Setting Meeting:

Upland shrub	Tall-emergent
Cattail	Bulrush
Short-emergent	Baltic rush
Spikerush/carex	Saltgrass
Shallow seasonal water (no vegetation)	Semipermanent wetland
Riparian	Riverine
Dense cover (planted by Refuge staff)	Agriculture

Annuals (kochia, chenopodiums, spikerush, foxtail, barley)

Since 1996, these plant or habitat types have been used in setting goals and objectives, in the development of a habitat map for the Alamosa NWR, and in the day-to-day work done on the Complex. Through time, some modifications have been made in the list of habitat types. (See Map 8 - Monte Vista NWR Habitat Types and Map 9 - Alamosa NWR Habitat Types.)

Plant Communities (Habitat Types) Currently Used (2001)

Upland shrub	Tall-emergent
Short-emergent	Saltgrass
Shallow seasonal wetland	Shortgrass
Riparian	Semipermanent wetland
Agriculture	Riverine

A habitat map was developed in 2000 for the Monte Vista NWR. Based on the field experience of Dr. Fredrickson's staff and Refuge staff since 1996, nine habitat types were used for this project. The nine are similar to the original list, except that semipermanent and shallow seasonal wetlands were mapped as open water and the "annual plant" category was not used.

The U.S. National Vegetation Classification (USNVC) system has recently been adopted for use on all national wildlife refuges in an effort to standardize vegetation monitoring and mapping. Most of the habitat mapping efforts on the Complex were done before the adoption of this methodology but most of it can and will be cross-walked into the USNVC system.

On Monte Vista NWR, most of the wetland basins are man-made with a design common to many managed wetland areas. At one or two sides is a "borrow area" where dirt was removed or borrowed to form the dike or levee. The resulting borrow area is the lowest portion of the wetland basin. From the borrow area, the elevation gradually increases until it becomes upland. The result is a zone of elevation changes which, depending on natural events and management actions, provides an array of water depths and vegetation conditions. Through the season or at any one time, an impoundment often contains several habitat types. Natural wetland basins on the Alamosa NWR are similar to impoundments in that a gradient of elevations occur, and thus several habitat types may be available based on water conditions.

The following is a description of the habitat types currently in use:

Shallow Seasonal Wetlands

On the Refuge complex, this habitat type usually consists of temporary, shallow water over the alkali or mudflat portions of a wetland or greasewood uplands that are seasonally flooded. These wetlands are defined by seasonal, shallow (<one foot) water with little to no vegetation. The existence of this habitat type depends upon water availability, either as water is added to a wetland basin in the spring or as it recedes during late summer. On the Complex, this habitat primarily exists at the shallow ends of gradually sloping semipermanent wetlands. Due to the warmer temperatures of the shallow water and nutrient recycling which occurs during the dry cycles these newly flooded areas often support higher densities and varieties of invertebrates. As a result, this habitat type supports the majority of foraging shorebirds on the Complex as well as several foraging waterfowl species, waders, rail and duck and water bird broods, and others. This habitat type also exists when upland areas usually dominated by greasewood with little to no plant understory are flooded. Soil has usually accumulated around the bases of greasewood plants which are usually dead due to previous flooding, forming small unvegetated islands which remain above the water. These hummocks provide nesting sites for American avocets while the surrounding shallow water areas provide foraging sites for many bird species.

Semipermanent Wetlands

This wetland type is characterized by deeper (usually greater than one foot in depth), more permanent water and is generally vegetated by submergent plants such as *Potamogeton*, mare's tail, and *spyrogyra* algae. This habitat type occurs in the deepest portion of the wetland which in most cases on the Complex is in the borrow areas adjacent to the levees. These areas are usually between 1 to 15 acres in size. This habitat provides foraging opportunities for water birds (grebes, coots, waterfowl and their broods) and aerial foragers (swallows, terns) and cover to molting waterfowl and water bird (ducks, coots, geese, and grebes) broods. These areas also support pied-billed grebe and occasionally western and eared grebe nesting colonies.. Some areas, because of their permanent nature, support rough fish, notably carp, and have in recent years been used by non-breeding white pelicans in the summer. When possible, these areas are dried periodically (approximately every 7 years) to control rough fish and promote annual plant growth on exposed mudflats. Examples of this habitat type is Parker Pond (Unit 17), Bowen Pond on Monte Vista NWR and Unit O on Alamosa NWR.

Tall-Emergent Vegetation

Associated with deeper water, usually greater than one foot and semipermanent to permanent in nature. Cattails, bulrush, and at Alamosa NWR, phragmites are the dominant plant species. This vegetation can occur along the edges of levees and canals; as large contiguous patches, islands or along water edges in semipermanent wetlands. Areas where bulrush occurs as islands within semipermanent water support small to large nesting colonies of white-faced ibis, snowy and cattle egret and black-crowned night heron. Tall-emergent areas provide critical nesting habitat for diving ducks, and in many cases even mallards, Canada geese, American bittern, and marsh passerines such as marsh wrens, common yellowthroats, and yellow-headed blackbirds. Often northern harriers and short-eared owls nest in downed or residual patches of tall emergent vegetation. When this habitat type occurs in shallow, more seasonal water and is associated with *carex* edges, it is important to rail species and nesting dabbling ducks such as mallards and teal.

Short-Emergent Vegetation

This habitat type, also referred to as wet meadow or upland meadow, is characterized by grasses and grass-like plants and is seasonally and shallowly (less than one foot) flooded. The dominant species within short-emergent plant communities are cool season plants that require water early in the growing season (i.e., March). Three subcategories occur of short-emergent vegetation: native grasses and rushes, spike rush, and sedges. The timing of flooding determines whether the community is dominated by rushes or grasses, whereas soil richness and other factors including water seasonality determines sedge occurrence.

The majority of the short-emergent habitat on the Complex and on neighboring lands is the grass and rush subcategory which is dominated by baltic rush. Other species may also be very common including spike rush, alkali muhly, curly dock, *Calimagrostis*, foxtail barley, and short-awn foxtail. Many species of forbs may exist. Among the most common are New Mexico checkermallow, American vetch, clovers, wild licorice, herbaceous cinquefoils, western yarrow, goldenpea, and gentian. Interspersions of tall-emergent vegetation, cattail and bulrush, begin to occur when seasonality of water is lost or given way toward permanence.

Due to the variety of vegetational structural within this transitional community (short-emergent and tall-emergent vegetation) provides the life cycle requirements for many avian species but it is extremely difficult to maintain. Slender spider flower, a species of State concern, may occur along the transition zone between short-emergent and salt grass communities. This habitat type is also most susceptible to invasion by noxious species such as tall whitetop and Canada thistle. Other species most likely to invade the site and increase from trace amounts to dominance are foxtail barley, rabbitsfoot grass, dandelion, and curly dock (Dixon 1986).

The grass/rush subcategory can become very dense and provide structure for ground-nesting birds; therefore, it supports a variety of species on the Complex from nesting mallards, small marsh birds, Northern harriers, and short-eared owls to foraging white-faced ibis. The spike rush subcategory provides excellent invertebrate habitat; and therefore, provides foraging habitat for waterfowl broods, white-faced ibis, Wilson's phalaropes and common snipe. Sedge subcategories provide for nesting and foraging teal and rail species.

Saltgrass

This habitat is usually associated with alkali soils in a variety of hydrologic conditions and is dominated by salt tolerant grass species such as inland saltgrass, alkali sacaton, alkali muhly, and alkali grass. It can contain scattered greasewood and rabbitbrush plants. When higher soil moisture occurs, large amounts of slender spiderflower appear. This habitat type is rarely impacted by invasive species, probably due to the high salinity (Dixon 1986). When shallowly flooded, the resulting brackish waters are warmer in temperature and support high invertebrate growth providing food for shorebirds, teal, northern shovelers, and others. It also provides cover for small shorebirds and nesting waterfowl. When dry, this habitat type supports many grass nesting species such as Savannah and vesper sparrows, and when combined with greasewood supports nesting mourning doves and sage thrashers.

Short Grass

This habitat type is comprised of a variety of plant species most of which are also found in short-emergent wetlands and in saltgrass, however, it is usually not dominated by either group and is a real mix of plant species such as alkali muhly, alkali sacaton, hoary cress, silverweed cinquefoil, silver sage, wild iris and wild licorice. Short grass is a grass upland habitat occurring on drier, more upland sites than wetland communities and often occurs as "hummocks" within wetlands and oxbows, and is most prevalent on the Alamosa NWR. In the past this habitat type has been called saltgrass but the short grass category occurs on soils with less salinity, is not dominated by salt tolerant species, and is usually not flooded like salt grass can be. This habitat type is often a transition zone and when that is the case it can contain scattered individuals of rabbitbrush and greasewood. Wildlife use of this habitat type is not well documented although some species of ducks, sparrow species, meadowlarks and other ground-nesting migratory birds use it for breeding purposes. It also provides cover to small mammals.

Upland Shrub

The upland shrub community consists of sub-categories based on the shrub species and understory vegetation. This habitat includes the drier areas (rarely flooded) dominated by greasewood in areas of tighter and more alkali soil and rabbitbrush in looser and sandier soils. At higher elevations with sandy soils, the community is dominated by Indian rice grass with an intermix of alkali sacaton and four-wing saltbush. In higher elevations with tighter soils, winterfat, fringed sage and blue grama dominant. The upland shrub areas of the Complex primarily support greasewood and rabbitbrush; however, the eastern edge of the Alamosa NWR contains areas of four-wing saltbush and Indian ricegrass, and the foothills along the western boundary of the Monte Vista NWR supports primarily winterfat. Currently there is little information on the wildlife use of this habitat on the refuge as other habitat types because traditionally monitoring efforts have focused on wetland and associated habitats. Species of sparrows, mourning doves, and sage thrashers have been observed nesting in upland shrub.

Riparian

This habitat type includes vegetation associated with and along rivers or waterway edges. Crack willow, sandbar willow and broad-leafed cottonwood comprise the overstory. The understory can contain a variety of shortgrass and short-emergent species such as: sedges, curly dock, western wheatgrass, cinquefoil, and others. The majority of riparian habitat on the Complex is along the Rio Grande on the Alamosa NWR. This strip of habitat supports nesting and migrating passerines and raptors, as well as providing habitat for amphibians, reptiles, small mammals, and deer. The southwestern willow flycatcher, an endangered subspecies of the willow flycatcher, has been documented nesting in relatively high numbers in the riparian habitat on the Alamosa NWR (Owen and Sogge 1997).

Riverine
This habitat type includes plant and wildlife species in the river channel itself but does not include the adjacent vegetation which is usually classified as riparian. The only place on the Complex where riverine occurs is within the Rio Grande as it flows through the Alamosa NWR (approximately 7 river miles). River flows through the refuge are inconsistent and can even be so reduced as to produce mere puddles within the channel. Therefore, the fisheries is fairly limited to carp, occasional northern pike and various species of minnows. During electro-shocking efforts on the Alamosa NWR in the mid-1990s no trout species, native or nonnative were detected (refuge files). Fishing is not allowed on the refuges due primarily to the lack of a consistent fishery.

Bird use of the river through the Alamosa NWR includes wintering Common mergansers, foraging greater and lesser yellowlegs in the fall when flows are low and mudflats are exposed, Canada geese and various duck species in the fall, winter, and early spring when the river is ice-free, and a few hundred roosting sandhill cranes in the spring and fall. In the past this habitat type has not gotten much management nor monitoring attention because there were no pressing issues. However, in about the last 2 years, the noxious weed, Eurasian Milfoil has become prevalent in portions of the Rio Grande, including some portions of the Alamosa NWR.

Plant Species Requiring Special Consideration
Within the previously described plant communities, a few individual plant species require special attention because of low population numbers, status as a noxious weed or their ability to become monotypic and thus a management concern under certain conditions.

Monte Vista NWR supports "good examples" of a globally and State periled plant species (slender spiderflower) and a State periled species (giant bur-reed) and three plant communities vulnerable on a global scale. The plant communities include wet meadow (*Carex simulata*), saline bottomland shrublands (*Sarcobatus vermiculatus/Sporobolus airodies*), and common three-square emergent wetland/wet meadow (*Scirpus pungens*) (Rocchio, et al. 2000). These three communities are fairly common on both refuges but primarily the Monte Vista NWR. Information is currently being collected to better understand the justification for being defined as vulnerable on a global scale and to gain management recommendations in order to ensure the existence of these communities on the refuge complex.

<u>Slender Spiderflower</u>
Slender spiderflower (*Cleome multicaulis*) ranges from southern Wyoming to Mexico; however, despite this fairly extensive range, populations have decreased dramatically in the last 100 years, especially in the southwestern states. The SLV has the most numerous, largest, and healthiest population in the world (Rocchio, et al. 2000). This species has not been documented in New Mexico or Arizona since the 1940s; some occurrences are in Texas and Mexico while Wyoming only has one. This forb is limited by very specific habitat requirements including moist alkaline soils and some form of soil disturbance. The fairly common occurrence of this plant on Monte Vista NWR is one of the primary reasons why the Refuge and some adjacent private lands were ranked as one of the 19 most important wetland sites in Rio Grande and Conejos counties by the Nature Conservancy (Rocchio, et al. 2000). On Monte Vista NWR the plant is found in the transition zones between wet meadows and salt desert shrub communities. This zone is very saline, relatively bare and very moist. Inland saltgrass is usually associated with this site.

Giant Bur-reed

According to the nature conservancy's biological inventory of Rio Grande County (Rocchio, et al. 2000), giant bur-reed (*Sparganium eurycarpum*) is a state imperiled species which is primarily found on the eastern plains as well as the SLV, including the MVNWR. (Rocchio, et al. 2000). This is a stout, perennial herb, usually 0.5-1.5 m in height flowering in June and July. Giant bur reed is a persistent emergent and is characteristic of silty, fertile waters. It is used by muskrats and the seeds are commonly eaten by waterfowl and marsh birds (Eggers and Reed 1997).The location of this species has not been mapped nor it's abundance quantified, however, incidental observations of it are common especially on the Monte Vista NWR.

Willows and Cottonwood

On the Refuges, the riparian community consists primarily of crack willow (*Salix fraglis*), sandbar willow (*Salix exiqua)*, and narrow leaf cottonwoods (*Populus angustifolia*) with an understory of grasses, sedges, and forbs. Protecting, maintaining, and enhancing riparian vegetation is a priority for refuge managers because it is a limited yet critical habitat in the western United States and in the San Luis Valley, and it supports a myriad of wildlife species, notably the endangered subspecies of the southwestern willow flycatcher. This neotropical migrant nests in dense stands of mixed willow species that are usually near or immersed in water, at least during nest initiation. As a result, all tall and dense stands of willows and cottonwoods will be treated as if it were southwestern willow flycatcher habitat.

Monte Vista NWR has a limited amount of riparian habitat; sandbar willows line many of the water delivery canals and small patches of the same species are located in low lying areas. The Alamosa NWR, however, has riparian habitat along the Rio Grande which supports many nesting, migrating, and resting migratory birds including the endangered race of the southwestern willow flycatcher. The oxbows and water delivery canals within Alamosa NWR support willows and a few cottonwoods. Some cottonwood regeneration, or seedling establishment, is occurring on Alamosa NWR; however, since these species depend on the river flooding for establishment, and flooding frequency has been reduced, overall tree establishment is infrequent. Beaver have also had an impact on older trees by cutting them down. The Refuge staff is interested in investigating techniques to promote and possibly expand riparian habitat on the Alamosa NWR through irrigation and other means.

Cattail

Cattail (*Typha latifolia*) is fairly common on the Complex primarily due to the water permanence in many wetlands which in some locations is a water management decision. Under certain situations, this species can become dominate resulting in large monotypic stands on both refuge. Muskrat foraging on cattails is usually insufficient to create openings in some of these vegetation-choked wetlands. In conjunction with appropriate water depths, cattail and other tall-emergent vegetation, such as bulrush, provide nesting habitat for American bittern, diving ducks, and several species of passerine birds. Refuge managers must evaluate when cattail has become too prevalent and determine if the wetland types available to wildlife are becoming limited due to the presence of monocultures. When cattail monocultures are not offering wildlife habitat or are too numerous relative to other wetlands on the Complex and in the San Luis Valley, then management tools such as winter grazing, burning, and others are used to decrease this community.

Phragmites

This perennial wetland grass occurs only on the Alamosa NWR as an extensive and monotypic which extends on the eastern side of the Refuge from the middle (Mumm Well) to the southern end. This stand has replaced the marsh and wet meadow vegetation in approximately 600 acres which would otherwise be occupied by primarily cattail and bulrush. Refuge staff assume that these monocultures of phragmites (*Phragmites phragmites*) support fewer wildlife species than other tall-emergent vegetation, and is, therefore, a concern to refuge managers.

Tall Whitetop or Perennial Pepperweed

This noxious weed is a perennial forb from southeastern Europe and western Asia. The plant is very competitive and adaptive, and as a result, has become established throughout the western United States becoming a serious land management and conservation issue. This species is very tolerant of soil salinity and thrives under an array of hydrological conditions. Tall whitetop is well adapted to riparian and wetland areas and threatens native hay and forage production. In riparian zones it interferes with regeneration of willows and cottonwoods and in wetland areas the composition and productivity of herbaceous species is radically changed (Young, et al. 1995). This tall (3 to 4 feet) weed grows and reproduces vigorously and is capable of forming dense mono-cultures. Tall whitetop started becoming established in the early 1950s (Harrington 1954), and now, to some degree, occurs in all of the Refuges' short-emergent communities (wet meadows).

On the Complex, tall whitetop occurs in varying degrees in most habitat types but is most prevalent in short-emergent vegetation, where it can occur as sparse to dominate. This species is found along roads, dikes, and other disturbed areas. This weed decreases the quality and quantity of wildlife habitat. It is a concern to Refuge neighbors and local weed boards; therefore, the control of this weed is a critical issue in refuge management and it is the focus of an intensive 5 year research project by Dr. Leigh Fredrickson on the Complex.

Canada Thistle

This creeping perennial is a noxious weed that reproduces from vegetative buds in its root system and from seed. Due to the extensive root system with vast nutrient stores, it is difficult to control. On the Complex, it is fairly common in upland and grassland areas as well as disturbed areas. The infestation of this species is similar to that of tall whitetop on the Complex except that thistle exists in a slightly more narrow range of hydrological conditions. Currently, no monotypic stands of thistle occur on either Refuge but it is a species of concern for refuge managers due to its degradation of habitat and because it is a large concern of the county weed boards and neighbors.

Russian Knapweed

This weed is a nonnative, herbaceous perennial that reproduces from seed and vegetative root buds. This weed forms dense, single species stands over time due to its allelopathic capabilities and competition. Russian knapweed is found throughout the west under various conditions but in Colorado it is not restricted to certain soil types. On the Complex this species is found in or near agriculture fields, along roads and levees and in some upland grass habitats. Currently this weed has not formed large monotypic stands; however, efforts will be taken to minimize its distribution and spread on the Refuge and onto neighboring lands.

Eurasian Watermilfoil

This submergent species has been found on the Rio Grande and at the terminal end of the Closed Basin Canal on the Alamosa NWR. The discovery and accurate identification of this noxious plant occurred in the late 1990s by the Alamosa County weed board. To date, no control methods have been enacted in the San Luis Valley. The Refuge staff maintains close communication with the weed board regarding this species and will cooperate with appropriate control methods when suggested.

Agriculture

Agricultural habitat does not occur on the Alamosa NWR. The Monte Vista NWR contains approximately 750 acres of agricultural fields. Of these, 510 acres are annually farmed in a 5 year crop-rotation; 3 years alfalfa and 2 years of small grains (barley and wheat). The majority of this annually farmed ground (462 acres) is located under four large center pivot sprinkler systems ranging in size from 71 acres to 147 acres. The remaining 48 acres are flood irrigated using siphon tubes. This component of the agricultural habitat is managed to provide a food source primarily for migrating sandhill and whooping cranes as well as for migrating and wintering waterfowl. Approximately 240 acres of this habitat type is planted into semipermanent cover and is actively farmed on a 4 to 6 year schedule. These areas, all of which are flood irrigated, contain a variety of plant species usually containing a grass mix, such as intermediate wheatgrass (for structure) and forb (such as alfalfa or clover) for density. These areas are managed to provide breeding and winter cover for a variety of migratory and resident birds, resident small mammals and large ungulates, primarily deer.

Wildlife

Historically, the SLV was rich in wildlife with numerous herds of antelope, elk, and deer and abundant small game, waterfowl, and water birds.

The Complex supports many groups of nesting, migrating, and wintering birds including grebes, herons, ibis, ducks, geese, hawks, eagles, falcons, shorebirds, owls, songbirds, and others. Approximately 11 species of ducks nest on the Refuges, and Monte Vista NWR has one of the highest number of duck nests per acre in North America (Gilbert, et al. 1996). The Complex also supports many species of nesting water birds, shorebirds, and songbirds including the largest nesting colony of white-faced ibis in Colorado. American avocets, black-necked stilts, common snipe, spotted sandpipers and Wilson's phalarope nest on the Complex as do American bittern, sora, and Virginia rails. The Refuges are also important staging areas for many migrating birds. Approximately 95 percent of the Rocky Mountain population of greater sandhill cranes spend several weeks in the Valley during the spring and fall migrations feeding and resting to replace critical fat reserves. Wintering bald eagles are very abundant at the Alamosa NWR as well as wintering ferruginous hawks and short-eared owls.

Many species of mammals use the Refuges including elk, deer, coyote, porcupine, rabbits, beaver, muskrats, weasels, and others. The SLV is a cold desert and, as such, supports a limited number of amphibians and snakes; however, tiger salamanders, garter snakes, and chorus frogs are abundant on the Refuges.

Threatened and Endangered Species

Federally Listed Endangered Species Using the Refuge Complex

Whooping Cranes (*Grus americana)*

While rare, whooping cranes were commonly observed in the SLV and on the Monte Vista NWR during spring and fall migrations up until 2001. Shallow water wetlands and wet meadows provided roosting, resting, and some feeding habitat for whooping cranes while migrating through the Valley. Similar to sandhill cranes, these birds fed on privately owned small grain fields during the fall migration and agriculture fields on the Monte Vista NWR during spring migration. However, as of March 2002, only one whooping crane is left in the Rocky Mountain flyway (Tom Stehn, pers comm, 2002).

The whooping crane using the Monte Vista NWR and the SLV is the remnant of experiments to test various reintroduction methods. In 1975, all of the world's wild whooping cranes belonged to one flock which wintered along the Texas Coast (Aransas NWR) and breed in Wood Buffalo National Park in Canada. It was recognized that survival prospects for the whooping crane would be greatly enhanced by establishing additional, disjunct populations (USFWS 1994). As a long-lived species, cranes must learn migration routes and other behaviors from their parents. The technique which seemed most worthy of consideration was cross-fostering whooping cranes to sandhill crane foster parents (USFWS 1994).

The Rocky Mountains are on the western periphery of historic whooping crane habitat and are home to the greater sandhill crane which numbers about 20,0000 birds (USFWS 1998). The Rocky Mountain population (RMP) of greater sandhill cranes primarily breed in Idaho, Wyoming, and Montana and winter in the middle and lower Rio Grande Valleys of New Mexico and Mexico. During the fall and spring migrations almost the entire population (95 percent) spends several weeks feeding and resting in the SLV (USFWS 1998).

In 1975, a cross-fostering experiment between RMP sandhill cranes and whooping cranes was initiated by the U.S. Fish & Wildlife Service and the Canadian Wildlife Service to test if sandhill cranes would raise young whooping cranes and to test if the juvenile whooping cranes would successfully learn and subsequently use the migration route (USFWS 1994). Eggs from the wild population at Wood Buffalo National Park and from captive flocks were transferred to greater sandhill crane nests at Grays Lake NWR in Idaho. Grays Lake NWR had many features which made it an excellent site to test cross-fostering techniques, including a large number of successfully breeding sandhill cranes (USFWS 1994). In the 15 year program, 289 whooping crane eggs were transplanted to greater sandhill crane nests of which 210 hatched and 85 survived to flight stage. The cross-fostered flock of whooping cranes reached a high of 33 whooping cranes in the winter of 1985 (USFWS 1994).

The project was successful in that the cross-fostered whooping cranes migrated with the RMP sandhill crane flock for many years, and used the SLV during migration. By 1989, however, the absence of pairing and subsequent lack of reproduction was suspected to be due in part to improper sexual imprinting (USFWS 1994) which has also been observed in other foster-reared species such as raptors, waterfowl, gulls and other birds (Bird, et al. 1985 and Immelimann 1972 as cited in USFWS 1994). The program was discontinued in 1989 based on the lack of pairing and reproduction, prolonged drought on the summer area, and the high mortality (USFWS 1994). Known causes of mortality within the cross-fostered whooping crane population were collisions with powerlines, and fences (Brown, et al. 1987 as cited in USFWS 1994), disease (Snyder et al. 1987, 1992 and Stroud et al. 1986 as cited in USFWS 1994), avian predators (Windingstad et al. 1981 as cited in USFWS 1994) and other causes. In 1989 the U.S. and Canadian Whooping Crane Recovery Team decided that the Rocky Mountain area was no longer going to be considered as a primary reintroduction site due to the high mortality and lack of reproduction.

The Rocky Mountain cross-fostered whooping crane population has been steadily decreasing since it's high point in 1985. In 1992, 12 cranes were left and that number decreased to four in January 1995 (three females and one male). Two whooping cranes died, one in spring 1998 and one in spring 2000, resulting from collisions with power lines while in the San Luis Valley. Currently, there is one whooping crane left from this project that summers at Red Rock Lakes NWR in Montana.

In October of 1992, the first and only evidence of a whooping-sandhill crane hybrid in the wild was observed in the San Luis Valley. In March 2000, this hybrid crane continued to winter in the Rio Grande Valley, migrate through the San Luis Valley and summer in Idaho and Wyoming. However, it was not seen during the 2000 summer or subsequent season and is listed as a mortality (Tom Stehn, pers comm, 2001).

Since cross-fostered whooping cranes may have improperly imprinted on sandhill cranes, experiments were begun to test techniques to teach captive-reared cranes appropriate migratory routes and wintering areas. If successful, these methods would be used to reintroduce whooping cranes into appropriate places. In the spring of 1995, eleven RMP sandhill crane chicks were hatched and hand-raised on a ranch south of Gray's Lake NWR, Idaho. As the cranes developed, they were conditioned to associate with and follow an ultra-light aircraft. During the fall migration, the young cranes were led by the ultra-light aircraft from the breeding grounds to traditional wintering grounds on the Bosque del Apache NWR in the middle Rio Grande Valley of New Mexico. The ultra-light cranes spent the winter among thousands of wild members of their species in hopes that they would migrate north with the wild birds during the subsequent spring migration. Four of the original 11 ultra-light sandhill cranes survived the winter and in the spring of 1996 migrated through the SLV and on to the breeding grounds.

The ultra-light project continued with sandhill cranes until 1997 when four whooping cranes were also reared and trained to follow the aircraft to New Mexico. Two of the ultra-light whooping cranes survived the 1997-1998 winter at Bosque del Apache NWR and migrated north in the spring of 1998. These birds were captured in north-eastern Colorado and released at Yellowstone National Park where they spent the summer. In the fall of 1998, both of these whooping cranes successfully migrated to Bosque del Apache NWR. In the spring of 1999 both whooping cranes began migrating north. One was later found dead in Utah. The remaining ultra-light whooping crane successfully made it to the summering grounds in 1999, and it continues to winter in the middle Rio Grande Valley in New Mexico and migrate through the SLV.

The ultra-light project illustrated that whooping cranes could be raised in captivity and taught the migratory path. However, the 1997 ultra-light project was a 1 year experiment to test a reintroduction technique and was not meant as the first stage of a reintroduction (Tom Stehn, pers comm 2000). After the project was completed it was not continued due to the biological hazards and political issues in the Rocky Mountain area and the Recovery Team's shift of focus to the eastern U.S. (Tom Stehn, pers comm 2001). Subsequently there will be no more attempts to reintroduce whooping cranes into the area.

In 1997, the Rocky Mountain population of whooping cranes was declared nonessential experimental under Section 10J of the Endangered Species Act. However, when on the refuges they are considered as threatened. (Tom Stehn, pers comm 2001).

In March of 2002, throughout the United States and Canada, there were 278 whooping cranes belonging to three wild populations (RMP [1], Texas-Canada [174], and Kisimmee Prairie, Florida [98], and Wisconsin/Florida [5]) and an additional 121 in captivity (Tom Stehn, Whooping Crane Recovery Team).

Southwestern Willow Flycatchers (*Empidonax traillii extrimus*)
Willow flycatchers (*Empidonax traillii*) are a small neotropical songbird and are fairly abundant in the willow-cottonwood corridor along the Rio Grande on the Alamosa NWR, and in other riparian habitats within the Valley. The species has four or five recognized subspecies, including the southwestern willow flycatcher (*Empidonax traillii extrimus*), which was listed as endangered in 1995 (USFWS 1995). Arizona, New Mexico, and California comprise the core of the southwestern willow flycatcher's historic and current range (Owen and Sogge 1997). Southwestern Colorado may have been used by breeding *extrimus* but nesting records are lacking (USFWS 1995). Determining the boundaries of *extrimus'* range has been difficult due to many factors including the limited number of museum specimens from some regions including southwestern Colorado (Paxton 2000), the difficulty in separating breeders from migrants in many areas, and the lack of data on willow flycatchers in south-central Colorado (Owen and Sogge 1997). In general, *extrimus* nests in dense stands of mixed willow species which are near water or are temporarily flooded at least during nest initiation.

Genetic studies have recently been underway to evaluate the genetic composition of willow flycatchers including those captured in the SLV. A 1996-1997 study conducted by the Colorado Plateau Field Station (Owen and Sogge 1997) evaluated the number, location, and extent of willow flycatcher breeding sites and analyzed genetic characteristics of willow flycatchers at 20 sites in Arizona, California, New Mexico, and Nevada and five sites in Colorado including the Alamosa NWR and McIntrye Springs (Owen and Sogge 1997). The results suggest that considerable genetic diversity exists within the *extrimus* subspecies and within local breeding sites (Busch, et al. 2000). Another study examined the molecular genetic structuring of willow flycatchers throughout their range and the results indicate that the flycatchers sampled on the Alamosa NWR and McIntrye Springs (managed by the BLM) belong to the endangered *extrimus* subspecies. Southwestern Colorado, however, proved to be the intergrade zone between the *extrimus* and the northern neighboring subspecies *E.t. adatmus* (Paxton 2000).

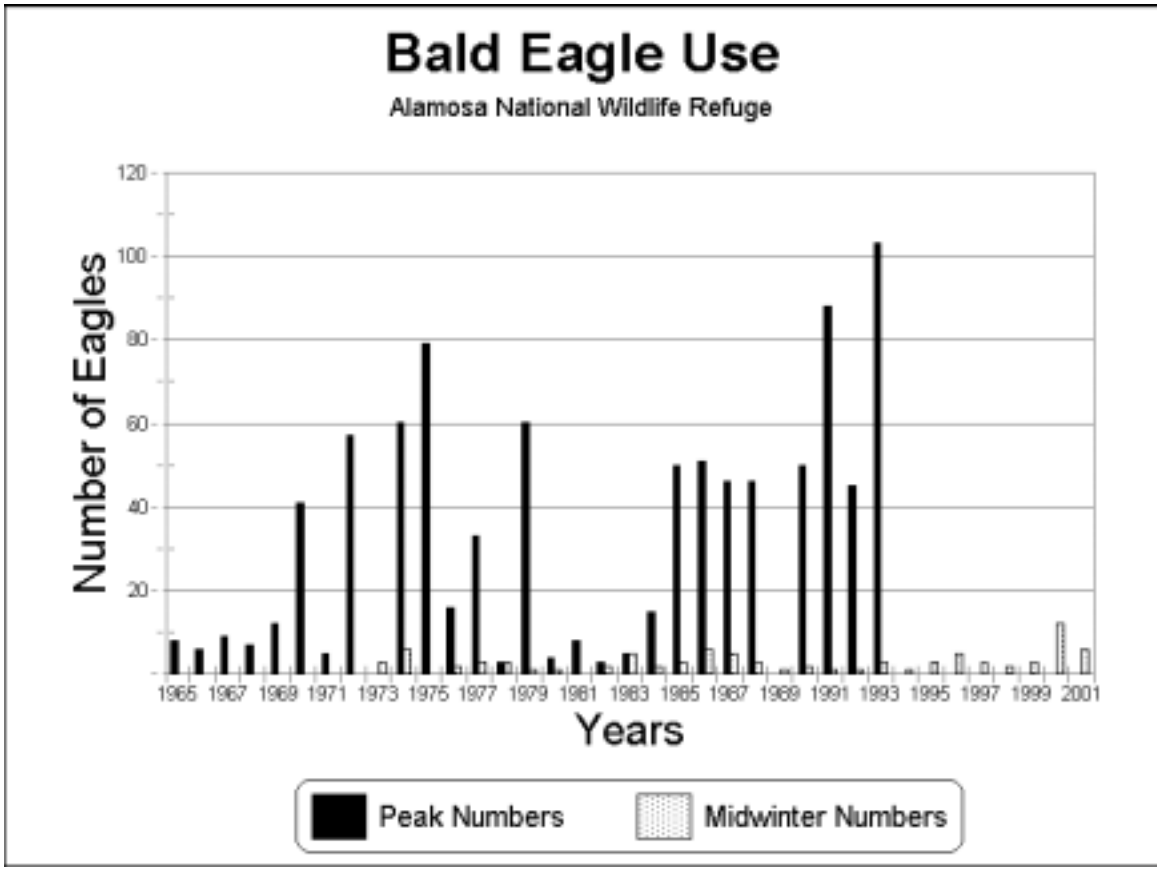
The 1995 listing (USFWS 1995) identifies the entire SLV as being within the *extrimus* breeding range. However, the results of the above studies will be used to reexamine the range of the southwestern willow flycatcher. The draft recovery plan was released for public comment in June 2001; the final plan is expected in July 2002.

During the 1996 and 1997 work, 29 willow flycatcher territories were documented on the Alamosa NWR. This was the highest number of territories documented on any of the sites in the study. At least 10 of those sites had confirmed breeding pairs and 18 flycatchers were banded, more than on any of the other 16 study sites. Three captured females had brood patches confirming nesting for the site. Additionally, six willow flycatchers were heard singing further east along the Rio Grande. The habitat on the Alamosa NWR was described as monotypic stands of coyote (*Salix exiquea*) and peach-leaf willow (*S. amygladoides*) with little narrow-leaf cottonwood overstory bordering the Rio Grande. These willow stands ranged from 3 to 12 meters in width and flycatchers were evenly distributed throughout them. McIntyre Springs, south of the Alamosa NWR, was also identified as high-quality habitat which could probably support more willow flycatchers than are currently present. The researchers concluded that the Valley could have an overall breeding population of willow flycatchers several times larger than is currently known (Owen and Sogge 1997). The opportunities to improve and or expand potential habitat for breeding willow flycatchers appears to be significant in the Valley, and these efforts will also benefit a large suite of riparian-obligate and other species.

Federally Listed Threatened Species Using the Complex

Bald Eagles (*Haliaeetus leucocephalus*)

Bald eagles migrate and winter on the Refuge complex due to the presence of prey such as waterfowl and shorebirds during migration (November and March) and winterkilled fish, primarily carp in the winter (December through February). Up to 105 bald eagles have wintered on the Refuges, however, maximum numbers of bald eagles usually occurs in mid-March during migration. In the 1980s, the Monte Vista NWR was a major wintering waterfowl area and the presence of this prey base attracted large number of bald eagles. Since 1995, refuge managers and other wetland managers in the SLV no longer intentionally provide habitat for wintering waterfowl in order to disperse ducks further south into the Rio Grande Corridor where wintering conditions may be less harsh and than the SLV (see waterfowl section below for more details on this issue). Subsequently, bald eagles have also disbursed throughout the SLV and concentrations on the Monte Vista NWR have declined. Locations of wintering bald eagles is largely determined by the location of ice-free water which attracts waterfowl. The refuge staff participates in an annual winter (January) eagle count which is conducted throughout the United States. Both refuges are included in surveys routes which cover most of the SLV. These data are compiled and managed by the CDOW.


Bald Eagle Use
Alamosa National Wildlife Refuge
Number of Eagles
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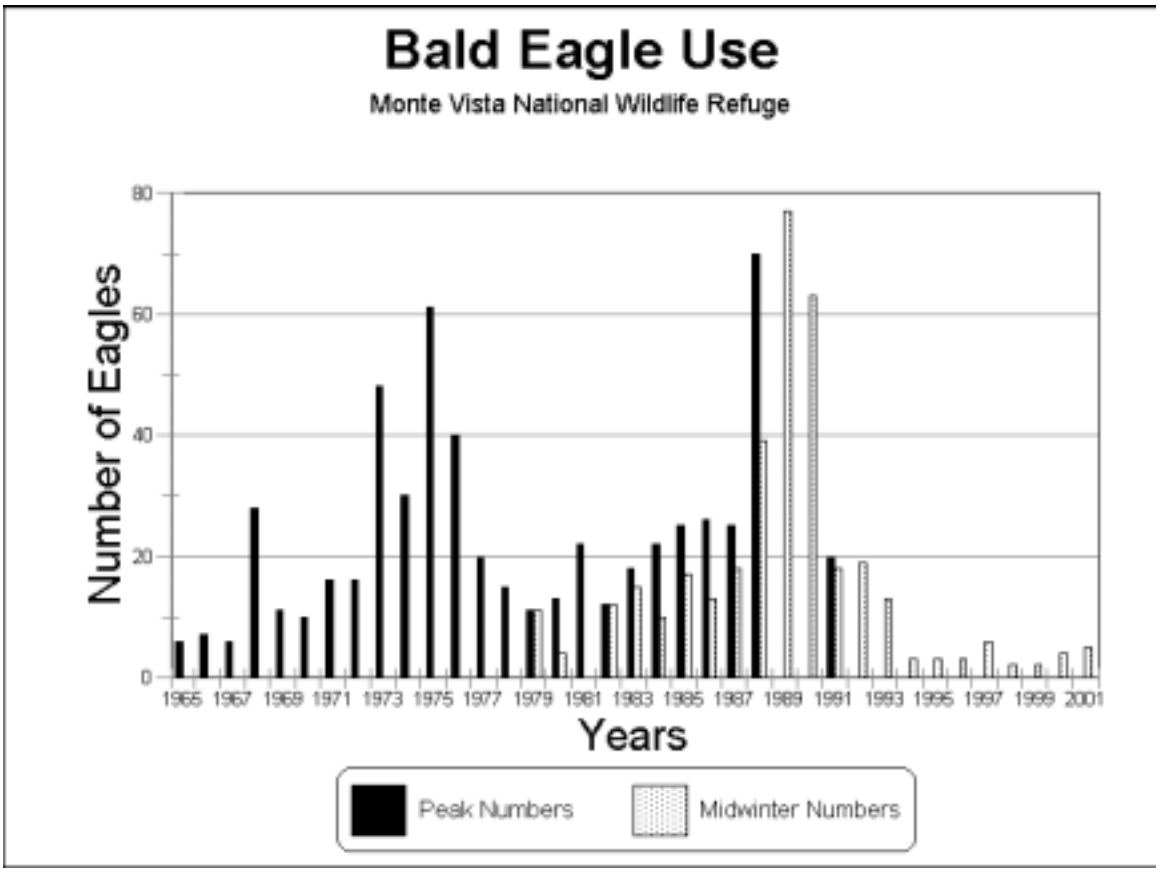
100
80
60
40
20
1965 1967 1969 1971 1973 1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001
Years
Peak Numbers
Midwinter Numbers


Bald Eagle Use
Monte Vista National Wildlife Refuge
Number of Eagles
80
60
40
20
0
1965 1967 1969 1971 1973 1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001
Years
Peak Numbers
Midwinter Numbers

Species of Management Concern within the U.S. Fish & Wildlife Service's National Migratory Bird Office

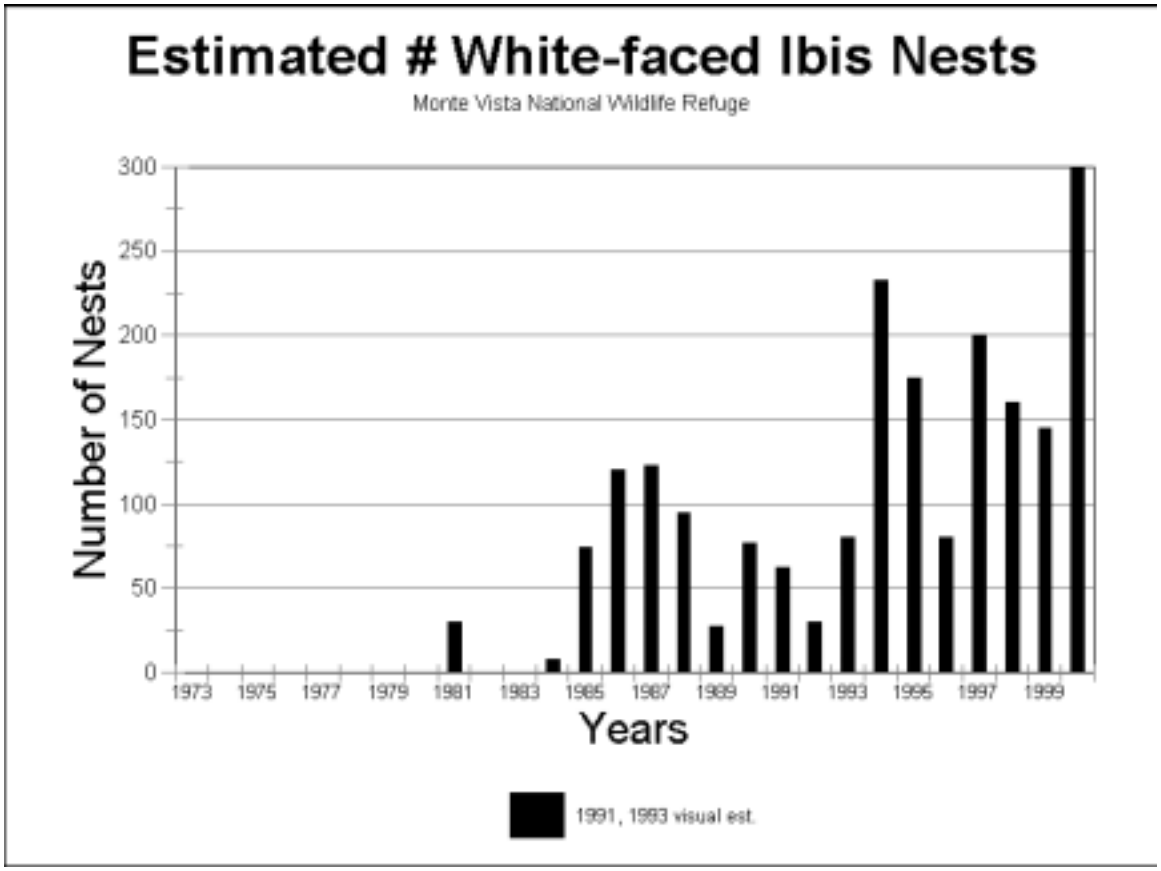
American Bittern (*Botaurus lentiginosus*)
Based on data collected during the annual duck nest transects on the Monte Vista NWR and incidental observations, American bittern are fairly common nesters in tall emergent habitat. On the Alamosa NWR booming bittern (indicative of breeding males) as well as observations of young bittern have been documented. There has been no quantitative surveys done on this and other secretive marsh bird species, however, in 2001 and 2002 portions of both refuges are included in a pilot study testing secretive marsh bird survey methods (D. Klute, USFWS Regional Office).

Black Tern (*Chlidonias niger*)
Black terns pairs are observed on both Refuges in the spring through early fall. This species typically nest in tall-emergent vegetation such as bulrush which is fairly common on the Complex; however, nests have never been documented. Juvenile black terns have been observed on the Complex, notably on the Alamosa NWR in the last few years but it is not known if these individuals were produced on the Complex or are migrating through. Black terns are also documented on the Alamosa Breeding Bird Survey (BBS) route which is southeast of the Alamosa NWR (USGS data). There haven't been specific efforts to survey black tern activity on the refuges, therefore, all of the data are incidental observations, however, refuge biologists are working with the Rocky Mountain Bird Observatory to begin a more formal survey for this species of management concern. Refuge managers are aware of this species and it's habitat requirements and in wetlands hosting tall emergent vegetation, water levels are kept constant during the breeding season (mid-May through July) to protect any black tern nests as recommended (Shuford 1999).

Burrowing Owls (*Athene cunicularia*)
Borrowing owls have been documented on the Complex but not since at least 1999. Appropriate nesting habitat, short-grass prairies and prairie-dog colonies, is not very common on the Complex, it primarily exists on the southeastern corner of the Alamosa NWR. There was an active prairie dog colony here but it has not been used for several years.

Ferruginous Hawk (*Buteo regalis*)
These hawks are fairly common and have been documented using the wetland and salt desert shrub habitat of both Refuges in the fall and winter.

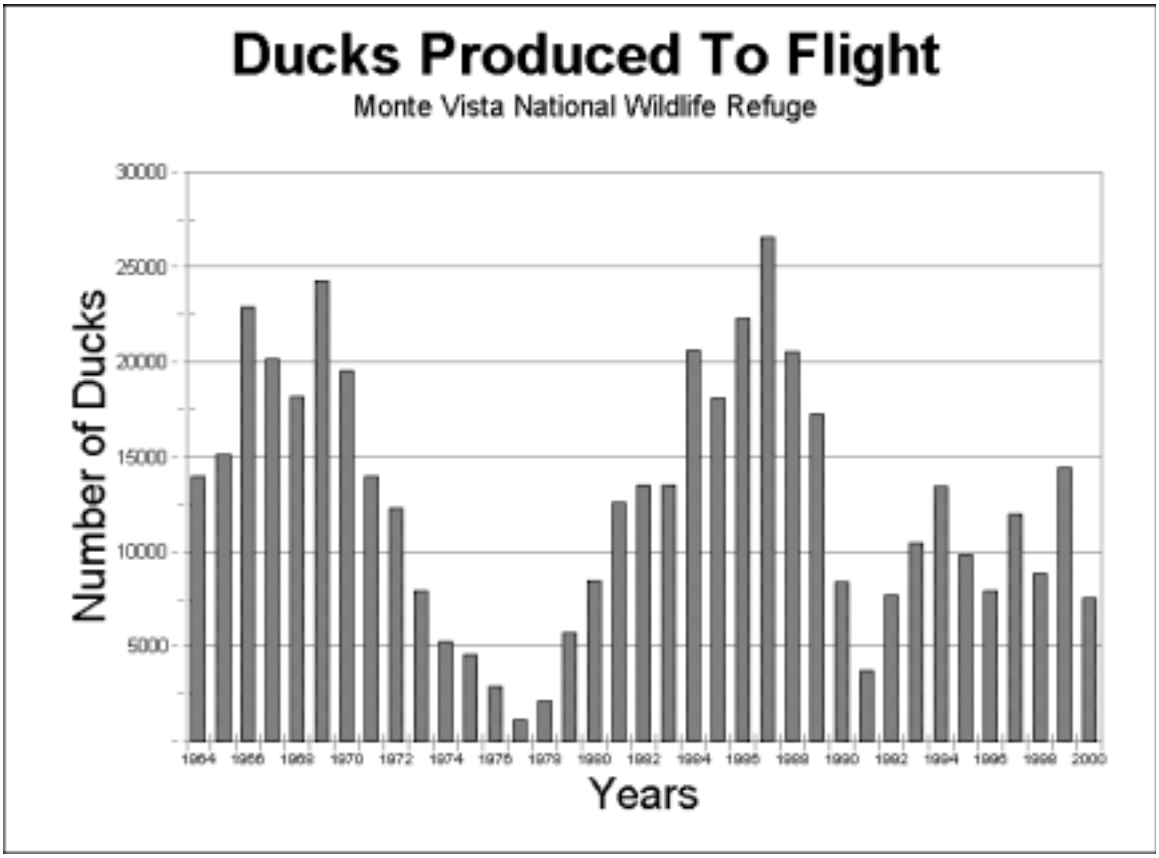
White-faced Ibis (*Plegadis chihi)*
White-faced ibis use both refuges but most of the use occurs on the Monte Vista NWR. There are four major colonial nesting colonies in the SLV, Bowen Pond and Parker Pond on the Monte Vista refuge, Russell Lakes State Wildlife Management Area, and on a privately-owned lake south of Alamosa. White-faced ibis, snowy and cattle egrets and black-crowned night heron nest in stands of bullrush in Bowen and Parker ponds. The number of ibis pairs nesting on the refuge colonies varies, however, at least one of them is consistently the largest to second largest colony in the state (Ron Ryder pers comm). On Bowen Pond in 2001, approximately 500 pairs of white-faced ibis were nesting. Short-emergent wetlands, shallow water and other wetlands on the Complex but primarily the Monte Vista NWR are used by ibis in the spring, summer and fall for cover, resting, and foraging during breeding and migration. Dr. Ron Ryder from Colorado State University started a colonial water bird banding project in the SLV with the help of the refuge biologist (R. Garcia) in the early 1990s in an attempt to estimate the number of birds using colonies and to document bird movement. These banding activities have been continued by refuge staff and are combined with estimating species composition and the number of nests in each colony.



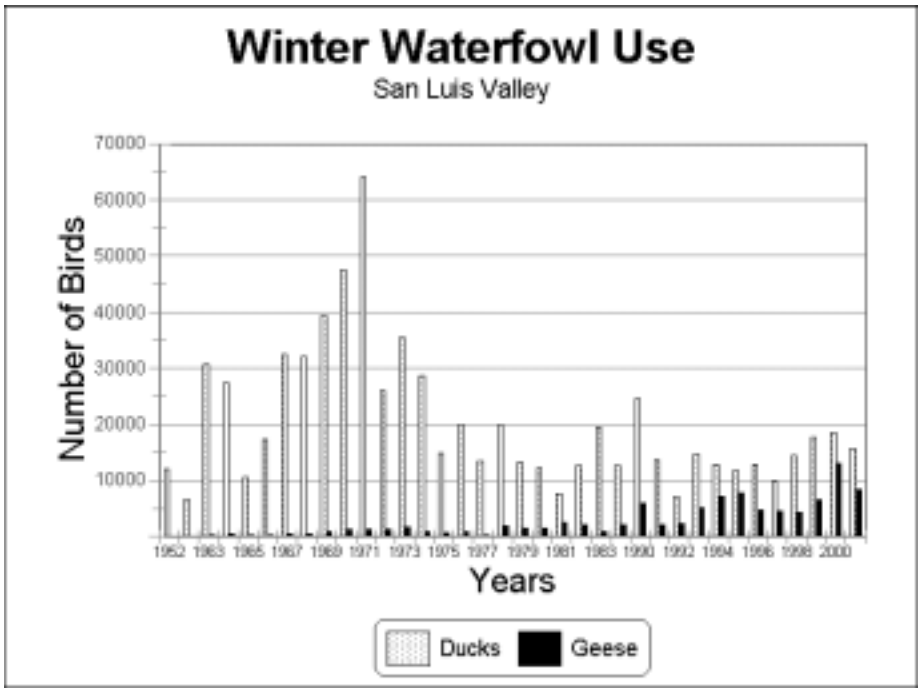
Waterfowl

Numbers and species of ducks are abundant in the spring, summer, and fall with annual population peaks of (20,000) occurring in mid-March. Eighteen duck species use the Refuges to refuel and rest during migration; most are dabbling ducks; mallard, northern pintail, cinnamon and green-winged teal; however, scaup, bufflehead, common mergansers and other diving ducks also use the Complex.

Ten species of ducks (mallard, gadwall, cinnamon, green-winged and blue-winged teal, Northern pintail, Northern shoveler, American wigeon, redheads, and ruddy ducks) and one species of goose (Canada) nest on the Refuges. The Monte Vista NWR has one of the highest densities of nesting waterfowl in the continent (Gilbert, et al. 1996). On average, 15,000 ducks are produced on Monte Vista NWR annually, which constitutes a major component of the State's population and subsequently to the Central Flyway's duck population. The Alamosa NWR also produces a significant number of ducks, 5,000 to 8,000, annually.



Numbers of wintering waterfowl in the SLV vary depending on the weather and subsequent availability of unfrozen water and waste grain. In the early part of the 20th Century, waterfowl, primarily mallards, wintered on the warm-water artesian-dependent wetlands that were found throughout the Valley. By 1970 the increase in the human population and its demand for water, as well as the change from flood irrigation to center pivot sprinklers on local farms, significantly increased the overall demand for water. Subsequently, groundwater levels dropped dramatically and most artesian wells ceased to flow which decreased the amount of wetlands available to wildlife. From 1980 through 1990, the majority of the waterfowl wintering in the Valley (15,000), were using the Monte Vista NWR.



As a result of a high number of ducks concentrated into a relatively small area, avian cholera outbreaks became common in the winters after 1980. An average of 6,500 ducks were killed annually by the disease between 1985 and 1990. In 1990, the USFWS through the Partners for Fish and Wildlife program, and in cooperation with the Colorado Division of Water Resources, started actively securing and increasing wintering habitat on private lands. Local farmers were paid to keep a portion of their crops standing in the field during the winter. This program was successful in that ducks dispersed to other areas within the Valley and cholera mortality was significantly reduced. The program, however, was costly and not designed to be a long-term solution. In 1996, the USFWS stopped actively providing wintering waterfowl habitat to encourage ducks to migrate south into the Middle and Lower Rio Grande Valley and into Mexico where appropriate wintering habitat exists.

This management decision is being evaluated by collecting and comparing body condition data on wintering mallards on the southern wintering grounds in New Mexico with similar data collected in the SLV during (1986-1989) and after (1990-1995) the cholera outbreaks.

Canada geese nest, migrate, and often winter on both Refuges. In the early to mid-1960s, the Great Basin population of Canada geese was experiencing a decline and many refuges and other wildlife areas were hand-raising geese. Wetland vegetation that traditionally supports nesting geese was not yet established on the new Monte Vista NWR. Therefore, Refuge staff placed nesting structures in wetlands throughout the Complex. As of 2000, Canada goose numbers have not only rebounded but have become problematic, especially in urban areas. This species continues to nest on the Refuges but most of the nesting structures are unused as geese build their nests in areas of thick cattail in and along wetland edges and on vegetated dikes.

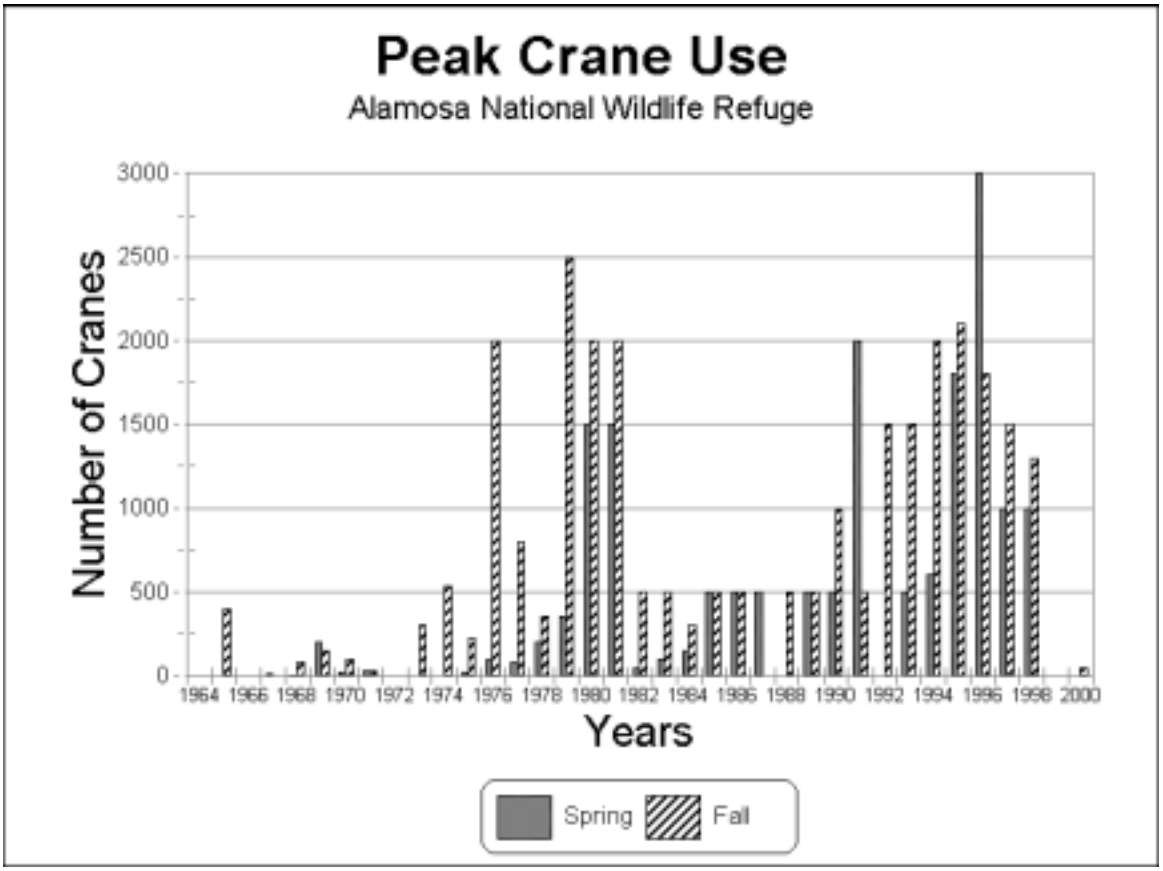
Lesser Canada geese spend a few days to weeks on the Refuges during the spring and fall migrations. Occasionally, a small number of white-fronted geese and tundra swans will use the Refuges during migration.

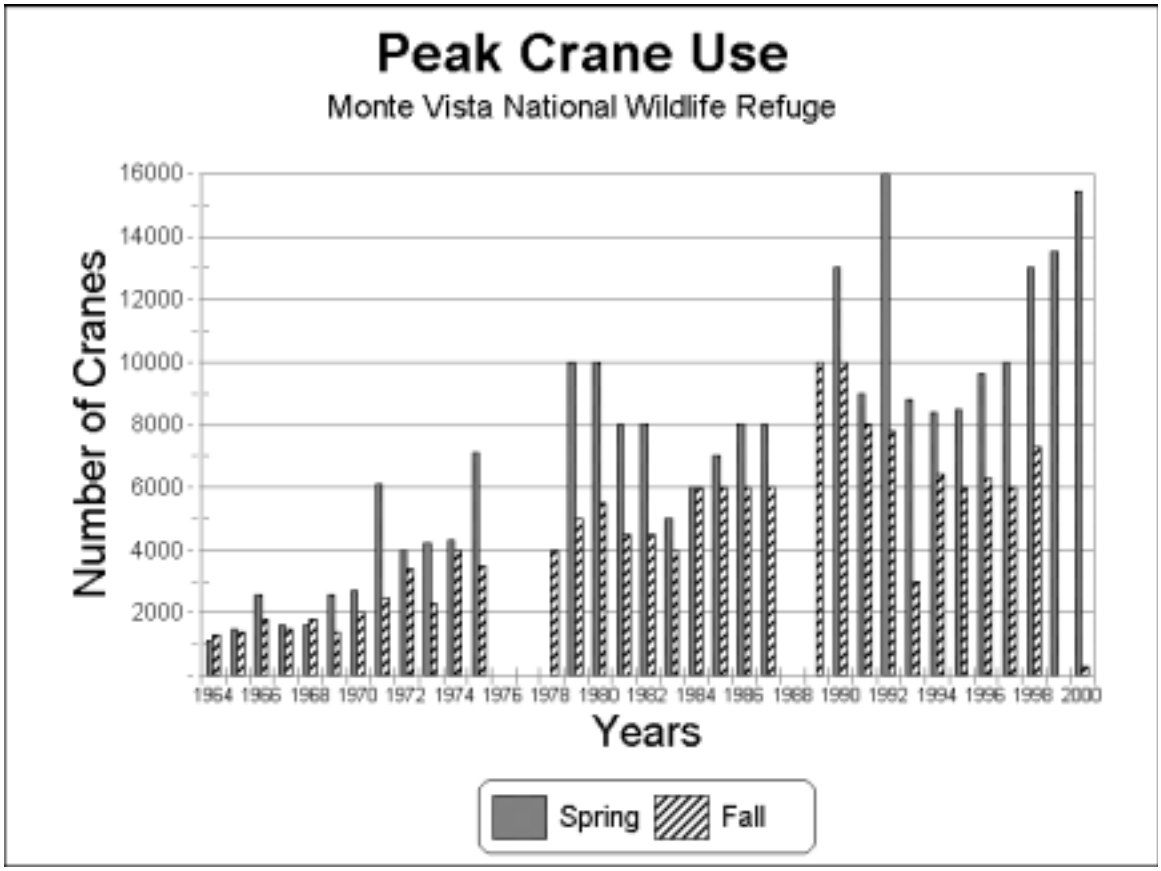
Sandhill Cranes

Three sub-species of sandhill cranes spend several weeks in the Valley during each spring and fall migration to rest and feed. The Rocky Mountain population of the Greater Sandhill Crane nests primarily in Wyoming and Idaho (Grays Lake NWR) and winters in the Lower and Middle Rio Grande Valley, primarily at the Bosque del Apache NWR. Ninety-five percent of this population (approximately 22,000 cranes) and 3,000 to 5,000 lesser and Canadian sandhill cranes also migrate through the Valley. Fall migration is from early September through mid-November depending on habitat and other conditions. Generally, the peak of fall migration is in mid-October. Spring migration occurs from mid-February through mid-March with the peak numbers in early March.

Most of the crane use in the Valley is near and around the Monte Vista NWR primarily due to the prevalence of agricultural fields where cranes extensively feed on barley and small grains in the spring and summer. In the fall, local farmers harvest crops, and cranes and other migrating birds feed on the excess grain that is left in the fields. Therefore, cranes are spread throughout Monte Vista area. In recent years, farmers are tilling or irrigating after harvest to discourage the establishment of volunteer plants and, if irrigated, sprouted plants are killed during the subsequent winter. Therefore, the ground is ready to be farmed in the spring, and the amount of waste grain on private farm fields is very limited in the spring when cranes are migrating north to the breeding grounds. The agriculture fields on the Monte Vista NWR are left standing in the fall when adequate supplies of waste grain are on neighboring fields. In the spring, crops are cut but not harvested which provide food for cranes and other migratory birds when it is limited on private lands.

As well as providing critical feeding sites in the spring, the Monte Vista NWR has the largest roosting site in the Valley, and up to 15,000 cranes seek protection each night in the Refuge's shallow-water wetlands. Cranes loaf and occasionally feed on invertebrates, frogs, and small mammals in wet meadows on and near the Refuges. In general, the Alamosa NWR receives less crane use than the Monte Vista NWR; however, use is increasing due to an increase in farming efforts to the east of the Refuge.


Peak Crane Use
Alamosa National Wildlife Refuge
Number of Cranes
3000
2500
2000
1500
1000
500
0
1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000
Years
Spring
Fall


Peak Crane Use
Monte Vista National Wildlife Refuge
Number of Cranes
16000
14000
12000
10000
8000
6000
4000
2000
1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000
Years
Spring
Fall

Shorebirds

Several species of shorebirds breed on the Complex: American avocet, common snipe, black-necked stilts, killdeer, Wilson's phalarope, and spotted sandpipers. These species use a variety of nesting habitats from unvegetated flats and dikes, to flooded short-emergent vegetation and gravel roads.

The San Luis Valley is not a major migratory path for shorebirds. In the intermountain west and prairies, this group of birds is often widely distributed across the landscape in small to medium flocks, and on a collective basis, an area such as the Valley supports thousands of shorebirds and is key to conserving these species on a large scale. At least 24 species of shorebirds migrate through the Refuges. Common migrants include the species breeding in the area as well as greater and lesser yellowlegs, dowitchers, long-billed curlews, Baird's sandpipers, least sandpipers, semipalmated sandpipers and other *Calidris* species.

Marshbirds

As is the case in most areas, very little is known about habitat use and nesting success of secretive marshbirds such as rails, soras, and others in the SLV. Virginia and sora rails nest on the Complex and are commonly seen during spring, summer, and fall in wet meadow and marsh communities. The number of rails produced on the Complex is unknown; however, these species and their young are regularly documented.

American bitterns are a species of management concern within the USFWS's Region 6 and on a national level. On the Complex, bitterns nest in dense cattail stands and feed along a variety of wetland types. This species is common on the Complex and nests throughout both Refuges; however, no quantitative data exists on this or other marshbird species.

Colonial Water Birds

Black-crowned night-herons, white-faced ibis, and snowy and cattle egrets nest on the Complex, often in the same bulrush islands. The Monte Vista NWR supports one of the largest nesting colonies of white-faced ibis and snowy egret colonies in the State. Ibis can change nesting locations each year if habitat conditions vary; however, they have consistently been nesting in Bowen Pond and Parker Pond for the last 10 years.

Foraging ibis use wet meadow and marsh communities during the spring, summer, and fall. Snowy egrets use open, shallow water as well as wet meadows and marshes for foraging. Black-crowned night-heron forage along canal and other waterways as well as wet meadows and marshes.

Great blue heron do not nest on the Complex or in the San Luis Valley; however, small numbers migrate, and despite harsh conditions, winter in the area. Double-crested cormorants are an occasional migrant but no nesting occurs in the Valley.

Water Birds

Pied-billed and some western and eared grebes nest on both Refuges. Pied-billed grebes are the most common nesting grebe on the Complex and are found in small to large wetlands with shallow to deep water. Western and eared grebes usually nest in large bodies of open and deep water; this type of wetland is not typical of the Refuges; however, occasional nesting of these species has been documented at Parker Pond and Bowen Pond on the Monte Vista NWR.

Raptors

The San Luis Valley and the Complex host an array of hawks, falcons, owls, eagles, and other raptors throughout the year.

Peregrine falcons hunt for shorebirds and other small water birds in the wetlands and short-emergent vegetation wetlands of the Complex during spring and fall migration. Peregrine falcon nesting is suspected in the mountains five miles west of Monte Vista NWR and fledglings have been found in the southern portion of the Valley near Jarosa. (Dean Swift, pers comm). Prairie falcons also migrate through the San Luis Valley and use the Complex for feeding and resting.

Red-tailed hawks, Swainson's hawks, and American kestrels nest on the Refuges primarily in trees of old homesteads and in trees scattered along water delivery canals. Northern harriers and short-eared owls nest in dense vegetation in wet meadows, and in the case of harriers, in tall-emergent wetland vegetation. Great horned owls nest in the deciduous and evergreen trees, in goose nesting structures, and in the banks of canals and water delivery ditches.

In the winter, ferruginous hawks, rough-legged hawks, northern harriers, short-eared owls, and golden and bald eagles are common winter residents on the Complex. The hawks, owls, and golden eagles find rodents, small mammals, and other prey on the Refuge farm fields, uplands and short-emergent wetlands where cover is abundant. Bald eagles spend the winter feeding on sick or weak waterfowl or on carrion. Most of the bald eagle use is on Alamosa NWR where eagles extensively use the cottonwood trees along the Rio Grande. In February and March, Alamosa NWR is an important staging area for spring migrating bald eagles.

Burrowing owls are declining in Colorado and is also a species of management concern in USFWS's Region 6 and other western regions. This species uses grasslands especially in or near prairie dog towns where abandoned prairie dog tunnels are used for nesting. This species is rare-to-uncommon in the San Luis Valley as it is in most western valleys and mountain parks of Colorado (Andrews and Righter 1992). Burrowing owls have been documented on the Complex; however, they are uncommon. Habitat loss is responsible for some of the declines in the State; however, burrowing owls are missing from areas with apparently suitable habitat, therefore other factors may be involved (Andrews and Righter 1992). Prairie dog colonies are rare-to-nonexistent on the Complex but are encouraged to provide habitat for prairie dogs, burrowing owls, and other avian species dependent upon sparsely vegetated prairies and uplands.

Songbirds

Alamosa and Monte Vista NWRs provide habitat for a variety of migrating, nesting, and wintering songbirds. The riparian habitat along the Rio Grande on the Alamosa NWR supports the greatest number of passerine species.

Thirty-two species of songbirds nest on the Complex including swallows, wrens, blackbirds, sparrows, flycatchers, and others. Songbirds nest and depend upon all habitat types on the Refuges from upland brush (sage thrasher and Brewer's sparrow), to dense cattails (common yellowthroat and marsh wren), and saltgrass (meadowlark and vesper sparrow).

Species nesting in the riparian include yellow warbler, western wood pee-wee, Bullock's oriole, song sparrow, and others. Many of these species are neotropical migrants, they breed in one hemisphere and winter in the other. The endangered race of the southwestern willow flycatcher nests within dense stands of willows on the Alamosa NWR and in other similar habitat in the Valley. All of these species face a multitude of threats from loss of habitat to pesticides; therefore, it is critical that riparian habitat is encouraged and conserved.

Corvids

Magpies, ravens, and crows are very numerous on both Refuges throughout the year. These species are the major predator of duck nests on Monte Vista NWR.

Resident Fish and Wildlife

Both Refuges contain fish populations of primarily fathead minnows, red shiners, and carp. The marshes receive fish annually via Rio Grande irrigation water and periodic flooding, but most fish die in the winter when the marshes freeze. Northern pike are found primarily in the Rio Grande and deeper wetlands of Alamosa Refuge.

Forty-eight species of mammals have been identified on the Refuges. Beaver, muskrat, and raccoon range from common to abundant in wetland habitat. Coyotes and skunks are abundant and use all the vegetative communities found on the Refuges.

The only prairie dog on the Complex is a subspecies of the Gunnison prairie dog (*Cynomys gunnisoni gunnisoni)*. It is uncommon and is only found in small colonies in the SLV and south-central Colorado (Fitzgerald, et al. 1994). Prairie dog towns will be protected on both Refuges to ensure habitat for the prairie dog as well as any burrowing owls that may be nesting in abandoned tunnels.

Mule deer and elk use most of the habitat types on the Complex year-round. Deer feed in agriculture fields on Monte Vista NWR and in other upland and wetland communities on both Refuges. The Refuges also offer fawning and winter cover for deer.

On Alamosa NWR a small herd of resident elk exist. On Monte Vista NWR, a resident herd of elk exists that primarily uses the short-emergent habitat on the eastern portion of the Refuge and a group of animals that use the southwestern portion of the Refuge in the fall. In September during the rifle hunting season on the adjacent Forest Service and Bureau of Land Management land, elk leave those lands and move onto the Refuge which is closed to public elk hunting. These elk can number into the hundreds and can depredate neighboring farm fields as well as causing potential hazards to motorized traffic on Highway 15 which intersects the Refuge. These animals are managed in a partnership with the Colorado Division of Wildlife.

Ring-necked pheasants, a resident bird, nest and are fairly abundant on Monte Vista NWR where they primarily nest and feed near agricultural fields. Smaller numbers are also found on Alamosa NWR.

Amphibians and Reptiles of the Monte Vista and Alamosa NWR

The altitude, climate, and relative isolation of the San Luis Valley limits the number of amphibians and reptiles to three species of lizards, three species of snakes, one salamander, three toads, and one frog species (L. Harvey, pers comm). Species fairly common on both Refuges include tiger salamander, great plains toad, Woodhouse's toad, western chorus frog, and western garter snake. Additionally, the Alamosa NWR hosts northern leopard frogs and bullsnakes while a few western rattlesnakes have been documented on or near the Monte Vista NWR. Several amphibian and reptile species have not been documented on the Complex but may occur on the Alamosa NWR including: the plains spadefoot toad, variable skink, short-horned lizard, and snapping turtle; or on the Monte Vista NWR the plateau lizard (eastern fence lizard). Bullfrogs were not historically present in Colorado, but early introductions as a game species by the Colorado Division of Wildlife and accidental introductions with fish stock have lead to firmly established populations along the Rio Grande River corridor, as well as in other isolated locations in the Valley. Bullfrogs have not been documented on the Refuges, but in 1996 one was heard calling near the Alamosa NWR (L. Harvey, pers comm).

Cultural, Archaeological, and Historical Resources

Archaeological evidence exists that mammoth, mastodon, and at least one species of extinct bison roamed the SLV at the end of the Pleistocene. Mammoth bone, teeth, and ivory were recovered from the Magna Site located south of Little Spring Creek. Remains of extinct bison were discovered in Folsom levels at the Linger, Cattleguard, and Reddin sites near Medano Springs Ranch in northeastern Alamosa County. The bison likely occurred in the San Luis Valley in modern times after the Pleistocene in to the early 20th century (Fitzgerald, et al. 1994)

Humans have used the land we now call Alamosa and Monte Vista National Wildlife Refuges for approximately 11 thousand years. Documented prehistoric and historic archaeological sites total 14 on Monte Vista NWR and 11 on Alamosa NWR. All but four sites (three on Monte Vista and one on Alamosa) have been determined as non-eligible for nomination to the National Register of Historic Places. The remaining four sites require further investigation and data collection before eligibility can be determined. These sites are being protected in accordance with the National Historic Preservation Act of 1996. Extensive archaeological sites exist in the headwaters of Spring Creek on Monte Vista Refuge and along Hansen's Bluff on Alamosa Refuge.

Spanish influence is readily apparent to visitors of the San Luis Valley. It is inhabited by a large population of Spanish people, hosts a vibrant Spanish culture, and bears many Spanish place names. Spanish involvement in the San Luis Valley between 1580 and 1780 occurred from their base settlements in northern New Mexico.

The following summary of San Luis Valley history was obtained from 'The San Luis Valley: Land of the Six-armed Cross' (Simmons 1999). The author graciously allowed liberal use of her work for this Plan.

Spanish people started venturing into the upper Rio Grande region in the 1580s, lured by rumors of mineral wealth and the potential expansion of the Catholic Church's influence. Following this quest, Don Juan de Onate was dispatched from Mexico to appropriate lands to the north. In so doing, he established two settlements in northern New Mexico named San Juan de los Caballeros and San Gabriel del Yungue near the confluence of the Rio Grande and Rio Chama. From these bastions, hunting and exploratory expeditions into the San Luis Valley were launched. It was during this time that Spanish contact with the New Mexican Pueblos and the Utes of the San Luis Valley were made and the first accounts of buffalo hunting and native Americans in the Valley were provided. In 1598, Onate claimed all the Rio Grande drainage in the name of King Phillip II of Spain.

In 1609, New Mexico became a colony of Mexico and governmental headquarters were established in Sante Fe. The Pueblos' relations with the Spanish eroded with the increasing authoritarian rule. The same occurred with the Utes of southern Colorado after an attack and enslavement of approximately 80 Utes by Spanish soldiers in the 1630s. In 1680, an uprising of all the Pueblos in northern New Mexico routed the Spanish from the territory until 1694 when Don Diego de Vargas reestablished Spanish control of Sante Fe and the region. In so doing, he pillaged the Taos Pueblo. On his return to Sante Fe, Vargas circled into the San Luis Valley across Culebra Creek and the Rio Grande. A camp was established at San Antonio River to hunt buffalo and elk. It was here that his detachment was attacked by several hundred Utes. Despite several fatalities, the engagement ended peacefully.

Legend has it that the San Luis Valley and the Sangre de Cristo mountains were both named by Spanish missionary, Francisco Torres. In the mid-1700s, he accompanied a mining expedition to the west side of the Valley. It was apparently here that he was so struck by the Valley's beauty that he named it after San Luis, the patron saint of Seville, his home. At some point later in the expedition he was mortally injured by an uprising of Indians who had been enslaved to work in a mine on the east side of the Valley. The surviving miners and Torres fled to San Luis Lake where, while floating on a raft, the dying missionary looked up to the east to see the snowy mountains lit in their characteristic salmon colored alpine glow and uttered "Sangre de Cristo," "blood of Christ."

During the mid-to-late-1700s, one of the first duties of Don Juan Bautista de Anza, the new governor of New Mexico, was to go on an offensive to control Comanche raiding parties that had grown troublesome to settlements in the region. In August 1779, Anza mobilized 600 soldiers to capture Comanche leader Cuerno Verde. Anza's forces moved from Sante Fe to the west side of the San Luis Valley, across the Los Pinos River, through La Jara, across the Alamosa River and Rock Creek and across the Rio Grande somewhere east of present day Del Norte. Along the way, Anza was joined by a number of Utes eager to fight the Comanches. Utes were attacked by Comanches at San Luis Lakes. The surviving Utes joined Anza and pursued the attackers through South Park, past Pikes Peak and finally engaged and killed several near present day Pueblo. The Comanche band was completely defeated near the peak currently called "Greenhorn," English for Cuerno Verde. This campaign ended hostilities between the Spanish and Comanches.

Spanish settlement in the SLV began early in the 1800s. After years of summer grazing by small flocks of sheep in the early1800s, permanent livestock production was established in the San Luis Valley around 1840. Settlement and ranching expanded rapidly in the second half of the 19th Century, with sheep use predominant in the lower half of the SLV and cattle and sheep grazing about equal in the upper part of the Valley. Experiencing severe winter losses, most ranchers developed the use pattern that exists today which consists of moving livestock from lower private lands in the late spring to higher public lands for the summer and fall, and subsequently back onto private lands during winter when hay is the primary source of forage.

Recreational Uses

The SLV contains a variety of land forms from mountains to valleys; vegetation from trees to sage; and a variety of topography from sand dunes to mountain streams. These features offer a number of diverse settings for outdoor recreational activities. The SLV provides opportunities for hunting, fishing, wildlife observation, off-highway vehicle use, hiking, picnicking, camping, vegetation and mineral gathering, snowmobiling, cross-country skiing, general leisure, and sightseeing. Although this region has a low population density, national attention focuses on attractions such as the Great Sand Dunes National Monument, the Sangre de Cristo Mountains, the Rio Grande Corridor, Rio Grande National Forest, and Alamosa and Monte Vista National Wildlife Refuges (USDI, BLM 1989).

About 30,000 people visit the Refuges annually. The Refuges have visitor contact stations, auto tour routes, several wildlife observation areas, and waterfowl/small game hunting areas.

Level of Participation on the Alamosa/Monte Vista National Wildlife Refuge Complex for Some Major Public Use Categories

Type of Use	1989	1990	1991	1992	1993	1994	*1997	*1999	2000
Visitor Contact Station	N/A	N/A	280	14,177	12,608	6,108	2,831	1,890	2,315
Auto Tour Route	3,000	5,000	15,000	26,105	31,518	15,270	19,406	15,635	15,650
Waterfowl/Small Game Hunting	600	400	500	885	339	254	1,099	1,284	1,190
School group tours/talks	100	300	571	1,449	740	630	457	788	1,030
Sub-total	3,700	5,700	16,351	42,616	45,205	22,262	23,793	19,597	20,185
Total Visits	3,700	5,700	16,351	42,616	45,205	22,262	^30,327	^25,000	^29,400

Social and Economic Aspects

Population and Unemployment

The SLV area consists of six counties: Alamosa, Conejos, Rio Grande, Costilla, Mineral, and Saguache Counties. The total population for the area has increased about 11 percent from April 1990 to July 1999 and is presently estimated at about 45,000 people. Saguache County has experienced the largest population increase, numerically and by percentage (1,557 people, 33.7 percent). Alamosa and Rio Grande Counties have the largest populations, about 14,500 and 11,500 respectively. One of the most significant social characteristics is the large Spanish speaking and Spanish surname population. The Hispanic population represents 52 percent of the total population in the five counties. The State of Colorado, as a whole, has a 15 percent Hispanic population. (U.S. Census Bureau 1999a,b)

Unemployment in the San Luis Valley tends to be higher than that experienced in the State of Colorado as a whole. In November 2000 the Valley had an unemployment rate of 5.7 percent, compared with 2.6 percent for the State. Unemployment in each county was: Alamosa 5.0 percent, Conejos 6.1 percent, Costilla 7.5 percent, Mineral 1.2 percent, Rio Grande 6.8 percent, and Saguache 4.8 percent. (Colorado Department of Labor and Employment 2000)

Lifestyles within the counties are varied. In Saguache, lifestyle is centered around a farming and ranching economy where most of the ranches are family-owned and operated. Alamosa in Alamosa County and Del Norte and Monte Vista in Rio Grande County provide retail trade and support services for the surrounding smaller communities and rural areas. Alamosa, an academic community associated with Adams State College, offers the community additional cultural activities. The rural areas support a ranching and farming lifestyle with rodeos, 4-H clubs, Boy Scouts, and riding clubs.

Tourism

Tourism has been an important component of the San Luis Valley's economy for decades. The Valley is promoted as the "land of cool sunshine" and boasts a refreshing summer climate, spectacular vistas, and a diverse array of recreational activities. Outdoor enthusiasts can take advantage of several sites including the Great Sand Dunes National Monument and Preserve, the Cumbres & Toltec Scenic Railroad, San Luis Lakes State Park, Blanca Wetlands, Zapata Falls Recreation Area, and one 18-hole golf course. Elk hunting is a growing activity in the Valley and has a large seasonal impact on the economy. Several guiding and outfitting businesses exist to support elk hunters during the fall but also accommodate fishing enthusiasts, outdoor photographers, and back country adventurists.

Both Alamosa and Monte Vista Refuges offer attractions for tourists. The Refuges receive an average of 30,000 visits annually. Approximately 10,000 of these visits occur during a two-week period centered around the Monte Vista Crane Festival in mid-to-early March.

The San Luis Valley offers several other cultural attractions, including the Creede Repertory Theater and Stations of the Cross Shrine, the Alamosa County Museum, old Fort Garland, and museums for Alamosa, Costilla, Rio Grande, Saguache, and Mineral Counties.

V. Environmental Consequences

No Action (Current Management) Alternative

Wildlife

Water Management

In this altered and arid landscape, the ability to manipulate water enables the Refuge staff to meet the Refuges' mission by enhancing migratory bird production, providing for migratory birds' resource needs during critical portions in the life cycle, and supporting an array of wildlife species. Water control on the Complex partially compensates for the changes and reduction in Valley wetlands that have occurred in the last 150 years. Management of water, to some degree, is necessary to achieve almost all wetland habitat goals on the Complex.

The ability to move, add, and remove water allows Refuge staff to create and support the types and condition of vegetation that provide nesting, foraging, and cover for wildlife. Current water control increases the number of nesting waterfowl, water birds, and shorebirds. Portions of the Monte Vista NWR consistently have some of the most productive duck nesting habitat on the continent (Gilbert, et al. 1996). This level of nesting would not be possible without the water management capabilities that support the vegetation which is critical to nest initiation and success. Not only do water management capabilities allow for the creation of suitable nesting habitat but it allows for the maintenance of it as well. For example, it is essential to the success of nesting white-faced ibis, snowy and cattle egrets, and black-crowned night herons to have consistent water levels in the colonies throughout nesting efforts. Without the current ability to add water to these bulrush marshes, the production of these species and others would be negatively impacted or compromised completely.

The ability to provide shallow water in the early spring and fall provides critical roosting and loafing habitat for the Rocky Mountain greater sandhill crane population, the majority of which migrates through the San Luis Valley twice a year, as well as thousands of migrating waterfowl. Water management supports the vegetation which offers food, cover, and loafing sites to migrating waterfowl, waders, and other water birds. The application of water also enhances invertebrate populations which are critical food sources for migrating and breeding shorebirds, breeding waterfowl, and others. Intensive water management also allows for the production of dense vegetation in short-emergent and agricultural habitats which provide cover to mammals and other species which feed wintering raptors and other wildlife.

The current ability to influence wetland conditions through water manipulation allows the Refuge to provide a fairly broad range of critical habitats which support an array of plant and wildlife species. This allows the Refuges' to contribute to the overall biological diversity of the San Luis Valley, the State, and even the hemisphere.

A sacrifice inherent to the application of water is the reduction in arid vegetation; however, in the San Luis Valley, that habitat type is very common and does not appear limiting for any wildlife species. The potential for creating wildlife sinks can occur if proper design is not considered in wetland creation and if planning does not consider annual life cycle needs of wildlife, climatology (snow pack), and juxtaposition of habitat types. Another compounding factor of water manipulation is the potential for dramatically changing soil salinity. The Refuge staff considers these factors when developing water management plans and evaluates impacts through consistent observation and time in the field.

The paradox exists that since the Refuges are supported by water diverted from the Rio Grande these diversions are contributing to depletions in the river and alteration in groundwater levels. On one hand, these depletions directly and indirectly affect wetland, riverine, and riparian communities supported by the river. While on the other hand, this water is used to create high quality wetlands and other habitats that mitigate for Valley-wide habitat modifications. These habitats and the species that depend upon them would be very limited to nonexistent in the Valley if the water was not used in some manner as is currently practiced on wetlands managed by the U.S. Fish & Wildlife Service, Bureau of Land Management, Colorado Division of Wildlife, and The Nature Conservancy. Additionally, surface water is moved into "recharge" areas in Units 12 and 19along the Monte Vista Canal and in Unit #9 from the Empire Canal throughout the Monte Vista NWR which provides some recharge of the water table in addition to that from spring snowmelt. This situation is unlikely to change given that management of water in the Rio Grande is governed by the State of Colorado and the Rio Grande Compact. For example, halting diversions for Refuge operations for the sake of restoring natural hydrology in the Rio Grande is not a viable strategy. Given that the Rio Grande is an over appropriated system, the water not diverted by the Refuges in this scenario would simply be made available to users with rights that are junior to those currently held by the Refuges.

Water management on this Complex is intensive and more complicated than most units of the National Wildlife Refuge System. Additional infrastructure is needed to maximize the ability to manage plant communities in varying successional stages and condition for the benefit of wildlife. The ability to adequately measure and monitor amounts, depths and area covered by water in individual wetland units is currently lacking and, therefore, limits the effective monitoring of water applications and hinders management activities to achieve desired responses.

The effectiveness of current water management to provide quality wildlife habitat is somewhat constrained because the impacts of water on many factors is unknown or not well understood. Little is known about the influence of current water management practices on the invasion and spread of noxious weeds, notably tall whitetop. Invasions of whitetop and other noxious plants can decrease the abundance of native plants which provide a higher quality of food and cover than do weeds, especially when they exist in monocultures.

Little is understood about the relationship between surface and groundwater hydrology. Understanding this complex relationship, however, is a daunting task which hydrologists continue to examine. Currently, the refuge staff recognizes that this highly complicated relationship exists and are aware that our water management actions impact more than the surface habitat.

The current level of understanding of how invertebrates, soils, plants, and other factors respond to various water regimes is primarily based on observations and limited vegetation monitoring. The structure and species composition of short-emergent vegetation is monitored on portions of the Monte Vista NWR to assist in determining how these plants respond to annual water management. Complex-wide, the effectiveness of water management in creating quality wildlife habitat is evaluated by observing vegetation condition and by documenting the wildlife use an area receives. The presence of wildlife, however, does not equate to quality habitat, but current efforts to adequately monitor the abiotic (i.e., soil salinity) and biotic (i.e., invertebrates) response to water management are limited by staff availability.

Rest

Rest refers to the lack of grazing, fire, mowing, and other habitat management tools which alter plant species composition, successional stage, structural density, and other characteristics of plant communities. Most of the Complex, however, does experience some form of water management, so most rested areas are not completely without management activity.

Refuge managers use rest in conjunction with other habitat management tools to provide a mosaic of habitat types with various structural conditions on the Complex that best support habitat goals and objectives. Most habitat types on the Complex are rested to allow for the production and maintenance of dense vegetation which is limited in the Valley and supports a large array of nesting and foraging migratory birds.

Long-term rest in wetland areas provides heavy residual vegetative cover and, when appropriately irrigated, provides optimum waterfowl, American bittern, rail, and colonial water bird nesting habitat. Dense wetland vegetation also provides nesting habitat for northern harriers and short-eared owls and cover for small mammals which are the prey base for birds of prey and other wildlife. Nothing in nature is static; in many plant communities ,the benefits of rest for wildlife habitat may be diminished when standing dead vegetation shades and reduces the vigor of new vegetative growth. Long-term rest can lead to losses in plant species diversity, decline in nutrient recycling and plant germination, and a decrease in soil temperatures. Even areas intended to provide nesting cover for ducks, primarily short-emergent wetlands, can potentially become so dense that new plant growth is inhibited and the long-term health of the plant community may be compromised. Currently, the decision to implement a management tool and, therefore, not rest an area, is based on the limited collection of plant density data, but is primarily based upon observations of vegetation and wildlife. While in the field, biologists and managers evaluate plant species composition, structure, and viability, but a quantitative method is not applied to the entire Complex. When plant communities show signs of limited new plant growth or new growth is not vigorous, then management tools designed to induce disturbance and subsequent plant rejuvenation are implemented.

Uplands, primarily greasewood dominated flats, are mostly rested because these areas probably had little historic disturbance and active management would not produce results that would support migratory birds. Riparian areas are also rested for long periods to allow for the production and maintenance of dense willow and cottonwood stands which are habitat for the endangered southwestern willow flycatcher and many other songbirds.

The biggest challenge in utilizing rest as a management action is the current lack of knowledge about the ratio of rest to disturbance under various conditions and within various vegetation types needed to best meet the needs of various wildlife species. For the majority of the Complex, staff rely primarily upon professional judgement, observation of vegetation response to past periods of rest, and the current moderate-to-low level of monitoring when deciding if an area should be disturbed to enhance plant communities.

Prescribed Burning

As with other habitat management tools, fire affects wildlife primarily through its modification of the habitat. The resulting impacts of burning depend on a variety of variables, including vegetation type, condition of the habitat, and climatic conditions. The long-term impact on habitat is also variable depending upon plant species composition, timing of the burn, fire frequency, and other characteristics.

Of all the management tools, prescribed burning has the most immediate effect on wildlife habitat by removing plant material, exposing the soil, stimulating growth of some plants, and killing or reducing the vigor of some plants. Some direct mortality of some sedentary animal species occurs during some fires.

Prescribed burning can enhance the cycling of nutrients by converting surface mulch and plant litter to ash (Higgins and Kjellsen 1990) and by making many nutrients soluble and available for plant growth. Fire encourages new growth of many plant species, such as grasses and forbs, which, in time, provides nesting sites for ground-nesting sparrows and other species. Fire can also be used to alter plant species composition. Burning can be used to clear the landscape of excess plant residual and, when used in conjunction with other tools, to negatively impact noxious weeds or plant species (such as phragmites) that have become so dominant that habitat quality is reduced. The ability to alter plant species composition and abundance allows Refuge staff to provide a variety of habitat conditions which better meets the resource needs of wildlife.

If portions of the Complex are burned, a mosaic of vegetation structure is created which increases the diversity of feeding and loafing opportunities for migratory birds and may provide habitat for additional species such as migrating long-billed curlews. Areas burned and followed with shallow water flooding during certain seasons produce a flush of invertebrates which feed waterfowl, sandhill cranes, white-faced ibis, shorebirds, and a host of others. Sites burned in the winter or early spring are usually the first to green up in the spring, enhancing invertebrate production as well as providing foraging sites for Canada geese and other wildlife.

Within most Refuge plant communities, fire temporarily changes the condition of the habitat versus eliminating the habitat. In riparian areas and brush uplands, however, burning has a longer lasting impact on vegetation, and subsequently wildlife, than in wetland and grassland habitats.

Refuge staff currently evaluate each proposed prescribed burn on an individual basis, considering vegetative response in context with providing long-term quality habitat for migratory birds and other wildlife. As with other tools, the impacts on habitat favor some wildlife species and not others, therefore, careful thought, experience, and professional judgement are used in determining when, where, and how a burn is used. Every attempt is made to monitor vegetation in a quantitative manner before and after a prescribed burn; however, long-term efforts are minimal due to staff availability.

Prescribed Grazing

The only grazing on the Complex since 1996 and until 2001 is to meet the protocol of a 5 year research project being conducted by the University of Missouri. This project began in response to the compatibility lawsuit filed in 1993 over grazing as a tool to create habitat diversity and control tall whitetop.

Based on experience with cattle grazing on the Complex, the Refuge staff currently views grazing as a method of clearing residual vegetation and stimulating new plant growth. It has been used in the past to assist in controlling noxious weeds, primarily tall whitetop; however, quantitative and long-term impacts of this tool in meeting this objective are currently being documented by Dr. Fredrickson.

Cattle grazing is used throughout wildlife management areas to accomplish a number of habitat conditions by altering its abiotic and biotic components. The way in which grazing influences the landscape, and thus wildlife, depends upon many variables, including plant species composition, life stage of plants, climatic factors, past disturbance of the area, hydrology, and intensity and seasonality of grazing. This tool is often used to alter abundance, distribution, and diversity of plant communities which allows refuge managers to provide the habitat conditions required by various wildlife species. Grazing is often used to help control or minimize problem plant or noxious weed infestations but it is most effective when combined with other management tools. The impacts of grazing on abiotic factors include changes in the availability of soil moisture, oxygen, light, and nutrients. In addition, grazing can compact soils and add fertilizer. All of these changes support certain vegetation types or conditions which favor some wildlife species and not others. Direct impacts on wildlife are generally negligible depending on the grazing prescription; however, ground nests may be trampled or, more often, are exposed by a reduction in structural density of the vegetation.

The current grazing prescription is similar to the one that was in use when the Complex was sued in 1993. It is a rest-rotation regime carried out in the growing season (May 15 to September 1), and has been used in the context of research on the Monte Vista NWR until currently and until 1998 on the Alamosa NWR. Under this regime, cattle are moved every one to six days to a new site with a 25 to 35 day recovery period before it is grazed again. Sites may be grazed two to three times during the summer. This particular grazing prescription has impacted wildlife by changing the vegetative structure within some of the Refuges' short-emergent and tall-emergent vegetation communities. In the short-term, this prescription provides more habitat for wildlife species requiring less vegetated areas, such as foraging white-faced ibis. The number of waterfowl nests in these areas may be temporarily reduced due to the reduction in plant cover. Cattle grazing does negatively impact wildlife species that require fairly dense vegetation; however, this temporary loss of habitat may be acceptable if the long-term quality of the habitat is improved by the reduction of tall whitetop, which is a noxious weed and detrimental to habitat quality. Prior to the conclusion of the research, however, the effectiveness of cattle grazing to assist in controlling whitetop on the Complex is unknown.

Aspects of the current grazing prescription, primarily its impact on vegetation structure in two wetland types on the Complex, were evaluated in a masters project under the umbrella of the compatibility research. Quantitative baseline information was collected to describe plant/cattle interactions. The impacts of cattle grazing were very different on the two Refuges. The impact of grazing on vegetation structure was greatly influenced by the hydrology. Water management (timing, depth, and duration of flooding) significantly altered structural condition of plants in the presence of cattle grazing. Whitetop was consumed by cattle but consumption was variable (Diebboll 1999). After cattle grazed an area, the impact to whitetop was apparent because the tops of the plants had been removed by foraging cattle. However, the impact grazing has on the underground biomass (roots) may be more of an indication of the effectiveness of this tool in whitetop control. The impact of management tools on the below ground biomass of whitetop is currently being evaluated by Dr. Fredrickson.

Regardless of the management alternative selected, after the research and analysis are completed (approximately 2002), grazing will become a potential management tool and under the direction of the Refuge staff. Under the current and proposed alternatives, the potential use of cattle grazing will be fully and closely evaluated and based upon the results of the compatibility study, incorporation of other research, professional judgement, and results from evaluation and monitoring of Refuge habitats. Under the current management alternative, and with the current staff level, the ability to monitor grazing impacts on habitat and wildlife will be restricted to the collection of fairly broad information or will be conducted at the expense of monitoring other tools and processes on the Complex.

Several biological and non-biological factors are involved with how grazing will impact the habitat and ultimately wildlife, and the Refuge staff will consider as many of these as possible when considering the use of this tool. When deciding if, how, when, and where to graze the plant species, plant phenology, hydrology, soils, season, and past disturbance of the site will be carefully described, considered, and evaluated to ensure that the best possible habitat is available for wildlife. When considering the implementation of grazing, sensitive and rare plant communities will be taken into account and water on the Complex will be protected from the potential impacts of erosion and decrease in water quality due to cattle use. If grazing is used, Refuge staff will document the decision-making process including desired outcomes and any assumptions made. Almost every impact of grazing can be interpreted as positive or negative, depending upon the original reason for using the tool and depending on the temporal and spatial scale in which the impacts are evaluated. Therefore, the Refuge staff will revisit and remain clear about the reason for grazing and will maintain a consistent level of monitoring.

The compatibility research will provide valuable information about land management tools, including grazing, and their impacts on Refuge habitat, primarily tall whitetop. However, like all research projects, the results will be based on a snapshot in time and under a range of environmental conditions which are constantly changing. Therefore, Refuge staff must continue to monitor and evaluate habitat and wildlife before and after grazing to provide the information required to make the management decisions that best provide for long-term support of trust species. Additionally, the landscape responds to management treatments in varied ways depending on an array of factors; therefore, grazing can create desired results 1 year and completely fail the next year (Fredrickson and Taylor 1982). So, to reach desired results, consistent and long-term monitoring is necessary for effective and adaptive management. Under the current management alternative, and with the current staff level, monitoring efforts will be somewhat limited based on the number of staff available to conduct the field work.

Farming

The Refuge staff will continue to farm 510 acres on the Monte Vista NWR, where small grains such as wheat and barley are grown as a high energy food source for migrating sandhill cranes and waterfowl. Ninety-five percent of the Rocky Mountain population (RMP) of greater sandhill cranes migrates through the San Luis Valley in the spring and fall where they spend several weeks feeding in agricultural fields. Historically, cranes probably fed on plants, invertebrates, and other foods provided in wetlands (R. Drewien, pers comm). In the last century, with a decrease in the number and quality of historic wetlands, cranes have adapted to the current landscape, which is dominated by agriculture. Foraging cranes are now dependent on agriculture fields on and off the Refuge. Migrating cranes and waterfowl, primarily mallards and northern pintail, will continue to feed and gain energy reserves on Refuge farm fields before moving to the breeding grounds or, in the case of some waterfowl, initiating nests in the Valley.

Farm fields also provide cover and food for rodents and other small mammals which are the food source for raptors throughout the year, but especially by wintering rough-legged hawks, northern harriers, golden eagles, and others.

Grain crops are rotated with alfalfa to improve soil health, notably nitrogen fixation. These legume stands provide nesting cover for several ground-nesting birds, such as northern harriers, meadowlarks, and pheasants. The irrigation of farm fields, however, can potentially flood nests. Alfalfa fields also provide cover for mule deer fawns and other wildlife.

During certain times of the year when crops are immature or a field is fallow, plant cover is temporarily removed which can increase soil erosion and decreases the total amount of cover available to wildlife. Farming also reduces the amount of ground that supports non-agriculture vegetation. The farm fields comprise less than 1 percent of the total Refuge and this loss of native plant species is not significant to the plant community nor to wildlife. Farming can introduce and/or encourage the invasion of undesirable plants such as Canada thistle, which is a potential hazard to the quality of neighboring native plant communities which support various wildlife species. However, the amount of wildlife habitat negatively impacted due to weed expansion from the farm fields is very low. Most of the habitat that has weeds common to agricultural fields, such as thistle, would probably have these plants regardless of the presence of Refuge farm fields.

The presence of high energy foods which are easily available to foraging birds and other species attracts large concentrations of wildlife. High numbers of birds in relatively small areas can create conditions conducive to the spread of disease such as avian cholera.

Farming practices also use water which could be used in other areas. The benefit to providing food for migrating cranes and waterfowl is assumed to off-set the relatively minor reduction in habitat that is caused by water being used to irrigate croplands versus wet meadow vegetation.

Farming requires a relatively large amount of staff time and effort in the spring and summer. Staff time is a valued commodity; however, the benefits to foraging cranes, waterfowl, and raptors is considered to be worth the time of Refuge personnel.

Naturalness

Water Management

Wetlands have likely been present in the San Luis Valley for thousands of years. They were probably distributed along river and stream corridors, springs and other areas where the groundwater level was high. For this reason wetlands are biologically "natural" in the San Luis Valley.

Wetlands maintained on Alamosa NWR have a more pleasing appearance to most because the basins themselves were sculpted by scouring actions of the Rio Grande. Few dikes and levees are seen on Alamosa Refuge. Most wetlands on Monte Vista NWR have been created during the 20th Century by ranchers and then by refuge management. Due to the flat terrain, water management has relied on an extensive network of large and small dikes, obvious to the observer. In addition, pumped wells are a major source of water on this Refuge. Some of the larger pumps are obvious and obtrusive to some observers.

Under this Alternative, the "natural" appearance of Alamosa Refuge will be maintained. Monte Vista Refuge will have a more managed appearance but efforts will continue to replace large obtrusive straight dikes with smaller contour dikes when terrain and habitat objectives allow.

Rest

Many observers and Refuge visitors view the absence of grazing, mowing, and burning as a more natural condition on a national wildlife refuge, following the notion that disturbance tends to discourage use of an area by wildlife. In addition, the use of grazing by domestic livestock is frequently criticized on the basis that domestic livestock are by definition a foreign species. Likewise, the use of mowing machines leaves wheel tracks, a uniform stubble height and creates a level of disturbance while being used that would not be considered natural by most Refuge visitors.

Prescribed Burning

Current prescribed burning practices do have a dramatic visual effect on the landscape, creating areas that are bare and black. These areas may appear "unnatural" to many. However, these effects are short-lived. Within 5 to 15 years, burned areas may actually appear more "natural" because of the species and structural diversity promoted by fire.

Prescribed Grazing
Grazing is considered by many to be a more natural management tool than are machines or chemicals, with some grazers being considered more "natural" than others. Native ungulates may be the most "natural," but are much more difficult to manage than are domestic livestock. However, many people believe that livestock grazing is an inappropriate use of public lands dedicated to wildlife.

Grazing requires fencing and other support facilities which mar the appearance of naturalness and affect the movement of wildlife. Many rest/rotation grazing schemes require relatively small paddocks which, in turn, require more fencing. One possible way to mitigate grazing's effect on "naturalness" is to use single strand electric fencing, which is generally viewed as less obtrusive than 3-strand barbed wire fencing.

Current Refuge operations do include some experimental grazing on Monte Vista NWR. However, grazing is not widespread and little fencing is required solely for this purpose. Therefore, at the current time, grazing has minimal impact on naturalness.

Farming
Current farming practices on some Refuge lands can create an "unnatural" appearance. Farming infrastructure, including tractors, plows, discs, drills, and irrigation equipment, are considered "unnatural" by many Refuge visitors and other interested parties. Organic farming is generally considered more natural than conventional agricultural practices. In this regard, Refuge management strives to use organic methods whenever feasible; however, current trends are towards incorporating more conventional methods because past organic practices were not achieving farming objectives. This trend may add to the perception of "unnatural" management on the Refuge.

A concern exists that fields left fallow do not look natural. Fields producing small grains are another concern for they lack the more typical species and structural diversity generally found in more "natural" less intensively managed landscapes. The high concentration of wildlife attracted by these crops are also perceived as "unnatural" by some Refuge visitors. However, these same concentrations are thought by many other visitors to be very "natural."

Elk Management
Current elk management efforts include reducing numbers of resident elk on the Monte Vista Refuge and limiting transient elk numbers. Some visitors may consider these actions to be "unnatural" for a national wildlife refuge.

Water Use

Water Management

The use of Rio Grande water is governed by a 1939 compact between the States of Colorado, New Mexico, and Texas, with provisions for water flows to Mexico as well. The compact ensures an equitable amount of river water to all parties and has to be the basis for assessing the effects of today's water uses in the San Luis Valley.

The use of water from the Rio Grande or groundwater from pumped or artesian wells throughout the SLV has some negative effects irrespective of its use, whether for irrigation of cropland or wetland vegetation. Reduced river flows at the Refuges' points of diversion are the most noticeable effects; however, with the Refuge's close proximity to the River, return water flows to the River are substantial. When compared to pre-irrigation times, consumptive use of water on the Refuges is considerable, especially since irrigation water is applied to Refuge lands from mid-February to November. However, current water diversions (Rio Grande and wells) of approximately 32,000 acre-feet is comparable with the water use prior to Refuge acquisition when the land was managed to produce livestock forage. The Refuge has been able to increase wetland acreage without increasing its consumptive use of water from the Rio Grande by using water from the Closed Basin Project, which is designated for Refuge use as mitigation for the Project's impacts to wetlands in the SLV.

Although current water management techniques are highly engineered and complex, they are not as efficient as current technology allows; nor do they permit exact monitoring of water consumption. A need exists for an improved understanding of the water delivery system and water rights associated with the Refuge Complex in order to ensure full and appropriate use of all water entitlements.

It is very likely that pumping water from wells has lowered the water table. Rio Grande surface water diversions are used to recharge groundwater in an effort to offset these losses. The unconfined aquifer in the central and western part of the valley is monitored closely by the Rio Grande Water Conservation District through a system of monitoring wells. It is currently thought that the unconfined aquifer is in a general state of equilibrium. With only a few exceptions annual recharge seems to replace water used. The confined aquifer has less artesian pressure than in the early 1900s. In the 1970s the State Engineer placed a moratorium on new wells in this aquifer. Given this general, valley-wide information there is little historic information specific to groundwater levels on either refuge.

The quality of the water returning to the river and contributing to groundwater may actually be enhanced by the cycling of nutrients provided by healthy wetland plant communities. The use of synthetic pesticides on the Complex is limited, perhaps further contributing to the enhanced water quality.

Rest

Current rest practices have no known measurable effect on water use.

Prescribed Burning
Prescribed burning has no measurable effect on water use.

Prescribed Grazing
Current grazing practices have no measurable effect on water use.

Farming
Until the late 1980s, croplands were flood irrigated. Since then, 462 acres have been converted to more efficient sprinkler irrigation. Forty-eight acres remain in flood irrigation. These acres are not suited for the use of sprinklers due to their location, size, and shape; it would not be cost effective to design a center pivot irrigation system.

Elk Management
Current elk management has no known measurable effect on water use on the Refuge Complex.

Public Use

Water Management
Current water management creates and maintains wetlands and produces wildlife food crops which, in turn, attract waterfowl, water birds, and other wildlife to the Refuges. This provides convenient public viewing and hunting opportunities. In particular, the many wetlands attract large numbers of migrating sandhill cranes, making possible the popular annual Crane Festival in the Spring. Water is also used to provide a Kid's Fishing Day when a small pond is temporarily filled and stocked with fish. The water is subsequently released and used for irrigation.

Rest
Rest helps create dense vegetation. These dense areas increase wildlife production by providing nesting cover. Subsequently, game bird hunting is improved and aerial predators are more visible as they fly these areas in search of prey. However, ground hugging wildlife are more difficult to observe in dense vegetation.

Prescribed Burning
Prescribed burning has both positive and negative effects on visitor use of the Refuges. The dramatic effects of burning attract the attention of visitors. Wildlife is more visible in burned areas and the lush green vegetation that emerges after a burn is a pleasant sight for many visitors.

The negative effects of burning on visitor use include a reduction in concealment for waterfowl hunters and the temporary displacement of wildlife. Wildlife displacement can adversely affect viewing and hunting opportunities.

Prescribed Grazing
Current grazing practices, limited to the research efforts described elsewhere in this document, have few direct or indirect impacts on public use. All fences are considered unaesthetic by some visitors, thereby adversely affecting their experience. Also, a segment of society is opposed to grazing on public lands and feel that the presence of cattle and its attendant impacts on the land detract from their experience.

Farming
Farming generally enhances the Refuge experience for most visitors. Farming attracts and concentrates wildlife to an area where they are highly visible due to the sparse cover. Croplands are located near public roadways to enhance viewing opportunities for all visitors, including those that are vehicle-bound. Current farming practices also attract ring-necked pheasants and other wildlife that are not commonly found in other parts of the San Luis Valley, which adds to the diversity of wildlife viewing and/or hunting experiences. Farming combined with water management that makes the annual Crane Festival possible.

Some members of the public find farming unaesthetic and inappropriate on wildlife refuges.

Elk Management
Current elk management does provide some public viewing opportunities, including easily accessible areas commonly used by elk during the fall and winter. Current management objectives are to limit elk numbers, not eliminate them all together.

Public elk hunting is not allowed on the Refuge. Safety concerns rule out the option of a public elk hunt on the Refuge. However, the dispersal hunt is highly regulated, very safe and is proving to be effective.

Weeds

Noxious weeds are the largest threat to the biological integrity of both national wildlife refuges. Weeds are of concern both on the Refuge Complex and throughout the San Luis Valley. Neighboring landowners see the Refuges as a source of weeds, compounding their efforts to eradicate them.

Opinions differ on what constitutes appropriate weed management. Some of the public expects weed elimination, versus weed control (i.e., managing weeds within a contained area and controlling further invasion). What some perceive as effective weed control does not conform with what science tells us. For instance, mowing and grazing (techniques many feel are effective and appropriate) may make weeds unnoticeable but research shows that the weeds are still there, particularly root stock, and able to reestablish themselves if control measures stop. Additionally, no herbicides are currently legally available that can effectively control the most problematic weed species, especially the older established colonies in wetland environments.

Water Management

Some weed species, such as Russian knapweed and tall whitetop can be controlled by water at appropriate depths and durations. On the other hand, current water management that improves wildlife habitat also creates conditions favorable to weed invasion. For instance, irrigation favors Canada thistle and tall whitetop, and flowing water disperses weed seeds. Also, the maintenance of water control structures disturbs the soil, which enhances conditions for weed invasion.

Compounding these effects is the fact that water, as applied on the Refuges, precludes or limits the use of some weed control methods. Only one herbicide, of limited effectiveness, is available for use in aquatic environments. Mowing is difficult in wet soils and largely ineffective if not combined with herbicide application.

Current water management capabilities do not allow for precise and adequate application of water on the Refuge. Improvements in the Complex's water control systems would enhance weed control efforts.

Rest

Resting lands can increase or decrease weeds, partially depending on the vegetation composition at the start of rest. If native vegetation is predominant, vigorous, and healthy, rest may give natives a competitive advantage over weed species. If the situation is reversed, weeds may spread. In either case, the absence of cropping from mowing or grazing lessens the stress on plants and promotes seed production. However, rest can reduce germination success as ground cover increases, creating more shade, less space, and lower soil temperatures. After rest periods, older stands of weeds are less susceptible to some control measures, such as chemicals and mowing, due to their extensive root stock.

Prescribed Burning
The effects of prescribed burning on weed control on the Complex is not clearly understood at this time. Little information is available on fires impact on species of local interest. Prescribed burning can increase the effectiveness of other weed control methods such as chemicals and grazing. Livestock may eat new green weedy shoots that sprout after burning, whereas they may not have eaten the older shoots that existed prior to burning. Chemicals applied after burning may limit the sprouting of weeds from root stock since new growth may be more susceptible to herbicides. Additionally, new shoots in the absence of dense cover may better transport the herbicide to the root stock.

Prescribed Grazing
Prescribed grazing is not currently used as a management tool and is only allowed as part of the research efforts described elsewhere in this document. The impact of grazing on weeds is being assessed by this research project.

Farming
The soil disturbance and bare soils associated with current farming practices can create weed invasion sites. Until recently, refuge management has tried to use organic farming methods but has started to switch towards more herbicide use. Past organic farming did not meet weed control objectives. Specifically, Canada thistle has dramatically increased over the past 10 years. Therefore, current management is switching towards a minimal use of chemical control methods in combination with the practice of including a fallow period in the farming rotation.

Elk Management
Current elk management has no known measurable effect on weeds.

Elk

Water Management
Water management has no known measurable effect on elk and their management on the Refuge.

Rest
Current rest practices have no known measurable effect on elk and their management on the Refuge.

Prescribed Burning
Prescribed burning has no known measurable effect on elk and their management on the Refuge.

Prescribed Grazing
Grazing can affect elk in that livestock may limit the availability of some Refuge units for elk foraging. Current grazing is very limited and conducted within the confines of ongoing research. Adverse effects on elk are negligible, if any.

Farming
Current farming practices have been modified to eliminate growing peas because they seemed to attract elk to the Refuge. This may decrease the forage value of Refuge lands to elk, which is in line with elk management goals.

Elk Management
Elk on the Refuge are not available for public hunting due to the safety concerns outlined in the description of the management alternatives. This, combined with heavy hunting pressure outside the Refuge, creates a haven for elk on Refuge lands. Elk on the Refuge can cause private property damage by leaving the Refuge at night and eat alfalfa stacks on private lands and damage privately owned fences in route. The State, in turn, is legally liable to the private landowner for the forage lost and damage to fences. This creates a serious public relations and economic problem for the Colorado Division of Wildlife. In consideration of these problems, plus the difficulty the Division of Wildlife is having in meeting elk harvest objectives and the safety threat to motorists on State Highway 15 and several county roads, refuge management calls for trying to dissuade large numbers of elk from using the Refuge.

Current management calls for discouraging elk residency and for limiting transient elk numbers to no more than 200. This is accomplished by a combination of dispersal hunting and strategic road closures during the hunting season. An average of about 30 elk (ranging from 11 to 80) are hunted each season through the dispersal hunt.

Proposed Alternative

Wildlife

Water Management

Under the proposed alternative, water management in general will have the same impact on wildlife habitat as in the current management alternative, with the notable exception that the quality and quantity of wetlands on the Complex will be enhanced. Improvements in the water control infrastructure, installation of equipment that enables monitoring of water application, and an increase in monitoring staff will all greatly contribute to the enhancement of wildlife habitats.

Most wetlands on the Monte Vista NWR are directly or indirectly dependent upon irrigation by Refuge staff. These wetlands replace some of those lost in the Valley and provide critical habitat to migratory birds and other wildlife. For this reason, water management must be as efficient as possible.

Improvements in water management infrastructure will increase the ability of the Refuge staff to manage water more efficiently, irrigate wetland vegetation during critical times, and just as importantly, to dewater areas. Currently, throughout the Complex, a series of wetlands must be filled in order to get water to the next wetland. This system limits water management options and the ability to provide wildlife habitat in a timely manner. Under the proposed alternative, improvements in water control structures, wells, canals, and pumps will greatly enhance the efficiency and timing of moving water as well as providing independent water control in many wetlands. This increased control over water movement and distribution allows for flexibility in creating and maintaining a range of vegetation and water conditions which supports more wildlife species as well as providing appropriate habitat to wildlife as their resource needs change during the life cycle.

Wetland basin capacity inventories are being conducted and staff gauges are being placed in wetlands. These resulting data will allow Refuge staff to quantify the amount of water in each basin, monitor water levels, document habitat and wildlife response to water regimes, and provide for accurate and consistent documentation of water use in each wetland. This information will allow for adaptive management; for example, in order to produce native wetland vegetation which feeds migratory birds, the Refuge staff must know under what hydrological and other conditions these plants thrive and be able to replicate those conditions in the future.

Increased monitoring will also enable Refuge staff to examine how water management practices impact the invasion and spread of noxious weeds which degrade the quality and quantity of wildlife habitat. With a better understanding of how these species are impacted by various water regimes, water management practices could be adjusted to limit their establishment or spread. The relationship between many species of migratory birds and their use of habitat types under various hydrological conditions is not well understood and could be further evaluated under this alternative. A better understanding of how, when, and why birds are using various wetland types will allow managers to make better informed decisions regarding habitat management and conservation on the Complex and Valley-wide.

Rest

Rest under the proposed alternative will have very similar impacts on wildlife as under the no action alternative with the exception of a significant increase in the monitoring of rested habitats. Currently, the decision to stop resting an area and implement a management tool such as fire, grazing, or mowing is based upon observations of vegetation condition and wildlife use. Under this alternative, additional Refuge staff would allow for the implementation of a more quantified monitoring system being applied to the majority of the Complex.

Areas are rested to allow for the production of vigorous plant growth which provides food and cover to migratory birds and other wildlife. In most vegetation communities, even rest can become detrimental to its long-term health when reductions in plant germination, plant vigor, and nutrient cycling occur. Identifying the ratio between rest and disturbance that best supports the long-term production of ground-nesting birds, such as mallards and many others, is critical to meeting the mission of the Refuges. Additionally, the impacts of rest on the landscape are highly variable depending upon site-specific variables such as hydrology, soil type, and plant species composition. Under this alternative, some level of quantitative monitoring would exist on the majority of the Complex to accurately determine if the vegetation has become too stagnant, if rest is encouraging noxious weeds and is not meeting habitat goals and objectives.

Prescribed Burning
Under the proposed alternative, burning would have similar impacts on wildlife as in the current management alternative except that the level of monitoring and evaluation would increase due to an increase in Refuge staff. The data collected will be the basis for future decisions regarding if, how, when, and where burning will be used.

Refuge staff will evaluate each proposed prescribed burn on an individual basis as is currently done; however, under this alternative, an additional staff member will be available who will concentrate on managing the burning and grazing programs on the Complex. As a result, more attention will be paid to examining and then monitoring the impacts prescribed burning has on the abiotic and biotic factors in context with Refuge goals and objectives. Additionally, historic information about the role of fire in the Valley will be gathered and incorporated into management decisions. The increase in information about this management tool will impact wildlife by allowing Refuge staff to manage vegetation with more clarity and precision and thus provide better quality habitat.

Prescribed Grazing
Upon completion of the 1996-2002 compatibility research, grazing will become a potential management tool and under the direction of the Refuge staff. The potential use of cattle grazing will be fully and closely evaluated and based upon the results of the compatibility study, incorporation of other research, professional judgement, and results from evaluation and monitoring of Refuge habitats. The use of grazing will only be considered if it can potentially meet the goals and objectives of the Complex. Under the proposed alternative, grazing will generally impact wildlife as it does under the current management alternative except that the level of monitoring will be increased, the amount of the Complex evaluated will also be increased, and monitoring results will be used to modify management as appropriate.

The compatibility research will provide valuable information about land management tools including grazing and their impact on Refuge habitat, primarily tall whitetop. However, like all research projects, the results will be based on a snapshot in time and under a range of environmental conditions which are constantly changing. Therefore, Refuge staff must continue to monitor and evaluate habitat and wildlife before and after grazing to provide the information required to make the management decisions that best provide for long-term support of trust species.

Due to all the factors that contribute to how the landscape responds to management treatments, grazing can create desired results 1 year and completely fail the next year (Fredrickson and Taylor 1982); therefore, consistent and long-term monitoring is necessary for effective and adaptive management. This will require collecting quantitative data over most of the Complex. Even if this effort is stratified, additional staff will be needed to conduct the field work. Under the proposed alternative, additional staff will be available for these purposes. This increase in the amount and quality of monitoring on the Complex will provide the information needed to make the management decisions that will improve the quality of habitat available for wildlife. In 1997 and 1998, the two Refuges responded very differently to the same grazing prescription, primarily due to the differences in hydrology (Diebboll 1999). Therefore, site-specific monitoring and evaluation needs to be completed. Under this alternative, pre- and post-evaluation of grazing will be conducted over a larger portion of the Complex and in greater detail.

Farming
Under the proposed management alternative, the impact of farming on wildlife will be the same as under the current management alternative. The crop rotation of 2 years of small grains followed by 2 years of alfalfa and 1 year fallow will continue on approximately 510 acres of the Monte Vista NWR. If determined feasible, the farming will be done by a cooperating farmer, except for irrigation which will be the Refuge staff's responsibility.

Under this alternative, the Refuge staff will investigate the potential for providing more natural wetland foods for migrating cranes and waterfowl to decrease the dependence of these species on farm fields. This investigation will require communication between land managers along the migration path as well as biologists and researchers familiar with these species.

Naturalness

Water Management
New water delivery infrastructure will increase the natural appearance of the Refuge. Older structures will be replaced with new ones designed to be more natural in appearance and generally less visible. Additionally, new water delivery infrastructure will produce wetlands that are more natural in their appearance (e.g., feathered water depths and gradual edges).

Rest
The effects of rest on "naturalness" under this alternative are the same as that described under the no action alternative.

Prescribed Burning
The effects of prescribed burning on "naturalness" under this alternative are the same as that described under the no action alternative.

Prescribed Grazing
The effects of grazing on "naturalness" under this alternative are similar to that already described under the no action alternative. However, it is possible that under this alternative livestock grazing will once again become an applied management tool to help meet habitat objectives. If this happens, both positive and negative impacts will occur on the overall "naturalness" of the Refuge.

More precise and knowledgeable application of grazing schemes will help create more natural-looking landscapes through better weed control without degradation to the soil, vegetation, and surface water.

Possible negative impacts include a more "unnatural" appearance for those visitors that view livestock as nonnative and inappropriate on wildlife refuges.

Farming
Farming under this alternative is very similar to farming under the no action alternative. Thus, the effects of farming on "naturalness" are the same as that already described under that alternative.

Elk Management
The effects of elk management on "naturalness" under this alternative are the same as those discussed under the no action alternative.

Water Use

Water Management

Water management under this alternative focuses on improved water delivery and monitoring, and better understanding of water law and water rights associated with the Refuge Complex. These improvements will assist and improve water management planning and decision-making.

The old water delivery system will be replaced with one that is better designed to allow more precise and adequate water delivery to Refuge units. This will allow for more efficient use of water in achieving habitat objectives.

Improved monitoring will enable Service employees to better understand the Refuge's role and impact on Valley-wide water issues, such as groundwater and aquifers. In turn, this will help improve the Service's ability to defend water rights and uses.

A better understanding of water law and water rights associated with the Refuges will also help determine appropriate water uses and help document beneficial use.

Improved water delivery and monitoring coupled with a better understanding of water rights will ensure full and adequate use of existing water rights.

With all of these improvements, refuge management will be better able to determine water needs and identify need for additional water rights. Increases in water rights may allow the Refuge to provide better habitat, more habitat, and perhaps improved timing of wetland habitat availability.

Rest

Rest has no known measurable effect on water use. The only possible effect is the nonuse of some artesian well water that is adjudicated for watering cattle. During periods of rest, these water rights are not being used as prescribed.

Prescribed Burning

Prescribed burning has no measurable effect on water use because all burning is conducted when plants are dormant, thus plant transpiration is not affected.

Prescribed Grazing

Grazing practices under this alternative will be based on the results of the current research. If livestock grazing becomes a viable management tool, some increase may occur in use of water for livestock watering. The Refuge already possesses water adjudicated for this purpose. Overall water consumption should not increase.

Farming

Cultivated acreage will not increase under this alternative. Nor will any changes occur in irrigation methods. Thus, the effects of farming on water use under this alternative will not change from those already discussed under the no action alternative.

Elk Management

Elk management under this alternative has no known measurable effect on water use on the Refuge Complex.

Public Use

Water Management

Under this alternative, improvement in the quality and timing of availability of wetlands due to more effective water management will likely increase the numbers and species diversity of water birds utilizing the Refuge. For instance, the ability to micro-manage the amount and timing of water delivered to Refuge units may increase the diversity of cranes and shorebirds. This should improve the quality of wildlife viewing and hunting opportunities.

Improved water monitoring will better facilitate environmental education by helping to develop a more thorough understanding of the interaction between water management actions, changes in habitat, and groundwater.

In addition to these effects on public use, those discussed for water management under the no action alternative apply to this alternative as well.

Rest

The effects of rest on public use under this alternation are the same as those discussed for the no action alternative.

Prescribed Burning

The effects of prescribed burning on public use under this alternative are the same as those discussed for the no action alternative.

Prescribed Grazing

The effects of prescribed grazing on public use under this alternative are the same as those discussed for the no action alternative with one additional note. The effects may be somewhat more pronounced if grazing becomes an active management tool after the research findings are analyzed and a decision about future grazing practices is made.

Farming

The effects of farming on public use under this alternative are the same as those discussed for the no action alternative.

Elk Management

The effects of elk management on public use under this alternative are the same as those discussed under the no action alternative.

Weeds

Water Management

Under this alternative, water delivery will be greatly improved, allowing for more precise, efficient, and effective water application on Refuge units. In addition, a better water-habitat monitoring program will produce an improved understanding of how water impacts weed proliferation and control. The combination of these two actions will result in better weed control on the Refuge Complex.

Rest

The effects of rest on weeds under this alternative are the same as those discussed under the no action alternative.

Prescribed Burning

Under this alternative, a prescribed burning monitoring program would be implemented. One goal of this program would be to clarify the relationship between prescribed burning and weeds. Results of the monitoring program would be used to design a burn program that would help meet management objectives, including maximizing weed control.

Prescribed Grazing

Grazing may become an actively employed tool to help achieve management objectives. Ongoing monitoring of the relationship between different grazing activities and habitat response will allow for the design of a prescribed grazing plan that better meets habitat goals, including maximized weed control.

Farming

The effects of farming on weeds under this alternative are the same as those discussed for the no action alternative.

Elk Management

Elk management under this alternative has no known measurable effect on weeds.

Elk

Water Management
Water management has no known measurable effect on elk and their management on the Refuge.

Rest
Rest practices have no known measurable effect on elk and their management on the Refuge.

Prescribed Burning
Prescribed burning has no known measurable effect on elk and their management on the Refuge.

Prescribed Grazing
Prescribed grazing may become a viable management tool under this alternative. If that happens, the effects on elk will be the same as that discussed under the no action alternative, but a bit more pronounced. Adverse effects are expected to remain negligible.

Farming
The effects of farming on elk under this alternative are the same as those discussed under the no action alternative.

Elk Management
The effects of elk management on elk populations under this alternative are similar to those discussed under the no action alternative. Elk habitat may be improved on lands adjacent to Monte Vista NWR, the goal being to attract elk away from Refuge lands and reduce elk densities in some areas by increasing the availability of suitable habitat. Lastly, injury and loss of elk due to fencing may be reduced with the installation of elk proof fencing in some areas.

VI. List of Preparers

This Comprehensive Conservation Plan was prepared by:

Alamosa/Monte Vista Refuge staff members: Michael Blenden (Refuge Manager, > November 1995), Ron Garcia (Deputy Refuge Manager), Kelli Stone (Biologist), Lisa Rawinski (Biological Technician), Jackie Hensley (Administrative Officer), Steve Berlinger (previous Refuge Manager), Rick Schnaderbeck (previous Deputy Refuge Manager, <2000).

Regional office staff members: Adam Misztal (Refuge Planner, Planning Team Leader), Bridget McCann (Assistant Refuge Planner), Cheryl Williss (Chief, Water Resources), John Esperance (Biologist, Planning), Jaymee Fojtik (former GIS Specialist for region 6), Barbara Shupe (Writer/Editor), Sean Fields (Biologist, Planning), Sheri Fetherman (Chief, Education and Visitor Services)

Others: Leigh Fredrickson (University of Missouri), Loree Harvey (Research Technician, University of Missouri), John Gerstle (Contract Hydrologist, Hydrosphere Inc., Boulder, Colorado), Robert Tribble (contract employee from U.S. Forest Service), Susan Echelberger (Rocky Mountain Arsenal NWR, Outdoor Recreation Planner).

VII. Consultation and Coordination with Others

Summary of Public Involvement/Comments

For a description of public involvement and a summary of comments and issues raised during the Public Scoping process, please refer to "Planning Issues" section.

Mailing List

Federal Officials

- U.S. Senator Ben Nighthorse Campbell
  Rita Bastien, District Director, Colorado Springs
- U.S. Senator Wayne Allard
  Jim Bensberg, Area Director, Colorado Springs
- U.S. Representative Scott McInnis
  Roger Gomez, District Director, Pueblo, CO

Federal Agencies

- Bureau of Land Management
- Bureau of Reclamation - Closed Basin Project
- Bureau of Land Management, La Jara, CO; Lakewood, CO
- Great Sand Dunes National Park
- National Park Service, Mosca, CO
- NRCS/RC&D, Alamosa, CO
- Rio Grande National Forest
- San Luis Valley Conservation District
- Upper/Middle Rio Grande Ecoteam
- USDA, NRCS
- USDA, Resource Conservation and Development Program
- US EPA, Denver, CO
- US Forest Service
- USFWS, Albuquerque, NM; Anchorage, AK; Arapaho NWR, CO; Arlington, VA; Arrowwood NWR, ND; Atlanta, GA; Crescent Lake/North Platte NWR, NE; Denver, CO; Fort Snelling, MN; Hadley, MA; Juneau, AK; Air Quality Branch, Lakewood, CO; Des Lacs NWR, ND; Ecological Services Field Office, Golden, CO; J.Clark Salyer NWR, ND; Lost Trail NWR, MT; Medicine Lake NWR, MT; Partners for Wildlife, Monte Vista, CO; Portland, OR; Sacramento, CA; Sherwood, OR; Sand Lake NWR, SD; Seedskadee NWR, WY; Shepherdstown, WV; Upper Souris NWR, ND; Waubay NWR, SD
- USGS, BRD, Rick Schroeder, Fort Collins, CO
- USGS, Keith Lucey, Pueblo, CO

State Officials

- Governor Bill Owens
- Senator Lewis Entz
- Representative Jim Snook
- Representative Carl Miller
- Colorado Wildlife Commissioner

State Agencies

- Colorado Division of Water Resources
- Colorado Division of Wildlife
- Colorado Natural Heritage Program
- Colorado State Forest, Alamosa, CO
- Colorado State Land Board, Alamosa, CO
- Colorado State Parks, Denver, CO
- State Historic Preservation Office, Denver, CO

City/County/Local Governments

- Alamosa County Commissioners
- Alamosa County Weed Supervisor
- Alamosa-La Jara Conservancy District
- City of Alamosa
- City of Monte Vista
- Conejos County Commissioners
- Conejos Planning Department
- Conejos Water Conservancy District
- Costilla County Commissioners
- Mineral County Commissioners
- Rio Grande County Commissioners
- Rio Grande Water Conservation District
- Saguache County Commissioners
- San Luis Valley GIS/GPS Coordinator

Organizations

- American Birding Association
- American Farmland Trust
- Animal Protection Institute, Sacramento, CA
- Arkansas Valley Audubon Society
- Colorado Cattleman's Agricultural Land Trust
- Colorado Environmental Coalition
- Crestone-Baca Land Trust
- Crestone POA
- Defenders of Wildlife, Washington, D.C.
- Ducks Unlimited
- Friends of the SLV National Wildlife Refuges
- Great Outdoors Colorado
- Hydrosphere Resource Consultants
- Illinois Dept of Natural Resources, Springfield, IL
- IWJV, West Valley City, UT
- KRA Corporation, F&W Reference Section, Bethesda, MD
- Manitou Foundation, Crestone, CO
- National Audubon Society, Gretchen Muller, Washington, D.C.
- National Trappers Association, New Martinsville, WV

- National Wildlife Refuge Association, Colorado Springs, CO
- The Nature Conservancy, Boulder, CO & Mosca, CO
- Rio Grande Headwaters Land Trust
- Rio Grande Rio Bravo Coalition
- Rio Grande Riparian Corridor Committee
- Rock Creek Heritage Project (Rio De La Vista)
- Rocky Mountain Bird Observatory
- Roth & Associates
- San Luis Valley - SCD Watershed
- San Luis Valley Community Connections
- San Luis Valley Development Resources Group
- San Luis Valley Ducks Unlimited
- San Luis Valley Ecosystem Council
- San Luis Water Conservancy District
- ScCeed, Center, CO
- Sinapu, Boulder, CO
- TWS-Central Mountain and Plains Section, Fort Collins, CO
- Trust for Public Land (Eric Love)
- Valley Wide Health Services
- Wildlife Management Institute, Washington, D.C. and Pratt, KS
- The Wilderness Society, Washington, D.C. & Denver, CO

Libraries

- Adams State College Library, Alamosa
- Carnegie Public Library, Monte Vista
- Center Branch Library, Center
- Del Norte Public Library, Del Norte
- Southern Peaks Library, Alamosa

Schools/Universities

- Colorado State University: Dr. Rick Knight, Dr. Ron Ryder
- Prof. Paul Friesema, Northwestern Univ., Evanston, IL
- University of Missouri

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- Colorado Springs Gazette Telegraph, Colorado Springs, CO
- The Denver Post, Monte Vista, CO
- Pueblo Chieftain, Alamosa, CO
- The Valley Courier, Alalmosa, CO
- Valley Publishing, Monte Vista, CO
- KGIW, Alamosa, CO
- KRZA, Alamosa, CO
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Amy Uhrich
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Jamie Williams
Harold Ziegler

Appendix A. Glossary

Adaptive Management: Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alternative: 1) A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2) Alternatives are different means of accomplishing refuge purposes and goals and contributing to the System mission (Draft Service Manual 602 FW 1.5).

Animal Unit Month: A measure of the quantity of livestock forage. Equivalent to the amount of forage needed to support a 1,000 pound animal (or 1 cow/calf pair) for 1 month.

Avian Cholera: A contagious disease resulting from infection by the bacterium *Pasteurella multocida* that affects migratory birds. High concentration of the bacteria can be found for several weeks in waters where birds die from the disease. The bacteria can be transmitted through ingestion by birds and other animals scavenging off of diseased carcasses, direct contact between birds, and by airborne particulate (Field Manual of Wildlife Diseases, 1999-001).

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (USFWS Manual 052 FW 1.12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as Biodiversity.

Biological Control: The use of organisms or viruses to control weeds or other pests.

Breeding Bird Survey: A cooperative program of the U.S. Fish & Wildlife Service and the Canadian Wildlife Service for monitoring population changes in North American breeding birds by using point counts along roads (Koford, et al. 1994).

Categorical Exclusion: (CE, CX, CATEX, CATX). A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

CFR: Code of Federal Regulations.

Compatible Use: A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the Mission of the System or the purposes of the refuge (Draft Service Manual 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identified stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan (CCP): A document that describes the desired future conditions of the refuge; and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the System, and to meet other relevant mandates (Draft Service Manual 602 FW 1.5).

Concern: See definition of "Issue."

Cultural Resources: The remains of sites, structures, or objects used by people in the past.

Cultural Resource Inventory: A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview: A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

Depredation: Damage inflicted upon agricultural crops or ornamental plants by wildlife.

Disturbance: Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., timber harvest).

Ecological Succession: The orderly progression of an area through time from one vegetative community to another in the absence of disturbance. For example, an area may proceed from grass-forb through aspen forest to mixed-conifer forest.

Ecosystem: A dynamic and interrelating complex of plant and animal communities and their associated nonliving environment.

Ecosystem Management: Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Endangered Species (Federal): A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.

Endangered Species (State): A plant or animal species in danger of becoming extinct or extirpated in a particular State within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Endemic Species: Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

Environmental Assessment (EA): A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an Environmental Impact Statement or Finding of No Significant Impact (40 CFR 1508.9).

Fauna: All the vertebrate and invertebrate animals of an area.

Federal Trust Resources: A trust is something managed by one entity for another who holds the ownership. The FWS holds in trust many natural resources for the people of the United States of America as a result of Federal Acts and treaties. Examples are species listed under the Endangered Species Act, migratory birds protected by international treaties, and native plant or wildlife species found on a national wildlife refuge.

Federal Trust Species: All species where the Federal government has primary jurisdiction including federally endangered or threatened species, migratory birds, anadromous fish, and certain marine mammals.

Finding of No Significant Impact (FONSI): A document prepared in compliance with the National Environmental Policy Act, supported by an Environmental Assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an Environmental Impact Statement, therefore, will not be prepared (40 CFR 1508.13).

Fire Regime: A description of the frequency, severity, and extent of fire that typically occurs in an area or vegetative type.

Flora: All the plant species of an area.

Forb: A broad-leaved, herbaceous plant; for example, a columbine.

Goal: Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).

Geographic Information System (GIS): A computer system capable of storing and manipulating spatial data.

Habitat: Suite of existing environmental conditions required by an organism for survival and reproductions. The place where an organism typically lives.

Habitat Type: See Vegetation Type.

Habitat Restoration: Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy forest lands, rangelands, and aquatic systems.

Indicator Species: A species of plants or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species. Also referred to as a key species.

Inholding: Privately owned land inside the boundary of a national wildlife refuge.

Integrated Pest Management: Methods of managing undesirable species (such as weeds) including: education, prevention, physical or mechanical methods of control, biological control, responsible chemical use, and cultural methods.

Issue: Any unsettled matter that requires a management decision; e.g., a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition (Draft Service Manual 602 FW 1.5).

Maintenance Management System (MMS): A national database which contains the unfunded maintenance needs of each refuge. Projects included are those required to maintain existing equipment and buildings, correct safety deficiencies for the implementation of approved plans, and meet goals, objectives, and legal mandates.

Management Alternative: See Alternative.

Management Concern: See Issue.

Migration: The seasonal movement from one area to another and back.

Mission Statement: Succinct statement of a unit's purpose and reason for being.

Mitigation: Measures designed to counteract environmental impacts or to make impacts less severe.

Monitoring: The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969 (NEPA): Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (from 40 CFR 1500).

National Wildlife Refuge: A designated area of land, water, or an interest in land or water within the Refuge System.

National Wildlife Refuge System: Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.

National Wildlife Refuge System Mission: The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Native Species: Species that normally live and thrive in a particular ecosystem.

Neotropical Migratory Bird: A bird species that breeds north of the U.S./Mexican border and winters primarily south of this border.

Notice of Intent (NOI): In the case of a Federal action, such as analyzed in this documentation, an NOI is a notice that a Comprehensive Conservation Plan and associated NEPA document will be prepared and considered (40 CFR 1508.22). Published in the Federal Register.

Notice of Availability (NOA): An NOA is a notice that documentation is available to the public on a Federal action, in this case, the Comprehensive Conservation Plan. Published in the Federal Register.

Noxious Weed: A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or nonnative, new, or not common to the United States. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and, therefore, is detrimental to the agriculture and commerce of the United States and to the public health.

Objective: An objective is a concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (Draft Service Manual 602 FW 1.5).

Planning Area: A planning area may include lands outside existing planning unit boundaries that are being studied for inclusion in the System and/or partnership planning efforts. It may also include watersheds or ecosystems that affect the planning area.

Planning Team: A planning team prepared the Comprehensive Conservation Plan. Planning teams are interdisciplinary in membership and function. Teams generally consist of a planning team leader; refuge manager and staff; biologists; staff specialists or other representatives of Service programs, ecosystems or regional offices; and other governmental agencies as appropriate.

Planning Unit: A single refuge, an ecologically/administratively related complex of refuges, or distinct unit of a refuge.

Plant Association: A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

Plant Community: An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site -- such as soil, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community, i.e., ponderosa pine or bunchgrass.

Preferred Alternative: This is the alternative determined (by the decision maker) to best achieve the Refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

Prescribed Fire: The skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, etc., that allow confinement of the fire to a predetermined area and produces the intensity of heat and rate of spread to accomplish planned benefits to one or more objectives of forest management, wildlife management, or hazard reduction.

Public: Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in Service issues and those who do or do not realize that Service decisions may affect them.

Public Involvement: A process that offers affected and interested individuals and organizations an opportunity to become informed about, and to express their opinions on, Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public Involvement Plan: Broad long-term guidance for involving the public in the comprehensive planning process.

Purpose(s) of the Refuge: The purpose of a refuge is specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorization, or expanding a refuge, refuge unit, or refuge subunit.

Record of Decision (ROD): A concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

Refuge Operating Needs System (RONS): The Refuge Operating Needs System is a national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans, and meet goals, objectives, and legal mandates.

Refuge Use: Any activity on a refuge, except administrative or law enforcement activity carried out by or under the direction of an authorized Service employee.

Refuge Goal: See Goal.

Refuge Purposes: The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, a refuge unit, or refuge subunit (Draft Service Manual 602 FW 1.5).

Refuge Revenue Sharing: A 1978 Act (Public Law 95-469) which authorizes payments to counties in which Service-owned land is located. The amount of the payment is computed based on things such as the appraised value of Service fee land, number of acres of fee land, and net receipts collected by the Service for certain activities permitted on reserve lands (lands withdrawn from the public domain).

Riparian: Refers to an area or habitat that is transitional from terrestrial to aquatic ecosystems; including streams, lakes wet areas, and adjacent plant communities and their associated soils which have free water at or near the surface; an area whose components are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes any and all plant-life growing on the land adjoining a stream and directly influenced by the stream.

Special Status Species: Plants or animals which have been identified through either Federal law, State law, or agency policy, as requiring special protection of monitoring. Examples include federally listed endangered, threatened, proposed, or candidate species; state-listed endangered, threatened, candidate, or monitor species; U.S. Fish & Wildlife Service species of management concern and species identified by the Partners in Flight Program as being of extreme or moderately high conservation concern.

Species of Management Interest: Those plant and animal species, while not failing under the definition of special status species, that are of management interest by virtue of being Federal trust species such as migratory birds, important game species including white-tailed deer, furbearers such as American marten, important prey species including red-backed vole, or significant keystone species such as beaver.

Step-down Management Plans: Step-down management plans provide the details necessary to implement management strategies identified in the comprehensive conservation plan (Draft Service Manual 602 FW 1.5).

Sound Professional Judgement: A finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of the Refuge Administration Act and other applicable laws.

Strategy: A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Draft Service Manual 602 FW 1.5).

Threatened Species (Federal): Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Threatened Species (State): A plant or animal species likely to become endangered in a particular State within the near future if factors contributing to population decline or habitat degradation or loss continue.

Trust Species: Species for which the U.S. Fish & Wildlife Service has primary responsibility including most federally listed threatened and endangered species, anadromous fish once they enter inland U.S. waterways, and migratory birds. Also see "Federal Trust Species."

Understory: Any vegetation whose canopy (foliage) is below, or closer to the ground than canopies of other plants.

U.S. Fish & Wildlife Service Mission: The mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and plants and their habitats for the continuing benefit of the American people.

Vegetation Type, Habitat Type, Forest Cover Type: A land classification system based upon the concept of distinct plant associations.

Vision Statement: A concise statement of the desired future condition of the planning unit, based primarily upon the System mission, specific refuge purposes, and other relevant mandates (Draft Service Manual 602 FW 1.5).

Watershed: The region draining into a river, river system, or body of water.

Wildfire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildlife Corridor: A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required for long-term survival or reproduction of its migrants.

Wildlife-dependent Recreation: A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the System.

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Appendix C. Refuge Operating Needs System (RONS) Projects

RONS Projects					
RONS No.	***Goal-Objective***	***Project Description***	***First Year Need***	***Recurring Annual Need***	***FTE[1]***
AL[2] - 00004	1-all, 2-all, 3-all, 4-all, 5-all, 6-all, 7-all, 8.1, 8.2, 9-all	Biological Monitoring Program	157,000	55,000	
MV[3] - 00007	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 8-all, 9-all	Improve Water Management/Monitoring on Monte Vista NWR	65,000	54,000	1.0
MV - 00004	1-all, 2-all, 3-all, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2	Invasive Weed Management Program	76,000	60,000	
AL - 00003	8.1, 8.2, 9-all	Inventory and Restore Riparian Habitat and Wildlife	62,000	20,000	
MV - 00022	1-all, 2-all, 3-all, 4-all, 5-all, 6-all, 7-all, 8.1, 8.3, 9-all	Conduct Long-term Habitat and Wildlife Monitoring to Comply with Compatibility Lawsuit Settlement	38,000	27,000	.5
MV - 98016	1-all, 2-all, 3.1, 4-all, 6-all, 7-all	Provide Fall Migration Habitat by Increasing Fall Well Pumping	54,000		
AL - 00100	1-all, 2-all, 3-all, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2	Expand Integrated Pest Management of Invasive Weeds	230,000		
AL - 00002	1-all, 2-all, 3-all, 4-all, 5.1, 5.3, 6-all, 7-all, 8-all, 9-all	Improve Maintenance on Alamosa NWR	65,000	54,000	1.0
MV - 00008	1.1, 1.2, 1.3, 1.4, 2-all, 3-all, 4-all, 6-all, 7-all, 8.1, 8.2	Improve Habitat with Fire and Grazing	65,000	63,000	1.0
MV - 00002	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 8.1, 8.2, 9-all	Improve Water Planning and Management	65,000	63,000	1.0
AL - 97001	1-all, 2-all, 3-all, 4-all, 5-all, 6-all, 7-all, 8.1, 8.2, 9-all	Initiate Biological Inventories	65,000	53,000	1.0
MV - 97002	13.3	Expand Refuge Public Use Facilities - Construct Wildlife Photography/Observation Blinds	196,000	5,000	
Totals			**$1,138,000**	**$454,000**	**5.5**
1- FTE=Full-time Equivalent; 2 - AL=Alamosa NWR; 3 - MV=Monte Vista NWR					

Appendix D. Maintenance Management System (MMS) Projects

MMS Projects			
MMS No.	***Goal-Objective***	***Description***	***Cost***
MV[1] - 00002	1-all, 2-all, 3.1, 4-all, 6-all, 7-all	Replace 20+ year old worn-out and unsafe backhoe	$130,000
AL[2] - 95001	1-all, 2-all, 3.1, 4-all, 6-all, 7-all, 8-all, 9-all	Replace worn-out backhoe	$115,000
AL - 01004	11.3	Rehabilitate River Walking Trail	$50,000
MV - 01003	5.1, 5.3	Replace Unit 14 farm irrigation system	$25,000
MV - 00003	5.1, 5.3	Replace worn-out 14' land-plane	$18,000
MV - 00006	5.1, 5.3	Repair and move Unit 13 center pivot sprinkler	$52,000
AL - 01001	2-all, 3.2, 3.3, 4.2, 4.3, 4.4, 8.1, 8.2	Replace 1978 6' pull behind mower	$10,000
AL - 91016	11.2	Rehabilitate hunter road/parking areas	$25,000
MV - 97009	1-all, 2-all, 3.1, 4-all, 6-all, 7-all	Replace D7 dozer	$360,000
AL - 97006	1-all, 2-all, 3.1, 4-all, 6-all, 7-all, 8-all, 9-all	Replace track hoe	$207,000
AL - 98007	1-all, 2-all, 3.1, 4-all, 6-all, 7-all, 9-all	Replace 1970 Allis-Chalmers motor grader	$220,000
MV - 00008	1-all, 2-all, 3.1, 4-all, 5.1, 5.3, 6-all, 7-all, 9-all	Replace 60 water control structures that minimally or no longer function	$62,000
Total			**$1,074,000**
1 - MV=Monte Vista NWR, 2 - AL=Alamosa NWR			

Appendix E. Compatibility Determinations

Station Name:
Alamosa-Monte Vista National Wildlife Refuge Complex

Date Established:
Alamosa National Wildlife Refuge was approved for acquisition on June 27, 1962 by the Migratory Bird Conservation Committee.
Monte Vista National Wildlife Refuge was approved for acquisition on June 10, 1952 by the Migratory Bird Conservation Committee.

Establishing and Acquisition Authorities:
Alamosa National Wildlife Refuge - Migratory Bird Conservation Act of 1929, Public Land Order 3899 dated December 1965.
Monte Vista National Wildlife Refuge - Migratory Bird Conservation Act of 1929, Public Land Order 2204 dated September 1960.

Purpose for which Established:
Both Refuges were established under the Migratory Bird Conservation Act ". . . for use as inviolate sanctuaries, or for any other management purpose, for migratory birds." (16 U.S.C. 715D)

Description of Proposed Uses:
Wildlife-dependent recreation, including hunting, fishing, wildlife observation and photography, environmental education and interpretation
Waterfowl and small game hunting are allowed on both refuges during the fall. Hunter parking areas are provided on both Refuges. Additionally, overnight camping is permitted at two hunter parking areas on Alamosa NWR and six parking areas on Monte Vista NWR. Camping is permitted only during hunting season, is restricted to the parking areas only, and is operationally limited to hunters as a convenience to accommodate their use of the Refuge.

Fishing is limited to "Kids Fishing Day" on Monte Vista NWR. This is a multi-agency collaboration held annually during National Fishing Week. A small pond (less than two acres) on the Refuge is stocked with trout donated by the Hotchkiss National Fish Hatchery. The event is designed to teach children the fun of fishing, angling techniques, and habitat conservation. In addition, a special-needs kids fishing day is provided in which children with disabilities are allowed to fish the pond. After the kids events have taken place, senior citizens are allowed to fish until the wetland is dewatered (usually within one week of the Kids Fishing Day Event) and remaining fish are caught and donated to local retirement homes or netted and taken to neighboring Home Lake, a State-managed area. The event usually reaches approximately 250 to 700 children annually.

Wildlife observation and photography are facilitated by an auto tour route on each Refuge, two hiking trails on Alamosa NWR, wildlife observation pull-outs on Monte Vista NWR, a wildlife viewing platform on Monte Vista NWR, and the bluff overlook on Alamosa NWR.

The Monte Vista Crane Festival is the largest wildlife observation event in Colorado. The Refuge has approximately 10,000 visitors during the period a week before and a week following this early March festival. All wildlife observation facilities on both Refuges are heavily used during this period. Bus tours are given on Monte Vista NWR twice daily during the three day event. All but one of the tours is confined to wildlife viewing areas open to the public. One tour is given on each Refuge in areas normally closed to public access. Refuge staff guide all Refuge bus tours, discussing the National Wildlife Refuge System, refuge management, natural history, local water issues and natural resource partnerships in the San Luis Valley and Colorado.

Environmental education and interpretation is provided for via a visitor contact station on Alamosa NWR and a seasonal contact station on Monte Vista NWR, interpretive signs along the auto tour routes, Refuge field trips, and classroom presentations. The Comprehensive Conservation Plan proposes construction of a new multiple-use education and visitor center on Monte Vista NWR. This facility would house the primary environmental education and interpretation facilities for the Alamosa-Monte Vista NWR Complex, a reception area, and general office space.

The Comprehensive Conservation Plan proposes to continue the above uses and add the following to improve public use of the Refuges:

- Construct multi-purpose education and visitor center on Monte Vista NWR.
- Construct fully accessible walking tour on Monte Vista NWR.
- Construct fully accessible wildlife observation deck and hunting blind on each Refuge.
- Implement cultural resources interpretation program.
- Construct 3 new auto pull-outs along State Highway 15 on Monte Vista NWR.
- Explore feasibility of seasonal expansion of auto tour route, wildlife observation sites along Parker Road, and wildlife observation decks along County Road 3E on Monte Vista NWR.
- Explore feasibility of constructing an observation deck adjacent to Refuge Headquarters on Alamosa NWR.
- Hire Outdoor Recreational Planner (ORP) and assistant ORP.
- Enhance and expand environmental education through various initiatives, such as educational displays, presentations, and web sites that feature Refuge purposes and wetlands.

Anticipated Impacts on Service Lands, Water, and Interests:
Minimal disturbance to wildlife and wildlife habitat will result from these uses at current and proposed levels. Adverse impacts are minimized through careful timing and placement of activities. The greatest potential threat to wildlife is the annual Crane Festival; however, disturbance is minimized by closing Refuge roads to private vehicles and by the presence of Refuge staff and volunteers that monitor visitor activity.

Appropriate Environmental Assessments for the proposed education and visitor center on Monte Vista NWR will be conducted when that project enters the planning phase.

Justification:
Based on the biological impacts described in the CCP and Environmental Assessment, the six public uses described here will have minimal, if any, adverse impacts on the wildlife-oriented purposes for which the Refuges were established.

At the same time, these six public uses help carry out the National Wildlife Refuge System Improvement Act mandate to "ensure that opportunities are provided within the System for compatible wildlife-dependent recreational uses."

Additionally, a secondary goal of the National Wildlife Refuge System is to provide opportunities for the public to develop an understanding and appreciation for wildlife. The six uses described here are identified as priority public uses in the National Wildlife Refuge System Improvement Act of 1997 and will help meet that goal on the Alamosa-Monte Vista National Wildlife Refuge Complex with minimal conflicts with the wildlife conservation mission of the Refuge System.

Determination:
Wildlife-dependent recreation, including hunting, fishing, wildlife observation and photography, and environmental education and interpretation are compatible.

Stipulations Necessary to Ensure Compatibility:

- ✔ Continue seasonal closures of some Refuge units during the fall hunting season.
- ✔ Monitor use, regulate access, and maintain necessary facilities to prevent habitat degradation and wildlife disturbance in high public use areas.
- ✔ Monitor levels of use and effects on wildlife.
- ✔ Monitor participants to ensure activities are conducted in compliance with Refuge regulations.

Description of Proposed Use:
Cooperative Farming Program on Monte Vista NWR
The Comprehensive Conservation Plan calls for converting the current farming program operated by Refuge staff to a cooperative farming program. The cooperating farmer would continue the current crop rotation of 2 years of small grains followed by 2 years of alfalfa and then 1 year of fallow. The cooperating farmer would be allowed to keep all, or a portion of, the alfalfa crop based on yields of the small grain crops. Refuge staff would be responsible only for irrigating the crops; the cooperating farmer would handle all other farming operations. The current mix of organic and non-organic farming practices would continue to focus on minimal use of petroleum based fertilizers and herbicides.

The object of this conversion to cooperative farming is to shift some of the time required from Refuge staff to the cooperative farmer while maintaining at least the current level of production of high energy food for migratory birds.

Anticipated Impacts on Service Lands, Water, and Interests:
This action would cause no increased disturbance to wildlife or wildlife habitat. Farming is already conducted on 510 acres on Monte Vista NWR. An additional 120 acres of farmland is in the process of being acquired as part of a larger acquisition. The specific management of this farmland is currently undecided. It is likely that part of this farmland will be restored to wetland habitat. The remainder will continue producing small grains as part of the Refuge farming program. These additional acres will enhance the ability of the Refuge to work with a farmer under a cooperative agreement. The cooperative farming program would be conducted on at least some of the land currently under cultivation with the same crops and rotation currently being used.

The cooperative farming program will provide the same amount of high energy food for migrating cranes and waterfowl as does the current farming program.

Justification:
Farming has been used as a management tool on Monte Vista NWR since 1952. Its primary purpose is to provide high energy food for migrating cranes and waterfowl. However, the food and cover provided by farm fields also benefit resident wildlife such as deer, rodents, and pheasants.

Based on the biological impacts described in the CCP and Environmental Assessment, the farming program described here will have a beneficial impact on the wildlife-oriented purposes for which the Refuges were established. It provides a high energy food source near quality roosting and nesting sites.

At the same time, farming facilitates wildlife observation, photography, and environmental education. Farming attracts and concentrates wildlife to an area where they are highly visible. Croplands are located near public roadways to enhance viewing opportunities for Refuge visitors.

Determination
Cooperative farming of small grains is compatible when used as a management tool.

Stipulations Necessary to Ensure Compatibility
- ✔ Cooperative farming will be conducted under the terms of a Cooperative Farming Agreement. The agreement will contain general and special conditions to ensure consistency with management objectives. Some of the general stipulations are as follows:
  - If herbicides are required, the cooperating farmer must coordinate with the refuge manager to prepare a Pesticide Use Proposal. This restricts and controls the use of chemicals to comply with the Refuge's Pesticide Use Plan.
  - Farming permittee must leave the entire small grains crop and part of the alfalfa crop in the field for use by wildlife.
  - Farming permittee must not hay alfalfa in the spring until after meadowlarks, waterfowl, and other ground-nesters are finished nesting, as determined by the refuge manager.
  - Farming permittee must obtain permission from the refuge manager to work in the fields after opening of waterfowl season.
- ✔ Other stipulations will be considered depending upon site and time specific circumstances.

Description of Proposed Use

Development of three auto pull-outs along Colorado State Highway 15 as it passes through Monte Vista National Wildlife Refuge

Rio Grande County, Colorado, Colorado Department of Transportation, Colorado Division of Wildlife, and U.S. Fish & Wildlife Service are building three wildlife observation pull-outs along Colorado State Highway 15, south of Monte Vista, Colorado, as it passes through Monte Vista National Wildlife Refuge. Two pull-outs will be located on the west side of the highway and one on the east side. The two northernmost pull-outs will be approximately 640 feet in length. The southernmost pull-out will be approximately 1,000 feet in length. All pull-outs will extend approximately 80 feet from the highway surface on to the Refuge. The two pull-outs on the western side of the highway will be located on existing levee berms while the one on the east will be new construction that will impact approximately one acre of shortgrass habitat on Refuge property. The pull-outs will provide safe and accessible wildlife viewing opportunities year-round for Refuge visitors. In order to protect from disturbance to loafing and roosting sandhill cranes, the turnouts will be designed primarily for vehicles, which act as natural blinds. The pull-outs will also include viewing stations landscaped as partial blinds and outfitted with permanent scopes in order to accommodate pedestrians and bicyclists. Additional landscaping and interpretive signage will complete the wildlife viewing experience.

Most importantly this project will alleviate dangerous traffic and pedestrian congestion that occurs along this State highway, especially during the spring and fall migration of sandhill cranes. This highway was constructed with practically no shoulder, and consequently drivers have no way to safely pull out of the 65 mile per hour traffic path to view wildlife.

These pull-outs will allow wildlife viewing enthusiasts to pull off the highway and either park and leave their vehicles to enjoy viewing stations or slowly drive through the turnout lane and leave the area. The turnouts will be paved to accommodate bicyclists and wheelchairs year-round.

This use is proposed for Refuge lands since no other site is available in the San Luis Valley that has such spectacular concentrations of wildlife visible from a public highway. By constructing these pull-outs not only will a safety hazard be eliminated but the opportunity will be created for wildlife observation, wildlife photography, environmental education and wildlife interpretation.

Availability of Resources:

The construction budget for this project is as follows:

Colorado Enhancement Program (TEA-21)	$188,000
Rio Grande County	23,600
Colorado DOW, Watchable Wildlife Program	8,000
Monte Vista National Wildlife Refuge	6,000
Total:	**$225,600**

Annual Maintenance:

Fences, mowing, litter removal, snow removal, sign upkeep, etc. (Monte Vista NWR)	$1,000
Asphalt maintenance (Rio Grande County)	500

Of the above mentioned costs, Monte Vista NWR will incur an additional estimated $1,000 in recurring annual maintenance costs associated with this project.

Anticipated Impacts on Service Lands, Water, and Interests:

Impacts from this project can be categorized as either due to habitat disturbance or disturbance to individual animals, especially sandhill cranes. Habitat disturbance will be most noticeable on the east side of Highway 15 where approximately one acre of shortgrass habitat will be destroyed by the footprint of the pull-out. Currently, this habitat type comprises about 1,700 acres of the Refuge. The loss of one acre near the highway is insignificant.

Disturbance to sandhill cranes roosting on the west side of the highway is potentially the most significant negative impact of this project. The wetlands on this side of the highway serve as roost sites for several thousand cranes during their spring and fall migrations. From these roost sites, cranes typically travel to nearby feeding sites in the morning and return in the evening. Many return to these wetlands to "loaf" during the middle of the day. They will be observable from proposed pull-outs during all daylight hours. The impacts from this source of disturbance is anticipated to be minor. Crane viewers will be 80 feet closer to these flocks than conditions currently allow, displacing birds a maximum distance of 80 feet farther west where more than an adequate amount of additional roosting habitat exists. Through the use of vegetative screening between cranes and people, this distance will be minimized.

Public Review and Comment:

Notice of this project was posted at Refuge headquarters and visitor kiosks on both Alamosa and Monte Vista NWR between April 9 and April 22, 2001. Instructions for providing comments were included on the notice.

Determination:
Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:
No stipulations are required to ensure this use will not materially interfere with the purpose of the Monte Vista National Wildlife Refuge or detract from fulfillment of the mission of the National Wildlife Refuge System.

However, vegetative screening and interpretive material will be employed to minimize disturbance to cranes near all three pull-outs and improve wildlife viewing opportunities.

Clearances have been received from the U.S. Army Corps of Engineers for Section 404 of the Clean Water Act, from the U.S. Fish & Wildlife Service for archaeological resources and Section 7 consultation of the Endangered Species Act. Engineering clearances and hazardous waste clearances were provided for the Colorado Department of Transportation.

Justification:
A determination that this project is "compatible" is justified since disturbance to wildlife, in addition to that already occurring along Highway 15, will be insignificant and only a small loss of a habitat type will occur that is very common in the San Luis Valley.

Description of Use
Grazing Research
Settlement of the 1992 Refuge Compatibility Lawsuit requires that the U.S. Fish & Wildlife Service initiate a scientifically credible research project that assesses how various management tools can assist management of the refuges to achieve habitat goals. One component of the research project looked at how grazing influenced vegetation on refuge lands.

The grazing methods tested are similar to those in use at the time the Compatibility Lawsuit was filed. An average of 2,600 acres of Monte Vista NWR are grazed with approximately 1,600 Animal Unit Months. Animals are segregated in four different grazing cells and are rapidly moved from paddock to paddock. Periods of rest between paddock grazing episodes ranges from 25 to 40 days, depending upon rate of plant growth.

A second component of the research occurred on Alamosa NWR in 2000 and assessed the impact of high densities of livestock grazing only during the spring to control noxious weeds. This trial used a total of 40 acres of Alamosa NWR and 19.5 animal units for approximately 1 month.

Anticipated Impacts on Service Lands, Water, and Interests:
Monte Vista NWR was included in the Refuge Compatibility Lawsuit due to the litigants' belief that grazing practices on the Refuge were resulting in excessive negative impacts to vegetation and waterfowl production compared to the stated benefits of improved health of the vegetative community. For this reason, they asserted that Monte Vista NWR was allowing a use that significantly detracted from the ability to manage the Refuge for its established purpose.

This research project will provide information that will help better determine negative and positive impacts on the plant community and migratory bird habitat on both Refuges. The apparent impacts of using livestock during the study appear to be limited negative impacts to noxious weeds, limited overutilization of preferred plants, and limited stimulation of growth of preferred plants. These impacts are from casual observation and should not be used to prejudge the outcome of the analysis of data acquired by this extensive research project.

Determination:
Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:
This use will remain compatible as long as it is conducted as part of the compatibility research project and grazing practices tested continue to result in a minimal negative impact to preferred vegetation and have a significant potential for improving vegetative health of the plant community.

Justification:
Scientific assessment of habitat management tools, including grazing, and the ability of these tools to help achieve Refuge goals is best tested in the context provided on Refuge land and under refuge management conditions.

Signatures:

_____ _____
Project Leader Date

Concurrence:

_____ _____
Refuge Supervisor Date

_____ _____
Regional Chief, NWRS Date

Appendix F. Species List

Birds (* Known to nest on Complex; > Suspected to nest on Complex)

Grebes

*	Pied-billed Grebe	*Podilymbus podiceps*
*	Eared Grebe	*Podiceps nigricollis*
>	Western Grebe	*Aechmophorus occidentalis*
	Clark's Grebe	*Aechmophorus clarkii*

Pelicans

	American White Pelican	*Pelecanus erythrorhynchos*

Cormorants

	Double-crested Cormorant	*Phalacrocorax auritus*

Bitterns, Herons, and Egrets

*	American Bittern	*Botaurus lentiginosus*
	Great Blue Heron	*Ardea herodias*
	Great Egret	*Ardea alba*
*	Snowy Egret	*Egretta thula*
	Little Blue Heron	*Egretta caerulea*
*	Cattle Egret	*Bubulcus ibis*
	Green Heron	*Butorides virescens*
*	Black-crowned Night-Heron	*Nycticorax nycticorax*

Ibises and Spoonbills

*	White-faced Ibis	*Plegadis chihi*

New World Vultures

	Turkey Vulture	*Cathartes aura*

Swans, Geese, and Ducks

	Greater White-fronted Goose	*Anser albifrons*
	Snow Goose	*Chen caerulescens*
	Ross' Goose	*Chen rossii*
*	Canada Goose	*Branta canadensis*
	Tundra Swan	*Cygnus columbianus*
	Wood Duck	*Aix sponsa*
*	Gadwall	*Anas strepera*
*	American Wigeon	*Anas americana*
*	Mallard	*Anas platyrhynchos*
*	Blue-winged Teal	*Anas discors*
*	Cinnamon Teal	*Anas cyanoptera*
*	Northern Shoveler	*Anas clypeata*
*	Northern Pintail	*Anas acuta*
*	Green-winged Teal	*Anas crecca*
	Canvasback	*Aythya valisineria*
*	Redhead	*Aythya americana*
	Ring-necked Duck	*Aythya collaris*
	Greater Scaup	*Aythya marila*
	Lesser Scaup	*Aythya affinis*
	Bufflehead	*Bucephala albeola*
	Common Goldeneye	*Bucephala clangula*
	Common Merganser	*Mergus merganser*
*	Ruddy Duck	*Oxyura jamaicensis*

Osprey, Kites, Hawks, and Eagles

	Osprey	*Pandion haliaetus*
	Bald Eagle	*Haliaeetus leucocephalus*
*	Northern Harrier	*Circus cyaneus*
	Sharp-shinned Hawk	*Accipiter striatus*
	Cooper's Hawk	*Accipiter cooperii*
*	Swainson's Hawk	*Buteo swainsoni*
*	Red-tailed Hawk	*Buteo jamaicensis*
	Ferruginous Hawk	*Buteo regalis*
	Rough-legged Hawk	*Buteo lagopus*
	Golden Eagle	*Aquila chrysaetos*

Falcons and Caracaras

*	American Kestrel	*Falco sparverius*
	Merlin	*Falco columbarius*
	Peregrine Falcon	*Falco peregrinus*
	Prairie Falcon	*Falco mexicanus*

Gallinaceous Birds

*	Ring-necked Pheasant	Introduced	*Phasianus colchicus*

Rails

*	Virginia Rail	*Rallus limicola*
*	Sora	*Porzana carolina*
*	American Coot	*Fulica americana*

Cranes

	Sandhill Crane	*Grus canadensis*
	Whooping Crane	*Grus americana*

Plovers

	Black-bellied Plover	*Pluvialis squatarola*
	Semipalmated Plover	*Charadrius semipalmatus*
*	Killdeer	*Charadrius vociferus*
	Mountain Plover	*Charadrius montanus*

Stilts and Avocets

*	Black-necked Stilt	*Himantopus mexicanus*
*	American Avocet	*Recurvirostra americana*

Sandpipers and Phalaropes

	Greater Yellowlegs	*Tringa melanoleuca*
	Lesser Yellowlegs	*Tringa flavipes*
	Solitary Sandpiper	*Tringa solitaria*
	Willet	*Catoptrophorus semipalmatus*
*	Spotted Sandpiper	*Actitis macularia*
	Long-billed Curlew	*Numenius americanus*
	Marbled Godwit	*Limosa fedoa*
	Sanderling	*Calidris alba*
	Western Sandpiper	*Calidris mauri*
	Least Sandpiper	*Calidris minutilla*
	Baird's Sandpiper	*Calidris bairdii*
	Pectoral Sandpiper	*Calidris melanotos*
	Stilt Sandpiper	*Calidris himantopus*
	Long-billed Dowitcher	*Limnodromus scolopaceus*
*	Common Snipe	*Gallinago gallinago*
*	Wilson's Phalarope	*Phalaropus tricolor*

Skuas, Jaegers, Gulls, and Terns

	Franklin's Gull	*Larus pipixcan*
	Bonaparte's Gull	*Larus philadelphia*
	Ring-billed Gull	*Larus delawarensis*
	Forster's Tern	*Sterna forsteri*
>	Black Tern	*Chlidonias niger*

Pigeons and Doves

*	Rock Dove	Introduced	*Columba livia*
	Band-tailed Pigeon		*Columba fasciata*
*	Mourning Dove		*Zenaida macroura*

Barn Owls

	Barn Owl	*Tyto alba*

Typical Owls

*	Great Horned Owl	*Bubo virginianus*
>	Burrowing Owl	*Athene cunicularia*
	Long-eared Owl	*Asio otus*
*	Short-eared Owl	*Asio flammeus*

Nightjars

>	Common Nighthawk	*Chordeiles minor*
	Common Poorwill	*Phalaenoptilus nuttallii*

Swifts

	White-throated Swift	*Aeronautes saxatalis*

Hummingbirds

	Black-chinned Hummingbird	*Archilochus alexandri*
	Broad-tailed Hummingbird	*Selasphorus platycercus*
	Rufous Hummingbird	*Selasphorus rufus*

Kingfishers

>	Belted Kingfisher	*Ceryle alcyon*

Woodpeckers

	Lewis' Woodpecker	*Melanerpes lewis*
	Williamson's Sapsucker	*Sphyrapicus thyroideus*
	Red-naped Sapsucker	*Sphyrapicus nuchalis*
	Downy Woodpecker	*Picoides pubescens*
	Hairy Woodpecker	*Picoides villosus*
	Northern Flicker	*Colaptes auratus*

Tyrant Flycatchers

	Olive-sided Flycatcher	*Contopus cooperi*
*	Western Wood-Pewee	*Contopus sordidulus*
*	Willow Flycatcher	*Empidonax traillii*
*	Say's Phoebe	*Sayornis saya*
	Cassin's Kingbird	*Tyrannus vociferans*
>	Western Kingbird	*Tyrannus verticalis*
	Eastern Kingbird	*Tyrannus tyrannus*

Shrikes

*	Loggerhead Shrike	*Lanius ludovicianus*
	Northern Shrike	*Lanius excubitor*

Vireos

	Warbling Vireo	*Vireo gilvus*

Crows, Jays, and Magpies

*	Black-billed Magpie	*Pica hudsonia*
	American Crow	*Corvus brachyrhynchos*
	Common Raven	*Corvus corax*

Larks

*	Horned Lark	*Eremophila alpestris*

Swallows

*	Tree Swallow	*Tachycineta bicolor*
	Violet-green Swallow	*Tachycineta thalassina*
>	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
	Bank Swallow	*Riparia riparia*
*	Cliff Swallow	*Petrochelidon pyrrhonota*
*	Barn Swallow	*Hirundo rustica*

Titmice and Chickadees

	Black-capped Chickadee	*Poecile atricapilla*
	Mountain Chickadee	*Poecile gambeli*

Nuthatches

	White-breasted Nuthatch	*Sitta carolinensis*

Wrens

	Rock Wren	*Salpinctes obsoletus*
*	House Wren	*Troglodytes aedon*
*	Marsh Wren	*Cistothorus palustris*

Kinglets

	Ruby-crowned Kinglet	*Regulus calendula*

Thrushes

	Western Bluebird	*Sialia mexicana*
	Mountain Bluebird	*Sialia currucoides*
	Swainson's Thrush	*Catharus ustulatus*
*	American Robin	*Turdus migratorius*

Mimic Thrushes

	Northern Mockingbird	*Mimus polyglottos*
*	Sage Thrasher	*Oreoscoptes montanus*

Starlings

*	European Starling	*Sturnus vulgaris*

Wagtails and Pipits

	American (Water) Pipit	*Anthus rubescens*

Wood Warblers

*	Yellow Warbler	*Dendroica petechia*
	Yellow-rumped Warbler	*Dendroica coronata*
	Townsend's Warbler	*Dendroica townsendi*
	Northern Waterthrush	*Seiurus noveboracensis*
	MacGillivray's Warbler	*Oporornis tolmiei*
*	Common Yellowthroat	*Geothlypis trichas*
	Wilson's Warbler	*Wilsonia pusilla*

Tanagers

	Western Tanager	*Piranga ludoviciana*

Sparrows and Towhees

	Green-tailed Towhee	*Pipilo chlorurus*
	Spotted Towhee	*Pipilo maculatus*
	Cassin's Sparrow	*Aimophila cassinii*
	American Tree Sparrow	*Spizella arborea*
	Chipping Sparrow	*Spizella passerina*
*	Brewer's Sparrow	*Spizella breweri*
*	Vesper Sparrow	*Pooecetes gramineus*
	Lark Sparrow	*Chondestes grammacus*
	Black-throated Sparrow	*Amphispiza bilineata*
	Sage Sparrow	*Amphispiza belli*
	Lark Bunting	*Calamospiza melanocorys*
*	Savannah Sparrow	*Passerculus sandwichensis*
	Grasshopper Sparrow	*Ammodramus savannarum*
*	Song Sparrow	*Melospiza melodia*
*	White-crowned Sparrow	*Zonotrichia leucophrys*
	Dark-eyed Junco	*Junco hyemalis*

Cardinals, Grosbeaks, and Allies

	Black-headed Grosbeak	*Pheucticus melanocephalus*
	Blue Grosbeak	*Guiraca caerulea*

Blackbirds and Orioles

	Bobolink	*Dolichonyx oryzivorus*
*	Red-winged Blackbird	*Agelaius phoeniceus*
*	Western Meadowlark	*Surnella neglecta*
*	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
*	Brewer's Blackbird	*Euphagus cyanocephalus*
	Great-tailed Grackle	*Quiscalus mexicanus*
*	Brown-headed Cowbird	*Molothrus ater*
*	Bullock's Oriole	*Icterus bullockii*

Finches

	Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
	Cassin's Finch	*Carpodacus cassinii*
*	House Finch	*Carpodacus mexicanus*
	Pine Siskin	*Carduelis pinus*
	Lesser Goldfinch	*Carduelis psaltria*
>	American Goldfinch	*Carduelis tristis*

Old World Sparrows

	House Sparrow	Introduced	*Passer domesticus*

Mammals (* breeding species on Complex)

Marsupials

	Virginia Opossum	*Didelphis virginiana*

Insectivores

*	Masked Shrew	*Sorex cinereus*
*	Montane Shrew	*Sorex monticolus*
*	Water Shrew	*Sorex palustris*

Bats

	Western Small-footed Myotis	*Myotis ciliolabrum*
	Long-eared Myotis	*Myotis evotis*
	Little brown Myotis	*Myotis lucifugus*
	Yuma Myotis	*Myotis yumanensis*
	Hoary Bat	*Lasiurus cinereus*
	Silver-haired Bat	*Lasionycteris noctivagans*
	Big Brown Bat	*Eptesicus fuscus*
	Townsend's Big-eared Bat	*Plecotus townsendii*
	Brazilian Free-tailed Bat	*Tadarida brasiliensis*

Lagomorphs

*	Desert Cottontail	*Sylvilgus audubonii*
*	Mountain Cottontail	*Sylvilagus nuttallii*
*	White-tailed Jackrabbit	*Lepus townsendii*

Rodents

*	Least Chipmunk	*Tamias minimus*
	Yellow-bellied Marmot	*Marmota flaviventris*
*	Thirteen-lined Ground Squirrel	*Spermophilus tridecemlineatus*
	Gunnison's Prairie Dog	*Cynomys gunnisoni*
*	Botta's Pocket Gopher	*Thomomys bottae*
*	Northern Pocket Gopher	*Thomomys talpoides*
*	Plains Pocket Mouse	*Perognathus flavescens*
*	Silky Pocket Mouse	*Perognathus flavus*
*	Ord's Kangaroo Rat	*Dipodimys ordii*
*	Western Harvest Mouse	*Reithrodontomys megalotis*
*	Deer Mouse	*Peromyscus maniculatis*
*	Northern Grasshopper Mouse	*Onychomys leucogaster*
*	House Mouse	*Mus musculus*
*	Western Jumping Mouse	*Zapus princeps*
*	Long-tailed Vole	*Microtus longicaudus*
*	Montane Vole	*Microtus montanus*
*	Meadow Vole	*Mecrotus pennsylvanicus*
*	American Beaver	*Castor canadensis*
*	Common Porcupine	*Erithizon dorsatum*

Carnivores

*	Coyote	*Canis latrans*
*	Red Fox	*Vulpes vulpes*
	Gray Fox	*Urocyon cinereoargenteus*
	Black Bear	*Ursus americanus*
*	Common Raccoon	*Procyon lotor*
	Short-tailed Weasel	*Mustela erminea*
*	Long-tailed Weasel	*Mustela frenata*
	Mink	*Mustela vison*
*	American Badger	*Taxidea taxus*
	Western Spotted Skunk	*Spilogale gracilus*
*	Striped Skunk	*Mephitis mephitus*
	Mountain Lion	*Felis concolor*
	Bobcat	*Lynx rufus*

Ungulates

*	American Elk	*Cervus elaphus*
*	Mule Deer	*Odocoileus hemionus*
	White-tailed Deer	*Odocoileus virginianus*
	Pronghorn	*Antilocapra americana*

Reptiles

	Snapping Turtle	*Chelydra serpentia*
	Short-horned Lizard	*Phrynosoma douglassii*
	Eastern Fence Lizard	*Sceloporous undulatus*
	Variable Skink	*Eumeces gaigeae*
	Milk Snake	*Lampropeltis triangulum*
	Bullsnake	*Pituophis melnoleucus*
	Western Terrestrial Garter Snake	*Thamnophis elegans*
	Western Rattlesnake	*Crotalus viridis*

Amphibians

	Tiger Salamander	*Ambystoma tigrinum*
	Plains Spadefoot	*Scaphiopus bombifrons*
	Western Frogs	*Bufo boreas*
	Great Plains Toad	*Bufo cognatus*
	Woodhouse's Toad	*Bufo woodhousii*
	Western Chorus Frog	*Pseudacris triseriata*
	Bullfrog	*Rana catesbeiana*
	Northern Leopard Frog	*Rana pipiens*

Vegetation

Agavaceae

Yucca	*Yucca spp.*

Alismataceae

Arrowhead	*Sagittaria cuneata*

Alliaceae

Wild Onion/Garlic	*Allium spp.*

Amaranthaceae

Rough Pigweed	*Amaranthus retroflexus*

Asclepiadaceae

Showy Milkweed	*Asclepias speciosa*
Swamp Milkweed	*Asclepias incarnata*

Asparagaceae

Garden Asparagus-fern	*Asparagus officinalis*

Asteraceae

Aster species	*Aster spp.*
Canada Thistle	*Cirsium arvense*
Common Cocklelbur	*Xanthium strumarium*
Common Mare's-tail	*Hippuris vulgaris*
Common Sagewort	*Artemesia campestris*
Dandelion	*Taraxacum officinale*
Field Bindweed	*Convolvulus arvense*
Fringed Sage	*Artemisia frigida*
Horseweed	*Conyza canadensis*
Marsh Sowthistle	*Sonchus arvensis*
Povertyweed	*Iva axillaris*
Rabbitbrush	*Chrysothamnus nauseosus*
Russian Knapweed	*Acroptilon repens*
Russian Thistle	*Salsola iberica*
Silver Sage	*Artemesia cana*
Snakeweed	*Gutierrezia lucida*
Sunflower	*Helianthus spp.*
Wild Lettuce	*Lactuca serriola*
Yarrow	*Achillea millefolium*

Brassicaceae

Flixweed	*Descurainia sophia*
Hoary Cress (small whitetop)	*Cardaria draba*
Peppergrass	*Lepdium montanum*
Small Whitetop	*Cardaria draba*
Tall Whitetop	*Lepidium latifolium*
Tansymustard	*Descurainia spp.*

Cactaceae

Prickly Pair	*Opuntia spp.*

Capparaceae

Rocky Mountain Bee Plant	*Cleome serrulata*
Slender Spider Flower	*Cleome multicaulis*

Caryophyllaceae

Chickweed	*Cerastium spp.*

Chenopodiaceae

Four-wing saltbush	*Artriplex canescens*
Goosefoot	*Chenopodium murale*
Greasewood	*Sarcobatus vermiculatus*
Halogeton	*Halogeton glomeratus*
Kochia	*Kochia scoparia*
Lambsquarters	*Chenopodium album*
Pickleweed	*Salicornia rubra*
Seepweed	*Suaeda depressa*
Winterfat	*Ceratoides lanata*

Cyperaceae

Hardstem Bulrush	*Scirpus acutus*
Nebraska Sedge	*Carex nebrascensis*
Nevada Bulrush	*Scirpus nevadensis*
Sedge Spp.	*Carex spp.*
Softstem bulrush	*Scirpus validus*
Spikerush	*Eleocharis spp.*
Three Square	*Scirpus spp.*
Three-Square	*Scirpus americanus (Scirpus pungens)*

Elaeagnaceae

Russian olive	*Elaeagnus angustifolia*

Equisetaceae

Field Horsetail	*Equisetum arvense*
Scouring Rush	*Equisetum hyemale*
Horsetail	*Equisetum spp.*

Euphorbiaceae

Prostrate Spurge	*Euphorbia spp.*

Fabaceae

American Vetch	*Vicia americana*
Colorado Locoweed	*Oxytropis lambertii*
Goldenpea	*Thermopsis rhombifolia*
Swainson Pea	*Sphaerophysa salsula*
Sweet Clover	*Melilotus officinalis?*
Wild Licorice	*Glycyrrhiza lepidota*

Gentianaceae

Genatin	*Gentiana detonsa*

Haloragaceae

Eurasian Watermilfoil	*Myriophyllum spicatum*
Water Milfoil	*Myriophyllum exalbescens*

Hippuridaceae

Mare's Tail	*Hippuris vulgaris*Listed (as an Asteraceae in CCP)

Iridaceae

Wild Iris	*Iris missouriensis*

Juncaceae

Baltic Rush	*Juncus balticus*

Juncaginaceae

Seaside Arrow-grass	*Triglochin maritimum*

Lamiaceae

Field Mint	*Mentha arvensis*
Spearmint	*Mentha spicata*

Leguminosae

Alfalfa	*Medicago sativa*
Clover	*Trifolium spp.*

Lemnaceae

Duckweed	*Lemna spp.*

Malvaceae

New Mexico Checkermallow	*Sidalcea spp.*
Scarlet Globemallow	*Sphaeralcea coccinea*

Najadaceae

Pondweed	*Potamogeton spp.*

Onagraceae

Yellow Evening Primrose	*Oenothera hookeri?*

Plantaginaceae

Common Plantain	*Plantago major*

Poaceae

Alkali Cordgrass	*Spartina gracilis*
Alkali Muhly	*Muhlenbergia asperfolia*
Alkali Sacaton	*Sporobulus airodes*
Barnyard Grass	*Echinochloa crusgalli*
Beardless Wildrye	*Elymus inerme*
Blue Grama	*Bouteloua gracilis*
Bluejoint Reedgrass	*Calamagrostis canadensis*
Brome spp.	*Bromus spp. Calimagrostis, Slimstem*
Common Rye	*Secale cereale*
Creeping Wildrye	*Elymus triticoides*
Foxtail Barley	*Hordeum jubatum*
Grass spp.	*Gramancea spp.*
Indian Ricegrass	*Oryzopsis hymenoides*
Johnsongrass	*Sorghum halipense*
Mat Muhly	*Muhlenbergia richardsonis*
Nuttall's Alkali Grass	*Puccinellia nuttalliana*
Phragmites	*Phragmites australis*
Prairie Wedgegrass (Reedgrass)	*Spenopholis obtusata*
Rabbitfoot Grass	*Polypogon monspeliensis*
Reed Canary Grass	*Phalaris arundinaceae*
Reedgrass	*Calimagrostis neglecta*
Saltgrass	*Distichlis spicata*
Sand Dropseed	*Sporobolus cryptandrus*
Sandhill Muhly	*Muhlenbergia pungens*
Short-awn Foxtail	*Alopecurus aequalis*
Slender Wheatgrass	*Agropyron trachycaulum*
Slimstem Reedgrass	*Calimagrostis neglecta*
Sloughgrass	*Beckmannia syzigachne*
Spike Bentgrass	*Agrostis exarata*
Spike Dropseed	*Sporobolus contractus*
Squirrel Tail	*Sitanion hystrix*
Timothy	*Phleum pratense*
Tufted Hairgrass	*Deschampsia cespitosa*
Weeping Alkaligrass	*Puccinellia distans*
Western Wheatgrass	*Agropyron smithii*

Polygonaceae

Curly Dock	*Rumex cirspus*
Prostrate knotweed	*Polygonum erectum*
Smartweed	*Polygonacae amphibium*
Smartweed (unid spp).	*Polygonacae spp.*
Western Dock	*Rumex occidentalis*

Portulacaceae

Common Purslane	*Portulaca oleracea*

Potamogetonaceae

Horned Pondweed	*Zannichellia palustris*
Pondweed (unid. species)	*Potamageton spp.*
Sago Pondweed	*Potamageton pectinatus*

Ranunculaceae

Buttercup	*Ranunculus cymbalaria*

Rosaceae

Herbaceous Cinquefoil	*Potentilla nivea*
Silverweed Cinquefoil	*Potentilla anserina*

Salicaceae

Coyote Willow	*Salix exiqua*
Crack Willow	*Salix fragilis*
Narrow-leaf Cottonwood	*Populus angustifolia*
Peach-leaf Willow	*Salix amygladoides*

Sparganiaceae

Giant Bur-reed	*Sparganium eurycarpum*

Typha

Cattail	*Thypa latifolia*

Appendix G. Section 7

The Section 7 Consultation for the Implementation of this CCP has been submitted to the Ecological Services field office for review. It will be completed prior to final approval of this Plan.

Appendix H. Compatibility Lawsuit Actions

In 1992 Monte Vista NWR was included in a lawsuit filed by National Audubon Society et al. versus Babbitt alleging the Fish and Wildlife Service had violated the National Wildlife Refuge Administration Act, the Refuge Recreation Act, the National Environmental Policy Act and the Administrative Procedures Act by allowing incompatible uses in the National Wildlife Refuge System. Monte Vista NWR was included because of its use of livestock grazing in habitat management. The Fish and Wildlife Service settled the lawsuit with the plaintiffs out of court in October, 1993. The agreement as it specifically related to Monte Vista NWR required the Service to take the following actions:

1. Alamosa Unit of the Alamosa/Monte Vista National Wildlife Refuge Complex. The Service will permit grazing within the refuge during 1995 within such terms as were in place from 1987-1994. Grazing in the refuge shall not exceed 3,824 AUM's (1994 level).

2. The Service will not permit grazing on Monte Vista NWR in 1995.

3. The Service agrees to implement a process leading to a "Comprehensive Management Plan" (CMP), with appropriate NEPA compliance for the Alamosa/Monte Vista NWR Complex. The CMP will describe the purposes and management objectives of the Alamosa/Monte Vista NWR Complex. The Service agrees to begin the CMP process by October 1, 1995.

4. As soon a practicable in the CMP process, the Service will initiate a scientifically credible study to determine which management practices may be most effective in achieving the purposes and objectives of the refuge. Such management practices may include, by not be limited to, various livestock grazing strategies, prescribed fire, water management, integrated pest management, and haying. The Service will consult with the plaintiffs and others, in selecting a person to lead the study. Grazing may be conducted in appropriate locations with Alamosa/Monte Vista NWR in accordance with the experimental prescriptions described in the study beginning in 1996.

5. Except with the terms of the above study, the Service shall not issue grazing permits or otherwise authorize grazing within the Alamosa/Monte Vista NWR Complex after 1995, unless the Service makes a written determination with appropriate NEPA compliance that grazing is compatible with the primary purposes of the refuge, and that within the framework of existing Service policy, grazing is a practical, effective, and ecologically sound tool for achieving management objectives for the refuge. If grazing is determined to be compatible, the Service shall implement a monitoring program to evaluate the efficacy of grazing treatments in meeting refuge management objectives.

6. The Service will defer completion of the NEPA process begun with Draft Environmental Assessments for the grazing programs at the units of the Alamosa/Monte Vista NWR Complex to the CMP/EA/EIS process described above.

This lawsuit and the resulting settlement have had a substantial influence on day to day operations of both refuges. The outcome of the research project described above is fundamentally important to all future habitat management of the refuges. Monitoring of habitat management actions is now more than just a common sense good idea but mandated especially if grazing is used as a habitat management tool.

Appendix I. Synopsis of Goal Setting Meeting

SYNOPSIS OF GOAL SETTING MEETING

MONTE VISTA AND ALAMOSA NATIONAL WILDLIFE REFUGES, COLORADO
15–17 OCTOBER 1996
HOLIDAY INN, ALAMOSA, COLORADO

BACKGROUND

Monte Vista Refuge was one of several refuges involved in a lawsuit that focused on compatibility issues in 1992. The primary compatibility issue on Monte Vista Refuge related to livestock grazing during the growing season. As a result of the Out-of-court Settlement Agreement between the plaintiffs and defendants, a research study was to be implemented that focused on an evaluation of refuge management "tools". As part of this evaluation, there was a requirement to establish appropriate goals and objectives that could be evaluated. An Interagency Team was established during 1994 and an initial meeting was held at Alamosa Colorado on 29 September 1994. Discussions during this meeting focused on the need for well conceived goals and objectives for the refuge. A second meeting was held 23 August 1995, with the purpose of establishing a preliminary set of goals and objectives for the refuge. These tentative goals (Appendix A) were developed with the understanding that Leigh Fredrickson would fill in the blanks and be involved in the development of final Goals and Objectives for the refuges. The proposed period of development was to coincide with the 5- year research program.

These Preliminary efforts set the stage for the initiation of the research project which began in September 1995. Two meetings were held; one on 26 September 1995 in Alamosa for ranchers and the second on 29 September 1995 in Fort Collins at the Colorado Division of Wildlife Conference Room for agency personnel and NGO's. Contacts were also made with other resource specialists in the Colorado Division of Wildlife, Colorado Department of Natural Resources (Division of Water Resources), U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation (Closed Basin Project), Rio Grande Water Conservancy, Adams State College, and private water engineers before a strategy for the initial proposal was developed. The proposal was distributed to interested parties. Following receipt of criticism relating to project approach and design, a response was sent to all parties. The field research was initiated in March 1996. On 23–24 July 1996, a meeting was held at Monte Vista and Alamosa National Wildlife Refuges to update interested parties on the status of the research project. The meeting included field inspections. The Rio Grande Weed Board also inspected study sites on 26 July 1996.

All of these initiatives led to the necessity of establishing goals and objectives that would facilitate the focus of the research for the remainder of the study. Thus, a meeting was scheduled to begin the process of developing more appropriate Goals and Objectives for Monte Vista and Alamosa National Wildlife Refuges within the setting of the San Luis Valley. The strategy of the initial meeting was to identify information of importance in the goal setting process and to establish a protocol upon which a complete set of Goals and Objectives could be developed. Manager Mike Blenden sent a letter of invitation to individuals (Appendix B) including the following:

<u>Non-Government Organizations:</u>
- The Wilderness Society: Pam Eaton, Regional Director
- The National Audubon Society: Gene Knoder
- The Wildlife Management Institute: Len Carpenter

<u>State Agencies:</u>
- Colorado Division of Wildlife: James Gammonley, Waterfowl Biologist and Central Flyway Representative

<u>Federal Agencies:</u>
- U.S. Fish and Wildlife Service
  - Office of Migratory Bird Management:
    - Dave Sharp, Central Flyway Migratory Bird Coordinator and
    - Mimi Hogan, Migratory Bird Office Anchorage, Alaska

Federal Agencies (cont.):

Regional Offices:
Region 6: Wayne King, Terry Terrel, and Carol Taylor
Region 3: Nita Fuller, Assistant Regional Director

U.S. Geological Survey, Biological Resources Division, Mid-continent Ecological Science Center:
David Hamilton, Ecologist
Murray Laubhan, Ecologist

The meeting was scheduled 15–17 October 1996. Field inspections of Alamosa and Monte Vista Refuges were scheduled before the formal meeting. The opening session began at 1 PM at Alamosa Refuge where Mike Blenden gave an overview of the rationale behind the meeting including the attempts at goal and objective setting that began in 1992. Pam Eaton reviewed the events that led to the compatibility court case and provided a more comprehensive overview of conflicts relating to programs and operations that stem from goals and objectives established for the refuge system. Those in attendance for the preliminary afternoon session on 15 October included. Pam Eaton, Ted Zukoski, Jim Gammonley, David Hamilton, Murray Laubhan, Wayne King, Mike Blenden, Ron Garcia, and Leigh Fredrickson. The group inspected the Closed Basin Canal, Mumm Well, Water Delivery Systems, Grazed and Ungrazed Paddocks, Riparian Zone along the Rio Grande River, Bluff Overlook, and Moist-soil Units.

The group inspected Monte Vista Refuge during a morning session on 16 October. Those in attendance were Jim Gammonley, David Hamilton, Murray Laubhan, Wayne King, Mike Blenden, Ron Garcia, Gene Knoder, and Leigh Fredrickson. The group inspected Grazed and Ungrazed Paddocks, patches of whitetop, the Moist-soil Unit, Empire Canal, and Unit 9.

The group met at the Alamosa Holiday Inn in the afternoon 16 October to develop the goals and objectives for Monte Vista and Alamosa refuges within the context of the San Luis Valley. Mike Blenden had provided materials to participants including: The San Luis Waterbird Plan (Draft), Objectives from the EA for Alamosa Refuge, descriptions of plant communities, and Interim Objectives that were set for both refuges in August 1995. Those in attendance included Jim Gammonley, David Hamilton, Murray Laubhan, Wayne King, Dave Sharp, Mike Blenden, Ron Garcia, Gene Knoder, and Leigh Fredrickson. Mike Blenden provided some preliminary comments and established the charge for the meeting. Leigh Fredrickson shared his perspective on conflicts and failures in wetland management based on interactions with state and federal wetland management agencies for more than 30 years. The salient points revolved around the changes in landscape conditions surrounding refuges, inappropriate goals for an ecoregion, limited recognition of abiotic factors, and dogma resulting from the drought of the 1930's (Appendix C). Wayne King initiated the goal setting process by providing a history of goal and objective setting in the Fish and Wildlife Service (Appendix D). Wayne discussed the rationale behind Comprehensive Management Planning and the procedures and deadlines that have been established. An emphasis was placed on the difference between goals and objectives and the important points to identify in each objective (Appendix E).

With this background of written material and presentations by Fredrickson and King, the process of setting goals and objectives was implemented under the guidance of Dave Hamilton. The interactions among the group as we developed a focus for setting objectives were complex. The following synopsis is an attempt to capture the thought process that stimulated our interactions.

Two different strategies commonly used in setting goals and objectives focus on 1) habitats or 2) populations. Within this framework there is usually a tendency to set objectives that relate to area of habitat or size of populations. A typical objective might be to provide native and agricultural foods for 20,000 cranes during fall migration. The transient nature of use by migrant species, the difficulty of censusing animals, and the difficulty of directly controlling populations all compromise the value of using population numbers for targets as goals or objectives. Because managers can directly impact habitats, setting goals and objectives that relate to the types, distribution, condition, time of use and amount of habitat provide better linkages with use of management tools and personnel. With some preliminary discussion, the decision was made to focus on habitat goals. Eleven habitat types (Table 1) were identified for Monte Vista and Alamosa National Wildlife Refuges and include Upland Shrub, Tall Emergent (Cattail and Bulrush), Short Emergent (Baltic Rush and Spikerush/Carex), Saltgrass, Shallow Seasonal Water, Semipermanent, Annuals,

Riparian, Riverine, Dense Nesting Cover, and Agriculture.

Because habitats are dynamic within and among seasons, specific conditions characteristic of each wetland type must be considered. Factors that are critical for wildlife use include those classed as abiotic and biotic. Abiotic factors include water availability, water source, water depth, chronology of flooding, duration of flooding, soil type, length of growing season, elevation, precipitation cycles, maximum and minimum temperatures, and fire frequency. Biotic factors include vegetation composition, vegetation structure (living and residual), chronology of plant growth, and amount and type of foods produced.

Bioenergetics provides an important linkage between life requisites of species and habitat dynamics. Information on nutritional needs provide an understanding of the type, amount and timing of food required to meet behavioral and physiological demands during each phase of the life cycle. Likewise, the cover required for survival and reproduction also must be identified in relation to parcel size, plant structural features, plant composition, juxtaposition to foods and other habitat components, and chronology of availability. As information on bioenergetics expands, there is increasing potential to understand how the seasonal needs of one species relates to the needs of all other species that use the same habitat. This information provides an opportunity to identify conflicts or mutual benefits resulting from management actions within each habitat type. These benefits or conflicts are of key importance in defining the size, distribution, juxtaposition, and conditions required among different habitat components.

One of the best known species in North America is the mallard because most life cycle events are well understood. Thus, the chronology of different events in relation to sex and age has been identified as well as the nutritional and habitat requirements where critical foods and cover are available. For example, during winter mallards face the important life cycle events including completion of the prealternate molt in both sexes, pair formation, completion of the prebasic molt in females, and the deposition of endogenous reserves for migration and breeding (Fig. 1). The timing and completion of these events is dependent on certain habitat conditions and certain foods (Fig 1). The distribution, quality, and quantity of these habitat and food resources determines the success of these processes and the speed at which they are completed. Thus, in addition to foods and habitats, time becomes an important component in management success (Table 2). For example during wet winters, females complete the prebasic molt much earlier. This timing enables females to have a longer period to store the endogenous reserves required for migration and breeding. When wet winter conditions occur, age ratios from the subsequent breeding season are higher. As this information becomes available for other species, managers greatly enhance their potential to make a difference with their management actions because required habitats and foods are provided at the proper time and in the proper condition to maximize success.

Table 1. Plant communities of the San Luis Valley

Upland shrub
Tall emergent
Cattail
Bulrush
Short emergent
Baltic rush
Spikerush/Carex
Saltgrass
Shallow seasonal water (no vegetation)
Semipermanent
Annuals (kochia, chenopodiums, spikerush, foxtail barley)
Riparian
Riverine
Dense nesting cover
Agriculture

Thus, in order to set habitat goals and objectives, information relating to wildlife that use Monte Vista and Alamosa Refuge was summarized. At best, a comprehensive suite of information for every species common to the San Luis Valley is incomplete. This is unfortunate because the recent interest in biodiversity and ecosystem management requires complex information for every species associated with this system, but such comprehensive information is not available. Nevertheless, there is much information available that provides direction for setting habitat based goals and objectives because of management and research efforts on state and federal lands in the Valley.

For organizational purposes we assembled the information in taxonomic categories. Taxons of interest or those with Service directives serve as the basis for summarization of pertinent informa-

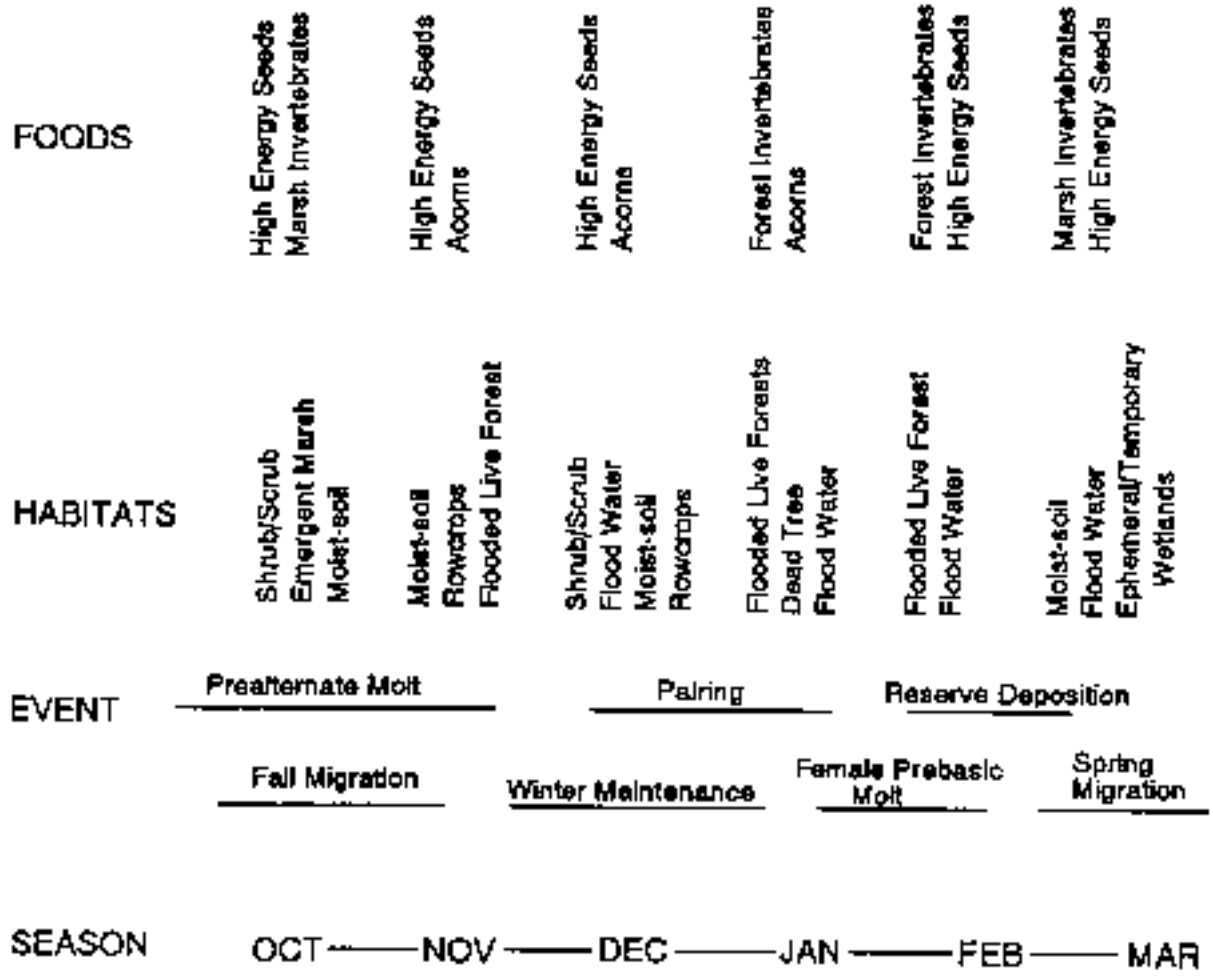

Figure 1 Annual cycle events, habitats used, and foods required by mallards from October to March.

tion. Once the taxon was selected, information was assembled on the basis of major life history events including migration, wintering, staging, and breeding. Within each life history category subcategories were identified. For example, breeding includes pairing, prebreeding, nesting, brood rearing, and molting. Important information related to these categories included the chronology of use (initiation, peak, and termination), extent of use, type of use (foraging, cover, etc.), structure of vegetation, type of food, foraging conditions (e.g., water depth), site of use (public or private, managed or unmanaged, etc.), and the degree which different sites fulfill species needs. There was also a consideration for scale. For a taxon, what role does the refuge or refuges play in

Table 2. Timing of the prebasic molt in female mallards in relation to winter wetland conditions.

Winter Wetland Conditions	Dry	Semi-wet	Wet
1st Prebasic Initiation	22 Jan	15 Dec	7 Dec
1st Prebasic Completion	22 Feb	8 Feb	9 Jan

relation to the continent, the flyway, the Valley or parts thereof (e.g., state lands, other federal lands, farmers, etc.), and the refuges. This compilation is critical because it identified what habitat type is needed, when a habitat is needed, what habitat condition is required, what foods are critical and when, an estimate of what population size must be accommodated, and whether seasonal needs change. For purposes of the workshop the group collectively brainstormed to identify this information for cranes, waterfowl, and shorebirds (Table 3). Then the information was summarized in figure form to enhance our ability to identify linkages by habitat, season, and chronology of use (Figs. 2 - 6). The first step was to summarize chronology of use by shorebirds, waterfowl and sandhill cranes (Fig. 2). Once the time of use was identified, we began to focus on use of habitats. Initially we chose 4 species (sandhill crane, mallard, killdeer, avocet) from each of the 3 groups representing wetland dependent species with different body sizes, food requirements, and habitat needs (Fig. 3). Foraging use was estimated during spring migration and breeding within 8 habitats (upland shrub, tall emergent, short emergent, saltgrass, shallow seasonal water, semipermanent, annuals, agriculture). This summarization indicates major differences in foraging habitat use. For example, the San Luis Valley is not a major crane breeding area whereas the other 3 species breed extensively in the Valley and thus forage there. Finally we summarized information for 7 species by adding phalarope, teal, shoveler and redhead. The chronology of use for 7 species was then developed for shallow water and short emergent (Fig. 4). Finally we developed chronology of foraging for the 7 species in shallow water and tall emergent (Fig. 5).

Information summarized in this way facilitated the identification of foods, habitats, or seasons where there are conflicting needs or benefits among species in the San Luis Valley. Not only was basic information relating to habitat conditions and wildlife use within the Flyway, Valley, and refuges summarized, but this information formed the basis for setting the goals and objectives. This strategy more clearly identifies what should be measured in order to develop an evaluation for meeting goals and objectives.

The session was concluded by developing an appropriate goal for short emergent vegetation. This habitat is of great importance for nesting waterfowl in the Valley and has been the target of many management efforts since the refuge was established. Because different activities require different habitats, objectives were driven by the type of use (e.g., foraging vs nesting). This information led to the following preliminary goals and objectives for cranes and mallards in short emergent habitat.

GOAL: Provide short emergent vegetation in suitable condition for migrant and breeding waterbirds.

This goal focused on short emergent habitat because of the importance, management effort, and area of this habitat in the San Luis Valley. The habitat also is an important component for waterbirds that breed in the Valley as well as those that migrate through the valley.

> **OBJECTIVE 1:** Monte Vista NWR will provide a 5-year average of ?? percent of the existing acres of shallowly flooded short emergent vegetation with diverse vertical structure from February to March for sandhill crane roosting and foraging

The rationale behind the first objective revolved around sandhill cranes. Cranes are migrants in the Valley in spring and fall but because their use of the refuge is different in spring an fall (see Table 3, Figures 2, 3, and 5B) the objective is set for spring. Because of environmental conditions, the area of short emergent is dynamic to some degree over time (i.e., among years the acreage may increase of decrease depending on precipitation cycles and managed hydrologic regimes). Because existing acres of short emergent are variable among years, the target is flexible over time (5 years). Because shallow flooding is important for roosting and foraging, a percent of the habitat that should be shallowly flooded will be identified as this objective is solidified. The condition of the vegetation is identified as having diverse vertical structure. At this point the object focuses on cranes. By reviewing Table 3 and Figures 2, 4, and 5B, one can identify whether the objective is in conflict or is compatible with the needs of the other species for which information has been summarized. As the objectives are developed further, these species can be added to the objective. For some species another objective appropriate for short emergent must be developed for this time period. Basically,

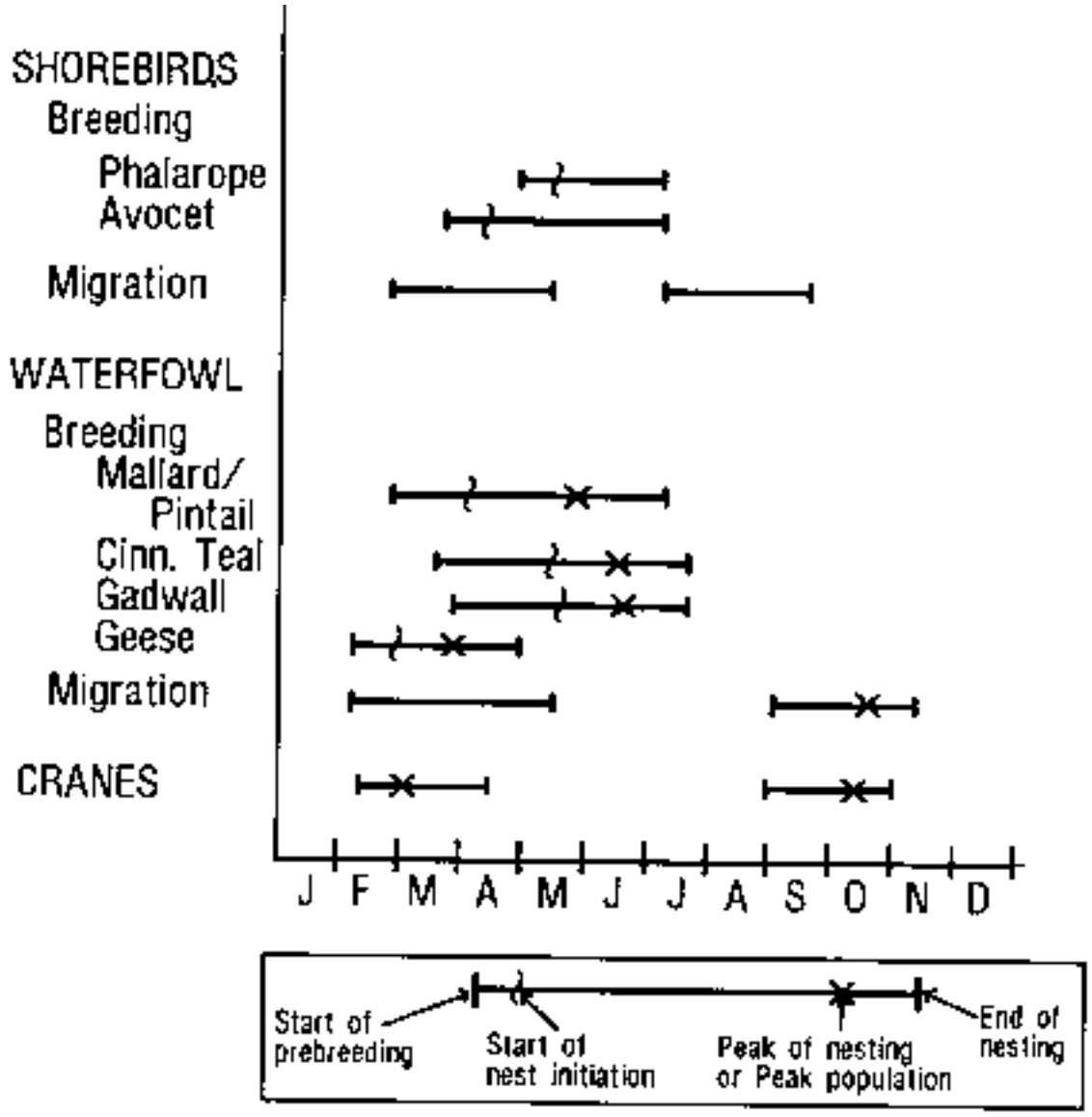

Figure 2. Chronology of use by shorebirds, waterfowl and cranes in the San luis Valley during the breeding season. Time for initiation of prebreeding, nest initiation, peak of nesting, and end of breeding season are identified.

the more comprehensive the information the better the objective and the more species that can be accommodated (or compromised) by the objective.

STRATEGY: How to Monitor/evaluate:

OBJECTIVE 2: Monte Vista NWR will provide a 5-year average of ?? percent of existing acres of shallowly flooded short emergent vegetation with ???? from March through July for mallard nesting.

The meeting ended with the following assignments:

Compile existing information during November and December — Mike, Rick, and Ron

Follow-up meeting to expand goals and objectives

November and December draft additional goals and objectives — Mike, Rick, Ron, and Leigh

Meeting in January with entire group.

Summary of current meeting — Leigh

Table 3. Synopsis of information critical for setting goals and objectives

WATERBIRDS

Migration

Cranes

Fall

20,000 pass through valley
Present Sept-Oct
Peak numbers on Oct 10 @ 15,000
Roosting on shallow open water (about 30% of valley population on refuge)
Foraging on private land depends on ag practices on lands surrounding the refuge

Spring

23,000-28,000 pass through valley
Present Mid-Feb. - Mid-April
Peak numbers on March 5 @ 23,000-28,000
Roosting - shallow open water
Feeding - small grain
- wet meadow
Loafing - wet meadow
45% of valley population on refuge

Waterfowl

Fall migration

Marsh herbivores - ringneck, redhead, gadwall
Terrestrial herbivores - geese (local or resident)
Marsh omnivores - mallard, teal, pintail, shoveler account for 90% of waterfowl on ref
Terrestrial omnivores
Marsh carnivore - bufflehead, scaup, merganser, ruddy
Roost and forage on refuge
Forage on private and state land
Very little land in valley not hunted 1/5 of refuges open to hunting
Most gone by early November except some marsh omnivores
Start of migration in early Sept - peak end of Sept
Divers primarily in Oct.

Spring migration

Marsh herbivores - gadwall (m)
Terrestrial herbivores
90% Marsh omnivores - mallard, cinnamon teal
Terrestrial omnivores
Marsh carnivores
Same habitats as needed in fall but amounts of each habitat might be different
Some birds staying in Valley while others migrate various distances further north (e.g., gadwall that nest in Valley vs. gadwall that will nest further north may be taking somewhat different resources)
Starts when open water is available = mid to late Feb (on refuges open water is present because of pumping; river open in March)
Ends early-mid May

Wintering

Discourage wintering ducks
Historically, wintering of up to 60,000 ducks around artesian wells
Some wintering in Valley on reservoirs
Canada geese winter on private lands & some reservoirs & along river
Some goldeneyes on canal

Table 3 (cont.). Synopsis of information critical for setting goals and objectives

Waterfowl (cont.)

- Breeding
  - 20% of nesting in valley on refuges (16% on Monte Vista, 4% on Alamosa)
    - 60% of nests are mallards; 25% cinnamon teal; 11% gadwall; 10% pintail
    - Geese - Valley population 4,000–5,000
    - Refuge produces 600–700 max or 450–500 average
  - Pair habitat
  - Nesting
  - Brood rearing
  - Molting
  - Pre-breeding

Start	Foraging - same guilds as migration
Late-Feb	Mallards and pintail - shallowly flooded, vegetated
Late-Mar	Cinnamon teal - same habitats as mallard plus saltgrass
Early-Apr.	Gadwall - same habitats as mallard plus semi-permanent
Mid-Feb.	Geese - shallowly flooded up into upland

- Nesting
  - Robust emergents - mallard, ruddy, redhead
  - Short emergents - teal, pintail, shoveler, mallard
  - Uplands - some gadwall, some mallard, some wigeon
  - Chronology - some nesting starts when birds first arrive
    - Mallard - start early April - peak early May - end early July
    - Teal - start early May - peak early June - end mid July
    - Gadwall (Ruddy, redhead) - start mid May - peak mid June - end end of July
    - 90% of nests are done by July 15 (all species)
  - Brood Rearing
    - Mallard - early May to end of August
    - Teal - early June to mid-September
    - Gadwall - mid-June to mid-September
    - Shallowly flooded for foraging (baltic rush, saltgrass, spikerush)
    - Deep water for escape cover and loafing
    - Wet meadows - for geese
    - Questions concerning proximity of brood rearing habitat or travel routes to nesting habitat
  - Molting
    - In late summer
    - Questions on what habitats
    - Food source

Shorebirds

- Migrant - mudflats, saltgrass, short-sparse vegetation
  - Spring - late April to late May
  - Fall - mid-July to mid-September
- Breeding
  - Avocets - alkali flats interspersed w/saltgrass
  - Killdeers - alkali flats interspersed w/saltgrass, gravel, along roads
  - Phalaropes - dense saltgrass, spikerush and grasses
  - Snipe - same as phalaropes (maybe taller and denser vegetation)
  - Spotted sandpiper - upland, saltgrass, Kochia, alkali flats
  - Stilt - Same as avocet
- Chronology?

	Crane		Mallard		Killdeer		Avocet	
	SM	B	SM	B	SM	B	SM	B
Upland Shrub (greasewood/rabbit brush)	0	N/A	0	0	+	+	+	+
Tall Emergent								
Cattail	0	N/A	0	0	0	0	0	0
Bulrush	0	N/A	+	+	0	0	0	0
Short Emergent								
Baltic Rush	+	N/A	+	+	+ (if sparse)	+	+ (if sparse)	+
Spikerush/Carex	++	N/A	++	++	+	+	+	+
Saltgrass	+	N/A	+	+	+	+	+	+
Shallow Seasonal Water (no vegetation)	+	N/A	+	+	+	+	++	++
Semipermanent	0	N/A	0	0	0	0	0	0
Annuals (kochia, chenopodiums, spikerush, foxtail barley)	+		++	+	+	+	+	+
Agriculture	++	N/A	++	0	0	0	0	0

SM = Spring Migration, B = Breeding

Figure 3. Foraging use by Sandhill Cranes, Mallards, Killdeer and Avocet in 8 habitats in the San Luis Valley during spring migration and breeding.

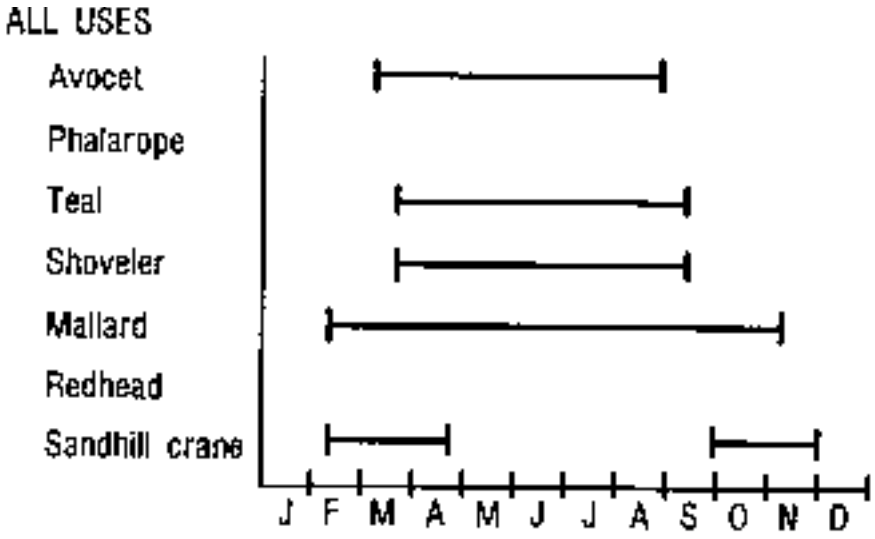

Figure 4A. Chronology of all use by 7 common avian species in shallow water habitat.

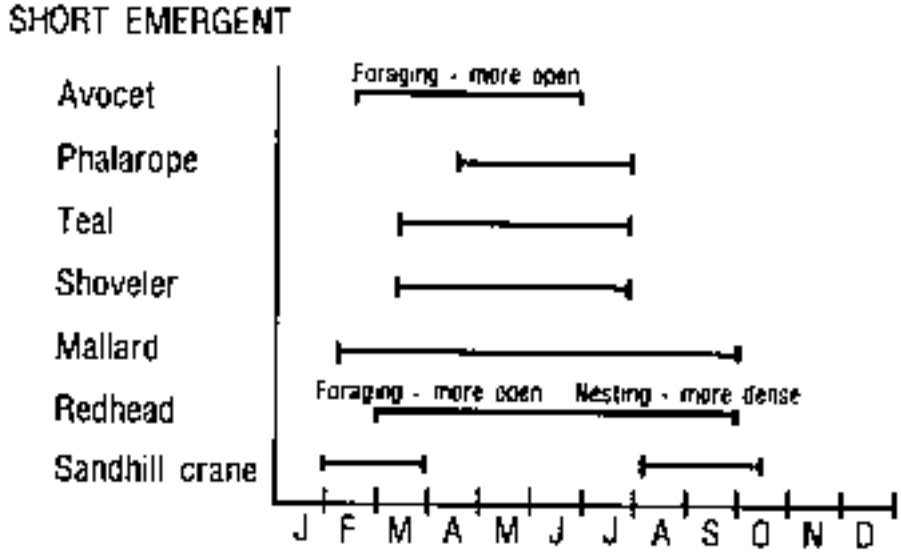

Figure 4B. Chronology of all use by 7 common avian species in short emergent habitat.

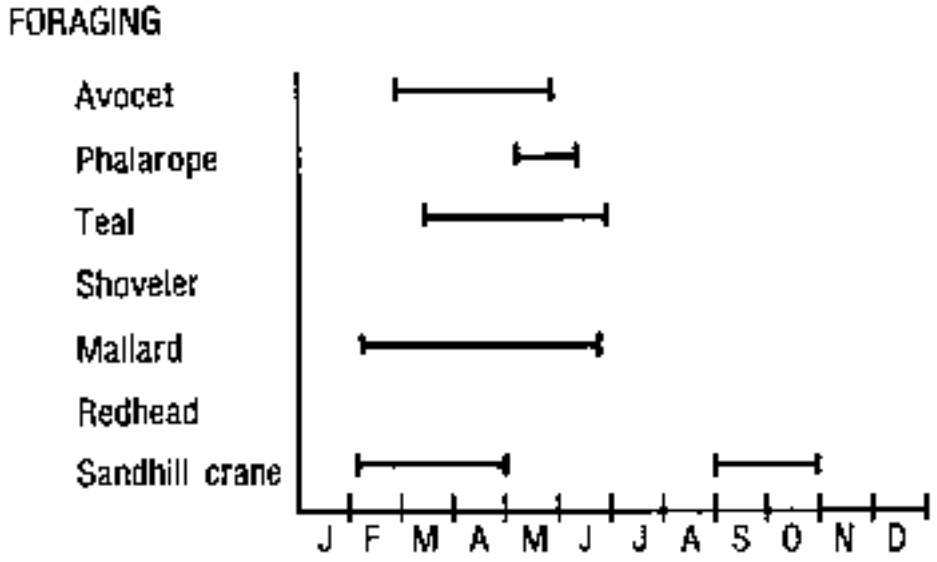

Figure 5A. Chronology of foraging by 7 common avian species in shallow water habitat.

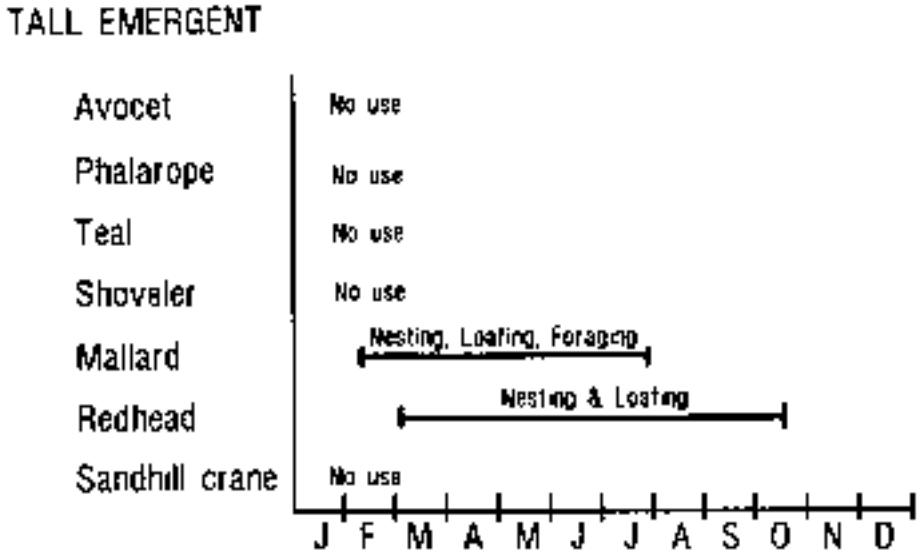

Figure 5B. Chronology of foraging by 7 common avian species in tall emergent habitat.

APPENDIX A.

INTERIM GOALS AND OBJECTIVES FOR MONTE VISTA AND ALAMOSA NATIONAL WILDLIFE REFUGES

MANAGEMENT SHOULD:

1) Integrate purposes of NWRs and other wildlife management areas.
2) Complement to SLV ecosystem.
3) Focus on endemics and their status (T&E).
4) Emphasizing mig bird and waterbirds.

MISSION OR GOAL STATEMENT:

To emphasize the diversity and abundance of native species in the SLV by providing wetlands and native plant communities for endemics at risk, waterbirds, and migratory birds in a manner that complements the SLV ecosystem. Major components are: (1) shorebirds, (2) waterfowl, (3) raptors, (4) colonial nesters and waders, (5) sandhill cranes, (6) neotropical and other birds, (7) native endemic fauna, (8) vegetative composition and manipulation (weed control), (9) NWRs goals, (10) education and recreation.

WETLAND COMMUNITY

Goal - Manage wetland community to best support the needs of water related species (both flora and fauna) that are the focus of this research study and CMP.

Objectives:

1) Alamosa NWR will provide XXXX acres of deep water, XXXX acres of mud flats, and XXXX acres of shallow marsh for the period 1996-2001 to provide life requirements for endemic species at risk, waterbirds and migratory birds.

2) Monte Vista NWR will provide XXXX acres of deep water, XXXX acres of mud flats and XXXX acres of shallow marsh for the period 1996-2001 to provide life requirements for endemic species at risk, waterbirds and migratory birds.

UPLAND COMMUNITY

Goal - Manage uplands to provide native plant communities (current and potential) to best support needs of upland endemic species and migratory birds that are the focus of this research study and CMP.

Objectives:

1) Alamosa NWR will provide XX habitat patches that each contain vegetation of XX height, XX density and XX composition of plants necessary for the nesting, resting, and feeding requirements of endemic species at risk, waterbirds and migratory birds during the period 1996-2001.

2) Alamosa and Monte Vista NWR will provide suitable habitat conditions for sustaining populations of slender spider flower based upon yet to determine information.

3) Monte Vista NWR will provide XX habitat patches that each contain vegetation of XX height, XX density and XX composition of plants necessary for the nesting, resting, and feeding requirements of endemic species at risk, waterbirds and migratory birds during the period 1996-2001

RIPARIAN COMMUNITY

Goal - Manage for seasonally dynamic riverine habitats to best support endemic species at risk, migratory birds and other endemic species.

Objectives: Alamosa will provide XXX acres of seasonally (periodically) wet acres of XXX composition in proximity to river to emulate natural flooding regimes that supported life requirements for endemic species at risk, waterbirds, and migratory birds for the period 1996-2001.

CROPLAND COMMUNITY

Goal - Provide grain for spring migrating sandhill cranes and waterfowl.

Objectives: Monte Vista NWR will provide XXX acres of unharvested grain capable of supporting XX use days for sandhill crane and waterfowl to provide food for enhancing fat reserves. A total of XXX acres of cropland will be rotated to maintain soil fertility and reduce the abundance of noxious weeds.

APPENDIX B.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Alamosa/Monte Vista National Wildlife Refuge
9385 El Rancho Lane
Alamosa, Colorado 81101

October 4, 1996

Wayne King
U.S. Fish and Wildlife Service
317 West Prospect
Ft. Collins, Colorado 80526

Dear Jim:

By now you have been contacted by Dr. Leigh Fredrickson or me concerning a workshop we are planning for Alamosa/Monte Vista National Wildlife Refuges. This workshop will be held on October 15-17, 1996 in and around Alamosa, Colorado. Please refer to the enclosed agenda.

This effort is warranted for several reasons. In 1995 the U.S. Fish and Wildlife Service (Service) agreed to implement a process leading to a Comprehensive Management Plan for the Alamosa/Monte Vista NWR Complex, describing purposes and management objectives. Internal directives will also require all refuges to develop goals by sometime next spring.

At the same time the Service agreed to initiate this planning process it agreed to initiate a study that will recommend the best management practices to achieve refuge goals. This study is underway and the first year appears very successful but we now need to articulate other goals so research can tell us how to achieve them. We also need to identify information gaps preventing us from setting additional goals. In some cases we will need to ask research to address a more fundamental question to help define goal before we ask how to reach it.

What I hope to achieve during this workshop is to identify how ecological values of these refuges relate to values within the San Luis Valley, the Region, and the Flyway. These relationships should set the stage to identify goal statements appropriate for these refuges. I anticipate that additional ideas and associated questions will need to be identified and answered before goals can be refined or additional goal statements can be developed. Then the process of identifying the appropriate objectives for these refuges within the landscape of the San Luis Valley should become clear.

As background information the following documents are enclosed:

1. San Luis Valley Waterbird Plan.

2. Draft Comprehensive Management Plan prepared in 1993.

3. Interim goals and objectives for Alamosa-Monte Vista NWR Complex, due August 1995.

As you can see effort has already been expended on goal and objective setting for these refuges but the results were incomplete in some fashion. They are simply available for us to improve upon.

I look forward to your help and thank you in advance for your interest in Alamosa and Monte Vista National Wildlife Refuges. This is an opportunity for us mold the future of these refuges and provide a successful model for other conservation units in the country about to struggle with this process.

The following is a list of motels in the Alamosa area. Please note that the meeting will be held in the Holiday Inn and they will discount the price of your room to $40.00 if you tell them you are with the meeting being held for Alamosa and Monte Vista National Wildlife Refuge. If there is some problem at check in please have the desk person talk to Robin in sales. The neighboring Days Inn is also conveniently located.

Holiday Inn
333 Santa Fe Avenue
Alamosa, CO
(719)589-5833

Days Inn
224 O'Keefe Parkway
Alamosa, CO
(719)589-9637

Best Western Motel
1914 Main Street
Alamosa, CO
(719)589-2567

Super 8 Motel
2505 Main Street
Alamosa, CO
(719)589-6447

Comfort Inn
6301 Road 107 South
Alamosa, CO
(719)587-9000

Please call me at (719) 589-4021 ext. 109 if you have any questions, problems or need help with logistics.

Sincerely,

Michael Biender
Refuge Manager

Enclosures

A WORKSHOP FOR SETTING GOALS AT ALAMOSA AND MONTE VISTA NATIONAL WILDLIFE REFUGES

Tuesday, October 15, 1996

1:00 PM - 2:00 PM

Where: Alamosa NWR Headquarters

What: Introductions
Welcome - Blenden and Fredrickson
Partners view of Compatibility Lawsuit and concerns in the planning process - Pam Eaton- Wilderness Society

2:00 PM - 5:00 PM

Field trip and overview of Alamosa National Wildlife Refuge

Wednesday, October 16, 1996

8:00 AM - 11:30 AM

Where: Monte Vista NWR, old office

What: Field trip and overview of Alamosa NWR

12:00 - 1:30 Lunch (place to be determined)

1:30 PM - 5:00PM

Where: Alamosa Holiday Inn, Santa Fe Room

What: Facilitator lays down rules - Hamilton
Background discussion - additional comments from Fredrickson, Blenden,
Goal and objective setting process on other refuges - King

Goal setting – Hamilton takes lead

Thursday, October 17, 1996

8:00 AM - 12:00 AM

Where: Alamosa Holiday Inn, Santa Fe Room

What: Goal setting, conclusion, next steps ?

APPENDIX C.

SYNOPSIS OF THOUGHTS PRESENTED BY LEIGH FREDRICKSON AT GOALS AND OBJECTIVES MEETING HELD AT ALAMOSA, COLORADO ON 15–17 OCTOBER, 1996.

Historical Perspectives
- Driven by drought of 1930's
- Lack of understanding
  - Life history requirements
  - Wetland processes and dynamics
  - Role of invertebrates
  - Role of abiotic factors
- Focus on breeding habitat

Doctrine from Historical Perspectives
- Must capture and maintain water consistently
- Stable water level is desirable
- Large systems
- Dams instead of levees
- Inappropriate water control structures
- Few units developed at a site
- Lack of independent water control
- Managed as semipermanent wetlands

Result of Historic Wetland Management Approach
- Productivity declines
- Monocultures develop
- Management costs excessive
- Rehabilitation difficult and costly

Historical Perspective

Early Years	Refuges/Wildlife Areas protected habitats common to a region
Late 1990's	Refuges/Wildlife Areas are remnant examples of previously abundant habitats
Challenge	What are appropriate goals and objectives within disrupted landscapes?

Goals/Objectives/Evaluation
- Do not match ecosystem
- Do not match habitat type
- Single species focus
- Evaluations not considered
- Monitoring does not fit evaluation
- Dynamics of systems overlooked
- Short-term perspective
- Local focus

APPENDIX D.

HISTORY OF THE DEVELOPMENT OF GOALS AND OBJECTIVES WITHIN THE NATIONAL WILDLIFE REFUGE SYSTEM

Mileposts in Refuge Planning

1971	Objective Handbook, Individual Refuge Objectives
1975	Guidelines for Preparing and Evaluating Program Objectives
1982	Refuge Manual RM 1.2, Individual Field Station Objectives
1988/89	Director Dunkel required written Goals and Objectives for Refuge
1993	Functional Unit Analysis, Reinventing Refuges
1994	Valentine, Nebraska
	August - Grassland Ecology and Ecosystem Management Workshop
	October - Region 6 to take lead in developing a task force to develop guidance for writing Goals and Objectives
1996	San Diego Meeting
1997	Comprehensive Master Planning for all refuges

Importance of the Comprehensive Management Planning strategy

1. Define objectives as they apply to NWRS.
2. Clarify hierarchial relationships between Refuge System goals and individual refuge purposes, mission, goals, and objectives.
3. Rationale for management - grazing, etc
4. Assess and modify management actions.
5. Setting station priorities.
6. Foundation of accountability, direction, and continuity.

APPENDIX E.

NATIONAL WILDLIFE REFUGE SYSTEM GOALS, DEFINITION AND CRITERIA FOR OBJECTIVES.

The NWRS has four systemwide goals:

1. To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.

2. To perpetuate the migratory bird resource.

3. To preserve a natural diversity and abundance of fauna and flora on refuge lands.

4. To provide an understanding and appreciation of fish and wildlife ecology and man's role in the environment, and to provide refuge visitors with high quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

What are objectives and why set them?

An objective derives from a goal, and describes conditions toward which effort is directed because of that goal. It must be clear and unambiguous regarding what is being measured and the expected achievement. Properly worded, it provides a yardstick against which progress can be evaluated. It is concise, measurable, and preferably quantitative. Well written objectives are (1) achievable; (2) measurable; (3) repeatable; (4) understandable, (5) reasonable; and (6) clearly defined in terms of time and location. Further, it should contain five elements: WHO, WHAT, WHERE, WHEN, and WHY. For example,

> The Valentine NWR (who) will provide native grassland habitat with a vegetative diversity index of 00% (what) on 20,000 acres of the refuge (where) in 1995 (when) for the benefit of endemic and migratory bird nesting requirements (why).

> The Arctic NWR (who) will monitor subsistence harvest and harvest efforts relating to moose, caribou, salmon, rainbow trout, ducks, geese, and beaver (what) annually (when) using surveys or other methods sufficiently sensitive to identify trends with sufficient accuracy to support timely management actions (why) on representative sections of the refuge (where). Note that this objective could be broken into several species-specific objectives

Without well-written objectives it is impossible to reliably assess progress or evaluate the outcome of management decisions. Further, writing and ranking objective statements forces management to define those resources most important to the refuge and the ecosystem.

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