4 Alternatives

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Rolling grasslands overlook Mud Lake.

A challenge for natural resource managers is to find ways to address the sometimes-conflicting goals for various aspects and levels of resource management and protection. For Arrowwood NWR, it is of paramount importance to provide diverse grassland types that emulate the natural variation of the Prairie Pothole Region. This will ultimately benefit trust resources including waterfowl, grassland birds, and songbirds.

Each alternative in this EA has been designed to meet the purposes and goals of the refuge through a unique set of objectives, levels of management, and timeframes. Three alternatives for management of the refuge form options for addressing the ecosystem and resource needs and the public use.

The no-action alternative (alternative 1) portrays current management. Alternative 2 would provide enhanced management with an emphasis on grasslands. The Service's proposed action (alternative 3) describes the draft CCP for the refuge. The proposed action includes not only enhanced management, but also a plan to improve water quality entering the refuge and reduce peak flows in the upper James River watershed during spring runoff and summer rainfall events.

This chapter includes the following sections:

- alternatives considered but eliminated from detailed study
- summary of alternatives
- description of alternatives
- staff and funding to carry out alternatives
- monitoring

Alternatives Considered but Eliminated from Detailed Study

The planning team considered other alternatives for management of the refuge, but eliminated them from detailed study. One such alternative was to focus all management efforts on water levels and the wetland units and to minimize or eliminate management activities on the uplands. This alternative would not meet refuge goals for migratory birds, other wildlife, recreation, or interpretation. Without active management on the uplands, invasive plant species would spread unchecked and continue to degrade the remaining tracts of native prairie. Seeded, native plant and DNC tracts would also degrade and not provide optimal habitat for waterfowl or other grassland-nesting birds. There would be no interpretative efforts for the public. The auto tour route, nature trail, Warbler Woodland Watchable Wildlife Area, and observation decks would not be maintained and would be closed to the public. Deer hunting and wildlife viewing from the state highway and county roads would be the only recreation available.

The removal of the Jamestown Dam and Jamestown Reservoir was another alternative that was considered. This alternative was dropped from further consideration (1) due to the social, political, and economical ramifications, and (2) because Reclamation has constructed a bypass channel at the refuge and has lowered the operating level of Jamestown Reservoir by 1.8 feet. The bypass channel along with the lower reservoir levels allow the refuge to manage water levels in each pool independent of each other and independent of the river flow. The increased capability to manage water levels mitigates the past, present, and future impacts of the reservoir at the refuge.

SUMMARY OF THE ALTERNATIVES

Table 3 provides descriptions of management actions by resource and use topics for each of the three alternatives.

Table 3. Summary of the management alternatives for Arrowwood NWR, North Dakota.

ALTERNATIVE 1 Current Management (*No Action*)	**ALTERNATIVE 2** Enhanced Management	**ALTERNATIVE 3** Enhanced Refuge and Watershed Management (*Proposed Action*)
Water Resources		
Manage water as outlined in the long-range water management plan, with the capability to independently manage water levels in each impoundment.	*Same as alternative 1.*	*Same as alternative 1, plus:* Improve water quality entering the refuge, and reduce peak flows in the upper James River watershed during spring runoff and summer rainfall events.
***Habitat**—Native Grassland*		
Protect native prairie. Manage with fire and grazing to increase the species diversity of the flora and fauna.	*Same as alternative 1.*	*Same as alternative 1.*
***Habitat**—Tame Grassland*		
Apply management that encourages nesting by waterfowl and upland-nesting birds.	Manage uplands to maximize the production of waterfowl and other grassland-nesting species.	*Same as alternative 2.*
***Habitat**—Woodland and Shelterbelts*		
Passively manage the woodlands.	Remove selected shelterbelts and tree stands. Reduce protection from fire.	*Same as alternative 2.*
***Habitat**—Wetland*		
Manage to provide abundant aquatic foods for migrating waterfowl.	Manage to provide habitat conditions for migrating waterfowl, migrating shorebirds, and nesting waterbirds.	*Same as alternative 2.*
***Habitat**—Invasive Plants*		
Apply management practices that follow the IPM Plan (USFWS 2005).	*Same as alternative 1.*	*Same as alternative 1.*
***Habitat**—Cropland*		
Phase out croplands unless needed to rehabilitate DNC or other grass plantings.	*Same as alternative 1.*	*Same as alternative 1.*

Table 3. Summary of the management alternatives for Arrowwood NWR, North Dakota.

ALTERNATIVE 1 Current Management (*No Action*)	**ALTERNATIVE 2** Enhanced Management	**ALTERNATIVE 3** Enhanced Refuge and Watershed Management (*Proposed Action*)
***Wildlife**—Threatened and Endangered Wildlife*		
Monitor. Consult Ecological Services. Manage Jim Lake for piping plovers during drought years.	*Same as alternative 1.*	*Same as alternative 1.*
***Wildlife**—Predator Management*		
Apply management activities through local cooperators in accordance with the predator management plan.	*Same as alternative 1.*	*Same as alternative 1.*
Cultural Resources		
Protect known and newly discovered cultural resources.	Expand cultural resource interpretation where compatible and as funding opportunities allow.	*Same as alternative 2.*
***Visitor Services**—Hunting*		
Manage the hunting program to manage wildlife and provide compatible, priority, wildlife-dependent public use.	Expand upland hunting where compatible and as opportunities allow. Modify refuge-specific regulations where appropriate to enhance the quality of the refuge hunting experience.	*Same as alternative 2.*
***Visitor Services**—Fishing*		
Manage the fishing program to provide compatible, priority, wildlife-dependent public use. Allow no expansion.	*Same as alternative 1, plus:* Clarify and modify the regulations about access to fishing opportunities to minimize or eliminate the potential for conflict with other refuge users. Produce new refuge "tear sheets" and informational brochures.	*Same as alternative 2.*
***Visitor Services**—Wildlife Observation, Wildlife Photography, Interpretation, and Environmental Education*		
Carry out and support the OWLS program. Allow use of the auto tour route to support priority wildlife-dependent use.	*Same as alternative 1, plus:* Expand wildlife observation and wildlife photography opportunities, and environmental education where compatible and as funding and staffing allow. Actions may include enhancement of the OWLS with interpretive signs or a brochure, development of field study kits for visitors, and construction of an environmental education pavilion in the Warbler Woodland Watchable Wildlife Area.	*Same as alternative 2.*

Table 3. Summary of the management alternatives for Arrowwood NWR, North Dakota.

ALTERNATIVE 1 Current Management (*No Action*)	**ALTERNATIVE 2** Enhanced Management	**ALTERNATIVE 3** Enhanced Refuge and Watershed Management (*Proposed Action*)
***Visitor Services**—Public Access*		
Provide limited public use opportunities when compatible.	Enhance compatible public access when staffing, funding, and volunteer opportunities occur. Clarify public access opportunities with modified refuge "tear sheets" and informational brochures.	*Same as alternative 2.*
Partnerships and Other Public Outreach		
Foster existing partnerships.	*Same as alternative 1, plus:* Develop new partnerships.	*Same as alternative 1, plus:* Seek new and innovative partnerships to improve the upper James River watershed.

DESCRIPTION OF THE ALTERNATIVES

This section further describes the three management alternatives. Management actions for each alternative are described for water resources, habitat and wildlife, visitor services, and operations. Alternative 3 is the Service's proposed action and is the basis for the draft CCP (chapter 6).

The following actions relating to the bypass channel apply to all alternatives. The bypass channel and other infrastructure constructed by Reclamation to mitigate the impacts of the Jamestown Reservoir would allow management of refuge water levels in all but the most extreme high water years. Refuge managers would be able to use the bypass channel to move large volumes of water downstream, bypassing all refuge wetlands except Arrowwood Lake. Since water passing through the refuge in the bypass channel would not be filtered through the remaining shallow refuge wetlands, sediment and contaminants gained in the upper watershed would have a greater chance of entering Jamestown Reservoir.

Alternative 1—Current Management (*No Action*)

The no-action alternative would continue the management of habitat, wildlife, programs, and facilities at current levels. Active management would continue as time, staff, and funds allow; in some cases, management would be reactionary to conditions as they present themselves. Interpretation, education, administration, and facilities would be maintained as is, with minor increases or decreases based on time, funding, and staffing.

Water Resources

Wetland management includes water level manipulations and mechanical treatments of dry pools. Water management would continue as outlined in the wetland management component of the step-down HMP, which would incorporate the improved water control features of the Arrowwood NWR mitigation project. Water elevations would be adjusted to provide quality habitat for migrating and resting waterfowl. The focus on waterfowl would also benefit shorebirds and other waterbirds. Pools would be filled per the water management plan, based on the amount of annual runoff (low, medium, high, and flood). Pools would be drawn down as allowed by downstream conditions to provide pair, brood, and resting habitat. This would also encourage seed-producing vegetation that provides a food source during migration and a substrate for spring production of invertebrates.

Management of the water impoundments would be aimed at providing abundant aquatic foods (mostly sago pondweed), exposed shoreline, and feathered marsh edge for tundra swan, geese, mallard, scaup, and northern pintail. The aquatic foods that have the potential to grow in abundance are sago pondweed, arrowhead plant, smartweed, and wild millet. Production of these aquatic plants generates production of aquatic invertebrates (an important food source for waterfowl).

The attractiveness of these habitats would be further enhanced through timely management of exposed shorelines and by seasonally flooding the

shoreline to produce a vegetated marsh edge. Timely water level manipulation can change the proportion of each of these habitats during different seasons.

Another key to management of refuge impoundments is timing of food production based on the biological need of the birds. There are two critical periods at the refuge when waterfowl energy demands are high—the brood-rearing period (June–August) and the fall migration period (October–November).

Wetland management on the larger pools would be mostly reactionary and has been essentially nonexistent for the past 10 years (1993–2003) due to flooding and construction. The Arrowwood NWR mitigation project would allow independent management of each impoundment. Water management would follow the guidelines in the wetland management component of the step-down HMP, which is currently being developed. No management would occur on naturally occurring wetlands located in upland areas except for protection. These wetlands are expected to maintain their natural productivity as they fluctuate in normal wet and dry cycles.

Habitat and Wildlife

Management of upland habitats would continue at current levels to encourage nesting by waterfowl and upland-nesting birds. Tools include mechanical manipulations, grazing, chemical applications, rest, and fire. Invasive plant control would continue at current or lower levels, but would not be expanded. Prescribed fire would be used on established burn units, with minimal monitoring to gauge success or failure. Grazing would probably be reduced as local animals and cooperators become scarce; however, grazing would be the "tool of choice" when good opportunities arose.

The Service has a longstanding policy prohibiting the conversion of native grasslands or unbroken sod to other upland types or conditions such as cropland or "improved" DNC. Native grasslands disturbed as a result of construction or other management actions would be restored using native species. Tools currently used are fire, grazing, mowing, haying, and rest. Monitoring would be limited to current systems to assess the effects of fire, grazing, and rest. Restoration efforts would occur for invasive plant control on currently identified conversion areas.

The estimated 785 acres of woodlands consist of naturally occurring wooded draws along lakeshores, wooded ravines, and shelterbelts. Select woodland tracts would be protected from prescribed fire. No management, surveys, or monitoring would be conducted.

The purpose of cropland management would be to reestablish quality nesting cover and provide additional winter food and cover. Purposes and objectives of cropland management are listed below:

- Reestablish cover while maintaining refuge soils.
- Break the invasive plant cycle and prepare fields for planting of DNC or native grasses.
- Demonstrate that profitable farming can be accomplished using environmentally sound practices.
- Provide a source of winter feed for wildlife to reduce private landowner depredation complaints.

Invasive plant control efforts would continue as time and funding allow. Herbicides would be judiciously applied to invasive plant infestations and used as field preparation for grass or DNC plantings. Biological control is the preferred method of control; this program continues to expand as insectaries (places for breeding insects) become more productive and insects are moved to more sites within the refuge boundary.

Threatened and endangered species that occur at the refuge include the whooping crane (endangered species) and the bald eagle and piping plover, both listed as threatened species. The eagle and the crane are present during migration periods. Sightings of these species would be noted but no special efforts would be dedicated to inventory or monitoring. However, no actions would be undertaken that would negatively affect these species.

The piping plover has been recorded as nesting at the refuge during years of low water, which exposed the gravel islands and shoreline habitat the bird prefers for nesting. Because of a history of piping plover use, the refuge has designated critical habitat for piping plovers. Piping plovers are not expected to nest regularly at the refuge. However, in years of severe drought when habitat is limited across the state, Jim Lake would be managed to provide access to the gravel islands, shoreline, and gravel side slopes of the dike along the eastern edge of the lake. The refuge would continue to participate in the "International Piping plover Breeding Census" conducted every 5 years.

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A marsh drawdown on Jim Lake encourages the growth of wetland plants.

The primary nest predator species targeted under the predator management plan are striped skunk, raccoon, and red fox. Local cooperators in accordance with the plan would conduct predator management activities. Additional control would be conducted within the predator exclosure by refuge staff. The refuge hosts a small, stable population of coyotes. No coyote control would be anticipated or conducted by refuge personnel or trappers. However, the North Dakota Department of Agriculture's Wildlife Services Program responds to landowner complaints in the area. The presence of coyotes appears to preclude the colonization of the refuge by the red fox, a much more effective predator of ground-nesting birds. In addition, nuisance animals such as beaver and muskrat would be removed to prevent damage to dikes and water control structures. This action is normally completed by recreational trappers or opportunistically by staff.

Vernon Burns/USFWS

Red Fox

Dave Menke/USFWS

Raccoon

Visitor Services

Public use and recreation programs would continue to be conducted essentially on a request basis.

Hunting programs would be provided for deer, upland game (late season), fox, and rabbit. Refuge managers would accommodate hunters with special access needs through special use permits.

The fishing program would be allowed under current regulations. Anglers would have access when the fishery was available. The fishing access is primarily at road crossings, where people can fish from the bank. Most fishing has been directed at northern pike. Fishing use has increased in flood years as the upstream movement of game fish from the reservoir has increased.

Refuge fisheries would be temporary and sporadic in nature as winterkill of fish would be common during severe winters with low water levels. Fish confined in refuge impoundments under the ice would die due to lack of sufficient oxygen. Another major factor limiting the fisheries would be the electric fish barrier located between the Jamestown Reservoir and the refuge. The electric barrier installed as part of the Arrowwood mitigation project would prevent carp from moving into the refuge and degrading water quality and habitat for migratory birds. However, in flood years when the Jamestown Reservoir elevation surpasses 1,442 feet mean sea level, water would overtop the electric barrier and both sport and rough fish could move into the refuge. The refuge would issue a special use permit to commercial fishing contractors to net carp and remove them from the river. This would also benefit the fishery in Jamestown Reservoir. The refuge would work closely with NDGF to coordinate the removal.

Boats could be used for fishing. The boating season is from May 1 through September 30. All refuge waters would be open to nonmotorized boating and canoeing. Nonmotorized boats and canoes are estimated at up to 100 visits per season. Boats with motors less than 25 horsepower could be used on Arrowwood and Jim lakes. The current level of boating is low and the use of motorized boats is rare.

Wildlife observation and wildlife photography would be permitted. The nature trail would receive minimal maintenance, as would the OWLS at the Kensal Public School. The auto tour route would remain open and receive maintenance as time and funding allow. No new interpretive signs, exhibits, or viewing opportunities would be developed.

Environmental education and outreach would continue on an as-requested basis with no new efforts initiated. Every effort would be made to maintain existing partnerships; however, new partnerships would only be undertaken if they resulted in a net gain of staff time or funding.

The following additional activities would continue at the present low levels: ice fishing (appendix L); biking (appendix N); gathering of wild foods such as berries, mushrooms, and asparagus (appendix P); recreational trapping (appendix Q); and horseback riding (appendix R).


Lee Karney/USFWS

Great Egret

Alternative 2—Enhanced Management

This alternative would maximize the biological potential of wetland and upland habitats at the refuge, to support a well-balanced and diverse flora and fauna representative of the Prairie Pothole Region. A scientific-based monitoring program would be developed and incorporated in the HMP. Monitoring would measure the habitat and wildlife population response to management activities. Public use opportunities would be expanded with the construction of additional facilities and development of educational programs. Public use regulations would be clarified and modified where appropriate to enhance the quality and quantity of wildlife-dependent recreational opportunities.

Water Resources

Wetland habitats would be managed to provide habitat conditions for migrating waterfowl, migrating shorebirds, and nesting waterbirds. Properly timed water level manipulations would result in the development of various wetland habitats: (1) deepwater, emergent vegetation habitat for black terns, Franklin's gulls, and heron and egret nesting habitat; (2) shallow water with emergent vegetation for pied-billed grebes and rails; (3) open water and submergent vegetation for eared grebes; and (4) annual plants for feeding waterfowl. Acres and location would vary from year to year. A monitoring plan would be developed and carried out to monitor the water manipulations, timing, habitat characteristics and response from the birds. The current long-range water management plan would be rewritten to reflect the habitat benefits to the colonial or overwater-nesting species.

Habitat and Wildlife

Upland habitats would be managed to maximize production of waterfowl and other grassland-nesting species. Areas of tame grass or DNC close to water would be managed primarily for tall DNC for waterfowl. Sharp-tailed grouse, other grassland birds, and small mammals would also benefit from this habitat type. Areas of native prairie would primarily be managed for ecological integrity, but would also provide important habitat conditions for upland-nesting birds, especially the grassland-endemic songbirds. The Grasshopper Hills area, which is probably the largest contiguous tract of native prairie, would be a priority tract for management.

Upland habitats would be managed with grazing, prescribed fire, mechanical manipulations, chemical applications, biological control, and rest. The treatment applications would vary from year to year and would be applied as habitat objectives dictate. A monitoring plan would be developed and carried out to monitor the habitat characteristics and wildlife population response to management activities.

To reduce the impacts of woody vegetation on grassland-dependent birds, selected sites would be targeted for tree removal; grasslands invaded by trees in areas with populations of priority species would be targeted. Priority would be given to sites with planted tree rows (shelterbelts) within 164 feet of grassland patches greater than 247 acres, and to plantings of single rows and dilapidated stands of trees.


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Early morning fog rolls over Arrowwood's uplands.

Cropping would be used to prepare fields for planting of DNC or native grasses.

Invasive plant control would be carried out as outlined in the IPM Plan (USFWS 2005).

Predator management would remain at the current level unless population monitoring results dictate otherwise.

Visitor Services

Public use would be enhanced with the improvement and expansion of wildlife-dependent recreation. The draft compatibility determinations in appendixes K–R detail the public use programs.

Opportunities to increase hunting and fishing would be reviewed and facilities constructed as funding became available. Due to recent changes made by the state regarding the early Canada goose season and resident-only waterfowl season, the periods for which the refuge is accessible to boats and canoes would be shortened to minimize disturbance and allow waterfowl to use the refuge as a rest area.

Refuge-specific regulations regarding access into the refuge for wildlife observation, wildlife photography, and other wildlife-dependent recreational activities would be clarified and, where appropriate, modified to eliminate or minimize potential conflicts between refuge user groups. For example, biking on vehicle trails would cease when archery deer season begins, and walk-in access for wildlife observation and wildlife photography would not be recommended during the deer gun and muzzleloader seasons.

Dave Menke/USFWS

Eastern Bluebird

Environmental education programs would be developed for presentation on and off the refuge. Additional staff would seek out opportunities to share the story of the Refuge System and educate the public about the refuge's natural resources.

Additional wildlife-viewing opportunities would be explored with the possible development of additional trails, overlooks, and improved interpretive and directional signs. The office entrance would be remodeled to accommodate a small visitor contact area. Outdated and extraneous signs would be removed to enhance the aesthetic beauty of the refuge. The access road to the Warbler Woodland Watchable Wildlife Area would be upgraded, along with the directional signs to the trailhead and interpretive signs on the trail. A covered pavilion at the Warbler Woodland Watchable Wildlife Area is planned to accommodate workshops, group presentations, and environmental education. The refuge would maintain at least one portable observation blind on an active sharp-tailed grouse lek and seek a suitable site for a permanent blind.

Alternative 3—Enhanced Refuge and Watershed Management (*Proposed Action*)

The management of habitat and wildlife, visitor services, and operations would be the same as described for alternative 2. The draft compatibility determinations in appendixes K–R detail the public use programs. Alternative 3's water resource actions are described below.

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Sunrise at the Refuge

Water Resources

In addition to the water resource actions described in alternative 2, this alternative includes a plan to improve water quality entering the refuge and reduce peak flows in the upper James River watershed during spring runoff and summer rainfall events.

In addition to wildlife benefits, the water quality and flood prevention benefits of protecting small streams and wetlands are well documented. Small streams and wetlands provide natural flood control, maintain surface water and groundwater supplies, trap sediment, filter and process natural nutrients and pollutants, and sustain natural biological diversity. Agricultural and other land use changes near small streams and wetlands can impair the natural functions on headwater systems. Removal of natural vegetation, hardening of soil surfaces, removal or straightening of stream channels, and draining of small wetlands greatly reduces the amount of rainfall and snowmelt the watershed can absorb before it floods. This increase in water volume scours stream channels, which promotes additional flooding. The altered channels and lack of wetlands significantly reduce groundwater recharge, sediment retention, and recycling of nutrients. Downstream lakes and rivers have poorer water quality, greater fluctuations in flow, and less diverse aquatic life. Algal blooms and fish kills become more common and recreational uses are adversely affected.

As stated in the UWA (described in chapter 3 under "Water Quality"), the upper James River watershed (including portions of Stutsman, Foster, and Eddy counties) encompasses 1,773 square miles with 70% in cropland. Targeting cropland in key areas and converting it to permanent cover would reduce sedimentation and improve water quality. Restoring wetlands in these key areas would trap sediment, slow runoff, and reduce peak flows entering the refuge, resulting in increased groundwater recharge. Based on interpretation of the National Wetland Inventory maps, more than 7,000 acres of wetlands have been drained in Eddy and Foster counties.

The water quality and water retention capabilities of the upper James River watershed could be improved and the refuge's wetland objectives could be achieved through cooperative efforts. This would include working through existing programs, as well as with the Service's Private Lands Program, the NRCS, county soil conservation districts, water boards, the EPA, Reclamation, and private landowners.

Habitat and Wildlife

Same as alternative 2.

Visitor Services

Same as alternative 2.

STAFFING AND FUNDING TO CARRY OUT THE ALTERNATIVES

Current staffing consists of 10 permanent, full-time employees (table 4). This current staff, plus any additional staff, as shown in table 4 would be required to carry out all aspects of each alternative.

Table 4. Current and additional staff required to carry out the management alternatives for Arrowwood NWR, North Dakota.

ALTERNATIVE 1 Current Management (*No Action*)	**ALTERNATIVE 2** Enhanced Management	**ALTERNATIVE 3** Enhanced Refuge and Watershed Management (*Proposed Action*)
Management Staff		
Project leader GS[1]-14*	Project leader GS-14*	Project leader GS-14*
Deputy project leader GS-13*	Deputy project leader GS-13*	Deputy project leader GS-13*
Refuge operations specialist GS-7/9/11*	Refuge operations specialist GS-7/9/11*	Refuge operations specialist GS-7/9/11*
	Refuge operations specialist GS-9	Refuge operations specialist GS-9
Biology Staff		
Wildlife biologist GS-9/11*	Wildlife biologist GS-9/11*	Wildlife biologist GS-9/11*
	Biological technician GS-7	Biological technician GS-7
	Biological technician GS-5/6/7	Fish and wildlife biologist GS-5/7/9/11
		Biological technician GS-5/6/7
Visitor Services Staff		
Outdoor recreation planner (assigned to Long Lake NWR) GS-9	Outdoor recreation planner GS-9	Outdoor recreation planner GS-9
	Park ranger GS-7/9	Park ranger GS-7/9
Administrative Staff		
Administrative officer GS-9*	Administrative officer GS-9*	Administrative officer GS-9*
Clerk (office assistant) GS-5*	Clerk (office assistant) GS-5*	Clerk (office assistant) GS-5*

Table 4. Current and additional staff required to carry out the management alternatives for Arrowwood NWR, North Dakota.

ALTERNATIVE 1 Current Management (*No Action*)	**ALTERNATIVE 2** Enhanced Management	**ALTERNATIVE 3** Enhanced Refuge and Watershed Management (*Proposed Action*)
Maintenance Staff		
Engineering equipment operator WG[2]-10	Engineering equipment operator WG-10	Engineering equipment operator WG-10
Tractor operator (term[3]) WG-6	Tractor operator (term) WG-6	Tractor operator (term) WG-6
	Maintenance worker WG-7/8	Maintenance worker WG-7/8
	Maintenance worker WG-6	Maintenance worker WG-6
Fire Staff		
Fire management officer GS-11*	Fire management officer GS-11*	Fire management officer GS-11*
Fire technician GS-6/7*	Fire technician GS-6/7*	Fire technician GS-6/7*
	Range technician (career-seasonal[4]) GS-5/6	Range technician (career-seasonal) GS-5/6
Total Cost of Staff Salaries and Benefits		
$752,993	$1,029,800	$1,099,400

[1]*GS=General pay schedule*
[2]*WG=Wage grade pay schedule*
[3]*term=temporary time-limited position*
[4]*career-seasonal=permanent seasonal position*
**Staff with responsibilities for the entire Arrowwood NWR Complex*

Base operational funding for fiscal year 2004 is $1,079,900. With additional funds for annual maintenance, deferred maintenance, small equipment, and the fire program, the total is $1,527,200. This base budget represents the minimum required to maintain existing programs (alternative 1). However, this budget level would not adequately support proposed (alternative 3) habitat management, biological monitoring, public use and education programs, and maintenance of all facilities and structures.

Additional funding to carry out the CCP may be made available through Refuge System funding and the Service Asset Maintenance Management System (SAMMS). The SAMMS is a database that records maintenance and replacement needs for real property. Cost estimates will be developed for projects needed to carry out the final CCP, and then entered into the SAMMS.

MONITORING

Monitoring is essential not only to ensure that approved CCP goals and objectives have been met, but also to assess whether those goals and objectives have achieved the desired effects.

Plan Monitoring

Implementation of the CCP would be monitored throughout its 15-year effective period (2007 through 2022). The supervisor of the project leader for Arrowwood NWR would annually monitor accomplishment of objectives in the CCP. Monitoring of accomplishments would be critical to carrying out the CCP.

It is reasonable to believe that substantial changes could occur within the Service during the next 15

years. The CCP objectives would be examined at least every 5 years to determine if revisions are necessary and to allow the addition or deletion of objectives.

Habitat and Wildlife Monitoring

Habitat management on refuges is an ongoing process, and the Service recommends that planning be conducted within the context of adaptive resource management (USFWS 1995, 1996).

Monitoring is essential to successful implementation of the CCP. Periodic review of the CCP would be required to ensure that established goals and objectives are being met and strategies are being carried out. Many of the objectives have associated monitoring strategies; others remain to be developed. A HMP and wildlife-monitoring plan would be developed with the specific details on monitoring techniques, frequency, and locations.

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Big Bluestem

Donna Dewhurst/USFWS

Redhead

An adaptive resource management approach to monitoring would be used. Adaptive resource management is a flexible management framework in which the success of management strategies can be evaluated. Management techniques for habitat, wildlife, and public use would be periodically evaluated; results would be used to modify or adapt the techniques or objectives to better achieve refuge goals.

Effects of management strategies on habitats and wildlife populations would be evaluated to assess whether the desired effects have been achieved. Baseline surveys would be conducted for wildlife species for which existing data is lacking or not well documented. Monitoring protocols would be developed—cooperatively with the wildlife researchers within the USGS and universities, and with other professionals—to ensure proper data collections and analysis. A habitat-monitoring plan would be written; a wildlife inventory plan would be updated following completion of the CCP.

Habitat and wildlife-related research would be encouraged. Refuge staff would pursue research opportunities related to the refuge's habitat management goals, species of concern, monitoring techniques, and data analysis. All studies would be applicable and compatible with refuge objectives.

Monitoring for wildlife diseases would be limited primarily to the detection of avian botulism outbreaks in waterfowl in the wetlands. New diseases that are causing some concern and that may affect refuge wildlife include the West Nile virus, avian chlamydiosis, avian influenza, and chronic wasting disease.