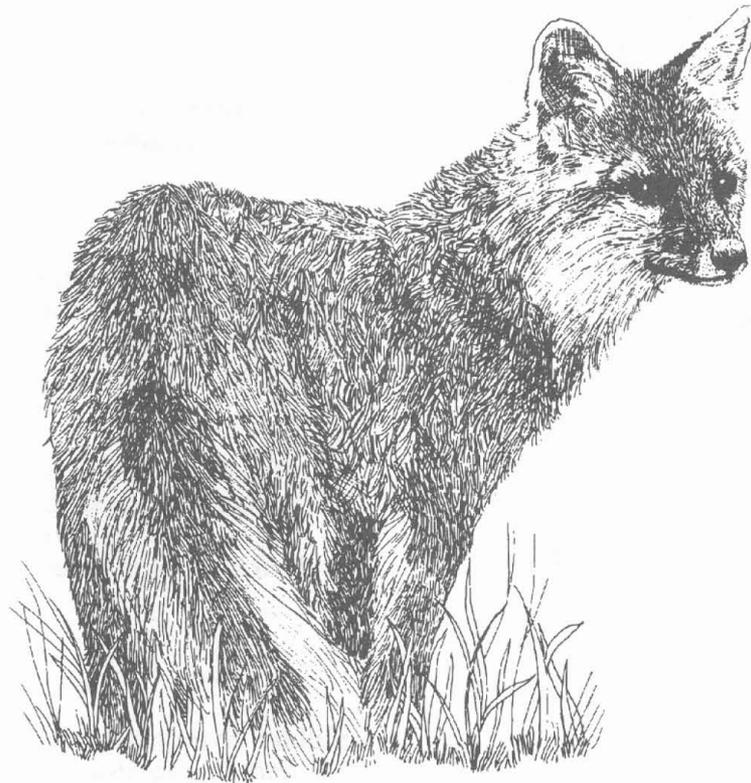

Management Guidelines and Strategies



Federal laws, U. S. Department of the Interior regulations and policies, Service regulations and policies, and Refuge System policies are the basis for the management guidelines. The Refuge's goals and objectives are the basis for the management strategies.

Management Guidelines

Threatened and Endangered Species

There are no known endangered or threatened species on the Refuge. Should any be found, they will be given priority consideration in evaluating any management actions.

Migratory Birds

Waterfowl management will be guided primarily by the provisions of the North American Waterfowl Management Plan. Central Flyway plans and state plans also will be consulted. All waterfowl management will be balanced with other migratory bird management.

The management of other migratory birds will be guided by the Region 6 non-game bird plan and its biodiversity strategies. The guiding principle will be to maintain a diverse, healthy ecosystem to provide the life requirements of migratory birds and related wildlife.

Resident Fish and Wildlife

Emphasis will be placed on production and protection of wildlife to perpetuate a natural diversity of wildlife species and their native habitats.

Congress, in the Refuge Recreation Act, has recognized the authority of the states and territories to manage resident fish and

wildlife. Therefore, the role of the State of Colorado in the management of resident animals is recognized and management actions for those species will be coordinated with the Colorado Division of Wildlife.

Fishery resources will be managed primarily to maintain a forage base for fish-eating birds. Management emphasis will be on species native to Colorado. Introductions of non-native fish may be permitted only if necessary to maintain the aquatic environment. The small size of the ponds may create population imbalances periodically. This may necessitate removing all fish in a pond and restocking. This will be done in cooperation with the Colorado Division of Wildlife.

Haying and Trapping

Haying and trapping are management tools, and may be used to support attainment of Refuge goals and objectives.

Pest Management

Plant and animal pests will be controlled when:

- The organism threatens human health and well-being or private property, the acceptable level of damage has been exceeded, or State and/or local governments have designated the pest as noxious; or
- The pest is detrimental to primary goals of the Refuge.

Education and Public Use

Education and public use facilities and activities will be developed to minimize impacts on wildlife and wildlife habitat. Regulations to protect wildlife and wildlife habitat on the Refuge will be adopted, when necessary.

Education and public use activities will promote an understanding of wildlife and their habitats and the concept of a healthy ecosystem. All public use and education activities will meet Service requirements and will be accessible to the

Archeological Management

No known cultural or historic structures exist on the Refuge. However, prior to any construction, an archeological survey and

physically challenged in accordance with *Uniform Federal Accessibility Standards*.

assessment will be made to make certain that no area of any historical significance will be disturbed.

Strategies

Education and Public Use

Two Ponds Refuge will provide hands-on environmental education on a multitude of subjects to Jefferson County and Denver metro area schoolchildren. In addition, it will be a quiet sanctuary for the general public interested in photography, bird watching, hiking, and other wildlife-oriented activities.

Audiences

The Refuge will be divided into two areas. The Environmental Education Area is Parcel 1. The Prairie Management Area includes Parcels 2, 3 & 4. The north half of Parcel 5 (which is not part of the Refuge) will be accessible by the public via a system of mowed trails that will connect Parcel 5 with Parcels 3 & 4 (See Figures 2 & 4).



Environmental Education Area

The Environmental Education Area will be managed as an environmental education facility with controlled access. All such use will be volunteer or teacher-led. Volunteers and teachers must attend a mandatory Refuge training course before conducting a field trip on the site. Teacher training will be tied to the curriculum currently being developed for the Refuge. Training will be tied to local school curricula to demonstrate to the teachers how this site can be used for those activities (i.e., third grade “Day on the Prairie”).

Prairie Management Area

The Prairie Management Area will be managed to allow for open access for the public. Users will be able to use mowed trails to take part in compatible wildlife-oriented activities such as hiking and wildlife viewing. Mowed trails will be tied into the perimeter of the Prairie Management Area via bridges connecting existing canal service roads.

Site Design

Minimum acceptable facilities that will promote a safe learning environment will be a small bus/car parking lot, rest rooms, and mowed trail system. All facilities will be accessible and construction completed as soon as funding is provided. The Environmental Education Area will include a covered amphitheater/pavilion/rest rooms structure and a boardwalk with platforms that will allow groups access to aquatic and cattail areas (Figure 5).

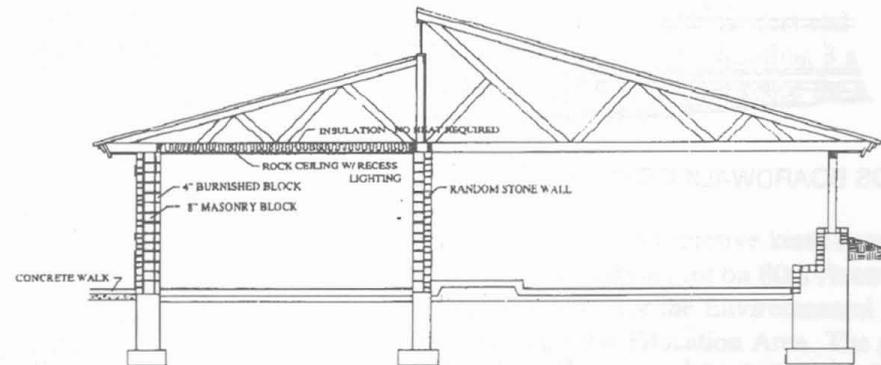
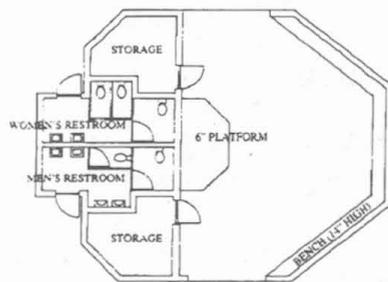
Amphitheater/Pavilion/Rest Rooms

The Service will design and construct an amphitheater/pavilion/rest rooms structure in the open area west of Marshall Pond. This facility will accommodate groups of up

to 60 people, will attract foot traffic away from the parking lot to avoid congestion, and will minimize gathering at informal sites causing trampled habitat. The Pavilion will also provide shade on hot days and cover during rain (Figure 5).

This structure will include space for storage of folding tables that can be used for work stations or for eating lunches. A permanent rest room will be incorporated into the amphitheater/pavilion. This facility will be tied into the City of Arvada water, sewer, and electricity. A lockable storage closet will be designed into the structure so that supplies can be stored on-site.

This structure will be built when funding can be secured through the Service in combination with grants obtained through partnerships with local government and private entities.

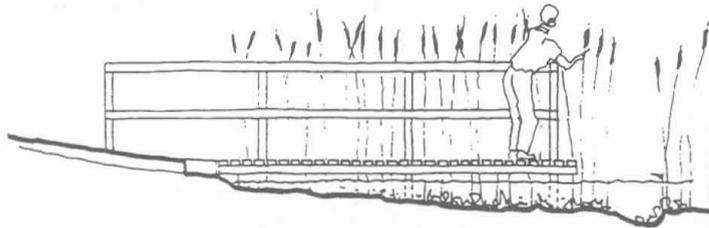


AMPHITHEATER/PAVILION/RESTROOMS - PLAN & SECTION (Figure 5)

Boardwalks/Platforms

The Service will design and construct boardwalks and observation platforms in the wetland areas in the Environmental Education Area. These platforms and boardwalks will be used for studying pond water, microscopic life, and wetland vegetation. The platforms will be large enough to give access to approximately 15 students at a time.

Boardwalks will be constructed along the northeast edge of the Lighter Pond. A platform will be constructed at the end of the boardwalk that extends into the cattail marsh. Another will be constructed at the northeast corner of the Unnamed Pond.



WETLANDS BOARDWALK CONCEPT

Trails

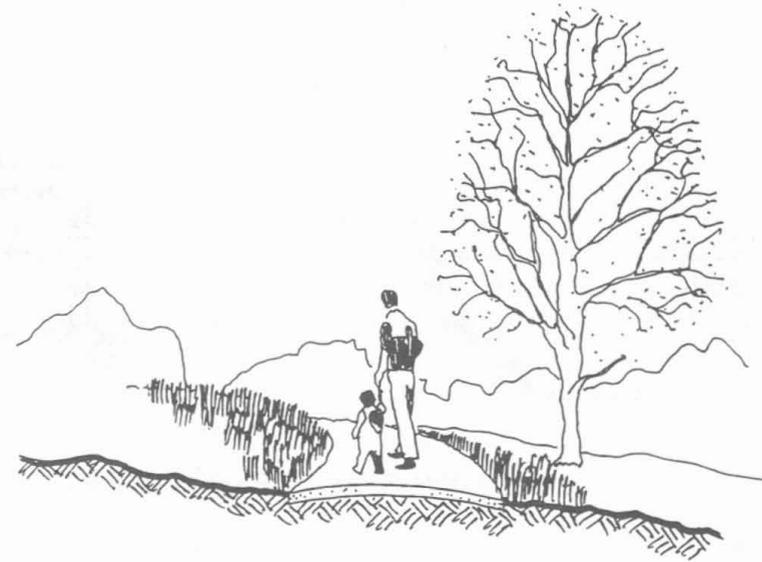
Trails encourage appropriate use and access. If trails take visitors where they would like to go or need to go, less off-trail use will occur with less damage to the habitat. Formal trails will be developed to support the environmental education program and other public use goals (Figure 4).

Trails will tie into the curriculum and will provide access to the appropriate habitats for field studies. All trails (environmental education or other), where possible, will be made accessible to

the mobility impaired. Access will be controlled and limited to staff or volunteer leaders of nature walks or environmental education programs. The Refuge will be open to Service staff involved in biological studies and maintenance activities and will provide access to the ponds and Environmental Education Area, via a gate to be located at the existing road off 80th Avenue, adjacent to the Marshall Pond.

Trail Locations

Two different trails will be constructed within the Environmental Education Area. A short path will connect the parking lot with the Environmental Education Area from which the two interpretive trails will originate.



CROSS SECTION OF TRAIL CONCEPT

Trails/Bridges - Western Loop

ENVIRONMENTAL EDUCATION AREA - WESTERN LOOP

A trail will be mowed to the south and west of the parking lot. This is a relatively flat area that transitions from the ponds up to a grassy area. The grade of this area is such that this trail could eventually be surfaced to accommodate persons with mobility impairments.

ENVIRONMENTAL EDUCATION AREA - EASTERN LOOP

The second trail will be constructed on the east side of the ponds. This trail will pass through an upland grassy area, in which some native plant species exist, and run parallel to the entire cattail marsh area. From the top of the southeast rise, the visitor is provided a panoramic view of the Refuge and surrounding area. Because of the grade, this trail would not be accessible to the mobility impaired. However, a similar view is available from outside the perimeter by using the Croke Canal service road.

PRAIRIE MANAGEMENT AREA TRAILS

The Service will manage the Prairie Management Area with less control than the Environmental Education Area. Users will not have to get clearance from the Service in order to use the property. However, users will be restricted to activities that are compatible with the purpose for which the Refuge was created.

The Service will maintain mowed paths inside the Refuge boundary of the Prairie Management Area. These paths will be tied into the perimeter of the Environmental Education Area via bridges connecting existing canal service roads. These trails will loop along the inside perimeter fence of the 16.5 acres south of the Lutheran Medical Center (Parcels 3 & 5) and onto the 6.5-acre Oxbow (Parcel 4). Trails will

connect these three parcels with the Farmers High Line Canal service road on the northwest via the use of footbridges and the Lutheran Medical Center property on the north.

A third mowed trail will be cut from the Medical Center through the northern portion of Parcel 5 into the Oxbow (Parcel 4) and then back into the southern half of Parcel 3. These trails will provide Lutheran employees and customers with a pleasant area in which they can take walks or runs as part of a health maintenance program. This area may be used by people who have come to visit a hospitalized family member and need to find a quiet place to spend time.

Parking Lot

A parking lot will be constructed between the sites of the former Lighter and Marshall houses and between the existing fence and 80th Avenue. A gate that will be kept locked will be constructed into the fence at the east end of the lot. The lot will have space for 21 cars, including 3 spaces reserved for use by disabled persons, and a space for a school bus.

Gatehouse

A covered gatehouse/interpretive kiosk headgate will be constructed at the parking lot on 80th Avenue and function as the main entry point for the Environmental Education Center in the Environmental Education Area. The gate will be kept locked to prevent access to the Refuge by the public unless accompanied by an authorized Service staff person or volunteer. This gate will provide a safe gathering point for groups with a path that leads to the Environmental Education Area and connects directly to the lot. Interpretive panels will be included in the gatehouse design. Panels will provide information on the resources and history of the Refuge and the process for gaining entry (Figure 6).

The gatehouse/kiosk will be designed during 1997. Funds for construction will be sought from grants and donations through the development of partnerships between the Service, Two Ponds Preservation Foundation, and local governmental and private entities.

Fencing

ALONG 80TH AVENUE

During 1995 a 5-foot chain link and wooden privacy fence was constructed along 80th Avenue the entire length of the Refuge's northern boundary. This fence will prevent vehicles from entering the Refuge except at designated parking areas.

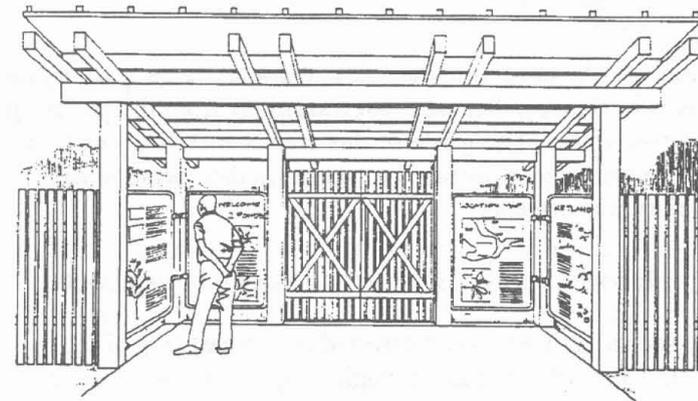
REMAINDER OF THE REFUGE

Sometime in the future, as funds become available, a 5-foot high chain link fence will be constructed around the remainder of the perimeter of the Environmental Education Area. This fence would prevent access by unauthorized motor vehicles, protecting the existing habitat.

Gates

A second gate was constructed in 1995 at the end of the existing road west of Marshall Pond where it connects with 80th Avenue. This road will be retained and improved because it provides access to the ponds and to the Environmental Education Area for maintenance purposes.

An egress gate will be constructed as part of the 5-foot fence that parallels the Croke Canal service road. This gate will allow groups using Environmental Education Area the ability to exit and walk along the canal and into the Prairie Management Area once the bridges across are constructed. A lockable gate will prevent the general public from entering the Environmental Education Area from the canal road.



ENTRY GATE/KIOSK (Figure 6)

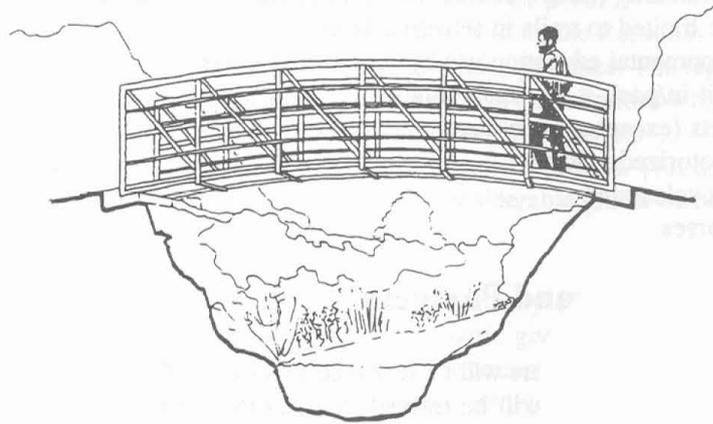
Interpretive Signs

The Service will construct interpretive signs at strategic points along the trail systems. Overlook sites will be maintained as mowed areas until funds can be obtained to develop them with hard surfaces and interpretive signs.

One sign will be located on top of the hill west of Lighter Pond in the Environmental Education Area (Figure 4, Prairie Overlook). This spot also will function as a rest area/scenic overlook and include a permanent bench structure with a panoramic view of the Refuge. A second interpretive overlook will be constructed along the eastern loop of the trail in the Prairie Management Area. This spot overlooks a natural drainage area to the southeast. A sign will be used to interpret the use of canal irrigation in the area (Figure 4, Wetland Overlook).

Bridges Over The Croke, Farmers High Line and Church Ditch Canals

Bridges over the Croke and Farmers High Line Canals would connect the Refuge property with, and provide access to, the 16.5 acres acquired from the Lutheran Medical Center. Two additional footbridges could be constructed across the canal that defines the Oxbow (Parcel 4), providing access to the Medical Center complex and the newly acquired acreage (Figure 4).



BRIDGE CONCEPT

Environmental Education

Environmental education opportunities at Two Ponds Refuge will be targeted primarily, but not exclusively, for Jefferson County schools and other schools in the Arvada area. The curriculum developed for the site will compliment the Jefferson County schools required core curriculum, targeting outdoor studies conducted by the schools each year. Curriculum needs for private schools and other organized groups, such as scouts, will also be taken into consideration.

The Site

The capacity of each of the two education loops at the site is 60 students per day. Peak school use will be September-October and April-May. School use is expected to be much lower at other months of the year. While the carrying capacity of the site is 120 students per day, instructors will be encouraged to bring smaller numbers of students to the site.

Site facilities and trails have been divided into two loops (Figure 4). In Jefferson County, each school usually has four classes of the same grade. Thus, it is anticipated that daily use will include the entire grade from one school, approximately 120 students. At Two Ponds Refuge, such large groups will be split into smaller groups, and each smaller group will use one trail loop and pavilion. The loops will be designed so that students on each loop will receive similar experiences. Instructors will be encouraged to break all groups into ratios of no larger than one instructor per 10-12 students with the students rotating through established learning stations.

Anticipated school use per year could be up to 1,500 students.

Curriculum Development

Jefferson County core curriculum includes third grade "Day on the Prairie" and fifth grade "Communities and Small Things," and all students in these grades go through these programs. Two Ponds Refuge is an ideal site for these experiences and others.

Curriculum developed for Two Ponds Refuge will be designed for all grades (K-12) and will fit the Jefferson County core curriculum. Curriculum is currently being developed by teachers from three Arvada public schools and Service staff. The curriculum will be designed similar to two educator's guides developed previously for the Service. Both of these models have been tested at other refuges and found to work quite well.

The educator's guides enable educators to conduct field trips with little or no guidance from Service personnel. The guides contain information on the site and its use, including regulations, maps, background information on the topics to be taught, suggested activities, pre- and post- activities, and much more. Suggested learning stations will be established in the curriculum.

Ideally, educators should be required to complete training through the Service prior to using the site to familiarize themselves with the site and the curriculum. However, this requires that Service staff or volunteers be available to provide this training, an option that the Service may not be able to provide. The educator's guides will be designed to minimize the need for on-site training.

All school use will be by reservation only.

Public Use

It is anticipated that Two Ponds Refuge will be used considerably by the general public, and site design takes this into consideration. Public use will include wildlife watching, photography, hiking, and other wildlife-oriented uses.

Without staff at the Refuge, general public use will be the most difficult to control. Site planning will be designed to take visitors where they want to go and encourage users to stay on the trails.

Interpretation will take place primarily through the use of a kiosk located at the entry gate at the main parking lot on 80th Avenue. Four interpretive panels at the entry gate will provide information about gaining access to the Refuge and the Refuge's mission and history. Small interpretive signs on the trails will be used to interpret site-specific messages.

Public use of the Refuge, particularly the trails along the canals, will be blended with the Jefferson County Open Space trail plan and Arvada Parks and Recreation plans.

Public Use Restrictions

In order to protect the site, it is necessary to put some restrictions in place. These restrictions will be presented through signs, barriers, and the guidance found in the educator's guide. Restrictions include:

- Day use only;
- No hunting;
- No fishing;
- No picnicking (environmental education students excepted);
- Public limited to trails in sensitive areas;
- Environmental education use by reservation only;
- Pack-it-in/pack-it-out trash policy;
- No pets (except service dogs);
- No motorized vehicles;
- No bicycles; and
- No horses.

Volunteers and Partners

Volunteers and partners will be recruited to work at Two Ponds Refuge. Volunteers will be trained to assist with site cleanup, rehabilitation, and maintenance; habitat management; environmental education; teacher training; and much more. Local residents and others have already shown an interest in assisting in many of these areas.

Partnerships will be key to the success of Two Ponds Refuge. The Service has a limited budget available for this site. Financial and service-oriented partnerships would allow much of what has and will be planned for the site to be implemented.

Cooperative Agreements

Cooperative agreements will be negotiated with the local police and fire departments to provide law enforcement and fire protection for the Refuge. Service staff and the Arvada Police

Police Department also will periodically patrol the area. Agreements also will be sought with the canal companies to address access and liability issues.

Landscape

Ecosystem

Two Ponds Refuge lies within the North Temperate Grassland biome (Shelford 1963), which extends from north-central Texas into central Alberta, and from Indiana into portions of California. The specific region surrounding the Refuge is frequently referred to as the High Plains province. The region typically includes a mosaic of grassland communities with a diverse component of perennial forbs (“wildflowers”). Shortgrass species tend to occur in more arid sites. Throughout the region, however, there exists considerable gradation and mixing between the two extremes.

The Refuge itself is located approximately 15 miles northwest of downtown Denver where the prairie gives way to the Rocky Mountains. Here, grassland communities are mixed and variable, owing to the diversity of topography, soils, and climate. Prior to settlement, prairie wildfires and grazing bison, pronghorn, and elk may have played a major role in maintaining the grassland vegetation. In modern times, most of the original vegetation has been destroyed by plowing and overgrazing of domestic livestock. Today the area around the Refuge is highly developed with single and multi-family dwellings, shopping centers, and small industrial businesses. Enclaves of open space and riparian areas that once functioned as agricultural areas exist between the developed areas.

Succession

The highest successional level at the Refuge is grassland. On native prairie tracts, grasses, forbs, and shrubs will

predominately be those perennial species native to the mixed and shortgrass prairies. Former croplands, which now contain several introduced plants, will be restored to permanent native cover. Management actions will favor those taller, broader-leaved grasses and forbs which are known to be most attractive to upland nesting birds. There will be small areas of shrubs and a few scattered trees. Total canopy coverage of shrubs and trees will not exceed 10% of the Refuge.

Water Cycle

In an effective water cycle, plants make maximum use of rainfall or irrigation--little evaporates. Management will strive for an effective water cycle by keeping the soils well covered with vegetation or plant litter and keeping the soils permeable. Run-off of growing season precipitation will be low.

The Refuge has a 3/4 share of water from the Farmers High Line Canal. To fill the ponds and offset evaporation, approximately 2 acre-feet are needed. Therefore, there should be sufficient water to fill the ponds, rejuvenate and maintain native prairie, and maintain the marsh/pond complex based on the water rights analysis in Appendix G.

Mineral Cycle

An active mineral cycle will exist with a minimum of run-off or erosion. Rapid decomposition of surface litter will prevent a build-up of matted, dead vegetation yet preserve a stable level of surface mulch. Substantial amounts of residual standing vegetation will be present each year during winter and early in the growing season for nesting habitat, wildlife cover, and snow catch. The shrub and forb component will promote deeper cycling of minerals from subsoils to the surface. There will be high invertebrate and microorganism activity at and below the soil surface.

Energy flow

The natural living world runs on solar power transformed through the ability of green plants to capture the energy of sunlight and convert it to usable forms. A moderately high energy flow will be present and indicated by a high density of plants on the ground surface. A variety of both warm season and cool season species of grasses, forbs, and wetland plants will be present, resulting in a long season of plant growth.

Vegetation

Many exotic plant species, both trees and grasses, have been introduced to the area under past management practices. Brome has encroached from hay fields into the remnant unbroken native plant community. Approximately 95% of the upland is dominated by brome. Detritus from past run-off has accumulated in the wetlands, changing the substrate to promote a near monotypic stand of cattail. These marsh and upland plants may pose significant management problems.

The potential plant community is about 80 to 90% grasses, 5 to 10% forbs, and 5 to 15% shrubs. This site has a rolling grassland aspect with mid-grasses dominating. Western wheatgrass, green needlegrass, and needle-and-thread grass should dominate the cool season plant community. Blue grama is the dominant warm season grass on the upland, and big bluestem and switch grass will occur toward the toe of the slopes. A number of other grasses occur in smaller amounts.

Several native shrubs—winterfat, fourwing saltbush, fringed sagebrush—were part of this community, and should be restored, along with other native forbs, including:

purple prairie clover;
American vetch;
scarlet globemallow;
drummond milkvetch;

slimflower scurfpea;
hairy golden aster;
orange arnica; and
two-grooved milkvetch.

Re-establishment of Natives

Uplands within the Refuge are dominated by exotic grasses, primarily brome. A native plant community will be re-established. Rejuvenation of the native plant community should proceed by stages. The area that is to be developed for environmental education will be returned to a native prairie plant community first, beginning around Unnamed Pond. All species used will be native grasses adapted to the particular ecological site. The site adjacent to the water will be a mix of tall warm-season grasses. The natural plant community will be developed in stages following the contour of the slopes. The natural progression of plants changes to a greater composition of cool-season mid-grass prairie species as one proceeds up slope.



Forbs/wildflowers native to the site will also be re-established. Some will be seeded in small patches to be more “showy” for interpretive purposes. The rest will be scattered as a natural component of native grasslands.

Forbs will make up 5 to 10 % of the seed mix at a rate of 0.25 to 0.50 lbs. of pure live seed per acre. Around pond margins and in moist bottomland, the seed mix above will be used with the addition of 5 pure live seed lbs. each yellow Indiangrass, prairie cordgrass, slender wheatgrass, and Missouri goldenrod.

Broad leaf plant species in the mix include prairie coneflower, purple prairie clover, Lewis blue flax, Rocky Mountain beeplant, dotted gayfeather, Missouri evening primrose, giant evening primrose, and scarlet globemallow. Shrubs will make up 5 to 15 % of the mix and include yucca and rabbitbrush (Appendix D).

Maintenance of Natives

Native plants on the inter-mountain landscape of North America evolved with light grazing and fire, but grazing and fire will not be used to sustain native plants because of the urban setting of this Refuge. Haying will be used from time to time to promote native vegetation.

Weed Control

Two primary choices exist for weed management - chemical control with herbicides or cultural control using tillage and mulch. Due to the sensitivity of the site, both ecologically and socially, the latter method is preferred. When available, biological control agents such as insects will be used to manage weeds at the Refuge.

Woodland

By the fall of 1997, the Service will survey woodland acreage to determine the current amount of Refuge woodland coverage. Depending upon the result of the survey, Service staff will either maintain the trees in their current location or remove exotic trees beginning with Russian olive. Trees will be replaced as needed to maintain the goal of 10% tree cover.

Wildlife

Service staff will determine sensitive wildlife areas and periods of use to minimize disturbances to wildlife. Service staff will also recommend strategies to minimize impacts to wildlife due

to habitat restoration, environmental education, and other public use projects.

Aquatic

The Service staff will maintain pond levels as full as possible based on the availability of water from the Farmers High Line Canal. Staff also will stock fathead minnows as a food source for wading and shorebirds, and to provide opportunities for environmental education classes to view pond life. Grass carp will initially be stocked in the ponds to control aquatic vegetation.