FOREST, FISH, AND WILDLIFE MANAGEMENT PLAN

APPENDICES B & D

TO MASTER PLAN

MISSISSIPPI RIVER

US Army Corps of Engineers
Rock Island District

FOREST, FISH AND WILDLIFE

APPENDICES B AND D TO THE MASTER PLAN

MISSISSIPPI RIVER

1982

US Army Engineer District, Rock Island

Clock Tower Building

Rock Island, Illinois 61201

16 MAR 1982
NCDCO-MO (Undated) 1st Ind
SUBJECT: Forest, Fish and Wildlife Appendices

DA, North Central Division, Corps of Engineers, 536 South Clark Street,
Chicago, Illinois 60605 9 April 1982

TO: Commander, Rock Island District
ATTN: NCROD-R

1. In reference to your letter, the subject Master Plan is approved subject to the following correction. Change the reference to expiration of cottage site leases from "1988" to "1989". Recent legislation will require extension of these leases to 31 December 1989. This correction may be made via an errata sheet, if desired.

2. Although not required, it is suggested that a brief "foreword" be added to the plan, explaining that the primary emphasis on management is focused upon management of habitat for enhancement of wildlife and recreation resources and that the production and utilization of commercial forest products is ancillary to these main management objectives.

3. You are commended for preparation of a well-written and comprehensive forest management plan with management prescriptions that should serve to implement wise resource stewardship.

FOR THE COMMANDER:

CARL C. CABLE, P.E.
Chief, Construction-Operations Division

5 Incl
wd

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:

NCROD-R

16 MAR 1982

SUBJECT: Forest, Fish and Wildlife Appendices

Commander, North Central Division
ATTN: NCDCO-MO

Inclosed please find 5 copies of the Forest, Fish and Wildlife Appendices B and D to the Master Plan for Mississippi River Pools 11-14, 16-18, 21 and 22. Copies of this management plan are provided for final review and approval.

FOR THE COMMANDER:

5 Incl
as

for HENRY G. PFIESTER, P.E.
Chief, Operations Division

APPENDICES B AND D TO THE MASTER PLANS
FOR MISSISSIPPI RIVER POOLS 11-14, 16-18, 21 AND 22

FORESTRY AND FISH AND WILDLIFE

MANAGEMENT PLAN

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1. Cover typed - aerial photos are included as a separate attachment to this document. The aerial photos with cover types are labeled by Mississippi River Pool and will be used in conjunction with the management prescriptions described in this document.

2. Coordination.

FOREST AND FISH AND WILDLIFE MANAGEMENT PLAN

1. PURPOSE AND POLICY.

1.1 Purpose.

The purpose of these management appendices is to present a flexible management guide for the forest and fish and wildlife resources on the Mississippi River, River Miles 614-300 (as required by ER 1130-2-400). The objective of this plan is to assure a long term healthy and diverse forest and fish and wildlife resource while achieving the multiuse management goals as expressed in the Master Plans.

Forestry and Fish and Wildlife appendices for Mississippi River Pools 15, 19, and 20 will not be written. Managable forestry resources or fish and wildlife resources do not exist in significant amounts on project lands in these pools.

1.2 Policy.

Management responsibilities of the natural resources on lands acquired for the 9-foot navigation project involves multiple Federal and State agencies. Principal administrative authority, however, remains under the Corps of Engineers with regard to the primary project purpose of navigation. National policies establish general administrative authority for the preservation, conservation, and recreational uses of project related resources. Management and development objectives concerning the natural resources are to assure such use is directed toward the continued enjoyment and maximum sustained use of both present and future generations, on a basis that is equal for all potential users. Priority is not assigned to any specific resource use objective, therefore, individual management actions seek to achieve mutually acceptable and compatible measures.

Intensive management programs on project lands concerning fish and wildlife conservation are primarily administered by either the US Fish and Wildlife Service (USFWS) or adjacent state agencies. A Cooperative Agreement made between the Department of the Army and the Department of Interior provides a large portion of project lands for fish and wildlife conservation programs. The Cooperative Agreement lands are managed by the US Fish and Wildlife Service as a part of the national refuge system or by the individual state conservation agencies through third party agreement.

The management plan outlined in this report represents a program to direct management actions for all project lands. The plan emphasizes forestry management objectives for all project lands, and represents the wildlife management objectives for lands not included in the Cooperative Agreement. Intensive management plans concerning fisheries and wildlife on Cooperative Agreement lands remain the responsibility of the USFWS and the respective state interest. Coordination during both preparation and implementation of Corps management actions on Cooperative Agreement lands is required with the USFWS and state agencies to assure compatibility with their respective fish and wildlife management goals.

The forestry management plan is directed to enhance the overall quality of wildlife habitat for both game and nongame species along with other project purposes. Production of fiber products is not to be a principal management objective. The basic goal of the plan is to establish and maintain a healthy timber resource to increase the value of such lands for beneficial uses including conservation, fish and wildlife habitat, and recreation. Wildlife management, as described in this plan, consists of those means by which the Corps of Engineers can use vegetation and/or forest manipulation to promote and maintain a diverse population of wildlife species on project lands. Strict wildlife management per se is not within the realm nor the intention of this plan, i.e., species stocking, construction of nest boxes, hunter control, etc. Our intentions do support, however, the cooperative venture of this management plan with the concerns and practices of other interested and affected State and Federal agencies for the benefit of all natural resources of the Mississippi River.

ADMINISTRATIVE AUTHORITY

Public Law 79-732, Fish and Wildlife Coordination Act of 1946. This act provides for a general plan to be developed with the Department of Interior to use designated Corps project lands and waters for wildlife conservation and management.

Public Law 85-634, The Fish and Wildlife Coordination Act of 1954. This law, amended in 1958, provides that fish and wildlife conservation shall receive equal considerations with other project purposes, and that such considerations be included in other aspects of water resources development programs.

Public Law 86-717, Conservation of Forest Land Act of 1960. This act requires that where applicable, timber resource management be carried out on Corps lands to increase the value of forest areas for conservation, recreation, and other beneficial uses.

Public Law 89-669, Protection of Rare and Endangered Species Act of 1966. This act provides for the conservation, protection, and propagation of the native species of fish and wildlife, including migratory birds, that are threatened by extinction.

Public Law 93-205, Endangered Species Act of 1973. This act provides for Federal agencies to use their authority to administer programs for the conservation of endangered and threatened species. Federal agencies are to insure that actions authorized by them do not jeopardize the continued existence of such endangered or threatened species to result in the destruction or modification of their habitat.

Public Law 93-251, The Water Resources Development Act of 1974. Section 77 of this act provides a 75-25 percent cost sharing between the Federal Government and State and local governments to enhance fish and wildlife on project lands as amendment to P.L. 89-72 authority.

2. NATURAL SETTING.

2.1 Location.

2.1.1 The Upper Mississippi River drains an area of 180,100 square miles. It is bounded on the north by the watershed of the Great Lakes, Lake of

the Woods, and the Red River of the North; on the east by the Great Lakes and the Ohio River basins; on the west by the Missouri River Basin; and on the south by the Arkansas and Lower Mississippi River drainage area. The Upper Mississippi River Basin includes major portions of Minnesota, Wisconsin, Iowa, and Illinois; a portion of Missouri; and minor portions of South Dakota and Indiana. Terrain consists principally of rolling land, with elevations ranging between 280 and 1,940 feet above sea level.

2.1.2 The Master Plan, and these appendices, cover 90,000 acres of project lands along a 315 mile stretch from Guttenberg, Iowa, to Saverton, Missouri.

2.2 Climate.

The average annual precipitation over the basin is 31.7 inches. Of this, 24.2 inches return to the atmosphere by the processes of evaporation and evapo-transpiration. The remaining 7.5 inches pass out of the basin as surface runoff via the Mississippi River, a basin-wide ratio of 24 percent. Average annual snowfall ranges from a high of 96 inches in the northern section to a low of 8 inches in the southern section.

The average annual temperature ranges from 40 degrees in the north to 59 degrees in the south. January has the lowest temperature, and July the highest. Basin winds generally blow from the northwest from January to April, and from the south during the remaining months. Mean wind speeds are 11 miles per hour in July and 10 miles per hour in October.

2.3 Soils and Geology.

2.3.1 The bedrock consists of nearly horizontal layers of sedimentary rock formed during geologic periods from the Ordovician (about 450 million years ago) to the Pennsylvanian (about 310 million years ago). The Ordovician, Silurian, Devonian, and Mississippian rocks consist mainly of dolomite, sandstone, and limestone; the Pennsylvanian rocks are mainly shales.

2.3.2 The Upper Mississippi River began its modern development about 10,000 years ago, at the close of the last (Wisconsinan) glaciation of North America. The receding ice left enormous quantities of crushed material debris in unsorted deposits of pebbles, sand, silt, and clay. Meltwaters collected in a great northern basin, called Lake Agassiz by geologists; it covered much of the area presently know as the Dakotas, Minnesota, Manitoba, and Saskatchewan. Serving as this lake's outlet, the Mississippi grew to a torrent of sediment-laden meltwater, eventually cutting a gorge. Agassiz slackened and sediments that formerly were carried to the sea filled the newly scoured Mississippi Valley. Today, the riverbed lies on top of as much as 200 feet of sand and silt.

2.3.3 A pliant bed of silt and sand is one key to the Mississippi's changeable character. The riverbed easily rearranges itself to pass around some obstacles and to obliterate others.

2.3.4 Flood plain soils are alluvial deposits primarily of silt and clay texture. Occassionally sand deposits of 2 - 20 feet in depth can overlay the silt or clay.

2.4 Topography.

2.4.1 From Guttenburg, Iowa (River Mile 614, the upper limit of the Rock Island District), to Saverton, Missouri (River Mile 300), the Mississippi River flows within a flood plain one to five miles wide bordered by wooded hills and bluffs. The bluffs closely restrict the watercourse in the northern section in many places. In the southern portion the river often divides and meanders through an extensive flood plain, most of which is now devoted to agriculture.

2.4.2 Project lands consist mostly of a strip of land along each bank, together with islands or parts of islands in the river. The most important flow characteristics of this meandering river are the relatively regular annual flood. A system of levees provides flood protection for a major portion of Mississippi River flood plain lands. The river is confined by agricultural levees in the southern reach, while bluffs confine the river in the northern reach above Savanna, Illinois.

3. FOREST RESOURCE.

3.1 The movement and presence of the Mississippi River has created several forest species associations that change with site microclimates along its bank and on its islands. Sloughs are being filled in and shorelines are being constantly changed, creating pioneer species associations. High water periods and low site elevation maintain silver maple or willow associations in many areas. Silt deposition and forest species succession lead to more modest moisture conditions that favor other species associations.

3.2 Soon after the creation of bare soil or sand by river or human activity, the bare medium is often colonized by sandbar willow (Salix interior), followed by or in combination with black willow (S. nigra) and cottonwood (Populus deltoides). Commonly growing among tree seedlings are usually such plants as cocklebur (Xanthium spp.), wormwood (Artemisia spp.), and grasses. Ideally, this initial phase of sandbar stabilization usually requires 2-5 years. However, this model may not occur so neatly in nature, and may take much longer than 2 years to stabilize. If, for instance, the bare soil was created by dredge spoil, initial colonization may take many decades and may be characterized by grasses as the initial vegetation. Woody species other than willow may follow the grasses such as cottonwood, black locust (Robinia pseudoacacia) or boxelder (Acer negundo). On lower river border sites, succession is generally held at the silver maple or willow stage by excessively moist conditions.

3.3 Pioneer stands mature rapidly, with the short-lived black willow competing vigorously in the overstory for about 20 years. Cottonwood may then dominate for one or two additional decades. The groundlayer is marked by areas of sand that alternate with thick stands of annual and perennial grasses and forbs. Accumulating leaf fall, twigs, and animal materials combine with silt trapped among the trees during floods to build up and enrich the soil. The seedlings of both willow and cottonwood are

poorly adapted to shady conditions. Eventually species such as silver maple (Acer saccharinum), green ash (Fraxinus pennsylvania), black ash (F. nigra), river birch (Betula nigra), and mulberry (Morus spp.), seed into the declining willow-cottonwood stands, especialy as large openings are created, supplanting both species in the stand. Dutch elm disease has reduced American elm, once important in this region, from the main canopy of the forest to the midstory or understory. The understory is often dominated by the seedlings of such shade-tolerants, with the intolerant cottonwood and willow saplings competing in canopy openings. The ground layer becomes densely overgrown with poison ivy (Toxicodendron radicans), trumpet vine (Campsis radicans), grapes (Vitis), bur cucumber (Sicyos angulatus), and wood nettle (Laportea canadensis).

3.4 In areas where sediment accumulation has raised the site, providing better drainage, species that require more moderate moisture conditions have become established. A list of such species would include sycamore (Platanus occidentalis), hackberry (Celtis occidentalis), hickories (Carya spp., especially C. cordiformis and C. ovata or C. laciniosa), pin oak (Quercus palustris), black walnut (Juglans nigra), honey locust (Gleditsia triacanthos), bur oak (Quercus macrocarpa), and pecan (Carya illinoensis). The understory sometimes contains persimmon (Diospyros virginiana), Red-Osier dogwood (Cornus stolonifera), flowering dogwood (Cornus florida), redbud (Cercis canadensis), hackberry, American elm and tall pawpaw (Asimina trilofa). The ground layer in such sites often becomes densly overgrown with poison ivy, miscellaneous weedy spp., bur cucumber and wood nettle.

3.5 Even though a slight increase in elevation provides better drainage for more valued species, such species are few or nonexistent on many higher sites. One reason, for instance, may be that bur oak, swamp white oak, hickory, and black walnut were logged on much of the pool. The logging operation left little or no seed source for regeneration. Because some species are at the edge of their range in the northern pools or grow in a favorable microclimate, the Mississippi River flood plain nut production may be more infrequent than in more favorable parts of their range. White oak, pin oak, hickory, and black walnut grow at the northern edge of their range along some of the Upper Mississippi River, while pecan and persimmon grow in favorable microclimates. When mast is produced, spring or summer floods often wash away the seeds before they can germinate and take root. Seedlings are often killed by extended inundation periods. Additionally, heavy growths of ground layer vegetation, squirrel consumption of the mast produced, and insect nut parasitism also contribute to the rarity of valuable species on better sites. For the above reasons, valuable species for wildlife and timber may need planting, burning, or other silvicultural practices to help establish and/or increase their numbers in the overstory, and to thus produce a self sustaining stand.

3.6 A few sites, such as Smith's Island above Lock and Dam #14, are never flooded. In this microclimate, species that grow on site out of the flood plain such as; sugar maple Acer saccharum, black cherry, Prunus serotina, white oak, Quercus alba, and red oak, Quercus rubra have become established and thrive. Sumac; Rhus sp.; dogwood; strawberry bush, Euonymus americanus;

and redbud are small shrub species or small trees found in the midstory. Ground cover includes bloodroot, Sanguinaria canadensis L; Solomon's seal, Polygonatum biflorum; and may apple, Podophyllum peltatum L.

4. FISH AND WILDLIFE RESOURCES.

4.1 Mammals.

4.1.1 Mammalian species occurring in the Mississippi River basin are diverse, with their real abundance limited by habitat. Unfortunately, most official attention has been paid in the past to mammals important to hunters and trappers. Habitat needs of species such as the western harvest mouse, meadow vole, little brown bat, and short-tailed shrew are of equal importance in wildlife management on the river. Many of these species are as abundant as their habitat is available and probably together do much to shape the natural environment of the Upper Mississippi. In the past, mammals important to hunters or trappers received systematic attention from agencies of State and Federal Government. The annual narrative reports of the two Federal refuges controlling land within the Rock Island District contain statistical information on these mammal species vary greatly in abundance from Pool 11 south to Pool 22. Such distributional differences are related to climate, existing land use, availability of suitable habitat, and degree of interspecific competition. Table 1 is a list of mammal species which occur naturally in the river valley.

4.1.2 The largest mammal dwelling along the upper river, the white-tailed deer, is now common in all but the most urbanized areas. The zone between wooded areas and cultivated fields provides shrubs, grasses, and other food plants, which the deer exploit in combination with waste grains, forest tree foliage, twigs, and fruits. The nuts of such forest trees as oaks, hickories, walnuts, and pecans are also important food sources. Low island and shoreline areas are usually accessible to deer and provide important foods and cover, however, the less diverse plant communities of the riverside sites are generally less crucial to the deer herd's nutrition than are forests and fields more distant, elevated, and thus protected from the influence of the river. The mobility of the deer permits them to take the best of each natural habitat in the river valley. Deer seek the protective cover and the food of dense shoreline forests in the fall after crops have been harvested. After wintering in the sheltered bottom lands, the deer are normally driven to higher ground by spring floods. A cycle of herd movement thus may be established by the interaction of human, climatic, and hydrologic circumstances. Predators, such as the coyote, dogs, and cats, are generally unable to overpower healthy adult deer, but may on rare occassion kill and feed on very young or diseased and downed animals.

4.1.3 Small bottom land herbivores are the six mouse, three rat, and three vole species. They feed primarily on the seeds, leaves and bulbs of plants but also consume insects, grubs, and other invertebrates when possible. They occupy every terrestrial habitat, building nests in dense grass, in tree hollows and in the ground. They are heavily preyed upon by such carnivores as owls, snakes, foxes, raccoon, mink, and skunk.

Populations near the river are frequently decimated by high waters. Survival of these species under such severe conditions is ensured only by high reproductive rates.

4.1.4 One species of cottontail rabbit inhabit the river valley with small existing populations being frequently decimated by high water. Rabbits consume grasses, forbs, and other tender foliage, much of which is most abundant in open meadows or along fence rows. Federal refuge records indicate that, except for the Ted Shanks Wildlife Area, relatively few rabbits live along the shores of the river because of a lack of adequate habitat free from the flooding danger.

4.1.5 Gray, fox, red, and flying squirrels inhabit a broad range of habitats within the river valley. Most frequently noticed and most heavily hunted is the fox squirrel. Past conversion of river valley forest to farm and open woodland greatly favored the fox squirrel, which prefer open areas and easy access to cultivated crops. The gray squirrel does best in excessive stands of mature hardwood forest and is therefore limited in numbers by lack of suitable habitat. Refuge records indicate that squirrels living near the river are not normally displaced or killed by flooding and their populations remain relatively stable despite predation by larger carnivorous mammals, birds, snakes, and man. Squirrels commonly eat acorns, fruits, buds, grains, and some invertebrates. Through the characteristic habit of burying nuts, squirrels contribute to the propagation of oaks, hickories, walnut, and pecan. The regeneration of populations of such species is of major importance to the animal community as a whole, since their seeds are a major food of many herbivores.

4.1.6 Beaver and muskrat are semiaquatic herbivores that complete most of their life cycles in the marshes, ponds, and backwaters of the river. Beaver construct lodges of sticks, and commonly excavate dens in the banks of sloughs and backwaters. Young thickets and forest stands, especially of willow and maple, provide food and construction materials. Beavers do not hibernate in winter, and must therefore store a supply of food underwater sufficient to last through periods of ice cover. Within the river valley, beavers have experienced great population fluctuations, related more to flooding and consequent denial of adequate habitat than to predation or recent trapping. Because beavers often interfere with drainage and other water control activities, trapping of Federal refuge lands has occasionally been authorized as a control measure. However, fur trapping intensity varies with the price of fur, and if price is low, trapping will generally be light. Present trapping pressure does not threaten beaver populations in the river valley.

4.1.7 Muskrat prefer shallow ponds and marshes that support dense stands of floating and emergent plants. Lodges are constructed of available vegetable material, and dens may be excavated in muddy banks. Muskrat feed on marsh vegetation and are exposed to light predation by hawks and owls, and heavy predation by mink and man. They provide many pelts to trappers. However, the marked fluctuations in muskrat populations during the period that Federal refuge statistics have been kept, reflect decimations during high water, rather than variations due to predation

and trapping. High reproductive capacity permits rapid replenishment of muskrat populations when habitat is restored to a favorable condition.

4.1.8 Skunk, raccoon, opossum, fox, coyote, weasel, mink, and feral cats and dogs are major predators in many portions of the Upper Mississippi River. While the life habits and abundance of these animals vary greatly, their food habits are somewhat similar and they all, to some degree, function to control populations of rodents, shrews, songbirds, snakes, lizards, amphibians, crustaceans, fishes, and insects. In order to satisfy their high energy needs, these predators roam over large areas, in some cases embracing island and shore forest, and do not hesitate to sample almost any food source. Each species is subject to predation, especially when young, and most are sought by trappers. Within the Upper Mississippi River valley, however, populations appear to be controlled more by floods and suitable habitat than by direct predation. Floods have periodically decimated predator populations living near the river; they suffer because flooding severely decreases the small animal populations upon which they feed. Striped or spotted skunk, river otter, weasel, and mink have been most affected by destruction of their hatitat. Statistics compiled during the past decade reveal either steady declines or maintenance of populations at very low levels. Trapping success, another measure of furbearer abundance, has generally declined since the early 1960's. Of the two fox species found in the valley, the forest-loving gray fox has suffered most from conversion of bottom land forests to farmland. The red fox, on the other hand, has found farmland and adjacent forests highly suitable. However, due to vectors, this species has suffered a serious population decline. Raccoon and opossum, which have adapted completely to the influence of man in the river valley, thrive throughout all rural areas and are also common in the urban suburbs. The coyote is increasingly reported in the Upper Mississippi River valley.

4.1.9 Moles and shrews daily consume enormous quantities of insects, earthworms, and other invertebrates. Shrews and moles experience heavy losses from predation, these losses are compensated for through a combination of high reproductive rates and adaptability to most habitats in the river valley. Except for areas recently flooded, all terrestrial habitats of the river valley host examples of these groups.

4.1.10 Bat species of the Upper Mississippi River valley are insectivores that seek their prey in the nighttime skies and rest throughout the day. Little brown bats, eastern pipistrels, big brown bats, and grey myotis bats are "cave bats," which seek shelter in caves during the day and may hibernate in caves through the winter. Indiana bats are cave bats and do hibernate in caves during winter. During the summer they roost in trees and have nursery colonies under the loose bark of large trees. Red bats and hoary bats do not use caves but rest in trees during the day; such "tree bats" migrate south for the winter. Bats are voracious consumers of flying insects and have few predators thus allowing individuals to survive many years. Nonetheless, bats are threatened by human activities that deny them preferred resting and wintering habitat. Timber removal and conversion of forest to farmland limits the daytime resting habitat of tree bats. Recreational development, urbanization, and other disturbances reduce the resting habitat of cave bats. The Indiana bat is probably rare

within the river valley and has suffered severe losses from damage to its highly centralized cave wintering sites; it has been placed on the Federal register of rare and endangered wildlife.

4.2 Resident and Migratory Birds.

4.2.1 Ducks, coots, and geese primarily use this upper portion of the river during the migratory seasons. These periods vary in response to natural variations in the arrival of spring and winter, and with variations in the supply of food and shelter along the flyway. Peak populations in the spring migration are generally recorded at the arrival of spring. Fall peaks may occur any time between mid-October and November. Favorable conditions along portions of the river may cause the flocks to linger until driven south by the advance of winter. Waterfowl tend to migrate with other of their species, and because responses of different species to seasonal changes in their environments vary, the peaks of river use by individual species may vary significantly. Certain species normally spend a longer period on the northern breeding grounds; and they typically precede other species in the spring and follow them in the fall.

4.2.2 Of all the birds, except blackbirds (various species including grackle and red winged), ducks use the river valley during seasonal migrations the most. Ducks may be categorized either as "dabblers" (surface feeding) or "divers" (seeking their food underwater). Among the dabblers, mallard, wood ducks, and green-winged teal are generally the most abundant during the migratory seasons. Other dabblers that are observed consistently include baldpate, black duck, gadwall, pintail, shoveler, and blue-winged teal. Diving duck numbers are dominated by scaup, with ring-necked ducks and canvasback also heavily represented. Other divers consistently using the flyway include mergansers, goldeneye, bufflehead, redhead, and ruddy ducks.

The diet of ducks varies by species, but all adults consume some plant and animal matter. Vegetable matter dominates the diet of most ducks; animal matter is the principal food of only a few species, such as goldeneye and mergansers. Dabbling ducks graze on leaves, seed heads, acorns, and bulbs of smartweed, pondweed, waterlilies, grasses, sedges, and many other plants that grow in or near shallow marshes and ponds. Waste grains also attract these ducks. Insects and aquatic invertebrates are eaten when possible. Dabbling ducks naturally congregate in marshes and sloughs where most of their food is available. Diving ducks find submerged plants, fish, and invertebrates in deeper water and therefore concentrate in open areas of the river. Areas that support a rich diversity of bottom organisms, such as the lake formed by Keokuk Dam, become favored feeding grounds and receive millions of duck visits each year. Other areas of the river, less fertile because of bottom disturbance or other reasons, may be visited by few or no diving ducks. Adult ducks are threatened by relatively few predators, and hunter management is federally and state controlled thereby minimizing damage to their populations in the Upper Mississippi River Valley. In contrast, losses are very severe on their more northerly breeding grounds, where owls, hawks, eagles, raccoon, fox, skunks, turtles, and other predators destroy eggs and kill ducklings. In addition, gradual

drainage of prairie breeding potholes for farming has combined with adverse weather to cause serious reproductive failure in recent years. Therefore, while distribution of ducks along the river during migration is heavily influenced by local habitat conditions, the total number of each species using the flyway is controlled by both reproduction habitat outside the Upper Mississippi River valley, and the river habitat that allows the mating pairs to reach the breeding area.

Wood duck, mallard, and blue-winged teal nest in many areas of the river valley. The wood duck is a versatile bird, able to use a variety of deep water, marsh, and woodland food sources. Acorns and the fruits of hickory, dogwood, and elm form important parts of its diet. Favored aquatic plants include pondweed, smartweed, arrow-arum, and water lily. Insects form only about 10 percent of the adult wood duck diet. Wood ducks nest in cavities in forest trees where some protection is afforded from such predators as raccoon, opossums, and snakes. The availability of suitable nesting cavities is crucial to the reproductive success of these birds. Young wood ducks are led from the nest to a marsh brooding area within a day of hatching. Ideal brooding areas offer an abundant invertebrate population, upon which the ducklings feed extensively, as well as concealment from hawks, owls, fox, mink, snapping turtles, and other predators. Land-locked ponds within islands frequently supply such ideal habitat. Unfortunately, marsh habitat is being steadily lost along the river because of river siltation and development.

Relatively small numbers of mallard and blue-winged teal nest in the river valley. Both species build nests in widely varied locations. Although most often hidden among bulrushes and reeds near the water's edge, nests may also be constructed hundreds of yards into the forest and are placed under logs, on piles of debris, and in tree cavities. Like wood ducks, the young of these species feed on insects and convert to the mostly vegetarian adult diet after the fledgling stage. Mallards and blue-winged teal obtain most of their nourishment from marsh plants, acorns, and cultivated crops. Eggs, ducklings, and occasional adults do fall prey to predators.

Canada geese pass through the river valley early in the spring and late in the fall. Canada geese have extended their breeding and wintering ranges to embrace most of the contiguous United States, and nesting has been reported in this portion of the Upper Mississippi valley. Canada geese are almost entirely vegetarian and graze on a wide variety of grasses, marsh plants, and cultivated crops. Snow and blue geese nest in the far north and share most habitat needs with Canada geese. Along the Mississippi River refuge planting are used by geese during years of good yield. Adult geese are generally protected by size from heavy predation but suffer some natural losses from accident and disease. Geese are extremely wary birds and during the hunting season, hunting pressures generally force them into "closed areas" of Federal and State wildlife refuges.

4.2.3 Coots are common migratory users of the river valley, usually migrating in large flocks, stopping frequently to rest and feed upon surface and underwater vegetation. Some animal matter, such as insects,

tadpoles, snails, and worms, is consumed also. Major predators of coots are raccoon, mink, turtles, hawks, owls, and eagles. Coots move southward slowly depending on climatic and habitat conditions and may stop over in suitable northern navigation pools.

4.2.4 Many species of shore birds and wading birds pass through the upper river valley during annual migrations, and several remain there each spring to nest (Table 2 lists these birds). The crayfish, tadpoles, small fish, insects, and other small creatures that comprise the diet of the predatory shore and wading birds abound in shallow water, among marsh plants, on beaches and grassy shoreline areas, and mud flats. Shore birds such as the sora rail and common gallinule, that feed on plant matter, find most of the leaves, fruits, grasses, and forbs on or near marsh areas. Shore birds that nest in the river valley may build their nests on marsh fringes (Sora rail), on a sandy or pebble shoreline (least tern), or on the forest floor (woodcock). Depending upon camouflage for protection, the nests are exposed to raids by a wide variety of predators, and to damage by recreationists.

4.2.5 Wading birds nesting throughout most of the upper river valley include great blue herons, common egrets, black-crowned night herons, bittern, little blue heron, and green herons. These birds like other wading birds present in the valley, stalk their prey of small fish, crayfish, amphibians, and invertebrates in shallow marsh waters. Great blue herons typically nest in the tops of large mature forest trees near the river. They are frequently joined by common egrets and black-crowned night herons. Nesting factors, such as specific species mix, tree spacing, and understory condition, are under study. Green herons nest singly or in small colonies, building nests about 20 feet from the ground in small trees near water. Eleven rookeries have been noted along the Mississippi River between Dubuque, Iowa, and Hannibal, Missouri. Mortality in herons and egrets is greatest on the nest and during the first six months of life. Older herons, egrets, and bitterns face much less danger from predators and may survive for many years.

4.2.6 Upland gamebirds are mostly excluded from riverside natural areas by frequent flooding. Incomplete records indicate that gray partridge, turkey, grouse, pheasant, and bobwhite quail are widespread but sparsely represented throughout the rural areas bordering the upper river. Hunting records applicable only to low-lying refuge lands reinforce this conclusion. In contrast, mourning doves make rather heavy use of areas near the river, feeding upon waste grains found in fields and weed seeds, which grow thickly on railroad embankments and roadsides, along levees, near navigation dams, on field margins, and in most forest clearings. Doves frequent sandy areas along the river to dust themselves and obtain grit. They prepare nests in the forest, occassionally on the ground. Eggs and chicks are destroyed by a wide variety of predators, but adults are swift flyers that can escape most predators. Doves are sought by hunters in this region, but records indicate that, due to the cyclic nature of dove populations, the hunters harvest is limited.

4.2.7. Hawks are present in the river valley usually as migrants and consume large quantities of rodents, rabbits, reptiles, amphibians, insects, other birds, and fish. Most commonly observed are red-tailed, marsh, red-shouldered, and Cooper's hawks. Hawks and falcons have been reduced in number through thoughtless shooting, nest disturbance, destruction of nesting habitat, and by pesticide-related reproductive failure. Osprey, peregrine falcon, and bald eagle are considered to be rare or endangered. Osprey are fish-eating predators that are seen in very small numbers during the migratory period. However, captive release and propagation programs have restored some peregrine nesting success in several northeastern US states. Peregrine falcons apparently have been eliminated as a breeding population east of the Rocky Mountains, primarily as a result of pesticide poisoning. Adult birds may occasionally be observed within the Mississippi River valley for years to come, but they are already quite rare. Bald eagles pass through the upper river valley as migrants, and many winter over in favorable areas. Numerous observations indicate that bald eagles winter where powerplants, industries, navigation dams, or natural conditions discourage ice forma-tion on the river. In such open areas, bald eagles have continuous access to the fish that comprise most of their diet. Like hawks and falcons, bald eagles have suffered from shooting, nest disturbance, and habitat destruction and may be suffering reproductive losses due to pesticide poisoning. Considerable public interest in the fate of the bald eagle in this region is reflected in able amateur research and the current interest of the city of Burlington, Iowa, in obtaining an easement for the protection of bald eagle habitat on Otter Island.

4.2.8 Owls are year-round residents of the upper Mississippi River Valley. Most common are great horned owls, screech owls, and barred owls with occasional long eared owls. These owls are residents of forest lands along the Mississippi River. Great Horned Owls build nests on branches of mature trees, generally as far from human habitation as possible, while both the screech and barred owls prefer nesting in tree cavities. Clutch size usually is from 1-3 eggs, except for the screech owl's, which is 3-7 eggs in size. Incubation of the eggs averages 3-4 weeks. Owls are aggressive predators that rest in trees during the day and awaken at sunset to hunt for mice, shrews, squirrels, rabbits, pheasants, crows, songbirds, fish, and almost any other small animal. Owl nests are raided by crows and occasional raccoons, but adult birds are virtually immune to predation.

4.2.9 Songbirds are widely distributed along the Upper Mississippi River. This is a large, diverse group of birds including such unmelodious species as shrikes, grackles, and blackbirds. Most of the songbirds are migraters, nuthatches, and occassionally cardinals, winter wrens, and red headed woodpeckers, being year-round residents of the river valley. As noted earlier, this group includes the blackbirds, probably the most numerous of the seasonal migrants, and the adaptable crow whose most serious predator is the great horned owl. The diets of this group include nectar (humming birds); fruits, carrion, berries, grains, and mammals (crows); seeds (cardinals); fish, frogs, and lizards (kingfishes); insects (whippoorwills); and fruits and insects (wood thrush). Nesting habits are as variable as their diets. Crows nest in the tops of tall hardwoods, nuthatches build their nests in tree cavities or on branches, while thrushes build their

nests in holes in the ground, among rocks, or on open sites among vegetation. These facets and more reveal the diversity of this group that lives along the Mississippi River.

4.2.10 A highly aggressive songbird is the starling, introduced from England during the last century. Having few natural predators on this continent, starlings have reproduced rapidly and are competing heavily with native wildlife. Flocks of over 200,000 birds have been reported in annual narrative reports of Upper Mississippi River refuges. The starlings compete directly with ducks and geese for waste grain and threaten to frustrate some refuge management efforts directed to the support of those birds. Starlings also threaten native songbird populations through takeover of nesting sites, especially of those species that use natural cavities in nesting.

4.3 Reptiles and Amphibians.

4.3.1 At least 86 species of snakes, turtles, lizards, frogs, salamanders, and toads are known to inhabit the Upper Mississippi River valley. There are 36 species of snakes, 20 species of turtles, and 4 lizard or skink species. Amphibians are represented by 8 species of salamanders and 18 species of frogs and toads. Virtually every habitat from high bluffs to deep water supports reptiles and amphibians. The numbers of these small animals make them a significant part of the total ecosystem. However, their economic importance is less than that of many other organisms of the river system.

4.3.2 Grass and sparse shrubby cover provide home and feeding territories to the garter snake, rat snake, bullsnake, and prairie kingsnake, while the massasauga prefers wetter grass areas. Frogs, such as the chorus frog and leopard frog, also prefer these grassy sites. Where grass edge meets water, and in the marshy slough vegetation, reptiles and amphibians abound. Marshes support garter, racer, water, and massasauga snakes, mudpuppies, eastern tiger salamanders, and most of the frog species. Even the more open waters provide suitable feeding for the northern water snake, map turtles, snapping turtles, Blandings turtle, smooth softshell, and the bullfrog.

4.3.3 The only commercially important species is the snapping turtle, harvested for soups and stews. In 1970 commercial catches reported were 10,527 pounds. The snapping turtle is a major predator, feeding on aquatic invertebrates, fish, reptiles, birds, mammals, and carrion. Snappers are considered a threat to ducklings. Snapping turtles also feed on vegetation. Females lay eggs on sandy beaches each fall; young emerge in the spring.

4.3.4 Possibly the most severe human disturbance to reptiles and amphibians occurs when marshes are destroyed. The destruction of marshes reduces habitat needed for a variety of species. Conversion of wet habitat to dry sand will replace aquatic species with terrestrial organisms such as the Fowler toad. Reptiles, particularly those laying eggs in sand, could benefit from such changes. However, conversion from wet to dry would limit amphibian populations, since all amphibians need water for breeding

and to maintain skin moisture. Prolonged high water conditions have the opposite effect of favoring amphibian populations and harming reptiles. Sedimentation, which creates more shallow water habitat, generally benefits amphibious animals but could in some cases destroy eggs.

4.4 Fishes.

4.4.1 In general, the standing crop of Mississippi River fish species is regulated by a combination of factors, including: (1) the fertility of the surrounding and underlying soils, (2) the accumulation rate of nutrients, (3) depth of water, (4) mean temperature and rainfall, (5) availability of preferred habitat, and (6) the competition among fish species. These factors are impacted by dams, dikes, dredging, and other development. Human intervention in the operation of any of these factors is likely to cause changes in the composition and distribution of fish populations.

4.4.2 Most fish species are widely distributed throughout the Rock Island District (Table 4).

Others are more commonly found in either the northern or southern pools. The chestnut lamprey is found only below Pool 19, and the black buffalo is more common below Pool 13. Smallmouth buffalo are generally found below Pool 11. Northern pike, black crappie, smallmouth bass, and log perch occur throughout the district. The weed shiner occurs in the Rock Island District only in Pools 11 and 12. The white sucker more common north of Pool 12, and the pumpkinseed occurs more commonly north of Pool 14. Pool 18 is the most sourthern location where the spotted sucker and pugnose minnow is commonly found. Yellow perch are most common between Pools 12 and 17, and mooneye and walleye occur more frequently north of Pool 20. Some species such as the lake sturgeon and the burbot are extremely rare and have been collected only a few times anywhere within the District.

4.4.3 The main channel includes the maintained portions of the nine-foot navigation channel. The shovelnose sturgeon lives part of its life almost exclusively in this habitat. Other species that frequently occur there are the channel catfish, flathead catfish, freshwater drum, sauger, walleye, and bigmouth and smallmouth buffalo. Mooneye also occur there in the spring.

4.4.4 The main channel border includes the wing dam and the bins between these dams and various riprap structures used in bank protection. These areas are good habitat and fishing areas for white bass, largemouth bass, bigmouth and smallmouth buffalo, carp, sauger, walleye, channel catfish, flathead catfish, and freshwater drum. This habitat also supports an abundance of small fishes eaten by larger fishes.

4.4.5 Tailwaters support most of the fishes already mentioned but are especially good habitat for freshwater drum, white bass, walleye, sauger, channel catfish, shovelnose sturgeon, and goldeye.

4.4.6 River lakes and ponds support both species of crappie, sunfishes, largemouth bass, carp, the buffalo, freshwater drum, paddlefish, bullheads, and various suckers. Stump fields, which occur in the downstream portions of most pools, are especially good spawning habitat for channel catfish and are considered very good fishing places for largemouth bass, white bass, crappies, flathead catfish, carp, and bluegills. Sloughs, in which dissolved oxygen levels of the water are high enough to support diverse animal populations, are practically the only place inhabited by bowfin and northern pike. However, they also support good populations of paddlefish, the sunfishes, crappies, and most forage species.

4.4.7 Records of the commercial catch in the Upper Mississippi River during the years 1960 to 1970 indicate that the buffalo species comprised the greatest percentage of the catch on a weight basis, followed by catfish, carp, and drum. Catfish was the most valuable species in the commercial catch. The total price brought by each of these species in 1970 fell in the same order as the total poundage; however, a ranking of the species caught according to the value per pound of fish sold was as follows: catfish, sturgeon, eel, buffalo, bullhead, and sucker. Carp and drum were among the lowest priced fish on a per-pound basis.

The sport fishing catch is mostly sunfishes and crappies although channel catfish, flathead catfish, white bass, freshwater drum, and sauger are also important sport species.

4.5 Aquatic Invertebrates.

The Upper Mississippi River supports an abundant dynamic population of aquatic insects and other benthic animals that varies according to stage, temperature, and turbidity. They are eaten by the majority of the fish species and some waterfowl. One hundred and seventeen (117) genera distributed among 46 families and 14 classes live along the river within and immediately north of the Rock Island District (Table 5). The zooplankton support several fish species of the river, including the commercially important buffalo and paddlefish. Zooplankton are also an important element in the diet of the notably important fingernail clams. One study done since the formation of the nine-foot navigation system provides some information about the diversity, abundance, and dynamics of the river's zooplankton populations. Samples of zooplankton were collected on seven occasions between late March and late July 1973 at six points near the navigation channel and in sloughs along the five-mile stretch of the river north of the Quad Cities (Table 7).

5. PLAN MANAGEMENT.

5.1 Management Objectives: "General, Forestry, and Wildlife."

5.5.1 General Management Objectives.

To manage for a healthy diverse forest resource with emphasis on maintaining habitat that supports the greatest variety and numbers of self-sustaining wildlife species while considering other resource demands such as recreation, aesthetics, and fiber production.

To tailor management of the Mississippi bottom land forests to meet the habitat demands of more specific wildlife species as management objectives become known during coordination with the US Fish and Wildlife Services or appropriate states. Management of the bottom land forests must still be consistent with sound forest management principles, including maintaining optimum size class diversity, sound stand structure, and tree species site compatibility on an overall unit basis. During the interim period, the bottom land forest will be managed to obtain the widest diversity of wildlife habitat, except at sites where specific wildlife demands have been pointed out during coordination. Examples of this included in the plan are heron nesting sites, eagle roosting and perching areas, and wood duck nesting habitat.

5.1.2 Forest Management Objectives.

To promote and maintain a regulated flood plain forest resource by striving for a biologically sound optimum mix of tree size class distribution and species.

To attain a sustained and regulated yield of forest products.

To develop a detailed comprehensive data base, from stand mapping and field experience to be used in future forest management decisions.

5.1.3 Wildlife Management Objectives.

To protect habitat for all endangered species found occurring on land covered by this plan. Enhancement of the habitat, such as providing perching and roosting trees for feeding and resting Bald Eagles, will be done using a special management zone in cooperation with appropriate state and US Fish and Wildlife Service personnel.

To manage habitat to provide resting and feeding sites for migratory birds, and resting, feeding, and nesting sights for resident/migratory birds, such as the wood duck.

To maintain, through protection specific management prescriptions, colonial nesting sites for such wildlife as the Great Blue Heron.

To maintain habitat that will support the greatest variety of naturally occurring game and nongame mammals.

5.2 Management Problems of the Upper Mississippi River.

5.2.1 Introduction.

In the next few pages we will briefly discuss many of the resource management problems that exist along the upper Mississippi River. These are not complete discussions of all the problems nor have all the problems been addressed here. However, this will acquaint the reader with some of the difficulties encountered in managing the river bottom land resource.

5.2.2 Installation of the locks, dams, and levees in the 1940's raised the ground water level of the pools. As a result of this pool elevation, we presently have a more moist soil regime which favors silver maple and other such water-tolerant woody species. In contrast, only areas directly below the lock and dam retain some resemblance to the pre-lock and dam era.

Without increasing land elevation, nothing can be done to resolve this problem of increased soil moisture. Increased moisture has made natural oak, pecan, and hickory stand regeneration difficult on many sites.

5.2.3 Higher areas will support mast species, but many such areas do not. Historically, logging removed the trees which provided the seed sources for regeneration, and as a result, less desirable species have been able to gain a foothold. Harsh growing conditions, especially wetter soil regimes and flooding, inhibit reestablishment of mast species in many areas where there is an inadequate or no seed source. Specific planting procedures, associated vegetative control techniques, and appropriate silvicultural practices, can help to establish mast tree species association where site and soil conditions warrant. Such reestablishment of mast tree stands will provide more food for wildlife.

5.2.4 The Dutch elm disease eliminated the American elm as an important species in the bottom land forest. Some larger trees can still be found and American elm still commonly occurs in the understory. Elm in the understory and the few larger trees should be left in the hope that genetic resistance to the disease will develop over time.

5.2.5 Ground vegetation, such as bur cucumber and wood nettle, grows luxuriantly in all pools. In many areas, summer ground layer vegetation is so thick that regeneration of trees is highly unlikely. Benefits in reestablishing woody vegetation would include the provision of more den and nesting cavities, more food, and more cover for wildlife that inhabit the bottom land forests.

5.2.6 Silver maple and cottonwood commonly seed quickly in any open area. These species usually form dense monocultures over wide areas. At certain stages of development, too many trees may occupy a site resulting in the formation of a dense canopy and the reduction of understory diversity.

Evenaged stands of silver maple, cottonwood, and ash are the dominant vegetation on most low bottom land sites. Management of these areas as evenaged stands in different stages of growth, and maintenance of a desirable stocking level through thinning will best provide diversity. More diverse habitat will result in the formation of a more suitable environment for wildlife species inhabiting the river bottom land, especially for species that prefer a forest of varied size classes.

5.2.7 Shoreline erosion is caused by wind and current, as well as by commercial and recreational traffic on the river. Removal of healthy trees next to the shoreline will speed erosion. Proper silvicultural practices can aid in rejuvenation of shoreline vegetative conditions.

5.2.8 Cavity development is a major concern in the existing forests. No treatment zones will reserve existing cavity trees for the present in that area; however, special management zones with longer rotations will maintain cavity tree development for future habitat needs. Silver maple "thinning cuts" to achieve faster growth, and very limited harvest cuts in silver maple and cottonwood stands will encourage nest cavities for wood ducks, owls, and squirrels. Woodpecker habitat, as well, will be enhanced through the establishment of special management zones.

5.2.9 In many areas, rare or unique tree species occur. These unique trees, exemplified by the strain of northern pecan in Mississippi River Pool 14, do not seem to be regenerating. Such stands should be monitored and data gathered for further understanding of the silvics of these unique species. Silvicultural practices, such as improvement cuts, and planting, may be applied to ensure regeneration and survival of these species, as well as to maintain the diversity which they give to woodlands.

5.2.10 Winter cover is lacking or very limited in much of the bottom land forest. An absence of thick woody growth, a result of either dense monocultures or the small amount of sapling sized stands of timber, seems to be the core of the problem. Dense monocultures favor a herbaceous understory that is lost in winter. Young sapling sized stands can furnish good winter cover for wildlife. However, these stands do not exist to any measureable amount in the total river land area. The abundance of pole to sawtimber size stands result in lack of adequate wildlife winter cover. On a very limited basis brush piles, created when silvicultural practices are applied to the forest, would furnish winter cover for mammals such as cottontail rabbits. Flooding in much of the flood plain forest would make the brush pile death traps and therefore unusable. Therefore, brush piles will provide winter cover on sites that are elevated enough so that the brush piles will be relatively undisturbed by flooding. In addition to the elevation of the site, a land bridge to an adjacent extensive unflooded area must be available.

5.2.11 In stands composed of mast hardwood species, mast production is too often low at such sites. Overstocked stands limit the amount of nutrients and light available for each tree, and therefore greatly restricts the amount of mast produced. Because of spring and summer floods that inundate much of the bottom land forest, many mast hardwood trees do not grow under optimal conditions. This will reduce the amount of mast produced by the trees. Another factor in low mast production, though of lesser impact, is overmaturity in bottom land forest stands.

5.2.12 Diseases such as oak wilt have taken their toll of trees in scattered parts of the midwest. Pin oak and the other red oaks are particularly susceptible to this disease. When an oak wilt pocket is located, the most practical control of disease transmission via root grafting may be to cut or kill all trees adjacent to infected trees. The chance of oak wilt infection from airborne spores can be greatly reduced by scheduling no logging activities in oak stands during the months of April, May, and June.

Updates of this management plan will cover any pathological and entomological problems of forest tree species discovered while working in the management units. All agencies should be aware of potential problems in the field and be responsible for reporting them. The Dutch elm disease creates a problem which is basically insolvable in most areas. In contrast, few other diseases or insects presently infect the trees. When disease infects trees, appropriate fungicides, pesticides, current biological controls, and/or sanitation cuttings to remove the infected trees will be implemented to hinder spread of the contagion.

5.2.13 On the Odessa area, the Iowa Conservation Commission maintains the water at a height suitable to the maintenance of good quality wildlife habitat. Any increase in water level would create a wildlife management problem, by reducing the number of oak and other mast hardwood trees growing on the Odessa area and an excellent food source for wildlife would be diminished.

5.2.14 Approximately 600 recreational cottage sites have been leased to private individuals on project lands. These cottage site leases will expire in 1988 and will not be extended. Other sites on project lands have been leased for various commercial, public, recreational, and other purposes. Prescriptions were made by timber stand type for all the wooded areas in each pool. Management prescriptions were based on the condition of the forestry resource in each area and the objectives of this plan. On many areas, especially in the case of the cottage lease sites, the management prescriptions will not be implemented at this time. However, when the leases expire and are not renewed, management prescriptions will be implemented. Openings at vacated lease sites and cover types 53 and 52 will be revegetated through natural succession or planting.

5.2.15 Often eroded soil sediments, primarily from agricultural land in the basin, are carried to the Mississippi River by its tributaries, then by the river as it flows to the Gulf of Mexico. When the river current slows, especially in backwaters and sloughs, the sediments fall out of suspension and are deposited on the riverbed. This process, sedimentation, gradually fills in the backwaters and sloughs, creating more shallow water and marshes, then mud flats, until the process reaches its culmination in dry land. Flushing action during high water may reverse the action temporarily in a few wetland areas, but the heavy load of sediments gradually fills in even the sloughs and backwaters that may be flushed out during floods. Shallow waters created by the deposition may temporarily increase the spawning habitat for fish and amphibians and resting habitat for migrating waterfowl. However, the overall quality of habitat available to fish and wildlife is greatly reduced. Sedimentation converts deeper aquatic habitat to shallow wetland, and shallow wetland to dry land, reducing the habitat available for wildlife that use those areas, especially migrating waterfowl. More shallow water eliminates the aquatic habitat for many juvenile and mature fish populations, because many of these fish species need deeper aquatic habitat.

5.2.16 The heavier suspended materials are often deposited in the main channel of the river when, for instance, the current slows or another

tributary enters the Mississippi River. In order to maintain the navigation channel, vital to the efficient bulk transport of commodities, dredging is necessary to remove the material deposited by the river. That presents a problem of where to put the material dredged from the river. The dredge material is a sterile sand in which vegetation takes a long period, perhaps several decades, to become reestablished. Deposition of the material reduces the quality of wildlife habitat by eliminating the habitat present at the disposal site before the material is put there. Additionally, the quality of wildlife habitat is reduced to practically nothing at the dredge site. Placing the dredge material on the shoreline of bottom land areas has created recreational beaches. However, this practice creates a much greater problem for wildlife by burying terrestrial and aquatic life and sterilizing a biologically productive area. Another possible problem with the dredged material is that it may not stay at the disposal site. Subsequent floods may resuspend the material that may then settle out and close side channels and sloughs to backwater areas or settle again in the main channel.

5.2.17 The water level of the Mississippi River changes during spring thaw, heavy rains, or drought. Before the levees were built, the Mississippi River could spread out onto wide flood plains after a heavy snowmelt upriver or heavy rains, but often was reduced to a trickle at the rapids at Rock Island during droughts. With the building of levees to contain the flooding, spring thaws and heavy rains produced a higher and swifter water level. Then in the late 1930's and early 1940's, locks and dams were constructed to maintain a minimum nine-foot channel so transportation of goods could continue at all times except when the river was frozen. The locks and dams created vast, relatively stable backwater areas that replaced seasonally flooded marshes, bogs, and lowlands. This enhanced fishery and wildlife productivity. However, the fluctuations of pool levels have created a host of wildlife problems including nest exposure or inundation at critical times and an inconsistent littoral zone.

Additionally, wooded areas are subjected to more frequent and larger flooding. Consequently, plants in the understory of the forests that are less tolerant of inundation are much less common or nonexistent. Unfortunately, these plants were replaced by wood nettle and other plants less valuable to wildlife as food and shelter.

5.2.18 Development of the river, its flood plain, and shores by man has its own impact on fish and wildlife resources. As man uses the river, flood plain and shoreline areas are developed for agricultural, industrial, recreational, and residential use. As this process proceeds, whether by small or large acreages, fish and wildlife habitat is lost. Increased erosion as a result of land disturbance and intensive agriculture increases the problems of sedimentation, discussed earlier, and water pollution from agricultural chemicals. Additionally, commercial towboat operation and recreational boat use on the river produce a propwash that induces turbidity and shoreline erosion. Unfortunately, the resuspended material again settles out in the process of sedimentation, covering and eliminating benthic communities, fish spawning grounds, and mussel beds.

5.2.19 Barge fleeting impacts the aquatic habitat. Both the barge bottoms and propwash of the towboats disturb or destroy the mussels and other benthic organisms. Because of a complex life cycle and immobility, mussels are most vulnerable to this disturbance. Additionally, large trees can be girdled and killed or uprooted by cables that secure the barges to the shore. Barge fleeting interferes with many of the recreational pursuits of people living along the Mississippi River. Many hunting and fishing sites are usurped by barge fleeting. The fleeting areas interfere with the use and enjoyment of adjacent park and wildlife refuge areas, and may block public access to the river for boating and other recreational pursuits.

5.3 Inventory Methodology.

In formulating this forestry plan, it was decided that an inventory would be needed to furnish information to properly evaluate the forestry resource. After careful consideration and completion of sampling two test areas, we decided to use the Illinois Forest Inventory Data Processing System. The system produced forestry and wildlife data useful in writing a sound forest management plan, however it may not reflect diversity of woodland characters in total and stand characters specifically. Future stand mapping will alleviate these shortcomings.

It was decided that we would inventory various areas in each pool as independent units with the exception of Pools 13 and 14, which were inventoried as a unit. Fish and wildlife resources are managed on different areas in several pools by the Iowa Conservation Commission, Illinois Department of Conservation, Missouri Department of Conservation, or the US Fish and Wildlife Service. It was decided that an inventory of separate areas in each pool would give better data to use in writing the management plan for each pool. Each area was also delineated based on geographical location and inventory logistics. Next, we decided to sample to a statistical accuracy of $\pm$30% with a confidence level of two standard deviations and a minimum stand variability of 60% uniformity in each area (or pool). These two values gave the number of points (plots) in each area (or pool) to be sampled to give an adequate inventory. With the exception of Pool 16, where transects ran east and west, all transects ran north-south. Uniform systematic point spacings on transect lines were selected to provide an adequate sample in each unit (pool). Systematic sampling allowed a statistical analysis to be developed for each area or pool sampled.

Data was then collected using a 10 BAF prism which indicates the appropriate trees to measure at each point. At each point, measurements were taken of tree height, diameter, and volume; as well as indicating dens, squirrel nests, or other wildlife characteristics of each tree measured.

Inventory of Pool 22 was completed in the late fall of 1978. That following winter, C. Hardzinki, then refuge forester for the US Fish and Wildlife Service, completed an inventory of Pool 13. The remaining Pools 11-14, 16-18, and 21 took from July to December of 1979 for their completion.

After collecting the data, it was checked for errors and key punched on standard key punch cards. A computer then processed the data and produced concise organized printouts of inventory information. Some important inventory information is subsequently documented in the addendum for each pool, including the wildlife data collected during the inventories.

Each pool addendum contains wildlife-related inventory data to be used in making site specific management decisions on the Mississippi River project lands. The inventory system classifies various trees in a particular stand relative to its condition as it provides wildlife food and cover. The following tree condition classes are represented:

Class 1-4	Tree form class in relation to wood quality (not represented)
Class 5	Upper cavity
Class 6	Lower cavity
Class 7	Standing dead tree
Class 8	Leaf nest
Class 9	Grapevine
Class 10	Mast tree and mast production

6. IMPLEMENTATION OF PLANS

6.1 Organization and Responsibility.

6.1.1 The Recreation Resource Management Branch, Operations Division was responsible for preparation of the Forest Management Appendix and Fish and Wildlife Appendix to the Master Plan. Preparation of the Appendices was done in cooperation with the Environmental Analysis Section, Planning and Reports Branch - Engineering Division. The Recreation Resource Management Branch - Operations Division is responsible for implementing the plan and updating it as necessary. The updating of the plan every 5 years and subsequent timber inventories performed every 10 years will be coordinated with Environmental Analysis Section, Planning Branch.

6.1.2 Appropriate ranger field offices, located at L/D 14, Dubuque, Iowa; L/D 13, Fulton, Illinois; L/D 16, Muscatine, Iowa; L/D 21, Quincy, Illinois; in coordination with appropriate Corps foresters, will implement this plan within existing Corps public use areas. The field station will be responsible for:

* Preparation of all vegetative management work plans.

* Supervision of all contracts dealing with vegetative management such as grass mowing, but excluding timber management.

* Maintenance of accurate records on materials, equipment, and labor costs involved in carrying out work plans.

Additionally, ranger field stations are charged with the inspection of all lands to insure that timber trespass and encroachments do not occur. Corps rangers will assist in onsite timber sale contractual compliance inspection.

6.2 Annual Management Plans.

6.2.1 Appropriate ranger field offices will prepare annual management plans on all Corps public use areas, coordinating their preparation with appropriate Corps project and District elements. These plans will detail ground work needed to implement management plans. These work plans will include the materials needed, man-hours to be used, costs, layout maps or drawings, dates for starting and completing the work, establishing priorities for use of funds which are made available, etc. Completed annual management plans for the next fiscal year will be forwarded to the park manager for approval prior to its implementation. The Corps park manager or the designated ranger field offices will be responsible for implementation of the approved work plans, with the input of Corps district forestry personnel, and other Federal and State personnel as directed in this plan. Any harvests, thinnings, improvement cuts, or timber stand improvements will be marked by Corps foresters. Cutting timber will be done internally or contracted to commercial logging crews.

6.2.2 Annual plans for all project forest lands will be prepared each year. The specific prescriptions and locations where they will be implemented will be determined based on funds, logistics, manpower, and resource need. The annual forest management plans will be prepared by the Corps foresters with additional support from the Mississippi Project Office. Any plans which involve Cooperative Agreement lands will be coordinated at an annual meeting with the US Fish and Wildlife Service and appropriate state agencies. The US Fish and Wildlife Service and the appropriate state agencies will have an additional 45 days to comment on the annual plans. After this comment period, the annual plan will be implemented. During this annual meeting, changes in management prescriptions may be discussed. However, under normal circumstances, changes will usually not be made until the management plan is updated in five years. The work plans will include the materials needed, man-hours to be used, costs, layout maps or drawings, dates for starting and completing the work, establishing priorities for use of funds which are made available, etc. Completed annual management plans for the next fiscal year will be forwarded by the Corps foresters to the park manager for approval prior to its implementation. The Corps foresters supervise the implementation of the approved work plans with the input and assistance of Mississippi River Project Office, ranger field stations, and other Federal and State personnel as directed in this plan. Any harvests, thinnings, improvement cuts, or timber stand improvements will be marked by the Corps foresters. Cutting timber will be done internally or contracted to commercial logging crews.

6.3 Management Prescriptions.

In Addendum 1, the specific forestry and fish and wildlife practices that will be prescribed in the plan are listed and explained. These practices will be applied on a "management" unit basis as explained in Addendum 1. The forestry and fish and wildlife individual prescriptions will be presented pool by pool in succeeding Addendums.

Under the Cooperative Agreement, management of the fish and wildlife resources on the majority of project land is the responsibility of the US Fish and Wildlife Service or appropriate state agencies. For Cooperative Agreement lands in each pool, the managing agency sends annual management plans to the Corps district office. Now, as in the past, these plans will constitute the wildlife management plan for that area with our approval. This management plan is to be used as a guide for all project woodlands in the Rock Island District. It is written in cooperation with the US Fish and Wildlife Service and concerned state forestry and fish and wildlife Management agencies. This plan is based on sound forest management principles that will provide diverse woodlands to produce general and specialized wildlife habitat, recreational opportunities, and fiber. Woody vegetative management practices prescribed should not be superceded, however, during the interim years between scheduled five-year updates, it is realized that wildlife species habitat and/or management goals may change. Additionally, various agents of change, both biotic and abiotic, have the potential of badly damaging forested areas. In the event of such unpredictable changes, prescriptions may be changed during the annual coordination meeting, or thereafter if specially approved in writing by the Corps. Changes will be approved only in keeping with sound biological and silvicultural practices.

The Annual Wildlife Management Plans submitted by the managing agencies for Cooperative Agreement lands may prescribe certain timber management practices to be performed by the manager's agency in order to enhance wildlife management. Any such plans will be reviewed by the Corps for inclusion into the Corps annual forestry plan.

6.4 Management Priority.

6.4.1 A priority list is included in the addendum for each pool. The area most needing attention and the silvicultural practice(s) is listed as item A, the area and silvicultural practice(s) next needing attention as item B, etc.

This priority list has been included to indicate those areas where silvicultural practices need to be implemented the most based on resource need. However, monetary and budgetary constraints may limit funding necessary to fully implement this plan over the next five-year period. In this case, the priority list should be checked and those silvicultural practices should be given priority over any other prescriptions included in the plan. Because the priority items in the appendices are listed based on resource need, they should, even under normal operating procedure, be implemented in the order they are listed. First priority in any pool (addendum) is to type map the entire management unit in which a practice will be implemented. For example, in Addendum 22 in the Ward Island management unit, the clear cutting (harvesting) of small areas and planting suitable higher areas have been discussed. The entire management area will be stand mapped to determine the best locations to implement the practices.

6.4.2 Money budgeted for forest management will be allotted to implement the prescriptions in the addendums to this appendix. If the opportunity

occurs to implement a silvicultural prescription, it will be taken, however, prescriptions should be implemented in the order they are listed.

6.5 Timber Sales and Inspection.

6.5.1 The Corps of Engineers Real Estate Division will handle timber sale and contractural silvicultural operations after the timber is marked and the total volume and minimum bid is determined. Real Estate Division and the Corps foresters will handle contract compliance inspection and contract supervision. Measuring and marking of timber on Cooperative Agreement lands will be done in coordination with the US Fish and Wildlife Service, or appropriate state management agency, by the Corps foresters. The Corps foresters will determine total volume and minimum bid. After a bid is accepted, the contractor, appropriate Corps personnel, and if Cooperative Agreement lands are involved, representatives from the US Fish and Wildlife Service, and/or the appropriate state agency will meet onsite to discuss the contractual obligations as they are applied to the site.

6.5.2 Inspections, as well as fines and/or penalties for incomplete compliance with the contract, will be necessary to insure maximum benefit from all silvicultural operations contracted out.

6.6 Cost of Plan Implementation.

6.6.1 Due to the potential cost variability of this forestry plan relative to economic conditions, forest products marketability, logging access, environmental fluctuations, and other extrinsic factors, a total implementation cost of this plan cannot be reasonably assessed. Also, a forest management plan is characteristically administered over several years to provide a well-regulated forest ecosystem for indefinite existence. The cost breakdowns described per pool represent the expense incurred by the Corps if all forest management prescriptions proposed were completed at one point in time by Corps personnel in that pool. This, however, is not the case. Resource need is the major factor involved in determining time and location for funding apportionment. Available funds will generally be applied to those units in order as stated in the priority lists; however, annual coordination meetings will provide useful information and updated additions or deletions to this list.

6.6.2 Initially, costs for most of the silvicultural prescriptions in the appendix will have to be financed through a line item in the fiscal year budget. Upgrading of the timber resource through thinning, improvement cuts, timber stand improvement, and planting will be priority items. However, when timber is harvested in the future, a percentage of the sales recripts will be invested back into the resource. The line item in the budget could then be set at a minimal amount.

6.6.3 As a guide to establishing and funding an active resource management plan on the Mississippi River, the approximate cost of implementing the forestry and fish and wildlife management prescriptions over the initial five-year period were estimated. For each silvicultural practice the approximate acreage to which it will be applied was totaled. The total

cost per silvicultural practice was then computed, and the total cost per pool determined. This data is listed in tabular form in the addendum for each pool. As the price of fuel increases, so does the demand for firewood for homes, and fuel chips for industry. This could result in improved cost effectiveness for commercial logging operations and would ultimately result in increased feasibility of silvicultural improvement cutting on the Mississippi River flood plain. Also, other practices may be done by logging contractors when they harvest timber in the same area, thus reducing projected costs. As an example, a harvest contract might provide for the harvest of some mature timber, the thinning of an overstocked pin oak stand (increasing mast production), and disking of an area of cucumber vines.

The cost of applying each silvicultural practice was computed as an approximate figure. Cost breakdowns are based on past Corps silvicultural operations on recreation areas, input from other sources such as Illinois Department of conservation and the Iowa Conservation Commission, and based on the premise all silvicultural practices except harvesting will be done by Corps personnel. Costs will be updated annually to allow for economic influences. The cost per silvicultural practice per acre is as follows:

Practice	Costs/Acre
Thinning	$150
Improvement Cutting	$150
Timber Stand Improvement	$ 30
Monitoring	$ 15
Planting	$ 50
Harvesting	$ 60
Site Preparation	$110
Type Mapping	$ 2

The costs are approximate figures. All costs for thinning and improvement cuttings were figured assuming Corps personnel would mark and cut the trees. The downed timber would be left in the woods, used as wildlife cover, or used by the public for firewood. Local or regional timber markets and silvicultural considerations could make some commercial thinning and improvement cutting practical. This could reduce the cost for those silvicultural practices. However, the prescription will be implemented based on silvicultural considerations, not economic reasons.

7. RELATED PROGRAMS.

7.1 Hunting and Hunter Control.

In general, hunting is permitted on project land and water areas and is regulated by the appropriate State conservation agencies. The primary exception is those Cooperative Agreement lands which are designated as wildlife refuges. In the refuges, the US Fish and Wildlife Service or the appropriate state agency determines which State regulated seasons can be permitted in the refuge areas without conflicting with the species targeted for protection. In general, any hunting season which coincides

with the time of waterfowl migration is not permitted within the confines of the refuge. Other non-hunting areas are located in the vicinity of the lock and dam structures and within 300 feet of any developed recreation area. All non-hunting areas will be adequately posted as such.

7.2 Vector Control.

Control of insects or other organisms that transmit pathogens will be implemented upon documented need as determined by state or local public health departments. All vector control measures will be coordinated with the respective health departments prior to implementation. Licensed commercial pesticide applicators will be utilized for vector control measures.

7.3 Pest Control.

7.3.1 All uses of pesticides are reviewed by the Corps District Pesticide Officer and submitted to the North Central Division for approval prior to use. Mechanical or physical control of pests is used when practical. Pesticide selection is based on effectiveness, toxicity, safety to the applicator, and other relevant environmental considerations.

7.3.2 Burrowing mammals such as groundhogs (Marmota monax) and muskrat (Ondatra zibethica) may significantly affect the integrity of flood control levees or lock and dam structures. If burrows create a structural problem, either mechanical trapping or suffocant gas bombs will be used. The gas bombs may be obtained from the US Fish and Wildlife Service.

7.3.3 Pigeon and starling control on the lock and dam structures has become necessary due to the health and safety factor caused by the large amount of bird droppings. Use of food bait treated with the chemical Avitrol has proven both safe and effective. When ingested by a bird, Avitrol produces a nervous muscular reaction which frightens the entire flock away. In most cases, the affected bird will survive. When ingested, the chemcial breaks down and therefore does not affect secondary non-target host species.

7.4 Endangered and Threatened Species.

7.4.1 According to the Federal Register containing a list of Endangered and Threatened Wildlife and Plants (17 January 1979), the following endangered and/or threatened species may be found within the project area:

American Peregrine Falcon (Falco peregrinus anatum)
Artic Peregrine Falcon (Falco peregrinus tundrius)
Bald Eagle (Haliaeetus leucocephalus)
Higgin's Eye Pearly Mussel (Lampsilis higginsii)
Indiana Bat (Myotis sodalis)
Gray Bat (Myotis grisescens)

7.4.2 Numerous state listed endangered or threatened species and some other federally listed species may be present within the study area, but they have not been identified, as yet.

7.4.3 Research on the occurrence and habitat needs of the endangered species is being carried on by the US Fish and Wildlife Service and the US Army Corps of Engineers, Rock Island District. Some good vegetative and wildlife management programs will aid many of the species. As knowledge of endangered and threatened wildlife in the area evolves, we will alter our management practices as indicated. Before we implement any practices, we will consult with the endangered species office of the US Fish and Wildlife service, as described in Section 8.2.

8. COORDINATION.

8.1 Management Plan Coordination.

Coordination of the Forestry and Fish and Wildlife Appendices for Pools 11-14, 16-18, 21, and 22 was begun early and is a continuing process. In preliminary meetings with the US Fish and Wildlife Service, the Missouri Department of Conservation, the Iowa Conservation Commission, and the Illinois Department of Conservation, it became evident that an inventory of present resources was necessary before a management plan could be written. The US Fish and Wildlife Service and the appropriate state agencies were invited to participate in the inventory. The inventories were completed in late 1979. Then computer printout tabulations of the data were distributed to the Illinois Department of Conservation, Iowa Conservation Commission, Missouri Department of Conservation, and the US Fish and Wildlife Service. Informal coordination with state agencies and the US Fish and Wildlife Service was begun with the resource inventories and will be continued as the management plan is developed and implemented. A draft of the Forestry and Fish and Wildlife Appendices to the Master Plan for Pools 11-14, 16-18, 21, and 22 was completed and distributed to the US Fish and Wildlife Service, Iowa Conservation Commission, Illinois Department of Conservation, Missouri Department of Conservation, and Wisconsin Department of Natural Resources. Later, at formal conferences, type maps were refined and management unit prescriptions discussed and finalized. Informal response to the draft plan was requested. After all comments are received, a final draft and environmental assessment are prepared and distributed. After comments are received on the final draft, the final document is prepared, approved, and implemented. Coordination with the US Fish and Wildlife Service and the states that we initiated at the beginning of writing this management plan will continue as the plan is implemented.

8.2 Continuing Annual Coordination.

Coordination will be done at annual meetings between the Rock Island District and the US Fish and Wildlife Service, and appropriate state agencies. Endangered species consultation, cultural resources coordination, and any water quality 404 coordination will be done after the meeting when the prescriptions to be implemented and the location at which they will be located have been selected. The first year after approval of this document, some coordination may have to be done individually with the US Fish and Wildlife Service and appropriate state agencies until the timing of the coordination meeting has been worked out.

A copy of the annual management plan in regards to cultural resources will be submitted to the State Historic Preservation Officer for review and comment prior to the implementation of any practices on specific sites. The management units and practices are small enough and simple enough that changes in implementation procedures can be accommodated.

9. LITERATURE CITED.

Environmental Impact Statement for the 9-foot navigation channel project; Environmental Analysis Section, Planning Branch, Rock Island District Corps of Engineers.

Recreation Use Projections and Needs Report; Recreation Work Group, GREAT II; Don Brazelton, Chairman.

Inventory Computer Printout Summaries, 1979 Inventory.

Fish and Wildlife Management Work Group Appendix, GREAT II, Final Report, December 1980.

TABLE 1

MAMMALS OF THE UPPER MISSISSIPPI

Common Name	Scientific Name	Region: Pools 11-15	Region: Pools 16-22
Virginia opossum	Didelphis marsupialis	C	C
Masked shrew	Sorex cincercus	C	U
Short-tailed shrew	Blarina brevicauda	C	C
Least shrew	Cryptotis parva	C	C
Eastern mole	Scalopus aquaticus	C	C
Starnose mole	Condylura cirstata	R	
Little brown bat	Myotis lucifugus	C	C
Keen's bat	Myotis keenii	C	R
Eastern pipistrel (bat)	Pipistrellus subflavus	U	U
Big brown bat	Eptesicus fusucs	C	C
Red bat	Lasiurus borealis	C	C
Hoary bat	Lasiurus cinereus	R	R
Indiana bat	Myotis sodalis	D	D
White-tailed jackrabbit	Lepus townsendii	R	
Eastern cottontail rabbit	Sylvilagus floridanus	C	C
Woodchuck	Marmota monax	C	C
Thirteen-lined ground squirrel	Citellus tridecemlineatus	C	R
Franklin's ground squirrel	Citellus franklinii	R	R
Eastern Chipmunk	Tamias straitus	C	C
Eastern gray squirrel	Sciurus carolinensis	C	C
Eastern fox squirrel	Sciurus niger	C	C
Red squirrel	Tamiasciurus hudsonicus	C	U or R
Southern flying squirrel	Glaucomys volans	C	R
Plains pocket gopher	Geomys bursarius	C	C
Beaver	Castor canadensis	C	C
Western harvest mouse	Reithrodontomys megalotis	U	U
Deer mouse	Peromyscus maniculatus	C	C
White-footed mouse	Peromyscus leucopus	C	C
Prairie white-footed mouse	Peromyscus maniculatus		C
Eastern wood rat	Neotoma floridana		R
Black rat	Battus rattus	C	C
Meadow vole	Microtus pennsylvanicus	C	
Prairie vole	Pedomys ochrogaster	C	C
Pine vole	Pitymys pinetorum	C	
Muskrat	Ondtra zibethicus	C	C
Norway rat	Rattus norvegicus	C	C
House mouse	Mus musculus	C	C
Meadow jumping mouse	Zapus hudsonius	C	R
Nutria	Myocaster coypus	R	
Coyote	Canis latrans	U	C
Red fox	Vulpes fulva	C	C
Gray fox	Urocyon cinereoargenteus	C	C
Raccoon	Procyon lotor	C	C

(Letter Key at End of Table)

Common Name	Scientific Name	Region Pools 11-15	Region Pools 16-22
Least weasel	Hustela rixosa	U	
Mink	Mustela vison	U	C
Badger	Taxidea taxus	U	R
Spotted skunk	Spilogale putorius	C	R
Striped skunk	Mephitis mephitis	C	C
River otter	Lutra canadensis	R	R
Lynx	Lynx canadensis	R	
Bobcat	Lynx rufus	R	R
White-tail deer	Odocoileus virginianus	C	C
Silver-haired bat	Lasionycteris noctivagans		C

Source: Upper Mississippi River Wildlife and Fish Refuge, Winona, Minnesota.
Mark Twain National Wildlife Refuge, Quincy, Illinois.

Key: C - Common
U - Uncommon
R - Rare
D - Endangered

No letter indicates that a particular species has not been recorded.

TABLE 2

BIRD SPECIES OF THE REGION

Common Name	Scientific Name	Region							
		Pools 11-15				Pools 16-22			
		Sp	Su	F	W	Sp	Su	F	W
Turkey	Meleagris gallopavo					U	U	U	U
Osprey	Pandion haliaetus	O	O	O	O	U		U	
Peregrine falcon*	Falco peregrinus	R	R	R		O			
Pigeon hawk	Falco columbrius	R		R					
Sparrow hawk	Falco sparverius	O	O	O	R	C	C	C	U
Ruffed grouse*	Bonasa umbellus	C	C	C	C				
Greater prairie chicken	Tympanuchus cupiod				R				
Sharp-tailed grouse	Pedioecetes phasianellus								
Bobwhite*	Colinus virginianus	O	O	O	O	C	C	C	C
Ring-necked pheasant*	Phasianus colchicus	C	C	C	C	O	O	O	O
Gray partiridge	Perdix perdix	O	O	O	O				
King rail*	Rallus elegans	U	U			O			
Virginia rail*	Rallus limicola	U	U	O		U			
Sora*	Porzana carolina	A	A	C		C	U	C	
Common gallinule*	Ballinula chloropus	R	R			-	O	O	-
American coot*	Fulica amricana	A	C	A	R	C	U	A	U
Semipalmated plover	Charadrius semipalmatus	C	O	C				U	
Killdeer*	Charadrius vociferus	C	C	C	R	C	C	C	O
American golden plover	Pluvialis dominica	O		U		U			
Black-bellied plover	Squatarola aquatarola	O	O			C			O
Ruddy turnstone	Arenaria interpres	R							
American woodcock	Philohela minor	R	R	R		C	C	C	
Common snipe	Capella gallinago	C	O	C	R	C		C	O
Long-pilled curlew	Numenius americanus			R					
Upland plover	Bartramia longicauda	O	O			O			
Spotted sandpiper*	Actitis macularia	C	C	C		C	C	C	
Solitary sandpiper	Fringa solitaria	C		C		C	C	C	
Willet	Catoptrophorus semipalmatus	R		R		R			
Greater Yellowlegs	Totanus melanoleucus	U		U		C	C	C	
Lesser yellowlegs	Totanus flavipes	A	O	A		C	C	C	
Pectoral sandpiper	Erolia melanotos	O	O	O		C	C	C	
White-rumped sandpiper	Erolia fuscicollis	O		O					
Baird sandpiper	Erolia bairdii	O	O	O					
Least sandpiper	Erolia minutilla	C	O	C		C	C	C	
Dunlin	Erolia alpina	O	O	O				U	
Long-billed dowitcher	Limnodromus scolopaceus	O		O				U	
Stilt sandpiper	Micropalama himantopus	O	O	O				U	
Western sandpiper	Ereunetes mauri						U		
Semipalmated sandpiper	Ereunetes pusillus	C	C	C			U	U	
Sanderling	Crocethia alba	O	O	O					
Wilson's phalarope	Steganopus tricolor	O	O	O					O
Northern phalarope	Lobipes lobatus	O		O					
American avocet	Recurvirostra americana								R
Herring gull	Larus argentatus	C	O	C	U	U		U	C

(Letter Key at End of Table)

Common Name	Scientific Name	Region							
		Pools 11-15				Pools 16-22			
		Sp	Su	F	W	Sp	Su	F	W
Ring-billed gull	Larus delawarensis	C	O	C	U	C		C	C
Franklin's gull	Larus pipixcan	O		O		O		O	
Bonaparte's gull	Larus philadelphia	U		U		R		R	
Forster's tern	Sterna forsteri	C	O	C		U		U	
Common tern	Sterna hirundo	C	O	C		O		O	
Least tern	Sterna albifrons	O	O	O				O	
Capian tern	Hydroprogne caspia	O		O		U	O	U	
Black tern*	Chlidonias niger	O	O	O		O		U	
Mourning dove*	Zenaidura macroura	C	C	C	O	C	C	C	U
Yellow-billed cuckoo*	Coccyzus americanus	C	C			C	C	C	
Black-billed cuckoo*	Coccyzus erythropthalmus	C	C			R		R	
Screech owl*	Otus asio	C	C	C	C	C	C	C	C
Great horned owl*	Bubo virginianus	C	C	C	C	C	C	C	C
Snowy owl	Nyctea scandiaca				O				R
Barred owl*	Strix varia	C	C	C	C	C	C	C	C
Common loon	Gavia immer	R		R					O
Red-necked grebe	Podiceps grisegena	R		R					
Norned grebe	Podiceps auritus	R		R				O	O
Pied billed grebe*	Podilymbus podiceps	C	C	C		C	U	C	U
White pelican	Pelecanus erythrorhynchus	O		O				R	
Double-crested cormorant*	Phalacrocorax auritus	C	C	C		C		C	
Great blue heron*	Ardea herodias	C	C	C	R	C	C	C	C
Green heron*	Butorides virenscens	C	C	C		C	C	C	
Little blue heron	Florida caerulea		R			U	C	C	
Common egret*	Casmerodius albus	C	C	O		C	C	C	
Snowy egret	Leucophoyx thula	R	R				U		
Cattle egret	Bubulcus ibis					R			
Black-crowned night heron*	Nycticorax nycticorax	C	C	C		C	U	U	
Yellow-crowned night heron*	Nyctanassa violacea	U	U	U		U	U	U	
Least bittern*	Ixobrychus exilis	O	O	O		U	U		
American bittern*	Botaurus lentiginosus	C	C	C		U	R	U	
Whistling swan	Olor columbianus	C		C		O		R	
Canada goose*	Branta canadensis	C	O	C	O	C		C	C
White-fronted goose	Anser albifrons	R		R		U		U	O
Snow goose	Chen hyperborea	C		C		C		C	C
Blue goose	Chen caerulescens	C		C		C		C	C
Mallard*	Anas platyrhynchos	A	C	A	C	C	C	A	A
Black duck*	Anas rubripes	C	O	C	O	C		C	C
Gadwall	Anas strepera	C		C		C		C	O
Pintail	Anas acuta	A	R	A	R	C		A	C
Green-winged teal*	Anas carolinensis	C	R	C	R	C	U	C	U
Blue-winged teal*	Anas discors	A	U	A		C	U	C	
American widgeon	Mareca americana	A		A		C		C	U
Shoveler	Spatula clypeata	C		C		C		C	U
Wood duck*	Aix sponsa	C	C	C		C	A	A	O
Redhead	Aythya americana	C	O	C	R	U		U	U
Ring-necked duck	Aythya collaris	A		A	R	C		C	C

Common Name	Scientific Name	Region							
		Pools 11-15				Pools 16-22			
		Sp	Su	F	W	Sp	Su	F	W
Canvasback	Aythya valisneria	C		C	R	U		U	C
Greater scaup	Aythya marila	U		U		O		O	O
Lesser scaup	Aythya affinis	A	R	A	R	A		C	C
Common goldeneye	Bucephala clangula	C		C	O	U		U	C
Bufflehead	Bucephala albeola	O		O	R	U		U	U
Oldsquaw	Clangula hyemalis	R		R	R			O	
White-winged scoter	Melanitta fusca	R		R	R				
Common scoter	Oidemia nigra			R	R				
Ruddy duck	Oxyura jamaicensis	C	R	C		A		C	U
Hooded merganser*	Lophodytes cucullatus	C	O	C	R	U	U	U	U
Common merganser	Mergus merganser	C		C		U		U	A
Red-breasted merganser	Mergus serrator	R		R	R	U		U	
Turkey vulture	Cathartes aura	O	O	O	R	C	C	O	
Goshawk	Accipiter gentilis				O			O	
Sharp-skinned hawk	Accipiter striatus	U	U	U	O	U	U	U	U
Cooper's hawk*	Accipiter cooperii	U	U	U	O	O	O	O	O
Red-tailed hawk*	Buteo jamaicensis	C	C	C	C	C	C	C	C
Red-shouldered hawk	Buteo lineatus	O	O	O	U	U	U	U	U
Broad-winged hawk*	Buteo platypterus	O	O			O	O	O	
Rough-legged hawk	Buteo lagopus			O	O			O	O
Golden eagle	Aquila chrysaetos	R		R	R				R
Bald eagle*	Haliaeetus leucocephalus	O	O	O	C	U		U	C
Marsh hawk*	Circus cyaneous	C	C	C	O	U		C	C
Harlan's hawk	Buteo harlani					R			R
Water pipit	Anthus spinoletta					O			
Bohemian waxwing	Bombycilla garrulus				O				
Cedar waxwing*	Bombycilla cedrorum	C	C	C	O	U	U	U	U
Northern shrike	Lanius excubitor			O	O				
Loggerhead shrike	Lanius ludovicianus	C	C	C		O	O	O	O
Starling*	Sturnus vulgaris	A	A	A	A	C	C	C	C
White-eyed vireo*	Vireo griseus	C	C			C	C	C	
Bell's vireo*	Vireo bellii	U	U						
Yellow-throated vireo*	Vireo flavifrons	C	C	C		U			
Solitary vireo	Vireo solitarius	O		O					
Red-eyed vireo*	Vireo olivaceus	C	C	O		C	C	C	
Warbling vireo*	Vireo gilvus	A	A	O		C	C		
Black-and-white warbler	Mniotilta varia	C		C		U		U	
Prothonotary warbler*	Protonotaria citrea	C	C			C	C	C	
Blue-winged warbler*	Vermivora pinus	O	O						
Golden-winged warbler	Vermivora chrysoptera	O	O			O			O
Tennessee warbler	Vermivora peregrina	C		C		U		U	
Orange-crowned warbler	Vernivora celata	O		O		U		U	
Nashville warbler	Vernivora ruficapilla	O		O		U		U	
Parula warbler	Parula americana	R		R		U	U		
Yellow warbler*	Dendrocia petechia	A	A	O		U	U	U	
Magnolia warbler	Dendroica magnolia	C		C		U			
Cape May warbler	Dendroica tigrina	O		O					
Black-throated blue warbler	Dendroica caerulescens	A		A					

Common Name	Scientific Name	Region: Pools 11-15 Sp	Su	F	W	Pools 16-22 Sp	Su	F	W
Cerulean warbler	Dendroica cerulea	R				U	U		
Blackburnian warbler	Dendrocia fusca	C		C					
Chestnut-sided warbler	Dendroica pennsylvanica	O		O		U		U	
Bay-breasted warbler	Dendroica castanea	O		O					
Blackpoll warbler	Dendroica striata	C		C		U			
Pine warbler	Dendroica pinus	O		O					
Palm warbler	Dendroica palmarum	C		C		U			
Ovenbird	Seiurus aurocapillus	O	O	O				U	
Northern waterthrush	Sieurus noveboracensis	C		C		C		U	
Louisiana waterthrush	Seiurus motacilla	O	O	O					U
Kentucky warbler	Oporornis formosus	R	R			U	U	U	
Connecticut warbler	Oporornis agilis	R		R					
Mourning warbler	Oporornis philadelphia	O		O					
Yellowthroat*	Geothlypis trichas	A	A	O		C	C	C	
Yellow-breated chat	Icteria virens	R	R			U	U	U	
Hooded warbler	Wilsonia citrina	R	R						
Wilson's warbler	Wilsonia pusilla	C		C		U			
Canada warbler	Wilsonia canadensis	C		C				U	
Worm-eating warbler	Helmitheros vermivorus							U	
Yellow-throated warbler	Dendroica dominica					O			
American redstart*	Setophaga ruticilla	A	A	O		C	C	C	
House sparrow*	Passer domesticus	A	A	A	A	C	C	C	C
Bobolink*	Dolichonyx oryzivorus	O	O	O		U			
Eastern meadowlark*	Sturnella magna	C	C	C	O	C	C	C	U
Western meadowlark*	Sturnella neglecta	O	O	O	O				
Yellow-headed blackbird*	Zanthocephalus xanthocephalus	O	O	O					
Red-winged blackbird*	Aglaius phoeniceus	A	A	A	O	A	A	A	C
Orchard oriole*	Icterus spurius	U	U			U	U		
Baltimore oriole*	Icterus galbula	C	C			C	C		
Rusty blackbird	Euphagus carolinus	C		C	O	U		U	
Brewer's blackbird	Euphagus cyanocephalus	U	O	U	R				R
Common grackle*	Quiscalus quiscula	A	A	A	U	A	A	A	C
Brown-headed cowbird*	Molothrus ater	A	A	A		C	C	C	
Scarlet tanager*	Piranga olivacea	O	O	O		C	C	C	
Cardinal*	Richmondena cardinalis	C	C	C	C	C	C	C	C
Long-eared owl	Asio otus	U	U	U	U				O
Short-eared owl	Asio flammeus	U	U	U	U				O
Saw-whet owl*	Aegolius acadicus	U	U	U	U				
Chuck-will's-widow	Caprimulgus carolinensis					O			
Whip-poor-will*	Caprimulgus vociferus	C	C			C	C		
Common nighthawk*	Chordeiles minor	A	A	O		O	O	O	
Chimney swift	Chaetura pelagica	A	A			C	C	C	
Ruby-throated hummingbird*	Archilochus colubris	C	C				C		
Belted kingfisher*	Megaceryle alcyon	C	C	O	U	C	C	C	O
Yellow-shafter flicker*	Colaptes auratus	C	C	C	U	C	C	C	C
Pileated woodpecker*	Dryocopus pileatus	O	O	O	O	C	C	C	C
Red-bellied woodpecker*	Centurus carolinus	C	C	C	C	C	C	C	C
Red-headed woodpecker*	Melanerpes erythrocephalus	C	C	C	R	C	C	C	C

Common Name	Scientific Name	Region							
		Pools 11-15				Pools 16-22			
		Sp	Su	F	W	Sp	Su	F	W
Yellow-bellied sapsucker	Sphyrapicus varius	C		C		C		C	
Hairy woodpecker*	Dendrocopus villosus	C	C	C	C	U	U	U	U
Downy woodpecker*	Dendrocopus pubescens	C	C	C	C	C	C	C	C
Eastern kingbird*	Tyrannus tyrannus	A	A			C	C	C	
Western kingbird	Tyrannus verticalus								
Great crested flycatcher*	Myiarchus crinitus	C	C			C	C	C	
Eastern phoebe*	Saynornis phoebe	C	C	O		U	U	U	
Yellow-bellied flycatcher	Empidonax flaviventris	U	U	U		U			U
Acadian flycatcher	Empidonax virescens	O	O			C	C	C	
Traill's flycatcher*	Empidonax traillii	C	C	O			O		
Least flycatcher*	Empidonax minimus	A	A	U					
Eastern wood pewee*	Contopus virens	C	C	U		C	C	C	
Olive-sided flycatcher	Nuttallornis borealis	O	O						
Horned lark*	Eremophila alpestris	C	C	C	O	C	C	C	C
Tree swallow*	Iridoprocne bicolor	A	A	U		C	C	A	
Bank swallow*	Riparia riparia	C	C	U		C	C	C	
Rough-winged swallow	Stelgidopteryx ruficollis	O	O			C	C	C	
Barn swallow*	Hirundo erythrogaster	A	A	U		C	C	C	
Cliff swallow*	Petrochelidon pyrrhonota	O	O	U		C	C	C	
Purple martin*	Progne subis	A	A	U		C	C	C	
Blue jay*	Cyanocitta cristata	C	C	C	C	C	C	C	C
Common crow*	Corvus brachyrhynchos	A	A	A	O	C	C	C	C
Black-capped chickadee*	Parus atricapillus	C	C	C	C	C	C	C	C
Tufted titmouse*	Parus bicolor	C	C	C	C	C	C	C	C
White-breated nuthatch*	Sitta carolinensis	C	C	C	C	C	C	C	C
Red-breated nuthatch	Sitta canadensis				R	O		O	
Brown creeper	Certhia familiaris	C		C	C	U		U	O
House wren*	Troglodytes aedon	A	A	O		C	C		
Winter wren	Troglodytes troglodytes	O		O				O	O
Bewick's wren	Thryomanes bewickii	O		O					
Carolina wren	Thryothorus ludovicianus	O	O	O		C	C	C	C
Long-billed marsh wren*	Telmatodytes palustris	C	C			U	U	U	
Short-billed marsh wren*	Cistothorus	O	O			U			
Mockingbird	Mimus polyglottos					C	C	C	O
Catbird*	Dumetella carolinensis	C	C	O		C	C	C	
Brown thrasher*	Toxostoma rufum	C	C	O		C	C	C	O
Robin	Turdus migratorius	C	C	C	R	C	C	C	O
Wood thrush*	Hylocichla mustelina	C	C	C			O		
Hermit thrush	Hyocichla guttata	C		C					
Swainson's thrush	Hylocichla ustulata	C		C		U		U	
Gray-cheeked thrush	Hylocichla minima	C		C		U		U	
Veery	Hylocichla fuscescens	C		C		U			
Eastern bluebird*	Sialia sialis	C	C	C	R	U	U	U	U
Blue-gray gnatcatcher	Poloiptila caerulea	U	U			C	C		
Golden-crowned kinglet	Regulus satrapa	O		O	O	U		U	O
Ruby-crowned kinglet	Regulus calendula	C		C		U		U	
Rose-breasted grosbeak*	Pheucticus ludovicianus	C	C			C	C	U	
Indigo bunting*	Passerina cyanea	C	C	O		C	C	C	
Dickcissel*	Spiza americana	C	C			C	C	C	

Common Name	Scientific Name	Region							
		Pools 11-15				Pools 16-22			
		Sp	Su	F	W	Sp	Su	F	W
Evening grosbeak	Hersperiphona vespertina				O				R
Purple finch	Carpodacus purpureus	O		O	O	U		U	C
Common redpoll	Acanthis flemmea				U				
Pine siskin	Spinus pinus	O		O	O				R
American goldfinch*	Spinus tristis	A	A	A	C	C	C	C	C
Red crissbill	Loxia curvirostra				R				
Rufous-sided towhee*	Pipilo erythrophthalmus	O	O	O		U	U	U	
Savannah sparrow	Passerculus sandwichensis	O	O	O		U		U	
Grasshopper sparrow	Ammodramus savannarum	O	O	O		U	U	U	
Henslow's sparrow	Passerherbulus henslowii	R	R	U					
Le Conte's sparrow	Passerherbulus caudacutus	U	U	U					
Vesper sparrow*	Pooecetes gramineus	C	C	C		U		U	
Lark sparrow	Chondestes grammacus	O	O			O			
Slate -colored junco	Junco hyemalis	C		C	C	C		C	C
Tree sparrow	Spizella arborea	C		A	A	C		C	C
Chipping sparrow*	Spizella passerina	A	A	A				O	
Clay-colored sparrow	Spizella pallida	U	U	U					
Field sparrow*	Spizella pusilla	C	C	C	R	C	C	C	O
Harris' sparrow	Zonotrichia querula	C		C					
White-crowned sparrow	Zonotrichia leucophrys	O		O	R	U		U	O
White-throated sparrow	Zonotrichia albicollis	A		A	R	C		C	U
Fox sparrow	Passerella iliaca	O		O		U		U	O
Lincoln's sparrow	Melospiza lincolnii	C		C		O			
Swamp sparrow	Melospize georgiana	C	C	O		C		C	C
Song sparrow	Melospize melodia	A	A	C	R	C	C	C	C
European tree sparrow	Passer montanus					U	U	U	C
Lapland longspur	Calcarius lapponicus	O		O	O				
Snow bunting	Plectrophenax nivalis				U				

Key

Sp - March to May
Su - June to August
F - September to November
W - December to February
* - Nests within study area

A - abundant
C - common
U - uncommon
O - occasional
R - rare

No letter indicates that a particular species has not been recorded in the region.

SOURCE: Upper Mississippi Wildlife and Fish Refuge, Winona, Minnesota
Mark Twain National Wildlife Refuge, Quincy, Illinois

TABLE 3

REPTILES AND AMPHIBIANS OF THE AREA

Common Name	Scientific Name	Region: Pools 11-15	Region: Pools 16-22
Graham's water snake	Natrix grahami	*	U
Diamond-backed water snake	Natrix rhombifera		U
Eastern garter snake	Thamnophis sirtalis sirtalis	C	C
Eastern plains garter snake	Thamnophis radix radix		C
Red-sided garter snake	Thamnophis sirtalis parietalis		R
Ribbon snake	Thamnophis sauritus	*	R
Western ribbon snake	Thamnophis sauritus proximus	*	
Eastern hognose snake	Heterodon platyrhinos		R
Ringneck snake	Diadophis punctatus	U	R
Prairie ringneck snake	Diadophis punctatus arnyi		U
Blue racer	Coluber constrictor foxi	C	C
Fox snake	Elaphe vulpina	U	
Western fox snake	Elaphe vulpina vulpina		U
Blackrat snake	Elaphe vulpina obsoleta	C	C
Bullsnake	Pituophis melanoleucus sayi	C	C
Eastern milk snake	Lampropeltis doliata triangulum	U	U
Red milk snake	Lampropeltis traingulum triangulum		U
Northern lined snake	Tropidoclonion lineatum lineatum		U
Prairie kingsnake	Lampropeltis calligaster calligaster		C
Midwest Worm snake	Carphophis amoenus ameonus		U
Western worm snake	Carphophis amoenus vermis		U
Western smooth green snake	Opheodrys vernali blanchardi		U
Midland brown snake	Storeria dekayi wrightorum		U
Northern water snake	Natrix sipedon sipedon	C	C
Yellow-bellied water snake	Natrix erythrogaster flavigaster		U
Midland water snake	Natrix sipedon pleuralis		U
Northern red-bellied snake	Storeria occiptomaculata occiptomaculata		R
Water moccasin	Agkistrodon piscivorus		U
Massasauga (swamp rattlesnake)	Sistrurus catenatus	C	U
Timber rattlesnake	Crotalus horridus horridus	C	U
Copperhead	Agkistrodon contortrix		U
Mud turtle	Kinosternon subrubrum subrubrum		U
Wood turtle	Clemmys insculpta	R	
Ornate box turtle	Terrapene ornata	C	C
Eastern box turtle	Terrapene carolina carolina		C
Map turtle	Graptemys geographica	C	C
Missouri map turtle	Graptemys kohni		U
Quachita map turtle	Graptemys pseudogeographica ouachitensis		R
False map turtle	Graptemy pseudogeogrpaphica	C	C
Smalling turtle	Chelydra serpentina	C	C
Blanding's turtle	Emydoidea blandingi	C	C

(Letter Key at End of Table)

Common Name	Scientific Name	Region: Pools 11-15	Region: Pools 16-22
Painted turtle	Chrysemys picta	C	
Western painted turtle	Chrysemys picta belli		C
Smooth softshell	Trionyx muticus	C	C
Eastern spiny softshell	Trionyx spinifer spinifer		U
Western spiny softshell	Trionyx spinifer hartwegi		C
Spiny softshell	Trionyx spinifer	C	
Stinkpot turtle	Sternothaerus odoratus	*	C
Yellow-nud turtle	Linosternon flavescens		*
Alligator snapping turtle	Macroclemys temmincki		R
Six-lined racerunner	Cnemidophorus sexlineatus	C	
Broad-headed skink	Eumesces laticeps		U
Live-lined skink	Eumesces fasciatus		R
Mudpuppy (salamander)	Necturus maculosus	C	C
Eastern tiger salamander	Ambystoma tigrinum	C	C
Small-mouth salamander	Ambystoma texanum		C
Central newt (salamander)	Diemictylus viridescens louisianensis	*	U
Hellbender (salamander)	Cryptobranchus alleganiensis allenganiensis		U
Marbled salamander	Ambystoma opacum		R
Blanchard's cricket frog	Acris crepitans blanchardi	C	C
Spring peeper	Hyla crucifer	C	
Gray treefrog	Hyla versicolor	C	
Northern spring peeper	Hyla crucifer crucifer		C
Easter gray treefrog	Hyla cersicolor versicolor		C
Western chorus frog	Pseudacris triseriata triseriata	C	C
Bullfrog	Rana catesbeiana	C	C
Green frog	Rana clamitans melanota	C	
Leopard frog	Rana pipiens	C	C
Pickerel frog	Rana palustris	R	
Wood frog	Rana sylvatica	C	
Northern crayfish frog	Rana areolata		U
American toad	Bufo americanus	C	C
Dwarf american toad	Bufo americanus charlesmithi		U
Fowler's toad	Bufo woodhousei fowleri		C
Eastern narrow-mouthed toad	Gastrophyne carolinensis carolinensis		U

KEY

C - Common U - Uncommon R - Rare
* - Recorded in counties bordering the Upper Mississippi River Refuge
- No letter indicates that a particular species has not been recorded in the region.

Source: Upper Mississippi River Wildlife and Fish Refuge, Winona, Minnesota
Mark Twain National Wildlife Refuge, Quincy, Illinois

TABLE 4

DISTRIBUTION AND RELATIVE ABUNDANCE OF UPPER MISSISSIPPI RIVER FISHES BY POOLS*

Species	Pool Number											
	11	12	13	14	15	16	17	18	19	20	21	22
Chestnut lamprey *Ichthyomyzon castaneus*	R	R								O	O	O
Silver lamprey *Ichthyomyzon unicuspis*	O	O	O	O	O	O	O	O	O	O	O	O
Lake sturgeon *Acipenser fulvescens*	R					R	H		H	H	R	H
Shovelnose sturgeon *Scaphirhynchus platorynchus*	O	O	O	O	O	O	O	O	O	O	O	O
Paddlefish *Polyodon spathula*	O	C	C	C	C	C	C	C	C	C	C	C
Longnose gar *Lepisosteus osseus*	C	C	C	C	C	C	C	C	C	C	C	C
Shortnose gar *Lepisosteus platostomus*	C	C	C	C	C	C	C	C	C	C	C	C
Bowfin *Amia calva*	C	C	C	C	C	C	C	C	C	C	C	C
American eel *Anguilla rostrata*	O	O	O	O	O	O	O	O	O	O	O	O
Skipjack herring *Alosa chrysochloris*			H		O	O	O	O	O	O	O	O
Gizzard shad *Dorosoma cepedianum*	A	A	A	A	A	A	A	A	A	A	A	A
Goldeye *Hiodon alosoides*	H	U	H	H		U	U	U	O	C	C	C
Mooneye *Hiodon tergisus*	C	C	C	C	C	C	C	C	C	O	O	O
Rainbow trout *Salmo gairdneri*				X								
Grass pickerel *Esox americanus*				X			X	X				
Northern pike *Esox lucius*	O	O	O	O	O	O	O	O	O	O	O	O
Stoneroller *Campostoma anomalum*	X					X	H		X		X	X
Goldfish *Carassius auratus*										X		
Carp *Cyprinus carpio*	A	A	A	A	A	A	A	A	A	A	A	A
Grass carp *Ctenopharyngodon idella*					O		O			O		O
Silvery minnow *Hybognathus nuchalis*	C	C	C	C								

Species	Pool Number 11	12	13	14	15	16	17	18	19	20	21	22
Speckled chub *Hybopsis aestivalis*	C	C	C	C	C	C	C	C	C	C	C	C
Silver chub *Hybopsis storeriana*	C	C	C	C	C	C	C	C	C	C	C	C
Golden shiner *Notemigonus crysoleucas*	H	O	O	O	H	H	O	O	O	H	O	
Pallid shiner *Notropis amnis*	H		R								H	
Pugnose shiner *Notropis anogenus*		X										
Emerald shiner *Notropis atherinoides*	A	A	A	A	A	A	A	A	A	A	A	A
River shiner *Notropis blennius*	A	A	A	A	A	A	A	A	A	A	A	A
Bigeye shiner *Notropis boops*								X			X	
Ghost shiner *Notropis buchanani*	R	R	R	O	C	C	C	C	C	C	C	C
Common shiner *Notropis cornutus*	H											
Bigmouth shiner *Notropis dorsalis*	O	O	O	O	O	O	O	O	O	O	O	O
Pugnose minnow *Notropis emiliae*	O	O	O	O	O	O	O	O				
Spottail shiner *Notropis hudsonius*	C	C	C	C	C	C	C	C	C	C	C	C
Red shiner *Notropis lutrensis*								C	C	C	C	C
Rosyface shiner *Notropis rubellus*	X											
Spotface shiner *Notropis spilopterus*	C	C	C	C	C	C	C	C	O	O	O	O
Sand shiner *Notropis stramineus*	O	O	O	O	O	O	O	O	O	O	O	O
Weed shiner *Notropis texanus*	U	U										
Redfin shiner *Notropis umbratilis*					X							
Mimic shiner *Notropis volucellus*	H											
Suckermouth minnow *Phenacobius mirabilis*	U		U		U	U		U	U		U	U
Southern redbelly dace *Phoxinus erythrogaster*	X											
Bluntnose minnow *Pimephales notatus*	O	O	O	O	O	O	O	O	O	O	O	O
Flathead minnow *Pimephales promelas*	U	U	U	U	U	U	U	U	U	U	U	U

Species	Pool Number											
	11	12	13	14	15	16	17	18	19	20	21	22
Bullhead minnow *Pimephales vigilax*	A	A	A	A	A	A	A	A	A	A	A	A
Creek chub *Semotilus atromaculatus*	H											
River carpsucker *Capiodes carpio*	C	C	C	C	C	C	C	C	C	C	C	C
Quillback *Carpiodes cyprinus*	C	C	C	C	C	C	C	C	C	C	C	C
Highfin carpsucker *Carpiodes velifer*	O	O	O					U	U			
White sucker *Catostomus commersoni*	C		X	X	X	X		X	X	X	X	
Blue sucker *Cycleptus elongatus*	H			U	H	H			U	U	H	
Northern hog sucker *Hypentelium nigricans*	R	R			X	X			X			
Smallmouth buffalo *Ictiobus bubalus*	R	C	C	C	C	C	C	C	C	C	C	C
Bigmouth buffalo *Ictiobus cyprinellus*	C	C	C	C	C	C	C	C	C	C	C	C
Black buffalo *Ictiobus niger*	H	H	R	C	C	C	C	C	C	C	C	C
Spotted sucker *Minytrema melanops*	O	O	O	O	O	O	O	U				
Silver redhorse *Moxostoma anisrum*	U	R	R	R	R	R	R	R	R	R		
Golden redhorse *Moxostoma erythrurum*	U	U	U	R	R	R	R	R	R	R		
Shorehead redhorse *Moxostoma macrolepidotum*	O	O	O	O	O	O	O	O	O	O	O	O
White catfish *Ictalurus catus*						X						
Blue catfish *Ictalurus furcatus*			H	H	H	H	H	H	H	H	H	H
Black bullhead *Ictalurus melas*	O	O	O	O	O	O	O	O	O	O	O	O
Yellow bullhead *Ictalurus natalis*	O	O	O			O	O	O	O	O	O	
Channel catfish *Ictalurus punctatus*	C	C	C	C	C	C	C	C	C	C	C	C
Stonecat *Noturus flavus*	H		U			H				O	O	
Tadpole madtom *Noturus gyrinus*	U	U	U	U					U		H	
Freckled madtom *Noturus nocturnus*										U	U	
Flathead catfish *Pylodictis olivaris*	C	C	C	C	C	C	C	C	C	C	C	C

Species	Pool Number 11	12	13	14	15	16	17	18	19	20	21	22
Pirate perch *Aphredoderus sayanus*	H											
Trout-perch *Percopsis omiscomaycus*								U				
Burbot *Lota lota*	H					R						
Blackstripe topminnow *Fundulus notatus*							U	U		O	O	O
Mosquitofish *Gambusia affinis*											X	
Brook silverside *Labidesthes sicculus*	C	C	C	C	C	C	C	C	C	C	C	C
Brook stickleback *Culaea inconstans*		X										
White bass *Morone chrysops*	C	C	C	C	C	C	C	C	C	C	C	C
Yellow bass *Morone mississippiensis*	O	O	O	O	O	O	O	O	O	O	O	O
Rock bass *Ambloplites rupestris*	R	O	R	R	R	R	R	R	R	R	R	R
Green sunfish *Lepomis cyanellus*	O	O	O	O	O	O	O	O	O	O	O	O
Pumpkinseed *Lepomis gibbosus*	C	C	C	C		H	H	U	H			
Warmouth *Lepomis gulosus*	U	U	U	U		U	U	U	U		U	U
Orangespotted sunfish *Lepomis humilis*	C	C	C	C	C	C	C	C	C	C	C	C
Bluegill *Lepomis macrochirus*	A	A	A	A	A	A	A	A	A	A	A	A
Redear sunfish *Lepomis microlophus*									X			
Smallmouth bass *Micropterus dolomieui*	U	U	U	U	U	U	U	R	R	R	R	R
Largemouth bass *Micropterus salmoides*	C	C	C	C	C	C	C	C	C	C	C	C
White crappie *Pomoxis annularis*	C	C	C	C	C	C	C	C	C	C	C	C
Black crappie *Pomoxis nigromaculatus*	C	C	C	C	C	C	C	C	C	C	C	C
Crystal darter *Ammocrypta asprella*	H											
Western sand darter *Ammocrypta clara*	O	O	O	O	O	O	O	O	O	O	O	O
Mud darter *Etheostoma asprigene*	H		O									
Fantail darter *Etheostoma flabellare*	H											

Species	Pool Number 11	12	13	14	15	16	17	18	19	20	21	22
Johnny darter *Etheostoma nigrum*	U	U	U	U	U	U		U	U		U	U
Banded darter *Etheostoma zonale*	X											
Yellow perch *Perca flavescens*	C	O	O	O	O	O	O	O	O			H
Logperch *Percina caprodes*	C	C	C	C	C	C	C			O	O	O
Slenderhead darter *Percina phoxocephala*	H									R	R	
River darter *Percina shumardi*	C	C	C	C	C	C	C	C	C	C	C	C
Sauger *Stizostedion canadense*	C	C	C	C	C	C	C	C	C	C	C	C
Walleye *Stizostedion vitreum*	C	C	C	C	C	C	C	C	C	C	O	O
Freshwater drum *Aplodinotus grunniens*	C	C	C	C	C	C	C	C	C	C	C	C

KEY TO THE STATUS OF A SPECIES:

X - Probably occurs in the pool only as a stray from a tributary water.
H - Records of occurrence are available for this pool, but the species has not been recorded in UMRCC collections in the last 10 years.
R - Considered to be rare in this pool. Some species in this category may be on the verge of extirpation.
U - Uncommon, does not usually appear in sample collections, populations are small, but the species in this category do not appear to be on the verge of extirpation.
O - Occasionally collected, not generally distributed, and local concentrations may occur.
C - Commonly taken in most sample collections through the pool, can make up a large portion of some samples.
A - Abundantly taken in all river surveys.

*Mississippi River pools are numbered according to US Army, Corps of Engineers nomemclature in which a pool carries the same number as the dam which has impounded it.

TABLE 5

INVERTEBRATES FOUND IN THE UPPER MISSISSIPPI RIVER (EXCEPT FRESHWATER MUSSELS)

Common Name	Scientific Name
Flatworms	Platyhelminthes
	Turbellaria
	Planariidae
	Dugesia
Roundworms	Nemathelmithes
	Nematoda
	Diplogasterdae
	Diplogaster
Aquatic earthworms	Annelida
	Oligochaeta
	Nadidae
	Dero
	Nais
	Uncinais
	Plesiopora
	Tubificidae
	Branchuira
	Ilyodrilus
	Limnodrilus
	Tubifex
	Peloscolex
Leaches	Mirudinea
	Glossiphoniidae
	Helobdella
	Glossiphonia
	Placobaella
	Theromyzon
	Halotaxidae
	Haplotaxis
	Pisicolidae
	Illinobdella
	Erpobdellidae
	Erpobdella
	Nephelopsis
	Arthropoda
	Arachnida
Spiders	Araneida
Mites and Ticks	Acarina
	Crustacea

Common Name	Scientific Name
Sideswimmers	Amphipoda
	Talitridae
	Hyallelo
Sowbugs	Isopoda
	Asellus
Crayfish	Decapoda
	Orconectes
	Insecta
	Diptera
Midges	Tendipedidae
	Coelotanypus
	Glyptotendipes
	Pentaneura
	Procladius
	Orthocladius
	Pelopia
	Cricotopus
	Lauterborniella
	Smitta
	Ablabesmyia
	Tendipedini
	Tenipes
	Chironomus
	(Cryptochironomus)
	Cryptochironomus
	Demicryptochironomus
	Leptochironomus
	Stenochironomus
	Polypedilum
	Microcricotopus
	Nicrotendipes
	Tanypus
	Tanytarus
	Dicrotendipes
	Epoic
	Harnishchia
	Rheotanytarus
	Thienamanniyia
	Trissocladius
	Xenochironomus
	Endochironomus
	Parachironomus
	Diamesa
	Paracladopelma
	Paralauterborniella

Common Name	Scientific Name
Midges	Chaoboridae
	Chaoborus
	Ceratopogonidae
	Bezzia
	Palpomyia
	Tabanidae
	Chrysops
Mayflies	Ephemeroptera
	Caenidae
	Tricorythodes
	Caenis
	Ephemeridae
	Hexagenia
	Potamanthus
	Pentagenia
	Heptageniidae
	Stenonema
	Baetidae
	Ephemerella
	Isonychia
Damselflies and dragonflies	Odonata
	Libellulidae
	Dorococrodulia
	Agrionidae
	Agrion
	Gomphidae
	Gomphus
	Coenagrionidae
	Ischnura
	Enallagma
	Aeschnidae
	Anax
Stoneflies	Plecoptera
	Perlodidae
	Isoperla
True bugs (water boatmen)	Heteroptera
	Corixidae
	Sigara
Caddisflies	Trichoptera
	Hydropsychidae
	Cheumatopsyche
	Hydropsyche
	Potamyia
	Leptoceridae
	Mystacides
	Leptocella
	Leptocerus

Common Name	Scientific Name
Caddisflies	Oecetis
	Psychomyiidae
	Neureclipsis
	Nyctionphylax
	Hydroptilidae
	Hydropolita
	Cyrnellus
	Arthripsodes
Beetles	Coleoptera
	Elmidae
	Stenelmis
	Promoresia
Dobsonflies	Megaloptera
	Sialidae
	Sialis
	Chrysomelidae
	Donancia
	Limnephilidae
	Hesperophylax
	Neophylax
	Oecetis
Snails	Mollusca
	Gastropoda
	Ctenobranchiata
	Amnicolidae
	Amnicola
	Viviparidae
	Campeloma
	Lioplax
	Viviparus
	Valvatidae
	Valvata
	Amnicolidae
	Somatogyrus
	Amnicola
	Physidae
	Menetus
	Physa
	Lymnaeidae
	Lymnaeda
	Pulmonata
	Ancylidae
	Ferrissia
	Pleuroceridae
	Pleurocera
	Heliosoma

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TABLE 6

FRESHWATER MUSSELS OF THE UPPER MISSISSIPPI RIVER DRAINAGE AND DISTRIBUTION BY POOL (SINCE 1965)

Species	Pool 11	12	13	14	15	16	17	18	19	20	21	22
Spectacle Case *Cumberlandia monodonta*					X	X	X		X			
Monkey-face *Quadrula metanevra*	X	X	X	X	X	X	X	X	X	X	X	X
Mapleleaf *Quadrula quadrula*	X	X	X	X	X	X	X	X	X	X	X	X
Warty-back *Quadrula nodulata*	X	X	X	X	X	X	X	X	X	X	X	X
Pimple-back *Quadrula pustulosa*	X	X	X	X	X	X	X	X	X	X	X	X
Buckhorn *Tritogonia verrucosa*		X				X	X	X				
Purple Warty-back *Cyclonaias tuberculata*				X		X						
Pig-toe *Fusconaia flava*	X	X	X	X	X	X	X	X	X	X	X	X
Ebony Shell *Fusconaia ebena*				X	X	X	X					
Washboard *Megalonaias gigantea*	X	X	X	X	X	X	X	X	X	X		X
Three-ridge *Amblema plicata*	X	X	X	X	X	X	X	X	X	X	X	X
Bullhead *Plethobasus cyphyus*						X	X	X				
Pond-horn *Uniomerus tetralasmus**												
Ohio Pigtoe *Pleurobema cordatum*												
Elephant ear *Elliptio crassidens*												
Spike *Elliptio dilatata*	X	X	X		X							
Threehorn *Obliquaria reflexa*	X	X	X	X	X	X	X	X	X	X	X	X
Pink heelsplitter *Proptera alata*	X	X	X	X	X	X	X	X	X			X
Pink paper shell *Proptera laevissima*	X	X	X	X	X	X	X	X	X	X		
Fat pocketbook *Proptera capax*												
Fragile paper shell *Leptodea fragilis*	X	X	X	X	X	X	X	X	X	X	X	X

Species	Pool 11	12	13	14	15	16	17	18	19	20	21	22
Narrow paper shell *Leptodea letodon*												
Butterfly *Plagiola (=Ellipsaria) lineolata*	X	X	X	X	X	X	X	X	X	X	X	X
Deer Toe *Truncilla turncata*	X	X	X	X	X	X	X	X	X	X	X	
Fawn Foot *Truncilla donaciformis*	X	X	X	X	X	X	X	X	X	X	X	
Hickory nut *Obovaria olivaria*	X	X	X	X	X	X	X	X	X	X	X	X
Mucket *Actinonaias carinata*			X	X	X	X	X	X	X			
Ellipse *Actinonaias ellipsiformis***		X										
Black Sandshell *Ligumia recta*	X	X	X	X	X	X	X	X	X	X		
Western Pondmussel *Ligumia subrostrata*												
Lilliput *Carunculina parva*	X		X		X	X			X			
Yellow Sandshell *Lampsilis anodontoides (=teres)*				X	X		X		X	X	X	
Higgins' eye *Lampsilis higginsi*	X			X	X	X	X					
Fat Mucket *Lampsilis radiata siliquoidea*		X		X								
Pocketbook *Lampsilis ovata ventricosa*	X	X	X	X	X	X	X	X	X	X	X	X
Rainbow Shell *Villosa iris**												
Snuffbox *Dysnomia triquetra***												
Rock Pocketbook *Arcidens confragosus*	X	X	X	X	X	X	X	X	X	X	X	X
White Heelsplitter *Lasmigona complanta*	X	X	X	X		X	X		X	X		
Fluted Shell *Lasmigona costata***												
Creek Heelsplitter *Lasmigona compressa***					X							
Elktoe *Alasmidonta marginata***												
Slipper-shell *Alasmidonta calceolus*												
Salamander Mussel *Simpsoniconcha ambigua*												

Species	Pool 11	12	13	14	15	16	17	18	19	20	21	22
Cylindrical Paper Shell *Anodontoides ferussacianus***						X						
Flat Floater *Anodonta suborbiculata*					X					X		
Paper Floater *Anodonta imbecillis*	X	X				X			X			
Floater *Anodonta grandis*	X	X	X	X	X	X	X	X	X	X		X
Squaw-foot *Strophitis undulatus*	X	X	X	X	X	X	X					

*Lives mainly in ponds or lakes; not usually found in streams.
**Lives mainly in small to medium streams.

TABLE 7

ZOOPLANKTON FOUND ALONG ONE FIVE-MILE STRETCH
OF THE UPPER MISSISSIPPI RIVER NORTH OF THE QUAD CITIES

Hydrozoa
- Genera unidentified

Crustacea
- Copepoda
  - Cyclops
  - Diaptomus
  - Eucyclops
  - Harpacticoidia
  - Macrocyclops
  - Mesocyclops
  - Tropocyclops
- Cladocera
  - Alona
  - Alonella
  - Bosmina
  - Ceriodaphnia
  - Chydorus
  - Daphnia
  - Diaphanosoma
  - Eurycercus
  - Ilyocryptus
  - Leptodora
  - Leydigia
  - Macrothrix
  - Moina
  - Pleuroxus
  - Scapholeberis
  - Sida
  - Simmocephalus
- Amphipoda
  - Hyalella
- Ostracoda
  - Several unidentified species

TABLE 8

SPECIES LIST FOR TRAIL PLANTING

Species	Scientific Name	Pool	Site	Characteristics
Flowering dogwood	Cornus florida	22, 21, 18-16	Higher	Attractive flowers, interesting fruits & persistent
Red Osier Dogwood	Cornus stolonifera	18-16, 14-11	Lower wet areas	Same as above
Redbud	Cercis canadensis	22, 21, 18-16	Higher	Same as above
Spicebush	Lindera benzoin	22, 21, 18	Higher	Fragrant foliage
Gray (red-panicle) Dogwood	Cornus racemosa	22, 21, 18-16	Higher	Attractive flowers
Nannyberry	Viburnum lentago	22, 21, 18-16	Higher	Attactive fruits, flowers
Black Jetbead	Phodo typos scanden	22, 21, 18-16, 14-11	Higher	White flowers, blackberry
Tartarian honeysuckle	Lonicera Tatarica	22, 21, 18-16, 14-11	Higher	Flowers - fragrant
Oregon Grape Holly	Mahoma aginfolinum	14-11	Lower (wet)	Purple foliage, flowers

TABLE 9

SELECTED
UPPER MISSISSIPPI RIVER BOTTOM LAND TREES
AND THEIR WILDLIFE VALUE

Name	Food Value	Winter Cover Value	Cavity Value	Abundance	Water Tolerance
Ash, green (Fraxinus pennsylvania)	Seed (M)	L	L	V	V
Baldcypress (Taxodium distichum)	(L)	L-M	L	R	V
Birch, river (Betula nigra)	Leaf Bark (L)	L	E	M	V
Boxelder (Acer negundo)	Flower Buds Seeds (M)	L	E	V	V
Butternut (Juglans cinerea)	*Nut (M)	L	L	L	L
Cherry, Wild Black (Prunus serotina)	Fruit (E)				
Cottonwood, eastern (Populus deltoides)	Buds, Catkins (L)	L	M	V	V
Coffee tree, Kentucky (Gymnocladus dioicus)	Pod (L)	L	N	M	V-M
Dogwood (Cornus spp.)	Fruit (E)	M	N	M-V	L
Elm, American or Slippery (Ulmus spp.)	Seeds, Buds (L)	L	E	V	V
Elm, Chinese (Introduced) (Ulmus parvifolia)	Seeds, Buds (L)	L	L	V	V
Hackberry (Celtis Occidentalis)	*Fruit (E)	L	L	L	M-L
Hackberry, Mississippi (Celtis laevigata)	*Fruit (E)	L	L	M-V	M
Hawthorne (Crataegus spp.)	Seed (M)	L	N	M	M-L
Hickory, Shagbark (Carya ovata)	*Nut (E)	L	L	M-L	M-L
Hickory, Shellbark (Carya laciniosa)	*Nut (E)	L	L	M-L	M-L

(Letter Key at End of Table)

Name	Food Value	Winter Cover Value	Cavity Value	Abundance	Water Tolerance
Locust, Black (Robinia pseudoacacia)	Seeds (L)	L	L	M	M-L
Locust, Honey (Gleditsia triacanthos)	Seeds (L)	L	L	L	L
Maple, Silver (Acer saccharinum)	Flower Buds, Seeds (M)	L	E	V	V
Mulberry, White (Morus alba) (Introduced)	Fruit (F)	L	L	L	M
Mulberry, Red (Morus Rubra)	Fruit (E)	L	L	M	M
Oak, Bur (Quercus macrocarpa)	*Nut (E)	L	G	M-L	M-L
Oak, Pin (Quercus palustris)	*Nut (E)	L	G	M	M-L
Oak, Red (Quercus rubra)	*Nut (E)	L	G	L	L
Oak, White (Quercus alba)	*Nut (E)	L	G	L	L
Oak, Swamp White (Quercus bicolor)	*Nut (E)	L	G	M	M-L
Pawpaw (Asimina triloba)	Fruit (L)	L	N	L	L
Pecan (Carya illinoensis)	Nut (E)	L	L	L	M-L
Persimmon, Common (Diopsyros virginiana)	Fruit (E)	L	N-L	L	M-L
Sweetgum (Liquidambar styraciflora)	Seeds (L)	L	L	L	M
Tupelo gum (Nyssa aquatica)	Fruit (G)	L	L	R	M-V
Sycamore (Platanus occidentalis)	- (L)	L	E	M-L	M
Walnut, Black (Juglans nigra)	*Nut (M)	L	L	L	L
Willow, Almond (Salix amygdaloides)	Bud, Browse (M)	M	N	L	V
Willow, Black (Salix nigra)	Bud, Browse (M)	M	L	V	V
Willow, Sandbar (Salix interior)	Bud, Browse (M)	M	N-L	V	V

Food, Cavity, Cover Value	Abundance	Water Tolerance	*Provides Winter Food
E = Excellent	V = Very	V = Very	
G = Good	M = Moderate	M = Moderate	
M = Moderate	L = Low	L = Low	
L = Low	R = Rare	I = Intolerant	
N = None			

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Compiled by David A. Nelson, Environmental Analysis Section, Rock Island District Corps of Engineers

ADDENDUM 1

ADDENDUM 1

Vegetative Cover Typing and Management Practices

1. INTRODUCTION

1.1 The fish and wildlife resources on the Mississippi River flood plains are abundant and diverse. Many different woody and ground cover or wetland associations in different stages of growth occur in the river flood plain forests. Each association in each stage of growth meets some needs of different species of wildlife. From that diversity of vegetation, from young silver maple-ash-cottonwood stands to mature pin oak-pecan stands to wetlands of American lotus (Nelumbo lotuea), comes the rich variety of wildlife native to the flood plain.

1.2 The vegetation of the flood plain is divided into specific associations of species, and is expressed as cover types. In this addendum vegetative management practices are listed and discussed. Since we will be dealing with vegetative management in the flood plain forests, the vegetative management practices are accepted silvicultural techniques.

1.3 Forest management, whether by private company, a Government agency, or a private individual, is the management of the forestry resource to fulfill the owner's purpose. In this case the purpose of the owner of this flood plain land is to hold the greatest number and variety of self sustaining species of wildlife while considering recreation, aesthetics, and wood products. Forest management practices will be used to maintain and encourage the greatest diversity of wildlife habitat along the river, especially habitat of endangered and threatened species. At the same time, other desirable management goals; such as, recreation, aesthetics, and forestry products for local industries will not be ignored. These goals will be met in varying degrees as diverse wildlife habitat is developed and enhanced along the Mississippi River.

1.4 Project lands not in forest, and not included in other sections of this management plan, such as agriculture leases administered by the Corps, will be administered as they are now. If agriculture leases are not renewed, management of these areas will be considered on a case by case basis and site plans will be added as changes to this plan.

2. COVER TYPE AND MANAGEMENT UNIT DELINEATION

As this management plan was developed, forested areas in each Mississippi River pool were examined. The US Fish and Wildlife Service had previously identified cover types in the Mississippi River pools. Cover types included in their cover type 2b (mixed lowland hardwoods >20 feet) were then identified and delineated. Each cover type is a specific association of dominant woody vegetation, associated woody species, and ground cover that occupies a forest site. We used information from the forest inventory completed in late 1979, color infrared aerial photographs, ground truthing of the photographic interpretations, and on-the-ground experience gained from working in the forests to determine cover types.

After determining the cover types for each area, each pool was divided into management units and silvicultural practices were prescribed for cover types in each unit. Management units allow the forest resources to be managed more effectively. One reason the use of management units is a good management tool is because different agencies manage the fish and wildlife resources on different tracts in the Mississippi River pools. Prescriptions in each unit can be designed to mesh with the wildlife management objectives of each area during coordination with the US Fish and Wildlife agency or state agency that manages the wildlife on each area. Geographical circumstances of different areas was also a factor in delineating unit boundaries. For instance, often large islands such as Beaver Island in Pool 14 are considered separate units. Finally, areas with distinctive resources or attributes are considered as separate units. For instance, the Wapsipinicon River in Pool 14 is one of the finest recreational rivers in Iowa and Armstrong Island in Pool 22 has an active Heron rookery on it. Each area is considered as a separate management unit.

3. KEY TO COVER TYPES AND FEATURES

Using the previously discussed classification scheme, the US Fish and Wildlife Service delineated cover types and features for Pools 22-11. The Fish and Wildlife Service interpreters made field notes on selected sites. Using this knowledge, the interpreters simultaneously viewed CIR photographs with streoscopes and identified the cover types found in the pools. To fit their cover types into our classification scheme and make this plan as workable as possible, we consolidated and selected those cover types necessary to a forestry and fish and wildlife plan and changed those symbols to numbers.

We then typed out mixed lowland hardwoods greater than 20 feet in height in the lands owned by the Rock Island District Corps of Engineers. The dominant species are those found as a major species in the overstory. Associated species are found in the understory or as occasional species in the overstory. Ground cover when it occurs is many times an indication of a certain stand type. Because of favorable microclimate occurences in the Mississippi bottom lands, oaks and other valuable trees may be found in stand types that, according to general bottom land cover typing, should not contain them.

For plan cover typing purposes all mature trees have a DBH greater than 20 inches, while immature species have a DBH up to and including 20 inches. Such classifications indicated on the cover typed maps (Attachment 1) as a small letter beside the class number, will help indicate what treatment to prescribe. Cover types are listed as numbers 1-56. (Addendum 1, Section 4)

4. FOREST, VEGETATIVE, AND WETLAND COVER TYPES

Type	Dominant Species	Associated Species	Ground Cover
1	Silver Maple and/or Willow, River Birch, Cottonwood.	none	wood nettle or nothing
2	Monocultures of Silver Maple, Cottonwood or a mixed stand of those two species	none	bur cucumber, wood nettle, or nothing
3	Silver Maple, Cottonwood, Ash	Sycamore, Hackberry some Oak and/or Hickory, Pecan and Walnut widely scattered singly or in groups	wood nettle, bur cucumber
4	Silver Maple, Oak and/other mast trees	Elm, Hackberry	wood nettle, poison ivy, tall meadow rue
5	Silver Maple, Cottonwood, Ash, open stand	Kentucky Coffeetree, Sycamore, Elm	wood nettle, bur cucumber
6	Silver Maple, Cottonwood, Oak	Ash, Hackberry, plus Pecan or Hickory or Walnut	wood nettle, poison ivy, tall meadow rue
7	Either Silver Maple or River Birch dominate the stand but not both	Oak and/or Pecan scattered singly or in groups	wood nettle
8	Ash	Silver Maple, Cottonwood	wood nettle or nothing
9	Silver Maple, Cottonwood, Ash	Sycamore, Elm, Mulberry	wood nettle, bur cucumber
10	Hackberry, Kentucky Coffeetree, and Honey Locust	Pin Oak (rare)	wood nettle
11	River Birch, Willow, Buttonbush	none	wetland species
12	Shagbark Hickory	Bur Oak, Black Walnut	wood nettle

13	Pin Oak with some Bur or Swamp White Oak intermixed with lower areas of Maple	Ash, Willow	wood nettle and areas of nothing or wetland plants
14	Silver Maple, Cottonwood, Oak, and Pecan open stand	Persimmon, Elm, Hackberry, Ash	wood nettle, cucumber vine, greenbriar
15	Pin Oak	Bur or Swamp White Oak	wood nettle or nothing
16	Pin Oak, Bur Oak, Swamp White Oak, Pignut Hickory, Shagbark Hickory	Silver Maple, Ash	wood nettle, grass
17	Wind damaged area of Silver Maple, Cottonwood	Elm, Ash	none
18	Pin Oak, Persimmon, Swamp White Oak, Silver Maple	Pecan	wood nettle, greenbriar
19	Pin Oak, Pecan	Elm	wood nettle
20	Silver Maple, Cottonwood, Ash, open stand	Sycamore	wood nettle, cucumber vine, and some area of forest re-generation
21	Silver Maple, Willow, Ash	none	wetland plants
22	Pin Oak and/or Bur Oak	none	none
23	Silver Maple, Ash, Cottonwood, open stand	Hackberry, Oak, Shellbark Hickory, Pin Oak	wood nettle, bur cucumber grasses
24	Hard Maple, Red Oak, White Oak	Hackberry, Black Cherry, Ash, Bur Oak, Shagbark Hickory, Bitternut Hickory	true soloman seal, false solomon seal bloodroot

Forest Stand Age Indication

i	Immature	1 - 20" DBH
m	Mature	20" DBH+
im	Immature, mature - both ages present	

Type Symbol	Description
Open Water Habitat	
25	All Forms of open water including main river channel, side channels, lakes, ponds, streams, and sloughs.
Alluvial Areas	
26	Water-deposited sand.
27	Water-deposited mud (sometimes includes wet sand which was difficult to distinguish from mud).
Wetland vegetation	
28	Submergent aquatics.
29	Submergent aquatics and duckweed: *Ceratophyllum demersum* (coontail) is often the dominant submergent species in this type.
30	Floating-leaf pondweeds such as *Potamogeton americanus*: this type was rarely encountered.
31	*Lemnaceae* (duckweeds) is characteristic of small, stagnant water bodies. In some cases, submergents may have been present but not discernible.
32	*Nymphaea* (water lilly) was rarely encountered.
33	*Nelumbo lutea* (American lotus).
34	*Nelumbo lutea* and duckweed.
35	*Sagittaria spp.* - primarily *latifolia* (duck potato).

36	Sparganium spp. - (bur reeds) were uncommon.
37	Scirpus fluviatilis (river bulrush).
38	Jussiaea sp. (water primrose) - very localized occurrence
39	Polygonum spp. (smartweeds) - a diverse class including emergents and marsh species, annuals and perennials.
40	Typha latifolia and T. angustifolia.
41	Eragrostis spp. (love grasses).

Herbaceous vegetation

42	Mixed grasses (other than 42, 45, or 41). Not a major type: some overlaps into the marsh category.
43	Forbs - mixed broadleaf weed species mostly of Eurasian origins: the most common genera include Amaranthus. Zanthium and Ambrosia. Some overlap into the marsh category.
44	Leersia oryzoides (rice cut-grass) considerable overlap into marsh category.
45	Phalaris arundinacea (reed canary grass).
46	Echinocystis lobata (wild cucumber).

Woody vegetation

47	Buttonbrush (Cephalanthus occidentalis).
48	Shrub species and/or woody vines which normally do not attain a height of greater than 20 feet.

Developed and agricultural vegetated areas

49	Agruculture - all areas appearing to have been tilled or pastured within the past year; includes areas tilled and planted for wildlife foods. Abandoned fields are usually typed 43.

50	Developed grass - all areas such as most levees which are covered largely by grasses and which are mowed at least once per year; also includes lawns over two acres in size.
51	Developed parks - includes campgrounds, picnic areas, golf courses, and other recreation areas with developed user facilities. Inclusions such as parking lots or open lawns over two acres in size would be typed as 52 or 50, respectively.
52	Developed - all areas which are essentially nonvegetated due to man's activities (excluding plowed croplands).
53	Residential - typically comprised of streets, houses, lawns, shrubs, and trees.

Dredged material sites

54	All dredged material sites.

Planted Areas

55	Coniferous species.
56	Hardwood species.

Manmade structures

	Levee.
	Dam.
	Powerline through nonforested area.
	Powerline right-of-way through forested area.

5. MANAGEMENT PRACTICES

5.1 Introduction.

Vegetative management practices are listed and described in this section. The management practices listed will be used to maintain a diverse bottom land forest ecosystem, and so maintain quality wildlife habitat.

Rotation age is chosen to best fit the biological and economical factors impacting the life of that species in a stand coupled with management objectives. Because of the lack of past regulated management and consistent recordkeeping, rotation length for the Oak-Hickory and Silver Maple-Cottonwood associations have not been permanently established. They will evolve as this vegetative management plan is implemented and updated in five years.

Rotation lengths will be determined by the following criteria: (1) stand mapping and unit acreage, (2) growth data, (3) species composition, (4) wildlife objectives, and (5) timber harvest feasibility.

The amount of acreage of each association in each management unit, number or timing of thinnings, and age of diameter at which stand will need to be regenerated will determine the rotations for each association. The current rotation we used for determining regeneration cut limits was 60 years in much of the Silver Maple-Cottonwood-Ash stands. In Corps fee title lands where management of wildlife resources is the responsibility of the US Fish and Wildlife Service, a rotation of 100 years in length was used in determining harvest limits in Silver maple and Cottonwood Ash stands.

The amount of existing mature Silver-Maple Cottonwood-Ash stands was first determined by using aerial photographs, US Fish and Wildlife Service cover type overlays, and on-the-ground survey. We determined the maximum harvest cut by dividing the total amount of acreage of mature Silver Maple, Cottonwood, and Ash in each unit, excluding the approximate amount of woodlands included in special management or no management types, by the number of years in rotation. The figure obtained was then multiplied by the total number of years selected for reentry (cutting cycle). Admittedly, this method could result in a large percentage of timber in a management unit becoming overmature at one time if it were carried on indefinitely. It is realized that a good distribution of timber in a whole spectrum of age classes is necessary to develop a healthy self-sustaining forest stand. However, it is felt that the harvesting limit determined by this method will provide a good beginning for scientific management on the river. As the management units are stand mapped, the method of determining the maximum allowable harvest (regeneration cut) will be changed or developed to meet specific management objectives. At that time, all immature and mature stands of Silver Maple, Cottonwood, and Ash, except those in special or no management zones, will be included in the total acreage figure. So as the management prescriptions are implemented, a diverse bottom land forest resource with a fully regulated distribution of tree size and age classes will be developed over time that will provide a variety of wildlife habitat and other benefits from what started as a conservative beginning.

Harvest cuts are based on area regulation. No regeneration cuts were recommended for Oak-Hickory stands in the next five years. As previously suggested, stands keyed as ash, cottonwood, silver maple, may contain some oaks, etc., not found when the cover types were delineated. If this occurs, regeneration cuts will be changed to practice V, U, or J, not practice I, and the oak, pecan, and other mast species should be left.

Planting these species back into these areas should be done only if there is a reasonable chance the trees will grow and become a self-sustaining stand. If thinning is prescribed, oaks and other mast trees will be favored. These practices will be applied to groups of tracts (management units) by stand type pool by pool by succeeding addendums. The appropriate total amount of wooded acreage in each unit and the type maps that the unit can be found on will be included as well in the each management unit's prescription.

5.2 Practices.

Practice A. Reforestation - Planting.

a. Plant balled and burlapped, containerized and/or bare rooted native deciduous tree species. Plant native species to regenerate individual trees lost to death or removed because of disease or insect infestations. Additionally this practice will be implemented to provide mast producing stands for wildlife in public use areas or to accomplish plantings detailed in the MP.

b. (Recreation areas) Plant the species that emphasize sound, touch and smell, as well as visual interest. This practice will be implemented along nature trails. Plant species which produce unique sounds, display varying textures on the leaves and bark, and/or exude odors either through natural pores or wounds from minor injuries. Select those species which are the most tolerant of soil compaction. A list of species that display attractive fruit and flowers, and fragrant leaves is included as Table 8.

c. (Recreation areas) Plant balled and burlapped containerized, and/or bare rooted species to accomplish the aesthetic screening of park facilities, screening of operation and mainenance facilities, and sewage lagoons.

d. Plant balled and burlapped containerized, and/or bare rooted species to improve mast production for wildlife. A list of trees and their wildlife value is included as Table 9.

e. Plant balled and burlapped, containerized and/or bare rooted species to reintroduce species that have been cut out by past logging practices. Plant these species in areas with conditions supporting their reintroduction. These species may be planted after the stand is harvested and proper site preparation done, or two-five years before the stand is harvested so they will be established and they will be ready to overcome the herbaceous bloom after the timber is harvested. Such species are as follows:

persimmon	Diospyros virginiana
bur oak	Quercus macrocarpa
swamp white oak	Quercus bicolor
shagbark hickory	Carya ovata

shellbark hickory	Carya laciniosa
black walnut	Juglans nigra
pecan	Carya illinoiensis
tall pawpaw	Asimina triloba

f. Plant a cover crop of grasses or forbs up to two years before planting seedlings to eliminate competition from fast growing woody and herbaceous vegetation.

g. Artificially seed, whether by air or hand, to reestablish the desired species in an opening created by a silvicultural practice; the opening may result from the inability of tree species to reestablish themselves.

Site preparation: The general maintenance practices of weed and vegetative competition control will be followed for two-four years (by contract or internal personnel) until the plantings have become established. Suggested application of herbicides will be as follows:

(1) For rapid knockdown without residual control use Roundup.

(2) For residual control around nursery plantings established for one or more years use Amizine, and other herbicides as approved.

(3) For broadleaf control use a preemergent herbicide.

Practice B. Tree Maintenance. (Recreation Areas.)

a. Remove hazardous trees in or adjacent to recreation areas.

b. Prune to improve the aesthetical appeal of individual trees.

c. General maintenance practices; such as fertilizing, spraying, removing disease or insect infected portions, fill-in voids, and sealing mechanical injuries, will be accomplished to improve growth and maintain healthy condition in existing tree species in the intensively maintained areas.

Practice C. Vista. (Recreation Areas.) Trees that obstruct a scenic vista adjacent to devel-oped recreation areas will be thinned to 50 feet basal area. When possible, lower branches or the remaining trees will be pruned up to half the total height. Only branches that are less than one-fourth the diameter of the trunk at the point of attachment will be removed. Branches larger than this size will remain to avoid an unsightly scar or a deformed tree. This pruning will cause adventitious sprouting of branches. These branches will be removed periodically. Pruning cuts may be sprayed for aesthetic reasons.

Practice D. Vista Thinning. (Recreation Areas.) Trees that are adjacent to developed recreation areas but don't obstruct a scenic vista will be thinned to 80 feet basal area.

Practice E. Shade Selection. (Recreation Areas.) Selection of species to be thinned will be governed by shade producing qualities. Mast producers will be given secondary consideration. Recreation areas should be no more than 50% shaded to encourage grass growth.

Practice F. Canopy Selection. (Recreation Areas.) Selection of species in relation to canopy position to be removed will be as follows: first - suppressed understory species; second - intermediate, excluding shade tolerant species; third - codominant and dominant species.

Practice G. Screening. (Recreation Areas.) Screening will be provided between developed recreation areas and adjacent roads and railroad tracks where space permits. The screening will be established by planting seedlings in 3 or 4 rows. The row adjacent to the road will contain red osier dogwood and red cedar spaced 6 feet apart. The next row will contain cherry or autumn olive spaced 10 feet apart. The middle row will contain silver maple spaced 12 feet apart. The next row will contain green ash spaced 10 feet apart; this is optional depending on space limitations. All rows will be 15 feet apart. These row plantings will provide both screening from users of the recreation area from the road user and will provide reduced noise level in the campground caused from vehicular traffic. The dust created on gravel roads adjacent to recreation areas will be collected in the row plantings.

Practice H. Cleaning. A cutting is made in a young stand, not past the sapling stage, for the purpose of freeing trees from other individuals of similar age that are of less desirable species or are likely to overtop them. Sapling stands should be cut to provide 4-5 feet of opening between crowns of the trees that will form the future stand.

Practice I. Clearcutting. The harvest of all timber in a mature stand in one cut. As this practice is implemented, the site will be scarified as much as possible with the equipment available, so that a good seedbed will be provided for the desired regeneration. If desired, scarification using specific equipment after the logging operation may be specified in the contract. Clearcutting will be used to maintain different stages of growth in the maple monocultures found on the flood plain. Deer and other wildlife will benefit from the vegetational diversity. Higher areas in elevation may be harvested with a clearcut if hardwood mast trees, important in providing food for wildlife, cannot reproduce themselves or should be reestablished in the area. After logging, the slash may be piled, windrowed, or scattered depending on the site and conditions involved and will be specified in the contract. Clearcuts done in the same area will be designed to leave travel lanes of 100 feet between areas of older timber so wildlife can safely travel to and from resting cover and food.

Removal of all timber in a silver maple or cottonwood stand will be done in a 1-10 acre "patch." The patch will be irregularly or cylindrically shaped to obtain a maximum of edge ecotone. In order to insure vigorous regeneration of harvested stands, we feel that the size of regeneration cuts should be from 5 to 10 acres when practical. Research indicates that very small regeneration harvests do not result in adequate restocking of the stand, and does not yield strong wildlife benefits.

The timing of clearcuts will be determined in coordination with the US Fish and Wildlife Service and the appropriate states. If regeneration does not occur in three years because ground vegetation takes over, the impeding vegetation will be removed via manual or chemical means.

Practice J. Improvement Cut. A cutting made in a stand past the sapling stage for the purpose of improving its composition and character, but removing trees of less desirable species, form and condition in the main crown canopy.

Practice K. Liberation. A cutting made in a young stand, not past the sapling stage, for the purpose of freeing the young trees from older individuals that are overtopping them.

Practice L. Timber stand improvement. Noncommercial improvement of the composition and quality of the timber stand by various methods including the following.

a. Cull tree removal (including girdling and liberation cut): girdling will provide potential denning or woodpecker trees.

b. Crop tree release.

c. Clearing of vines and herbaceous growth - manual or herbicidal.

d. Thinning or weeding.

e. Release cut - hand or herbicidal treatment.

f. Sanitation cut.

g. Pruning - high value trees.

Practice M. No Treatment Zone. No treatment will be provided in a small area or extended zone of 100-200 feet due to overriding wildlife or aesthetic considerations, where such a practice is considered useful; such as along some heavily traveled shoreline areas. The extent of the zone will be determined based on environmental and ecological factors, human usage of the area, and sensitivity of wildlife using the area.

Practice N. Natural or Unique Areas. Unique areas are to have no prescriptions applied to them. The areas will have research or educational significance or be habitat for very sensitive or endangered wildlife.

Monitoring will be applied with this practice to acquire hard data on the unique areas. The data will be used to determine future status of the area and any management needed.

Practice O. Sanitation Salvage. A cutting made to remove trees killed or injured by wind, fire, insects, fungi, or other harmful agencies (and sometimes trees susceptible to such injuries), for the purpose of preventing the spread of insects or disease.

Practice P. Selection. Selection harvesting of mature timber as single trees or small groups and repeated indefinitely at short intervals to stimulate reproduction and create or maintain an unevenaged stand.

Group removal opening will be equal to or greater than the height of the overstory trees, but no opening will be created larger than one acre. Any opening larger than one acre is a clearcut and will be done only when that practice is prescribed.

Practice Q. Thinning. A cutting made in an immature stand for the purpose of increasing the rate of growth, and the form of the trees that remain. The cutting should increase the total production of the stand by increasing understory growth for wildlife. The thinning may be cut to an accepted basal area which is currently 90-100 BA per acre in Silver Maple-Cottomwood and 70 square feet per acre BA in Oak-Hickory stands. Thinning will be based on stand mapping, silvicultural considerations, and wildlife habitat needs.

As the practice of thinning is applied, the forester marking the timber to be removed must look at the trees in two ways: tree product quality of the residual stand and stand composition for future wildlife habitat.

A forest consists of trees of varying species, quality, form, and often age. In considering tree product quality, forest trees can be placed in three general classes: good growing stock, reserve growing stock, or poor growing stock. Most of the trees remaining after cutting should consist of good growing stock, and some reserve growing stock. Trees will generally be thinned from reserve growing stock and poor growing stock.

While looking at product quality, in the decision of what trees to cut and what trees to leave, the composition of stand as it provides wildlife habitat in the future must be considered. An appropriate number of den trees, potential den trees, and mast bearing trees, for instance, should be a part of the residual stand after thinning.

Practice R. Lopping and scattering. Lopping the slash soon after logging and spreading it more or less evenly over the ground, without burning (lopping may be done without scattering).

Practice S. Slash or Prescribed Burning. Slash burning - burning slash in windrows, in piles, or in an area to reduce it or remove it from the harvested or damaged area. Nutrients will be released more quickly for use by the regenerating stand, and the amount of flash fuels will be reduced, decreasing potential for wildfire occurrence.

Prescribed burning - burning an area after properly constructed firelines have been established. Fuel moisture content of the different fuels present, air temperature, wind speed and direction, atmosphere relative humidity, and the number of days since the last rain are all factors that

must be considered in the decision making process involved in a prescribed burn. Additionally, properly constructed firelines are necessary to insure positive control of the fire. Smoke management is also a part of conducting a prescribed burn. The effect of smoke on pleasure craft, commercial craft, nearby recreation, and any nearby residential areas must be noted. Because of the sensitivity of burning, coordination must be complete. Prescribed burning must be coordinated with all interested and affected parties.

Practice T. Monitor. Monitor the area or stand for any change in the stand indicating a need for the implementation of management practices. A significant change in the overstory or continued absences of regeneration leading to a change of species are two situations that may call for monitoring. Monitoring will be done over a 10-20 year period, unless a storm or other conditions necessitate immediate action.

As a result of the monitoring process, hard data will be acquired. Two or more plots, as well as a control plot, will be established and measured each year to gather hard data on which to base a sound management decision at the end of the monitoring period. The plots will be at least 1/5 acre in size, except for reproduction test plots which may be smaller. All plots will be systematically installed and located so data can be gathered for the entire monitoring period. Data acquired during the monitoring process will be kept on file in the Mississippi River Project office of Recreation Resources, Box 34, Pleasant Valley, Iowa 52767.

Practice U. Shelterwood. The stand is removed in two cuts over a period of several years. The residual stand left after the first cut will be composed of species such as hardwood mast trees, if such trees are present, that will help to meet the management needs of the area in the interim period.

Underplanting after the first cut may be used to regenerate Oaks or Hickory, etc., where natural regeneration may be hindered by a lack of seed source, etc. From 50-70 percent of the Basal Area will be removed in the first cut. The final cut removes the Shelterwood trees.

Practice V. Seed Tree Modified. A cutting in which 6-10 trees are left per acre in a 1-10 acre irregularly shaped "patch." As this practice is implemented with the equipment available, the site will be scarified as much as possible with the equipment available, so that a good seedbed will be provided for the desired regeneration. If desired, scarification using specific equipment after the logging operation may be specified in the contract. The "leave" trees should be windfirm and of the more desirable species and form for seeding the area back in. The trees left standing can be girdled or harvested once the new stand is established. Pile brush after harvesting if wildlife using the site will benefit. Brush piles will be six feet in height and have a surface area of from 500-2,000 square feet.

Practice W. Special Management Zones. Special management practices will be practiced in designated zones. A different rotation may be necessary to accomplish this.

In a zone 100-400 feet wide or in large areas, management practices including some clearcuts will be made over a different or perhaps longer rotation; such as 150 years. These zones will provide for special management purposes, such as to sustain wood duck nesting cavities in silver maple. Sloughs, ponds, or lakes that are stagnant or have little current are preferred by wood ducks for nesting. Conditions as this result in prime habitat, and as such the widest zone (400 feet) may be aplied along these water areas. Where oak and/or hickory occupies sites in this zoning, only improvement cuts will be done to reduce the basal area per acre to 70 square feet per acre and to encourage mast production and natural regeneration. In silver maple stands, shelterwood, seed tree, and small clearcuts, up to two acres, may be done at the end of the rotation. Thinnings down to 90-100 square feet per acre will be done when the stand is overstocked to increase growth speed cavity formation. Squirrel and/or wood duck nesting boxes can be put up to (1) provide more nesting opportunity for target species, and (2) developing or maintaining a squirrel population in an area. The nest boxes must be predator-proof, durable, and provide weather protection.

Practice X. Stand Mapping. Map the unit perhaps on north-south or east-west transects 10 to 20 chains apart for large homogenous areas. Smaller areas, areas which have good representative aerial photos, or areas having easily followed terrain features will be stand mapping using individual transect lines. The lines will be set up to adequately cover different stand types down to two acres in size. It is essential that the stand mapping collect the necessary information in an efficient manner. The following is a brief description of the method we will use.

a. Stand number - to be assigned to each stand, marked on the map and indexed to a set of stand descriptions.

b. The stand description is to contain the following information:

(1) Stand and unit number and name, and pool number.

(2) A list of the three dominant overstory species in order of dominance.

(3) The basal area per acre.

(4) The average age of the overstory stand.

(5) The dominant understory species, its height and crown coefficient factor in percent.

(6) The secondary understory species, its height and crown coefficient factor in percent.

(7) Any seed source present for mast bearing trees.

(8) Diameter growth rates of the dominant overstory.

(9) Average diameter or range of diameters of the dominant overstory species.

(10) The acreage of the stand.

ADDENDUM 11

ADDENDUM 11

1. INTRODUCTION

Pool 11 extends 32.1 miles from Guttenberg, Iowa, to Dubuque, Iowa. The pool contains 15,000 acres of water, 275 miles of shoreline (including islands), and 7,163 acres of public land. Project lands comprise the majority of the total public land area.

Approximately 3,745 acres of project woodlands are located in this pool. Mast tree associations occur rarely on higher areas.

In this pool the fish and wildlife resources are managed on Cooperative Agreement lands by the US Fish and Wildlife Service. Dago Slough and 12 Mile Island have been designated as closed wildlife sanctuaries by the US Fish and Wildlife Service.

2. PRESCRIPTIONS FOR POOL 11

Unit Title	Tract No.
Dago Slough Closed Wildlife Sanctuary	FW 217-230, 232-234

720.4 acres. UNIT NO. I

Photos No. 11-19 to 11-16. River mile 600-604.

Apply practice W (Special Management) along river shores and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i and 9_i apply practice Q (Thinning).

In this unit harvest no more timber.

The Long Term Goal - Maintain the unit's valuable wetland habitat.

From Lock and Dam 11 to River Mile 600 (Most of the Dage Slough Wildlife Area owned by US Fish and Wildlife Service land)	FW 1, 2, 27-31, 52-57, 62, 64, 68, 70-192, 194-196, 200-203, 205-207, 211-216 FIA 1-37, 41-67

314.6 acres. (II)

Photos No. 11-15 to 11-1. River Mile 583-600.

Apply practice W (Special Management) along river shores and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 9_i and 2_i apply practice Q (Thinning).

In Type 51 apply practice A_{a-c} and B (Planting and Tree Maintenance).

Practice N (Unique Area) delineates the rookery.

A Heron rookery is located at about river mile 600. It is marked as a unique area on the type maps. All of the Corps-owned lands in this area will be in a special management zone status.

The Long Term Goal - maintain the aesthetic and wildlife qualities of the area.

Bunker Chute and Nearby Islands — FIA 68-73, IAIS 6-8

292.9 acres. (III)

Phots No. 11-18 and 11-17. River mile 601-603.

Apply practice W (Special Management) along river and island shores and sloughs.

Apply practice X (Stand Mapping) before applying any other practice.

In Type 9_i and 2_i apply practice Q (Thinning).

In Type 5 apply practices L_a and L_c (Timber Stand Improvement).

The Long Term Goal - Maintain a mix of evenaged stands in different stages of growth.

Jack Oak Island Area — IAIS 9, 10, WIS 19, 22

408 acres. (IV)

Photos No. 11-19 and 11-20. River mile 603-606.

Apply practice W (Special Management) along river shore and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 6_{im} apply practice J (Improvement Cut).

In Type 2_i 9_i apply practice Q (Thinning). If majority of the stand is willow, practice Q will not be applied.

The Long Term Goal - Maintain a mix of evenaged stands in different stages of growth. On the few higher areas we will maintain and, if practical, diversify mast tree associations.

Turkey River Area FIA 81-97, 102

879 acres. (V)

Photos No. 11-19 to 11-23. River mile 605-609.

Apply practice W (Special Management) along river shore and sloughs shores.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 9_i and 2_i apply practice Q (Thinning).

In Type 20 treat the area as a wetland.

In Type 5 apply practices L_a and $_c$ (Timber Stand Improvement) if feasible.

In Type 3_{im} apply practice J (Improvement Cut). Release the few pin oaks found growing there. If oak responds, further planting and fertilization will establish a better species mix on this ridge of higher ground generated by dredge spoil.

In Type 9_{im} apply practice V (Seed Tree Cut).

Apply practice S (Prescribed Burn) on sites where rice cut-grass is the dominant ground vegetation, but not in standing timber because of damage to the timber that will result from any fire. though not put in the type maps, this prescription will be applied at the discretion of the Wildlife Managers.

In this unit, harvest no more than 20 acres every 5 years.

The Long Term Goal - Establish some mast tree associations on the higher ridge area. Otherwise a mix of evenaged stands in different stages of growth will be maintained.

Muddy Creek Area and North FW 264, 268 269, 273-282

664.5 acres. (VI)

Photos No. 11-25 to 11-27. River mile 610-615.

Apply practice W (Special Management) along river shores, sloughs, and lakes.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 2_i, 9_i and apply practice Q (Thinning). If willow is 70%+ do not apply this practice.

In Type 3_{im}, apply practice J (Improvement Cut).

In Type 51 apply practices A_{a-c} and B (Planting and Tree Maintenance).

In Type 49 on selected areas apply practice S (Prescribed Burn).

In this unit harvest no acreage.

The Long Term Goal - Maintain a mix of evenaged stands in different stages of growth.

Goetz Area — FIA 112-122, IAIS 15

527.4 acres. (VII)

Photos No. 11-24 to 11-27. River mile 611-614.5.

Apply practice W (Special Management) along river shore.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 6_{im}, 3_{im}, apply practice J (Improvement Cut), then practice T (Monitor) for oak regeneration.

In Type 2_i and 9_i, apply practice Q (Thinning).

In Type 9_{im}, 9_m, apply practice V (Seed Tree Cut).

In this unit harvest no more than 10 acres every 10 years.

The Long Term Goal - Maintain the oak association and a mix of evenaged stands in different stages of growth.

3. PRIORITIES LIST - POOL 11

A	Thin, young silver maple, ash, and cottonwood stands north and south of Turkey River.
B	Plant some mast trees in the higher sandy area where a few pin oak trees are now growing (near the powerline), and release the pin oak trees there now.
C	Thin silver maple, ash, cottonwood areas landward Bunker Chute.

4. ESTIMATED COST

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	1,900	$150	$285,000
Improvement cut	108	$150	$ 26,200
Timber stand improvement	10	$ 30	$ 300
Harvest (contractural preparation)	32	$ 60	$ 1,920
Site Preparation	32	$110	$ 3,520
Planting	50 ± 30	$ 50	$ 2,500 ± $ 1,500
Type mapping	2,050	$ 2	$ 4,100
	Total Cost for Pool 11		$323,540 ± $ 1,500

Pool 11 - Inventory Data

AREA SOUTH OF TURKEY RIVER (IA) UNIT NO. V

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	4.29	38.88	146.68	4.50
Cottonwood	4.29	1.33	468.45	24.32
Elm Sp	5.71	23.66	98.76	6.66
Silver Maple	82.86	241.19	3338.53	7.94
Willow Sp	21.43	118.14	634.33	5.77
Misc	0.00	1.00	0.00	0.00
TOTAL	118.58 sq.ft.	424.20	4686.75 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	4686.6	2496.94	6876.17
Sq. Ft. Basal Area	132.9	98.94	166.78
Number of Trees	439.9	162.85	717.01

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 111.4
Sq. Ft. Basal Area .63

FOR CLASSES 5-9
Per Acre Figures

Wildlife Related Inventory Data

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
SILVER MAPLE		1.43	1.41	13.63
	TOTAL	1.43 sq.ft./A	4.41/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
SILVER MAPLE		2.86	1.76	17.23
	TOTAL	2.86 sq.ft./A	1.76/A	
Class 7 Standing Dead Tree				
ELM SP		2.14	1.83	14.67
SILVER MAPLE		1.43	3.72	8.39
WILLOW SP		7.14	9.43	11.78
MISCELLANEOUS		3.57	1.77	19.25
	TOTAL	14.28	16.75/A	
Class 9 Grapevine				
ASH SP		2.14	33.48	3.43
COTTONWOOD		2.86	1.09	21.90
ELM SP		1.43	11.82	4.71
SILVER MAPLE		7.14	5.48	15.46
WILLOW SP		1.43	1.42	13.58
MISCELLANEOUS		1.43	.49	23.21
	TOTAL	16.43 sq.ft./A	53.78/A	

AREA NORTH OF TURKEY RIVER (IA) UNIT NO. V

Total Stand Summary

Sp.	Ba/Aft2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	11.67	8.35	637.80	16.01
Cottonwood	11.67	3.47	1897.31	24.82
Elm Sp	13.33	41.35	304.99	7.69
Silver Maple	50.00	251.45	1248.02	6.04
Willow Sp	18.33	21.04	705.60	12.64
Misc	0.00	1.00	0.00	0.00
TOTAL	105.00 sq.ft.	326.66	4793.72 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	4829.7	12.78	9646.65
Sq. Ft. Basal Area	120.0	64.86	175.14
Number of Trees	348.4	0.00	852.14

Average Annual Growth Per Acre Int. Bd. Ft. 69.6
Sq. Ft. Basal Area .47

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	1.67	.19	40.00
TOTAL	1.67 sq.ft./A	.19/A	
Class 7 Standing Dead Tree			
ELM SP	3.33	4.99	11.07
SILVER MAPLE	3.33	9.25	8.13
WILLOW SP	3.33	6.90	9.41
MISCELLANEOUS	5.00	1.56	24.23
TOTAL	14.99 sp.ft./A	22.70/A	

FOR CLASSES 5-9
Per Acre Figures

Wildlife Related Inventory Data (Cont'd)

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine			
ASH SP	6.67	3.16	19.66
COTTONWOOD	1.67	.63	22.00
ELM SP	3.33	3.68	12.88
SILVER MAPLE	20.00	1.26	12.99
MISCELLANEOUS	3.33	1.26	22.00
TOTAL	34.67 sq.ft./A	20.47/A	

BUNKER CHUTE (IA) UNIT NO. III

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.43	5.68	0.00	6.79
Cottonwood	5.00	2.53	512.22	19.05
Elm Sp	2.86	37.80	67.68	3.72
Silver Maple	70.71	204.35	1397.53	7.97
Willow Sp	27.86	25.39	1682.88	14.18
TOTAL	107.86 sq.ft.	275.75	3660.31 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	3609.3	2233.22	4985.35
Sq. Ft. Basal Area	122.9	96.80	148.91
Number of Trees	292.5	163.29	421.61

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 510.7
Sq. Ft. Basal Area 3.19

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree			
COTTONWOOD	1.43	.60	20.93
SILVER MAPLE	3.57	4.27	12.39
WILLOW SP	10.00	11.84	12.44
TOTAL	15.00 sq.ft./A	16.71/A	
Class 9 Grapevine			
COTTONWOOD	2.14	1.30	17.41
ELM SP	.71	32.74	2.00
SILVER MAPLE	9.29	15.99	10.32
WILLOW SP	4.29	3.52	14.95
TOTAL	16.43 sq.ft./A	53.55/A	

MUDDY CREEK (WI) UNIT NO. VI
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	9.38	15.0	638.14	10.70
River Birch	.63	.58	41.57	14.00
Cottonwood	15.00	15.08	1555.78	13.51
Elm Sp	4.38	3.20	342.91	15.83
Silver Maple	71.25	159.88	3304.66	9.04
Willow Sp	7.50	7.62	624.42	13.43
Misc	0.00	1.00	0.00	0.00
TOTAL	108.14 sq.ft.	202.36	6507.48 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6464.4	4143.50	8785.28
Sq. Ft. Basal Area	118.1	97.70	138.55
Number of Trees	212.2	136.03	288.39

Average Annual Growth Per Acre Int. Bd. Ft. 141.9
Sq. Ft. Basal Area .59

FOR CLASSES 5-9 **Wildlife Related Inventory Data**
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
RIVER BIRCH	.63	.45	16.00
SILVER MAPLE	1.88	.29	34.47
TOTAL	2.51 sq.ft./A	.74/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	1.88	.21	40.00
MISCELLANEOUS	.63	.11	32.00
TOTAL	2.51 sq.ft./A	.33/A	
Class 7 Standing Dead Tree			
RIVER BIRCH	2.50	2.20	14.43
ELM SP	1.25	1.59	12.00
SILVER MAPLE	.63	1.79	8.00
WILLOW SP	2.50	3.11	12.14
MISCELLANEOUS	3.13	2.16	16.30
TOTAL	10.00 sq.ft./A	10.85/A	
Class 9 Grapevine			
ELM SP	1.88	1.55	14.89
SILVER MAPLE	8.75	8.36	13.85
WILLOW SP	.63	.58	14.00
MISCELLANEOUS	1.88	1.25	16.59
TOTAL	13.14 sq.ft./A	11.74/A	

ADDENDUM 12

ADDENDUM 12

1. INTRODUCTION

Pool 12 extends from Dubuque, Iowa, to Bellevue, Iowa, a distance of 26.3 miles. The pool contains 19,000 acres of water, 280 miles of shore (including islands), and 5,865 acres of public land. Project lands comprise the majority of the total public land area.

Approximately 4,200 acres of project woodland are located in this pool. The mast tree associations that can be found in this pool are small stands on higher areas.

Fish and wildlife resources on Cooperative Agreement lands in this pool are managed by the US Fish and Wildlife Service.

2. PRESCRIPTIONS FOR POOL 12

Unit Title	Tract No.
Lock and Dam 12 to River Mile 564	iisl, 9b, 13, 14 FIa 1-8 IAIS 1, 2, 15, 17 FI 9, 1, 9A, 9B, 13, 14, 18-20, 22-29, 30-33, 35

630.7 acres. UNIT NO. I

Photos No. 12-1 to 12-9. River mile 557-563.

Apply practice W (Special Management Zone) along river shore, sloughs, and wetlands.

Apply practice X (Stand Mapping) before applying any other practice.

In Type 9_1 apply practice Q (Thinning).

Most of the area is too wet to manage as a timber type.

In the Bellevue and Crooked Slough recreation areas apply practices A_{a-c} (Plant) and B (Tree Maintenance).

The Long Term Goal - Maintain sufficient den trees and some variety of vegetation in the stone slough area.

Menominee Slough South
River Mile (about) 571.5 to 563
and islands and Stone Lake

IIS 5-11, 18, 20, 21-29, 32A, 32B, 32C
FI 7, 38-44, 48A, 48B, 49-59

1,638 acres. (II)

Photos No. 12-9 to 12-15. River mile 571.5-563.

Apply practice M (No Treatment Zone) along all shore lines and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 4_{im} and 6_{im}, apply practice J (Improvement Cut), then T (Monitor).

In Types 2_i and 9_i apply practice Q (Thinning).

In Type 3_{im} apply practice J (Improvement Cut), V (Seed Tree), or U (Shelterwood), then A_{d-f} (Plant).

In Type 9_{im} apply practice I (Clearcut) then A_{d-f} (Reforestation).

In this unit harvest no more than 50 acres every 5 years.

The Long Term Goal - Maintain the higher areas in the oak complex dominating those areas, and if feasible diversify area by planting hickory, walnut, and other species of oak. The lower areas will be a mix of evenaged stands in different stages of growth.

Nine Mile Island
Shawon Sasse Slough Area

IAIS 4A, 4B, 4C, 6, 9
FIa 25, 26, 28

671 acres. (III)

Photos No. 12-14 to 12-16. River Mile 571.5-574.5.

Apply practice W (Special Management) along all shores and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 9_i apply practice Q (Thinning).

In Type 5 apply practices L_a and L_c (TSI) then A_{d-f} (Reforestation) in appropriate areas. If walnuts or oaks are found on the edge or in this type do not deaden them.

In Type 4_{im} and 6_{im} follow practice J (Improvement Cut).

In this unit harvest no more timber.

The Long Term Goal - Diversify and maintain the oak, hickory, or walnut now established on higher areas. Other higher areas in this unit that can support an oak, hickory, and/or walnut association will be planted in those species. Lower areas will be a mix of evenaged stands in different stages of growth.

South of the Menominee River and offshore islands — FI 62-64 and part 61 iis 37-39

326.7 acres. (IV)

Photos No. 12-15 and 12-16. River mile 573-574.5.

Apply practice W (Special Management) along the Mississippi and Menominee River, around lakes, and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

Leave the islands alone.

In Type 6_{im} apply practice J (Improvement cut).

In Types 6_i, 9_i and 1_i apply practice Q (Thinning). A small ridge line dominated by oak was located during the inventory, and then approximately on the photograph. If the area extends into Type 9_i or 1_i, thin to release these trees. Do not thin areas 70%+ willow.

In this unit harvest no more timber.

The Long Term Goal - Maintain and diversify the higher areas that support oak. The lower areas should be a mix of evenaged stands in different stages of development. Management of this area will be difficult due to the wetness of the area and poor access.

Bowfin - Fentress - Julien Dubuque Bridge and associated islands — FI 65-69, 74-84 iis 41

664.6 acres. (V)

Photos No. 12-17 to 12-20. River mile 574.5-579.8.

Apply practice W (Special Management) along slough, river shore, and Fentress Lake.

Apply practice X (Stand Mapping) before applying any other practices.

Apply practice N (Unique Area) to Heron rookery area and a 1,500-foot zone around the rookery.

In Types 9_i, 2_i, and 1_i apply Q (Thinning).

In Type 48, 5 and 46 apply practice L_c (TSI).

In Type 6_{im} apply practice J (Improvement Cut).

In this unit harvest no more timber.

The Long Term Goal - Maintain and diversify the higher areas that support oak. The lower areas will be a mix of evenaged species in different stages of growth.

River Mile 581
to Eagle Point Bridge — FW 1-7, 8A, 10

260 acres. (VI)

Photos No. 12-22 and 12-23. River mile 581-583.

Apply practice W (Special Management) along river shores, sloughs, and lakes.

Apply practice X (Stand Mapping) before applying any other practice.

In Type 9_i apply practice Q (Thinning).

The Long Term Goal - Maintain a mix of evenaged stands in different stages of development.

3. PRIORITIES LIST - POOL 12

A — In the Menominee river area, conduct an improvement cut to release oak found during the inventory. This is a small ridge that may not be easily distinguished on the aerial photographs.

B — Thin, young, overcrowded silver maple, ash, and cottonwood stands on Nine Mile Island.

C — Improvement cuts should be made to aid in mast production and perhaps tree regeneration where mast trees occur in the pool. In the Menominee slough and south, a special effort should be made to insure continued reestablishment of mast tree areas in this area if indications over the next few years are that the trees cannot reestablish themselves.

D Thin, young overcrowded silver maple, ash, cottonwood stands south and west of Bowfin Lake (FI 78), south and west of Fentris Lake (FI 65-69), south of the Menominee River, finally, along west and south of the Menominee Slough (river mile 572-565).

4. ESTIMATED COST

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	1,700	$150	$255,000
Improvement cut	235	$150	$ 35,250
Timber stand improvement	30	$ 30	$ 900
Harvest (contractural preparation)	70	$ 60	$ 4,200
Site preparation	70	$110	$ 7,700
Planting	100 ± 70	$ 50	$ 5,000 ± $ 3,000
Type mapping	2,035	$ 2	$ 4,070
	Total Cost for Pool 12		$312,120 ± $ 3,500

Pool 12 - Inventory Data

NINE MILE ISLAND (IA) UNIT NO. III

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.11	.23	137.51	30.00
Boxelder	1.11	5.66	0.00	6.00
Elm Sp	10.00	31.79	303.35	7.59
Hackberry	4.44	21.22	0.00	6.20
Silver Maple	65.56	233.46	1956.69	7.18
Willow Sp	10.00	19.67	130.30	9.65
Misc	0.00	1.00	0.00	0.00
TOTAL	92.22 sq.ft.	313.03	2527.86 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	2527.9	53.11	5002.62
Sq. Ft. Basal Area	104.4	51.87	157.02
Number of Trees	322.9	0.00	654.23

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 100.3
Sq. Ft. Basal Area .50

FOR CLASSES 7-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree			
ELM SP	4.44	7.14	10.69
SILVER MAPLE	1.11	.14	38.00
WILLOW SP	2.22	2.08	14.00
MISCELLANEOUS	6.67	3.62	18.39
TOTAL	14.44 sq.ft./A	12.98/A	
Class 9 Grapevine			
ELM SP	5.56	25.89	6.27
HACKBERRY	2.22	2.83	12.00
SILVER MAPLE	14.44	18.02	12.12
WILLOW SP	7.78	8.35	13.06
TOTAL	30.00 sq.ft./A	55.09/A	

MENOMINEE RIVER SOUTH TO RIVER MILE 573 (IL) UNIT NO. IV

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	.63	.29	36.53	20.00
Boxelder	1.88	4.73	0.00	8.53
Cottonwood	8.75	14.93	618.96	10.37
Elm Sp	5.00	20.32	44.53	6.72
Silver Maple	53.75	252.73	959.73	6.24
Pin Oak	0.00	1.00	0.00	0.00
Willow Sp	33.13	37.07	1219.17	12.80
Misc	0.00	1.00	0.00	0.00
TOTAL	103.13 sq.ft.	332.06	2878.92 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	2878.9	1551.71	4206.12
Sq. Ft. Basal Area	130.0	103.12	156.88
Number of Trees	363.2	127.85	598.62

Average Annual Growth Per Acre Int. Bd. Ft. 159.5
Sq. Ft. Basal Area .76

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	.63	.07	40.00
PIN OAK	.63	.15	28.00
WILLOW SP	1.25	.55	20.36
TOTAL	2.51 sq.ft./A	.77/A	
Class 7 Standing Dead Tree			
SILVER MAPLE	3.75	2.20	17.68
PIN OAK	.63	.15	28.00
WILLOW SP	15.00	20.96	11.45
MISCELLANEOUS	7.50	9.86	11.81
TOTAL	26.88 sq.ft./A	33.17/A	

FOR CLASSES 5-9 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine			
COTTONWOOD	1.25	1.29	13.32
ELM SP	.63	7.16	4.00
SILVER MAPLE	6.88	19.58	8.02
MISCELLANEOUS	1.25	1.38	12.88
TOTAL	10.01 sq.ft./A	29.41/A	

MENOMINEE RIVER NORTH TO FENTRIS LAKE (IL) UNIT NO. V
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	20.00	25.50	703.69	11.99
River Birch	0.00	1.00	0.00	0.00
Cottonwood	1.43	.54	176.31	22.00
Elm Sp	5.71	14.21	135.36	8.59
Hackberry	5.71	65.48	0.00	4.00
Silver Maple	67.14	123.77	1150.27	9.97
Pin Oak	4.29	2.22	457.30	18.82
White Oak	2.86	.68	209.41	27.79
Willow Sp	8.57	6.99	248.31	14.99
Misc	0.00	1.00	0.00	0.00
TOTAL	115.71 sq.ft.	241.39	3080.66 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	3080.7	774.25	5387.08
Sq. Ft. Basal Area	134.3	89.98	178.60
Number of Trees	327.8	151.29	504.36

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 12.3
Sq. Ft. Basal Area .34

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	1.43	1.82	12.00
SILVER MAPLE	1.43	.16	40.00
TOTAL	2.86 sq.ft./A	1.98/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
PIN OAK	1.43	.23	34.00
WHITE OAK	1.43	.39	26.00
TOTAL	2.86 sq.ft./A	.62/A	
Class 7 Standing Dead Tree			
ASH SP	2.86	9.09	7.59
RIVER BIRCH	1.43	1.82	12.00
ELM SP	4.29	9.42	9.13
SILVER MAPLE	5.71	41.84	5.00
WILLOW SP	1.43	2.62	10.00
MISCELLANEOUS	2.86	23.65	4.71
TOTAL	18.58 sq.ft./A	88.44/A	
Class 9 Grapevine			
ASH SP	2.86	3.64	11.99
ELM SP	1.43	.81	18.00
SILVER MAPLE	1.43	.54	22.00
PIN OAK	1.43	.65	20.00
WILLOW SP	2.86	1.31	20.00
MISCELLANEOUS	2.86	23.65	4.71
TOTAL	12.87 sq.ft./A	30.60/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 10			
PIN OAK	4.29	2.22	18.82
WHITE OAK	2.86	.68	27.79
TOTAL	7.15 sq.ft./A	2.90/A	

AVERAGE ACORNS AND NUT YIELD BY SPECIES

SPECIES LISTING	POUNDS/ACRE	TOTAL POUNDS
PIN OAK	6.29	1,005.71
WHITE OAK	10.58 lbs./A	1,691.42 lbs.

BOWFIN AREA (IL) UNIT NO. V
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	15.00	46.92	182.67	7.66
River Birch	3.00	3.26	133.39	12.98
Boxelder	4.00	8.28	0.00	9.41
Cottonwood	24.00	27.56	2270.64	12.63
Elm Sp	14.00	125.21	133.88	4.53
Silver Maple	17.00	97.42	371.35	5.66
Pin Oak	1.00	5.09	0.00	6.00
Willow Sp	31.00	66.38	813.51	9.25
TOTAL	109.00 sq.ft.	380.13	3905.44	

Variable of Interest	Mean/Ac	95% Confidence Interval	
Int 1/4 Bd Ft	3905.4	1104.23	6706.65
Sq. Ft. Basal Area	114.0	80.25	147.75
Number of Trees	387.4	161.17	613.66

Average Annual Growth Per Acre Int. Bd. Ft. 340.6
Sq. Ft. Basal Area 1.66

FOR CLASSES 7-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree				
RIVER BIRCH		1.00	.94	14.00
COTTONWOOD		1.00	.94	14.00
ELM SP		1.00	2.86	8.00
WILLOW SP		2.00	2.55	11.99
	TOTAL	5.00 sq.ft./A	7.29/A	
Class 9 Grapevine				
ASH SP		4.00	4.42	12.88
BOXELDER		2.00	2.55	12.00
ELM SP		1.00	1.27	12.00
SILVER MAPLE		1.00	5.09	6.00
WILLOW SP		1.00	2.86	8.00
	TOTAL	9.00 sq.ft./A	16.19/A	
Class 10				
PIN OAK		1.00	5.09	6.00
	TOTAL	1.00	5.09/A	

ADDENDUM 13

ADDENDUM 13

1. INTRODUCTION

Pool 13 extends from Clinton, Iowa, to LeClaire, Iowa, a distance of 34.2 miles. The pool contains 29,103 acres of water, 503 miles of shoreline (including islands), and 25,160 acres of public land. Public lands purchased for other than project purposes and administered by the USFWS and the Department of the Army comprise a large portion of public land in this pool.

Approximately 5,920 acres of project woodlands are located in this pool.
31.3
3.0 = 5954.3 - includes reforested Ag leases.
Fish and wildlife resources on Cooperative Agreement lands in the Green Island drainage district area are managed by the State of Iowa under a third party agreement. Fish and wildlife resources are managed on the remaining Cooperative Agreement lands by the US Fish and Wildlife Service. The Elk River, Spring Lake, and Pleasant Creek areas have been designated as closed wildlife areas by the US Fish and Wildlife Service. Extensive wetland areas are maintained in this pool; such as the Green Island area which has 1,228 acres of wetland, compared to 391 acres of woodland.

2. PRESCRIPTIONS FOR POOL 13

Unit Title	Tract No.
Spring Lake Wildlife Area and Savanna Slough Area	FI 13, 13a, 162-175 IIS 4-6, 8-16B

591.7 acres. UNIT NO. I

Photos No. 13-14 to 13-19. River mile 531-536.8.

Apply practice W (Special Management) along the Mississippi and Plum River, and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_1 apply practice Q (Thinning).

In Type 6_{1m} apply practice J (Improvement Cut), then apply practice T (Monitor).

In Type 51 apply practices A_{a-c} (Plant) and B (Tree Maintenance).

Along the upriver levee of the Spring Lake Wildlife Area in 15 acres of type 9_{1m} apply practive I (Clearcut).

Up to 90% of the area will be under special management zoning.

The Long Term Goal - Maintain the wetland habitat and waterfowl it supports.

Lock and Dam 13 to Cook's Island Iowa side of the river channel only	A 3, 5, 10 -B FIa 3, 14, FIA 3, 14, 30, 42, 67-69, 81, 83, 84, 86, 87, 91, 93, 94, 148-154, 155B, 166-178 IAIS 40, 42, 44-46

392.8 acres. (II)

Photos No. 13-1 to 13-15. River mile 533-583.

Apply practice W (Special Management) along river shoreline and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i and 2_i 1_i apply practice Q (Thinning).

In Type 1_{im} and 9_{im} apply practice I (Clearcut).

In the recreation area in Tract FIa 67-69 apply practice A_{a-c} (Plant) and B (Tree Maintenance).

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Maintain the quality wildlife habitat and improve it. The area is composed of slender islands and peninsulas of shoreline. For that reason much of this unit will be left alone.

Lock and Dam 13 to River Mile 531.5 (Southern border of Spring Lake Wildlife Area) Illinois side of the Channel Only in Thompson Causeway Recreation Area	R 4, 5 FI 1-6B, 37, 64-68, 73, 104, 105, 109, 110, 112-155, 185-190, 193-195

531.5 acres. (III)

Photos No. 13-1 to 13-15. River mile 531-583.

Apply practice W (Special Management) along river and slough shores.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 3_i, 9_i, and 1_i practice Q (Thinning) will be applied.

In Type 48 apply practice S (Prescribed Burning) to maintain wetland areas. The amount of Type 48 to burn will be determined by the US Fish and Wildlife Service biologists in Savanna, Illinois.

In Type 51 apply practice A_{a-c} and B (Planting and Tree Maintenance).

In Type 4_{im}, 3_{im} and 6_{im} apply practice J (Improvement Cut) and practice P (Group Selection) in patches of undesirable tree species along the hunter access road. Then apply practice A_{d-f} (Reforestation) to a limited extent to patch cuts showing poor response or producing undesirable species reproduction.

The Long Term Goal - Maintain and enhance the recreational experience and wildlife experience that the area provides for users.

Savanna Bay, Hickory Lake Area + Santa Fe, Indian Little Soupbone, Big Soupbone, and Miscellaneous Island and river shore to the proving grounds — FIa 202-221, 229; IIS 28-33; IAIS 31, 33-35

684.9 acres. (IV)

Photos No. 13-20 to 13-24 and 13-26. River mile 538.5-545.

Apply practice W (Special Management) along river and slough shorelines.

Apply practice X (STand Mapping) before applying any other practices.

In Types 4_i, 9_i, 2_i, and 1_i apply practice Q (Thinning).

In Type 6_{im} apply practice J (Improvement Cutting).

In Type 51 apply practice A_{a-c} (Plantings) and B (Tree Maintenance).

In Type 9_{im} apply practice V (Seed Tree), then A_{d-f} (Reforestation) in suitable areas.

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Maintain the higher areas in oak, hickory, or walnut. Most areas are too low to support the preceeding species and will be managed as a mix of evenaged stands in different stages of growth.

Browns Lake Area — FIA 136-146, 292, 293

368 acres. (V)

Photos No. 13-24 to 13-26. River mile 543-546.

Apply practice W (Special Management) along lake and river shore.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 9_i, 2_i, and 1_i apply practice Q (Thinning).
As a part of thinning on Corps fee titled areas on the Browns Lake unit, an adjacent area on US Fish and Wildlife land may also be thinned at the same time. The thinning indicated on the type map was put there at the request of the US Fish and Wildlife Service, so that thinning on their land can be done in conjunction with and fully coordinated with thinning on Corps land.

In Type 6_{im} apply practice J (Improvement Cutting) to encourage regeneration and development of better mast production.

The Long Term Goal - Maintain this area as high quality wildlife habitat by maintaining a mix of evenaged stands in different stages of development, and higher areas in oak and other mast producing species.

Green Island Area + Southeastern shore of Maquoketa River — FIA 295-318, 349-355

391.1 acres. (VI)

Photos No. 13-25 to 13-29. River mile 546-548.5.

Apply practice W (Special Management) along river shore, lake shores, sloughs, and selected wetland areas.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 9_i and 1_i apply practice Q (Thinning). Coordinate the thinning in the lower right hand corner of the Green Island Wildlife Management Area with the US Fish and Wildlife Biologists Office from Savanna, Illinois.

In two small tracts of type 9_i apply practice I (Clearcut) to regenerate wetland.

In Type 9_{im}, 4_{im}, and 6_{im} apply practice J (Improvement Cutting) to encourage regeneration and increase mast production.

In In 5 apply practice L_a or L_b (Timber Stand Improvement), then practice A_{d-f} (Reforestation) if feasible.

In this unit harvest no timber for the next 5 years.

The Long Term Goal - Maintain and enhance species association on higher areas and maintain a mix of evenaged stands in different stages of development to maintain and enhance the wildlife habitat for a variety of wildlife. The Woodduck and other waterfowl, deer, raccoon, squirrel, and raptors are wildlife species whose habitat needs are of priority to the Iowa Conservation Commission.

1,244.3 acres. (VII)

Photos No. 13-13, 33, 35, 37, and 39. River mile 548.5-554.5.

Apply practice W (Special Management) along river shore, lakeshores, and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

Apply practice N (Unique Area) to the one heron rookery and a 1,500-foot zone around it.

Two heron rookeries occur in this management unit. Both are denoted by management practice N, even though both are on US Fish and Wildlife Service fee title lands. Silvicultural practices should be coordinated closely with the US Fish and Wildlife Service so as disturbances to the rookeries are minimized.

In Types 46, 48, 5, and 14_{im} apply practice L_a, L_b, and/or L_c (Timber Stand Improvement). Do not deaden any oaks, hickory, or walnut. Apply practice A_{d-f} (Reforestation) to suitable areas.

In Types 9_i and 3_{im} apply practice Q (Thinning). Favor mast producing trees such as oak when thinning Type 3_{im}.

In Type 6_{im} apply practice J (Improvement Cutting).

In Type 9_{im} apply practice I (Clearcut) or V (Seed Tree Cut) and A_{d-f} (Reforestation) in suitable areas.

In Type 51 apply practices A_{a-c} and B (Planting and Tree Maintenance).

In this unit, a large area is owned by the US Fish and Wildlife Service.

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Maintain and enhance the higher areas that can or do support oak, hickory, and/or walnut associations. The lower areas will be a mix of unevenaged stands in different stages of growth. Maintain the active rookeries, principally by minimizing any disturbance to the rookeries.

1,470 acres. (VIII)

Photos No. 13-15, 13-17, and 13-29 to 22. River mile 531-541.

Apply practice W (Special Management) along river and lake shores and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

Practice N (Unique Area) has been used to denote the heron rookery. Even though the rookery occurs entirely on US Fish and Wildlife Service fee title areas, any silvicultural practice on nearby Corps lands should be coordinated very closely with the Fish and Wildlife Service so as disturbance to the rookery is minimized.

In Types 6_i, 9_i, and 1_i apply practice Q (Thinning).

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3. PRIORITIES LIST - POOL 13

A Thin young, overstocked, silver maple, ash, cottonwood stands.

4. ESTIMATED COSTS

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	2,100	$150	$315,000
Improvement cut	300	$150	$ 45,000
Timber stand improvement	90	$ 30	$ 2,700
Harvest (contractural preparation)	45	$ 60	$ 2,700
Site preparation	45	$110	$ 4,950
Planting	70 ± 40	$ 50	$ 3,500 ± $ 2,000
Type mapping	2,535	$ 2	$ 5,070.00
	Total Cost for Pool 12		$378,920.00 ± $ 2,000

Pool 13 - Inventory Data

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	3.58	27.45	231.64	4.89
River Birch	6.42	12.31	401.64	9.78
Boxelder	1.13	18.57	38.01	3.34
Catalpa	0.19	0.04	16.14	30.00
Cottonwood	7.74	18.41	837.44	8.78
Elm Sp	4.34	33.95	32.36	4.84
Shagbark Hickory	0.19	0.11	23.84	18.00
Black Locust	0.00	1.00	0.00	0.00
Silver Maple	46.98	110.32	2720.42	8.84
Bur Oak	0.19	0.54	0.00	0.00
Pin Oak	1.89	1.05	180.20	18.12
Red Oak	1.89	1.34	151.09	16.80
Swamp White Oak	0.38	1.31	5.45	7.28
White Oak	0.38	0.17	45.59	19.97
Black Walnut	0.19	0.14	21.89	16.00
Willow Sp	9.25	65.91	476.25	5.07
TOTAL	84.72 sq.ft.	292.61	5181.95 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	5181.9	3912.82	6451.07
Sq. Ft. Basal Area	110.6	93.42	127.71
Number of Trees	336.2	212.47	459.84

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 132.7
Sq. Ft. Basal Area 0.67

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	0.19	0.11	18.00
CATALPA	0.19	0.04	30.00
COTTONWOOD	0.75	0.28	22.06
SILVER MAPLE	3.40	5.57	10.57
WILLOW SP	0.19	2.16	4.00
MISCELLANEOUS	1.70	0.53	24.13
TOTAL	6.42 sq.ft./A	8.69/A	

FOR CLASSES 5-10
Per Acre Figures

Wildlife Related Inventory Data (Cont'd)

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	0.94	3.64	6.90
WILLOW SP	0.19	0.11	18.00
MISCELLANEOUS	0.75	0.24	23.93
TOTAL	1.88 sq.ft./A	3.99/A	
Class 7 Standing Dead Tree			
RIVER BIRCH	0.94	1.18	12.11
COTTONWOOD	0.57	0.18	24.17
ELM SP	0.38	0.25	16.70
BLACK LOCUST	0.38	0.69	10.00
SILVER MAPLE	0.57	0.76	11.67
PIN OAK	0.19	0.05	26.00
RED OAK	0.19	0.24	12.00
WILLOW SP	0.57	2.40	6.57
MISCELLANEOUS	5.85	3.83	16.73
TOTAL	9.64 sq.ft./A	9.58/A	
Class 8 Leaf Nest			
WILLOW SP	0.19	0.09	20.00
TOTAL	0.19 sq.ft./A	0.09/A	
Class 9 Grapevine			
ASH SP	0.75	11.01	3.55
RIVER BIRCH	0.38	0.22	17.67
COTTONWOOD	1.32	0.61	19.98
ELM SP	0.94	6.59	5.12
SHAGBARK HICKORY	0.19	0.11	18.00
SILVER MAPLE	6.42	11.94	9.92
PIN OAK	0.19	0.14	16.00
WILLOW SP	0.57	0.40	16.15
MISCELLANEOUS	0.75	0.47	17.17
TOTAL	11.51 sq.ft./A	31.49/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 10				
SHAGBARK HICKORY		0.19	0.11	18.00
BUR OAK		0.19	0.54	8.00
PIN OAK		1.89	1.05	18.12
RED OAK		1.70	1.20	16.10
SWAMP WHITE OAK		0.38	1.31	7.28
WHITE OAK		0.38	0.17	19.97
BLACK WALNUT		0.19	0.14	16.00
MISCELLANEOUS		0.19	0.14	16.00
	TOTAL	5.11 sq.ft./A	4.66/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
BUR OAK		0.43	2,842.45
PIN OAK		3.94	25,829.22
RED OAK		8.89	58,208.45
WHITE OAK		0.91	5,932.07
	TOTAL ACORNS	14.17/lbs./A	92,812.19 lbs.
SHAGBARK HICKORY		0.25	1,606.60
	TOTAL NUTS	0.25 lbs./A	1,606.60 lbs.

ADDENDUM 14

ADDENDUM 14

1. INTRODUCTION

Pool 14 extends from Clinton, Iowa, to LeClaire, Iowa, a distance of 29.2 miles. The pool contains 10,450 acres of water, 277 miles of shoreline (including islands), and 4,953 acres of public land. Project lands comprise the majority of public land in this pool.

Approximately 4,460 acres of project woodlands are located in this pool. The great majority of mast tree associations in this pool can be found on the Wapsipinicon River Basin area and Beaver Island. A stand of bottom land mixed species including pecan can be found on an island offshore of the mouth of the Wapsipinicon River. This is unique because it is one of the most northerly stands of bottom land forest that contains pecan in the Mississippi River basin.

The Wapsipinicon River is one of the most valued recreational areas in the State of Iowa. A special management zone of 200 feet will be left on both banks of the river to preserve one of the few prime canoeing and boating waterways in Iowa.

Fish and wildlife resources on Cooperative Agreement lands in the Princeton area are managed by the State of Iowa under a third party agreement. Fish and wildlife resources on the remaining Cooperative Agreement lands are managed by the US Fish and Wildlife Service as a part of the Upper Mississippi River Wildlife and Fish Refuge System.

2. PRESCRIPTIONS FOR POOL 14

Unit Title	Tract No.
Lock and Dam #14 to Princeton including Smith's Island	Plat #1-5, LS 1-10 IAIS 1-3, FIA 1, 7, 8, 20-57, 88, 89, 115, 116, 121, 125, 134, 135, 160, 161, 164 A1, FI 1-10, 52-55, 55A, 60-83 IIS 4

Photos No. 14-1 to 14-9. River mile 493-502. UNIT NO. I

Apply practice W (Special Management) along river and slough shores.

Apply practice A_{a-c} (Plant) and B (Tree Maintenance) on tract A-1.

Apply practice X (Stand Mapping) before applying any other practices.

Plant experimental plantings on Type 54.

In Type 3_i, 24_{im}, on Smith's island immediately above L's/D 14, apply practice J (Improvement Cut). This is near a heavily used recreation site. Because of its historic structure and unique upland vegetation, this is an area with high interpretive potential.

The Long Term Goal - Maintain the aesthetic quality and interpretive potentials because of the upland vegetation found there.

South of the Princeton Wildlife area and Steamboat Slough area

FIA 218, 219, 221, 222
IAIS 4, 5, 8, 20-37

339.7 acres. (II)

Photos No. 14-9 and 14-10. River mile 502-505.8.

Apply practice W (Special Management) along river shores, island shores and slough.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 1_i and 9_i apply practice Q (Thinning).

In Type 9_{im} apply practice I (Clearcut) and then A_{d-f} (Reforestation).

Much of Steamboat Island area will be in the special management zones.

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Develop and maintain a mix of evenaged stands in different stages of growth. Eagles have been seen roosting along steamboat slough.

Princeton Wildlife area

FIA 224-226, 228, 513
Part 227

351.2 acres. (III)

Photos No. 14-9 to 14-11a. River mile 504-506.

Apply practice W (Special Management) along shoreline, sloughs, and lakes.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i and 1_i apply practice Q (Thinning). If 1_i is predominantly willow leave area alone. Thin above elevation (contour) lines 780 feet only. Do not thin below river mile 505.5.

In this unit harvest no more timber.

The Long Term Goal - Maintain and enhance the wildlife habitat in this unit by maintaining a mix of evenaged stands in different stages of development. Woodduck and other waterfowl and deer are priority wildlife species designated by the Iowa Conservation Commission in this unit.

Wapsipinicon River area and Schricker Slough area	FIA 227, 229-237, 239, 243, 247, 248, 250, 251, 269, 277-281, 292-294, 296-300, 316

1,510 acres. (IV)

Photos No. 14-11A to 14-15. River mile 506-509.

Apply practice W (Special Management) along the Wapsipinicon River and the Mississippi River.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 4_i, 15_i, 3_i, 1_i, 2_i, and 9_i apply practice Q (Thinning).

In Type 6_{im}, 4_{im}, apply practice J (Improvement Cut) to release oak in the understory.

In Type 9_{im} apply practice I (Clearcut) then A_{d-f} (Reforestation).

In Type 13_{im} and 3_{im} apply practice J (Improvement Cut) where scattered oaks occur. In higher openings apply practice L_c (TSI) and then A_{d-f} (Reforestation). In all other areas apply practice Q (Thinning) where the stand is stagnated and desirable species are present, or I (Clearcut) and A_{d-f} where such species are mature or not present on the site.

In type 21 apply practice T (Monitor) to determine if this area has become a wetland naturally or if poor management created the situation. Very small (100-square-foot) blocks of timber may be improved in the study by applying practice L (TSI).

In type 16_{im} apply practice W (Special Management).

In type 5 apply practice L_a and L_c (TSI) then A_{d-f} (Reforestation).

In this unit harvest no more than 5 acres every 5 years.

The Long Term Goal - Enhance and/or maintain the higherareas and the understory found on many of the areas. On higher areas where oaks are overtopped by silver maple, ash, or cottonwood the oaks will be released and other mast-producing species may be planted there to diversify the timber type. Lower area will be a mix of evenaged stands in different stages of growth. The recreational experience and aesthetic qualities will be maintained with the special management zone while wildlife is maintained and enhanced by applying silvicultural practice.

Adams, Coes and next northern island, offshore of Adams — IAIS 11-15 small island

189 acres. (V)

Photos No. 14-12 to 14-14. River mile 507-509.5.

Apply practice W (Special Management) along island shores and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 3_{im} apply practice J (Improvement Cut) then T (Monitor). Release pecan trees and use some of the pecans as a seed source for maintaining this northern pecan strain.

In Type 9_{i} apply practice Q (Thinning).

In Type 6_{im} apply practice J (Improvement Cut) then T (Monitor) for regeneration of oaks and hickories.

The Long Term Goal - Increase nut production from the pecan trees and use the nuts as a seed source for maintaining this northern hardy strain of pecans. The remaining associations of oak and hickory will be maintained. The lower areas will be a mix of evenaged stands in different stages of development.

Meredosia Island, areas below Albany, north and south of Meredosia, Swan Island and nearby land area and islands — IIS 12-18, 20 and islands; IAIS 18, FI 217; IAIS 17-19, 41; FIA 323

302.4 acres. (VI)

Photos No. 14-15 and 14-16. River mile 510-513.

Apply practice W (Special Management) along shorelines and along sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

On Swan Island, In Type 3_{im} apply practice J (Improvement Cut) to release any mast-producing trees.

In Type 9_{i} apply practice Q (Thinning).

The Long Term Goal - Maintain a mix of evenaged stands in different stages of development. In order to maintain a quality aesthetical boating experience, much of this area will have to be left alone.

Beaver Island area — IAIS 43, 44-70, 72, 73, 92

1,050 acres. (VII)

Photos No. 14-17 to 14-20. River mile 513-517.

Apply practice W (Special Management) along island shoreline, lakes, ponds, and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

Apply no practice to the heron rookery and a 1,500-foot zone around it.

In Type 2_i, 9_i, and 2_i apply practice Q (Thinning).

In Type 3_{im}, 15_{im}, 6_{im}, and 4_{im} apply practice J (Improvement Cut).

In Type 9_{im} apply practice I (Clearcut) then A_{d-f} (Reforestation).

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Maintain the areas dominated by oak and other mast-producing trees and diversify those areas. The lower areas will be a mix of evenaged stands in different stages of development.

Cattail Slough Area — FIA 254-260, 283-320, 326, 327, 331-353

340 acres. (VIII)

Photos No. 14-19 to 14-21. River mile 516-518.

Apply practice W (Special Management) along sloughs and river.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i apply practice Q (Thinning).

In Type 6_{im} apply practice N (Unique Area) or J (Improvement Cut). In most areas of pin oak apply practice N. In area where young trees could be helped apply practice J.

In the recreation area apply practice A_{a-c} (Plant) and B (Tree Maintenance).

In this unit harvest no acreage for the first 5 years.

The Long Term Goal - Maintain the areas already supporting good populations of pin oak in pin oak. Other areas will be a mix of evenaged stands in different stages of development.

Willow Island, Joyce's Island, and below Lock and Dam 13	IAIS 125, 126 FI 388-395, 406A, 407A, 409A, 410

467 acres. (IX)

Photos No. 14-20 to 14-25. River mile 519-523.

Apply practice W (Special Management) along sloughs and river shore.

Apply practice X (Stand Mapping) before applying any other practices.

Leave Willow and Joyce's Islands alone.

No practice will be applied on a 1,500-foot zone around the rookery. However, because only one nest exists, the area will be monitored for change.

In Type 2_i, 9_i, and 1_i apply practice Q (Thinning) if feasible.

In Type 5 apply practice L_a and L_c (TSI).

In Type 4_{im} and 6_{im} apply practice J (Improvement Cut).

In this unit harvest no more timber.

The Long Term Goal - Maintain a mix of evenaged stands in different stages of growth.

3. PRIORITIES LIST FOR POOL 14

A	Release oak in the Wapsipinicon River management unit.
B	Thin the pin oak area in the Wapsipinicon River management unit.
C	Release oak in areas where oak may be overtopped or in competition with maple or other non-mast hardwoods in the Cattail Slough and Beaver Island areas.
D	Conduct an improvement cut on class 6_{im} and 4_{im} stands on Beaver Island.
E	Thin the overcrowded silver maple and cottonwood area in Cattail Slough area and Beaver Island areas.
F	Plant "mast" trees in Wapsipinicon River management unit.

4. ESTIMATED COSTS

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	2,200	$150	$330,000
Improvement cut	1,200	$150	$180,000
Timber stand improvement	20	$ 30	$ 600
Harvest (contractural preparation)	25	$ 60	$ 1,500
Site preparation	25	$110	$ 2,750
Planting	20 ± 20	$ 50	$ 1,000 ± $ 1,000
Type mapping	3,445	$ 2	$ 6,890
	Total Cost for Pool 14		$522,740 ± $ 1,000

Pool 14 - Inventory Data

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	3.46	17.44	168.73	6.03
River Birch	4.87	10.04	231.50	9.43
Cottonwood	8.21	7.29	862.78	14.36
Elm Sp	5.38	57.64	80.55	4.14
Hackberry	.90	10.52	13.38	3.96
Hickory Sp	.13	1.47	0.00	4.00
Silver Maple	68.46	203.70	3951.08	7.85
Mulberry Sp	.90	9.30	0.00	4.21
Pin Oak	9.23	21.24	886.65	8.80
Swamp White Oak	.90	.48	95.30	18.59
Pecan	.13	.07	20.89	18.00
Sycamore	.26	.06	35.10	29.21
Willow Sp	6.41	61.59	378.41	4.37
Misc	.26	5.92	15.61	2.82
TOTAL	109.49 sq.ft.	406.94	6739.99 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6740.0	5822.12	7657.86
Sq. Ft. Basal Area	118.8	108.20	129.49
Number of Trees	416.6	286.43	546.83

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 107.7
Sq. Ft. Basal Area .53

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
RIVER BIRCH	.38	.24	17.22
COTTONWOOD	.13	.01	40.00
SILVER MAPLE	1.41	.58	21.18
PIN OAK	.38	.07	31.21
WILLOW SP	.26	.12	19.70
MISCELLANEOUS	1.03	.30	24.92
TOTAL	3.59 sq.ft./A	1.32/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
ASH SP	.13	.03	30.00
COTTONWOOD	.51	.07	37.75
SILVER MAPLE	2.18	.75	23.06
PIN OAK	.38	.06	35.65
WILLOW SP	.13	.07	18.00
MISCELLANEOUS	.90	.18	29.87
TOTAL	4.23 sq.ft./A	1.16/A	
Class 7 Standing Dead Tree			
ASH SP	.13	.24	10.00
RIVER BIRCH	1.41	.94	16.63
COTTONWOOD	.13	.02	38.00
SILVER MAPLE	2.95	4.99	10.40
PIN OAK	.26	.05	30.83
WILLOW SP	1.67	2.11	12.04
MISCELLANEOUS	2.82	1.35	19.54
TOTAL	9.37 sq.ft./A	9.70/A	

FOR CLASSES 5-10
Per Acre Figures

Wildlife Related Inventory Data (Cont'd)

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 8 Leaf Nest				
RIVER BIRCH		.13	.07	18.00
COTTONWOOD		.13	.09	16.00
PIN OAK		.51	.34	16.52
SWAMP WHITE OAK		.13	.03	26.00
	TOTAL	.90 sq.ft./A	.53/A	
Class 9 Grapevine				
ASH SP		.64	.66	13.34
RIVER BIRCH		.64	.29	20.12
COTTONWOOD		1.54	.84	18.27
ELM SP		.64	9.02	3.61
HACKBERRY		.13	.37	8.00
SILVER MAPLE		7.56	13.19	10.25
MULBERRY SP		.38	1.47	6.93
PIN OAK		1.67	1.34	15.12
SWAMP WHITE OAK		.26	.03	40.00
SHAGBARK HICKORY		.13	.16	12.00
WILLOW SP		.51	.47	14.12
MISCELLANEOUS		.26	.08	24.94
	TOTAL	14.36 sq.ft./A	27.92/A	
Class 10				
HICKORY SP		.13	1.47	4.00
PIN OAK		8.97	21.24	8.80
SWAMP WHITE OAK		.90	.48	18.59
PECAN		.13	.07	18.00
SHAGBARK HICKORY		.26	.18	16.25
	TOTAL	10.39 sq.ft./A	23.44/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS/ACRE	TOTAL POUNDS
PIN OAK		15.23	56,034.00
	TOTAL ACORNS	15.23 lbs./A	56,043.00/lbs.
HICKORY SP		.17	613.17
	TOTAL NUTS	.17 lbs./A	613.17/lbs.

ADDENDUM 16

ADDENDUM 16

1. INTRODUCTION

Pool 16 extends from the Quad City area to Muscatine, Iowa, a distance of 25.6 miles. The pool contains 12,047 acres of water, 202.5 miles of shorelines (including islands), and 4,843 acres of public land. Project lands comprise the majority of public land area in the pool.

Approximately 3,690 → 3,709.7 acres of project woodlands are located in this pool. Mast tree species ~~can~~ 19.7 be found on Andalusia islands, and Milan Bottoms. Included among those found in these areas are red oak and hickory. On much of Andalusia Island, however, young mast tree species are not common.

Fish and wildlife resources on Cooperative Agreement lands in this pool are managed by the Illinois Department of Conservation and the Iowa Conservation Commission through third party agreement.

2. PRESCRIPTIONS FOR POOL 16

Unit Title	Tract No.
Hog Island, Lock and Dam 16 area, Iowa shoreline to River Mile 472 nearby small island	IIS 1-4, 46 A1, 2 D 2 L 1, 2 FIA 1-3, 5, 7-11,
+	13-17, 21, 22, 24, 25, 30-37, 41, 43-60
Islands and Illinois shoreline to River Mile 463	FI 17-31 IAIS 1-47, 49

513.9 acres. UNIT NO. I

Photos No. 16-1 to 16-12. River mile 457-463 (Illinois) and 457-472 (Iowa).

Apply practice W (Special Management) along shorelines, sloughs, and wetlands.

Leave this area alone.

The Long Term Goal - Maintain aesthetic recreational values. The Iowa Conservation Commission has designated the eagle and the wood duck as priority wildlife species in this unit.

Above Dead Slough and from River Mile 463 to River Mile 474 plus Martin and Scisco Islands, Illinois side of the river	FI 31-48, 61-66, 69-71 IIS 6, 7

580.1 acres. (II)

Photos No. 16-5 to 16-13. River mile 463-472 (Illinois).

Apply practice W (Special Management) along shorelines and sloughs and wetland areas.

Apply practice X (Stand Mapping) before applying any other practice.

In Type 9_i apply practice Q (Thinning).

At the developed recreational areas practices A_{a-c} (Plant) and B (Tree Maintenance) may be applied.

The Long Term Goal - Provide a more pleasing recreational experience along this area.

Andalusia and assorted iles (including Smiths Island)	IIS 8-34 47-50

1,734.9 acres. (III)

Photos No. 16-6 to 16-14. River mile 464-475.6.

Apply practice W (Special Management) on the islands' shores, and main and side channel shorelines.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i, 3_i, and 9_i apply practice Q (Thinning). Where oak, pecan or hickory is found, release those species (in type 3_i).

In Type 5 and 46 apply practice L_a and/or L_c (TSI).

In Type 3_{im} apply practice J (Improvement Cut) or I (Clearcut). Where the maple is not mature and mast trees present make an improvement cut favoring and releasing oak, hickory, black walnut, then silver maple and sycamore. Where the maple or cottonwood is mature and no mast trees present, harvest (practice I) then apply practice A_{d-f} (Reforestation).

In Type 4_{im}, 6_{im}, apply practice J (Improvement Cut).

In Type 10 apply practice I (Clearcut) then A_{d-f} (Reforestation).

In Type 9_{im} apply practice I (Clearcut) A_{d-f} (Reforestation).

In this unit harvest no more than 45 acres every 5 years.

The Long Term Goal - Maintain and restore oak, hickory, and walnut to suitable areas. The lower areas will be a mix of unevenage stands in different stages of growth. Our long term goals will enhance this area for wildlife habitat and a recreational area.

Milan Bottoms and below — FI 72-87, IIS 51-63

693 acres (about). (IV)

Photos No. 16-14 to 16-16. River mile 472-478.

Apply practice W (Special Management) along river shore, sloughs, lakes, and ponds.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i, 1_i, and 9_i apply practice Q (Thinning).

In Type 9_{im} apply practice I (Clearcut) then A_{d-f} (Reforestation).

In Type 4_{im}, 6_{im} apply practice J (Improvement Cut). Do not remove any red oaks.

In Type 3_{im} apply practice U (Shelterwood) or V (Seed Tree), then A_{d-f} (Reforestation) where oak, hickory, or walnut occur. In other areas apply practice I (Clearcut).

Apply practice W (Special Management) and T (Monitor).

In this unit harvest no more than 30 acres every 5 years.

Our Long Term Goal - Maintain the higher areas in oak, hickory, and walnut. The red oak area should be monitored to see if it is reestablishing itself. In lower areas, a mix of evenaged stands in different stages of development will be maintained.

3. PRIORITIES LIST FOR POOL 16

A — Thin overcrowded stands of maple and cottonwood on Andalusia, and in Milan Bottoms.

B — Encourage young oak, hickory, and black walnut stands on the Andalusia islands and Milan Bottoms units. On higher areas where they may or may not now occur, conduct improvement cuts, or harvest and plant.

4. ESTIMATED COSTS

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	780	$150	$117,000
Improvement cut	655 ± 300	$150	$ 98,250 ± 45,000
Timber stand improvement	10	$ 30	$ 300
Harvest (contractural preparation)	75	$ 60	$ 4,500
Site preparation	75	$110	$ 8,250
Planting	75 ± 50	$ 50	$ 3,750 ± $ 2,500
Type mapping	1,820	$ 2	$ 3,640
	Total Cost for Pool 16		$280,690 ± $ 47,500

Pool 16 - Inventory Data

MILAN BOTTOMS - TOP HALF SWIFT ILE (IL) UNIT NO. IV

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	5.24	5.51	398.09	13.20
Boxelder	.95	5.61	28.65	5.58
Cottonwood	6.67	1.51	960.65	28.45
Elm Sp	5.71	40.47	103.93	5.09
Hackberry	5.71	22.64	66.68	6.80
Shagbark Hickory	.48	.22	48.94	20.00
Silver Maple	92.38	181.49	6710.68	9.66
Red Oak	2.86	.58	354.56	30.05
White Oak	1.90	1.14	179.24	17.51
Black Walnut	1.43	.73	181.24	18.99
Willow Sp	1.90	.94	190.27	19.30
Misc	.48	1.36	0.00	8.00
TOTAL	126.19 sq.ft.	263.07	9222.91 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	9222.9	7505.28	10940.53
Sq. Ft. Basal Area	135.7	117.14	154.29
Number of Trees	272.7	123.24	422.14

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 174.0
Sq. Ft. Basal Area .88

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	.95	.35	22.42
COTTONWOOD	.48	.08	34.00
SILVER MAPLE	6.67	2.46	22.30
RED OAK	.48	.11	28.00
WILLOW SP	.95	.40	20.93
MISCELLANEOUS	1.43	.36	26.82
TOTAL	10.96 sq.ft./A	3.76/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	4.76	1.98	21.02
TOTAL	4.76 sq.ft./A	1.98/A	
Class 7 Standing Dead Tree			
ASH SP	1.90	1.41	15.72
COTTONWOOD	.48	.18	22.00
SILVER MAPLE	3.33	6.38	9.79
RED OAK	.48	.11	28.00
WILLOW SP	.95	.61	16.91
MISCELLANEOUS	1.90	.71	22.25
TOTAL	9.04 sq.ft./A	9.40/A	

FOR CLASSES 5-10
Per Acre Figures

Wildlife Related Inventory Data (Cont'd)

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 8 Leaf Nest				
SILVER MAPLE		1.43	.65	20.00
	TOTAL	1.43 sq.ft./A	.65/A	
Class 9 Grapevine				
ASH SP		1.43	1.07	15.64
COTTONWOOD		.48	.06	38.00
ELM SP		1.43	3.52	8.63
HACKBERRY		.95	1.49	10.81
SILVER MAPLE		15.24	10.58	16.25
RED OAK		.48	.09	32.00
WHITE OAK		.48	.15	24.00
BLACK WALNUT		.95	.28	24.94
WILLOW SP		.48	.18	22.00
MISCELLANEOUS		.48	.13	26.00
	TOTAL	22.40 sq.ft./A	17.55/A	
Class 10				
HICKORY SP		.48	.87	10.00
SHAGBARK HICKORY		.48	.22	20.00
RED OAK		2.86	.58	30.05
WHITE OAK		1.90	1.14	17.51
BLACK WALNUT		1.43	.73	18.99
	TOTAL	7.14 sq.ft./A	3.54/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS/ACRE	TOTAL POUNDS
RED OAK		2.86	1,811.43
WHIE OAK		4.67	2,958.67
	TOTAL ACORNS	7.53 lbs./A	4,770.10 lbs.
HICKORY SP		.62	392.48
SHAGBARK HICKORY		.62	392.48
	TOTAL NUTS	1.24 lbs./A	784.96 lbs.

ANDALUSIA ISLAND - RIVER MILE 469-473 UNIT NO. III

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	4.62	5.71	239.93	12.17
Cottonwood	7.69	3.45	1014.74	20.22
Elm Sp	6.15	30.98	0.00	6.03
Hackberry	15.38	56.38	221.96	7.07
Silver Maple	88.46	178.40	4644.34	9.54
Pin Oak	3.08	2.84	313.38	14.09
Pecan	.77	.24	109.27	24.00
Black Walnut	.77	3.92	0.00	6.00
Willow Sp	.77	.35	0.00	20.00
Misc	0.00	1.00	0.00	0.00
TOTAL	127.69 sq.ft.	283.28	6543.61 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6543.6	4363.86	8723.36
Sq. Ft. Basal Area	143.8	100.79	186.90
Number of Trees	319.7	85.90	553.44

Average Annual Growth Per Acre Int. Bd. Ft. 51.7
Sq. Ft. Basal Area .20

FOR CLASSES 5-10 Per Acre Figures

Wildlife Related Inventory Data

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	6.15	.95	34.40
MISCELLANEOUS	1.54	9.06	5.58
TOTAL	7.69 sq.ft./A	10.01/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	3.08	1.06	23.11
TOTAL	3.08 sq.ft./A	1.06/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree				
ASH SP		1.54	1.76	12.65
ELM SP		.77	3.92	6.00
HACKBERRY		.77	1.41	10.00
SILVER MAPLE		8.46	17.22	9.49
MISCELLANEOUS		4.62	13.09	8.04
	TOTAL	16.16 sq.ft./A	37.40/A	
Class 9 Grapevine				
ASH SP		1.54	1.62	13.20
COTTONWOOD		2.31	.60	26.59
ELM SP		2.31	19.04	4.71
HACKBERRY		3.08	14.63	6.21
SILVER MAPLE		33.85	27.65	14.98
PIN OAK		2.31	.64	25.76
PECAN		.77	.24	24.00
BLACK WALNUT		.77	3.92	6.00
MISCELLANEOUS		2.31	12.00	5.94
	TOTAL	49.24 sq.ft./A	80.34/A	
Class 10				
PIN OAK		3.08	2.84	14.09
PECAN		.77	.24	24.00
BLACK WALNUT		.77	3.92	6.00
	TOTAL	4.62 sq.ft./A	7.00/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS/ACRE	TOTAL POUNDS
PIN OAK		5.31	2,797.15
	TOTAL ACORNS	5.31 lbs./A	2,797.15 lbs.

ADDENDUM 17

ADDENDUM 17

1. INTRODUCTION

Pool 17 extends from Muscatine, Iowa, to New Boston, Illinois, a distance of 20.1 miles. The pool contains 8,312 acres of water, 202.5 miles of shoreline (including islands), and 7,179 acres of public land. Project lands comprise the majority of public lands in the pool.

Approximately 6,150 acres of project woodlands are located in this pool. All of the Odessa area is protected by a levee, and many fine stands of mast trees can be found in this area. The only area where oak regeneration is common and often numerous can be found in the southern end of the Odessa area. Finally, on many sites in the Odessa area oak and/or pecan are establishing themselves under silver maple stands. Fine associations of hickory and pin oak can also be found in the Big Timber area. But, as in other pools, past logging practices have removed valuable species such as hickory from much of the woodland. Additionally, ground vegetation is a problem, and becoming a major hindrance to the growth and reestablishment of the forest stands on some sites.

North of Odessa Lake, on Cooperative Agreement lands at the Louisa Refuge, the Big Timber area, and the Turkey and other Island areas, the fish and wildlife resources are managed by the US Fish and Wildlife Service. The Iowa Conservation Commission and the Illinois Department of Conservation manage the fish and wildlife resources on the remaining Cooperative Agreement lands.

2. PRESCRIPTIONS FOR POOL 17

Unit Title	Tract No.
Land between the levee, the Iowa River on the south and the Mississippi River on the east.	FIA 114, part FIA 113 (10%)

229.2 acres. UNIT NO. I

Photos No. 18-19 to 18-21. River mile 434-435.

Apply practice W (Special Management) along the Iowa River and Mississippi River.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 5 and 23, apply practice L_a or L_c (TSI). Do not deaden any hardwood mast trees in the area.

In Type 2_i apply practice Q (Thinning).

In Type 9_{im} and 2_m apply practice I (Clearcut) and then A_{d-f} (Reforestation) in higher areas.

In Type 4_{im} apply practice J (Improvement Cut).

In Type 3_m apply practice U (Shelterwood Cut). Leave swamp white and bur oaks after the first cut. Apply practice A_{d-f} (Reforestation) to higher areas.

In this unit harvest no more than 15 acres every 5 years.

The Long Term Goal - Maintain the associations of bur oak and shellbark hickory and the scattered hickory and pin oaks in other areas. Lower areas of silver maple, cottonwood, and ash will be maintained in a mix of evenaged stands in different stages of development. The Iowa Conservation Commission has designated the eagle, woodduck, deer, and turkey as priority wildlife in this unit.

Land south of the Blackhawk Slough — FIA 97-112, 113 (90%) 115, 117-122

615.7 acres. (II)

Photos No. 18-21 and 18-22. River mile 435-436.

Apply practice W (Special Management) along all sloughs, lakes, and waterways.

All areas in this unit have been stand mapped by the ICC.

In Type 2_i, 1_i, 3_i, and 9_i apply practice Q (Thinning). Favor pecan, oak, and hickory. Favor silver maple when mast trees are not present.

In Type 15_{im}, 15_m, 4_{im}, 4_m, 6_{im}, and 3_{im} apply practice J to open up the stand, increase mast production, and create den trees. Deaden some of the trees rather than removing all the trees to be cut out of the stand when applying practice J (Improvement Cut).

The Long Term Goal - Maintain the mast-producing stands, and help succession in young stands from silver maple, cottonwood, ash into oak, pecan, and hickory. Lower areas will be a mix of evenaged stands in different stages of growth. Iowa Conservation Commission field personnel have stand mapped much of the area. Coordination with them will eliminate the need for additional stand mapping. The Iowa Conservation Commission has designated the deer, turkey and woodduck as priority wildlife in this unit.

Land between Sand Run and Blackhawk Slough — FIA 123-126, 128-130

272.9 acres. (III)

Photos No. 18-22 and 18-23. River mile 435.5-436.5.

Apply practice W (Special Management) along sloughs.

In Type 9_i, 3_i and 7_i follow practice Q (Thinning). Release oak and pecan in the stands.

In Type 15_{im}, 7_{im}, 4_{im}, 6_{im}, and 3_{im} follow practice J (Improvement Cut). Release oak and pecan in the stands. Then favor silver maple, sycamore, and river birch for cavity production after the oak and pecan.

In Type 5 apply practice L_a and L_c (TSI) if cucumber vine and nettle are suppressing regeneration. If the ground cover is wetland plants treat the area as a wetland, and apply practice L_a to create den trees.

In this unit harvest no more timber the first 5 years.

The Long Term Goal - Help natural succession to develop oak and pecans where they are beginning to occur naturally. Lower areas that stay in silver maple will be maintained in a mix of evenaged stands in different stages of development. Iowa Conservation Commission field personnel have stand mapped this area. Coordination with them should eliminate the need for additional stand mapping. Wood duck is the priority wildlife species in this unit.

Odessa Lake Island Unit — FIA 133, 138, part of 132, 138, 141-145

415.5 acres. (IV)

Photos No. 18-23 and 17-1. River mile 436 to 438.

Apply practice W (Special Management) along shorelines and along inland sloughs.

In Type 4_{im}, 6_{im} apply practice J (Improvement Cut).

In Type 16_m apply practice J then T (Monitor).

On selected sites in type 9_{im} apply practice I (Clearcut).

In Type 15_{im}, 21_i, 2_i, 1_i, and 9_i apply practice Q (Thinning). When the stand is predominantly willow, leave the area alone.

In Type 11_i apply practice T (Monitor) to determine reason for tree damage, and alternatives to reestablish tree cover.

The Long Term Goal - Maintain and diversify the associations of mast-producing trees such as bur oak, pin oak, and pecan. Lower areas should be maintained in a mix of evenaged stands in different stages of development. The Iowa Conservation Commission personnel have stand mapped this area. Coordination with them will eliminate the need for additional stand mapping. The priority wildlife species in this unit are the eagle, wood duck, deer, and songbirds.

Shoreline (western) from Sand Run to Odessa — FIA 127, 128, 133 134-137, 148-157, 163

Photos No. 18-23 to 17-3. River mile 436-438. (V)

Leave alone.

The Long Term Goal - Allow natural succession of upland species above Sand Run launching area and bottomland species below it to preserve aesthetic and recreational value. The priority wildlife in this unit are songbirds.

Area north of Horseshoe Slough - East of Goose Pond Remaining Odessa area under state Fish and Wildlife Management in conjunction with the US Fish and Wildlife Service — FIA 131,139,140, 144, A1, 1 A-C part of 132, 138, 141-143, 145

598.4 acres. (VI)

Photos No. 18-23 to 17-2. River mile 436-438.

Apply practice W (Special Management) along lake and slough shorelines, and ponds.

In Type 6_i, 9_i, 3_i, 1_i, and 2_i apply practice Q (Thinning). Favor mast-producing trees and future den trees. Do not apply any practice where the stand is 70%+ willow.

In Type 16_m, 6_{im}, 4_{im} apply practice J (Improvement Cut).

In Type 5 apply practice L_a, L_c (TSI).

In Type 9_m, 2_{im}, apply practice I (Clearcut)

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Maintain areas of mast-producing trees such as oak, hickory, and pecan in those species; increase mast production; and increase species diversity. Lower areas will be a mix of evenaged stands in different stages of growth to maintain a diversity of habitat. Iowa Conservation Commission personnel have stand mapped much of this area. Coordination with them should eliminate the need for additional stand mapping. The priority wildlife species in this unit are eagle, wood duck, deer, and songbirds.

Louisa Refuge — FIA 146, 159-162, 164-180, 2-9, part 145

670.9 acres. (VII)

Photos No. 17-2 to 17-4. River mile 438-441.

Apply practice W (Special Management) along lake shorelines, river shorelines, and ponds; and along levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 4_{im} apply practice J (Improvement Cut).

In Type 4_i, 6_i, 3_i, 2_i, 1_i, and 9_i apply practice Q (Thinning).

The Long Term Goal - Implement Fish and Wildlife practices that will maintain the maximum amount of quality wildlife habitat in the sanctuary. The lower areas should be maintained in a mix of evenaged stands in different stages of growth. Higher areas should be maintained in mast-producing species and diversified through planting of desirable mast-producing species.

Turkey, Otter, and Otter Tail Islands — D1, D2

377.4 acres. (VIII)

Photos No. 18-23 to 17-2. River mile 436.5-439.

Apply practice W (Special Management) along river shorelines and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i and 1_i apply practice Q (Thinning).

In Type 6_{im} and 4_{im} apply practice J (Improvement Cut).

In Type 9_{im}, 2_{im}, apply practice I (Clearcut), or V (Seed Tree) and then in Type 3_{im} apply practice A_{d-f} (Reforestation). Where oak and other hardwood mast trees occur apply practice J, U (Shelterwood), or V where such trees do not occur apply practice I.

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Plant higher areas with mast-producing trees. Lower areas should be a mix of evenaged stands in different stages of growth.

Lock and Dam area and Illinois shoreline up to River Mile 440.5 and Jonas Johnson Island	LS 1, 2 Fl 1-5 iis 1

Photos No. 17-1 to 17-4. River mile 437-439. (IX)

Apply practices A_{a-c} (Plant) and B (Tree Maintenance) in the immediate area of Lock and Dam 17.

Leave the shoreline and island alone.

The Long Term Goal - Provide a good recreational and aesthetic experience for users along this shore of the pool.

Bogus, Coleman Islands, and landward Bogus on the Illinois side and miscellaneous islands	irs 1-7 Fl 6-9

895.2 acres. (X)

Photos No. 17-4 to 17-6. River mile 439-444.5.

Apply practice W (Special Management) along river shore, sloughs and levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 3_{im} and 6_{im} apply practice J (Improvement Cut) then T (Monitor) for regeneration of desired species.

Apply practice A_{d-f} (Reforestation) to small openings and understory to determine if planting of some mast-producing trees and such wildlife food trees such as dogwood will survive and grow in diminished light conditions.

In Type 2_i, 9_i apply practice Q (Thinning).

In Type 9_{im} apply practice I (Clearcut), and then practice A_{d-f} (Reforestation).

In Type 5 and 46 apply practice L_a and/or L_c (TSI).

In this unit harvest no more than 60 acres every 5 years.

The Long Term Goal - Maintain and diversify the oak, hickory, hackberry, and pecan association and establish other such associations on higher areas of the island. Lower areas will be a mix of evenaged stands in different stages of growth.

Big Timber FIA 18-73

837.9 acres. (XI)

Photos No. 17-5 to 17-8. River mile 445.

Apply practice W (Special Management) along river shore, along lakes, sloughs, and the levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type selected areas of 15_{im}, 2_i, 3_i, and 9_i apply practice Q (Thinning). When oaks, walnut, or other mast trees are located release the trees.

In Type 52 apply practice A_{a-c} and B (Planting and Tree Maintenance).

On the designated sites in Type 4_{im}, 6_{im} apply practice J (Improvement Cutting).

Reduce Basal Area to 70-80 square feet per acre to provide more light for young pin oak and/or pecan saplings.

Over most of the unit apply practice T (Monitor). Though not put on the cover type map, monitoring will be applied where other specific practices are not.

Practices have been primarily applied where valuable young mast trees such as black walnut will be released and where young silver maple or cottonwood stands are overstocked. On selected sites in the rest of the unit, we will put in test plots.

At a minimum the following test plots should be put in to acquire data.

1. Mow wood nettle in mid or early summer promptly after nettles reach a height of 4 to 5 feet. Nettles should be cut to within 1 to 2 feet off the ground or above the height of oak regeneration.

2. Mow nettles as in the plot above. However, mow nettle to within 6 inches of the ground. Cutting oak regeneration will promote better root growth, and therefore allow better growth of the oak when released.

3. Thin bottom land hardwoods from below to a basal area of 70-90 square feet per acre. Interplant paw paw, persimmon, dogwood, hawthorne, or other understory trees listed in table 9.

4. Thin from below to a basal area of 60-90 square feet per acre, then interplant oaks and other nut producing hardwoods. Plant largest seedling stock possible, preferable at least 1/4 caliper inch in diameter at the root collar.

5. Underplanting of largest oak seedling stock possible preferably at least 1/4 inch in diameter at the root collar. Thin 3-5 years from below after seedlings have become well established.

6. Measure mast production on thinned sites in the Big Timber Unit.

7. Measure mast production on immature and mature areas in the lower Odessa area.

8. Monitor areas of type 5 occupied by cucumber vines, nettle, poison ivy, and poor growth timbers for any signs of stand regeneration and wildlife use.

9. Set up growth rate plots in several DBH size classes of silver maple-cottonwood and measure in comparison with several thinned stand plots.

In this unit harvest no timber.

The Long Term Goal - Maintain the hickory grove, pin oak grove, and other areas of hickory, pecan, and oak. Higher areas will be planted in mast-producing trees and other species to diversify species association. Understory will be encouraged through thinning and planting. Lower areas will be a mix of evenaged stands in different stages of growth.

The main goal for the next 10 years is to acquire data about flood plain forests from scientific studies conducted in this unit and to maintain its high recreational value. Logging was done in this unit in the 1940's but since then no timber has been harvested. This will give the Corps and the US Fish and Wildlife Service a good opportunity to evaluate the growth of a flood plain forest, even while valuable young mast trees are released and young overstocked maple stands are thinned.

Kilpeck Island, IA, and
Barkis Islands, IL — IAIS 3, 10, 11

263 acres. (XII)

Photos No. 17-7 to 17-9. River mile 445-447.5.

Apply practice W (Special Management) along shoreline along sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i apply practice Q (Thinning).

In Type 2_{im} apply practice I (Clearcut).

In type 5 apply practice L_a and L_c (TSI).

In this unit harvest no more than 15 acres every 5 years.

The Long Term Goal - Maintain a mix of evenaged stands in different stages of development.

Below powerline crossing above River Mile 447 on Illinois shoreine including Little Bogus Island and small island south of Little Bogus — iis 8, 8A, and 9 and Fl 9-14

260 acres. (XIII)

Photos No. 17-6 to 17-9. River mile 444.5-447.

Apply practice W (Special Management) along river shoreline, sloughs, and levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i and 9_i apply practice Q (Thinning).

In Type 3_{im} apply practice I (Clearcut), V (Seed Tree), or U (Shelterwood), then A in appropriate areas. Oaks, pecans and walnut are irregularly spotted. In most areas apply practice I. Where walnuts, oaks, and pecans occur apply practice U. Leave such species, then apply practice A_{d-f} (Reforestation) where possible and practical.

In this unit harvest no more than 20 acres every 10 years.

The Long Term Goal - Maintain and develop oak, pecan, walnut, silver maple associations on suitable areas. Lower areas will be a mix of evenaged stands in different stages of development.

Mississippi River shoreline (IA)
River Mile 442.6 to 443 — FIA 10, 13A, 13B
River Mile 447 to 449 — FIA 75-79

Photos No. 17-1 to 17-11. (XIV)

This unit will be under practive W (Special Management).

The Long Term Goal - Leave the area alone to enhance the recreational experience.

Blanchard, Willow and
Bass Islands — iis 15-34

648.2 acres. (XV)

Photos No. 17-9 to 17-12. River Mile 448.

Apply practice W (Special Management) along island shorelines and along sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i apply practice Q (Thinning).

In Type 5 apply practice L_a and/or L_c (TSI).

In Type 6_{im} and 4_{im} apply practice J (Improvement Cut). Oak regeneration observed there during inventory. Oak regeneration survival should be helped by applying practice.

In Type 3_{im} apply practice V (Seed Tree) or U (Shelterwood). Leave pecans and silver maple as seed trees. Apply practice A_{d-f} (Reforestation) to insure adequate reestablishment of pecan if practical and possible.

In Type 9_{im} and 2_{im} apply practice I (Clearcut), the A_{d-f} (Reforestation) to suitable areas.

In this unit harvest no more than 40 acres every 5 years.

The Long Term Goal - Maintain and develop more diverse associations of oak, pecan, hickory and walnut on the higher areas of this unit. Lower areas will be a mix of evenaged stands in different stages of development.

North and south of the recreation area landward of Blanchard on the Illinois shore — F1 15-23

186 acres. (XVI)

Photos No. 17-9 to 17-11. River mile 447-457.

Apply practice W (Special management) along river shore, sloughs, and the levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i apply practice Q (Thinning).

In Type 51 apply practice A_{a-c} (Plant) and B (Tree Maintenance).

In Type 9_{im} apply practice I (Clearcut) in smallest patches (1-4 acres).

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Maintain a mix of evenage stands in different stages of growth. (Narrow width of the land and proximity of the recreation area may restrict management options on this unit.)

3. PRIORITIES LIST FOR POOL 17

A — Thin Oak stands on the Louisa Refuge unit (FIA 132, 133, 138, 142) especially, young stands on the upper end.

B — Release oak, pecan, hickory under or as a part of the overstory in the lower end of the Louisa Refuge area (FIA 124, 129, 115, 113).

C — Thin silver maple, river birch area as oak and pecan is released in FIA 124, 129, on the land between Sand Run and Blackhawk slough.

D — Remove larger mature individuals to provide growing space for younger trees that will provide an annual mast crop on the land south of Blackhawk slough (Tract #FIA 119).

E — Harvest and plant suitable higher areas on Blanchard Island, Bogus Island, and in the Big Timber area.

F — Release black walnut in Big Timber unit (in FIA 70) and decrease BA in the pin oak and oak associations in Big Timber area to 70 sq. ft. BA per acre.

G — Thin silver maple, cottonwood stands in Big Timber, Blanchard, and in Odessa area for better growth and quicker development of den cavities and timber.

H Conduct an improvement cut in landward Bogus area to allow more crown development and nut production of pecan trees.

4. ESTIMATED COSTS

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	1,570	$150	$235,500
Improvement cut	1,120	$150	$168,000
Timber stand improvement	180	$ 30	$ 5,400
Harvest (contractural preparation)	230	$ 60	$ 13,800
Site preparation	230	$110	$ 25,300
Planting	190 ± 50	$ 50	$ 9,500 ± $ 2,500
Type mapping	3,100	$ 2	$ 6,200
	Total Cost for Pool 17		$436,730 ± $ 2,500

Pool 17 - Inventory Data

SOUTH OF RECREATION AREA AT RIVER MILE 447 (IL) UNIT NO. XII

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	6.67	2.10	747.27	24.15
Coffeetree	1.33	.46	81.45	22.93
Cottonwood	2.67	2.06	152.28	15.40
Elm Sp	11.33	32.89	149.78	7.95
Hackberry	2.67	12.26	84.22	6.31
Silver Maple	68.67	35.44	5245.75	18.85
Mulberry Sp	3.33	27.54	0.00	4.71
Bur Oak	1.33	.25	127.57	31.26
Pecan	4.67	1.32	398.37	25.44
Black Walnut	.67	.62	0.00	14.00
Willow Sp	.67	.48	76.28	16.00
Misc	0.00	1.00	0.00	0.00
TOTAL	104.00 sq.ft.	116.43	7062.97 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	7063.0	4591.01	9534.93
Sq. Ft. Basal Area	116.0	93.38	138.62
Number of Trees	118.2	61.80	174.70

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 16.2
Sq. Ft. Basal Area .09

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	.67	.08	40.00
MISCELLANEOUS	2.00	.34	32.75
TOTAL	2.67 sq.ft./A	.42/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	6.67	1.37	29.86
MISCELLANEOUS	1.33	.26	30.83
TOTAL	8.00 sq.ft./A	1.63/A	
Class 7 Standing Dead Tree			
ASH SP	.67	.25	22.00
SILVER MAPLE	3.33	1.09	23.70
MISCELLANEOUS	8.00	1.48	31.46
TOTAL	12.00 sq.ft./A	2.82/A	
Class 8 Leaf Nest			
SILVER MAPLE	.67	.31	20.00
TOTAL	.67 sq.ft./A	.31/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		2.67	1.15	20.61
ELM SP		2.67	7.00	8.36
HACKBERRY		.67	7.64	4.00
SILVER MAPLE		22.67	9.64	20.77
MULBERRY SP		1.33	8.86	5.25
PECAN		1.33	.46	23.02
BLACK WALNUT		.67	.62	14.00
MISCELLANEOUS		2.67	.73	25.90
	TOTAL	34.68 sq.ft./A	36.11/A	
Class 10				
BUR OAK		1.33	.25	31.26
PECAN		4.67	1.32	25.44
BLACK WALNUT		.67	.62	14.00
	TOTAL	6.67 sq.ft./A	2.19/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
BUR OAK		2.33	813.40
	TOTAL ACORNS	2.33 lbs./A	813.40 lbs.

KILPECK, BARKIS ISLAND UNIT NO. XII
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Cottonwood	5.00	.82	500.75	33.42
Elm Sp	15.00	73.46	194.14	6.12
Hackberry	4.00	8.58	65.32	9.25
Silver Maple	88.00	111.67	4676.81	12.02
Mulberry Sp	3.00	62.39	0.00	2.97
Willow Sp	6.00	5.29	488.38	14.43
Misc	1.00	.72	0.00	16.00
TOTAL	122.00 sq.ft.	262.92	5925.39 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	5925.4	2865.61	8985.17
Sq. Ft. Basal Area	142.0	102.27	181.73
Number of Trees	289.4	131.50	447.39

Average Annual Growth Per Acre Int. Bd. Ft. 70.0
Sq. Ft. Basal Area .29

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
COTTONWOOD	1.00	.11	40.00
SILVER MAPLE	4.00	2.26	18.00
WILLOW SP	2.00	2.40	12.36
MISCELLANEOUS	1.00	.72	16.00
TOTAL	8.00 sq.ft./A	5.49/A	
Class 6 Den Tree - Lower Vavity (Lower 3/4 Bole)			
COTTONWOOD	2.00	.39	30.83
SILVER MAPLE	8.00	2.40	24.71
TOTAL	10.00 sq.ft./A	2.79/A	
Class 7 Standing Dead Tree			
SILVER MAPLE	8.00	10.64	11.74
WILLOW SP	7.00	11.01	10.80
MISCELLANEOUS	4.00	4.76	12.42
TOTAL	19.00 sq.ft./A	26.41/A	

FOR CLASSES 5-9 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine			
COTTONWOOD	2.00	.39	30.83
ELM SP	5.00	7.96	10.73
HACKBERRY	2.00	6.93	7.28
SILVER MAPLE	30.00	24.60	14.95
MULBERRY SP	3.00	62.39	2.97
TOTAL	42.00 sq.ft./A	102.27/A	

BOGUS, COLEMAN, LAND BOGUS, ILLINOIS UNIT NO. X
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	.56	.18	57.03	24.00
Cottonwood	5.56	1.10	706.19	30.41
Elm Sp	11.67	76.10	52.87	5.30
Hackberry	3.33	13.34	36.78	6.77
Honey Locust	.56	1.02	16.04	10.00
Silver Maple	87.22	73.95	4897.67	14.71
Willow Sp	6.11	4.18	323.63	16.37
Misc	0.00	1.00	0.00	0.00
TOTAL	115.00 sq.ft.	170.87	6090.20 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6090.2	4115.92	8064.49
Sq. Ft. Basal Area	130.0	106.86	153.14
Number of Trees	206.4	129.28	283.55

Average Annual Growth Per Acre Int. Bd. Ft. 30.4
Sq. Ft. Basal Area .20

FOR CLASSES 5-9 **Wildlife Related Inventory Data**
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
ASH SP		.56	.71	12.00
SILVER MAPLE		5.56	1.88	23.28
MISCELLANEOUS		4.44	1.36	24.51
	TOTAL	10.56 sq.ft./A	3.95/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
ELM SP		.56	.06	40.00
SILVER MAPLE		8.33	2.52	24.60
MISCELLANEOUS		2.22	.49	28.90
	TOTAL	11.11 sq.ft./A	3.07/A	
Class 7 Standing Dead Tree				
ASH SP		.56	.71	12.00
ELM SP		.56	1.59	8.00
SILVER MAPLE		5.00	3.59	15.98
WILLOW SP		.56	.40	16.00
MISCELLANEOUS		7.78	30.19	6.87
	TOTAL	14.46 sq.ft./A	36.48/A	
Class 8 Leaf Nest				
SILVER MAPLE		1.67	.36	28.77
	TOTAL	1.67 sq.ft./A	.36/A	

FOR CLASSES 5-9 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine			
ASH SP	.56	.18	24.00
COTTONWOOD	1.11	.33	24.94
ELM SP	5.00	45.49	4.49
HACKBERRY	1.11	1.54	11.51
SILVER MAPLE	41.67	26.87	16.86
MISCELLANEOUS	3.89	1.94	19.15
TOTAL	53.34 sq.ft./A	76.35/A	

BIG TIMBER (IA) UNIT NO. XI
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	3.16	26.07	229.33	4.71
River Birch	5.79	3.08	333.46	18.57
Coffeetree	1.05	3.35	19.10	7.59
Cottonwood	3.68	1.19	495.51	23.78
Elm Sp	6.84	20.14	41.56	7.89
Hackberry	6.84	37.98	69.51	5.75
Shagbark Hickory	2.11	1.49	106.73	16.11
Honey Locust	3.16	2.27	222.98	15.96
Silver Maple	52.63	105.15	3097.26	9.58
Mulberry Sp	3.16	57.72	0.00	3.17
Bur Oak	1.05	.20	121.02	31.26
Pin Oak	2.63	1.17	295.78	20.26
Pecan	2.11	1.02	140.25	19.41
Sycamore	.53	.20	81.45	22.00
Black Walnut	2.11	3.41	90.77	10.63
Misc	0.00	1.00	0.00	0.00
TOTAL	96.84 sq.ft.	265.45	5344.70 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	5344.7	3630.22	7059.18
Sq. Ft. Basal Area	126.3	101.16	151.48
Number of Trees	299.4	154.21	444.59

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 70.5
Sq. Ft. Basal Area .48

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
RIVER BIRCH		.53	.20	22.00
COTTONWOOD		.53	.07	38.00
SILVER MAPLE		.53	.14	26.00
PIN OAK		.53	.20	22.00
MISCELLANEOUS		2.11	1.33	17.02
	TOTAL	4.23 sq.ft./A	1.94/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole				
SILVER MAPLE		1.05	.54	18.92
PECAN		.53	.14	26.00
BLACK WALNUT		.53	.20	22.00
MISCELLANEOUS		.53	.30	18.00
	TOTAL	2.64 sq.ft./A	1.18/A	
Class 7 Standing Dead Tree				
ELM SP		1.58	5.36	8.15
SHAGBARK HICKORY		1.58	1.17	15.75
HONEY LOCUST		.53	6.03	4.00
SILVER MAPLE		4.21	6.45	10.94
PIN OAK		3.16	1.51	19.56
PECAN		.53	.14	26.00
MISCELLANEOUS		17.37	15.16	14.49
	TOTAL	28.96 sq.ft./A	34.82/A	
Class 8 Leaf Nest				
PECAN		.53	.12	28.00
	TOTAL	.53 sq.ft./A	.12/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		.53	.14	26.00
RIVER BIRCH		.53	.17	24.00
COFFEETREE		.53	2.68	6.00
COTTONWOOD		1.05	.24	28.24
ELM SP		.53	.96	10.00
HACKBERRY		2.63	6.61	8.54
SHAGBARK HICKORY		1.05	.67	16.91
HONEY LOCUST		.53	.07	36.00
SILVER MAPLE		12.11	65.35	5.83
MULBERRY SP		1.58	3.44	9.18
BUR OAK		.53	.12	28.00
PIN OAK		1.05	.26	27.15
PECAN		1.58	.86	18.38
MISCELLANEOUS		5.26	4.23	15.11
	TOTAL	29.49 sq.ft./A	85.80/A	
Class 10				
SHAGBARK HICKORY		2.11	1.49	16.11
BUR OAK		1.05	.20	31.26
PIN OAK		2.11	1.10	18.73
PECAN		2.11	1.02	19.41
BLACK WALNUT		2.11	3.41	10.63
	TOTAL	9.49 sq.ft./A	7.22/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
BUR OAK		1.84	3,427.61
PIN OAK		4.95	9,205.57
	TOTAL ACORNS	6.79 lbs./A	12,633.18 lbs.
SHAGBARK HICKORY		2.74	5,092.44
	TOTAL NUTS	2.74 lbs./A	5,092.44 lbs.

TRACT #119 (IA) UNIT NO. II

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
River Birch	13.85	12.49	765.12	14.26
Cottonwood	3.08	.80	308.27	26.49
Elm Sp	6.92	63.05	48.87	4.49
Hackberry	.77	1.41	26.66	10.00
Hickory Sp	5.38	24.78	224.02	6.31
Shagbark Hickory	3.08	18.02	109.53	5.60
Honey Locust	3.85	3.54	30.82	14.12
Silver Maple	23.08	34.80	1560.67	11.03
Bur Oak	2.31	.42	175.71	31.66
Pin Oak	44.62	74.52	2267.27	10.48
Swamp White Oak	9.23	7.51	615.34	15.02
Pecan	.77	.21	79.80	26.00
White Walnut	2.31	14.94	0.00	0.00
Misc	0.00	1.00	0.00	0.00
TOTAL	119.23 sq.ft.	257.48	6212.08 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6212.1	4651.17	7772.99
Sq. Ft. Basal Area	143.1	123.75	162.41
Number of Trees	292.2	213.11	371.38

Average Annual Growth Per Acre Int. Bd. Ft. 360.4
Sq. Ft. Basal Area 2.19

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
RIVER BIRCH	.77	.18	28.00
MISCELLANEOUS	1.54	1.01	16.70
TOTAL	2.31 sq.ft./A	1.19/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
RIVER BIRCH		2.31	.98	20.82
COTTONWOOD		.77	.16	30.00
PIN OAK		4.62	.89	30.88
SWAMP WHITE OAK		.77	.16	30.00
MISCELLANEOUS		.77	.72	14.00
	TOTAL	9.24 sq.ft./A	2.91/A	
Class 7 Standing Dead Tree				
RIVER BIRCH		3.85	3.07	15.16
PIN OAK		7.69	7.29	13.91
SWAMP WHITE OAK		.77	3.92	6.00
MISCELLANEOUS		11.54	21.48	9.92
	TOTAL	23.85 sq.ft./A	35.76/A	
Class 9 Grapevine				
RIVER BIRCH		.77	.44	18.00
SILVER MAPLE		1.54	1.53	13.58
BUR OAK		.77	.16	30.00
PIN OAK		3.08	1.98	16.86
SQAMP WHITE OAK		.77	.98	12.00
	TOTAL	6.93 sq.ft./A	5.09/A	
Class 10				
HICKORY SP		5.38	24.78	6.31
SHAGBARK HICKORY		3.08	18.02	5.60
BUR OAK		2.31	.42	31.66
PIN OAK		44.62	74.52	10.48
SWAMP WHITE OAK		9.23	7.51	15.02
PECAN		.77	.21	26.00
WHITE WALNUT		2.31	14.94	5.32
	TOTAL	67.70 sq.ft./A	140.45/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
PIN OAK		76.54	15,307.69
	TOTAL ACORNS	76.54 lbs./A	15,307.69 lbs.
HICKORY SP		7.00	1,400.00
SHAGBARK HICKORY		4.00	800.00
	TOTAL NUTS	11.00 lbs./A	2,200.00 lbs.

BETWEEN LEVEE AND IOWA RIVER (IA) UNIT NO. I
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	2.22	.55	162.89	27.26
Coffeetree	1.11	2.04	0.00	10.00
Cottonwood	4.44	.93	510.84	29.59
Elm Sp	1.11	.63	80.64	18.00
Hackberry	4.44	12.65	80.64	8.02
Hickory Sp	1.11	.13	162.34	40.00
Shagbark Hickory	0.00	1.00	0.00	0.00
Honey Locust	1.11	.20	138.76	32.00
Silver Maple	54.44	50.78	2917.05	14.02
Bur Oak	4.44	.77	557.56	32.56
Pin Oak	2.22	.33	138.76	32.00
Pecan	1.11	.51	133.69	20.00
Misc	0.00	1.00	0.00	0.00
TOTAL	77.78 sq.ft.	71.51	4883.18 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	4883.2	1303.81	8462.56
Sq. Ft. Basal Area	90.0	48.78	131.22
Number of Trees	76.4	9.85	142.88

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 179.7
Sq. Ft. Basal Area 1.26

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
SILVER MAPLE		1.11	.80	16.00
	TOTAL	1.11 sq.ft./A	.80/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
SILVER MAPLE		2.22	.92	21.01
	TOTAL	2.22 sq.ft./A	.92/A	
Class 7 Standing Dead Tree				
SHAGBARK HICKORY		1.11	.35	24.00
SILVER MAPLE		5.56	4.08	15.79
PIN OAK		1.11	.13	40.00
MISCELLANEOUS		4.44	2.29	18.87
	TOTAL	12.22 sq.ft./A	6.85/A	
Class 9 Grapevine				
ELM SP		1.11	.63	18.00
HACKBERRY		2.22	6.29	8.05
SILVER MAPLE		18.89	30.97	10.57
MISCELLANEOUS		2.22	.98	20.36
	TOTAL	24.44 sq.ft./A	38.87/A	
Class 10				
HICKORY SP		1.11	.13	40.00
BUR OAK		4.44	.77	32.56
PIN OAK		1.11	.20	32.00
PECAN		1.11	.51	20.00
	TOTAL	7.77 sq.ft./A	1.61/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING	POUNDS PER ACRE	TOTAL POUNDS
BUR OAK	3.89	1,244.44
TOTAL ACORNS	3.89 lbs./A	1,244.44 lbs.

BLANCHARD ISLAND UNIT NO. XV

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	2.63	21.07	41.99	4.79
Coffeetree	.53	.11	0.00	30.00
Cottonwood	12.11	12.83	1250.45	13.15
Elm Sp	14.74	255.22	143.79	3.25
Hackberry	2.11	2.46	87.49	12.52
Silver Maple	88.95	105.29	5342.13	12.45
Mulberry Sp	1.05	1.34	16.68	11.99
White Oak	.53	.06	66.95	40.00
Pecan	1.05	.87	99.33	14.90
Willow Sp	.53	.17	64.08	24.00
Misc	.53	.67	36.29	12.00
TOTAL	124.74 sq.ft.	400.09	7149.18 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	7149.2	5415.34	8883.03
Sq. Ft. Basal Area	134.2	111.93	156.49
Number of Trees	408.7	192.19	625.30

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 212.5
Sq. Ft. Basal Area .96

FOR CLASSES 5-10 Per Acre Figures

Wildlife Related Inventory Data

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	2.63	1.49	17.98
MISCELLANEOUS	2.63	.74	25.55
TOTAL	5.26 sq.ft./A	2.23/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
SILVER MAPLE		2.63	.60	28.34
MISCELLANEOUS		1.05	.81	15.41
	TOTAL	3.68 sq.ft./A	1.41/A	
Class 7 Standing Dead Tree				
COTTONWOOD		.53	1.51	8.00
SILVER MAPLE		1.05	.28	26.12
WILLOW SP		1.05	.44	20.93
MISCELLANEOUS		6.84	6.42	13.97
	TOTAL	9.47 sq.ft./A	8.65/A	
Class 8 Leaf Nest				
SILVER MAPLE		.53	.20	22.00
	TOTAL	.53 sq.ft./A	.20/A	
Class 9 Grapevine				
ASH SP		1.58	18.09	4.00
COFFEETREE		.53	.11	30.00
COTTONWOOD		1.05	.73	16.22
ELM SP		6.32	70.65	4.05
HACKBERRY		2.11	2.46	12.52
SILVER MAPLE		23.68	14.21	17.48
MULBERRY SP		.53	.38	16.00
WHITE OAK		.53	.06	40.00
PECAN		.53	.67	12.00
WILLOW SP		.53	.30	18.00
MISCELLANEOUS		1.58	1.04	16.66
	TOTAL	38.97 sq.ft./A	108.7/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 10				
WHITE OAK		.53	.06	40.00
PECAN		1.05	.87	14.90
	TOTAL	1.58 sq.ft./A	.93/A	

ODESSA LAKE ISLAND (IA) UNIT IV
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	6.00	74.73	70.94	3.84
River Birch	8.00	26.64	106.78	7.42
Coffeetree	1.00	11.46	0.00	4.00
Cottonwood	0.00	1.00	0.00	4.00
Shagbark Hickory	2.00	5.73	0.00	8.00
Silver Maple	17.00	196.70	197.36	3.98
Bur Oak	8.00	32.15	0.00	6.75
Pin Oak	25.00	29.96	1271.85	12.37
Swamp White Oak	6.00	12.32	249.30	9.45
Misc	0.00	1.00	0.00	0.00
TOTAL	73.00 sq.ft.	391.69	1796.23 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	1796.2	75.73	3516.74
Sq. Ft. Basal Area	108.0	68.85	147.15
Number of Trees	443.0	110.14	775.91

Average Annual Growth Per Acre Int. Bd. Ft. 208.6
Sq. Ft. Basal Area 1.30

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
MISCELLANEOUS		1.00	.32	24.00
	TOTAL	1.00 sq.ft./A	.32/A	
Class 7 Standing Dead Tree				
RIVER BIRCH		1.00	5.09	6.00
COTTONWOOD		8.00	17.90	9.05
SILVER MAPLE		2.00	.73	22.42
PIN OAK		12.00	11.61	13.76
MISCELLANEOUS		11.00	15.14	11.54
	TOTAL	34.00 sq.ft./A	50.47/A	
Class 8 Leaf Nest				
PIN OAK		1.00	.20	30.00
	TOTAL	1.00 sq.ft./A	.20/A	
Class 9 Grapevine				
SILVER MAPLE		1.00	.13	38.00
PIN OAK		4.00	2.95	15.76
	TOTAL	5.00 sq.ft./A	3.08/A	
Class 10				
SHAGBARK HICKORY		2.00	5.73	8.00
SILVER MAPLE		1.00	2.86	8.00
BUR OAK		8.00	32.15	6.75
PIN OAK		23.00	28.23	12.22
SWAMP WHITE OAK		6.00	12.32	9.45
	TOTAL	40.00 sq.ft./A	81.29/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
BUR OAK		14.00	6,790.00
PIN OAK		49.40	23,959.00
	TOTAL ACORNS	63.40 lbs./A	30,749.00 lbs.
SHAGBARK HICKORY		2.60	1,261.00
	TOTAL NUTS	2.60 lbs./A	1,261.00 lbs.

ADDENDUM 18

ADDENDUM 18

1. INTRODUCTION

Pool 18 extends from New Boston, Illinois, to north of Burlington, Iowa, a distance of 26.6 miles. The pool contains 13,600 acres of water, 279 miles of shoreline (including islands), and 9,953 acres of public land. Project lands comprise the majority of public area in the pool.

Approximately 6,000 acres of project woodlands are located in this pool. Stands of oak and walnut can be found on Huron Island. Some of the remaining areas in the pool have some small stands of scattered oak; however, most of the areas are forested by silver maple, cottonwood, and ash.

Fish and wildlife resources on the Cooperative Agreement lands are managed by the Iowa Conservation Commission and the Illinois Department of Conservation under third party agreements, except for the Keithsburg Reguge which is managed by the USFWS.

2. PRESCRIPTIONS FOR POOL 18

Unit Title	Tract No.
Above Lock and Dam 18	D1-D3, A1, A2 RW 1-7

266.6 acres. UNIT NO. I

Photos No. 18-1. River mile 410-412.

Apply practice W (Special Management) along the river, sloughs, and lakes.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i, 9_i, 3_{im} apply practice Q (Thinning).

In Type 3_{im} apply practice J (Improvement Cut).

The Long Term Goal - Maintain the refuge wooded cover along the inland water areas and agricultural fields.

Mississippi Shorelines	F1 68-84
Illinois Shorelines 421-414 R.M.	F1A 6-21,
Iowa Shoreline 422-413 R.M.	23-31

Photos No. 18-1 to 81-12. River mile 421-414 and 422-413 (IA). II

Leave all cottage leased areas alone.

Apply practice W (Special Management) along shorelines and sloughs.

In Type 4_{im} apply practice J (Improvement Cut).

The Long Term Goal - Provide aesthetic appeal to people using the river for recreation. This area has steep shorelines with sandy soils. Any improvement cutting done in this area should be done with consideration of the sensitive erodable soil conditions.

Benton Island, IL — iis 5, 6
Camp and Jacoby Islands, IA — iis 11, 12, 13

190.3 acres. (III)

Photos No. 18-6 to 18-8. River mile 419-420.5.

Apply practice W (Special Management) along slough and river shores.

In type 9_i apply practice L_a (TSI).

The Long Term Goal - Leave it alone and provide some den trees along the inland wetland areas, otherwise leave the area alone to provide widlife habitat, and retain aesthetic values for receational boating. Wood duck is the priority wildlife species in this unit on Iowa managed areas.

Campbell Island — iais 10, 19-28

616 acres. (IV)

Photos No. 18-7 to 18-10. River mile 420-423.5.

Apply practice W (Special Management) along the river shore and all sloughs and lakes.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i apply practice Q (Thinning).

In Types 3_{im}, apply practice J (Improvement Cut) near oaks to produce den trees to increase mast production. Apply practice T (Monitor) for regeneration.

In Type 9_{im} apply practice I (Clearcut) then A_{d-f} (Reforestation) to higher areas.

In this unit harvest no more than 20 acres every 5 years.

The Long Term Goal - Diversify the habitat while maintaining a mix of evenaged stands in different stages of development. The area is low and wet. Conversion of habitat through the planting of mast-producing hardwoods is very limited.

North of Campbells Chute
to River Mile 427 — F1 85-96

219.2 acres. (V)

Photos No. 18-10 and 18-11. River mile 423.5-427.

Apply practice W (Special Management) along river shoreline, sloughs, and Campbell Chute.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i and 2_i follow practice Q (Thinning).

In Type 9_{im} follow practice I (Clearcut) and A_{d-f} (Reforestation) in higher areas.

In Type 6_{im} follow practice J (Improvement Cut).

In Type 3_i follow practice L_c (TSI) or I, then follow with practice A_{d-f}.

Where oaks are dying to oak wilt apply practice L_a, I or O.

In this unit harvest no more than 10 acres every 5 years.

Our Long Term Goal - Develop a mix of evenaged stands in different stages of development. Few higher areas suitable for planting oaks, pecans, etc., are present.

Huron Island Area
including Johnson Island, Big Cody,
and assorted islands — iais
14-17, 19-21, 23-27
29,31-36, 38-40,44, 46

1,633.7 acres. (VI)

Photos No. 18-9 to 18-12. River mile 420.5-425.2.

Apply practice W (Special Management) along river shore, sloughs, and lakes.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 2_i and 9_i apply practice Q (Thinning).

In Type 5 apply practice L_a and L_c (TSI).

In Type 4_{im} and 6_{im} apply practice J (Improvement Cut) to develop den trees and increase mast production. Otherwise apply practice T (Monitor). Black walnut association should be monitored to assure it is replacing itself on the area.

In Type 9_m, 9_{im}, and 2_m apply practice I (Clearcut) then A_{d-f} (Reforestation).

In this unit harvest no more than 25 acres every 5 years.

The Long Term Goal - Maintain the black walnut association. Other higher areas will be replanted in mast-producing species. Lower areas will be a mix of evenaged stands in varying stages of development. The priority wildlife species in this unit are the deer, wood duck, raccoon, songbirds, and raptors.

Landward Huron on the Iowa Shoreline — FM 31-42

157 acres. (VII)

Photos No. 18-11 and 18-12. River mile 425-426.

Apply practice W (Special Management) to the river shoreline and along slough and levees except in Type 5.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_m apply practice I and then A_{d-f} (Reforestation).

In this unit harvest no more than 10 acres every 5 years and create two 5-acre openings.

The Long Term Goal - Maintain a mix of unevenaged stands in different stages of growth. The few higher areas will be planted and maintained in mast-producing species. Wood duck is the priority wildlife species in this unit.

Mapes Island
Willow Bar — iis 34, 35A, 35B, 36, 37

182.7 acres. (VIII)

Photos No. 18-10 to 18-13. River mile 425-427.

Apply practice W (Special Management) along shorelines of the island and along sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i, 1_i, and 2_i apply practice Q (Thinning).

In Type 9_{im} and 2_m apply practice I (Clearcut).

In Type 3_m apply practice J (Improvement Cut).

In this unit harvest no more than 5 acres every 5 years.

The Long Term Goal - maintain a mix of evenaged stands in different stages of growth.

Blackhawk Island — iais 51, 52

538.7 acres. (IX)

Photos No. 18-12 to 18-14. River mile 426.5-429.

Apply practice W (Special Management) along river shoreline of the island and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i apply practice Q (Thinning).

In Type 5 apply practice L_a and L_c (TSI).

In Type 9_{im} and 2_{im} apply practice I (Clearcut).

In this unit harvest no more than 30 acres every 5 years.

The Long Term Goal - Develop and maintain a mix of evenaged stands in different stages of development. Priority wildlife in this unit include wood duck, deer, songbirds, and small mammals.

Landward Blackhawk and Iowa Shore North and Assorted Islands — F1A 45-51A iais 61-65

368.7 acres. (X)

Photos No. 18-13 to 18-17. River mile 426-430.8.

Apply practice W (Special Management) along the river shore, along the slough, and the levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 6_m apply practice J (Improvement Cut).

In Type 9_{im} apply practice I (Clearcut).

In Type 2_i apply practice Q (Thinning).

In this unit harvest no more than 15 acres every 10 years.

The Long Term Goal - Develop and maintain a mix of evenaged stands in different stages of development.

Keithsburg — Fl 98-104

863.8 acres. (XI)

Photos No. 18-13 to 18-16. River mile 428-431.

Apply practice W (Special Management) along river shore, sloughs, levees, and lakes.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 4_i, 6_i, 3_i, 9_i, and 1_i apply practice Q (Thinning). Where willow occupies 70%+ of the stand, leave the parcel alone.

In Type 9_{im} apply practice V (Seed Tree), then A_{d-f} (Reforestation).

In Type 4_{im}, 6_{im}, and 3_{im} apply practice J (Improvement Cut).

In Type 19_{im} apply practice N (Unique Area) and T (Monitor).

In this unit harvest no more than 5 acres every 5 years.

The Long Term Goal - Manage for the maximum production of wildlife resources.

Boston Bay Area — Fl 170, 171, 172A, 172B, 172C, 173A

555 acres. (XII)

Photos No. 18-18 and 18-19. River mile 433-434.

Apply practice W (Special Management) along river shores and Boston Bay shores.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 5 apply practice L_a and L_c (TSI).

In Type 2_i apply practice Q (Thinning).

In type 2_{im} apply practice I (Clearcut).

Apply practice W and T (Monitor) heron rookery and to a 1,500-foot buffer zone around it. Monitor for heron usage of the rookery.

In this unit harvest no more than 35 acres every 5 years.

Some oak were noticed during iventory. In any harvest or thinning leave these trees. Change harvest to V (Seed Tree) or U (Shelterwood) where the few oaks, etc., exist.

The Long Term Goal - Maintain a mix of evenaged stands in different stages of development. Herons are the priority wildlife in this unit.

From Pipeline River Mile 430.8 to Iowa River on Iowa Side of the River and Islands	FIA 52-62
From River Mile 431 to New Boston on the Illinois Side of the River and Nearby Islands	IAIS 67-71 Fl 105-107A iais 72-74

277 acres. (XIII)

Photos No. 18-16 to 18-23. River mile 438.0-434 (IA), 431-434 (IL).

Apply practice W (Special Management) along river and island shores the levee.

Apply practice X (Stand Mapping) before applying any other practices.

Leave the cottage sites on the shoreline north of the recreation area along the Iowa River alone.

In Type 51 apply practices A_{a-c} (Plant) and B (Tree Maintenance) (Ferry Landing Recreational Area).

In Type 2_i apply practice Q (Thinning).

In Type 9_{im} apply practice I (Clearcut).

In this unit harvest no more than 10 acres every 10 years.

The Long Term Goal - Maintain a mix of evenaged stands in different stages of growth south of the recreation area on the Iowa side of the Mississippi River.

3. PRIORITIES LIST FOR POOL 18

A Cut oaks dying or dead because of oak wilt. Plant white oak and hickory in their place.

B Thin overstocked pin oak silver maple, cottonwood stands on all island areas (such as IAIS 68, Huron Island, etc.).

C Make regeneration (harvest) cuts and thinning on Blackhawk and Mapes Island and plant suitable areas.

D Closely examine Huron Island, walnut stands, and make improvement cuts.

E Apply improvement cuts or thinning to Illinois shoreline between Oquawka and Keithsburg (Tract #FI68-96).

4. ESTIMATED COSTS

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	\$ 1,990	\$150	\$298,500
Improvement cut	325	\$150	\$ 48,700
Timber stand Improvement	160	\$ 30	\$ 4,800
Harvest (contractural preparation)	160	\$ 60	\$ 9,600
Site preparation	\$ 160	\$110	\$ 17,600
Planting	150 ± 50	\$ 50	\$ 7,500 ± \$ 2,500
Type mapping	2,635	\$ 2	\$ 5,270
	Total Cost for Pool 18		\$391,970 ± \$ 2,500

HURON ISLAND - UPPER 1/3 UNIT NO. VI

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.67	.91	182.36	18.30
River Birch	1.67	.67	153.46	21.41
Coffeetree	.83	.47	66.49	18.00
Cottonwood	9.17	6.01	1193.69	16.72
Elm Sp	2.50	40.79	0.00	3.35
Hackberry	6.67	14.32	116.77	9.24
Honey Locust	3.33	2.11	268.09	17.01
Silver Maple	71.67	167.67	3000.71	8.85
Pin Oak	1.67	2.54	119.74	10.98
Pecan	.83	.32	85.71	22.00
Black Walnut	.83	.60	96.69	16.00
Willow Sp	1.67	.55	223.45	23.53
Misc	0.00	1.00	0.00	0.00
TOTAL	102.50 sq.ft.	237.94	5507.18 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	5507.2	4152.35	6862.01
Sq. Ft. Basal Area	113.3	87.02	139.65
Number of Trees	255.9	104.55	407.15

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 231.4
Sq. Ft. Basal Area 1.05

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	5.83	1.63	25.62
PIN OAK	.83	.23	26.00
WILLOW SP	.83	.17	30.00
MISCELLANEOUS	1.67	.39	28.00
TOTAL	9.16 sq.ft./A	2.42/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (3/4 Lower Bole)				
SILVER MAPLE		5.00	1.31	26.47
WILLOW UP		.83	.17	30.00
	TOTAL	5.83 sq.ft./A	1.48/A	
Class 7 Standing Dead Tree				
ELM SP		.83	.27	10.00
SILVER MAPLE		6.67	16.67	8.56
PIN OAK		.83	.23	26.00
MISCELLANEOUS		1.67	.39	28.00
	TOTAL	10.00 sq.ft./A	18.82/A	
Class 8 Leaf Nest				
HONEY LOCUST		.83	.27	24.00
	TOTAL	.83 sq.ft./A	.27/A	
Class 9 Grapevine				
ASH SP		.83	.32	22.00
RIVER BIRCH		1.67	.67	21.41
COFFEETREE		.83	.47	18.00
COTTONWOOD		.83	.27	24.00
ELM SP		1.67	2.59	10.86
HACKBERRY		1.67	5.31	7.59
HONEY LOCUST		2.50	1.64	16.71
SILVER MAPLE		10.00	26.10	8.38
PIN OAK		.83	.15	32.00
BLACK WALNUT		.83	.60	16.00
WILLOW SP		.83	.38	20.00
	TOTAL	22.49/sq.ft./A	38.50/A	

FOR CLASSES 5-10
Per Acre Figures

Wildlife Related Inventory Data (Cont'd)

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 10			
PIN OAK	1.67	2.54	10.98
PECAN	.83	.32	22.00
BLACK WALNUT	.83	.60	16.00
TOTAL	3.33 sq.ft./A	3.46/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING	POUNDS/ACRE	TOTAL POUNDS
PIN OAK	1.42	680.00
TOTAL ACORNS	1.42 lbs./A	680.00 lbs.

BLACKHAWK, MAPES ISLANDS UNITS NO. VIII, IX
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.54	1.96	0.00	11.99
River Birch	.77	.21	0.00	26.00
Cottonwood	3.85	.99	519.20	26.72
Elm Sp	3.08	30.36	0.00	4.31
Silver Maple	118.46	173.42	5945.53	11.19
Willow Sp	9.23	12.29	328.84	11.73
Misc	0.00	1.00	0.00	0.00
TOTAL	136.92 sq.ft.	220.23	6793.56 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6793.6	3298.95	10288.18
Sq. Ft. Basal Area	150.8	114.05	187.49
Number of Trees	239.4	116.71	362.03

Average Annual Growth Per Acre Int. Bd. Ft. 68.4
Sq. Ft. Basal Area .35

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
SILVER MAPLE		7.69	2.87	22.15
WILLOW SP		.77	.35	20.00
	TOTAL	8.46 sq.ft./A	3.22/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
SILVER MAPLE		6.92	2.27	23.65
	TOTAL	6.92 sq.ft./A	2.27/A	
Class 7 Standing Dead Tree				
ELM SP		.77	2.20	8.00
SILVER MAPLE		6.92	12.31	10.15
WILLOW SP		4.62	4.08	13.03
MISCELLANEOUS		.77	.09	40.00
	TOTAL	13.08 sq.ft./A	19.68/A	
Class 9 Grapevine				
COTTONWOOD		.77	.24	24.00
SILVER MAPLE		15.38	13.66	14.37
	TOTAL	16.15 sq.ft./A	13.90/A	

LANDWARD BLACKHAWK - IOWA UNIT NO. X

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	10.00	17.26	514.44	10.31
Cottonwood	2.50	.43	414.38	32.59
Elm Sp	3.75	9.45	45.72	8.53
Hackberry	8.75	115.29	0.00	3.73
Honey Locust	7.50	2.45	145.56	23.71
Silver Maple	48.75	26.15	2643.65	18.49
Pin Oak	2 50	.40	313.69	33.94
Willow Sp	2.50	1.41	39.26	18.00
Misc	0.00	1.00	0.00	0.00
TOTAL	86.25 sq.ft.	173.85	4116.70 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	4116.7	1476.13	6757.27
Sq. Ft. Basal Area	108.8	90.63	126.87
Number of Trees	185.8	0.00	377.60

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 85.9
Sq. Ft. Basal Area .48

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	1.25	.90	16.00
MISCELLANEOUS	1.25	.47	22.00
TOTAL	2.50 sq.ft./A	1.37/A	
Class 7 Standing			
HONEY LOCUST	1.25	.25	30.00
SILVER MAPLE	11.25	5.54	19.29
MISCELLANEOUS	10.00	7.14	16.03
TOTAL	22.50 sq.ft./A	12.93/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		1.25	3.58	8.00
ELM SP		1.25	3.58	8.00
HACKBERRY		5.00	29.35	5.59
HONEY LOCUST		5.00	1.13	28.42
SILVER MAPLE		35.00	18.84	18.46
PIN OAK		2.50	.40	33.94
MISCELLANEOUS		2.50	3.92	10.81
	TOTAL	52.50 sq.ft./A	60.80/A	
Class 10				
PIN OAK		2.50	.40	33.94
	TOTAL	2.50 sq.ft./A	.40/A	

BOSTON BAY AREA (IL) UNIT NO. XII
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	6.00	3.08	406.16	18.89
River Birch	1.00	.16	0.00	34.00
Elm Sp	1.00	1.27	34.38	12.00
Hackberry	3.00	2.59	167.42	14.58
Silver Maple	121.00	72.89	7602.75	17.45
Misc	0.00	1.00	0.00	0.00
TOTAL	132.00 sq.ft.	80.99	8210.70 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	8210.7	6737.81	9883.59
Sq. Ft. Basal Area	146.0	115.43	176.57
Number of Trees	90.5	49.24	131.75

Average Annual Growth Per Acre Int. Bd. Ft. 133.4
Sq. Ft. Basal Area .72

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
SILVER MAPLE		4.00	.50	38.21
	TOTAL	4.00 sq.ft./A	.50/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
ASH SP		1.00	.46	20.00
SILVER MAPLE		7.00	1.21	32.51
	TOTAL	8.00 sq.ft./A	1.67/A	
Class 7 Standing Dead Tree				
SILVER MAPLE		12.00	8.52	16.07
MISCELLANEOUS		2.00	1.99	13.58
	TOTAL	14.00 sq.ft./A	10.51/A	
Class 8 Leaf Nest				
SILVER MAPLE		1.00	.32	24.00
	TOTAL	1.00 sq.ft./A	.32/A	
Class 9 Grapevine				
ELM SP		1.00	1.27	12.00
HACKBERRY		2.00	1.87	14.00
SILVER MAPLE		9.00	4.20	19.82
	TOTAL	12.00 sq.ft./A	7.34/A	

ADDENDUM 21

ADDENDUM 21

1. INTRODUCTION

Pool 21 extends from Canton, Missouri, to Quincy, Illinois, a distance of 18.4 miles. The pool contains 6,350 acres of water, 146.6 miles of shoreline (including islands), and 8,536 acres of public land. Project lands comprise the majority of public land area in the pool.

Approximately 7,100 acres of project woodlands are located in this pool. The Long Island and Pecan Grove areas contain some fine mast tree associations ranging from pure pecan to a general mixture of species with paw paw or persimmon in the understory.

As in Pool 22, the Illinois Department of Conservation and the Missouri Department of Conservation manage the fish and wildlife resources on most Cooperative Agreement lands in Pool 21. The Gardner unit of the Mark Twain Refuge is managed by the US Fish and Wildlife Service and designated as a wildlife refuge.

2. PRESCRIPTIONS FOR POOL 21

Unit Title	Tract No.
Around Quincy Memorial Highway Bridge	Fl 39-56 FM 1-5B

275 acres. UNIT NO. I

Photos No. 22-21 and 21-2. River mile 325-328.

Apply Practice M (No Management) along river shoreline, levee, and slough.

Leave area on Illinois shore below Quincy, Illinois, alone.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 5 apply practice L_a and/or L_c (TSI).

In Type 9_i and 2_i apply practice Q (Thinning).

In Type 9_{im} and 2_m apply practice I (Clearcut).

In this unit harvest no more than 5 acres every 5 years.

The Long Term Goal - Develop a mixed bottom land forest of silver maple, ash, and cottonwood. The area will be a mix of evenage stands in different stages of development.

Missouri Shoreline from R.R. Bridge to Below Canton, Missouri	Mis 3 FM 6-11

Photos No. 21-3, 4, and 6. River mile 328-334.8 and 335.5-341.5. (II)

Leave area alone to preserve aesthetic values of recreational experience.

The Long Term Goal - Allow natural development of the timber to provide habitat for wildlife using the bordering agricultural fields and preserve aesthetic river values for boaters.

Quincy Bay Area, Illinois Shore along Bay and Above and Below Railway	Fl 134-139, 141-145, 147, 117-130 iis 50 Fl 63, 64

Photos No. 21-3 to 21-5. River mile 329-330. (III)

Leave the area alone except in tracts 141, 143-145, and 147.

In those tracts apply practice W (Special Management) along river shore.

Most of the area left is under lease. If leases are terminated these areas will probably be used for recreation.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i and 1_i apply practice Q (Thinning).

The Long Term Goal - Allow the timber to develop naturally. Small persimmons in Tract Fl 147 may be used as seed stock for reestablishing persimmon in other areas.

Libby, Hogback, Teal, Deadman Island, and North and South Knapheide	iis 1-4 Fl 30-36, 38, 94, 96, 98 Fl 2-29, 63, 64

1,225 acres. (IV)

Photos No. 21-3 and 4, and 21-6 to 21-8. River mile 329-334.

Apply W (Special Management) along the river shore, sloughs, and lakes.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i and 2_i apply practice Q (Thinning).

In Type 5 apply practice L_a and/or L_b (TSI).

In Canton Chute campgrounds apply practices A_{a-c} (Plant) and B (Tree Maintenance).

In Type 9_{im} apply practice I, then practice A_{e-g} to suitable higher areas. Apply practice L_a or K where younger timber may be overtopped by older timber.

In Type 3_{im} and 6im apply practice J (Improvement Cut), I (Clearcut), V (Seed Tree), or U (Shedterwood, then practice A_{d-f} (Reforestation) in suitable higher areas. Where a good association of oak, hickory, and pecan is found apply practice J, U, or V. Where no such tree occupies the site, apply practice I.

In type 5 on Hogback Island apply practice S (Prescribed Burn).

In this unit harvest no more than 55 acres every 5 years.

Some very limited reproduction and young trees noted. These should be released and more mast trees established in the area.

The Long Term Goal - Develop and maintain higher areas in oak and other mast-producing trees. The lower areas will be a mix of evenaged stands in different stages of development. An understory will be developed on the higher areas by planting such trees as dogwood and persimmon. Thinnings should help to develop an understory in lower areas.

Cottonwood Island — Mis 2, 2A, 2B

319.7 acres. (V)

Photos No. 21-3, 4, and 6. River mile 328.5-330.5.

Apply practice M (No Treatment) along island shoreline.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i apply practice Q (Thinning).

In Type 5 apply practice L_a and L_c (TSI).

In Type 9_{im} and 2_{im} apply practice I (Clearcut) then apply practice A_{d-f} (Reforestation).

In this unit harvest no more than 20 acres every 5 years.

Our Long Term Goal - Develop a mix of evenaged stands in different stages of development.

Gardner	iis 7, 15-20, 10, 10A
Long Island	10B, 23-28, 31, 32,
	36, 38-40

3,117.8 acres. (VI)

Photos No. 21-7 to 21-14. River mile 333.5-340.5.

Apply practice W (Special Management) along river, lake, and slough shores, and high use inland eagle areas.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 4_{im} apply practice T (Monitor) for 10 years. If mast production is low due to overstocked condition, apply practice J (Improvement Cut).

In Type 6_{im} apply practice J.

In Type 3_{im} apply practice J, or U (Shelterwood) or V (Seed Tree) and then A_{d-f}.

In Type 9_i and 2_i apply practice Q (Thinning).

In Type 9_{im} apply practice V (Seed Tree) or U (Shelterwood), then apply practice A_{d-f} (Reforestation) in higher areas.

In this unit harvest no more than 66 acres every five years.

Our Long Term Goal - Preserve higher areas that are supporting good mast producing tree associations that are regenerating themselves. The lower areas should be a mix of different evenaged stands at different stages of development. Applying practice V as a harvesting measure will allow den trees to be left in younger stands. Planting dogwood, persimmon, and other smaller trees should help develop an understory on the higher areas.

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	iis - 41, 41A, 44, 46, 47
Bear Creek Area, Pecan Grove	Fl 72, 76, 77, 80, 81, 83
Barns Island, Chatton Island	84, 86, 87, 89, 157, 158, 160

890 acres. (VII)

Photos No. 21-12 and 21-13. River mile 339-342.

Apply practice W (Special Management) along river shoreline and along sloughs and lake.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 4_{im} and 3 apply practice J (Improvement Cut) to release desired trees and promote mast production.

In Type 9_i and 2_i apply practice Q (Thinning).

In Types 9_m, 9_{im}, and 3_{im} apply practice I (Clearcut) or V (Seed Tree) and L_c (TSI), then A_{d-f}. When mast hardwood trees are present apply practice V or U and leave mast trees as seed trees. Otherwise apply practice I, then A_{d-f}.

In Types 23, 16_{im} apply practice T (Monitor) for low mast production and species regeneration.

In this unit harvest no more than 85 acres every 5 years. Harvest areas of overmature or highgraded timber first.

The Long Term Goal - Maintain the pecan groves and the association of species along on branch of the road leading back into the unit. The higher areas will be restored to a diverse association of mast-producing trees and the lower areas will be managed so a mix of evenaged stands in different stages of growth will be maintained. Thinning will maintain as much understory as possible in the lower areas.

3. PRIORITIES LIST FOR POOL 21

A	Conduct an improvement cut in the pin oak area in the upper part of Pecan Grove unit.
B	Thin appropriate stands in Knapheide and Bear Creek-Chatton-Barnes units (stands that average about 10" DBH).
C	Harvest areas in Bear Creek-Chatton-Barnes and Pecan Grove management units that have reached the indicated basal area and plant mast trees into suitable areas.

4. ESTIMATED COSTS

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	600	$150	$ 90,000
Improvement cut	150 ± 100	$150	$ 22,500 ± $ 15,000
Timber stand Improvement	100	$ 30	$ 3,000
Harvest (contractural preparation)	250	$ 60	$ 15,000
Site preparation	250	$110	$ 27,500
Monitoring	400	$ 15	$ 6,000
Planting	200 ± 75	$ 50	$ 10,000 ± $ 3,750
Type mapping	1,500	$ 2	$ 3,000
	Total Cost for Pool 21		$195,750 ± $ 18,750

Pool 21 - Inventory Data

CANTON CHUTE RECREATION AREA, SOUTH (IL) UNIT NO. IV

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	3.64	2.50	96.04	16.32
Coffeetree	.91	.65	36.49	16.00
Cottonwood	.91	.10	78.91	16.00
Elm Sp	2.73	5.16	0.00	9.84
hackberry	6.36	22.99	126.42	7.12
Silver Maple	48.18	103.04	1597.31	9.26
Bur Oak	1.82	1.10	153.39	17.43
Pecan	2.73	.84	256.50	24.34
Sycamore	.91	.10	0.00	40.00
Willow Sp	2.73	3.67	65.43	11.67
Misc	0.00	1.00	0.00	0.00
TOTAL	70.91 sq.ft.	141.18	2410.50 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	2410.5	739.35	4081.66
Sq. Ft. Basal Area	75.5	90.08	100.83
Number of Trees	143.8	0.00	300.21

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 120.2
Sq. Ft. Basal Area 1.20

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	.91	.51	18.00
TOTAL	.91 sq.ft./A	.51/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
ASH SP	.91	1.67	10.00
SILVER MAPLE	2.73	.49	31.92
TOTAL	3.64 sq.ft./A	2.16/A	
Class 7 Standing Dead Tree			
ASH SP	.91	.51	18.00
BUR OAK	.91	.85	14.00
PECAN	.91	1.16	12.00
MISCELLANEOUS	1.82	1.14	17.10
TOTAL	4.55 sq.ft./A	3.66/A	
Class 9 Grapevine			
ELM SP	.91	.12	38.00
HACKBERRY	2.73	13.75	6.03
SILVER MAPLE	33.64	96.11	8.01
PECAN	1.82	1.34	15.76
WILLOW SP	2.73	3.67	11.67
TOTAL	41.83 sq.ft./A	114.99/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 10				
BUR OAK		1.82	1.10	17.43
PECAN		2.73	.84	24.34
	TOTAL	4.55 sq.ft./A	1.94/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
BUR OAK		5.45	2,270.18
	TOTAL ACORNS	5.45 lbs./A	2,270.18 lbs.

NORTH OF THE CANTON CHUTE RECREATION AREA (IL) UNIT NO. IV
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.11	.37	22.26	23.53
Boxelder	.56	2.83	0.00	6.00
Coffeetree	1.67	4.87	0.00	7.92
Cottonwood	12.22	13.94	723.68	12.68
Elm Sp	5.56	57.42	0.00	4.21
Hackberry	.56	6.37	0.00	4.00
Honey Locust	.56	.31	40.32	18.00
Silver Maple	70.00	158.21	2623.08	9.01
Bur Oak	1.11	.24	40.11	29.10
Pecan	1.67	.33	0.00	30.49
Willow Sp	1.67	8.36	44.60	6.05
Misc	0.00	1.00	0.00	0.00
TOTAL	96.67 sq.ft.	254.24	3494.05 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	3471.7	1801.92	5141.57
Sq. Ft. Basal Area	102.2	77.82	126.62
Number of Trees	268.3	122.29	414.34

Average Annual Growth Per Acre Int. Bd. Ft. 327.4
Sq. Ft. Basal Area 2.77

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
SILVER MAPLE		.56	.06	40.00
	TOTAL	.56 sq.ft./A	.06/A	
Class 7 Standing Dead Tree				
SILVER MAPLE		1.67	2.43	11.21
MISCELLANEOUS		2.22	1.86	14.81
	TOTAL	3.89 sq.ft./A	4.29/A	
Class 9 Grapevine				
ASH SP		.56	.25	20.00
BOXELDER		.56	2.83	6.00
COFFEETREE		1.67	4.87	7.92
COTTONWOOD		2.78	4.30	10.89
ELM SP		5.00	51.05	4.24
HACKBERRY		.56	6.37	4.00
HONEY LOCUST		.56	.31	18.00
SILVER MAPLE		29.44	58.64	9.60
PECAN		1.11	.24	29.10
WILLOW SP		1.11	7.96	5.06
	TOTAL	43.35 sq.ft./A	136.82/A	
Class 10				
BUR OAK		1.11	.24	29.10
PECAN		1.67	.33	30.49
	TOTAL	2.78 sq.ft./A	.57/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING	POUNDS PER ACRE	TOTAL POUNDS
BUR OAK	1.94	305.86
TOTAL	1.94 lbs./A	305.86 lbs.

PECAN GROVE (IL) UNIT NO. VII

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	6.28	5.02	446.74	15.15
River Birch	1.16	.39	73.93	23.37
Boxelder	1.86	8.07	0.00	6.50
Cottonwood	8.14	3.19	831.53	21.63
Elm Sp	2.33	23.00	8.68	4.31
Hackberry	1.40	4.40	24.50	7.62
Hickory Sp	1.16	1.02	75.37	14.43
Shagbark Hickory	1.16	.62	78.68	18.58
Silver Maple	65.58	46.72	3720.66	16.04
Pin Oak	9.30	3.47	931.51	22.19
Swamp White	1.86	1.54	94.16	14.87
Pecan	1.63	.58	120.04	22.75
Persimmon	.93	5.76	43.87	5.44
Sycamore	1.16	.54	131.04	19.94
Willow Sp	2.56	46.65	34.20	3.17
Misc	.23	.05	24.27	28.00
TOTAL	106.74 sq.ft.	151.01	6639.16 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6639.2	5311.63	7966.70
Sq. Ft. Basal Are	114.7	96.19	133.11
Number of Trees	156.0	86.76	225.17

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 258.8
Sq. Ft. Basal Area 1.76

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	.47	.24	18.92
RIVER BIRCH	.23	.06	26.00
BOX ELDER	.23	.09	22.00
SILVER MAPLE	1.16	.51	20.51
PIN OAK	.70	.30	20.59
TOTAL	2.79 sq.ft./A	1.20/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	1.86	.39	29.58
PIN OAK	.23	.03	36.00
PECAN	.23	.11	20.00
MISCELLANEOUS	.23	.22	14.00
TOTAL	2.56 sq.ft./A	.75/A	
Class 7 Standing Dead Tree			
ASH SP	.70	.94	11.67
RIVER BIRCH	.47	.10	29.81
HACKBERRY	.23	.22	14.00
SILVER MAPLE	3.72	2.32	17.14
PIN OAK	.70	.33	19.75
MISCELLANEOUS	1.16	.84	15.94
TOTAL	6.98 sq.ft./A	4.75/A	
Class 8 Leaf Nest			
SILVER MAPLE	1.40	.56	21.34
PIN OAK	.47	.14	25.09
TOTAL	1.87 sq.ft./A	.70/A	

FOR CLASSES 5-10
Per Acre Figures

Wildlife Related Inventory Data (Cont'd)

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		.70	.28	21.38
RIVER BIRCH		.93	.25	25.94
BOXELDER		.70	4.52	5.32
COTTONWOOD		.93	.20	28.87
ELM SP		1.40	16.79	3.90
HACKBERRY		.93	.86	14.06
HICKORY SP		.93	.86	14.06
SILVER MAPLE		17.21	14.64	14.68
PIN OAK		5.58	2.05	22.35
SWAMP WHITE OAK		.93	.86	14.07
PECAN		.47	.14	24.94
PERSIMMON		.23	.30	12.00
SYCAMORE		.93	.45	19.51
WILLOW SP		.47	21.32	2.00
MISCELLANEOUS		.47	.27	17.71
	TOTAL	32.58 sq.ft./A	63.57/A	
Class 10				
HICKORY SP		1.16	1.02	14.43
SHAGBARK HICKORY		1.16	.62	18.58
PIN OAK		9.30	3.47	22.19
SWAMP WHITE OAK		1.86	1.54	14.87
PECAN		1.63	.58	22.75
MISCELLANEOUS		.23	.05	28.00
	TOTAL	15.34 sq.ft./A	7.28/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
PIN OAK		17.02	12,052.47
	TOTAL ACORNS	17.02 lbs./A	12,052.47 lbs.
HICKORY SP		1.51	1,070.23
SHAGBARK HICKORY		1.51	1,070.23
	TOTAL NUTS	3.02 lbs./A	2,140.46 lbs.

COTTONWOOD ISLAND (MO) UNIT NO. V

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.67	2.00	31.41	12.36
Boxelder	2.50	3.19	33.45	11.99
Coffeetree	.83	.78	0.00	14.00
Cottonwood	9.17	5.11	843.25	18.13
Elm Sp	5.00	17.85	125.85	7.17
Silver Maple	75.83	90.06	2323.34	12.42
Sycamore	5.83	6.19	257.21	13.15
Willow Sp	2.50	1.79	33.45	16.00
Misc	0.00	1.00	0.00	0.00
TOTAL	103.33 sq.ft.	127.97	3647.97 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	3648.0	2145.62	5150.32
Sq. Ft. Basal Area	110.8	89.94	131.72
Number of Trees	135.5	79.04	191.90

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 296.5
Sq. Ft. Basal Area 2.62

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	2.50	.96	21.86
TOTAL	2.50 sq.ft./A	.96/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	1.67	.89	18.58
MISCELLANEOUS	.83	.47	18.00
TOTAL	2.50 sq.ft./A	1.36/A	

FOR CLASSES 5-9 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree			
SILVER MAPLE	4.17	6.24	11.06
WILLOW SP	2.30	1.79	16.00
MISCELLANEOUS	.83	.47	18.00
TOTAL	7.50 sq.ft./A	8.50/A	
Class 9 Grapevine			
BOXELDER	1.67	2.59	10.86
COTTONWOOD	.83	.32	22.00
ELM SP	3.33	16.56	6.07
SILVER MAPLE	29.17	50.08	10.33
SYCAMORE	1.67	.61	22.42
WILLOW SP	.83	.60	16.00
MISCELLANEOUS	.83	.47	18.00
TOTAL	38.33 sq.ft./A	71.23/A	

BARNS ISL. - BEAR CREEK - CHATTON ISL. (IL) UNIT NO. VII
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	10.53	29.31	384.74	8.11
River Birch	0.00	1.00	0.00	0.00
Boxelder	1.05	1.64	0.00	0.00
Cottonwood	12.63	16.95	1039.97	11.69
Elm Sp	3.68	61.48	0.00	3.31
Silver Maple	96.84	181.61	4585.65	9.89
Mulberry Sp	1.05	8.71	0.00	4.71
Swamp White Oak	2.11	.75	236.42	22.73
Pecan	1.58	.60	153.39	21.88
Sycamore	1.05	.27	125.75	26.94
Willow Sp	1.05	.97	28.65	14.12
Misc	0.00	1.00	0.00	0.00
TOTAL	131.58 sq.ft.	304.29	6554.58 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	6554.6	4984.63	8124.52
Sq. Ft. Basal Area	148.4	127.95	168.89
Number of Trees	355.0	195.78	514.27

Average Annual Growth Per Acre Int. Bd. Ft. 176.0
Sq. Ft. Basal Area 1.25

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	.53	.17	24.00
SWAMP WHITE OAK	.53	.11	30.00
TOTAL	1.06 sq.ft./A	.28/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	2.63	1.17	20.31
PECAN	.53	.06	40.00
TOTAL	3.16 sq.ft./A	1.23/A	
Class 7 Standing Dead Tree			
ASH SP	.53	24.12	2.00
RIVER BIRCH	.53	.20	22.00
ELM SP	1.05	.54	18.83
SILVER MAPLE	8.95	17.65	9.64
PECAN	.53	.14	26.00
MISCELLANEOUS	4.21	8.14	9.74
TOTAL	15.80 sq.ft/A	50.79/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		1.05	.37	22.77
BOXELDER		.53	.67	12.00
COTTONWOOD		4.21	5.62	11.72
ELM SP		2.63	53.95	2.99
SILVER MAPLE		38.95	112.43	7.97
SWAMP WHITE OAK		1.58	.64	21.27
PECAN		1.05	.52	19.27
SYCAMORE		.53	.14	26.00
MISCELLANEOUS		1.58	4.39	8.12
	TOTAL	52.11 sq.ft./A	178.73/A	
Class 10				
SILVER MAPLE		1.05	1.93	10.00
SWAMP WHITE OAK		2.11	.75	22.73
PECAN		1.58	.60	21.88
	TOTAL	4.74 sq.ft./A	3.28/A	

LONG ISLAND, FLANAGAN, SHANDREW, LAGRANGE - REFUGE AREA UNIT NO. VI

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	10.59	21.72	1033.82	9.45
Basswood	.15	.42	0.00	8.00
River Birch	.74	.36	43.91	19.39
Boxelder	1.76	5.55	57.36	7.63
Coffeetree	.59	.90	23.82	10.94
Cottonwood	8.82	4.96	1134.31	18.06
Elm Sp	6.76	49.84	92.67	4.99
Hackberry	9.12	39.86	413.83	6.48
Hawthorn	.44	2.53	0.00	5.66
Hickory Sp	.44	.41	33.76	14.08
Shagbark Hickor	1.18	1.05	126.86	14.31
Honey Locust	2.21	1.26	188.89	17.90
Silver Maple	78.53	91.28	5957.62	12.56
Bur Oak	.74	.34	76.76	19.90
Pin Oak	3.09	.85	379.30	25.86
White Oak	.29	.15	33.36	18.83
Pecan	2.35	.73	270.36	24.25
Persimmon	.15	.27	9.99	10.00
Sycamore	1.32	.94	129.54	16.08
Black Walnut	.15	.07	14.91	20.00
White Walnut	.15	.07	14.91	20.00
Willow Sp	2.94	2.86	186.73	13.72
Misc	.44	.56	8.46	11.99
TOTAL	132.94 sq.ft.	227.00	10231.19 Bd.ft.	

Variable of Interest	Mean/A	95% Confidence Interval	
Int 1/4 Bd Ft	10231.2	8902.20	11560.18
Sq. Ft. Basal Area	147.8	135.94	159.64
Number of Trees	244.3	197.33	291.20

Average Annual Growth Per Acre Int. 1/4 Bd. Ft. 66.6
Sq. Ft. Basal Area .27

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	1.47	.63	20.62
RIVER BIRCH	.15	.06	22.00
BOXELDER	.15	.11	16.00
COTTONWOOD	.74	.19	26.32
ELM SP	.15	.42	12.00
HACKBERRY	.88	.97	12.91
HAWTHORN	.15	.42	8.00
HONEY LOCUST	.74	.20	26.24
SILVER MAPLE	13.68	5.05	22.28
PIN OAK	.44	.11	26.75
PECAN	.29	.05	34.62
SYCAMORE	.29	.05	14.00
WILLOW SP	.74	.65	14.37
MISCELLANEOUS	2.50	1.37	18.26
TOTAL	22.37 sq.ft./A	10.05/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
ASH SP	1.32	.51	21.89
RIVER BIRCH	.15	.05	24.00
SILVER MAPLE	9.71	2.64	25.95
PIN OAK	.44	.09	30.49
PECAN	.29	.05	31.88
SYCAMORE	.59	.27	20.00
WILLOW SP	.15	.19	12.00
MISCELLANEOUS	.88	.39	20.32
TOTAL	13.53 sq.ft./A	4.19/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree			
ASH SP	.44	.14	23.83
RIVER BIRCH	.15	.06	22.00
COTTONWOOD	.59	.36	17.25
ELM SP	.15	.11	16.00
HACKBERRY	.88	.63	16.00
HICKORY SP	.15	.14	14.00
SHAGBARK HICKORY	.15	.08	18.00
HONEY LOCUST	.29	.05	34.62
SILVER MAPLE	16.47	5.04	24.48
PIN OAK	.88	.22	27.11
PECAN	.88	.21	27.80
SYCAMORE	.15	.03	28.00
WHITE WALNUT	.15	.07	20.00
WILLOW SP	.15	.19	12.00
MISCELLANEOUS	.44	.51	12.58
TOTAL	21.92 sq.ft./A	7.81/A	
Class 8 Leaf Nest			
ASH SP	.44	.22	19.26
COTTONWOOD	.15	.04	26.00
HACKBERRY	.15	.27	10.00
SHAGBARK HICKORY	.15	.08	18.00
SILVER MAPLE	.44	.12	25.96
PIN OAK	.29	.09	24.94
PECAN	.15	.02	38.00
SYCAMORE	.15	.03	28.00
WILLOW SP	.15	.08	18.00
TOTAL	2.08 sq.ft./A	.95/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		.88	.62	16.20
RIVER BIRCH		.15	.06	22.00
COTTONWOOD		.29	.23	15.41
ELM SP		.88	3.64	6.67
HAWTHORN		.15	.42	8.00
HONEY LOCUST		.44	.33	15.75
SILVER MAPLE		3.97	7.59	9.79
PIN OAK		.59	.17	25.12
WILLOW SP		.15	.11	16.00
MISCELLANEOUS		4.26	3.81	14.32
	TOTAL	11.76 sq.ft./A	16.98/A	
Class 10				
HICKORY SP		.44	.41	14.08
SHAGBARK HICKORY		1.18	1.05	14.31
BUR OAK		.74	.34	19.90
PIN OAK		3.09	.85	25.86
WHITE OAK		.29	.15	18.83
PECAN		2.35	.73	24.25
BLACK WALNUT		.15	.07	20.00
WHITE WALNUT		.15	.07	20.00
	TOTAL	3.67 sq.ft./A	3.68/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
BUR OAK		1.34	3,037.79
PIN OAK		4.47	10,148.24
WHITE OAK		1.24	2,804.12
	TOTAL ACORNS	7.05 lbs./A	15,990.15 lbs.
HICKORY SP		.57	1,301.91
SHAGBARK HICKORY		1.53	3,471.76
	TOTAL NUTS	2.10 lbs./A	4,773.67 lbs.

ADDENDUM 22

ADDENDUM 22

1. INTRODUCTION

Pool 22 extends south from Quincy, Illinois, to Saverton, Missouri, a distance of 23.6 miles. The pool contains 8,540 acres of water, 126 miles of shoreline (including islands), and 6, 592 acres of public land. Project lands comprise the majority of public land area in the pool.

Approximately 6,200 acres of project woodlands are located in this pool. Historical harvest practices and recent harsh growing conditions have limited mast tree association. However, stands of pecan and oak; persimmon, oak, and pecan; and oak can be found on a few scattered sites. In a portion of the Bay D. Charles area, heavy ground layer vegetation hinders regeneration.

The Missouri Department of Conservation and the Illinois Department of Conservation manage fish and wildlife resources on the Cooperative Agreement lands. The most sensitive wildlife resources in this pool are the active Heron rookery on Armstrong Island, and the Bald eagle and songbirds on Fabius Island. Both areas will be carefully monitored and studied. Vegetative management practices on either island will not be implemented now and should be carefully considered if and when they are implemented in either area.

2. PRESCRIPTIONS FOR POOL 22

Unit Title	Tract No.
Ward Island and Landward of Ward Island	Tracts iis 30-35 FI 61, 63, 64, 66, 68, 70, 72

775 acres. UNIT NO. I

Photos No. 22-18 to 22-20. River mile 321-324.

Apply practice W (Special Management) along river shore and Texas chute.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 2_i apply practice Q (Thinning) to two plots of 3 acres each. Reduce BA/acre to 100 in one and 70 square feet/acre in the other. Monitor results noting understory development and tree growth for 4 years, and then apply practice Q over the remaining area. Present stocking is 133.96 BA/acre.

In Types 3_{im} and 9_{im} apply practice V (Seed Tree) or I (Clearcut), then L_a or L_c (TSI) to areas where mast hardwood trees don't occur. After harvesting apply practices, A_{d-f} on the areas suitable for planting. Where mast producing trees occurs apply practice V (Seed Tree) or U (Shelterwood), then A_{d-f} (Reforestation).

A few young pecans can be found on the northern end of ward. Release these young trees.

In Type 2_m apply practice I (Clearcut) and the A_{d-f} (Reforestation).

In Types 5 and 43 apply practice L_a or L_c (TSI), then A_{e-g} on the area suitable for planting. In Type 43 there are some areas of massive silver maple reproduction. Apply practice Q to these areas.

In this unit harvest no more than 45 acres every 5 years.

Apply practice N (Unique Area) in areas under lease as cottage sites. When leases are discontinued in 1989, manage as a recreation area.

The Long Term Goal - Plant in higher areas capable of supporting them, oak, pecan, walnut, and hickory. Smaller understory trees should be encouraged as well, such as hawthorne, dogwood, persimmon, and hackberry. The lower areas should be in maple and other species which should seed in naturally. Stands in different stage of growth should be maintained to enhance diversity in these stands. The river shore area now under cottage leases may be used as a recreation park area in the future.

Lock area and opposite shore A-1, LS 1

58.7 acres. (II)

Photos No. 22-20 and 21. River mile 324-325.

Apply practice M (No Treatment) along river shoreline and along levee.

This area has been noted as an eagle feeding and roosting area.

Apply practice X (Stand Mapping) before any other practice is applied.

Apply practice Q (Thinning) on Type 2_1.

Apply practice T (Monitor) to the entire area for eagle useage.

Apply practice to A_{a-c} (Plant), and B (Tree Maintenance) to the lock area.

The Long Term Goal - Maintain eagle useage in the area opposite the lock and maintain grounds attractive and pleasing for visitors in the immediate lock area.

Landward of Orton and Fabius Islands — MIS 9, 10 FM 87, 88, 152, 154, 156, 157, 159-162

348.4 acres. (III)

Photos No. 22-18 to 22-20. River mile 321.5-324.

Apply practice M (No Treatment) along the levee and river shorelines.

Apply practice X (Stand Mapping) before any other practices are applied.

In Type 5 apply practice La and/or L_c (TSI) to encouraged regeneration of tree species by natural seeding.

In Type 2_i apply practice Q (Thinning).

In Type 9_{im} apply practice I (Clearcut). Do not apply this practice where land width is less then 400 feet or in areas where eagle perching and feeding occurs in winter.

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Maintain maple stands in different stages of growth. However, due to the eagle use of the area, and the long linear nature of the area, management and vegetational diversity may be limited. The area north of the North River (FM 87, 88, 152) may be used as a recreation area in the future. The present diversity of vegetation around the pond will be maintained.

Orton Island — MIS 11

52.5 acres. (IV)

Photos No. 19 and 20. River mile 323-324.

Apply practice M (No Treatment) along shoreline of the island.

Practice X (Stand Mapping) will be applied to aid in the monitoring of songbird use.

In all types apply practice T (Monitor) for 10 years.

Monitor for eagle and songbird use. If usage declines, silvicultural practices may be useful in maintaining habitat.

The Long Term Goal - Maintain eagle and songbird use of the area. Eagle use will have priority in the area.

Fabius Island — MIS 8

313.3 acres. (V)

Photos No. 22-18 and 19. River mile 321-323.

This has been noted as an active winter eagle feeding and roosting area, as well as a songbird haven.

Practice X (Stand Mapping) will be applied to aid in monitoring of songbird and eagle use.

The US Fish and Wildlife has advised against implementing any practices in this area.

Apply practice T (Monitor) to the island for 10 years. Monitor for eagle and songbird useage. This will provide information on existing vegetative conditions as related to eagle and songbird use of the area. If eagle and songbird usage decreases, practices to aid in maintaining eagle habitat will be implemented.

The Long Term Goal - Maintain eagle and songbird usage through vegetative manipulation or nonmanipulation of the forest cover.

Landward Goose Island and North Shore of Mill Creek — FI 57-60, 94, 95, 98

183 acres. (VI)

Photos No. 22-15 to 22-17. River mile 318-321.

Apply Practice W (Special Management) along shoreline.

In Type 17, apply practice O (Sanitation/Salvage) if wood is salvagable. Otherwise apply practices La and L_c (TSI) to encourage reproduction of the stand.

Leave remaining area alone. Width of this land that borders the river is no more than 300 feet.

The Long Term Goal - Allow maples and other trees to naturally seed in and to maintain widlife cover and aesthetic appeal of the area.

Horseshoe in North River and South of the North River — FM 76-81, FM 84

298 acres. (VII)

Photos No. 22-17 and 22-18. River mile 320-321.

Apply Practice M (No Treatment) along waterways and levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 6_{im} apply J (Improvement Cut) then practice T (Monitor) for regeneration and mast production.

In Type 9_{im} apply practice I (Clearcut).

In Types 2_i and 9_i apply practice Q (Thinning).

In this unit harvest no more than 5 acres every 5 years.

The Long Term Goal - Maintain the area in overmature oak and perhaps diversify that area by planting hickory, persimmon, dogwood, etc. The remaining forest lands will seed in naturally to silver maple, cottonwood, etc. These should be maintained so a variety of stands in different age classes occur in this area.

Goose Island — iis 26-28

322.1 acres. (VIII)

Photos No. 22-15 to 22-17. River mile 318.5-320.5.

Apply practice W (Special Management) along the river and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 17, apply practice O (Sanitation/Salvage) if the timber is salvageable. If the timber is not salvageable, apply practice L_c (TSI) and A_{d-f} (Reforestation) to suitable higher areas. Practice L_c will be necessary if regeneration becomes suppressed by ground cover. At this time, no oak, pecan, walnut, or hickory was recorded in the inventory total stand summary. When mast hardwood trees are reestablished in the unit, squirrel nest boxes may be put up to encourage repopulation of the area by squirrels.

In Type 2_i and 9_i apply practice Q (Thinning).

In Type 5 apply practices L_a and L_c (TSI).

In Type 9_{im} apply practice I (Clearcut) then apply A_{d-f} (Reforestation) in suitable higher areas.

In this unit, harvest no more than 10 acres every 5 years.

The Long Term Goal - Restore oaks and other mast producing hardwoods to suitable higher areas. Understory should be encouraged in the area. The lower areas will naturally seed into silver maple, ash, etc. Maintain these areas in different stages of growth.

Mill Creek Shore South — FI 88, 90-92, 96, 97

322 acres. (IX)

Photos No. 22-14 and 15. River mile 317-318.5.

Apply practice M (No Treatment) along shorelines and sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 20_{im} apply practice L_a or L_c (TSI) to appropriate areas to encourage development of the young stand.

In Type 9_i apply Q (Thinning).

In Types 9_{im} and 9_m apply practice I (Clearcut) then L_c (TSI), finally A_{d-f} (Reforestation).

In this unit harvest no more than 10 acres every 5 years.

The Long Term Goal - Plant higher areas into oak and other mast-producing trees. Lower areas that should seed into silver maple, cotton-wood and other such species will be a mix of stands in different stages of growth.

Whitney Islands — MIS 2-5, 6

252.8 acres. (X)

Photos No. 22-11 to 22-14. River mile 314-317.

Apply practice M (No Treatment) along all shorelines.

Apply practice X (Stand Mapping) before applying any other practices.

In Types 9_{im}, 9_m, and 2_i practice V (Seed Tree) or I (Clearcut) in 2 years except in areas left for mature growth. Silver maples should be left as seedtrees to encourage their reestablishment over cottonwood. If V is applied, seed trees may be girdled to provide den trees after regeneration is established.

On south island, lower half of the island, in 2_i and 9_i apply practice Q (Thinning).

In this unit harvest no more than 15 acres every 5 years.

The Long Term Goal - Manage this area for multiple resources. No areas are high enough to support oak and other mast trees. A mix of silver maple, cottonwood, and ash stands in different stages of growth will provide a more diverse woodland than exists in the present monoculture.

Beebe Island — iis 36

140.2 acres. (XI)

Photos No. 22-14. River mile 317.

Apply practice W (Special Management) to the shoreline of the island.

Apply practice X (Stand Mapping) before applying any other practice.

In Type 20_{im} apply practices L_a or L_c (TSI) to aid young growing trees and develop den trees or to remove ground cover preventing regeneration.

The Long Term Goals - Maintain the area of silver maple, cottonwood, and ash in a mix of stands in different stages of development.

Sny North, IL — iis 25; Fl 53, 78-87, and 89

620 acres. (XII)

Photos No. 22-11 to 22-14. River mile 315-317.

Apply practice W (Special Management) along all shore areas, sloughs, levees, inland lakes, and ponds.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 19_m apply practice T (Monitor) for 10 years with the option of applying practice A_{d-f} (Reforestation) in some of the more open areas. Monitor for mast production of the pecans and pin oaks, and seedling establishment.

In Type 3_{im}: 1) apply either practice V (Seed Tree) or U (Shelterwood) where oaks, pecans, hickorys, and walnuts occur, then practice L_a and L_c (TSI), then practice A_{e-g}; 2) apply practice J (Improvement Cut) to young stand of silver maple, ash, cottonwood, hackberry of DBH 10-20 being overtopped by a few older larger individuals; or 3) apply practice I (Clearcut) to mature stands of silver maple cottonwood.

Preserve current pawpaw population found in the understory.

In Type 9_i, apply practice Q (Thinning).

In this unit harvest no more than 20 acres every 5 years.

The Long Term Goal - Plant mast-producing trees such as oak, hickory, pecan, and walnut on higher areas and diversify the understory that consists of some pawpaw. Plants such as persimmon, dogwood, and serviceberry should be planted to diversify the understory. On lower areas silver maple, cottonwood, and ash should seed into the areas. These lower areas will be a mix of even age stands in different stages of growth. The pecan, pin oak, and elm grove will be maintained in those species by monitoring the groves growth and reestablishment. Reestablishment will only be aided by practices such as harvest cuttings and/or planting if it is absolutely necessary.

Sny South, IL

iis 22A, 22B
FI 45B, 45D, 46, 47, 48b, 49-52

560.7 acres. (XIII)

Photos No. 22-11 and 12. River mile 313-315.

Apply practice W (Special Management) along all river shoreline and slough areas.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 10 follow practice V (Seed Tree) or I (Clearcut), then practice A_{e-g} (Reforestation). In making the harvests preserve some of the mature hackberry and all pin oak. In any adjacent lower areas included in this type follow practice I.

In Type 6_{im} follow practice V or U (Shelterwood) leaving oak and other mast-producing trees. Then follow practice A_{e-g} to diversify the stand.

In types 3_{im} and 9_{im} follow practice I, V, or U and then practice A_{e-g}. On areas where pecan, oak, hickory, or walnut occur apply practice V or U. On areas where such trees do not occur apply practice I.

In type 2_i apply practice Q (Thinning).

In this unit harvest no more than 40 acres every 5 years.

The inventory total stand summary shows much more hackberry per acre than in Sny North and only a very little pecan and no other mast-producing trees. Hackberry is the second dominant species, but should not be.

The Long Term Goal - Plant suitable mast-producing species such as oak and hickory on the higher areas dominated by Kentucky coffeetree, honey locust, and hackberry. Some mature hackberry would be a part of these areas overstory. Understory will be developed by planting species such as persimmon, pawpaw, etc., to provide a wildlife food source. Lower areas will be seeded back in silver maple. Lower areas will be a mix of evenage stands in different stages of development.

Armstrong Island — iis 11, 15, 17

269.5 acres. (XIV)

Photos No. 22-10 and 11. River mile 312-314.

Apply practice M (No Treatment) along the islands shoreline and along the sloughs.

Apply practice X (Stand Mapping) before applying any other practices.

Apply practice N (Unique Areas) on active heron rookery area, and 1,500-foot zone around the rookery area. Encourage study of the rookery area to determine if future practices can aid in development of rookery areas on Corps lands.

In all areas apply practice T (Monitor) for 10 years.

The Long Term Goal - To maintain the Heron rookery, which is the priority wildlife species in this unit.

Glaucus Island — MIS 1
Turtle, Idlewild and Unnamed Iles — iis 7-10

231.5 acres. (XV)

Photos No. 22-9 and 10. River mile 310.5-312.5.

Apply practice M (No Treatment) along islands shoreline.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 9_i and 2_i apply practice Q (Thinning) on Glaucus Island only.

Turtle, Idlewild, and Unnamed Iles should be left alone.

The Long Term Goal - Allow the areas to develop naturally. Glaucus should have a limited mix of stands in different stages of growth.

Clear Creek, Bay D. Charles, MO — FM 39, 41-45, 48, 51, 52

597.8 acres. (XVI)

Photos No. 22-9 and 10. River mile 311-313.

Follow practice M (No Treatment) along the river shore, sloughs, and levee.

Apply practice X (Stand Mapping) before applying any other practices.

In Type 14_m apply practice practice L_a, L_c (TSI), and then A_{e-g} (Reforestation). Leave oak and pecan trees.

In Types 1_i, 9_i, and 2_i apply practice Q (Thinning), favor silver maple and sycamore.

In Type 4_{im} and 9_{im} apply practice J (Improvement Cut).

The Long Term Goal - Reestablish a pecan, oak, and hickory stand in all of Type 14, and maintain Type 4. An understory should be encouraged by planting such trees as persimmon and paw paw. The lower areas will be a mix of even aged silver maple, cottonwood, ash, and perhaps sycamore stands in several stages of growth.

North & South of the John Hay Recreation Area, IL — FI 11, 12, 13, 17, 17a, and 18

339 acres. (XVII)

Photos No. 22-6 and 7. River mile 308-309.8.

Follow practice M (No Treatment) along river shore and along levee.

Apply practice X (Stand Mapping) before applying any other practices.

In type 18_{im} apply practice J (Improvement Cut) then T (Monitor) for increased regeneration of the oaks. An on site visit in 1979 indicated this was happening.

In type 2_i apply practice Q (Thinning).

In type 6_{im} apply practice J.

In type 5 apply practice L_a and L_c (TSI) to aid regeneration of stand type.

In Type 9_{im}, apply practice I (Clearcut) and then A_{e-g} (Reforestation) on an elevated old wing dam or water control structure is regenerating into silver maple, ash. Plantings of oak and hickory on this area will add more diversity.

In this unit harvest no more than 10 acres on the wing dam.

The Long Term Goal - Maintain the higher areas in oak, pecan, and persimmon. The lower areas will be a mix of evenaged stands in different stages of developments.

Shucks, King, Glassock, Harris Iles	FM 133, 135, 139, 140
IL Shore 309-301.5	FM 1-15, 18-27, 102, 107-137
MO shore 309-301.5	LS1-3

Photos No. 22-1 to 22-6. River mile 301.5-309. (XVIII)

Leave this area alone, except for Shucks Island.

Most of this area is land 100-400 feet between river and levee.

The islands are small, the largest, Shucks Island is 64.7 acres. On Shucks Island apply practice Q (Thinning).

The Long Term Goal - Allow natural succesion along a natural strip of vegetation between the agricultural fields and levee and the Mississippi River. This should be left to preserve aesthetic values of the river and cover for animals using the agricultural fields.

Above Railroad Bridge, IL	FI 19A, 19B, 20, 23, 25-45A

Photos No. 22-8 and 9. River mile 309.8-312. (XIX)

Apply Practice W (Special Management) along river and slough shores.

Much of this land is in cottage leases, with some in industrial lease. Leave it alone until the leases have expired.

Pecans and oaks can be found on higher sites in this area.

The Long Term Goal - Develop this area as a recreation or wildlife area when the area is not under lease.

3. PRIORITIES LIST FOR POOL 22

A Thin plots in overstocked stands on Ward Island - as indicated in forestry plan.

B Do timber stand improvement in the areas currently dominated by hackberry, honey locust, cucumber vine and herbaceous vegetation in Clear Creek (Bay D Charles) and restore pecan-oak-hickory-persimmon to the area (only a few larger individuals are present now).

C Salvage, if possible, wood felled by storm on Goose Island and landward Goose Island. At the same time, do TSI in stands and thin stands north of the damaged area. Plant suitable areas in mast trees (oak, hickory, walnut, and pecan).

D Do TSI on Ward's Island to remove competing herbaceous vegetation and establish mast trees, maple, and mixed hardwood stands in suitable areas.

E Harvest some mature timber on Ward Island and plant suitable areas in mast trees.

F Harvest higher ridge areas in South Sny and convert these areas to oak, hickory, walnut, and/or pecan stands.

G Do TSI on Beebe Island and south Mill Creek.

H Conduct an improvement cut to release small pecan at northern (upriver) end of Ward Island.

4. ESTIMATED COSTS

Silvicultural Practice	Acreage to be Treated	Cost Per Acre	Total per Practice
Thinning	940	$150	$141,000
Improvement cut	500	$150	$ 7,500
Timber stand Improvement	400	$ 30	$ 12,000
Monitoring	320	$ 15	$ 4,800
Planting	170 ± 50	$ 50	$ 8,500 ± $ 2,500
Harvest (contractural preparation)	250	$ 60	$ 15,000
Site preparation	250	$110	$ 27,500
Type mapping	2,330	$ 2	$ 4,660
	Total Cost for Pool 22		$220,960 ± $ 2,500

Pool 22 - Inventory Data

WARD I (IL) UNIT NO. I

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	1.33	3.81		8.00
Coffeetree	2.00	1.62	156.09	15.02
Cottonwood	65.33	55.08	6273.33	14.72
Elm	1.33	33.95		2.68
Hackberry	1.33	3.13	45.28	8.83
Silver Maple	54.66	143.34	3493.68	8.36
Sycamore	.66	.37		18.00
Willow	.66	.30		20.00
Misc.	6.66	43.30		5.14
TOTAL	133.96 sq.ft.	287.95	9968.39 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Level	
Int 1/4" Bd Ft	---	7027.04	12910.00
Sq. Ft. Basal Area	134	112.37	155.63
# of Trees	287.95	155.00	420.89

Average Annual Growth Per Acre Int. 11/4" Bd Ft 308.33
Sq. Ft. Basal Area 1.32

FOR CLASSES 5-9 Per Acre Figures

Wildlife Related Inventory Data

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
COTTONWOOD	66.67	7.64	40.00
TOTAL	66.67 sq.ft./A	7.64/A	
Class 7 Standing Dead Tree			
COTTONWOOD	886.67	1,019.58	12.48
SILVER MAPLE	66.67	18.08	26.00
MISCELLANEOUS	466.67	1,193.00	8.47
TOTAL	1,400.00 sq.ft./A	2,230.66/A	

FOR CLASSES 5-9
Per Acre Figures

Wildlife Related Inventory Data (Cont'd)

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine			
COTTONWOOD	1,133.33	862.92	15.52
SILVER MAPLE	1,533.33	2,276.01	11.11
MISCELLANEOUS	200.00	398.10	9.60
TOTAL	2,866.67 sq.ft./A	3,537.02/A	

WARD II (IL) UNIT NO. I

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	13.57	49.92	970.59	7.06
Boxelder	.71	.27	73.46	22.00
Cottonwood	5.71	2.10	731.02	22.32
Elm Sp	4.29	9.37	148.39	9.16
Hackberry	5.71	16.11	284.46	8.06
Honey Locust	1.43	.66	132.56	19.97
Silver Maple	62.86	38.18	4773.15	17.37
Mulberry Sp	1.43	4.95	20.62	7.28
Sycamore	.71	.19	0.0	26.00
Black Walnut	.71	.17	76.17	28.00
Misc	3.57	3.34	80.55	14.00
TOTAL	100.70 sq.ft.	125.26	7290.97 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Interval	
Volume	---	4752.2	9829.8
Sq. Ft. Basal Area	100.714	82.39	119.03
# of Acres	125.268	50.52	200.02

Average Annual Growth Int. 1/4" Bd. Ft. 193.88
Sq. Ft. Basal Area .787

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity			
SILVER MAPLE	1,071.43	400.15	22.16
SYCAMORE	71.43	19.37	26.00
MISCELLANEOUS	71.43	22.74	24.00
TOTAL	1,214.29 sq.ft./A	442.26/A	
Class 6 Den Tree - Lower Cavity			
SILVER MAPLE	357.14	77.58	29.05
TOTAL	357.15 sq.ft./A	77.58/A	
Class 7 Standing Dead Tree			
COTTONWOOD	71.43	66.82	14.00
SILVER MAPLE	71.43	16.70	28.00
SYCAMORE	71.43	19.37	26.00
MISCELLANEOUS	142.86	45.47	24.00
TOTAL	357.14 sq.ft./A	148.37/A	
Class 8 Leaf Nest			
ASH SP	71.43	90.95	12.00
ELM SP	71.43	363.78	6.00
SILVER MAPLE	71.43	204.63	8.00
TOTAL	214.29 sq.ft./A	659.36/A	

FOR CLASSES 5-9 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		357.14	932.19	8.38
BOXELDER		71.43	27.06	22.00
COTTONWOOD		285.71	60.97	29.31
ELM SP		214.29	436.94	9.48
HACKBERRY		285.71	318.94	9.48
SILVER MAPLE		1,642.86	1,072.78	12.82
MULBERRY SP		142.86	494.74	7.28
MISCELLANEOUS		142.86	197.78	11.51
	TOTAL	3,142.86 sq.ft/A	3,541.40/A	

WARD III (IL) UNIT NO. I
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	6.67	3.01	699.03	20.16
Cottonwood	10.00	2.87	832.83	25.27
Hackberry	4.16	8.14	103.36	9.69
Honeylocust	.83	.15	0.0	32.00
Silver Maple	40.83	52.46	2308.88	11.95
Sycamore	2.50	.57	445.49	28.35
Misc	1.67	.74	0.0	20.36
TOTAL	66.66	67.94	4389.59	

Statistical Analysis	Mean/A	95% Confidence Level	
Volume	---	949.31	7830
Sq. Ft. Basal Area	66.667	28.80	104.53
# of Trees	67.934	14.06	121.81

Average Annual Growth Per Acre Int. 11/4" Bd Ft 8.29
Sq. Ft. Basal Area .06

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
COTTONWOOD		83.33	10.58	38.00
SILVER MAPLE		250.00	131.16	18.69
	TOTAL	333.33 sq.ft./A	141.74/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
HONEY LOCUST		83.33	14.92	32.00
SILVER MAPLE		83.33	26.53	24.00
	TOTAL	166.67 sq.ft./A	41.45/A	
Class 7 Standing Dead Tree				
ASH SP		83.33	38.20	20.00
COTTONWOOD		83.33	47.16	18.00
SILVER MAPLE		83.33	152.79	10.00
MISCELLANEOUS		166.67	73.68	10.36
	TOTAL	416.67 sq.ft./A	311.83/A	
Class 9 Grapevine				
ASH SP		166.67	49.13	24.94
COTTONWOOD		250.00	64.05	26.75
HACKBERRY		166.67	391.52	8.83
SILVER MAPLE		666.67	601.47	14.26
SYCAMORE		166.67	42.09	26.94
	TOTAL	1,416.67 sq.ft./A	1,148.26/A	

WARD IV (IL) UNIT NO. I
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	10.67	9.02	693.95	14.73
Boxelder	0.67	1.91	0.0	8.00
Cottonwood	4.67	1.46	267.50	24.19
Elm Sp	5.33	20.43	216.84	6.92
Hackberry	3.33	10.12	145.15	7.77
Honey Locust	4.00	32.45	413.51	17.31
Silver Maple	77.33	57.38	5058.08	15.72
Sycamore	1.33	0.51	120.64	21.83
Misc	2.67	2.80	0.0	13.21
TOTAL	110.00 sq.ft.	106.08	6915.68 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Interval	
Int. 1/4" Bd. Ft.	6915.7	5088.18	8742.13
Sq. Ft. Basal Area	110.0	92.24	127.76
# Of Trees	106.1	65.27	146.89

Average Annual Growth Per Acre Int. 1/4" Bd. Ft. 193.88 81.1
Sq. Ft. Basal Area 0.58

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
HONEY LOCUST	.67	.31	20.00
SILVER MAPLE	3.33	1.65	19.23
TOTAL	4.00 sq.ft./A	1.96/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
ASH SP	.67	.31	20.00
COTTONWOOD	.67	.08	40.00
SILVER MAPLE	.67	.25	22.00
TOTAL	2.00 sq.ft./A	.63/A	

FOR CLASSES 5-9 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree				
ASH SP		.67	.48	16.00
COTTONWOOD		.67	.48	16.00
ELM SP		.67	1.91	8.00
SILVER MAPLE		3.33	2.33	16.18
MISCELLANEOUS		2.67	2.80	31.21
	TOTAL	8.00 sq.ft./A	8.00/A	
Class 9 Grapevine				
ASH SP		2.67	2.08	15.32
COTTONWOOD		1.33	.31	28.24
ELM SP		2.67	2.39	14.30
HONEY LOCUST		3.33	1.82	18.30
SILVER MAPLE		27.33	17.27	17.03
MISCELLANEOUS		.67	.62	15.00
	TOTAL	38.00 sq.ft./A	24.50/A	

FABIUS ISLAND UNIT NO. V
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	2.63	2.66	270.38	13.46
Boxelder	7.89	32.84	198.65	6.64
Cottonwood	46.32	23.00	5,865.87	19.22
Elm Sp	5.79	47.81	119.76	4.71
Hackberry	2.11	48.62	64.83	2.82
Honey Locust	.53	.38	83.80	16.00
Silver Maple	64.74	76.65	4,966.39	12.44
Sycamore	2.43	1.40	276.18	18.58
Misc	2.11	4.22	52.64	9.56
TOTAL	134.40 sq.ft.	237.58	11,898.51 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Level	
Int. 1/4" Bd. Ft.	11,898.5	9,252.07	14,544.95
Sq. Ft. Basal Area	135.3	109.94	160.58
# of Trees	237.7	114.08	361.29

Average Annual Growth Per Acre Int. 1¼" Bd Ft 181.9
Sq. Ft. Basal Area .96

FOR CLASSES 5-9 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
BOXELDER	1.05	.54	18.83
SILVER MAPLE	4.74	1.58	23.48
MISCELLANEOUS	.53	.67	12.00
TOTAL	6.32 sq.ft./A	2.79/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
BOXELDER	.53	.30	18.00
COTTONWOOD	.53	.17	24.00
SILVER MAPLE	3.68	1.31	22.69
TOTAL	4.74 sq.ft./A	1.78/A	
Class 7 Standing Dead Tree			
COTTONWOOD	2.63	2.72	13.31
SILVER MAPLE	.53	.49	14.00
MISCELLANEOUS	1.05	1.16	12.88
TOTAL	4.21 sq.ft./A	4.38/A	
Class 8 Leaf Nest			
SILVER MAPLE	.53	.17	24.00
TOTAL	.53 sq.ft./A	.17/A	

FOR CLASSES 5-9 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine			
BOXELDER	2.11	1.08	18.87
COTTONWOOD	12.63	4.93	21.67
ELM SP	1.58	8.21	5.94
SILVER MAPLE	15.79	23.08	11.20
SYCAMORE	1.58	.37	27.86
MISCELLANEOUS	1.05	.87	14.90
TOTAL	34.74 sq.ft./A	38.55/A	

GOOSE ISLAND UNIT NO. VIII
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.54	.54	122.77	22.93
Boxelder	2.31	9.25	0.00	6.76
Cottonwood	32.31	11.42	1,564.29	22.77
Elm Sp	6.15	54.53	59.36	4.55
Honey Locust	.77	35.26	0.00	2.00
Silver Maple	70.77	95.57	4,299.62	11.65
Willow Sp	1.54	4.90	0.00	7.59
Misc	5.38	4.97	0.00	14.09
TOTAL	120.77 sq.ft.	216.44	6,036.04 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Level	
Int. 1/4" Bd. Ft.	6,036.0	2,705.64	9,366.45
Sq. Ft. Basal Area	120.8	84.81	156.73
# of Trees	216.4	83.58	349.30

Average Annual Growth Per Acre Int. 11/4" Bd Ft 154.6
Sq. Ft. Basal Area .74

FOR CLASSES 5-9 **Wildlife Related Inventory Data**
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
SILVER MAPLE		1.54	.39	26.94
	TOTAL	1.54 sq.ft./A	.39/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
SILVER MAPLE		1.54	.33	29.10
MISCELLANEOUS		1.54	.53	23.01
	TOTAL	3.08 sq.ft./A	.87/A	
Class 7 Standing Dead Tree				
COTTONWOOD		6.15	1.68	25.95
ELM SP		.77	.44	18.00
SILVER MAPLE		2.31	1.37	17.59
MISCELLANEOUS		4.62	4.25	14.11
	TOTAL	13.85 sq.ft./A	7.73/A	
Class 9 Grapevine				
COTTONWOOD		8.46	2.77	23.68
ELM SP		1.54	37.46	2.74
HONEY LOCUST		.77	35.26	2.00
SILVER MAPLE		8.46	8.46	13.54
	TOTAL	19.23 sq.ft./A	83.95/A	

NORTH SNY (IL) UNIT NO. XII

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	15.65	37.43	1215.18	8.76
Basswood	0.65	3.88	14.20	5.55
River Birch	3.26	4.17	171.94	11.98
Boxelder	1.52	6.74	6.89	6.43
Coffeetree	0.22	0.08	31.87	22.00
Cottonwood	11.30	5.52	1090.46	19.37
Elm Sp	5.87	56.69	114.09	4.36
Hackberry	12.61	41.50	*******	7.43
Honey Locust	2.61	1.29	120.74	19.26
Sugar Maple	0.22	0.20	12.05	14.00
Silver Maple	66.30	127.75	4909.11	9.75
Black Oak	0.22	0.12	8.19	18.00
Pin Oak	4.78	2.92	522.72	17.33
Swamp White Oak	1.74	4.72	119.47	8.22
Pecan	0.43	0.13	50.82	24.94
Sycamore	3.04	4.22	414.21	11.50
Willow Sp	1.30	2.14	25.23	10.56
Misc	6.98	35.10	138.39	5.98
TOTAL	138.70 sq.ft.	335.65	******* Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Level	
Int. 1/4" Bd. Ft.	*******	*******	********
Sq. Ft. Basal Area	135.3	127.42	151.28
# of Trees	345.9	225.48	466.28

Average Annual Growth Per Acre Int. 11/4" Bd Ft 225.39
Sq. Ft. Basal Area 1.21

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity			
ASH SP	1.09	.49	20.08
COTTONWOOD	.22	.02	40.00
HACKBERRY	.43	.52	12.36
HONEY LOCUST	.65	.19	25.14
SILVER MAPLE	4.13	1.59	21.82
SYCAMORE	.22	.02	40.00
TOTAL	6.74 sq.ft./A	2.84/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA	NO. TREES/A	AVERAGE DIAMETER
Class 6 Den Tree - Lower Cavity			
ASH SP	.43	.29	16.70
RIVER BIRCH	.22	.03	38.00
HACKBERRY	.22	.20	14.00
SILVER MAPLE	2.83	.87	24.39
SYCAMORE	.22	.03	34.00
TOTAL	3.91 sq.ft./A	1.42/A	
Class 7 Standing Dead Tree			
ASH SP	.22	.12	18.00
RIVER BIRCH	.22	.04	30.00
BOXELDER	.22	.20	14.00
COTTONWOOD	.87	.28	23.93
HONEY LOCUST	.87	.39	20.12
SILVER MAPLE	1.30	.61	19.72
PIN OAK	.22	.07	24.00
WILLOW SP	.22	.62	8.00
MISCELLANEOUS	1.96	1.37	16.18
TOTAL	6.09 sq.ft./A	3.72/A	
Class 8 Leaf Nest			
ASH SP	.22	.20	14.00
COFFEETREE	.22	.08	22.00
HACKBERRY	.43	.29	16.70
ELM SP	.22	.20	14.00
SILVER MAPLE	.65	10.44	3.38
PIN OAK	.65	.40	17.23
TOTAL	6.09 sq.ft./A	11.61/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		3.04	2.14	16.13
BASSWOOD		.22	.28	12.00
RIVER BIRCH		.87	.18	29.62
BOXELDER		.22	.16	16.00
COFFEETREE		.22	.08	22.00
COTTONWOOD		4.13	.89	29.23
ELM SP		1.09	2.33	9.24
HACKBERRY		3.91	10.94	8.10
HONEY LOCUST		.87	.62	15.98
SILVER MAPLE		19.13	19.58	13.38
PIN OAK		1.09	.70	16.89
SWAMP WHITE OAK		.43	.18	20.93
SYCAMORE		.87	.74	14.72
MISCELLANEOUS		1.74	11.45	5.28
	TOTAL	37.83 sq.ft./A	50.28/A	
Class 10				
BUR OAK		.22	.12	18.00
PIN OAK		4.57	2.85	17.14
SWAMP WHITE OAK		1.74	4.72	8.22
PECAN		.43	.13	24.94
	TOTAL	6.96 sq.ft./A	7.82/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
BUR OAK		.59	270.00
PIN OAK		10.57	4,860.00
	TOTAL ACORNS	11.15 sq.ft./A	5,130.00 lbs.

SOUTH SNY (IL) UNIT NO. XIII
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	6.80	3.04	651.42	20.26
Boxelder	0.40	0.37	22.17	14.00
Cottonwood	3.60	3.82	284.20	13.14
Elm Sp	6.80	40.35	103.98	5.56
Hackberry	24.00	75.17	708.75	7.65
Honey Locust	2.80	1.17	312.62	20.90
Silver Maple	86.80	112.99	5763.02	11.87
Pecan	1.20	0.41	148.99	23.16
Sycamore	1.60	19.03	148.29	3.93
Willow Sp	0.80	0.35	48.99	19.27
Misc	2.40	6.01	0.0	8.55
TOTAL	137.20 sq.ft.	262.81	8192.02 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Interval	
Int. 1/4" Bd. Ft.	8192.0	6322.07	10061.95
Sq. Ft. Basal Area	137.2	118.80	155.60
# of Trees	262.8	174.98	350.65

Average Annual Growth Per Acre Int. 1/4" Bd. Ft. 224.6
Sq. Ft. Basal Area 1.38

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	.40	.09	28.00
HACKBERRY	1.20	18.80	3.42
HONEY LOCUST	.80	.33	20.93
SILVER MAPLE	6.40	1.85	25.20
MISCELLANEOUS	.40	.05	40.00
TOTAL	9.20 sq.ft./A	21.13/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
HACKBERRY		.40	.29	16.00
SILVER MAPLE		2.40	.68	25.45
	TOTAL	2.80 sq.ft./A	.97/A	
Class 7 Standing Dead Tree				
COTTONWOOD		.40	.15	22.00
HACKBERRY		.40	.37	14.00
SILVER MAPLE		3.20	2.37	15.74
MISCELLANEOUS		1.60	1.38	14.56
	TOTAL	5.60 sq.ft./A	4.28/A	
Class 8 Leaf Nest				
SILVER MAPLE		.40	.06	36.00
	TOTAL	.40 sq.ft./A	.06/A	
Class 9 Grapevine				
ASH SP		4.00	1.11	25.65
BOXELDER		.40	.37	14.00
COTTONWOOD		2.00	1.91	13.86
ELM SP		2.00	5.02	8.54
HACKBERRY		12.00	38.51	7.56
HONEY LOCUST		1.20	.43	22.61
SILVER MAPLE		30.40	14.13	19.86
PECAN		.80	.28	22.77
SYCAMORE		.80	.51	16.91
MISCELLANEOUS		.80	.14	32.44
	TOTAL	54.40 sq.ft./A	62.43/A	
Class 10				
PECAN		1.20	.41	23.16
	TOTAL	1.20 sq.ft./A	.41/A	

ARMSTRONG ISLAND UNIT NO. XIV

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	8.89	7.92	934.95	14.35
Boxelder	1.67	6.06	0.0	7.10
Cottonwood	22.78	6.91	2816.49	24.58
Elm Sp	5.56	28.50	104.56	5.98
Hackberry	4.44	7.12	162.71	10.70
Honey Locust	0.56	0.18	94.70	24.00
Silver Maple	85.56	124.80	5547.40	11.21
Pecan	0.56	0.25	67.61	20.00
Sycamore	1.11	0.34	143.95	24.46
Willow Sp	1.67	1.94	59.91	12.56
Misc	3.33	3.03	0.0	14.20
TOTAL	136.11 sq.ft.	187.04	9931.91 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Level	
Int. 1/4" Bd. Ft.	9931.9	7032.07	12831.73
Sq. Ft. Basal Area	136.1	116.28	155.94
# of Trees	187.0	113.52	260.56

Average Annual Growth Per Acre Int. 11/4" Bd Ft 262.4
Sq. Ft. Basal Area 1.24

FOR CLASSES 5-10 Per Acre Figures

Wildlife Related Inventory Data

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	4.44	1.06	27.66
TOTAL	4.44 sq.ft./A	1.06/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
COTTONWOOD	.56	.11	30.00
SILVER MAPLE	3.33	4.38	11.81
TOTAL	3.89 sq.ft./A	4.49/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 7 Standing Dead Tree				
COTTONWOOD		.56	.10	32.00
SILVER MAPLE		.56	.21	22.00
WILLOW SP		.56	.52	14.00
MISCELLANEOUS		3.33	3.03	14.20
	TOTAL	5.00 sq.ft./A	3.86/A	
Class 9 Grapevine				
ASH SP		4.44	3.56	15.13
BOXELDER		1.67	6.06	7.10
COTTONWOOD		5.56	1.63	25.02
ELM SP		2.78	16.84	5.50
HACKBERRY		1.11	1.11	13.58
SILVE MAPLE		45.56	58.27	11.97
SYCAMORE		1.11	.34	24.46
WILLOW SP		.56	1.02	10.00
MISCELLANEOUS		1.11	.65	17.67
	TOTAL	63.89 sq.ft./A	89.46/A	
Class 10				
PECAN		.56	.25	20.00
	TOTAL	.56 sq.ft./A	.25/A	

WHITNEY ISLANDS UNIT NO. X
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	1.00	0.38	154.75	22.00
Boxelder	3.00	18.39	28.88	5.47
Cottonwood	66.00	27.63	5400.51	20.93
Elm Sp	4.00	17.99	0.0	6.38
Silver Maple	96.00	135.01	7098.41	11.42
Sycamore	3.00	3.26	305.54	12.98
Willow Sp	4.00	4.05	36.29	13.46
TOTAL	177.00 sq.ft.	206.71	17024.37 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Interval	
Int. 1/4" Bd. Ft.	17024.4	11547.45	22501.27
Sq. Ft. basal Area	177.0	132.57	121.49
# of Trees	206.7	112.02	301.41

Average Annual Growth Per Acre Int. 1/4" Bd Ft. 550.2
Sq. Ft. Basal Area 2.56

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)				
WILLOW SP		1.00	.57	18.00
	TOTAL	1.00 sq.ft./A	.57/A	
Class 7 Standing Dead Tree (Lower 3/4 Bole)				
COTTONWOOD		1.00	.72	16.00
SILVER MAPLE		1.00	1.83	10.00
WILLOW SP		1.00	1.27	12.00
	TOTAL	3.00 sq.ft./A	3.82/A	
Class 9 Grapevine				
BOXELDER		1.00	1.83	10.00
COTTONWOOD		7.00	3.15	20.20
SILVER MAPLE		17.00	21.52	12.03
SYCAMORE		1.00	1.27	12.00
	TOTAL	26.00 sq.ft./A	7.77/A	

BAY D CHARLES I (MO) UNIT NO. XVI

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	5.00	33.66	33.66	358.91
Basswood	0.83	2.39	0.0	8.00
River Birch	1.25	1.36	28.73	12.93
Boxelder	0.42	1.19	0.09	8.00
Cottonwood	34 58	26.35	4131.53	15.51
Elm Sp	10.42	123.81	240.81	3.93
Hackberry	1.67	29.84	0.0	3.20
Honey Locust	0.42	0.24	49.16	18.00
Silver Maple	62.08	197.21	2668.81	7.60
Pin Oak	0.83	0.28	51.57	23.53
Pecan	1.67	0.58	238.55	22.98
Sycamore	1.25	5.01	15.24	6.76
Willow Sp	8.75	15.15	272.18	10.28
Misc	4.17	4.68	0.07	12.78
TOTAL	133.33 sq.ft	441.79	8054.72 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Level	
Int. 1/4" Bd. Ft.	8.054.7	6145.05	9964.37
Sq. Ft. Basal Area	133.7	113.52	153.98
# of Trees	442.6	307.62	577.49

Average Annual Growth Per Acre Int. 11/4" Bd Ft 368.3
Sq. Ft. Basal Area 1.57

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
COTTONWOOD	.42	.05	40.00
SILVER MAPLE	1.67	.45	26.08
TOTAL	2.08 sq.ft./A	.50/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)				
SILVER MAPLE		1.25	.59	19.73
	TOTAL	1.25 sq.ft./A	.59/A	
Class 7 Standing Dead Tree				
RIVER BIRCH		.42	.53	12.00
COTTONWOOD		2.50	4.07	10.61
SILVER MAPLE		2.50	2.61	13.26
PIN OAK		.42	.19	20.00
WILLOW SP		1.25	3.42	8.19
MISCELLANEOUS		3.33	2.72	14.98
	TOTAL	10.42 sq.ft./A	13.54/A	
Class 8 Leaf Nest				
ASH SP		.42	.24	18.00
SILVER MAPLE		1.25	1.92	10.94
	TOTAL	1.67 sq.ft./A	2.15/A	
Class 10				
PIN OAK		.42	.08	30.00
PECAN		1.67	.58	22.98
	TOTAL	2.08 sq.ft./A	.66/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
PIN OAK		.96	343.08
	TOTAL ACORNS	.96 lbs./A	343.08 lbs.

BAY D CHARLES II (MO) UNIT NO. XVI

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	4.12	14.06	312.77	7.33
River Birch	0.59	0.12	0.0	30.00
Boxelder	1.76	60.67	0.0	2.31
Cottonwood	8.82	3.55	*******	21.35
Elm Sp	5.88	70.20	0.0	3.92
Hackberry	4.12	32.91	103.14	4.79
Silver Maple	38.82	132.21	2199.78	7.34
Pin Oak	10.00	2.71	802.84	25.99
Pecan	10.00	5.02	849.27	19.10
Persimmon	0.59	1.08	0.0	10.00
Misc	3.53	2.01	0.0	17.96
TOTAL	88.24 sq.ft.	324.54	******** Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Interval	
Int. 1/4" 80. Ft.	5399.2	2849.70	7948.70
Sq. Ft. Basal Area	95.2	68.13	123.63
# of Trees	326.7	60.86	492.63

Average Annual Growth Per Acre Int. 1/4" Bd. Ft. *******
Sq. Ft. Basal Area 1.13

FOR CLASSES 5-10 Per Acre Figures

Wildlife Related Inventory Data

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	1.18	.34	25.30
PECAN	1.18	.25	29.10
TOTAL	2.35 sq.ft./A	.59/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
COTTONWOOD	.59	.19	24.00
SILVER MAPLE	.59	.07	38.00
PIN OAK	2.35	.37	33.94
PECAN	1.18	.30	26.94
MISCELLANEOUS	.59	.19	24.00
TOTAL	5.29 sq.ft./A	1.12/A	
Class 7 Standing Dead Tree			
RIVER BIRCH	.59	.12	30.00
COTTONWOOD	1.76	.43	27.50
HACKBERRY	.59	1.08	10.00
PIN OAK	1.76	.52	24.84
PECAN	1.18	.64	18.30
MISCELLANEOUS	3.53	2.01	17.96
TOTAL	9.41 sq.ft./A	4.80/A	
Class 8 Leaf Nest			
SILVER MAPLE	1.18	.62	18.69
PIN OAK	.59	.27	20.00
PECAN	2.35	.93	21.57
TOTAL	4.12 sq.ft./A	1.81/A	
Class 9 Grapevine			
ASH SP	2.35	10.62	6.37
RIVER BIRCH	.59	.12	30.00
COTTONWOOD	2.94	1.75	17.55
ELM SP	3.53	56.92	3.37
HACKBERRY	2.35	1.87	15.20
SILVER MAPLE	20.59	67.44	7.48
PIN OAK	7.06	1.84	26.54
PECAN	8.82	4.38	19.22
MISCELLANEOUS	.59	.42	16.00
TOTAL	48.82 sq.ft./A	145.36/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 10				
PIN OAK		8.82	2.26	26.77
PECAN		8.82	4.38	19.22
	TOTAL	17.65 sq.ft./A	6.64/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING		POUNDS PER ACRE	TOTAL POUNDS
PIN OAK		12.88	824.47
	TOTAL	12.88 lbs./A	824.47 lbs.

NORTH OF THE JOHN RECREATION AREA ON THE ILLINOIS SHORE
BETWEEN RAILROAD BRIDGE AND JOHN HAY RECREATION AREA UNIT NO. XVII
Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash	6.67	12.43	378.38	9.91
Cottonwood	0.83	4.24	0.0	6.00
Hackberry	4.17	9.42	111.96	9.00
Silver Maple	73.33	80.29	4496.56	12.94
Mulberry Sp	1.67	47.75	0.0	2.53
Pecan	1.67	0.77	114.41	19.97
Sycamore	0.83	0.17	150.24	30.00
Willow Sp	0.83	1.06	76.39	12.00
Misc	4.17	1.87	0.0	20.20
TOTAL	94.17 sq.ft.	4158.01	5327.93 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Level	
Int. 1/4" Bd. Ft.	5327.9	2360.21	8295.66
Sq. Ft. Basal Area	94.2	65.31	123.02
# of Trees	158.0	49.81	266.21

Average Annual Growth Per Acre Int. 1¼" Bd Ft 73.4
Sq. Ft. Basal Area 0.35

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
SILVER MAPLE	3.33	2.67	15.13
TOTAL	3.33 sq.ft./A	2.67/A	
Class 6 Den Tree - Lower Cavity (Lower 3/4 Bole)			
HACKBERRY	.83	1.53	10.00
SILVER MAPLE	1.67	.75	20.24
TOTAL	2.50 sq.ft./A	2.27/A	
Class 7 Standing Dead Tree			
MISCELLANEOUS	4.17	1.87	20.20
TOTAL	4.17 sq.ft./A	1.87/A	
Class 8 Leaf Nest			
SILVER MAPLE	1.67	.85	18.92
TOTAL	1.67 sq.ft./A	.85/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data (Cont'd)
Per Acre Figures

SPECIES LISTING		BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine				
ASH SP		.83	4.24	6.00
HACKBERRY		3.33	5.18	10.86
SILVER MAPLE		22.50	33.16	11.15
PECAN		1.67	.77	19.97
MISCELLANEOUS		2.50	1.17	19.76
	TOTAL	30.83 sq.ft./A	44.53/A	
Class 10				
PECAN		1.67	.77	19.79
	TOTAL	1.67 sq.ft./A	.77/A	

SOUTH OF THE JOHN HAY RECREATION AREA ON ILLINOIS SHORE
BETWEEN RECREATION AREA AND RIVER MILE 308 UNIT NO. XVII

Total Stand Summary

Sp.	Ba/Aft^2	# Trees/A	Vol/ABd.ft.	Av. Diameter (in.)
Ash Sp	7.22	10.40	449.33	11.28
River Birch	1.67	1.81	69.16	13.01
Cottonwood	6.11	2.58	977.45	20.83
Elm Sp	4.44	17.31	128.76	6.88
Hackberry	5.00	14.89	40.90	7.85
Silver Maple	65.00	191.74	3884.58	7.88
Pin Oak	2.22	1.09	234.66	19.30
Willow Sp	3.33	3.21	319.95	13.79
Misc	1.67	7.33	0.0	6.46
TOTAL	96.67 sq.ft.	250.38	6104.77 Bd.ft.	

Statistical Analysis	Mean/A	95% Confidence Interval	
Int. 1/4" 80. Ft.	6104.8	3598.91	8619.63
Sq. Ft. Basal Area	96.7	74.36	118.97
# of Trees	250.4	105.86	394.89

Average Annual Growth Per Acre Int. 1/4" Bd. Ft. 551.5
Sq. Ft. Basal Area 3.07

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 5 Den Tree - Upper Cavity (Upper 1/4 Bole)			
ASH SP	.56	.21	22.00
SILVER MAPLE	1.11	.49	20.36
TOTAL	1.67 sq.ft./A	.70/A	
Class 6 Den Teee - Lower Cavity (Lower 3/4 Bole)			
SILVER MAPLE	1.11	.61	18.30
TOTAL	1.11 sq.ft./A	.61/A	
Class 7 Standing Dead Tree			
ASH SP	.56	.71	12.00
SILVER MAPLE	.56	.13	28.00
PIN OAK	.56	.25	20.00
MISCELLANEOUS	.56	.25	20.00
TOTAL	2.22 sq.ft./A	1.35/A	
Class 8 Leaf Nest			
COTTONWOOD	.56	.40	16.00
HACKBERRY	1.11	2.11	9.82
SILVER MAPLE	1.11	.71	16.91
TOTAL	2.78 sq.ft./A	3.22/A	

FOR CLASSES 5-10 Wildlife Related Inventory Data
Per Acre Figures

SPECIES LISTING	BASAL AREA (sq.ft./A)	NO. TREES/A	AVERAGE DIAMETER (inches)
Class 9 Grapevine			
ASH SP	2.78	2.58	14.05
RIVER BIRCH	.56	.06	40.00
COTTONWOOD	4.44	1.88	20.81
ELM SP	3.33	11.65	7.24
HACKBERRY	4.44	14.18	7.58
SILVER MAPLE	26.67	63.24	8.79
PIN OAK	2.22	1.09	19.30
MISCELLANEOUS	1.11	7.07	5.37
TOTAL	45.56 sq.ft./A	101.75/A	

AVERAGE ACORN AND NUT YIELD BY SPECIES

SPECIES LISTING	POUNDS PER ACRE	TOTAL POUNDS
PIN OAK	5.22	731.11
TOTAL ACORNS	5.22 lbs./A	731.11 lbs.

LETTERS OF COORDINATION

ATTACHMENT 1 - Cover type/Prescription Aerial Photos

ATTACHMENT 2 - Letters of Coordination

Agency	Date	Subject
Missouri Dept. of Conservation	27 Jan 82	Final Draft App.
Corps of Engineers, RID		(Response)
Illinois Dept. of Conservation	29 Jan 82	Final Draft App.
Corps of Engineers, RID		(Response)
Iowa Conservation Commission	16 Feb 82	Final Draft App.
Iowa Conservation Commission	22 Feb 82	Final Draft App.
Missouri Dept. of Conservation	13 Aug 81	Draft App.
Missouri Dept. of Conservation	2 Sep 81	Draft App.
Illinois Dept. of Conservation	17 Sep 81	Draft App.
Iowa Conservation Commission	5 Oct 81	Draft App.
US Fish and Wildlife Service	15 Oct 81	Draft App.
Iowa Office of Planning & Programming	6 Jan 82	E. Assessment
USDA SCS Iowa	12 Jan 82	E. Assessment
USDA SCS Illinois	27 Jan 82	E. Assessment
USDA SCS Wisconsin	1 Feb 82	E. Assessment
USDA SCS Missouri	1 Feb 82	E. Assessment
Corps of Engineers, RID		(Response)
National Wildlife Federation	2 Feb 82	E. Assessment
Corps of Engineers, RID		(Response)
US Fish and Wildlife Service	4 Feb 82	E. Assessment
Corps of Engineers, RID		(Response)
Corps of Engineers, RID	4 Mar 82	Finding of No Significant Impact

MISSOURI DEPARTMENT OF CONSERVATION

MAILING ADDRESS:
P.O. Box 180
Jefferson City, Missouri 65102

STREET LOCATION:
2901 North Ten Mile Drive
Jefferson City, Missouri

Telephone 314/751-4115
LARRY R. GALE, Director

January 27, 1982

Colonel Bernard P. Slofer
District Engineer
Rock Island Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Re: NCROD-R-MR
Master Plan for Mississippi
River Pools 21 and 22

Dear Colonel Slofer:

Members of my staff have reviewed the formal draft of the Forestry, Fish and Wildlife Appendices to the Master Plan for certain Mississippi River pools. We appreciate the good working relationship we have had with Mr. Ralph Montrone of your staff during the development of these documents. The final draft represents a great deal of effort by your staff and we believe it will provide a good basis for managing forest resources. In addition, the plan will assist in the management of wildlife resources associated with forested lands.

The plan provides a good description of how the forest management objectives will be achieved (page 16). However, four wildlife management objectives are listed with little discussion on the strategies or management prescriptions for achieving the nonforest wildlife portion of these objectives. Relating management prescriptions outlined in the plan to the objectives would demonstrate the need to develop plans for aquatic and other wildlife resources and result in a more complete document. We would be interested in working with you and your staff in developing meaningful plans for the aquatic and other wildlife resources not covered in this document. Your thoughts or suggestions on how we might best meet that need would be appreciated.

Again, thank you for the opportunity to offer comments on this document.

Sincerely,

Larry R. Gale

LARRY R. GALE
DIRECTOR

COMMISSION

W. ROBERT AYLWARD
Kansas City

J. ERNEST DUNN, JR.
Kansas City

CARL DISALVO
St. Louis

PETER C. MYERS
Matthews

cc: Office of Administration
A-95

U. S. Fish and Wildlife Service
Rock Island, Illinois

U. S. Fish and Wildlife Service
Quincy, Illinois

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:

NCROD-R

Larry R. Gale, Director
Missouri Department of Conservation
P. O. Box 180
Jefferson City, Missouri 65102

Dear Mr. Gale,

We appreciate the comments on the Forestry, Fish and Wildlife Management Plan for the Mississippi River Pools 11-14, 16-18, 21 and 22, in your letter to our office dated 29 January 1982.

Regarding your request about developing meaningful plans for aquatic and wildlife resources, we view the authority and responsibility to write these plans as belonging to the US Fish and Wildlife Service (FWS) and appropriate state agencies.

We want to reemphasize that we will work closely with all involved state resource management agencies and the Fish and Wildlife Service to implement this plan. We hope this letter has clarified any confusion you have regarding the draft Forestry, Fish and Wildlife plan. If you have any questions they may be directed to our District Staff Forester, Ralph Montrone, at 319-332-6696.

Sincerely,

BERNARD P. SLOFER
Colonel
Commander and District Engineer

CF: OD (Dist File)
OD-R
ED-PB
DD
DE

Illinois Department of Conservation
life and land together

January 29, 1982

Bernard P. Slofer, Colonel
District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Slofer:

The Department of Conservation has completed its review of the Environmental Assessment and the final draft of the Forestry, Fish and Wildlife Appendice to the Master Plan for Pools 11-14, 16-18 and 21 and 22 of the Mississippi River. The following comments concerning the above documents are provided for your consideration:

Environmental Assessment

1. As stated under the Purpose Section "The plan emphasizes forestry management objectives for all project lands and represents the wildlife management objectives only for lands directly under Corps administration". The forestry management objectives must be in conjunction with all management objectives of the project, thus the objectives can benefit the project as a whole. Presently, we are not sure if a management objective complements or conflicts with the objective of another. The specific wildlife objectives and practices are not defined for the entire project area.

2. The first objective includes maintaining habitat that supports the greatest variety and numbers of self-sustaining wildlife species. While a laudable objective, there are certain species which depend more upon this major river corridor than others (e.g. Bald Eagle, waterfowl, river otter, Higgin's eye pearly mussel, colony nesting birds such as the great egret -- primarily those associated with large forests and large bodies of water and associated communities). Therefore, the management should emphasize directives for these species rather than providing equal weight to less restricted species.

3. Fifth Management Objective -- This objective should also include "nesting" habitat conditions for the species groups mentions; feeding and resting areas do not necessarily imply inclusion of nesting habitat.

4. Last Management Objective -- See comment on first objective.

5. Page 10 -- Item "e" should be added, discussing the impact of the use and management of areas that are recognized by the individual states as Natural Areas in that State.

6. Page 13 V. Environmental Consequences of Preferred Action, A. Social Impacts., 1. Noise. We are concerned about noise and disturbance during the waterfowl hunting season. Many of the areas referred to throughout the plan are adjacent to public duck blinds.

7. Page 18 -- Wood duck is not a notable exception -- they feed primarily on mast during fall.

8. The assessment should state the disposition of the wood material derived from the silvicultural practice. This is implied but not stated directly.

9. Great blue heron and/or egret rookeries have not all been identified. Reference is made to one or more under the Pool discussion portion of the Environmental Assessment. Many more rookeries exist and should be identified as soon as possible. The Assessment states that rookeries will be mapped prior to any management practices, but there would be benefits in mapping locations whether or not management practices are contemplated.

10. Some supposedly non-corps lands in the upper portion of Pool 16 (Milan Bottoms Area) are shown as Corps-owned and are coded on the accompanying photos. Corps boundaries should be re-examined to substantiate or disprove this.

Draft Report

1. Page 7 (Top of Page) -- This section (4.1.3) implies that river otters feed heavily on small herbivores; river otters feed primarily on fish and crayfish, and have been found at times to feed heavily on waterfowl. This suggests capture of prey is in water; there are few small herbivores which spend much time in the water.

2. Page 8 -- Fifth line from the bottom of this paragraph says "other vectors" -- drop "other".

3. Page 8, 4.1.10 -- Indiana bats are "cave bats" only during the winter when they use caves for hibernacula. During the summer they roost in trees and have nursery colonies under the loose bark of large trees. Also, bats are preyed upon by screech owls and snakes when conditions are proper. We are sure many mammalian predators (e.g. cats, dogs, and raccoons) will also prey upon these animals during day roosting.

4. Page 9, Section 4.2 -- Resident and Migratory Birds. Reference is made in the last paragraph to hunting being Federally controlled thereby minimizing damage to duck populations in the Upper Mississippe River Valley. A statement should be added that waterfowl and hunter management in many cases is a state Conservation Department responsibility and that waterfowl hunting is a very important part of public use on the Upper Mississippi River.

5. Page 11, 4.2.4 -- The nesting habitat noted for the black tern is incorrect; the author may be referring to the least tern.

6. Page 12, 4.2.6 -- Nesting by peregrine falcons was eliminated east of the Rocky Mountains in the United States. Through captive propagation and release programs, there are records of nesting success occurring in several northeast U.S. states.

7. Page 16, 5.1.2 -- Forest Management also includes wildlife, recreation, protection, etc.

8. Page 16, 5.1.3 -- The second paragraph fails to mention nesting sites for Wood ducks. This should be one of the primary wildlife management objectives.

9. Page 24, 6.4.2 -- A budget should be developed for a given management unit covering costs for all practices recommended prior to initiating any one component of the management prescription.

10. Page 25, 6.4.2 -- That specific portions of the funds generated from the sales of forest products should return to the natural resource base.

11. Page 26, 7.2 -- It is suggested that the Department and the U.S. Fish and Wildlife Service be involved in the review of any control programs.

Page 27, 7.24 -- Table 1, 2 and 3 need to be reorganized and corrected. As an example, the white-tailed jackrabbit is endangered in Illinois and is found along Pool 12; the river otter is threatened and is being considered for change to endangered in Illinois; Black tern is also endangered in Illinois. For additional references, we would suggest the following publications:

a. "An Annotated Check-List of the Birds of Illinois" by H. David Bohn, Illinois State Museum, 1978

b. "Fieldbook of Illinois Mammals", D.F. Hoffmeister and Carl O. Mohr, Dover Publication, Inc., New York, 1972

c. "The Wild Mammals of Missouri", by C. Schwartz and E. Schwartz, University of Missouri Press, 1981

d. "Distribution and Biogeography of Mammals of Iowa", by J. Bowles, Special Publications, The Museum Texas Tech University, 1975

Also, enclosed is a copy of the publication entitled: "Endangered and Threatened Vertebrate Animals and Vascular Plants of Illinois", by The Natural Land Institute, January 1981. The Department is accumulating additional information on eagle wintering areas along the Mississippi River. As this information is compiled it can be made available to the Corps of Engineers to update this plan.

12. Page 34, Table 2 -- Bird species of the Region show that presently the Canvasback is an uncommon visitor in Pools 16-22 during the spring and fall. The status should be changed to common during these periods.

13. Page 67, Practice I -- The last sentence of that page should be restated. Burnell C. Fischers paper entitled "Managing Light in the Selection Method" which appears in the 1979 John S. Wright Forestry Conference publication "Proceedings Regenerating Oaks in Upland Hardwood Forests" concludes that on level land four tree height openings will provide sufficient light for regeneration.

14. Page 68, Practice L -- Paragraph b under this practice really describes a site preparation activity rather than a TSI operation. Also practice Y (Crop Tree Release) is a timber stand improvement operation and could be combined under this practice.

15. Page 69, Practice Q -- Thinning -- There seems to be a lot of discussion dealing in specifics instead of a general practice objectives and descriptions. Some of the details mentioned here are really marking guidelines. These should be established and discussed on a unit by unit basis prior to actual marking procedures rather than defined here as a general practice description.

    In the 4th paragraph trees with cavities or potential wood duck nesting sites should be mentioned as well.

16. Page 71, Practice W -- Special Management Zones -- We would like to see the 100-200 foot wide area talked about be enlarged to at least 200-400 feet along water areas. This zone is more important along water areas composed of interior and land-locked sloughs inside islands, side channels, and other quality wood duck nesting habitat than those water areas next to open river.

    The item about fish collectors using brush piles or felling trees into the water for such purposes may have a valid biological use in certain areas. However, under Illinois Conservation Laws, we have an obligation to keep streams and rivers free from "logging" debris and even keep such debris far enough away to prevent such debris from washing into these channels. This could pose a problem in regards to this portion of the practice as well as in the establishment of brushpiles created for wildlife cover. This should only be carried out under the appropriate Department of Conservation biologist's recommendation and supervision.

17. Page 192, Pool 22 -- Addendum -- On the accompanying Upper Mississippi River Habitat Inventory Map Sheets, Sheet #282-22-11 shows a narrow area of forest cover type 2, mature along a small slough running north-south. This area is slated for Practice I (Clear Cutting). This practice is inconsistent with Practice W (Special Management) which specifies for slough shorelines to be undisturbed for Wood Duck nesting habitat management and other wildlife objectives.

18. General Comments

    A. In northwest Illinois, several species of plants and animals are associated with sandy areas of no or open forest conditions. Forest management practices and harvests techniques should be reviewed and presented at that time which recognize the fragility of these areas and their importance.

B. While we appreciate the desire to not disturb forest habitat where colony nesting species occur, we believe an effort should be made to assure no disturbance of similar forest conditions within five to ten miles of these colonies. When the present colony sites become inadequate, colonies will shift to similar areas nearby, as has happened in southwest Illinois.

C. The river otter needs large forested tracts along the Mississippi River. Its only real viable population appears to be in northwest Illinois. Old forest habitat should be developed and maintained along Pools 11-14 for this species.

D. A reference should be made between the prescription for each pool and the inventory data for that pool. Some of the areas are listed in such a way that you cannot compare the prescription with the inventory.

E. In addition, in Attachment #1 the islands and other landmarks should be noted to assist in locating project areas.

F. Within the plan management activities have been identified on several areas that are significantly important to the natural community of Illinois. Nine areas have been identified by the Illinois Natural Area Inventory to be significant to our natural heritage. Therefore, these areas should be managed to protect the valuable resources.

In conclusion, we appreciate the opportunity to review and comment on the subject documents and offer the assistance of Department personnel in further resource management planning efforts on the Mississippi River. Only through continued cooperation, may the valuable natural resources of the Mississippi River be conserved and protected for our future generations.

If you have any questions concerning the above comments, please contact me.

Sincerely,

David Kenney

DK:JM:la

Enclosures

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:

NCROD-R

David Kenney, Director
Illinois Department of Conservation
605 Wm. G. Stratton Building
400 South Spring Street
Springfield, Illinois 62705

Dear Mr. Kenney,

We appreciate the detailed comments on the Forestry, Fish and Wildlife Management Plan for the Mississippi River Pools 11-14, 16-18, 21 and 22, in the letter to our office dated 29 January 1982.

Your comments furnished us with useful input to the final Forestry, Fish and Wildlife Management Plan. All the tables were based on the most recent data available. We will update those tables using the most accurate sources possible as implementation and update occurs.

Regarding your comment on the Forestry Management objectives, we believe the Forestry Management objectives to be in conjunction with all the management objectives of the project. We feel that at meetings held in July and August of 1981 with the US Fish and Wildlife Service and appropriate states, that management prescriptions in each unit were discussed and changed, if needed, to compliment other objectives. Additionally we believe that through the stand mapping process and the flexibility of the plan, prescriptions can be changed as the plan is implemented (see section 6.2.2 and Addendum 1, section 4.1). Finally we want to emphasize that the goal of continuing a sustained and regulated yield of forest products is not included as a source of revenue. Rather, we believe that by attaining a sustained yield regulated by our ability to meet all management objectives, we will be better able to implement the overall silvicultural practices that will meet wildlife species and population needs.

Our coordination efforts on the preliminary draft were meant to obtain needed information on objectives for wildlife species composition and population for cooperative agreement lands from those agencies that manage them on a day-to-day basis. Significant input was received from those participating in the meetings and, subsequently, general wildlife objectives and wildlife management species priorities were added to the final draft of the appendix. We view the authority to write specific wildlife objectives and practices for cooperative agreement lands as belonging to the US Fish and Wildlife Service (FWS) and appropriate state agencies.

NCROD-R
Mr. David Kenney

As per your desire to have the management plan emphasize directives for species which depend upon the river corridor, we agree with you. However, we feel the overall management objective in section 5.1.1 expresses that intention. During the coordination process, the management prescriptions in each unit were tailored to emphasize those species that depend upon the river corridor as stated to us by the meeting's participants. As stand mapping is completed, we will continue to tailor each management unit prescription to those wildlife species emphasized by the appropriate state or the US Fish and Wildlife Service. (See section 5.1.1 and Addendum 1, Section 4.1).

We appreciate your suggestion that an effort be made to assure that no disturbance of similar forest conditions within five to ten miles of present colonial nesting sites take place. However, we believe that by maintaining an optimum mix of tree size class distribution and species in each management unit and by leaving a special or no management zone up to 1500 feet around each rookery, similiar sites will always be available nearby for nesting. We feel a sustained and regulated supply of the mature stands in nearby management units of the tree size, density, and species desired by the birds could be developed through active management. During the meetings held in July and August of 1981, the maximum zone of land that should be left minimally or completely undisturbed around a colonial rookery was extensively discussed. A figure of 1500 feet was determined to be the maximum zonal limit. However, Mr. Stan Tate, District Forester for the Iowa Conservation Commission, noted that he had implemented silviculture practices up to 400 feet from rookeries in Pool 19 when the birds were absent from the nests. He made the points that the rookeries were not disturbed and that by maintaining a sound biological mix of tree sizes, species, and density in similiar timber near the colonial nesting birds, similiar mature timber would always be available nearby.

Concerning your comment about the Milan Bottoms Area, some non-Corps lands were coded to assist us in the management of adjacent Corps-owned lands. As stated in the introduction provided with the maps, no silviculture practices will be implemented on lands that are not owned in fee title status by the Corps of Engineers.

Finally we want to reemphasize that we will work closely with all involved state resource management agencies and the Fish and Wildlife Service to implement this plan. We hope this letter has addressed the concerns you had regarding the draft Forestry, Fish and Wildlife plan. If you have any questions they may be directed to our District Staff Forester, Ralph Montrone at 319-332-6696.

Sincerely,

BERNARD P. SLOFER
Colonel
Commander and District Engineer

CF: OD-R
OD-R-MR
ED-PB
OD (Dist File)
DD
DE

COMMISSIONERS
CAROLYN T. WOLTER, Chairman — Des Moines
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BAXTER FREESE — Wellman
DONALD E. KNUDSEN — Eagle Grove
MARIAN PIKE — Whiting
RICHARD THORNTON — Des Moines

Larry J. Wilson — Director
Wallace State Office Building, Des Moines, Iowa 50319
515/281-5145

An EQUAL OPPORTUNITY Agency

Fairport Hatchery Feb. 16, 1982

Ralph Montrone
Army Corps of Engineers
Mississippi River Project
P.O. Box 34
Pleasant Valley, IA 52767

Dear Ralph:

Selected field staff of the Iowa Conservation Commission are in reciept of the final draft of the Forest, Fish & Wildlife Appendices B&D to the Master Plan for the Mississippi River.

We have reviewed this document as time has allowed. We do not have any comments to make relative to the final draft of this document and do agree with the general philosophy and intended activities outlined therein.

We do appreciate the inclusion of our comments that were submitted relative to the first draft of the appendice.

Also, please include a copy of any correspondence concerning this project to me at the address shown below. I am responsible for the cooridination of river projects and if I am to be effective I must be included in all notices and material handouts.

Sincerely yours,

William H. Aspelmeier
Fairport Hatchery
R.R. Box 434
Muscatine, IA 52761

OD-R

COMMISSIONERS
CAROLYN T. WOLTER, Chairman — Des Moines
RICHARD W. KEMLER, Vice-Chairman — Marshalltown
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DONALD E. KNUDSEN — Eagle Grove
MARIAN PIKE — Whiting
RICHARD THORNTON — Des Moines

IOWA CONSERVATION COMMISSION

Larry J. Wilson — Director
Wallace State Office Building, Des Moines, Iowa 50319
515/281-5145

An EQUAL OPPORTUNITY Agency

February 22, 1982

Colonel Bernard P. Slofer
Rock Island Corps of Engineers
Clocktower Building
Rock Island, Illinois 61201

Dear Colonel Slofer:

My staff has reviewed the final draft of the Forestry, Fish, and Wildlife appendices to the Corps Master Plan for Mississippi River Pools 11-14, 16-18, 21, and 22. I understand that my state biologists and foresters have worked closely with your staff during the preparation of the appendices. Since all of their comments have been incorporated in the final draft, we do not have any further comments at this time.

I like the idea of the March Coordination Meeting. Let know when you schedule the meeting and I will make sure the appropriate staff from my agency attend.

I appreciate the opportunity for the Iowa Conservation Commission to review the appendices.

Sincerely,

LARRY J. WILSON, DIRECTOR
IOWA CONSERVATION COMMISSION

LJW/KS/mll

MISSOURI DEPARTMENT OF CONSERVATION

MAILING ADDRESS:
P.O. Box 180
Jefferson City, Missouri 65102

STREET LOCATION:
2901 North Ten Mile Drive
Jefferson City, Missouri 65101

Telephone 314/751-4115
LARRY R. GALE, Director

August 13, 1981

Colonel Bernard P. Slofer
District Engineer
U. S. Army Engineer District
Rock Island Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Re: Forest, Fish and Wildlife Management Plan

Dear Colonel Slofer:

My staff reported on the meetings with the Rock Island District personnel involved in review of the draft appendices for Forest, Fish and Wildlife Management, Mississippi River Pools 11-14, 16-18 and 21 and 22. We appreciate having the opportunity for indepth involvement in preparation of the draft appendices. Following are our major comments on this early draft:

1. The draft is entitled "Forestry and Fish and Wildlife Management Plan" for Mississippi River Pools 11-14, 16-18, 21 and 22. While the draft includes adequate forest resource coverage, there is little relating to fish and wildlife resources. As the state fish and wildlife agency with both direct and indirect management responsibilities for the lands and waters in and adjacent to the pools, we look forward to having a big role in planning for those resources. The long range planning needs must be addressed in this type of document; they cannot be met by our short term "Annual Management Plans." The scope of each type of plan varies significantly. Our staff has expressed an eagerness to provide meaningful assistance to more adequately plan for the fish and wildlife resources.

2. There is a need to establish 20 percent of each forest unit as old growth to meet den cavity and other requirements of wildlife. Much of this objective can be

COMMISSION

W. ROBERT AYLWARD, Kansas City | J. ERNEST DUNN, JR., Kansas City | CARL DISALVO, St. Louis | PETER C. MYERS, Matthews

achieved by leaving a timber strip at least 200 feet wide adjacent to all permanent water. The strips would provide erosion control, have aesthetic values and be located in areas where access is often difficult.

We define old growth as (1) sawlog stands with more than 50 percent of the sawlog basal area in trees in excess of the diameter objective for the site, (2) less than 30 feet of basal area in saplings and poles, and (3) at least "C" level stocking of mature and/or acceptable growing stock. In addition, some old growth stands are characterized by a well developed mid-story of tolerant species and/or well developed forage component on the forest floor.

Primary consideration with respect to old growth is to allow unique conditions to develop in the understory and at canopy level which would not otherwise occur in stands harvested at normal rotation age. To allow these unique conditions to develop, it is imperative that in each designated stand all cultural practices, including timber stand improvement and thinning, be curtailed indefinitely or until a decision is made to regenerate and place the stand back in rotation. Rotation age for old growth stands will vary depending on species composition, however, with bottomland hardwoods it could approach 150 years.

3. Past experiences on Mississippi River lands indicate some difficulty in reestablishing desired tree cover. It is imperative that the Rock Island District establish a policy that where clear cutting is prescribed to be followed by cultural practices such as planting, vegetative control, etc., there be no cutting unless funds are committed for completion of the follow-up work to accomplish the prescribed revegetation within three years of the cut.

In the next week to ten days, my staff will provide detailed comments on the draft. Questions regarding our comments may be directed to Mr. William H. Dieffenbach of this office.

Sincerely,

Larry R. Gale

LARRY R. GALE
DIRECTOR

cc: U. S. Fish and Wildlife Service
Rock Island, Illinois

U. S. Fish and Wildlife Service
Quincy, Illinois

MISSOURI DEPARTMENT OF CONSERVATION

MAILING ADDRESS:
P.O. Box 180
Jefferson City, Missouri 65102

STREET LOCATION:
2901 North Ten Mile Drive
Jefferson City, Missouri 65101

Telephone 314/751-4115
LARRY R. GALE, Director

September 2,1981

Mr. Ralph Montroni
Mississippi River Project
P. O. Box 34
Pleasant Valley, Iowa 52767

Dear Mr. Montroni:

As promised in Mr. Gale's letter of August 13, 1981, we are providing detailed comments on the draft Master Plan for Mississippi River Pools. A major concern that remains centers around the need to include fish and wildlife in the plan.

In our more detailed review, there appears to be real value in your using the products of GREAT II. The Fish and Wildlife Management Work Group Appendix dated December 1980 would be a good source of problem statements, as well as detailed lists of animals by pool. I'd highly recommend you use as much of that report as possible.

I hope the attached photocopied pages are self-explanatory. If you have questions, please call me.

Sincerely,

W. H. Dieffenbach

WILLIAM H. DIEFFENBACH
ENVIRONMENTAL SERVICES SUPERVISOR

WHD:jct
Attachment

COMMISSION

W. ROBERT AYLWARD, Kansas City
J. ERNEST DUNN, JR., Kansas City
CARL DISALVO, St. Louis
PETER C. MYERS, Matthews

Illinois Department of Conservation
life and land together

605 WM. G. STRATTON BUILDING • 400 SOUTH SPRING STREET • SPRINGFIELD 62706
CHICAGO OFFICE – ROOM 100, 160 NO. LASALLE 60601
David Kenney, Director • James C. Helfrich, Assistant Director

September 17, 1981

RALPH MONTRONE WAS TDY TO OD - MVR (WAT RES MGMT SECT, MISS RIVER). SUPERVISOR ROGER BOLLMAN, ASST PARK MANAGER.

Mr. Ralph Montrone
District Forester
COE-IRD
Clock Tower Bldg.
Rock Island, IL 61201

Dear Ralph:

This is in reference to Mr. Roger Bollman's letter regarding the preliminary draft copy of the Corps Forestry, Fish and Wildlife Management Plan.

After reviewing the comments from our District Foresters and reviewing the subject draft myself, the following are my comments. I hope these can be incorporated in your next draft before full agency review.

1. There are strong objections by the fish and wildlife interests, and rightfully so, in referring to this as a Forestry, Fish and Wildlife Management Plan. As stated in the plan's objectives, wildlife is the primary consideration. However, there are no specific wildlife management objectives defined. Long-term wildlife management goals or objectives need to be defined and then the appropriate forestry prescriptions can be chosen to achieve those goals. The purpose of the plan appears to be unclear and inadequate. With the U.S. Fish and Wildlife Service and the state conservation agencies responsible for the management of the fish and wildlife resources which includes, without question, the habitat, why is the Corps of Engineers attempting again to alter the resource without taking into consideration the total resource? The plan appears to be interested in commercial timber harvesting and not necessarily the management of the entire ecosystem of the river. Forest management and wildlife habitat development and protection can be compatible and will enhance the total resource, however, they cannot be separated.

2. During the development of this plan, consideration should not only be given to the wildlife game species but also to our precious few (the heritage species). The plan will then allow for the impact on threatened and endangered plant and animal species.

3. In Section 6 of the draft, pertaining to implementation of the

plan, there are numerous concerns raised. First of which is the right of the Corps to implement practices on cooperative agreement lands. Assuming you may and we agree to the practices, the Department has additional restrictions imposed on lands managed by the Department with our current tree cutting policy ordered by the court.

In regards to the personnel, as it relates to the implementation and administration of the various forestry practices, the appropriate state wildlife and forestry field people should be involved in the layout work of each practice within a unit or compartment. This would also include developing marking guidelines and possibly assisting in the marking procedures. The administration, "or enforcement", of a federal contract with a contractor (to carry out a specific forestry practice) by state agency personnel will undoubtedly cause problems.

In Section 6.2, 6.3 and 6.4, the plan emphasizes the ranger's responsibility as to the implementation of the subject plan. It is not clear if the ranger responsibilities for implementation covers only the Corps recreation areas or the entire system. I think this needs to be clarified in the plan. Furthermore, the plan should spell out very definitely who would implement the plan, who will do the marking and administering the contracts of any products and most obvious, who will receive the dollar value for such activities. Also, the term "district forester" should be defined in the plan. Does it mean Corps of Engineers or Conservation District Forester?

4. In regards to implementation costs of the various practices, a budget should be developed for a given management unit covering costs for all practices recommended prior to initiation of any one component of the management prescription. For example, in Ward Island on Pool 22, various harvesting techniques are being recommended followed by a TSI and/or planting operation. Therefore, money should be available to cover the followup TSI and/or planting costs before harvesting operations are initiated.

5. Money generated through the selling of firewood from thinning operations or timber sales should be reinvested into the resource. Item 6.7.1.2. covers this to a degree. However, a specific percentage of sale receipts should be specified. I suggest 100 percent.

6. The estimated costs for implementing the specific practices are low in some cases. I would suggest a timber stand improvement operation cost of $40 per acre and a tree planting cost of $100 per acre, which would include chemical weed control but not site preparation. Also, I think clean cultivation as a weed control practice in plantations should be considered.

7. I am not clear as to what is covered as a cost in the item designated: harvesting (contractual). These figures will need to be adjusted upward as costs rise in future years.

8. The following information should be added to the full addendum description and proposed prescription.

a. Include the wildlife information (den trees, upper and lower cavities, mast production, grapevines, etc.) in the write up for each

area as it should be available from printouts from your computerized inventory.

b. For reference purposes, each unit should also be identified by the state which the unit is in.

c. The proposed practices should be spelled out instead of a letter or group of letters. Also replace type number with the type association name or dominant species.

d. For each unit, the management objection should be stated.

e. List soil types for each unit or mention soil somewhere in the plan if they are the same throughout the plan.

f. There is a need for a priority statement of our overviews on which specific species of wildlife the unit is being managed for. Habitat requirements vary greatly among species.

9. Practice A - Planting seedlings should be carried out with discretion due to cost and associated risks involved in establishing a successful plantation. When implemented, proper site preparation and followup weed control will be essential to establishing a successful planting. If herbicides will be used, a pre-emergent for broadleaf control should be included with those already mentioned in the practice description. Clean cultivation may be an alternative to herbicides and may be cheaper in the long run in terms of application and success in establishing a well stocked stand.

In areas where cottonwood, silver maple, sycamore and ash is desired, natural reproduction should be encouraged. This should be done by creating openings with scarified soil conditions to promote ideal seed bed conditions for these species.

Fertilizers are not recommended or needed for the type of sites that will be available for tree planting. Therefore, this practice should be omitted in terms of reforestation work.

Practice H - This practice can be interpreted more than one way. It is suggested that sapling stands be thinned to provide 4-5 feet of opening between crowns of potential crop trees.

Practice L - This definition has a problem in that it is being defined by the technique to be used in treating the area rather than by a specific objective, as in practices H. J and K. Also, scarification of soil seems to me to be a site preparation practice for reforestation purposes. Perhaps rather than a "tree planting" practice we should define it as a reforestation practice, which would include natural and artificial regeneration methods. Soil scarification and prescribed burning might be lumped under this category.

Practice Q - Thinning under this prescription relates to improving growth rates or in other words crop tree release. Thinning young sawtimber stands (12" dbh plus) usually produces low levels of growth response. Therefore, this practice should be restricted to well-stocked stands of

pole size timber (4-10" dbh).

Practice I - In the areas where a clearcut harvest method would be necessary, I think a 5-acre maximum should be the guideline with one acre being the minimum. These figures can be adjusted in the future to achieve the desired results pending observations on the results of this type of practice as it is implemented on a limited basis.

Clearcut layouts were recommended to provide travel lanes between timbered areas. One hundred feet was suggested to be included as a specification. Also, the piling of logging residue for wildlife habitat was questioned especially on the floodplain. It was felt that this activity in those areas would be negated at the first high water stage. This activity could be carried out based on the wildlife biologists' evaluation as to the benefit it would create and placement and numbers could then be specified.

In the last sentence of this practice description covering regeneration, it was proposed that if regeneration does not occur within 3 years, then impeting vegetation will be removed.

Practice P - It is recommended that the size openings created through group or individual tree selection method of harvesting to be equal to the height of overstory trees or greater. With the exception of cottonwood, this size opening should be adequate to promote good growing conditions for most of the desirable species. A more detailed description of this practice would be more beneficial.

Practice R - Lopping could be done on those areas where aesthetics is a concern. This would minimize visual impact. However, I do not see the need for spreading logging residue evenly over the ground, especially if the site is slated for tree planting.

Practice U - The description of this practice appears to be inadequate and too simplistic. The practice can be interpreted differently by users and therefore, could create problems.

Also on floodplain areas, logging residue could be moved around easily during flood stages of the river. In these situations, efforts should be made to reduce or eliminate the chance of logging debris moving into the main channel.

Practice X - Type mapping is to be done within an area prior to any silvicultural treatment. This would be an ideal time for biologists and foresters to coordinate design and placement of silviculture prescriptions for an area.

If a version of this proposed plan is adopted, the various practices should be initiated on a limited basis and monitored to ensure the objectives of the site are met. It is my understanding the plan will be implemented as accepted. I feel a plan of this type must be written so that it is flexible to change or alter the objectives, prescriptions or purposes as needed. The practices which you proposed are acceptable methods on management. However, the one factor that will affect these practices will be the river. Before a final draft is prepared, the wildlife considerations and objectives must be discussed and incorporated into the plan.

With these considerations, some practices for a unit may need to be altered.

I hope the above comments will be helpful in your review and evaluation. If you have any questions, please advise.

Sincerely,

Dick R. Little
Section Manager
Division of Forest Resources
and Natural Heritage

DRL:jmm

cc: Al Mickelson
Dave Cooper
Kurt Bobsin
Reuben Laverdiere
Matt Siemert
Dick Thom

COMMISSIONERS
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Larry J. Wilson — Director
Wallace State Office Building, Des Moines, Iowa 50319
515/281-5145

An EQUAL OPPORTUNITY Agency

5 October 1981

Mr. Frank Collins
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Dear Frank:

Attached please find comments and response to the draft of the Forestry Fish and Wildlife Appendix to the Corps Master Plan for Mississippi River Pools 11-14, 16-18, and 22.

This response was prepared by field staff of the Forestry and Wildlife Sections, Iowa Conservation Commission.

Our comments on the Draft Plan are in two parts. First, general comments on the entire Draft Plan; and secondly, specific comments relative to the Draft Plan by section number.

The field staff of the Forestry and Wildlife Sections, Iowa Conservation Commission, commend the Rock Island District for the initiation of timber management planning. The river's timber resource is an important habitat component with high management potential. We do appreciate the opportunity to participate in the development of the plan and anticipate continued cooperation with the Rock Island District as woodland management is pursued.

Sincerely,

W.H. Aspelmeier

W.H. Aspelmeier
Wildlife Biologist

WHA:sk
cc: Dean Dalziel
Don Pfeiffer
Stan Tate
Art Roseland
Jim Ripple
Bob Sheets
file

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:
OP - G - 360.45
Master Plan

OCT 15 1981

Colonel Fredrick W. Mueller, Jr.
District Engineer
Corps of Engineers
Rock Island District
Clock Tower Building
Rock Island, IL 61201

Dear Colonel Mueller:

This letter provides comments that we feel are pertinent to the Forestry and Fish and Wildlife Appendix to the pool Master Plans for your District. We appreciate the opportunity for our field and regional office personnel to participate in the coordination meetings and discuss both the general and specific provisions of the Appendix. Our comments will be limited to the general sections of the Appendix; specific pool comments will be discussed at the annual coordination meetings as proposed in Section 6.4.2, a section which was added between the Wappello and Green Island meetings.

General Comments

1. We would like to see an expanded discussion of wildlife and fish management in the Appendix. Other than the species lists and sections on occurrence there is a lack of quantified objectives for both species composition and populations. Forest management, i.e. habitat manipulation, can impact significantly on wildlife species and populations; the timber management practices proposed can be designed to meet quantified species and population objectives.

2. The division of the Appendix between forestry and fish and wildlife does create some other difficulties. Because the fish and wildlife portion applies only to those lands under complete Corps management, application of the forest management portion to all Corps owned lands appears to limit the flexibility of both the States and the Service in intensive wildlife management activities on General Plan lands.

3. Another major concern is that site-specific prescriptions are already included in the plan, yet the master plans for the individual pools are not completed. It would be preferable for the States, Service, and Corps to cooperatively develop long range wildlife and fish objectives first, then tailor the Appendix to meet those objectives.

4. As presently prepared, the annual management plans required by the General Plan and Cooperative Agreement will be difficult to mesh with the Appendix. The reason for this is the time frame--five years for the Appendix and one year for the annual plans. Annual plans as currently written are not the intensive plans discussed in the policy section. We recommend that an effort be made to revise the Cooperative Agreement, Condition 1. The purpose of the revision would be to add forest management planning to the State and Service responsibilities on the General Plan Lands.

5. During the field meetings all agencies agreed that cooperating agency personnel would be involved in the field activities resulting from plan implementation. We would like to insure that all pertinent parts of the Appendix reflect this level of participation.

6. We have concerns about some of the forest management practices that are proposed. Our view is that a number of the practices should be field tested in small areas and evaluated for the first five years that the Appendix is in effect to insure that the desired results are obtained before the practices are adopted for widespread use in the river bottoms. The clear cutting practice is the subject of considerable concern to our field people. Some type of assurance is necessary to allay the fear that these sites would become logical candidates for dredge spoil sites if they are within reach of dredging equipment. The potential for loss of habitat to such a use is sufficient to cast doubts on the wisdom of using this practice on areas close to the navigation channel.

In summary, we want to thank the members of your staff for their cooperation in the series of meetings held to discuss the Appendix. Their willingness to discuss the issues that concerned field people from all of the agencies was very much appreciated.

If we can be of further assistance, do not hesitate to contact us again.

Sincerely,

James W. Pulliam, Jr.
Acting Regional Director

STATE OF IOWA

Office for Planning and Programming

523 East 12th Street, Des Moines, Iowa 50319 Telephone 515/281-3711

ROBERT D. RAY
Governor

EDWARD J. STANEK, PhD
Director

STATE CLEARINGHOUSE

PROJECT NOTIFICATION AND REVIEW SIGNOFF

Date Assigned: January 6, 1982 STATE APPLICATION IDENTIFIER: IA820105-412

Review Completed: January 6, 1982

APPLICANT PROJECT TITLE:
Final Draft, Environmental Assessment, Forestry, Fish and Wildlife Plan

APPLICANT AGENCY: Department of the Army Rock Island, Illinois 61201
Address Rock Island District
Corps of Engineers
Clock Tower Building Bernard P. Slofer

FEDERAL PROGRAM TITLE, AGENCY AND CATALOG NUMBER: Department of Defense
Department of the Army
Office of the Chief of Engineers

AMOUNT OF FUNDS REQUESTED:
NA

PROJECT DESCRIPTION:
Environmental Assessment and draft state of "Finding of No Significant Impact" for the Forestry, Fish and Wildlife Plan, Mississippi River, Pools 11-22. The proposed actions presented in the plan are intensive forest management practices to be undertaken initially over a period of five years on lands that were acquired for the Nine-Foot Navigation Project.

The State Clearinghouse makes the following disposition concerning this application:

[X] No Comment Necessary. The application must be submitted as received by the Clearinghouse with this form attached as evidence that the required review has been performed.

[ ] Comments are Attached. The application must be submitted with this form plus the attached comments as evidence that the required review has been performed.

STATE CLEARINGHOUSE COMMENTS:

CH-14

A. Thomas Wallace
Federal Funds Coordinator

United States
Department of
Agriculture

Soil
Conservation
Service

693 Federal Building
210 Walnut Street
Des Moines, Iowa 50309

January 12, 1982

Bernard P. Slofer
Colonel, Corps of Engineers
Rock Island District
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Slofer:

We have received and reviewed the Environmental Assessment and draft statement of "Finding of No Significant Impact" for the Forestry, Fish and Wildlife Plan, Mississippi River, Pools 11-22.

We have no comments.

Sincerely,

William J. Brune

William J. Brune
State Conservationist

United States
Department of
Agriculture

Soil
Conservation
Service

Springer Federal Building
301 North Randolph Street
Champaign, Illinois 61820

January 27, 1982

Colonel Bernard P. Slofer
District Engineer
US Army Engineer District, Rock Island
ATTN: ED-PB-FP
Clock Tower Building
Rock Island, IL 61201

Dear Colonel Slofer:

Your request regarding the Environmental Assessment and draft statement of "Finding of No Significant Impact" (FONSI) for the Forestry, Fish and Wildlife Plan, Mississippi River, Pools 11-22, has been reviewed by our field office.

We have no comments on the document at this time.

Sincerely,

Earl E. Voss acting

August J. Dornbusch, Jr.
Acting State Conservationist

cc:
Roger Rowe, AISWCD, Marseilles, IL
John Rowley, IDOA, Springfield, IL
Ron Darden, IDOA, Springfield, IL
Don Manecke, Orion, IL
W. Hartman, AC, Macomb, IL

United States
Department of
Agriculture

Soil
Conservation
Service

4601 Hammersley Road
Madison, Wisconsin 53711

February 1, 1982

Colonel Bernard P. Slofer
District Engineer
Corps of Engineers
Rock Island District
Clock Tower Building
Rock Island Illinois 61201

Dear Colonel Slofer:

We have reviewed the final draft of the environmental assessment of the Mississippi River Forestry, Fish and Wildlife Plan, Pools 11-22, dated December 1981.

We have no further comment on the assessment as presented. It appears to be adequate and complete.

Sincerely,

Kenneth M. Cohen for

Cliffton A. Maguire
State Conservationist

The Soil Conservation Service
is an agency of the
Department of Agriculture

555 Vandiver Drive
Columbia, Missouri
65201

February 1, 1982

Col. Bernard P. Slofer
Rock Island District, Corps
of Engineers
Attn: ED-PB-FP
Clock Tower Building
Rock Island, IL 61201

Dear Colonel Slofer:

We have reviewed the Findings of No Significant Impact for the Forestry Fish and Wildlife Plan, Mississippi River, Pools 11-22 and have the following recommendations:

The thinning cuts and improvement cuts appear to be too severe for best management. The recommended basal area for optimum growth and tree form is 60-70 sq. ft. per acre. If the average tree size, Diameter Breast High (DBH), is 8", the plan recommends a basal area of 24. Thinning to such a low stocking rate could degrade tree form by causing epicormic branching, wolf trees, or crook and on wet soils could cause wind-throw problems. The soils in the management area are highly productive, and an open stand will increase plant competition of the understory to the detriment of tree growth.

The following table suggests stocking rates based on tree diameter and is displayed for oak and cottonwood. This information is based on a recommended basal area of 60-70 sq. ft./acre for oak and 70-90 sq. ft./acre for cotton wood.

Average Tree Size (DBH, inches)	Recommended Stocking Level (Trees/Acre)	
	Oak	Cottonwood
6	305-356	356-458
8	172-200	200-258
10	110-128	128-165
12	76-89	89-127
14	56-65	84-94
16	43-50	- -

Regeneration efforts should include consideration of intensive site preparation and weed control.

We appreciate this opportunity to review and comment on the proposed plan.

Sincerely,

Robert J. Graham ACTING

Paul F. Larson
State Conservationist

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:

NCROD-R

Paul F. Larson, State Conservationist
United States Department of Agriculture
Soil Conservation Service
555 Vandiver Drive
Columbis, Missouri 62501

Dear Mr. Larson,

We appreciate the detailed comments on the Forestry, Fish and Wildlife Management Plan for the Mississippi River Pools 11-14, 16-18, 21 and 22, in your letter to our office dated 1 February 1982.

Regarding your comment about thinning and improvement cuts, an error was made in the Environment Assessment. The stocking rates were meant to read 70 sq. ft. of basal area for Oak and Hickory and 90-100 sq. ft. of basal area for Silver Maple and Cottonwood.

Thank you for bringing this error to our attention. Any further questions can be directed to our District Staff Forester, Ralph Montrone, at 319-332-6696.

Sincerely,

BERNARD P. SLOFER
Colonel
Commander and District Engineer

CF: OD (Dist File)
OD-R
ED-PB
DD
DE

NATIONAL WILDLIFE FEDERATION

1412 Sixteenth Street, N.W., Washington, D.C. 20036 202—797-6800

February 2, 1982

Bernard P. Slofer, Colonel
District Engineer
U.S. Army Engineering District,
Rock Island
Attn: ED-PB-FP
Clock Tower Building
Rock Island, IL 61201

Dear Sir:

The National Wildlife Federation appreciates the opportunity to comment on the draft Finding of No Significant Impact for Mississippi River Forestry, Fish, and Wildlife Plan, Pools 11-22. NWF is a nonprofit citizens' conservation organization dedicated to the wise management of our nation's natural resources, with over 4.5 million members and supporters nationwide.

The plan appears to be beneficial for rejuvenating and managing the area. However, the Environmental Assessment has grey areas which need clarification, as well as a need for much more emphasis on prevention of harvest-related problems.

The Purpose, Section I, is not clear as to whether environmental assessments for fish and wildlife impacts are being conducted on lands impacted by the forestry plan, but licensed to other public agencies. Is the Fish and Wildlife Service responsible for assessing the impact of timber-harvesting operations on the 7,000 acres of surface waters within its wildlife sanctuaries (p. 7, Section IV.A.4.)?

Any action involving endangered species must be coordinated with the Office of Endangered Species under the Endangered Species Act. Also, surveys to determine the presence and distribution status of endangered species should be completed before a plan is implemented (as mentioned on page 16, paragraph 6, but this should be strongly emphasized). Emphasis is needed to ensure that temporary roads and bridges are properly built and maintained to minimize impact.

The objectives set forth in Section I are generally met in the plan. However, the objectives of habitat management for migratory birds and the provision of colonial nesting sites are

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not addressed. On page 18, paragraph 1, it is not clear what constitutes an "adequate buffer zone" around a heron rookery. From the text, it appears that no work has yet been done on bats, and that mussel surveys are incomplete.

Confining harvests to winter months to protect wetlands may only delay erosion until spring floods. Potential danger to wetlands is rightly acknowledged. Are there possibly other deterrents to damage than buffer zones? We see a need for erosion and siltation effects to be emphasized especially in relation to endangered mussels and spawning fish.

Some comments on the Project Description section: on page 2, paragraph 1, does $52,000 for monitoring and stand mapping include monitoring of wildlife resources? If not, where will this money come from? Sanitation cuts that remove actual or potential den sites (page 4. B.) should be balanced by deadening of trees (page 4. C. Timber Stand Improvement) to avoid loss of wildlife habitat. The page 4, Section D, clearcutting recomendations are good. Perhaps if slash were piled and left in certain instances, air quality deterioration from burning would not occur to a large extent. Plantings balance harvest operations almost perfectly (page 4-5, D & E, 1,137 acres harvested and 1,025 acres planted). This should provide for habitat replacement and sustained timber yields over time.

Discussions of silvicultural practices by pool require Table 1 before the meanings are clear. Presentation of material in the text does not include acreage involved in harvest. The reader must refer back to Table 1 to find harvest acreage. Harvest acreages are not divided, so total acreage of clearcuts vs. selective cuts cannot be ascertained. Table 1 should be referenced in each pool discussion for clarity.

In the pool descriptions, the goals include enhancement or maintenance of natural aesthetic and recreational values. How does the Corps propose to carry out this goal?

It is unclear if the Corps of Engineers or local private contractors will be doing the cutting and clearing of timber, and thus, who will reap financial benefits from this forest management program. If it is local contractors that will be doing the cutting, how will they be monitored to ensure proper silvicultural techniques are being followed and endangered species habitat protected? Will the private contractors bear the costs of fish and wildlife mitigation, habitat enhancement, and replanting programs?

It is possible that bringing logging into the area will also bring in increased navigation channel traffic. Are there

impacts associated with increased traffic on the channel? The anticipated construction of barge docks and fleeting areas (p. 16, para. 3) is not adequately addressed as to possible environmental impacts. The draft is unclear regarding what methods will be used to transport timber if barges are not used.

We would again like to say that this plan appears to have many benefits for the resources of the area. It must be strongly emphasized in the Environmental Assessment that erosion and major water disturbances be mitigated or restored, as appropriate, and that these actions be continued all throughout and after the timber-harvesting operations.

Finally, no mention is made of total project costs, nor the allocation of these costs by project purpose. Those elements of the plan with quantifiable benefits for navigation, such as erosion reduction, should be allocated accordingly, and the corresponding costs recovered from waterway users in accordance with the President's cost recovery program.

Sincerely,

E. R. Osann

Edward R. Osann
Director, Water
Resources Program

Amy Rosenstein

Amy Rosenstein
Water Resources Program

Timothy E. O'Brien

Timothy O'Brien
Fish & Wildlife Program

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:

NCROD-R

Edward R. Osann, Director
Water Resources Program
National Wildlife Federation
1412 Sixteenth Street, N. W.
Washington, D.C. 20036

Dear Mr. Osann,

The comments on the environmental assessment for the Mississippi River Forestry, Fish and Wildlife Plan, Pools 11-14, 16-18, 21, and 22 are very much appreciated. Being a branch of the Federal Government, the US Army Corps of Engineers actively solicits comments from concerned groups and individuals on matters of the public's interest and concern.

Many of your comments and queries in which concern is expressed are more fully covered in our actual Management Plan (Appendix). In order to disspell any misgiving that the National Wildlife Federation may have about the plan, a few of the comments will be addressed here.

This Forestry, Fish and Wildlife Management Plan (Appendice) has been four years in development and is now in final draft form. Throughout the four years the plan was in the developmental stages, coordination has occurred with the Fish and Wildlife Service, Iowa Conservation Commission, Illinois Department of Conservation, and the Missouri Department of Conservation.

Federal lands administered soley by the Fish and Wildlife Service are not covered by this plan. A cooperative agreement exists between the Corps and Fish and Wildlife Service that allows the Fish and Wildlife Service to actively manage for wildlife purposes on specified Corps' project lands. The Corps,however, has retained rights to manage timber resources on these lands, and for these areas our plan covers this aspect of natural resource management.

The assessment itself covers the impacts to fish and wildlife resources on lands where silvicultural practices would be implemented. Any impacts to the shoreline or surface waters would be covered and mitigated through the section 404 water quality process by the Corps of Engineers before the practice is implemented. Potential impacts will be determined during the coordination process with the appropriate state agency and the Fish and Wildlife Service.

As regards your comment about endangered species, it is required in the management plan that coordination with the Fish and Wildlife Service office of Endangered Species be completed prior to implementing any silvicultural practice except stand mapping. Stand mapping is the process of examining each management unit on the ground, delineating stand boundaries and determining pertinent data about it. Such data would include dominant tree species, tree size, stand age, ground cover and tree growth rate.

During coordination meetings with the state agencies and the Fish and Wildlife Service the width of an adequate buffer zone around heron rookery sites was discussed and a determination made that a buffer zone of 1500 feet was reasonable. For your interest, a District Forester with the Iowa Conservation Commission indicated that silvicultural prescriptions had been implimented around colonial rookeries on privately owned lands in Pool 19 with buffer zones as low as 400'. It was indicated that the rookeries were stable or had increased in the number of nests. Additionally, it is felt that through active forest management it is possible to maintain a sustained and regulated level of optimum wildlife habitat, in this case, future rookery sites.

Buffer zones are the best deterent to soil erosion after harvest and where endangered mussels and fish spawning areas are located, annual and continuing coordination will allow us to changed the size and location of harvest to minimize impact to these sensitive areas. Additionally, on the forest floodplain the woody and/or herbaceous vegetation will revegetate the site quickly during spring further reducing potentials for soil erosion.

We appreciate your specific comments about the project description section. The $52,000 consists basically of funds for stand mapping. The monitoring of wildlife resources is the basic responsibility of the appropriate state and the Fish and Wildlife Service, however, we expect to be involved in the monitoring of sensitive areas on Corps' fee titled lands, a small percentage of the money will be spent on monitoring wildlife resources. Sanitation cuts will be balanced by timber stand improvement practices to avoid the loss of wildlife habitat as it becomes apparent during the coordination process. Where air quality deterioration may occur, slash may be piled and left. This option will be discussed during coordination with the appropriate state agencies and the Fish and Wildlife Service, however, we must not allow this option to hinder regeneration or pose a danger of leaving slash to be swept into navigational channel during flooding periods.

We propose to enhance or maintain natural aesthetic and recreational values by the establishment of special management or no management zones along all bodies of water. Additionally, we feel that the rejuvenation of the wildlife resource will allow the public to observe wildlife more frequently. Finally, we believe a bottomland forest resource of an optimum mix of tree species and size class will be more pleasing to the public using the woodlands.

As silvicultural prescriptions are implemented, the Corps may, on a limited basis, cut and clear timber. However, we expect 90% of the silvicultural practices to be implemented by private contractors. The Corps of Engineers will prepare contracts on all timber to be cut and removed, and all timber stand improvement work to be done. Bids will be solicited and the highest bid accepted. All contracts must have a minimum bid below which bids are not accepted. During actual implimentation of silvi-

cultural practices Corps Real Estate personnel, foresters, and Ranger personnel will monitor the contractor during the cutting period by visits to the work site. Replanting programs, habitat enhancement and wildlife mitigation will be done through the Corps of Engineers as coordinated during annual meetings with the states and Fish and Wildlife Service. At the present time logging receipts are put into a general all-purpose fund, however, a mechanism will be installed in the near future that allows logging receipts to be put back into the resource, thereby perpetuating the program. As silvicultural practices are implemented in any management unit, we expect that movement or harvested logs and/or chips by barge to involve only a negligible increase in navigation channel traffic. In most management units logs will be skidded to selected landing areas and then transported via truck to the mill.

In the few areas where barging the wood is the only feasible means to transport the timber, all specialized docks or other structures will be required to be removed upon contract completion.

We hope this will clarify the grey areas in the Enviornmental Assessment. Any further questions may be directed to our district staff forester, Ralph Montrone, at 319-332-6696.

Sincerely,

BERNARD P. SLOFER
Colonel
Commander and District Engineer

CF: OD (Dist File)
OD-R
OD-R-MR
ED-PB

Copies Furnished:
Amy Rosenstein
Water Resource Program
National Wildlife Federation
1412 Sixteenth Street, N.W.
Washington, D. C. 20036

Timothy O'Brien
Fish and Wildlife Program
National Wildlife Federation
1412 Sixteenth Street, N.W.
Washington, D. C. 20036

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:
REC

FEB 2 1982

Colonel Bernard P. Slofer
District Engineer
United States Army Corps of Engineers
Attn: ED-PB-FP
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Slofer:

This will respond to your letter of December 31, 1981, requesting our review and comment of your "Finding of No Significant Impact" and Environmental Assessment for the Forestry, Fish and Wildlife Plan, Mississippi River, Pools 11-12.

Specific Comments

Page 1, paragraph 3, line 4: "Service or appropriate states", should be changed to "and".

Page 2, paragraph B. Need: The last sentence of the paragraph infers that intensive forest management can reverse the effects of man's influence on the woodlands of the river system. This is not entirely true; ie., most trees can sustain only moderate amounts of standing water and not for extended time periods. Flood flows can be affected to a limited extent by lock and dam operations although this does not duplicate the natural process. The higher water table has changed the vegetative succession and it appears unlikely that the predominance of silver maple and cottonwood can be affected by forest management practices.

Page 2, Section II, first paragraph: Intensive forest management is mentioned several times in the lead section. Unless there are guarantees that the practices believed necessary for regeneration will be funded, harvesting activities cannot be considered intensive management activities.

Page 2, Section II, paragraph A: The proper terminology should be 90-100 square feet of basal area per acre and 70 square feet of basal area per acre.

Page 10, paragraph B, line 5: The proper name for refuge lands should read, "Upper Mississippi River Wild Life and Fish Refuge".

Page 15, paragraph C: The control of vehicle access and trespassers should be addressed both in the appendix and environmental assessment. Opening access areas could have significant effects on wildlife populations due to disturbance.

Page 16, paragraph 5: The wording of this section could lead one to believe that total funding for the proposal is currently available. Is this true?

Page 17, paragraph 10a: There is a problem with this section in that there is little or no discussion of limiting factors currently in effect. Such things as small mammals on seasonally flooded islands are not discussed and islands are a significant part of the land area covered by the appendix and assessment.

Page 18, paragraph 1, line 7: "Adequate buffer zones" should be clarified to include a circumference of at least 1,500 feet around the rookery from the outer most nest trees where no clearcutting will occur.

Page 18, paragraph 10b: The last sentence refers to a 100-year rotation and the appendix addresses 70-year rotations. This conflict should be corrected (FWS prefers a 100-year rotation period).

Page 20, paragraph II, B: We cannot accept the definition of "high grading" that is presented. We suggest that high grading is the removal of only the best size and quality timber.

Page 20, paragraph VI, C: We strongly disagree with the last sentence. It has been our understanding that only the Corps could operate this type of program under the General Plan and Cooperative Agreement. The Fish and Wildlife Service may not have the monetary resources but we do have a high management interest in this type of activity. The sentence should at least read "and/or management interest". It also appears that the Corps may not have the monetary resources to implement this appendix.

In conclusion, our comments of October 15, 1981 on the draft appendix recommended that the forest management responsibility be turned over to the Service and states. Your further consideration of this recommendation, along with the aforementioned comments should be incorporated into the final environmental assessment.

We appreciated the opportunity to review this document and concur with your "Finding of No Significant Impact."

Sincerely yours,

James W. Pulliam, Jr.
Acting Regional Director

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:

15 MAR 1982

NCROD-R-MR

James W. Pulliam, Jr.
Acting Regional Director
Unites States Department of the Interior
Fish and Wildlife Service
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

Dear Mr. Pulliam:

We appreciate your comments on the Environmental Assessment for the Forestry, Fish and Wildlife Management Plan for the Mississippi River Pools 11-14, 16-18, 21 and 22, in your letter to our office dated 4 February 1982.

Revision of the final environmental assessment is not being undertaken, as reevaluation of the assessment has been determined to be unwarranted. Your review comments will, however, become a part of our EA and FONSI District File.

Control of vehicle access and vehicular trespass are not considered a significant environmental impact; however, this matter will be addressed at our scheduled annual coordination meetings with the States and US Fish and Wildlife Service.

The flexibility of the plan allows for justified site specific changes in forest management prescriptions based upon input received during the annual coordination and stand mapping processes. Through the cooperation of all the agencies involved it may be possible to attain a sustained yield of superlative wildlife habitat that will benefit all involved resource agencies as well as the general public.

The plan proposes appropriate funding to accomplish intensive management objectives with any Federal action dependent upon Congressional appropriation. It is also hoped that the program will become partially self-sustaining after initial implementation.

15 MAR 1982

NCROD-R-MR BOLLMAN/jj/332-6696
James W. Pulliam, Jr.

It should be reemphasized that we will continue to work closely with all involved State resource management agencies and the US Fish and Wildlife Service during the implementation of this plan in order to assure its success.

Sincerely,

Signed By:
JOSEPH F. MANZI, JR.
LTC, Corps of Engineers
Deputy District Engineer

BERNARD P. SLOFER
Colonel, Corps of Engineers
District Engineer

CF:
OD (File Copy)
OD-R ✓
ED-PB
OD-R-MR

FINDING OF NO SIGNIFICANT IMPACT
FOR
MISSISSIPPI RIVER
FORESTRY, FISH AND WILDLIFE PLAN
POOLS 11-22

Having reviewed the information provided by this environmental assessment, and data obtained from cooperating Federal, State, and local agencies having jurisdiction by law or special expertise, and from the interested public, I find that implementation of the initial 5-year program for the Forestry, Fish and Wildlife Plan, Mississippi River, Pools 11-22, will not have a significant adverse effect on the quality of the environment. Therefore, it is my determination that preparation of an Environmental Impact Statement is not required. This determination may be reevaluated if warranted by later developments.

Three alternatives were considered in addition to the preferred action: "no action," "private-commercial action," and "other public agencies action."

Factors that were considered in making a determination that an Environmental Impact Statement was not required are as follows:

1. Negative environmental impacts which could occur are minor, isolated, dispersed, and temporary in effect.

2. Vegetative management techniques are sound silvicultural practices intended to improve timber quality and enhance wildlife and recreation benefits.

3. No significant social,economic, environmental, or cultural impacts are anticipated as a result of the proposed actions. Continued coordination of annual implementation plans will be made to assure appropriate protection, conservation, or mitigation of rare and endangered species and cultural concerns.

4. Findings concerning placement of fill material into the water body, as a result of timber harvesting operations, will be specified through the application of Section 404(b)(1) Guidelines, for the annual implementation plans.

4 MAR 82
DATE

BP Slofer
BERNARD P. SLOFER
Colonel, Corps of Engineers
District Engineer