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# GARRISON DIVERSION UNIT BIOLOGICAL INVESTIGATIONS 1979 ANNUAL REPORT



U.S. Department of the Interior

Water and Power Resources Service

Missouri-Souris Project Office

Bismarck, North Dakota 58501

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CORRECTIONS TO 1979 ANNUAL REPORT:

Page 1, Line 1      Should read "This progress report summarizes biological data collected in the Garrison Diversion Unit (GDU) area in 1979 and supplements the 1978 Annual Report (USBR 1979).

All References To      "irrigation" sites, "irrigation" area, "irrigation" routes, and "irrigation" quarters, refer to areas proposed for irrigation. At this time, actual GDU irrigation development has not taken place.

Page 34, Para. 4,  
Lines 9-13      Should read "Robel readings were taken at 0.48-km (0.3 mi.) intervals off the study sites on the remainder of the canal to determine if the residual vegetation height densities on the study areas were representative of the entire canal right-of-way. Vegetation density was also measured at each observed nest site."

U.S. Department of the Interior  
Water and Power Resources Service  
Missouri-Souris Projects Office  
Bismarck, North Dakota

GARRISON DIVERSION UNIT - BIOLOGICAL INVESTIGATIONS  
1979 ANNUAL REPORT

May 1980

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

The mention of trade names or commercial products does not constitute endorsement or recommendation for use by the Federal government.

Illustrations by Bob Vogelsang.

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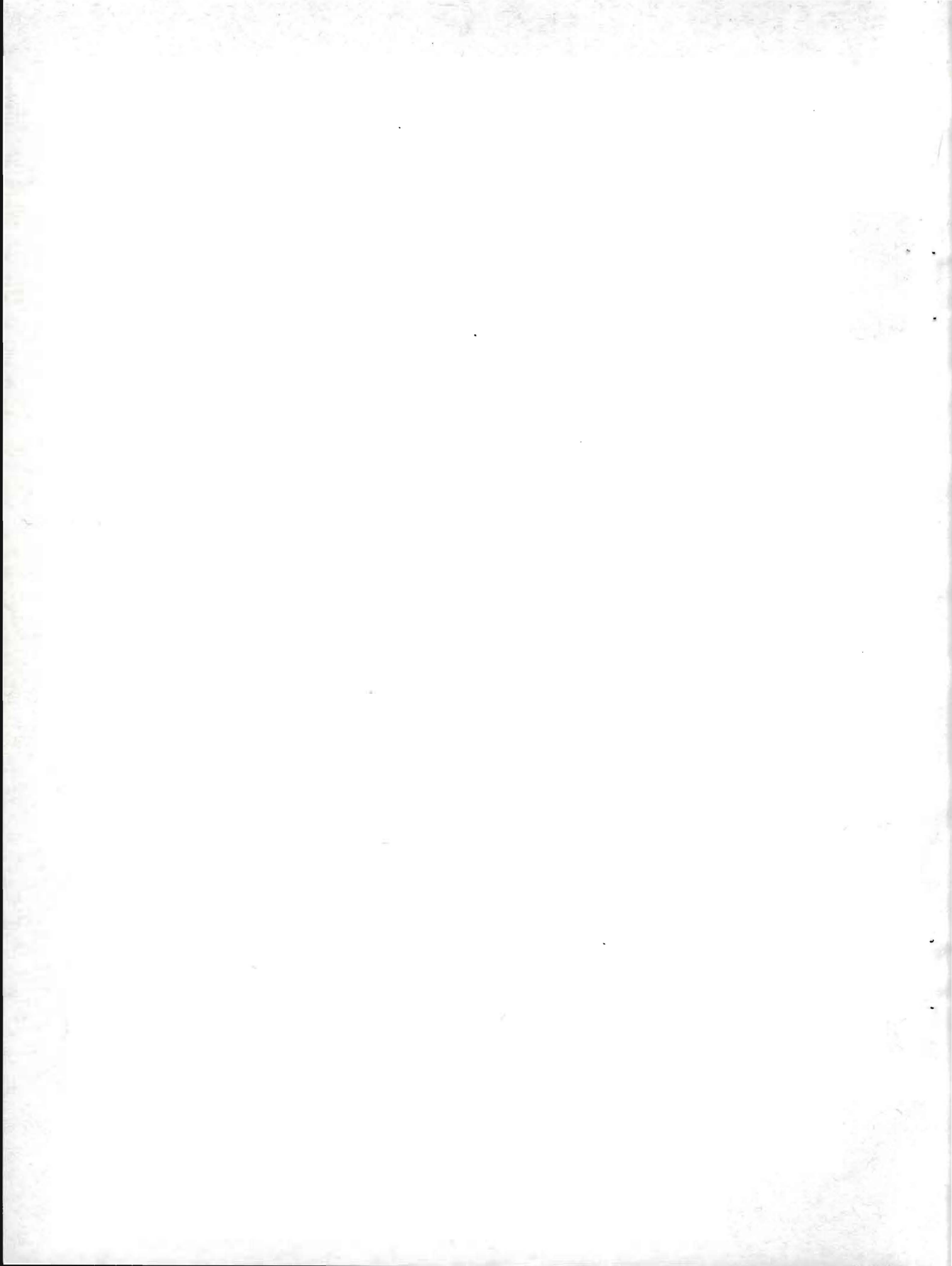
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## INTRODUCTION

This progress report summarizes biological data collected in the Annual Report (USBR 1979). GDU is a multipurpose water resource development project of the Water and Power Resources Service (WPRS) in North Dakota. The project diverts water from the Missouri River via the McClusky Canal to areas east of the river and outside the Missouri River drainage for irrigation, municipal use, light industrial use, and rural domestic use. It will also include fish and wildlife conservation, create recreational opportunities, and provide for flood control. In addition to substantial effects on the local economy and people, the project will significantly affect the distribution and numbers of fish and wildlife. The authorized GDU would irrigate 101,173 ha (250,000 acres). Based on a recent analysis of alternative plans, a 38,972-ha (96,300-acre) irrigation plan has been recommended.

These studies were undertaken to update and improve the information on the existing wildlife resources. Absence of detailed baseline data is a common failing which has hampered predictions and verification of changes in wildlife populations caused by water projects and other development.

The most important wildlife habitat in the GDU area is the prairie wetland. Wetlands in North America have been reduced to about one-half the hectarage existing a century ago and are now being drained at the rate of about 141,642 ha (350,000 acres) per year. In North Dakota, an estimated 1.3 million wetland hectares (3.2 million acres) (Stewart and Kantrud 1973) are being drained at a rate of 2 to 5 percent annually (USFWS 1978). Individual wetlands scattered throughout the GDU area are islands of high-quality habitat. Nearly all wildlife species in the project area benefit directly or indirectly from wetland habitat.

Prior to agricultural development, tall grass prairie and mixed grass prairie communities were prevalent throughout the glaciated Prairie

Pothole Region. These grasslands, in combination with complexes of wetlands, supported highly diverse and abundant populations of birds and mammals. From 1850 to 1920, most of the native grassland in the eastern half of North Dakota was developed for agriculture. Such conversions are continuing and the remaining native grasslands represent precious remnants of the original prairie ecosystem.

Most woodland vegetation in the project area borders rivers and intermittent streams. Trees are also found in a few hilly areas, and some woody cover has been developed in farm shelterbelts.

#### THE STUDY AREA

GDU stretches diagonally across the State of North Dakota covering portions of land in an area 320 km (200 mi) from northwest to southeast and is over 160 km (100 mi) at the widest east-west distance. The project areas selected for studies to collect baseline information include the proposed New Rockford irrigation area, the McClusky Canal, the Audubon-Mercer Area (including Lakes Brekken, Holmes, and Williams), and several special study areas (Figure 1).

The proposed New Rockford irrigation area, north and east of the town of New Rockford in Eddy County, is in the drift prairie. About 70 percent of the area is cultivated and 10 percent is wetlands. Small intermittent drainageways and swales occur throughout the area. The major drainage systems are the Sheyenne and James Rivers.

The McClusky Canal, the principal waterway for GDU, extends for 118.4 km (73.6 mi) through McLean, Burleigh, and Sheridan Counties. The canal right-of-way width varies from 109 to 682 m (360 to 2,250 ft), and averages 346 m (1,140 ft) across. Of the 4,980 ha (12,305 acres) required for right-of-way, 48 percent was cropland, 42 percent was grassland, and about 10 percent was wetland.

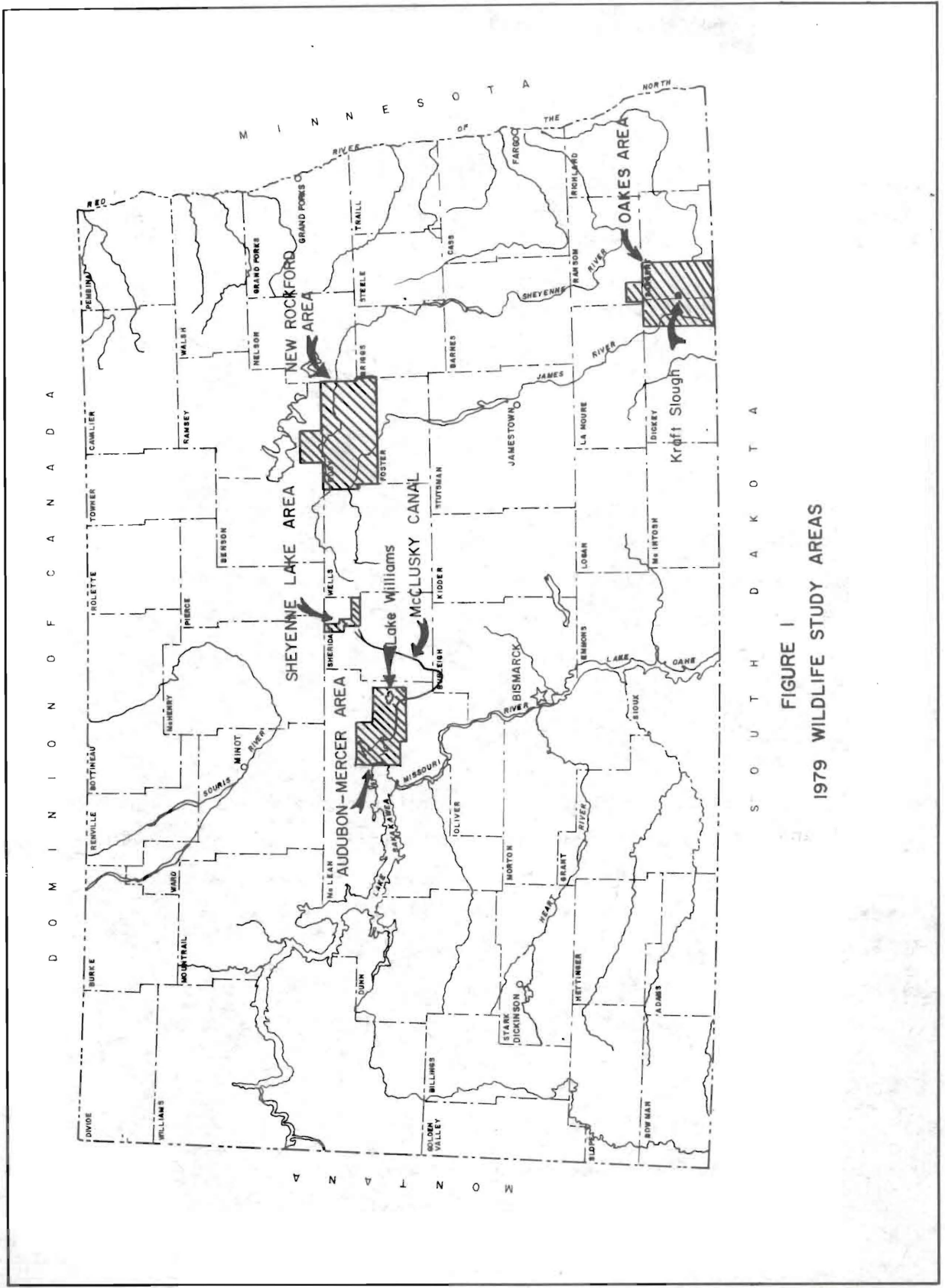


FIGURE I  
1979 WILDLIFE STUDY AREAS

## SUMMARY OF STUDIES

This section presents a summary of our 1979 findings. Detailed results are separated into four major categories:

New Rockford Studies  
McClusky Canal Studies  
Lakes Brekken, Holmes, and Williams Studies  
Special Studies

In addition, progress reports of contracted studies are in Appendix A.

### New Rockford Studies

#### Land Use and Habitat

Study sites were covermapped in July and November 1979 using aerial photographs taken in May 1979. Control and irrigation sites had similar proportions of cropland (70 percent), grassland (15-20 percent), and wetland (8-12 percent). Waterfowl Production Area (WPA) sites were dominated by grassland (52 percent) and wetland (44 percent).

#### Residual Vegetation

The height-density and height of residual vegetation was measured during April and May. Measurements were taken in 63 fields on 37 study sites. Measurements varied with both the vegetation type and treatment, and were lowest in croplands and heavily grazed grasslands, and highest in seeded nesting cover. Vegetation measurement will be correlated with wildlife population data and covermapping information to more accurately describe change in wildlife populations associated with GDU.

#### Breeding Birds

Breeding bird surveys were conducted twice on all study sites. A total of 18,456 birds of 137 species was observed.



Seventy-one of the 77 species exhibiting breeding behavior were on both irrigation and control sites. Four species (horned lark, red-winged blackbird, grasshopper sparrow, and savannah sparrow) comprised 35 percent of the total breeding pairs observed. Except for five grassland-associated species, most species were more abundant in the proposed irrigation area than the control area. Breeding pair densities of two species were substantially higher than statewide estimates.

#### Roadside Bird Survey

In 1979, 908 individual birds of 48 species were observed on the irrigation route, 701 individuals of 45 species on the north control route, and 921 individuals of 44 species were observed on the south control route. The mourning dove, horned lark, western meadowlark, red-winged blackbird, common grackle, and brown-headed cowbird were among the 10 most frequently observed species on all three routes.

#### Waterfowl

Breeding pair counts (ground and aerial) and an upland nest search were conducted on study sites.

Pair Counts (Ground).--Total wetland area increased 33 percent from 1978 to 1979. Between the first and second pair counts, the number of basins with water decreased 47 percent on control sites, 43 percent on irrigation sites, and remained the same on WPA sites. Overall, 449 indicated duck pairs were tallied on the 56 quarter sections studied. Breeding pair populations were up 51 percent over 1978. However, a portion of this increase is probably due to a change in census techniques. Twelve of the 13 duck species commonly nesting in North Dakota were observed. Blue-winged teal were the most abundant species. Species distribution was similar between areas.

Pair Counts (Aerial).--Two aerial duck pair counts were conducted to coincide with the ground duck pair counts. Aerial surveys indicated similar pond densities on both the irrigation and control

areas. A total of 132 indicated duck pairs were recorded during the aerial census. When adjusted for visibility, breeding duck pair densities, as determined from the aerial census, were similar with that calculated from ground breeding pair counts.

Nest Search.--A single nest search (cable-chain drag) was conducted on 4,086 ha (10,097 acres) of cropland and grassland habitats on quarter section study sites. A total of 106 nests was found: 70 duck nests and 36 nests of other birds. Nest densities were  $10.81/\text{km}^2$  ( $27.97/\text{mi}^2$ ) in control sites,  $20.33/\text{km}^2$  ( $52.66/\text{mi}^2$ ) in irrigation sites, and  $37.20/\text{km}^2$  ( $96.36/\text{mi}^2$ ) in WPA sites. Nest densities were greatest in haylands and idle grasslands and lowest in pasture and stubble fields. Nest success was highest on WPA quarters and lowest on irrigation quarters. Successful nest densities were highest on idle grasslands and lowest in pastures. Predators were the greatest cause of nest failure. Successful nests had higher vegetation height-densities than depredated nests.

#### Mourning Doves

A roadside mourning dove call-count census was initiated in May. A total of 98 doves was heard in the control area compared to 107 doves in the irrigation area. The mean number of doves heard per stop was not significantly different between areas.

#### Prairie Grouse

Eleven sharp-tailed grouse dancing grounds were found and nine possible grounds were located during surveys in April and May. Other observations made throughout the field season suggest other dancing grounds are located throughout the study area.

#### Raptors

Two raptor nest searches were conducted. Fifty-seven nests of 8 species were found. Nest densities were  $0.20/\text{km}^2$  ( $0.52/\text{mi}^2$ ) in the irrigation

area and  $0.15/\text{km}^2$  ( $0.39/\text{mi}^2$ ) in the control areas. The three most common species were Swainson's hawk, red-tailed hawk, and great horned owl. Nests of three species (ferruginous hawk, long-eared owl, and burrowing owl) not found in 1978 were found in 1979. Nest success was 73 percent in the irrigation area and 92 percent in the control area.

#### Mammalian Predators

A scent-post survey was conducted during September. Fox were the most frequently encountered species on both the control and irrigation areas. Other important species were: domestic cat, domestic dog, and skunk. Species occurrence was similar between areas.

#### Deer

Both aerial and spotlight deer surveys were conducted. A total of 119 deer were observed during the aerial census in February. Most deer were found along the Sheyenne River. Four deer were observed in the control area and seven in the irrigation area.

Six deer were recorded on the spotlight survey conducted in July: two on the control area and four on the irrigation area. Jackrabbits, red fox, and skunk were also recorded on surveys.

#### Small Mammals

Small mammals were snapped-trapped immediately after snowmelt in April. Trapping was conducted in 10 different habitats. A total of 679 small mammals of 9 species was collected in 16,044 trap nights.

Catch rates were highest in idle grassland and wetlands and lowest in grazed grassland. Meadow voles were the most frequently captured species. Only the deer mouse was captured in every habitat.

## McClusky Canal Studies

### Waterfowl

A total of 3,655 ducks was recorded on the canal and the canal lakes on a May 4 aerial survey. Diving ducks were most abundant on the canal lakes, while dabbling ducks were most common on the canal. Breeding ducks averaged 7 pairs/km (11 pairs/mi) during the ground survey on both the canal and control routes.

The average residual vegetation density on the duck nesting study plots was 0.43 dm (1.7 in). Most duck species had higher vegetation height-densities at successful nests than at depredated nests.

Eight species of ducks initiated 256 nests (83 nests/km<sup>2</sup> or 215 nests/mi<sup>2</sup>) with an average nest success of 50 percent. Smooth brome, sweet clover, and several species of wheatgrasses were the most frequently encountered plants at duck nests.

Waterfowl broods averaged 1.4/km (2.3/mi) on the canal route compared to 0.6/km (1.0/mi) on the control route. Based on our data and the findings of other studies in the Prairie Pothole Region, it is estimated that the canal right-of-way can potentially produce 12 times more successful duck nests than it did before construction.

### Roadside Bird Survey

During 4 surveys, 9,929 birds of 85 species were recorded on the canal route compared to 3,629 birds of 76 species on the control route.

Numbers of species and individuals were consistently higher on the canal route compared to the control route during the breeding seasons of 1977, 1978, and 1979.

### Mourning Doves

Seventy-one doves were recorded on the control route compared to 45 doves on the canal route. The mean number of doves per mile on the control was significantly greater than the mean of the canal.

### Mammalian Predators

Tracks of nine species were identified on the canal route compared to five species on the control route. Skunk was the most frequently recorded species on the canal route, while fox were most frequent on the control route.

### Deer

During the winter aerial survey, 0.63 deer/km (1.0/mi) were observed on the canal route compared to 0.04/km (0.07/mi) on the control route. Deer densities observed during the late summer spotlight survey were 0.21/km (0.35/mi) on the canal route and 0.10/km (0.17/mi) on the control route.

### Small Mammals

A total of 127 small mammals of 5 species was trapped (112.8/1,000 trap nights) on the canal transects compared to 30 mammals of 4 species (26.3/1,000 trap nights) on the control transects. All canal transects had higher average vegetation densities than did the control transects in agricultural land.

## Lakes Brekken, Holmes, and Williams Studies

### Land Use and Habitat

The proposed recreation area in the Lake Brekken-Holmes complex is now 28 percent wetland, 22 percent agricultural land, 42 percent grassland, 7 percent brush, 1 percent trees, and 1 percent miscellaneous.

The increase in water level needed to develop the recreation area will inundate 47 percent of the area. Ninety-six percent of the existing wetlands, 44 percent of the brushland, 34 percent of the grassland, and 14 percent of the agricultural land will be inundated.

### Limnology

Studies were initiated in 1978 to document changes in the aquatic ecosystem resulting from the freshening of Lakes Brekken and Holmes and to gather data to determine the feasibility of a fishery in these lakes. Lake Williams was also studied.

Benthic and drift communities were studied in both years and physical parameters were examined in 1979. Invertebrate diversity of these lakes was low (13 species in 1978), a characteristic of highly saline lakes. In both years, fairy shrimp was the most common species.

### Breeding Birds

The proposed Brekken-Holmes Recreation Area had an overall density of 278 breeding pairs of birds/km<sup>2</sup> (721/mi<sup>2</sup>). The highest number of breeding pairs was in brush habitat, which is the upland habitat that will be reduced the most by the proposed inundation of the area.

The Lake Williams Area had an overall density of 171 pairs/km<sup>2</sup> (442/mi<sup>2</sup>). The highest number of breeding pairs was in saline wetlands. Two species with limited breeding habitat in North Dakota, the California gull and the piping plover, would be seriously affected by changes in water level.

### Shorebirds

A total of 26,426 shorebirds of 22 species was recorded using the saline lake complex in the Brekken-Holmes-Williams Area. The American avocet, two species of phalarope, and several species of sandpiper were the most abundant shorebirds. Peak numbers of birds occurred in late July and

early August on all lakes except Lake Brekken, which peaked in mid-July. Lake Brekken also had the highest total of shorebirds (12,722) of all lakes studied. Pumping activities temporarily increased the mudflat habitat on Lake Brekken and decreased habitat on two other lakes in the area.

### Gulls

The importance of the Lake Williams gull colony to the State population was studied by locating and counting all the California and ring-billed gull colonies in the State. Eleven gull colonies were located; three were previously unreported. Two colonies, one each on Devils Lake and East Devils Lake, were destroyed by rising water levels. A total of 337 nestling California gulls and 209 nestling ring-billed gulls were banded at the Lake Williams and Peterson Lake colonies. At least four out of 42 California gulls, color-marked as adult in 1978, returned to Lake Williams in 1979.

Six California gulls and one ring-billed gull color-marked as adults in 1978 were reported at feeding areas during the 1979 breeding season. The marked birds were seen at distances up to 45 km (28 mi) away from the 1978 banding location. No marked birds were known to be nesting at any colony observed.

### Special Studies

#### Cranes

The WPRS, in consultation with the Fish and Wildlife Service (FWS), is studying the potential effects of GDU on the endangered whooping cranes. The Audubon-Mercer Area in eastern McLean County and the Sheyenne Lake Area in northeast Sheridan County were systematically surveyed from both the ground and air to monitor use of these areas by whooping cranes and sandhill cranes during spring and fall migrations.

No whooping cranes were observed on either study area during the spring migration. Two whooping cranes were observed near Lake Williams on September 24, 1979.

Sandhill cranes did not roost in the Sheyenne Lake Area during the spring migration and only 19 cranes were observed there during the fall. The Audubon-Mercer Area, however, was heavily used by sandhill cranes for staging during fall migration. The number of cranes using that area peaked at over 21,000 cranes on October 5. Lake Williams had over 70 percent of all crane-use on the Audubon-Mercer Area during the fall surveys.

#### Oakes Area Studies

Prairie Grouse.--A breeding population of approximately 50 greater prairie chickens was primarily concentrated in the sandhills of Southwest Township (T. 129 N., R. 58 W.) between the East and West Oakes Extension irrigation areas. Four booming grounds and one combination sharp-tailed grouse/prairie chicken display ground were located. Sharp-tailed grouse were uncommon in the study area and hybrids were observed.

Negative impacts to prairie chickens could be avoided by deleting the arable classed lands of Southwest Township from future GDU plans.

Kraft Slough.--Habitat and over-water nest densities in Kraft Slough were compared to nine other semi-permanent wetlands in the area. Kraft Slough is fed by ground water rather than being solely dependent on surface runoff and represented only 13 percent of the wetland area studied, but contained 48 percent of all the marsh nests found. Kraft Slough had the greatest relative abundance and diversity of avian species. The Franklin's gull colony (10,000 nests) accounted for a large portion of the nests found. The most significant factor affecting nest densities appeared to be the interspersion of emergent cover and small pools and channels of open water.



Converting this marsh to a reservoir would eliminate the over-water avian nesting community, and would be a major adverse wildlife impact of GDU. Relocating the proposed reservoir to any other site in the area would substantially reduce adverse wildlife impacts.

#### Receiving Streams

This study addresses concerns of the International Joint Commission on the quality of fish habitat in GDU receiving streams. Thirty-two permanent transects on the James River and four transects on the Sheyenne River were analyzed using standard stream survey techniques. Certain techniques were modified for monitoring warm-water streams.

The James River has a dominantly silt/muck substrate. The sites above Jamestown had more variation in habitat characteristics compared to the more homogeneous sites downstream. The Sheyenne River has a dominantly sand and gravel substrate.

