

J. Clark Salyer
National Wildlife Refuge
Upham, North Dakota

ANNUAL NARRATIVE REPORT
Calendar Year 1986

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

J. CLARK SALYER NATIONAL WILDLIFE REFUGE

Upham, North Dakota

ANNUAL NARRATIVE REPORT

Calendar Year 1986

<u>Robert L. Howard</u>	<u>4/24/87</u>	<u>Dale Blenny</u>	<u>4-30-87</u>
Refuge Manager	Date	Refuge Supervisor Review	Date
<u>Wm L. Blum</u>	<u>5/4/87</u>		
Regional Office Approval	Date		

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Introduction

The J. Clark Salyer National Wildlife Refuge is located along the Souris River in Bottineau and McHenry Counties of north-central North Dakota. The refuge was established by Executive Order Number 7170 on 4 September 1935, under the Migratory Bird Conservation Act (45 Stat. 1222), as a refuge and breeding ground for migratory birds. The 58,700-acre refuge extends from Canada southward for approximately 45 miles. The nearest town is Upham, North Dakota, located about three miles from refuge headquarters.

Included within the refuge are 36,000 acres of upland habitat composed of native and introduced grasslands, thick woodlands, shrub thickets and croplands. The northern portion is basically confined to the river valley with a narrow band of adjacent upland habitat. The southern portion of the refuge contains about 16,000 acres of native prairie interspersed with aspen and brush covered sandhills and 4,200 acres of wooded river bottom.

Wetland habitats include high value managed deep and shallow marshes within the Souris River flood plain. Five dikes with water control structures have restored 21,000 acres of open water, marsh and wet meadow habitat for waterfowl production and migration use.

While the primary objective of the refuge is waterfowl production, the area has a very diverse population of other bird species. More than 250 species have been noted, ranging from sharp-tailed grouse on their dancing grounds in spring; Swainson's hawks in great numbers in fall; and wide variety of waterbirds, including five species of nesting grebe, to relatively rare small birds such as Sprague's pipits and Baird's and LeConte's sparrows.

More than 125 species nest on the refuge, some in great numbers. Up to 17,000 Franklin's gulls and colonies of hundreds of double-crested cormorants, great blue herons and black-crowned night herons are found. In an average year about 18,000 ducklings are produced, including pintail, mallard, gadwall, green-winged teal, blue-winged teal, American wigeon, northern shoveler, black duck, wood duck, redhead, ring-necked duck, canvasback, lesser scaup, and hooded merganser.

White pelicans use the refuge all summer, while thousands of sandhill cranes, tundra swans and snow geese use the refuge as a feeding and resting area during migration.

The entire refuge lies within an area which was once Glacial Lake Souris. The surrounding area is also old lake bottom with extremely flat topography and a high density of temporary wetlands. These are important for waterfowl production and natural flood storage which improves water quality in the Souris River. Unfortunately a substantial portion of the original wetlands have been drained.

A. HIGHLIGHTS

An ongoing study indicates waterfowl production on refuge islands can be significantly increased by predator removal (Section D.5.).

The U.S.G.S. installed a new guaging weir below the Westhope station to provide more reliable management of required minimum flow to Manitoba (Section F.2.).

One bald eagle found dead on the refuge died of lead poisoning and an injured eagle turned in to the refuge also showed signs of chronic lead poisoning (Section G.2. and 6.).

Waterfowl response to drawdown of Pool 320 was tremendous (G.3. and 5.).

Estimated duck production was 10 percent below 1985 (Section G.3.).

A major botulism outbreak occurred in Pool 326 (Section G.17.).

A Ducks Unlimited project will allow better control of water in the Benson Subimpoundment of Pool 326 (Section I.2.).

Projects were completed to correct deficiencies in the office building which was constructed in 1980 (Section I.2.).

Flood control planning for the Souris River shifted from the four-foot raise in Lake Darling to construction of Rafferty and Alameda dams in Saskatchewan (Section J.I.).

B. Climatic Conditions

A refuge weather station was maintained during 1986 as an official weather record for the National Oceanic and Atmospheric Administration.

Snowfall for the winter of 1985-86, for period November through March, was only 28 inches. Snow depth during the period averaged 8 inches and the greatest water content measured was only 1.65 inches in readings taken in February. Consequently, when the melt began in late February only a light runoff occurred.

Temperatures during January and the first part of February were considerably above normal and made conditions easy for wildlife. A return to winter for two weeks brought the coldest temperature of the winter with a reading of -36°F on 20 February.

The warm weather of late February remained, and by 10 March most snow had disappeared from the landscape. Continued warm and dry weather brought a major waterfowl migration by 21 March. By 1 April refuge pools were ice-free.

A snowstorm in mid April with overnight temperatures in the low to mid-teens resulted in refuge pools refreezing for a week. Precipitation for April totalled three times the normal. Total precipitation for the

period January through April totalled 4.81 inches, compared to the normal of 2.96 inches, as a result of heavy April precipitation. However, low runoff occurred due to most moisture going into the ground.

Last frost of the spring was 26° on 17 May. Temperatures gradually warmed to summertime readings and in late May and early June reached the 90's. Temperatures during the rest of June and through August moderated with only nine days at 90° or above. Highest temperature of the year was 96° on 19 June.

May and June were dry but soil moisture conditions remained good due to surplus subsoil moisture from heavy precipitation in April. Heavy rains came in July and resulted in good to excellent crops. Dry weather returned in August and allowed farmers to begin harvest. Precipitation for the period May through August was 7.51 inches compared to the normal of 10.13 inches.

First frost of the fall was 26° on 6 September. Conditions for harvesting were favorable until mid September when rainy weather halted the harvest for a month. Warm, dry weather arrived in mid October and permitted farmers to complete their grain harvest.

Winter arrived suddenly on 7 November with a major blizzard that dumped over a foot of heavy snow. By 9 November most waterfowl were gone, and refuge pools were frozen. Average snow depth from early November until the end of the year was nine inches. Precipitation for the period September through December was 3.67 inches compared to the normal of 3.52 inches.

Total snowfall for 1986 was 35.9 inches. Total precipitation was 15.99 inches or 0.62 inches below the normal of 16.61 inches.

D. Planning

2. Management Plan

The refuge hunting and fishing plan was updated and approved through the Regional Office. A field inventory of refuge signs was completed in preparation for development of a new sign plan.

4. Compliance with Environmental Mandates

Most refuge projects this year were determined to be categorical exclusions to environmental assessments requirements. Compliance activities included:

- a. Section 7 certification of the refuge hunting program was completed.
- b. Necessary environmental coordination was completed and permits were obtained for the Benson Subimpoundment Ducks Unlimited Project (see Section I.2.).

- c. Regional Office approval for continued use of existing gravel and barrow pits was obtained.
- d. A preliminary compatibility determination was completed for a competitive oil lease request on refuge tracts which were determined by the Bureau of Land Management to be suffering from drainage. After a decision by the Regional Office to proceed, an environmental assessment was initiated.
- e. Personnel from J. Clark Salyer and Upper Souris NWR's and the Bismarck Habitat Resources office coordinated throughout the year on development of Environmental Impact Statements for the Lake Darling and Souris River Basin flood control projects (see Section D.6.).

5. Research and Investigations

- a. Research Project: Determine the Lethality Performance Potential and Limitations of Steel Shot on Wild Waterfowl - Investigator
Mr. Tom Roster, Klamath Falls, Oregon

The various shooting tests that have been conducted have measured the performance of certain steel vs. lead shotshell loads when fired under laboratory conditions and/or by a group of voluntary hunters in a variety of field conditions. In many of these field tests the hunters did not know whether they were shooting lead or steel shotshells.

The objective of this research project is to examine the external and terminal ballistic performance of steel shotshell loads and pellet sizes, both commercially available and experimental, for the taking of wild waterfowl under actual field conditions.

Specifically, the project will test three hypotheses:

- 1) That traditional steel shot loads and pellet sizes may exhibit superior performance characteristics under field conditions for the taking of wild waterfowl when fired through non-full choke guns.
- 2) That steel pellet sizes and shapes not currently being loaded in commercial shotshell ammunition may exhibit superior performance characteristics under field conditions for the taking of wild waterfowl over commercially available steel pellets which are essentially spherical in shape and offered only in sizes (diameter) No. 1 (.160"), 2 (.150"), and 4 (.130").
- 3) That steel shotshell loads in other than 10 gauge and 12 gauge shells may show promise for efficient harvest of wild waterfowl under field conditions.

Field work in the refuge vicinity during 1985 involved testing the effectiveness of No. T experimental steel shot loads for taking snow geese. Tests on snow geese in Texas were also included in the study. Canada geese were collected in California, Oregon, Colorado and Texas. Overall the No. T experimental loads exhibited greater long range killing

effectiveness (55-70 yards) in taking the larger race of Canada geese than the smaller races and white-fronted and snow geese. The No. T loads exhibit greater killing effectiveness in taking the larger Canada geese over all ranges than currently existing No. BB steel shots.

Field work this year involved testing both an experimental goose load and an experimental diving duck load. Results of these tests are not yet available.

b. Nest Density and Hatching Success in Relation to Habitat and Predator Control on Islands at J. Clark Salyer NWR

Introduction

The first year of this 3-year study was 1985. During that year extensive nest searches were completed on islands in Pools 320 and 326. Predator management was carried out in Pool 320 on 11 islands while the effects of no management were evaluated on 16 islands in Pool 326. Most islands are manmade and average 1.5 acres in size.

Results of the first year indicated nest density was very high, but success varied dramatically. The only significant factor affecting success was predator presence, with mink being the primary cause of nest loss. The study also indicated removal of just one mink from an island could result in nest success approaching 100 percent. In 1985 mink density averaged one mink per island. These were usually denning females. When a denning mink was removed nest success was significantly higher. Red fox and raccoon were also significant causes of nest loss on islands which are near shore or connected to land by cattail corridors. Most islands studied in 1985 are some distance from shore, and mink were the primary cause of nest loss.

Methods

During 1986 Pool 320 was in drawdown so the study was conducted in Pools 326 and 332. Intensive nest searches were conducted in Pool 332 on 14 islands. Only two islands in Pool 326 were nest searched during the nest season. Two others were searched postseason. During 1985 several islands in 326 pool had very high nest densities, and success could have been influenced by researcher disturbance. Searches were reduced in 1986 to avoid this potential loss.

All islands in Pool 332 were nest searched five times; two times for Canada goose nests and early duck nesting and three times for locating the majority of duck nests. Each island was thoroughly searched by pulling a 100-foot by 1/2-inch rope and attached tin cans through vegetation to flush hens from their nests. Beater sticks (canoe paddles) were then used to locate nests where the female was absent. Vegetation height and density at each nest were measured using a Robel pole. Major vegetation species at the nest were noted, and two or three eggs were candled to determine incubation stage. Hatching rates for each duck species and each island were determined using Mayfield exposure calculations (Tables I and II).

Table I - Mayfield Hatching Success by Species in Pool 332 - 1986

spp.	# Nests ¹	Exposure Days	M ²	S ³	P ⁴	% Successful
Gadwall	105(29)	1454.8	0.0199	0.9801	0.4948	49.48
B.W. Teal	59(25)	855.6	0.0292	0.9708	0.3651	36.51
Mallard	51(21)	752.6	0.0279	0.9721	0.3714	37.14
N Pintail	6(1)	110.0	0.0090	0.9909	0.7464	74.64
L. Scaup	6(2)	68.8	0.0291	0.9709	0.3557	35.57
Shoveler	7(4)	81.0	0.0494	0.9506	0.1786	17.86
Wigeon	2(0)	32.0	0.0000	1.0000	1.0000	100.00
Redhead	4(3)	31.8	0.0943	0.9057	0.0312	3.12
Total	240(85)	3386.6	0.0251	0.9749	0.4147	41.47

1. # Nests - 10(2) (e.g. 10 is total number of nests attempted, (2) is attempts that failed.)
2. Daily Mortality Rate (M) = Nesting attempts that failed divided by total exposure.
3. Daily Survival Rate (S) = 1-M
4. Estimated Survival Rate of Clutches from Initiation to Hatching (P) $P=S^t$ where t=the average age of clutches at hatching. Weighted average - 34.63.

Table II - Hatching Success by Island - 1986

Island	# Mayfield Nests ¹	Exposure Days	Mayfield % Success	Acres ²	Mayfield Nests/Acre
<u>Pool 332</u>					
Crescent	38(17)	443.4	25.81	.80	47.5
H & W	18(13)	184.4	8.13	3.00	6.0
Leo's	26(11)	299.4	27.33	1.01	25.7
Clover	17(2)	323.0	80.91	.48	35.4
Round	22(5)	391.4	63.98	.85	25.9
Oxbow	6(5)	57.0	4.08	.76	7.9
Triangle	1(1)	7.0	.72	.67	1.5
Twin Butte North*	14(7)	203.0	29.35	1.00	14.0
Twin Butte South*	10(2)	138.0	60.33	1.00	10.0
Cat's Meow	35(4)	653.6	80.87	1.68	20.8
Avocet	32(2)	431.0	85.24	1.76	18.2
Long Spoil	14(11)	163.4	8.95	2.00	7.0
East Spoil	4(4)	36.8	2.78	1.00	4.0
West Spoil	3(1)	47.2	47.24	1.00	3.0
Total	240(85)	3378.6	42.00	17.01	14.6
<u>Pool 326</u>					
"V"	30(27)	513.8	81.9	2.75	10.5

1. # Mayfield Nests - 10(2) (e.g. 10 is total number of nests attempted, (2) is attempts that failed.)
 2. Area of islands after rehabilitation (1977).
- *Islands rebuilt in 1977.

Predator management was improved in 1986 by contracting a well-known trapper from Minot, North Dakota. Mr. Roy Hiller spend two weeks removing predators from islands in Pools 332 and 326 and instructing refuge staff in efficient trapping methods.

Results and Discussion

Many of the observations from 1985 were confirmed by findings in 1986. This was especially true of mink habits and the effectiveness of mink removal in increasing nesting success. The contract trapper was able to locate mink dens on nearly every island. During 1985 we were not efficient in recognizing the presence of the denning mink on the islands until after the best trapping period. Active dens were much easier to locate in the early spring, before growth of new vegetation. Rather than baited trap sets or trail sets, Mr. Hiller placed conibear 110 traps or 1 1/2 double coil traps in the entrance of active dens. This method was very effective. Nine mink and one skunk were removed from seven islands in Pool 332, and one mink was removed in Pool 326. Only one of the mink was a male. Apparently male mink do not use the islands heavily during the nest season. Males were very devastating to duck nests if they did visit an island. Their depredation patterns usually involved visits to many nests in a short period (one day). Many hens were killed but not eaten, and many of the eggs were not destroyed. Our trapping was not effective in controlling male mink.

Hatching Success and Nest Density

Hatching success varied from zero to 100 percent. Depredation by mink was the only significant cause of nest failure in 1986. During 1985 Pools 320 and 326 were the primary study areas while Pool 332 was the site of most 1986 investigations. Comparison of the study areas showed:

1. Nest densities were lower in Pool 332, but nests were more equally distributed on all islands rather than concentrated on a few islands as in Pools 320 and 326.
2. Mallard nests were more numerous in Pool 332 than in the other pools.
 (Pool 332 N=51 21% of Total)
 (Pool 326 N=27 10% of Total)
 (Pool 320 N=9 2% of Total)
3. Gadwall were the most abundant nester in all pools.
 (Pool 332 N=118 44% of Total)
 (Pool 326 N=182 69% of Total)
 (Pool 320 N=232 64% of Total)
4. Nesting Success (Mayfield corrected) varied between pools with the lowest success found in Pool 326 when no predator management was conducted.

Pool 332 (1986)*	41% success	240 total nests
Pool 326 (1985)	21% success	262 total nests
Pool 326 (1986)*	82% success	30 total nests
Pool 320 (1985)*	59% success	364 total nests

* Predator management conducted

Observed hatching success was calculated and included in Tables III and IV. Data from post hatch searches probably give a reasonably accurate picture of nest success on islands at this refuge. These small islands are relatively easy to search and several people intensively searching one to two-acre islands probably miss few nest bowls.

Nest densities were so high on some islands in Pool 326 that we made only one post-hatch check. This method made Mayfield calculations impossible because no exposure days were available. Thus 198 of 228 nests in Pool 326 were not included in the Mayfield tables (Tables I and II). Obviously nesting success and nest density were very high, as indicated by the post-hatch check.

Table III - Observed Hatching Success for Ducks in Pool 332 - 1986

<u>Island</u>	<u>Total # Nest</u>	<u># Successful</u>	<u>% Successful</u>
Crescent	44	20	45
Round	22	14	64
Clover	19	11	58
North Twin Butte	16	4	25
South Twin Butte	14	5	36
Cat's Meow	36	24	67
Avocet	36	27	75
Triangle	2	0	0
Oxbow	12	1	8
Leo's	28	16	57
Long Spoil	27	2	7
East Spoil	5	0	0
West Spoil	7	0	0
Hiller-West	<u>33</u>	<u>5</u>	<u>15</u>
Total	301	129	43

Table IV - Observed Hatching Success for Ducks in Pool 326 - 1986

<u>Island</u>	<u>Total # Nest</u>	<u># Successful</u>	<u>% Successful</u>
"V" Island	78	63	81
Wilmer	51	43	84
Mary's	74	46	61
Section Line	<u>25</u>	<u>7</u>	<u>28</u>
Total	228	158	69

Summary of other findings:

- Vegetation available for nesting sites on islands varied from planted DNC and/or grasses to forbs, shrubs, emergent aquatics and other grasses.
- The habitats most often used by nesting ducks were buckbrush, wild rose, nettle, thistle, leafy spurge, wormwood and areas of mixed forbs and wheatgrasses.

- Less preferred habitats included Kentucky bluegrass, smooth brome, phragmites, and monotypic stands of tall wheatgrass.
- c. Lead-Poisoning Monitoring in Migrating Snow Geese and Ducks --
Investigators - Madison National Wildlife Health Lab

During 1985 refuge staff collect paired gizzard and livers from hunter shot birds. One hundred and forty-four paired snow goose organs and 61 paired duck organs were collected. Fifteen whole carcasses were also collected for analysis.

Results received during 1986 indicated lead levels were very low.

E. ADMINISTRATION

1. Personnel

Gregory Siekaniec entered on duty on 30 March 1986 in the position of Clerk/Typist (part-time).



Front Row from left to right: Latendresse (11), Berg (3), Opdahl (6), Zeretzke (10), Benson (9), and Eslinger (5). Back Row from left to right: Badke (8), Giese (2), West (5), and Howard (1). GES.

1. Robert L. Howard, Refuge Manager, GS-12, PFT
2. Fred G. Giese, Assistant Refuge Manager, GS-11, PFT
3. William J. Berg, Wetlands Manager, GS-11, PFT
4. William L. West, Refuge Manager Trainee, GS-7, PFT
5. Gary A. Eslinger, Biological Technician, GS-7, PFT
6. Wanda L. Opdahl, Refuge Assistant, GS-6, PPT
7. Gregory E. Siekaniec, Clerk/Typist, GS-3, PPT, EOD 3/30/86
8. Raymond F. Badke, Automotive Mechanic, WG-10, PFT
9. Hamilton S. Benson, Maintenance Worker, WG-7, CS, 4/27/86-12/7/86
10. Edwin C. Zeretzke, Motor Vehicle Operator, WG-7, CS, 1/1/86-1/5/86 and 4/27/86-12/31/86
11. Leo J. Latendresse, Engineer Equipment Operator, WG-8, CS, 4/27/86-12/7/86
12. Jay F. Peterson, Biological Technician, GS-5, 4/26/86-12/6/86
13. Mike L. Grabow, Biological Technician, GS-5, 4/26/86-9/6/86
14. Mark A. Koepsel, Biological Aid, GS-4, 5/5/86-10/11/86
15. Andra Buchl, SCA Volunteer, 5/19/86-8/8/86
16. Betsy Vorse, SCA Volunteer, 5/5/86-10/11/86



Although Greg Siekaniec (7) was usually doing clerical work, his experience at prescribed burning was put to use when J. Clark Salyer staff assisted in the 5,000-acre burn on Lostwood NWR's wilderness area. WLW.



Jay Peterson (12) returned this summer to provide valuable assistance on the refuge and WMD. BV.



Mike Grabow (13) worked primarily on J. Clark Salyer WMD, but pitched in when needed on the refuge. Mike is standing next to one of the buffalo rubbing rocks along the Grassland Trail. GAE.



Mark Koepsel (14) provided supervision for our YCC program among other duties. Mark's dedicated effort on the botulism cleanup and operation of the duck hospital saved many birds that would have died without treatment. GAE.



SCA Volunteers Betsy Vorse (on ladder) and Andra Buchl made an outstanding contribution to refuge and WMD programs during the summer. WLW.

Both the refuge and WMD are included in the following personnel figures.

<u>Year</u>	<u>Permanent</u>		<u>Temporary</u>	<u>Total FTE</u>
	<u>Full-Time</u>	<u>Part-Time</u>		
1986	6	5	3	10.51
1985	7	3	5	10.56
1984	7	3	5	10.72
1983	7	3	5	10.70
1982	7	3	0	9.10

2. Youth Programs

The J. Clark Salyer complex was staffed with seven YCC enrollees. One enrollee was terminated due to tardiness and absenteeism. Supervision by a biological aid worked out well as it provided the constant supervision that young people need.

Wetland and waterfowl management practices were explained while doing such projects as checking wood duck boxes, island nest searches, night banding of Canada geese and a canoe trip down the Souris River.



YCC crew pouring a new sidewalk at the office after installation of a new drain system. FGG.

The YCC enrollees accomplished many projects. A few of the most noteworthy were:

- 1) Landscaped office grounds including forming and pouring a concrete pad and sidewalk and seeding native grass.

- 2) Scraping and painting three refuge buildings, a gas island and a semi-trailer.
- 3) Assisted in island nesting study and planted 1,000 rose bushes on two islands.
- 4) Created a 1,800-linear foot nature trail.

Safety training was provided to the enrollees on the first day of employment and periodically during the summer.



YCC Pat Olsen spent many hours helping in the office and entering data in the computer. GES.

4. Volunteer Programs

During the year a total of 81 volunteers worked on the refuge, contributing 982 hours of service. The majority of the volunteer hours were utilized during our waterfowl banding operations. Most volunteers were wildlife science majors from North Dakota State University at Bottineau. The "hands on" work with waterfowl banding fit well into their schedule, and, with a banding quota of 4,000 mallards, their help was gratefully accepted. Thirteen volunteers from the Bottineau and Minot Sportsmen Clubs helped us with the sanitation operation during our botulism outbreak.



Volunteers from the Bottineau County Wildlife Club display certificates of appreciation for their help with the botulism cleanup.

5. Funding

A schedule of funding for the refuge and WMD over the past five years is as follows:

<u>Funding</u>	<u>FY-82</u>	<u>FY-83</u>	<u>FY-84</u>	<u>FY-85</u>	<u>FY-86</u>
1210	257,000	308,000			
1220	13,000	11,500			
1240	8,000	12,000			
1260			380,000	433,100	478,000*
6860			3,000	5,000	5,000
6810		3,500			
O&M	278,000	335,000	383,000	438,100	483,000
1510		28,225		1,895	573
6410		125,000			
6450		140,000			
8610			10,700	12,000	11,000
2821		127,000	107,000		10,575
TOTAL	278,000	755,225	500,700	451,100	505,148

* Includes \$115,000 of Resource Problems funds.

6. Safety

Safety meetings were held each month. Use of personal protective equipment, potential safety hazards in various jobs and safety precautions to be taken while operating various types of equipment were the main topics.

Special safety training included a refresher CPR course and a 4-hour hands on ATV course put on by the North Dakota Department of Public Safety. Howard, Giese, Berg, West, Eslinger and Siekaniec also completed Pinch Hitter Flight Training which is intended to enable a person to fly and land a light aircraft in an emergency.



Refuge staff completed an ATV safety course conducted by the North Dakota Department of Public Safety. FGG.

7. Technical Assistance

The following types of assistance and/or services were provided to other agencies during the year:

- a. Assisted North Dakota Game and Fish with law enforcement activities.
- b. Provided technical information concerning native grass seeding and grazing to the Soil Conservation Service.

8. Other Items

Bottineau County received \$22,294 and McHenry County received \$29,242 in Revenue Sharing payments for fiscal year 1986. The payments represent approximately 64 percent of full entitlement. Bottineau County received

a \$1,296 increase, and McHenry county received a \$1,213 decrease from last year's payment of \$20,998 and \$30,455, respectively.

F. Habitat Management

2. Wetlands

The Service's June 1985 report entitled, "Impacts of the White Spur - Stone Creek and Russell Diversion Drainage Projects on the J. Clark Salyer National Wildlife Refuge and Wetland Management District", identified the refuge's ultimate water management goal as management of the pools through a range of conditions which vary from Class I wetlands through Class V wetlands. The report presents some management plan options based on a 5-year drawdown cycle and recognizes that up to three years of high water may be needed to kill cattail and prepare for drawdown. While we are following the basic philosophy presented in the report, we have not yet reached the point where the entire model flooding-drawdown schedule can be maintained. Pool 320 was drawn down in 1986 to follow guidelines of this report. Results of the drawdown are discussed in Section G.3.

The overall drawdown schedule has been modified to accommodate major construction being planned by the Corps of Engineers. The construction is part of the mitigation package for flood control projects in upstream reaches of the Souris River.

River breakup occurred 22-25 March. Precipitation during 1986 was normal in amount but much of it came in the form of rain during April and July. The runoff from these rains and snowpack was normal in much of the basin. A very warm spring resulted in snowmelt earlier than normal and soil moisture was very high throughout the area. Flows in the river were adequate all year long, and management objectives were not hampered by excessive high or low flows.

Souris River inflow to the refuge at Bantry for the March through May period was 56,220 acre-feet, 11,380 acre-feet (25 percent) more than the same period in 1985. Peak inflow for the year was 565 cfs on 4 May. Releases from Lake Darling during August and September were requested to reflood Pool 320 and to raise the level in Pool 326 to combat the botulism problem.

Total measured inflow at Bantry during the calendar year was approximately 88,730 acre-feet or 53 percent of the 49-year average of 167,050 acre-feet. Flow measurements were available for four tributaries during 1986. Measured inflows at Willow Creek, Stone Creek, Deep River and Boundary Creek were 13,158; 1,419; 7,860 and 6,678 acre-feet, respectively. Total inflow to the refuge from all sites was 117,845 acre-feet.

Total outflow for 1986 was 104,140 acre-feet. The peak release for the year was 690 cfs on 6 May. Total outflow was 13,705 acre-feet less than total measured inflow.

The Souris River flows south to north through the refuge and 22,500 acres of water are impounded by five major dams and various cross dikes which form subimpoundments (see map).

Rubble Masonry Unit

This 300-acre unit was kept at normal operating level of 1424.0 (msl) by use of stoplogs in the rubble masonry dams #1 and #2. The drawdown in Pool 320 did not affect levels in this unit. Due to ample flow, water was routed through this unit all year.

320 Unit

Plans were to drawdown Pool 320 to promote growth of moist soil vegetation and improve fertility and aeration of the surface soils in the pool. This 5,000-acre pool was nearly dry by late June. Plant growth was tremendous, and the pool was reflooded in late August with a 5,000 acre-feet release from Lake Darling. The pool was held at 1423.5 until 1 October when releases were initiated to prepare for freeze-up. The pool was nearly empty at 1420.0 by 7 November freeze-up. Optimum weather conditions along with adequate water supply from Upper Souris NWR (Lake Darling) insured one of the most effective wetland management operations this staff had experienced. The migratory bird response to this management is discussed in Section G.3.



The drawdown in Pool 320 resulted in smartweed five feet tall along with good stands of goosefoot and curley dock. FGG.

326 Unit

This pool was to be operated at 1420.7 or high phase to continue pressure on cattails. The 800-acre Benson subimpoundment of this unit was held at approximately 1421.5 to compensate for the loss of habitat during the 320 drawdown. Water level stabilized at 1420.7 by 29 May, but peaks between 1421.2 and 1421.5 were common until mid May. The pool was maintained at or near the proposed level until 4 October when water was lowered for freeze-up.

A severe outbreak of avian botulism was discovered in this pool on 9 August. All gates exiting the unit were closed on 11 August, and no water was passed down river from this pool until 4 October. Flow into Canada were supplied by water from Units 332, 341 and 357. This was the first severe or even moderate outbreak of botulism in the pool since the 1940's.

Redhead Marsh

This subunit of 332 was held at approximately 1418.5 during most of the summer, impounding about 300 surface acres. Due to the botulism outbreak, no water was passed from this unit from August until 1 October. The freeze-up level was controlled by 332 gates at 1417.5.

Pool 332

Plans called for holding 332 at spillway level or 1419.0 for cattail control. This was accomplished as flow was adequate until the 11 August closing of upstream dams. Water continued to surcharge over the spillway until late August. Gates were opened 21 September to pass water for maintaining river flow to Canada. The unit was lowered to 1417.5 for freeze-up. At year's end three to four inches of water were surcharging over control gates.

Pool 341

The proposed level for Pool 341 was 1415.0. Water peaked at 1417.8 several times in April. Plans for this pool were modified, and the level was kept high all summer to put pressure on cattail in preparation for proposed drawdown and construction on this dam in 1988. Water was surcharged over the gates all summer. Gates were opened on 14 September to maintain river flow to Canada. The water level was reduced to 1414.7 for freeze-up.

Pool 357

The target level for this unit was 1413.0 or year five of the 5-year drawdown cycle. The pool was dry when gates were lowered for impoundment on 3 March. Peak levels of 1414.6 were recorded several times in late April and early May. Due to good rains and ample run-off in the Boundary Creek drainage during April and May, the level did not drop below 1414.0 until late June. Rather than reduce the level drastically at a period important to waterfowl habitat, water was maintained at the late June level of 1413.7 to 1413.8. After 11 August, flow into Canada was main-

tained by water from this pool. Heavy rains in August, isolated in the Boundary Creek drainage, helped maintain water between 1413.0 and 1413.85.

An international agreement between the State of North Dakota and the Province of Manitoba states, "North Dakota shall deliver from any available source during the months of June, July, August, September and October 6,069 acre-feet of water at the Westhope crossing, regulated at the rate of 20 cubic feet per second . . . No account shall be taken of water crossing the boundary at a rate in excess of said 20 cfs."

Maintenance of minimum flow into Canada is the responsibility of refuge staff. Summer flow is regulated with a special low-flow structure to insure adequate water for refuge marshes while meeting stipulations of the agreement.

A stream flow gauging station is maintained by the U.S. Geological Survey (U.S.G.S.) to monitor flows of the Souris River into Canada. An automated telephone activated readout is used to monitor daily or even hourly change in stream flow. This telemark system had been the standard method of determining flow after making gate changes, but accuracy of the readings became unacceptable over the past two years due to deteriorated of the gauging weir.

Flow into Canada was stopped for one day on 13 August at the request of the U.S.G.S. This action was coordinated with Canada and facilitated construction of a coffer dam around the construction site of a new gauging weir. This new weir was completed by late September, and very accurate measures of outflow to Canada were available through the telemark system. Future management of water flows should be less of a problem and more in line with international agreements.

U.S.G.S. also completed the first year of a baseline water quality study on the refuge. The study is being financed with Resource Problems funds.

4. Croplands

1986 Grain Production Average

<u>Crops</u>	<u>Acres Planted</u>	<u>Est. Bu. Produced</u>	<u>Refuge Share</u>	<u>Est. Ave. Yield/Ac.</u>	<u>Unharvested Acres</u>
Barley	393	10,812	5,063	27.5	0
Wheat	237	4,186	469	18.0	0
Oats	30	1,000	0	33.0	0
Flax	38	127	0	0.0	0
Sorghum	80	200 Ton	sil.* 0	0.0	0
Corn	67	260 Ton	sil.* 0	0.0	0
Foodplot	0	0	0	0.0	13**
Fallow*	110	0	0	0.0	0
Total	845	16,125	5,532	78.5	13

*Not included in total.

**Left unharvested and standing.

A total of 921 acres was farmed by eight cooperators on a 70 percent (permittee), 30 percent (refuge) split. One hundred and thirty-seven acres were farmed biologically; crops seeded were wheat, barley, sweet clover and corn. One hundred and ten acres of summer fallow were allowed this year, mostly old DNC fields which are being rejuvenated.

Approximately 1,590 bushels of barley were used at four waterfowl banding sites during 1986. About 1,488 bushels of grain were fed to resident wildlife.

5. Grasslands

Robel survey data were not collected this year because all available personnel were needed to work on the nesting island study.

Establishment of native grass is an important management tool on J. Clark Salyer NWR. Very little maintenance is needed other than burning every five to six years. Also, warm season natives are not susceptible to 2,4-D used to control leafy spurge. One tract of 25 acres was seeded to a native mix of big bluestem and switch grass, and another tract of 10 acres was seeded to North Dakota Indian grass.

The refuge and the Soil Conservation Service have been working together to determine which variety of warm season native grasses would be adapted to northern North Dakota. The project study was completed during 1986. Data evaluating four warm season grass plantings can be found in SCS publication entitled "The Performance of Selected Cultivars of Warm Season Grasses in the North Prairie and Plains States."

7. Grazing

The rest-rotational grazing system on J. Clark Salyer was implemented in 1976 under a 4-year lottery drawing, replacing the previous program of annual, recurring use by the same permittees.

All units have now been converted to crowd grazing (spring), which is more advantageous than summer or fall grazing because it puts greater pressure on the cool season grasses such as Kentucky blue and smooth brome. A total of 3,878 acres in 10 of the regular units was grazed and 5,790 acres in 17 of the regular units were rested in 1986.

Grazing fees on the refuge are based on the percent of change in USDA reported price for cows and calves sold each fall. The fee was \$7.50 per AUM. Grazing use totalled 1,751.76 AUM's, and refuge grazing receipts were \$13,138.28.

We were one of eight refuges that were selected to participate in an experimental program of using grazing income to support various grassland improvement practices. Approximately \$11,224.40 of our grazing receipts were used for grassland improvement by controlling weeds.

8. Haying

The meandering Souris River, bordered with bottomland hardwoods and interspersed with wet meadows and old oxbow marshes, is prime waterfowl habitat. Haying is used on J. Clark Salyer to keep woody species such as willows from invading wet meadows. Regular hay permits were issued for a 4-year period (1984-1987) by a lottery drawing. The 25 hay permittees are allowed to cut one-half of the assigned units in alternating years. During 1986 some 1,286.96 tons of hay were harvested on our regular units. Revenue to the government was \$7,721.76.

9. Fire Management

Fire has always been important to the prairie ecosystem. Wildlife not adapted to all aspects of the environment are not found in the ecosystem or remain only for a short time. Wildlife that remain in the prairie ecosystem have adapted to fire. Therefore, fire is a very important management tool used on the refuge.

Favorable weather conditions allowed the burning of 1,465 acres. Our primary objectives in burning are to promote greater species diversity, to enhance both growth and vigor of native plants, to control introduced cool season grasses and to control cattails.

The refuge fire suppression crew responded to three wildfires during 1986. All of the fires were caused by refuge neighbors burning trash on their land. Total area burned was about 103 acres.

10. Pest Control

The cost of chemical control for leafy spurge is horrendous. A significant portion of this cost in 1986 was covered by the experimental grassland improvement program described in Section F.7.

11. Water Rights

Representatives from the USFWS met on 17 March with the Eaton Irrigation Board to discuss spring operations. The Board asked for an additional 2,000 to 3,000 acre-feet from Lake Darling on 24 March. About 1,400 acre-feet were released by 5 April when the release was terminated because too much water was leaking through Eaton gates.

13. WPA Easements

This section is covered in the J. Clark Salyer WMD narrative.

G. Wildlife

2. Endangered and/or Threatened Species

Bald eagles were observed periodically at several locations on the refuge. Most were seen during the fall with a peak of 15 counted on

2 November. The number is down from the peak of 30 in 1985, but about average for the refuge. Bald eagles are usually associated with the large numbers of snow goose using the refuge as a migratory stop. The National Wildlife Health Laboratory determined one bald eagle found dead on the refuge died of lead poisoning. An injured bald eagle turned in to the refuge and treated at the North Dakota State University Veterinarian School also had chronic lead poisoning from ingested shot (see Section G.6.).

No peregrine falcons, whooping cranes or piping plovers were observed on the refuge in 1986.

3. Waterfowl

Two significant events related to waterfowl occurred during 1986. On 9 August a botulism outbreak was discovered. Before the problem subsided in mid September nearly 6,000 dead birds had been picked up with an estimated 15,000 total lost. About half of the birds were ducks and half were coots. A summary of the outbreak and associated water quality problems is found in Section G.17.



Waterfowl response to the drawdown of Pool 320 was outstanding. A single photo cannot begin to depict the level of waterfowl activity after this 5,000-acre unit was reflooded in September. WLW.

The other significant waterfowl event was the increase in peak numbers in Pool 320 in response to the drawdown and reflood of that 5,000-acre unit. The abundance of moist soil foods provided excellent migratory bird habitat. Several duck species that usually peak in early September were

found at peak levels in late September, and most of these lingering early migrants were in Pool 320. Included were green-winged teal (12,000), American wigeon (20,000), gadwall (20,000) and pintail (25,000). Banding operations during 1986 netted higher numbers of some species in response to their increase use of the refuge and refuge banding sites near Pool 320 (see banding summary in G.16).

We continued to find extremely high numbers of duck and Canada goose nests during studies of refuge islands. This study is summarized in Section D.5.

a. Ducks

Duck use recorded during 1986 was 21,243,022 use-days, a 49 percent increase over the 1985 level of 10,565,420. Duck use peaked on 30 September at an estimated 118,000 birds. Of this amount, 40,000 were mallards.

Much of the increase in duck use and peak population can be attributed to the increase in birds using Pool 320 moist soil foods. On the day that duck numbers peaked at 118,000; 100,000 were in Pool 320.



This male mallard came to the refuge to molt, but the sixpack trash necktie was more than he bargained for.
BV.

b. Duck Production

Duck production for 1986 was an estimated 12,536, a 10 percent decrease from the 1985 level of 14,005 and 15 percent below the most recent 13-year mean of 14,906.

Many unknown factors influence the refuge brood counts used to determine duck production, and we are becoming increasingly concerned about the accuracy of production estimates. The brood count was developed by Merrill Hammond, a FWS biologist at Salyer for some 30 years. Evidently, changes through the years, including a shift in the relative abundance of nesting species, have influenced the reliability of our brood counts and production projections. One factor that definitely affects the count is the water level in the marsh. Lower levels enhance counting conditions since broods are concentrated in deeper portions of the pools where most of the brood transects were established. The system causes an inverse relationship between water levels and broods observed. More broods are seen in low water years than in high water years. We hope some of the work on survey techniques being done at NPWRC will lead to development of a better system for the refuge.

The refuge duck boxes hit an all time low for duck production in 1986. An avian predator (starling, magpie?) is still causing significant losses. Duck boxes on oxbow lakes have more problems than river boxes, but those on the river are in disrepair and need substantial work. We lose about five nest boxes per year due to "wear-out", and there are only 36 left on the river. Boxes near the Nelson Bridge and the Canoe route portions of the river were the most successful.

No successful wood duck nest has been discovered in the boxes during the past two years. Hooded merganser success is relatively good except where the egg depredation has occurred. Although the refuge is located on the northern edge of the wood duck's nesting range, we still see wood duck broods during brood counts and a peak population of 300-400 is normal. Apparently sufficient natural cavities are available to support the population.

Table V. Duck Box Production 1986

	<u>River</u>	<u>Oxbow Lakes</u>	<u>Total</u>
Number of Available Nests	36	59	95
Number of Nests Checked	30	59	89
Number of Nests Used	23	21	44
Percent Used	77	36	49
Number of Successful Nests	13	9	22
Percent - Nest Success	57	43	50
Number of Dump Nests	4	2	6
Number with Nest Bowl or Down (No eggs)	0	3	3

c. Geese

The first spring migrants, consisting of seven giant Canada geese, arrived on 28 February. The spring peak snow goose population averaged about 60,000 during the first week of April and declined thereafter. This time frame is very consistent from year to year. Snow geese moved through this area during the first two weeks of April in all of the past 10 years despite great differences in timing of ice-out on the pools.



Canada goose nesting on islands and in elevated baskets has continued to increase since restocking in the 1950's. We now transport 30 to 90 goslings per year to sites in the Wetland Management District. WLW.

Fall migration of snow geese was first noted 5 September when 75 birds were seen near the refuge. This was a relatively early date and might have reflected the bust in snow goose production noted in parts of the nesting grounds. The peak of 168,00 was observed on 15 October, up from 143,000 in 1985. Approximately 60,000 still remained in the area when the severe blizzard hit on 7-8 November. Most if not all weak or injured birds did not survive the intensity of the storm. Healthy birds weathered the 20 inches of snow and 60 mph winds for two days then moved south on 9-10 November as the temperature plunged to 25° below zero.

d. Canada Goose Production

Canada goose production was estimated at 759 for 1986, approximately the same as 1985. Gosling production from elevated structures was 422, compared to 453 last year. The intensive survey of islands in Pool 332 found more nests than we had anticipated. Production on islands in Pool 320 was calculated by extrapolating data from the intensive island searches in Pools 332 and 326.

Table VI. Canada Goose Production by Unit 1986 (Structures)

<u>Unit</u>	<u>Pool</u>	<u># Available</u>	<u># Checked</u>	<u># Used</u>	<u># Suc- cessful</u>	<u>% Used</u>	<u>% Nests Successful</u>	<u>Estimated # Goslings Produced</u>
A	Hay M	30	28	11	6	39	55	27
C	Hay M	15	15	4	3	27	75	13
D	Hay M	14	14	5	5	36	100	22
E	320	46	46	37	27	82	73	121
F	Benson	3	3	3	3	100	100	14
G	326	60	60	51	35	85	69	157
H	332	19	19	17	14	89	82	63
I	341	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>100</u>	<u>100</u>	<u>5</u>
Totals		187	185	129	94	70	73	422

Table VII. Canada Goose Island Nesting Pool 326 - 1986

<u>Island Name</u>	<u>Island Size in Acres</u>	<u>Nests** Found</u>	<u>Nests/ Acre*</u>	<u>Nests Successful</u>	<u>% Suc- cessful</u>	<u>Estimated # Goslings Produced</u>
Blip	.62	0	-	-	-	-
Scaup	.83	4	4.82	3	75	13
Gravel	.92	2	2.17	2	100	8
Mary's	1.25	4	3.20	0	0	0
Wilmer	.77	3	3.89	1	33	4
One-Acre	1.11	3	2.70	0	0	0
Quarter Line	.93	2	2.15	1	50	4
V-Island	2.75	12	4.36	5	42	21
Section Line	2.87	6	2.09	3	50	13
Willow Clump	1.03	2	1.94	2	100	8
Goosepen	1.96	3	1.53	2	67	8
Arneson	.79	0	-	-	-	-
"Y"	2.07	0	-	-	-	-
Horseshoe	2.30	0	-	-	-	-
Salix	1.63	0	-	-	-	-
Henry	1.06	3	2.83	1	33	4
Natural	.70	0	-	-	-	-
S. Island	<u>2.80</u>	<u>0</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
Totals	30.76 (15.48)*	44	2.84	20	45	83

* Calculations used only islands that had nests

** Several nests had been depredated by red fox after marsh pools refroze in mid-April thus many geese renested. These events inflated the total number of nests since many geese were involved in initiation of at least two nests but were only successful at one.

Table VIII. Canada Goose Island Nesting Pool 332 - 1986

<u>Island Name</u>	<u>Island Size in Acres</u>	<u>Nests** Found</u>	<u>Nests/Acre*</u>	<u>Nests Successful</u>	<u>% Successful</u>	<u>Estimated # Goslings Produced</u>
Crescent	.80	3	3.75	2	67	8
Road Grade	.32	0	-	-	-	-
Leo's	1.01	1	.99	0	0	0
Clover	.48	2	.42	1	50	4
Round	.85	3	3.53	3	100	13
Oxbow	.76	4	5.26	4	100	17
Triangle	.67	1	1.49	1	100	4
Twin Butte North	1.00	4	4.00	4	100	17
Twin Butte South	1.00	6	6.00	3	50	13
Cat's Meow	1.68	3	1.79	1	33	4
Avocet	1.76	4	2.27	3	75	13
Hiller & West (H & W)	3.00	0	-	-	-	-
Long Spoil	2.00	2	1.00	1	50	4
West Spoil	1.00	1	1.00	1	100	4
East Spoil	.75	1	1.33	0	0	0
Totals	17.08	35	2.54	24	69	80
	(13.76)*					

* Calculations used only islands that had nests.

** Several nests had been depredated by red fox after marsh pools refroze in mid-April thus many geese renested. These events inflated the total number of nests since many geese were involved in initiation of at least two nests but were only successful at one.



This is one of many Canada goose eggs cached by red fox when marsh pools refroze in mid April. For a 24-hour period only one inch of ice covered the pools, but nearly half the island nests were destroyed. WLW.

1986 Canada goose production on islands in Pool 320 was estimated at 73 nests and 174 goslings. The estimate was derived using the mean of all data collected in Pools 326 and 332 or 2.70 nest/island acre, 56 percent nest success and 4.25 goslings produced per successful nest.

e. Swans

Spring migration of tundra swans was first noted on 28 March and ended by 11 April. A peak population of 200 was observed on 10 April. Fall migration noted the first swans on 30 September. Numbers peaked at 1,500 on 20 October. Over 5,000 swans were counted in the WMD and refuge during the peak.

For the second year, in cooperation with Selawik NWR, Kotzebue, Alaska, frequencies of Alaska radioed tundra swans were monitored. The survey took place during fall waterfowl census flights over the refuge and WMD. We had no luck picking up their birds. Apparently Selawik birds stay west of North Dakota, migrating to areas in the Pacific flyway. Our swans are thought to be from Yukon Delta in Alaska. Migrations through here are bound for Chesapeake Bay.

4. Marsh and Water Birds

Eared grebes are the most abundant marsh and waterbird on the refuge with an estimated 20,000 breeding individuals. Many young grebes were observed during 1986. Other common nesters include American coot, American bittern, black-crowned night heron, double-crested cormorant and pied-billed grebe. White pelicans utilized the refuge frequently for feeding but nested only at nearby Willow Lake National Wildlife Refuge. Sandhill cranes were again suspected refuge nesters, but young have not been observed since 1973.

Fall populations of sandhill cranes were much higher in 1986. The migrant population peaked in mid October when over 3,000 were observed in the drawn down unit (320). Measurements taken from several hunter-killed cranes indicated most were of the greater sandhill subspecies.

5. Shorebirds, Gulls, Terns and Allied Species

Franklin's gull colonies were active in Pool 326. Numbers appeared to be down from normal. About 5,000 birds utilized the refuge in 1986. Lower numbers of black, common and Forster's terns were also observed.

Generally, because of lower water levels and exposed mud flats, shorebird use is higher in the fall. Due to the drawdown in Pool 320 shorebird numbers were way up in May, June and July. Estimated peak populations of various species are shown in Table X.

Table X. Seabirds at Salyer N 1986

	<u>Pe</u>	<u>Pop.</u>
California Gull		0
Ring-bill Gull		0
Franklin's Gull		0
Forster's Tern		0
Common Tern		0
Black Tern	3	0
Red-necked Phalarope		30
Wilson's Phalarope	6,000	
Avocet	1,000	
Common Snipe	1,500	
Long-billed Dowitcher	500	
Pectoral Sandpiper	1,000	
Baird's Sandpiper	600	
Least Sandpiper	1,200	
Semipalmated Sandpiper	60	
Marbled Godwit	1,000	
Hudsonian Godwit	40	
Greater Yellowlegs	1,000	
Lesser Yellowlegs	750	
Solitary Sandpiper	30	
Willet	300	
Upland Sandpiper	200	
Black-bellied Plover	200	
Golden Plover	75	
Killdeer	1,500	
Spotted Sandpiper	500	
Ruddy Turnstone	250	

6. Raptors

Golden and bald eagles were occasionally seen throughout the year with peak numbers occurring in the fall. Raptors known to nest on the refuge include red-tailed hawk, northern harrier, Swainson's hawk, American kestrel and short-eared, long-eared, burrowing and great-horned owls. Wintering species included snowy and great-horned owls, golden eagles, and northern goshawks.

During 1986 an abnormally high number of injured raptors were brought to the refuge. Fortunately old facilities once used for rearing Canada geese were available for a make shift hospital and way station. In the past we made attempts to rehabilitate the birds with very minor injuries or those in need of a meal or two. More often than not birds in more serious conditions were subject to euthanasia if they were not threatened or endangered species.



The number of injured raptors brought to the refuge was way up in 1986. This adult Swainson's hawk was one of many transferred to the raptor rehabilitation facility at North Dakota State University, Fargo. AB.

During the fall 1986 a rehab center was established in Fargo at the North Dakota State University Veterinarian School. This facility was a welcome outlet for our patients, and eight specimens were transported to the center during September, October and November.

The birds were given vitamins, water and, in some cases, food prior to shipment. Some were transported by FWS personnel early on, but an agreement with Burlington Northern railroad sped up the transportation process. With their help, most birds were in Fargo within 24 hours of their arrival at the Salyer Refuge. Species treated at the refuge included red-tailed hawk, ferruginous hawk, Swainson's hawk, great horned owl, snowy owl, and bald eagle. The bald eagle had been shot and had chronic lead poisoning from ingested shot. The rehab center had it back in shape and released into the wild within two months.

7. Other Migratory Birds

The refuge is rich in bird life with the eastern and western North American avifaunas coming together in this region. Over 290 species have been recorded on the refuge. These include the numerous wood warblers, Baird's sparrow, LeConte's sparrow, Sprague's pipit and mountain bluebird to name a few.

Forty-three nest boxes constructed and erected by YCC enrollees in June 1984 were again very successful. These nests were erected to provide nest sites for mountain bluebirds in the sandhills area of the refuge. Forty-one (98 percent) were used for nesting. Tree swallows used 31,

eastern bluebirds used eight, and mountain bluebirds used two. Some boxes were successful both for tree swallows and for bluebirds. It is obvious from the high use of these boxes that cavities for nesting are at a premium.

Twenty-one new boxes were erected in 1986 by a group of girl scouts from Rugby. Although these boxes were put up in mid April they had 90 percent use by early June. Most were three swallows, but three were occupied by eastern bluebirds.

Our first confirmed use of a nesting box by a mountain bluebird occurred in 1986, and we had two successful nests in different locations.



A Girl Scout group from Rugby spend a weekend in April camping on the refuge and installing new bluebird boxes. WLW.

8. Game Mammals

The refuge wintering white-tailed deer population is probably at an optimum for the habitat. An aerial count of the refuge on 2 February found approximately 900 deer. This number is down from 1,300 in 1985. Winter kill and wild dogs were not a problem this winter.

10. Other Resident Wildlife

a. Resident Birds

(1) Sharp-tailed Grouse

Sharp-tailed grouse were censused between 9 April and 14 May on traditional dancing grounds. A total of 219 males were sighted

(8.6/ground). This was a 33 percent increase from the 1985 level. The population is most likely stable or increasing.



Sharp-tailed grouse were at the highest level in ten years. Use of the dancing ground photo blind also increased. FGG.

(2) Ring-necked Pheasants

The ring-neck pheasant population is significantly down due to a tough winter 1984-85 and to an abundance of northern goshawks. The latter were observed on numerous occasions in 1985 and 1986 with fresh-killed pheasants near headquarters bird feeders. The refuge cock crow count was the lowest in 25 years of surveys. Only one cock crow was heard on two routes with a total of 40 stops.

(3) Gray Partridge

Although no official census was taken on gray partridge, their number appears to be way up over the 1985 level. Coveys of 10 to 20 were seen frequently along roadside areas.

(4) Turkeys

A stocking program to introduce eastern wild turkeys on the refuge was undertaken in 1980 and 1981. This was a joint venture between the Service and the North Dakota Game and Fish Department. The species has adapted very well to the hardwood river bottoms and wooded sandhill areas of the refuge. Good production occurred this year, and numerous young birds were observed in fall flocks on or adjacent to the refuge. The winter population was estimated after incidental observations during the annual aerial deer survey. During

the flight approximately 200 turkeys were using the refuge. Reports of other birds wintering off the refuge at cattle feeding sites indicate the total population may be closer to 300.

Three-week-long spring gobbler seasons were held in 1983, 84, 85 and 86. During 1986 fifty permits were issued through lottery drawing conducted by the North Dakota Game and Fish Department. Two hundred and fifty applications were received. A total of 24 gobblers were harvested by 47 hunters for a 52 percent success rate.

For the fourth year in a row we conducted a wild turkey hunting seminar on the week prior to the season. This course is well received and very important since applicants are randomly selected, and many have never hunted wild turkeys before. Subjects covered included calling and hunting techniques, safety, ammunition and gobbler identification.

(5) Ruffed Grouse

Evaluations of the 1980-81 introduction of ruffed grouse to the refuge indicate the project has been successful. Drumming activity has increased each year on an established survey route. State biologists figure 0.75 drums per stop indicates a healthy density of birds for this area. During 1986 the refuge averaged 1.4 drums per stop. Plans for 1987 include increasing the length of the survey route to determine dispersal and distribution.

b. Other Mammals

Porcupine, coyote, red fox, red and fox squirrel, cottontail rabbit, white-tailed jackrabbit, snowshoe hare and various small mammals are common on the refuge. Sightings of both moose and elk were reported during the year.

11. Fishery Resources

Northern pike remained at good levels as evidenced by consistent good catches at various public fishing locations. Bullheads also remained stable while walleye numbers were surprisingly good on the southern portions of the refuge. We have no active fishery management on this refuge, but fish populations continue to thrive despite frequent draw-downs of marsh pools.

12. Wildlife Propagation and Stocking

A total of 100 pheasants were released at various locations on the refuge. This joint effort between the refuge and the North Dakota Game and Fish Department has been continued since 1977.

15. Animal Control

Barley was distributed at several locations on the refuge to minimize deer and waterfowl depredations on nearby cropland. Blackbird and water-

fowl depredation did not become a problem during this year's delayed small grain harvest.

Mink were controlled on islands in Pool 332 and 326 in conjunction with the island nesting waterfowl study. Ten mink were caught during the target months of April and May. Nest success was significantly higher on islands where we were successful in removing denning mink.

16. Marking and Banding

The 1986 duck banding program was conducted from 4 September - 3 October. The quota was set at 4,000 mallards (1,000 of each age and sex), 500 pintails and any incidentals.

Due to staff shortages from work on the botulism outbreak, banding sites were not prepared as early as normal. Also, the Pool 326 airport site was not used since we did not want to bait birds into the botulism infected area.

An alternative site was constructed the last week in August in Pool 320. Subsequent reflooding of 320 attracted birds to the area, and by late September it was a good trap site. An abnormally high catch of American wigeon was attributed to natural food in Pool 320 attracting this species to the vicinity of the new banding site. High numbers of green-winged teal can only be explained by a warm fall and delayed migration of this normally early migrant.

The total number of ducks banded was 3,193; the third highest in 20 years. The mallard total was below the past eleven year average of 2,136. Eighteen percent of the mallards banded were immature. This is below the eleven year average of 22 percent. This may be a sign of the times.

Summary of 1986 Banding Accomplishments

<u>Age & Sex</u>	<u>Mallard</u>	<u>Pintail</u>	<u>Am. Wigeon</u>	<u>GWT</u>	<u>Gadwall</u>	<u>Wood Duck</u>	<u>BWT</u>
AM	1,142	161	88	31	0	10	0
AF	472	304	167	49	5	0	0
IM	168	27	97	28	1	0	4
IF	190	66	160	16	1	0	4
Total	1,972	560	512	124	7	10	8

During 1986 we requested that the bird banding lab send all band recoveries from all birds banded at J. Clark Salyer Refuge. Since about 80,000 birds of various species have been banded since the late 30's and early 40's, the printouts we received were understandably large. We used YCC help to input direct recoveries of banded mallards into our own computer (Digital Rainbow 100). We only used recoveries from 1970 thru 1984 and still got nearly 1,500 entries.

These data confirmed what we already suspected; nearly 6 percent of the birds we band in September fly back into Canada that fall. Also, the primary direct recovery regions for Salyer Refuge banded birds are North

Dakota (20%), Arkansas (13%), Louisiana (9%) and Mississippi (7.5%). Band recovery locations for other species of ducks included Alaska, Cuba, Mexico, Puerto Rico and Russia.

Table XI. Direct Band Recoveries of Mallard Banded at
J. Clark Salyer NWR 1970-84

<u>Recoveries</u>	<u>State</u>	<u>Recoveries</u>	<u>State</u>
1	Florida	35	Minnesota
4	Georgia	108	Mississippi
1	Maryland	76	Missouri
1	New Jersey	10	Ohio
1	New York	27	Tennessee
3	North Carolina	34	Wisconsin
3	Pennsylvania	5	Colorado
11	South Carolina	47	Kansas
5	Virginia	6	Alabama
193	Arkansas	3	Montana
79	Illinois	47	Nebraska
1	New Mexico	296	North Dakota
11	Indiana	33	Oklahoma
45	Iowa	38	South Dakota
10	Kentucky	40	Texas
135	Louisiana	15	Michigan
53	Manitoba	1	Nova Scotia
18	Saskatchewan	11	Ontario



The Canada goose trapping operation involved night lighting and nets and many late hours. WLW.

The giant Canada goose flock at Salyer has grown to an estimated 1,000 adults. Although band returns have been received from western Nebraska, very little is known about overall migration patterns or if any summer molt migrations take place. Past efforts to use drive traps and rocket nets to capture these birds have met with little success. Two airboats equipped with generators and a battery of night lights were used to capture geese for banding.

Fifty-five geese were captured and banded on the three southern refuge pools. Thirty-three of the birds were transplanted to a WPA in a group of 4 adults and 29 young birds.

17. Disease Prevention and Control

Due to historical botulism outbreaks in Pools 320 and 326 weekly patrols by airboat were initiated in July. No outbreak was noted until 8 August when several birds were located in dense cattails along the shore of Pool 326. These birds were discovered by a dog owned by refuge staff.



Water quality was quickly deteriorating in Pool 326 two weeks prior to the botulism outbreak. The green tint is the result of a massive algae bloom. WLW.

During a search of the pool on the following day over 300 birds were picked up in a relatively small section of the pool. The pickup continued daily for nearly a month as birds continued to die, despite relatively mild weather (85-90°F highs) and very high water levels. Due to good flows in the Souris River and excess storage in Lake Darling (Upper Souris NWR) we were able to increase water levels to avoid exposed mudflats. Nearly 6,000 dead birds were picked up, and the total loss was

estimated at 15,000. About half of the birds lost were ducks; the rest were coots. This was the first major outbreak since 1977 when an estimated 17,000 ducks died.



Day after day this was the result of our botulism clean up - - up to 100 sick birds and 300 carcasses. WLW.



It may not be a pretty picture, but pulling up to 20 leeches from the nostrils of each duck was standard procedure if we were going to save them. GAE.

A duck hospital was set up to rehabilitate sick birds. Most of the work was done by volunteers and off-duty refuge staff. Leeches were removed from the nostrils, fresh water was forced into the birds and antitoxin was injected into the body cavity. The ducks were then confined to a pen, where fresh water and feed was provided. Survival was very good until cold nights in mid September placed additional stress on the birds.



The final treatment in our duck hospital was an antitoxin shot into the body cavity. We treated 654 ducks, and about 73 percent survived. GAE.

Ron Windingstad and Kathy Converse from the National Wildlife Health Lab at Madison, Wisconsin, visited the refuge on 16-17 August. Dr. Windingstad's report indicated he had never seen such an extensive outbreak on a wetland of this type in his experience with botulism at numerous sites across the country. Normally outbreaks are associated with extensive mudflats, shallow water, high temperatures and very little green vegetation. Pool 326 was in a high water stage (2 1/2 - 3 1/2 feet) to control cattails and as final preparation for drawdown the next year (1987). The shoreline of this pool is made up of steep banks and/or heavy cattail cover. There are extensive bulrush and cattail stands in the pool. Daytime temperatures were relatively mild for August. The health lab staff indicated the pool's water quality was very low, and the botulism outbreak was reminiscent of outbreaks in sewage lagoons.

While the problem is certainly complex, refuge staff believe there is a significant relationship between the release of municipal sewage effluent into an already nutrient rich system and development of conditions which trigger botulism outbreaks. Heavy algae blooms were very obvious as the late June release from Minot passed through the system. Pool 320, our most upstream impoundment, has a long history of major outbreaks. With this pool in drawdown, Pool 326 was first in line to receive the

effluent. Since it was being held in a high phase, sago pondweed and other submergents were not as abundant as normal and the excess nutrients resulted in an explosion of algae.

We theorize that the tremendous day to night shifts in photosynthetic activity and dissolved oxygen set up conditions for invertebrate dieoff, high BOD, anaerobic conditions and proliferation of clostridium bacteria. Some State Department of Health personnel attributed our water quality problems to duck feces.

Negotiations scheduled between this refuge, Upper Souris NWR, North Dakota Department of Health and Minot officials will hopefully be the beginning for better coordination of Minot sewage releases. Possibilities for building a tertiary facility at Minot with funds from the new Clean Water Act are being investigated. The State Health Department and the refuge are also discussing increased monitoring of water quality parameters.

H. Public Use

1. General

Public use at J. Clark Salyer is dominated by hunting, fishing and bird watching. However, refuge personnel put on many programs, most of which dealt with refuge activities and wildlife management.

Talks, presentations and other public information efforts given in 1986 included:

- a. Ten slide talks on the J. Clark Salyer Refuge were given to the Newburg and Kramer 4-H Clubs, Towner Cub Scouts and eight school groups from Upham, Towner, Bismarck High, NDSU-Bottineau and UND.
- b. Two talks on Alaska refuges and FWS research were given to Upham P.T.O. and to students at NDSU-Bottineau.
- c. Four National Wildlife Week programs were given to local grade schools.
- d. Judged the Science Fair at Upham High School.
- e. Participated in two N.D. Game and Fish Advisory Board meetings.
- f. Participated in two Project Wild Workshops.
- g. Participated in eight programs at the Minot Air Force Base.

2. Outdoor Classrooms - Students

Approximately 10 tours of J. Clark Salyer NWR were given to various groups during the year. Classes from area schools as well as biology students from Bottineau Branch of North Dakota State University (NDSU-BB) toured the refuge during 1986. A special 3-station outdoor classroom was presented for participants of a Youth Conservation Camp sponsored by the North Dakota Wildlife Federation.

4. Interpretive Foot Trails

Guided and unguided tours of the sandhills walk area were popular with 1986 visitors. This area is open to the public and consists of an aspen community in rolling hills. Various native grasses, forbs, prickly-pear and ball cacti can be observed in this area of the refuge. Giant Canada geese now nest in the bottom areas near the sandhills and provide an added dimension to spring bird watching on this trail.

5. Interpretive Tour Routes

The refuge canoe route is listed as a component of the National Trails System. The route extends 13 miles beginning at the Johnson Bridge and winding through the wooded river bottom of the Souris River, ending at Dam 1. An alternative 5 1/2-mile segment stops at the Thompson Well site.

There are two auto tour routes available to the visitor. One is the Scenic Trail, a 22-mile auto trail beginning at refuge headquarters traveling through Pool 326 and winding through the southern portion of the refuge. Signs on this route and a special brochure help explain wildlife management programs at J. Clark Salyer and describe marshlands, wooded river bottoms, and aspen covered sandhills observed along the route. New signs were obtained this year, and the brochure was revised. This route is our most popular self tour attraction. It gets especially heavy use during spring and fall migrations. It is also the primary access road for many deer and turkey hunters.

Another tour route is the 5-mile Grassland Trail north of refuge headquarters. It passes through prairie grasslands and travels along the river marsh of Pool 341. Along this trail the visitor can view many of the native grasses and flowers that once flourished in the prairie regions. Numerous species of grassland birds inhabit the area and are sought by birdwatchers visiting the refuge.

During 1986 portions of the Grassland Trail were prescribed burned to encourage the native grass and forb species and depress introduced cool season grasses such as smooth brome and Kentucky bluegrass.

6. Interpretive Exhibits/Demonstrations

Upper Souris and J. Clark Salyer personnel staffed a Law Enforcement Day display at Minot. The display included a fully equipped refuge enforcement vehicle and an airboat.

Refuge staff worked with personnel from other North Dakota stations at a display booth which was operated throughout the North Dakota State Fair in Minot.

Refuge personnel joined with Upper Souris NWR personnel to present a program on waterfowl identification at the Minot Air Force Base. Fishing, tour routes, birdwatching, hunting and related regulations were also discussed.



Assistant Manager Giese presents a portion of the waterfowl identification workshop at Minot AFB.

7. Other Interpretive Programs

A sports reporter from a Minot television stations (KXMC Channel 13 and KMOT Channel 10) visited the refuge several times during 1986. As a result, several programs were aired concerning nesting islands and nesting success. Also, two spots were broadcasted about the YCC program on the refuge.

A state required hunter safety course was presented by refuge personnel in cooperation with the North Dakota Game and Fish Department. A course was also presented to refuge turkey hunter permittees on species and sex identification, hunting techniques and refuge regulations.

8. Hunting

a. Waterfowl

Waterfowl hunting is the most popular public use activity at Salyer (3,700 visits in 1986). Waterfowl hunting is permitted at nine designated public hunting areas and along the refuge boundary at 15 retrieval zones.

Hunting was generally good in 1986 since snow goose populations were high. However, several days of nice weather in mid October made for slow hunting. A severe snow storm on 7-8 November pushed all birds out of the area.

b. Upland Game

Nine designated public hunting areas on the refuge are open to upland game hunting during the regular state seasons. In addition the southern portion of the refuge, south of the Upham-Willow City Road, was open to sharp-tailed grouse, ring-necked pheasant, gray partridge and wild turkey hunting.

Sharp-tailed grouse hunting pressure was similar to past years, but success was up. Ring-necked pheasant numbers were down, and harvest was low due to lack of opportunity.

c. Deer

The entire refuge, with the exception of the headquarters area, is open to archery and firearm deer hunting. Only 400 refuge permits are issued for the first 1 1/2 days of the firearm season to reduce the number of hunters and prevent over harvest. The 1986 deer season ran for 23 1/2 days (7 November thru 30 November). The worst winter weather for 1986-87 occurred during the first week of deer season. Many hunters simply did not go afield, and deer harvest was low early in the season. Milder weather and frozen marsh bottoms made for better access to remote portions of the refuge pools while heavy snow cover kept hunter numbers low in the wooded portions of the refuge. In the end, deer harvest was about normal or even a little heavier than in the past. We estimate 250 deer were harvested.

9. Fishing

Public fishing is permitted at 13 locations from spring through fall. Most of the refuge is also open to winter ice fishing. Fishing pressure was up in 1986. During the year there were 2,255 fishing visits as compared to 2,050 in 1985. The single best reason for the upswing was simply the fish were biting.

10. Trapping

We again placed announcements in several local newspapers soliciting applications for serious trappers interested in trapping fox, raccoon, mink and skunk. We ended up with one new trapper whom we hope to retain for future years and two past permittees.

Three trapping permits were issued for taking furbearers on the refuge. The permits included a clause designating striped skunk and raccoon as reward species. After a trapper had harvested ten target animals he would receive a rebate of \$5.00 for each additional animal taken. The total rebate was then subtracted from the \$300.00 trapping fee. This technique was initiated in 1983 in an attempt to increase harvest of these species and possibly reduce predation on ground nesting birds.

Trappers reports indicated red fox numbers were down and coyotes were up. Coyotes continue to slowly pioneer into more northern portions of the refuge. Apparently fox are being displaced by the coyotes, a trend we have tried to promote by requiring trappers to release all coyotes in

past years. This year we allowed coyote trapping south of the Upham-Willow City Road, where nine were taken. Three coyotes were trapped and released in the area north of this road.

Trapping opportunity was cut short in 1986 due to the severe snow storm of 7-8 November. Very little trapping was available after this storm except for beaver sets. Many traps were snowed in for the winter.

Below is a summary of the 1984, 1985 and 1986 trapping seasons.

<u>Species</u>	<u># Trapped in 1984</u>	<u># Trapped in 1985</u>	<u># Trapped in 1986</u>
Badger	0	3	7
Beaver	8	116	7
Coyote	0	2	9
Fox	6	84	49
Mink	17	58	18
Muskrat	123	1	2
Raccoon	15	49	21
Skunk	12	50	41
Weasel	3	1	0
Porcupine	0	0	6
Total # Predators	53	244	160

11. Wildlife Observation

Over 6,100 visitors were recorded at the refuge during 1986, a 16 percent increase from the 1985 level. Our greatest wildlife observation use occurs in early fall when large concentrations of snow geese and other waterfowl can be found on the refuge. This was a great year for observing large numbers of snow geese, and visits were up.

14. Picnicking

The refuge receives only light picnicking use, primarily at the sandhills fire tower, the old Thompson Well, and the headquarters area.

17. Law Enforcement

A total of 18 violations were prosecuted through the Federal Magistrate Court in Minot, North Dakota. Fines collected amounted to \$1,170.00, an average of about \$65.00 per offense. This is an increase of six violations over 1985.

Type and number of violations are listed below:

- Taking migratory game bird in excess of daily limit - 2
- Taking migratory bird during closed season - 4
- Violation of state law - 3
- Illegal entry and use of a NWR - 3
- Hunting in a closed area - 3
- Duck stamp violation - 1
- Off established trail - 1
- Camping on NWR - 1

I. Equipment and Facilities

1. New Construction

YCC enrollees constructed an 1,800-foot nature trail in the headquarters area.

2. Rehabilitation

Ducks Unlimited replaced three road culverts and installed slide gates at the Benson Subimpoundment of Pool 326. These improvements will allow retention of up to 800 acres of water in the subimpoundment when the remainder of the pool is in drawdown.



As part of Ducks Unlimited's Benson Unit Project, two 6-foot slide gates and new culverts were installed on the Upham-Willow City road. WLW.

Automotive Mechanic Badke modified the Pool 332 gates to allow operation of this unit at the high phase identified in the refuge water management plan. Prior to this modification, approved levels could not be maintained after spring flows subsided.

With the help of Ken Fox from Engineering, refuge staff completed force account installation of a subsurface drain around the headquarters office building. This facility, constructed in 1980, was suffering severe structural damage from heaving of the concrete slab floor. Engineering recommended cracks in interior walls and floor damage not be repaired until the building stops moving around.

The headquarters building has also been suffering from a roof leak that defied location for two or three years. The solar panel contractor had inspected the system, and a section of flat roof had been test flooded with no success. The problem was finally isolated this summer to faulty seams in an interior gutter in the solar system. A seamless rubber liner was placed in the gutter and the interior ceiling damage was repaired by a contractor at the cost of \$3,267.

A new leaching field was provided for the Quarters 137 septic system which was not functioning properly. Ken Fox, Engineering, provided design advice for the project.

3. Major Maintenance

The refuge had about \$60,700 in small ARMM's money for FY 1986. The following is a list of ARMM's projects and other major maintenance projects for 1986.

- a. Graveled headquarters area.
- b. Sprayed noxious weeds.
- c. Mowed refuge trails and dikes.
- d. Repaired and replaced nesting materials in goose nesting structures, duck and bluebird boxes.
- e. Rehabilitation of Scenic Trail road.

Maintenance of a recurring nature included: winter snow removal, periodic sewer flushing, general vehicle and building maintenance, sign maintenance, lawn care and trash pickup at public fishing areas. Also, patrol and tour roads were bladed as needed to maintain them in good condition.

4. Equipment Utilization and Replacement

Following is a list of new equipment purchased to replace old equipment:

- a. 4-wheel all terrain vehicle
- b. 4x4 Dodge pickup
- c. Video camera and monitor



During the year we purchased a VCR and camcorder. They are handy for public presentations, easement enforcement and documentation of bird use and refuge problems. Refuge Clerk Siekaniec built the cabinet. WLW.

5. Communication Systems

A modem for the refuge computer was installed, and we began regular use of the electronic mail capabilities of the system.

Arrangements were made by the end of the year for purchase of station telephone equipment. After comparing several systems, we ended up with POETS equipment from the local company, Souris River Telephone.

6. Computer Systems

This station has been using a Digital Rainbow 100A since early 1984. Virtually all our correspondence and reports, except very short memos and forms, are done on the computer, and the electroic mail capability is used regularly. All short memos would likely be typed on the computer as well if a work station was located nearer to the main reception area and telephone.

We are also rapidly expanding use of the machine for data management, and on several occasions this summer and fall, we ran into scheduling conflicts for use of the computer for wordprocessing, data entry and program development. In short, we have reached the point where we can effectively use a second state-of-the-art computer with more memory and storage capacity than our present machine.

7. Energy Conservation

Setback thermostats have been installed in the office and shop buildings, and insulation jackets have been placed on all water heaters.

A propane furnace was installed in Quarters 137 to provide more economical and efficient heating. Engineering has also recommended replacement of the electric furnaces in the office building with a propane system.

J. Other Items

1. Cooperative Programs

Cooperative planning for flood control in the Souris River Basin continued to be a major project this year. However, emphasis changed early in the year from the Lake Darling four-foot raise to using storage in two large reservoirs being planned in Saskatchewan, Rafferty and Alemeda, to provide 100-year flood protection for Minot.

These dams have been on the books for a number of years, and, while support in Canada has been questionable at times, discussion of potential for providing flood control for the U.S. is not new. In February, Premier Grant Devine announced the province was ready to build Rafferty and Alemeda dams if the United States provided \$41.1 million in American dollars as its share.

U.S. contribution to the project was authorized through an amendment to the Omnibus Water Bill sponsored by North Dakota Senator Burdick. No money has yet been appropriated. The city of Minot passed a referendum placing an additional one percent sales tax on all purchases made in the city to pay its share of the project.

The fate of the proposal was questionable early in the year. Premier Devine called a provincial election, and the project was not supported by the opposition party. Opposition groups called for a moratorium on the project until an independent, comprehensive and publically funded study was completed. With Premier Devine's re-election, planning for the projects went forward.

The Corps of Engineers completed environmental documentation of the Lake Darling project and continued to plan those features which were common to both projects. Commitments for U.S. participation in the Canadian dam projects were made before a Corps Reconnaissance Study was completed. The Corp also began writing a supplemental EIS for the Lake Darling project which will address the Canadian dams. Contractors for the Corps completed much of the design for on-refuge mitigation features during the year.

FWS personnel from both J. Clark Salyer and Upper Souris NWR's, Bismarck Habitat Resources Office and the Regional Office were involved throughout the year in coordination with the Corps of Engineers and other agencies for project planning and negotiations. A Fish and Wildlife Coordination Act report was finalized in December.

Most mitigation features of the Lake Darling project downstream from the Lake Darling dam were retained, including those on J. Clark Salyer. During a reanalysis of project losses, the Corps determined they were short on mitigation and added rip-rapping of refuge islands to make up the difference. We remain at odds with the Corps over impacts of low flow operation of the dams and are pushing for a better analysis of impacts and mitigation requirements.

By treaty agreement, the U.S. is entitled to 50 percent of the natural flow of the Souris River in Saskatchewan. Since Canada has not in the past had the capability to hold their 50 percent, the average flow to the U.S. has been around 60 percent, and in many years was closer to 80 percent. With the new dams, Canada can hold more than their share, and a considerable deficit due to added evaporation from the reservoirs could occur in some years.

Operating plan negotiations began with Canada asking for a 50-50 split of both flow and evaporation from the reservoirs. This was not acceptable to United States parties, and several proposals and counter-proposals have bounced back and forth. At year's end, negotiations were centering around a 60 (Canada) - 40 (U.S.) split unless Lake Darling falls below 1592 msl. At that point, a 50-50 split would go into effect until Lake Darling reaches 1593.

Flood operation plans have not been finalized, but most proposals have remained very close to those for operation of Lake Darling after the proposed four-foot raise. In flood years, this would mean prolonged flows of over 500 cfs through J. Clark Salyer, sometimes extending well into the winter. Most project mitigation features were proposed to offset projected losses from these high flows.

Low flow impacts have been poorly addressed. The Corp has been very reluctant to address the issue in the supplemental EIS, and it wasn't until the end of the year the FWS and the Wildlife Federation convinced the Corp to address the impacts of the reduced flows during non-flood years.

At the end of the year, there was still no agreement on an operating plan, and several significant questions remain. Operation of the carp control structure and other mitigation features designed for flood operation will significantly increase our O & M costs, but these operational features have not been considered in the same manner as other project operation costs. Estimates for operation of the carp control alone have been as high as \$18,000 annually. The issues of refuge compatibility and the need for rights-of-way on the refuges have been raised, but not resolved.

2. Other Economic Uses

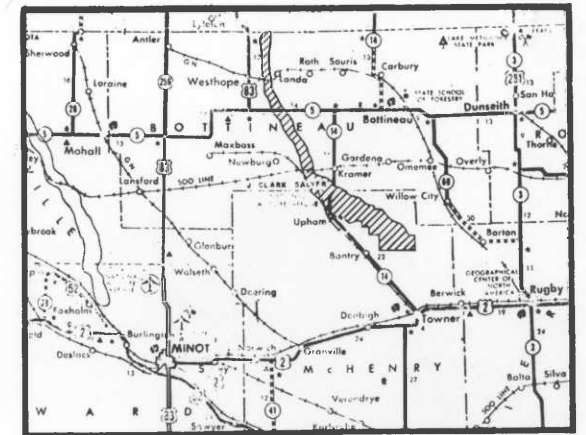
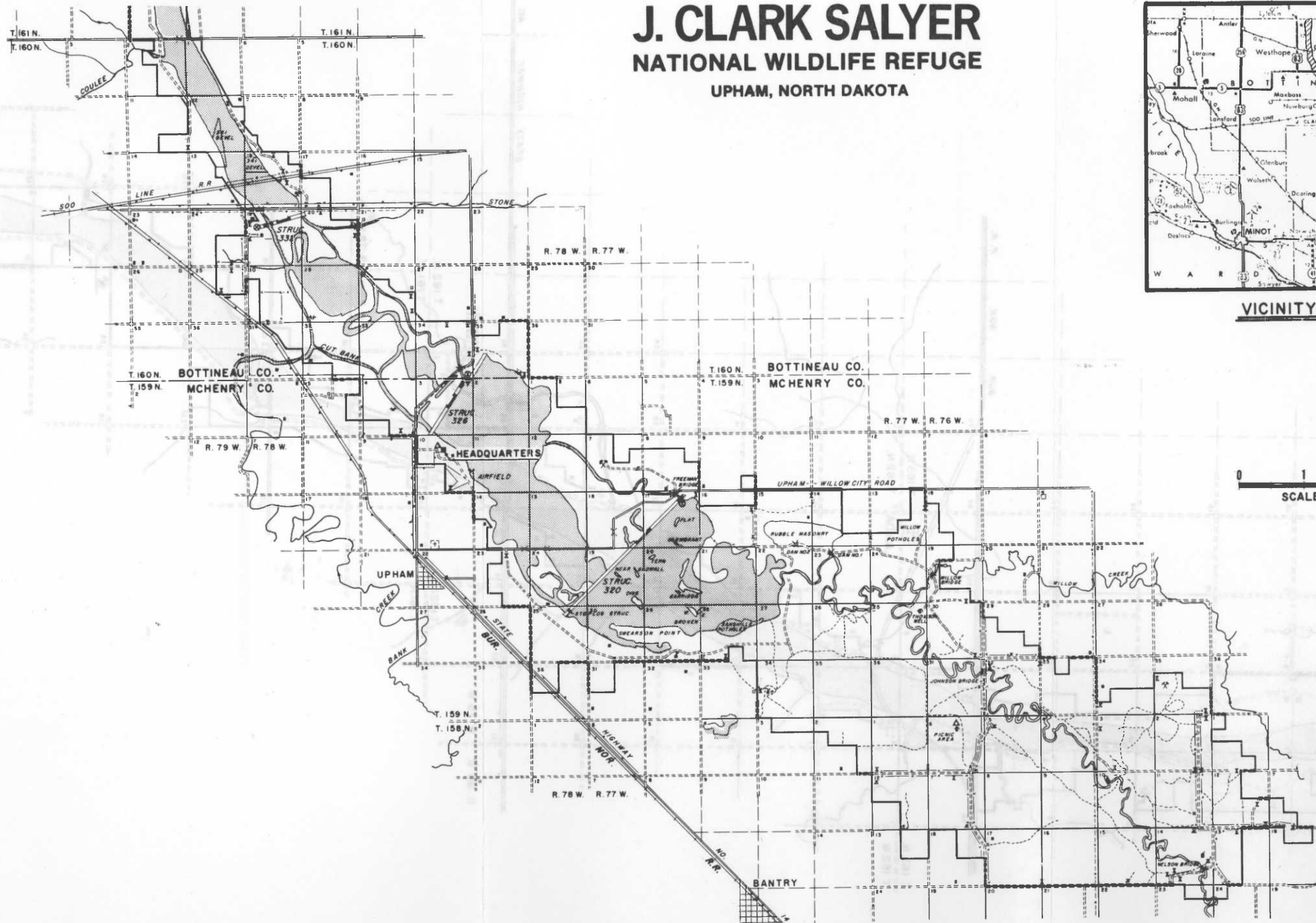
Preliminary evaluation of a request for competitive leasing of refuge tracts for oil development was completed. The Bureau of Land Management determined the tracts are suffering from drainage. Overall, oil activity in the area was quite slow, with many wells not operating and several being abandoned.

4. Credits

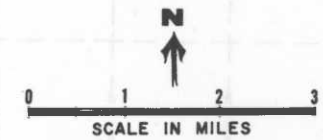
Bill West wrote Sections D.5., F.2., G. and H.8.-11. Fred Giese wrote Sections E.2.,4.,6.,7.,8.; F.; H.1.-7.,14.,17.; and I.3.,4. Gary Esslinger wrote Section B. Bob Howard wrote the Introduction; A.; D.1.-3.; E.1.; I.1.,2.,5.,6.,7.; and J.1.-4. and edited the report. Wanda Opdahl typed and assembled the report.

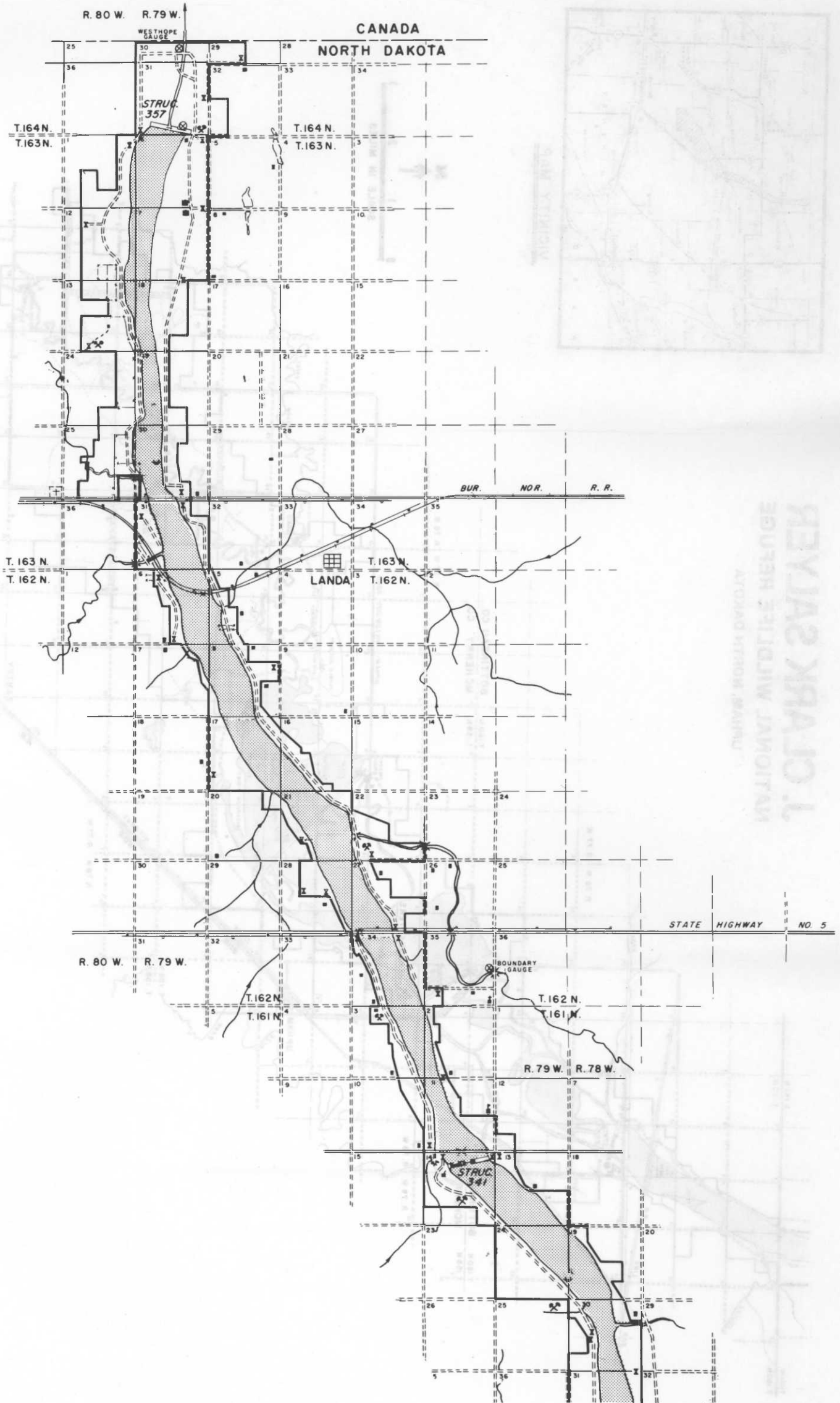
J. CLARK SALYER NATIONAL WILDLIFE REFUGE

UPHAM, NORTH DAKOTA



VICINITY MAP





Auto Tour Guide

**J. Clark Salyer
National
Wildlife
Refuge**



WELCOME to J. Clark Salyer National Wildlife Refuge.

Established in 1935 for the preservation and propagation of migratory waterfowl and other wildlife, the refuge is nearly 59,000 acres in size, extending along the Souris River for 50 miles between Bantry, North Dakota and the Manitoba border. Originally called Lower Souris Refuge, it was renamed in 1967 in honor of J. Clark Salyer II, who was a biology teacher in Minot, North Dakota and went on to become the Chief of Refuges for the U.S. Fish and Wildlife Service.

The name "Souris" is French for "mouse." Before 1800, French explorers found the Indians calling the stream "the mouse river" because of the great number of mice found in the meadows on the banks of the river.

A 22-mile tour covering marshes, wooded river bottoms and sandhills of the refuge starts here and ends north of Bantry on Highway 14. Kramer is the nearest source of gasoline.

Nursery



This tree nursery to your left was established in 1935, and from it the Civilian Conservation Corps planted most of the trees now at headquarters. This nursery and similar tree groves are valuable winter habitat for pheasants, deer and small

animals as well as being attractive summer nesting areas for songbirds.

Pool 326



A dam north of Headquarters forms Pool 326 to the left (east). Farmers of the early 1900s drained the natural marsh that was here for farming, but such operations failed. The dam impounds the water, thereby restoring the marsh. Water levels

are controlled to stabilize marsh vegetation, prevent flooding of nesting areas and encourage growth of food-producing aquatic plants.

Also notice the wildlife observation and photo blind where ducks, geese and water birds such as the American avocet or eared grebe can be seen. Please feel free to walk down and use the blind except when the banding sign is in place. This indicates that refuge personnel are banding waterfowl.

Refuge personnel band about 4,000 ducks each year. Band returns have been received from South America, Mexico, Canada and from all regions of the United States.



To the left is a typical refuge wildlife cover patch, established by seeding a Dense Nesting Cover mixture of sweet clover, alfalfa and two types of wheatgrass on a former farm unit. These patches maintain good vigor and provide excellent wildlife

cover for 5-10 years after establishment. Some type of manipulation is then required to rejuvenate the cover. This is often done by farming the areas for a few years before reseeding.

Grain from the farming operations keeps ducks on the refuge during harvest season, attracts ducks to banding sites, and is winter food for pheasants, partridge, grouse and deer.

Marshland Wildlife



The Scenic Trail continues left on the Upham-Willow City road. To the left in Pool 326 are small platforms on poles in open water areas where wild Canada geese nest, safe from flooding and predators such as raccoons. The refuge marshes

contain over 200 of the artificial nests where several hundred goslings are produced annually. Visitors may see different species of ducks in the road ditches ahead. The tour route continues straight ahead to stop 5.

Leconte's Sparrow



Refuge visitors may find Leconte's sparrow in one of its few habitats in the midwest.

This small, interesting bird, which is uncommon and difficult to see, seeks meadows with tall grassy areas like those directly ahead.

Pool 320



Dike and water control structure 320, directly ahead, extends southwest for nearly three miles, creating a pool and marsh of 4,300 acres. Here visitors can observe ducks and many other water birds. Visitors are welcome to walk up

on the dike and look out over the marsh. Canada geese and many ducks use the islands to nest. Gates of the control structure may be raised or lowered to achieve desired pool water levels. PLEASE REFRAIN FROM DRIVING ON THE DIKE OR GOING NEAR THE CONTROL STRUCTURE — IT IS A DANGEROUS PLACE.

Refuge dikes and the pools behind them are numbered (320, 326, etc.) to correspond with the number of river miles from where the Souris River enters North Dakota from Canada. The last 75 of 358 river miles within the state are in the refuge.

The main road brings travelers across the Freeman Bridge, named for a pioneer family in this area, to one of 13 public fishing areas on the refuge. Diving ducks and cormorants (large black birds) may also be visible.

Follow the county road ahead for 1½ miles and turn right at the "Scenic Trail" marker. This is a dry weather road only. Fire danger may be high so please be careful if you smoke.



"End of the Woods Crossing"

Ahead, where the timber along the river ends, was once a crossing well travelled by Indians, fur traders and explorers. They call it "End of the Woods." From here north was open prairie. In 1852, Charles

Cavelier, a customs collector, camped here for 21 days. About 40 Indian families were also living here. Cavelier recorded that their hunters killed more than 400 buffalo in one chase during his stay.

Grazing units are located on both sides of the trail. Refuge neighbors have grazing privileges on 12,000 acres. Refuge managers permit cattle to graze early in the growing season to retard growth of grasses less valuable to wildlife. This encourages growth of warm season native grasses of more value to wildlife.



River Oxbow

To the right is a river oxbow slough, a good place to see ducks. The meandering river forms these water areas by changing its channel over the years, which isolates an oxbow, or loop, in the river. The oxbow is habitat for tree-nesting ducks and their

broods. Across the slough is a cedar nesting box erected to attract tree-nesting ducks such as hooded mergansers and wood ducks.



Water Control

To your right, Dam #1 crosses the river. It was built in 1936 to divert water to the marsh on the left. The dam also maintains water levels in the river, filling old oxbows to the south. Water diverted at Dam #1 flows back into the river near Dam #2.

This is where the Canoe Trail ends.



(such as willows).

There are 25 hay units on the refuge. Each unit is about 100 acres and the hay permittee cuts one-half of the unit each year. Haying of the 2,500 acres is used, along with burning, as a technique to control the invasion of brush species



Willow Creek

The woods follow Willow Creek, a name the Indians gave the small stream. Porcupine and deer are common here. Wood ducks are sometimes seen along this wooded creek.



Twining Expedition

On September 8 and 9, 1869, Captain W. J. Twining of the U.S. Engineers Corps camped near here. He was making a reconnaissance of northeastern North Dakota, including the Souris River and Red River valleys. From here Twining's

party made a circle of the southeast back to Ft. Totten, where he arrived on the 18th of September.

Just ahead by the spruce trees is the Thompson Place, a farm home before establishment of the refuge. Visitors will find here picnic tables and a well with good drinking water.

13



Prescribed burning is used by wildlife managers to control monotype stands of grass and the invasion of brush species. To your right is an area that is prescribed burned every three to four years. Notice how sparse the willows are, compared

to the area on your left which has not been burned for many years.

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Johnson Bridge

The Scenic Trail now crosses the Souris River on the Johnson Bridge. Historians believe the Indians used a crossing about 100 feet to the right of the bridge. Beaver inhabit this part of the river. Look for red squirrels, wood ducks and hooded mergansers. This is also the beginning of the refuge canoe trail.

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Early History

The Scenic Trail now leaves the river bottom and enters the sandhills. An early day cattle operation, the famous Stevens Ranch Company, based its headquarters on the first sand ridge entering the sandhills. Texas longhorn cattle were shipped

here around 1900 but were not hardy enough to withstand the cold North Dakota winters. Some say these Texas herds furnished the foundation stock for nearly all the cattle produced in this area.

Two miles southeast is the Cole Ford, another famous crossing used by Sioux, Chippewa and Assiniboine Indians, fur traders, trappers, explorers and even cars in more recent years. The late historian Dana Wright said of it, "This was a well established rendezvous known to every plainsman on the northern prairies."

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Sandhills

These tall sand ridges were a beach of glacial Lake Souris in the last ice age, about 10,000 years ago. Wind formed the ridges by sweeping loose sand into dunes at the edge of the lake. The sandhills are home for deer, turkeys, ruffed grouse,

sharp-tailed grouse, red squirrels, snowshoe hares, many songbirds and coyotes.

Visitors are welcome to park and walk into the sandhills.

The view from the sand ridges is beautiful. Note the many grasses and forbs to be found here. The blue three-petaled spiderwort and prairie wild rose, state flower of North Dakota, are common. The tiny ball cactus may be spotted on close inspection. Watch for poison ivy, a creeping plant with three leaflets, found mainly beneath trees and shrubs. TAKE CARE NOT TO BECOME LOST.

17



Tower and Picnic Area

A side trail leads to the sandhills tower and picnic area, which has picnic tables and a well with good water. Again watch for poison ivy. Please cooperate in keeping the picnic area clean; waste barrels have been provided. After detouring to the

tower, return to this point and continue on the Scenic Trail.

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Historic Trail

Here the trail crosses the Red River Hunters Trail, also used by Captain Twining in 1873. This trail comes from the Red River across the Cole Ford and goes into Canada, leaving the U.S. at the Hill of the Murdered Scout near Portal, North Dakota.

The Scenic Trail is a reminder of the rich history and a look at the wildlife habitats of J. Clark Salyer National Wildlife Refuge. Continue west four miles to Highway #14 and turn right four miles to Upham or go left 17 miles to Towner. We hope you return soon to the J. Clark Salyer National Wildlife Refuge!

