

IV. Management Direction

The Complex planning team defined goals for four main categories: habitat, wildlife, cultural resources, and wildlife-dependent recreation. Objectives and strategies are further refinements of each goal. The most extensive section concerns habitat, with the assumption that good habitat management should bring a corresponding response from wildlife populations. Managing habitat is often more controllable than wildlife population management, which may be subject to regional or continental influences beyond the control of localized management efforts. For example, management for tall, dense, diverse grasslands may not bring a corresponding increase in waterfowl during a drought cycle, when these birds also are dependent on abundant wetland resources.

Goals and objectives are presented separately for Waubay National Wildlife Refuge and Waubay Wetland Management District for ease of understanding and reference. (NWR goals are designated with an “R” while WMD goals are designated with a “D.”) However, the NWR and WMD are interrelated in many ways. Waubay NWR is located nearly in the center of Waubay WMD, and its habitats and wildlife are similar. The major building facilities (headquarters, shop, storage buildings) are physically located on Waubay NWR, but most staff activities, equipment, and facilities are associated with WMD programs. At present, all staff work on both NWR and WMD activities.

The biggest concerns for the Complex include protecting remaining native prairie, increasing biodiversity by restoring tame grasslands to native species, protecting and providing habitat for waterfowl and other migratory birds, protecting and restoring wetlands, and providing increased opportunities for public use, environmental education, and interpretation. There is also a concern for native woodlands in the Complex - a little studied or understood resource in this area.

“Those who dwell, as scientists or laymen, among the beauties and mysteries of the earth are never alone or weary of life. Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts.”
Rachel Carson

Waubay National Wildlife Refuge

Habitat

- *R1 - Habitat Goal: To preserve, restore and enhance the ecological diversity of grasslands, wetlands, and native woodlands of the Prairie Pothole Region of the Great Plains on Waubay National Wildlife Refuge.*

Grasslands

According to a 1948 Refuge land use plan, much of the Refuge had been farmed or heavily grazed prior to acquisition. The dominant Refuge upland cover types are native prairie (1,109 acres) and native trees (494 acres). However, the high water period of the late 1990s inundated 941 acres of native prairie (Thanapura 1998), much of it diverse tallgrass communities adjacent to Refuge lakes. Currently, there are 1,371 acres of grassland on the Refuge, including 262 acres of tame grasses, dense nesting cover, or old alfalfa fields. Old alfalfa fields (69 acres), heavily invaded by brome and quack grass, are included in the grassland totals.

Objectives

R1.1 Annually convert up to 50 acres of tame grasses, dense nesting cover, or old alfalfa fields to native plant communities, including forbs, until reaching a total of 262 acres.

Rationale for Objective: The most abundant introduced grasses, especially Kentucky bluegrass and smooth brome, tend to be more uniform in height and density than native species (Wilson and Belcher 1989). This uniformity may produce changes in nongame bird species composition (Wilson and Belcher 1989). Conservation of grassland-dependent bird species and other wildlife depend on a variety of successional and diverse habitat conditions within a large block of grass (Skinner et al. 1984, Volkert 1992, Madden 1996). Several bird species, such as dickcissel and savannah sparrow, are most abundant in fields with a strong forb component (Sample and Mossman 1997). Forbs are also needed to provide nectar and larval host plants for butterflies. Three Refuge species considered at risk in the Dakotas (Moffat and McPhillips 1993) include the regal fritillary, Dakota and powesheik skippers. Restored native prairie tracts can provide more variety in structure, height, and species than is found in most monotypic tame stands, better emulating native prairie.

Strategies:

- Research appropriate native seed mixes and their availability, within one year.
- Prioritize areas of tame grasses, dense nesting cover, and old alfalfa fields for conversion.
- Develop management plans to monitor restored native grasslands for weeds, grassland condition, and wildlife response.

R1.2 Eliminate 95 percent of Russian olive and juniper stands and reduce by 50 percent other nonnative plants, such as leafy spurge and Canada thistle, over the next 15 years.

Rationale for Objective: For grassland obligate wildlife species, woody vegetation should cover less than 5 percent of available habitat (Sample and Mossman 1997). Nonnative junipers, Russian olives, and other woody vegetation, especially those over 1 meter (39 inches) in height in grasslands, can provide habitat for nest parasites, predators, and corridors for predator movement (Berkey et al. 1993). Removing woody vegetation can improve nesting habitat and success for waterfowl and other grassland species. Nonnative plants, such as Canada thistle and leafy spurge, have no natural controls in the United States and can aggressively invade grasslands, reducing biodiversity and structure necessary for healthy grasslands and wildlife species.

Strategies:

- Inventory and map existing distribution of nonnative plants, within 5 years.
- Use a combination of biological, chemical, and mechanical means; with an emphasis on biological control for leafy spurge.

R1.3 Within 5 years, develop and implement a Habitat Management Plan for the Refuge.

Rationale for Objective: Developing unit-specific habitat management plans will increase staff effectiveness and habitat conditions by setting priorities and ensuring actions are directed towards the most critical areas on the Refuge first. Documenting and monitoring changes improves the ability of staff to relate specific management tools to on-the-ground results.

Strategies:

- Develop individual unit plans for management, biological inventories, and monitoring activities to be carried out on each grassland unit on the Refuge. Unit plans would determine current grassland condition and decide management course of action.
- Establish monitoring criteria to evaluate grassland management techniques, within 5 years.
- Manage tame grassland sites not scheduled for conversion to natives for maximum potential height and density based on grass species involved and site conditions. Strive for two decimeters (8 inches) of total visual obstruction in mid-April, as suggested for optimal nesting habitat for waterfowl (Duebbert et al. 1981).
- Develop prescribed burn plans for all grassland units which would benefit from periodic burning.

Wetlands

During “normal” water conditions, there are approximately 1,800 acres of wetlands on the Refuge. About 12 acres were considered temporary, 90 acres seasonal, 192 acres as semipermanent, and 1,500 acres as permanent lakes. High water conditions which began in the mid-1990s have increased wet acreage (mostly lake acreage) by another 400 to 500 acres. Many semipermanent wetlands have been swallowed up and are currently included as part of Waubay Lake, which also now includes Spring and Hillebrand’s Lakes. These changes have resulted in an increase in water depths and a corresponding decrease in submergent and emergent vegetation. This means there is less feeding and nesting habitat for diving ducks and over-water nesters such as red-necked grebes, but more habitat for pelicans, double-crested cormorants, and wood ducks. It is anticipated that current high water levels will continue for at least 15 years, the life of this plan (Niehus et al. 1999, 1999a).

There are three water control structures located on the Refuge. One is completely inundated by the extreme water levels and will not be replaced or repaired when water levels recede. Another, which affects approximately three acres, is located along the entrance road and is in need of repair. It will be replaced with an ordinary culvert to reduce maintenance problems and protect the road. The third is located on Barse Slough, a 15 acre wetland on the east side of the Refuge. Some minor repairs are needed to make this structure fully functional.

Objective

R1.4 Enhance wetland conditions on 15 managed acres by allowing them to flood each spring and slowly drawing down water levels to expose mudflats and provide shallow water areas, 15 cm (6 inches), for waterfowl and shorebird feeding during spring migrations.

Rationale for Objective: Water control structures can increase the productivity of a wetland by allowing managers to change water levels to affect the types and amount of vegetation that grows in the wetland. In fact, in many wetlands, active management may be necessary to maintain desirable species and communities (Baldassarre and Bolen 1994). Managed wetlands may also be able to provide habitat that might be in short supply due to overall climatic conditions. However, there is no water source for reflooding this wetland, it is dependent on spring snowmelt and rains. Providing habitat for fall migration by drawing down in the summer and reflooding in fall would be difficult if not impossible some years. Since this structure only affects 15 acres, providing emergent cover for nesting or brooding waterfowl or other waterbirds would not affect a large number of birds. At this time, mudflats and shallow water areas are in short supply and providing this habitat during spring migration could help numerous waterbirds, especially prenesting females. Drawing down water levels will also help to concentrate macroinvertebrates and other food sources for migratory birds.

Strategies:

- Monitor site frequently to make adjustments to water level depths for optimum plant and macroinvertebrate production as determined by standard methods.
- Maintain records of responses by plants and animals to determine if changes need to be made in timing or frequency of drawdowns.

Native Woodlands

There are approximately 500 acres of native bur oak woodlands on the Refuge. The overstory consists mostly of bur oak, green ash, basswood, elm, and hackberry. The understory includes choke cherry, buffalo berry, Juneberry (serviceberry), and buckbrush. Ground cover is dominated by sedges and stinging nettle. Before the establishment of the Refuge, food plots of 10 to 30 acres in size were cut out of three woodland areas (West Woods, Centerwoods, and Clubhouse Woods). After the Refuge was established, these three fields continued to be used for wildlife food plots. Rye was planted in the fall for green browse, then plowed under in spring and planted to millet, which was left standing for wildlife (D. Okroi, pers. comm.). When waters began rising these areas were planted to alfalfa as staff realized getting equipment to these soon to be isolated sites would be impossible.

Objectives

R1.5 Restore native trees on 3 food plots of 10 to 30 acres in size (total of 50 acres) within the Refuge's native woodlands (Map 6), within 15 years, to decrease fragmentation to reduce brown-headed cowbird populations and increase woodland bird species and their nesting success.

Rationale for Objective: From 1994 to 1996 a constant effort mist netting site was set up in Centerwoods. Data collected also contributed to the Monitoring Avian Productivity and Survivorship (MAPS) program. Point counts were conducted in conjunction with the mist netting. Results averaging the 3 years of point counts showed brown-headed cowbirds were the second most abundant species observed, after red-winged blackbirds. They also made up nearly 6 percent of total captures in mist nets. Even though yellow warblers comprised 10 percent of total captures, only one hatch year bird was banded during this study period. Yellow warblers are one of the three most frequent cowbird hosts (Ehrlich et al. 1988) and the high abundance of cowbirds may be affecting yellow warbler nest success in this area. Nests that occur along forest edges and in small forest patches experience greater rates of nest predation (Wilcove 1985, Yahner and Scott 1988) and brood parasitism by brown-headed cowbirds (Brittingham and Temple 1983, Gates and Gysel 1978). Replanting the old farm fields will reduce edges and increase effective woodland size, thereby reducing negative edge effects and possibly brood parasitism.

Strategies:

- Replant old farm fields located on Headquarters, Centerwoods, and West Woods islands to native trees.
- Monitor, with point counts, changes in bird populations as reforestation progresses.
- Research appropriate methods, such as field preparation and tree species to use within 5 years.

R1.6 Develop and implement a Habitat Management Plan (HMP) for oak savannah and eastern deciduous forest types, within 5 years, to protect and sustain these important habitats for migratory birds and other wildlife.

Rationale for Objective: Few management plans have been developed specifically for Refuge woodlands, although they encompass nearly one third of upland habitats. Forest management is generally outside the scope of current staff and most of their time is dedicated to wetland and grassland habitats. Although a few prescribed burns have been executed in and around woodland areas, little is known about the effects these burns have had or how best to continue management of these areas. Consulting with people more knowledgeable in this field and developing long-term management plans can provide benefits to many species that inhabit these sites. Some woodland-dependent bird species that currently occur on the Refuge that could benefit from improved management include black-billed cuckoo, Cooper's hawk, least and great-crested flycatchers, red-eyed and warbling vireos, yellow warbler, northern oriole, and rose-breasted grosbeak.

Strategies:

- Use GIS or other methods to map forest types.
- Consult forestry experts to help formulate forestry management plans.
- Maintain 60 acres of rotating food plots (outside forest areas), annually, to reduce browse pressure on woodlands from wintering deer.
- Develop research study to determine impact of white-tailed deer to forests and possible strategies to minimize these impacts.

Wildlife

- *R2 - Wildlife Goal: To promote a natural diversity and abundance of native flora and fauna of the Prairie Pothole Region of the Great Plains on Waubay National Wildlife Refuge.*

Because wildlife populations are dynamic and can be affected by factors such as weather, disease, pollution or other factors outside of human control, the following objectives focus on increasing our knowledge of wildlife needs and monitoring wildlife populations and land use patterns in order to better direct habitat management.

Objectives

R2.1 Develop an Inventory and Monitoring Plan, within 3 years, to locate and track specific locations used by the following endangered or threatened species: bald eagle, piping plover, American burying beetle, and western prairie fringed orchid.

Rationale for Objective: The species listed above may potentially use the Refuge for some part of their life-cycles. Bald eagles were previously only seen during migration on the Refuge and in the District, but within the last 3 years, nesting pairs have been found in Roberts and Marshall Counties. Sightings of bald eagles are also becoming more common during summer months (Refuge files).

Piping plovers rarely nested in Day and Codington counties (South Dakota Ornithologists' Union 1991), with the last known nesting attempt in 1985 between North and South Waubay Lakes (SDGFP 1994). Major habitat changes have occurred since then, reducing available sand or gravel beaches preferred for nesting. However, even small reductions in water levels now can open up new nesting sites for these birds. Monitoring for these changes can help to protect future nesting pairs.

Recent trapping efforts have found American burying beetles in extreme south central South Dakota, primarily in Tripp and Gregory counties (Backlund and Marrone 1995). A trapline set-up on the Refuge in 1996 produced no American burying beetles. However, their presence cannot be ruled out without further surveys. Knowing of their presence and locations will help Refuge managers avoid adversely affecting them through actions such as prescribed burning and pesticide application.

The Western prairie fringed orchid is the only known federally threatened plant species that may be present on the Refuge. Historical locations have included sites in the Big Sioux River valley in the southeastern part of South Dakota. It occurs in moist, tallgrass prairies and sedge meadows, both of which can be found on the Complex. It appears to have been extirpated from South Dakota, but remote populations may have been overlooked as it does occur in adjacent counties of Minnesota, North Dakota, Iowa, and Nebraska.

Strategies:

- Protect Refuge sites used by endangered and threatened species.
- Monitor public use of documented sites for adverse impacts and restrict access if and when necessary to minimize disturbance and habitat degradation.
- Use appropriate management techniques and timing to help ensure continued survival of these species.

R2.2 Develop an Inventory and Monitoring Plan, within 3 years, to locate and track specific locations used by the following State species at risk: regal fritillary, Dakota skipper, and powesheik skipper butterflies; osprey; northern redbelly snake; banded killifish; and central mudminnow.

Rationale for Objective: South Dakota's endangered species law was passed in 1977 to ensure the protection of threatened and endangered species within the state. The Game, Fish, and Parks Commission reviews the list of species every 2 years with species added or deleted depending on their vulnerability, with the Game, Fish and Parks Department in charge of the protection of listed species. The South Dakota Natural Heritage Program also documents and monitors over 400 plant and animal species considered at risk in South Dakota. Ongoing monitoring is achieved through the cooperation of various agencies and individuals and helps to keep species from declining to the point where they must be listed. We can further this goal by monitoring these species as well as limiting or adjusting habitat management efforts to reduce potential negative impacts.

Certain species may also serve as indicators of the health of an ecosystem, such as butterflies. Butterflies are part of the prairie ecosystem. If these species are in trouble, other endemic (and harder to track) species may also be in decline. Tracking these butterflies and adjusting management to benefit them should benefit other prairie endemics, improve the health of the prairie ecosystem, and help to prevent the listing of these and other species that have declined due to the poor health of prairie habitats.

Strategies:

- Initiate surveys during appropriate flight times to monitor presence, abundance, and locations of at risk butterfly species.
- Protect Refuge sites where the above mentioned species are located.
- Monitor public use of documented sites for adverse impacts and restrict access if and when necessary to minimize disturbance and habitat degradation.
- Use appropriate management techniques and timing to ensure continued survival of these species at risk.

R2.3 Rewrite and update the Wildlife Inventory Plan to include methodology for a variety of surveys, increasing the number and quality of surveys of residential and migratory wildlife species, within 10 years.

Rationale for Objective: Incredible habitat changes have occurred since 1968 and 1972 when the Wildlife Inventory Plan for Waubay NWR was written and last amended. The CCP provides an opportunity to update the Plan. Better quality surveys will increase the staff's knowledge of Refuge use patterns by resident and migratory species. Past surveys have concentrated on waterfowl and deer with little effort devoted to other birds or wildlife besides casual observations. Newly developed refuge management plans and looking at regional plans developed by The Nature Conservancy, Partners in Flight, Prairie Pothole Joint Venture, and others, will help to direct which species would best benefit from monitoring. Continued participation in cooperative surveys helps to contribute to long-term national databases and a larger scale understanding of wildlife populations. These surveys can help staff understand the Refuge's role regionally, and to develop local goals and objectives. White-tailed deer populations are regulated by the South Dakota Game, Fish and Parks. Cooperation with them is essential for providing recreation and keeping deer herds in check to reduce depredation complaints and habitat destruction.

Strategies:

- Continue participation in cooperative surveys such as the Christmas Bird Count.
- Cooperate with SDGFP on deer surveys and population management.
- Review regional and national plans to help determine how to broaden surveys, for which species.
- Research and determine appropriate survey methodologies for habitats and species targeted.

Cultural Resources

- *R3 - Cultural Resources Goal: Protect and interpret significant historic and prehistoric cultural resources associated with Waubay National Wildlife Refuge.*

In 1981 a complete survey for cultural resources was conducted on the Refuge (Keller and Zimmerman 1981) as well as other partial surveys (Zimmerman et al. 1978, Winham 1983, Bradley and Ranney 1985). A total of 27 sites were found: 14 prehistoric and 13 historic. Most of the prehistoric sites consist of mounds or habitation sites from several major cultural groups, including the Plains Woodland and Plains Village cultures (Keller and Zimmerman 1981). The historic sites are mostly foundations of destroyed structures from early homesteads or farms inhabited prior to the establishment of the Refuge.

Jackson and Toom (1999) believed that Keller and Zimmerman (1981) misinterpreted the guidelines of the National Register of Historic Places (NRHP) since they believed the four major Refuge prehistoric sites were not eligible for nomination to NRHP. Jackson and Toom pointed out that NRHP eligibility was not limited to just national significance, but also can be evaluated on the basis of local or state importance (National Park Service 1998).

Historic sites, mostly old foundations, dating from around 1900, were submitted by the Service for NRHP eligibility, but were found not to be significant resources. However, the major prehistoric sites were not submitted to NRHP.

Objectives

R3.1 Within the 15 year life of this plan, locate, map, and determine NRHP eligibility of all significant historic and prehistoric cultural and archaeological resources on the Refuge.

Rationale for Objective: All sites should be relocated and reevaluated as to their current condition and protection needs. Unfortunately, some of the sites have probably been covered or partially covered by high water levels. Sites that are under water should be monitored closely for the appearance of artifacts and other important materials. Jackson and Toom (1999) believe that most of the archaeological sites should be reevaluated to determine their NRHP eligibility. Most of the historic sites are likely ineligible. The information revealed from these sites can help guide current and future management by providing a historical background of habitats, wildlife, and cultural uses which shaped this land and the changes that have occurred since then.

Strategies:

- Nominate for listing on the NRHP the four major prehistoric archaeological sites.
- Reevaluate and record the remaining documented sites to determine official NRHP status.
- Produce a cultural resource overlay for Geographic Information System (GIS) database.
- Consult with the Regional Historic Preservation Officer prior to all proposed actions.
- Monitor sites that are now under water and exposed shorelines as water levels recede for the appearance of artifacts and other important materials.
- Avoid areas of known cultural sites and potential sensitive areas when practical and mitigate any adverse effects to sites.
- Utilize standard law enforcement practices and strategies to protect cultural resources already identified and those that may be discovered where development of water control structures, wetland restorations, and other ground breaking activities will occur.

R3.2 Interpret the cultural resources of the Refuge for visitors of all ages and abilities through at least 3 exhibits within 7 years.

Rationale for Objective: Prehistoric and historic cultural sites can provide a fascinating wealth of information about the history of this area and the people and cultures that inhabited it. They help us learn how these cultures related to wildlife and the environment. Interpreting these sites will allow the public to learn more about this history and these relationships. This can often be an important step to understanding and developing solutions to current issues. Partnering with the Sisseton-Wahpeton Sioux Tribe will give a vital perspective often missing in cultural interpretation.

Strategies:

- Upgrade Refuge kiosk exhibit as advised in the 2001 Visitor Services Requirement report prepared by the regional Education and Visitor Services group.
- Upgrade Refuge visitor center exhibit as advised in the 2001 Visitor Services Requirement report.
- Investigate establishment of a cooperative interpretive site with Sisseton-Wahpeton Sioux Tribe.
- Ensure all new visitor materials and facilities reach the broadest audience possible by following the Universal Design concept.
- Incorporate interpretation of Wetland Management District cultural resources into the Refuge program, presenting a more comprehensive interpretive program.

Public Use and Education

- *R4 - Wildlife-dependent Recreation Goal: To foster an understanding and appreciation of the ecology and management of the fauna and flora and of the role of humans in the Prairie Pothole Region of the Great Plains by providing Refuge visitors of all abilities with compatible wildlife-dependent recreational experiences.*

In 1997, the National Wildlife Refuge System Improvement Act was signed into law. In addition to establishing a mission for the NWRs, it also determined that wildlife-dependent recreation, when compatible with a Refuge's purpose, are legitimate uses and should be facilitated where appropriate. Priority wildlife-dependent uses include hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation.

Hunting

Three types of deer hunting are allowed on the Refuge: archery, rifle, and black-powder rifle (or muzzleloaders). Bows and black-powder rifles are considered primitive weapons. Modern rifles are more effective for controlling herd numbers than either of the primitive weapons. Currently, no separate archery season occurs on the Refuge. Anyone with an east river or Statewide tag may archery hunt on the Refuge. In Day County, and others, there is also an antlerless deer tag offered for archery hunters. This season runs from late September through mid-January. These tags can also be used on the Refuge.

For muzzleloader hunters, the Refuge offers two 5-day seasons for any deer before the regular rifle seasons (Refuge or State). The State only offers a late December to January hunt for antlerless only deer. Since most tags are sold each season, Refuge hunts appear to be attractive to hunters.

Waterfowl hunting is not allowed on the Refuge for several reasons. Abundant waterfowl hunting opportunities exist in the six county area around the Refuge, including 40,000 acres of Waterfowl Production Areas managed by the Service, 46,700 acres of state-managed public hunting areas, and 88,700 acres of public walk-in areas, for a total of 175,400 acres. South Dakota Game, Fish and Parks realizes the need to maintain closed areas to allow migrating birds to rest during the hunting season and currently manages six waterfowl refuges closed to hunting, with Waubay NWR providing another closed area for waterfowl. The Service has developed retrieval zones on prime hunting areas along Refuge boundaries to facilitate hunting on neighboring lands.

Pheasant hunting is also not allowed on the Refuge. Waubay NWR and the immediate surrounding area is marginal pheasant habitat. In 2002, less than a dozen pheasants were found on the Refuge, numbers too low to warrant a hunt. Additionally, as with waterfowl hunting, 175,400 acres in the six county area are already open to pheasant hunting.

Objective

R4.1 Regulate hunter numbers to no more than one hunter per 100 acres of upland deer habitat to provide safe, quality, deer hunting experiences.

Rationale for Objective: Before 1939, white-tailed deer did not occur on the Refuge (Revised Master Economic Use Plan 1949, Refuge Files). Since then, deer herds have grown and have taken a toll on Refuge woodlands and surrounding lands, especially during harsh winters. The objectives for white-tailed deer hunting on the Refuge are to keep deer herds in check to protect Refuge and surrounding habitat, and to provide quality recreational opportunities. The Refuge is also used for protection and feeding by wintering deer herds. These needs must be considered when developing season lengths as well as any conflicts with other public uses, such as ice fishing. License numbers are based on past season hunting success, winter survival, herd size, and the desire to maintain a quality, uncrowded hunting experience.

Strategies:

- Work with South Dakota Game, Fish and Parks to annually evaluate permit numbers, season lengths, and types.
- Work with South Dakota Game, Fish and Parks to conduct law enforcement patrols to ensure regulation compliance and to provide a safe experience for all visitors.
- Maintain designated hunting parking areas.
- Identify areas open to hunting and inform the public about Refuge hunting regulations and access through signs, news releases, and pamphlets.
- Consider limiting the season length of the archery antlerless deer season, currently late September to mid-January, in order to make sure wintering deer herds are not overly disturbed later in the season.
- Investigate feasibility of offering hunts for people with disabilities and youth.
- Continue to promote primitive weapon (archery, black-powder rifle) Refuge deer hunts.

Fishing

Before 1997, no sustainable fishery existed on Refuge lakes. Shallowness and a tendency to winterkill prevented any sport fish populations from developing. Since Spring and Hillebrand Lakes have merged with Waubay Lake, populations of perch, walleye, northern pike, and others have grown dramatically and inhabit all corners of this 20,000-acre lake system. Some 2,500 to 3,000 acres of the Waubay Lake system currently occur within Refuge boundaries.

Fishing is one of the priority public uses as outlined in the Refuge Improvement Act of 1997. However, all uses must be considered compatible with the mission of the System and the Refuge's purpose, namely "a refuge and breeding ground for migratory birds and wildlife." The productivity, abundance, and distribution of waterbirds can be impacted by fishing activities (Bell and Austin 1985, Edwards and Bell 1985, Cooke 1987, Bouffard 1982). Waterfowl tend to be wary of any disturbance, especially that associated with loud noise and rapid movement (Korschgen and Dahlgren 1992). Cooke (1987) also found that anglers on shore or in a boat tend to fish the same areas that birds favor, namely shallow, sheltered bays and creeks. Johnson (1964) also found that breeding, feeding, or resting waterfowl will be disturbed often by anglers in boats or on shore. Human disturbances to breeding waterfowl can affect numbers of breeding pairs, cause increased desertion of nests, reduce hatching success and decrease duckling survival (Korschgen and Dahlgren 1992, Beard 1953, Barngrover 1974, Jahn and Hunt 1964, Keith 1961). Migrating birds may also be negatively affected by increasing energy expenditures and depleting fat reserves and prolonged disturbances can ultimately affect migration patterns (Evenson 1974, Heitmeyer 1985, Korschgen et al., 1985). Recreational activities can also have detrimental effects on plants (both on and offshore) and water quality (Liddle and Scorgie 1980).

Shoreline fishing offers several problems in addition to waterfowl disturbance. There is only one area accessible to the public for shoreline fishing, the headquarters road. Large numbers of vehicles would park along this road due to a lack of parking areas. To build more parking areas would necessitate destroying native prairie. Secondly, this road would be very susceptible to damage from vehicles being parked on the shoulders during wet conditions. This road is vitally important since it is the only link to the outside for all the facilities and equipment housed at the headquarters area. Erosion and ruts are difficult to repair. A third issue is safety. Anglers parking along the headquarters road would need to make their way across about 30 feet of slippery boulders to reach the water's edge. Injuries are inevitable. During the winter, these boulders are usually snow-covered, providing a good ramp down to the ice. Once on the ice, there is no need to hop from boulder to boulder like there is during the summer. Fourth, shoreline fishing would conflict with birders who use the headquarters road for this activity, and because fishing would likely scare the birds away from the area. Lastly, there are literally hundreds of good fishing lakes in northeastern South Dakota.

Because fishing and other recreational activities can disturb waterfowl, the Service has determined that boating and spring and summer fishing activities on Waubay NWR would interfere with breeding and migratory birds and is not compatible with Refuge purposes.

Objective

R4.2 Provide unique ice fishing opportunities during daylight hours and without the use of vehicles, including snowmobiles, on Refuge lakes from the end of deer firearm seasons (early December) to ice-out.

Rationale for Objective: Wildlife use of the Refuge is more limited in winter months. Since there are fewer direct impacts with wildlife, especially waterfowl, ice-fishing is deemed compatible with Refuge purposes. Limiting ice fishing to day-use only and not allowing vehicles (including snowmobiles) on the ice reduces disturbances to wintering deer. It also provides a unique experience for the user; one that is not marred by the view of numerous vehicles, permanent ice shacks, or excessive noise. This helps to preserve the wild and peaceful nature of the Refuge setting.

The current fishery is opportunistic due to current water conditions, as explained above. No efforts will be made to sustain this fishery on the Refuge once water levels begin to decline. Spring and Hillebrand Lake will eventually separate from Waubay Lake and each other at some time. When this occurs, shallow waters and winterkill will, again, likely prohibit a viable fishery on the Refuge. The Service will not take means, such as fish stocking and storing water to keep lake levels high, to maintain the fishery.

Strategies:

- Maintain ban on vehicles, overnight shacks, and night fishing.
- Continue use of “Youth Ice Fishing Day” to teach methods and ethics of ice fishing to area children.
- Work with South Dakota Game, Fish and Parks to conduct law enforcement patrols to ensure regulation compliance and to provide a safe experience for all visitors.
- Identify areas open to fishing and inform the public about Refuge fishing regulations and access through signs, news releases, and pamphlets.

Environmental Education

Environmental education programs are offered on a case-by-case basis, when requested and if staff are available. This often limits the number of groups that can be accommodated. A new program called “1-2-3 To The Refuge” was developed in 2001 to bring all first, second, and third graders in Day County to the Refuge to learn about a variety of environmental subjects. It is hoped this program will be expanded to include other counties in the District as well.

Objective

R4.3 Improve the environmental education program by doubling the number of students reached on the Refuge from 300 to 600 in the next 5 years.

Rationale for Objective: Although the Refuge is within 30 miles of six schools, few educators take advantage of the resources the Refuge has to offer. Oftentimes, teachers do not feel they have enough information to lead an educational program. Developing and implementing educational programs that may be used with or without refuge staff assistance may encourage more teachers to use the Refuge for science and environmental based curricula.

Strategies:

- Develop educational packets about Refuge habitats that can be used by educators during Refuge field trips with minimal staff assistance.
- Conduct one teacher workshop, annually, to prepare them to lead environmental education programs for their students.
- Seek partners and explore development of an environmental education center for programs and student research, either on the Refuge or nearby.
- Continue development of “1-2-3 To The Refuge” to include 43 schools in the six county area and reach a wider audience of first, second, and third grade students.
- Conduct or host as least 10 schools and group tours on the Refuge per year.

Wildlife Observation, Wildlife Photography, Interpretation, and Community Involvement

The Refuge has a number of trails, signs, exhibits, and other visitor use facilities. Some are adequate, but most could use some updating or expanding to improve visitor experiences and Service messages. Currently, interpretive kiosks with leaflet dispensers are located at Headquarters and the Observation Tower. Although these are good locations, visitors must drive 1.5 miles into the Refuge before finding them. Providing an orientation kiosk near the entrance would greatly improve visitor orientation to Refuge lands. Interpretive panels for the existing kiosks were developed in the 1980s or earlier. Many have outdated information and do not reflect current Service messages or standards. Oftentimes, these are the only messages the public sees, especially during weekends when the office is closed. These panels need to be updated to better educate the public about current issues or problems.

Many visitors come to the refuge hoping to get out of their cars and do some exploring. Two walking trails are available during daylight hours. One is about ½ mile long and is located near the Headquarters building. A portion of this trail is accessible to persons with disabilities. The other trail travels approximately ¼ mile up a small hill to a view of Spring Lake and native prairie. Both trails include interpretive signs. Possible locations for longer trails include Headquarters Island to the west, West Woods (when water levels recede), and/or a grassland trail on the east side of the Refuge. The Headquarters Island also offers the opportunity to develop a short boardwalk and viewing/photography blind near a wetland with wonderful wildlife viewing potential.

Another potential trail site should be considered in the long-term future. Day County 3A is a north-south county road which cut across the western edge of the Refuge. Currently, this road is completely inundated within Refuge boundaries. When water levels recede - which may take 10 to 15 years - Refuge staff would consult with Day County officials to ask them to consider not reconstructing this gravel road, but to use it as a biking, hiking, or unimproved auto tour route. This would help to retain the remote and wild nature of the Refuge and could increase tourism by offering unique opportunities for wildlife observation and wildlife photography.

Half of the Headquarters building is used for office space, the other half for visitor use and interpretation. Even with movable exhibits, this space begins to feel quite crowded with 20 to 30 people. This limits the ability to present programs, or host open houses or meetings where more than 30 people are expected. Staff generally make use of facilities off-Refuge for events that draw larger crowds, but this is inconvenient when staff would like to use the Refuge for part of the program or allow visitors to explore the Refuge after the program. Constructing additional space for public presentations, meetings, and interpretive programs would give staff more flexibility when developing or hosting such events.

Objectives

R4.4 Expand and improve Refuge access, programs, and public use facilities to better accommodate visitors of all abilities and ages in their use of the Refuge, increasing potential for use by 5,000 people, within 7 years.

Rationale for Objective: While a variety of visitor facilities currently exist at the Refuge, the value and quality of the visitor experience could be improved through the development of additional facilities planned utilizing universal design principles which allow access by visitors of all ages and abilities. In addition, many facilities and signs need to be updated to present a better image of the Service to the public and enhance their visit to the Refuge.

Strategies:

- Develop a kiosk near the Refuge entrance to provide visitor information and orientation to Refuge lands.
- Update existing kiosk interpretive panels to reflect current Service messages and standards as advised in the 2001 Visitor Services Requirement report prepared by the regional Education and Visitor Services group.
- Develop one or two longer hiking trails with an observation blind to provide more opportunities to experience Refuge habitats and wildlife. Make part or all of these trails accessible to people with disabilities.
- Explore development of a low impact trail system (walking, biking, or unimproved auto tour route) on Day County 3A (currently inundated) in conjunction with Day County officials to offer additional wildlife observation opportunities.
- Construct additional space at headquarters to be used for public presentations, meetings, and other interpretive programs.
- Ensure all new visitor materials and facilities reach the broadest audience possible by following the Universal Design concept.

R4.5 Develop 5 public outreach programs to foster public appreciation for the resources of the Refuge to gain support from individuals and groups that can help the Refuge achieve its goals.

Rationale for Objective: In order to achieve many of the Refuge's goals, community support and involvement are needed. Getting local communities and people involved in Refuge goals promotes a sense of ownership, and local communities often benefit from the increase in tourism. Currently, one or two special events are offered each year, usually National Wildlife Refuge Week and the Christmas Bird Count. Presenting additional programs throughout the year will help to bring visitors to the Refuge and foster a greater appreciation for the resources Refuges have to offer, especially for public use and education.

Strategies:

- Develop a Refuge Friends Group within 5 years.
- Involve tourist boards and Chambers of Commerce in program development and promotion.
- Develop and implement at least four special events annually, such as National Wildlife Refuge Week, National Wildlife Week, Migratory Bird Day, National Fishing Day, Christmas Bird Count, bird-watching events, etc.
- Inform local wildlife and community groups once a year about the importance and economic benefits of the Refuge, Refuge activities, management, and issues.
- Visit with congressional offices annually to keep them up-to-date on Refuge activities, management, and issues.
- Maintain a Waubay Complex website with current information.
- Host a Refuge Open House every year.
- Write 10 news releases for local and state newspapers annually. Conduct television and radio spots upon request.

R4.6 Within 5 years, develop and promote an active volunteer program to recruit 20 volunteers contributing 500 hours per year to enhance the Refuge's ability to meet goals and objectives.

Rationale for Objective: Many opportunities to promote the Refuge are missed because of a lack of dollars or staff. An active volunteer program can help recoup these missed opportunities and turn them into achievements. Developing and promoting an active volunteer program would help accomplish some of these goals without the need to hire additional staff. It would also help build local support for the Refuge as volunteers share their positive experiences with others in the community.

Strategies:

- Develop a Refuge Friends group to help organize and recruit volunteers.
- Work with the South Dakota Volunteer Coordinator to develop a volunteer program to meet Refuge needs.
- Provide room and board for volunteers while they are working on the Complex.
- Develop two trailer pads for volunteer use.

Waubay Wetland Management District

The Service has varying amounts of influence on lands within the Wetland Management District. These lands include Waterfowl Production Areas; grassland, wetland, and conservation easements; and private lands. WPAs are owned in fee-title and can be directly manipulated to benefit wildlife. The various easement programs provide protection for their respective habitats but ownership and management ultimately rests with the landowner. The Partners for Fish and Wildlife Program was developed specifically to provide technical assistance and often cash incentives for landowners eager to improve their own lands. WMD goals seek to address the land as a whole while working within the constraints of these differing landownership (and management) classes.

Habitat

- *D1 - Habitat Goal: To preserve, restore, and enhance the ecological diversity of grasslands, wetlands, and native woodlands of the Prairie Pothole Region of the Great Plains on the Waubay Wetland Management District.*

Grasslands

The Great Plains of North America once covered over a million square miles through the center of the continent. Tallgrass prairie comprised the eastern third of this vast ecosystem, covering almost 200 million acres. An extraordinary biodiversity developed from complex interactions between animals, soils, plants, climate, and fire. The loss of natural disturbances, fragmentation, and increased invasion of nonnative species has rendered the tallgrass prairie region one of North America's most endangered ecosystems (Noss et al. 1995).

The six counties of northeastern South Dakota encompasses 3.4 million acres, half of which has been converted to cropland. Of the 1.3 million acres of remaining grasslands, approximately one million acres is considered native prairie. This "native" prairie is defined as grassland that has never been plowed, but all plant communities have been altered from pristine conditions, to some extent, due to nonnative plant introductions, livestock grazing impacts, lack of fire, and other factors since European settlement. It is safe to assume that few, if any, native grasslands retain the species composition, number of species, or structure of the original grasslands encountered only 150 years ago. Even so, there are at least 300 species of plants, 113 species of butterflies, 35 species of reptiles and amphibians, 60 species of mammals, and 260 species of birds known to breed in or use tallgrass prairie in North and South Dakota (USFWS 2000).

The following objectives work together to make an effect on a landscape scale - to stem the loss of grasslands to reduce fragmentation, protect remaining tallgrass prairie, and restore some of the lost natural ecosystem processes and biodiversity.

Grassland Preservation Objectives

D1.1 Preserve, on average, 10,000 acres of grasslands annually for the benefit of waterfowl and other grassland-dependent wildlife.

Rationale for Objective: Today, less than 4 percent of the original tallgrass prairie remains (Steinauer and Collins 1996). As the average prairie size has diminished from 1,000,000 acres in 1790 to today's 40 acres, biodiversity has been reduced (Apfelbaum and Chapman 1996). These smaller, isolated tracts are less complex and, therefore, less able to renew themselves or respond to changes in the environment. These grasslands continue to disappear. USDA data compiled by the USFWS showed that 700,000 acres of native prairie in South Dakota were converted to crop production from 1985 to 1995 (C. Madsen, pers. comm.). More recently, the Farm Services Agency in South Dakota reported that 40,000 acres of native prairie had been plowed under for crops in 2001. At the same time, grassland-dependent bird species across the continent have shown the most consistent and widespread declines of all migratory birds (Knopf 1994). Butterflies and other invertebrates have also suffered: there are seven butterfly species of concern that occur in South Dakota (Moffat and McPhillips 1993).

This objective seeks to stem the continued losses of grasslands and associated species by purchasing grassland easements from willing sellers and with minimal fee title purchases. This objective cannot stop the continued conversion of grasslands but can protect what is still there. Since less than 3 percent of the land base in Waubay WMD is devoted to wildlife management, protecting private lands becomes paramount to restoring the overall health of grasslands and wildlife populations. Keeping land in grass cover will also help to reduce soil erosion, improve water quality, and help trap snow and rain, recharging water supplies.

Purchasing easements from willing sellers is the preferred method to protect against further loss of habitat in the six northeast counties. Ten thousand acres per year is an achievable goal although this may fall short if conversion rates continue at present levels. Easements will be selected and evaluated by tract size, percent native prairie, number of waterfowl pairs it supports, and other factors (Appendix J). Occasionally it may be advantageous to purchase a tract under fee-title to gain more control over the management and other rights. Fee-title purchases from willing sellers will be considered only for larger acreages (160 acres or greater) of exceptional habitat. Larger blocks of grassland (40 acres or greater) have been found to attract more nesting waterfowl, with increased nest success (Duebbert et al. 1981). In addition, the species richness of grassland birds is positively associated with the size of a grassland area (Herkert 1994).

Strategies:

- In easement procurement, focus on areas scoring 40 or more pairs/square mile on the Waterfowl Breeding Pair Distribution (WBPD) (Map 8) for the benefit of waterfowl and migratory birds.
- Focus on tracts exceeding threshold scores for the grassland easement evaluation worksheet. Factors evaluated include tract size, percentage of native prairie, soil capability, etc. (Appendix J).
- Enforce contract terms on all grassland easements through annual monitoring, and send reminder letters every 3 to 5 years to contract owners.
- Develop a Region-wide computerized mapping system of grassland easements, with the lead of the Habitat and Population Evaluation Team (HAPET) and the Realty Division, to greatly reduce stafftime and errors on manual mapping and facilitate information transfer to other agencies and individuals.
- Consider potential or likely ranges where remote populations of the western prairie fringed orchid might occur.
- Inform easement holders of the Partners for Fish and Wildlife program that provides technical assistance to private landowners on rotational grazing systems to provide more residual vegetation for waterfowl and other ground-nesting birds.
- Preserve unique grassland/wetland complexes by making limited (less than 500 acres annually) fee-title purchases, using Duck Stamp funds.

D1.2 Work with the Dakota Tallgrass Prairie Wildlife Management Area staff to protect 100,000 acres of high-quality tallgrass prairie in eastern South Dakota, by 2016, to ensure the future of this highly endangered ecosystem.

Rationale for Objective: The Dakota Tallgrass Prairie Wildlife Management Area seeks to preserve a total of 190,000 acres of native tallgrass prairie in eastern North and South Dakota to help maintain biodiversity and slow habitat fragmentation (USFWS 2000). Efforts will be made to cluster protected areas into 10,000 to 20,000 acre blocks. Lands will be preserved primarily through perpetual easements purchased from willing sellers.

Nearly all of the original tallgrass prairie has been lost to agriculture and other development (Noss et al. 1995). What remains, tends to be in isolated parcels, surrounded by agricultural lands. This isolation and small patch size exacerbate edge effects, pesticide and contaminant drift, infiltration of exotic species, and increases the susceptibility of prairie-dependent species to extirpation or extinction (Steinauer and Collins 1996, The Nature Conservancy 1998). Some of the largest remaining tracts of native tallgrass prairie occur on the Coteau (Leoschke 1997). This is largely due to the hilly and rocky nature of the region which lends itself more to grazing than crop production. This makes this part of northeastern South Dakota essential to the preservation of the tallgrass prairie ecosystem. This objective recognizes that Waubay WMD can play a large part in fulfilling the goals of the Dakota Tallgrass Prairie Project.

Strategies:

- Assist Aberdeen Wetland Acquisition office and Dakota Tallgrass Prairie Wildlife Management Area coordinator to locate and contact prospective easement holders.
- Recruit farm organizations, USDA, conservation groups, and others to promote grassland preservation programs.
- Assist with development and use of a Geographic Information System (GIS) mapping method to aid identification and delineation of native prairie tracts.
- Acquire a 300+ acre high quality (diverse native vegetation composition) tallgrass prairie tract, fee-title, for the perpetuation of prairie species and grassland-dependent birds. This tract could also serve as a seed source for future restorations and as a demonstration site for private, State and Federal agencies to promote current management programs and techniques.
- Cluster protected areas into 10,000 to 20,000 acre blocks.
- Develop funding sources and programs outside the Small Wetlands Acquisition Program for tallgrass prairie that often is not associated with adjacent wetlands in the Minnesota-Red River Lowlands, Lake Dakota Plain, and the James River Lowland.

D1.3 Work with partners to develop a 20,000+ acre Prairie Coteau Natural Area in southwestern Roberts County or southeastern Marshall County to protect northern tallgrass prairie habitat and to educate the public about this dynamic and rich ecosystem.

Rationale for Objective: Few people have seen an intact piece of prairie ecosystem or are aware of the complexities and interactions that make up a healthy system. The development of a large tract of prairie could be enhanced and used as a showcase for tourism, for educating landowners and school children, and as a center for research. Benefits to the landscape would include increased air and water quality, greater biodiversity, reduced soil erosion and fragmentation of habitat.

Strategies:

- Assist The Nature Conservancy (TNC) or other partners to fulfill their plan to acquire this habitat with a combination of private, State, or Federal funding.
- Assist partners with developing a land management system using grazing impacts and fire as a demonstration area for land managers on the Prairie Coteau.
- Assist partners in developing a showcase for natural prairie system to be used by the area's educators.
- Stress natural disturbance regimes, research, and environmental education programs in management of the Natural Area to benefit all preservation, restoration, and enhancement efforts for prairie on the Prairie Coteau.

Grassland Restoration and Enhancement Objectives

D1.4 Convert cropland and poor quality tame grass to diverse grasslands, emphasizing native plants, on 295,500 acres of private land and 4,500 acres of Waterfowl Production Areas, for a total of 300,000 acres, within 15 years.

Rationale for Objective: Changes made to private lands have a greater impact overall on the landscape than the smaller number of acres in public ownership (less than 3 percent of lands in the WMD are state or federally protected). Bird use and productivity are negatively influenced by cultivated lands. Despite its high availability in some areas, cropland is the least preferred nesting habitat for ducks except northern pintails (Naugle et al. 2000). Nongame bird species may also be negatively impacted by the presence of tame grasses (Wilson and Belcher 1989). Through the Partners for Fish and Wildlife and USDA programs, thousands of acres of lands could be converted to native grasses, thus stemming the continued losses of grasslands and restoring poor quality tame grasslands and croplands to higher quality native seedings. This may also ultimately help reduce global warming effects as prairie grasslands are superior carbon sinks (Seastedt and Knapp 1993).

Legumes currently used, usually alfalfa, mature about June 1; pushing this date back to August 1 would save many nesting birds. Current haying practices on private haylands involve two or three cuttings, the first usually occurring in June during the height of the nesting season. This can cause much damage to nests and is oftentimes fatal to incubating females. Native vetches can be used as an alternative to alfalfa. Canada milkvetch matures later so there is no loss of protein if cutting is delayed until after the nesting season. The addition of native forbs, such as Canada milkvetch, may assist butterfly populations by providing a nectar source during flight periods.

Strategies:

- Inventory and map existing croplands and tame grasses on the WMD within one year.
- Research appropriate native seed mixes and their availability, within one year.
- Provide technical and personnel assistance to USDA and other agencies implementing private land wildlife habitat programs such as Conservation Reserve Program (CRP), Wetland Reserve Program (WRP), Waterbank, and other set-aside programs.
- Provide financial incentives and technical assistance for landowners to reseed their croplands and low quality grasslands to native prairie communities.
- Convert croplands on acquired grassland easement properties and WPAs to native prairie communities.
- Convert 300 acres of WPA tame grasslands to native plant communities, annually.
- Manage restored native plantings on WPAs for maximum height and density, based on grass species involved and site conditions.
- Develop management plans on WPAs to monitor restored native grasslands for weeds, grassland condition, and wildlife response.
- Restore all WPA food plots to grasslands within 2 years.
- Manage tame grasslands on WPAs not scheduled for conversion to natives for maximum height and density, based on grass species involved and site conditions. Ideally, residual cover in mid-April would measure at least 20 cm (8 inches) total visual obstruction (as measured by a Robel pole) for waterfowl nesting (Duebbert et al. 1981).
- Work with partners to develop three sites demonstrating late-maturing legumes as a hay crop.

D1.5 Assist Partners for Fish and Wildlife to enhance grasslands on approximately 5,000 acres of private lands, annually, for a total of 75,000 acres.

Rationale for Objective: In northeastern South Dakota, most landowners practice season long grazing, often using the same pasture year-after-year, with no rest. Native vegetation is altered, resulting in plant species better adapted to repeated clipping or those of low stature. Certain plant species increase under these conditions while others decrease or disappear altogether. In addition, pastures grazed season long often exhibit less residual cover and higher rates of erosion than idled pastures or those under rotational systems. This type of grazing tends to have negative effects on the production of most upland nesting birds (Kirsch et al. 1978) as well as limiting maximum livestock production. The weight of beef produced per unit area can increase by 15 to 44 percent by changing to a short duration or twice-over rotation system (Hertel 1987). Monitoring of these systems can help make sure objectives for both wildlife and beef production are being met.

An evaluation of grazing systems by Barker et al. 1990 in North Dakota found that systems designed to leave more residual vegetation were more attractive and productive for nesting ducks than traditional season-long grazing systems. Their study found ducks used well managed pastures at 70 percent of the rate of idled grasslands (no grazing). Since nearly 1,000,000 acres of native tallgrass prairie remains in eastern South Dakota, mostly in Waubay WMD (Higgins et al. 2001), compared to the 40,000 acres in Service ownership, the potential impact realized by improving pastured grasslands for waterfowl and other grassland birds is clear.

Strategies:

- Provide financial and technical assistance to land owners to improve wildlife habitat on existing livestock pastures.
- Provide landowners information about the use of fire to improve wildlife habitat on livestock pastures.
- Preserve and enhance grasslands by creating small wetlands (embankment ponds) that allow farmers and ranchers to maintain their current land base in its grassland status.
- Design grazing systems that leave at least 15 cm (6 inches) of vegetative cover (visual obstruction reading) on or about June 1, during the prime nesting season.
- Monitor a subset of 10 grazing systems to determine height/density of grasslands and evaluate effectiveness of the program.
- Develop new and current partnerships (conservation districts, grazing associations, agricultural groups, etc.) to promote and monitor improved grazing practices on private land.

D1.6 Eliminate 90 percent of Russian olive and juniper stands and 45 percent of other nonnative plants, such as leafy spurge and Canada thistle, on WPAs over the next 15 years.

Rationale for Objective: In the absence of regular fire, brushy and woody species can encroach on grasslands, reducing habitat for species that depend on areas free of this type of vegetation. For grassland-obligate species, woody vegetation should cover less than 5 percent of available habitat (Sample and Mossman 1997). Junipers, Russian olives, and other woody vegetation (especially that over 1m, or 39 inches, in height) in grasslands can provide habitat for nest parasites, predators, and corridors for predator movement (Berkey et al. 1993). Removing woody vegetation can improve nesting habitat and success for waterfowl and other grassland species.

Noxious weeds, particularly Canada thistle and leafy spurge, have no natural controls and can aggressively invade grasslands. This can reduce the overall biodiversity, structure, and productivity necessary for healthy grasslands and wildlife species. Integrated Pest Management (IPM) is a multi-faceted approach to nonnative plant control that uses a practical, economical, and scientifically based combination of biological, mechanical, and chemical control methods. Oftentimes, a combination of methods is used for the most effective treatment. Promising results have been seen in the reduction of leafy spurge using biological controls, particularly *Apthona spp.* (flea beetles). USFWS will continue to urge the use of bio-controls to reduce the use of potentially harmful chemicals in the environment. Bio-control methods can also reduce landowner costs and time spent spraying chemicals.

Strategies:

- Inventory and map existing distribution of nonnative plants on WPAs within 10 years.
- Utilize a combination of biological, chemical and mechanical means, with an emphasis on biological control (especially in native grasslands) to reduce noxious weed infestations and protect biodiversity.
- Conduct annual flea beetle collections and distribute to infected areas on public and private lands to control leafy spurge.
- Promote biological noxious weed (Canada thistle, absinthe wormwood) control methods on private lands by providing insectories on Federal lands, education, and assistance to state biological control groups and landowners.

D1.7 Over the next 10 years, develop a Habitat Management Plan for the 61 Category “A” WPAs to maintain maximum vegetative cover during Spring of each year to provide waterfowl nesting cover for blue-winged teals, mallards, and gadwalls.

Rationale for Objective: Some WPAs are small and relatively unmanageable (i.e., are all water or inaccessible). Other sites have recently become unmanageable due to high water levels. In an average year and with current dollars and staff, 10 to 15 percent of uplands are managed in some form. An Integrated Habitat Management Plan will prioritize WPAs, allowing managers to better direct their time and energies to the best tracts (or those most needing management), thereby improving or maintaining what will generally be larger tracts capable of sustaining greater diversity and wildlife populations. As each WPA varies in habitat, size, landscape location, developments, or management tools that can be used, developing individual site plans will help current and future managers know what the site has for resources, problems, cooperators, past management, which management tools worked, and which did not work.

Strategies:

- Determine the level of management intensity on each WPA using the WPA Priority Management list (Appendix H).
- Develop individual WPA unit plans, based on the Priority Management List, with objectives and strategies for management, biological inventories, and monitoring activities carried out on each site. Site plans would determine current grassland condition and strive toward optimum potential condition.
- Establish monitoring criteria to evaluate grassland management techniques on WPAs, within 5 years.
- Develop prescribed burn plans for all WPAs which would benefit from periodic burning.
- Develop site plans for all existing water control structures on WPAs.
- Develop plans to incorporate mechanical (haying, mowing, cropping, cutting), chemical, biological, and grazing weed control techniques into WPA management.
- Decrease the number of Category “C” WPAs (see Appendix H) by creating five larger blocks of contiguous lands using land exchanges with South Dakota Game, Fish and Parks, private landowners, and others.

Wetlands

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin et al. 1979). It is estimated that the contiguous United States once contained 221 million acres of wetlands, just 200 years ago (Dahl 1990). By the mid-1970s, only 46 percent of the original acreage remained (Tiner 1984). Wetlands now cover about 5 percent of the landscape of the lower 48 states. One of the most productive wetland regions in the world is the Prairie Pothole Region. Containing only 10 percent of the breeding habitat in North America, this region produces up to 50 percent of the continent's waterfowl (Batt et al. 1989). It is estimated that over 19 million acres of potholes (wetlands) were once present in the Prairie Pothole Region, sometimes covering as much as 40 to 60 percent of the landscape (Framer et al. 1983). Currently, only about 35 percent of the original prairie potholes remain (USDOI 1988).

Objectives

D1.8 Preserve, on average, 2,000 acres of wetlands annually for the benefit of waterfowl and other migratory birds.

Rationale for Objective: The average size of wetlands in eastern South Dakota is only .4 acre; 72.9 percent of wetlands are ≤ 1 acre and 92.1 percent are ≤ 5 (Johnson and Higgins 1997). The small size and temporary nature of many wetlands in South Dakota makes them prime targets for drainage. Approximately 35 percent of South Dakota's wetlands have been destroyed since settlement, most in the last 60 years (Johnson and Higgins 1997). In 1981, Weller believed that all privately owned prairie wetlands in the United States would be drained by 2050. Hundreds of species of fish, wildlife, and plants inhabit or use wetlands during some part of their life cycle. More than 50 percent of the Nation's migratory bird species use wetlands for nesting, migration, and wintering (USFWS 1990). About one-third of federally threatened or endangered species require wetland habitats for their survival. These relatively rare and critical ecosystems help protect the quality of our waters by reducing sediments and erosion, and storing nutrients (Kusler and Brooks 1987, Mitsch and Gosselink 1986). Wetlands also provide flood control and recharge groundwater supplies. Wetlands would be protected primarily through purchase of easements from willing sellers, with only rare fee title purchases made for exceptional wetlands or wetland complexes in imminent threat of drainage.

Strategies:

- For wetland easements purchased with Duck Stamp funds, focus on areas ranking 40 pairs/square mile or better on the Waterfowl Breeding Pair Distribution (WBPD) map and on tracts meeting criteria established for the Small Wetlands Acquisition Program, including wetland complex size, presence of brood water, and other factors important for breeding waterfowl and migratory birds.
- Assist Aberdeen Wetlands Acquisition office to locate and contact prospective wetland easement sellers.
- Work with farm organizations, USDA, conservation groups, and others to promote wetland preservation programs.
- Assist USDA with their farm program wetland protection provisions and wetland easement programs.
- Develop a computerized mapping system of protected wetlands, with the lead of Habitat and Population Evaluation Team (HAPET) and the Realty Division.
- Map all wetlands on pre-1976 wetland easement contracts.
- Enforce contract terms on all wetland easements through annual inspections, and send reminder letters every 3 to 5 years to contract owners of wetland easements.

D1.9 Work with Partners for Fish and Wildlife to restore a minimum of 1,000 wetland acres annually on private lands, for a total of 15,000 acres over 15 years.

Rationale for Objective: Since settlement, 35 percent of South Dakota's wetlands have been destroyed, most in the last 60 years (Johnson and Higgins 1997). Since small wetlands are easier to drain than larger ones, the biggest impacts of drainage affect the temporary and seasonal wetlands most important for breeding and feeding waterfowl (Baldassarre and Bolen 1994). To reduce the effects of continued wetland drainage and restore previously drained wetlands, this plan would work with private landowners, federal, state and local governments, and private organizations to promote and provide assistance for wetland restoration. Restored wetlands may or may not be protected by a Service wetland easement.

Strategies:

- Partner with private organizations, landowners, watershed groups, State and other Federal agencies, Conservation Districts, and other partners to restore wetlands.
- Provide technical and personnel assistance to USDA and other agencies implementing private land wildlife habitat programs such as CRP, WRP, Waterbank, and other set-aside programs.
- Restore 100 percent of wetlands on WPAs and newly acquired easement lands, within 2 years of acquisition.

Watersheds

A watershed is the area of land that catches rain or snow and drains or seeps into a marsh, stream, river, lake, or groundwater. What happens on the land in a watershed will ultimately affect the water. A lake that is surrounded by cropland or feedlots will suffer from increased sediment and phosphorous loads, reducing water clarity and increasing algal blooms and eutrophication (SD State Lakes Preservation Committee 1977). Lake cabins and associated sewage treatment needs can also have drastic effects on water quality.

Objective

D1.10 Participate in watershed protection projects throughout the WMD to implement conservation practices to enhance wildlife habitat and water quality over the next 15 years.

Rationale for Objective: The State of South Dakota has an active program for watershed improvement in which conservation practices are applied to individual watersheds over a set period of time, usually 5 years. Funding and personnel are concentrated on an individual watershed, then the process is repeated in another watershed. Watershed conservation practices, such as improved grazing systems, conversion of cropland to grassland, wetland restoration, and wetland creation, often compliment Partners for Fish and Wildlife habitat improvement programs. Watershed protection projects concentrate on conservation practices that improve water quality, which often produces a side benefit of improving habitat conditions for wildlife and fish. Funding packages often can be developed to partner local funds with matching federal dollars to maximize the acres impacted by wildlife habitat improvement projects. Watershed protection groups currently active in the WMD and working with the Service Partners for Fish and Wildlife program include Big Stone Lake, Pickerel Lake, Blue Dog Lake, Upper Waubay Lake, Upper Big Sioux River, Little Minnesota River, North Fork Whetstone River, Pelican Lake, Lake Byron, Crow Creek, Wild Rice River, White Lake, and Clear Lake Watershed Protection Projects.

Strategies:

- Research current water quality in Bitter and Waubay Lakes to establish a baseline for future comparisons.
- Develop partnerships with The Nature Conservancy, South Dakota Game, Fish and Parks, local governments, private landowners, and others.
- Continue implementing Natural Resource Conservation Service (NRCS) best management practices on Service lands.
- Cooperate with Waubay Watershed Protection Project (WWPP) to take water quality samples and monitor annually.
- Assist watershed protection projects through Partners for Fish and Wildlife efforts to implement conservation practices on private lands (e.g. buffer/filter strips, fencing cattle off riparian areas, wetland restoration, rotational grazing systems, restoring grasslands).
- Assist Partners for Fish and Wildlife program and other watershed partners with monitoring compliance of conservation practices.
- Purchase grassland and wetland easements to reduce sedimentation and nutrient loading.

Native Woodlands

Native woodlands are a natural part of the landscape, occurring in the draws on the east slopes of the Coteau des Prairie and also at the edges of larger lakes and lake systems. Most, if not all, of the Prairie Coteau woodlands (including the Sica Hollow area), were cut for lumber, fenceposts, and firewood by the early part of the 20th century for use by Fort Sisseton and the influx of settlers in 1892 (Leoschke 1997). Present day woodlands have regrown from that era.

No long-term studies of avian communities have been conducted in wooded draws. Casual observations have found five species of warblers during spring migration as well as reports of turkey vultures and pileated woodpeckers in wooded coulees in Roberts County. One study of woodland types in the Little Missouri National Grasslands found that certain neotropical migrants (red-eyed vireo, black-and-white warbler, yellow-breasted chat, American redstart, lazuli bunting, rufous-sided towhee, lark sparrow, and American goldfinch) were significantly more abundant in ash woodlands than in juniper, pine or even cottonwood habitats (Hopkins et al. 1986).

Objective

D1.11 Preserve 1,000 acres of critical blocks of native woodlands on the Wetland Management District, by year 2017.

Rationale for Objective: Although these habitats cover less than 1 percent of the northern Great Plains, wooded draws can attract a disproportionately rich number of bird species compared to other plains habitats (Dobkin 1992). These woodlands are often subjected to heavy grazing (Faanes 1987) and/or used for lumber and firewood. Cattle grazing of wooded draws can create open canopy stands that consist of a low shrub layer, a sparse overstory of decadent trees, an herbaceous layer of invasive, mostly alien species, and the complete absence of intermediate layers (Hodorff et al. 1988). Grazing will often preclude any woody plant recruitment by trees and tall shrubs, leading to the eventual conversion of these woodlands to grass-forb communities. Preserving and understanding these woodland habitats may be vital to certain migratory and breeding birds.

Strategies:

- Inventory and map native woodland habitat base.
- Establish baseline bird inventory of woodland habitats.
- Document use of and threats to native woodlands for breeding and migratory birds and other wildlife.
- Develop a task force with South Dakota Game, Fish and Parks; The Nature Conservancy; Audubon Society; Sisseton-Wahpeton Sioux Tribe; Coteau Watch; and others to identify priority woodlands for preservation.
- Protect native woodlands through easements or fee-title purchases from willing sellers.

Wildlife

- *D2 - Wildlife Goal: To promote a natural diversity and abundance of native flora and fauna of the Prairie Pothole Region of the Great Plains on Waubay Wetland Management District.*

Since wildlife populations are dynamic and can be affected by factors such as weather, disease, pollution or other factors outside of human control, specific wildlife objectives have not been developed. It is especially impossible to develop specific wildlife objectives for a wetland management district with hundreds of disjunct pieces of land spread throughout a wide range of habitats, land use, and even physiographic regions. Therefore, the following objectives focus on increasing our knowledge of wildlife needs and monitoring wildlife populations and land use patterns in order to better direct habitat management.

Objectives

D2.1 Develop a Monitoring Plan, within 3 years, to locate and track specific locations used by the following endangered or threatened species: bald eagle, piping plover, whooping crane, Eskimo curlew, interior least tern, American burying beetle, Topeka shiner, and western prairie fringed orchid.

Rationale for Objective: The species listed above may potentially be found on or use WPA s for some part of their life-cycle. Confirming their presence and location will help Refuge managers prevent potential adverse effects from some management actions, such as prescribed burning and pesticide application.

Strategies:

- Investigate and document sightings and reports of bald eagle nests.
- Promote protection and perpetuation of native fisheries, including Topeka shiner, by working with partners to protect streams, lakes, and watersheds.
- Protect sites on the WMD used by endangered and threatened species.
- Use appropriate management techniques and timing to help ensure continued survival of these species.

D2.2 Develop a Monitoring Plan, within 3 years, to locate and track specific locations used by the following State species at risk: regal fritillary, Dakota skipper, and poweshiek skipper butterflies; osprey; banded killifish; central mudminnow; trout-perch; northern redbelly dace; northern redbelly snake.

Rationale for Objective: South Dakota's endangered species law was passed in 1977 to ensure the protection of threatened and endangered species within the State. The Game, Fish, and Parks Commission reviews the list of species every 2 years with species added or deleted depending on their vulnerability, with the Game, Fish and Parks Department in charge of the protection of listed species. The South Dakota Natural Heritage Program also documents and monitors over 400 plant and animal species considered at risk in South Dakota. Ongoing monitoring is achieved through the cooperation of various agencies and individuals and helps to keep species from declining to the point where they must be listed. We can further this goal by monitoring these species as well as limiting or adjusting habitat management efforts to reduce potential negative impacts.

Certain species may also serve as indicators of the health of an ecosystem, such as butterflies. Butterflies are part of the prairie ecosystem. If these species are in trouble, other endemic (and harder to track) species may also be in decline. Tracking these butterflies and adjusting management to benefit them should benefit other prairie endemics, improve the health of the prairie ecosystem, and help to prevent the listing of these and other species that have declined due to the poor health of prairie habitats.

Strategies:

- Initiate surveys during appropriate flight times on WPAs with native prairie habitat to monitor presence, abundance, and locations of these at risk species.
- Protect WPA sites where the above mentioned species are located.
- Use appropriate management techniques and timing to ensure continued survival of these butterflies.

D2.3 Rewrite and update the Wildlife Inventory Plan to include methodology for a variety of surveys, increasing the number and quality of surveys on residential and migratory wildlife species, within 10 years.

Rationale for Objective: This objective would seek to increase the overall knowledge of wildlife species present so that informed decisions can be made regarding habitat needs and the development of models or the use of indicator species as a method of measuring the success of management goals and practices.

Strategies:

- Conduct an additional Breeding Bird Survey route (one is currently done).
- Conduct passerine surveys on selected intensively managed WPAs to monitor for management impacts to grassland species.
- Locate sharp-tailed grouse and prairie chicken dancing and booming grounds.
- Continue 4-square mile waterfowl pair surveys at current levels (22 plots).
- Continue participation in cooperative surveys such as mourning dove, sandhill crane, Christmas Bird Count, etc.
- Cooperate with South Dakota Game, Fish and Parks on deer surveys and population management.
- Review regional and national plans to help determine how to broaden surveys, for which species.
- Research and determine appropriate survey methodologies for habitats and species targeted.

Cultural Resources

- *D3 - Cultural Resources Goal: Protect and interpret significant historic and prehistoric cultural resources associated with Waubay Wetland Management District.*

Long before Europeans arrived, various cultures and native peoples occupied the Northern Great Plains, some documented as early as 12,000 years ago (Jackson and Toom 1999). Reminders of these cultures can be found throughout the WMD in burial mounds, cultural material scatter sites (containing artifacts such as ceramics, tools, or animal bones among other things), or trails. It is important to remind ourselves of these peoples and how they lived on the land, making use of its rich resources, without causing the vast changes that Europeans have wrought on the landscape.

Objectives

D3.1 Within the 15 year life of this plan, locate, identify, map, and determine NRHP eligibility of all significant historic and prehistoric cultural and archaeological resources on 30 Category "A" WPAs.

Rationale for Objective: Although a recent study has been compiled for archaeological resources found in and around the Refuge, a similar study has not been done for the WMD. Cultural resource sites known in the WMD have usually been discovered when water development or other ground breaking projects required a survey to comply with the National Historic Preservation Act (NHPA). This is probably the best way to find and survey these culturally important sites considering the extent of the WMD and the impossibility of doing a wide-ranging study.

Strategies:

- Utilize standard law enforcement practices and strategies to protect cultural resources already identified and those that may be discovered where development of water control structures, wetland restorations, and other ground breaking activities will occur.
- Produce a cultural resource overlay for Geographic Information System (GIS) database.
- Consult with the Regional Historic Preservation Officer prior to all proposed actions.
- Avoid areas of known cultural sites and potential sensitive areas when practical, and mitigate any adverse effects to sites.
- Investigate and inventory two known archaeological resources and other possible sites, as found, for presence of cultural resources.

D3.2 Interpret the cultural resources of the WMD for visitors of all ages and abilities through a combination of 3 programs, within 7 years.

Rationale for Objective: Interpreting these sites can help to establish a link between past and present generations. Learning how other cultures lived and used natural resources can help current and future inhabitants understand their role in the environment. This insight may help to solve current issues by providing a larger backdrop and history often forgotten.

Strategies:

- Upgrade Refuge kiosk exhibit as advised in the 2001 Visitor Services Requirement report prepared by the regional Education and Visitor Services group.
- Upgrade Refuge visitor center exhibit as advised in the 2001 Visitor Services Requirement report.
- Investigate establishment of a cooperative interpretive site with Sisseton-Wahpeton Sioux Tribe.
- Ensure all new visitor materials and facilities reach the broadest audience possible by following the Universal Design concept.
- Incorporate interpretation of Wetland Management District cultural resources into the Refuge program, presenting a more comprehensive interpretive program.

Public Use and Education

- *D4 - Wildlife-dependent Recreation Goal: To foster an understanding and appreciation of the ecology and management of the fauna and flora and of the role of humans in the Prairie Pothole Region of the Great Plains by providing Wetland Management District visitors of all abilities with compatible wildlife-dependent recreational experiences.*

The Refuge Improvement Act recognized the importance of developing an understanding and appreciation of our fish and wildlife resources and mandated six priority public uses on Refuge lands. They include hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation.

Objectives

D4.1 Continue to provide hunting, fishing, and trapping opportunities on WPAs in accordance with State regulations, seasons, and population changes.

Rationale for Objective: When Waterfowl Production Areas are purchased, they are open to public hunting, fishing, and trapping by statute. WPAs may be opened to other recreational activities only if they do not materially interfere with or detract from the purposes for which they were established, namely to provide breeding and nesting habitat for waterfowl and other migratory birds. Travel is restricted on most WPAs to foot travel only. This helps to protect habitat and retain the wild nature of these tracts. Most of these activities also occur during fall or winter when breeding and nesting activities are done. Few improvements have been made to WPAs besides grassed parking lots and fencing to facilitate grazing management and reduce trespass problems.

Strategies:

- Provide law enforcement assistance to ensure compliance with State and Federal regulations on WPAs and for hunting seasons on migratory game birds.
- Work with South Dakota Game, Fish and Parks to annually evaluate permit numbers, season lengths, and types.
- Investigate feasibility of offering youth deer hunts or hunts for people with disabilities.

D4.2 Develop 5 educational opportunities which highlight the Wetland Management District and its role in wildlife conservation in the Prairie Pothole Region, over the next 15 years.

Rationale for Objective: Few people know about Wetland Management Districts or why they exist. Even fewer students or teachers take advantage of Waterfowl Production Areas that may be located near rural schools. This objective would actively promote environmental education opportunities and develop new programs for use either in area schools or on WPAs near schools. This would provide new opportunities for many rural schools and increase exposure of students to the environmental challenges faced today and the benefits of protecting our natural resources. Interpretive signs and a birding trail will also help reach a wider audience and increase tourism dollars and appreciation of Service programs.

Strategies:

- Conduct a minimum of one educational program at 15 schools in the WMD each year so that one-third would be served each year (there are 43 schools in the WMD).
- Develop and implement educational programs for educators to use on a WPA to explain functions of various habitats in the WMD (i.e. wetlands, prairies, and woodlands), and their importance to wildlife.
- Conduct one teacher workshop, annually, to prepare them to lead environmental education programs for their students.
- Develop at least two interpretive kiosks on WPAs located on well traveled roadways to promote and interpret the Small Wetlands Acquisition Program (possible sites: Berwald, Jensen, Grass Lake, or Lardy WPAs).
- Work with partners to develop the Coteau Birding Trail to find, map, and interpret birding hot spots to increase tourism and an appreciation of local natural resources.

Summary Comparison of Management Alternatives

Waubay National Wildlife Refuge Comprehensive Conservation Plan -Alternatives			
	<i>Alternative A Current Management (No Action)</i>	<i>Alternative B Tallgrass Prairie</i>	<i>Alternative C Enhanced Management (Proposed Action)</i>
HABITAT: Grasslands			
Protection	N/A	N/A	N/A
Restoration	130 acres	0	262 acres
Enhancement	2,742 acres burned or grazed	2,742 acres burned or grazed	5,484 acres burned or grazed
HABITAT: Wetlands			
Protection	N/A	N/A	N/A
Restoration	N/A	N/A	N/A
Enhancement	175 acres burned or grazed	175 acres burned or grazed	350 acres burned or grazed
HABITAT: Native Woodlands	0	0	988 acres managed
WILDLIFE			
T&E Species	1 survey	0	2 surveys
Other Wildlife	0	0	4 surveys
CULTURAL RESOURCES			
Protection	27 sites	27 sites	27 sites
Interpretation	0	0	2 signs/exhibits
WILDLIFE-DEPENDENT RECREATION			
Hunting	500 hunters	500 hunters	600 hunters
Fishing	1,500 anglers	1,500 anglers	2,000 anglers
Other Uses*	8,500 visitors	5,000 visitors	12,000 visitors
Volunteers	5 volunteers	10 volunteers	20 volunteers

* wildlife observation, wildlife photography, environmental education and interpretation

**Waubay Wetland Management District
Comprehensive Conservation Plan - Alternatives**

	<i>Alternative A Current Management (No Action)</i>	<i>Alternative B Tallgrass Prairie</i>	<i>Alternative C Enhanced Management (Proposed Action)</i>
HABITAT: Grasslands			
Protection	100,000 acres	185,000 acres	250,000 acres
Restoration	300 acres	1,000 acres	4,500 acres
Enhancement	50,000 acres rotational grazing	10,000 acres rotational grazing	75,000 acres rotational grazing
HABITAT: Wetlands			
Protection	20,000 acres	10,000 acres	30,000 acres
Restoration	7,500 acres	0	15,000 acres
Enhancement	0	0	0
HABITAT: Native Woodlands			
	0 inventories 0 protected	0 inventories 0 protected	1 inventory 1,000 acres protected
WILDLIFE			
T&E Species	2 surveys	0	3 surveys
Other Wildlife	4 surveys	0	7 surveys
CULTURAL RESOURCES			
Protection	0 inventories	0 inventories	2 inventories
Interpretation	0 programs	0 programs	1 program
WILDLIFE-DEPENDENT RECREATION			
Hunting	38,750 hunters	40,000 hunters	45,000 hunters
Fishing	1,000 anglers	1,000 anglers	1,500 anglers
Other Uses*	5,280 users	6,000 users	7,500 users
Volunteers	0 volunteers	10 volunteers	20 volunteers

* wildlife observation, wildlife photography, environmental education and interpretation

