

CHAPTER 2—The Refuge Complex



Mike Artmann / USFWS

Numerous waterfowl and shorebirds use the Lakeside unit of Bowdoin National Wildlife Refuge, Montana.

This chapter explains the establishment, management history, purposes, and special values of Bowdoin National Wildlife Refuge Complex in north-central Montana, along with the vision and goals and a discussion of the planning issues.

The refuge complex consists of 84,724 acres of lands and waters encompassing five refuges—Bowdoin, Black Coulee, Creedman Coulee, Hewitt Lake, and Lake Thibadeau National Wildlife Refuges—and Bowdoin Wetland Management District. The Service is responsible for the protection of 10,635 acres of wetland easements, 7,806 acres of refuge and flowage easements, 39,767 acres of grassland easements, 9,504 acres in fee-title waterfowl production areas, and 17,012 acres of refuge lands.

The Bowdoin Refuge Complex spreads across a four-county area in north-central Montana, totaling 17,183 square miles: Blaine County (4,226 square miles), Hill County (2,896 square miles), Phillips County (5,140 square miles), and Valley County (4,921 square miles) (National Association of Counties 2009). The refuge complex headquarters is near the town of Malta.

2.1 Establishment, Acquisition, and Management History

The following section describes the establishment, acquisition, and management history of the national wildlife refuges and wetland management district within the Bowdoin Refuge Complex. Tables 2 and 3 at the end of this section summarize the land acquisition history.



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Bowdoin Refuge's first entry sign, 1938.



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Headquarters for the Bowdoin National Wildlife Refuge Complex, 2007.

Bowdoin National Wildlife Refuge

Before becoming a national wildlife refuge, the lands within Bowdoin were managed by the Bureau of Reclamation (Reclamation). Initially these 10,648.92 acres were reserved from public domain (public land placed into permanent reserved status, such as a national wildlife refuge, that is not held in private ownership).

When President Franklin D. Roosevelt established Bowdoin Migratory Waterfowl Refuge in 1936, the Bureau of Biological Survey (a precursor to the U.S. Fish and Wildlife Service) and Reclamation shared jurisdiction.

On November 15, 1940, Executive Order 8592 changed the refuge name to Bowdoin National Wildlife Refuge and added an additional 1,398.16 acres of land to the area.

On March 22, 1971, a revocation of reclamation withdrawal was filed to give primary jurisdiction to the Service. This revocation was approved on February 7, 1972, under Public Land Order 5162. While under Reclamation jurisdiction, Lake Bowdoin was managed as a sump for irrigation return flows from the Milk River Project.

Bowdoin National Wildlife Refuge lies approximately 7 miles northeast of Malta in the Milk River Valley of Phillips County and today encompasses 15,551 acres (figure 5). The refuge consists of more than 6,000 acres of freshwater and saline wetlands.

The remaining upland is typical mixed-grass prairie with a complex of western wheatgrass, needle and thread grass, sagebrush, and forbs. Greasewood and rabbitbrush are common on the heavier clay soils. The marsh areas are dominated by sedges, while excellent stands of emergent and aquatic vegetation are found in the shallow, open-water areas. Plateaus and grassland benches surround the refuge with elevations varying from



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Refuge headquarters, 1938.

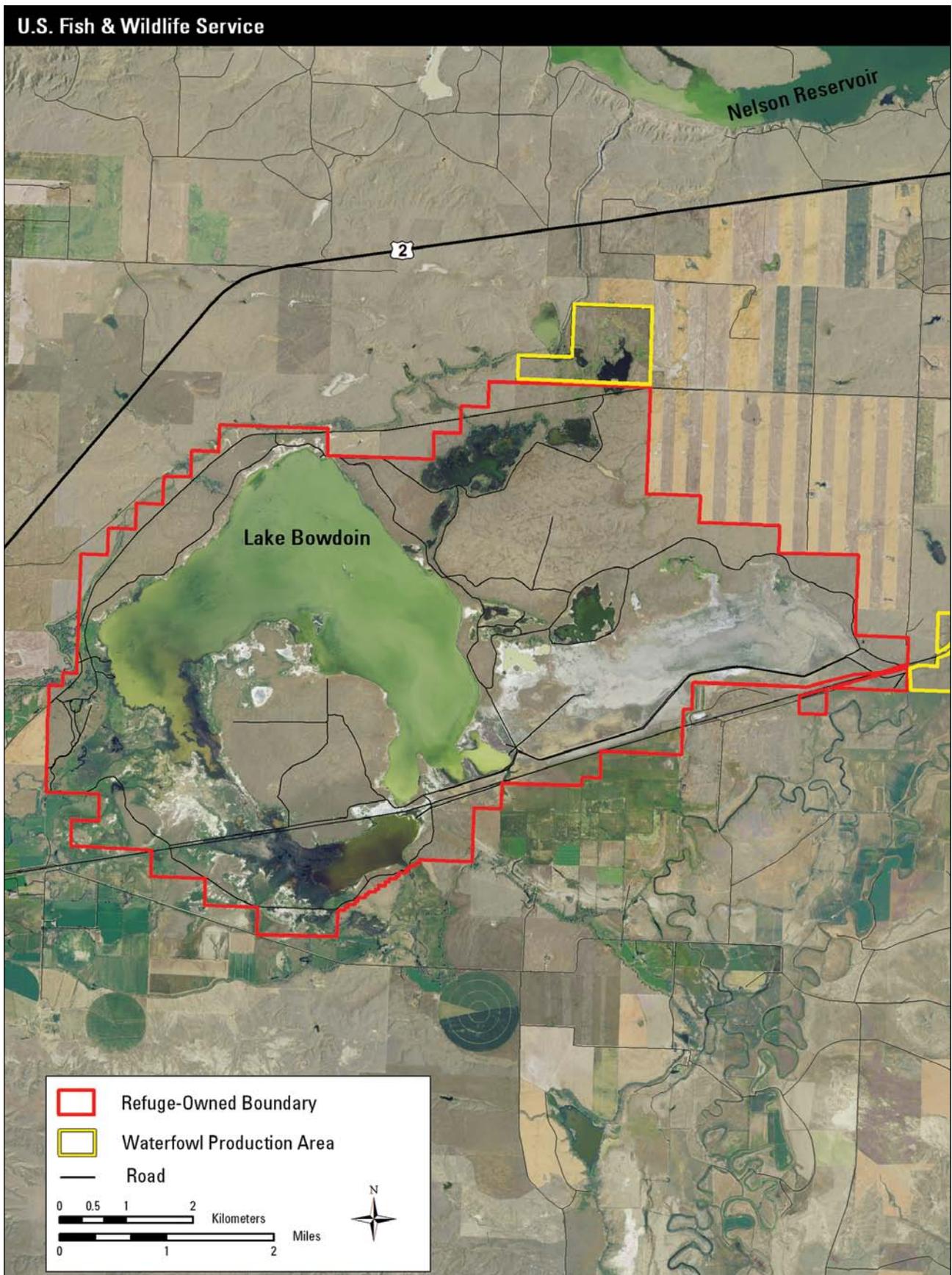


Figure 5. Base map of Bowdoin National Wildlife Refuge, Montana.

2,400 to 2,600 feet (Bureau of Sport Fisheries and Wildlife 1973).

There are three major wetland types on the refuge: (1) permanent wetlands; (2) semipermanent wetlands; and (3) seasonal or temporary wetlands. These wetlands are either freshwater or saline. Upland habitats include more than 5,000 acres of native prairie, 200 acres of DNC, 269 acres of planted grasses (primarily crested wheatgrass), and 850 acres of shrubland or woodland. The remaining acreage is in roads, parking lots, and developed areas (figure 6). The refuge serves as an important staging and nesting area for migrating waterfowl, shorebirds, sandhill cranes, and other migratory birds. A variety of refuge habitats are home for resident wildlife such as sharp-tailed grouse, pronghorn, and white-tailed deer.

Geologic history indicates that Lake Bowdoin was once an oxbow of the preglacial Missouri River channel. Today, the Missouri River lies nearly 70 miles south of Bowdoin National Wildlife Refuge. Historically, Lake Bowdoin acted as a large catch basin for precipitation, early spring floods, and runoff events. The lands surrounding the lake were native prairie.



Donna A. Dewhurst / USFWS

Sandhill cranes nest at Bowdoin Refuge.

Lake levels fluctuated from year to year, depending on runoff conditions and evaporation during the hot, dry summers.

In the 1800s, Lake Bowdoin was an important watering source for trailing cattle herds. Grasslands around the lake suffered extensive overgrazing from the watering herds, and it was not until the refuge was established in 1936 that the area received protection and development for wildlife purposes (Bureau of Sport Fisheries and Wildlife 1973).

After establishment in 1936, an extensive system of dikes, ditches, and water control structures were constructed to better manage the available water supply. In 1937, the Service negotiated a memorandum of agreement (MOA) with Reclamation to receive part of their water right, 3,500 acre-feet, from the Milk River Project. In return, the Service contributed \$40,000 toward construction of the Fresno Reservoir storage facility near Havre, Montana. Water is the lifeline between management and waterfowl survival and is essential to wildlife management at Bowdoin Refuge. During years of normal runoff, Reclamation furnishes up to 3,500 acre-feet of water to the refuge. In years of below-normal runoff, Reclamation agrees to furnish the portion of 3,500 acre-feet that the natural conditions and Federal reclamation laws permit.

Water diverted to Bowdoin National Wildlife Refuge from the Milk River Project is used to manage ponds, lakes, and marshes ranging in size from 1 acre to 4,470 acres. The diverted water provides food and migrating and nesting habitat for migratory birds and wetland-related wildlife, as well as for resident wildlife. In addition, delivered water is used to attract piping plover (a threatened bird species that had used the refuge for nesting in the past) and to manage its habitat.

Black Coulee National Wildlife Refuge

Black Coulee National Wildlife Refuge totals 1,309 acres (figure 7): 639 acres of lands reserved from public domain and 840 acres of privately owned lands encumbered by three perpetual refuge and flowage easements. In 1982, 185 acres were purchased with Duck Stamp money as a waterfowl production area. The new addition included 170 acres of a previous 240-acre flowage easement. This land acquisition reduced the easement area to 670 acres.

The Black Coulee Refuge is located about 10 miles south of the town of Turner in northeastern Blaine County, Montana. The general topography of the land is rolling mixed-grass prairie with major drainages running in a northeasterly direction.

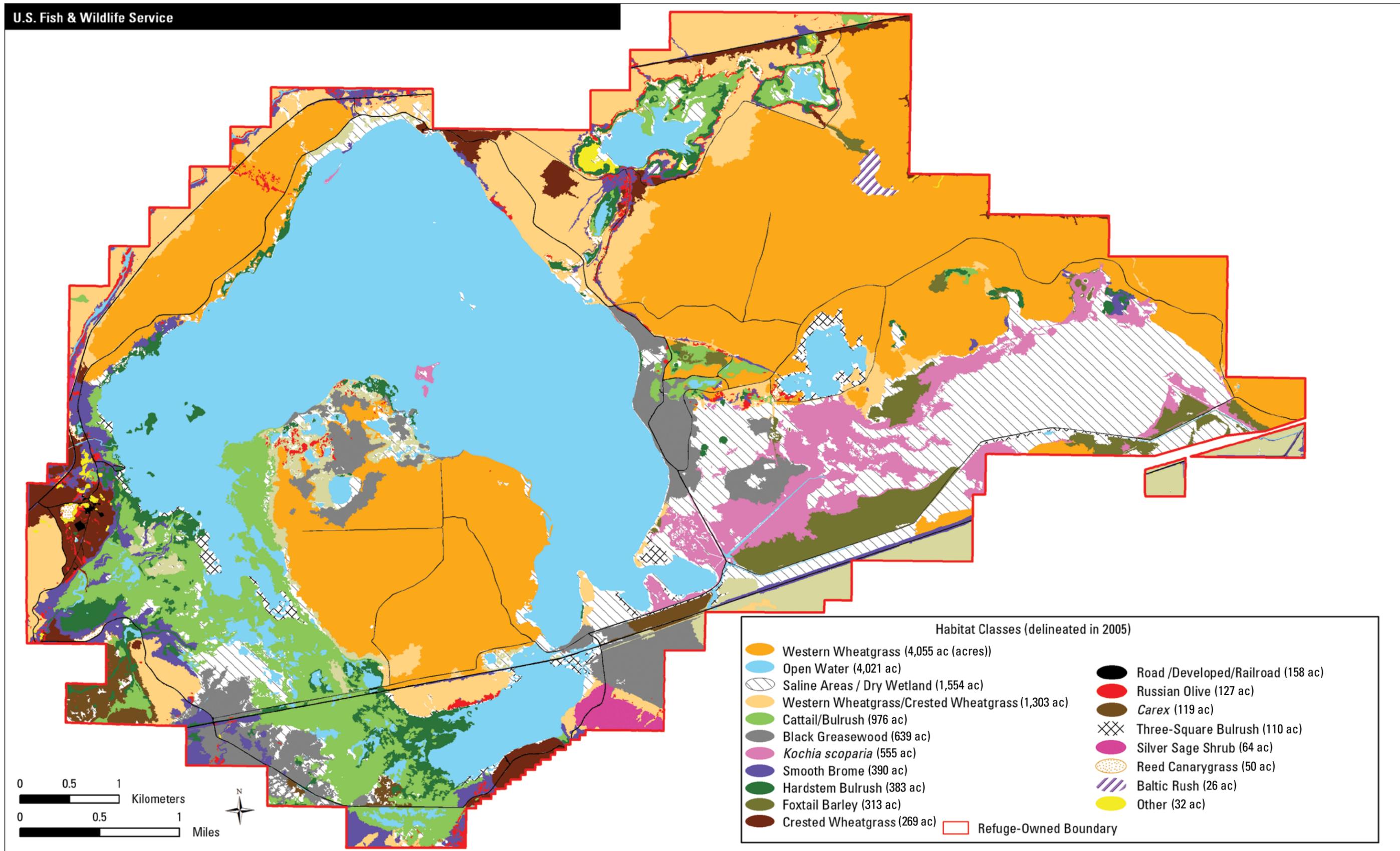


Figure 6. Map of habitat types at Bowdoin National Wildlife Refuge, Montana.

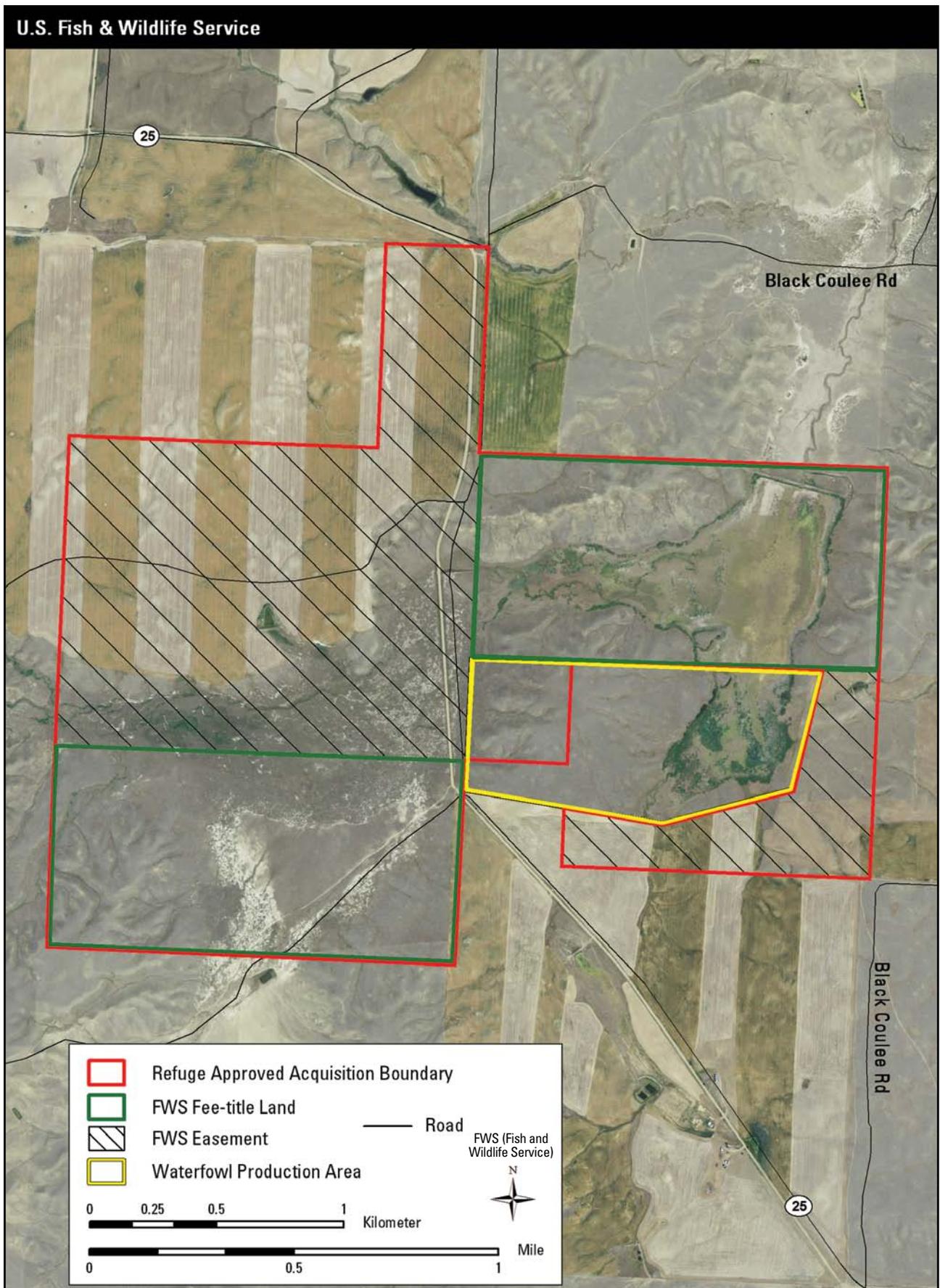


Figure 7. Base map of Black Coulee National Wildlife Refuge, Montana.

Black Coulee Reservoir provides water for migratory birds as well as nesting and brood-rearing habitat (figure 8). The refuge has a dependable water source from the runoff in the west branch of Black Coulee drainage, which has a large watershed. The area influenced by the dam on the Black Coulee drainage covers about 482 acres. In years when extreme runoff is observed, the upper most areas influenced by the dam are temporarily inundated by water. When average runoff occurs, the reservoir provides about 173 acres of wetland habitat.

The wetland total for the Service-owned land is 211 acres; wetland on the easement-controlled land is about 85 acres. Service-owned uplands protect 428 acres of native prairie. The remaining uplands, which are under easement, consist of both cropland and land enrolled in the Conservation Reserve Program. Due to fluctuations in grain commodity prices, conversion of the Conservation Reserve Program land back to cropland has increased in the past several years.

Creedman Coulee National Wildlife Refuge

The original Executive order designated 3,040 acres, consisting of 80 acres reserved from public domain and 2,960 acres of privately owned land encumbered by eight refuge and flowage easements (figure 9). The 80 acres owned by the Service are located in the southwest corner of the Executive boundary and contain native prairie habitat. Historical records document two other names for this drainage, Greedman Coulee or Greenman Coulee.

Creedman Coulee is in Hill County, about 33 miles north of Havre, Montana. One of the primary features of this refuge is the 181-acre Creedman Reservoir.

The uplands are a mix of native prairie and agricultural land. The Service easements over these uplands provide no authority over the surface use, except for hunting and trapping. Accurate acreage of the upland habitat on these private lands is difficult to estimate because the landowners convert the prairie to other uses more suitable to their farm and ranch operation needs (figure 10).

When full, Creedman Reservoir attracts migrating waterfowl and

provides habitat for hundreds of nesting birds. Established trees near the reservoir serve as a rookery for great blue herons and double-crested cormorants.

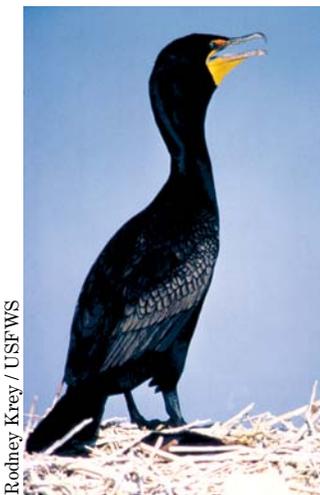
Water rights to Creedman Reservoir are owned by one downstream landowner and the Service. Before enlargement of the dam in 1938, Creedman Reservoir was usually dry by late June or early July, providing little to no nesting and brood-rearing habitat for waterfowl. The downstream landowner and the Service reached an agreement that benefits both parties. The existing dam height was increased, thereby increasing the storage capacity of the reservoir. To ensure that water was available for nesting waterfowl and broods, a gravity-flow outlet structure was installed in the dam so that water could not be drawn below the elevation of 90 feet. Under this arrangement, the downstream landowner could still use all the water above this elevation for irrigation purposes without the need for pumping.

In recent years, natural gas exploration and extraction has increased within the refuge boundary and surrounding area. No drilling occurs on the 80-acre parcel of Service-owned land, but the presence of this activity contributes to habitat fragmentation and bird disturbance and affecting the aesthetics of the prairie portion of the refuge. The mineral rights were reserved by the landowner when the easement was acquired, and all of this activity is occurring on the privately owned refuge and flowage easement lands. The Service easements do not prohibit such activities.

Hewitt Lake National Wildlife Refuge

The Executive order that established the Hewitt Lake National Wildlife Refuge in 1938 described a 1,200-acre approved acquisition boundary. The early refuge consisted of 400 acres of land reserved from public domain and 800 acres under refuge and flowage easements. An additional 160 acres, not included in the Executive order boundary, was added to the refuge through another easement agreement (tract 2, dated August 30, 1938), bringing the total number of refuge and flowage easements to three.

In 1959, Secretarial Order 2843 transferred 320 acres of public land for inclusion into Hewitt Lake National Wildlife Refuge, increasing the size to 1,680 acres. In 1992, an existing 320-acre easement tract was purchased with Duck Stamp dollars as a waterfowl production area. The 320-acre Hewitt Lake waterfowl production area (WPA) is described in the below section on Bowdoin Wetland Management District. The current acreage of this limited-interest refuge consists of 1,040 acres of refuge lands (including the 320-acre waterfowl production area) and 640 acres encumbered by easements on private lands (figure 11).



Rodney Krey / USFWS

Double-crested cormorants nest in groups in trees, referred to as rookeries.

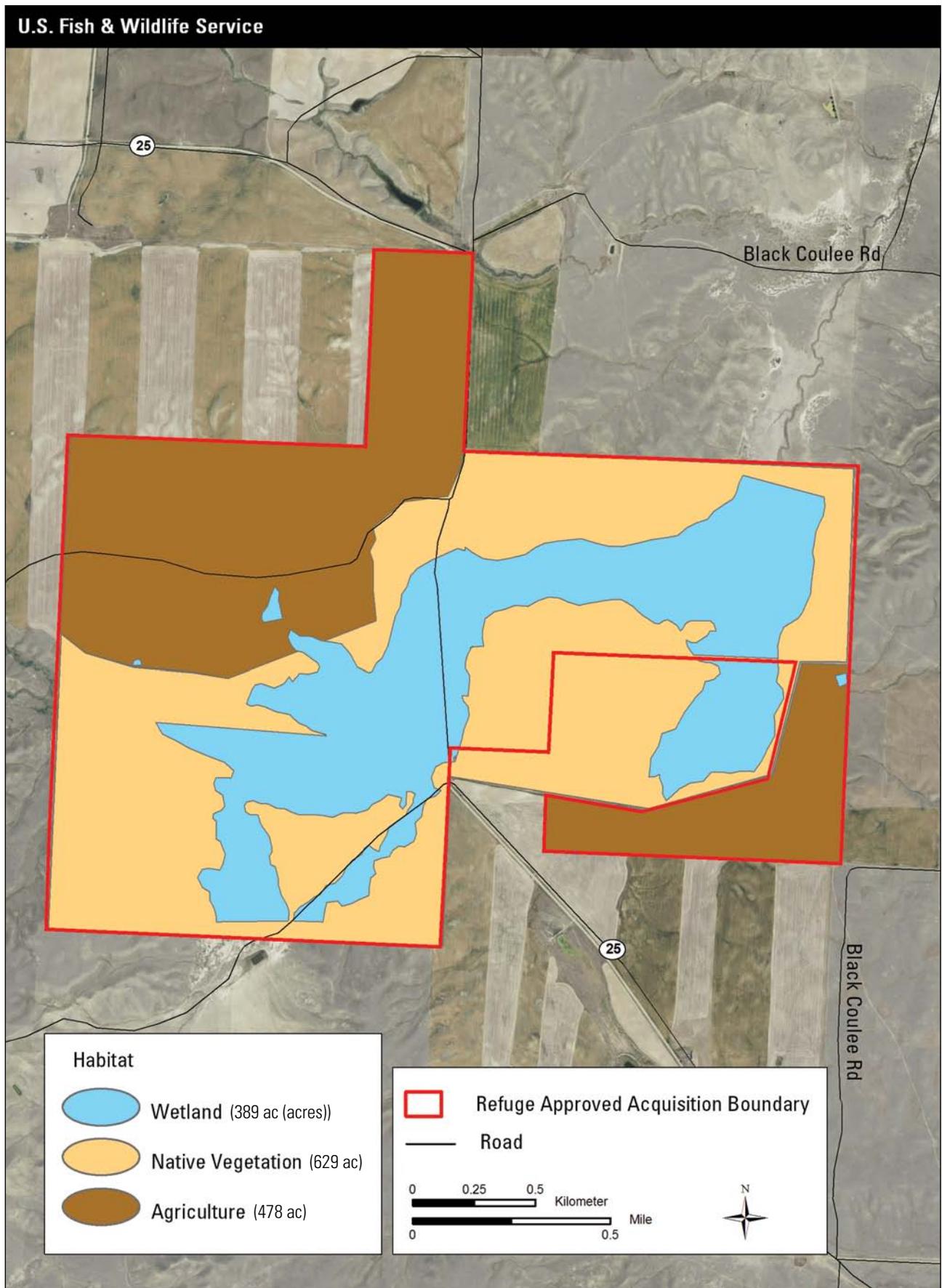


Figure 8. Map of habitat types at Black Coulee National Wildlife Refuge, Montana.

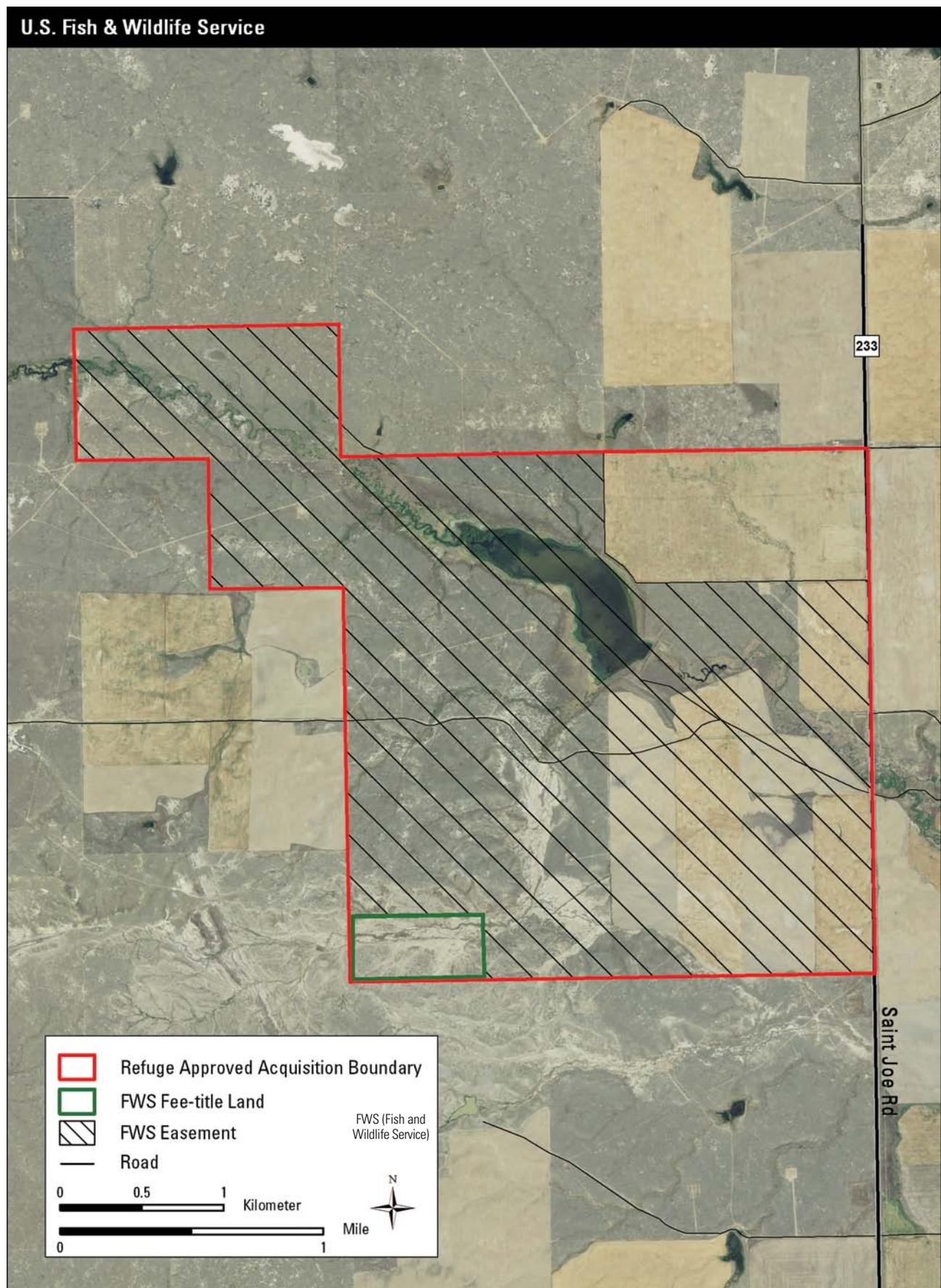


Figure 9. Base map of Creedman Coulee National Wildlife Refuge, Montana.

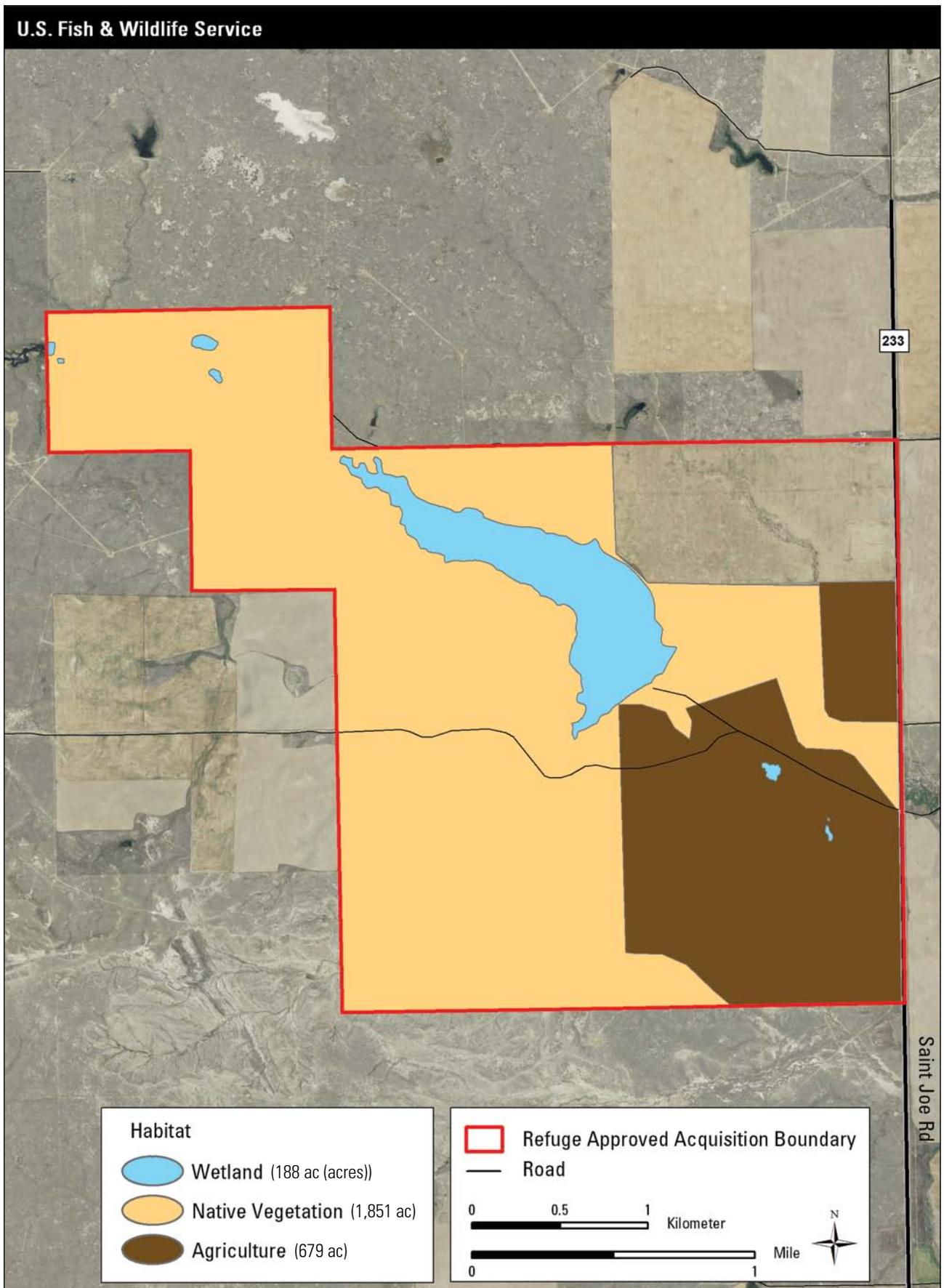


Figure 10. Map of habitat types at Creedman Coulee National Wildlife Refuge, Montana.

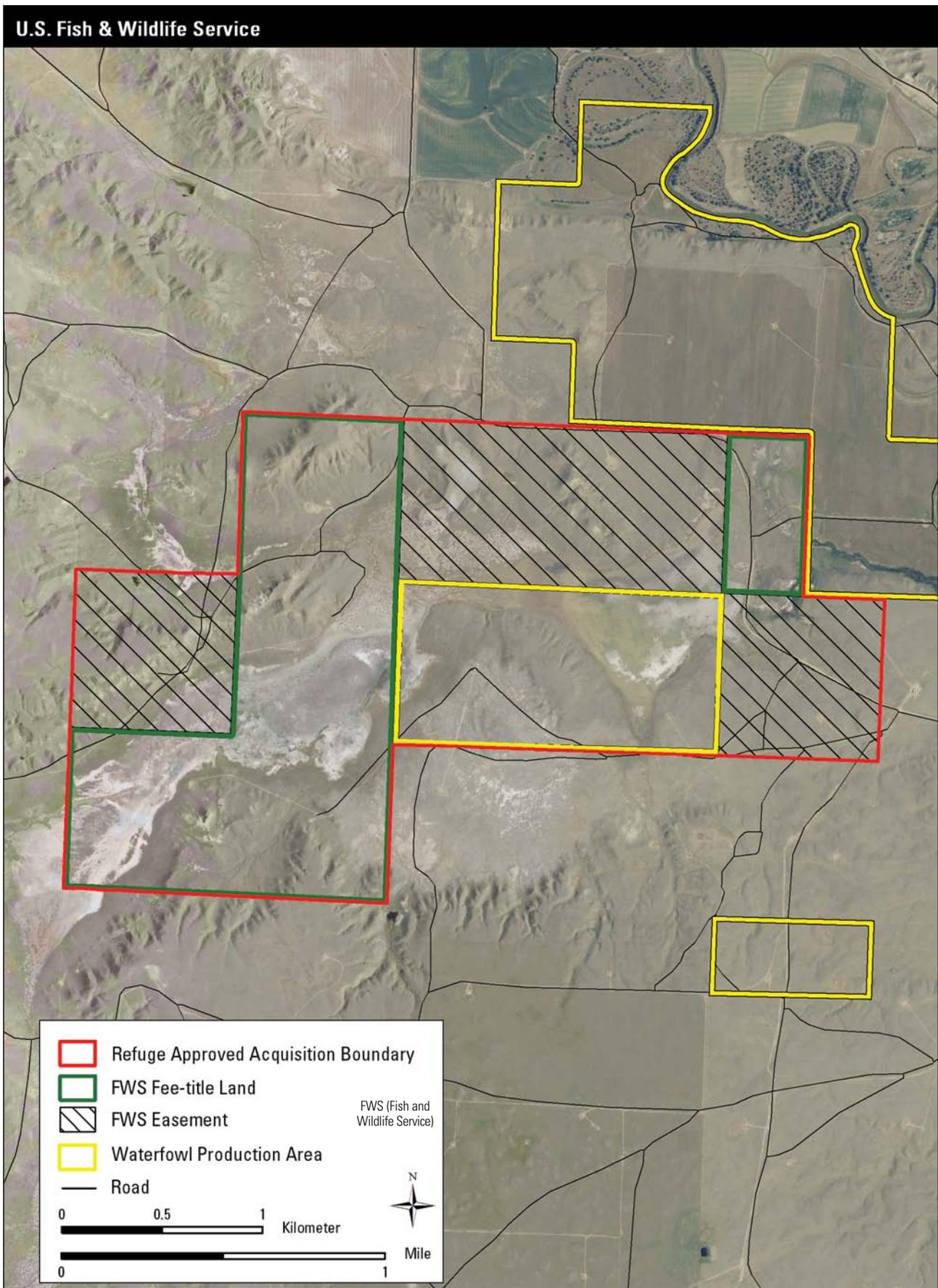


Figure 11. Base map of Hewitt Lake National Wildlife Refuge, Montana.

The Hewitt Lake Refuge lies in Phillips County, about 25 miles northeast of Malta via U.S. Highway 2 and about 1.5 miles northwest of Nelson Reservoir (created by Reclamation). The general topography is rolling, mixed-grass prairie with the major drainage running in an easterly direction. Hewitt Lake is located a short distance from the Milk River. The lake, enhanced by an earthen dam, creates a shallow 492-acre seasonal wetland. There are about 234 acres of wetland habitat on the Service-owned lands and another 156 wetland acres on private lands that are protected by Service easements. When the lake is full, it attracts migratory birds in the spring.

The uplands on both Service and private lands are primarily native prairie habitat (figure 12). The Hewitt Lake Refuge has one of two known black-tailed prairie dog towns in the refuge complex. Burrowing owls and mountain plovers have been known to nest within the prairie dog town. The uplands are also used by upland-nesting birds such as long-billed curlew, Sprague's pipit, and waterfowl.

Natural gas exploration and extraction occurs within the refuge boundary and surrounding area, contributing to habitat fragmentation and bird dis-

turbance and affecting the aesthetics of this prairie refuge. The refuge contains a large gas field in which the Federal Government owns much of the mineral rights. The Executive order establishing the refuge permitted oil and gas leasing. Specifically, the Executive order noted that the refuge land was within the known geologic structure of a producing gas field and stated that, "nothing should affect the disposition of its oil and gas deposits under the Mineral Leasing Act of 1920." In addition, at the time it was established, Interior regulations did not prohibit oil and gas leasing on refuge lands (General Accounting Office 2001).

Lake Thibadeau National Wildlife Refuge

Lake Thibadeau National Wildlife Refuge, established in 1937, encompasses 3,868.48 acres: 19.42 acres reserved from public domain (originally by the Bureau of Land Management) and 3,849.06 acres encumbered by 13 refuge and flowage easements (figure 13).



James Graham / USFWS

Hewitt Lake attracts many waterbird species, particularly white-faced ibis (foreground).

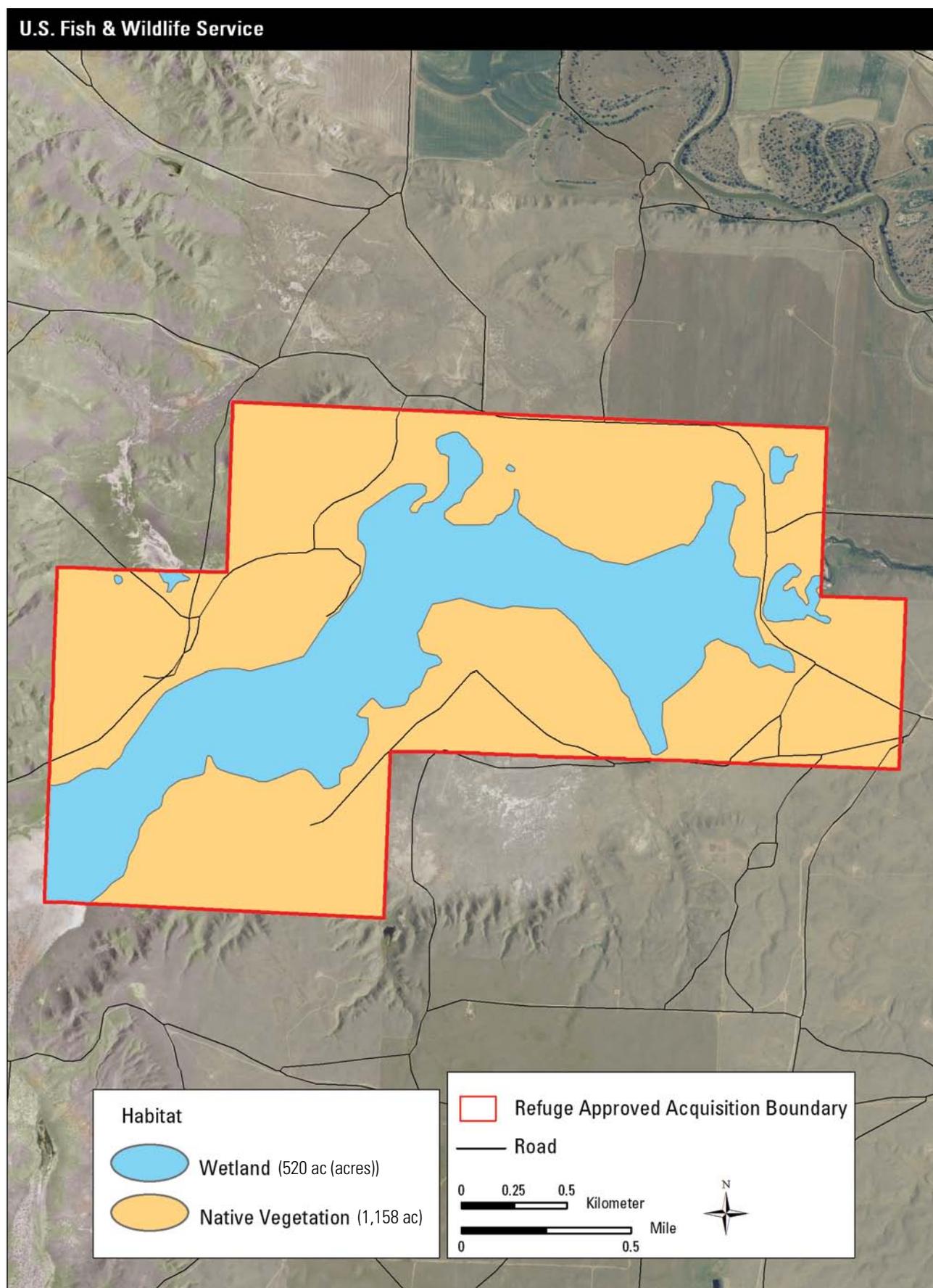


Figure 12. Map of habitat types at Hewitt Lake National Wildlife Refuge, Montana.

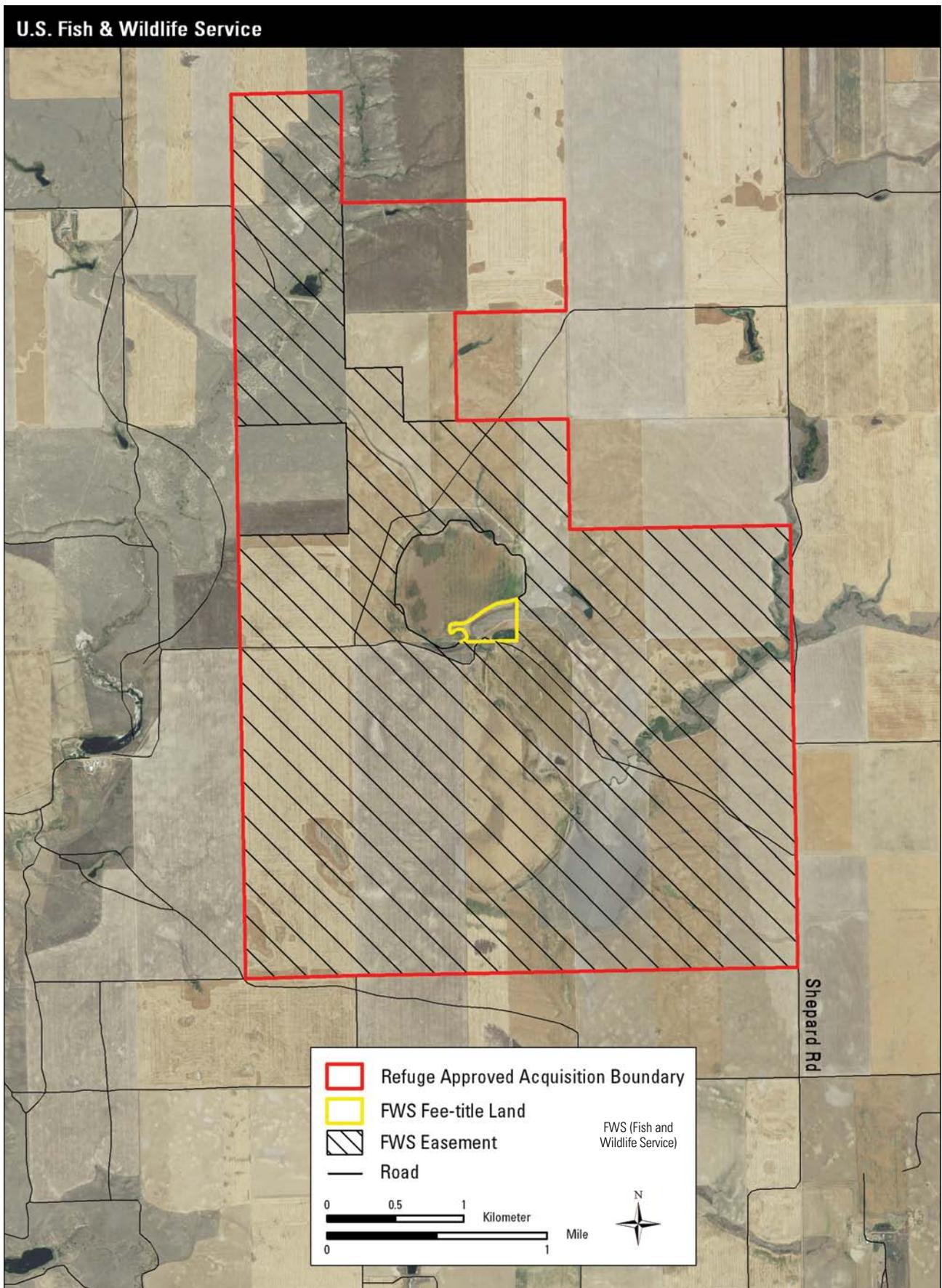


Figure 13. Base map of Lake Thibadeau National Wildlife Refuge, Montana.

The Lake Thibadeau Refuge is located about 15 miles north of the city Havre in central Hill County. The four main water units of this limited-interest refuge are Thibadeau Diversion Dam (16.4 acres), Lake Thibadeau (120.7 acres), Grassy Lake (152.4 acres), and Mud Lake (100 acres). These large wetland basins are surrounded mostly by cropland and very little native prairie. When established as a refuge in 1937, there were only 480 acres of prairie left within the refuge boundary. Over the last 70 years, there has been additional conversion of the native prairie to cropland, resulting in a loss of about 140 acres of prairie. Current cropland totals about 3,139 acres (figure 14).

Of the four refuge wetlands, only Mud Lake and the diversion unit hold any significant amounts of water. The diversion dam diverts waters from Lehman Coulee. An unnamed drainage flows from the north and east into Mud Lake; when Mud Lake reaches capacity it overflows into Grassy Lake. Water development projects in these two drainages have significantly affected the watershed above these wetland units. Lake Thibadeau and Grassy Lake are farmed every season, and Mud Lake is farmed in most years. The refuge and flowage easement does not give the Service any rights to control the uses of these uplands, including farming activities, except for the control of hunting. Lake Thibadeau National Wildlife Refuge provides only marginal waterfowl habitat, except during the wettest years. Intensive agriculture in the area is probably contributing pesticides and fertilizers to the wetlands. There is no public access to this refuge.

Natural gas exploration and extraction occurs within the refuge boundary and surrounding area. All of this activity occurs on the private land portions within the refuge boundary. The refuge and flowage easements do not prohibit these activities on the uplands. The Service controls only hunting on the uplands.

Bowdoin Wetland Management District

The Bowdoin Wetland Management District, established in 1973, is spread over a four-county area consisting of Blaine, Hill, Phillips, and Valley Counties in north-central Montana (figure 15). There are several types of Refuge System lands within the wetland management district:

- Waterfowl production areas, which are acquired in fee title
- Perpetual wetland easements, which protect privately owned wetlands from being drained, filled,

or leveled, while the landowner retains control of all public access

- Perpetual grassland easements, which protect privately owned rangeland and hayland from conversion to cropland, and the landowner retains control of all public access
- Perpetual conservation easements through the Farmers Home Administration (FmHA) to help farmers reduce their debt load on farmland and protect wetlands and grasslands

More than a million acres of potholes in the prairie States were drained between 1943 and 1961 (Briggs 1964). The Prairie Pothole Region once produced up to 15 million ducks each year but now produces about one-third that amount. This loss of habitat is the main reason for the reduced production (Belrose 1976). Other causes include the destruction of upland nest cover by the cultivation of land adjacent to wetlands and sloughs (Belrose 1976). These two significant factors led to conservation movements by citizens and pressure from waterfowl-hunting interests to reverse the loss of wetland habitat. In response to this pressure, the Service issued Duck Stamps to fund a program of wetland acquisition and the purchase of conservation easements (van der Valk 1989).

Waterfowl production areas and easements are purchased from willing sellers through the Small Wetlands Acquisition Program authorized by Congress in 1958—an amendment to the Migratory Bird Hunting and Conservation Stamp Act of 1934. This program is funded by the sale of Federal Duck Stamps and loans against future Duck Stamp sales. The purpose of this important program is to ensure the long-term protection of breeding habitat, primarily within the Prairie Pothole Region of the United States, for waterfowl and other migratory bird species.

The Service owns waterfowl production areas in fee title and manages them to provide breeding waterfowl with quality wetlands for courtship and brood rearing, as well as suitable grasslands for nesting. Habitats are managed using techniques such as prescribed grazing, haying, and fire; farming and reseeded of former cropland; and rest from crop production. These areas are open to hunting (with the exception of the Holm WPA), fishing, and trapping according to State seasons. Hunting opportunities attract hunters from across the United States and Canada.

Wetland easements are perpetual and prohibit filling, leveling, draining, and burning of wetlands under easement. Wetland easements are real-property interests that the Service buys from willing landowners and are permanent fixtures to land titles. The land remains in private ownership and the landowner controls public access. Since 1962 when the Small

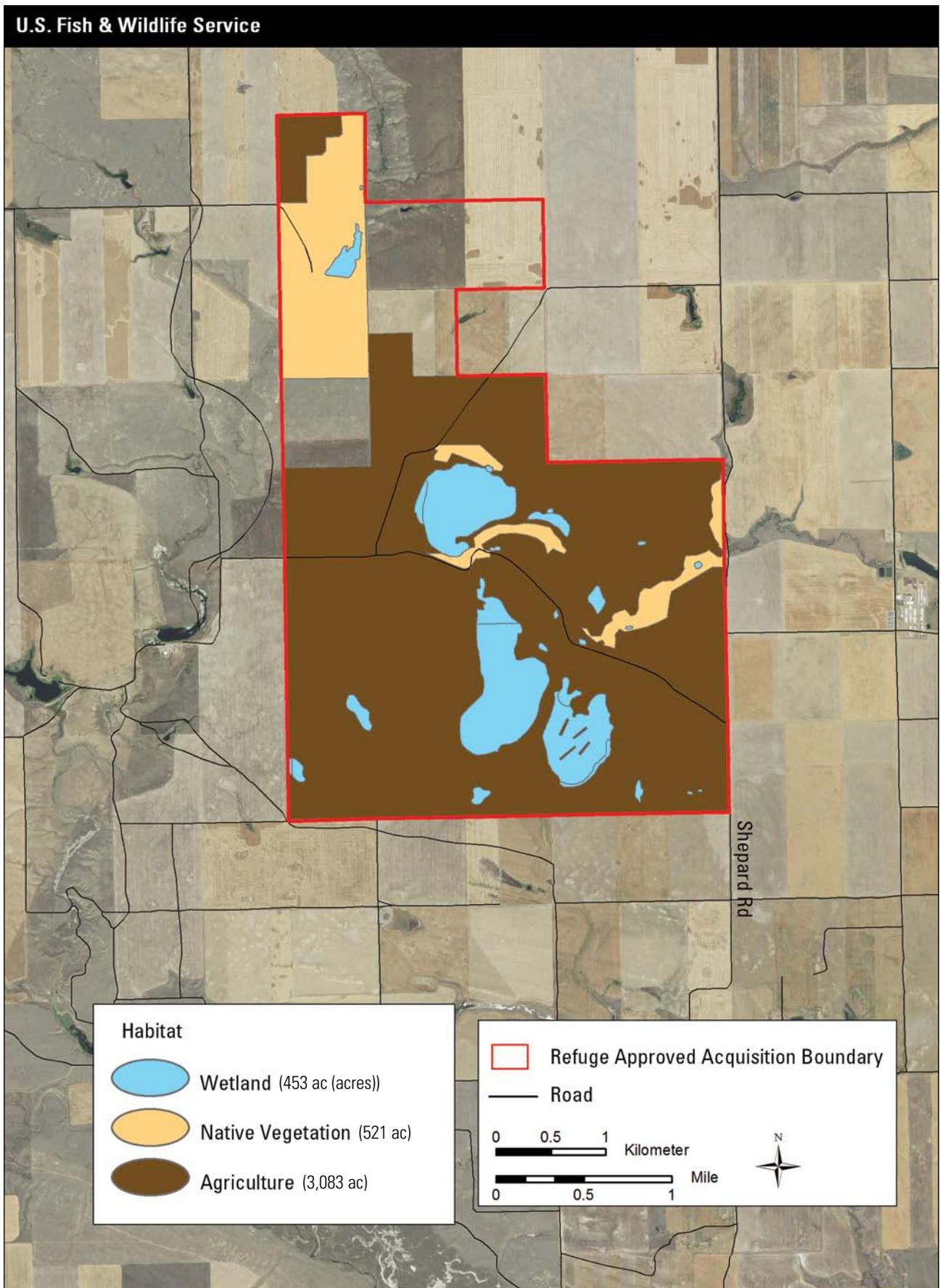


Figure 14. Map of habitat types at Lake Thibadeau National Wildlife Refuge, Montana.

Wetlands Acquisition Program began, the Service has acquired a perpetual, real-property interest in more than two million wetland acres for waterfowl production in the Great Plains States, which include Montana.

Conversion of grassland to cropland has generated a need for protection of upland habitat adjacent to wetlands. The loss of upland-nesting cover and plant foods has reduced the value and productivity of wetlands for nesting waterfowl and their broods, other migratory birds, and other wildlife. Grassland easements, like wetland easements, are perpetual and protect both existing and restored habitat. The purposes of the perpetual grassland easement program are (1) to improve and protect the water quality of wetlands, (2) maintain upland-nesting habitat for ground-nesting birds, (3) protect highly erodible soils, and (4) provide an alternative to the purchase of uplands in fee title, leaving land in private ownership. Grassland easements are real-property interests that the Service buys from willing landowners to prohibit a loss of grassland cover from cropland conversion, development, or other causes. This agreement also protects nesting birds by prohibiting haying or mowing until after July 15. The land remains in private ownership. Grazing is not prohibited or regulated under the grassland easement. Funding for grassland easements comes from a variety of sources including the Migratory Bird Hunting and Conservation Stamp Act (with Governor approval), North American Wetland Conservation Act grants, and the Land and Water Conservation Fund.

FmHA conservation easements were developed by Congress under the Consolidated Farm and Rural Development Act of 1985 to establish easements for conservation, recreation, and wildlife purposes on properties that were foreclosed on by the Federal Government ("inventories" properties). The Service was designated as the easement manager on those easements worthy of inclusion into the National Wildlife Refuge System.

As of December 1, 2009, the Bowdoin Wetland Management District included nine waterfowl production areas totaling 9,504 acres: Beaver Creek, Black Coulee, Dyrdaahl, Hewitt Lake, Holm, Korsbeck, McNeil Slough, Pearce, and Webb WPAs. Major habitat types on these areas follow: 1,390.8 acres of freshwater wetlands, 4,103.91 acres of native prairie, and 4,008.91 acres of prior cropland.

- *Beaver Creek WPA*: Located next to the Bowdoin Refuge, the waterfowl production area was purchased in 1992 and added two new tracts in 2000 and 2003. This 2,125.8-acre area consists of wetlands (325.3 acres), riparian areas (35.9 acres), DNC (1,504.5 acres), and native prairie (260.1 acres).
- *Black Coulee WPA*: This 184.8-acre area, acquired in 1982, has 49.2 acres of wetland and 135.6 acres of native prairie. This waterfowl production area

lies within the Executive boundary of the Black Coulee National Wildlife Refuge.

- *Dyrdaahl WPA*: Acquired in 1985, this waterfowl production area is 8 miles northwest of Loring in Phillips County, Montana. The 1,327.17-acre area consists of wetland (140.2 acres), DNC (800 acres), and native grassland (386.97 acres).



Dyrdaahl WPA

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- *Hewitt Lake WPA*: Of this waterfowl production area's 320 acres (bought in 1992), 120.6 acres are wetland and 199.4 acres are native prairie. The area is within the Executive boundary of Hewitt Lake National Wildlife Refuge.
- *Holm WPA*: This waterfowl production area was the first to be acquired, in 1977, and is the only waterfowl production area in the district that is closed to hunting. The property was sold to the Service by the three Holm brothers who wished to have their farm (located north of Chinook) preserved as a sanctuary for Canada geese. Habitat types on this 2,250.46-acre follow: 245.7 acres of wetlands (natural, constructed or enhanced, and prairie stream), DNC (332 acres), and native prairie (1,672.76 acres).
- *Korsbeck WPA*: Acquired in 1990, this waterfowl production area is 12 miles south of Dodson in Phillips County, Montana. The 1,041.15-acre unit consists of wetlands (203.2 acres), DNC (440 acres), and native prairie (397.95 acres). The Service also holds a State of Montana grazing lease on 320 acres of native prairie, which is managed as part of the waterfowl production area.
- *McNeil Slough WPA*: The most recent purchase in the wetland management district was in May of 2008 when an inholding (139.52 acres) on McNeil Slough WPA was acquired. These acres were added to the lands acquired in 1992, for a total size of 1,339.18 acres. The Milk River borders this waterfowl production area for 4 miles along its north boundary. It is also bordered by Big McNeil Slough to the south and Hewitt Lake Refuge to the west. The habitat types found on this area are wetland (118.6 acres), DNC (602.52 acres), and native grassland (618.06 acres).

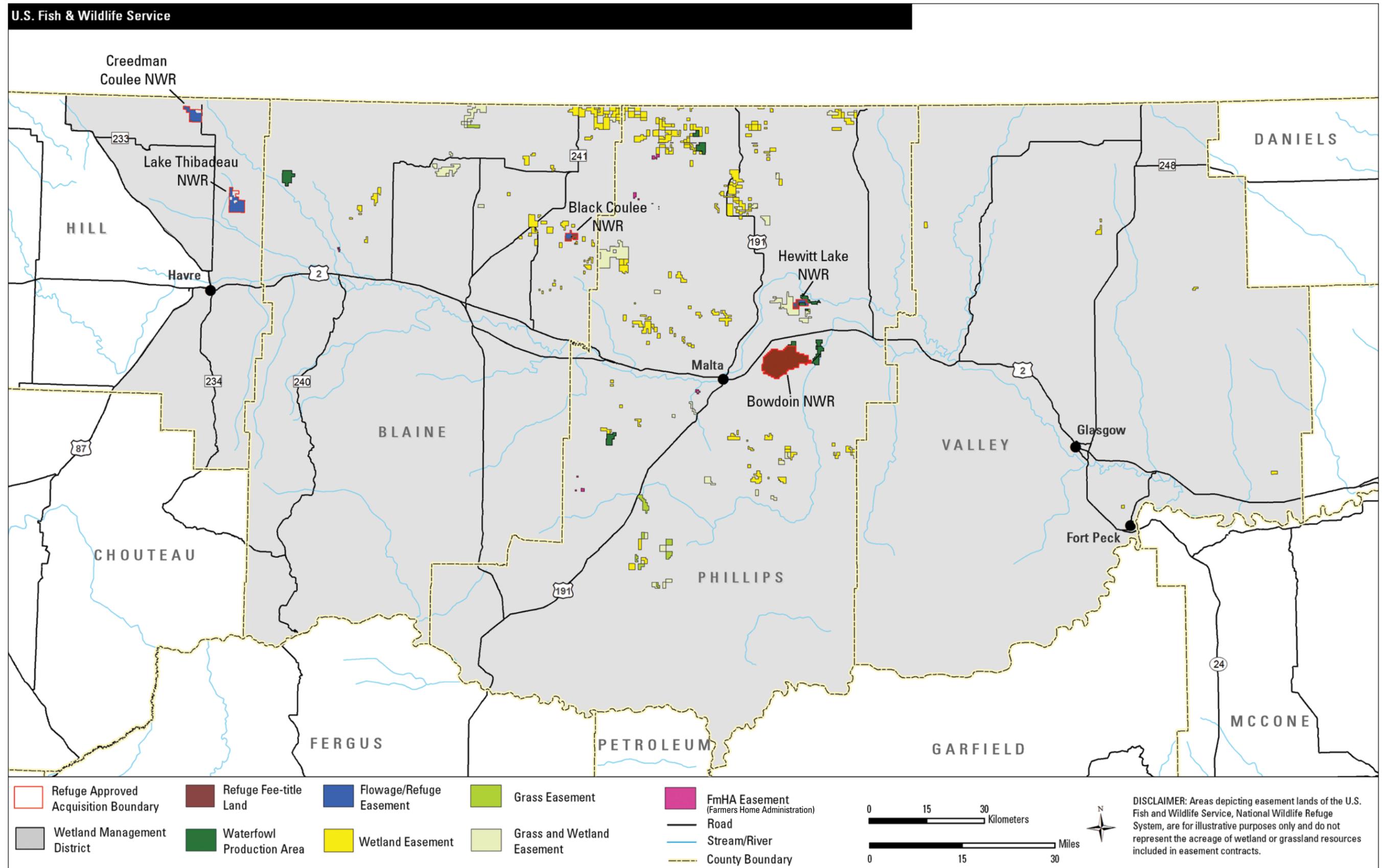


Figure 15. Map of conservation easements and waterfowl production areas in Bowdoin Wetland Management District, Montana.

- *Pearce WPA*: Purchased in 1977, this waterfowl production area is adjacent to the northeastern boundary of Bowdoin Refuge. The 438.47-acre unit contains wetland (84.4 acres), DNC (132 acres) and native grasslands (222.07 acres).
- *Webb WPA*: This waterfowl production area is 1 mile north of Dyrdaahl WPA and was acquired in 1978. The 476.59-acre area contains wetlands (67.7 acres), DNC (197.89 acres), and native prairie (211 acres).

The remaining wetland management district includes 125 perpetual wetland easements, 33 perpetual grassland easements, a 6-acre perpetual flowage easement, 4 perpetual FmHA conservation easements—totaling 958 acres—and a State of Montana grazing lease. As

of 2009, the district's easement program has protected 10,635.4 acres of wetland and 39,766.6 acres of grassland. These easement acres change frequently depending on priorities in the Service's Mountain-Prairie Region and the availability of funding from the North American Wetland Conservation Act grants and the Migratory Bird Conservation Fund.

Summary of Land Acquisition History

Tables 2 and 3 summarize the above-detailed history of land acquisition for the five refuges and one district in the Bowdoin Refuge Complex.

Table 2. Land acquisition history for refuges in Bowdoin National Wildlife Refuge Complex, Montana (1937–89).

<i>National wildlife refuge</i>	<i>Acres</i>	<i>County</i>	<i>Date acquired</i>	<i>Tract number</i>	<i>Means of acquisition</i>
Black Coulee	108.88	Blaine	05/18/1937	5M	Easement
	240	Blaine	06/18/1937	3M	Easement
	320	Blaine	06/18/1937	4M	Easement
	640	Blaine	01/28/1938	1	Primary withdrawal
Bowdoin	11,937.08	Phillips	02/14/1936	1	Primary withdrawal
	640	Phillips	06/23/1937	2	Primary transfer
	115.39	Phillips	1937–59	Various	Donations
	2,859.5	Phillips	09/20/1989	1G	Primary withdrawal
Creedman Coulee	8	Hill	05/29/1937	5F	Easement
	160	Hill	05/25/1937	6F	Easement
	560	Hill	11/15/1937	8F	Easement
	120	Hill	11/16/1937	9F	Easement
	600	Hill	11/17/1937	7F	Easement
	480	Hill	08/15/1938	4F	Easement
	640	Hill	12/10/1938	3F	Easement
	80	Hill	03/08/1939	3F–1	Easement
80	Hill	10/25/1941	1	Primary withdrawal	
Hewitt Lake	320	Phillips	04/09/1937	3F–1	Easement
	320.49	Phillips	07/03/1937	500BN	Primary transfer
	160.43	Phillips	08/03/1937	3F	Easement
	400	Phillips	03/07/1938	1	Secondary withdrawal
	160	Phillips	08/30/1938	2F	Easement
Lake Thibadeau	240.14	Hill	04/03/1937	4F	Easement
	160.15	Hill	04/10/1937	5F	Easement
	320.68	Hill	04/12/1937	6F	Easement
	320	Hill	04/12/1937	7F	Easement
	546.86	Hill	04/12/1937	10F	Easement
	153.54	Hill	04/13/1937	11F	Easement
	318.4	Hill	04/14/1937	12F	Easement
	309.06	Hill	04/19/1937	9F	Easement
	19.42	Hill	09/23/1937	1	Primary withdrawal
	160	Hill	03/23/1938	13F	Easement
	320	Hill	03/29/1938	14F	Easement
	640.23	Hill	04/04/1938	15FA	Easement
	40	Hill	04/06/1938	8F	Easement
	320	Hill	12/10/1938	3F	Easement
Total	24,817.28				

Table 3. Land acquisition history for Bowdoin Wetland Management District (1977–2008).

<i>Waterfowl production area</i>	<i>Acres</i>	<i>County</i>	<i>Date acquired</i>	<i>Tract number</i>
Holm	2,250.46	Blaine	04/19/1977	10
Pearce	438.47	Phillips	04/22/1977	10
Webb	316.59	Phillips	08/01/1978	48
Addition–1	160	Phillips	04/27/1979	20
Black Coulee ¹	184.8	Blaine	05/24/1982	35
Dyrdahl	765.35	Phillips	07/12/1985	27
Addition–1	561.82	Phillips	10/02/1989	76
Korsbeck	1041.15	Phillips	01/03/1990	75
McNeil	1,199.66	Phillips	01/10/1992	77
Burgess Addition	139.52	Phillips	05/02/2008	106
Hewitt Lake ²	320	Phillips	01/10/1992	77
Beaver Creek	560	Phillips	01/10/1992	77
Masters Addition	965.8	Phillips	08/18/2000	86
Copple Addition ³	600	Phillips	02/20/2003	90
Total	9,503.62			

¹ Part of Black Coulee National Wildlife Refuge.

² Part of Hewitt Lake National Wildlife Refuge.

³ 51 acres donated.

2.2 Purposes

Every national wildlife refuge and wetland management district has a purpose for which it was established. This purpose is the foundation on which to build all refuge and district programs—from biology and public use, to maintenance and facilities. No action undertaken by the Service or public may conflict with this purpose. The refuge and district purposes are found in the legislative acts or Executive actions that provide the authorities to either transfer or acquire a piece of land for one of these units. Over time, an individual refuge or district may contain lands that have been acquired under various transfer and acquisition authorities, giving the unit more than one purpose. The goals, objectives, and strategies in chapter 4 are intended to support the individual purposes for which each refuge or district was established.

Four of the refuges within this refuge complex are encumbered by refuge and flowage easements acquired on private lands in the late 1930s. All but one are perpetual. The Executive order or legislative purposes only apply when the Service buys the easement lands. Until that time, the only purpose for that area is the language found in the refuge or flowage easement.

Bowdoin National Wildlife Refuge

The purposes of the Bowdoin National Wildlife Refuge are:

- As “a refuge and breeding ground for migratory birds and other wildlife [...] and that such part of said lands as the Secretary of Agriculture may deem proper be reserved for use as a shooting area to be operated under a cooperative agreement or lease with the Montana State Game Commission or such other operating agency as may be approved. The reservation of these lands as a migratory waterfowl refuge is subject to the use thereof by [the Department of the Interior] for irrigation and other incidental purposes.” (Executive Order 7295, February 14, 1936)
- As “a refuge and breeding ground for migratory birds and other wildlife [...] subject to their use pursuant to the reclamation laws, and for the purpose of oil and gas development [...] and for purposes incidental thereto.” (Executive Order 8592, November 12, 1940)
- For “any other management purpose, for migratory birds.” (Migratory Bird Conservation Act)

Black Coulee National Wildlife Refuge

The purposes of the Black Coulee National Wildlife Refuge are:

- For “water conservation, drought relief, and for migratory bird and wildlife conservation purposes, [...] wildlife conservation demonstration unit and closed refuge and reservation for migratory birds and other wildlife.” (Three refuge and flowage easement agreements, 1937–38)
- As “a refuge and breeding ground for migratory birds and other wildlife.” (Executive Order 7801, January 28, 1938)

Creedman Coulee National Wildlife Refuge

The purposes of the Creedman Coulee National Wildlife Refuge are:

- For “water conservation, drought relief, and for migratory bird and wildlife conservation purposes, [...] wildlife conservation demonstration unit and closed refuge and reservation for migratory birds and other wildlife.” (Eight refuge and flowage easement agreements, 1937–39)
- As “a refuge and breeding ground for migratory birds and other wildlife.” (Executive Order 8924, October 25, 1941)

Hewitt Lake National Wildlife Refuge

The purposes of the Hewitt Lake National Wildlife Refuge are:

- For “water conservation, drought relief, flood control, stock water, migratory waterfowl and wildlife conservation purposes, [...] and operate and maintain a closed refuge for migratory birds and other wildlife.” (Revocable easement signed August 30, 1938; section 16 land [State-owned lands set aside for schools])
- For “water conservation, drought relief, and for migratory bird and wildlife conservation purposes,

[...] wildlife conservation demonstration unit and closed refuge and reservation for migratory birds and other wildlife.” (Two refuge and flowage easement agreements, 1937–38)

- As “a refuge and breeding ground for migratory birds and other wildlife [...] nothing herein shall affect the disposition of the oil and gas deposits therein.” (Executive Order 7833, March 7, 1938, applies to easements within the Executive boundary only when purchased)
- For “purposes of a land conservation and land utilization program.” (Bankhead–Jones Farm Tenant Act)
- For “use and administration under applicable laws as refuges for migratory birds and other wildlife.” (Secretarial Order 2843, November 17, 1959)

Lake Thibadeau National Wildlife Refuge

The purposes of the Lake Thibadeau National Wildlife Refuge are:

- For “water conservation, drought relief, and for migratory bird and wildlife conservation purposes, [...] wildlife conservation demonstration unit and closed refuge and reservation for migratory birds and other wildlife.” (13 refuge and flowage easement agreements, 1937–38)
- As “a refuge and breeding ground for migratory birds and other wildlife.” (Executive Order 7713, September 23, 1937)

Bowdoin Wetland Management District

The purposes of the Bowdoin Wetland Management District are:

- As “Waterfowl Production Areas subject to [...] all of the provisions of such Act [Migratory Bird Conservation Act] [...] except the inviolate sanctuary provisions.” (Migratory Bird Hunting and Conservation Stamp)
- For “any other management purpose, for migratory birds.” (Migratory Bird Conservation Act)

2.3 Vision

A vision is a concept, including desired conditions for the future, that describes the essence of what the Service is trying to accomplish. The following vision for the Bowdoin National Wildlife Refuge Complex is a future-oriented statement designed to be achieved through refuge and district management throughout the life of this CCP and beyond.

Under seemingly limitless skies, Bowdoin National Wildlife Refuge Complex provides vast expanses of gently rolling native mixed-grass prairie, dotted with an array of diverse wetlands.

Recognized as one of the most important migratory bird refuges in the State of Montana, these habitats are managed to ensure that grassland- and wetland-dependent waterfowl, shorebirds, songbirds, and native wildlife species thrive.

Visitors recognize these unique and wondrous qualities and experience a sense of solitude and a connection to the land that fosters a desire to conserve this and other remnants of the northern Great Plains.

2.4 Goals

The Service developed six goals for the refuge complex based on the National Wildlife Refuge System Improvement Act, the purposes of the refuge complex, and information developed during project planning. 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.

Goal for Upland Habitat and Associated Wildlife

Protect, enhance, and restore grassland habitat for breeding and migratory birds and other wildlife while maintaining the biological diversity and integrity of native prairie grasslands.

Goal for Wetland Habitat and Associated Wildlife

Provide, protect, and manage wetland habitat for breeding and migratory birds and other wildlife that maintains the biological diversity and integrity of prairie pothole wetlands.

Goal for Salinity and Blowing Salts

Develop a water management system on Bowdoin National Wildlife Refuge that protects the environment and mitigates current and future blowing salt concerns for neighboring properties, while providing quality water and wildlife habitat for migratory birds and other wetland-dependent wildlife.

Goal for Visitor Services

Provide visitors of all abilities with wildlife-dependent recreation, interpretation, and environmental education opportunities that foster an appreciation and understanding of the unique wildlife, plant communities, and cultural resources of the Montana Prairie Pothole Region.

Goal for Partnerships

Maintain and expand partnerships that preserve, restore, and enhance healthy and productive prairie-wetland complexes on Bowdoin National Wildlife Refuge and within Bowdoin Wetland Management District.

Goal for Operations

Prioritize for wildlife first and emphasize the protection of trust resources in the use of staff, funding, partnerships, and volunteer programs.



John and Karen Hollingsworth / USFWS

Blue-winged Teal Hen and Drake

2.5 Special Values

Early in the planning process, the planning team and public identified the outstanding qualities or special values of the Bowdoin National Wildlife Refuge Complex. These special values are characteristics and features of the refuge complex that make it special, valuable for wildlife, and worthy of refuge status. It was important to identify the special values of the refuge complex to recognize its worth and to ensure 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.

Part of a National System

The Bowdoin National Wildlife Refuge Complex is part of a national system of lands. In the 1920s, public agencies and private organizations attempted to elevate the public's awareness of wetland loss and to take positive steps to slow it. The Migratory Bird Conservation Act of 1929 authorized the Federal Government to acquire wetlands and associated uplands to conserve them as waterfowl habitat and thus create a chain of stepping stones along major migration routes. The law also established a commission of Federal and State officials to evaluate lands for possible acquisition, and in so doing it established the National Wildlife Refuge System (Adair 2003).

Migratory Birds

The lands of the refuge complex were established to protect and provide habitat for migratory birds, especially waterfowl, that cross State lines and international borders and are by law a Federal trust responsibility.

The refuge complex is located primarily in the central flyway (figure 16). This makes Bowdoin National Wildlife Refuge Complex an acutely important and strategic stopover point for migratory birds during spring and fall migrations and as resting, feeding, and nesting habitat.

In eastern Montana, there are very few natural wetlands the size of Lake Bowdoin (including the surrounding array of wetland complexes) with the necessary food and habitat resources for ducks, shorebirds, and other waterbirds. Most importantly, the refuge complex—located in the Prairie Pothole Region in north-central and northeastern Montana—has very high duck-nesting success.

The Bowdoin Refuge Complex is of such great value to waterfowl and shorebirds, as well as other migrating waterbird species, because of its diversity of wetland and upland habitats that provide for the diverse life cycle requirements of these species. In addition, the refuge complex serves as a valuable research site for the study of migratory birds, plant communities, and grassland and wetland management.

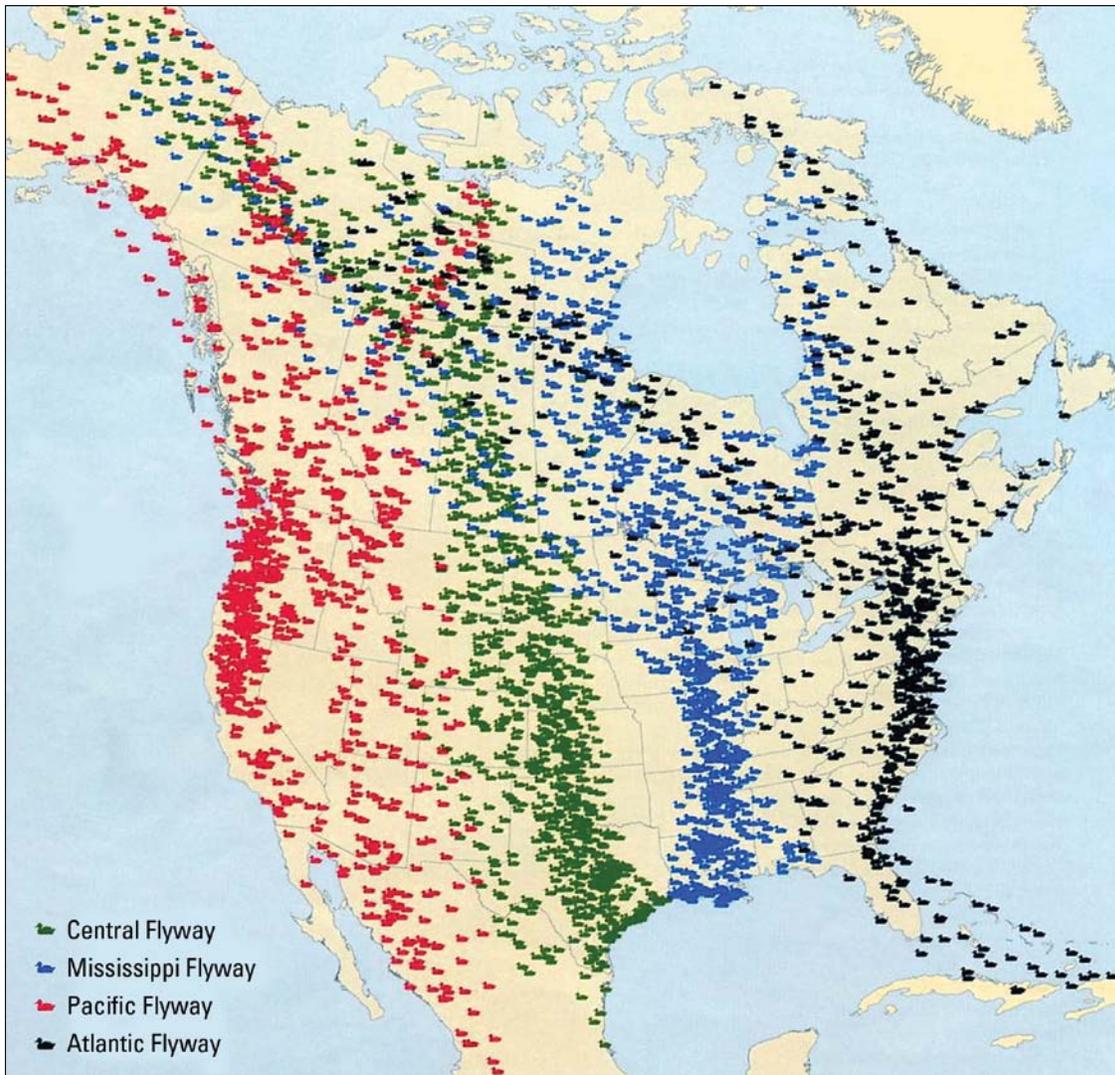


Figure 16. Map of waterfowl flyways in North America.

Prairie Pothole Region

The refuge complex is within the Prairie Pothole Region, which the North American Waterfowl Management Plan (U.S. Fish and Wildlife Service and Canadian Wildlife Service 1986) identifies as the number one priority geographical conservation area in North America.

Furthermore, the refuge complex is within the Prairie Pothole Joint Venture, which is a collaboration between agriculture groups, conservationists, and other partners to protect wetlands, waterfowl, and other wildlife. In Montana, the Prairie Pothole Joint Venture works in 21 counties (including the 4 counties in the refuge complex) that cover more than 60,500 square miles. Within this region, 27 percent of the wetlands and 50 percent of the grasslands have already been lost to drainage and conversion (Ducks Unlimited 2003).

Wetlands of the Bowdoin National Wildlife Refuge Complex provide habitat for a large variety of plants and animals including the threatened piping plover. The primary attractant is the availability of suitable habitat for food and reproduction. These wetlands are very important as areas of great biodiversity and biological productivity.

Early accounts of Bowdoin National Wildlife Refuge note its significance to waterfowl and hunters: "Lake Bowdoin, Montana's most important collective breeding-ground for waterfowl. Famed throughout eastern and central Montana since pioneer days as a hunting-ground [...] Lake Bowdoin under Federal supervision should be even more important as a breeding and feeding area for waterbirds than it has been in the past" (Weydemeyer and Marsh 1936).

At least 300 of the more than 800 migratory bird species in North America rely on the Prairie Pothole Region for breeding and nesting habitat during the spring and summer and feeding and resting habitat

during spring and fall migrations (Ducks Unlimited 2003). More than 260 species of birds depend on the refuge complex for their life cycle requirements.

Special Designations

Bowdoin National Wildlife Refuge has been designated as part of the Western Hemisphere Shorebird Reserve Network, an organization that monitors and protects key shorebird areas throughout the hemisphere. To be selected, an area must host a minimum of 20,000 shorebirds during migration.

In March 2001, Bowdoin National Wildlife Refuge was designated as a Globally Important Bird Area by the American Bird Conservancy (now managed by the National Audubon Society). The refuge was noted for its high value for the conservation of birds and bird habitats.

Native Prairie

Large, intact native prairie communities can still be found throughout the refuge complex. This is important, because 50 percent of native grasslands have been lost in the Prairie Pothole Region of Montana (Ducks Unlimited 2003). Visitors to the area can experience the vastness and big sky of relatively undisturbed prairie landscapes. Native prairie areas are important to grassland-dependent species such as black-tailed prairie dog and mountain plover, as well as other species of concern such as northern pintail, burrowing owl, and swift fox. These wildlife species favor large expanses of native prairie and are sensitive to its development and conversion to agricultural uses.

Conservation Easements

The refuge complex's conservation easement program protects existing native prairie areas and wetlands in perpetuity through the acquisition of grassland and wetland conservation easement on private lands as well as through fee-title areas called waterfowl production areas. Since April 14, 1977, the Service and surrounding landowners have protected more than 60,000 grassland and wetland acres.

Cultural History

The Bowdoin Refuge Complex has a rich cultural history of Native American inhabitants, explorers, frontiersmen, outlaws, and early settlers. Evidence of early human occupation in the State of Montana dates back 11,000 years (Brumley 2006).

The Lewis and Clark expedition traveled the Missouri River, approximately 70 miles south of Bowdoin National Wildlife Refuge, and parts of the Milk River.

Public Use

The refuge complex is valued by hunters for its quality hunting opportunities and by other visitors for its opportunities to view and photograph wildlife and their habitats.

The refuge complex attracts many visitors and tourist dollars to the communities surrounding the refuges and waterfowl production areas. Employment and nonsalary refuge expenditures (maintenance and operations) greatly benefit the local community, county, and State in the form of income, jobs, taxes, and personal spending. In Phillips County, Bowdoin National Wildlife Refuge's annual budget in 2004 generated \$806,700 in economic output, 8.6 jobs, \$411,600 in job income, and \$163,500 in taxes (Caudill and Henderson 2005).

2.6 Planning Issues

Several key issues were identified following the analysis of comments collected from refuge complex staff and the public and a review of the requirements of the Improvement Act and the National Environmental Policy Act. A public meeting, news releases in the local and regional press, a presentation to the Malta Chamber of Commerce, an announcement in the Federal Register, and planning updates were used to solicit public input on which issues the CCP should address. Substantive comments (those that could be addressed within the authority and management capabilities of the Service) were considered during formulation of the alternatives for future management. These key issues are summarized below.

Upland Habitat and Associated Wildlife

The refuge complex has outstanding ecological features and vegetation communities (previous figures 6, 8, 10, 12, 14, and 15) that should be conserved, particularly unique landforms such as the prairie potholes and the large expanses of native prairie. The prairie is considered native where the sod is unbroken and the soil composition is generally intact. Nonnative and invasive plant species may become established in these areas, but some native plants and a native seed source may still persist.

The refuge complex's primary purpose is to provide optimal habitat conditions for migratory birds and, to a lesser extent, the native resident wildlife. To achieve goals and objectives, aggressive management of upland habitat, including use of prescribed fire and treatment of invasive species, has been conducted. In addition to native prairie areas, the refuge complex also includes previously farmed uplands that have since been converted to various mixes of tame and native grasses.

Historically, the northern Great Plains was a grassland-dominated system where fire and native grazers restricted natural tree growth to riparian floodplains, wooded draws, islands within lakes, and small patches downwind of wetland edges (Higgins 1986). These large expanses of treeless prairies have been fragmented by cropland, shelterbelts, and human settlement. Grassland bird populations are declining faster and more consistently than any other group of North American birds (Samson and Knopf 1994) due to habitat fragmentation and loss of native grasslands. A growing body of literature indicates that trees in prairie landscapes, such as the nonnative Russian olive trees found throughout Bowdoin Refuge, are often associated with negative consequences to numerous bird groups including ducks (Rumble and Flake 1983, Gazda et al. 2002), wetland-dependent birds (Naugle et al. 1999), prairie grouse (Hanowski et al. 2000, Niemuth 2000, Grant et al. 2004), and even ring-necked pheasants (Snyder 1984, Schmitz and Clark 1999). These fragmented grasslands make it

easier for predators to successfully locate and capture vulnerable birds, including their nests and young. The nonnative trees also serve as perches for these predators to successfully survey these fragmented grasslands while hunting, increasing their success. Habitat loss and fragmentation has been one of the greatest threats to declining grassland-dependent birds.

Loss of Sharp-tailed Grouse Leks

A "lek" or "dancing ground" is an area used by the males of species like sharp-tailed grouse and greater sage-grouse to attract females for mating. A lek consists of bare, grassy, or sparse shrubland. Males select hilltops, ridges, or any place with a good field of view for leks, so they can see the surrounding displaying males, approaching females, and predators (Johnsgard 2002, Manske and Barker 1987, Sisson 1969). The same leks may be used year after year and may be active for decades if not destroyed by cultivation, invasion of dense woody vegetation, or tree planting. Males commonly roost overnight near the lek and, before sunrise, will move to the lek and display (strut). This will continue for a couple of hours following sunrise from March through May.

There have been nine documented sharp-tailed grouse leks on Bowdoin Refuge; however, the most leks used by sharp-tailed grouse in any one year was seven. Use of leks on consecutive years ranged from as many as 18 years to as few as 2 years. Since 1984,



USFWS

A male sharp-tailed grouse performs a courtship display at a lek.

the number of leks on the refuge has continued to steadily decline from nine known sites to one lek, and in more recent years none.

Research supports the current theory that the loss of these leks on Bowdoin Refuge is a direct result of the encroachment of trees and woody plants near sharp-tailed grouse leks.

- Gregg (1987) and Prose (1987) showed preferred lek sites by sharp-tailed grouse are characterized by low, sparse vegetation and that an excess of woody cover within 2,625 feet of the lek site (well over half a mile), has a negative effect on the number of dancing males.
- Berger and Baydack (1992) examined 21 years (1965–86) of aerial photographs of habitat around prairie sharp-tailed grouse leks; they found that leks were abandoned when aspen forest increased beyond 56 percent and prairie fell below 15 percent of the total area within 0.6 mile of the lek. In 1976, at least 12 leks existed within their study area, but by 1986 only 5 remained.
- Moyles (1981) and Swenson (1985) both concluded that the invasion of woody vegetation and trees into leks also caused displaying males to abandon the leks. Moyles (1981) observed an inverse relationship of lek attendance by males with an increase in quaking aspen within 0.5 mile of leks in the parklands of Alberta, Canada.
- A study by Hanowski et al. (2000) showed that active sharp-tailed grouse leks had significantly lower proportions of upland forest and brush cover types and higher percentages of native grasses than inactive leks in Minnesota. They also noted sharp-tailed grouse were sensitive to even small increases in the amount of woody vegetation and that the reduction in the population on their study area appeared to be associated with the loss of prairie habitat.

Despite the decline of the number of leks on Bowdoin Refuge, sharp-tailed grouse are observed on lands surrounding the refuge during the mating season and throughout the year. Sharp-tailed grouse use the refuge in the fall and winter months for feeding and roosting.

Water Resources and Wetland Management at Bowdoin Refuge

The principle sources of water for Bowdoin Refuge are precipitation, floodwater from Beaver Creek,

ground water seepage, delivered water from the Milk River, and irrigation return flows. The refuge relies on these sources to supply the water needed to manage refuge wetlands. The quantity of water received is dependent on both weather and the availability of water from the Milk River and, at times, irrigation water from the Milk River Project. The semiarid climate of this region provides just over 12 inches of precipitation annually and an annual evaporation rate of more than 2 feet. Subsequently, the refuge is more reliant most years on delivered water from the Malta Irrigation District.

Through an MOA, Reclamation allows the refuge to use its allotted water supply of 3,500 acre-feet from the Milk River, which is delivered to the refuge by the Dodson South Canal. The Service pays an operations and maintenance fee to the Malta Irrigation District for every acre-foot of water delivered to the refuge. During drought years or low-water years when there is insufficient water to meet the needs of all users, the refuge water supply is reduced along with that of all other irrigators. Nevertheless, the original purpose of the Milk River Project was for irrigation, and many people consider any irrigation water used for wildlife purposes as secondary to irrigation purposes.

In some years, the refuge receives only the 3,500 acre-feet and only if sufficient water is available to all irrigators. This minimal water supply is insufficient to properly manage all wetlands as well as manage the refuge's salinity problem. For example, Piping Plover Pond, a wetland developed specifically for the threatened piping plover, is unable to be flooded in most years. With the current water transfer system, the wetlands in line before Piping Plover Pond must be sufficiently flooded before transferring water to this wetland. This pond remains dry and unavailable as nesting habitat for the plover in many years because of the refuge's limited water supply.

The preferred period to deliver water to provide wetland habitat is in the early spring and before the arrival of waterbirds. In some years, it is necessary to deliver water to wetland units during late summer (at the end of the irrigation season and when the chance for a botulism outbreak is minimal) to provide migration habitat for the following spring and also to provide waterfowl-hunting opportunities on Lake Bowdoin and Drumbo Pond during the fall. Although this is not the preferred method to manage refuge wetlands, the Service bases its decision on climate conditions at the time, weather forecasts for the following season, and the possibility that there may be very little or no water available to provide wetland habitat the following spring.

Water is moved through the refuge using a series of canals and water control structures. The refuge attempts to mimic natural wetland cycles—flooding during the spring and drying throughout the

summer—to provide quality habitat for nesting and migratory waterbirds and other wetland-dependent wildlife. However, on average, the refuge is unable to flood and properly manage all its wetlands using its annual water supply alone.

In wetter years, additional water may be available for purchase from the Malta Irrigation District over the 3,500 acre-feet. The refuge does pay for this added water supply, but money targeted for purchasing water has been static, making it difficult to get the added water needed to properly manage wetland habitat.

Salinity in Lake Bowdoin and Blowing Salts

The most significant issue addressed through the planning process was the salinity and blowing salts at Bowdoin Refuge—a direct result of the “salt balance,” which is the relationship between the salt entering the refuge compared to the salt leaving the refuge. For many years, the amount of salt entering the refuge has been, and continues to be, far more than the amount of salt leaving the refuge. Thus, the overall concentration of salts in Lake Bowdoin and surrounding areas such as Dry Lake continues to rise.

Increasing salinity has the potential to shift Lake Bowdoin from one that supports a diverse plant and animal community that thrives in a brackish-type system to one that thrives in a saline-type system. Such a shift could negatively affect the ability of the lake and surrounding wetlands to fully support and meet the life cycle needs of migratory birds, including waterfowl. Additionally, if no action were taken to improve water quality on the refuge, the progressively increasing salinity levels in Lake Bowdoin and the blowing salts out of Dry Lake would continue to threaten not only migratory birds but other wildlife, refuge wetlands, and, potentially, neighboring landowners and downstream irrigators.

Understanding the relationship of the salt balance is fundamental to devising a solution that not only protects and sustains refuge habitats and resources for wildlife, but also protects the interests of local farmers, ranchers, and refuge visitors. Water quantity has a direct relationship to the effect of salts carried in the water—quantity, evaporation, inflow, and outflow all contribute to the salt balance. Even with the current MOA with Reclamation for 3,500 acre-feet and with natural sources of water, the water quantity has been insufficient for supplying necessary water for improving water quality.

The out-of-balance salt situation is due to a variety of factors—many from modifications to the landscape,



Mike Artmann / USFWS

Salt residue covers Dry Lake's northern bay, which supports salt-tolerant plants like bulrush and the low-growing saltgrass.

but others are natural. These factors contribute to increased salinity levels in Lake Bowdoin by preventing natural flooding and creating a closed basin (having no water outlets):

- *Climate*—The high evaporation loss due to a harsh, semiarid climate concentrates salts in the water.
- *Geology*—There are naturally occurring soluble salts in the soil.
- *Water*—Water sources for the lake contain salts.
- *Development*—The railroad, constructed in 1887, intercepts the natural flow of floodwater from Beaver Creek, keeping the water from entering the refuge. The Dodson South Canal prevents natural runoff from entering the refuge. Surrounding lands have been converted for irrigated or dryland farming.
- *Infrastructure*—Roads, dikes, and water control structures along Lake Bowdoin and Dry Lake were constructed by the Service to hold more water. Lake Bowdoin has been converted from a flow-through basin to a closed basin.

Water Resources and Wetland Management in Bowdoin District

In the wetland management district, the Korsbeck and Holm WPAs and all of the satellite refuges have reservoirs that rely on the runoff from precipitation events to fill and maintain the wetlands. Since establishment of the satellite refuges in the 1930s, there has been extensive water development in the watersheds. Runoff is being captured or diverted up stream of these wetlands. This water once sustained the wetlands. This has resulted in a decrease in the amount of waterbird habitat on these refuges and waterfowl production areas, changing them from semipermanent to seasonal wetland habitat.

The Service uses irrigation water rights acquired with the land purchase for the Pearce, Beaver Creek, and McNeil Slough WPAs. The water is used to provide waterfowl habitat during spring and fall migration. Landowners surrounding these waterfowl production areas have expressed concern about the Service's use of irrigation water for wildlife, but the State of Montana recognizes benefits to wildlife as a beneficial use of the water.

Beaver Creek WPA is the only unit that requires monitoring of the salinity levels of water that is used in filling wetland units. The preferred time to exer-

cise the Service's water rights is during spring runoff when water quality is at its best. Filling wetlands at any other time of the year requires monitoring, and the water is not used if elevated salt levels are recorded.

Riparian Habitat and Associated Wildlife

Riparian habitat is the green area next to streams, rivers, and lakes. Riparian areas are identified by the presence of vegetation that requires large amounts of water. Within the refuge complex, this habitat occurs along Beaver Creek, which borders the east boundary of Beaver Creek WPA, and the Milk River, which borders the north boundary of McNeil Slough WPA. Beaver Creek is dominated by grasses, shrubs, and willows. The Milk River is dominated by cottonwoods and willows. Cottonwood trees are dependent on stream and riverine processes for regeneration.

Riparian habitat serves many functions including filtering sediments and nutrients, building streambanks, storing water, recharging aquifers, providing fish and wildlife habitat, and dissipating stream energy. Riparian habitats are important to a diversity of species such as neotropical birds, fish, reptiles, invertebrates, and mammals for feeding, nesting, escape cover, and breeding. Riparian areas provide economic and recreational benefits as well.

Threats to riparian areas are invasive plants, streambank erosion, and lack of cottonwood regeneration.

Wildlife Disease

Several wildlife diseases are of concern within the Bowdoin National Wildlife Refuge Complex either due to a history of occurrence or a concern that the disease could spread to the immediate area in the near future. Most of these diseases have been well documented on Bowdoin National Wildlife Refuge but have been absent or only noted incidentally throughout the rest of the refuge complex. The diseases that have had the most impact on wildlife species in the refuge complex are avian botulism, West Nile virus, and epizootic hemorrhagic disease. Little or nothing can be done to control the spread of most wildlife diseases, but all employees are required to review the refuge complex's Disease Contingency Plan so they are aware of the possible risks of handling sick or dead animals.

Avian botulism has been documented almost every year since Bowdoin Refuge was established in 1936, with losses of less than 100 birds and up to as many

as 20,000 birds. The disease is left to run its course naturally, although water management is still used to help minimize attracting birds into an affected area.

West Nile virus was first documented in the surrounding area in 2003. Although a variety of migratory birds, especially young pelicans, are susceptible to this disease, the biggest concern is for the human population. Service staff is provided with training and materials to avoid mosquito bites as much as possible. Nevertheless, in 2008, a seasonal employee was diagnosed with spinal meningitis brought on by West Nile virus.

Epizootic hemorrhagic disease has killed both white-tailed deer and pronghorn throughout the refuge complex. The disease is not contagious from one animal to another, and it is not transferable to humans. The last significant outbreak was in the summer of 2001, when the disease swept through much of the Milk River watershed, killing at least 26 deer and 5 pronghorn within the refuge complex. It occurs in the driest part of the year when conditions are just right for biting gnats, the carriers of the disease. The disease is fatal, because these animals become emaciated after they stop eating due to illness. At present, there is little that can be done to prevent or control this disease.



Bill Byrne / USFWS

The piping plover nests on open shorelines.

Piping Plover

Approximately 3,325 acres of Bowdoin National Wildlife Refuge has been designated as critical habitat for the Great Plains population of piping plover, federally listed as threatened (figure 17). However, since 2000, there have been no known piping plover nests on Bowdoin Refuge, primarily due to insufficient water supplies necessary to create attractive nesting habitat. Through partnerships with Reclamation and Ducks Unlimited, the Service created Piping Plover Pond and enhanced the habitat by adding gravel to nesting beaches and removing Russian olive trees used by predators as perches to locate and kill these threatened birds. Since piping plovers establish territories and begin breeding activities almost as soon as they arrive in May, habitat must be made available before the spring migration or the birds will simply bypass the refuge, choosing less protected areas to breed and nest. The pond has to be filled either in late fall, before the Dodson South Canal is “dewatered,” or in early spring through the Malta Irrigation District or runoff. Since this water is transported through other wetlands, no water is delivered after May 15 to prevent the flooding of over-water nesters in these other units. In most years, there is not enough water available to fill this entire system sufficient to deliver it all the way to the pond.

Invasive Plants, Nonnative Plants, and Noxious Weeds

According to the National Invasive Species Management Plan, 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). Management of invasive plants, nonnative plants, and noxious weeds has been an issue throughout the refuge complex for many years. A portion of the refuge complex’s resources are directed to control introduction and spread of these species through integrated pest management strategies such as herbicides, prescribed burning, grazing, mowing, and farming.

One of the most challenging and damaging nonnative plant species throughout the refuge complex is the Russian olive tree. This species was first planted by refuge managers in the 1950s as an ornamental for windbreaks and wildlife food and cover. Although this tree is currently not designated as a noxious species in Montana, its ability to outcompete native species and fragment habitat is well documented. As with most nonnative species, Russian olive trees have

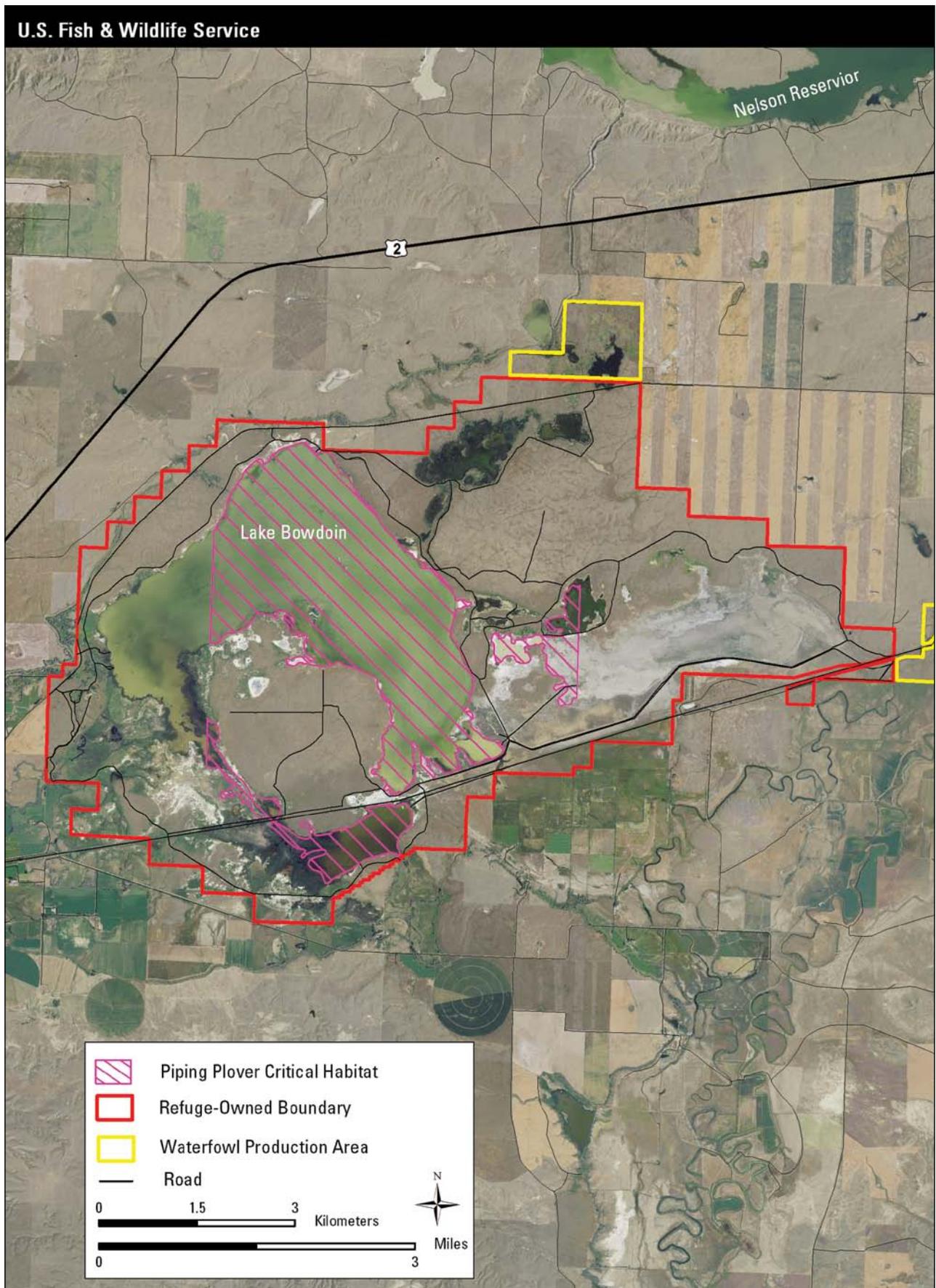


Figure 17. Map of critical habitat for piping plover at Bowdoin National Wildlife Refuge Complex, Montana.



Mike Artmann / USFWS

Russian olive trees in the upland east of Lakeside Extension at Bowdoin Refuge.

spread rapidly across the refuge complex, taking over many prairie wetland zones, drainages, water conveyance systems, and some uplands and riparian areas. Russian olive trees can outcompete native vegetation, interfere with natural plant succession and nutrient cycling, and tax water reserves. The largest infestation is on Bowdoin National Wildlife Refuge.

The areas where most of these nonnative trees now dominate were historically unfragmented, native grassland. Although these trees do provide some benefit to wildlife, particularly for food and cover in the winter, these trees and the resulting fragmentation of grassland habitat create ideal conditions for predators such as fox, raccoon, and skunks to find and kill imperiled grassland-nesting birds and their young and to destroy their nests. These trees also serve as perches for predators such as great-horned owls and hawks and for nest parasites such as brown-headed cowbirds. Many grassland-nesting birds and upland-nesting waterfowl avoid areas adjacent to trees or have lower nest success due to predation.

Crested wheatgrass is the primary invasive grass species and leafy spurge, perennial pepperweed, and Canada thistle are the primary invasive forb species. Left unmanaged these invasive plant species can have a detrimental effect on the diversity of native plants, wildlife species, and habitat quality.

New invasive species such as saltcedar and spotted knapweed pose additional threats to refuge complex lands. The best control methods for small infestations of invasive plants are early detection and a quick management response. Due to the scattered nature of land holdings in the refuge complex, this is not easily monitored or achieved.

Habitat Protection and Acquisition

Native prairie and wetland are the most productive habitat types in Montana, particularly in the Prairie Pothole Region. Although there are some laws that protect these areas, particularly wetland, these vital habitats continue to be lost. Most of these habitat types occur on private lands. The Service has committed to work with willing landowners in Montana to compensate them for protecting these habitats, primarily through perpetual wetland or grassland conservation easements. With limited acquisition funding, easements are the most cost-effective method rather than the traditional fee-title acquisition. Easements are less expensive and the landowner retains ownership, using their land much in the same way as before the easement purchase. Landowners also continue to maintain their fences, signs, and control of noxious weeds and other invasive plants. As of 2009, willing landowners have been compensated for protecting more than 50,000 acres of grassland and wetland habitat.

The easement program was developed by the Service to protect the natural resource on the landscape while minimally affecting normal farming and ranching practices. Habitat protection needs to be evaluated through a priority system so that critical areas are identified and the most effective means of protection, through either fee title or easement, can be determined.

Visitor Services

Hunting, fishing, wildlife observation, photography, environmental education, and interpretation are identified in the National Wildlife Refuge System Improvement Act of 1997 as the priority public uses that may be accommodated on a national wildlife refuge if they are found compatible with the establishing purposes. All six of these public uses are offered, to various degrees, on the lands administered by the refuge complex. Appendix B contains the required compatibility determinations for these six uses.

An estimated 25,000 visitors come to explore the refuge complex annually. This may be an underestimate given that the refuge complex is spread out across four counties, making it difficult to estimate visitor numbers. The refuge complex is located in north-central Montana, an area commonly known as the Hi-line and with one of the smallest population densities in the State. A major attraction for wildlife observers and hunters, the refuge complex is also popular with local school groups. There has never been any visitor services staff so these and other interested groups are accommodated as staff and time allows.

Bowdoin Refuge is well known by professional and amateur wildlife photographers and filmmakers; requests for expanded access to the refuge have increased over the last 10 years.

There is a general lack of understanding about the mission and purposes of the National Wildlife Refuge System and the refuge complex. Many visitors do not know they are on a national wildlife refuge. There are boundary signs and some interpretive panels throughout the refuges and waterfowl production areas and several displays in the visitor contact area, but there are opportunities to do more.

The refuge complex is starting to see an increase in visitation as the public has become more interested and educated about locating and exploring natural areas. The Service will need to address if and how to offer expanded opportunities for compatible, wildlife-dependent public use while better educating the public about the value and purposes of these lands and the National Wildlife Refuge System.

Partnerships

The Service's partners include Federal, State, and local government agencies; schools and universities; nongovernmental organizations; and individual landowners. The Service's mission is to work with others to promote stewardship activities that restore, enhance, and protect fish and wildlife habitats. Effective communication and diverse partnerships are important for the refuge complex to be able to meet

habitat and conservation goals and objectives. Furthermore, through partnerships the refuge complex has opportunities to garner support and awareness for the Refuge System and the refuge complex and to promote Service programs designed to increase habitat restoration and protection.

The activities on surrounding lands greatly affect and enhance the Service's abilities to manage its own resources. Some of the most important partnerships are with surrounding landowners, who have vast areas of intact wetland and grassland habitat that provide the greatest opportunities for habitat protection, enhancement, and restoration for sustaining migratory birds and other wildlife.

Operations

The Service is responsible for protection and management of the refuge complex's 84,724 acres spread across a four-county area. Due to the large size of the management area, limited staff and funding, and long travel times, some lands can only be inspected once a year for maintenance and management needs. Service lands closest to the refuge complex office receive the greatest attention because they are logistically easier to manage and maintain.

The Bowdoin National Wildlife Refuge Complex is responsible for maintaining a vast system of lands, roads, trails, fences, signs, buildings, and other equipment and infrastructure necessary to manage habitats and public use programs. The facilities found on the refuge complex follow:

- 137 water control structures
- 34 pullouts/parking areas
- 10 bridges
- 62 miles of roads including a self-guided auto tour (15 miles)
- Three boat launches (one handicap accessible)
- Accessible hiking trail (0.4 mile)
- 90 miles of boundary fence
- 32 miles of canals and dikes
- Two low-lift water pumps
- Five ground water wells
- 10 buildings—refuge headquarters, two residences with unattached double-car garages, an apartment

for seasonal housing with three storage bays, a building for all-terrain vehicles and equipment storage, two cold storage buildings, one seed storage building, and one shop with seven parking bays

The storage facilities are insufficient to store existing vehicles; most vehicles remain outside and are exposed to the harsh weather of this area. The refuge headquarters is sufficient for existing staff, including seasonal employees. The office areas need to be expanded if more permanent staff are added. Although recently remodeled, the bunkhouse is still not adequate to provide housing for seasonal and volunteer staff. This housing is critical to recruiting seasonal staff, because rental housing is very limited in the surrounding rural communities.

Currently, the refuge complex staff consists of five permanent full-time employees: a refuge manager, one nonsupervisory wildlife refuge specialist who also serves as the collateral law enforcement officer, a wildlife biologist, a maintenance worker, and an administrative support assistant. Since 1998, the refuge complex has lost two positions including a permanent-seasonal biological technician and a permanent-seasonal maintenance worker. The current staffing level remains well below the minimum prescribed in the minimum staffing model developed by the Service for all refuges (USFWS 2008c). The model recommends adding an additional five and one-half full-time equivalents: (1) five full-time positions—maintenance worker, deputy refuge manager, visitor services specialist, law enforcement officer, and wildlife refuge specialist; and (2) one permanent-seasonal biological science technician. Additional staff and funding is critical for implementing habitat management projects, facilities maintenance, and meeting the purposes of the refuge complex.

Natural Gas Development

Oil and gas leasing is at the discretion of the Secretary of the Interior who has delegated the Bureau of Land Management authority to administer the laws, but has by regulation restricted oil and gas leasing on lands of the Refuge System to those involving drainage (43 CFR 3101.5–1, 3100.2).

In conformance with the policy set forth in 50 CFR 27, the Service usually recommends against leasing when the Bureau of Land Management asks for comments. In the case of non-federally owned oil and gas rights, it is the policy of the Service to protect project resources to the maximum extent possible without infringing on the rights of subsurface owners.

Extraction of natural gas within the Bowdoin Wetland Management District has occurred since the 1940s (figure 18). In most cases, when the Service acquired lands through fee title or easement, the mineral rights were reserved or excepted by the landowner or the Bureau of Land Management. In the case of Hewitt Lake Refuge, the Executive order establishing the refuge notes that the refuge land was within a known geologic structure of a producing gas field. The refuge purpose states that, “nothing should affect the disposition of its oil and gas deposits under the Mineral Leasing Act of 1920.”

There are 104 natural gas wells in production status on Service-interest lands. Annual activities on these lands include mineral exploration, well drilling and maintenance, pipeline construction and maintenance, road building and maintenance, and hauling offsite of produced water. Many of these activities can fragment habitats and disturb wildlife. For example, Ingelfinger (2001), found that roads associated with natural gas development in sagebrush-steppe reduced the guild of sagebrush-dependent species such as sage-grouse by 50 percent within 328 feet of roads.

Production companies operating within the Bowdoin natural gas dome estimate that drilling is expected to last for about 10–15 years, with a project life of 30–50 years (Bureau of Land Management 2008). To minimize impacts to Service interests, the refuge complex staff works directly with the lessee or operator during exploration or extraction of private minerals. To develop stipulations and conditions of approval to minimize the impacts, the Service works closely with the Bureau of Land Management to manage leasing or leases of Federal minerals below Service-interest lands. The Service outlines stipulations for accessing extraction sites in a special use permit, which the lessee or operator signs.

Prioritization of Refuge Complex Lands

The refuge complex staff is charged with managing habitat and protecting trust resources (such as migratory birds and threatened and endangered species) on 14 different tracts of fee-title land scattered throughout a four-county area. Limited staff, funding, and other resources require the Service to set priorities for lands, so those with the greatest management potential or most vulnerable resources are recognized, protected, and enhanced.

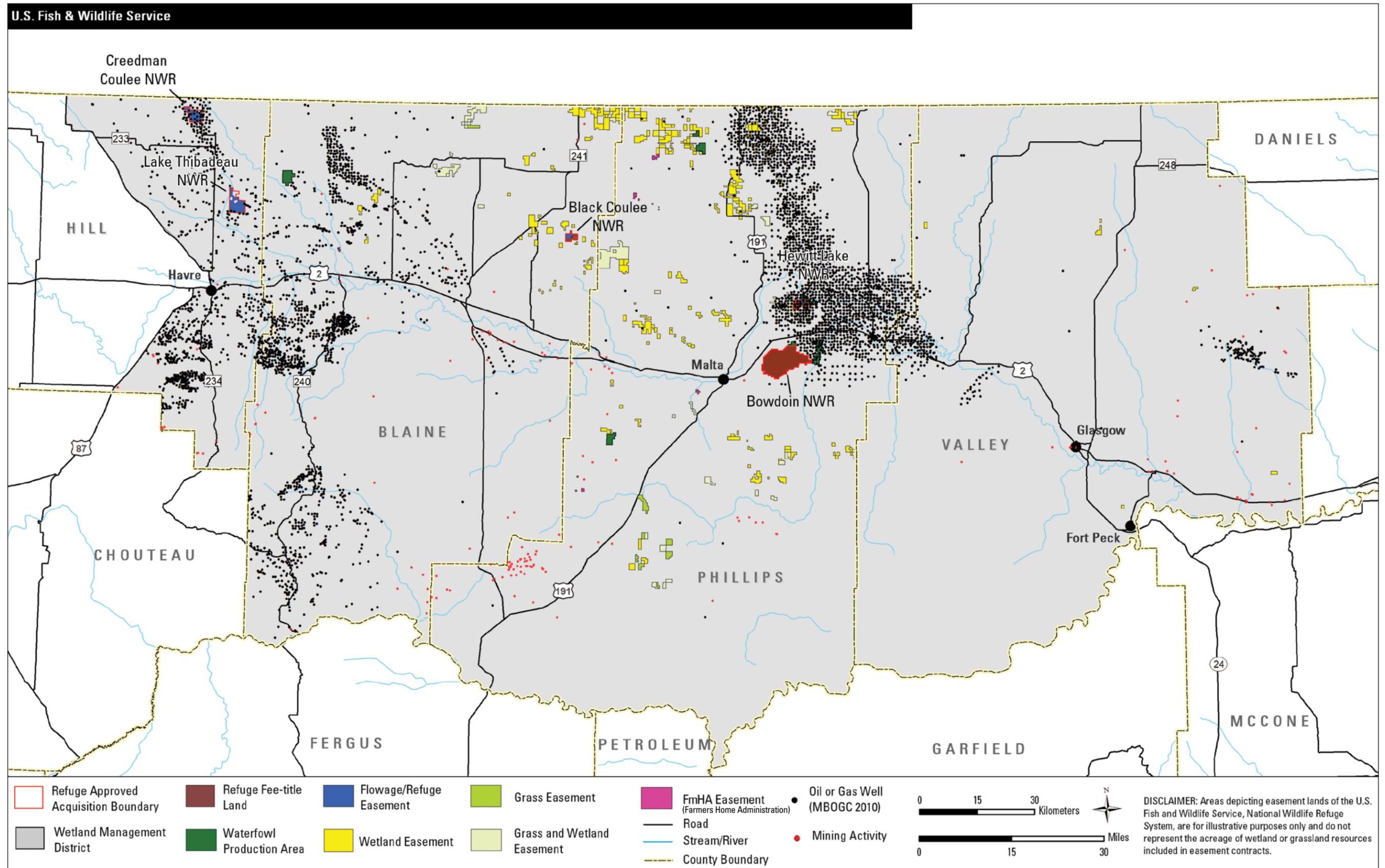


Figure 18. Map of oil and gas activities in and around Bowdoin National Wildlife Refuge Complex, Montana. Source: MBOGC (2010).

Research, Inventory, and Monitoring

In 2007, Bowdoin National Wildlife Refuge completed a 10-year study, in cooperation with the Division of Migratory Birds, to assess the productivity and habitat needs of grassland-nesting birds in the mixed-grass prairie. This research has been very beneficial to management of the Bowdoin Refuge and other grassland-nesting bird habitat.

Research throughout the Bowdoin National Wildlife Refuge Complex has been minimal and sporadic, and some past projects have not adequately addressed management issues. As a result, some current management actions are based on outside research, not necessarily designed to address critical refuge issues, and may not follow an established management plan.

Recent inventories carried out within the refuge complex include fish surveys (2000–2003), a small mammal trapping study on Bowdoin Refuge (2000), and an inventory of aquatic plants in Lake Bowdoin. Other much-needed inventories for amphibians, reptiles, vegetation, invertebrates, and invasive plants have not taken place due to lack of staff and funding.

Some limited monitoring of migratory birds (waterfowl, raptors, and shorebirds) and other wildlife (pronghorn) take place as staff availability and time allows.

Further research and monitoring to better understand the hydrologic conditions that control the chemical characteristics of Lake Bowdoin, Drumbo Pond, and Dry Lake as well as the effect of water chemistry on plant and invertebrate communities and bird physiology, would provide valuable knowledge that could be used to preserve and better manage these wetlands for migratory birds.

The Bowdoin National Wildlife Refuge Complex is responsible for controlling invasive plants on Service-owned lands within the four counties in the districts. As visitors from across the Nation and Canada come to these lands, there is a greater opportunity for transporting and introducing various invasive species from other parts of the country and Canada. In addition to educating visitors, the Service needs to monitor these lands to detect and respond to any new or expanding invasive plant and noxious weed species. The Service needs to develop a more strategic inventorying and monitoring program to prevent introduction and spread of current and new harmful species. This could be challenging given the widespread area

that needs to be monitored, combined with the limited time and staff available.

The refuge complex recently hired a wildlife biologist for the first time in many years. They will need to begin identifying the research, inventory, and monitoring needs for the refuge complex and to work with Service staff, universities, and other biologists to develop studies that benefit the refuge complex and address the wildlife and habitat goals.

Lake Thibadeau National Wildlife Refuge

Lake Thibadeau National Wildlife Refuge was established in 1937 as what the Service now calls a limited-interest refuge. During the era of water shortages, the Great Depression, and the call for conservation across the country, the United States began acquiring refuge and flowage easements from willing landowners across Montana, North Dakota, and South Dakota. In the past 70 years since these easements were first acquired, some lands have been further protected through additional easements or fee-title acquisition and have become productive, functioning national wildlife refuges or waterfowl production areas. This is not the case with Lake Thibadeau. Except for the 19.4 acres in the center of the refuge that are reserved from public domain, the remaining acres remain in private ownership.

The refuge and flowage easements give the Service the right to control hunting and trapping and the uses of the main bodies of water including impoundments, lakes, and streams, and the uses that occur on those waters. The Service was not given the right to control uses of the upland areas including farming, grazing, and development.

This refuge is in essence a working farm and ranch. Habitat loss has been significant over the decades; the refuge currently has little value to wildlife and the purpose for which this area was first established has been lost. Native prairie areas that may have existed when the refuge was first established are now farmed intensively. Due to upstream development that captures water for irrigation and stock watering, Lake Thibadeau, Grassy Lake, and Mud Lake are often dry and farmed in most years, offering limited value for migratory birds. Public use on this refuge is negligible, as permission to cross private land remains the right of the landowner. During this planning process, the Service evaluated whether to keep Lake Thibadeau in the National Wildlife Refuge System.

