

Chapter 2—The Refuge



Ann Hough / FWS

Trumpeter Swans

This chapter explains the establishment, management history, purposes, and special values of the National Elk Refuge in northwestern Wyoming along with the proposed vision and goals and a discussion of the planning issues.

established in 1912 as a “winter game (elk) reserve,” but over the years, its purpose has been broadened to include “refuges and breeding grounds for birds, other big game animals, the conservation of fish and wildlife, and the protection of natural resources and conservation of threatened or endangered species.”

2.1 Establishment, Acquisition, and Management History

The following section describes the refuge’s establishment, acquisition, and management history.

Establishment

The National Elk Refuge is one of the oldest refuges in the Refuge System (see figure 5). It was

Acquisition History

When the U.S. Congress appropriated \$20,000 on March 4, 1911, for “feeding, protecting and removing elk from the Jackson Hole and vicinity,” it also assigned E.A. Preble, scientist for the Bureau of Biological Survey, the task of making a preliminary investigation of the Jackson Hole elk situation. Preble was assisted by D.C. Nowlin (who became the first refuge manager) in assessing the Jackson elk herd and its needs.

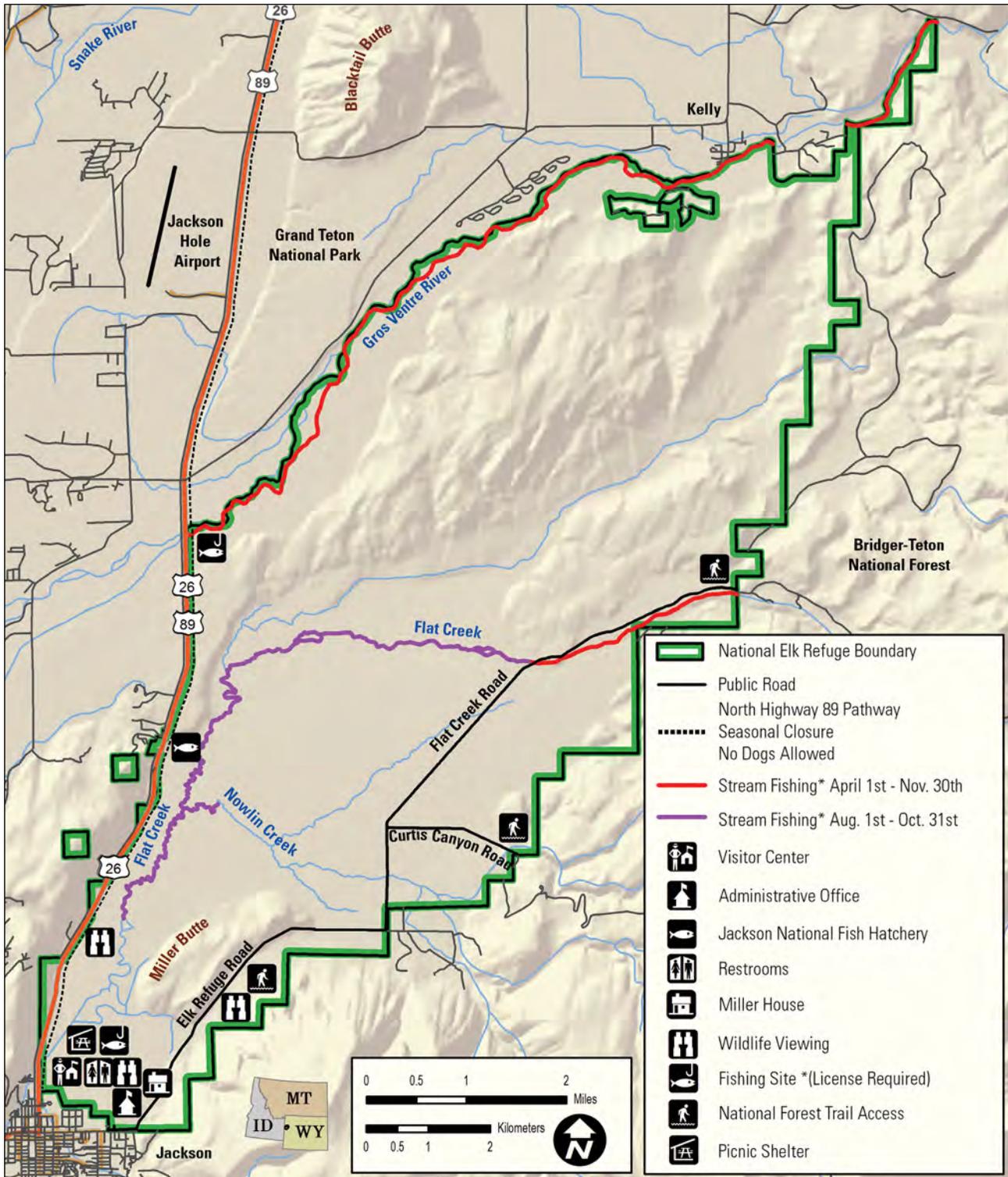


Figure 5. Base map of the National Elk Refuge, Wyoming.

Preble and Nowlin conducted an evaluation of that part of the Snake River Valley known as Jackson Hole, which extends from Jackson Lake on the north to the mouth of the Hoback River on the south. They also evaluated the Buffalo River and Gros Ventre River valleys. Preble and Nowlin's population estimate was 20,000 elk with an estimated winter mortality of 2,000–2,500. Preble concluded his report with the statement, "The Biological Survey looks on the establishment of one or more winter refuges as the best solution of the problem of properly caring for the elk in winter." He recommended winter elk refuges either in the Gros Ventre River valley or in the Snake River Valley near the town of Jackson. Residents in Jackson strongly opposed the Gros Ventre River valley site but generally supported a location near their town.

On August 10, 1912, the U.S. Congress appropriated \$45,000 to buy lands and pay for maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first tract for the National Elk Refuge was bought in 1914. Since that time, we have acquired land primarily through purchase with a few tracts obtained through exchange, donation, or condemnation. Several noteworthy acquisitions have occurred. In 1927, the Isaac Walton League of America donated 1,757 acres, which increased the size of the refuge at that time by 30 percent. The top-priority acquisition listed in our 1965 refuge master plan was an 80-acre tract that occupied a 2.75-mile-long area along the eastern side of State Highway 89. We acquired this tract to prevent any commercial or residential development next to the refuge that would "block and disfigure" the "breathtaking view of the land."

By 1950, the refuge had expanded in size to 23,001 acres. More acquisitions occurred in 1978 and 1986 to

prevent the completion of the adjacent Teton Highlands and Teton Ranch subdivisions. Land values in Teton County, especially next to the refuge, began to skyrocket in the 1990s and reached multiple millions of dollars per acre by 2007. These exorbitant land values have prevented all fee-title land acquisition since 1992. Today, the refuge has completely filled its approved acquisition boundary and is 24,778 acres in size. Table 2 summarizes the history of land acquisition for the refuge, and figure 6 shows locations of the land tracts. The refuge is bounded by the town of Jackson on the south, the Gros Ventre River on the north, Highway 89 on the west, and the Bridger-Teton National Forest on the east. Because much of the refuge was comprised from homesteads, areas of the refuge have retained some of these historical names, as shown on figure 7.

Management History

The National Elk Refuge was established in response to severe elk starvation in Jackson Hole. The development of the town of Jackson and settlement of the valley by cattle ranchers substantially reduced historical elk winter range and led to massive elk starvation during the winters of 1909 and 1910. At the request of the State of Wyoming, the U.S. Congress first appropriated \$20,000 on March 4, 1911, for "feeding, protecting and removing elk in Jackson Hole and vicinity."

Feeding hay to elk wintering in Jackson Hole was one of the first management activities to occur on what is now the National Elk Refuge. No-feeding years have occurred irregularly and infrequently.

Table 2. Land acquisition history for the National Elk Refuge, Wyoming.

<i>Date of acquisition</i>	<i>Tract number</i>	<i>Final acres</i>	<i>Means of acquisition</i>
3/16/1914	9e, 9f, 9g	1,205.25	Purchase
4/21/1915	1	4,322.27	Primary withdrawal
10/18/1915	121	360	Purchase
10/22/1915	118	160	Purchase
9/26/1927	119, 119a	1,757.38	Donation
7/20/1936	59	240	Purchase
7/21/1936	39	802.74	Purchase
7/23/1936	52	140	Purchase
7/23/1936	68	796	Purchase
7/23/1936	30, 30-I	470.13	Purchase
7/30/1936	7	279.82	Purchase
7/30/1936	58	240	Purchase
7/30/1936	61	160	Purchase

Table 2. Land acquisition history for the National Elk Refuge, Wyoming.

<i>Date of acquisition</i>	<i>Tract number</i>	<i>Final acres</i>	<i>Means of acquisition</i>
10/31/1936	54	320	Purchase
10/31/1936	117	320	Purchase
11/7/1936	56	320	Purchase
1/14/1937	24	237.36	Purchase
4/2/1937	9, 9a, 9b, 9c, 9d	1,471.03	Purchase
4/13/1937	27, a, a-1, a-2, b, c, e	825.97	Purchase
4/28/1937	22	400	Purchase
5/11/1937	25	438.56	Purchase
5/12/1937	44	143.3	Purchase
5/17/1937	72	320	Purchase
5/17/1937	116	160	Purchase
5/17/1937	53, 53a, 53b	800	Purchase
5/24/1937	8	320	Purchase
5/24/1937	40	120.12	Purchase
6/7/1937	58a	160	Purchase
6/8/1937	28	640	Purchase
7/9/1937	34	160	Purchase
12/27/1937	8a	678.64	Condemnation
12/27/1937	113	160	Condemnation
1/5/1938	11	626.12	Purchase
6/9/1938	120	0.98	Purchase
7/25/1938	36	80	Purchase
11/3/1938	55	230	Purchase
11/21/1939	31, 31a, 31c	42.38	Donation
6/11/1940	2	320	Purchase
11/15/1941	51	220	Purchase
12/16/1949	206, 206a	2,712.97	Donation
2/6/1959	42	160	Land exchange
3/17/1965	122a	460	Land exchange
2/7/1972	123	80.12	Purchase
12/20/1974	124, 124a	111.51	Purchase
8/26/1975	124b	26.07	Purchase
4/18/1977	132	10.31	Purchase
11/16/1978	137	11.78	Purchase
12/14/1978	133, a, b, c, d	245.17	Purchase
9/6/1979	143	16.97	Purchase
7/21/1980	128	5.18	Purchase
2/8/1986	131	5.01	Purchase
3/28/1986	122b	354.26	Primary withdrawal
5/2/1986	154	41.03	Purchase
10/1/1986	130	5	Purchase
10/22/1986	125	50	Purchase
8/5/1991	155	20	Purchase
9/2/1992	124c	10	Purchase
10/1/1992	156	3.87	Purchase

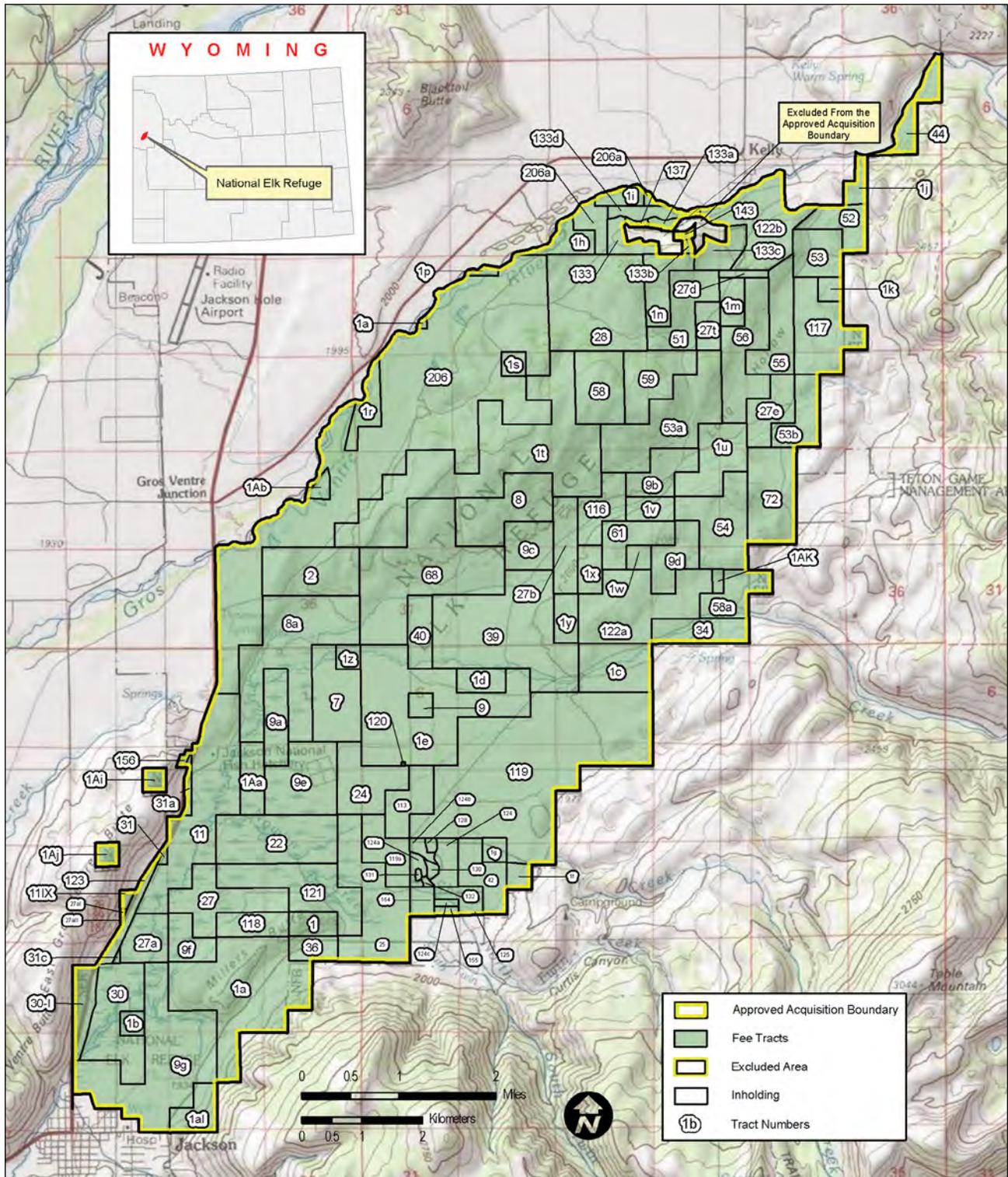


Figure 6. Map of land tracts composing the National Elk Refuge, Wyoming.

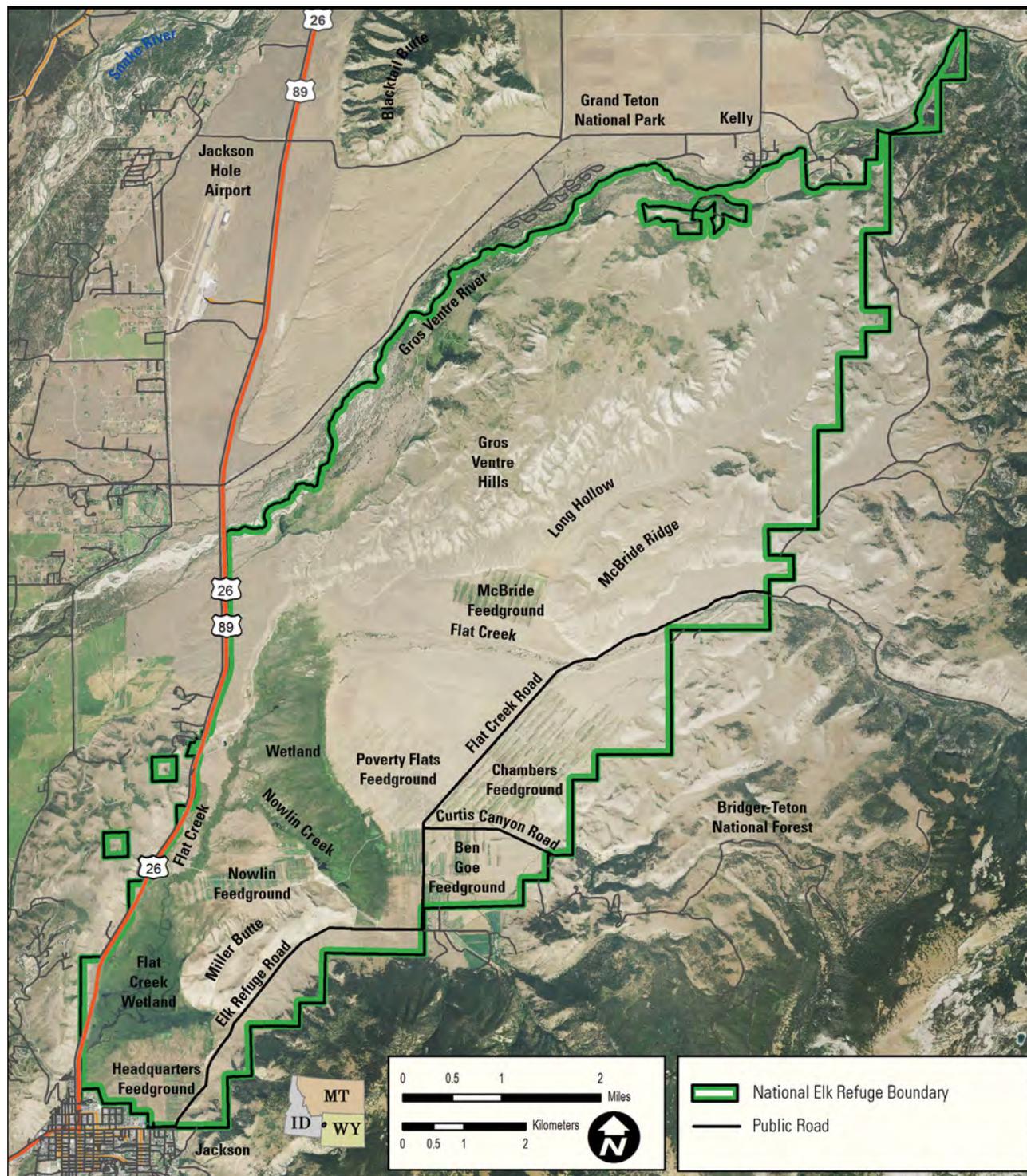


Figure 7. Map of areas and feedgrounds on the National Elk Refuge, Wyoming.

Since the refuge was established in 1912, there have been 9 years when no feeding was provided. The last such winter was in 1980–81. The length of the supplemental winter feeding program has ranged from no feeding to a maximum of 147 days; elk are fed an average of 70 days annually. We have fed hay to elk during at least a part of most winters from 1912 to 1975. In 1975, after several years of testing, we made a switch to alfalfa pellets (Smith and Robbins 1984).

Hunting is the primary management tool used to control the size of the Jackson elk herd. The first hunting season on the National Elk Refuge was in 1943, but hunting did not become an annual event until 1955.

Members and descendants of a small display herd of bison that escaped from Grand Teton National Park in the late 1960s discovered the refuge's winter supplemental feeding program in 1980. This source of winter nutrition enabled the bison herd size to increase almost exponentially to 1,250 animals by the fall of 2007. To reduce herd size to objective levels in the Bison and Elk Management Plan, bison hunting became an annual activity on the refuge in 2007 and has been the primary tool used to control the size of the Jackson bison herd.

2.2 Purposes

Every national wildlife refuge has a purpose for which it was established. The purpose is the foundation on which to build all refuge programs—from biology and public use to maintenance and facilities. No action that we or the public undertake may conflict with this purpose. The refuge purposes are found in the legislative acts or executive actions that provide the authorities to either transfer or acquire a piece of land for a refuge. Over time, an individual refuge may contain lands that have been acquired under various transfer and acquisition authorities, giving the refuge more than one purpose.

The goals, objectives, and strategies proposed in the draft CCP (refer to chapter 6) are intended to support the individual purposes for which the National Elk Refuge was established:

- The National Elk Refuge was established in 1912 as a “winter game (elk) reserve” (37 Stat. 293, 16 United States Code [U.S.C.] 673).
- In 1913, the U.S. Congress designated the area “a winter elk refuge” (37 Stat. 847).

- In 1921, all lands included in the refuge or that might be added in the future were reserved and set apart as “refuges and breeding grounds for birds” (Executive Order 3596), which was affirmed in 1922 (Executive Order 3741).
- In 1927, the refuge was expanded to provide “for the grazing of, and as a refuge for, American elk and other big game animals” (44 Stat. 1246, 16 U.S.C. 673a).

These purposes apply to all or most of the lands now within the refuge. Several parcels have been added to the refuge specifically for the conservation of fish and wildlife (Fish and Wildlife Act of 1956), opportunities for recreational development oriented to fish and wildlife, the protection of natural resources, and the conservation of threatened or endangered species (Refuge Recreation Act of 1962, 16 U.S.C. 460k–l).

2.3 Vision

A vision is a concept, including desired conditions for the future, that describes the essence of what we are trying to accomplish at a refuge. The following vision for the National Elk Refuge is a future-oriented statement designed to be achieved through refuge management throughout the life of the CCP and beyond:

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.

A goal is a descriptive, broad statement of desired future conditions that conveys a purpose but does not define measurable units. The goals direct efforts toward achieving the vision and purposes of the refuge and outline approaches for managing refuge resources. We developed five goals for the refuge based on the Improvement Act, the purposes of the refuge, and information developed during planning.

Habitat and Wildlife Management Goal

Adaptively manage bison, elk, and other wildlife populations and habitats as outlined in the Bison and Elk Management Plan. Contribute to the conservation of healthy native wildlife populations and their habitats. Restore and sustain a native fishery that provides quality fishing opportunities.

Cultural Resources Goal

Preserve and interpret cultural resources in a way that allows visitors to connect to the area's rich history and conservation heritage.

Visitor Services Goal

Enable a diverse audience to understand and appreciate the refuge's wildlife conservation role in Jackson Hole, while safely enjoying year-round opportunities for wildlife-dependent recreation.

Visitor and Employee Safety and Resource Protection Goal

Provide for the safety, security, and protection of visitors, employees, natural and cultural resources, and facilities throughout the refuge.

Administration Goal

Provide facilities and effectively use and develop staff resources, funding, partnerships, and volunteer

opportunities to maintain the long-term integrity of habitats and wildlife resources of the refuge.

2.5 Special Values

Early in the planning process, our planning team and the public identified the outstanding qualities or special values of the National Elk Refuge. These special values are characteristics and features of the refuge that make it special to the public, valuable for wildlife, and worthy of refuge status. It was important to identify and describe the special values of the refuge to recognize its worth and to make sure they are conserved, protected, and enhanced through the planning process. These special values can be unique biological resources as well as something as simple as a quiet place to see a variety of birds and enjoy nature.

Intact Ecosystem

The refuge lies in a nearly intact ecosystem. The Greater Yellowstone Ecosystem is one of the last remaining nearly intact ecosystems in the northern temperate zone. As human population pressure and development degrade natural systems worldwide, large nearly intact areas such as the Greater Yellowstone Ecosystem sustain some of the last remaining populations of large carnivores, support some of the longest ungulate migrations in North America, and contain some of the largest areas of undeveloped wilderness in the lower 48 States. A contiguous system of national park, national wildlife refuge, and national forest lands has conserved the relative integrity of the Greater Yellowstone Ecosystem.

High Scenic Quality

The National Elk Refuge is considered one of the "crown jewels" of the Refuge System because of its spectacular scenery, closeness to two iconic national parks (Grand Teton and Yellowstone), and large charismatic populations of seasonal wildlife—especially elk and bison—that people want to stop and watch.

The refuge, along with vast expanses of undeveloped national forest and national park land surrounding the refuge, offers spectacular scenic views of the Teton and Gros Ventre Ranges, the Sleeping Indian (Sheep Mountain), Jackson Peak, Cache Peak, Snow King Mountain, East Gros Ventre Butte, and the



Lori Iverson / FWS

Tagging elk is a regular and necessary activity.

Gros Ventre Hills in the northern part of the refuge. The refuge's location along a heavily traveled highway leading to and from the Grand Teton and Yellowstone National Parks and its vast expanses of scenic open space are integral to the visual experiences of visitors. The visual appearance of a landscape is often the first thing to which a viewer responds. The most prominent view of the refuge, which is seen by several million visitors annually as they drive to and from Jackson on U.S. Highway 26/89, is the expansive Flat Creek wetland.

Undeveloped Habitat

“Habitat” is a species-specific concept that refers to the resources necessary to sustain populations of a given species or communities of species. Each wildlife organism has particular space, food, water, and thermoregulation needs that influence whether that species can exist in an area, and these requirements define the habitat of that species.

The National Elk Refuge represents one of the last undeveloped low-elevation areas in Jackson Hole. The refuge provides important habitat for species that depend on limited snow cover, open grasslands, sagebrush shrublands, or wetlands. Important refuge

habitats include (1) winter range for elk, bison, moose, and bighorn sheep; (2) breeding habitat for grassland birds such as long-billed curlew; (3) wintering and breeding habitat for greater sage-grouse; and (4) wetland habitat for trumpeter swans, amphibians, and cutthroat trout.

Quality Water Resources

The Gros Ventre River drains approximately 600 square miles of eastern Jackson Hole and the adjacent Gros Ventre Range to the east. The river is the largest watercourse on the refuge and is among the river segments designated as wild and scenic by the Craig Thomas Snake Headwaters Legacy Act of 2008.

The refuge experiences a relatively natural, annual hydro-regime (waterflows occur without substantial human-constructed controls or alterations), which promotes healthy aquatic ecosystem processes, supports robust populations of aquatic invertebrates (animals without a backbone), and sustains native Snake River cutthroat trout populations. The diversion of irrigation water from the Gros Ventre River into Flat Creek is sustaining higher than normal summer flows and is not a “natural, annual hydro-regime.” The Gros Ventre River irrigation diversion is conveyed through a ditch dug across the glacial moraine complex separating the river from Flat Creek. The lowermost portion of this ditch failed catastrophically in 1932, producing a massive erosion event in the moraine material. A deep gully developed, which delivered a large amount of sediment to the valley floor and directly to Flat Creek.

Water-level contours show that ground water from higher elevations flows to the southwest through the valley toward the Snake River. Data for the valley aquifer (permeable rock storing underground water) indicate excellent water quality, supporting use for drinking water supplies, recreation, and other commercial uses.

Variety and Abundance of Wildlife

The National Elk Refuge harbors a wide variety of wildlife. Unlike most national wildlife refuges, it is the abundance of big game animals, including the refuge's namesake, rather than birds that makes the refuge biologically unique. The refuge habitat is critical to sustain regional populations of these species, supporting unparalleled hunting and wildlife-viewing opportunities in Jackson Hole.

Federally and State-Listed Species

The National Elk Refuge is home to Federal and State species of concern. The grizzly bear is federally listed as threatened under the Endangered Species Act and the greater sage-grouse is a candidate for listing; we have documented both species on the refuge. We have only incidental grizzly bear use documented on the northern parts of refuge. However, recent observations in the southern part of Grand Teton National Park bordering the refuge suggest that increased grizzly bear activity on the refuge may be likely in the near future. Greater sage-grouse use the refuge year-round, and successful breeding has been documented.

There is documented use of the refuge by 35 of Wyoming's species of greatest conservation need (refer to "Appendix D—Federally and State-Listed Plants and Animals"). We have documentation of breeding on the refuge for several of these species: trumpeter swan, bald eagle, redhead, lesser scaup, sandhill crane, long-billed curlew, Brewer's sparrow, bobolink, moose, bighorn sheep, and river otter. Refuge grassland and sagebrush shrubland communities support breeding populations of Wyoming species of greatest conservation need, including long-billed curlew and Brewer's sparrow. Undoubtedly, other Wyoming-designated species of greatest conservation need from certain taxonomic groups, such as bats and small mammals, are also present on the refuge, but we need more survey work to confirm their presence and use of the refuge.

Mammals

The refuge is the terminus of seasonal migrations for three celebrated large mammal species. Portions of the Jackson elk herd migrate up to 60 miles from their summer range in Yellowstone National Park to winter on the refuge. The refuge hosts the Jackson bison herd during the winter months, one of only three remaining free-roaming bison herds in North America. Pronghorn summer on the refuge and winter south of Pinedale, Wyoming (more than 70 miles away), making it part of the second-longest mammal migration in the Western Hemisphere.

Given the abundance of prey and the lack of human disturbance, the refuge has become a haven for large carnivores. Gray wolves have been active on the refuge since 1999 and have denned on the refuge in all but 1 year since 2005. Mountain lion activity occurs on Miller Butte and on the eastern part of the refuge. Black bears occasionally use the refuge, particularly during the fall season. Coyotes occur at high densities, particularly in the winter when they scavenge elk carcasses and occasionally kill weak and sick elk.

Migratory Birds

Parts of the refuge were established to protect and provide habitat for migratory birds that cross State lines and international borders; these bird species are by law a Federal trust responsibility. The refuge contains significant wetland and grassland communities that are important to migratory birds, and the value of these habitats is enhanced by the restricted human access, which prevents disturbance during nesting and other critical periods in their life cycle. The refuge contains one of the largest wetlands in northwestern Wyoming—Flat Creek Marsh—which is an important migratory stopover for waterfowl and shorebird species in the Pacific flyway (figure 8) and breeding habitat for trumpeter swans and other waterfowl.

Fish

Flat Creek, a spring-fed stream augmented by irrigation, originates north of the town of Jackson, runs through town, and ends at the Snake River south of town. This stream is integral to Jackson Hole and the natural recruitment of native trout for the Snake River. No stocking occurs in Flat Creek, making natural recruitment the only source of native Snake River cutthroat trout. The Gros Ventre River contains Snake River cutthroat, rainbow trout, and hybridized fish species.

Amphibians

The Gros Ventre River, Flat Creek, and Nowlin Creek riparian areas with their associated ponds and wetlands provide essential habitat for regional amphibian populations. Boreal chorus frogs are the most widespread species. Columbia spotted frogs are locally abundant in the Nowlin Creek drainage in two large breeding areas. In addition, boreal toads are locally abundant in two main breeding areas in the Nowlin Creek and Gros Ventre River drainages. Tiger salamanders, although common in the region, are thought to be rare on the refuge.

Abundant Visitor Opportunities

Visitor surveys conducted by the Jackson Hole Chamber of Commerce have consistently documented that 80–90 percent of valley tourists identify natural resource-based activities as their primary reason for visiting Jackson Hole. Hunting, fishing, wildlife observation, photography, environmental education, and interpretation are the six priority public uses (wildlife-dependent recreational uses) of the Refuge

System, and we provide opportunities for all of these activities on the National Elk Refuge.

We allow elk and bison hunting on the refuge to help meet herd management objectives and to provide recreational opportunities. Depending on which area hunters are in, we allow hunters to use a variety of weapons including rifles, archery equipment, and designated limited-range weapons such muzzle-loading rifles, shotguns with slugs, and handguns. The refuge accommodates hunters with disabilities and offers a special elk hunt for young people.

We manage Flat Creek as a trophy class fishery for Snake River cutthroat trout. This fish is a unique subspecies of cutthroat trout and is the only trout native to the area.

But, it is the spectacle of thousands of elk and hundreds of bison wintering on the refuge's grasslands that most intrigues the public and makes the refuge a national icon. Our visitor services staff offers year-round programs to incorporate wildlife viewing, photography, interpretation, and environmental education into the visitor experience. Thousands of people each year take the opportunity to

view elk at close range on the refuge while participating in the sleigh ride program. Bison are popular with visitors and residents as a symbol of the West, and they are central to the culture and traditions of many American Indian tribes. Bison can often be viewed along the fence north of the Jackson Fish Hatchery and in the McBride area before the Flat Creek Road is closed seasonally in December. Other ungulates such as bighorn sheep can often be easily viewed from Elk Refuge Road and are a popular species for winter wildlife viewers. From November to May, bighorn sheep can be found on the eastern slopes of Miller Butte and in the northern parts of the refuge near Curtis Canyon. Moose, pronghorn, and mule deer also frequent the refuge.

Rich Cultural History

In prehistoric times, American Indians living on surrounding lands used this high-elevation valley primarily during the warm months, and no one tribe

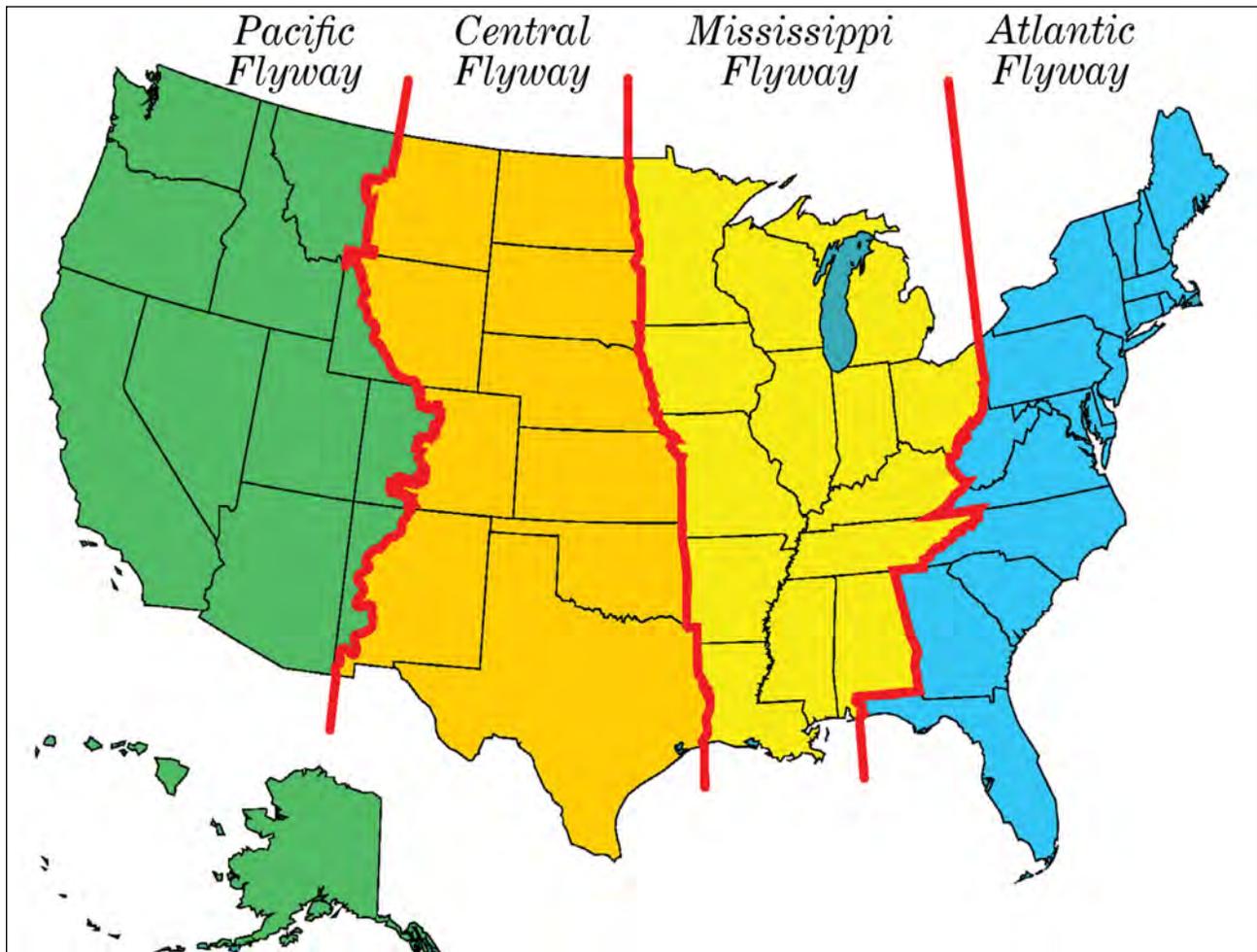


Figure 8. Map of waterfowl flyways in North America.

occupied Jackson Hole year-round. Traditional uses of the lands included hunting and fishing, collection of plants and minerals, and ceremonial activities. We have recorded eight prehistoric archaeological sites on the refuge, which include roasting pits, stone circles, and a bison kill site. Among the artifacts that have been discovered are bones from elk and bison, numerous flakes, choppers, scrapers, and projectile point pieces. Present-day activity includes the ceremonial bison hunt that the Shoshone-Bannock Tribes conduct on the refuge.

The Miller House, built in 1898, was one of the early homesteads in the valley. Later, it became one of the first land tracts to be bought for the refuge, and it was the original office for the refuge. Listed on the National Register of Historic Places in 1969, much of the original house has been restored to period standards and aesthetics, and it is open for tour by the public during the summer.

2.6 Planning Issues

We identified several key issues following the analysis of comments collected from refuge staff and the public and a review of the requirements of the Improvement Act and the National Environmental Policy Act. As described in chapter 1, section 1.6, we used a public meeting, news releases, presentations to local agencies and organizations, an announcement in the Federal Register, and planning updates to solicit public input on which issues the CCP should address. We considered the substantive comments (those that could be addressed within the authority and management capabilities of the Service) when formulating the alternatives for future management of the refuge. These key issues are summarized below.

Unknown Effects of Climate Change

Although climate change is a naturally occurring phenomenon and temperature and precipitation changes are anticipated, there are many unknowns. Consequently, we do not fully understand the potential impacts that climate change may have on terrestrial and aquatic habitats and the associated wildlife species. Several scientific studies show that, in the past century, the climate has become warmer and drier in northern Yellowstone National Park (Balling et al. 1992a, 1992b). If this warming trend continues,

it could have far-reaching effects on the plants and animals of the Greater Yellowstone Ecosystem (Romme and Turner 1991), which includes the National Elk Refuge.

Analysis of precipitation records from 1921 to 2002 gathered at a National Oceanic and Atmospheric Administration weather station in Jackson, Wyoming, showed no significant trends, either increasing or decreasing (Smith et al. 2004). Although temperature readings from 1931 to 2002 increased, calculations using the 1949–2001 Keetch-Byram Drought Index values, which evaluate upper level soil moisture content, revealed a “minor decline in drought conditions” (Smith et al. 2004).

Landscape-Scale Conservation Needs

There is increasing residential, commercial, and energy development near the refuge and surrounding areas. Threats to wildlife associated with development include loss of habitat, habitat fragmentation, vehicle collision mortality, loss of pronghorn migration routes, poaching, and increased infestations of invasive plants, including noxious weeds. As towns, developments, farms, ranches, and roads spread across the region, wildland shrinks and is broken into smaller fragments. The land surrounding the refuge is mostly comprised of federally managed lands (Grand Teton National Park and Bridger-Teton National Forest) and the town of Jackson. The town of Jackson is already intensively developed, leaving little opportunity for further habitat protection in the immediate area. The National Elk Refuge, national parks, national forests, and State lands in the Greater Yellowstone Ecosystem preserve continuous tracts of important habitat and travel corridors for the area’s wildlife and for the enjoyment of people.

Big Game Management Effects on Wildlife Habitat

Historical evidence suggests that the refuge once supported substantial willow, cottonwood, aspen, and mountain shrub communities. Because the refuge has consistently maintained artificially high numbers of elk through supplemental feeding for almost 100 years, browsing by elk has reduced the spatial extent and structural complexity of woody plant communities, particularly on the southern end of the refuge (Smith et al. 2004). As a result, habitat for species

that depend on these communities, such as beaver and breeding birds that nest in dense woody vegetation, has been drastically reduced. Furthermore, when the large concentrations of wintering elk and bison consume streamside woody vegetation, the streambanks become unstable and vulnerable to collapse into the stream, sending substantial amounts of sand and silt into the stream. Experiments suggest that these plant communities have the capacity to recover, but only if ungulate numbers are drastically reduced or they are excluded from browsing using fencing or other physical barriers.

Irrigation is a common habitat management tool that we use to increase both the quantity and quality of forage available to grazing wildlife. We have used irrigation to produce forage for many years on the National Elk Refuge as a technique to reduce wintering elk reliance on supplemental feeding. However, moving the irrigation system requires dragging the lines over the ground, and this activity can potentially have negative effects on the nests of birds such as the curlew, which is an important ground-nesting bird on the refuge as a bird of special concern to the State of Wyoming.

Invasive Plants Replacing Native Habitat

An invasive species is defined as a species that is nonnative to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (National Invasive Species Council 2008). Invasive plant species spread easily, replace native habitat, reduce diversity, and cause great expenditure of financial and human resources. Adjacent private lands are often the sources for invasive plants, including State-designated noxious weeds.

Common noxious weeds present on the refuge are musk thistle and spotted knapweed. There are many other invasive plant species on the refuge including the following:

- Bindweed
- Dalmatian toadflax
- Oxeye daisy
- Scotch thistle
- Black henbane
- Diffuse knapweed
- Perennial pepperweed
- Whitetop
- Bull thistle
- Houndstongue
- Russian knapweed
- Woolly mullein
- Canada thistle
- Marsh sow thistle
- Scentless chamomile
- Yellow toadflax
- Common tansy

Many invasive plant infestations on the refuge are a direct result of abandoned livestock-feeding areas and corrals, old homesites, and roadbeds. These species reduce the diversity and number of native plants and change habitats, such as replacing a grass community with a forb community. Studies in Montana report that bison and deer reduced their use of a particular habitat by 70–82 percent when it was invaded by leafy spurge. Elk forage in bunchgrass sites on the refuge was decreased by 50–90 percent after a spotted knapweed invasion (Teton County Weed and Pest District 2002).

Invasive grasses, forbs, and woody species are of concern because they diminish the quality and suitability of habitat and reduce its potential to support many native wildlife species. Invasive plants also fail to protect and hold soil because they generally have a shallow root system, leading to increased erosion and sedimentation in streams. This in turn affects water quality, reduces aquatic habitat, and may lead to decreases in fish production.

Flat Creek Enhancement

There is a need to improve the condition of Flat Creek to increase aquatic habitat for all age classes of the Snake River cutthroat trout. This creek is an iconic fixture in Jackson Hole for tourists, anglers, and the native cutthroat trout. Flat Creek on the refuge provides a walk-in opportunity for anglers to experience a trophy fishery of Snake River cutthroat trout. However, the refuge reach of Flat Creek has experienced direct and indirect alteration to its stream form and function from changes in hydrologic and sediment inputs, installation of instream structures and treatments, and nearby land management activities. With some enhancement work on Flat Creek done in 2013, we need to continue this work farther down the refuge reach of Flat Creek to improve habitat for cutthroat trout (Biota 2013a, b).

Conserving Wide-Ranging Wildlife

The refuge provides habitat for several wide-ranging wildlife species including elk, bison, bighorn

sheep, pronghorn, moose, gray wolf, and grizzly bear. The refuge supports the preservation of the large landscapes that these species require. With long-distance mammal migrations imperiled around the globe, the refuge's importance in sustaining these phenomena is critical. The success of wolf restoration in the Greater Yellowstone Ecosystem continues to be a major issue for many of the citizens of Wyoming. The National Elk Refuge provides an excellent location and ideal habitat for seasonal occupation by wolves and, in recent years, has hosted a denning pack of wolves during the winter, spring, and summer months. These wolves have a large home range that contains substantial amounts of nonrefuge Federal, State, and private lands, where they can come into conflict with privately owned livestock.

Managing Habitat for Migratory Birds

Protecting habitat and managing for a wide variety of migratory birds is a priority for the refuge. Waterfowl and other waterbirds, grassland songbirds, and riparian-dependent birds are some of the highest priority groups.

Wildlife Disease

The supplemental feeding program has maintained artificially high densities of elk for almost 100 years and artificially high densities of bison for more than 30 years. Feeding is a strategy designed to support elk population objectives and reduce damage to surrounding private lands, but it has unintended management and disease consequences. Although reduced reliance on supplemental feeding is an objective in the 2007 Bison and Elk Management Plan, feeding is often initiated earlier or terminated later than is biologically necessary to prevent the elk and bison from commingling with livestock on adjacent private lands. Feeding is used as a strategy to reduce brucellosis transmission from elk and bison to cattle; yet artificially concentrating elk and bison on feedgrounds also maintains higher brucellosis seroprevalence in elk and bison (Cross et al. 2007, 2010) and puts them at risk for other density-dependent diseases (Smith 2001). As a result, density-dependent ungulate disease is a major concern for the refuge. Brucellosis, septicemic pasteurellosis, psoroptic mange, necrotic stomatitis, necrotizing pododermatitis (foot rot), and helminth and lungworm parasitism have been well documented in the Jackson elk herd.

Similarly, brucellosis and density-associated parasitism have been well documented in the Jackson bison herd.

Although the population level effects of these diseases have been minimal for elk and bison, their prevalence at the refuge suggests that substantial population reductions and other negative wildlife health effects are possible if more serious ungulate diseases were introduced to the refuge. For example, chronic wasting disease, bovine tuberculosis, malignant catarrhal fever, and foot-and-mouth disease have not been documented in the Jackson elk herd, but could have serious negative population effects at current elk densities. Likewise, bovine tuberculosis, bovine paratuberculosis, malignant catarrhal fever, and foot-and-mouth disease could pose significant threats to bison populations on the feedgrounds if these diseases were introduced.

During routine monitoring of cutthroat trout in 2003, tissue samples sent to the WGFD lab tested positive for *Myxololus cerebralis*, the parasite that causes whirling disease. Infection levels were low and no declines in the cutthroat trout population have been documented.

Amphibian monitoring on the refuge occurs at a finer temporal and spatial scale than other amphibian monitoring in the region (Patla 2009). As a result, amphibian monitoring functions as an early warning system for declines in amphibian populations and disease outbreaks. These monitoring efforts are particularly important given the detection of chytridiomycosis (chytrid disease) on the refuge. Chytrid disease is a fungal skin disease that has been implicated in amphibian population declines worldwide. A boreal toad collected on the refuge in 2000 was the first documented occurrence of the disease in northwestern Wyoming. Unlike infected amphibian populations in other areas, amphibians in northwestern Wyoming have not experienced catastrophic declines. However, the effects could be chronic and, therefore, continued monitoring is necessary to evaluate the effects of the disease on regional populations.

Insufficient Research, Inventory, and Monitoring

Artificial concentrations of high densities of elk and bison, because of supplemental feeding and habitat enhancement, provide unique opportunities to evaluate the effects of these management activities on vegetation, ungulate habitat use, breeding bird populations, and wildlife diseases.

The refuge facilitates regionally important cooperative research and monitoring including amphibian

population monitoring, greater sage-grouse habitat use and demography, mountain lion research, bighorn sheep habitat selection and migration, and invasive plant monitoring. Given potential threats associated with climate change and invasive species, more inventory work is necessary to assess the baseline presence and abundance of certain taxonomic groups including invertebrates, rodents, bats and owls.

Members of the public, representatives from non-profit conservation organizations, and staff from other agencies have expressed concern that inventory and monitoring efforts are insufficient to evaluate the effects of current and proposed management activities. Principle concerns are related to (1) the irrigation system expansion and its effects on hydrology, amphibians, and ground-nesting birds; (2) development of a multi-use pathway next to Highway 89 and its potential impacts on ungulate migration, invasive plant species introduction, and disturbance of breeding birds; and (3) the ongoing effects of the supplemental feeding program on breeding bird habitat and wildlife diseases. These are valid concerns that would require more staff and money to effectively monitor the effects of these management activities over time.

Human–Wildlife Conflicts

Wildlife that winter on the refuge can cause human–wildlife conflicts when they venture off the

refuge and into the developed Jackson area. Of greatest concern are bison, which are large and sometimes bold animals that can exhibit aggressive behavior and be a serious threat to human safety and property. Elk have left the refuge in the past: in January 2006, a radio-collared elk left the refuge and went to a livestock feedline. Elk can create conflicts, mostly as a traffic hazard as they cross heavily used highways or pathways when moving onto the refuge, although they can also cause property damage and threaten human safety in certain situations.

Hunting Management

Although hunting is the primary means of meeting herd objectives, the need was identified to consider the negative visual effect of hunters killing elk and seeing dead elk as they are transported off the refuge. Some individuals expressed a desire to prohibit hunting on the refuge, and others desire a limited waterfowl hunt for population control of resident Canada geese. Some people would like the CCP to include monitoring the use of lead shot for waterfowl hunting (if it were allowed) and the subsequent impacts on bald eagles. However, mandatory State regulations already require the use of lead-free ammunition.”



BJ Baker / FWS

Miller Ranch in the morning.

Increasing Demand for Environmental Education and Interpretation

The refuge cannot meet the high public demand for environmental education and interpretation programs with the current staff level. We need more interpretative staff and public facilities with adequate program areas.

Operational Efficiency of the Jackson Hole and Greater Yellowstone Visitor Center

During the peak summer season, visitation can reach 2,400 people per day, or roughly 3.6 visitors per minute, at the Jackson Hole and Greater Yellowstone Visitor Center (visitor center). With only one staff member assigned to the facility, staff levels are not adequate to maintain, run, and staff the busy visitor center. Rather than seasonally increasing Government staff or hiring employees funded through non-governmental sources to enhance public use programs, the refuge solely relies on residential volunteers to provide interpretive and educational services. It is important to have adequate permanent refuge staff at the visitor center to guarantee consistent service, to recruit and manage volunteers, and to provide interpretive programming. In addition, the current building is old and needs to be replaced to meet the customer service demand and to be compliant with the Architectural Barriers Act Accessibility Standard (United States Access Board 2013). Previous condition assessments identified many of the visitor center's features as poor or unsafe.

Management of Other Uses

There are several other public uses that demand extensive time by our refuge staff to coordinate and carefully manage to protect refuge resources and keep the public safe.

North Highway 89 Pathway

The North Highway 89 Pathway provides an opportunity for the public to enjoy the beauty of the National Elk Refuge and observe much of the wildlife that makes Jackson Hole so special. Some of the pub-

lic would like us to extend the use of the bike path by eliminating or modifying the seasonal closure. However, the seasonal closure is part of the agreement with Jackson Hole Community Pathways to mitigate for wildlife disturbance and is believed to be an essential requirement for this activity to be compatible with the refuge purposes.

Public Use of North Park

The refuge's North Park provides a shelter and picnic facilities to support wildlife-dependent recreation at the refuge, for use on a first-come, first-served basis. North Park is a small area on the refuge that is so close to town that it appears to be part of Jackson. In fact, we have a memorandum of understanding with Jackson to maintain the lawn, picnic table, and shelter. The memorandum of understanding also allows Jackson to conduct a reservation system for private use of the shelter for weddings and other events; Jackson charges a fee for the reserved use and keeps the fee. However, these uses do not support wildlife-dependent recreation, and reserving the area may hinder the experience of people visiting the refuge for activities such as wildlife observation.

Special Use Permits

Because of the refuge's location in the scenic, highly visited Jackson Hole, the staff receives a high volume of requests for special uses of the refuge. The refuge issues approximately 40 special use permits annually. Most of these permits are issued to wildlife auto-tour companies, fishing outfitters and guides, and commercial filmmakers and photographers.

The refuge receives an extensive amount of local, regional, national, and international media attention, especially during the winter season. Media coverage includes print, electronic, and video and film venues. Because the area is a focus of media attention and millions of people visit this area each year, the National Elk Refuge has the opportunity to embody our mission as an ambassador for the Refuge System.

The refuge staff has an extensive workload to properly evaluate, process, and monitor special use permits and filming requests. Because of the volume of requests the refuge receives for activities such as special access and photography in closed areas, discretion must be used to accommodate a request even if the activity is compatible. When considering a special use request, the refuge staff must decide not only if the single activity can be accommodated, but whether or not it is feasible if multiple parties make the same request. Furthermore, there is a need to set standards for consistent evaluation of the special use

requests that we allow and to give groups equal opportunities to gain permits.

Swimming

At the northeastern corner of the refuge, there is a feature known as the Gros Ventre River “jump cliff.” Here swimmers jump off of cliff rocks in Grand Teton National Park into the Gros Ventre River and into the jurisdiction of the refuge. Technically, when the diver hits the water, they are trespassing onto the refuge and participating in an activity that we have not determined as a compatible use of the refuge. A further complication is that the public does not clearly understand the boundary between the park and the refuge. Swimming is not a wildlife-dependent recreational use.

Access

The refuge has high demand for various types of access as described below.

General Access

There is a concern that only hunters and anglers are allowed access to the refuge, with birdwatcher and other user groups not having equal opportunity to use the refuge for other wildlife-dependent purposes such as birding and wildlife observation. The need to provide free access to the refuge for other user groups was identified.

Elk Refuge Road

Elk Refuge Road is the primary access to the refuge and the only legal entrance to the refuge for the public. The refuge struggles with management of traffic on Elk Refuge Road because of its mixed use by pedestrians, vehicles, service trucks, and large equipment. Because of the ease of access to the refuge and its proximity to town, local residents use Elk Refuge Road extensively for walking, jogging, and bicycling. Many pedestrians walk several abreast or do not move to the side of the road when vehicles are present, causing drivers to move into the oncoming lane to pass.

A regulation panel at the refuge entrance and literature available to the public states that stopping or parking a vehicle on Elk Refuge Road is prohibited; however, many cars, vans, and trucks park in the road when wildlife is present near the roadway rather than using the turnouts. In some cases, traffic traveling in both directions stop on the road, obstructing the free movement of other vehicles and

creating safety hazards. Furthermore, roadway congestion is a safety concern in bad weather when there may be icy road conditions or limited visibility because of fog, rain, or snow.

Access for Boating

Public comment received during the CCP scoping process requested that boat use be allowed on Gros Ventre River segment upstream from the town of Kelly. The northern boundary of the refuge is the Gros Ventre River, and the northeastern corner of the refuge is used as a takeout point by boaters floating downstream from Slide Lake. Less frequently, boat traffic continues downstream to the town of Kelly. However, the refuge and the Grand Teton National Park consider this part of the Gros Ventre River to be closed to boating. The segment of the river from the Jump Rock takeout site to the town of Kelly was recently designated as scenic under the Craig Thomas Snake Headwaters Legacy Act of 2008. The act requires the refuge and the park to create a comprehensive river management plan to guide the management of each segment designated as wild, scenic, or recreational to protect the “outstandingly remarkable values” of the river.

The proposed use of boating was reviewed during development of the Snake River Headwaters Comprehensive River Management Plan. The prohibition against boating on the portion of the Gros Ventre River that serves as the common boundary between the refuge and the park will be retained.

Access to the National Forest

Because the Bridger-Teton National Forest lies adjacent to the refuge, some users want to access the forest through the refuge. Open portions of Elk Refuge Road allow the public seasonal access to national forest lands, including designated routes to reach the forest on foot or by vehicle. Allowing limited access to the national forest, either by road or trail, shows good cooperation between two Federal agencies and extends a convenience to forest users.

Presently, the refuge allows antler hunters to park and camp overnight on Elk Refuge Road on April 30 to await the lifting of the national forest closure (for wintering wildlife) where the public enter the forest to collect antlers. At 8 a.m. on May 1, refuge staff caravans 100 or more vehicles through the refuge to the boundary of the national forest. The overnight parking creates some resource damage, requires us to increase our law enforcement presence, costs us a significant amount of money to manage, and may be an incompatible use of the refuge.

Public Outreach Opportunities

The National Elk Refuge is featured in many newspapers, Web sites, and other publications each year. These articles are reviewed for accuracy whenever possible; when the media does not directly speak to a refuge staff member, or when staff resources are insufficient to meet or speak with the media contact, erroneous information is common.

People living in or visiting Jackson Hole are easily confused about the differences among Federal land management agencies and how their missions and public use opportunities can greatly vary. Neighboring Grand Teton National Park and Bridger-Teton National Forest are areas with many more non-wildlife-dependent recreational opportunities for the public such as boating, mountain biking, swimming, and hiking. Conflicts can arise when a public use is denied or restricted on the refuge, especially when the same recreational opportunity is allowed under another nearby Federal jurisdiction. Consequently, the National Elk Refuge can seem excessively restrictive without a better understanding of its mission and the prominence of its “wildlife first” guiding principle.

The National Elk Refuge has made it a public outreach goal to continue to write articles, conduct interviews, and use other sources to share information about refuge projects or management issues. Staff limitations and workloads limit this specific type of outreach and have precluded incorporating new technologies into information dissemination. The visitor services staff bought software to produce short video segments, but allocating work time for training and production has not yet been a priority.

Miller House Restoration

The historic Miller Ranch has three main structures: the house, the barn, and the USDA Forest Service cabin. Other than a 2-week rehabilitation project in the summer of 2007, no substantial work has been completed on any of the structures. The upper floor of the barn has outstanding potential for use as an interpretive site and location for programs and events, but the foundation has experienced substantial settling and cracking. Stabilization and restoration would be necessary before the building could be used as a site for interpretive programs. We would need to find funding opportunities other than the refuge’s base funding to restore the historic structure and prevent further deterioration of the structure.

Lack of Resources to Administer the Refuge

Money and staff are not sufficient to fulfill the purposes and meet the goals of the refuge. In addition, visitor numbers and associated demands are expected to increase in coming years. Consequently, less will get done with a corresponding decline in programs, infrastructure, and facilities. The refuge has 10.5 permanent full-time equivalent (FTE) positions, a measure indicating the amount of available workforce on the refuge, and approximately 0.5 seasonal FTE. Refuge staff needs to identify and set priorities for unfunded needs to be able to compete effectively for more money within our agency and from partners and other sources. Creative partnerships and volunteer assistance, although helpful, are not a complete or reliable solution and require sub-



Bald Eagle

Lori Iverson / FWS

stantial staff time. With additional resources, we could accomplish more of the goals and objectives in the CCP.

Stronger Programs Through Partnerships

The National Elk Refuge has many opportunities for partnerships because of the popularity of Jackson Hole and the many nongovernmental organizations, tourism operators, and interested public in the area. Furthermore, there are several governmental agencies—Teton County, National Park Service, and USDA Forest Service—that have land management responsibilities around the refuge. Maintaining a strong partnership network including private landowners, public agencies, and nonprofit organizations is integral to accomplishing our mission of conservation. Partners provide financial assistance, technical assistance, and help with planning and implementation. Partnerships and management coordination with public and private partners is important because refuge operations can have substantial impacts on surrounding lands.

The refuge shares the responsibility of managing wildlife with the State of Wyoming. Close coordination with WGFD enables refuge programs to complement the State's wildlife goals and objectives. This is especially critical in the management of the migratory elk and bison herds. Collaboration with WGFD on harvest goals, permits and licenses, law enforcement, and disease monitoring are important for the effective management of these herds.

To enhance Flat Creek for native cutthroat trout (Biota 2013a, b), the refuge is collaborating with several organizations: Jackson Hole Trout Unlimited, Rocky Mountain Elk Foundation, and Snake River Fund.

The town of Jackson shares its boundary with the refuge and both are located within Teton County. Regular communication with elected officials from the town and county helps diffuse ongoing residential development and public service expansion pressures. Refuge management actions must consider the residential water facilities for the town and a multi-use, nonmotorized pathway for Teton County that are located on the refuge.

Winter sleigh ride interpretive tours are conducted through the Grand Teton Association by a private concessionaire. The visitor center and sleigh rides are integral to wildlife observation, photography, interpretation, and environmental education

programs and generate revenue used to enhance these programs.

The refuge has enjoyed a 55-year partnership with the Jackson District Boy Scouts. In addition to clearing much of the refuge of antlers that are a hazard to refuge vehicles, 75 percent of the proceeds of the annual Boy Scouts of America Elk Antler Auction are returned to the refuge for habitat management-related expenses.

Refuge Management Effects on the Jackson Economy

Employment and nonsalary refuge expenditures (maintenance and operations) benefit the local community, county, and State in the form of income, jobs, taxes, and personal spending. The refuge plays an active, albeit small, role in economic development in the local economy. The National Elk Refuge attracts many visitors and tourist dollars to the local community of Jackson. The national prominence of the refuge and its proximity to Jackson ensures that many Jackson Hole visitors either directly or indirectly use the refuge, but actual dollars generated from the refuge are minor. However, any changes to refuge management are perceived by some people to affect the economy of Jackson.

Issues Outside the Scope of the CCP

Although the public identified elk and bison management as an issue during scoping for the CCP, the issue is outside the scope of this CCP process. Managing elk and bison in this area was recently addressed in an interagency process following the National Environmental Policy Act that had extensive public involvement; the resulting Bison and Elk Management Plan was completed in 2007. The plan has goals, objectives, and strategies for managing elk and bison on the National Elk Refuge and Grand Teton National Park. Supplemental winter feeding of the elk herd is addressed in the Bison and Elk Management Plan.

Some people felt the State of Wyoming should manage the National Elk Refuge instead of our agency. Divestiture of a national wildlife refuge requires an act of Congress; therefore, this would be outside the scope of the CCP.

