

Chapter 4: Management Direction

The Environmental Assessment in Appendix A describes and analyzes three management alternatives for Crane Meadows NWR. The Service identifies one as its preferred alternative and it is described in the following chapter as the proposed future management direction that would guide activities on the Refuge for the next 15 years.

The Refuge has three management goals:

- **Goal 1: Habitat**

Conserve a diverse mosaic of habitats both on- and off-Refuge, particularly sedge meadow, shallow lake, oak savanna, prairie, and other declining endemic habitat types, to meet the needs of native plants and wildlife with emphasis on Service Regional Conservation Priority Species. Crane Meadows NWR will remain engaged in efforts to protect and enhance water quality and natural hydrology in the watershed.

- **Goal 2: Wildlife**

Protect, restore, and maintain native wildlife species to ensure biological diversity and abundance, with special emphasis on Service Regional Conservation Priority Species.

- **Goal 3: People**

As an active partner in collaborative conservation, the Refuge will provide quality wildlife-dependent recreation, environmental education, and outreach to a diverse audience. These activities will preserve cultural resources and promote understanding, appreciation, and support for Crane Meadows NWR, the National Wildlife Refuge System, and natural resource conservation.

Goals, objectives, and strategies comprise the proposed future management direction. Goals are descriptive broad statements of desired future conditions that convey a purpose. There are three goals for Crane Meadows NWR. Goals are followed by objectives, which are specific statements describing management intent. Objectives provide detail and are supported by rationale statements that describe



Crane Meadows NWR. Photo Credit: FWS

background, history, assumptions, and technical details to help clarify how the objective was formulated.

Finally, beneath each objective there is a list of strategies, the specific actions, tools, and techniques required to fulfill the objective. The strategies may be refined or amended as specific tasks are completed or new research and information come to light. Some strategies are linked to the duties of an employee position, which indicates that the strategy will be accomplished with the help of a new staff position. When a time in number of years is noted in an objective or strategy, it refers to the number of years from approval of this CCP. If no time is given, the objective is to be accomplished within the 15 years of the life of the plan.

Goal 1: Habitat

Conserve a diverse mosaic of habitats both on- and off-Refuge, particularly sedge meadow, shallow lake, oak savanna, prairie, and other declining endemic habitat types, to meet the needs of native plants and wildlife with emphasis on Service Regional Conservation Priority Species. Crane Meadows NWR will remain engaged in efforts to protect and enhance water quality and natural hydrology in the watershed.

Desired benchmark vegetation conditions for all future Refuge habitats are described in Table 16.

Table 16: Benchmark Conditions for Habitat Types, Crane Meadows NWR

Habitat Type	Benchmark Conditions (Minnesota DNR 2005)
Emergent Marsh	Emergent marsh has 20-60 inches of standing water present most of the year, providing favorable conditions for hydrophytic plants. Relative vegetation cover is dominated by native cattails (>50 percent), bulrushes, submergents such as common coontail, milfoil, and floating aquatic plants such as pondweeds, duckweed, broad-leaved arrowhead, and water-lilies. Open water (25-75 percent) is interspersed throughout dense stands of emergent vegetation and shrubs are absent or very sparse.
Sedge Meadow	Sedge meadow is an open wet meadow subjected to moderate inundation following spring thaw and heavy rains, but with little to no standing water during the growing season. There is sufficient saturation to inhibit shrub (<25 percent) and tree (<5 percent) establishment. Vegetation is dominated by broad-leaved graminoids including sedges and bluejoint (>50 percent), with variable forb cover (5-75 percent) including tufted loosestrife, marsh skullcap, and water smartweed.
Willow-dogwood Shrub Swamp	Willow-dogwood shrub swamps are open wetlands which contains >25 percent shrub cover, primarily willows, red-osier dogwood, speckled alder and bog birch, with abundant broad-leaved graminoids such as tussock sedge and bluejoint.
Southern Rich Conifer Swamp	Southern rich conifer swamps has a canopy cover ranging from 25-70 percent and are tamarack dominated, with < 25 percent elm, red maple, and paper birch. These canopy species are also primary components of the understory layer. Also common in the understory are forbs (25-75 percent) such as mash marigold and tufted loosestrife, some graminoids (<50 percent) including sedges and bluejoint, and a variable shrub layer that includes Virginia creeper and poison ivy.
Northern Floodplain Forest	Northern floodplain forest is a riparian community occasionally or annually flooded by natural events in the spring and is dominated by deciduous trees (50-100 percent cover) tolerant of occasional anoxic conditions. The canopy is strongly dominated by silver maple, but also has green ash, American elm, box elder, willow, river birch, basswood, and aspen. The most common sub-canopy or shrub layer has young canopy tree species in addition to choke cherry and nannyberry. Understory vegetation is variable in cover (5-100 percent) and species.
Upland Prairie	<p><i>Tallgrass prairies</i> are dominated by tall graminoids (75-100 percent) with sparse to patchy (5-50 percent) forb cover; shrub and tree layers absent.</p> <p><u>Wet:</u> Typic species include prairie cordgrass, big bluestem, Indian grass, woolly sedge, and Canada goldenrod.</p> <p><u>Southern Mesic:</u> Typic species include big bluestem, Indian grass, little bluestem, porcupine grass, stiff goldenrods, purple and white prairie clovers.</p> <p><i>Short-grass prairies</i> are dominated mostly by short to mid-height graminoids and some tall-grass species (50-100 percent cover) and sparse to patchy forb cover (5-50 percent); shrub and tree layers absent.</p> <p><u>Southern Dry:</u> Dominated by little bluestem; other common mid-height grasses include, side-oats grama, prairie dropseed, porcupine grass, and junegrass. Typical forbs include silky aster, purple coneflower, pasqueflower, and harebell.</p>
Southern Dry Savanna	A relatively open community with scattered or clustered (10-70 percent canopy cover, but more typically 25-50 percent), with a basal area (BA) of 5-50 sq ft/acre, stunted (15-35 feet tall), open-grown bur oak and black oak trees, often interspersed with jack pine, and with grass-dominated herbaceous ground layer (Wovcha et al. 1995, Minnesota DNR 2005). The understory vegetation is sparse or patchy with both native grasses (25-100 percent) and forbs (5-50 percent) (MNDNR 2005). Northern pin oak is sometimes present as a secondary tree species in the overstory or in the shrub layer. The density of shrubs is less than 30 percent in high quality occurrences (Dunevitz 1993). As the dominant upland habitat at Crane Meadows NWR, a more detailed description of this habitat type has been developed and can be found in Appendix L.
Oak Woodland	Deciduous-dominated with an interrupted to continuous canopy (50-100 percent cover) consisting primarily of bur oak and northern pin oak. Northern red oak, white oak, red maple, basswood, American elm, and aspen are occasionally present and a minor conifer component with white pine or jack pine may be present as well. The understory and shrub layer is patchy to continuous (25-100 percent), depending on light penetration through canopy. The ground layer is a variable mix of forbs and graminoids including pointed-leaved tick trefoil, hog peanut, Pennsylvania sedge and a shrub layer of black cherry, red maple, and bur oak.

Table 17: Habitat: Current and Proposed, Crane Meadows NWR

Habitat Type	Habitat ^a	Service-owned Acres (1,800)		Total Acquisition Boundary Acres (13,540)	
		Current ^b	Approximate 15-Year Objective ^c	Current	Approximate Long-term Objective (100+ years)
Wetland	Open Water	18	18	150	150
Wetland	River/Stream	3 miles	3 miles	32 miles	32 miles
Wetland	Emergent Marsh	100	100	1,600	1,600
Wetland	Sedge Meadow	460	460	2,640	3,350
Wetland	Willow-Dogwood Shrub Swamp	410	410	2,500	2,500
Wetland	Southern Rich Conifer Swamp	0	0	0	100
Wetland	Northern Floodplain Forest	50	50	435	300
Upland	Prairie (Wet, Southern Mesic, and Southern Dry)	380	305	910	500
Upland	Southern Dry Savanna	5	210	185	4,700
Upland	Jack Pine Woodland	10	5	85	0
Upland	Oak Woodland	200	100	1,180	300
Upland	Oak-Aspen Woodland	65	33	670	0
Upland	Agriculture	10	0	2,940	0
Upland	Conifer Plantation	10	0	200	0

- Refuge vegetation was identified and quantified during a 2006 aerial imagery project conducted by the Service. Habitat classes were later standardized using plant communities described in the Minnesota DNR's Field Guide to the Native Plant Communities; Eastern Broadleaf Forest Province (2005).
- Current habitat acreages for both existing fee-title and acquisition boundary are approximate and based on GIS area calculations.
- These numbers only account for land currently-owned by the Service, and will change with any new land acquisitions made by the Service over the 15-year planning period.

Objective 1.1 Wetlands

Total Acquisition Boundary Acres: 7,329

Total Service-owned Acres: 1,041

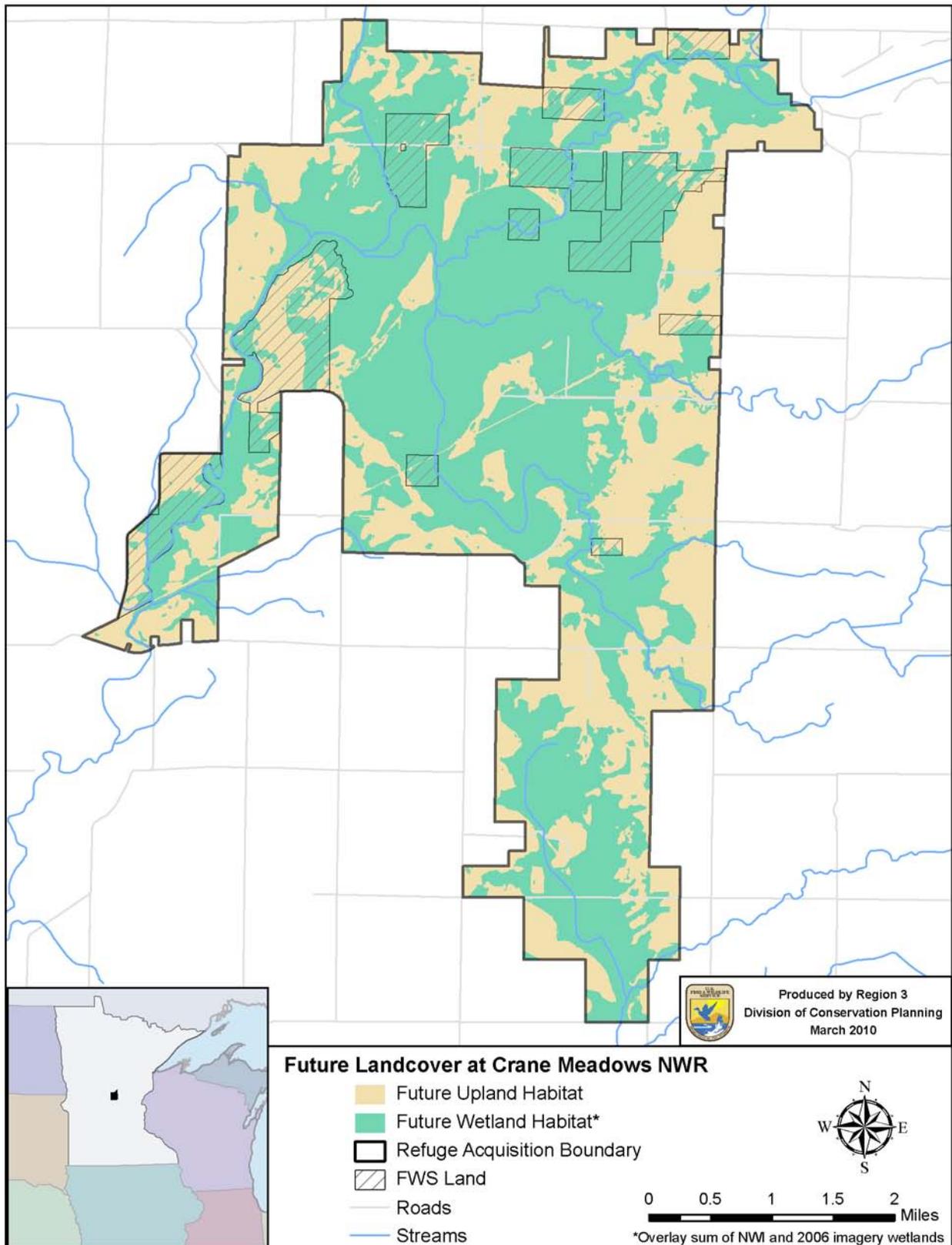
Maintain existing wetland habitat, and restore disturbed, altered, or degraded wetland areas where feasible within 5 years of acquisition.

Over the long term (100-plus years) within the full Refuge acquisition boundary, maintain existing and restore drained or degraded wetland habitats in suitable areas to the desired benchmark conditions (see Table 16 on page 83) to achieve a minimum of 8,000 acres (approximately 60 percent of the Refuge) in a mosaic of wetland habitats with the approximate desired acreages targets displayed in Table 17. (See Figure 30)

Rationale: Protecting and maintaining the integrity of existing wetland habitat and restoring degraded habitats to benchmark conditions is important for numerous reasons. The following list cites some of the key reasons:

- It is NWRS policy as mandated by the Refuge Improvement Act of 1997 to "ensure that the biological integrity, diversity, and environmental health of the System are maintained..." which provides guidance to restore and maintain "biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic (benchmark) conditions..." on refuge lands where appropriate.
- The primary purpose of the Refuge is derived from the Emergency Wetland Resources Act of

Figure 30: Desired Future Land Cover, Crane Meadows NWR



1986, which mandates "... the conservation of the wetlands of the Nation..."

3. Approximately 9 million acres (72 percent) of Minnesota's natural wetlands have been lost since 1850 (FWS 1992).
4. There is an ongoing threat of development and expansion of agriculture in the area; nearly 1,800 acres of wetlands have already been drained or ditched within the acquisition boundary (Cowardin et al. 1979).
5. The wetland complex itself has been classified as 'regionally significant' by the Service because it is considered a "natural" ecosystem that remains healthy and relatively intact.
6. A mosaic of these habitat types on the landscape would support an abundant and diverse array of wildlife species.
7. Wetlands provide a multitude of ecosystem services that benefit both humans and wildlife - from controlling floods to improving water quality.

The short and long-term objectives described in this CCP strive to maximize acres of Refuge wetlands by protecting existing wetland habitat and restoring wetland areas that have been altered or degraded. Although a number of factors, including climate change, have the potential to affect fundamental ecosystem conditions and balances, historic records still form a benchmark by which to gauge the level of anthropogenic alteration and disturbance, and therefore lend direction and guidance regarding restoration potential.

In addition, it is important to acknowledge the natural range of variation within each habitat type, both spatially and temporally, depending on disturbance and local environmental factors. Selecting a range of targeted conditions and habitat acreages is a more accurate and less risky way to identify desired conditions than with exact numbers, however numerical ranges can obscure the precision of the existing data. Therefore, exact numbers are identified for this objective with the understanding that these are approximations based on the best available information. Furthermore, annual fluctuations in water levels make it nearly impossible to pinpoint exact desired acreages between wetland habitat types – particularly open water and emergent marsh. Nonetheless, an average of current and pre-existing conditions obtained from a variety of sources, including an analysis of aerial imagery, the National Wetlands Inventory, USDA NRCS soils data, and Marschner's pre-settlement vegetation

estimates make it possible to establish target acreages – fully acknowledging the limitations of these data sources and resulting numbers.

Chapter 3 of the CCP describes in further detail the data used to acquire the numbers in this objective.

In summary, current imagery portrays over 7,300 acres of wetland habitat, the NWI shows just under 7,800 acres of wetlands, SSURGO identifies nearly 8,300 acres of suitable wetland soils in the acquisition boundary, and Marschner's generalized map of historic cover types contains over 6,600 acres of bottomlands when summarized using GIS software.

The large and relatively intact sedge meadow habitat found at Crane Meadows NWR is recognized for its high quality condition, and warrants protection and where appropriate restoration. Although sedge meadow habitat is relatively abundant in Northern Minnesota, there is an overall decrease in the quantity and quality of this once abundant habitat as you move southward in the state. There are few examples of large, high quality sedge meadows throughout the Anoka Sand Plain, and in central or southern Minnesota in general. Many sedge meadows in central and southern Minnesota have been degraded by invasive reed canary grass, herbicide use, woody encroachment resulting from reduced disturbance cycles, alteration of natural landscape hydrology, increased or contaminated run-off, and other anthropogenic factors. There are over 250 areas of sedge meadow identified in the Anoka Sand Plain by the Minnesota County Biological Survey (MCBS), but many are small and/or low quality and most are not actively managed. Unmanaged sedge meadows will eventually succeed to shrub or tree-dominated wetlands (like willow-dogwood shrub swamp) and/or will be invaded by exotic-invasive species. Therefore protecting, managing, and restoring sedge meadow habitat on the Refuge will enhance one of the only large, high quality sedge meadows that is actively managed and restored in this part of the state. Management will use sedge meadow benchmark conditions as a target for wetland habitat restoration where appropriate in order to mitigate the loss or degradation of this habitat type throughout the Anoka Sand Plain, and provide habitat for native species dependent on this declining habitat.

Southern rich conifer swamp is no longer present within the Refuge boundaries, but was extant at the time of European settlement according to GLO notes and Marschner's historic vegetation data. This habitat is also documented by the Minnesota DNR as occurring in surrounding areas in association with basins on moraines and outwash plains underlain by sandy substrates (Minnesota DNR 2005).

They are often present as small patches mixed with shrub or hardwood swamps - a reasonable form to consider re-establishing at Crane Meadows NWR. Because of its increasing rarity and the unique wild-life associated with this habitat type, including habitat-limited species of lady slipper, sundew, mosses, and sedges, there is value in restoring this habitat to the Refuge landscape.

The local benefits of various wetland habitats to bird species and other wildlife are well documented. During spring and fall migration open water, emergent marsh, and sedge meadow habitats on the Refuge are essential stopover habitats for approximately 10,000 waterfowl, a mix of both divers and dabblers, and over 100 other migratory bird species. There are notable concentrations of American Wigeon, Gadwall, Mallards and Blue-winged Teal in the fall and thousands of Canvasbacks and Mergansers in early spring. The emergent marsh and sedge meadow habitats on the Refuge support several breeding waterfowl species including Mallards, Blue-winged Teal, Green-winged Teal, Canada Geese, and Ring-necked Ducks. These wetland habitats also host one of the largest nesting populations of Greater Sandhill Cranes in central Minnesota (FWS 1992). Willow-dogwood shrub swamp provides cover for many resident wildlife species and breeding habitat for several Region 3 Resource Conservation Priority (RCP) species including American Woodcock, Willow Flycatcher, and Black-billed Cuckoo. Southern rich conifer swamp is a biologically rich and a unique wetland type that is dominated by tamarack and supports a variety of wildlife species including several RCP species such as Virginia Rail and Golden-winged Warblers. Animal species that occur in tamarack bogs are not exclusive to this habitat, but many breeding bird species reach their highest densities in conifer bogs (Sullivan 1994). Northern floodplain forest is a diverse riparian habitat that occurs along rivers and streams that provide seasonal variability correlated to natural water fluctuations. Ephemeral pools, usually devoid of fish, are temporarily available during spring thaw influx providing habitat and safe conditions for breeding and the development of natal amphibian and insect species. Other wildlife species that commonly use floodplain forest include mink, river otter, and RCP species such as American Woodcock, Bald Eagle, Red-shouldered Hawk, Loggerhead Shrike, Sedge Wren, and Black-billed Cuckoo.

Strategies:

1. Identify and restore drained wetland habitat.
2. Continue wetland health evaluation study to assess condition and productivity of emergent marshes. Document plant and wildlife species

and develop an “index of biological integrity” (IBI) once every 5 years or as needed after a management activity that may affect emergent marsh habitat.

3. Within the life of the plan assess and determine the most suitable location(s) on the Refuge for southern rich conifer swamp restoration. Begin planting tamarack trees and other bog species on the site(s), and restore natural hydrology required for this habitat type over the long-term.
4. Use prescribed fire events that mimic historical burn cycles to help minimize woody encroachment.
5. Coordinate with Minnesota DNR regarding management of wetland habitats, the weir, and water levels in the wetland complex.
6. Educate landowners within acquisition boundary about their role in the health of the wetland complex.
7. Further define Refuge habitat management in a step-down plan within 5 years of CCP approval.

Objective 1.2 Upland Prairie

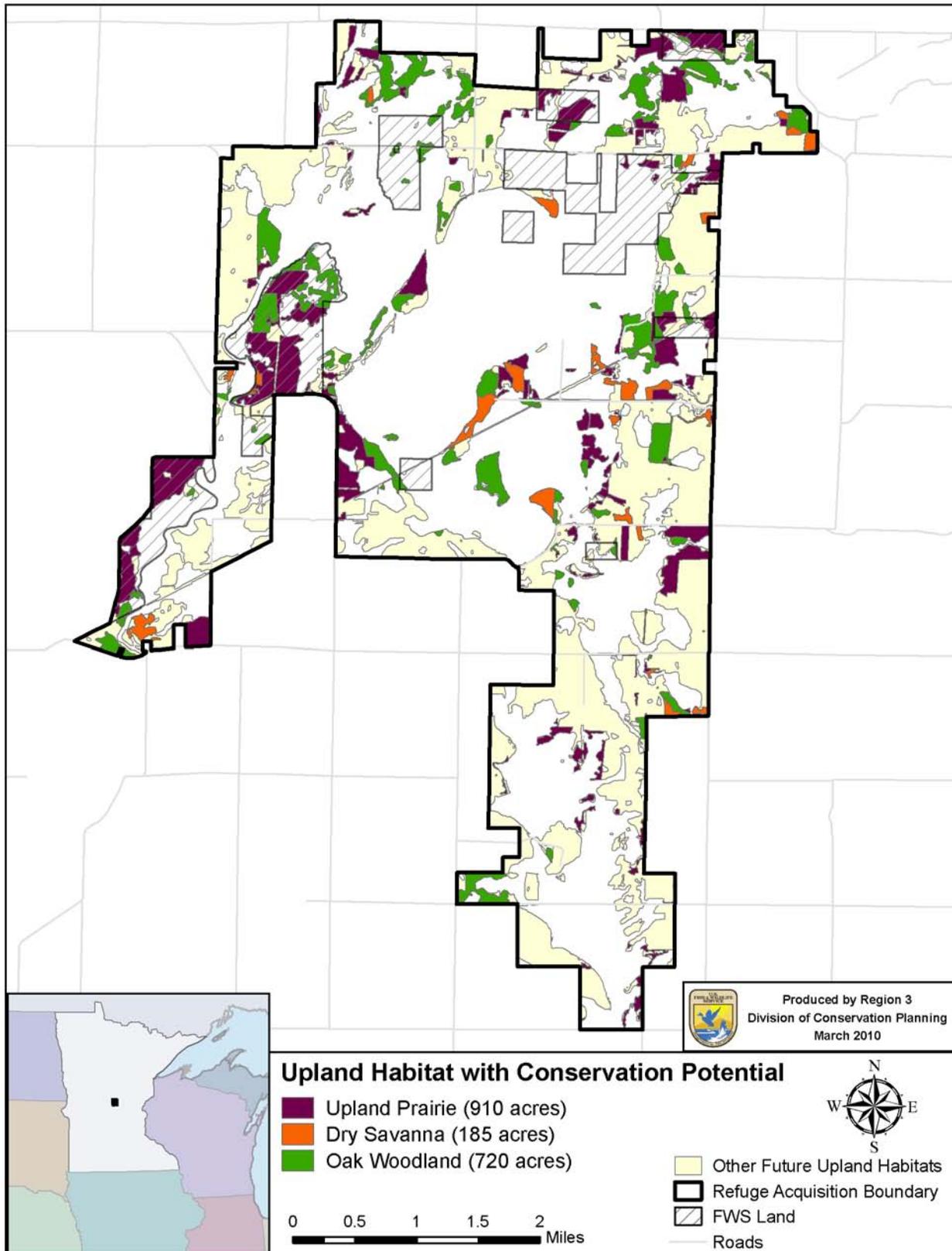
Total Acquisition Boundary Acres: 911

Total Service-owned Acres: 379

Over the life of the plan:

- Seed all newly acquired disturbed, altered, or degraded upland areas to prairie (as a transition step for southern dry savanna restoration) using local ecotype seed characteristic of savanna within 5 years of acquisition.
- Restore 20 percent (approximately 75 acres) of Service-owned upland prairie habitat to southern dry savanna.
- Within 3 years of plan approval identify the highest quality Service-owned upland prairie habitat to retain (see Figure 31 on page 88 for a map of existing upland prairies on the Refuge). Work in these areas to improve vegetation structure and composition to desired benchmark habitat conditions (see Table 16 on page 83) and develop quality prairie seed source areas.
- Over the long term (100-plus years) within the full Refuge acquisition boundary, maintain a minimum of 4 percent (approximately 500 acres) upland prairie habitat at desired benchmark habitat conditions (see Table 16 on page 83), transitioning the remaining 3

Figure 31: Existing Upland Habitat Source Areas, Crane Meadows NWR



percent (approximately 400 acres) to southern dry savanna. (see Figure 31 on page 88)

Rationale: As mandated by the Refuge Improvement Act of 1997, it is Service policy to “ensure that the biological integrity, diversity, and environmental health of the System are maintained...” Service policy provides guidance to restore habitat to historical benchmark conditions on Refuge lands where it’s appropriate. Much of the Refuge uplands were once prairie or savanna, but were converted to agricultural fields over the last 100 years. Newly acquired Refuge lands containing farm fields should be converted to prairie with native, local ecotype seed as a step toward pre-settlement conditions and transitional step to oak savanna restoration. Historical records indicate that only approximately 500 acres of uplands were considered tallgrass prairie and that most of the upland landscape of the Refuge was predominately oak and jack pine savanna (Marschner 1930). In addition, information from the SSURGO database indicating potential vegetation based on soils does not account for any coverage of an uninterrupted open prairie, but instead accounts for wetland, forest, and savanna (USDA 2009). Retaining approximately 500 acres as upland prairie over the long-term has the benefit of not only providing stepping stone for savanna restoration but also providing a more diverse mosaic of habitat types extending from prairie to savanna to woodland, thereby allowing for the potential to enhance overall flora and fauna diversity.

Finally, despite a lack of large-scale historical coverage in this area, prairie is considered one of the most endangered ecosystems in the country. Less than 1 percent of the original prairie habitat in Minnesota is still in existence (DOI 2004). The majority of this loss can be attributed to conversion to agriculture. As a result, many of the grassland birds and other wildlife associated with this habitat are also declining. By restoring prairies, the Refuge would provide critical habitat for declining grassland birds and other wildlife and plant species associated with grasslands.

Strategies:

1. Identify and map the highest quality upland prairie habitat in the Refuge acquisition boundary to retain.
2. Research historical vegetation records to assist in refining benchmark conditions.
3. Prepare native grasses and forbs in the greenhouse for transfer to prairie restoration sites.
4. Expand vegetation monitoring to include periodic field-based species richness surveys and GIS-based land cover analysis.
5. Further define Refuge habitat management in a step-down plan within 5 years of CCP approval.

Objective 1.3 Southern Dry Savanna

Total Acquisition Boundary Acres: 185

Total Service-owned Acres: 5

Over the life of the plan, begin restoring southern dry savanna habitat to desired benchmark conditions (see Table 16 on page 83) on 30 percent (approximately 210 acres) of the total Service-owned land. This acreage will come from suitable existing upland prairie (approximately 75 acres) and oak woodland (approximately 135 acres) habitats.

Over the long term (100-plus years) within the full Refuge acquisition boundary, establish and maintain a minimum of 35 percent (approximately 4,700 acres) southern dry savanna habitat (see Table 16 on page 83 for desired benchmark conditions). Existing savanna will be retained (~200 acres), and restoration will occur on existing upland prairies (~400 acres), oak woodlands (~1,550 acres), conifer forests and plantations (~300 acres), and agricultural areas (~2,250 acres). (Figure 31 on page 88)

Rationale: The distribution of oak savanna throughout the Midwest was widespread before European settlement. This habitat type once occupied as much as 50 percent of Midwestern landscape covering 11 to 13 million hectares (Nuzzo 1986). Most oak savanna habitat has been lost due to timber harvest, fire suppression, land conversion to agriculture, and development, with only about 0.02 percent of pre-European oak savannas of the Midwest remaining today in small fragments and scattered remnants. The Nature Conservancy has identified savanna as a globally imperiled habitat. The uplands of the Refuge were predominantly oak savanna according to all historical accounts, yet only a few small remnants remain within the acquisition boundary today totaling less than 200 acres. This landscape naturally lent itself to the establishment of savanna habitat in the past due to the nature of the sandy soils and historic disturbance regimes. While these conditions prohibited the establishment of mature woodlands, the abundance of water features supported limited growth of woody vegetation. Marschner’s pre-settlement vegetation data depict almost 6,000 acres of savanna habitat within the Refuge acquisition boundary, and SSURGO nearly 2,000, clearly demonstrating the historic abundance of this habitat in the upland areas of the Refuge

(Marschner 1930, USDA 2009). Protecting any existing oak savanna habitat is of critical importance, and restoring 35 percent of the Refuge acreage back to oak savanna would be consistent with the Refuge Improvement Act (1997) and Service policy for restoring habitat to historical (benchmark) conditions where appropriate. This restoration would also provide critical habitat for many declining species associated with grasslands and savannas. Restoration efforts will focus on thinning existing oak woodlands while restoring the savanna understory layer, or oppositely transitioning agricultural lands through upland prairie to savanna. Upland habitats may prove to be the most challenging habitats to protect due to the value and use of this land for agriculture.

Strategies:

1. Determine and map the most suitable sites for restoration to southern dry savanna.
2. Research historic vegetation records to assist with refining benchmark conditions.
3. Plant appropriate areas of existing upland prairie with oak seedlings at a rate of 335 seedlings per acre, with an expected long-term (10 years) mortality rate of 70 percent (Ly et al. 2009, unpublished).
4. Support reestablishment of jack pine in selected areas.
5. Seed degraded savanna restoration units with local ecotype seed as needed.
6. Research additional methods of oak reintroduction to prairie habitat (i.e. tree spading)
7. Harvest timber on appropriate wooded sites to achieve the desired tree density of 10-70 percent (mainly 25-50 percent) canopy cover.
8. Manage regeneration sites to protect seedlings from tree disease, white-tailed deer browsing, and gopher damage.
9. Work to improve the prairie/savanna grass and forb species composition (description reference).
10. Use prescribed fire to suppress woody encroachment and maintain fire-dependent savanna species.
11. Work with private landowners within the Refuge acquisition boundary to protect and restore southern dry savanna habitat.
12. Further define Refuge habitat management in a step-down plan within 5 years of CCP approval.

Objective 1.4 Oak Woodland

Total Acquisition Boundary Acres: 1,854
Total Service-owned Acres: 268

Within 3 years of plan approval identify the highest quality Service-owned oak woodland habitat to retain (see Table 16 on page 83 for desired benchmark conditions and Figure 31 on page 88 for a map of existing oak woodlands). Begin thinning 50 percent of those stands outside the highest quality oak woodlands selected to be retained to the desired basal area (ranging from 5 to 50 square feet/acre) and species composition for southern dry savanna habitat.

Over the long term (100-plus years) within the full Refuge acquisition boundary, reduce coverage of oak woodland to 2 percent (approximately 300 acres), transitioning approximately 1,550 acres to southern dry savanna. (see Figure 31 on page 88)

Rationale: At Crane Meadows NWR, the geographic extent of oak woodland habitat during pre-settlement was minimal or completely absent according to both Marschner's pre-settlement data and SSURGO's potential vegetation data (Marschner 1930, USDA 2009). The increasing proliferation of oak and other woodlands on the Refuge over the past century is a direct result of fire suppression and a lack of other natural disturbance mechanisms responsible for maintaining savanna conditions in the landscape.

Because this habitat exists today, but was not present to any great extent according to historic documentation and research, it can be argued that this cover type is most appropriately managed or maintained in only limited quantities. Nonetheless, oak woodland is important to maintain as a seral stage along a common ecological continuum that includes both upland prairie and oak savanna. These habitat types are dynamic plant communities that have always varied through space and time depending on disturbance frequency and magnitude, and natural climate variability.

Maintaining a full spectrum of upland habitat also promotes resiliency in the ecosystem as the effects of climate change become more pronounced. Drier future conditions would favor less woody growth, and wetter conditions would favor expansion of woodland cover types. Retaining oak woodland communities provide a number of additional benefits such as providing source populations and/or refugia for oak savanna plant and animal species depending on their resource requirements (i.e. cover, shade, forage, etc.); providing a niche to species of animals and plants that do not occur in open prairies or savannas; and even benefits associated with carbon

sequestration and nutrient retention. Much of the existing forest habitat would serve as a transition stage for oak savanna restoration and will ultimately be restored to more open historic conditions.

Strategies:

1. Identify and map the highest quality stands of oak woodland to retain.
2. Use prescribed burning as a tool to mimic historical mild surface fires every 20-30 years.
3. Expand vegetation monitoring to include periodic field-based species richness surveys and GIS-based land cover analysis.
4. Further define Refuge habitat management in a step-down plan within 5 years of CCP approval.

Objective 1.5 Water Resource Monitoring, Management, and Watershed Conservation

Within 5 years of plan approval, begin regular monitoring of the five major streams passing through the Refuge acquisition boundary. Work with partners to improve water quality with the long-term goal of removing all Refuge waters from state impaired waters lists.

Rationale: Water is a driving component of any ecosystem, and its importance is further accentuated in a wetland system like that found at Crane Meadows NWR. The Refuge Improvement Act (1997) requires the maintenance of “environmental health,” and by definition, environmental health includes abiotic factors such as water. Furthermore, protecting the health of the wetland system is the primary establishing purpose of the Refuge, making water an important consideration in Refuge management and the allocation of Service resources. Water is not strictly an ‘on-Refuge’ issue. The health of the aquatic ecosystem starts at the drainage divides of the watershed and can be affected along its course by many variable before entering the Refuge. Maintaining water quality and quantity on the Refuge can only be effectively addressed by working with land owners and partner agencies in the larger geographic area affecting the Refuge’s water resources.

Many wetland-dependent species, both plants and animals, are sensitive to water quality, sediment, and contaminants. The need to address water resources as part of management at Crane Meadows NWR is further exacerbated by issues related to ensuring continued water availability for both wildlife and humans, maintaining overall water quality in the system, and a general lack of data necessary to fully understand the hydrology of the upland-wetland sand plain complex. It is important

to be an active participant in efforts to monitor and manage water resources affecting the Refuge. Fostering additional partnerships and collaborative management approaches will benefit all stakeholders affected by the watershed. Because the streams and lakes on the Refuge are public waters, working with state partners will be essential. More specifically, management will work with the Minnesota DNR which has managerial jurisdiction to waters on the Refuge, and the Minnesota Pollution Control Agency (MPCA), which is responsible for meeting state water quality standards. According to the MPCA’s Electronic Data Access database only four of the five streams that flow onto the Refuge are monitored, and three of those four are on the state’s impaired waters lists (MPCA 2009b).

In addition to upstream considerations, the Platte-Spunk Watershed (Minnesota HUC 7010201) in which Crane Meadows NWR is located (see Figure 21 on page 49) also straddles the Mississippi River. Much of the land area north and west of the Refuge drains through Crane Meadows NWR’s wetland complex before reaching the Mississippi River, giving the Refuge an important role in the health of the larger Mississippi River ecosystem.

Strategies:

1. Work with the Minnesota DNR, MPCA, local groups and other partners to conduct routine monitoring of rivers and streams entering and exiting the Refuge.
2. Quantify existing sediment and contaminant loads in Refuge streams as they enter the Refuge and work to establish acceptable threshold values.
3. Over the life of the plan, work to reduce the amount of sediment and contaminants from the baseline quantities encountered in the initial years of monitoring.
4. Increase the local understanding of water quality and watershed issues through public outreach and education.
5. Partner with the Minnesota DNR, MPCA, SWCD, NRCS, FSA, Ducks Unlimited, TPL, The Nature Conservancy, other partners, and private landowners to implement land conservation projects in and adjacent to areas with key aquatic resources (i.e. streams, lakes, and wetlands) upstream of the Refuge.

Objective 1.6 Prescribed Fire

Implement and monitor a rotational prescribed burn program over the life of the plan that supports the fire dependent vegetation communities on the Refuge and reduces hazardous fuel

Table 18: Burn Cycles for Crane Meadows NWR Habitat Types

Habitat Type	Historic Burn Cycle
Wetlands	2-4 years
Upland Prairie	<3 years
Southern Dry Savanna	3-6 years
Oak Woodland	20-30 years

loads according to historic guidelines (see Table 18).

Rationale: Nearly all of the Refuge habitats are fire-dependent communities, and the frequency and magnitude of burns have a profound impact on their successional state and the transition from one habitat type to another. After Euro-American settlement wildfires were suppressed, disrupting the natural disturbance cycle, and resulting in habitat succession into seral stages or into different habitat types altogether. Prescribed burning is an effective tool in restoring these fire-dependent plant communities to historic, benchmark conditions, suppressing woody encroachment, and maintaining desired habitat conditions. The Refuge Improvement Act (1997) states that the Service must ensure that “biological diversity”, “biological integrity”, and “environmental health” is maintained and, by definition, these include, “...the natural biological processes that shape genomes, organisms, and communities...” such as fire.

Strategies:

1. Complete an adaptive fire management step-down plan within 1 year of CCP approval to better implement, evaluate, and improve the burn program on the Refuge.
2. Continue upland vegetation monitoring activities as part of the Fire Monitoring Program.
3. Adapt timing, seasonality, and frequency of burns in response to monitoring.
4. Partner with state and private landowners to burn larger tracts within and immediately adjacent to the Refuge acquisition boundary.

Objective 1.7 Land Acquisition

Within 3 years of plan approval, update the land acquisition priority map created for the environmental assessment that established the Refuge (see Figure 32 on page 93); over the life of the plan, increase efforts to make land acquisitions from willing landowners in high priority areas.

Rationale: Land acquisition is a key component in permanently protecting wildlife habitat. The National Wildlife Refuge System identifies land protection priorities, then designates formal boundaries within which acquisitions can be made at fair market value from willing landowners. As a part of the Refuge System mission statement, extending permanent protection to important natural resources of the nation such as the Rice-Skunk wetland complex, the Refuge System is sustaining wildlife and habitats, “for the benefit of present and future generations of Americans.” Protection emphasis at Crane Meadows NWR is focused on the large intact sedge meadow wetland complex, but extends to protect adjacent upland habitats required by wildlife during various life cycle stages. Protection also extends to other important aquatic resources, wildlife, and habitat such as those associated with the Platte River below the lakes and Little Rock Creek in the southern spur of the Refuge.

Land acquisition has become more difficult and more costly over time, and while land remains unprotected additional damage may be done to the area’s natural resources. For example, in recent years large scale animal husbandry structures with unforeseen effects on adjacent wildlife and habitat have been erected directly within the acquisition boundary. According to Service land status records, there are currently 54 national wildlife refuges in the Midwest Region. Of the 48 refuges with boundaries that are proposed for complete acquisition, Crane Meadows NWR owns the smallest percent of its proposed acquisition boundary at only 13 percent. In order to adequately protect the proposed boundary of the Refuge, additional steps and alternative methods will be required to prioritize acquisitions and acquire targeted lands. By first reassessing the highest priority areas, then directing limited acquisition resources to those lands, the Refuge can have the greatest conservation impact.

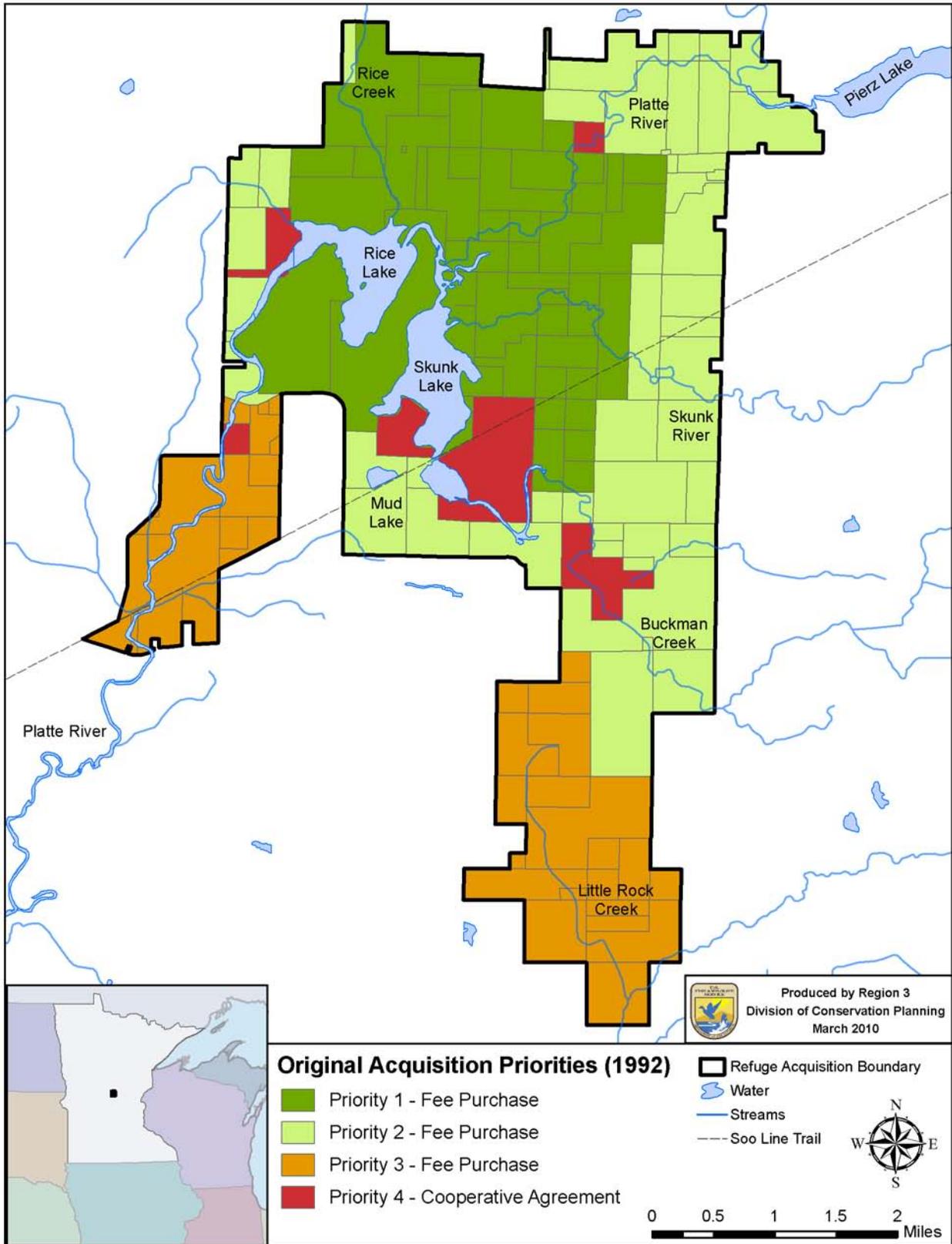
Strategies:

1. Actively work with partners to secure lands via grant opportunities, donations, bequeaths, and purchases.
2. Provide accurate and up-to-date land acquisition information to landowners within the Refuge acquisition boundary.
3. Where land acquisition is not practical within the Refuge acquisition boundary, work to obtain conservation easements.

Objective 1.8 Partners Program and FSA Easements

Over the life of the plan, conduct a minimum of 100 habitat improvement projects through the Partners program within Morrison County,

Figure 32: Original Acquisition Priorities (1992), Crane Meadows NWR



specifically targeting areas within, and up-watershed of the Refuge acquisition boundary. Ensure compliance of all properties with FSA easements (annual monitoring) and Partners program volunteer agreements (5-year monitoring cycle).

Rationale: Management emphasis is first and foremost on the lands owned by the Service. However, targeting land protection within the acquisition boundary of the Refuge is only one step in caring for our natural resources. The need is only increasing for all entities with conservation interests – federal, state, county, NGO, and private – to look outside traditional boundaries at the larger picture and work together to conserve and better manage wildlife habitat.

The Partners for Fish and Wildlife Program is set up to work with the other agencies, organizations, and the public to restore degraded habitats across the landscape. For Crane Meadows NWR, focusing on land use and activities in the watershed above the Refuge can have the greatest impact on the Refuge.

The health of the watershed above the Refuge has direct implications and impacts on the quality of Refuge habitats and wildlife. By working to protect and enhance lands and waters in the watershed upstream of the Refuge, it is possible to improve habitat quality and other variables that flow through the wetland complex. The complexity of environmental concerns and threats has forced land managers to address issues at a regional scale, obviating the value-added nature of work done on private lands in the larger landscape.

Strategies:

1. Work with interested landowners to assess and improve habitat for fish and wildlife conservation.
2. Distribute information regarding the Private Lands program to landowners in the Refuge acquisition boundary, watershed, and at all Refuge events.
3. Provide assistance to other agencies doing habitat improvement and wildlife conservation on private lands in the vicinity of the Refuge.
4. Collaborate with the Service's Office of Law Enforcement to develop an annual, systematic, and safe compliance evaluation and enforcement program for the 21 FSA easements. Methods of review include direct contact with landowners, on-site inspections, and aerial imagery surveillance.

Goal 2: Wildlife

Protect, restore, and maintain native wildlife species to ensure biological diversity and abundance, with special emphasis on Service Regional Conservation Priority Species.

Objective 2.1 Federal and State Threatened and Endangered Species and/or Regional Species of Conservation Priority

Participate in larger state and federal wildlife population monitoring efforts for species of conservation concern. Within 5 years of plan approval, develop and implement monitoring programs for the Bald Eagle and Blanding's turtle.

Rationale: As Trust Resources of the FWS and a goal of the NWRS, it is a priority for the Refuge to monitor and protect rare, threatened, and endangered species. It is also required by The Endangered Species Act (1973), "that all Federal departments and agencies shall seek to conserve endangered and threatened species...". All living things are part of a complex, often delicately balanced network within an ecosystem comprised of plants, animals, and their physical environments. No one knows how the extinction of organisms will affect the other members of its ecosystem, but the removal of a single species can set off a chain reaction affecting many others (FWS 2005). Therefore, it is important as an agency and a Refuge within the NWRS to attend to these rare species. Currently there are no federally-listed endangered species inhabiting Crane Meadows NWR, but the Refuge supports several state-listed threatened species and many regional Resources of conservation Priority (RCP) species as well. Bald Eagles were once listed as a federally threatened species. They were delisted on August 9, 2007, and moved to a protected status, and remain an RCP species in Region 3. Bald Eagles are commonly observed in the area during spring and fall migration and the Refuge currently supports three nesting pairs. Because of its recent delisting and a priority status in Region 3, Bald Eagles should be monitored and considered during management activities. Blanding's turtles have been observed on the Refuge and are currently threatened in the state of Minnesota. This species is highly dependent on the wetland complex during most of the year and savannas and prairies during the breeding season. Monitoring Blanding's turtles is important because of the species' rare status throughout their original range, and because they are valuable biological indicators of environmental health due to an inherent sensitivity to changes in the quality of their surroundings (Congdon and Keinath 2006). Over time, and as additional research is done, species may be added or removed from state and federal lists. Thus, it is necessary for the

Refuge to maintain an adaptive management approach regarding individual species protection and monitoring.

Strategies:

1. Monitor Bald Eagle nesting activities and actively protect species during prescribed burns.
2. Opportunistic mark-recapture study of Blanding's turtles.
3. Conduct surveys of rare/declining species to determine presence/absence within Refuge boundaries.
4. Design and implement a monitoring program to track abundance, population trends, and habitat associations of selected Trust species.
5. Increase collaborative research and monitoring with Central Lakes College, St. Cloud State University, and other academic institutions.
6. Further define Refuge wildlife inventory and monitoring in a step-down plan within 5 years of CCP approval.

Objective 2.2 Migratory Birds

Participate in larger state and federal wildlife population monitoring efforts (see Table 19).

Over the life of the plan, conduct periodic monitoring of marsh birds, songbirds, and other migratory bird species.

Rationale: Migratory birds are Trust Resource for the Fish and Wildlife Service and are protected by the Migratory Bird Treaty Act. It is also a goal of the Refuge System to perpetuate migratory bird populations. The Refuge attracts over 100 birds during migration with notable concentrations of waterfowl. However, reliable surveys and monitoring of migratory birds have been limited since Refuge establishment, and thus the Refuge would benefit from baseline inventories and trend analyses of migratory song birds to help inform management and partners. Cooperative efforts are essential because migratory species are dependent on multiple locations and large geographic extents, and are affected by habitat changes in their breeding range, wintering range, and migratory flyways.

Strategies:

1. Maintain existing and establish new partnerships with government agencies, non-government organizations, and private interests for bird monitoring and education efforts.

Table 19: Wildlife Monitoring at Crane Meadows NWR

Monitoring Effort	Periodicity
Crane Unison Call Surveys	Annually
Midwest Crane Counts	Annually
Waterfowl Surveys	Weekly/ Biweekly
Bald Eagle Surveys	Weekly
Mourning Dove Surveys	Annually
Woodcock Surveys	Annually
Nest Boxes (Bluebird, Wood Duck, and Purple Martin)	Annually

2. Document and share all monitoring results, particularly following any management changes.
3. Further define Refuge wildlife inventory and monitoring in a step-down plan within 5 years of CCP approval.

Objective 2.3 Native Plant Species

Within 5 years of plan approval, collaborate with the Minnesota DNR and other partners to conduct baseline inventories of plant species on the Refuge.

Rationale: The Refuge Improvement Act of 1997 states that the Service shall “ensure that the biological integrity, diversity, and environmental health of the System are maintained...” Biological integrity is defined as “biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions...” Thus, it is important to complete a more thorough inventory of the plant species currently inhabiting the Refuge, investigate which native species were on the Refuge historically, and take the necessary steps to restore the biological communities where possible and appropriate. Crane Meadows NWR is acknowledged by many sources as a relatively intact wetland system, despite a century and a half of land conversion in the surrounding landscape. More thorough examination of the vegetation in the area may yield additional insights to the local ecology and natural history.

Strategies:

1. Work with the DNR to establish new relevé plots on the Refuge.
2. Review historic vegetation records to determine if the current plant community is missing species present in the historic landscape.

Determine the need for translocation or seeding actions to replace missing species.

3. Work with partners to generate and harvest a supply of local ecotype seed. Increase seed production efforts on Refuge seed plots and in the greenhouse.

Objective 2.4 Invasive and Exotic Plant Species

Within 5 years of plan approval, conduct a comprehensive survey to assess the extent of invasive plant species on Service-owned Refuge lands. Within 10 years no more than 10 percent of acquired Refuge lands will be affected by invasive plant species.

Rationale: Invasive species can be native or exotic, and are typically early successional pioneer species that quickly establish themselves in ecologically disturbed communities.

Potential concerns at the time of writing include the following species:

Wetland

- Purple loosestrife
- Cattail
- Phragmites
- Eurasian water milfoil

Upland

- Buckthorn
- Siberian elm
- Box elder
- Black locust
- Spotted knapweed
- Common tansy
- Leafy spurge
- Japanese knotweed
- Aspen
- Hairy vetch
- Crown vetch
- Canada thistle

Exotic species occur in areas outside their native range, are often introduced by human activities, and are sometimes invasive in nature.

Invasives, particularly invasive exotics, are difficult to control because of their (typically) prolific reproductive capabilities, faster growth rates, efficient modes of dispersal, heightened environmental tolerance, and lack of natural predators and diseases which control populations in their native environments. If uncontrolled, they can displace native

flora and interfere with a community's natural ecological processes, thereby reducing its biological potential and benefit to native wildlife.

Fortunately, to date many of the species listed above are not established on the Refuge, but are regional issues and pose potential future threats to native plant communities on the Refuge. It is necessary for Refuge staff to be engaged in proactive monitoring and management efforts to help prevent these invasive species from establishment. It is also important to monitor and control certain native species such as aspen that have an aggressive nature, and can become invasive to areas where they were historically absent as ecosystem processes and balances are interrupted.

Strategies:

1. Actively communicate with state and federal natural resource agencies and other partners regarding new and existing exotic/invasive threats and effective management techniques.
2. Coordinate Refuge inventories, monitoring, management, reduction, and prevention activities of invasive species with the Minnesota DNR and other landowners inside the acquisition boundary.
3. Maintain up-to-date records of invasive control efforts and results.
4. Control invasive species through appropriate mechanical, chemical, and biological treatments, including herbicides, biological control agents, mowing, flooding, prescribed burns, cutting, hand pulling, and others.
5. Educate the public about invasive species and how they can help.
6. Further define Refuge habitat management in a step-down plan within 5 years of CCP approval.

Objective 2.5 Wild Rice

Keep informed of the wild rice trends in the wetland complex and assist with monitoring and documenting wild rice trends through routine Service aerial imagery vegetation surveys.

Rationale: For many wildlife species, wild rice is an essential food resource and it is especially important forage for migrating waterfowl. A large wild rice crop can attract and sustain waterfowl in the area as they rest during migration, which may also benefit local hunters during waterfowl hunting season. The abundance of wild rice can also lend insight to local hydrology dynamics due to its specific water requirements for establishment and growth. Wild

Table 20: Future Visitor Services Facilities

Unit	Additional Facilities	Timeframe
Headquarters	Kiosk (near office), outdoor classroom	5 years
Highway 27	Directional signage, kiosk, parking area	10 years
Soo Line East ^a	Kiosk	15 years
Platte River West ^a	Kiosk	15 years
Sedge Meadow	Kiosk, observation platform, trail/boardwalk, parking area, restroom	15 years

a. *The facilities at these locations will require partnerships with Morrison County Trail Association, Minnesota DNR, and private landowners.*

rice has been an important part of the Rice-Skunk wetland complex for as long as written records have been kept in the area, including General Land Office descriptions from 1852 (U.S. OSG 1852).

The Minnesota DNR has monitored wild rice in the complex since the 1970s, and increased efforts to understand the dynamics of this species in recent years to include aerial surveys. The wetland complex is a very dynamic system, and wild rice monitoring will need to be conducted over the long term to gain a better understanding of its dynamics and the effects of management.

Strategies:

1. Review monitoring activities conducted by the Minnesota DNR and others.
2. Share Refuge vegetation imagery with state partners monitoring wild rice trends.
3. Work cooperatively with local universities, colleges, and other agencies to promote wild rice research within the wetland complex.

Goal 3: People

As an active partner in collaborative conservation, the Refuge will provide quality wildlife-dependent recreation, environmental education, and outreach to a diverse audience. These activities will preserve cultural resources and promote understanding, appreciation, and support for Crane Meadows National Wildlife Refuge, the National Wildlife Refuge System, and natural resource conservation.

Objective 3.1 Welcoming and Orienting Visitors

Bring all Refuge literature, web resources, kiosks, and directional signage into compliance with Service standards within 10 years of plan approval, and expand welcoming and orienting at the locations described in Table 20 (illustrated in Figure 33 on page 98).

Rationale: Welcoming and orienting Refuge visitors contributes to the criteria that defines a quality wildlife-dependent recreation program as identified

in the National Wildlife Refuge System Improvement Act of 1997 and defined in Service Manual (605 FW 1). The number of visitors and amount of visitor services has increased steadily since the Refuge was established in 1992.

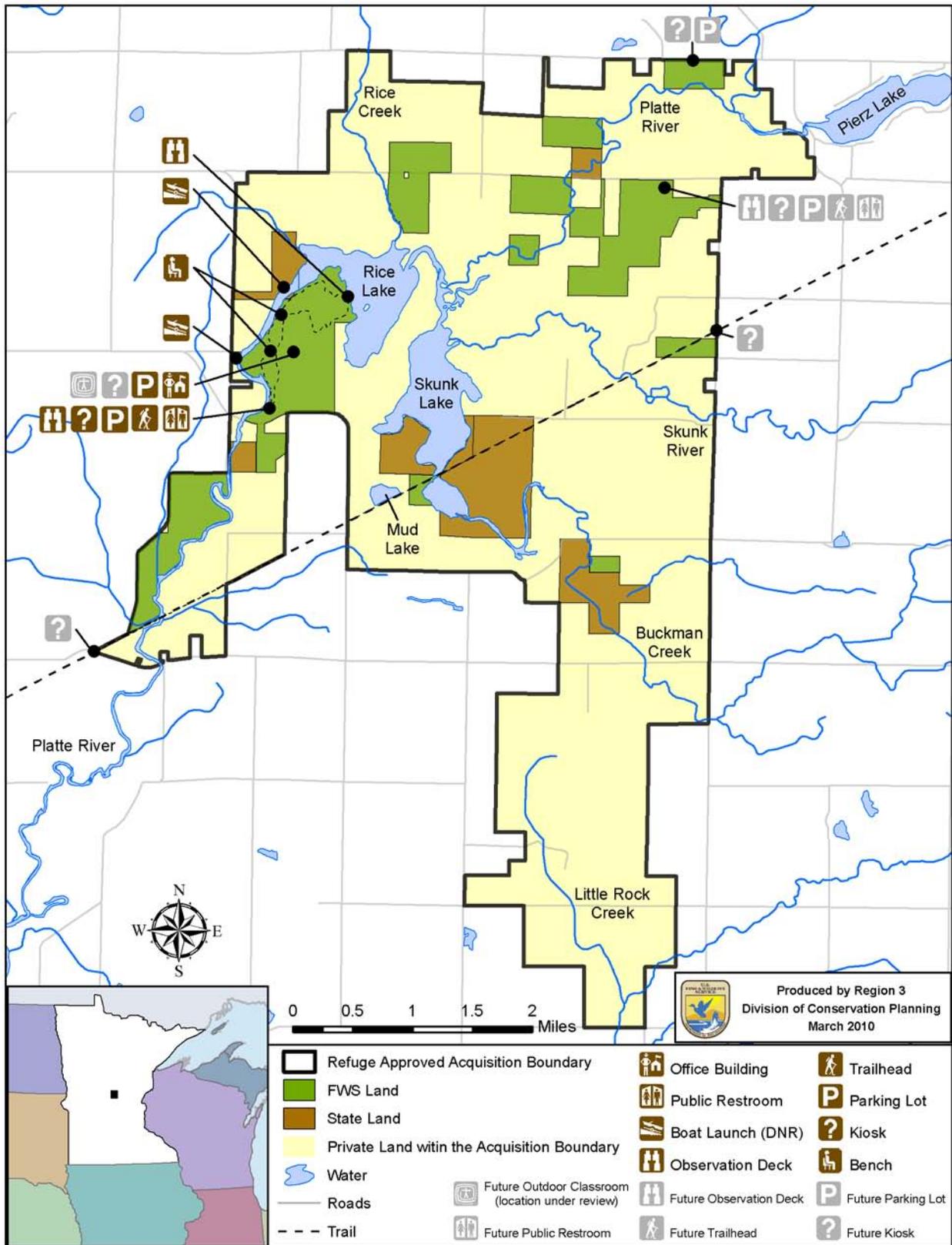
With approximately 87 percent of the land within the Refuge boundary not yet acquired, and Refuge lands intermingled with other types of ownership, clear signage and adequate visitor information is essential. The ease with which the public can navigate to visitor use areas on the Refuge, understand guidelines for appropriate conduct and safety, have basic needs met (i.e. parking, restrooms, maps, etc.), and fully engage in wildlife-related activities directly translates to a quality recreational experience, a positive impression of the Service, and an identification with the mission and goals of the Agency.

Proper signage and other welcoming and orienting materials can also reduce the need for direct interaction with Refuge staff, particularly on the headquarters unit which has the greatest concentration of visitor use. Direct contact can be difficult to offer at all times with current staffing levels, but a strategy has been included to increase staffing to greatly enhance the Refuge's ability to better accommodate visitor needs.

The two main transportation corridors in the area are Highway 10 west of the Refuge (which currently has directional signage) and Highway 27 on the northern border. Adding directional signage to Highway 27 will increase awareness of the Refuge, and has the potential to increase visitation. The county maintains the Soo Line Recreational Trail that bisects the Refuge. This trail is an additional underutilized opportunity to inform the public about the Refuge, the values of the Service, and interpretation of local natural history.

Finally, the Sedge Meadow Unit is one of the largest contiguous tracts of land owned by the Refuge within the acquisition boundary, contains ade-

Figure 33: Future Visitor Services Facilities, Crane Meadows NWR



quate access and existing structures that could be modified for visitor use, and provides a wide-sweeping view of a large, natural sedge meadow landscape, making it an ideal location to offer additional wildlife-dependent recreation opportunities.

Strategies:

1. Within 2 years of CCP approval complete a visitor services step-down plan to further evaluate and define additional Refuge facilities and programs.
2. Within 10 years, establish way-finding signage on Highway 27 and on intermediate roads between Highway 27 and the Headquarters.
3. Provide adequate signage to direct and instruct visitor recreation according to established rules and safety standards.
4. Inspect Refuge signs annually, updating and rehabilitating where necessary.
5. Develop and install an accurate system for tracking visitation to the headquarters site.
6. Within 5 years, design and produce a full color general Refuge information brochure according to Service standards.
7. Annually review and update visitor services section of Refuge website.
8. Within 2 years, add an annual accomplishments summary to the Refuge website.
9. Renovate the headquarters office building to include an area for welcoming guests, additional offices, and a meeting area.
10. Provide visitors access to staff during normal hours of operation, by hiring an administrative technician/visitor services specialist.
11. Expand the west side of the maintenance shop to include an oil room, restroom, and office space.
12. Provide clean, maintained, and accessible visitor facilities.
13. Routinely inspect and maintain existing maintenance facilities, visitor service structures, and transportation infrastructure on the Headquarters Unit (office, maintenance shop, greenhouse, three storage barns, two observation decks, kiosk, spotting scope, one-half-mile of road, two parking lots, 3.7-miles of trail), and the Sedge Meadow Unit (residence, garage, and storage building.)

Objective 3.2 Hunting

Within 5 years of plan approval, work with partners to open managed white-tailed deer and turkey hunts on specified Refuge units for hunters with disabilities and for youth hunters.

Rationale: Hunting is one of the six priority wildlife-dependent recreational uses identified in the National Wildlife Refuge System Improvement Act of 1997. Service policy directs us to provide hunting opportunities when compatible with Refuge management, and offering this use was a long-term goal of the Refuge when it was established in 1992. Managed hunting programs help promote an understanding and appreciation of natural resources and their management. Additionally, managed hunts on the Refuge provide a traditional recreational activity with no definable adverse impacts to the biological integrity or habitat sustainability of Refuge resources.

The limited size and distribution of current Service land ownership at the Refuge continues to limit our ability to offer quality hunting experience opportunities, but management has long understood the demand for, and importance of providing this activity on the Refuge. By beginning with short-duration, assisted, managed hunts, Refuge staff can provide hunting opportunities in a controlled fashion, direct these activities to specific audiences, and adaptively evaluate the hunting program for expansion or reduction based on demand and program success.

Strategies:

1. Prepare and submit all materials required to open hunting as a use on the Refuge.
2. Partner with Minnesota DNR, Wheelin' Sportsmen, National Wild Turkey Foundation, Capable Partners, Minnesota Deer Hunters Association, Pheasants Forever, Camp Ripley, Minnesota State Archery Association, local sportsmen's clubs, and others to conduct managed hunts.
3. Prepare the Headquarters, Sedge Meadow, and Platte River West Units for managed hunts.
4. Provide adequate boundary signage on all hunting areas.
5. As additional land is acquired, re-evaluate the areas that are available and safe for hunting with the ultimate goal of opening additional areas of the Refuge to hunting.
6. Increase law enforcement as the hunting program expands.

7. Manage hunts to minimize conflicts with other uses and resources.
8. Assist with hunter education.
9. Survey participants in specialized hunts.
10. Adhere to state regulations for hunting activities.
11. Further define Refuge management of the hunting program as a part of the visitor services step-down plan and complete it within 2 years of CCP approval.

Objective 3.3 Fishing

Within 3 years, evaluate the potential to establish seasonal bank fishing opportunities on the Platte River West Unit; over the life of the plan evaluate the potential for new bank fishing opportunities as additional properties are acquired.

Rationale: Fishing is one of the six priority wildlife-dependent recreational uses identified in the National Wildlife Refuge System Improvement Act of 1997. Fishing would provide a traditional recreational activity on the Refuge, if no definable adverse impacts to the biological integrity or habitat sustainability of Refuge resources are found and it is determined that a quality fishing experience is possible and sustainable. Fishing programs help promote understanding and appreciation of natural resources and their management on lands and waters in the Refuge System. Fishing is also a way to engage visitors in activities related to water resources and water-associated habitats, which relates to the primary purpose of the Refuge under the Emergency Wetlands Resources Act of 1986, "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide...".

Because of the great abundance of other quality fishing opportunities in the area, the additional management responsibilities associated with offering this activity, and a limited understanding of the fisheries adjacent to Refuge properties, Refuge staff feel it is important to further investigate the demand for this activity and the ability of the Refuge to meet the demand before opening the Refuge to fishing. It is a goal of the Refuge System to provide the most appropriate and compatible, highest quality, and most sustainable wildlife-dependent recreation opportunities for the public.

Strategies:

1. Conduct site evaluations for quality fishing opportunities.



Crane Meadows NWR by water. Photo Credit: FWS

2. Review potential fishing sites and evaluate the potential for disturbance to eagle nests.
3. Evaluate potential for bank erosion and vegetation disturbance when considering new fishing access sites.
4. Provide appropriate directional and informational signage when establishing any fishing access sites.

Objective 3.4 Wildlife Observation and Photography

Over the life of the plan, maintain existing wildlife observation and photography infrastructure and opportunities, and expand and promote opportunities along the Soo Line Trail corridor and on the Sedge Meadow Unit to correspond to a 20 percent increase in Refuge visitation from 2009 levels (see welcoming and orienting objective 3.1 for additional information).

Rationale: Wildlife observation and photography are priority wildlife-dependent recreation activities listed in the National Wildlife Refuge System Improvement Act of 1997. They are important and valuable activities that promote understanding and appreciation of natural resources and their management.

If properly managed, these uses provide invaluable opportunities for interaction between people and the natural environment with little or no detrimental effects to wildlife or habitat. By developing trails, boardwalks, observation decks, and other infrastructure it is possible to enhance mobility and access to locations that offer premium wildlife viewing opportunities. The various modes of travel permitted on the Refuge also help facilitate year-round access to these opportunities. The objectives and strategies proposed in this CCP were conceived and further developed during a visitor services planning

session held by Refuge staff, members of the Refuge Friends group, and other natural resource professionals in March 2009 in preparation for the writing of the CCP.

Strategies:

1. As the Refuge grows in size and visitor use increases, develop a public use site on the Sedge Meadow Unit (see welcoming and orienting objective 3.1 for additional information).
2. Consider accessible wildlife observation and photography facilities at selected sites as new lands are acquired for the Refuge, and as visitation and demand increase; facilities may include blinds, observation platforms, trails, and other provisions.
3. Continue to offer wildlife observation and photography opportunities for portable blinds by special use permit.
4. Work with partners to establish Crane Meadows NWR as an Audubon Important Bird Area (IBA).

Objective 3.5 Environmental Education and Interpretation

Increase Refuge environmental education and interpretation provision from 2009 levels, specifically:

- Increasing participation in programs (see rationale) by 20 percent within 15 years.
- Establishing new interpretive displays that convey key habitat, wildlife, and other natural resource messages to visitors on the following Refuge units: Headquarters, Highway 27, Sedge Meadow, Platte River West, and Soo Line East (see welcoming and orienting objective 3.1 for additional information).

Rationale: Environmental education and interpretation are priority wildlife-dependent recreational uses listed in the National Wildlife Refuge System Improvement Act of 1997. Well-designed environmental education and interpretive programs can be effective management tools and provide the opportunity to influence visitor attitudes about natural resources, refuges, the Refuge System, and the Service. They can help develop a citizenry that has the awareness, knowledge, attitudes, skills, motivation, and commitment to work cooperatively towards the conservation of our nation's environmental resources. They can also influence visitor behavior when visiting units of the Refuge System. One aspect of future management efforts will be directed toward on-Refuge programs with a goal of

increasing the knowledge of, and appreciation for the Refuge and its resources. Another emphasis will be directed towards a growing need to connect the nation's youth with the natural world and engage children in the outdoors. Richard Louv's 2005 book, 'Last Child in the Woods,' motivated a growing interest in, and acknowledgement of the disconnect between modern youth and nature (Louv 2005). By working with local schools and increasing provision of environmental education and interpretation, the Refuge hopes to begin addressing some of these issues at the local level.

Current programs and activities include:

- Habitat Day
- Platte River Cleanup Day
- Winter Backyard Bird Feeding
- Spring and Fall Birding Tours
- Morrison County Water Festival
- Pheasant Forever Youth Days (Sherburne and Anoka Counties)

Strategies:

1. Identify priority natural resource messages and relevant Refuge audiences to develop interpretive themes that will guide interpretive programs and products.
2. Work with local educators, regional Service environmental education staff, and others to identify target audiences and topics for environmental education programs.
3. Encourage self-directed learning on the Refuge, in addition to providing programs, activities, talks, publications, audio-visual media, signs, and exhibits.
4. Begin coordinating environmental education programs with the five local schools (Royalton, Little Falls, Pierz, Upsala, and Swanville.)
5. Serve as a local resource for environmental education and interpretation related to area wildlife, habitats, water resources, and cultural history by providing curricula, workshops, outdoor classrooms, and teaching materials.
6. Work with local educators to develop environmental education curricula and teach workshops.
7. Develop operational measures of success for the environmental education program.
8. On the Headquarters unit, design and develop the plan for an outdoor classroom with electricity, running water, and flush toilets, and

an indoor visitor information area (see welcoming and orienting objective 3.1 for additional information).

9. Work with local scout groups on merit badges and conservation projects.
10. Update existing kiosk at the Platte River Trailhead.

Objective 3.6 Outreach and Partnerships

Maintain relationships with current partners (see rationale) and existing outreach activities (see rationale), and identify and participate in at least 10 new outreach opportunities or community activities over the life of the plan to increase collaboration, improve the public understanding of Crane Meadows NWR and the Refuge System, and reinforce the importance of natural resource conservation.

Rationale: It is critical to the mission of the Refuge System, and to Crane Meadows NWR, that the neighbors, citizens, organizations, and agencies in the surrounding landscape know about the Refuge and support it as a valuable and contributing part of the community. The Refuge is an asset to the local community and has received strong support since its establishment in 1992. Continued support is essential for the success of the Refuge and its long-term viability. Developing relationships with other conservation agencies and organizations is mutually beneficial in conducting efficient and effective natural resource work. Also, building support for land and water conservation among Refuge neighbors is essential in protecting the natural resources in the area over the long term. It is important that the Refuge continue efforts to build and maintain open communication, informing partners and the public about the successes, opportunities, and challenges involved in conservation and wildlife-dependent recreation.

Current partners include:

- Morrison County Sportsmen Clubs
- Ducks Unlimited
- Minnesota Waterfowl Association
- Central Minnesota Audubon Society
- Delta Waterfowl
- Central Minnesota Environmental Council
- Minnesota Department of Natural Resources
- Camp Ripley Environmental Office
- National Wild Turkey Federation
- Minnesota Deer Hunters Association
- Morrison County Pheasants Forever
- Soil and Water Conservation District

- Natural Resource Conservation Service
- Morrison County Government (Commissioners, Planning and Zoning, Roads and Transportation)
- Local snowmobile and ATV clubs
- Royalton Lions Club
- Morrison County Master Gardeners

Current outreach activities include:

- Habitat Day
- Platte River Cleanup Day
- Winter Backyard Bird Feeding
- Spring and Fall Birding Tours
- Morrison County Water Festival
- Anoka County Game Fair
- Pheasant Forever Youth Days (Sherburne and Anoka Counties)
- Camp Ripley hunts
- Local Expos (business and others)
- Anoka Game Fair
- Morrison County Fair

Strategies:

1. Work with the state to establish a Memorandum of Understanding (MOU) for managing land and water within the acquisition boundary.
2. Increase interaction with public media outlets to promote Refuge activities, amenities, accomplishments, and management.
3. Maintain regular contact with community leaders, schools, agencies, and partner organizations.
4. Continue to develop good relations with landowners in, and immediately adjacent to the Refuge acquisition boundary.
5. Contact at least one new potential partner each year.
6. Work cooperatively with local universities, colleges, and other agencies to promote research within the Refuge.
7. Develop periodic news articles and radio programs on Refuge-related topics.

Objective 3.7: Cultural Resource Management

Over the life of the plan, work to protect all cultural, historic, and archaeological resources on the Refuge.

Rationale: Cultural resources are an important part of the nation's heritage, and historic/pre-his-

toric artifacts on the Refuge are limited and irreplaceable national treasures. Crane Meadows NWR remains committed to preserving archeological and historic sites against degradation, looting, and other adverse impacts. The guiding principle for management derives from the National Historic Preservation Act of 1966 as amended, 16 U.S.C.470 et seq., and the Archeological Resources Protection Act of 1970 as amended, 16 U.S.C. 47011-mm. There are a number of documented archaeological sites in the area of the Rice-Skunk wetland complex.

The abundance of wildlife that has been attracted to this area for thousands of years has, in turn, drawn early native peoples to this wetland system. Although none of the known archaeological sites are currently owned by the Refuge, there may be undiscovered sites that will need to be properly attended as more research is done on Refuge lands. In addition, full acquisition would place a number of historic resources under the care of the Service, and it is important for Refuge and Regional Office staff to be aware of these resources.

Strategies:

1. Ensure archaeological and cultural resources are identified, described, and taken into consideration prior to implementing management actions.
2. Conduct site-specific surveys prior to any ground disturbance activities.
3. Conduct consultations with Minnesota State Historic Preservation Officer (SHPO) and Service Regional Historic Preservation Officer (RHPO) to ensure compliance with Section 106 of the National Historic Preservation Act.
4. In the event of inadvertent discoveries of ancient human remains, follow instructions and procedures indicated by the SHPO and RHPO, including tribal notification and consultation where appropriate.

Objective 3.8: Volunteers and Friends Group

Over the life of the plan, increase Friends group membership by 10 percent, increase the 3-year moving average of annual service hours contributed by volunteers an average of 1 percent per year, and increase volunteer opportunities related to resource monitoring, environmental education, partnership development, land protection, and visitor services.

Rationale: The human resource hours required to effectively manage a national wildlife refuge often exceeds that which can be provided by staff alone. The accomplishments of any refuge, especially the

exemplary work above and beyond the day-to-day management needs are often the result of joint public and private teamwork and the collective interests and enthusiasm of the multitude of individuals that benefit from the Refuge. As public servants, Service staff manage a public resource owned by the citizens of this nation. The greater the involvement of the public, the more successfully the mission of the Fish and Wildlife Service is met, "...working with others...for the continuing benefit of the American people."

Crane Meadows NWR staff sees the opportunity to work with private individuals as critical to their effective management, and are grateful to those who have become engaged with the conservation, research, and education activities conducted by the Refuge. As an extension of Refuge volunteerism, a Refuge Friends Group is a grassroots organization formed by citizens who have a shared desire and vision to support their local National Wildlife Refuge. They join with Service personnel in a partnership that seeks to accomplish mutually defined goals.

Establishing a Friends group helps build a constituency of support for the Refuge, provides people with opportunities to assist in the accomplishment of the Service mission, and enhances Refuge performance through the creativity, innovations, labor, and expertise contributed by its members. The Refuge will continue to work diligently to increase opportunities to support Crane Meadows NWR, and to enhance the experience of its volunteers.

Strategies:

1. Actively recruit new volunteers in areas within and adjacent to the Refuge acquisition boundary, and throughout the watershed.
2. Use off-site outreach and education events as opportunities to recruit new volunteers and promote the Friends group.
3. Work with volunteer agencies and service groups to increase volunteerism at the Refuge.
4. Support the Refuge Friends Group in Refuge advocacy, education, and resource management.

Objective 3.9 Law Enforcement

Work with local police authorities, state conservation officers, and law enforcement officers from other national wildlife refuges to ensure visitor safety and resource protection. Work to minimize the potential for incidents, violations, and other illegal activities on the Refuge.

Table 21: Additional Staffing Needs at Crane Meadows NWR

Position Title	Priority	Issues Addressed by New Position
Wildlife Refuge Specialist	1	General Refuge management; replace existing position provided by Sherburne NWR.
Biologist	2	Land acquisition efforts; habitat restoration; research and monitoring (i.e. water resources, invasive species, wildlife surveys).
Administrative Assistant	3	Hospitality, communications, information provision, filing, outreach, volunteer program administration, and local visitor services oversight.

Rationale: The Refuge is responsible for protecting the resources within its boundaries and for providing a safe environment for visitors and employees. The Refuge law enforcement program is a critical tool in protecting trust resources, wildlife habitat, public facilities, employees, and the visiting public. To provide this essential service, the Refuge will share regional resources and cooperate with other law enforcement authorities to meet its responsibilities.

Strategies:

1. Actively maintain partnerships with local, state, and Service law enforcement officers that support the Refuge.
2. Promote surveillance of the Refuge by local landowners, visitors, and partner agency personnel.
3. Report and document all incidents and violations on the Refuge.
4. Maintain all facilities and infrastructure in compliance with OSHA and other regulations.
5. Increase boundary signage where necessary to prevent illegal trespass.

Objective 3.10 Staffing

Increase staffing from the existing two positions to the levels projected by the 2008 Region 3 staffing model ² (see Table 21) in order to accomplish the work set forth by the CCP.

Rationale: With a strong Private Lands program, increasing visitation trends, endless research interests, and incomplete land acquisition, the Refuge will require additional human resources to meet future management needs.

Current staffing at Crane Meadows NWR includes two positions:

2. *The 2008 staffing model does not account for personnel associated with fire, the Partners Program, or law enforcement.*

- Private Lands Biologist/Refuge Operations Specialist (provided by Sherburne NWR)
- Maintenance

The commitments described in this CCP will be greatly influenced by the availability of human resources. In addition to a healthy volunteer program, the Refuge needs professional FWS staff to effectively manage the expansion of biological and visitor service programs at the Refuge.