

FINAL ENVIRONMENTAL ASSESSMENT

FOR ENDANGERED SPECIES HABITAT

ENHANCEMENT/CREATION

ALONG THE MISSOURI RIVER MAIN STEM SYSTEM

SPRING 1992 ACTIVITIES

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INTRODUCTION

The interior least tern (*Sterna antillarum*) and the piping plover (*Charadrius melodus*) are federally endangered and threatened species, respectively, which nest on sandbars in the Missouri River. This nesting habitat has been decreasing in past years, at least in part due to vegetative encroachment. Vegetation is no longer regularly scoured from sandbars by heavy spring flows and/or ice, primarily because flows are regulated by the main stem dams. New sandbar creation is uncommon because the river carries less sediment and is no longer meandering along much of its course. Bank erosion still continues to supply sediment along "natural" segments of the Missouri River; however, the reservoirs collect much of the incoming sediment, so little passes on to the river downstream from the dams. The combination of vegetation encroachment and reduced island formation result in less suitable nesting habitat for these two bird species.

BACKGROUND

The Missouri River, in its natural state, was a meandering, dynamic river that continually eroded and deposited, creating and destroying islands and sandbars. Sandbars and islands would be scoured of vegetation by heavy spring runoffs and winter ice flows. Channelization was initiated in the early 1900's with the Missouri River Bank Stabilization and Navigation Project, a 6-foot deep channel from Kansas City downstream to the mouth. Authorization for additional channelization upstream followed, as well as construction of six main stem dams. The last dam to fill was Big Bend in 1963.

In 1985, the interior least tern was listed as an endangered species and the piping plover was listed as a threatened species in the Midwest. In 1986, the Fish and Wildlife Service (Service) was asked to review a draft environmental assessment (EA) which was prepared by the Corps of Engineers (Corps) concerning the operations of the Missouri River reservoirs during the drought. The Service responded by requesting formal Section 7 consultation on the entire operations of the main stem system. The Biological Assessment was completed in 1987. It concluded that the operations of the main stem system would not effect the bald eagle or the peregrine falcon. The assessment also concluded that the interior least tern and piping plover may be affected. The Service completed its Biological Opinion in November 1990. The Opinion concurred with the Corps' findings on the bald eagle and peregrine falcon. The Opinion also concluded that the operation of the main stem system would jeopardize the continued existence of the interior least tern and piping plover. The Opinion describes Reasonable and Prudent Alternatives, Conservation,

Recommendations, and Reasonable and Prudent Measures for implementation in order to remove or alleviate the jeopardy opinion rendered by the Service. The Fiscal Year (FY) 1992 Implementation Plan describing all proposed activities for the interior least tern and piping plover prior to 1 October, 1992, has been sent to the Service. An incremental approach to a long-term plan is being developed, in which suggested activities will be implemented and monitored for success for several years, then the "best" methods from those years will continue on into the next phase of the plan. The actions described in this Environmental Assessment are those which would result from the Corps' implementation of the Service's suggestions for creation and enhancement of interior least tern and piping plover habitat. The ultimate goal of these actions is to increase fledge ratios and adult populations for interior least terns and piping plovers.

The Missouri River Division is presently reviewing its current Master Manual for operations for the Missouri River Main Stem System. The Biological Opinion issued by the Service and this EA which addresses the implementation of the recommendations contained in that Opinion are based on the current Manual. Should the Division's review result in changes to the Manual, then the reinitiation of consultation will be considered. In the meantime, the Corps will continue to implement the recommendations of the Opinion in order to avoid jeopardizing the continued existence of the two birds under current operations.

A summary of the Opinion, as prepared by the Service, is included in Appendix 3.

PROPOSED FEDERAL ACTIONS

There are general actions that can be accomplished in order to increase populations and fledging success. For example, primary causes of fledge loss along the Missouri River are flooding, predation, and human disturbance. Therefore, criteria for selecting and developing habitat will try to avoid these impacts. Public education is discussed in the FY 1992 plan, and will be continued into the future. Flooding is a threat because birds are nesting near the water surface. Some field experts theorize that nesting near the water is a result of a lack of suitable unvegetated habitat at higher elevations. In order to provide suitable high elevation habitat, one can clear away vegetation on high islands, raise elevations of unvegetated low islands, create floating islands, etc. All methods are experimental, although limited use of some methods (such as vegetation removal) shows probable success. Predation is a natural problem for interior least terns and piping plovers and not entirely within our control, but stop-gap measures such as predator-excluding cages over nests can aid in increasing the fledge ratio. It is important, however, to choose areas for enhancement and creation where little predator habitat exists in order to minimize the risk to nesting birds and chicks. Habitat creation in areas of high recreational use should also be avoided, as well as increasing the public's awareness of terns and plovers and their requirements for survival. Specific criteria for selection of islands for future habitat creation activities will be developed for each reach of the main stem system that contains nesting habitat. These

are being developed as part of the FY 1992 Implementation Plan. A listing of criteria for each reach will be included in the end-of-year report to the Service on the FY 1992 tern and plover activities.

The actions described below will deal primarily with alleviating or minimizing flooding of nests and chicks and with creation of new high-elevation nesting areas. Pre-action activities include: selection of the area utilizing appropriate criteria; selection of the appropriate habitat method; a pre-trip reconnaissance to the chosen area in order to ascertain details not on aerial photos; coordination with appropriate Corps' Project, State Game and Fish, and Service personnel; securing the necessary permits, real estate accesses, etc. All River Mile (RM) locations are estimates based on 1981 or 1985 river maps, and are plus-or-minus half a mile. Since 1985, the exact shapes and locations of the sandbar islands have changed. Some of the present island locations were under water in 1985, so appear to be non-existent on 1985 (and 1981) river maps.

Success of the habitat methods will be determined by several means. First, the accomplishment of the goals for the activity, for example if we set out to raise island elevations one foot and accomplished this goal, that is one measure of success, meaning that the chosen method accomplished its purpose. Or, if the goal was to remove all vegetation, and we succeeded in removal of not all, but 75% of the vegetation, the method was not as effective as we had hoped. Another measure of success is the longevity of the habitat, or how often it needs to be repeated to stay "successful." For example, vegetation will regrow, built up islands will erode and/or vegetate. How often maintenance is required for the area to still provide nesting habitat is another facet of the success of the operation. Thirdly, use of the created area by the interior least tern and the piping plover, and the successful fledging of chicks will also determine the success of the operation. And ultimately, the increase of the fledge ratios for these species through our efforts will determine success. A habitat evaluation form is being developed to monitor these parameters on habitat enhancement areas in order to determine which methods are more successful in achieving the goal of the activity and in attracting and fledging birds. Worker-hours will be another parameter to assist us in creating efficient, successful habitat enhancement measures for the future. Tentatively, these forms will keep a running log on all maintenance activities needed to keep the habitat acceptable for nesting, and bird usage, to be evaluated for preliminary "success" after three years.

Fort Peck Reservoir. Approximately 50 acres of vegetation will be burned this spring (also spring 1993, spring 1994) on two Fort Peck Reservoir beach areas near the dam. Designated enhancement sites are located in Sections 20 and 21, T26N, R41E, Valley County Montana (Figure 1). Location 1 is approximately 35 acres; location 2 is approximately 15 acres. The burning method used will be a drip-torch with a 1:1 mixture of diesel fuel and gasoline. Drips of fuel ignite as they roll down the wick past the burner. A "fringe" of vegetation will be left along the water's edge to provide a deterrent to nesting in areas of fluctuating water levels, and to reduce the amount of dust and sediment entering the water.

Missouri River below Garrison Dam. Islands chosen for work during the spring of 1992 are shown on Figure 2. Scheduled activities at each location are as follows:

At RM 1380, grassy vegetation will be burned using a propane torch. Islands located at RMs 1352 and 1349.5 will also be burned using a propane torch. No cutting of saplings on these islands is anticipated. Least tern decoys will be used to attract birds to the enhanced area. All burning activities are scheduled for late April.

Missouri River below Fort Randall Dam. National Environmental Policy Act (NEPA) documents are incorporated herein by reference (Appendix 1).

Missouri River upstream from Lewis and Clark Lake. Four low-elevation islands will be built up to higher elevations using dredged sand. The islands are located at RMs 833.8, 833.0, 832.8, and 832.0 (Figure 4). Currently, these islands are one to two feet above water surface elevations at their highest point. The proposed method of construction is to use a crane mounted on a barge which will be equipped with a clam shell bucket. The floating plant will also place existing snags (large tree driftwood) at the upstream end of the submerged sandbar. The barge will then anchor off to the side of the sandbar, and the fill material to create the island will be taken from the deeper water adjacent to the sandbar. The fill material will be placed on the downstream side of the snags and allowed to drain prior to leveling with a small tracked bulldozer. All machinery used in the construction activities are powered by diesel engines, and their fuels are self-contained. There will be no on-site fuel storage during the construction. If additional equipment fuel is required, it will be transported to the job site in approved fuel containers. These four small islands to be created will be approximately 1/4 acre in size, so the total high-elevation nesting habitat created will be approximately one acre.

Missouri River below Gavins Point Dam. Two separate activities are planned for this reach during the spring of 1992:

An on-going patterned vegetation-removal study will be continued this year, as done last year. The purpose of this study is to evaluate piping plover and least tern responses to various patterns of vegetation removal on previously-used nesting islands in this reach. Vegetation will be manually pulled or cut with non-motorized hand tools and removed from the island. Islands chosen for spring hand-clearing are located at RMs 804.5, 781.6, and 775.0 (Figure 5). Since the vegetation-removal is patterned, some living vegetation will still remain in the area in order to provide shade and escape cover for tern and plover chicks. Vegetation re-growth, bird use, and possibly additional clearing will occur over the summer months. When vegetative cover exceeds 20%, then additional hand-clearing will be done. Other island areas not needing spring clearing, but possibly needing clearing later in the summer are at RMs 803.7, 790.5, 781.4, and 759.0. These islands were cleared last fall and will be monitored for vegetative re-growth, and cleared during the summer if vegetative cover exceeds 20%. Clearing will not disturb nesting, as it will be done by the same personnel that are monitoring the nesting populations, and with the same restrictions (less than 20 minutes on an island, etc.).

A one-day volunteer hand-pulling project will be conducted this year. Approximately 40 people, volunteers with Gavins Point Project personnel supervising, will spend a day using non-motorized hand tools for vegetation removal. The volunteers will be divided into four crews and eight boats in order to travel to ten islands (Figure 5). The first crew will clear portions of islands at RMs 803.8, 799.1, and 798.5. The second crew will clear portions of islands at RMs 790.6, 781.3. The third crew will clear portions of islands at RMs 775.9, 770.1, and 770.0. The fourth crew will clear portions of islands at RMs 757.4 and 759.2. The total area cleared in this manner will be less than five acres. These islands will be monitored, along with the others listed above (RMs 804.5, 803.7, 790.5, 781.6, 781.4, 775.0, and 759.0), in order to maintain vegetation densities of less than 20%.

Burning of dense sweet clover and underbrush on an island located at RM 759 was described in the draft EA. As a result of a warm spring and the early greening of clover, the clover burn as described in the draft EA will be conducted during the fall or early winter.

ENVIRONMENTAL EFFECTS OF PROPOSED ACTIONS

The following were considered during the environmental analysis process: air/water quality, biological resources, cultural resources, socioeconomic resources, land use/ownership, and recreational use. Air/water quality and biological resources will be discussed on a reach-by-reach basis.

ENVIRONMENTAL EFFECTS FOR ALL REACHES

Cultural resources

Sandbar and beach areas are continually changing due to the erosive nature of the river currents, and due to fluctuations in reservoir levels and wave action. These areas are naturally disturbed and changing. Most of the islands are recently accreted, and therefore would have little or no archeological significance. Most of the actions described are non-intrusive and would not alter the shape of the islands, or disturb the soils of the surrounding area. The exception to this would be the dredging operation slated for the upstream end of Lewis and Clark Lake. When significant digging activity takes place along the Missouri River, it is necessary to check for sunken steamboats in the vicinity. There is a list of known steamboat sinkings compiled by the Missouri River Commission in 1897 that can be correlated to existing towns and communities along the river. There are two known sinkings in the vicinity of Yankton, South Dakota (Chittenden, 1897). Yankton is located near the Gavins Point Dam, or the downstream end of Lewis and Clark Lake, and the construction area is at the upper end of Lewis and Clark Lake, or approximately 25 miles west of the Yankton area. Therefore, dredging in the upper end of Lewis and Clark Lake should not pose any archeological problems.

Socioeconomic resources

The direct and indirect effects of the proposed activities on employment and community income are negligible due to the small scale and limited duration of the activities. Most of the work will be done by Corps personnel. Land values will not be affected, nor will community growth, farmland, tax revenues, or public services and facilities. Normal noise levels and acceptable esthetic values will be maintained, with the exception of the dredging activity (Missouri River above Lewis and Clark Lake), where noise levels will be increased during the 30-day dredge period.

Land use/ownership

Lands slated for habitat enhancement are not developed, not farmed or grazed, and have no permanent buildings. The lands are sandbar islands in the Missouri River and within the floodplain. All islands could potentially be underwater during high river inflows upstream and/or high level discharges from upstream reservoirs.

For habitat work taking place in Nebraska, local landowners will be contacted by Corps' real estate personnel in order to obtain rights-of-entry.

Islands in North Dakota are owned by the state; therefore, island habitat work approval must be approved by the North Dakota State Water Commission and the State Engineer prior to commencement of the activities.

In South Dakota, the state also owns the islands, and rights-of-entry need to be requested from the South Dakota State Department of Game, Fish, and Parks.

Reservoir areas, such as the beaches at Fort Peck, Montana, are owned by the Corps of Engineers. It is customary for anyone doing habitat work in Montana for the interior least tern and piping plover to approach the Montana Ad-hoc Tern and Plover Working Group with their proposal. The Tern and Plover Group meets annually in the spring, and is comprised of people from the Bureau of Reclamation, the Service, the Bureau of Land Management, and the Sioux and Assiniboine Tribes.

Recreation

The Missouri River from Fort Randall Dam to the downstream terminus of Ponca State Park, Nebraska is designated as a Missouri National Recreational River (MNRR) (Figure 6). This 58-mile Gavins Point Dam to Ponca stretch was designated in 1978 [Public Law 95-625 (Nov. 10, 1978)]. The 39-mile stretch from Fort Randall Dam to the headwaters of Lewis and Clark Lake, designated in 1991, is known as the 1991 Missouri Recreational River (91MoRR) [Public Law 102-50 (May 24, 1991)]. All of our habitat enhancement activities in these two river reaches are within the boundaries of the recreational river. Recreational use of specific sandbar islands in the area is sporadic. During the fall and winter months, river islands are used for waterfowl hunting. Hunting activities should not be adversely affected by the proposed activities, as these actions occur at a different time of year. However, construction of new permanent blinds on islands slated for activity can

be limited. During the summer months, river islands are used for picnicking, sand volleyball, sandbar golf, fishing, campfires, etc. Island areas used for interior least tern and piping plover nesting would be off-limits for recreational uses. This use restriction is permitted by both the Endangered Species Act and by the National Wild and Scenic Rivers Act [Public Law 90-542 (Oct. 2, 1968)]. Even within recreational rivers, public use can be regulated and distributed where necessary to protect and enhance the resource values of the river area.

FORT PECK RESERVOIR

Biological resources

Vegetation present includes sweet clover (Melilotus spp.) sparsely intermixed with Canada thistle (Cirsium arvense). Areas are known to be used occasionally by the following species: mule deer, coyote, passerine birds, rodents, and past history of nesting by the piping plover. Planned activities will temporarily improve shoreline nesting site availability for the interior least tern and piping plover. Burning will temporarily limit suitable ground cover for rodents and passerine birds and therefore limit probable use by coyotes as hunting territory. Burning will limit future use by mule deer due to lack of concealment cover and available foods until revegetation occurs.

Air/water quality

Air quality effects will be minimal as temporary suspension of particulates in the air will occur during and immediately after burning. A burn permit is not required; however, Valley County fire/police dispatch needs to be notified prior to the burn, and notified when the burn is ended. The Service's burn specialists from Lewistown will be conducting the burn, and have their own internal procedures to follow (prescribed burn plan, etc.). Burning cannot take place prior to March 1 of each year. Water quality effects of the burning will be minimal, as much of the wind-blown ash will be trapped in the "fringe" of unburned vegetation bordering the water. Erosional effects will also be minimal, as plant roots will still be there to hold the soil.

MISSOURI RIVER BELOW GARRISON DAM

Biological resources

RM 1380 - Vegetation present consists of cottonwood (Populus deltoides), diamond willow (Salix missouriensis), and sandbar willow (Salix interior) saplings, cocklebur (Xanthium italicum), three square (Scirpus americanus), goatsbeard (Tragopogon dubius), and goosefoot (Chenopodium sp.). Animals present on this island include the interior least tern, piping plover, spotted sandpiper, and killdeer. The island may be used by various migrating waterfowl and other avian fauna. Planned activities will temporarily improve island nesting site availability for the interior least tern and the piping plover.

RM 1352 and 1349.5 - Vegetation present consists of cottonwood and sandbar willow saplings, cocklebur, three square, barnyard grass (Echinochloa crusgalli), goatsbeard, goosefoot, hardstem bulrush (Scirpus acutus), and spikerush (Eleocharis erythropoda). Animals present are same as listed above. Planned activities will temporarily improve island nesting site availability for the interior least tern and piping plover.

Air/water quality

Air and water quality effects from the burning activities will result in localized suspended particulate matter in the form of ash and smoke during, and immediately after, the burn.

MISSOURI RIVER ABOVE LEWIS AND CLARK LAKE.

Biological resources

Specific islands slated for elevation with dredge material are sparsely vegetated with pioneer plant species. These islands are normally inundated by upstream flows and only a small percentage of their area is above the normal water surface. Because the major portion of these sandbar islands is below the normal water surface, disturbance to existing vegetation will be minimal. Likewise, these underwater areas will not be inhabited by birds or animals. Potentially, the only animal life utilizing these underwater areas are soft shelled and painted turtles, snails, clams, and crayfish. Fish may utilize these areas for feeding, but the lack of cover and vegetation would limit fish use for spawning, rearing of young, and cover.

Sandbar habitat on other, less frequently inundated islands in the Springfield/Niobrara area typically consists of dense stands of emergent palustrine vegetation with poor diversity, or even monotypical characteristics. Important species include cattail (Typha spp.), common reedgrass (Phragmites australis), and reed canarygrass (Phalaris arundinacea). Bulrush (Scirpus spp.) is commonly found along sandbar perimeters, especially on the developing downstream edge. Emergent/scrub marsh habitat is also common, with willow species in this area (Salix spp.) being the most common woody plant. Purple loosestrife (Lythrum salicaria) is densely established in the Niobrara river confluence area. This plant successfully outcompetes native vegetation. It has little or no wildlife value, and has been declared a noxious weed by the state of South Dakota (Ron Flakus, personal communication). It is very likely to be among the first plants to invade any newly established sites, especially if existing specimens are nearby.

Wildlife in this general area include abundant waterfowl and upland game species, as well as mammals. Mammal species would include beaver, muskrat, raccoon, and mink, and occasionally coyotes, fox, and whitetail deer. Bird species are primarily migratory, and would include the American bittern, great blue heron, cormorant, bald eagle, interior least tern, piping plover, and numerous species of ducks and geese.

Aquatic habitat in the vicinity of the dredge operation consists of many cattail islands and low-elevation barren (sometimes inundated) sandbar islands networked by areas of low-

velocity open water and higher-velocity deeper channels. Substrate consists of silt (deposited as the river meets the reservoir), with areas of sand and small-sized gravel as one moves upstream from the reservoir. This habitat type can support major sportfish such as walleye, sauger, northern pike, smallmouth bass, and channel catfish. Other species include the crappie, bluegill, common carp, and buffalo. There are several other fish species that could potentially inhabit the area, but due to their scarcity and limited populations, their occurrence in the two-mile construction area (RM 832 - 834) is unlikely. These uncommon species are the pallid sturgeon, paddlefish, blue sucker, sicklefin chub, and sturgeon chub. The pallid sturgeon is listed as endangered. The paddlefish, sicklefin chub, sturgeon chub, and the blue sucker are candidate species for listing (Category II). We did not survey the area for actual fish species present, but rather are describing all fish species in the vicinity that could potentially utilize the project area.

The effects on neighboring islands and their associated wildlife within the vicinity of construction will be minimal. Animals may temporarily avoid the construction area, due to the increase in activity and associated noise of the dredging. Air and water quality effects described below will be temporary and minimal.

Beneficial effects of the construction activity to the wildlife in the area are anticipated. The barren sandbar habitat produced will be less likely to be inundated, producing safer nesting areas for interior least terns and piping plovers. Staging waterfowl also may utilize this habitat, as they have been known to congregate on barren sandbar habitat. The areas that receive the dredge fill will, in time, support similar vegetation as seen in existing above-water islands in the surrounding area, in the absence of vegetation control. It is probable that the dredging activity will temporarily create a more diversified bottom structure attractive to fish. The nature of the flowing river and its constant supply of sand and siltaceous materials from the Niobrara River will fill in the dredged areas very quickly, returning the river bottom contours to elevations similar to those seen before construction.

Air/water quality

There will be a temporary air quality deterioration in the immediate construction area during the 30-day construction period, due to the burning of approximately 700 - 800 gallons of diesel fuel in the tug, crane, boats, and vehicles used to actually dredge and to transport personnel and equipment. The by-products of the fuel-burning process include nitrogen oxides, carbon monoxide, hydrocarbons, carbon dioxide, and smoke (suspended ash molecules). None of these compounds would be in sufficient quantity to pose a health or pollution problem. Dissipation of these compounds should be rapid due to normal breezes along the river.

A temporary, localized increase in turbidity will occur as the natural silty-sand bottom is disturbed. Some temporary resuspension of soil and organic matter will occur. A 404 permit and water quality certification will be obtained before commencement of activities. Bottom sediments have been evaluated for possible contaminants that may be present and would be suspended in the water column if excavating activities commence. Chemicals

tested for were: pesticides, PCBs, and heavy metals (mercury, cadmium, lead, chromium, zinc, selenium, arsenic, and nickel). The elutriate analyses of samples obtained from RMs 833, 840, and 843 indicate that no significant water quality problems should occur as a result of dredging activity. All parameters were below state water quality standards and EPA criteria. A copy of the report obtained is located in Appendix 4. There are no other known impacts to the habitats of the species listed above.

MISSOURI RIVER BELOW GAVINS POINT DAM.

Biological resources

The islands selected for hand-clearing are characterized by similar vegetative communities, although they may have differing percentages of each species. These communities consist of eastern cottonwood, sandbar willow, slender flatsedge (*Cyperus rivularis*), and cattail. Of these species, the cottonwood is dominant.

There appears to be no resident populations of wildlife on these islands. Wildlife use by swimming mammals such as mink, muskrats, and beavers is possible. Occasional use by migratory ducks and geese, shorebirds, as well as interior least terns and piping plovers is likely. Habitat enhancement activities will increase the available nesting habitat for interior least terns and piping plovers. The barren sandbars will also be attractive loafing areas for geese.

Air/water quality

There will be no adverse air quality effects from the proposed hand-pulling vegetative clearing. Water quality will not be affected by the hand-pulling vegetative clearing. There may be a temporary increase in local wind erosion, however this is not an unusual condition along these sandbar islands. Wind-borne sands are being accumulated behind cattail stands and driftwood on a regular basis. The upper sand layers are not lost, they just accumulate behind an obstruction in another area.

ALTERNATIVES CONSIDERED

The various methods used within the different reaches are all alternative methods of habitat enhancement. Habitat enhancement of nesting areas for interior least terns and piping plovers is still in experimental stages, and the "best" method or combination of methods is still not known, and could differ along the different reaches of the Missouri River. Alternatives to the actions chosen for each reach are described below. For all reaches, the "no action" alternative would result in continued loss of nesting habitat due to vegetative encroachment, and/or continued loss of eggs and nests due to flooding.

Alternatives to vegetative control by burning:

1. Mechanical clearing (disking, mowing, bulldozing)
2. Hand clearing
3. Chemical clearing (pre-emergent herbicide, contact herbicide)
4. Flow manipulations

Mechanical clearing requires transportation of large equipment from the shore to the targeted island(s). This is usually accomplished with the help of the National Guard and their floating bridges. We have utilized the South Dakota National Guard in the past, and will use them again this year in the Fort Randall reach of the river. They know what we need and can mobilize relatively quickly. We will consider using National Guard units in other states for future activities, but we anticipate this will require a year to organize. Mechanical clearing along the beach area at Fort Peck would be possible, however the vegetation is dense, so it would be more time-consuming (and expensive) than burning. Burning is relatively inexpensive and fast, and is being used experimentally to determine if it can be a viable method of vegetation control on densely vegetated areas.

Hand clearing will be used in the reach below Gavins Point Dam, and may be a viable method for clearing newly established vegetation in small areas. Burning dense vegetation over large areas (especially the 50-acre area at Fort Peck) is preferable to hand clearing, since burning is faster and less labor-intensive.

Chemical clearing is a method of vegetation control used successfully in past years. Application of a pre-emergent herbicide could be done in the spring, however we haven't researched the toxicity of this type of herbicide in depth at this time. Until a literature review, and possibly additional testing, on the toxic effects of pre-emergent herbicides is conducted, this method is not acceptable. A contact herbicide, specifically RODEO, has been used successfully in the past. RODEO is translocated through the plant tissues, so plants need to be actively growing and have sufficient leaf surface area for chemical uptake. This method is normally used in late summer or early fall, the recommended season (by the manufacturer) for control of woody vegetation and other perennials. If used during the spring, it would have to be after sufficient leaf-out to allow chemical uptake, and this timing may overlap with bird nesting seasons.

Flow manipulation has been suggested for scouring vegetation. The Reservoir Control Center has manipulated flows in the past when there were opportunities for flow fluctuations without hampering flood control and navigational responsibilities. More guidance is needed on what flow discharges would be required to kill vegetation, and what the duration of those discharges need to be, for the Reservoir Control Center to allocate water for these purposes.

Alternatives to vegetative control by hand-pulling:

1. burning
2. mechanical clearing
3. chemical clearing
4. flow manipulations

Burning is the only alternative listed above that hasn't been discussed already. Since burning is an experimental method, we don't want to use that method exclusively for vegetation clearing. If it proves to be effective and efficient, we may elect to expand use of burning. If it proves unsuccessful, we want other methods of clearing (and data gathered on the success or lack of success seen with those methods) to fall back on.

Alternatives to crane-on-barge dredging for island elevation:

1. hydraulic dredging
2. bulldozing
3. floating islands

The crane-on-barge method of construction was chosen over use of a hydraulic dredge because it will result in less turbidity to the river/lake. It is also much less expensive than operating a hydraulic dredge (which we would have to rent).

Bulldozing is a viable method for raising the elevation of specific islands (as used in the Fort Randall reach); however, the heavy equipment must be transported to the islands somehow. The assistance of the National Guard may be required. They will be assisting us, as a drill exercise, in the Fort Randall Reach. It is uncertain whether they can drill over this same floating bridge exercise several times during the same year.

Floating islands may be a viable alternative to creating high elevation islands. Their use in other countries and other states shows them to have potential for interior least tern nesting. However, they do not supply shallow-water piping plover foraging areas. Buying the necessary equipment, and the construction of the islands this late in the spring would likely push us into the nesting season. We want to have nesting areas available for the birds prior to their arrival this spring. This method of habitat creation will remain an option for later years.

COORDINATION WITH OTHER AGENCIES

The draft EA was sent out to a number of State and Federal agencies for review (Agency List, Figure 10). Agencies were given 15 days to offer verbal and written comments, and several time extensions were given. All written (and FAX-ed) comments are now addressed in the final EA. Some letters contain many specific comments, so the letters are included

in this Final EA (Appendix 2). Selection of areas for habitat enhancement activities has been coordinated with State and Federal agencies throughout the planning stages of this year's activities.

Written comments were received from the Nebraska Game and Parks Commission, the U.S. Fish and Wildlife Service in Bismarck, and the U.S. Environmental Protection Agency (EPA) in Denver.

Briefly, Nebraska suggested that ultimately, solutions to habitat creation must be flow-related, asked us to consider creating larger islands, asked that activities below Gavins Point Dam be supplemented with techniques used in other reaches (mechanical elevation, etc.), and asked us to expand our consideration of potential impacts to invertebrates, fish species, and mussel populations. These recommendations will be taken under advisement for preparation of the next habitat EA.

Nebraska also requested that their comments for the Ft. Randall EA be included in the final document for that activity. The final EA had already been prepared when we received their comments, so we will instead include their letter in Appendix 2, along with the written responses to this EA.

The Service in Bismarck had primarily technical comments, which were incorporated into this document. Also, slight changes in methodology for work done in North Dakota and a change in two locations for habitat work (as a result of nesting geese) were incorporated into this document. Erection of sand fences this spring was eliminated due to time constraints.

The U.S. EPA in Denver had lengthy, specific comments. Some of their comments have been incorporated into this document to add clarity, such as ways to measure success, and our tentative vision for a long-range, incremental habitat program. The answers to some of their comments can be found in the FY 92 plan which has been sent to the Service during the month of May. Other questions will be answered in the FY 93 - 95 plan which is currently being developed. This EA describes only one small part of a much more comprehensive program which is beginning this fiscal year. The entire habitat program for terns and plovers is in the process of being developed, and much of it is experimental, so we do not have exact answers on many questions yet. Even our ideas on measuring success are in the developmental stages.

The EPA requested a copy of the Biological Opinion as an appendix to this document, or a summary of its recommendations to be included in the main body of the text. The Biological Opinion is a lengthy document that we chose not to append, however copies of this document can be obtained on request from the Service or the Corps.

The EPA had questions as to the relationship between the Master Manual EIS and this project. The Master Manual EIS will talk in general terms about the system impacts on

endangered species and what will be done to mitigate for such impacts. It probably will not describe specific actions with as much detail as the EAs for each activity will, but it will have to consider work being done pursuant to the Biological Opinion. The big picture is the system operation covered in the Master Manual; ours is really a small and much more specific effort in comparison.

Habitat enhancement by means of flow manipulations surfaced again. Our EAs describe the impacts of the District's activities to create or improve habitat. Strictly speaking, flow manipulation is not a part of this, except to the extent that flows have already been modified for terns and plovers (as described in each year's Annual Operating Plan produced by the Reservoir Control Center (RCC), Missouri River Division office). We do coordinate our activities with the RCC, so they are aware of what we are doing and will do their part in keeping these islands above water during the summer months. Decisions for scouring flows cannot be made by the Omaha District Office. Furthermore, use of water in this way is not supported by other legitimate users of the Main Stem System, especially during times of drought. The authorized uses of water in the system will most likely be discussed in detail in the Master Manual EIS.

Regarding question 7 (from the EPA letter) about restricting access onto islands, we can only legally restrict access on Corps-owned islands. In general, known nesting areas (regardless of activity) and substantial nesting colonies in areas close to human activity will be posted and roped off. That means that they will be "off-limits" to humans, and violators will be subject to prosecution.

Prepared by:

for Richard D. Gorton
Rebecca J. Latka
Environmental Resource Specialist
Date 8/12/92

Reviewed by:

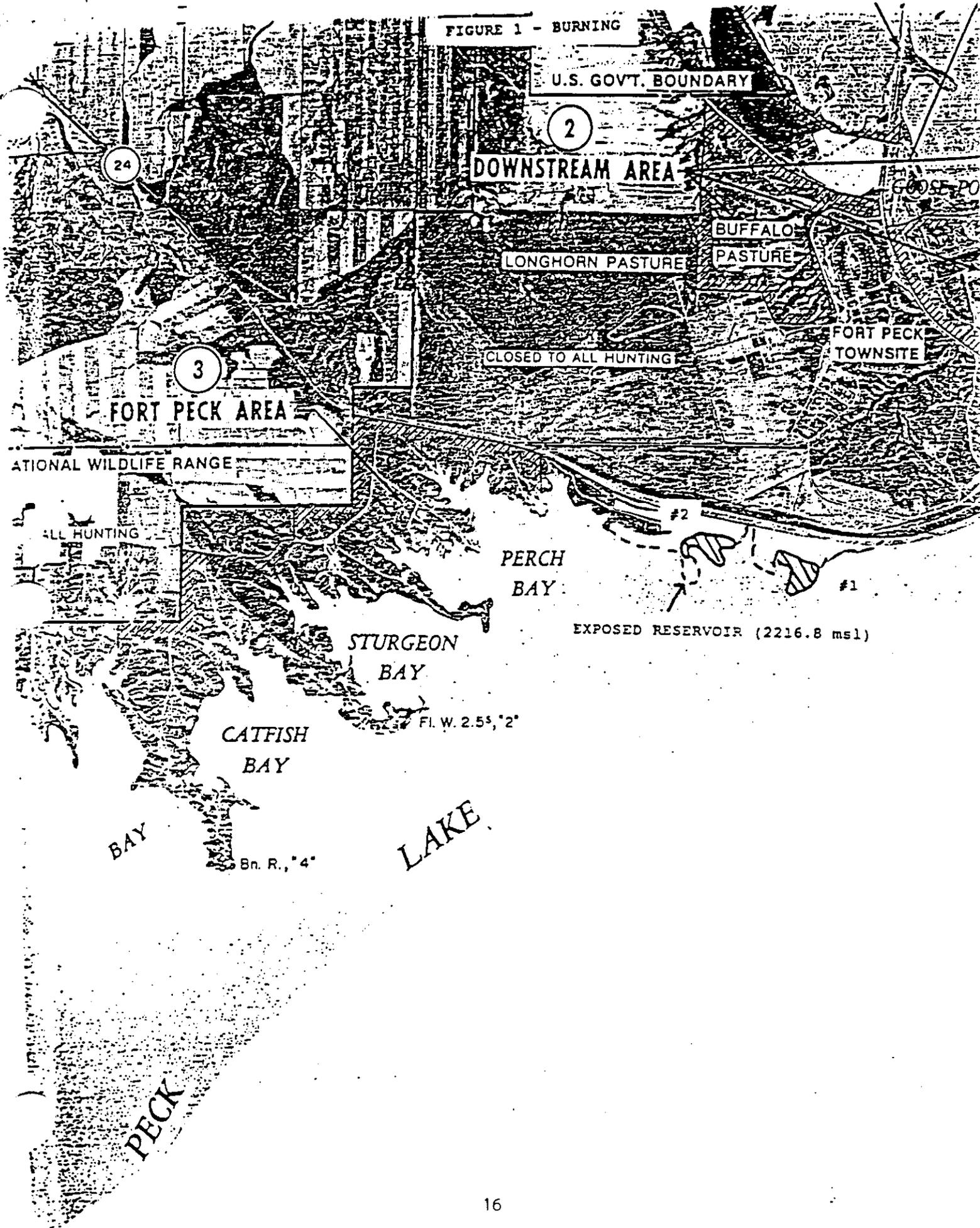
Richard D. Gorton
Richard D. Gorton
Chief, Environmental Analysis Branch
Date 8/12/92

REFERENCES

Chittenden, Hiram M. 1897. [Appendix D] Report on steamboat wrecks on the Missouri River by Capt. H.M. Chittenden, Corps of Engineers, Missouri River Commission, Office of the Secretary, St. Louis, MO.

Flakus, Ron. 1992. South Dakota Department of Agriculture employee who was present at the South Dakota Weed and Pest Committee meeting 2/22-23/ 92 when purple loosestrife was declared a noxious weed.

FIGURE 1 - BURNING



U.S. GOVT. BOUNDARY

2

DOWNSTREAM AREA

LONGHORN PASTURE

BUFFALO PASTURE

FORT PECK TOWNSITE

CLOSED TO ALL HUNTING

3

FORT PECK AREA

NATIONAL WILDLIFE RANGE

ALL HUNTING

PERCH BAY

EXPOSED RESERVOIR (2216.8 msl)

STURGEON BAY

CATFISH BAY

Fl. W. 2.55, '2"

BAY

Bn. R., '4"

LAKE

PECK

FIGURE 2 - BURNING



FIGURE 2 (cont.) - BURNING

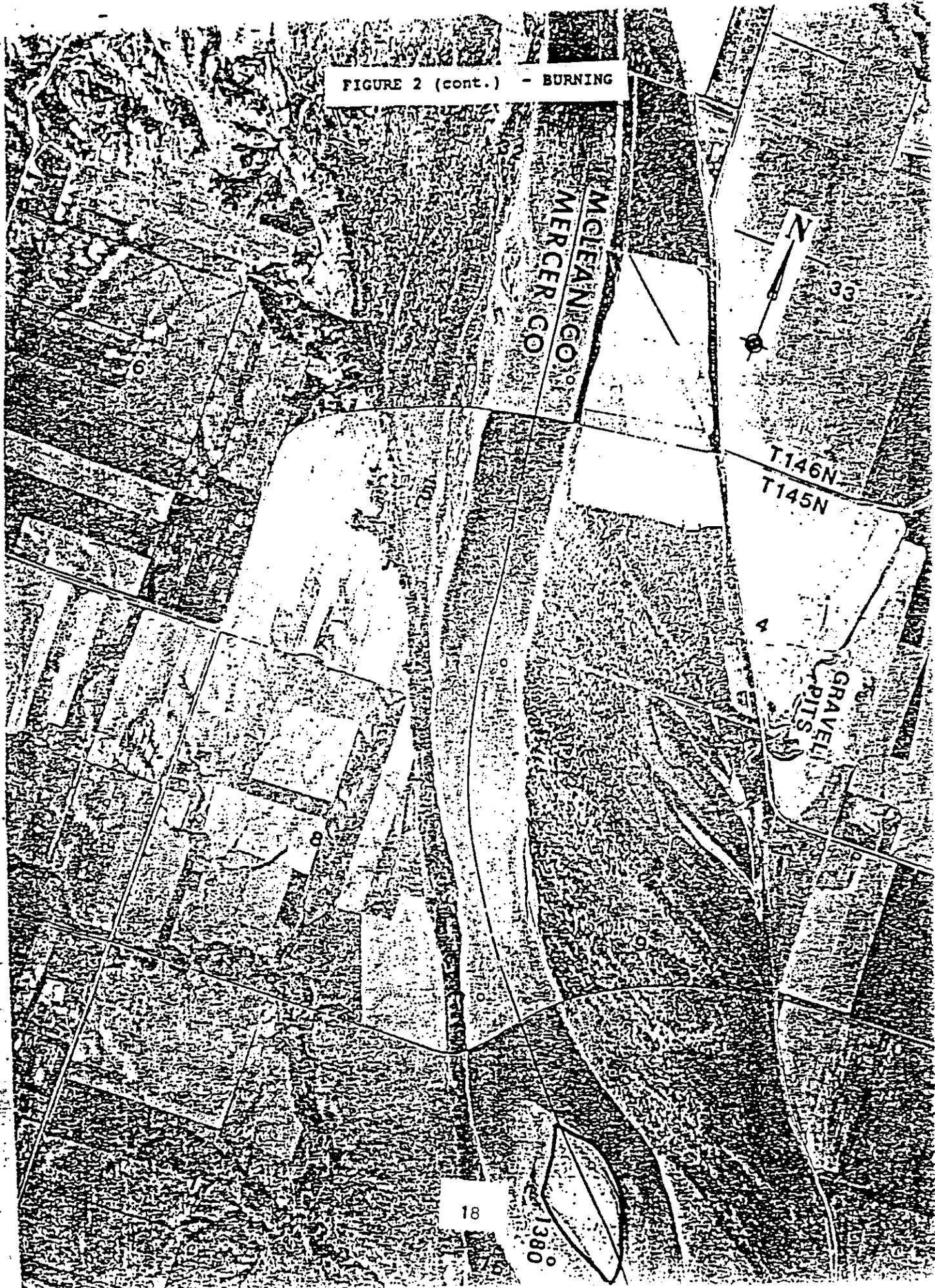
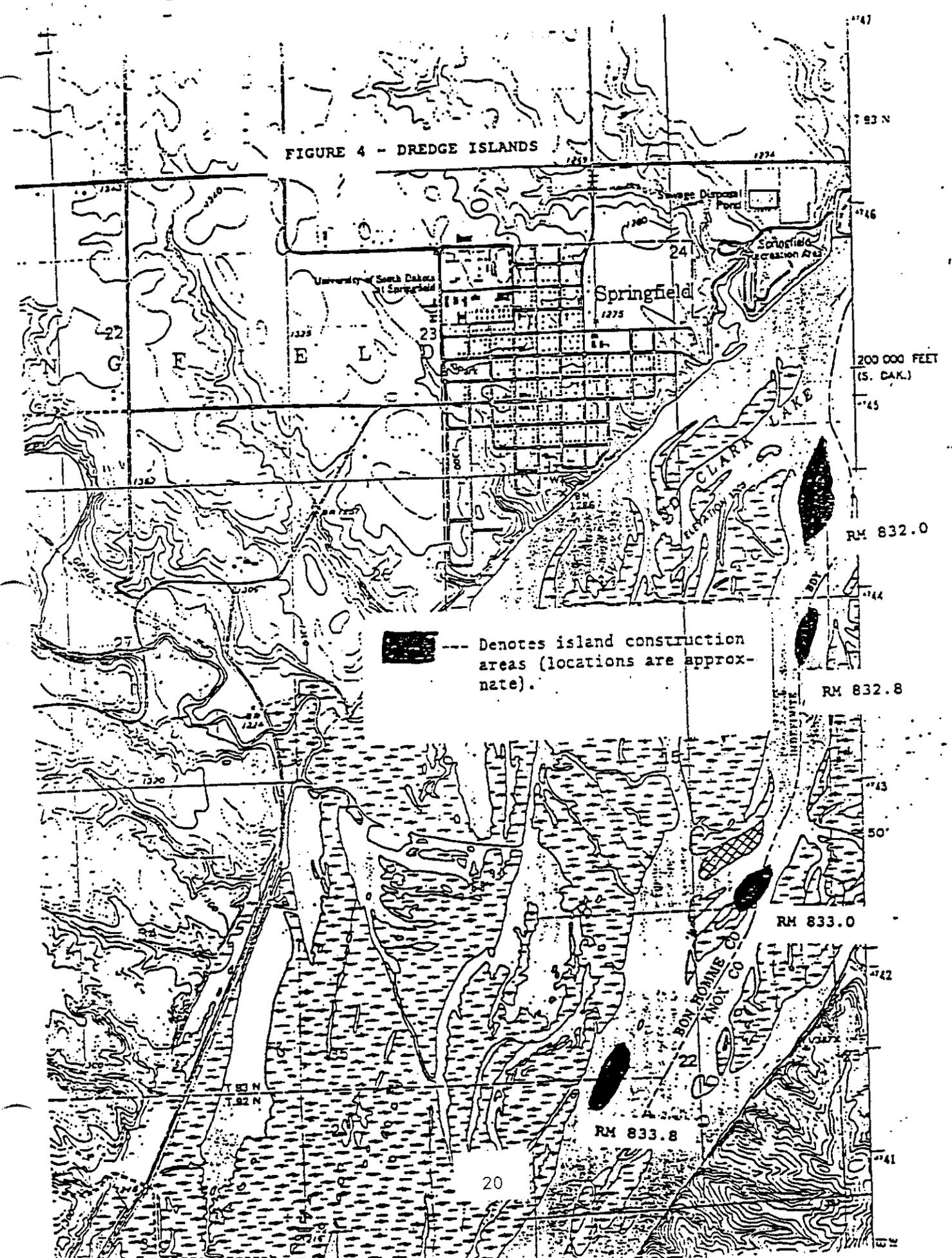


FIGURE 3 - SAND FENCING



FIGURE 4 - DREDGE ISLANDS



--- Denotes island construction areas (locations are approximate).

200 000 FEET (S. DAK.)

RM 832.0

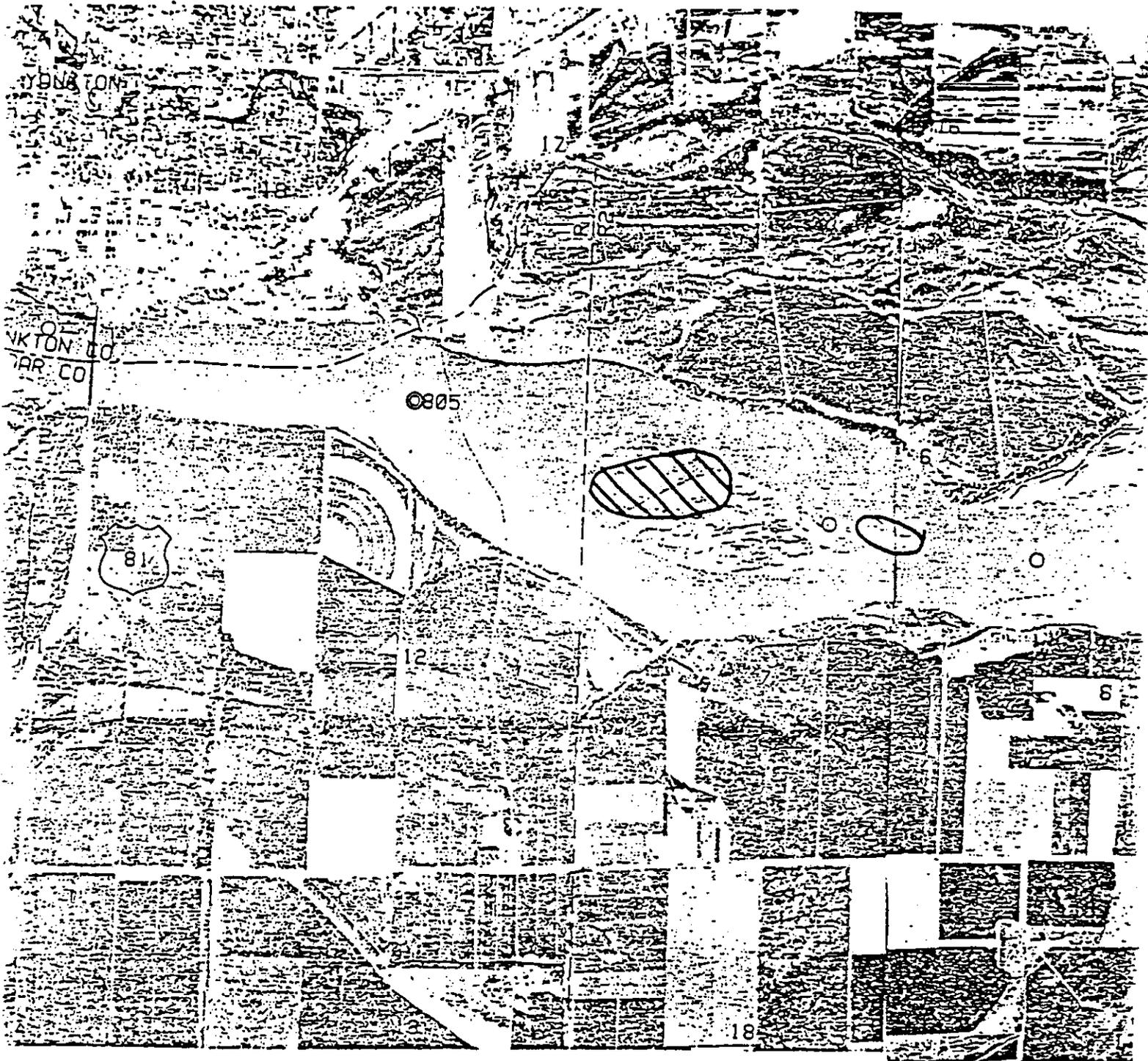
RM 832.8

RM 833.0

RM 833.8

20

FIGURE 5



PATTERNED HAND CLEARING



VOLUNTEER HAND CLEARING



FIGURE 5 (cont.)

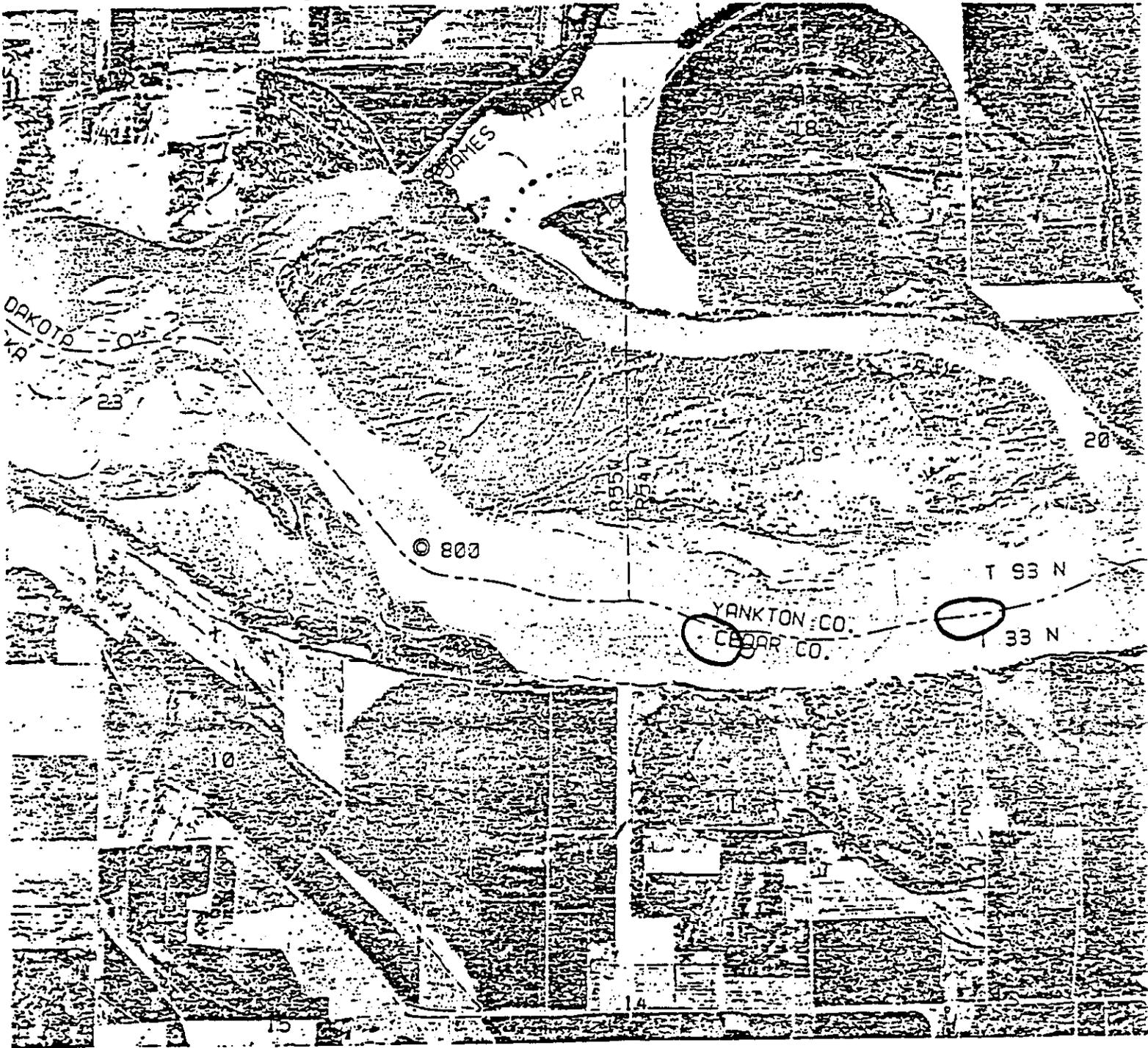


FIGURE 5 (cont.)

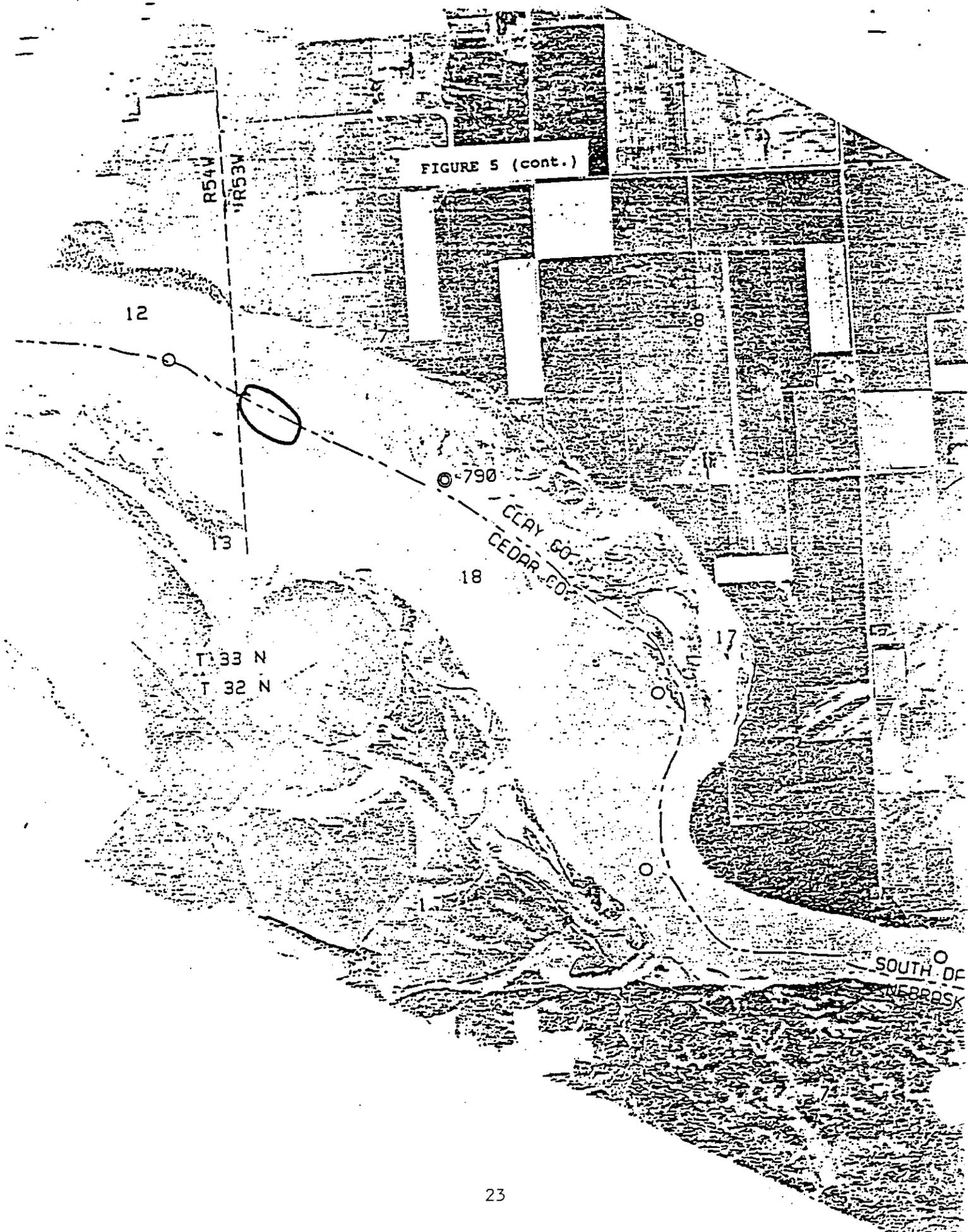
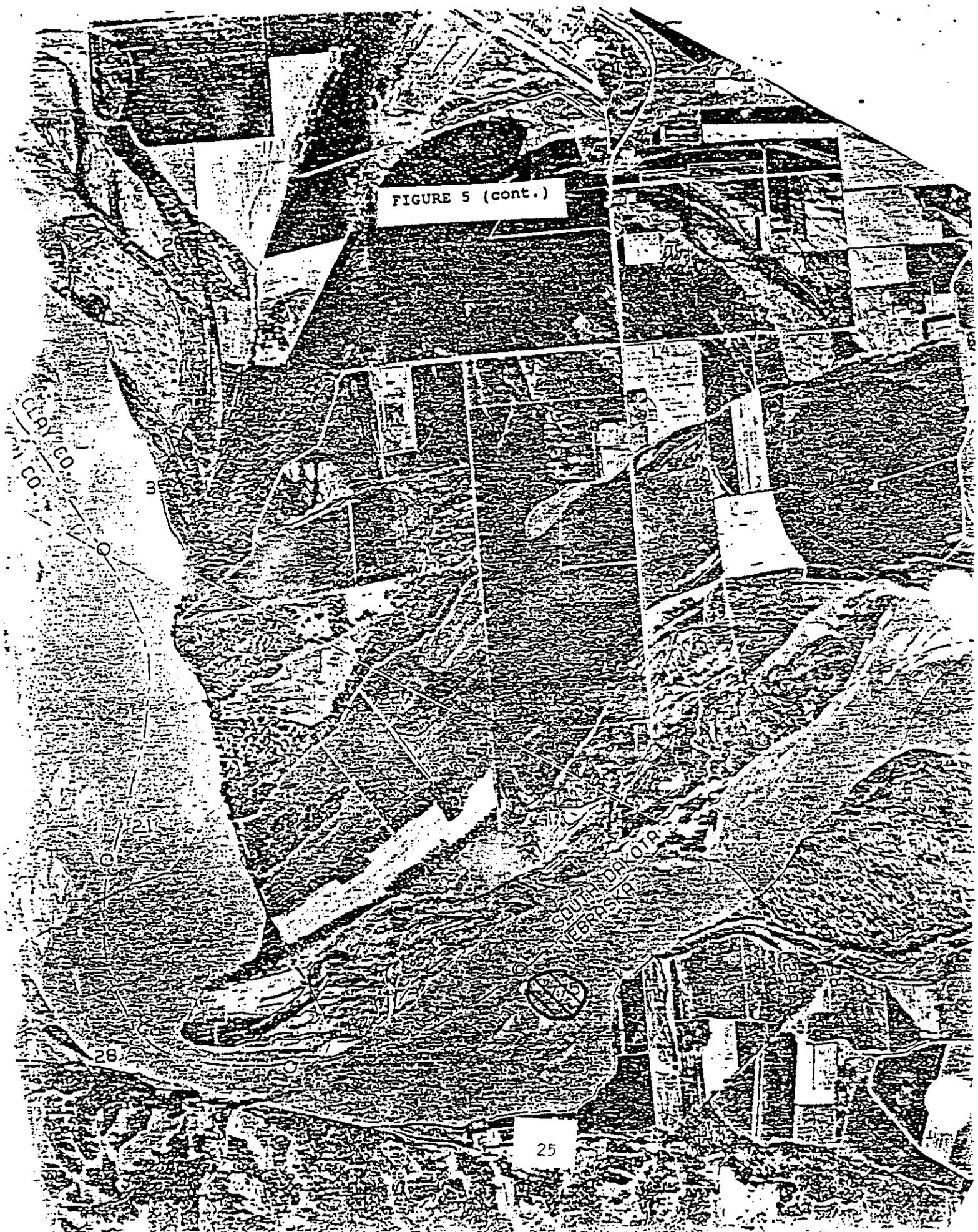


FIGURE 5 (cont.)



FIGURE 5 (cont.)



CLAY CO.

28

25

WEST VIRGINIA

FIGURE 5 (cont.)



FIGURE 5 (cont.)



BURNING

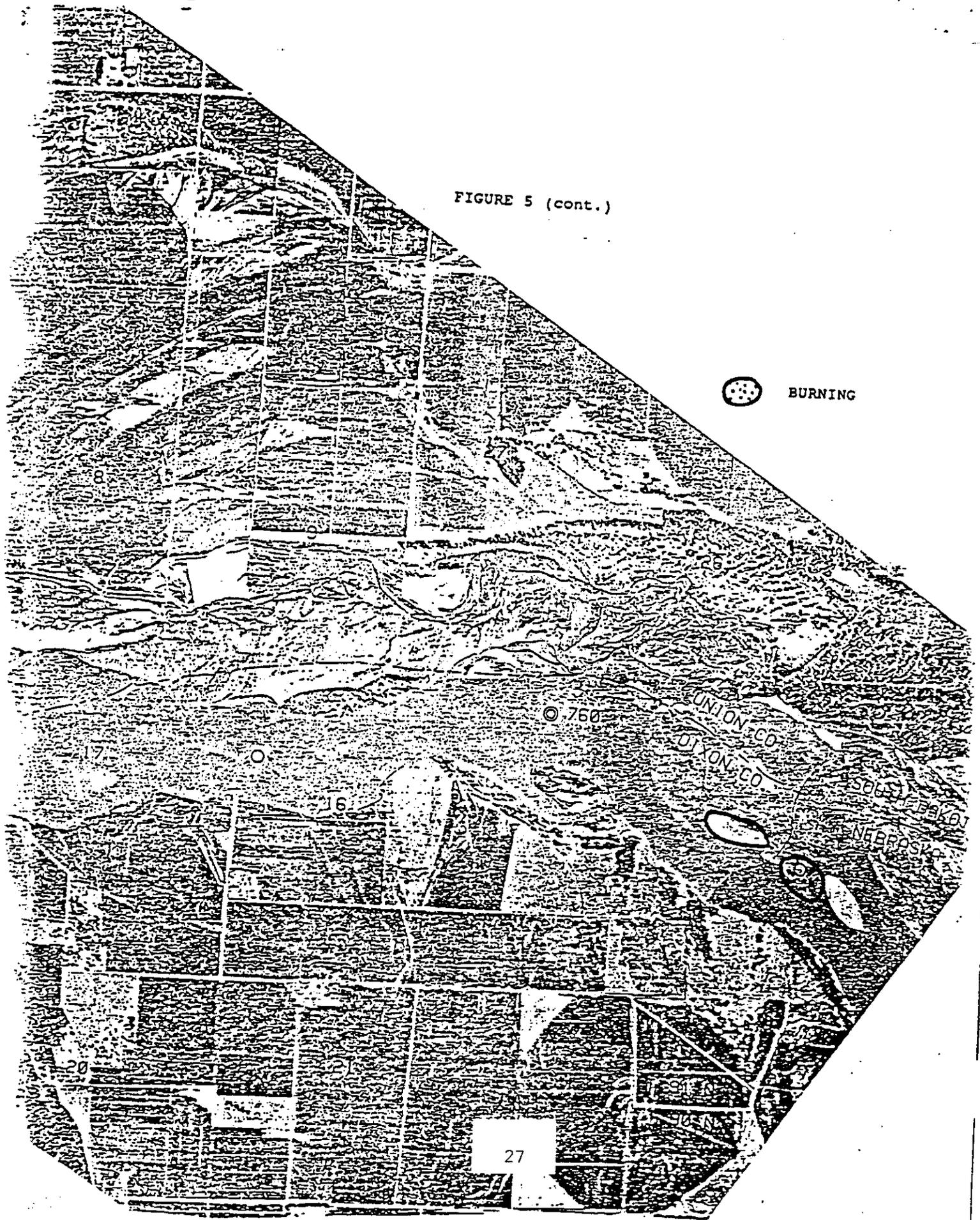


FIGURE 5 (cont.)

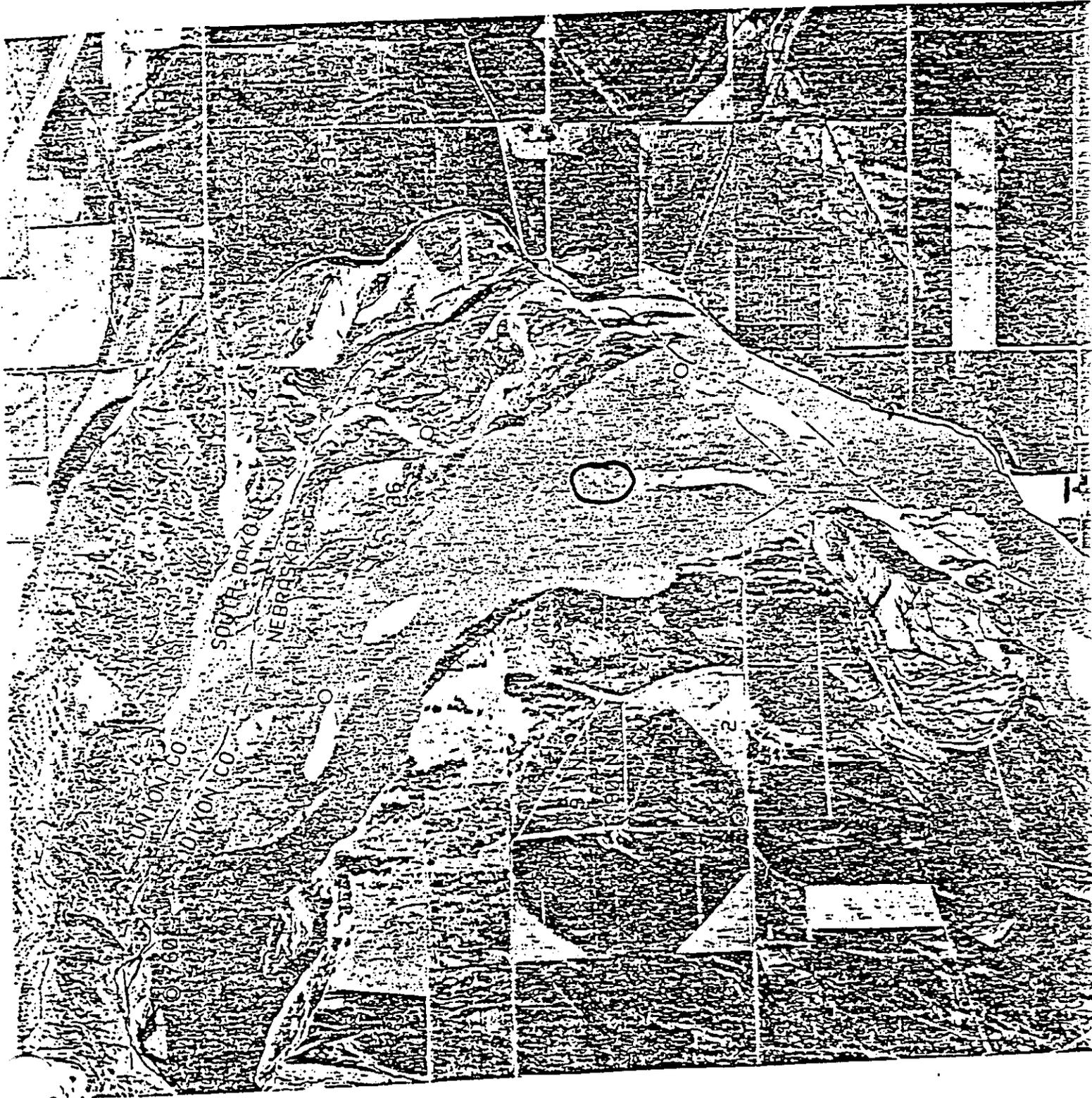


FIGURE 6

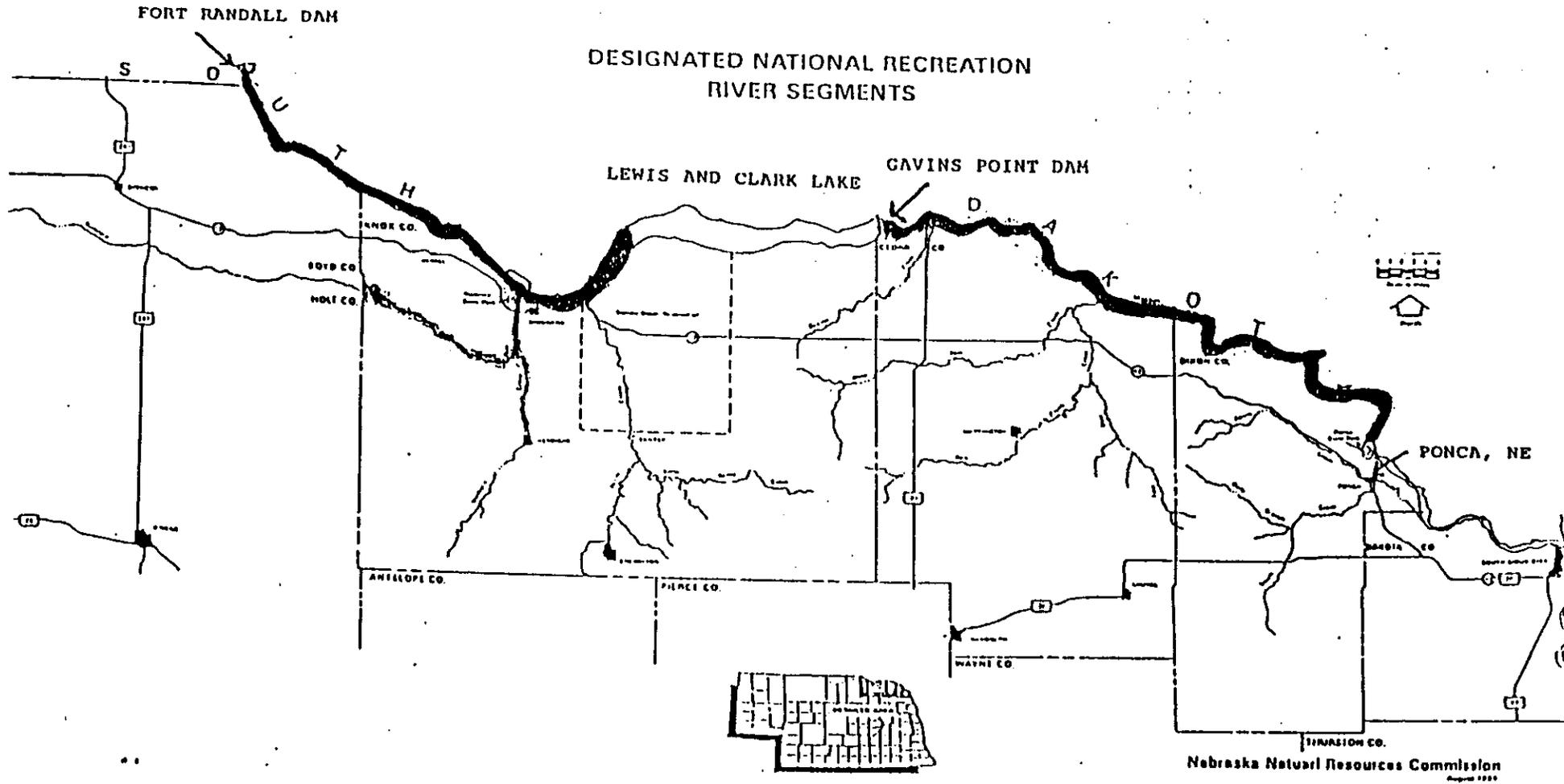


FIGURE 7

LIST OF AGENCIES SOLICITED FOR COMMENT

U.S. Fish and Wildlife Service, Nebraska
U.S. Fish and Wildlife Service, South Dakota
U.S. Fish and Wildlife Service, North Dakota
U.S. Fish and Wildlife Service, Montana
Nebraska Game and Parks Commission
National Park Service, O'Neill NE
National Park Service, Omaha NE
South Dakota Department of Game, Fish, and Parks
North Dakota Department of Game and Fish
Montana Department of Fish, Wildlife, and Parks
U.S. Environmental Protection Agency, Region 7, Kansas City
U.S. Environmental Protection Agency, Region 8, Denver
Missouri River Division, Corps of Engineers

APPENDIX 1

FINDING OF NO SIGNIFICANT IMPACT
ENDANGERED SPECIES HABITAT ENHANCEMENT
ON THE MISSOURI RIVER

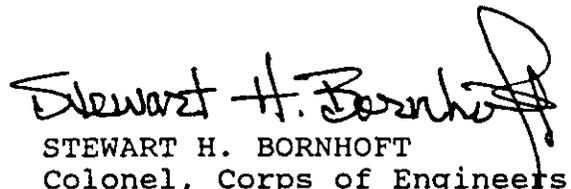
An environmental assessment has been prepared for elevating sand with a bulldozer on sandbar islands in the Missouri River below Fort Randall Dam. The elevated sand will provide nesting habitat for interior least terns and piping plovers that will reduce the risk of flooded nests.

Adverse impacts of this specific action are limited to the temporary displacement of burrowing or non-flying invertebrates that may be residing in the sand to be moved. No long-term impacts on the environment are anticipated. This action will not adversely impact any threatened or endangered species. Short-term traffic disturbances may occur during the transport of equipment needed for this action.

Factors that were considered in making this decision included but were not necessarily limited to conservation, economics, esthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, air and water quality, energy needs, safety, food production, and in general the needs and welfare of the people.

It is my finding that the Federal action would not have significant adverse impacts on the quality of the human environment and therefore, an environmental impact statement will not be prepared.

3 April 1992
Date


STEWART H. BORNHOFT
Colonel, Corps of Engineers
District Engineer

**FINAL ENVIRONMENTAL ASSESSMENT
FOR ENDANGERED SPECIES HABITAT ENHANCEMENT
ON THE MISSOURI RIVER BELOW FORT RANDALL DAM**

INTRODUCTION

The interior least tern and the piping plover are endangered and threatened species, respectively, which nest on sandbars in the Missouri River. This nesting habitat has been declining in past years, at least in part due to vegetative encroachment on the sandbars. Thus, more birds nest in areas of fluctuating river levels which typically have little vegetative encroachment. Nests initiated in these areas are rarely successful, as they are lost to flooding during temporary rises in river elevation. Increases in river elevation are caused either by rainfall events that increase tributary inflow, or from operational actions of the dams. In some cases, an increase of tributary inflow can be compensated by lower releases from Fort Randall Dam, resulting in a steady river elevation. Predictions of specific sites that might be inundated is difficult, however, due to the changing morphology of the river due to degradation and aggradation of sediment.

LOCATION AND PROBLEM

Least terns and piping plovers nest in the Missouri River below Fort Randall Dam. Drought conditions in recent years have resulted in lower releases from the dam, thus exposing more nesting islands. With more habitat available, the numbers of birds sighted and nests initiated have increased during the past three years. There were record numbers (57) of piping plovers utilizing this reach in 1991. Least tern numbers (87) almost tied the record high of 88 achieved in 1990. Nests initiated in this reach were the greatest since 1987 for least terns, at 47, and over twice the highest amount seen since 1986 for piping plovers, at 44. Unfortunately, this was not translated into a high number of fledged chicks, as most of the nests for both species were flooded out. Only 8 least tern nests and 4 piping plover nests hatched chicks, resulting in fledge ratios of 0.25 for least terns and 0.32 for piping plovers. The purpose of our actions is to carry out the Reasonable and Prudent Alternatives as described in the FWS Biological Opinion (1990) in order to meet or exceed fledge ratios of 0.70 for least terns and 1.44 for piping plovers. These birds will nest anywhere from two inches to two feet above the existing water line at the time of any given individual's nest initiation. Low water levels at a time when a bird initiates a nest may still cause the nest to be flooded if the water levels rise regardless of the elevation of the island. Raising the elevation of selected islands may encourage more birds to nest high enough to avoid being flooded.

PROPOSED ACTION

Desirable nesting habitat can be created by removing established vegetation from islands. Newer islands that do not yet have the problem of encroaching vegetation can be raised mechanically to increase elevation and avoid flooding. In order to provide habitat that can be utilized this year, the second method was chosen. The targeted islands are located at River Miles 869.0, 866.7, 853.8. Work is scheduled for April 6 - 8, 1992. At all islands, existing sand will be pushed to higher elevations using a bulldozer. Island areas will be elevated from one to three feet higher than what is presently available. The chosen islands appear to be free from established, significant vegetation, although

there is enough pioneer vegetation to require using the bulldozer to scrape off the vegetation prior to pushing the sand. Vegetation will be piled in one location in order to keep the seed base localized. An attempt will be made to physically remove vegetation from the islands. If removal is not feasible, then vegetation will be placed in one location and covered with sand.

The South Dakota National Guard will assist in the transport and operation of equipment. The equipment will be transported by truck to a boat ramp, then loaded onto floating bridge sections which will be pushed barge-style to the islands. The equipment will be unloaded, the islands will be re-shaped, then the equipment will be re-loaded onto the floating bridges and transported back to the boat ramp.

EFFECTS OF THE ACTION

Most riparian and riverine flora and fauna will not be affected by the proposed activities. The islands themselves will naturally vegetate with local species (cocklebur, sandbar willow, cottonwood, grasses, sedges) within three years if vegetation control is not conducted. We plan to monitor and control vegetative growth in order to maintain these islands as barren nesting habitat. Riparian areas will not be entered, except for the vicinity of the boat ramp, already a recreational area. In this area there may be a short-term disturbance while equipment is being unloaded from the boats and loaded onto the floating bridges. There may be a temporary increase in water turbidity and possibly suspended sediment while equipment is being loaded and unloaded onto the bridge sections.

All possible landowners have been contacted and are filling out right-of-entry forms for access to the islands, destruction of vegetation, and mechanical re-shaping.

The islands themselves are recently accreted, so they have no archeological significance.

The islands were visited in February, at which time there were no resident mammal, reptile, or amphibian population on the islands. The presence of deer and raccoon tracks indicate that the island is used occasionally by mammals that access the island across the shallow water present during the winter months. Permanent habitat is not present for these species, and the normal depths present during navigation season (and during construction activities) makes immigration unlikely. There may be incidental use by shorebirds other than least terns and piping plovers also. There may be populations of invertebrates, such as aquatic insects, snails, and molluscs. Invertebrates can colonize islands through their eggs, larvae, and possibly adults carried in the drift of the river. There may be use by flying terrestrial insects as well. Any disturbance to these invertebrates is not of significant concern because they have a high rate of reproduction and recolonization.

Habitat creation in this manner will not affect the values of the river for its "Wild and Scenic" designation. The basis of the classification is the degree of naturalness that exists in the area. Under natural conditions (prior to the dams and channelization), least terns and piping plovers nested on islands and

and sandbars. As stated in Federal Register 47(173), resource management practices are allowed, but "limited to those which are necessary for protection, conservation, rehabilitation, or enhancement of the river area resources," and threatened and endangered species are the resource in this case.

ACTIONS CONSIDERED

The following actions were evaluated as a means to provide habitat for the interior least tern and the piping plover:

- A. No federal action
- B. Flow manipulations
- C. Clearing of vegetated islands
- D. Mechanical elevation of unvegetated islands

It was considered that alternative A would result in the perpetual non-use of the vegetated sandbar by the terns and plovers, resulting in their nesting in marginal high-risk areas near the water. This would result in loss of nests and chicks and would not be conducive to increasing the fledge ratios of these species.

Alternative B has been suggested by state game agencies and by the U.S. Fish and Wildlife Service as a means for controlling vegetative encroachment. The reservoir control center has manipulated flows when there were opportunities, however, many times this is not possible without affecting flood control or navigational responsibilities.

Alternative C has been utilized in habitat enhancement activities in the past, using a combination of chemical and mechanical manipulation. The chemical tool of choice is RODEO due to its rapid biodegradation. Unfortunately, plants need to be actively growing with sufficient leaf surface area for chemical uptake in order for RODEO to kill the plants. The dead plants then need to be cleared away to provide an open area for nesting. It is probable that habitat could not be created soon enough with this method for birds to nest safely in 1992. This method is traditionally utilized in the fall, after the birds have gone.

The selected course of action, alternative D, accomplishes the objectives of habitat enhancement available for 1992 without significant adverse impacts to the environment.

COORDINATION WITH OTHER AGENCIES

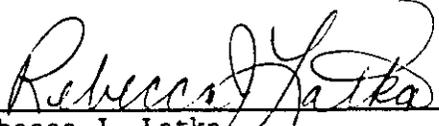
The draft of this Environmental Assessment was distributed to the following agencies:

- U.S. Fish and Wildlife Service, Nebraska
- U.S. Fish and Wildlife Service, South Dakota
- Nebraska Game and Parks Commission
- South Dakota Dept. of Game, Fish, and Parks

National Park Service, O'Neill, NE
U.S. Environmental Protection Agency, Kansas
U.S. Environmental Protection Agency, Colorado
Missouri River Division, Corps of Engineers
U.S. Army National Guard, South Dakota

We received written response to the draft from the U.S. Environmental Protection Agency (EPA) in Kansas, and from the U.S. Fish and Wildlife Service offices in Nebraska and South Dakota. The EPA wanted to be sure that the National Park Service was informed of our plans. The Service (Nebraska) suggested that dredged sand and gravel be placed on top of the islands mechanically cleared of vegetation to suppress vegetative growth, and that the island creation activities take place near recently used nesting sites. The area of construction is in an area of historical nesting sites. Dredging gravel and sand as described would not be feasible this spring, due to financial and time constraints. The dredge would need to be rented, incurring an added expense to the operation. The South Dakota National Guard will be assisting us for only three days, and the already-scheduled activities will require the entire time to complete. The Service (South Dakota) sent editorial changes, including paragraphs to define the purpose of the activities and additional information about the problem of low-nesting birds which have been incorporated into the final Environmental Assessment.

Prepared by:



Rebecca J. Latka
Environmental Resources Specialist
Date: 3/25/92

Approved by:



Richard D. Gorton
Chief, Environmental Analysis Branch
Date: 3/31/92

Environmental Review

a. Archeological and Historic Preservation Act, as amended, 16 U.S.C. 469, et seq.

No impact, as sandbar areas are recently accreted, so have little potential for prehistoric and historic significance.

b. Clean Air Act, as amended, 42 U.S.C. 1857h-7, et seq.

Heavy equipment exhaust will be temporary, minimal, and localized.

c. Clean Water Act, as amended, (Federal Water Pollution Control Act) 33 U.S.C. 1251, et seq.

A Section 404 permit is not required, as the action will not involve placing of fill below the water line.

d. Coastal Zone Management Act, as amended, 16 U.S.C. 1451, et seq. Not applicable. The proposed project does not involve a coastal zone.

e. Endangered Species Act, as amended, 16 U.S.C. 1531, et seq.

Because the operation of the Missouri River mainstem system has been determined likely to jeopardize the future of least terns and piping plovers, according to the U.S. Fish and Wildlife Service, they have suggested that we create additional habitat in order to avoid a violation of Section 7 of the Endangered Species Act.

f. Estuary Protection Act, 16 U.S.C. 1221, et seq. Not applicable. The proposed project does not involve an estuary.

g. Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(12), et seq.

Not Applicable.

h. Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, et seq.

Fish and wildlife will be given equal or greater consideration with other project purposes, as the purpose of the project is habitat enhancement. This action has been discussed with the Pierre, South Dakota office of the U.S. Fish and Wildlife Service, and they concur with our actions.

i. Land and Water Conservation Fund Act, as amended, 16 U.S.C. 4601-4601-11, et seq.

Not applicable.

j. Marine Protection, Research, and Sanctuaries Act, 33 U.S.C. 1401, et seq. Not applicable. The proposed project does not involve the discharge of materials into the ocean.

k. National Historic Preservation Act, as amended, 16 U.S.C. 470a, et seq.

No impact, due to the recent accretion of these areas.

l. National Environmental Policy Act, as amended, 42 U.S.C. 4321, et seq.

An EA was prepared to discuss the effects of the proposed action. It was determined that the impacts were insignificant and therefore a FONSI was prepared.

m. Rivers and Harbors Act, 33 U.S.C. 401, et seq.
Not applicable.

n. Watershed Protection and Flood Prevention Act, 16 U.S.C. 1101, et seq. Not applicable. This statute imposes no requirements on the proposed project.

o. Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et seq.

This stretch of the river is a designated wild and scenic river, the Missouri Recreational River (Rec. River). The National Park Service has been informed of the proposed action. The activities described will not impact the characteristics of this river reach that deemed it eligible for the Recreational River designation.

p. Floodplain Management (E.O. 11988)
No adverse impacts to the floodplain.

q. Protection of Wetlands (E.O. 11990)
No adverse impacts to wetlands are anticipated.

r. CEQ Memorandum, August 11, 1980, Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA.
Not applicable.

s. CEQ Memorandum, August 10, 1980, Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory. The river section is part of the Nationwide Inventory, and adverse affects will be avoided.

APPENDIX 2



Nebraska Game and Parks Commission

2200 N. 33rd St. / P.O. Box 30370 / Lincoln, NE 68503-0370 / (402) 471-0641

April 17, 1992

Ms. Becky Latka,
U.S. Army Corps of Engineers
Planning Division
215 N. 17th St.
Omaha, NE 68102-4978

RE: Draft EA for Missouri River endangered species habitat enhancement/creation project.

Dear Becky:

I am commenting on the draft EA as it pertains to threatened and endangered species and as it pertains to reaches of the river that border Nebraska. I am not commenting on other aspects, such as impacts to recreation or even other wildlife, except brief comment concerning fish and mussels.

Please understand that our comments are abbreviated, partially in recognition of the short time frame involved before the work will be accomplished. Therefore, some of our comments are directed towards similar work that might be planned in future years. We would hope to be able to more fully assess and comment on future proposals.

We concur with your assessment that the proposed activities in the following reaches will not adversely impact the interior least tern and the piping plover provided that the activities are completed prior to the arrival of terns or plovers: (1) Missouri River below Fort Randall Dam, (2) Missouri River upstream from Lewis and Clark Lake, and (3) Missouri River below Gavins Point Dam.

However, in concurring, we are not concluding that the selected alternatives are the only, or even the most effective and appropriate techniques, that should be used to provide quality nesting habitat for terns and plovers. As you point out in the introduction and background to the draft EA, nesting habitat degradation has resulted as the Missouri was changed from a meandering, dynamic river to its present state. Specifically, you mention the lack of heavy spring scouring flows, the reduction in sediment load, and vegetation encroachment. Because these problems are all flow related, the Commission believes that the ultimate solutions must also be flow related. Therefore, we encourage the Corps to fully reconsider the entire spectrum of alternatives, including flow manipulations, when planning future

Becky Latka, COE
April 17, 1992
Page 2

activities to create, enhance or maintain tern and plover habitat.

We have previously commented on activities proposed for the Missouri River below Fort Randall (refer to an April 1, 1992 letter to Richard Gorton). Even though we did not meet the suggested response date (March 21), we request that our response be acknowledged in the final EA for this reach (Appendix 1).

In planning future work, the Corps should consider creating larger islands rather than limit size to 1/4 acre (above Lewis and Clark) or 1 acre (below Fort Randall - pers. comm. to John Dinan). The activities planned below Gavins Point Dam should be supplemented in future years with island creation, enhancement and maintenance using techniques being applied in the upstream reaches (i.e. mechanical elevation, barge-on-crane dredging, vegetation discing, etc.).

The Corps should more fully consider potential impacts that might occur to groups of organisms or as a result of techniques as follows:

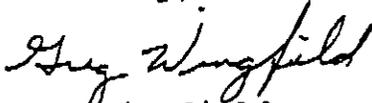
1. Assess and discuss potential contamination from fuels or other residues when using a Panama flame gun to burn vegetation. Include possible impacts to invertebrates used as forage by plovers and to the aquatic community of organisms.
2. Expand the evaluation of potential impacts to fish species including the pallid sturgeon (endangered), and paddlefish, blue sucker, sicklefin chub, and sturgeon chub (USFWS category 2 candidate species). The Corps apparently concludes that these species will not be impacted because "due to their scarcity and limited populations, their occurrence in the two-mile construction area is unlikely." An expanded evaluation should address each species habitat requirements, how proposed activities would alter that habitat, and what impacts would result.
3. Evaluate the occurrence of mussel populations and potential impacts to any such populations. While the endangered Higgins' eye pearly mussel (Lampsilis higginsii) has not been documented along the Missouri River in Nebraska, there have been few if any comprehensive surveys to determine its presence or absence. The Higgins' eye is considered a "big river" species. Additionally, a specimen of the scale shell mussel (Leptodea leptodon) was collected below Gavins Point Dam in 1982. This species is a C2 candidate

Becky Latka, COE
April 17, 1992
Page 3

species for listing. The Corps should incorporate mussel surveys when planning future activities that physically alter aquatic habitats.

The Nebraska Game and Parks Commission does not have reason to believe, at this time, that the proposed activities will adversely impact the species discussed in the above paragraph. Consequently, we are not recommending that the Corps delay the proposed activities in order to accomplish the assessments suggested. However, we recommend that the inadequacies described above be eliminated from the environmental assessments for any activities planned for future years.

Sincerely,



Greg Wingfield
Endangered Species Specialist
Wildlife Division

GAW:gw(C)MoLtPp.EA

pc: Gerald Chaffin
Ross Lock
Ken Johnson
Wes Sheets



Nebraska Game and Parks Commission

2200 N. 33rd St. / P.O. Box 30370 / Lincoln, NE 68503-0370 / (402) 471-0641

April 1, 1992

Richard D. Gorton, Chief, Environmental Analysis Branch
U.S. Army Corps of Engineers
Planning Division
215 N. 17th St.
Omaha, NE 68102-4978

Dear Mr. Gorton:

This letter provides comments to the C.O.E.'s Environmental Assessment for providing high elevation nesting habitat on the Missouri river for the endangered least tern and threatened piping plover.

Four alternative actions were considered for accomplishing the identified goal of providing higher elevation habitat for nesting this year. We agree that alternative D (using mechanical means to elevate unvegetated islands) will accomplish your stated objective and is probably the most feasible alternative based on the time frame that you are working with because of the fast approaching nesting season. However, we encourage you to reconsider alternatives B (Flow manipulations), C (Clearing of vegetated islands) and alternative D when planning any future activities to create, enhance or maintain tern and plover habitat. We also concur with your assessment of no significant adverse impacts to the environment from the planned activities. Since the three sites targeted for enhancement have had nesting terns and/or plovers in past years, all planned activities will need to avoid the nesting period, April 15 - August 15.

We appreciate the opportunity to provide comments on this draft assessment.

Sincerely,

Greg Wingfield
Endangered Species Specialist, Wildlife Division

GW/JJB

cc: Gerald Chaffin
Ross A. Lock



United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
1500 EAST CAPITOL AVENUE
BISMARCK, NORTH DAKOTA 58501



APR 24 1992

28 APR 1992

Richard D. Gorton
Chief, Environmental Analysis Branch
Planning Division
Corps of Engineers, Omaha District
215 N. 17th Street
Omaha, NE 68102-4978

Dear Mr. Gorton:

I have reviewed your draft Environmental Assessment (EA) of the effects of spring 1992 habitat enhancement activities for the interior least tern and piping plover, and provide the following comments.

We have been coordinating with your staff on all enhancement projects scheduled for North Dakota and the draft EA addresses all issues discussed during development of enhancement activities. Therefore, I concur with the findings of this draft EA. However, I would like to provide a few technical comments.

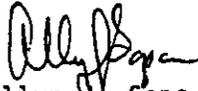
On page 2 under PROPOSED FEDERAL ACTIONS, the draft EA states that "All River Mile (RM) locations are estimates based on 1985 river maps, . . ." The RM locations in North Dakota that we provided your staff are based on 1981 river maps.

On April 16, 1992, persons from my staff and the North Dakota Game and Fish Department inspected the sandbars scheduled for enhancement activities. At that time, they determined that large willow trees at river mile 1380 will not need to be removed using a chainsaw. They also noted at RM's 1353.5 and 1351 that Canada geese had initiated nests in the areas to be enhanced. To avoid destruction of these nests, enhancement activities will not occur at RM's 1353.5 and 1351. Sandbars at river miles 1352 and 1349.5 were chosen as alternative sites for enhancement activities.

Due to the amount of time and energy required to erect and take down sand fences, we decided that the sand fences will not be put up in April, only to be taken down again one month later. However, the fences will be erected in late summer (August) and left until late fall (October/November).

Thank you for the opportunity to comment on the draft EA. Please do not hesitate to contact this office if you need further assistance. The final EA should be submitted to this office.

Sincerely,



Allyn Sapa
State Supervisor
North Dakota State Office

cc: State Supervisor, FWE, Pierre
(Attn: N. McPhillips)
Director, North Dakota Game & Fish Dept., Bismarck
(Attn: R. Kreil)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

Ref: 8WM-EA

MAY 1 1992

Richard D. Gorton, Chief
Environmental Analysis Branch
U.S. Army Corps of Engineers, Omaha District
215 North 17th Street
Omaha, NB 68102-4978

RE: Draft Environmental Assessment (EA), Endangered Species
Habitat Enhancement/Creation along the Missouri River
Mainstem System: Spring 1992 Activities

Dear Mr. Gorton,

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA), the Region VII and Region VIII Offices of EPA have reviewed the above document and offer the following comments.

In addition to detailed comments (attached), there are several general comments the Environmental Protection Agency (EPA) would like to bring to your attention. First, although the document appears hastily prepared, the Corps is to be commended for beginning to address the biological effects of the System. It is hoped that successes in providing for the requirements of endangered species will encourage the Corps to address other biological effects, such as loss of riparian habitat.

Secondly, it is very important that your office demonstrate how the Spring 1992 Activities relate to the Missouri River Reoperation EIS and the Master Manual, and what effect(s) reoperation of the system is expected to have on the biological effectiveness of the nesting sites proposed in the EA.

If you have any questions or wish further clarification of any of the comments, please contact Suzanne Wuerthele at (303) 293-0961 or Cathy Tortorici at (913) 276-7435.

Sincerely,

A handwritten signature in black ink, appearing to read "Weston W. Wilson".

Weston W. Wilson
Environmental Engineer

Attachment

cc: Cathy Tortorici, EPA, Kansas City
Suzanne Wuerthele, EPA, Denver
Roy McAllister, Corps, Omaha
Allyn Sapa, FWS, Bismarck

Detailed Comments by the
EPA Region VII and Region VIII Offices

Draft EA, Endangered Species Habitat Enhancement/Creation
along the Missouri River Mainstem System: Spring 1992 Activities

1. Page 3, paragraph 3: NEPA means the National Environmental Policy Act, not "National Protection Environmental Agency." This error contributes to the overall impression that the document was prepared under deadline pressure.
2. There is no overview of the process under which this EA was created, nor is there a description of the agreement between the Corps and the U.S. Fish and Wildlife Service (FWS). Such an overview is necessary and should include:
 - a. A description of the relationship between the System-wide EIS and this EA.
 - b. A summary of the U.S. Fish & Wildlife Service's recommendations contained in their November 1990 Biological Opinion.
 - c. A description of the extent to which the Spring 1992 Activities carry out these suggestions (a copy of the Biological Opinion could be attached for reference).
3. Each purpose of the Spring Activities should be stated in such a way that its success can be measured. Fledge ratios are defined as one goal. If experimental studies are also a goal, the hypotheses those experiments test and how their outcome will be used should also be stated (see comment below).
4. A description of the purpose and the use of the experimental (versus proven) techniques should be included in the document. It is not clear, however, which (if any) of the Spring 1992 Activities reflect practices already demonstrated to create suitable nesting habitat and which are experimental in nature. Sprinkling some dunes with oyster shells and measuring dune growth before and after fence erection (page 3), appears experimental. On the other hand, at some locations (e.g., Fort Peck Reservoir) a fringe of vegetation will be left along the water's edge to "...provide a deterrent to nesting in areas of fluctuating water levels...". Such a statement suggests that the practice of creating fringe vegetation has been shown to be efficacious and is therefore likely to enhance tern and plover recovery. On the other hand, Appendix 1 states: "These birds will nest anywhere from two inches to two feet above the existing water levels ... Low water levels at a

time when a bird initiates a nest may still cause the nest to be flooded if the water levels risk regardless of the elevation of the island." This latter statement suggests that the proposed actions may inhibit actually prevent nesting rather than facilitate it. How the results of such experimental actions will influence future actions by the Corps should be stated. For example, if constructed dunes are successful only for a few years, will the Corps then reconstruct new nesting habitat? If leaving vegetation fringes along the islands deters birds from nesting, will it be removed? Will the most successful techniques be adopted System-wide?

5. On page 2, paragraph 2, the selection of high-elevation nesting areas with "appropriate criteria" was mentioned, but these criteria are not described in the document. Two criteria, "Habitat creation in areas with little predator habitat" and "avoiding areas with high recreational use", are mentioned in general. All criteria should be stated.
6. It is not clear how the Spring 1992 Activities relate to long-term protection of the tern and plover. A description of how the Spring Activities relate to future monitoring and maintenance activities must be included. For example:
 - a. Does the proposed action plan take into account the possibility that the flows dictated by the final preferred alternative may inundate (or make unnecessary) these nesting sites?
 - b. Some of the present island locations were under water in 1985. If shapes and locations of sandbar islands change in such a way as to reduce nesting habitat, will more nesting habitat be created to maintain a desired total?
 - c. Will the Activities be continued until the FWS determines the tern and plover are no longer in jeopardy? How often will the results be assessed and modified?
7. The document should state what educational or other activities the Corps is doing or will do to reduce the effects of human disturbance to terns and plovers. On page 2, paragraph 2, the document states that: "...the primary causes of fledge loss along the Missouri River are flooding, predation and human disturbance.", and that it is important to "...increase the public's awareness of terns and plovers and their requirements for survival." These statements suggest that human activities have been a problem and need to be modified in some way. The Spring 1992 Activities, however, "...deal primarily with alleviating or minimizing

flood of nests and chicks and with creation of new high-elevation nesting areas."

- a. Will persons who own land slated for habitat enhancement be given information about harmful activities or times when intrusion could harm tern and plover nests and chicks?
 - b. How will persons who visit state- or Corps-owned sandbar areas for recreational purposes be informed about how their presence could threaten terns and plovers? Via the media, printed literature, or posting signs?
 - c. On page 6 the document states that "...construction of new permanent blinds on islands slated for activity can (emphasis added) be limited." Will they actually be limited? How? Will the public be forbidden access to these areas? Will warning signs be used? Will areas be fenced off? The document also states: "Island areas used for interior least tern and piping plover nesting would (emphasis mine) be off-limits for recreational uses...public use can be regulated" Under what conditions would these areas be off-limits? Will such regulation actually take place?
 - d. The document should clarify whether the Corps plans on making these areas off-limits to use. Paragraph 3, page 2 states that "Approximately 50 acres of vegetation will be burned this spring...on two Fort Peck Reservoir beach areas near the dam." The clearing of the beaches would appear to attract recreational uses, unless the Corps plans to restrict access to them.
8. On page 4, paragraph 1, the possibility of removing vegetation during the summer months is mentioned. From all of the evidence presented, it appears that this act would be a direct disturbance to both the least tern and piping plover populations attempting to nest in marginal areas, since their nesting season lasts from late April/early May to late August. The document should state why these activities will not disturb nesting.
 9. On page 6, paragraph 4, the document states that "Burning cannot take place prior to March 1 of each year." The reason for this restriction is should be stated.
 10. Page 10, paragraph 3: "Burning dense vegetation over large areas (especially the 50-acre area at Fort Peck) is preferable to hand clearing." The reason that this method is preferable is not stated.

11. On page 3, paragraph 2, the document states that "later during the Spring...fences will be taken down." It would seem more logical to leave the fences intact on the islands given the fact that removing the fences at this time in the Spring may disturb birds that have already begun nesting.
12. The significance of a number of other technical details given in the document is not explained. For example, what is the significance of T-posts or electric fence posts in sand fences or the use of propane torch, drip torch, or a Panama flame gun? If the methodological details are not relevant to environmental effects, then they need not be included.
13. On page 8, paragraph 2 the document states: "There are several other fish species that could potentially inhabit the area, but due to their scarcity and limited populations, their occurrence in the two-mile construction area (RM 832 - 834) is unlikely." No evidence was included to indicate that unusual fish species, including the endangered pallid sturgeon, do not inhabit this area. Data on habitat needs of the unusual fish and habitat in the construction area, for example, might allow some estimate of the probabilities that unusual fish could be found there. Fish are distributed according to habitat, which itself is unevenly distributed, not mathematically as this statement suggests. The document should acknowledge that this information is unavailable.
14. On page 8, paragraph 4, the document states that "...the dredging activity will temporarily create a more diversified bottom structure attractive to fish." Data or references to support this statement should be included.
15. Bottom sediments are being evaluated for possible contaminants that might be suspended during construction. The analytical data, however, are not in the draft EA. The expected date of availability and the criteria which will be used to determine if such resuspension would make the construction unfeasible should be stated.

APPENDIX 3

SUMMARY OF FISH AND WILDLIFE SERVICE
BIOLOGICAL OPINION ON OPERATIONS OF
MISSOURI RIVER MAIN STEM SYSTEM

CHRONOLOGY OF BIOLOGICAL OPINION DEVELOPMENT

March 4, 1986

Fish and Wildlife Service (FWS) provided comments on the Corps of Engineers' (Corps) Environmental Assessment on operations of Missouri River Main Stem System. FWS requested Corps enter into formal Section 7 consultation.

April 8, 1986

Corps requested formal Section 7 consultation.

October 19, 1987

Corps completed Environmental Assessment on operations of Missouri River Main Stem System.

November 20, 1987

FWS requested additional information from Corps to prepare Biological Opinion (Opinion).

May 26, 1989

Corps provided additional information and considered this transmittal as initiating formal consultation.

February 13, 1990

FWS provided Corps with draft Opinion for comments.

February 22, 1990

FWS and Corps met in Pierre, SD to discuss Opinion.

March 15, 1990

Corps provided FWS with comments on draft Opinion.

April 30, 1990

FWS incorporated Corps' comments into Opinion and another draft was sent to corps.

July 13, 1990

Corps provided FWS with comments on draft Opinion.

September 4, 1990

FWS incorporated some of Corps' requested revisions and issued another draft Opinion.

November 2, 1990

Conference call between FWS and Corps. Draft Opinion was finalized.

November 14, 1990

FWS Regional Director signed final Biological Opinion and issued it to Corps.

BIOLOGICAL OPINION SUMMARIZED

Endangered Bald Eagle - Not likely to jeopardize

Conservation recommendations:

1. Corps' project offices evaluate and map potential wintering and breeding habitat on the Missouri River.
2. Corps census breeding and wintering bald eagles on Corps property.
3. Corps' project offices draw up and implement plans for protection, conservation, and restoration of bald eagles on Corps land.
4. Evaluate a potential hacking program on Missouri River. If found feasible, a hacking program should be implemented.
5. Closer working relations between Corps and the FWS Karl Mundt National Wildlife Refuge.

Endangered Interior Least Terns/Threatened Piping Plovers - Likely to jeopardize

Reasonable and Prudent Alternatives:

1. Manage flows and discharges such that:
 - a. Operational-caused flooding should be avoided during breeding season. Flows will be set by nest initiation.
 - b. Provide conditions that will meet or exceed fledge ration goals of 0.70 for least terns and 1.44 for piping plovers.
 1. Proximity to forage habitat - Least tern nesting areas no >400 meters from forage areas. Piping plover nesting areas must include sandbar flats.
 2. Substrate - Nesting substrate should = fine sand.
 3. Vegetation (at nest initiation) - Percent cover on sandbars <25 percent, optimum <10 percent.
 4. Elevation of nests above river level - Nesting areas should be 8 inches or greater above river levels.

5. Disturbance-free area - Nesting areas should be free of predation and human disturbance.
- c. Create additional nesting habitat when release flows are as follows:

Fort Peck - >8,500 cfs & <13,200 cfs
Garrison - >18,000 cfs & <31,000 cfs
Fort Randall - >28,000 cfs & <38,500 cfs
Gavings Point - >30,000 cfs & <39,500 cfs
2. Provide information to, and/or meet with, FWS during development of the Corps' draft Annual Operating Plan to ensure Opinion objectives are met.
 3. Compile an annual report by December 31 or include in the Annual Operating plan an outline for least tern and piping plover management actions. This will allow the FWS and the Missouri River Tern and Plover Management Team to evaluate effectiveness of Corps' actions. Report should include:
 - a. Least tern and piping plover fledge ratios.
 - b. Least tern and piping plover population survey results.
 - c. Nest elevations.
 - d. Map of nesting habitat, including changes in sandbar morphology during the nesting season.
 - e. Sandbar acreages.
 - f. Historic hourly release data from all dams, including water levels for all reaches for the May 12 to August 30 season.
 4. Form a Missouri River Tern and Plover Management Team (Team). Corps will schedule and arrange Team meetings.
 5. Map, every 3 years, all essential least tern and piping plover nesting habitat used on the Missouri River. Maps will be provided in annual report.
 6. Continue "Investigations of Channel Degradation" studies.

Conservation Recommendations:

1. Monitor least tern/piping plover populations each year on reservoirs.
2. Maintenance dredging operations or permits (Section 10/404 of Clean Water Act) should be evaluated, in consultation with FWS, for creating habitat.
3. Strive to meet Missouri River recovery goals of 800 least tern adults for 10 years; 975 piping plover adults for 15 years.

Incidental Take

A minimal amount of incidental take of least terns and piping plovers will occur as a result of system operations, even if reasonable and prudent alternatives are successfully implemented. The extent of take that is not likely to jeopardize the species is that which will not cause the fledge ratios to drop below 0.70 (terns) and 1.44 (plovers) during a given nesting season.

Reasonable and Prudent Measures Necessary to Minimize Take:

1. Monitor nesting habitat on riverine reaches below dams, including headwaters of Lewis and Clark Lake, as well as reservoir areas during long-term droughts. to determine fledge success and total number of adult birds.
2. Monitor daily/hourly fluctuations of dam releases to avoid unnecessary take and document unavoidable taking.
3. Continue to evaluate operational changes used to avoid take.
4. Implement public info and education to increase public awareness.

Terms and Conditions That Implement the Reasonable and Prudent Measures:

Measure No. 1 - Productivity and population surveys on riverine reaches will be conducted each year (reservoirs surveyed during drought years).

- a. Population surveys shall include:
 1. Total number of colonies.
 2. Total number of birds.

3. Map of areas used for nesting (includes sandbar acreages).
- b. Productivity estimates will include:
 1. Total number of nests.
 2. Fledge ratios.
 3. Causes of nest and chick loss.
 4. Elevation of nests above water levels and distance to water's edge.

Measure No. 2 - Document and report to FWS all incidence of take.

Measure No. 3 - If new operational scenarios, that were not considered during this consultation, are developed, then consultation will be reinitiated.

Measure No. 4 - Implement the following actions:

- a. Production of a Public Service Announcement.
- b. Corps' project offices will engage in intensive public relations efforts.
- c. Post and rope all nesting areas on the Missouri River.

Procedures for Handling or Disposing of Least Terns and Piping Plovers:

All eggs, chicks, or adults found dead on the Missouri River will be reported to FWS immediately (within 24 hours).

Annual Report

In regard to Reasonable and Prudent Measures 1 through 3, in addition to those items identified in Reasonable and Prudent Alternative 3, the Corps will include the following in the annual report:

- a. Any taking, including reasons for take and actions to avoid take.
- b. Evaluation of operational efforts to avoid take.

APPENDIX 4

ELUTRIATE RESULTS FOR DREDGING AT THE GAVINS POINT PROJECT

The elutriate analyses of samples obtained from the Gavins Point Project, River Miles 833, 843 and 840 indicate that no significant water quality problems should occur as a result of dredging activity. Elutriate testing indicated that sediments scavenged arsenic from the water resulting in a decreased concentration. Analysis of sediment samples indicates that alpha-BHC is present in samples 1 and 3, river miles 833 and 840 respectively. However, the alpha-BHC is insoluble and the elutriate process did not increase concentrations in the water column. Chromium, zinc and nickel all showed increases in one or more of the elutriated samples. However, all three of these metals parameters were below state water quality standards and EPA criteria.

Table 4 summarizes results between the initial river water and the water after completion of the elutriate process. Tables 1 - 3 show the raw data obtained from the MRD laboratory.

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Gavins Point
Date Sample Taken: 11 Mar 92
Date Sample Received: 13 Mar 92
Sample Description: Water and Sediment

Customer Sample Id: GP-RM833
Lab Sample No: 920323-W001, W002, & W003
Sample Container: 1-1 gal wide mouth glass (sed)
3-1 gal amber glass (water)

Analysis	Sediment		Receiving Water		Elutriate Water	
	Result	Units	Result	Units	Result	Units
Arsenic	5.8	mg/kg	2.7	µg/L	<1.0	µg/L
Cadmium	<2.0	mg/kg	<10	µg/L	<10	µg/L
Chromium	5.1	mg/kg	<10	µg/L	32	µg/L
Lead	<4.0	mg/kg	<20	µg/L	<20	µg/L
Mercury	<0.1	mg/kg	<0.2	µg/L	<0.2	µg/L
Selenium	<1.0	mg/kg	<1.0	µg/L	<1.0	µg/L
Zinc	25.5	mg/kg	<10	µg/L	90	µg/L
Nickel	12.5	mg/kg	<15	µg/L	25	µg/L
Aldrin	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
alpha-BHC	16	µg/kg	<0.03	µg/L	<0.03	µg/L
beta-BHC	<4.0	µg/kg	<0.06	µg/L	<0.06	µg/L
delta-BHC	<6.0	µg/kg	<0.09	µg/L	<0.09	µg/L
gamma-BHC (Lindane)	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
Chlordane	<9.4	µg/kg	<0.14	µg/L	<0.14	µg/L
P,p'-DDD	<7.5	µg/kg	<0.11	µg/L	<0.11	µg/L
P,p'-DDE	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
P,p'-DDT	<8.0	µg/kg	<0.12	µg/L	<0.12	µg/L
Dieldrin	<1.3	µg/kg	<0.02	µg/L	<0.02	µg/L
Endosulfan I	<9.4	µg/kg	<0.14	µg/L	<0.14	µg/L
Endrin	<4.0	µg/kg	<0.06	µg/L	<0.06	µg/L
Heptachlor	<2.0	µg/kg	<0.03	µg/L	<0.03	µg/L
Heptachlor epoxide	<55.6	µg/kg	<0.83	µg/L	<0.83	µg/L
Methoxychlor	<118	µg/kg	<1.76	µg/L	<1.76	µg/L
Toxaphene	<161	µg/kg	<2.40	µg/L	<2.40	µg/L
PCB-1016	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1221	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1232	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1242	<43.6	µg/kg	<0.65	µg/L	<0.09	µg/L
PCB-1248	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1254	<160	µg/kg	<1.0	µg/L	<0.09	µg/L
PCB-1260	<160	µg/kg	<1.0	µg/L	<0.09	µg/L
beta-Endosulfan	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Gavins Point
Date Sample Taken: 11 Mar 92
Date Sample Received: 13 Mar 92
Sample Description: Water and Sediment

Customer Sample Id: GP-RM843
Lab Sample No: 920323-W004, W005, & W006
Sample Container: 1-1 gal wide mouth glass (sed)
3-1 gal amber glass (water)

Analysis	Sediment		Receiving Water		Elutriate Water	
	Result	Units	Result	Units	Result	Units
Arsenic	<1.0	mg/kg	2.9	µg/L	<1.0	µg/L
Cadmium	<2.0	mg/kg	<10	µg/L	<10	µg/L
Chromium	<2.0	mg/kg	<10	µg/L	<10	µg/L
Lead	<4.0	mg/kg	<20	µg/L	<20	µg/L
Mercury	<0.1	mg/kg	<0.2	µg/L	<0.2	µg/L
Selenium	<1.0	mg/kg	<1.0	µg/L	<1.0	µg/L
Zinc	4.2	mg/kg	<10	µg/L	16.5	µg/L
Nickel	<4.0	mg/kg	<15	µg/L	<15	µg/L
Aldrin	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
alpha-BHC	<2.0	µg/kg	<0.03	µg/L	<0.03	µg/L
beta-BHC	<4.0	µg/kg	<0.06	µg/L	<0.06	µg/L
delta-BHC	<6.0	µg/kg	<0.09	µg/L	<0.09	µg/L
gamma-BHC (Lindane)	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
Chlordane	<9.4	µg/kg	<0.14	µg/L	<0.14	µg/L
P'P'DDD	<7.5	µg/kg	<0.11	µg/L	<0.11	µg/L
P'P'DDE	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
P'P'DDT	<8.0	µg/kg	<0.12	µg/L	<0.12	µg/L
Dieldrin	<1.3	µg/kg	<0.02	µg/L	<0.02	µg/L
Endosulfan I	<9.4	µg/kg	<0.14	µg/L	<0.14	µg/L
Endrin	<4.0	µg/kg	<0.06	µg/L	<0.06	µg/L
Heptachlor	<2.0	µg/kg	<0.03	µg/L	<0.03	µg/L
Heptachlor epoxide	<55.6	µg/kg	<0.83	µg/L	<0.83	µg/L
Methoxychlor	<118	µg/kg	<1.76	µg/L	<1.76	µg/L
Toxaphene	<161	µg/kg	<2.40	µg/L	<2.40	µg/L
PCB-1016	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1221	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1232	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1242	<43.6	µg/kg	<0.65	µg/L	<0.09	µg/L
PCB-1248	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1254	<160	µg/kg	<1.0	µg/L	<0.09	µg/L
PCB-1260	<160	µg/kg	<1.0	µg/L	<0.09	µg/L
beta-Endosulfan	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Gavins Point
Date Sample Taken: 11 Mar 92
Date Sample Received: 13 Mar 92
Sample Description: Water and Sediment

Customer Sample Id: GP-RM840
Lab Sample No: 920323-W007, W008, & W009
Sample Container: 1-1 gal wide mouth glass (sed)
3-1 gal amber glass (water)

Analysis	Sediment		Receiving Water		Elutriate Water	
	Result	Units	Result	Units	Result	Units
Arsenic	3.2	mg/kg	1.8	µg/L	<1.0	µg/L
Cadmium	<2.0	mg/kg	<10	µg/L	<10	µg/L
Chromium	2.2	mg/kg	<10	µg/L	<10	µg/L
Lead	<4.0	mg/kg	<20	µg/L	<20	µg/L
Mercury	<0.1	mg/kg	<0.2	µg/L	<0.2	µg/L
Selenium	<1.0	mg/kg	<1.0	µg/L	<1.0	µg/L
Zinc	15	mg/kg	<10	µg/L	16	µg/L
Nickel	4.2	mg/kg	<15	µg/L	<15	µg/L
Aldrin	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
alpha-BHC	17	µg/kg	<0.03	µg/L	<0.03	µg/L
beta-BHC	<4.0	µg/kg	<0.06	µg/L	<0.06	µg/L
delta-BHC	<6.0	µg/kg	<0.09	µg/L	<0.09	µg/L
gamma-BHC (Lindane)	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
Chlordane	<9.4	µg/kg	<0.14	µg/L	<0.14	µg/L
P'P'DDD	<7.5	µg/kg	<0.11	µg/L	<0.11	µg/L
P'P'DDE	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L
P'P'DDT	<8.0	µg/kg	<0.12	µg/L	<0.12	µg/L
Dieldrin	<1.3	µg/kg	<0.02	µg/L	<0.02	µg/L
Endosulfan I	<9.4	µg/kg	<0.14	µg/L	<0.14	µg/L
Endrin	<4.0	µg/kg	<0.06	µg/L	<0.06	µg/L
Heptachlor	<2.0	µg/kg	<0.03	µg/L	<0.03	µg/L
Heptachlor epoxide	<55.6	µg/kg	<0.83	µg/L	<0.83	µg/L
Methoxychlor	<118	µg/kg	<1.76	µg/L	<1.76	µg/L
Toxaphene	<161	µg/kg	<2.40	µg/L	<2.40	µg/L
PCB-1016	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1221	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1232	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1242	<43.6	µg/kg	<0.65	µg/L	<0.09	µg/L
PCB-1248	<80	µg/kg	<0.50	µg/L	<0.09	µg/L
PCB-1254	<160	µg/kg	<1.0	µg/L	<0.09	µg/L
PCB-1260	<160	µg/kg	<1.0	µg/L	<0.09	µg/L
beta-Endosulfan	<2.7	µg/kg	<0.04	µg/L	<0.04	µg/L

TABLE 4

	Sample 1 RM 833	Sample 2 RM 843	Sample 3 RM 840
Arsenic	d	d	d
Cadmium	nc	nc	nc
Chromium	i	nc	nc
Lead	nc	nc	nc
Mercury	nc	nc	nc
Selenium	nc	nc	nc
Zinc	i	i	i
Nickel	i	nc	nc
Aldrin	nc	nc	nc
alpha-BHC	nc	nc	nc
beta-BHC	nc	nc	nc
delta-BHC	nc	nc	nc
gamma-BHC (Lindane)	nc	nc	nc
Chlordane	nc	nc	nc
P'P''DDD	nc	nc	nc
P'P''DDE	nc	nc	nc
p'p''DDT	nc	nc	nc
Dieldrin	nc	nc	nc
Endosulfan I	nc	nc	nc
Endrin	nc	nc	nc
Heptachlor	nc	nc	nc
Heptachlor epoxide	nc	nc	nc
Methoxychlor	nc	nc	nc
Toxaphene	nc	nc	nc
PCB 1016 *	nc	nc	nc
PCB 1221 *	nc	nc	nc
PCB 1232 *	nc	nc	nc
PCB 1242 *	nc	nc	nc
PCB 1248 *	nc	nc	nc
PCB 1254 *	nc	nc	nc
PCB 1260 *	nc	nc	nc
beta-Endosulfan	nc	nc	nc

d = decreased. The material in question was scavenged from the elutriated water resulting in a decreased water concentration.

nc = no change. The material in question remained unchanged from the overburden water.

i = increased.

* = The detection limit of the equipment changed between sampling the receiving water and sampling the elutriate water. However, the detection limit of all samples is low enough to indicate that no contaminant problem exists.