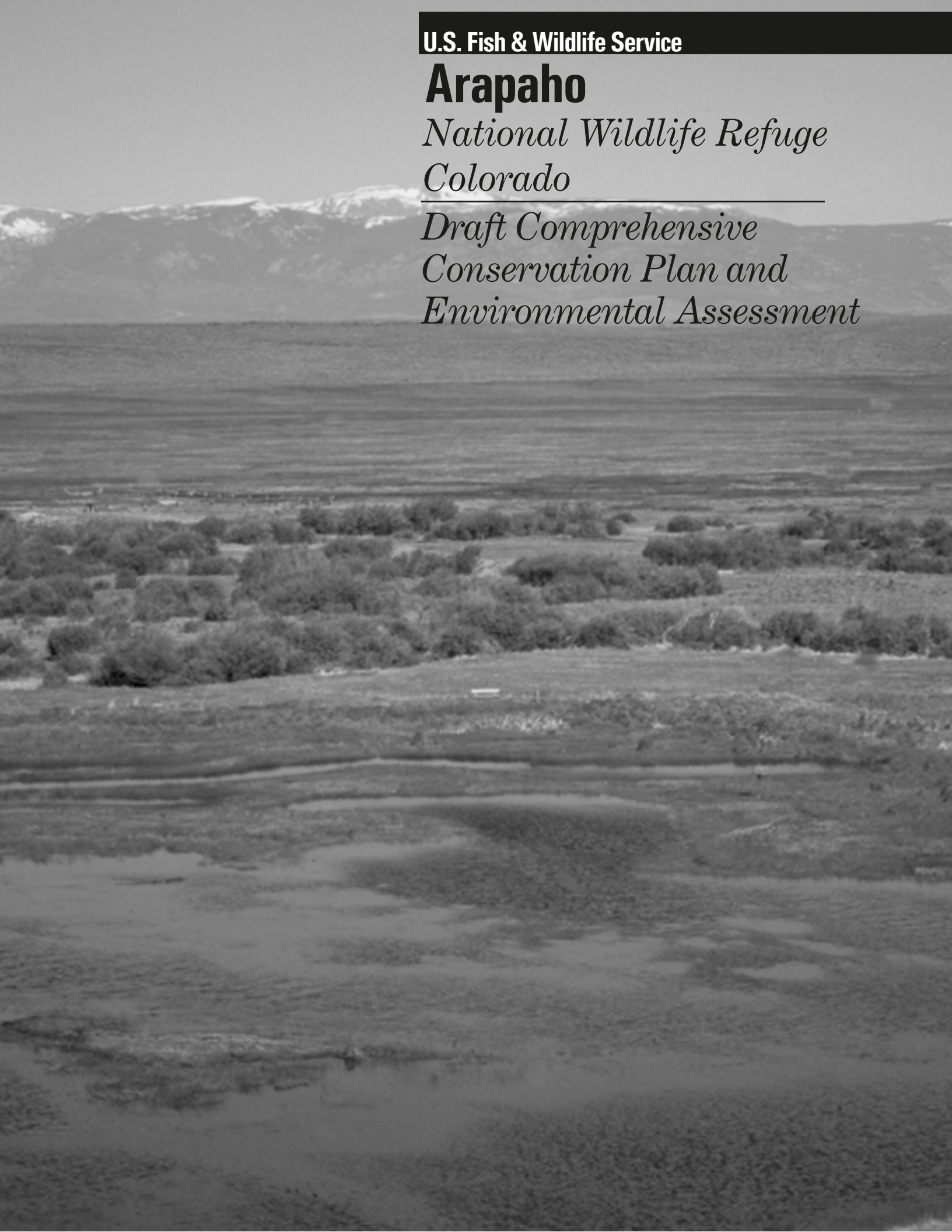

U.S. Fish & Wildlife Service

Arapaho

National Wildlife Refuge
Colorado

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.

ARAPAHO
NATIONAL WILDLIFE REFUGE

Draft
Comprehensive Conservation Plan
and Environmental Assessment

July 2003

Prepared by
U.S. Fish & Wildlife Service
Arapaho National Wildlife Refuge
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Arapaho National Wildlife Refuge
Comprehensive Conservation Plan Approval
U.S. Fish & Wildlife Service, Region 6

Submitted By:

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Gregory J. Langer
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Arapaho National Wildlife Refuge

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Richard A. Coleman, Ph.D.
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Summary

The U.S. Fish & Wildlife Service (Service) is the principal Federal agency with the responsibility for conserving, protecting, and enhancing fish and wildlife and plants and their habitats for the continuing benefit of the American people. The Service manages the 95-million-acre National Wildlife Refuge System (System) which encompasses more than 540 national wildlife refuges, thousands of small wetlands and other special management areas. It also operates 70 national fish hatcheries, 64 fishery resource offices, and 78 ecological services field stations. The agency enforces Federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

National wildlife refuges are established for a particular purpose. Formal establishment is generally based upon a statute or executive order that specifies a purpose for that Refuge. However, refuges can also be established by the U.S. Fish & Wildlife Service using the authorization found within laws such as the Endangered Species Act, Migratory Bird Conservation Act, and the Fish and Wildlife Act of 1956. Arapaho National Wildlife Refuge was established on September 26, 1967, for the following purposes:

> ". . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)
>
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These two broad statements provide the "side-boards" to guide future management of Arapaho NWR.

To accomplish these purposes, the Refuge has utilized the existing ditch irrigation system to irrigate hay meadows for waterfowl, shorebird, and songbird nesting habitat. Additionally, 78 wetlands were created or enhanced to provide waterfowl brood-rearing habitat. The result is that Arapaho NWR contains abundant wildlife resources, produces 6,000 to 8,000 ducks annually, and supports a diverse wildlife community that is common to high mountain valleys in the central Southern Rocky Mountains. In April of 1997, Arapaho NWR experienced an office fire that completely destroyed the headquarters building. Unfortunately, much of the historic wildlife resource data was lost to this fire. Implementation of this plan will require some collection of baseline wildlife and plant resource information to regain what was lost to fire.

The Arapaho National Wildlife Refuge Complex includes the following four satellite refuges in Wyoming: Bamforth NWR, Hutton Lake NWR, Mortenson Lake NWR, and Pathfinder NWR. The Arapaho NWR staff administers all five refuges from Walden, Colorado with a combined total of 44,960 acres.

Comprehensive Conservation Plans (CCP) were mandated by the National Wildlife Refuge System Improvement Act of 1997. This Act requires that the CCP must identify and describe:

1) purposes of the Refuge;
2) fish, wildlife, and plant populations and their habitats;
3) archaeological and cultural values;
4) significant fish, wildlife, and plant problems; and
5) the actions necessary to correct them.

The CCP should also identify and describe compatible wildlife-dependent recreational opportunities and administrative and visitor facilities required to implement the Plan. This CCP only addresses the management of Arapaho NWR near Walden, Colorado. Management of the remaining four Wyoming satellite Refuges will be addressed in a separate planning effort.

Benefits of the CCP are several: better long-term continuity in Refuge management; better understanding of Refuge management actions for Refuge staff members and visitors; a clear description of future development and funding needs; and the assurance that Refuge management will fulfill the mission of the National Wildlife Refuge System and the specific purposes for which the Refuge was established.

The Arapaho CCP will be used to prepare step-down management plans and revise existing management plans. It also will be used to prepare budgets which describe specific actions to be taken by the Refuge over the next 15 years. Given that new information, guidance, and technology frequently change and become available, the CCP will be updated as necessary throughout the 15-year period.

The Environmental Assessment considered four management alternatives for management of the Arapaho National Wildlife Refuge. Each of these alternatives were evaluated for environmental consequences in accordance with the National Environmental Policy Act (NEPA). The CCP is the preferred alternative for Refuge management.

Refuge Vision

Arapaho National Wildlife Refuge is managed to benefit the diversity of plants and wildlife found in this high mountain valley of the southern Rocky Mountains. The Refuge and its resources are also managed for the benefit of the citizens of the United States.

The Refuge includes wetland, meadow, sagebrush uplands, and riparian communities that provide habitat for large mammals, neotropical migratory birds, nesting waterfowl, fishes, and species of concern from national and regional conservation plans. In particular, efforts by Refuge staff to restore the Illinois River channel hydrology, areas of sagebrush uplands, and to effectively manage wetlands and meadows, contribute to the ecological integrity of the Refuge, North Park, and the overall North Platte River system.

Through wildlife-dependent recreation and education, people have opportunities to learn of the wonder and significance of North Park's fauna and flora. Firsthand experiences with the Refuge encourage people to participate as stewards, not only of the Refuge, but also of the natural resources in their own communities.

Working in collaboration with the local community and other agencies and organizations helps the U.S. Fish & Wildlife Service manage the Refuge as a contributing ecological, cultural, and economic component of the unique mountain valley within which it sits.

Refuge Goals

Arapaho NWR lands will be managed using the following goals within four primary habitat types (riparian, wetlands, meadows, and uplands). Compatible public uses, cultural resources, research opportunities, and partnerships will be used to facilitate Refuge management, and enhance public understanding of natural resource values within North Park. Refuge staff recognize that many landscapes have been altered and may never be restored. Arapaho NWR goals include:

- ***Riparian Habitats*** - *Provide a riparian community representative of historic flora and fauna in a high valley of the southern Rocky Mountains to provide habitat for migratory birds, mammals, and river-dependent species.*

- ***Wetland Habitats*** - *Provide and manage natural and man-made permanent and semipermanent wetlands (in three wetland complexes) to provide habitat for migratory waterfowl, shorebirds, wading birds, and associated wetland-dependent wildlife.*

- ***Meadow Habitats*** - *Provide and manage irrigated, grass-dominated meadows historically developed for hay production, to support sage grouse broods, waterfowl nesting, and meadow-dependent migratory birds.*

- ***Upland Habitats*** - *Provide an upland community representative of the historic flora and fauna in a high valley of the southern Rocky Mountains to provide habitat for sage grouse, large mammals, and other shrub-associated species.*

- ***Public Use*** - *Through wildlife-dependent recreation and education, people of a range of abilities and interests are able to learn of, and appreciate, the natural resources of this unique high mountain park. Thereby, citizens become better stewards of nature in their own communities and stronger supporters of the Refuge specifically and the National Wildlife Refuge System generally.*

- ***Cultural Resources*** - *The cultural resources of the Refuge are preserved, protected, and interpreted for the benefit of present and future generations.*

- ***Research*** - *The Refuge is a learning platform for compatible research that assists management and science of high mountain park sage-steppe communities.*

- ***Partnerships*** - *A wide range of partners join with the Fish and Wildlife Service in promoting and implementing the Refuge vision.*

The vision and goals presented here will be implemented over the next 15 years using the measurable objectives and strategies identified within this CCP. Working with partners, the Arapaho National Wildlife Refuge will conserve, protect, and enhance fish and wildlife habitats for the continuing benefit of the American people.

Nuttall's Cottontail © Everett & Nancy Collin

American Avocet © William H. Miller

Eared Grebe © William H. Miller

North Park Middle School Science Class

Cow Moose with Twins © William H. Miller

Prairie Lupine © Everett & Nancy Collin

Sunset Over Arapaho NWR © Everett & Nancy Collin

House Wren © Everett & Nancy Collin

Gadwall with Brood ©Virginia Heitman

Butterfly © William H. Miller

Sage Grouse Hen with Young © Everett & Nancy Collin

Prairie Dog © USFWS

Introduction/Background

The Arapaho NWR Complex is located in the northwest corner of Colorado. The Complex includes the Arapaho National Wildlife Refuge (NWR) and the following four satellite refuges in Wyoming: Bamforth NWR, Hutton Lake NWR, Mortenson Lake NWR, and Pathfinder NWR (see Map 1 - Vicinity Map). On September 26, 1967, the Migratory Bird Conservation Commission, acting under the authority of the Migratory Bird Conservation Act, approved the established area known as the Arapaho NWR, which is currently is 23,243 acres in size and is located in Jackson County (see Map 2 - Base Map). Purchased acres total 18,451 while 4,792 acres have been withdrawn. The Arapaho Complex staff administers an additional 21,717 acres on the Wyoming satellite refuges for a total of 44,960 acres under Complex management.

The Refuge is located in an intermountain glacial basin just south of the town of Walden, the county seat of Jackson County, Colorado. The basin is approximately 30 miles wide and 45 miles long. Commonly known as "North Park" since it is the most northern of three such "parks" in Colorado. Jackson County is a high, isolated intermountain basin that lies in the northern tier of Colorado counties (see Map 3 - North Park).

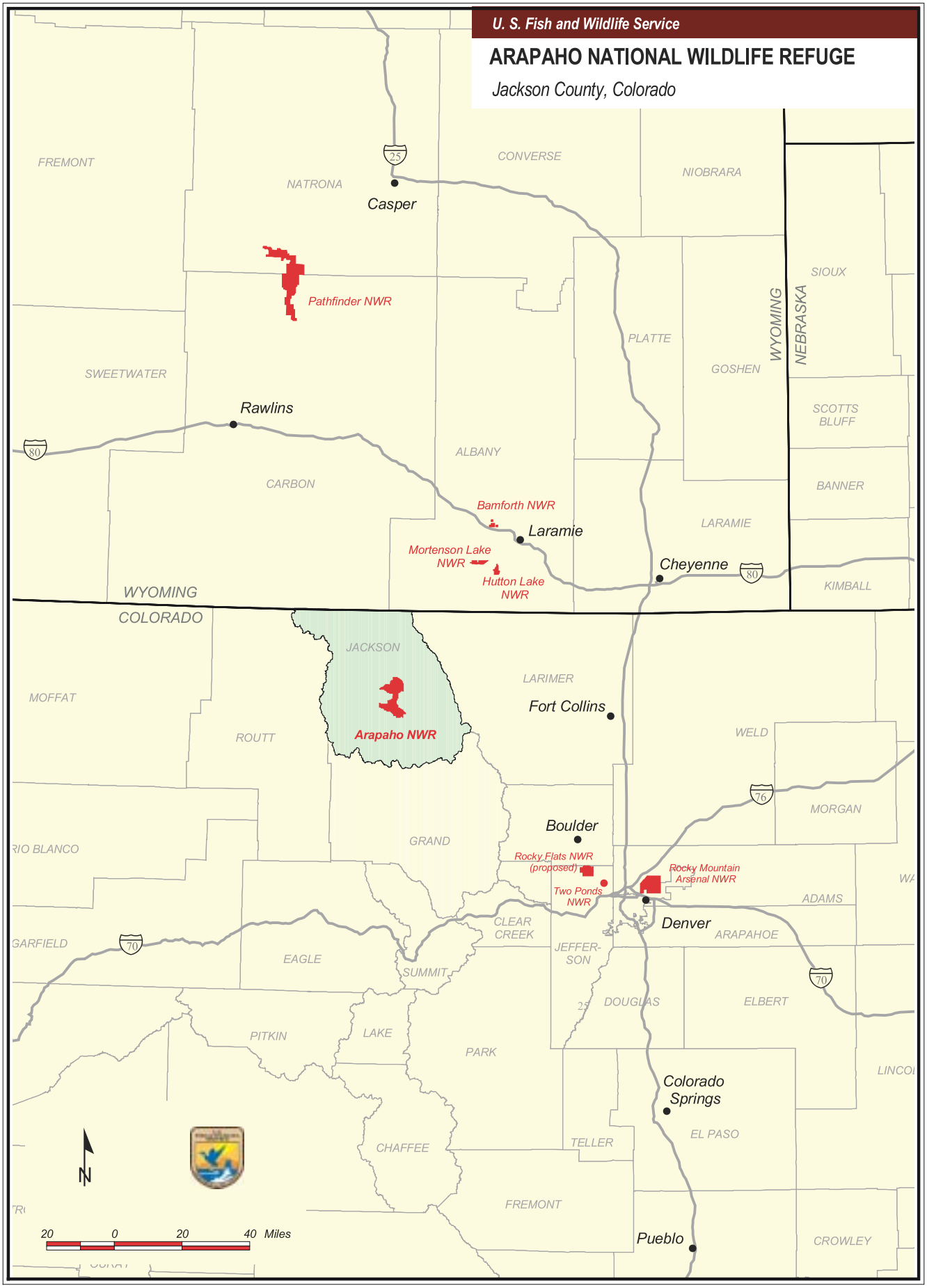
Forming the headwaters of the North Platte River, the basin opens north into Wyoming and is rimmed on the west by the Park Range, on the south by the Rabbit Ears Range, and on the east by the Medicine Bow Range (see Map 4 - Physical Features of North Park, Colorado). Elevation ranges from 7,800 to 12,953 feet above sea level. The floor of the basin is interspersed with many slow meandering streams that come together in the north-central part of the county to form the North Platte River. Main tributary rivers are the Michigan, Illinois, Canadian, and Grizzly (Map 5 - Platte River Watershed).

A major portion of the bottom land along the streams is irrigated hay meadow and irrigated pasture while the low rises between streams are dry grassland and sagebrush grazing lands. The picture changes rapidly on the edges of the basin where the land pitches abruptly upward to the mountain tops, the slopes heavily clothed with aspen, spruce, pine, and fir up to timberline at about 11,000 feet, then tundra and rock up to the mountain summits.

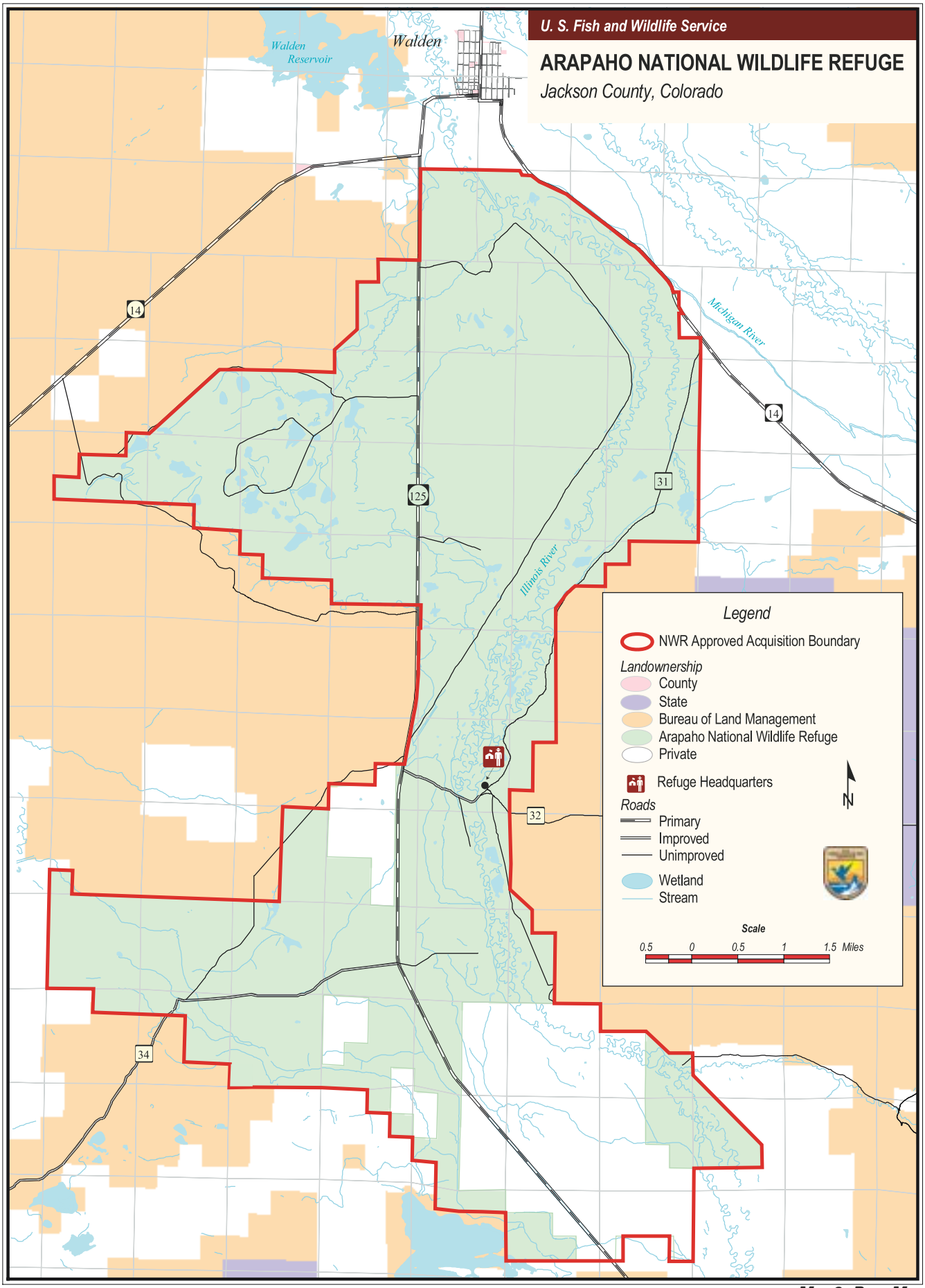
The ecosystems in the North Park area of Colorado have grown through hundreds of years in a fire-dependent system, with fire as an important, dominating influence. High elevations and a short season, with a cool, often moist, climate was part of the fire regime. Class 4 Fire Regime consist of combined crown fires and severe surface fires (25 to 100 year return interval). Most woody vegetation or stand elements were killed over large areas.

The fire regime has been altered, changing the cultural activities, i.e., grazing patterns over a 100-year period, in the North Park area. Early explorers noted tallgrass found in the Park. Native Americans dubbed North Park the "Bullpen," referring to the bison inhabiting the area. This gives an indication that the area may have been more dominated by grasses, and thus likely was more influenced by fire than the present condition dominated by sagebrush hills.

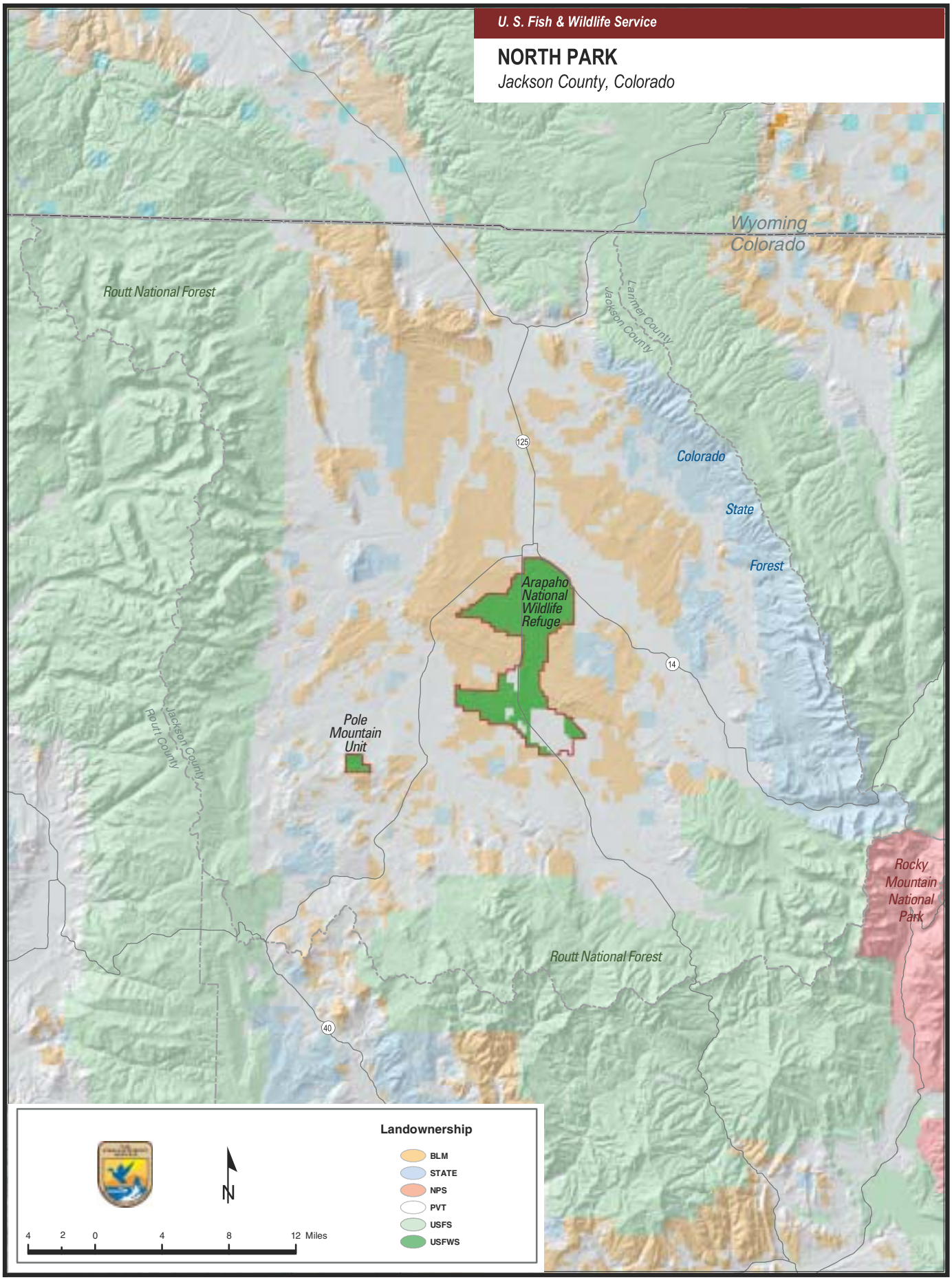
Records for North Park indicate little significant wildfire activity in the past 50 years.



Map 1- Vicinity Map

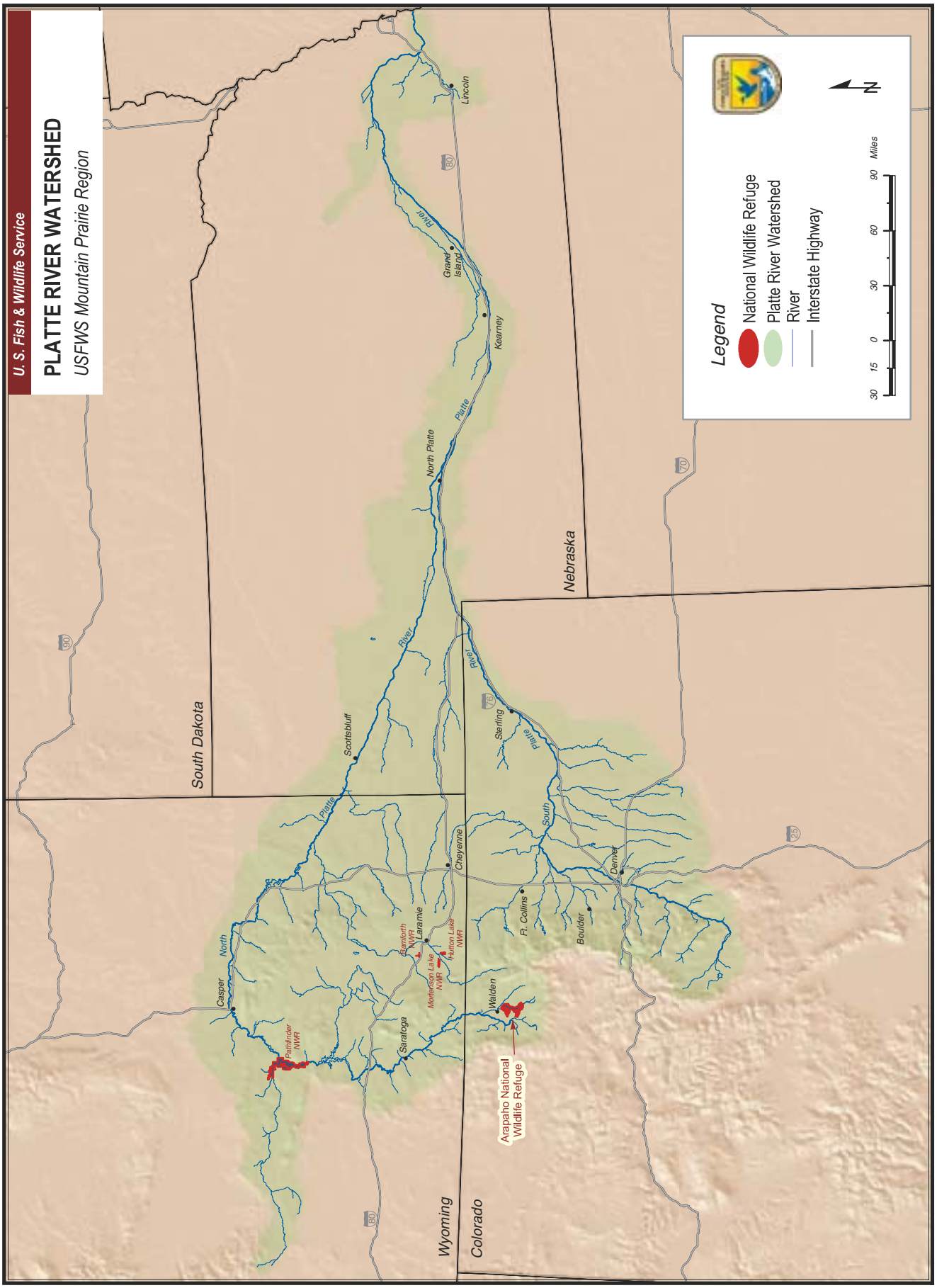


Map 2 - Base Map



Map 3 - North Park, Jackson County, Colorado

Map 4 - Physical Features of North Park, Colorado



Map 5 - Platte River Watershed

Prior to 1820, the Ute Indians spent their summers in North Park, living on mule deer, buffalo, pronghorn antelope, and many other kinds of game. The severity of the winters forced both the Indians and the game down to lower altitudes in the fall.

The Arapaho Indians also made frequent hunting trips into North Park coming in from the southwest over a pass described by Lt. John F. Fremont, as one of the most beautiful he had ever seen. The Utes and Arapaho's were bitter enemies, and many battles occurred when they chanced to meet. Besides their well worn trails, other mute evidence of Indian life of pre-settlement time still exists in North Park. A band of Utes who participated in the Meeker, Colorado massacre in 1879 fled to North Park after the incident and spent the winter in the north end of the Park. Several large log tepees left by this band of Utes, still stand in a sheltered and secluded spot in the north end of Jackson County.

The first Europeans to visit and explore North Park were probably trappers, who were in northwestern Colorado as early as 1819. Beaver were particularly abundant along North Park's streams. In 1820, Josephy Bijeau told of the good trapping he had experienced in North Park a few years prior, while with the Chateau and DeMunn Expedition. About the same time, 1820, Jacques Laramie trapped in the Park for the Northwest Fur Company. He was followed by a party of trappers headed by Alexander Sinclair and Robert Bean who trapped beaver in the Park in 1825. A number of trappers visited the Park into the 1840s including Peg Smith, John Gantt, Kit Carson, Henry Fraeb, Calvin Jones, Bill Williams, Jim Baker, Jim Bridger, Sublette, Gervais, and Vasquez. In 1855, the famous Irish hunter Sir George Gore made a spectacular hunting trip through North Park, killing thousands of mule deer, buffalo, and pronghorn antelope.

Beaver © Cindie Brunner

Miners and prospectors followed the trappers and hunters to North Park. James O. Pinkham was one of the first prospectors in North Park and began panning gold in the area in the early 1870s spending the long cold winters in Laramie, Wyoming, and the summers in North Park. He believed that North Park was the richest and finest country in the world, and built a home in the Park in 1874. Mr. Pinkham interested others in North Park through his tales of rich placer land, and by 1875, nearly 100 men were prospecting for placer gold around Rabbit Ears, Independence, and Owl Mountains.

During August and September 1879, George Bird Grinnell, naturalist, writer, and hunter entered the Park to collect museum specimens. Traveling by horse from the train station in Laramie, Wyoming, this 29-year-old Yale graduate entered the north end of the Park. "The country at this point had been burned over and was black and extremely desolate in appearance. I inquired the cause of the fire and learned from the owner of the ranch (Pinkham) that the burn had been made to clear off the sagebrush which takes up so much room that might be occupied by grass." Several days later, while camped on a meadow along the North Platte River, Grinnell writes: ". . . was perhaps a mile and a half wide, a superb level meadow, covered with fine grass, on which in the morning and evening from two to five hundred pronghorn antelope were in sight at one time. Sage and dusky grouse, ducks, and jack rabbits abounded here also . . . . It is only necessary to get back from the road to find both mule deer and elk."

The first settlers lived on wild game, and hunting was as much a business of the men as attending to their ranch work. North Park, in the late 1880s, was a paradise of game. Thousands of pronghorn antelope summered in the Park and migrated to the lower valleys in Wyoming during the winter. Also, hundreds of mule deer and elk were in the Park, but their numbers diminished after the arrival of settlers. Few buffalo were left in the Park when the first settlers came, but they soon disappeared. Many bears, mountain lions, mountain sheep, and beaver existed along with thousands of sage grouse, blue grouse, and ducks in the early days. No trout existed in any of the North Park streams when the first settlers came; however, in the 1880s, settlers stocked the streams with eastern brook trout and rainbow trout.

In 1880, cattle were introduced in large numbers, being driven down from the railroad lines in Laramie, Wyoming. However, the winter of 1883-84 was severe, and half of the stock died. As a result, most of the ranchers purchased mowers and rakes prior to the following summer's haying season in preparation for putting up the wild hay for winter feed. Hay has always been the main agricultural crop in Jackson County, with about 100,000 acres being in native mountain hay and only 370 acres in other crops. For years, all the hay was fed inside North Park, but in 1914, ranchers began to bale and sell the hay outside the Park.

By the early 1890s, North Park was fairly well settled in every direction, and a central point for securing supplies became necessary. As a result, the Town of Walden, elevation 8,100 feet, the present county seat, was established in the middle of North Park located in the vicinity of two wagon roads from Laramie to Teller City and from Albany to Granby. The town was named after Mark S. Walden who was postmaster of the nearby settlement, Sage Hen Springs.

The economy of Jackson County is based primarily on agriculture and recreation. Additionally, mining and logging have provided economic stimulus to the county. The economic base has been fairly stable throughout the history of Jackson County with some fluctuations caused by the instability of the mining and logging industry.

Recreation is becoming more and more of an economic importance to Jackson County. The county's many streams, lakes, uplands, timbered areas, and mountains, most with public access, offer unusual opportunities for outdoor recreational activities such as hunting, fishing, bird-watching, backpacking, camping, snowmobiling, cross-country skiing, bicycling, horseback riding, and many other activities.

Refuge Overview

History of Refuge Establishment, Acquisition, and Management

Since the 1890s, North Park (Jackson County) Colorado has been known for high waterfowl productivity. Historically, high spring river flows flooded meadows providing suitable nesting habitat for a host of nesting bird species, especially waterfowl. Today, North Park serves as the second most productive waterfowl area in the State of Colorado. On August 15, 1967, the Migratory Bird Conservation Commission approved the first land acquisition project for the establishment of Arapaho NWR. The Refuge purpose was "for use as an inviolate sanctuary, or for other management purposes, for migratory birds" 16 U.S.C. (Migratory Bird Conservation Act). The original land purchase was the Allard Ranch of 4,433.07 acres. Subsequently, nine additional land tracts were purchased, and land exchanges completed with the U.S. Bureau of Land Management and the State of Colorado, for a current Refuge size of 23,243 acres.

Since 1967 the Refuge has been managed primarily for waterfowl nesting and production. Utilizing existing irrigation ditches for the water delivery system, the Refuge staff constructed or enhanced 78 wetland impoundments in the Illinois River. These impoundments, and associated wet-meadow habitats, provide the habitat necessary to produce waterfowl. The Refuge provides high quality habitat for many other mammals and birds common to high mountain sagebrush steppe environments. The willow riparian area alone supports over 40 species of songbird (neotropical migrants) during part of their migration or nesting cycle. Sage grouse are common on the Refuge, and wet-meadow habitats provide critical feeding areas for sage grouse young. Moose, mule deer, elk, and pronghorn antelope are common Refuge wildlife species. These big game species migrate on and off the Refuge; however, it is not uncommon for 1,200 elk, 200 pronghorn antelope, and 20 moose to inhabit the Refuge at any one time.

The Refuge headquarters is located 8 miles south of Walden on Highway 125. A full-time staff of six employees and three summer temporaries work to manage the Refuge wetlands and irrigation system, the wildlife habitats, and maintain visitor facilities. Grazing is the primary management tool used to manage meadow and upland habitats. Currently seven grazing cooperators are used to maintain and enhance Refuge grassland habitats. Water level manipulation, irrigation, fire, mowing, harrowing, and discing are additional tools used to improve grassland and wetland habitats on the Refuge.

The Refuge accommodates approximately 8,000 visitors annually. The 6-mile auto tour route, the walking trail, and Brocker Overlook account for the majority of visitor use. Approximately 500 recreation days are provided to hunters and anglers. The Refuge is currently open to limited small game, waterfowl, sage grouse, and pronghorn antelope hunting opportunities. The lower one-third of the Refuge provides brown and rainbow trout fishing opportunities to anglers.

Jackson County is rural and sparsely populated with only 1,577 individuals (2000 census data) residing there. Walden is the county seat, and approximately 900 individuals live within its city limits. At 8,200 feet in elevation, North Park is an intermountain glacial basin approximately 30 miles across and 45 miles long. Ranching, including both hay production and cattle, continues to be the dominant land use of North Park. Hunting, fishing, snowmobiling, and other outdoor recreational activities also promote the economy of the area. Fortunately, the traditional ranching history of North Park has not only produced hay and cattle, it has preserved and protected thousands of acres of wildlife habitat.

Purpose of and Need for Comprehensive Conservation Plan

Initiated by the National Wildlife Refuge System Improvement Act of 1997, Comprehensive Conservation Plans (CCP) will be developed for all units of the National Wildlife Refuge System. Plans must include public involvement in their development, and must set forth strategies to fulfill the Refuge System mission, as well as the purposes for which the Refuge was established.

Wildlife has first priority in the management of Refuges. Recreation or other uses are allowed if they are compatible with wildlife conservation. Wildlife-dependent recreation activities such as hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation will be emphasized.

This Comprehensive Conservation Plan provides a 15-year guidance for the management of Arapaho National Wildlife Refuge. Management goals and objectives developed for Arapaho National Wildlife Refuge are presented in the Management Direction Section. Based on the life requirements of selected wildlife species, these goals and objectives provide specific "targets" for Refuge staff to manage toward. Future management efforts will focus on achieving these goals and objectives for the benefit of wildlife and the American people.

To fulfill the U.S. Fish & Wildlife Service mission, Congress has charged the Service with conserving and managing migratory birds, endangered species, anadromous and inter-jurisdictional fish, and certain marine mammals. The Service operates more than 540 national wildlife refuges, 70 national fish hatcheries, 64 fishery resource offices, and 78 ecological services field stations. The agency enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid Program which distributes hundreds of millions of dollars in excise taxes on hunting and fishing equipment to state wildlife agencies.

The National Wildlife Refuge System is the world's largest collection of lands set-aside specifically for the protection of wildlife. The first unit of the Refuge System was created in 1903, when president Theodore Roosevelt designated 3-acre Pelican Island, a pelican and heron rookery in Florida, as a bird sanctuary. Today, the Refuge System consists of 540 national wildlife refuges and waterfowl production areas, encompassing more than 95-million acres and located in all 50 States and a number of U.S. Territories.

The Refuge System provides habitat for native mammals, birds, reptiles, amphibians, fishes, invertebrates, and plants "trust resources" for which the Federal government is ultimately responsible. It plays a vital role in preserving endangered and threatened species, preventing species from becoming endangered, and offers wildlife-dependent recreation for over 34 million visitors annually.

U.S. Fish & Wildlife Service Mission

"To work with others to conserve, protect and enhance fish and wildlife and plants and their habitats for the continuing benefit of the American people."

National Wildlife Refuge System Mission

"To administer a network of lands and waters for the conservation, management, and where appropriate, restoration of fish and 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, Public Law 105-57).

National Wildlife Refuge System Goals

1) To fulfill our statutory duty to achieve Refuge purpose(s) and further the System mission;
2) Conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered;
3) Perpetuate migratory bird, inter-jurisdictional fish and marine mammal populations;
4) Conserve a diversity of fish, wildlife, and plants;
5) Conserve and restore, where appropriate, representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems;
6) 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.

Ecosystem Goals

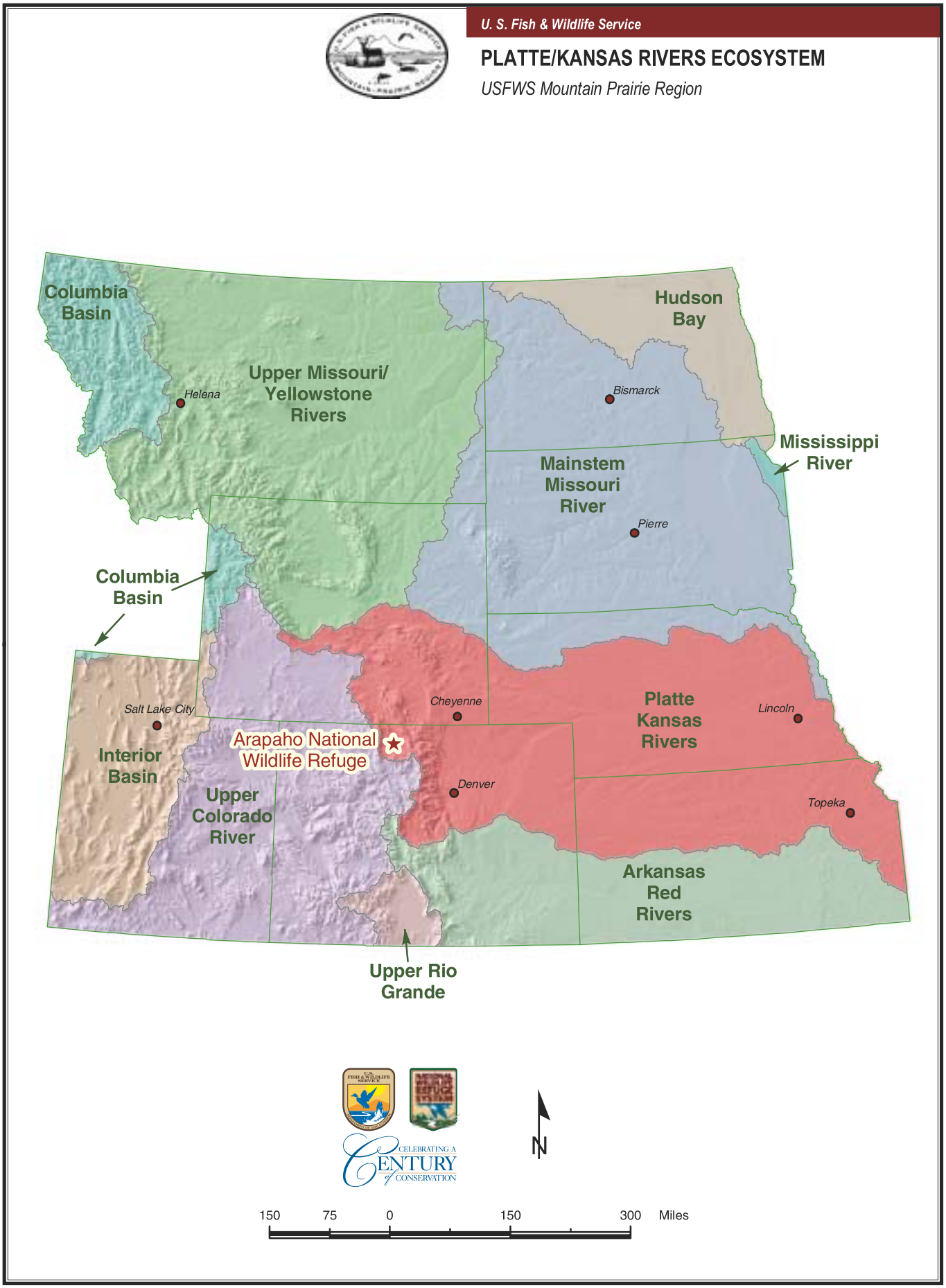
Platte/Kansas Rivers Ecosystem Vision

The vision of the Platte/Kansas Rivers ecoteam is to provide partnership based, landscape level conservation for the diversity and abundance of natural resources within the ecosystem. The team envisions landscapes which exhibit natural, healthy, ecological processes; ongoing protection of threatened, endangered and endemic species; protecting and promoting native prairie vegetation; involving all stakeholders in decision-making processes; and recognizes that partnerships are the key to success.

Platte/Kansas Rivers Ecosystem Description

The U.S. Fish & Wildlife Service has divided the country into 53 watershed-based ecosystem management units. The Platte/Kansas Rivers ecosystem unit encompasses approximately 182,000 square miles of the central Great Plains of the United States (see Map 6 - Ecosystem Map). The Platte/Kansas Rivers Ecoregion includes the States of Colorado, Kansas, Nebraska, and Wyoming. The area is diverse, beginning at the headwaters of the North and South Platte River systems high in the Rocky Mountains, moving into sagebrush uplands of north-central Colorado and southeastern Wyoming, traversing across the shortgrass prairie regions of eastern Colorado, and the mixed-grass prairie regions of Nebraska and Kansas. The primary ecological processes affecting this system are climate, cultivation, grazing, and fire. The ecosystem is considered arid with an average annual precipitation between 8 and 16 inches per year. Approximately 85 percent of the Platte/Kansas Rivers Ecoregion is privately owned. The remainder is primarily owned and managed by State and Federal agencies.

The Platte/Kansas Rivers Ecosystem Planning Team, with input from current partners and field stations, identified and prioritized three primary geographic sub-units: mixed-grass prairie, mountain, and shortgrass prairie. Within each geographic sub-unit, priorities were established based on significance in the ecosystem, species diversity, risk/threat to the entire ecosystem area, public benefits, and trust resources. Also considered were legal mandates, opportunity for partnerships, likelihood of success, and cost effectiveness. Arapaho National Wildlife Refuge falls within the Mountain Sub-Unit of the Ecosystem Plan and plays a vital role in uplands management and protection.



Map 6 - Ecosystem Map

Refuge Purposes

National wildlife refuges are established for a particular purpose. Formal establishment is generally based upon a statute or executive order that specifies a purpose for that Refuge. However, refuges can also be established by the U.S. Fish & Wildlife Service using the authorization found within laws such as the Endangered Species Act, Migratory Bird Conservation Act, and the Fish and Wildlife Act of 1956. Arapaho National Wildlife Refuge was established on September 26, 1967, for the following purposes:

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> ". . . for the development, advancement, management, conservation, and protection of fish and wildlife resources . . . " 16 U.S.C. § 742f (a)(4) ". . . for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude . . . ." (Fish and Wildlife Act of 1956)

These two broad statements provide the "side-boards" to guide future management of Arapaho National Wildlife Refuge.

As part of the planning process, the Refuge staff and planning team reviewed past national, regional, and complex planning documents and current planning guidance. Using the legislation and plans, the planning team developed the following vision statement for the Refuge.

Refuge Vision Statement

Arapaho National Wildlife Refuge is managed to benefit the diversity of plants and wildlife found in this high mountain valley of the southern Rocky Mountains. The Refuge and its resources are also managed for the benefit of the citizens of the United States.

The Refuge includes wetland, meadow, sagebrush uplands, and riparian communities that provide habitat for large animals, neotropical migratory birds, nesting waterfowl, fishes, and species of concern from national and regional conservation plans. In particular, efforts by Refuge staff to restore the Illinois River channel hydrology, riparian areas, sagebrush uplands, and to effectively manage wetlands and meadows, contribute to the ecological integrity of the Refuge, North Park, and the overall North Platte River system.

Through wildlife-dependent recreation and education, people have opportunities to learn of the wonder and significance of North Park's fauna and flora. Firsthand experiences with the Refuge encourage people to participate as stewards, not only of the Refuge, but also of the natural resources in their own communities.

Working in collaboration with the local community and other agencies and organizations helps the U.S. Fish & Wildlife Service manage the Refuge as a contributing ecological, cultural, and economic component of the unique mountain valley within which it sits.

Legal and Policy Guidance

National wildlife refuges are guided by: The mission and goals of the U.S. Fish & Wildlife Service and National Wildlife Refuge System; the legal purpose of the Refuge unit as described in the enabling legislation or executive orders; international treaties; Federal laws and regulations; and Service Policies (Appendix C).

The National Wildlife Refuge System Administration Act of 1966, as amended, provided guidelines and directives for administration of the National Wildlife Refuge System. Use of any area within the Refuge System was permitted, provided that such uses were compatible with the major purposes for which such areas were established.

The National Wildlife Refuge System Improvement Act of 1997 amends the Refuges System Administration Act by including a unifying mission for the Refuge System, a formal process for determining compatible uses on Refuges, and a requirement that each Refuge will be managed under a Comprehensive Conservation Plan. This Act states that wildlife conservation is the priority of Refuge System lands and that the Secretary of the Interior shall ensure that the biological integrity, diversity, and environmental health of the refuge lands are maintained. Each refuge must be managed to fulfill both the specific purposes for which it was established and the mission of the Refuge System.

Further, the Refuge Improvement Act defines the wildlife-dependent recreational uses as: hunting and fishing, wildlife observation and photography, environmental education and interpretation. (Specific details regarding additional amendments are available through the Refuge or Regional Fish and Wildlife Service offices).

Lands within the Refuge System are different from other public lands in that they are closed to all public uses unless specifically and legally opened. Unlike other Federal lands that are managed under a multiple use mandate (i.e. national forests administered by the U.S. Forest Service and public lands administered by the U.S. Bureau of Land Management), the Refuge System is managed specifically for the benefit of fish and wildlife resources.

Compatibility is a legal requirement of all refuge uses. By Federal law, all uses of national wildlife refuges, including wildlife-dependent recreational activities, must be formally determined to be compatible. A compatible use is defined as “a use that, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the Refuge.” Sound professional judgement is further defined as “a finding, determination, or decision that is consistent with the principles of sound fish and wildlife management and administration, available science and resources (funding, personnel, facilities, and other infrastructure), and adherence with applicable laws.” No use of a National Wildlife Refuge may be allowed unless determined to be compatible.

Uses that have been determined to be compatible for Arapaho National Wildlife Refuge include: hunting, fishing, environmental education and interpretation, wildlife observation and photography. Additionally, habitat management tools, including but not limited to, are fire, mowing, grazing, noxious weed control (chemical, mechanical, and physical methods), Dixie harrow, fencing, water management, routine Refuge maintenance activities, and public use related structures (Appendix F).

Existing Partnerships

Arapaho National Wildlife Refuge currently promotes partnership opportunities to accomplish natural resource related goals both on and off the Refuge. Existing partnerships include the following groups and agencies:

Colorado Division of Wildlife - Wildlife and fishery habitat improvement, resource sharing, law enforcement.

Colorado Scenic Byways - Overlooks and roads development and interpretation.

Colorado State Forest - Natural resources improvement projects, forest management plans, fire management.

Colorado State University - Assist with planning, wildlife research, and habitat management.

Habitat Partnership Program - Reducing cattle and big game conflicts throughout North Park (Colorado Division of Wildlife (CDOW)).

Jackson County - Noxious weed management and fire support.

Natural Resource Conservation Service - Soils and vegetative management assistance.

Owl Mountain Partnership - Land health improvement projects on public and private lands. Includes developing grazing management plans, wildlife watering areas, and sagebrush management projects.

Platte/Kansas Rivers Ecoteam - Assist with funding and planning natural resource projects.

National Center for Atmospheric Research - Research snowpack characteristics to create reliable snowpack models.

Sage Grouse Working Group - Sage grouse habitat protection and enhancement.

U.S. Bureau of Land Management - Partner in several programs, equipment sharing, resource sharing.

U.S. Forest Service - Partner in several programs, equipment sharing, fire management, resource sharing.

U.S. Geological Survey - Cooperative wildlife research, planning, and water monitoring projects.

Planning Process

Description of Planning Process

The Arapaho National Wildlife Refuge Comprehensive Conservation Plan is guided by the mission of the U.S. Fish & Wildlife Service, the mission of the National Wildlife Refuge System, the established purposes of the Refuge, U.S. Fish & Wildlife Service compatibility standards, and other Service policies, plans, and laws related to Refuge management. This Plan establishes habitat-based goals, objectives, strategies, and monitoring priorities for Refuge management.

The Plan will be used to prepare more specific step-down management plans that address programs (hunting, fishing, environmental education, etc), annual priorities, and budgets. Projects completed by the Refuge will be monitored and documented to ensure progress toward achieving overall Refuge goals. Step-down plans also provide flexibility to accommodate annual changes in Refuge staff levels, funding, equipment, and other resources.

Key steps in the planning process include:

1) preplanning;
2) identifying issues and developing a vision;
3) gathering information;
4) assessing environmental effects;
5) developing alternatives;
6) identifying the proposed alternative;
7) publishing a Draft Plan and soliciting public comments;
8) reviewing the comments and making appropriate changes to the Draft;
9) preparing the Final Plan for approval by the U.S. Fish & Wildlife Service, Regional Director.

Issues addressed in this Plan were identified by the public, Refuge staff, and cooperating agencies. Public meetings were held on February 15, 2001, in Walden Colorado, and February 16, 2001, in Fort Collins, Colorado. Questionnaires and CCP summary handouts were distributed during these public events. News releases were published in the Jackson County Star and the Fort Collin's Coloradoan newspapers. Additionally, the public meeting presentation was delivered at a Fort Collins Chapter Audubon Society meeting in April of 2000. Public comments were received and utilized throughout the planning process.

Comprehensive Conservation Plans are initiated, developed, and published in a 2-year time frame. The Plan duration is 15 years; however, the Plan may be revised if necessary. The CCP will supercede current management plans.

Table 1. Arapaho National Wildlife Refuge Planning Process Summary

DATE	TITLE	OUTCOME
June 2000	CCP kick off meeting	Initiate CCP process
June 2000	Notice of intent for Federal Register	Intent filed
July 2000	Stake holder involvement plan	Stakeholder plan completed
August 2000	Significant issues development	Develop and refine list of issues
September 2000	Biological workshop	Develop draft focus areas
October 2000	Biological workshop	Develop draft riparian goals
December 2000	Biological workshop	Develop draft wetland goals
January 2001	Congressional tour	Tour Refuge, discuss CCP
January 2001	Commissioner tour	Tour Refuge, discuss CCP
January 2001	Biological workshop	Develop draft meadow goals
January 2001	Biological workshop	Develop draft upland goals
February 2001	Public Scoping – Walden	Develop Issues summary
February 2001	Public Scoping - Fort Collins	Develop Issues summary
February 2001	Biological Workshop	Develop riparian objectives
April 2001	Public Scoping	Develop Issues summary
April 2001	Decision support system	Develop timelines for DSS
May 2001	Biological Workshop	Refine goals and objectives
June 2001	Landscape scales issues meeting	Issues identification
June 2001	Riparian workshop	Field visit of riparian areas
July 2001	Alternatives development	Develop range alternatives
July 2001	Alternatives development	Refine alternatives
August 2001	Alternatives development	Refine Public Use Alternatives
September 2001	CCP process meeting	Evaluate CCP status
October 2001	CCP objectives	Refine biological objectives
October 2001	CCP objectives	Refine biological objectives
October 2001	CCP objectives	Refine biological objectives
October 2001	CCP objectives	Refine public use objectives
November 2001	CCP objectives	Refine public use objectives
November 2001	CCP objectives	Refine biological objectives
December 2001	Economic impact meeting	Evaluate economic issues
January 2003	CCP preparation	Writing draft CCP
February 2003	CCP preparation	Writing draft CCP
March 2003	Internal review	Complete internal review
June 2003*	Prepare Public review document	Document completed
July 2003*	Public review – comment period	Review completed
July 2003*	Public meeting draft CCP – Walden	Presentation
July 2003*	Public meeting draft CCP – Fort Collins	Presentation
August 2003*	Follow-up Landscape scale issues	Meeting completion
August 2003*	Incorporate public comments	Complete incorporation
September 2003*	Internal final review	Complete review
October 2003*	Publish final CCP	Publish
*proposed schedule		

Planning Issues

Primary issues concerning future management of Arapaho NWR include: changing from a species-based management approach to a habitat-based management approach; sage grouse preservation and management; use of grazing as a wildlife management tool, and water management. Additionally, close coordination with the state wildlife management agency is critical to plan success.

Pole Mountain

History

During 1993, the Service acquired lands formerly known as the Stelbar Ranch owned by E.B. Shawver. As part of the "all-or-nothing" purchase of lands adjacent to Arapaho NWR, this acquisition included an isolated tract of land known as Pole Mountain (T7N, R81W, Sec 33 and 34, 6PM), located approximately 6 miles southwest of the Refuge in Jackson County, Colorado. With a peak elevation of 9,200 feet, this 800-acre tract contains significantly different habitats than Arapaho Refuge proper. The site has private land on three sides and a piece of BLM land to the south that has no public access to it. Similarly, the Service does not own a permanent access easement to the property, and currently gains access across private land by virtue of a positive working relationship with a neighboring landowner.

The site is dominated by sagebrush uplands (50 percent) and mixed aspen/conifer forest (50 percent), which is common throughout the county where the uplands meet the forest edge. Currently, the Pole Mountain property is grazed annually, and invasive weeds are monitored and controlled. Minimal wildlife monitoring has been conducted at the site. Wildlife use includes mule deer, elk, blue grouse, porcupine, and a variety of passerines. Although the area has wildlife value, it does not match current or future objectives of the remainder of Arapaho NWR.

Issues

The habitat does not meet purposes of Refuge establishment and is not unique in the area in terms of habitat or wildlife use. Few management options are available for habitat improvement.

Several entities are interested in the land for various reasons, including: members of the local Sage Grouse Working Group to trade these lands for others in the county to protect sage grouse habitat; the CDOW for big game management (however, they currently have a moratorium on acquiring new lands); local ranchers for use as grazing land; developers for home sites.

Lack of a legal access right-of-way. This makes any management effort tenuous, especially anything to do with public use as we do not want to encourage citizens to trespass on private lands to gain access to public grounds.

Considered Options

1. Keep tract, survey, re-sign, change/add Refuge objectives to include this parcel;
2. Work with Colorado State Forest Service to develop and implement a forest management plan for the area;
3. Sell tract through government regulations to highest bidder;
4. Trade tract for (in priority order):
   A. Refuge Inholdings
   B. Lands and waters adjacent to Arapaho NWR that are manageable to reach objectives listed in this Plan
   C. Lands and waters adjacent to other Refuges in:
      a. Colorado
      b. Region 6 of the FWS
      c. any Refuge in the nation, which help these areas achieve their goals and objectives
   D. Lands with a natural resource interest by other Federal land management agencies
5. Place a conservation easement on the property prior to divestment to limit or preclude development on the tract;
6. Secure a legal right-of-way easement to assure access to the property;
7. Open area to hunting of all species according to State regulations.

Proposed Action

Divest of the Pole Mountain property within 5 years using the priority criteria listed above. Until that time, the Refuge staff will ensure proper stewardship of the land, but minimal management will occur.

Strategies:

- Place a conservation easement on the property prior to sale/trade to ensure the wildlife benefits of the area remain intact.
- Continue grazing at recent levels as deemed appropriate by management.
- Continue weed control efforts as part of the Pest Management Agreement with the county.
- Obtain a right-of-way access to the property for management and public use.
- Open the tract to hunting by advertising such intentions in the Code of Federal Regulations.
- If the tract is not divested, create a forest and rangeland management plan for the area prior to update of this CCP.

Grazing

The lands that now make up Arapaho National Wildlife Refuge had been grazed by cattle and sheep, prior to acquisition, for nearly a century. Since establishment of the Refuge in 1967, grazing has continued to be the most common management tool to manipulate Refuge habitats, especially the meadow areas. Immediately after land purchases, some grazing was permitted as part of purchase agreements, and some areas were rested to establish waterfowl nesting cover. From 1969 to 1982, 47 to 95 percent of the Refuge lands were grazed annually at a Refuge-wide rate varying between 0.4 and 1.2 Animal Unit Months (AUMs) per acre. Grazing records from 1982 to 1991 were destroyed by an office fire. From 1991 to 2001 (excepting 1993 for which data is unavailable) 46 to 74 percent of the Refuge lands were grazed annually at a Refuge-wide average rate between 0.52 and 0.71 AUMs per acre. Actual rates per field vary significantly depending on the site, with some upland areas being as low as 0.01 AUMs per acre and some meadow fields as high as 2.18 AUMs per acre.

Grazing in meadow/riparian areas has generally not commenced until after August 1 of a given year to minimize disturbance to nesting waterfowl. Uplands are sometimes grazed earlier, but as a general rule, grazing on the Refuge does not commence until June 1. Grazing systems used have included high intensity, short duration (Holistic Resource Management (HRM) type), rest-rotation, light annual grazing, and complete rest.

Livestock grazing has been the preferred management tool used on the Refuge because the effect on vegetative communities is more controllable and predictable than other management tools available at this time. All known and available management tools will be assessed for suitability of use in achieving defined habitat objectives. Other treatment options that will be considered include:

Prescribed fire -Some prescribed fires have occurred on the Refuge and others may be planned in the future. Burning could be used to accomplish efforts to remove excess decadent growth and reset successional stages; however, due to severe weather extremes including high winds, low humidities, and unpredictable water weather conditions, meeting burning prescriptions is difficult. Even though fire could accomplish habitat goals, manipulation may not have the chance to occur for years.

Haying/mowing - Minimal haying occurred on some parcels as agreements of purchase, but were short-lived. Haying would be effective in removal of vegetative growth, but the primary objective of haying would likely be to remove decadent growth. In this case, hay quality would probably be poor, so finding someone interested in doing the work may be difficult. Mowing would successfully remove decadent growth, and the cut grass would ultimately break down to form litter and duff needed for objectives. This could be very costly in time and energy compared to other tools.

Fertilizing - Applying fertilizers is an option to increase plant growth, and is used by many in the county to increase hay production. Cost, equipment, and time deter its use at present, but this tool should be considered if habitat objectives are not being met by other means.

Mechanical treatments - These are treatments typically associated with efforts to manipulate sagebrush and could include using a disc, aerator, roller/chopper, Dixie harrow, or similar implements. Several hundred acres around the county have been treated in recent years in an effort to open up and vary the age diversity of sagebrush stands, and increase plant diversity, but success of these projects is still being assessed.

There is little Refuge specific data available to assess how past Refuge grazing practices have or will effect proposed habitat objectives due to: 1) all data prior to April 1997 was destroyed in an office fire: 2) any available data from other studies was not necessarily looking for the objectives as defined in this document and, therefore, is of limited use for assessment purposes. With this said, it is the opinion of the Refuge staff based on their knowledge of the Refuge lands, that although grazing practices on the Refuge to-date have not harmed the habitat, current levels of grazing probably do not allow us to meet the objectives as defined, and some reduction in grazing will be required. With more intensive monitoring of habitats to assess how well objectives are being met, a better understanding of appropriate grazing levels should be developed. Anticipated grazing use of the different alternatives as identified in this CCP are as follows (refer to the Environmental Assessment for full discussion of alternatives):

Alternative A
Estimated grazing numbers are based on the 1996 to 2001 annual average AUMS of 8,470. This range of years was used because 1996 was the first year of grazing on the current Refuge acreage of 23,243 acres following the purchase of the Stelbar tract. The figures for 2002 were not included as they were considered an anomaly since one of the worst droughts on record significantly decreased use. Status quo, figuring what we have been doing is working.

Alternative B
Uses estimated grazing numbers of 3,050 to 7,650 AUMs annually, and represents approximately 36 to 90 percent of the 1996 to 2001 average. This assumes an average use of between 0.4 and 1.0 AUMs per acre of grazable acres for riparian and meadows, and 0.05 to 0.15 on uplands. Nothing is guaranteed; however, this alternative assumes some grazing will likely occur every year to help achieve objectives on and off the Refuge. Work closely with permittees to combine Refuge needs and permittees operational needs together as much as possible as far as timing, areas, and to a certain extent, numbers. Permittees in good standing have a reasonable expectation of how many AUMs will be available to them for the upcoming year - barring extenuating circumstances (drought, etc.).

Alternative C
Uses estimated grazing numbers of 3,050 to 7,650 AUMs per annual use based on the 1996 to 2001 average and a rate between 0.4 to 1.0 AUMs per acre of grazable acres for riparian and meadows, 0.05 to 0.15 on uplands. Since this alternative requires tighter decisions based solely on predicted habitat needs, there is the higher likelihood of significant variability in AUMs from year-to-year, and an increased possibility of no grazing under certain circumstances. The Refuge staff will set strict guidelines as to where, when, and how intense grazing will occur. Permittees in good standing should have some expectation of grazing to occur the next year, but with more variation possible. If the grazing program under this alternative proves to be too unreliable to maintain regular permittees, it may be necessary to institute a lottery or bid system. The Refuge staff would have to identify where grazing was to occur in the upcoming year, how many AUMs were being offered, and what level of stocking rate would be required, and then advertise that to any interested rancher.

Alternative D (Preferred Alternative)
Uses estimated grazing numbers of 3,050 to 7,650 AUMs annually, and represents approximately 36 to 90 percent of the 1996 to 2001 average. This assumes an average use of between 0.4 and 1.0 AUMs per acre of grazable acres for riparian and meadows, and 0.05 to 0.15 on uplands. Nothing is guaranteed; however, this alternative assumes some grazing will likely occur every year to help achieve objectives on and off the Refuge. Work closely with permittees to combine Refuge needs and permittees operational needs together as much as possible as far as timing, areas, and to a certain extent, numbers. Permittees in good standing have a reasonable expectation of how many AUMs will be available to them for the upcoming year - barring extenuating circumstances (drought, etc.).

Options for implementing any needed changes to grazing program include:

1) Attrition - As permittees drop out, they will not be replaced immediately - if at all. Fields that have historically been grazed by a permittee that drops out will be given to a new permittee after at least a year of rest - when assessment of ground indicates treatment is needed again. Or fields will be adjudicated among remaining permittees to better manage AUMs throughout the Refuge. Anticipated grazing needs will be identified by January 15 of each year for permittee planning purposes.

2) New grazing protocol is instituted immediately upon signing of the CCP. Refuge staff will establish AUMs to be used and where; and permittees will work with those numbers.

3) Permittees could be guaranteed a certain number of AUMs or range to expect from year-to-year. No guarantee will occur as to where these AUMs will be, so permittee must be willing to go anywhere on the Refuge. AUMs per permittee could be based on a ratio of past use, or a similar amount/range for all.

4) If no permittees drop out, decrease AUMs across the board a percentage (5 to 10 percent) every year until a predetermined threshold, or habitat objectives are met. Adjust annually, thereafter, based on habitat needs and outside projects.

5) If no permittees drop out, set a date - such as 5 years from signing of the CCP - when any changes will take effect. Refuge staff will have a chance to come up with firm numbers that will be communicated to permittees to aid them in long-term planning.

6) If a permittee drops out, rest all fields they grazed for 2 years to conduct intensive evaluations of fields. When it is deemed manipulation is needed, advertise the availability of a grazing permit allowing so many AUMs per year, for ***X*** out of the next ***Y*** years (e.g. 500 AUMs per year for 3 out of the next 6 years), with the permittee choosing which years to use. Permittee could be selected by lottery or bid. Permit would define available fields and maximum AUMS per year to be used in each.

Proposed Action

Continue working with existing permittees and adjust use to Refuge goals using attrition and across the board cuts in AUMS if needed. If a permittee has intentions of not grazing any longer on the Refuge, the fields they historically used will be utilized as they are in need of treatment to spread out use elsewhere on the Refuge. If all permittees are still interested in continued use in 2 years, all permits will be decreased annually approximately 5 to 10 percent from 1996 to 2001 averages until objective levels are met. Grazing levels will, from thereafter, be driven entirely by habitat needs based on identified objectives.

Elk

History

Until the mid-to-late 1980s, seeing elk on or around the Refuge at any time of year was a rarity. Then, for various known and unknown reasons, they began to show up regularly in the winter, until about 500 were common on and around the Refuge from December to March. Most of the animals would disperse for higher ground as the snow melted in the spring, but some began to stay along the Illinois River year-round. By the mid-1990s, a resident herd of approximately 150 elk had become established. The CDOW initiated a Distribution Management hunt on private lands to thin this resident herd to try and disperse some of its numbers off the private lands. This effort was successful in reducing the resident herd size for awhile. The wintering herd has continued to grow to the point that winter counts conducted by the CDOW in late December 2002 found about 2,400 elk on and near the Refuge. They typically are scattered into several herds that vary in size, but it is not unusual to see a herd of +/- 1,000 animals. Although a herd of this size is a magnificent wildlife resource to behold, other things need to be considered. The first is that the Refuge, though fairly large, cannot be all things for all wildlife. A point comes where too many individuals of one species (elk) can negatively impact the habitat for another species or group of species (waterfowl). With one of the purposes for establishing the Refuge being used as a sanctuary for migratory birds, too many elk could keep this purpose from being met. Also, elk by law are a state-owned resource, and high elk numbers may lead to resource or economic problems elsewhere in the county. The Refuge should, and will, work with the Colorado Division of Wildlife to address elk issues on the Refuge.

Elk Issues

Historically, ranching was the primary use of North Park lands, and that continues to be the case in much of the county. Elk, as grazers and potential competitors with cattle, can get into hay harvested for livestock and cause damage to fences and other ranch structures. Elk will continue to concentrate in areas of the county, and depending on the landowner and the number of elk in the particular herd, the perspective of whether an elk "problem" exists or not changes. A landowner that does not rely on livestock for their livelihood may view 100 elk as a valuable resource, but may view 300 as a problem. Similarly, a landowner relying on the land to make a living might view the 100 animals as too many. The Refuge strives to find an elk population size that achieves refuge goals, and meets North Park herd management objectives. A large visible herd of elk can be a reminder that herd objectives have been surpassed, and when that herd is on the Refuge, it may seem to some that they are on a likely spot to reduce numbers.

As mentioned, elk are grazers. When on the Refuge they are foraging, trampling and eating grasses that the Refuge staff is trying to manage as habitat for other wildlife. Elk can also have a severe impact on willow stands. Habitat objectives within this document identify maintaining grasslands and willows to varying degrees to benefit wildlife. Although the elk do use the Refuge extensively during the winter months, they do not use it exclusively - making it more difficult to determine what the cumulative impact of their use may be. A method needs to be developed to estimate elk use and impact to Refuge lands.

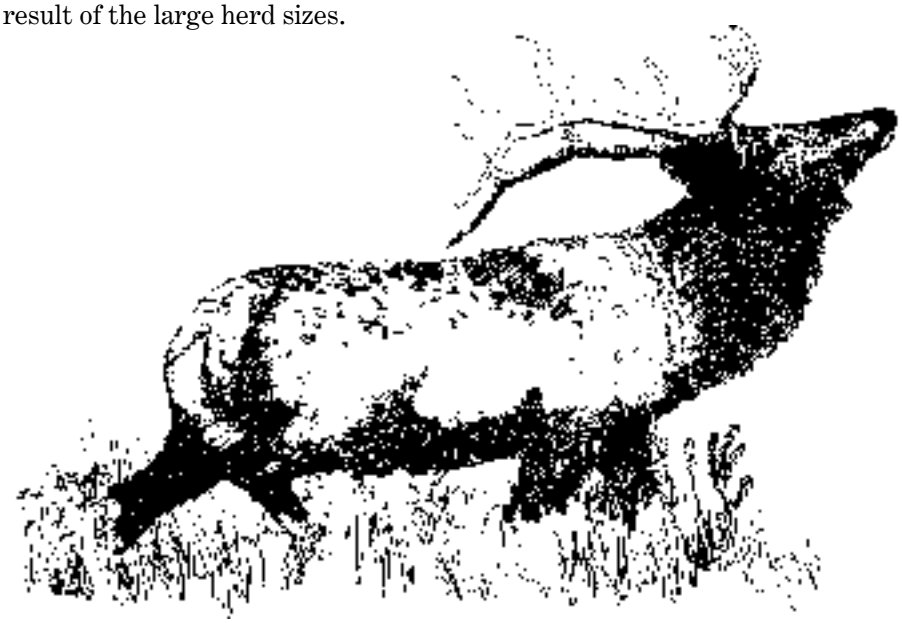
The number of elk using the Refuge is continuing to grow, and with recent drought conditions, recent growth may be larger than usual. Is this a short-term gain in numbers with a decrease when conditions change, or have the animals found a new place and will stick with it? Also, is the increase in elk on the Refuge proportional to the increase throughout the county, or are a higher (or lower) proportion using the Refuge?

The Refuge is a good place for the elk, since it is a place set-aside for wildlife, and if they are on the Refuge, they are not on private lands potentially damaging property or consuming forage meant for livestock. The problem is that they do not stay just on the Refuge, so the potential exists for them to travel to adjoining private land and do damage. And as the numbers of animals using the Refuge grows, so will the possibility of damage to private resources grow.

Elk Hunting

During the general rifle big game hunting seasons, the resident elk herd on and near the Refuge typically becomes more noticeable. As the later hunting seasons progress, more elk move onto the Refuge from the forested areas of the county. With the exception of some private lands scattered around the county, the Refuge is the only place on the south end of North Park where the elk are not pursued during the general seasons. But as more elk move onto the Refuge, an impression is created with some hunters that "all the elk are on the Refuge," especially if the animals are hard to find in other locations. The Refuge is composed mainly of sagebrush uplands, meadow, and open areas, without many places for elk to hide (the elk typically are in large herds at this time). The lands surrounding the Refuge are very open and the hunting that occurs on these areas often includes radio use, pushing animals with vehicles and all-terrain-vehicles (ATVs), party hunting, and over limits of animals. In general, this does not fit Refuge System requirements as outlined in the Refuge Manual to offer a quality hunting experience that promotes "positive hunting values and hunter ethics such as fair chase and sportsmanship" on National Wildlife Refuges.

Chronic Wasting Disease (CWD) has been documented in white-tailed and mule deer and elk in Jackson County. Though these are typically State issues, the Refuge staff is also concerned, since elk use is high on the Refuge. The potential for other diseases and their risk of spread rises dramatically as a result of the large herd sizes.



Elk © Cindie Brunner

Elk Management Options

- Eliminate livestock, and manage Refuge habitats with elk grazing. This would involve trying to haze the elk on or off various fields on the Refuge, or completely off the Refuge if habitat goals are thought to be met. The problems with this include the fact that elk are wild and getting them to move where you want them to is not an easy task, and elk moved off the Refuge could very well end up on private land, potentially causing problems there.

- Eliminate elk, and manage Refuge habitats with cows and other management tools. This would decrease the likelihood of disease problems such as CWD on the Refuge, and since management would be more controllable, this would seem an appropriate option. However, we would still be into a hazing program, and where the elk go when they are not on the Refuge should be a concern. Also, is it appropriate and within Refuge purposes to keep a species native to the area off a National Wildlife Refuge?

- Try and meet habitat objectives with range management practices including prescribed livestock grazing since it is a controllable tool. Monitor elk use and impact on Refuge habitats. Develop a protocol for action when management objectives are not being met, using management tools such as elk hazing, hunting, transplant, etc. Protocol should define what circumstances will trigger these actions and when. Coordination with CDOW will be critical to address potential impacts to other parts of the county.

- Open an elk hunting season. Objectives of a hunt would have to be defined. Opening the Refuge during the general seasons would not meet the guidelines set out in the Refuge Manual to provide a quality hunting experience. A limited quota hunt of just the Refuge with the aim at reducing overall herd size would be minimally successful as elk would quickly leave the Refuge for safer areas. Any hunt geared toward population management would have to incorporate adjacent BLM and private lands since the elk are not on the Refuge all the time, and they will not necessarily remain on the Refuge once the shooting begins. A limited, late season youth and/or disabled hunt could supply a quality learning experience for young and disabled hunters, while contributing to countywide efforts to control herd sizes. Other hunting options would include Coordinated Management hunts, or Limited Access hunts, through the CDOW and the local Habitat Partnership Program group.

- Calculate daily impact to forage by elk and develop a means to determine when elk use is stressing habitat objectives. Management decisions for elk, livestock, or any other manipulation could then be made with that impact in mind.

- Work with the State to monitor CWD and/or other disease issues, especially those on the Refuge.

- Initiate herbivory (elk, moose, cattle) studies to assess the independent and cumulative impacts to riparian, upland, and meadow habitats on the Refuge by these species. Willow regeneration along the Illinois River is slow, and small willow shoots are frequently grazed to one inch height. Elk damage to riparian areas is well documented in the scientific literature (see Riparian Summary - Appendix H). Currently, approximately 150 elk utilize the Refuge during the spring, summer, and fall. During winter months (November through March), elk numbers vary considerably but average 1,000 to 1,400 using the Refuge and surrounding area. Elk numbers and elk damage are not necessarily a linear relationship. Snow depth, temperature, duration of feeding, and a host of other factors may determine wintering elk impacts. Elk wintering on the Refuge may minimize game damage on adjacent private lands. Therefore, the Refuge proposes to evaluate herbivory impacts of elk, moose, and cattle. Studies will be conducted in conjunction with the State and other partners to evaluate impacts. Exclosures will be installed during 2004 to begin the evaluation process.

Proposed Action
Initiate studies to determine elk impact to willow communities and impact on grasslands. The Refuge staff is concerned primarily with the lack of willow regeneration, the percent cover provided by willows, and willow density along the Illinois River channel. Develop protocol outlining actions to take when impacts become severe. Work with the State to develop a hunting strategy for land on and adjacent to the Refuge. Strategy could include a late season limited youth and disabled hunt, and protocol outlining the need and administration of additional hunts based on game damage, herd reduction, Refuge habitat degradation, etc.

Sage Grouse Hunting
Greater sage-grouse are only found in sagebrush dominated rangelands in Western North America. Sage grouse are dependent on sagebrush for winter cover, nesting, and feeding habitat. Currently, North Park supports greater sage-grouse habitat and a viable grouse population. However, over the last 40 years, the population has exhibited extreme fluctuations. In 1998, because of increased local concerns about the status of sage grouse in North Park, a group of concerned citizens and agencies formed the North Park Sage Grouse Working Group. The mission of the group is to develop, implement, and monitor a conservation plan to maintain a viable sage grouse population in Jackson County, Colorado. Historically, the Refuge has supported sage grouse hunting in accordance with State regulations and seasons. The Refuge proposes to continue offering sport hunting opportunities for sage grouse in accordance with State regulations and seasons. Additionally, the Refuge staff will monitor and evaluate upland habitats to improve conditions for nesting and brood-rearing sage grouse (See Upland Habitats, Appendix H). Finally, the Refuge will support the purpose and guiding principals of the North Park greater sage-grouse conservation plan.

Inholdings

The following lands lie within the approved acquisition boundary of Arapaho National Wildlife Refuge.

These properties represent valuable wildlife habitat and are of interest to the Refuge. Following the Service acquisition policy and guidelines, the Refuge will attempt to acquire these properties on a willing-seller, willing-buyer basis only. Additionally, the Refuge will attempt to acquire mineral resource interests on lands within the existing acquisition boundary. Surface disturbance associated with minerals extraction may destroy wildlife habitats, and prevent Refuge goals and objectives from being met. The Refuge staff has not identified any additional lands or minerals for acquisition outside the approved boundary.

Tract	Approximate Acreage
Stephens	160
Anderson	480
Burr (Tract 1)	200
Burr (Tract 2)	2,960
Hwy 14 Tract	18
Old RR grade (pieces)	24
Total	3,842

Summary Refuge and Resource Descriptions

Geographic/Ecosystem Setting

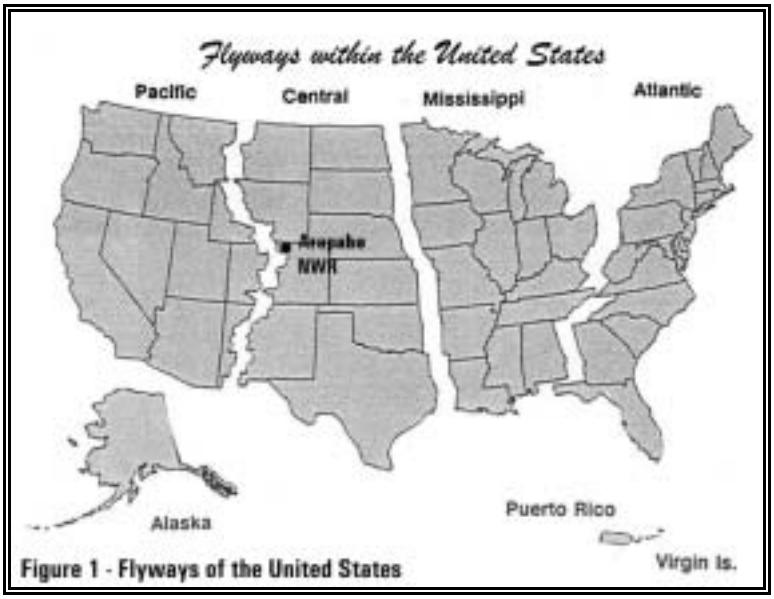


Figure 1 - Flyways of the United States

Arapaho National Wildlife Refuge, situated at an elevation of 8,200 feet, is located in an intermountain glacial basin in north-central Colorado. The Refuge is situated along the western edge of the Central Waterfowl Flyway (Figure 1). Jackson County opens north into Wyoming and is rimmed on the west by the Park Range, on the south by the Rabbit Ears Range, and on the east by the Medicine Bow Range. The basin floor is locally known as North Park and encompasses approximately 600 square miles. The basin floor is relatively flat with an elevation range of 7,900 to 8,300 feet. Slow, meandering streams, which criss-cross the basin, flow toward the north-central part of the basin to form the North Platte River. Most of the floodplain is irrigated meadow, while the adjacent low rises are characterized by sagebrush grasslands. Sagebrush uplands are the dominate vegetative community encompassing 80 percent of the Park. Sagebrush uplands are dominated by seven primary species of sagebrush, with a perennial bunch-grass and forb understory. Meadows are typically irrigated to produce a single hay crop per year. Meadow grasses typical include timothy, red top, garrison creeping foxtail, and foxtail barley. Riparian areas are dominated by willows (*Salix sp.*) and other low growing shrub species.

Climate

The climate is semiarid which can be characterized as having short-cool summers, followed by long, cold winters. The mean rainfall in Walden is 10.83 inches of precipitation annually. Temperatures and precipitation vary greatly with elevation and location. Mean annual air temperature in Walden, near the center of the Park, is 36.4 degrees Fahrenheit. Temperature extremes are minus 39 degrees to 90 degrees Fahrenheit, based on the National Weather Bureau 30-year average. The average length of the growing season in Walden is 43 days. The average date for the last killing frost in Walden is July 1, and the average first killing frost is August 14, based on North Park weather station's 70-year average. The relatively short frost-free season inhibits any form of agriculture today except hay near floodplain areas. Generally, annual precipitation increases as elevation increases from the floor to the outer edge of North Park. Elevation ranges from slightly below 8,000 feet on the valley floor to 12,965 feet on Clarks Peak. Seventy percent of the annual precipitation falls as snow. Walden averages 53 inches of snow per year, the lowest of any point in the Park. The highest average monthly precipitation occurs in March, April, May, and August (Lischka et al. 1983).

Geological Resources

North Park is a structural basin between the Precambrian granites, gneisses and schists of the Medicine Bow and Park Ranges and Independence Mountain. The Surface geology of the Park floor is dominated by the sandstones, conglomerates, and shales of the Tertiary Coalmont Formation. Coal is found in the lower members of the formation (Hail, 1968). The North Park Formation overlies the Coalmont Formation and consists of white, calcareous conglomerates. The Coalmont Formation is exposed along a long narrow syncline ridge trending northwest from Owl Mountain to the confluence of Roaring Fork and Grizzly Creeks. The syncline includes Owl Ridge and Peterson Ridge. Pierre Shale underlies the Coalmont Formation and is exposed primarily in the northwestern and northeastern quadrants of North Park. Evidence of Tertiary volcanics is obvious along the south boundary of the Park. Quantities of breccia and other volcanics are common in the Rabbit Ears Range in the form of dikes, plush, flows, and ash. Significant glacial activity occurred in North Park during the Pleistocene. Fluviatile gravels, and interfluvial terraces are examples of the influence of glacial activity upon the current landscape of the Park floor. Several natural lakes in the area are thought to be remnants of Pleistocene glaciation. Winds also influenced the geology of the Park. Prevailing southwesterly winds, thought to be caused by the low ridge between Rabbit Ears Peak and Arapaho Pass, have deposited fine grains alluvium, some of which reaches thicknesses of 30 feet. Winds are suggested to have created several shallow lakes within the basin, including Hebron Sloughs, located just southwest of the Refuge (Lischka et al. 1983).

Soil Resources

Soils that have the capacity to reproduce the same kinds, amounts, and proportions of range plants are grouped into range sites. Fletcher (1981) defined 15 different range sites and two forest types within Jackson County. Five range sites are found on the Refuge: (Floodplain sites):

1) Randman - Blackwell-Dobrow association; deep, poorly drained, dominantly sandy soils;
2) Spicerton -Stumpp association: deep, well drained sandy loams and clay loams (bench and upland sites);
3) Fluetch - Bosler - Tealson association, deep and shallow well drained sandy loams;
4) Tiagos - Cabin association: deep, well drained fine sandy loams; and
5) Coalmont - Brinkerton - Aaberg association: moderately deep of soft shale and well drained sandy loams.

The Refuge contains 31 individual soil types within the five range sites (Fletcher, 1977). Dominate soil types include Spicerton sandy loam, Fluetsch -Tiagos association, Bosler sandy loam, and the Boettcher-Bundyman association. These soils are found on slopes less than 15 percent, and generally have slow to moderate permeability. Mean soil temperature at Walden is 58 degrees Fahrenheit.

Ecosystem Setting

Bailey (1995) described the Jackson County area as part of the southern Rocky Mountain Ecoregion. The Service has adopted an ecosystem approach to natural resource management and has identified 53 watershed-based ecoregions in the United States (Figure 2). Within the Service ecosystem organization, the Refuge lies within the boundaries of the Platte/Kansas Rivers Ecosystem. The Service is developing a nationally coordinated approach involving ecosystem teams, partners, and stakeholders to preserve natural resources for the American people. Ecosystem teams are fundamental to the Service in sustaining good land health. Ecosystem teams should be the primary delivery mechanism for establishing priorities and identifying areas of greatest conservation concern in their ecosystems (Fulfilling the Promise, 1999).

Figure 2 - Ecoregions of the USFWS

Refuge Resources, Cultural Resources, and Public Uses

Water Rights

The Refuge is located on the Illinois River and its tributaries. The Illinois River is tributary to the Michigan River, which is tributary to the North Platte River. Prior to settlement, the bottoms and meadows of the Illinois River and its tributaries flooded annually with snowmelt and spring runoff, creating significant waterfowl nesting habitat. As the area became settled, much of the natural flooding and ponding were reduced and irrigated meadows replaced ponds and marshes. Since the Refuge's first land acquisition in 1967, the Service created new wetland habitat through the management of acquired irrigation and stock reservoirs; diversion of water into natural depressions; as well as diversion of water into Service-constructed ponds.

The Refuge has a decreed diversion rate of 515.05 cubic feet per second, most of which is diverted from the Illinois River, with lesser amounts diverted from the Big, Willow, Spring, Potter, and Antelope Creek tributaries. This water is either ditched for storage in 9 decreed reservoirs and 73 undecreed ponds, or ditched to meadows for direct irrigation. Currently, the Refuge has decreed rights to 7,626.4 acre-feet for reservoir/pond initial fills and refills, and is seeking an additional 2,582.5 acre-feet. The total capacity of Refuge storage units is 5,678.5 acre-feet. Approximately 814 surface acres are ponded, and approximately 9,499 acres are irrigated meadow grass.

Since 2001, the U.S. Geological Survey has measured Illinois River flow at gauging stations at the upstream and downstream ends of the Refuge in order to determine the effect of Refuge diversions, wildlife use, and return flow on river discharge.

Groundwater is present in an unconfined, sand and gravel alluvial aquifer which underlies the entire Refuge. The water table is shallow, with the elevation of the groundwater table approximating the water-surface elevations in nearby rivers, creeks, reservoirs, and ponds.

The Refuge's water rights are administered according to the prior appropriation doctrine by the Colorado Division of Water Resources, commonly referred to as the State Engineer's Office. Whereas much of the Refuge's acquired land has rather senior appurtenant water rights, conversion of ranch land to wildlife habitat has required obtaining junior water rights which cannot be exercised in dry or semidry years. The Refuge staff believes it holds sufficient water rights to implement Refuge goals and objectives. Water rights held by the Refuge are summarized in Table 2.

Table 2. Summary of Water Rights Held by the Refuge

Court	Admin #	Name	Flow, Storage, Use	Approp. Date
11	12179	Home No. 1 and Upland Ditch	4.0 cfs (Refuge 2.0 cfs)	5/6/1883
81	13635	Dryer Ditch	5.2 cfs	5/1/1887
80	13635	North Park Ditch No. 6	9.0 cfs	5/1/1889
86	13642	Everhard Baldwin Ditch	10 cfs (Refuge 5 cfs	5/8/1887
100	13686	Hubbard Ditch No. 1	1 cfs	6/21/1887
110	13849	Hubbard Ditch No. 1	3 cfs	6/21/1889
122	14015	Ward Ditch No. 1	3 cfs	5/15/1888
161	14148	Hill, Crouter Ditch	6 cfs	9/25/1888
167	14337	Hubbard Ditch No. 2	3 cfs	4/2/1889
170	14350	Oklahoma Ditch No. 1	41 cfs	4/15/1889
180	14370	Home No. 1 and Upland Ditch	2 cfs	5/5/1889
190	14403	Ward Ditch No. 2	.5 cfs	6/7/1889
196	14417	Hubbard Ditch No. 1	2 cfs	6/21/1889
195	14417	Ward Ditch No. 1	3 cfs	6/21/1889
217	14731	Hubbard Ditch No. 2	3 cfs	5/1/1890
229	14762	Everhard Baldwin Ditch	8 cfs	6/1/1890
232	14805	Home No. 1 and Upland Ditch	2 cfs	7/14/1890
243	15151	Oklahoma Ditch No. 1	10 cfs	6/25/1891
264	15891	Hubbard Ditch No. 2	8 cfs	7/4/1893
270	16215	Dryer Ditch	3.6 cfs	5/24/1894
275	16360	Boyce Bros Ditch No. 1	9.25 cfs	10/16/1894
276	16362	Oklahoma Ditch No. 2	9 cfs	10/18/1894
382	16942	Ish and Baldwin Ditch	1.6 cfs (Refuge .9 cfs)	5/20/1896
286	17420	Hubbard Ditch No. 2	15 cfs	9/10/1897
287	17496	Ward Ditch No. 1	13 cfs	11/25/1897
296	17806	Dryer Ditch	2.4 cfs	10/1/1898
302	18395	Ward Ditch No. 3	2.25 cfs	5/12/1900
306	18507	Midland Ditch	15 cfs (Refuge 5 cfs)	9/1/1900
329	20270	Potter Ditch No. 2	5 cfs	7/1/1905
344	21367.91160	North Park Ditch No. 6	6 cfs	5/1/1903
344	21367.91160	Oklahoma Ditch No. 1	10 cfs	5/1/1903
344	21367.91160	Oklahoma Ditch No. 2	4 cfs	5/1/1903
346.5	21367.93177	Hubbard Ditch No. 2	16 cfs	7/5/1904
349	21367.94726	Everhard Baldwin Ditch	5 cfs	10/17/1947
353	21367.99593	Riddle Ditch	3 cfs	4/6/1908
355	21367.99710	Midland Ditch	6 cfs	5/1/1908
357	21392	Hubbard Ditch No. 2	27 cfs	7/26/1908
364	22189	Howard Ditch	75 cfs	10/1/1910
375	23017.81853	Hubbard Ditch No. 1	6 cfs	8/1/1901
None	23017.92901	Hubbard Ditch No. 4	2 cfs	7/18/1908
378.2	23017.95734	Hubbard Ditch No. 2	31 cfs	5/1/1910
398	24008	Midland Ditch	20.5 cfs (Refuge 5 cfs)	9/24/1915
700	30281.61915	Boyce Bros Ditch No. 1	20.5 cfs	5/1/1901
707	30281.70359	Antelope Ditch No. 1	5.47 cfs	5/1/1908
726	30281.91011	State Walden Pipeline	.75 cfs	6/20/1939

Table 2. Summary of Water Rights Held by the Refuge cont'd.				
Court	**Admin #**	**Name**	**Flow, Storage, Use**	**Approp. Date**
	49102	Howard Ditch	70 cfs (Refuge 35 cfs)	6/8/1984
2	22208	MacFarlane Reservoir	6507AF (Refuge3253.5AF)	10/20/1910
11	30281.70643	Case Reservoir #1	124 AF	7/26/1908
12	30281.70646	Case Reservoir #2	106 AF	7/27/1908
14	30281.75467	Case Reservoir #3	67 AF	7/26/1912
18	30281.91011	State Walden Reservoir	37.9 AF	6/20/1939
	48578.98394	Muskrat Pond	390 AF	11/12/1980
	51499.47542	Spring Creek Pond	93 AF	3/1/1980
	51499.47999	Fox Pond	140 AF	6/1/1981
	30280.21308	Antelope Well	.10 cfs	5/1/1908
	47481.33602	Arapaho NWR Domestic Well	.10 cfs	12/31/1941
	47481.33602	Arapaho NWR Stock Well	.10 cfs	12/31/1941

Reserved Rights and Privately-Owned Mineral Estate

Purchase of some of the land tracts on the Refuge were subject to existing rights-of-way at the time of purchase. Some of these existing rights-of-way include Jackson County Roads 32, 34, and 21. A 100 foot right-of-way on Highway 125 and a 50 foot right-of-way on Highway 14 are owned by the Colorado State Highway Department. Additional rights-of-way include buried telephone lines along Highway 125 and 14, and power lines along Highway 125, through the length of the east side of the Refuge and across the Case tract on the south side.

With the purchases of the land tracts, the Refuge acquired the surface mineral rights of all its land except the BLM transfers. The Refuge owns the majority of the subsurface mineral rights with the State of Colorado, BLM, and some private landowners holding the rest.

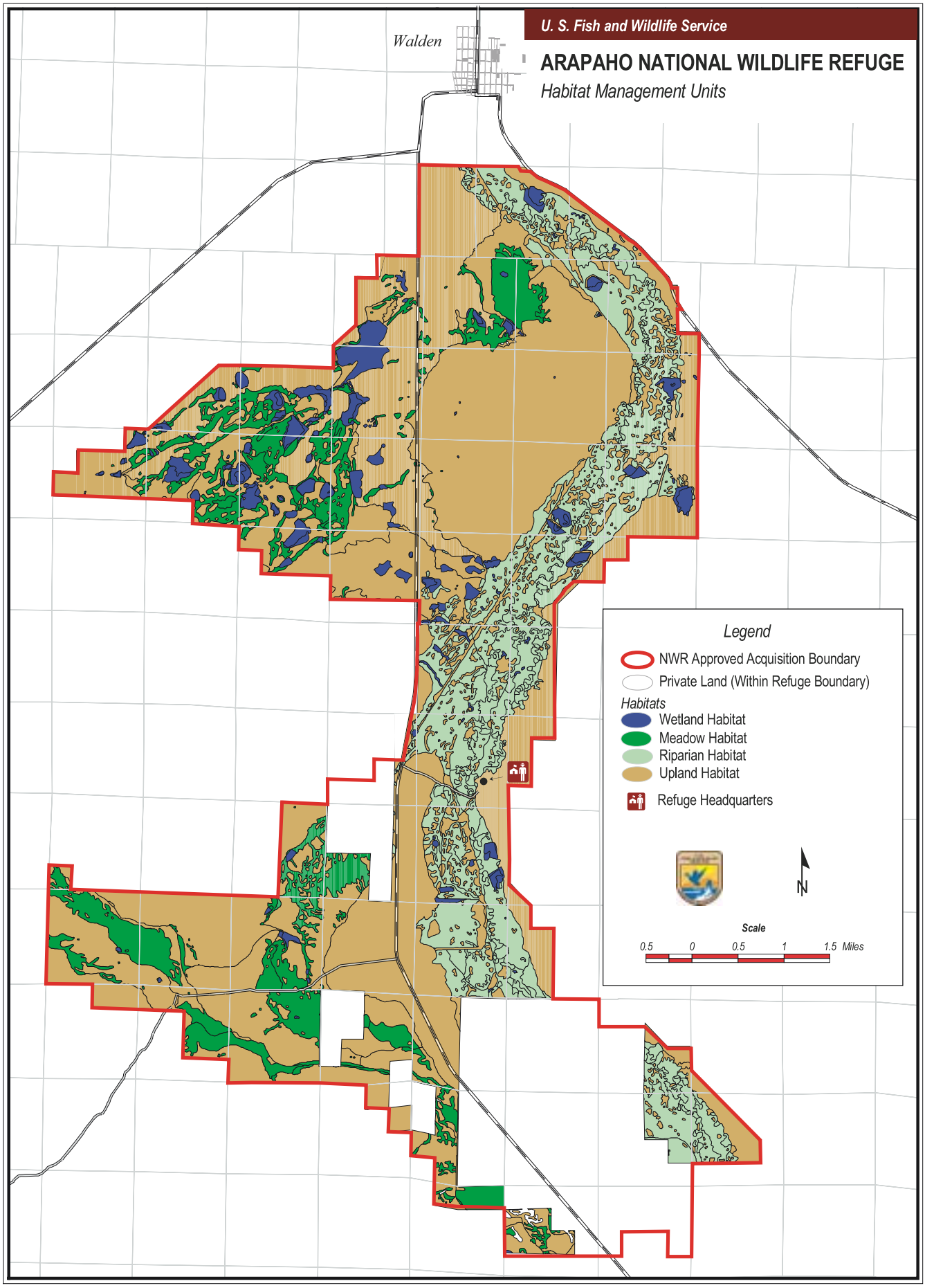
Habitat Management Units

Habitat on the Refuge can be divided into four broad types: riparian, wetland, meadow, and upland. Acreages for each habitat type were calculated using ArcView GIS software, with Refuge boundary topographic base maps, and National Wetland Inventory map layers. Width of the riparian area was determined by estimating width of the historic floodplain using topography and vegetative community changes as a guide. Meadow habitats were derived using primarily National Wetland Inventory Maps with corrections for recent wetland additions. Upland acreages were calculated by subtracting the other three habitat types from the Refuge base acreage. Descriptions of these habitat types follows:

Riparian Habitat

The riparian habitat contains 4,374 acres on Arapaho NWR and is composed of the channel, floodplain, and transitional upland fringe along portions of the Illinois River and Spring Creek. Historically, the Refuge staff has considered the floodplain and transitional fringe collectively as irrigated meadow. However, we have chosen to use channel, floodplain, and transitional fringe in this document because these components more appropriately represent the collective functions and processes of riparian habitats, and such a designation allows management potential of the entire area to be more thoroughly evaluated (Map 7 - Habitat Management Units).

Plant species found along the Illinois River include: Drummonds's willow, coyote willow, Geyers willow, whiplash willow, mountain willow, and planeleaf willow. Grass species common to these moist soil areas include bluejoint reedgrass, Timothy, mannagrass, smooth brome, meadow foxtail, meadow barley, Nevada bluegrass, sloughgrass, rufted hairgrass, saltgrass, *Carex nebrascensis*, *Juncus sps*., nuttall alkaligrass, redtop, and winter bentgrass. The runs and pools in the river channel typically contain aquatic vegetation (*Elodea*, *Potamogeton*, and *filamentous algae*). Canada thistle is the main noxious weed in this area. Wildlife species that utilize the riparian habitat grasslands include waterfowl (northern pintail, mallard, gadwall, green-winged teal) and sage grouse broods in search of high protein invertebrates. Additionally, the willow complex supports at least 40 species of migrating songbirds (yellow warbler, willow flycatcher) along with moose, river otter, beaver, and wintering elk. Water birds, including common Wilson's snipe, spotted sandpiper, sora, American white pelican, and black-crowned night herons also extensively utilize this habitat type. Within the Illinois River, 7 species of native and nonnative fish and at least 17 taxa of aquatic invertebrates can be found in this cold water river system.



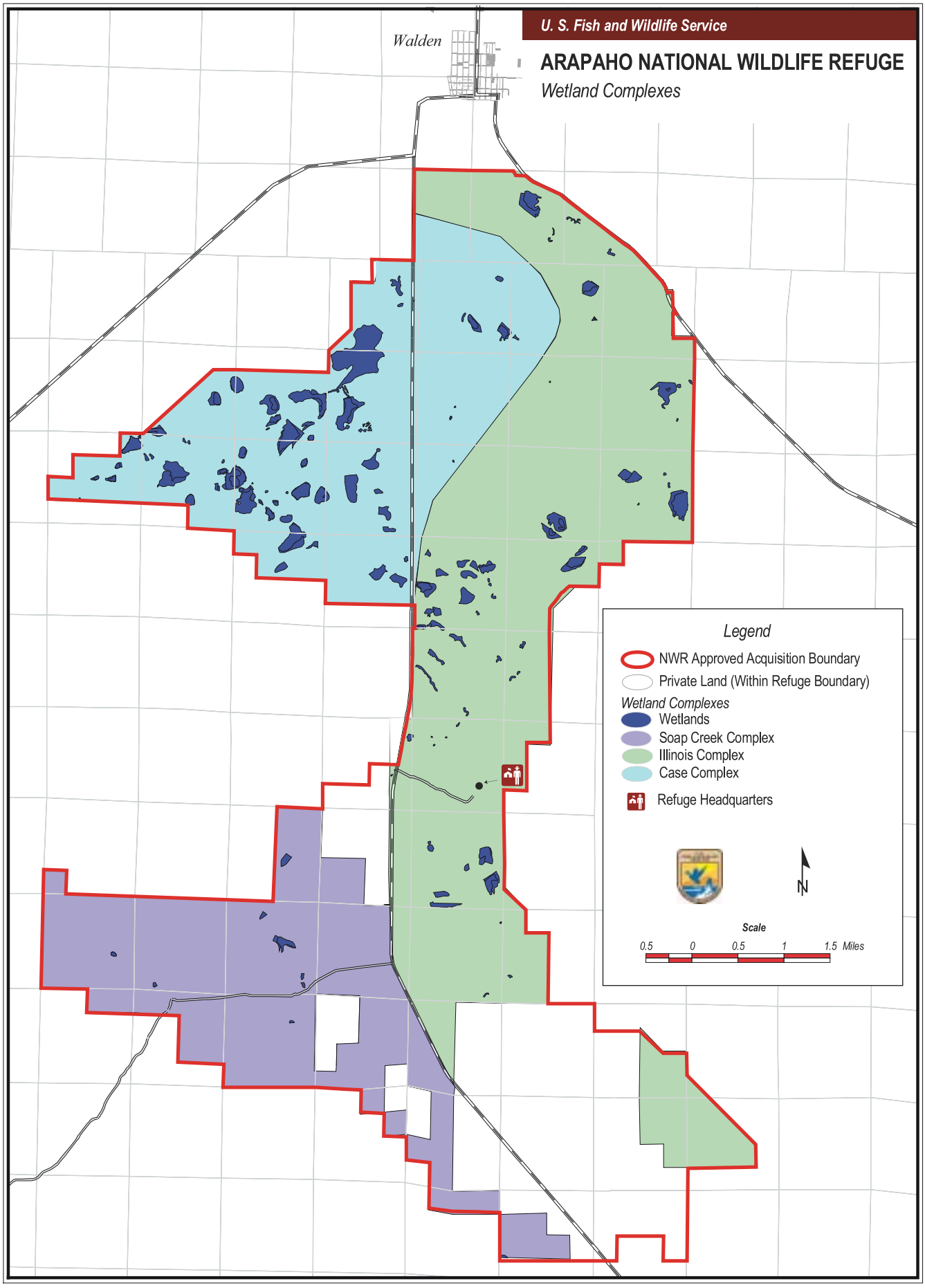
Map 7 - Habitat Management Units

Wetland Habitat

Wetland habitat includes 824 acres of natural and created ponds and lakes up to the high water mark, excluding the surrounding meadows and riparian corridor. Ponds and lakes, henceforth referred to as basins or wetlands, were delineated using both National Wetland Inventory (NWI) maps and Refuge coverage maps. Currently, approximately 78 shallow wetlands exist within the Refuge boundary (Map 2 - Base Map). For management purposes, three wetland complexes were developed: the Case, Illinois, and Soap Creek Complexes (Map 8 - Wetland Complexes).

The majority (90 percent) of the wetland basins on the Refuge are man-made. Construction of these "artificial" wetlands is intended to offset wetland losses occurring elsewhere in the Central Flyway. Maintenance of these facilities provides benefits to a host of wetland-dependent species, including waterfowl. Specific wetland objectives only account for approximately 50 percent of the total wetland surface area to be managed in a given year. Drought, evaporative losses, periodic drawdowns for aquatic vegetation enhancement, dike maintenance activities, and fall migration drawdowns account for the remainder of the wetland surface area.

Aquatic vegetation of Refuge wetland habitats includes both emergent (cattail, spike rush, bulrush) and submerged (sago pondweed, leafy pondweed, widgeon grass) species. Invertebrate abundance is high in the wetland basins. Common invertebrates include *Hemiptera* (true bugs), and the families *Corixidae* (water boatman) and *Notonectidae* (backswimmers), *Dytiscidae* (predacious diving beetle), and *Haliplidae* (crawling water beetles). Invertebrates are a critical food source to many waterfowl shorebirds. Waterfowl species include both diving ducks (lesser scaup, canvasback, redhead, ring-necked) and puddle ducks (mallard, northern shoveler, gadwall, American wigeon). Over-water nesting birds (black-crowned night-heron, Wilson's phalarope, white-faced ibis, marsh wrens, coots, rails, and blackbirds) also extensively utilize wetland habitats.



Map 8 - Wetland Complexes

Meadow Habitat

Meadow habitat includes 2,683 acres of grasslands and old hay meadows on the Refuge except those along the riparian corridor (which are considered part of the "Riparian" habitat). These historically irrigated fields provide the majority of the Refuge nesting habitat for waterfowl, shorebirds, and songbird species. Meadow habitats represent common feeding, resting and loafing areas for most avian and mammal species found on the Refuge (Map 7 - Habitat Management Units).

Vegetation common to meadow habitat is primarily native plants including: rushes; Colorado rush, baltic rush, dagger-leaf rush, long-styled rush, tuberous rush, field woodrush, smallflowered woodrush; sedges: slenderbeaked sedge, capitate sedge, Hayden's sedge, narrow-leaved sedge, elk sedge, wooly sedge, Nebraska sedge, dunhead sedge, beaked sedge, shortbeaked sedge, water sedge, golded sedge, soft-leaved sedge, new sedge, valley sedge. Grass species common to these moist soil areas include: bluejoint reedgrass, Timothy, mannagrass, smooth brome, meadow foxtail, meadow barley, Nevada bluegrass, sloughgrass, tufted hairgrass, saltgrass, Nuttall alkaligrass, redtop, and winter bentgrass; Common forbs include sulphur buckwheat, hoods phlox, longleaf phlox, rosy pussytoes, silvery lupine, prairie lupine, groundsels, narrow leaved maertensia, small bluebells, cinquefoil, early cinquefoil, stonecrop or wormleaf sedum, daisys, beard tongue. Canada thistle is the main noxious weed in this area. Wildlife species that utilize the meadow habitat include: waterfowl (pintail, shoveler, gadwall, green-winged teal) and sage grouse broods in search of high protein invertebrates. Snipe broods and other grassland nesting songbirds utilize this habitat type. Additionally, elk, pronghorn antelope, and coyote are common habitat users.

Upland Habitat

The upland habitat consists of 14,285 acres of a shrub-steppe plant community dominated by sagebrush, drought tolerant perennial bunchgrasses, and forbs. Uplands are the dominate Refuge habitat type and include all lands not accounted for in the wetland, meadow, and riparian descriptions. Many upland habitats exhibit a mosaic pattern around meadows sites on the Refuge, these sites are generally managed as meadows (Map 7 - Habitat Management Units).

Historical reports of the sagebrush-steppe plant community are conflicting, and pre-settlement community conditions may never be fully known. Additionally, the focus of past Refuge management efforts have been devoted to wetland-dependent birds, therefore current Refuge upland plant community information is limited. Available information suggests that sagebrush historically was the dominate plant species, although perhaps taller >3m plants may have existed. Floristic diversity in North Park and on the Refuge has likely decreased, especially within the grasses and forbs. Management efforts for the past 50 years have attempted to increase grass and forb abundance through mechanical and chemical means. In general, the sagebrush plant community appears to be degraded, but given the lack of basic information, management alternatives are difficult to define. Therefore, Refuge upland management objectives center on developing an upland habitat database that defines plant species, location, abundance and characteristics. Secondly, the Refuge proposes to "experiment" with 4,000 acres of uplands habitats in an attempt to create a preferred plant community structure. Lessons learned will be applied to larger pieces of Refuge upland habitats.

Upland vegetation consists primarily of shrubs including: mountain big sagebrush, Wyoming big sagebrush, alkali sagebrush, fringed sage, rubber rabbitbrush, Douglas rabbitbrush, broom snakeweed, gray horsebrush, black greasewood, and winterfat. Dominant grasses include mutton grass, Nevada bluegrass, sandberg bluegrass, bottlebrush squirreltail, Idaho fescue, bluebunch wheatgrass, western wheatgrass, blue grama, elk sedge, needle and thread grass, and green needlegrass. Common forbs include sulphur buckwheat, hoods phlox, longleaf phlox, rosy pussytoes, silvery lupine, prairie Lupine, groundsels, narrow leaved maertensia, small bluebells, cinquefoil, early cinquefoil, stonecrop or wormleaf sedum, daisys, beard tongue. Noxious weeds included yellow toadflax and musk thistle, and occur primarily in disturbed sites. Sage-grouse are a sage-obligate species, and requires sagebrush plants for cover and food. Elk, mule deer, white-tailed deer, and pronghorn antelope are common big-game users of upland habitats. Additionally, vesper sparrow, brewers sparrow, and sage thrasher are songbirds common to Refuge uplands.

Wildlife Resources

Arapaho NWR's habitat diversity is reflected in the broad diversity of wildlife found here. Only those species that are residents or frequent visitors to the Refuge are discussed in the following text. Many species, especially birds, may infrequently inhabit or migrate through the Refuge. Threatened, Endangered, and Candidate Species and Species of Special Concern are listed in Table 3. All species of birds, mammals, fish, amphibians, and reptiles are listed in Appendix A.

Avian

Waterfowl – ducks and Canada geese: A large number of waterfowl depend on the Refuge's wetland, riparian, and meadow habitat for foraging, nesting, brood-rearing, and molting. The most common type of ducks breeding on the Refuge include lesser scaup, gadwall, American wigeon, Northern shoveler, and cinnamon teal.

Most of the ducks common to the Refuge use the three habitats listed above and occasionally some species use the upland habitat. These ducks include: green-winged teal, mallard, northern pintail, cinnamon teal, Northern shoveler, blue-winged teal, gadwall, and American wigeon. Redhead, ruddy duck, and lesser scaup depend on the wetlands for most of their life needs, with the scaup and redhead nesting in the meadows occasionally. Ring-necked duck, canvasback, and bufflehead are generally spring and fall migratory visitors but the canvasback does infrequently nest on the Refuge. Common merganser primarily inhabit the riparian areas to meet their life requirements.

Canada goose is an abundant species that is the first to arrive in the spring and the last to migrate in the fall. The geese use the wetland, riparian, and meadow habitats for foraging, nesting, and brood-rearing.

Wading birds are water birds that usually do not swim or dive for food, but wade in shallow edges of water for prey. The black-crowned night-heron, great blue heron, and white-faced ibis are the common breeding species on the Refuge. The ibis and black-crowned night-heron use wetlands with heavy cattail/hardstem bulrush vegetation for nesting and brood-rearing. They forage across the Refuge in riparian, meadow, and wetland areas. The great blue heron uses the riparian habitat primarily for nesting and foraging but can be observed in the wetlands.

Black-crowned Night-Heron
© Cindie Brunner

Shorebirds are most often found foraging for food along the water margins, they use the Refuge as a migratory stop-over, and some nest here. American avocet, willet, killdeer, spotted sandpiper, common snipe, and Wilson's phalarope are the common nesters. Avocet and willet mainly use the wetland habitat for their needs, where the killdeer is more a generalist and can be found in all habitat sites. The spotted sandpiper and common snipe reside mostly in the riparian habitat. Wilson's phalarope use the meadow/riparian for nesting and forage and rear young in the wetlands. Black-necked stilt are an occasional nester in the Refuge wetlands. Dowitcher, yellowleg and other sandpipers use the area for a stop-over during spring and fall migration.

Other water birds are represented by a variety of species. Pied-billed grebe, eared grebe, and American coot use wetlands for nesting, foraging, and brood-rearing. Virginia rail and sora use the meadow/riparian habitats extensively. American white pelican, double-crested cormorant, and California gull do not nest on the Refuge but use the area for foraging. Black and forester's terns nest in areas of dense carex, cattail, and bulrush foraging in the wetlands.

Raptors consist of several families of hawks, falcons, and owls. The most common raptors of the Refuge include: northern harrier, swainson's hawk, rough-legged hawk, golden eagle, American kestrel, prairie falcon, short-eared owl, and great horned owl. Only the golden eagle and great horned owl are year-round residents. The rough-legged hawk is a winter visitor while the rest of the birds are present in the spring, summer, and fall. The raptors utilize all habitats for nesting and foraging. Red-tailed hawk, ferruginous hawk, sharp-shinned hawk, and cooper's hawk use the area occasionally.

Golden Eagle © Cindie Brunner

Upland bird species rely on the uplands primarily to subsist. Several of the common upland birds are sage grouse, horned lark, sage thrasher, vesper sparrow, and brewer's sparrow. The sage grouse and horned lark are year-round residents, the sage grouse resides primarily in the upland but uses the edge areas of the riparian and meadow habitats. The sage thrasher, horned lark, and sparrows depend on the upland area for nesting but may forage in the other habitats.

Neotropical migrants are birds that breed in North America, north of Mexico, but winter in Mexico, Central and South America or the West Indies. The following species are found commonly on the Refuge either during migration or the nesting season. These birds rely heavily on the riparian habitat for foraging, cover, and nesting, they include: common nighthawk, belted kingfisher, willow flycatcher, warbling vireo, house wren, marsh wren, yellow warbler, MacGillivrays warbler, common yellowthroat, western kingbird, gray catbird, Wilson's warbler, savannah sparrow, fox sparrow, song sparrow, Lincoln's sparrow, and white-crowned sparrow. A few of these species also use the meadow and wetland habitat for nesting or foraging such as the savannah sparrow and the marsh wren. The cliff, barn, and tree swallows use a combination of habitats including wetland, riparian, and meadow.

Resident and migrant songbirds breed in North America and migrate throughout a limited North American range. This group includes mountain bluebird, American robin, dark-eyed junco, rosy finch, pine siskin, American goldfinch, and lark bunting. These birds use riparian, meadow, and upland habitats. Red-winged, yellow-headed, and brewer's blackbirds utilize both wetlands and riparian for nesting and foraging. Species like the black-capped chickadee, red-breasted nuthatch, and ruby-crowned kinglet use the riparian woody areas for foraging but tend to nest off the Refuge.

The Northern flicker is the most common woodpecker. This species inhabits the riparian willow habitat but also uses upland and meadow habitats. Other less common woodpeckers include downy, hairy, and red-naped sapsucker.

Northern Flicker © Cindie Brunner

Mammals

Big game animals common to the Refuge include: pronghorn antelope, mule deer, white-tailed deer, moose, and elk. Fifteen to 20 moose can be found on the Refuge at any one time, spending most of their time in the riparian habitat. The mule deer population is approximately 40 animals that roam on and off the Refuge spending time in the riparian, meadow, and upland habitats. White-tailed deer, population of about 20 animals, use the same areas as the mule deer. Pronghorn antelope utilize the upland habitat primarily but can be found in the riparian and meadow habitats. They use the Refuge in the spring, summer, and fall with a population of about 50 animals present at any one time. In the winter, the pronghorn antelope generally move north off the Refuge, making them a rare sight in the area. The Refuge has a resident herd of approximately 150 elk; these animals reside primarily in the riparian area in the southern half of the Refuge and on neighboring land. During the winter (November through March) the Refuge and surrounding area hosts about 1,400 elk, these animals are usually in several herds and can be found using riparian, meadow, and upland habitats.

Pronghorn antelope © Cindie Brunner

The Refuge has many small mammals which utilize all habitat types, depending on their life requirements. Common species are Nuttall's cottontail, white-tailed jackrabbit, least chipmunk, Wyoming ground squirrel, white-tailed prairie dog, beaver, deer mouse, montane vole, muskrat, porcupine, coyote, long-tailed weasel, mink, badger, and striped skunk (Appendix A).

Fish

The Illinois River and wetlands are two main types of aquatic communities present on the Refuge. The Illinois River is a transition stream beginning as a trout stream in the headwaters down to the southern end of the Refuge to a native species stream by the time it reaches the northern half of the Refuge. The splitting of the stream channel into two channels appears to be the basis of this fishery transition. The low flows of the split are ultimately responsible for trout giving way to the more tolerant native species. The following species are common in the Illinois River on Arapaho NWR: Brown trout, rainbow trout, Northern redbelly dace, fathead minnow, creek chub, long-nosed sucker, white sucker, and Johnny darter (Appendix A).

Potter and Spring Creeks are tributaries of the Illinois River on the Refuge. These creeks provide little fishery habitat with only a few native fish such as long-nosed dace, white sucker, fathead minnow, and creek chub found in them.

Many of the wetlands will not support a fishery, with water depth and winter survival being the limiting factors. The most common fish found in the wetlands is the fathead minnow, a native which has evolved in this type of habitat.

Brown Trout © Cindie Brunner

Reptiles and Amphibians

The wandering garter snake is the only reptile known to inhabit the Refuge. Sightings of this snake are rare with only one or two seen in a year. Amphibians are slightly more numerous with the following species: barred tiger salamander, Western toad, wood frog, Northern leopard frog, and striped chorus frog. The salamanders are primarily associated with the wetlands but have been seen in all habitats. The wood frog has only been documented once on the Refuge, and that was in the riparian habitat. The toad is rare but should frequent all the habitat types. Leopard frogs have been observed in the riparian habitat and also in irrigation ditches in the meadow habitat. Chorus frogs can be found in the wetland, meadow, and riparian areas; they are the most abundant amphibian on the Refuge.

Invertebrates

Some sampling of invertebrates has been done on Refuge wetland and riparian areas. Wetland invertebrates were the most diverse with 20 different families represented in the sampling. Stream sampling identified 17 different taxa in the Illinois River. Further sampling of invertebrates to establish a quantitative baseline would assist in identifying problems in wetlands and riparian areas in the future.

Threatened, Endangered ,and Candidate Species and Other Wildlife Species of Special Concern

Table 3 lists special status wildlife, fish, amphibian species that are known to use habitat types on Arapaho NWR. This list includes Endangered Species, Threatened Species, Candidate Species, and Species of Concern (Source: Colorado Division of Wildlife and U.S. Fish & Wildlife Service).

Table 3. Special Status Wildlife, Fish, Plant, and Amphibian Species Potentially Occurring on Arapaho NWR

Common Name	*Seasonal Occurrence*[1]	*Federal and State Status*[2]	*Date Last Observed*[3]
Birds			
American Peregrine Falcon	SR	CDOW SC	WOL2001
Bald Eagle	YR	USFWS Threatened (proposed delisting)	WOL2002
Western Burrowing Owl	B, M	CDOW Threatened	WOL2002
Ferruginous Hawk	SR	CDOW SC	WOL2002
Northern Sage Grouse	B, YR	CDOW SC	WOL2002
Long-billed Curlew	M, SR	CDOW SC	WOL2000
White Pelican	SR	CDOW SC	WOL2002
Mammals			
River otter	YR, B	CDOW Endangered	WOL2001
Fish			
Northern Redbelly Dace	YR	CDOW Endangered	No Records
Plants			
North Park Phacelia	YR	USFWS Endangered	WOL 2002
Amphibians			
Northern Leopard Frog	YR	CDOW SC	WOL2002
Wood Frog	YR	CDOW SC	WOL1994

[1] Seasonal occurrence: B =breeding (assumes summer resident); SR = summer resident (no evidence of breeding); YR = year-round resident; M = migrant

[2] See Glossary for special status definitions

[3] WOL = Refuge Wildlife Observation Log. Includes data through 2002.

[4] CDOW = Colorado Division of Wildlife

[5] SC= Species of Concern

[6] Threatened - See Appendix B for definition

[7] Endangered - See appendix B for definition

The bald eagle, a federally-listed species, is an intermittent visitor on the Refuge; it is a year-round resident of the county. Nesting habitat does not exist on the Refuge but the eagle does use all habitat types for foraging. The peregrine falcon, which is proposed for Federal de-listing, is also an intermittent visitor on the Refuge using all the habitat types for foraging.

Burrowing owl, Ferruginous hawk, northern sage grouse, long-billed curlew, and white pelican are all listed as Colorado State Special Concern species. Burrowing owls have been documented as nesting on the Refuge with an occurrence of one nest found every 5 years. They are more commonly observed as a migrant in the fall of the year. Ferruginous hawk can be seen in the spring, summer, and fall foraging on Refuge habitats. Northern sage grouse are an abundant year-round resident of the Refuge. The grouse use the upland, riparian, and meadow habitats for breeding (one lek found on Refuge), nesting, foraging, and brood-rearing. Long-billed curlews are observed every few years on the Refuge. White pelicans nest off the Refuge on MacFarlane Reservoir, frequenting the Refuge to forage in the wetland and riparian habitats.

The river otter is a Colorado State Endangered Species, which was re-introduced into a watershed south of the Refuge. The Refuge staff has observed (average one a year) several otters in the southern half of the riparian habitat.

Little is known about the northern redbelly dace on the Refuge. This Colorado State Endangered Species is found in the Illinois River.

Northern leopard and wood frogs are listed as Colorado State Special Concern species. The leopard frog is fairly common and found in Refuge riparian and meadow habitats. Only one observation of the wood frog has occurred; this was in the Illinois River south of the Refuge Headquarters.

General Public Use

Arapaho NWR annual number of visits is estimated at 7,200 which is an average of the past 6 years. This estimate is based broadly on a traffic counter on the auto tour route, visitors entering the Visitor Center/Office, and general observation. Table 4 summarizes estimated visits in five categories from 1997 to 2002.

Table 4. Estimated Annual Visitors to Arapaho NWR

	1997	*1998*	*1999*	*2000*	*2001*	*2002*
Total Estimated Visitors	7,248	6,805	6,797	7,107	7,575	7,710
Interpretation/Observation	6,762	6,361	6,263	6,360	7,220	7,496
Environmental Education	65	132	162	180	167	135
Hunters	357	228	302	522	152*	61*
Fishing	64	84	70	45	34*	18*

* Severe drought conditions limited hunting and fishing opportunities.

The Refuge Visitor Center is open Monday through Friday (7:00 am to 4:30 pm). Information, regulations, and universally accessible rest rooms are available during the same hours.

The Refuge has a general leaflet which contains a Refuge map, describes the Refuge and its management, addresses habitats, lists wildlife interpretation / recreation activities and cites the Refuge regulations. The Refuge also provides three other leaflets: wildlife list, hunting guide, and self-guided auto tour. The leaflets are available in three dispensers (Auto Tour entrance, Headquarters entrance, Brocker Overlook) and at the Visitor Center.

Compatible Wildlife-Dependent Recreation

Arapaho NWR offers visitors a variety of self-guided recreation opportunities. The Refuge Improvement Act (1997) states that public use of a refuge may be allowed only where the use is 'compatible' with the Refuge System mission and the purpose of the individual refuge. The Act also sets forth a current standard by which the Secretary of the Interior shall determine whether such uses are compatible. The term 'compatible use' means a proposed or existing 'wildlife-dependent recreational use' or any other use of a refuge, that in the sound professional judgement of the Service, will not materially interfere with or detract from, the fulfillment of the Refuge System's mission or the purpose of the refuge. Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are the six priority general public uses of the National Wildlife Refuge System.

Wildlife Observation and Photography

Wildlife observation with interpretation is the most popular public use on the Refuge (Table 4). Most of the observation activity occurs on the auto tour route and the interpretive nature trail. The auto tour route is on the west side of the Refuge and passes through meadow, wetland, and upland areas, offering a diversity of wildlife viewing [Map 9 - Public Use Map - Alternative B and D (Preferred)]. The wetlands on this route offer optimum waterfowl and water bird viewing. The interpretive nature trail is just south of the visitor center and meanders through a riparian area [Map 9 - Public Use Map - Alternative B and D (Preferred)]. This area is great for birding and also the chance to encounter mammals large and small.

Hunting

Hunting seasons range between early September to mid-January. These seasons are in accordance with State regulations for this area. The most common species hunted are pronghorn antelope, sage grouse, ducks, and Canada geese. Other species which are open to hunting include Nuttall's cottontail, white-tailed jackrabbit, American coot, common snipe, Virginia rail, sora, and mourning dove.

Certain areas of the Refuge are closed to hunting to protect Refuge facilities, limit public use conflicts, and provide resting and feeding habitat for migratory birds (Map 9 - Public Use Map - Alternative B and D (Preferred)]. Closed areas, such as the Case tract (Unit A), are posted with signs and mapped in the hunting leaflet.

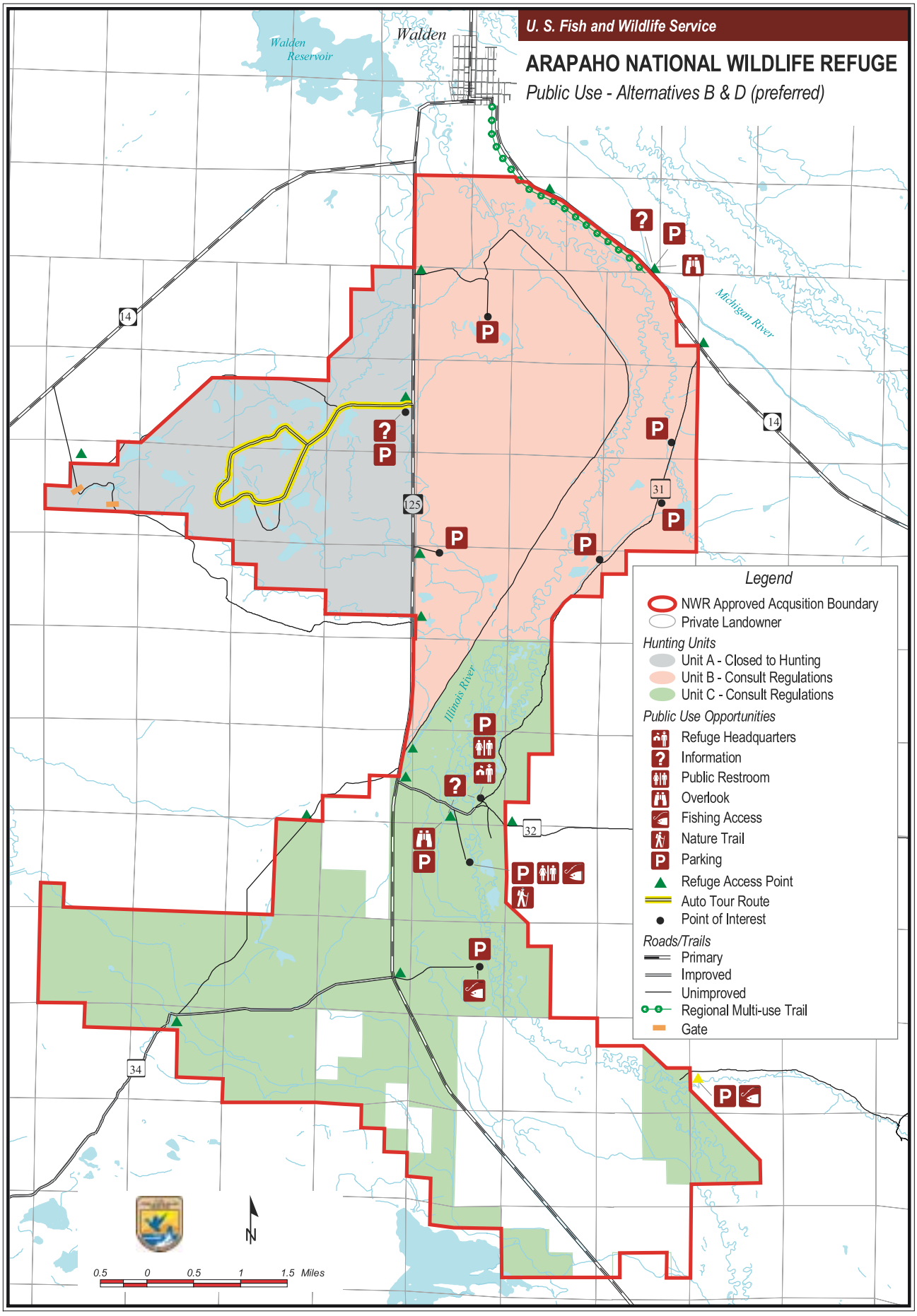
Fishing

Fishing on the Refuge is limited to the Illinois River and focuses mainly on brown trout. The Illinois River runs north through the east side of the Refuge. Two parking areas are designated for fishing access. Fishing is in accordance with Colorado State fishing regulations for the Illinois River. The Refuge is closed to fishing from June 1 through July 31 each year to minimize disturbance to nesting waterfowl. Periodic stocking of trout in the Illinois River occurs to maintain and enhance the Refuge fishery.

Environmental Education

Environmental education activities are limited at Arapaho NWR, with an on-demand type of approach. The Refuge staff has worked with various groups such as Boy/Girl Scouts, colleges, County Extension Office, and local elementary and Junior/Senior high schools.

Programs and talks that the Refuge staff has participated in include 'Day in the Woods,' 'Water Carnival,' Junior/Senior high school science class requirements, scout badge work, and summer hands-on environmental work for college students. In addition, the Refuge has conducted special programs for International Migratory Bird Day.



Map 9 - Public Use - Alternative B and D (Preferred)

Interpretation

Three interpretive kiosk sites are on the Refuge: Auto Tour entrance, Headquarters entrance, and Brocker Overlook. These sites have panels ranging from Refuge management activities to specific wildlife species information. The Auto Tour route is self-guided with interpretive signs and a leaflet. The Interpretive Nature Trail is signed with information about management tools and wildlife species found in riparian/wetland habitats. The Refuge staff is in the process of contracting new interpretive information for the visitor center which will deal with water history and management and also the four Refuge habitats and associated wildlife.

The Refuge staff publishes several brochures. The wildlife brochure is a list of all wildlife species documented on the Refuge along with the best time of year for viewing each species. The hunting brochure contains regulations and a map of the hunting units. The self-guided auto tour brochure contains basic Refuge information and map, viewing tips, and interpretation for the auto tour route signs.

Non-wildlife-dependent Recreation

Currently, some non-wildlife-dependent uses occur on the Refuge. These uses include biking, cross-county skiing, picnicking, camping, and horseback riding. These uses are infrequent, and not a major management concern. However, they are not an authorized use of a National Wildlife Refuge. Therefore, these inappropriate uses are handled by Refuge law enforcement personnel. The Refuge will strive to eliminate these non-wildlife-dependent uses by maintaining quality signage and brochures for all users.

Cultural Resources

The Colorado mountains have been used by humans for thousands of years. Spears points dating to the Paleoindian Period have been recovered in North Park. The Paleoindian Period extends from 12,000 B.C. to around 5740 B.C. Although numerous other Paleoindian sites have been located in Middle Park, including evidence of bison hunting 10,000 years ago, known occurrences of Paleoindian occupation in North Park have been limited to small campsites. Some archaeologists think Paleoindian groups lived in the Parks year-round; others propose winter camps in the foothills with exploitation of various mountain resources during summer months. The Archaic Period followed the Paleoindian Period and lasted until A.D. 150. Hunters used darts and throwing sticks called atlatls. There is also a higher reliance on small game and plant resources. A major drought on the Plains (ca. 5,000 to 2500 B.C.) caused change to settlement and subsistence patterns. People moved into the mountains for longer periods of time and exploited a wider variety of plant and animal resources. Increased moisture during the latter part of the Archaic brought people back onto the Plains, but the mountains continued to be an important part of their subsistence. Activity increased in North Park during the Archaic. The Late Prehistoric Period (A.D. 150 to A.D. 1540) saw the introduction of the bow and arrow and ceramics. Bison hunting again became an important part of the economy, but the people of the Late Prehistoric continued to rely on a variety of available plant and animal resources. Researches have proposed a seasonal round of activities. People would leave their foothills winter camps and head north into the Laramie Basin, then south through North and Middle Park collecting and hunting until fall. From there, they would turn east hunting bighorn sheep along the Continental Divide on their way back to the foothills.

The Protohistoric Period starts with European contact around A.D. 1540. Of the modern tribes, the Utes are most often associated with the mountains and long-term utilization of the resources of North Park. There are also historic accounts of visits to North Park by the Shoshone, Arapaho, and Cheyenne.

Archaeological sites in North Park are generally small in size and associated with seasonal use of the area. They include open campsites and lithic scatters with stone circles (tipi rings) located along the ridges. Culturally scarred trees and wickiups representing Protohistoric Ute use may be found in the forested area. Rock art and bison kill sites, though uncommon, have been reported in North Park.

The first European visitors to New Park (now known as North Park) were probably trappers. The first known party of trappers was headed by Alexander Sinclair and Robert Bean in 1825. Several famous trappers, miners, and hunters made their way through North Park. Kit Carson, Jim Baker, Sublette, Gervais and Vasquesz, Calvin Jones, Henry Fraeb, John Gantt, and Pegleg Smith all visited the Park in the 1840s The second western expedition of John C. Fremont took him through the Park in 1844. Sir George Gore passed through the Park on a hunting expedition in 1855, and found mule deer, elk, beaver, bear, and mountain sheep. By 1917, most of the game species were gone. Cyrus Mendenhall began grazing cattle in North Park in 1879. By 1885 the beef industry was booming, and North Park had its share of large ranches. Overgrazing and severe winters decimated herd sizes in the Park, and by 1889, ranching was no longer as profitable as it had been. In the late 1800s, the economy of the North Park shifted to mining; mining of coal, gravel, fluorspar, copper, silver, and gold, along with logging and ranching, became the main economic developments of the area.

Cultural resource studies have been completed on approximately 50 percent of the Refuge lands. Significant cultural resources have been located on the Refuge including prehistoric stone circles and open campsites and historic ranches, graves, and other features associated with Euroamerican settlement of North Park. Future efforts will continue to identify existing cultural resources and protect them from degradation. A detailed cultural resource overview of North Park (Larson and Letts, 2003) is available from the Service Regional Archaeologist.

Special Management Areas

Limited special management areas currently exist on the Refuge. The Refuge has no wilderness designation or other similar land use restriction beyond Refuge policy. This Refuge does not contain any area that qualifies for wilderness designation. All the lands within the Refuge have been highly manipulated, and contain roads, since this was a working ranch prior to its becoming a Refuge. The only specific historical or cultural areas include grave sites that will continue to be protected. The Refuge is operating under a 1982 habitat management plan that provides guidance for lands management. This plan will be replaced with guidance provided within the CCP. Additionally, the Refuge currently utilizes a hunting plan, and "zone" system (Management Units A, B, and C) to distribute hunters, anglers, and other public uses. This plan will remain in effect until completion of the step-down management plans for public use and hunting.

Other issues identified in this Plan which may require special management:

- **North Park Phacelia** - Preservation of this endangered plant may require fencing and/or plans to minimize disturbance, and ensure the survival and recovery of the species.

- **Elk Road Closures** - During winter months, the Refuge staff will continue to close roads to minimize disturbance to wintering elk. Coordination with the Colorado Division of Wildlife, and implementation of the revised hunting step-down management plan may alter this strategy.

- **Multi-use Trail** - Although this trail will be located on the Refuge boundary to minimize wildlife and habitat disturbance, the potential for litter and trespass will be higher. Signage and additional law enforcement patrols will be used to minimize these conflicts.

- **Moose Overlook** - Located ¼ mile south of the Headquarters, this site will facilitate moose, elk, and mule deer viewing. This site is located on an existing road, therefore, the potential for litter and trespass will be higher. Signage and additional law enforcement patrols will be used to minimize these conflicts.

- **Case Barn Interpretive Site** - Located along the Auto Tour Route, this site may facilitate historical interpretation of North Park and the role ranching has played to preserve wildlife habitats. The Refuge will pursue partners to rehabilitate and interpret these important structures. This site is located on an existing road, therefore, the potential for litter, vandalism, and trespass will be higher. Signage and additional law enforcement patrols will be used to minimize these conflicts.

- **Hampton Barn** - Depending on the outcome of the State Historical Preservation Office review, the site may be used to facilitate historical interpretation of North Park and the role ranching has played to preserve wildlife habitats. The Refuge anticipates only developing one barn interpretive site. The Case Barn will be first priority based on its proximity to the auto tour route. This site is located on an existing road, therefore, the potential for litter, vandalism, and trespass will be higher. Signage and additional law enforcement patrols will be used to minimize these conflicts.

Management Direction

Refuge Management Direction:
Goals, Objectives and Strategies/Projects

Development of Refuge goals and objectives involved the melding of multiple sources of information including the review and interpretation of national plans, review and interpretation of existing scientific literature, an evaluation of existing habitat conditions on the Refuge, and the personal knowledge of planning team participants. Refuge objectives were derived using species-habitat requirements (See Appendix H). However, many of these species deemed important in national plans were used as "indicators" to prepare objectives that satisfy the needs of multiple species. Other consulted sources of information included Partners in Flight lists, Audubon Watch lists, Bird Conservation Region lists, and the Refuge wildlife observation log books. Constraints considered during plan formulation include number of employees, financial resources, equipment availability, harsh winter conditions, arid climate, lessons learned from previous management efforts, and the likelihood of success.

Riparian Habitats

Riparian Habitat Goal: *Provide a riparian community representative of historic flora and fauna in a high valley of the southern Rocky Mountains to provide habitat for migratory birds, mammals, and river-dependent species.*
(Detailed biological justification is discussed in Appendix H.)

1. **Objective:** Restore 50 to 100 acres of dense (40 to 100 percent) willow in patches >.2 ha and 20 m wide in the central third of the Illinois River (from the north end of the island to the confluence with Spring Creek) to connect existing willow patches and maintain 535 acres of dense willow in patches in the lower third of the Illinois River to benefit nesting neotropical migrant songbirds (yellow warbler, willow flycatcher) and resident moose, river otter, and beaver.

   Strategies:
   - Willow plantings along the stream corridor combined with 8 foot fences to exclude large herbivores.
   - Water manipulation Refuge-wide that may involve decreased diversions to maintain in-stream flows for willow establishment.
   - Construction of small artificial dams in the river to raise water tables locally to aid in willow establishment.
   - Establish a vegetation monitoring plan to assess health of established willow stands, and measure and document success or changes needed in reestablishment efforts. Plan should include herbivory and hydrology factors.
   - Wildlife monitoring will occur to document changes in wildlife use and possible correlations to changes in habitat.
   - Experiment with alternative willow restoration strategies.
   - Consider hunting as a management tool.

   Rationale: Sections of the Illinois River on the Refuge had willows removed prior to acquisition by the FWS, probably in an effort to increase hay yields. These open stretches of river have: less bank stability, resulting in potential for increased sedimentation; decreased shade over the stream, resulting in increased water temperatures for trout; and sparse woody vegetation for use by songbirds or other wildlife. A section of river further downstream from the proposed reestablishment site has had livestock grazing removed for 8 years, but has shown little willow regeneration. Given the growth characteristics of willows, these results lead to the conclusions that there is either significant herbivory other than livestock restraining willow expansion, and/or hydrology has been altered enough with upstream diversions and recent drought conditions that lack of groundwater is keeping willow establishment from occurring. With this in mind, willow plantings will only be done in association with fencing, and consideration of hydrological needs will be used as well. Possible methods of increasing groundwater needs will be: to divert less water upstream for other Refuge purposes; locate willow plantings adjacent to existing beaver dams to take advantage of higher water tables near these ponds; and place logs and other natural materials in the stream to create simulated beaver dams and raise water tables adjacent to areas to be planted. Monitoring will be essential to document reestablishment efforts, and to note any significant changes to existing willow communities.

2. **Objective:** Provide 3,630 to 3,845 acres, over a 5-year average, of a grass:forb (75:25) plant community composed primarily of native plants (rushes, sedges, grasses, forbs) characterized by 10 to 30 cm visual obstruction reading, 0 to 10 cm duff layer and minimal (<5 percent) bare ground and less than 40 percent (canopy closure) willow to benefit nesting waterfowl (pintail, shoveler, gadwall, green-winged teal) and sage grouse broods.

   Strategies:
   - Utilize grazing, resting, and burning practices to stimulate or maintain meadow conditions.
   - Irrigate areas as water is available to help stimulate vegetative growth.
   - Develop a vegetation monitoring protocol.
   - Develop a wildlife monitoring plan that correlates wildlife use and habitat condition.
   - Consider hunting as a management tool.

   Rationale: The grass:forb mix identified in the objective requires periodic manipulation of some sort to achieve the stated ranges of the objective. The combination of resting, grazing, and burning, combined with irrigation, where available and practical, are the best tools to accomplish this. It is anticipated that on average, 1/3 to 2/3 of this area will require grazing at an average rate of 0.4 to 1.0 AUMs per acre resulting in the removal of approximately 1,950 to 4,200 AUMs of forage. Vegetative monitoring combined with wildlife use data will be needed to document that objective levels are correct.

3. **Objective:** Provide 210 to 425 acres, over a 5-year average, of a grass:forb (75:25) plant community composed primarily of native species (grasses, sedges, forbs, and rushes) characterized by >30 cm visual obstruction reading, 10 to 20 cm duff layer and minimal (<5 percent) bare ground, and less than 40 percent (canopy closure) willow from mid-April through August to benefit nesting waterfowl (mallard, gadwall, pintail, scaup), songbirds (savannah sparrow, meadowlark), and foraging shorebirds if flooded (snipe, phalarope, white-faced ibis, sora, curlew, willet).

   Strategies:
   - Utilize grazing, resting, and burning practices to stimulate or maintain meadow conditions.
   - Irrigate areas as water is available to help stimulate vegetative growth.
   - Develop a vegetation monitoring protocol.
   - Develop a wildlife monitoring plan that correlates wildlife use and habitat condition.
   - Consider hunting as a management tool.

   Rationale: The grass:forb mix identified in the objective requires periodic manipulation of some sort to achieve the stated ranges of the objective. The combination of resting, grazing, and burning, combined with irrigation, where available and practical, are the best tools to accomplish this. To meet and maintain the taller vegetation and duff layers identified, it is anticipated that rest will be utilized more for this objective. It is anticipated that on average, 1/3 to ½ of this area will require grazing at an average rate of 0.4 to 1.0 AUMs per acre resulting in the removal of approximately 100 to 350 AUMs of forage. Vegetative monitoring combined with wildlife use data will be needed to document that objective levels are correct.

4. **Objective:** Given the altered river flow regime, provide a properly functioning river channel characterized by a well defined thalweg (deepest point in the river channel), outside river edges that are deeper than inside edges, a river sinuosity of 2.0 to 2.5, pool spacing every 7 to 9 channel widths, active point bar formation, and gradients in riffles that are higher than in pools to benefit willow establishment for neotropical migrants, and indirectly provide suitable habitat for native and nonnative fishes.

   Strategies:
   - Map river channel and identify problem areas. Prioritize stretches for rehabilitation.
   - Alter irrigation diversions as needed to assist in-stream restoration.
   - Install in-stream structures as necessary to adjust thalweg, create point bars, adjust depth ratios, increase sinuosity, and/or adjust pool spacing.
   - Monitor wildlife and vegetative response to these strategies.

   Rationale: Mapping the river to identify current characteristics is needed in order to define where restoration is needed. Increasing flows in the river by diverting less water on upstream Refuge water rights may assist in maintaining higher water tables, especially when used in conjunction with in-stream restoration projects. Documenting vegetative, fishery, and wildlife response is necessary to ensure that the projects are working.

5. **Objective:** Establish a private lands program to encourage restoration of degraded riparian zones through funding and technical assistance to accomplish similar objectives as those defined for the Refuge. High priority areas are those that have immediate influence on the Refuge because of drainage or proximity.

   Strategies:
   - Add a full-time private lands position to the staff.
   - Work with local partners and willing landowners to identify, prioritize, and restore degraded areas in North Park.

6. **Objective:** Work with partners to address land health issues throughout Jackson County.

Strategy:

- Continue active Refuge participation in Sage Grouse Working Group, North Park Wetlands Focus Group, Owl Mountain Partnership, North Park Habitat Partnership Program, and any other group formed with the goals of improving land health and/or stewardship in Jackson County.
- Partner with Jackson County weed coordinator to manage and minimize noxious weeds on the Refuge.
- Variations in water diversions and/or grazing regimes.
- Use adaptive management techniques to implement new management ideas.

Rationale: The Refuge has the ability and resources available to restore and maintain a productive riparian area for the benefit of wildlife, fisheries, water quality, and a healthy landscape, while also utilizing local agriculture. The streams within the Refuge boundaries are a small fragment of those located within Jackson County, Colorado. By working with interested landowners and partners, the possibility exists of expanding the benefits of a healthy riparian zone throughout North Park.

From time-to-time, projects may be proposed within the county by other agencies, non-government organizations, or private landowners, that have a benefit to ecosystem health and wildlife outside of the Refuge boundary. There may be an occasion that in order to make an off-Refuge project succeed, resources normally reserved for Refuge purposes, such as water or vegetative cover, could be used to help make the off-Refuge project successful. These would not be long-term commitments of Refuge resources, but rather a management decision that a short-term diversion of these resources would better be served to benefit the ecosystem as a whole.

Wetland Habitats

Wetland Goal: *Provide and manage natural and man-made permanent and semipermanent wetlands (in three wetland complexes) to provide habitat for migratory waterfowl, shorebirds, wading birds, and associated wetland-dependent wildlife.*

1. **Objective:** Maintain 10 acres of, and attempt to establish in one other wetland basin, tall (>=60 cm visual obstruction reading) emergent vegetation in water depths >4 cm over a 5-year period to provide nesting habitat for over-water nesting birds (black-crowned night-heron, white-faced ibis, waterfowl, marsh wrens, coots, rails, and blackbirds).

   Strategies:
   - Water level manipulation, including drawdowns, and maintaining water levels in specific wetlands from spring to fall when possible.
   - Develop and apply a plan for transplanting of cattail and hardstem bulrush into specific wetlands.
   - Develop and use an over-water nesting bird monitoring plan.
   - Develop and implement an annual water management plan as a component of an overall habitat management plan.

   Rationale: Wetlands with tall dense vegetation provide a litter layer for use by nesting water birds as well as a flooded emergent litter for macroinvertebrate production. Manipulation of water levels will contribute to maintaining the existing wetlands with tall emergent vegetation. Transplanting cattail and hardstem bulrush in wetlands with the highest potential for success will help increase the availability of this type of habitat. The criteria for such wetlands would be based on such things as water control abilities, evaporation rates, and distribution. Timing of needed drawdowns for expansion of the tall dense vegetation will be planned in such a way as to get maximum benefit for all Refuge wetland objectives such as during shorebird migration or to stimulate submergent aquatic vegetation beds. Monitoring water bird species will help assess how successful habitat management is.

2. **Objective:** Provide 10 percent of the wetland acres, over a 5-year average, in short (<10 cm), sparse (<10 cm visual obstruction reading) emergent vegetation in water depths <4 cm from April to August to provide foraging habitat for shorebirds and waterfowl, as well as nesting and brood-rearing habitat for shorebirds.

   Strategies:
   - Water level manipulation, including full and partial drawdowns, and maintaining water levels in specific wetlands from spring to fall when possible.
   - Tillage of dry wetlands as a management tool.
   - Rehabilitation and maintenance of existing dikes and infrastructures.
   - Conduct shorebird surveys on the Refuge.
   - Monitor monthly wetland bird use.
   - Develop and apply a wetland emergent/submergent vegetation monitoring plan.
   - Develop and implement an annual water management plan as a component of an overall habitat management plan.

3. **Objective:** Provide 20 percent of the wetland acres, over a 5-year average, of emergent vegetation >25 cm tall with visual obstruction reading >80 percent of vegetation height in water depths 4 to 18 cm to provide escape cover and foraging habitat for dabbling duck broods and molting ducks and foraging habitat for water birds.

   Strategies:
   - Water level manipulation, including full and partial drawdowns, and maintaining water levels in wetlands from spring to fall when water is available and conditions are appropriate.
   - Tillage of dry wetlands as a management tool.
   - Rehabilitation and maintenance of existing dikes and infrastructures.
   - Conduct waterfowl surveys on the Refuge.
   - Monitor monthly wetland bird use.
   - Develop and apply a wetland emergent/submergent vegetation monitoring plan.
   - Develop and implement an annual water management plan as a component of an overall habitat management plan.

   Rationale: The availability of a variety of wetland habitat conditions may benefit a greater diversity of wildlife species and/or support species for longer periods in their annual life cycle. The above two objectives contribute to habitats varying from shallowly flooded, short, sparse emergents to both shallow water and moderately dense cover. Water manipulation techniques including drawdowns and back flooding can be used to create these conditions. Using monitoring to evaluate the response of the flora and fauna will indicate success of management techniques. Short-term variations of habitat objectives may be considered, on a case-by-case basis, by Refuge management to promote other important ecosystem projects within North Park.

4. **Objective**: Provide 10 to 20 percent of the wetland acres within each wetland complex, over a 5-year average, with a 70 percent coverage of submergent aquatic vegetation species (*Potomogeton*, *Ruppia*) in wetlands of >18 cm water depth to provide invertebrates and seed sources for foraging water birds, especially waterfowl broods, and escape cover for diving ducks.

   Strategies:
   - Water level manipulation, including full and partial drawdowns, and maintaining water levels in wetlands from spring to fall when water is available and conditions are appropriate.
   - Tillage of dry wetlands as a management tool.
   - Rehabilitate and maintain existing dikes and infrastructures.
   - Conduct waterfowl surveys and brood counts on the Refuge.
   - Monitor monthly wetland bird use.
   - Develop and apply a wetland submergent vegetation monitoring plan.
   - Develop and implement an annual water management plan as a component of an overall habitat management plan.

   Rationale: Submergent vegetation provides a complex structure for macroinvertebrate production and a seed source for foraging water birds. *Potamogeton* and *Ruppia* both produce a food resource (plant foods and invertebrates) for waterfowl and broods. These submergents are used by other wetland birds for nesting, foraging, and escape habitat. A variety of drawdown schedules and tillage are used to enhance the growth of these plants. Monitoring the responses of plant and wildlife will gauge the level of success in providing this habitat.

5. **Objective:** Enhance the existing private lands program to encourage creation and restoration of wetlands in North Park and surrounding areas through funding and technical assistance to accomplish the same objectives as on the Refuge.

Strategies:

- Obtain funding and full-time equivalency for a Partners for Fish and Wildlife position.
- Work with willing stakeholders to create and restore wetlands in North Park.
- Develop a plan to identify wetland habitats throughout North Park.
- Consider wetland development opportunities as they become available.
- Continue participation in the North Park Wetland Focus Group.
- Establish a monitoring plan for created habitats to ensure benefits are realized.

Rationale: Since the Refuge is only part of the total North Park landscape efforts, to look beyond the boundaries are important in an ecosystem approach. Many wetland potentials exist in North Park, and working to restore or create these wetlands will benefit not only wildlife but society as well. To achieve the most positive results, priority projects will be close to existing wetland complexes or reasonably well functioning segment of rivers or near the larger reservoirs. Wetland management would mimic above Refuge objectives when possible. Work would be completed with the help of others to identify wetland habitats throughout North Park, partnering with willing stakeholders to restore, protect, and improve wetland habitats for wildlife use. Set up demonstration areas practicing sound wetland habitat management, and improve water levels in wetlands from spring to fall when possible.

Meadow Habitats

Meadow Habitat Goal: *Provide and manage irrigated, grassland dominated meadows historically developed for hay production, to support sage grouse broods, waterfowl nesting, and meadow-dependent migratory birds.*

Detailed biological justification is discussed in Appendix H.

1. **Objective:** Provide 20 to 50 acres, over a 5-year average, of a grass:forb (75:25) plant community composed primarily of native plants (rushes, sedges, grasses, forbs) characterized by <20 cm height, <10 cm visual obstruction reading, with dry to moist soils (no standing water), adjacent to (within 50 m) or intermingled with sagebrush (10 to 25 percent sage canopy cover), from early-June to late-July, to benefit sage grouse and snipe broods.

   Strategies:
   - Utilize grazing, resting, and burning practices to stimulate or maintain meadow conditions.
   - Irrigate areas as water is available to help stimulate vegetative growth.
   - Working with partners, develop a vegetation monitoring protocol.
   - Working with partners, develop a wildlife monitoring plan that correlates wildlife use and habitat condition.
   - Consider hunting as a management tool.

2. **Objective:** Provide 1,650 to 1,850 acres, over a 5-year average, of a grass:forb (75:25) plant community composed primarily of native species (grasses, sedges, forbs, rushes) characterized by 10 to 30 cm visual obstruction reading, 0 to 10 cm duff layer and minimal (<5 percent) bare ground from mid-April to the end of July to benefit nesting waterfowl (gadwall, shoveler, pintail, green-winged teal) and sage grouse broods.

   Strategies:
   - Utilize grazing, resting, and burning practices to stimulate or maintain meadow conditions.
   - Irrigate areas as water is available to help stimulate vegetative growth.
   - Working with partners, develop a vegetation monitoring protocol.
   - Working with partners, develop a wildlife monitoring plan that correlates wildlife use and habitat condition.
   - Consider hunting as a management tool.

   Rationale: The grass:forb mix identified in the objective requires periodic manipulation of some sort to achieve the stated ranges of the objective. The combination of resting, grazing, and burning, combined with irrigation, where available and practical, are the best tools to accomplish this. It is anticipated that on average, 1/3 to 2/3 of this area will require grazing at an average rate of 0.4 to 1.0 AUMs per acre resulting in the removal of approximately 950 to 2,100 AUMs of forage. Vegetative monitoring combined with wildlife use data will be needed to document that objective levels are achieved, and whether or not objectives are correct.

3. **Objective:** Provide 630 to 790 acres, over a 5-year average, of a grass:forb (75:25) plant community composed primarily of native plants (grasses, sedges, forbs, rushes) characterized by >30 cm visual obstruction reading, 10 to 20 cm duff layer and minimal (<5 percent) bare ground to benefit nesting waterfowl (mallard, gadwall, pintail, scaup), songbirds (savannah sparrow, meadowlark), and foraging shorebirds if flooded (snipe, phalarope, white-faced ibis, curlew, willet, sora).

   Strategies:
   - Utilize grazing, resting, and burning practices to stimulate or maintain meadow conditions.
   - Irrigate areas, as water is available, to help stimulate vegetative growth.
   - Working with partners, develop a vegetation monitoring protocol.
   - Working with partners, develop a wildlife monitoring plan that correlates wildlife use and habitat condition.
   - Consider hunting as a management tool.

   Rationale: The grass:forb mix identified in the objective requires periodic manipulation of some sort to achieve the stated ranges of the objective. The combination of resting, grazing, and burning, combined with irrigation, where available and practical, are the best tools to accomplish this. To meet and maintain the taller vegetation and duff layers specified, it is anticipated that rest will be utilized more for this objective. It is anticipated that on average, 1/3 to ½ of this area will require grazing at an average rate of 0.4 to 1.0 AUMs per acre resulting in the removal of approximately 350 to 700 AUMs of forage. Vegetative monitoring combined with wildlife use data will be needed to document that objective levels are achieved, and whether results support species requirements.

4. **Objective:** Short-term variations of habitat objectives may be considered, on a case-by-case basis, by Refuge management for important ecosystem projects within North Park.

   Strategies:
   - Work with partners to identify potential projects in the county.
   - Implement variations in water diversion, grazing regimes or other Refuge management strategies as deemed appropriate.

   Rationale: From time-to-time, projects may be proposed within the county by other agencies, non-government organizations, or private landowners, that have a benefit to ecosystem health and wildlife outside of the Refuge boundary. In order to make an off-Refuge project succeed, resources normally reserved for Refuge purposes, such as water or vegetative cover, could be used occasionally to help make a project successful. These would not be long-term commitments of resources, but rather a cooperative management decision that a short-term diversion of these resources would better be served to benefit the ecosystem as a whole.

5. **Objective:** Establish a private lands program to provide funding and technical assistance to encourage wildlife-compatible land management practices in meadow habitats to accomplish objectives similar to those of the Refuge.

   Strategies:
   - Add a full-time private lands position to the staff.
   - Work with local partners and willing landowners to identify, prioritize, and restore degraded areas and create new wildlife habitat in North Park.

6. **Objective:** Work with partners to address land health issues throughout the county.

   Strategy:
   - Continue active Refuge participation in Sage Grouse Working Group, North Park Wetlands Focus Group, Owl Mountain Partnership, North Park Habitat Partnership Program, and any other group formed with the goals of improving land health and/or stewardship in Jackson County.
   - Partner with Jackson County weed coordinator to manage and minimize noxious weeds on the Refuge.

   Rationale: The Refuge has the ability and resources available to maintain productive meadows for the benefit of wildlife, water quality and a healthy landscape, while also utilizing local agriculture. The meadows within the Refuge boundary were used to produce hay prior to Refuge establishment, and proposed management practices vary little from thousands of similar acres throughout the county that are still in hay production. By working with interested landowners and partners, the possibility exists of expanding the wildlife benefits of Refuge meadows and/or maintaining the benefits that are occurring on these off-Refuge sites.

Upland Habitats

Upland Habitats Goal: *Provide a sagebrush/grassland upland community representative of the historic flora and fauna in a high valley of the southern Rocky Mountains to provide habitat for sage grouse, large mammals, and other shrub associated species.*

Detailed biological justification is discussed in Appendix H.

1. **Objective:** Provide 2,000 acres, over a 5-year average, of uplands composed of shrubs (>70 percent sage) >25 cm height and 20 to 30 percent canopy cover, >20 percent grass cover, and >10 percent forbs (native species preferred) to benefit sage grouse, vesper sparrow, brewers sparrow, elk, and pronghorn antelope.

   Strategies:
   - Complete a sagebrush/grassland upland habitat inventory of the Refuge by 2008.
   - Use cattle grazing at varying stock rates, seasons, and intensities as a management tool for uplands.
   - Use 'rest' (free from biological, mechanical, or chemical manipulation) of varying lengths of time as a management tool for uplands.
   - Develop and implement an integrated pest management plan.
   - Use a variety of mechanical treatments of the habitat as a management tool for uplands.
   - Develop and implement a vegetation monitoring plan.
   - Develop and implement a wildlife monitoring program.

2. **Objective:** Provide 2,000 acres, over a 5-year average, of uplands composed of shrubs (>70 percent sage) >40 cm height and >30 percent canopy cover, <20 percent grass cover, and >5 percent forbs (native species preferred) to benefit brewer's sparrow, sage thrasher, and pronghorn antelope.

   Strategies:
   - Complete a sagebrush/grassland upland habitat inventory of the Refuge by 2008.
   - Use cattle grazing at varying stock rates, seasons, and intensities as a management tool for uplands.
   - Use 'rest' of varying lengths of time as a management tool for uplands.
   - Develop and implement an integrated pest management plan.
   - Use a variety of mechanical treatments of the habitat as a management tool for uplands.
   - Develop and implement a vegetation monitoring plan.
   - Develop and implement a wildlife monitoring program.

   Rationale: The Refuge has five primary range sites that support sagebrush/grassland uplands. The 2,000 acres of each of the above objectives are scattered within several of these range types and intermingled with meadow areas. A completed inventory of the uplands will assist in specifically defining these areas. Sagebrush/grassland uplands in a mosaic of patchy sagebrush with openings of grasses and forbs across the landscape reflect the needs of most wildlife species. Moderate livestock grazing, ranging from .05 AUM per acre to .15 AUM per acre in intensity, combined with rest will help maintain these acres. This rest rotational coverage will promote plant diversity, nutrient cycling, and cover. Controlling or eliminating noxious weeds that reduce the abundance and diversity of native forbs in the sagebrush/grassland habitats is important. Mechanical treatments will be considered in small areas to increase grass and forb components of the site. Monitoring the response of the flora and fauna will aid in assessing the success of the tools applied and help improve these methods.

3. **Objective:** Manage the remaining 10,225 acres of sagebrush/grassland uplands based on a better understanding of Refuge habitats, wildlife usages, and affected variables using best management practices.

Strategies:

- Complete upland habitat inventory by 2008 if financial resources are available.
- Conduct research and monitor outcomes of Refuge upland habitats over the next 15 years.
- Develop habitat based goals and objectives for the remaining Refuge upland acres (10,000) by 2017.
- Establish upland research plots by 2012 to investigate and monitor upland habitats on the Refuge.
- Use cattle grazing at varying stock rates, seasons, and intensities as a management tool for uplands.
- Use 'rest' of varying lengths of time as a management tool for uplands.
- Develop and implement an integrated pest management plan.
- Use a variety of mechanical treatments of the habitat as a management tool for uplands.
- Develop and implement a prescribed burning program.
- Coordinate with existing projects and research and monitoring efforts in the area.
- Establish research plots to test strategies for habitat manipulations.
- Short-term variations of habitat objectives may be considered, on a case-by-case basis, by Refuge management for important ecosystem projects within North Park.

Rationale: In an effort to manage the sagebrush/grassland uplands, an inventory of what the Refuge has is essential. A variety of tools are available to provide a structurally diverse shrub community, with a grass:forb component to support migratory birds and other wildlife species. Livestock grazing, used in moderation, at rates ranging from .05 to .15 AUMs per acre will be used. It is anticipated that approximately 1/3 to ½ of the upland areas will be grazed annually, resulting in 450 to 1,200 AUMs of forage being removed. Rest also needs to be used in moderation; too much rest can result in dominate brush communities that prevent herbaceous species from recovering. Grazing used in conjunction with rest can enhance the nutrient cycles, plant regrowth, and plant community diversity. Efforts to control and/or eradicate noxious weeds will help maintain the diversity of plant life required to provide wildlife habitat needs. Mechanical treatments break up the soil and remove a variable percent of the brush species, depending on the coverage, to promote grasses and forbs growth. Historically, frequencies of fire in the upland were low, and they were small, patchy fires. Prescribed burns may be beneficial in some upland sites to control dense stands of sagebrush so that herbaceous species can increase. The use of other upland habitat projects in the area, with range types similar to the Refuge, will help to identify successful methods for manipulation the habitat to reach the objectives. A portion of these sagebrush/grassland upland acres will be used to establish research plots to get a better understanding of how to increase sage height and grass:forb abundance to benefit nesting and wintering sage grouse, songbirds (vesper sparrow, sage thrasher, brewer's sparrow, swainson's hawk) and pronghorn antelope. This information will focus on the tools that might get more acres of uplands into the first two objectives. In working with the entire North Park landscape, some habitat objectives may change to accommodate actions deemed essential elsewhere in the upland habitats of the Park to improve the overall quality of wildlife habitat.

4. **Objective:** Manage North Park Phacelia (*Phacelia formosula*) populations currently known to exist on the Refuge to ensure its continued existence.

Strategies:

- Initiate research to understand the plant's life history and develop a management plan.
- Protect and develop a monitoring plan for the existing and future new populations.
- Work with other entities to preserve North Park Phacelia populations throughout North Park.

Rationale: The North Park Phacelia is the only known federally-listed endangered plant species on the Refuge. The plant is only found in North Park with several populations scattered across the area. Only two known populations of the plant exist on Refuge lands. Little is known about its life history, so management is limited. Research on the life history of the plant is essential. As part of a partnership approach, information and management techniques will be shared to help ensure the continued existence of the Phacelia and eventually the down listing of the species.

Public Use

Public Use - Gen. Info.

General Information

The 1997 National Wildlife Refuge System Improvement Act (P.L. 105-57) requires that each Refuge be managed to fulfill the Refuge System mission as well as the specific purpose(s) for which the Refuge was established. The Act also declares that compatible wildlife-dependent recreational uses are legitimate and appropriate priority general public uses of the Refuge System. These six uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) are to receive enhanced consideration in planning and management over all other general public uses of the Refuge System. These activities receive a special focus because they help foster an appreciation and understanding of wildlife and the outdoors. Wildlife conservation is always the top obligation of national wildlife refuges. However, when compatible, these wildlife-dependent recreational uses are to be strongly encouraged on Refuges. Consequently, these six activities are first in line for the Refuge's available staff and financial resources. Although other public uses may be allowed on Refuges, the process for considering proposed uses, other than priority uses, is more stringent, and these uses must be reevaluated more frequently.

A compatibility determination is required for a wildlife-dependent recreational use or any other public use of a Refuge. A compatible use is one which, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from fulfillment of the Refuge System Mission or Refuge purposes. Compatibility determinations for public uses can be found in Appendix F.

Arapaho public use opportunities are combined into five categories and include:

1. Hunting
2. Fishing
3. Wildlife observation and photography
4. Environmental education and interpretation
5. Other uses

Additionally, cultural resources, research, and partnerships are evaluated. Each public use evaluation contains a specific list of objectives, a list of strategies, and a supporting rationale statement.

Public Use Goal: *Through wildlife-dependent recreation and education, people of a range of abilities and interests are able to learn of and appreciate the natural resources of this unique high mountain park. Thereby, citizens become better stewards of nature in their own communities and stronger supporters of the Refuge specifically and National Wildlife Refuge System generally.*

Hunting

Public Use - Hunting

1. **Objective:** Provide recreational hunting opportunities consistent with Refuge goals and objectives, and that facilitate North Park wildlife management objectives.

   Strategies:
   - Working with the State, develop a hunting step-down management plan that provides hunting (big game, small game, and waterfowl) opportunities to meet North Park and Refuge objectives.
   - Working with the State, provide limited small game and furbearer hunting opportunities depending on Refuge habitat objectives and/or population objectives North Park-wide.
   - Hunting of predators will not be authorized in order to minimize disturbance to wildlife. The hunting step-down management plan will reevaluate the role of predator hunting on the Refuge.

2. **Objective:** The Refuge will work with the State in promoting sound hunting practices as a wildlife management tool.

   Strategies:
   - The Refuge will partner with the State and North Park Chamber of Commerce for the dissemination of information about hunting opportunities on the Refuge and throughout North Park.
   - Hunting brochures and hunting information will be provided to hunters at the headquarters building.
   - Assist Colorado Division of Wildlife off-Refuge with law enforcement, hunter recruitment, and hunter education when requested.

3. **Objective:** Facilities will be maintained, and improved as necessary, to provide a quality recreational hunting experience while minimizing resource damage.

Strategies:

- Develop five parking areas [Map 9 - Public Use - Alternative B and D (Preferred)] using post and cable methods and minimize resource damage caused by vehicles. Parking areas also provide opportunities to inform the hunting public about rules and regulations.
- Develop two permanent gates that can be locked to minimize resource damage caused by vehicles [Map 9 - Public Use - Alternative B and D (Preferred)].
- Develop a travel management plan that will revegetate two track roads [Map 9 - Public Use - Alternative B and D (Preferred)] not needed for maintenance, law enforcement, hunting access, or other management purposes.
- Develop a signage plan that facilitates the public use, enhances the public's understanding of Refuge management, provides public information and safety, and the Refuge System.

Rationale: This alternative recognizes that the Refuge is part of a larger system of lands known as North Park. Given that many wildlife species in North Park migrate on and off the Refuge (waterfowl, elk, mule deer, pronghorn antelope, sage grouse), the Refuge hunting program effects more than just Refuge lands. The key to success is a strong working relationship with sportsman and with the State, and incorporation of Refuge hunting goals and objectives into a hunting step-down management plan. Additional Refuge hunting opportunities (i.e. moose, elk, mule deer) will be determined in conjunction with the community and the State. The Refuge will continue to work with the State in promoting sound hunting practices as a wildlife management tool. Additionally, this alternative suggests we modify and possibly expand existing public use facilities to include emphasis on hunting both on the Refuge and in North Park. The Refuge will engage in partnerships to disseminate information on hunting opportunities throughout North Park. The Refuge may continue to utilize habitat management units A, B, C to provide resting areas for migratory birds and to minimize conflicts between hunters and visitors, and to distribute hunting pressure. However, the A, B, C system may be modified during the development of a hunting step-down management plan.

Fishing

Public Use Goal: *Through wildlife-dependent recreation and education, people of a range of abilities and interests are able to learn of and appreciate the natural resources of this unique high mountain park. Thereby, citizens become better stewards of nature in their own communities and stronger supporters of the Refuge specifically and National Wildlife Refuge System generally.*

1. **Objective**: Where compatible, opportunities for fishing will be provided based on Refuge goals and objectives.

   Strategies:
   - Encourage brown and rainbow trout fishing opportunities on the Refuge in accordance with State seasons and regulations and Refuge management objectives. Fishing is closed during June and July to protect nesting waterfowl and other riparian nesting species.
   - Evaluate angler impacts to Refuge goals and objectives by 2008.
   - Work with the State to develop a sport fish step-down management plan by 2008.

2. **Objective**: Where possible, expand fishing opportunities throughout North Park and help promote fishing as a recreational activity.

   Strategies:
   - Provide fishing information and fishing regulations to Refuge visitors when requested.
   - Utilize the Service Partners for Fish and Wildlife Program to improve fishery habitats on public and private lands when requested.
   - When requested, assist the State with fisheries planning issues in North Park.
   - Assist the State with law enforcement, fishery management, fisheries sampling, fisheries habitat projects, and spawning throughout North Park when requested.
   - Partner with others to enhance fishery habitats in North Park.
   - Install and monitor Illinois River gauges on the upstream and downstream end of the Refuge to evaluate river flows.

   Rationale: The above objectives encourage the Refuge staff to not only provide sport fishing opportunities on the Illinois river, but also to partner with the State and others to improve fishery habitats and promote sport fishing opportunities throughout North Park. The Illinois River fishery is influenced by management actions that occur upstream of the Refuge. Logically, it is important that the Refuge assist, when requested, with habitat projects that impact the Illinois River upstream of the Refuge, and when deemed valuable to Refuge wildlife resources. Similarly, habitats throughout North Park are connected through a system of waterways. Refuge efforts to improve aquatic habitats, when requested, benefit all in North Park. The downside to this strategy involves using very limited personnel and resources on areas other than strictly Refuge grounds that may result in Refuge goals and objectives being delayed or not being met. Partnerships are the key to success when funds and personnel are limited. The Refuge strives to be included as a partner on fishery related habitat improvement projects in North Park.

Wildlife Observation and Photography

Public Use - Wildlife Observation and Photography

Public Use Goal: Through wildlife-dependent recreation and education, people of a range of abilities and interests are able to learn of and appreciate the natural resources of this unique high mountain park. Thereby, citizens become better stewards of nature in their own communities and stronger supporters of the Refuge specifically and the National Wildlife Refuge System generally.

1. **Objective:** Enhance opportunities for wildlife observation and photography based on Refuge habitat goals and objectives by 2017.

   Strategies:
   - Rebuild Brocker Overlook by 2004.
   - Construct multi-use trail from Walden to Brocker overlook by 2008.
   - Enhance auto tour route road.
   - Maintain Refuge Visitor Center for distribution of information.
   - Keep brochures current with updated information.
   - Complete and maintain boardwalk section of interpretive nature trail.
   - Build moose observation platform by 2005.
   - Construct wildlife photography blinds on the auto tour route by 2006.
   - Establish use limitations for wildlife observation and photography based on habitat goals and objectives.
   - Maintain and potentially modify existing facilities to reflect new management strategies.

   Rationale: Current visitation to the Refuge ranges from 7,000 to 9,000 visits (visit is defined as a person crossing the Refuge boundary). Many opportunities to enhance viewing and photography of wildlife while maintaining habitat goals are available. Each strategy should be designed to facilitate a quality experience for the visitor while fulfilling Refuge goals and objectives.

2. **Objective:** Assist with funding, construction, and program development to enhance wildlife photography and observation in North Park.

   Strategies:
   - Develop and disseminate information on the best wildlife observation and photography opportunities throughout North Park.
   - Partner with the CDOW plus others to construct and provide observation facilities for moose and other desirable species.
   - Pursue funding and partners to assist with the construction of viewing/photography blinds at various other locations in North Park.
   - Assist partners with revising the "Watching Wildlife in North Park" guide by 2006.
   - Create partnerships with other wildlife-oriented organizations and individuals.

   Rationale: Recreation plays a major role in the economy of North Park. Wildlife viewing and photography are key factors in the recreational opportunities available. Enhancing these uses will be beneficial to the economy as well as creating a better understanding of wildlife and its habitats.

Environmental Education/Interpretation

Public Use - Environmental Education / Interpretation

Public Use Goal: Through wildlife-dependent recreation and education, people of a range of abilities and interests are able to learn of and appreciate the natural resources of this unique high mountain park. Thereby, citizens become better stewards of nature in their own communities and stronger supporters of the Refuge specifically and National Wildlife Refuge System generally.

1. **Objective:** Work with partners, including the North Park School District, to provide opportunities and facilities to conduct five environmental education programs a year, based on Refuge habitat goals and objectives.

   Strategies:
   - Work with partners to develop specific environmental education programs covering:
     - ✓ habitat management practices and principles;
     - ✓ the natural history of North Park;
     - ✓ agricultural and wildlife;
     - ✓ the life history of various local species including waterfowl, sage grouse, elk, and moose;
     - ✓ North Park and its importance to Colorado waterfowl;
     - ✓ how a Refuge comes into existence and what its role is;
     - ✓ water issues and needs.
   - Use existing environmental education opportunities as they occur, such as the water carnival, bird banding, Refuge field trips, and Day in the Woods.
   - Create programs for students and volunteers to assist in management tasks for service learning.

2. **Objective:** Incorporate the Refuge and its niche in the North Park landscape in other environmental education messages developed in the county.

   Strategies:
   - Partner with other land management agencies, non-government organizations, local schools and private individuals to expand the network of environmental education programs and facilities in North Park.
   - Hire an outdoor recreation planner to conduct outreach and education activities on the Refuge and North park.

3. **Objective:** Update Refuge interpretive message to reflect recent wildlife issues and concerns (elk, sage grouse), habitat based decision-making, local agricultural uses and how they are not mutually exclusive on or off the Refuge.

   Strategies:
   - Replace signs on the kiosks, overlooks, trails and visitor center, and pamphlets, and update the Refuge website to reflect a message of the Refuge working for wildlife and county-wide environmental interests.
   - Rehabilitate the Case Barn and develop an interpretive site there presenting the relationship between the county's ranching history and wildlife.
   - Interpret prehistoric cultural resources of the Refuge in relation to natural resources found in North Park.

4. **Objective:** Incorporate the Refuge and its niche in the North Park landscape in other interpretive messages developed in the county.

   Strategy:
   - Partner with other entities in the development of interpretive material involving the land management of North Park to identify the role of the Refuge.

   Rationale: Arapaho National Wildlife Refuge is located almost in the geographic center of North Park. It is known to most residents as a major part of the county landscape, but exactly what the Refuge does and how it contributes to that landscape is not fully understood. Similarly, most out-of-county visitors do not understand how the lands surrounding the Refuge compliment its wildlife-oriented goals. An outdoor recreation planner position will facilitate integration of environmental education at the Refuge and in Jackson County schools. Articulating the story of history of North Park and how the Refuge and the surrounding lands benefit each other will be beneficial to all interests.

Other Uses

1. **Objective**: Compatible, non-wildlife-dependent uses will be allowed, but limited to less sensitive areas based on habitat goals and objectives.

   Strategies:
   - Eliminate walking leashed dogs, picnicking, horseback riding, and bicycling along roads.
   - Use law enforcement, signs, information, and brochures to minimize impacts of other non-wildlife-dependent public uses.
   - Prepare and implement a travel management plan to minimize vehicle impacts to Refuge habitats by 2006.

2. **Objective:** Consider non-wildlife-dependent public uses and their benefits to North Park and its residents.

   Strategies:
   - With Partners, design and construct the Case Barn interpretive loop by 2008. Incorporate North Park and Refuge history and the preservation of wildlife habitats as a theme in the interpretation.
   - Encourage partners to be sensitive to wildlife needs when developing recreational opportunities in North Park.
   - Continue to allow the Colorado Department of Transportation to plow snow windbreak along Highway 125, subject to a compatibility determination.

3. **Objective:** Allow compatible, non-wildlife-dependent uses that support the Refuge mission.

   Strategies:
   - Continue operation of the rifle range to facilitate law enforcement firearms requalification for Refuge officers, Colorado Division of Wildlife officers, and other local law enforcement agencies on request.
   - Identify and prioritize non-Refuge mineral rights within Refuge boundaries by January 2005.
   - Acquire, on a willing-seller basis, priority mineral rights by 2010.
   - Continue operation of the Allard gravel pit to support both Refuge and county roads (on-Refuge) requirements.

   Rationale: Compatible, non-wildlife-dependent uses should be limited to less sensitive areas based on habitat goals and objectives. The Refuge views mineral resource development as having negative impacts on wildlife habitat. Non-federally owned minerals within the Refuge boundary must be identified and purchased, on a willing-seller basis, to minimize future resource damage. The rifle range will continue to operate as it already facilitates Refuge and North Park law enforcement needs. The travel management plan must meet Refuge compatibility determination standards, facilitate management and public use requirements. The Allard gravel pit supports Refuge and county roads (on Refuge) and will remain active to support Refuge goals and objectives.

Cultural Resources

Cultural Resources Goal: *The cultural resources of the Refuge are preserved, protected, and interpreted for the benefit of present and future generations.*

1. **Objective**: Identify existing Refuge cultural resources and protect from degradation.

   Strategies:
   - Complete a cultural resources survey, as needed, for management purposes.
   - Determine National Register of Historic Places status for the Hampton, Allard, and Case Barns by 2003.
   - Protect cultural resources located on the Refuge by minimizing disturbance in sensitive areas.
   - When possible, preserve historical records by conducting oral interviews with local residents.
   - Apply for monies (grants, maintenance management funds, etc.) to restore and preserve the Case Barn by 2007.
   - Support provisions within the Archaeological Resources Protection Act by developing a plan for managing Refuge archaeological resources.

2. **Objective**: Encourage interpretation and protection of cultural resources and their importance to North Park wildlife resources.

   Strategies:
   - Interpret the Case Barn by extending the tour route to include the barn. Develop an interpretive area adjacent to the Case Barn that discusses its regional significance by 2007. Consider adaptive re-use of the Case Barn in fulfilling the mission of the Refuge.
   - Determine historic status of Hampton Barn; make decision to keep or eliminate barn by 2005.
   - Interpret history of North Park at the Brocker overlook site by 2004.
   - By 2004, develop an interpretive area within the headquarters building that demonstrates connectivity of the Refuge with the remainder of North Park.
   - When requested, and dependent on available funding, partner with other individuals and agencies to protect and preserve cultural resources that relate to wildlife throughout North Park.

   Rationale: A broader cultural resource role needs to be described for the Refuge. The philosophy is to comply with existing cultural resource related laws and policies and to protect Refuge cultural resources from degradation. Additionally, protection and interpretation of cultural resources that relate to North Park wildlife is encouraged. Interpreting the role of ranches in the preservation of habitat can serve as an example for visitors to learn and gain a greater appreciation for wildlife and their habitats.

Research

Research Goal: *The Refuge is a learning platform for compatible research that assists management and science of high mountain park sage-steppe communities.*

1. **Objective**: Identify and promote the biological research needed to help achieve the Refuge's habitat goals and objectives.

   Strategies:
   - Identify and prioritize habitat management research needs by 2004.
   - Conduct in-house research on priority needs.
   - Promote the Refuge research needs within the scientific community. Encourage research that focuses directly on the Refuge's habitat management goals.

2. **Objective**: Identify and promote non-biological research as it relates and contributes to achieving habitat goals and objectives on the Refuge and within North Park.

   Strategies:
   - Identify and prioritize research related to Refuge and North Park wildlife in other disciplines needs by 2004.
   - Encourage research in non-biological disciplines that facilitates the Refuge and achieve goals and objectives.
   - Allow and encourage research that focuses on natural resource management goals throughout North Park.

   Rationale: These objectives and strategies focus on identifying and implementing the biological research needs of the Refuge and North Park. Research will focus on achieving the habitat goals and objectives outlined in this Plan. Identified research needs can then be promoted within the scientific community and actively encouraged by Refuge staff. Proposed research, not falling within the categories identified, would generally not be allowed. Conversely, research meeting identified Refuge needs could be supported with funding, lodging, equipment sharing, etc. Disturbance to resident wildlife and habitat is the primary concern. Limiting non-Refuge identified projects will minimize unnecessary disturbance and habitat damage.

Partnerships

Partnerships Goals: *A wide range of partners join with the Fish and Wildlife Service in promoting and implementing the Refuge vision.*

Partnerships

1. **Objective**: The Refuge will participate in partnerships that promote sound wildlife management.

   Strategies:
   - Engage in partnerships that result in wildlife and/or land-health improvements.
   - Participate in Habitat Partnership Program, Owl Mountain Partnership, Sage Grouse Working Group, Colorado Wetlands Initiative, Platte/Kansas Rivers Ecosystem team, and others to protect, enhance, or restore wildlife habitats.
   - Work with partners to achieve the Refuge goals and objectives.
   - Work with the Colorado Historical Society and other partners to restore / rehabilitate the Case Barn Interpretive Site.
   - Develop a conservation easement on Pole Mountain property.
   - Work with Colorado Land Trust and others to help acquire lands and mineral rights within the Refuge's approved boundaries. Minerals extraction may cause habitat disturbance within the Refuge.

2. **Objective**: Maintain or form partnerships to achieve the wildlife related goals and objectives on the Refuge and within North Park.

   Strategies:
   - Promote new partnerships (consider partnering with Ducks Unlimited, Trout Unlimited, Safari Club International, Audubon, Sierra Club, and others) to assist with achieving the Refuge and North Park natural resource goals.
   - Strive to develop a Refuge Friends group over the next 15 years.
   - Establish a full-time Private Lands Coordinator position to be stationed at the Refuge to assist in wildlife habitat enhancement throughout North Park.

   Rationale: These objectives and strategies describe the potential level of partnership activity that will improve wildlife habitats throughout North Park. The Refuge staff will form partnerships to promote sound wildlife management within and outside the Refuge. The Refuge will actively participate in partnerships that result in improvements to land health and provide appropriate wildlife habitat in North Park. The Refuge will collaborate with partners on management of critical wildlife habitats in North Park. The private lands position will enable the Service to contribute its biological expertise and resources to private and public landowners when requested.

Implementation and Monitoring

Funding and Personnel

Current staffing at the Refuge consists of six permanent and four seasonal employees. Additional permanent and seasonal staff will be required to implement the strategies in the CCP and effectively monitor the flora and fauna to determine if the goals and objectives in the Plan are being met.

At this time, the Refuge has an annual base budget of $381,700, based on fiscal year 2002 figures (fiscal year 2003 figures were not available due to continuing resolution) to maintain salaries for six permanent personnel and annual operating expenses for the Refuge Complex. The current budget represents the minimum needed to maintain current annual activities and does not adequately support Complex habitat management, biological monitoring, maintenance, public use, and education programs, and all Complex facilities and structures.

Table 5 shows the current staff and the proposed additional staff required to fully implement the CCP. If all positions are funded, the Refuge Complex staff will be able to carry out all aspects of this Plan. This would provide maximum benefits to wildlife, maximum efficiency, improve facilities and provide for increased public use. Projects that have adequate funding and staffing will receive priority for accomplishment. Staffing and funding are requested for the 15-year period of the Plan.

Table 5. Current and Proposed Staff

	Current	Proposed
Management Staff	Project Leader, GS-12 Refuge Operations Specialist, GS-11	Complex Project Leader, GS-13 Supervisory Refuge Operations Specialist, GS-12 Refuge Operations Specialist, GS-9/11* Private Lands Refuge Operations Specialist, GS-9/11
Biological Staff	Wildlife Biologist, GS-9/11 Career Seasonal Wildlife Biological Technician, GS-6 Seasonal Biological Technicians, GS-4 to GS-5 (3-4)	Complex Wildlife Biologist, GS-11 Wildlife Biologist, GS-9* Career Seasonal Wildlife Biological Technician, GS-6 Seasonal Biological Technicians, GS-3 to GS-5 (4-5)* GIS Coordinator/Data Manager, GS-9/11*
Public Use Staff		Outdoor Recreation Planner, GS-9/11*
Administrative Staff	Administrative Assistant, GS-8	Administrative Officer, GS-9* Administrative Assistant, GS-5/6*
Maintenance Staff	Equipment Operator, WG-8	Equipment Operator, WG-10 Career Seasonal Maintenance Worker, WG-8 (Irrigator) Career Seasonal Maintenance Worker, WG-8*

*Shared with other stations in Wyoming under Arapaho's Complex Management

Economic Impact Analysis

For Refuge CCP planning, an economic impact analysis describes how current (No Action Alternative) and proposed management activities (Alternatives B, C, and D) affect the local economy. This type of analysis provides two critical pieces of information: 1) it illustrates a refuge's true value to the local community; and 2) it can help in determining whether local economic effects are or are not a real concern in choosing among management alternatives. Economic impacts are typically measured in terms of number of jobs lost or gained, and the associated result on income. Economic input-output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. The economic impacts of the management alternatives for Arapaho NWR were estimated using IMPLAN, a regional input-output modeling system developed by the USDA Forest Service.

The Refuge management activities of economic concern in this analysis are Refuge personnel staffing and Refuge spending within the local community, livestock grazing activities on the Refuge, and spending in the local community by Refuge visitors. The detailed report is provided in Appendix G. Table 6 summarizes the direct and total economic impacts for all Refuge management activities by management alternative.

Current Refuge staffing and budgeting (Alternative A) generates 11.3 jobs and $398,839 in personal income in Jackson County and accounts for 1 percent of total employment in Jackson County. Due to increased staffing levels, Alternatives B, C, and D would generate more jobs and income than Alternative A.

Total annual revenue of $484,779 is associated with permittees that use the Refuge as part of their grazing operation. This accounts for an estimated 3.4 jobs and $67,780 in labor income in the Range Fed Cattle Industry and a total of 6.9 jobs (0.61 percent of total county employment) and $131,959 in labor income throughout the Jackson County economy. It is important to note that the permittees use the Refuge as part of their overall grazing operation, the economic values presented in this analysis represent the value of the overall operation not just the value of grazing on the Refuge. For reduced Refuge grazing below the levels identified in Alternative A, the key issue is to identify how permittees will respond to being able to graze fewer head on the Refuge. Several options are available including transferring to private land, purchasing additional hay, or reducing the number of animals in their operation. Because it is not known how each permittee will respond, this analysis encompassed the best (transferring to private land) and worst (cut in permittee operations by the associated reduction in Refuge AUMs) case scenarios to frame the possible impact range. For alternatives B, C, and D, the anticipated reduction in AUMs is 10 percent to 64 percent, the 64 percent reduction impacts are reported in Table 6 as one end of the impact range to represent the absolute worst case scenario. Total annual revenue associated with the worst case scenario is $174,566. The sales associated with a 64 percent reduction from the current level would result in a decrease of 2.2 jobs and $43,373 in labor income in the Range Fed Cattle Industry and would decrease countywide employment by 4.4 jobs (-0.39 percent of total county employment) and labor income by $84,441. The other end of the impact range reported in Table 6 represents the best case scenario of transferring head to private land. Because no economic impacts are expected, the economic impacts for the best case scenario are the same as Alternative A. Which scenario (transfer to private land or cut production) a permittee chooses will depend on their level of dependence on the Refuge for their overall operation and the actual reduction in Refuge AUMs.

Current Refuge visitors spend about $160,500 annually in the Jackson County economy which directly generates $29,918 in personal income and 2.1 jobs for local businesses accommodating visitors (hotels, restaurants, supply stores, and gas stations) and generates a total of $39,308 in personal income and 2.5 jobs (0.2 percent of total county employment) throughout the local economy. At this time no significant change is expected in current visitation levels for Alternatives B, C, and D. Therefore, the economic impacts reported in Table 6 are the same across all alternatives.

Under current Refuge management (Alternative A), total economic activity directly related to all Refuge operations generate an estimated 14.7 jobs and $458,634 in Jackson County. Including direct, indirect, and induced effects, all Refuge activities account for 20.7 jobs (1.8 percent of total county employment) and $570,106 in personal income in Jackson County. Due to the increased staffing levels for Alternatives B, C, and D, the associated economic effects generate more jobs and income than Alternative A.

Table 6. Summary of all Refuge Management Activities by Alternative

	Alternative			
Jackson County	**A**	**B**	**C**	**D**
Total Refuge Staffing and Budgeting Impacts				
Direct Effects				
Income ($/year)	$360,936	$736,625	$643,864	$736,625
Jobs	9.2	18.2	16.1	18.2
Total Effects				
Income ($/year)	$398,839	$811,883	$710,274	$811,883
Jobs	11.3	22.4	19.8	22.4
Refuge Grazing Activities				
Direct Effects		*Range from a 64% reduction in AUMs (option 2) to no impact expected (Option 1)*		
Income ($/year)	$67,780	$24,407 to $67,780	$24,407 to $67,780	$24,407 to $67,780
Jobs	3.4	1.2 to 3.4	1.2 to 3.4	1.2 to 3.4
Total Effects				
Income ($/year)	$131,959	$47,518 to $131,959	$47,518 to $131,959	$47,518 to $131,959
Jobs	6.9	2.5 to 6.9	2.5 to 6.9	2.5 to 6.9
Recreation Activities				
Direct Effects		*No change in visitation expected across alternatives*		
Income ($/year)	$29,918	$29,918	$29,918	$29,918
Jobs	2.1	2.1	2.1	2.1
Total Effects				
Income ($/year)	$39,308	$39,308	$39,308	$39,308
Jobs	2.5	2.5	2.5	2.5
Aggregate Impacts				
Direct Effects				
Income ($/year)	$458,634	$790,950 to $834,323	$698,189 to $741,562	$790,950 to $834,323
Jobs	14.7	21.5 to 23.7	19.4 to 21.6	21.5 to 23.7
Total Effects				
Income ($/year)	$570,106	$898,709 to $983,150	$797,100 to $881,541	$898,709 to $983,150
Jobs	20.7	27.4 to 31.8	24.8 to 29.2	27.4 to 31.8
% of Total County Employment	*1.8%*	*2.4% to 2.8%*	*2.2% to 2.6%*	*2.4% to 2.8%*

Funding Needed to Implement This Plan

Projects required to implement the Arapaho CCP are listed in Appendices D and E. These Appendices shows the funding needed to implement the CCP through two different systems. The first system is the Refuge Operations Needs System (RONS). This documents requests to Congress for funding and staffing needed to carry out projects above the existing base budget. Amounts shown include a start-up cost of implementing each program with actual yearly costs that are significantly less. The other system is the Maintenance Management System (MMS) which documents the equipment, buildings, and other existing property that require repair or replacement. All of the current RONS projects directly support the implementation of the CCP. Below is a summary of funding needed to fully implement the CCP based on the RONS Projects in Appendix D.

		Recurring
	First Year	**Annual Need**
Personnel/Staffing	$792,000	$430,000
Facilities	$541,000	$ 000
Habitat Projects	$192,000	$ 36,000
Research/Studies	$383,000	$ 10,000

Other funding needs include the maintenance or replacement of existing equipment and facilities. In the past, the Complex has had a large backlog of these funding needs. However, in recent years, much of the funding has been provided to eliminate a large number of the backlog projects. Below is a list of remaining needs required to implement the CCP and maintain the structures and equipment to a safe and productive standard for the 15 years of the Plan.

Water Control Structures and Dikes	$146,000
Road, Gates, and Fences	$2,341,000
Buildings and Facilities	$516,000
Public Use Facilities	$276,000
Equipment	$531,000
Vehicles	$60,000

A list of the top 18 prioritized items are located in the MMS list in Appendix E. The remaining MMS projects do not directly impact the CCP implementation and were not included in this Plan. These were generally projects that were required to be included in MMS, such as equipment / vehicle replacement, etc., for an additional $1,964,000 in funding.

Step-Down Management Plans

Service managers have traditionally used the Refuge Manual to guide field station management actions. The policy direction given through the manual has provided direction for developing a wide variety of plans which are used to prepare annual work schedules, budgets, public use, and land management actions. The CCP is intended as a broad umbrella plan which provides general concepts and specific wildlife, habitat, endangered species, public use and partnership objectives, and examples of strategies that might be used to complete the objectives. The purpose of step-down management plans is to provide greater detail to managers and employees who will implement the strategies described in the CCP.

Under the guidance provided within the CCP, the Refuge staff will revise or develop several step-down management plans to be implemented over the next 15 years. Step-down management plans to be revised or developed include:

- Habitat Management Plan
- Public Use Plan
- Fisheries Management Plan
- Illinois River Rehabilitation Plan
- Integrated Pest Management Plan
- Archaeological Resources Protection Plan
- Hunting Management Plan
- Water Management Plan
- Fire Management Plan
- Habitat Monitoring Plan
- Wildlife Monitoring Plan
- Station Safety Plan

Partnership Opportunities

Partnerships are an integral part of the existing Refuge management and are viewed as the key to successful management in the future. The staff recognize that the Refuge is not an ecosystem, rather it represents merely an island of wildlife habitat. The Refuge is dependent on wildlife and habitats provided by other land managers throughout North Park and throughout the Central Flyway. “The Refuge is not sustainable alone, in fact it is dependent on other habitats and lands that surround it to be functional, and by itself may serve little wildlife value” (quote, Dr. Richard Knight). The CCP strives to recognize this connection to, and dependance on, other lands. Past and current agricultural practices have provided benefits for wildlife in North Park. The livelihood of ranchers largely has been dependent on maintaining a healthy plant community. As a result, many plant and wildlife species have benefitted from these practices. Further, ranching has impeded urban development which adversely impacts natural communities. Ranchers are one of the land stewards that have protected and preserved wildlife habitats for the past 125 years. We believe sustainable ranching is one key to continued protection of North Park natural resources.

The message for new and existing partners is “we need you.” The Refuge will cooperate and partner with other land managers in North Park to improve wildlife habitats. The Refuge has identified a new Private Lands Coordinator position within the CCP to facilitate partnering. The CCP recommends that short-term variations in management be considered to accommodate other wildlife related projects within North Park. For example, the Refuge would consider allowing additional grazing AUMs to accommodate a 2-year rest following Dixie harrow treatment on adjacent BLM lands. The down-side to this approach is that the Refuge will achieve its habitat objects at a slower pace because resources are diverted away from Refuge lands. However, the benefits of combining Refuge resources with other land managers will result in improved land health for North Park and the Refuge. Additionally, the Plan will encourage other partners to come join Refuge habitat improvement efforts. Through partnering, we envision the Refuge serving as a demonstration site for sound land management practices.

Monitoring and Evaluation

Monitoring is essential to successful implementation of the CCP. The new habitat-based goals and objectives will change the past monitoring practices at the Refuge. Vegetative community function and structure will drive the management actions of the Refuge. Adaptive management will be used to incorporate new information into existing monitoring techniques. Periodic evaluations of vegetation community progress will be used to direct future management strategies.

Refuge goals, objectives, and strategies have been identified within the CCP. Monitoring strategies have also been evaluated and are included within this Plan. Required step-down management plans have been identified. Step-down management plans will further refine monitoring, methods, techniques, and locations. Additionally, the step-down plan will identify how, when, and who will conduct the monitoring.

All habitat management activities will be monitored to assess whether the desired effect of wildlife and habitat components has been achieved. Baseline surveys will continue for waterfowl, big game, and small game species. Baseline surveys will also be conducted for wildlife species for which existing or historical numbers and occurrence is not well known. It is also important to conduct studies to monitor wildlife responses to increased public use (multi-use trail, moose overlook) to assess impacts of these activities on Refuge wildlife.

Refuge habitat monitoring methods and frequency are currently being developed cooperatively with wildlife researchers within the U.S. Geological Survey. Evaluation of those methods will occur periodically, and the Refuge will consult with U.S. Geological Survey, Universities, and other professionals to ensure proper data collection and analysis.

Wildlife research will be encouraged at the Refuge. The Refuge staff will actively pursue research opportunities, especially those that advance, or answer questions, related to Refuge management. Research that enhances monitoring (techniques or data analysis) on the Refuge will also be encouraged. Refuge staff will work with researchers to ensure that the studies are applicable and compatible with Refuge objectives. Research that does not relate to Refuge goals and objectives will be discouraged.

This CCP is designed to be effective for a 15-year period. Periodic reviews (5 year minium) of the CCP will ensure established goals and objectives are being met. Monitoring and evaluation will be an important part of this process.

Plan Amendment and Revision

The CCP will guide management on the Refuge for the next 15 years. CCPs are signed by the Regional Director, Mountain-Prairie Region 6, thus providing the regional direction to the station project leader. A project leader at the station will review the CCP every 5 years to determine if it needs revision. In the case of severe circumstances, the project leader has the authority to modify management actions to respond appropriately. The Plan will be revised no later than 2018.

Comprehensive Conservation Plan Preparers

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The Draft CCP and Environmental Assessment were written by Refuge staff and the Refuge planner with input from the above mentioned individuals. The documents were reviewed by Refuge Staff, Regional offices, other Service offices, U.S. Geological Survey, the Colorado Division of Wildlife, and the Bureau of Land Management. The Refuge staff recognizes and appreciates all input received from the individuals noted in the acknowledgments section and the input derived from public scoping meetings.