REFUGE MANAGEMENT PLAN, PART III

MARK TWAIN NATIONAL WILDLIFE REFUGE

ANNADA DISTRICT

GREGORY LANDING DIVISION

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Part III: Management Program

Management Program Summary - Gregory Landing Division

The following information is from an August 1990 publication, "Management Alternatives for the Gregory Landing Division, Mark Twain National Wildlife Refuge" prepared by James E. Roelle, David B. Hamilton, and Duane A. Asherin of the U.S. Fish and Wildlife Service, National Ecology Research Center.

Current Habitat Values

Because the refuge has been owned by the Service for only two years and is located two and a half hours from the headquarters, information concerning its present contribution to the objectives and other resource values is limited. Most of the following description of the habitat values provided by the Gregory Landing Division is based on general knowledge of the character of the area and habitat requirements of the species of interest.

Wood duck production on the area probably depends on the availability of nesting cavities, mast, and brood habitat. Bottomland forests currently occupy about 400 acres, but mast and nesting cavities are probably limited due to the generally young age structure and species composition of the forests. Bottomland hardwoods generally must be at least 30 years old to produce significant mast and at least 75 years old to produce cavities suitable for nesting by wood ducks. Brood habitat, which generally consists of wetlands with emergent vegetation, may also be limited, particularly in dry years. However, the abundance of brood habitat in relation to nesting habitat is unknown.

Dabbling ducks such as mallards probably make greatest use of the area during the spring migration, when natural flooding allows exploitation of available food (e.g., mast, weed seeds, invertebrates, waste grain from the previous year). Although nutrition prior to the breeding season is important for spring migrants, the role of the Gregory Landing Division in fulfilling this need may be limited because extensive sheet flooding in the spring generally provides large amounts of habitat. Fall habitat on the area is probably limited to resting areas and sanctuary provided by the permanent water bodies. Currently, there is no way to flood additional areas in the fall. In 1990, the first year of a cooperative farming program, approximately 350 acres will be in agriculture. The refuge will receive a one-third share of these crops in the form of standing corn and winter wheat. The winter wheat will provide green browse for geese, and both geese and mallards will use the corn during the spring when these areas are flooded. Farming will also maintain these areas in an open condition pending future decisions about reforestation. In the absence of active reforestation or agriculture, species such as cottonwood and silver maple, not as valuable to wildlife as mast-producing bottomland hardwoods, would probably invade.

It is unlikely that the Gregory Landing Division presently provides many resources for diving ducks, such as canvasbacks and redheads. Periodic flooding and associated siltation apparently have prevented development of submerged aquatic vegetation, which provides preferred food resources for divers, in Nelson and Willow Lakes. Further more, in the absence of much more complete flood protection, it seems unlikely that these lakes will ever support submerged aquatic vegetation.

The refuge probably provides few food resources for bald eagles at the present time (perhaps some crippled waterfowl), but may provide some perch sites for eagles foraging along the Mississippi. The number of suitable sites is probably limited, however, by the fact that most of the bottomland hardwoods on the area are relatively young. Currently, most eagle use in the general vicinity is during fall and winter, but there may be potential for nesting as the forest becomes more mature.

Description of Alternatives

To provide a framework for analysis, participants defined five alternative development and management strategies for the Gregory Landing Division. These are clearly not the only alternatives, nor is there any guarantee that any one of them represents the best alternative. Participants believed, however, that these five alternatives do represent the range of things that might be done on the area, and that an analysis of their benefits and drawbacks would provide some insight on the best ways to proceed in managing the area.

Alternative 1 would consist of installing simple dirt plugs in at least four ditches to provide some additional permanent water, reforesting areas that would thus become too wet to farm (perhaps 100 acres), and continuing to farm the remainder of the area currently in agriculture.

Alternative 2 would be similar to Alternative 1, except that all of the area currently in agriculture would be reforested, and farming would be discontinued.

Alternative 3 would involve replacing ditch plugs with water control structures (e.g. stop logs), cleaning ditches, and installing a pump station. The control structures and functional ditches would provide the capability to draw down the lakes for management purposes. The pump station would increase the potential for maintaining permanent water even in times of drought. Reforestation (about 100 acres) and agriculture (about 250 acres) would be as in Alternative 1.

Alternative 4 would also involve controllable structures, ditch cleaning, and a pump station. However, the entire 350 acres now in agriculture would be reforested.

Alternative 5 would involve the development of at least five moist soul units (about 150 acres) on three areas presently in agriculture. This would represent a significant departure from the other four alternatives in that moist soil units would primarily provide resources for dabbling ducks and a variety of other migratory birds during the fall migration. Under the other four alternatives, dabbling ducks would probably continue to use the refuge primarily during the spring. Other hydrologic developments (controllable structures, ditch cleaning, pump station) would be as in Alternatives 3 and 4. Current agricultural areas not converted to moist soil would remain in agriculture.

Evaluation Criteria

Management objectives for the Gregory Landing Division include wood duck production, migration habitat for ducks and geese, and mature riparian stands for migrating bald eagles. As the refuge is developed, these objectives will eventually be quantified in units such as nesting pairs or use-days. Discussions at the meeting, however, focused more on the qualitative nature of the objectives

and evaluation criteria that would discriminate among the development alternatives. Most of the evaluation criteria were stated in terms of habitat components that development and management should be directed toward providing or enhancing. Development costs, operation and maintenance costs, staffing, and public use were also considered as possible evaluation criteria.

For wood ducks, identified evaluation criteria included cavity nest sites, mast production, and brood habitat. Nest cavities and mast production, generally provided by forested areas, were quantified in terms of acres of bottomland hardwood, with the realization that age of the forest is also an important factor. Brood habitat consists of wetlands with emergent vegetation in the period May to August. Flooded shrub swamp provides most of this kind of habitat on the Gregory Landing Division.

Evaluation criteria for ducks and geese were separated because of differences in the resources required by these species. For dabbling ducks, criteria included resting and loafing areas (represented by surface area of wetlands) and food production (represented by moist soil production, mast production, and agricultural production). Geese require more open water for resting and loafing, and do not generally feed on mast. They do, however, feed on moist soil plants, green browse, and other agricultural crops.

For bald eagles, evaluation criteria included roosting and perching sites and feeding areas and opportunities. Roosting and perching sites are generally provided by mature riparian trees. Individual trees may suffice for perching, but larger blocks of mature forest are generally required for night roosting. Food consists largely of scavenged fish and waterfowl, but these must be available in relatively open area.

Costs and staffing were also identified as evaluation criteria. Costs were divided into capital costs and operation and maintenance costs. Capital costs included factors such as bulldozer rental to plug or clean existing ditches, reforestation, stop log structures, pumps and associated feeder ditches, road improvements, and dikes for moist soil units. Most of the alternatives described above would probably not warrant on-site personnel; operation and maintenance costs therefore included vehicle maintenance, travel, office rental, and staff salaries. Staffing requirements were expressed as full-time equivalents (FTE's), and included time for factors such as travel, pump operation, administration of the cooperative farming program, and periodic maintenance of pumps, control structures, and ditches. Estimated unit costs for each of these factors are shown in Table 1.

At present, there is little or no public recreational use of the Gregory Landing Division. Several possible public use activities were discussed at the meeting. However, participants concluded that, because the refuge is so small, any public use would diminish the ability of the area to achieve its primary purpose of providing a sanctuary for wildlife. Therefore, public use was not further considered as an evaluation criterion.

Analysis

Following specification of the evaluation criteria, participants analyzed each alternative with respect to its impact on these criteria. Their analysis of costs and individual habitat components is summarized in Table 2. For each

general habitat objective, the participants then combined the individual habitat components and ranked the alternatives from 1 to 5 (1 being the best alternative for that objective and 5 being the worst). These rankings are presented in Table 3. The relative desirability of alternatives was discussed during the workshop but not quantified for the table (e.g., the top ranked alternative for migratory ducks would provide significantly more habitat than the second-ranked alternative whereas the top two alternatives for wood duck production would provide about the same benefits).

Capital Costs, Operation and Maintenance Costs, Staffing

Alternatives 1 and 2 differ only in the acres of land to be reforested. Assuming that reforestation would be done with aerial seeding, the cost for Alternative 1 would be $7,500 (100 acres) and the cost for Alternative 2 (350 acres) would be $26,250. The only other capital cost would be $1,000 to rent a bulldozer to plug the four existing drains. Participants estimated that these alternatives would require $14,000 per year operating expenses plus $6,000 salary for 0.25 FTE.

Alternatives 3 and 4 also differ only in the amount of reforestation; therefore they have the same reforestation and ditch plug costs as Alternatives 1 and 2 respectively. In addition, these alternatives include capital costs for four primary screw gate or stop log structures ($20,000) to be installed where the ditches are plugged, cleaning about one mile of drains ($6,000), a 3,000-gpm diesel pump ($50,000) and associated feeder ditches ($10,000). Because of the increased operation and maintenance required for these alternatives, operating expenses were estimated at $28,000 plus $12,000 salary for 0.5 FTE.

Alternative 5 involves improving access roads and constructing five 30-acre moist soil units in addition to the ditch plugs, control structures, drain cleaning, pump, and feeder ditches of the previous alternatives. However, this alternative does not include any reforestation. The moist soil units would required approximately five miles of dikes ($316,000) and five additional control structures ($15,000). The diesel pump described above would be adequate for flooding the moist soil units but additional feeder ditches would be required ($10,000). Approximately eight miles of road would have to be improved ($160,000) to provide sufficient access for managing the moist soil units.

Wood Duck Production

The additional 350 acres of bottomland forests associated with Alternatives 2 and 4 would eventually provide the greatest increase in wood duck habitat. However, these forests will require about 30 years to begin mast production and 75-100 years before natural nest cavities are formed. Both of these alternatives would provide an additional 50 acres of brood habitat; Alternative 4 would be slightly better than Alternative 2 because the pump and feeder ditches would allow the brood habitat to be maintained for a longer time during dry years. Alternatives 1 and 3 would be less desirable for wood ducks because only 100 acres would be reforested. Again, Alternative 3 with the pump would be slightly better than Alternative 1. Alternative 5 would be the least desirable for wood ducks because there would be no reforestation. However, it would provide more brood habitat than the other alternatives since the moist soil ditches and units could be kept wet through the summer if desired.

Migration Habitat for Ducks

Evaluation of the alternatives for migrating ducks was based primarily on fall migration habitat because (1) sheet flooding of surrounding land was assumed to provide adequate habitat during spring migration, (2) all of the alternatives would provide sanctuary during the fall hunting season, and (3) all would provide an additional 50 acres of semi-permanent water for resting habitat. The moist soil units associated with Alternative 5 would provide significantly greater fall food resources than any of the other alternatives. Alternatives 1 and 3 would

provide an additional 100 acres of mast trees and a corresponding reduction of agriculture to 250 acres. The 100 acres of reforestation would be done on the lowest agricultural lands and therefore would be more likely to flood during fall migration. These alternatives were preferred over Alternatives 2 and 4 in which all 350 acres of agriculture would be replaced by forests. Although the mast production in these forests would be used by migratory ducks, most of the additional 250 acres of forests would be on higher ground and therefore flooded only during spring migration.

Migration Habitat for Geese

The evaluation for geese was based primarily on fall migration habitat for Canada geese and was therefore very similar to that for ducks. The moist soil units in Alternative 5 would provide much more food during the fall than the other alternatives. Of the remaining alternatives, 1 and 3 were considered better than 2 and 4 because there would be smaller losses of agricultural production and associated browse (e.g., winter wheat). The additional 50 acres of wetlands provided by all of the alternatives would not likely be used by geese because it would be mostly scrub/shrub.

Migration Habitat for Bald Eagles

Participants assumed that when present forests mature, there will be an abundance of roost trees for migrating bald eagles. Also, all of the alternatives would reduce human disturbance. Alternatives were therefore compared on the basis of food supply during fall and early winter and consequently were ranked identically to those for migratory ducks and geese. The increased numbers of ducks and geese and greater amount of open water associated with moist soil units would be most important to immature bald eagles; mature eagles seem to feed more on fish from the river.

Conclusions

Following the analysis described above, participants selected a preferred alternative based on the assumption that the most critical need was for fall migration habitat (food resources, resting areas, sanctuary) for ducks and geese. Although wood duck production was listed as the top priority in the 1985 acquisition document, participants felt that the continued decline of waterfowl populations since 1985 indicated that providing habitat for migrating ducks may now be of greater importance than providing habitat for wood duck production. Also, an increase in waterfowl use during fall and early winter would provide an increased food base for bald eagles.

Alternative 5 was clearly the preferred alternative because the moist soil units would provide significant food resources for waterfowl during fall migration. These resources are currently very limited in the area in general and at the Gregory Landing Division in particular. Actual waterfowl use of moist soil units depends on the plant species growing in a unit, the pounds per acre of seed production, and the length of time a unit is flooded. However, based on estimates of average use at Mingo NWR, in 1989, the 150 acres of moist soil might be expected to provide approximately 175,000 duck use-days and 170,000 goose use-days. The other alternatives would provide small increases in resting habitat for fall migration but little if any increase in fall food resources. The moist soil units associated with this alternative would also provide numerous secondary

benefits for non-game birds such as shorebirds, wading birds, and raptors.

Alternative 5 would provide some improvement in wood duck production, primarily through an increase in brood habitat. The other alternatives would provide more acres of nesting habitat but the density of suitable nesting cavities and actual use of those cavities might be limited. The number of wood duck pairs that forested habitats might support was not discussed during the workshop but past surveys provide estimates of nest cavity densities and use (Dreis and Hendrickson 152; Bellrose et al. 1964; Weier 1966). The density of suitable cavities (adequate entrance and interior dimensions, no water or excessive debris, closed top) ranged from one per 8 to 24 acres in bottomland forests and from one per 4 to 5 acres in upland forests. A survey in upland forests indicated that only one-third of suitable cavities were used by wood ducks.

In the absence of funds for Alternative 5, the current drains should be plugged in order to evaluate how much more water the area will retain. Some limited reforestation might also be considered in the lower and wetter areas on the edges of existing forests.

For any of the alternatives, wood duck production could be increased with a nest box program. Prior to the nest survey at Mingo NWR mentioned above, it was assumed that natural cavities were abundant and that many wood ducks nested in them. However, broods were seldom seen, the survey indicated a low density of suitable cavities, and when nest boxes were provided they were readily used. The primary technical problems with a nest box program at Gregory Landing would be limited access and distance from the Mark Twain headquarters, which would make servicing the boxes a problem. If Alternative 5 is implemented, it would require on-site staff and improved access, both of which would make this option more feasible. A volunteer program with a local sportsman's club might also be considered.

Finally, acquisition of the additional 2,000 acres should be considered, but not in lieu of developing the existing parcel. The expanded area would contain some good mature forests for wood duck production, a nice slough, agricultural fields that would be suitable for conversion to moist soil units, and wooded islands that would provide good eagle roosting sites.

Table 1. Estimated unit costs for development and management activities.

Item	Unit Cost
Capital costs	
ditch plugs	$1,000
primary stop log structures or screw gates	$5,000/structure installed
clean drains	$6,000/mile
pump	
diesel pump (3,000 gpm)	$50,000
feeder ditches	$10,000
moist soil dikes (4' high, 4:1 side slope, 10' driveable top)	$63,200 mile
moist soil stop log structures	$3,000/structure installed
reforestation	
seeding (includes 25% for reseeding areas that do not germinate)	$75/acre
seedlings	$300/acre
road improvement (6" of gravel)	$20,000/mile
Operation and maintenance costs	
salaries	$24,000/FTE
operating costs	$56,000 FTE of staff required
additional maintenance of Alternative #5	3% of capital costs

Table 2. Comparison of development alternatives. A dash indicates no change from present conditions.

Evaluation Criteria	Alternatives				
	1	2	3	4	5
Wood duck production					
cavity nest sites	+100 ac	+350 ac	+100 ac	+350 ac	-
brood habitat	+ 50 ac	+ 50 ac	+ 50 ac	+ 50 ac	+50 ac
mast production	+100 ac	+350 ac	+100 ac.	+350 ac	-
Waterfowl migration habitat					
Ducks					
surface area of wetlands	+ 50 ac	+ 50 ac	+ 50 ac	+ 50 ac	+200 ac
moist soil production	-	-	-	-	+150 ac
agricultural production	-100 ac	-350 ac	-100 ac	-350 ac	-150 ac
mast production	+100 ac	+350 ac	+100 ac	+350 ac	-
Geese					
surface area of wetlands	-	-	-	-	+150 ac
moist soil production	-	-	-	-	+150 ac
agricultural and browse production	-100 ac	-350 ac	-100 ac	-350 ac	-150 ac
Bald eagle migration habitat					
roost trees	+100 ac	+350 ac	+100 ac	+350 ac	-
feeding areas and opportunities	-	-	-	-	+150 ac
Cost					
capital costs	$ 8,500	$27,250	$94,500	$113,250	$581,000
operation and maintenance	$20,000	$20,000	$40,000	$ 40,000	$127,000
staffing	0.25	0.25	0.5	0.5	1.5

Table 3. Comparison of alternatives.

Evaluation Criteria	Alternatives				
	1	2	3	4	5
Wood duck production	4	2	3	1	5
Migratory ducks[a]	3	5	2	4	1
Migratory geese[b]	3	5	2	4	1
Bald eagles[c]	3	5	2	4	1

[a] Based primarily on fall migration and does not include deepwater habitat for canvasbacks and redheads.

[b] Based primarily on habitat for Canada geese.

[c] Based primarily on abundance of waterfowl during the fall migration and on amount of open areas.