

CRESCENT LAKE NATIONAL WILDLIFE REFUGE

Ellsworth. Nebraska

NORTH PLATTE NATIONAL WILDLIFE REFUGE

Minatare. Nebraska



ANNUAL NARRATIVE REPORT

Calendar Year 1988

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

REVIEW AND APPROVALS

CRESCENT LAKE NATIONAL WILDLIFE REFUGE

Ellsworth, Nebraska

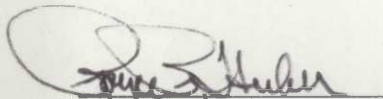
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NORTH PLATTE NATIONAL WILDLIFE REFUGE

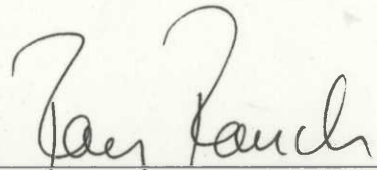
Minatare, Nebraska

ANNUAL NARRATIVE REPORT

Calendar Year 1988

  
Refuge Manager

3/28/89  
Date

  
Refuge Supervisor Review

8/22/89  
Date

  
Regional Office Approval

8/24/89  
Date

## INTRODUCTION

Crescent Lake National Wildlife Refuge was established in 1931 as a waterfowl production and maintenance refuge. It is located at the eastern edge of the Nebraska Panhandle in Garden County, approximately 28 miles north of Oshkosh. This is the southwestern edge of the 20,000 square mile Nebraska Sandhills, which is characterized by a continuous grass-forb covered succession of dunes and swales. It is considered the largest body of sand in the world that is not classified as desert. Where the swales dip below the water table, subirrigated meadows, marshes, and lakes have formed. In most cases, no stream systems exist between wetlands. Many lakes are maintained solely by underground water sources, often including springs.

The refuge consists of 45,818 acres (71.59 square miles) and includes 37,453 acres of native prairie grasslands, 4,755 acres of type II fresh meadows, 1,154 acres of type III shallow fresh marshes, 309 acres of type IV deep fresh marshes, 2,033 acres of type V open fresh water, 70 acres of noncommercial tree groves, 10 acres of brush and 34 acres of administrative lands including 12 miles of roads.

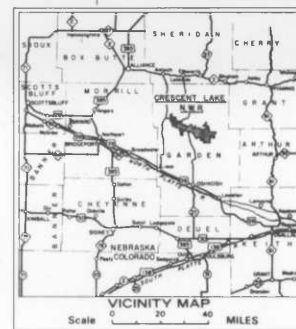
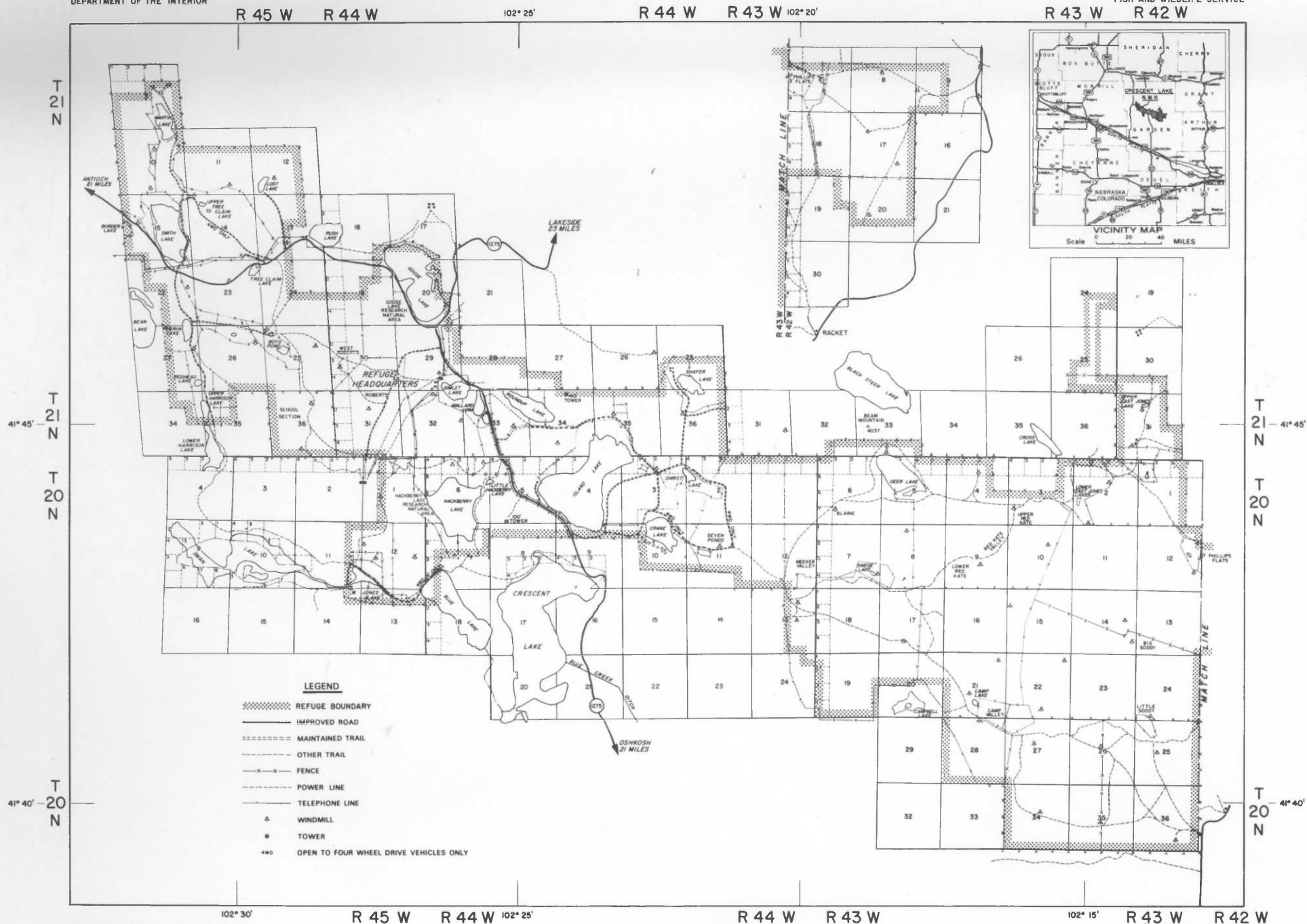
Oshkosh, with a population of 1,040, is the county seat and closest town. This town cannot provide the refuge with necessary supplies. Therefore supplies are obtained in Alliance (population 10,000) which is 45 miles to the northwest--30 miles of which are covered on a one-lane, chuck-hole riddled, cattleguard crossed, sandhills road. It is not unusual for all roads from the refuge to be impassable for several days as the result of a winter storm.

# CRESCENT LAKE NATIONAL WILDLIFE REFUGE

## GARDEN COUNTY, NEBRASKA

UNITED STATES  
DEPARTMENT OF THE INTERIOR

UNITED STATES  
FISH AND WILDLIFE SERVICE

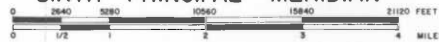


COMPILED IN SURVEYS AND MAPS FROM  
SURVEYS BY BLM, USGS AND FWS

DENVER, COLORADO  
Revised: JUNE 1978

JUNE, 1965

SIXTH PRINCIPAL MERIDIAN



MEAN  
DECLINATION  
1975



# TABLE OF CONTENTS

	PAGE
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u> Nothing to Report (NTR)	
D. <u>PLANNING</u>	2
1. Master Plan . . . . .	2
2. Management Plan . . . . .	3
3. Public Participation . . . . .	3
4. Compliance with Environmental Mandates . . . . .	NTR
5. Research and Investigations . . . . .	3
E. <u>ADMINISTRATION</u>	13
1. Personnel . . . . .	13
2. Youth Programs . . . . .	NTR
3. Other Manpower Programs . . . . .	NTR
4. Volunteers Program . . . . .	16
5. Funding . . . . .	16
6. Safety . . . . .	17
7. Technical Assistance . . . . .	18
8. Other Items . . . . .	19
F. <u>HABITAT MANAGEMENT</u>	22
1. General . . . . .	22
2. Wetlands . . . . .	23
3. Forests . . . . .	30
4. Croplands . . . . .	NTR
5. Grasslands . . . . .	30
6. Other Habitats . . . . .	NTR
7. Grazing . . . . .	32
8. Haying . . . . .	34
9. Fire Management . . . . .	34
10. Pest Control . . . . .	35
11. Water Rights . . . . .	38
12. Wilderness and Special Areas . . . . .	39
13. WPA Easement Monitoring . . . . .	NTR
G. <u>WILDLIFE</u>	39
1. Wildlife Diversity . . . . .	39
2. Endangered and Threatened Species . . . . .	40
3. Waterfowl . . . . .	41
4. Marsh and Water Birds . . . . .	45
5. Shorebirds, Gulls, Terns and Allied Species . . . . .	46
6. Raptors . . . . .	48

G. WILDLIFE (Continued)

7.	Other Migratory Birds . . . . .	50
8.	Game Mammals . . . . .	50
9.	Marine Mammals . . . . .	NTR
10.	Other Resident Wildlife . . . . .	51
11.	Fishery Resources . . . . .	53
12.	Wildlife Propagation and Stocking . . . . .	NTR
13.	Surplus Animal Disposal . . . . .	NTR
14.	Scientific Collections . . . . .	NTR
15.	Animal Control . . . . .	54
16.	Marking and Banding . . . . .	NTR
17.	Disease Prevention and Control . . . . .	56

H. PUBLIC USE 57

1.	General . . . . .	57
2.	Outdoor Classrooms - Students . . . . .	57
3.	Outdoor Classrooms - Teachers . . . . .	NTR
4.	Interpretive Foot Trails . . . . .	58
5.	Interpretive Tour Routes . . . . .	58
6.	Interpretive Exhibits/Demonstrations . . . . .	58
7.	Other Interpretive Programs . . . . .	58
8.	Hunting . . . . .	60
9.	Fishing . . . . .	62
10.	Trapping . . . . .	63
11.	Wildlife Observation . . . . .	63
12.	Other Wildlife Oriented Recreation . . . . .	NTR
13.	Camping . . . . .	NTR
14.	Picnicking . . . . .	NTR
15.	Off Road Vehicling . . . . .	64
16.	Other Nonwildlife Oriented Recreation . . . . .	NTR
17.	Law Enforcement . . . . .	64
18.	Cooperating Associations . . . . .	NTR
19.	Concessions . . . . .	NTR

I. EQUIPMENT AND FACILITIES 64

1.	New Construction . . . . .	64
2.	Rehabilitation . . . . .	67
3.	Major Maintenance . . . . .	68
4.	Equipment Utilization and Replacement . . . . .	71
5.	Communication Systems . . . . .	72
6.	Energy Conservation . . . . .	NTR
7.	Other . . . . .	NTR

J. OTHER ITEMS 72

1.	Cooperative Programs . . . . .	72
2.	Items of Interest . . . . .	72
3.	Credits . . . . .	72

K. FEEDBACK 73

#### A. HIGHLIGHTS

Waterfowl nesting success increases dramatically in areas with predator control. (Section G-3)

Record fall migration of waterfowl. (Section G-3)

Lucy Koenig wins Nebraska's "Take Pride in America" award. (North Platte Section)

Affidavit concerning the effects of water rights on the North Platte NWR presented to the U.S. Supreme Court. (North Platte Section)

Crescent Lake NWR offers first "Open House" to the public. (Section H-1)

Wetlands monitoring and evaluation techniques initiated in 1988. (Section F-2)

A five mile self-guided auto tour was established in 1988. (Section H-5)

#### B. CLIMATIC CONDITIONS

Precipitation was 11% above normal with a total of 18.43 inches. This is the second year in a row that the refuge has received above normal precipitation. May was the wettest month with a total of 7.06 inches of precipitation. Above average precipitation was also recorded during the months of January, July, and August. The driest months were April (1.23" below average) and October (.71" below average). The majority of snowfall was received in January with little recorded during the final months of the year. Temperatures during 1988 were just slightly above normal. The greatest deviation from the normal monthly average occurred during December (Table 1).

Table 1. Crescent Lake NWR Weather Summary

	Precipitation (inches)			Snow Fall	Temperature °F			
	<u>1988</u>	<u>1987</u>	<u>Normal</u>		<u>Max.</u> <u>1988</u>	<u>Min.</u> <u>1988</u>	<u>Ave.</u> <u>1988</u>	<u>Normal</u> <u>Ave.</u>
JAN	0.53	0.03	0.32	11.8	51	-25	16	21.6
FEB	0.09	1.42	0.30	3.9	62	-20	22	27.6
MAR	0.50	1.17	1.06	9.5	79	- 5	36	36.5
APR	0.66	0.69	1.89	3.5	83	13	45	47.0
MAY	7.06	8.06	3.10	-	87	30	58	55.0
JUN	2.06	1.62	2.74	-	98	48	71	65.2
JUL	4.07	1.94	2.21	-	97	51	72	72.4
AUG	1.89	3.51	1.43	-	95	38	71	70.2
SEP	1.09	1.75	1.45	-	94	34	59	60.3
OCT	0.12	0.46	0.91	-	82	12	47	48.2
NOV	0.14	0.72	0.75	Trace	74	4	37	33.3
DEC	0.21	0.56	0.35	Trace	65	-10	34	24.6
Annual totals:					Extremes:		Averages:	
	<u>18.42</u>	<u>21.93</u>	<u>16.51</u>	<u>28.65</u>	<u>98</u>	<u>-25</u>	<u>47</u>	<u>46.8</u>

The last spring frost was recorded on May 4 and the first fall frost occurred on October 8. Refuge lakes froze over in early December. Warmer temperatures, however, caused small areas of open water to appear on several lakes throughout the month. Annual snowfall for the year was 28.65 inches, with the majority of snow falling in January and March. Trace amounts of snow were recorded in November and December, however no snow cover was on the ground at year's end.

The refuge staff continued to gather weather data from monitoring sites set up by the National Weather Service and the U.S. Geological Survey. Weekly measurements of wind velocity, temperature, humidity, and precipitation were gathered from sites near Island Lake and daily temperature and precipitation measurements were recorded at Refuge headquarters.

#### D. PLANNING

##### 1. Master Plan

In response to Mr. Dunkle's memorandum of December 1, 1987, parts 1 (background statement) and 2 (operating statement) of a Station Plan were drafted for both Crescent Lake NWR and North Platte NWR. The intent of this endeavor is to keep future planning simple and at the same time provide continuity and priorities for each refuge.



## 2. Management Plan

The following items were written and submitted to the RO during the year:

- Public Use Management Plan for North Platte NWR.
- Sign Plan for Crescent Lake and North Platte NWRs.
- Biological plans and control charts for the grazing program on Crescent Lake and North Platte NWRs.
- Fire Management Activity Scheduling
- Work Activity Plan
- Pesticide Use proposals
- Prescribed Burn Plan
- Water Management Plan

## 3. Public Participation

In an effort to improve the public understanding of refuge objectives and management goals, specifically for the grazing program, the refuge hosted a two day Holistic Resource Management (HRM) Workshop on January 5-6. Facilitated by Roland Kroos, Northern Plains Regional Director for the HRM Center, the workshop was attended by 30 neighboring ranchers, permittees and Service personnel. The workshop permitted and encouraged dialogue, exchange of opinions, explanation of controversial matters, planning for the achievement of goals and an optimistic view of the future. Very positive feedback was received from permittees and others in attendance with requests for future workshops of that nature.

## 5. Research and Investigations

### Crescent Lake NR-88: Ecology of the Yellow Mud Turtle (64510-81-1)

The lead researcher for this study is Dr. John Iverson, Earlham College, Indiana.

The yellow mud turtle has been reported in the Nebraska Sandhills since the 1940's, however, early investigators thought it was an introduced population because the Sandhills were far removed from the turtles known range. More recent fossil evidence suggests that the turtle naturally occurs in western and northern Nebraska. This study was initiated to determine the species range in Nebraska and to document its basic demography.

Yellow mud turtles are collected for study during their spring migration from nearby sandhills to Gimlet Lake. The turtles are intercepted by a 900 meter drift fence (30 centimeters high) with can and funnel traps.

The wet, warm spring of 1988 provided optimum mud turtle growth and activity. Iverson captured 1,221 individual mud turtles a total of 1,620 times, including 500 previously unmarked turtles. This year was another good one for recruitment of young turtles. Included among the new captures were 258 first year turtles, compared with 340 in 1986, 72 in 1982 and only 22 in 1983. Over the past eight years, Iverson has marked a total of 1,702 turtles and accumulated 5349 total captures. Virtually all mud turtles less than 17 years of age are now accurately aged.

Growth rates over the past three years (1986-1988) have been very rapid. During the eight years of study 1987 and 1988 produced the most growth, followed by 1986 and 1983 with good growth, 1984 with reasonable growth, 1985 with very little growth, and 1981 and 1982 with almost no growth. Growth rate is related primarily to precipitation, but also to temperature if there is adequate moisture. Thus, wet, warm years produce the most growth and dry years result in little growth. Iverson also obtained more precise data on age at maturity, which averages about 10 years (normal range 9-12) for females in Gimlet Lake, but 12 to 16 years in females inhabiting the pond in the willows east of Mallard Arm. The difference is due to the fact that the pond normally dries up by early July, forcing the turtles to begin estivating (and thus stop feeding) before those in Gimlet Lake.

Radio transmitters were used to follow 14 females through nesting. Nests were flagged so they can be relocated next March to check egg fertility and winter survivorship rates.

**Crescent Lake NR-88: The Natural History of the Bullsnares on Crescent Lake National Wildlife Refuge (64510-87-1)**

In order to gain additional insight into the primary waterfowl production inhibitor on the refuge, the bullsnares, Dr. Iverson has agreed to include as part of his work the study of bullsnares feeding and reproductive behavior. Iverson began this study of the bullsnares during the 1987 field season. During 1988, 130 bullsnares were captured along the Smith Lake drift fence (66), the Gimlet turtle fence (52), and incidentals (12) along refuge roads. All snakes were dissected for diet and reproductive tract analysis, and were weighed and measured as soon after capture as possible. Six females were kept alive until they oviposited.

Based on the presence of enlarged ovarian follicles, female bullsnares mature at body lengths between 85 and 90 cm. Based on the presence of enlarged testes or epididymis with

sperm, males mature at virtually the same size. Unlike many northern populations of snakes, all adult female bullsnakes reproduce every year. Iverson has never found an adult female that was not reproductively active.

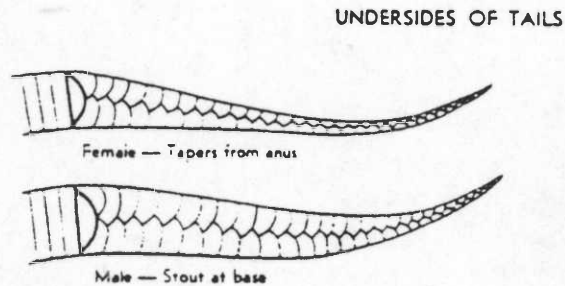


Figure 1. Bullsnakes can be quite reliably sexed in the field by comparing the width of the body just anterior to the anus to that immediately posterior to it.

Bullsnakes emerge from hibernation (presumably in burrows up on the sandhills) and immediately begin feeding and mating. Iverson has only observed courtship or mating during late April or early May on the refuge. At the time of mating the follicles in the ovaries that will represent the year's egg clutch have already begun enlarging. Sperm is stored in the female's oviduct while the follicles continue increasing in size. The follicles are ovulated in early June, and the eggs are fertilized as they move down the oviducts, prior to being shelled. Egg-laying in nature apparently takes place in mid-June; females captured in mid-May and held in captivity did not nest until late June and early July, the delay presumably because of the disturbance due to capture. However, a female captured on June 8, 1988 laid eggs in captivity on June 23, confirming the mid-June nesting period. A mid-June nesting time is also reflected in the temporary drop in female captures in the field at that time. Bullsnake nesting sites are unknown, but are presumably within burrows excavated by rodents or the snakes themselves.

Incubation takes about 60 days in captivity, and hatchlings average 33.7 cm snout-vent length. In nature hatchling snakes are active from mid-August well into the fall. Based on the number of enlarged ovarian follicles or the actual number of eggs laid, clutch size ranged from 7 to 13 for females from the refuge. Clutch size tends to increase with female size, with an average increase of one egg for every 10.5 cm increase in snout-vent length.

Gutzke et al (1985) reported that sex ratio is highly male-biased in adult as well as hatchling bullsnakes from Valentine Refuge. This finding differs from what has been found for nearly all snake populations that have been adequately studied. Their finding of more adult males than females is apparently an artifact of sexual differences in activity levels. Although general activity in bullsnakes is correlated with warm temperatures, males are apparently more active (and thus more likely to be caught) from mid-April to mid-May, but females and males are equally active from mid-May to early June. In mid-June, males again are more obvious, since females are nesting. Following nesting, females are again as abundant, if not more so, than males. Imler (1945) reported this same sexual difference in relative activity levels, and Iverson's data on weekly changes in the sex ratio of captured snakes made at the Gimlet fence support this pattern of activity. Thus, Iverson contends that Gutzke et al's (1985) report of male-biased sex ratios in adults is very likely only an artifact of biased sampling.

The role of chemoreception in snakes is very poorly studied and even less well understood. However, increasing evidence suggests that snakes have incredibly powerful olfactory capabilities. It is very likely that many snakes use odor trails to locate prey as well as mates. Bullsnakes excrete highly odorous musk upon disturbance or capture, but the functional significance of these secretions is unknown. Anecdotal observations made by Iverson suggest that secretions by females may serve as an attractant for males, or at the very least make it much easier for males to find females. Further study of pheromone and scent trailing in bullsnakes could prove a very rewarding endeavor to managers trying to capture bullsnakes for increased waterfowl production.

The frequency of snakes with gut contents varies with season and size. Juveniles are less likely to have food in their guts than adults, presumably because of the lower diversity of prey types available to them, and also their lesser experience with prey capture and handling. The frequency of snakes with food in their guts also tends to increase from April to June. This probably reflects the increase in prey populations as the season progresses.

Although it is often assumed that bullsnakes remove only a single waterfowl egg from a nest at a time, this is not always the case. Of six snakes containing bird eggs in their stomachs or intestines, three contained only one egg, two contained two eggs, and one contained at least six duck eggs. There is no evidence from the diet data that females



and males differ at all in their feeding habits; 82% of females with gut contents contained mammals, whereas 80% of males did.



Figure 2. Contrary to conventional wisdom, the bullsnake is now known to occasionally take multiple duck eggs during a visit to the nest. 1NR-88-BWM

Crescent Lake NR-88: Ecological Effects of Hydrology and Soil Parameters on Wetland Plant Associations at Crescent Lake NWR, Nebraska (64510-88-1)

Lead researchers for this study are Dr. Arnold van der Valk and doctoral candidate, Nanette Erickson, Department of Botany, Iowa State University, Ames.

Interrelationships among vegetation, soil, and hydrology parameters provide essential guidelines for delineation and management of important wetland types throughout the United States. Wetlands in the Sandhills that are associated with

the shorelines of shallow lakes are found in three different hydrological regimes: groundwater inflow regions, groundwater outflow regions and groundwater flow reversal regions. Each of these hydrological regimes, on the basis of field observations, has different plant communities associated with it. Since groundwater chemistry differs significantly from basin to basin, the plant communities in these basins vary in composition in response to these differences in groundwater chemistry. One of the first potential impacts of groundwater depletion in and around a wetland is a change in the local groundwater flows along the portions of the shoreline. Regions that had been inflow areas will become groundwater reversal areas and groundwater reversal areas will become outflow areas. This change in hydrology will alter composition of the plant communities of these regions, and probably will be the first readily visible sign of groundwater depletion.

Groundwater depletion via center-pivot irrigation is considered the major cause of wetland habitat destruction in the Sandhills where use of center-pivot systems has increased 1,746% since 1972. An estimated 1 meter depletion of the groundwater table depth will alter areal coverage and vegetation type of a Sandhill wetland, but no data yet exists to quantify the role of groundwater in maintaining these wetlands. Therefore, information is needed to understand the role of hydrology as it relates to wetland vegetation and soils in the Nebraska Sandhills. Researchers hypothesize that the composition of wetland plant communities is an indicator of local hydrological conditions in these wetlands and that it reflects both the direction of groundwater movement and groundwater chemistry. Researchers further hypothesize that areas with groundwater inflows are the most sensitive indicators of local depletions of the water table.

This research will document relationships among wetland vegetation, soils, groundwater chemistry, and local hydrology on Crescent Lake NWR. Specifically, the primary objectives are: (1) to establish the relationship between the composition of plant communities and the characteristics of associated soils along portions of a wetland basin that are areas of groundwater inflow, reversals, and outflow; (2) to determine the effect of differences in groundwater chemistry among wetland basins on the composition of wetland vegetation; and, (3) to describe the coenocline and soils along elevation gradients from the deepest portion of a wetland to the adjacent uplands for sections of wetlands with different local hydrological regimes and different groundwater chemistries.

During the 1988 field season, Erickson conducted a general vegetation survey of sixteen lake basins at or near the refuge. She set up 10 transects per lake. Sampling efforts were concentrated along north and south shorelines. End points of transects were placed in predetermined emergent and upland zones. Five  $1/2$  m<sup>2</sup> quadrats were sampled along each transect.

Vegetation was sampled from a total of 800 quadrats. Species within quadrats were identified and percent cover was estimated for each species; voucher specimens also were collected. All quadrat locations were marked with survey flags for later verification of soil types by the Soil Conservation Service. Erickson also selected sites and assisted with the installation of groundwater wells for use in the 1989 field season. Wellsites were chosen on the basis of ease of access and placement within discrete vegetation zones. Sixty-one potential wellsites were located, and eight were installed in August 1988. Remaining wellsites will be installed by the U.S. Geological Survey.

**Crescent Lake NR-88: Effect of Ground Water Recharge on Configuration of the Water Table Beneath Sand Dunes and on Seepage Lakes in the Nebraska Sandhills (64510-85-2)**

This study is the result of a 1979 cooperative agreement between the U.S. Fish and Wildlife Service (Service) and the U.S. Geological Survey (Survey) to study ground water in the Nebraska Sandhills, specifically on portions of Crescent Lake NWR. This agreement was revised in 1987 (Intra-Agency Agreement No. 14-16-0006-87-911(R)) to provide the Service with funding from the Survey in the amount of \$4,255 for each year of the study. This payment to the Service will be used to offset salary cost of personnel required to monitor data-gathering equipment and wells put in place by the Survey.

The principal researcher for this study is Tom C. Winter with the Survey.

This project is interested primarily in determining the interaction between selected lakes on the refuge and their contiguous ground-water systems. This includes determining the role of ground water in maintaining the size, depth, and chemical quality of these lakes, as well as the detailed pattern of seepage in the lakebeds. Researchers have chosen to concentrate on Island Lake as the primary lake of interest where they can measure as accurately as possible all water that enters or leaves the lake. While the major sources of water to the lake are precipitation

and ground water, evaporation is the major loss of water from the lake.

During the past year, eight wells were added to the biweekly well network. These wells, WT-42 through WT-49, are designed to facilitate Nanette Erickson's vegetation/groundwater research (64510-88-1). Three other wells were instrumented and connected to the data logger at the automated well array. Another change implemented this year was a switch from a printer at the automated well array to an electronic storage medium.

Crescent Lake NR-88: Effect of the Interaction of Ground Water and Lakes on Limnological Characteristic of Selected Lakes in the Nebraska Sandhills (64510-85-3)

This research was implemented in conjunction with the cooperative agreement of 1979 between the Service and the Survey to study ground water on portions of Crescent Lake NWR.

The principal researcher, James W. LaBaugh, is investigating the processes that control the supply of biologically important chemicals between lakes and wetlands and their watersheds, particularly for lakes and wetlands that have no streams entering or leaving them.

LaBaugh's objectives are to find answers to the following: 1) What is the relative contribution of ground water to supply and loss of biologically important chemicals in the lakes, 2) How does this contribution vary as a function of seasonal and annual climatic changes (wet versus dry seasons, wet versus dry years), 3) What is the effect of changes in supply and loss of biologically important chemicals on biota of the lakes, particularly the microscopic plants and animals in the lake waters, 4) What is the relation of the amount of plant nutrients (nitrogen and phosphorus) in the lakes to the amount of microscopic plant material (phytoplankton chlorophyll) found in the lakes, and 5) Is this relation affected by differences in salinity between the lakes.

During 1988, Island, Roundup, and Goose Lakes were visited at approximately monthly intervals between April and November. Samples were collected for chemical and biological analyses from each lake.

The largest value of salinity in Goose Lake in 1988 was less than the smallest value of salinity measured in the lake in 1986, and less than most of the salinity values measured in the lake in 1987. Values of salinity measured in Roundup Lake in 1988 were similar to those for 1987 but



less than values measured in the lake in late summer 1986. There was no distinct difference in values of salinity in Island Lake between 1986, 1987, and 1988. Differences between these three years in changes in salinity in Goose Lake appear to be related to changes in rainfall from year to year.

Seasonal changes in concentration of nitrogen and phosphorus were independent of changes in salinity in all three lakes. Concentration of these nutrients were approximately the same each year in Roundup Lake between 1986 and 1988. However, in general, concentrations of total phosphorus in Island and Goose Lakes were smaller in 1987 than in 1986 and smaller in 1988 than in 1987. This same general trend occurred for concentrations of phytoplankton chlorophyll in Island and Goose Lake.

Plans for 1989 are to continue monthly sample collection at the three lakes when they are free of ice. Selected wells will be sampled on the same trips the lakes are sampled. Measurements of in situ pH, specific conductance, and temperature of all wells is planned.

Crescent Lake NR-87: Influence of Dune and Interdune Deposits, Structures, and Morphology on Infiltration, Flow in the Vadose Zone, Recharge, and Saturated Flow in the Western Nebraska Sandhills (64510-85-4)

This research was implemented in conjunction with the cooperative agreement of 1979 between the Service and the Survey to study ground water on portions of Crescent Lake NWR.

The principal researcher for this study is Kerry L. Keen, an advanced degree student at the University of Minnesota.

The objectives of this study are:

1. Description and mapping of surficial geology and geomorphology, with emphasis on eolian features, forms, deposits, and internal structures.
2. Characterization of the hydrologic properties of dune and interdune deposits, with emphasis on their spatial variability and anisotropy.
3. Description of infiltration and flow through the vadose zone, with emphasis on the influence of hard bands and anisotropy of eolian sediments.
4. Characterization of the recharge process in the Sandhills including consideration of the importance to

the recharge process of dune ridges, intradune and interdune depressions, and alluvial-sand fans.

The following is a summary of Keen's research findings to date:

1. Groundwater recharge occurs after major summer rainstorms (such as a 4 cm rainstorm on Aug. 31, 1986)
2. The pattern and timing of this recharge is complex. Automated water-level monitoring is necessary to measure this recharge.
3. Apparently recharge is highly localized in depressions, where the water table is at relatively shallow depth (<2 meters)
4. After heavy rainfall, water moves downward rapidly and can reach the water table beneath depressions in minutes to hours.
5. Infiltrating rain water apparently may not reach the water table beneath even small dune ridges. Instead the observed water level changes beneath dune ridges or slopes appears to be adjustments of the water table to significant recharge beneath shallow depressions.
6. The well (WT 28) in the lowest depression was automated for about 2 months in the summer of 1987. Whereas small rainfalls (<2 cm) caused very little or no recharge at most of the automated wells, the water level at well 28 experienced significant rises (10-20 cm) in response to each precipitation event. Apparently the soil remains wet in these depressions which allows water to efficiently pass downward after being concentrated in the depressions.
7. Recharge in the spring is somewhat different from summer storm recharge. Although recharge appears to begin first beneath depressions, infiltration apparently transmits water from dune ridges and slopes to the water table as well. In others words, recharge is more broadly distributed in the spring.
8. Recharge began in early March of 1987. Recharge from spring rains may be as important or more important than spring snowmelt recharge.
9. The pattern of groundwater flow at the automated well site apparently changes on a yearly cycle. From early summer until the following spring, flow is southwestward. This pattern changes very rapidly in

early spring with the spring recharge. Groundwater flow is reversed toward an easterly direction.

10. Hydrographs of non-automated wells for 1982-1987 display similar characteristics, but also differences.
  - a. All hydrographs show annual cycles characterized by recharge in spring.
  - b. Less than normal recharge is evident in 1982 and 1985 in most wells.
  - c. Hydrographs display either slight downward, upward, or level long-term trends.
  - d. Magnitude and variability of water-level fluctuations in a given well appears to be fairly consistent over time.

#### E. ADMINISTRATION

##### 1. Personnel

Lydia Jones transferred to Alamosa/Monte Vista NWR in June leaving the Refuge Assistant position vacant at Crescent Lake. The vacancy was filled by Bradley Johnson in October. Brad had been a temporary Range Technician at Crescent Lake NWR for the preceding three years.

Shaul and Koenig were notified of their selection as participants in the Department of Interior's random drug testing program. They were selected for their roles as heavy equipment operator and police officer respectively.

The intermittent Biological Aid position at North Platte NWR was terminated in 1988. Since the Refuge Officer position was filled in 1987, the bio-aid position has not been fully utilized. Sherry McCoy, who has filled the position for the past 10 years, will continue to be called upon to assist the refuge under a special needs appointment.



Figure 3. (l to r) RJI, MLS, BDJ, BWM, RRH. 2NR-88-GLW

#### PERSONNEL

1. Royce R. Huber, Refuge Manager GS-11, PFT
2. Bradley W. McKinney, Assistant Refuge Manager GS-9, PFT
3. Lydia M. Jones, Refuge Assistant GS-5, PFT  
Transferred 6/6/88
4. Bradley D. Johnson, Clerk-Typist GS-3, PFT  
EOD 10/9/88
5. Monte L. Shaul, Heavy Mobile Equipment Repairer WG-9, PFT
6. Richard J. Iwanski, Maintenance Worker WG-6, PFT
7. Felix V. Koenig, Police Officer GS-4, TPT
8. Gordon L. Warrick, Range Technician GS-5, TFT
9. Timothy G. Williams, Range Aid GS-3, TFT
10. Sherry K. McCoy, Biological Aid GS-3, TPT





Figure 4. (l to r) TGW, GLW. 3NR-88-BDJ

Table 2 shows the staffing patterns at Crescent Lake NWR for the past five years.

Table 2. Staffing Patterns at Crescent Lake NWR

<u>Fiscal Year</u>	<u>Full Time</u>	<u>Part Time*</u>	<u>Temporary</u>
1984	5	1	4
1985	5	1	4
1986	5	2	3
1987	5	2	3
1988	5	2	3

\*Assigned to North Platte NWR

Temporary help for the summer consisted of Brad Johnson, Range Technician (2/28/88 - 10/9/88), who assisted with biological activities and predator control; Gordon Warrick (3/28/88 - 11/25/88); who assisted with fence and windmill repairs, biological activities, and predator control; and Tim Williams (5/1/88 - 8/19/88), hired in part with transfer funds from the US Geological Survey, who monitored the ground water test well network and weather stations as well as assisting with biological activities and predator control. Gordon was also hired to fill a one month Special Needs appointment that ended 1/4/89. Brad, a rehire from 1987, and Gordon were also utilized as firefighters.

#### 4. Volunteer Program

Volunteers for 1988 included Father Daniel Christensen, Lana Huber, Connie McKinney, Cheryl Iwanski, Ty Gray and Dale Bremer.

Father Dan, as he is so affectionately called, was a great help in teaching the staff about the uses of the various software packages that were installed on the refuge computer. He also spent a great deal of time installing and updating software packages as needed. He was a real asset in helping the staff enter the computer age.

With Lydia Jones' impending transfer to Alamosa/Monte Vista looming, refuge volunteer Lana Huber donated much of her time learning the many aspects of Lydia's position. Lana's volunteer effort proved invaluable during the transition period between Refuge Assistants. Lana assumed much of the responsibility for payroll, budget tracking and filing. Volunteers Connie McKinney and Cheryl Iwanski made Lana's contribution possible by assuming child care while Lana was at the office. For her volunteer contribution, Lana was awarded the Service's Volunteer Certificate of Appreciation.

The staff's wives also spent a number of hours cleaning the office and bunkhouse, doing artwork for various refuge projects, and saved many trips to town by picking up needed supplies.

Ty Gray, a research assistant working with Nanette Erickson (Section D-5), donated 48 hours of volunteer service to the refuge on those days when his help was not required by Miss Erickson.

Dale Bremer from Scotia, NE volunteered a day of haying public use trails while on the refuge visiting Gordon Warrick.

#### 5. Funding

This years budget was augmented by a \$40,000 ARMM project which has completed the first phase of an overall project to improve grassland management on the refuge. (Section F-5). The other funding levels were adequate to accomplish the necessary operations and maintenance needs of the refuge. A note of concern would be the drastic decline (34%) in one year of base funding (1261). Presently, 1261 funds cover permanent salaries only. Fixed costs are now coming out of maintenance (1262) and account for 95% of this fund.

Table 3. Funding Levels

	FY83	FY84	FY85	FY86	FY87	FY88
1210	160,000					
1220	13,000					
1240	8,000					
1260		171,000	169,000	170,000		
1261					227,850	151,000
1262					26,000	100,000
1510	1,768					
1520	7,500	9,000	9,000	3,000		
1971					4,225	4,225
2821	11,600					
6860	7,000	7,000	7,000	7,000	12,000	9,000
8610	5,000	16,000	16,000	13,313	12,587	10,700
ARMM		50,000	85,000	78,000		
TOTAL	213,868	253,000	286,000	271,313	282,662	274.955

FY87 & FY88 ARMM monies listed under Cost Code 1262

#### 6. Safety

The refuge enjoyed an accident-free year.

Monthly safety meetings were conducted throughout the year with safety topics discussed as shown:

Table 4. Safety Topics

<u>Month</u>	<u>Topic</u>
January	Safety belts
February	Aircraft pre-accident plan
March	Firefighting hand tools/shelters
April	CPR and step test
May	Blood donation risks/myths
June	Proper lifting techniques
July	Water safety
August	Heat exhaustion
September	Boat safety
October	Selection of smoke/heat detectors
November	Hypothermia
December	Home heating with wood

The station safety committee met quarterly to note, discuss, and abate safety related concerns. Safety related projects that were conducted during 1988 are as follows:

- The refuge chemical storage area was properly signed using the National Fire Protection Association signing standard.
- Domestic water wells (8) were tested for coliform and nitrates. Safe levels of each were found.
- The station aircraft Pre-Accident Plan and Hazards Map were completed and posted.
- All 67 refuge fire extinguishers were inspected.
- Grab bars were installed in both office restrooms.
- In April, all employees were certified in CPR and First Aid. The annual steptest was administered to applicable personnel.
- A contractor removed several "widow-maker" limbs from the administrative complex.
- Fire shelters were inspected for proper protective liner and obvious deterioration or cracks.
- A certified solid fuel technician provided a safety inspection and cleaning of 5 refuge wood burners and chimneys.
- All entrance auto-gates were painted "safety" yellow.

#### 7. Technical Assistance

Technical assistance was provided to the US Geological Survey, the National Weather Service, the Nebraska Game and Parks Commission, the General Accounting Office, the Regional Solicitor's Office, and Cornell University.

Assistant Jones, Range Aid Williams and Clerk Johnson monitored groundwater test wells in two ongoing Survey projects. These projects consist of 76 wells and five staff gauges. Twenty-five (25) of these wells are monitored on a quarterly basis with data being forwarded to the USGS Nebraska State office in Lincoln, Nebraska. The remaining wells and staff gauges are monitored bi-weekly from March to November with monthly monitoring during the winter months. Ten of the bi-weekly wells are electronically monitored and are manually checked monthly.

In addition to the ground water test wells, refuge staff also monitor a radiometer, located at the refuge headquarters, which records long and short wave radiation, a land weather station located near Island Lake and a raft weather station anchored in Island Lake. The land station records rainfall and humidity while the raft station logs wind speed, surface water temperature, air temperature and humidity. This data, along with the test well readings, is

gathered as part of a study designed to help understand groundwater fluctuations and their relationship to surface wetlands (Section D-5).

In conjunction with the National Weather Service, refuge staff record year round daily high and low temperatures as well as precipitation and snow depth.

Production information was collected in conjunction with the NG&PC on upland game birds. Harvest data on deer and antelope was collected and forwarded to NG&PC personnel. The refuge serves as a big game check station for the NG&PC and all big game harvested on the refuge must be checked in at headquarters. Grouse wing collection boxes were placed at refuge entrances with wings enclosed in envelopes provided by and forwarded to the NG&PC (Section H-8). In addition refuge personnel conducted a Canada goose/trumpeter swan survey in cooperation with the NG&PC.

The National Wildlife Federation Annual Eagle Census was conducted along the North Platte River by refuge personnel. The route covers 20 miles of river bottom and 30 miles around Lake McConaughy along with the three units of the North Platte NWR.

A breeding bird survey was conducted by refuge personnel with data being forwarded to Cornell Laboratory of Ornithology. The route used on the survey begins on Crescent Lake NWR and covers 25 miles on and off the refuge.

In response to a request from the Regional Solicitor's Office Huber provided the Solicitor's Office with an affidavit concerning impact on the North Platte NWR as a result of a lawsuit between the States of Wyoming and Nebraska over water rights in which the USFWS is a principal to the case.

The refuge completed and submitted a request for information made by the General Accounting Office (GAO) concerning the compatibility of refuge uses to the original and primary objectives of the refuge.

#### 8. Other Items

Various meetings and training sessions were attended by refuge personnel including:

Huber        -40 hour LE refresher in Marana, AZ - February  
              -Pathfinder Irrigation District - March  
              -Pheasants Forever organizational meeting at  
              Oshkosh, NE - March



- HRM Grazing Program meeting at RO with Steve Berlinger and Ned Peabody - April
- First Aid/CPR refresher - April
- Garden County Commissioners re Presentation of revenue sharing check - May
- Project Leaders meeting at Alamosa/Monte Vista NWR, CO - August
- Waterfowl/Island management symposium in Jamestown, ND - September
- Semi-annual LE requalification at Valentine, NE - September
- Ducks Unlimited meeting and banquet at Alliance, NE - December
- Antelope restoration meeting at Alliance, NE - December

- McKinney
- 40 hour LE refresher in Marana, AZ - February
  - Pheasants Forever organizational meeting at Oshkosh, NE - March
  - First Aid/CPR refresher - April
  - S-390 Fire Behavior training at Valentine, NE - August
  - Project Leaders meeting at Alamosa/Monte Vista NWR, CO - August
  - Semi-annual LE requalification at Valentine, NE - September
  - Ducks Unlimited meeting and banquet at Alliance, NE - December
  - Antelope restoration meeting at Alliance, NE - December

- Johnson
- First Aid/CPR refresher - April
  - WordPerfect 5.0 training at RO - December
  - Ducks Unlimited meeting and banquet at Alliance, NE - December

- Shaul
- 40 hour LE refresher in Marana, AZ - February
  - Semi-annual LE requalification at Valentine, NE - September
  - First Aid/CPR refresher - April

- Iwanski
- Pheasants Forever organizational meeting at Oshkosh, NE - March
  - First Aid/CPR refresher - April
  - Antelope restoration meeting at Alliance, NE - December

Koenig     -40 hour LE refresher in Marana, AZ - February  
              -Pathfinder Irrigation District - March  
              -Oregon Trails Day celebration and parade in  
              Scottsbluff, NE - July  
              -Semi-annual LE requalification at Valentine, NE -  
              September  
              -First Aid/CPR refresher - April

Warrick    -Basic Firefighting course at Fort Niobrara NWR,  
              Valentine, NE - April

Take Pride in America accomplishments for 1988 included:

Huber was the keynote speaker at the North Platte Natural Resource District's annual awards banquet in Oshkosh, NE in February. He discussed resource management and soil conservation.

In recognition of "National Wildlife Week", the refuge presented a slide program entitled "Forests Are More Than Trees" to the Goose Lake School and other refuge guests. The "Take Pride in America" theme was also incorporated into the program.

The first annual Refuge Open House was held in April. "Take Pride in America" leaflets, litter bags, and bookmarks were made available to Open House visitors.

In recognition of "Take Pride in America" month, the campaign to "promote participation by individuals, organizations and communities in caring for public lands and resources", the refuge forwarded copies of the North American Waterfowl Management Plan to sportsmens clubs throughout Nebraska soliciting their participation. As a result, the refuge was contacted by Cabela's, Inc. of Sidney, NE, a nationally known sporting goods outlet, asking for more information. A program dealing with the National Wildlife Refuge system, as well as projects at Crescent Lake NWR, was presented to Cabela's officials by Huber and McKinney. The company expressed an interest in assisting the refuge on certain projects.

Official visitors to the refuge in 1988 included the following:

Manager Al Trout and Assistants, Rick Potter and Alice Hanley from Rainwater Basin WMD visited the refuge to discuss various management techniques involving thistle control, and grassland and grazing (HRM) management - June

Frederick Chevallia, a Service volunteer from France, spent two days touring Crescent Lake Refuge with escort Maury Wright, Staff Specialist, RO, before heading to Grand Island where Chevallia worked with Ecological Services - July

#### F. HABITAT MANAGEMENT

##### 1. General

Crescent Lake National Wildlife Refuge is located near the southwestern edge of the 20,000 square mile Nebraska Sandhills. The refuge is also at the eastern edge of the Nebraska Panhandle and is characterized by a continuous grass-forb covered succession of dunes and swales. Where the swales dip below the water table, subirrigated meadows, marshes and lakes have formed. In most cases no stream systems exist between wetlands. Many lakes are maintained solely by underground water sources, often including springs (Figure 5).



Figure 5. The refuge is characterized by a continuous grass-forb covered succession of dunes and swales. 4NR-88-GLW

The refuge consists of 45,818 acres which includes 37,453 acres of native prairie grasslands, 4,755 acres of type II fresh meadows, 1,156 acres of type III shallow fresh

marshes, 309 acres of type IV fresh marshes, 2,033 acres of type V open fresh water, 70 acres of noncommercial tree groves, 10 acres of brush and 34 acres of administrative lands including 12 miles of roads.

Habitat conditions on the refuge are beginning to show gradual improvement aided, in part, by high intensity, short duration grazing.

The total number of grazing permits have dwindled from an original 43 to the present two. Animal Use Month's (AUM's) have been reduced from an estimated 45,000 AUM's at the refuge's inception to this year's 2,803 AUM's.

Outside the refuge, habitat conditions vary with landowners. Grasslands are generally over grazed, although several ranchers have some rest rotation in select areas. Blowouts of immense size are not uncommon in all directions from the refuge.

Wetlands off the refuge have been and are still being drained to allow haying and grazing of the meadows. This drainage along with a tremendous number of irrigation wells surrounding the western Sandhills have lowered the water table in some areas.

## 2. Wetlands

The 8,253 acres of wetlands at Crescent Lake are, for the most part, surface expressions of the ground water table. These basins were formed when scouring action of the wind removed sand from the swales and deposited it on the dunes. Where the swales dipped below the water table subirrigated meadows, marshes and lakes were formed. Drought cycles subjected lake bottoms to wind erosion and were undoubtedly important in preventing the lakes from becoming filled by sand. With a shift in the prevailing wind direction, valleys were blown closed, clogged by the same sands that created them. Thus hills exist today dotted with numerous small lakes and marshes, few with an inlet or outlet.

Water levels usually cycle naturally during the year with reasonably high water levels in the spring, low levels in the summer and fall and a gradual rise in the winter. A noteworthy increase in lake levels occurs in the fall after the first killing frost when evaporation and transpiration slow down and irrigators stop their center pivot irrigation systems. Lake levels generally followed this pattern in 1988 with some of the temporary wetlands retaining water throughout the year. Statistical values for the larger refuge wetlands are shown in Table 5.



Table 5 Basic Lake Data: Crescent Lake National Wildlife Refuge

Lake	Surface Elev.		Type Drainage	Surface Ac.		Ac/ft M. Cap.	Depth	
	Avg.	Max.		Avg	Max		Avg	Max
Martin	3843	3845.5	O	62	90	180	3.5	6.0
S. Martin Subimpoundments	-	-	O	7	7	9.33	2.0	4.0
Ramelli	3837	3839	O	31	48	.64	2.5	4.0
Smith	3835	3839	O	210	310	878.33	4.5	8.5
S. Smith Subimpoundments	-	-	O	7	7	9.33	2.0	4.0
Border	-	-		(15)	(20)	(26.66)		
	3836	3837.7	C	32	40	53.33	2.0	4.0
E. Border Subimpoundments	-	-	O	7	14	18.66	2.0	4.0
Perrin	3827	3829	O	30	80	133.33	3.0	5.0
Redhead	3818	3820	O	7	20	33.33	3.0	5.0
Upper Harrison	3818	3820	O	15	33	88	5.5	8.0
Lower Harrison	-	-		(5)		(10)		
	3814	3815.5	P.O.	100	100	200	3.0	6.0
West Jones	3799	3801.0	O	26	36	60	3.0	5.0
Lost	-	-	C	17	-	17	1.5	3.0
Blue	-	-		(80)	-	(478.66)		
	3782	-	P.O.	288	-	1,728	6.5	18.0
Hackberry	3791	-	C	375	-	1,500	5.0	12.0
Island	3790	-	C	711	-	1,659	3.5	7.0
Crane	3786	-	C	128	-	256	3.4	6.0
Christ	3796	-	C	26	-	30.33	1.5	3.5
Roundup	3801	-	C	144	-	264	3.0	5.5
Gimlet	3806	-	C	91	-	151.66	3.0	5.0
Shafer	3814	-	C	41	-	68.33	3.0	5.0
Goose	3823	-	C	364	-	667.33	3.2	5.5
Deer	3799	-	C	176	-	176	1.8	3.0

Capacity =  $\frac{\text{M. Surface Ac.} \times \text{M. Depth}}{3}$ 

O - Open

P.O. - Partially Open

C - Closed

Bureau of Reclamation formula for stock water ponds.



Management objectives are (1) to provide and enhance wetlands for wildlife, specifically National Species of Special Emphasis, (2) maintain and enhance wildlife and plant diversity, and (3) provide opportunities for compatible wildlife oriented recreation and interpretation.

In the past efforts to enhance waterfowl production were to protect wetlands. Lakes and marshes were fenced to control grazing pressure. Over the years many of these shallow lakes evolved into wetlands choked with emergent vegetation, predominately hardstem bulrush.

In an effort to alleviate this problem, the refuge has at various times in the past conducted prescribed burns. Although some of these burns were successful in opening up the shorelines, the effect was short lived. Prescribed burning in the Sandhills is politically perilous and logistically demanding. Ideal fuel and weather conditions seldom coalesce and the refuge has seldom been able to burn areas under prescription.

Another method in our attempt to control vegetation was the use of herbicide. In 1985, several refuge lakes, choked with emergent vegetation, were sprayed with the herbicide Rodeo. Cattails were reduced, however, it had little effect on bulrush, which is the dominant emergent plant.

Periodic crowd grazing of refuge lake margins holds promise of reducing dense emergent vegetation along the edge. However, this technique does little to help those lakes that are nearly covered with emergent vegetation. Also, this practice is viewed with skepticism by permittees due to the threat of bovine footrot and insect problems.

In 1983, the refuge began to rehabilitate and upgrade a system of ditches and wooden water control structures which when completed would assist in the control of water levels and, theoretically vegetation. Some of these ditches and structures originate from 1915 when private landowners attempted to drain the Moore Valley lakes for agricultural purposes. A major portion of the rehabilitation by the refuge was accomplished in 1985 and 1986 with efforts continuing in 1987 and 1988 (See Section I-1 & 3). To further the refuge's ability to manipulate water levels in the Moore Valley lakes a 1985 easement with a private landowner (Eldred) provided for the delivery of up to 13 cubic feet per second (c.f.s.) of fresh water to the refuge (See Section F-11). This supply of spring water provides

several benefits--one of which is to flush the salts from alkaline lakes located in the south portion of Moore Valley. These lakes are typical of lakes with high alkalinity, almost devoid of suitable vegetation.

Wetlands outside of Moore Valley benefited from two years of above average rainfall, which kept spring water levels higher and water longer than normal. Precipitation was 18.43 inches during the year, 11% above normal. May was the wettest month with a total of 7.06 inches of precipitation. Above average precipitation was also recorded during the months of January, July, and August. The driest months were April (1.23" below average) and October (.71" below normal).

Management of lakes and wetlands in Moore Valley, which includes Martin, Ramelli, Smith, Bean Crossing, Perrin, Redhead, Upper Harrison, West Jones and Duck Slough, was substantial this year with most of these areas in the early stages of renovation or being renovated. All other refuge lakes and wetlands are in a closed water system and no manipulation was planned or conducted in these areas in 1988.

In order to gauge the effectiveness of the wetlands management program in Moore Valley, an intensive system of wetlands monitoring and evaluation techniques was initiated in 1988. These nine wetland complexes, totaling approximately 500 surface acres, are being monitored and evaluated on the following observations:

- Bi-weekly wildlife surveys will be conducted at each of the 9 wetlands units. Duck, goose, endangered species, and other migratory bird use-days and waterfowl production will be tabulated for the calendar year.
- Vegetative transects will be conducted during July. Vegetative species, an abundance percentage factor, and seed production will be recorded by the observer walking/wading linear transects and using a square meter quadrat every 20 paces (approximately 60 feet) (Figure 6). A sketch of the wetland as it appears on the date of the transect will be made showing open water, heavy vegetative concentrations by species, transect line, control structures, goose tubs and other noteworthy features.



Figure 6. The table has been set--now taking a closer look at the menu. 5NR-88-BWM

- Bi-weekly water level gauge readings will be recorded, converted to average water depth, and charted for the year.
- Annual aerial photos of these wetlands will be taken each fall (Figure 7).

Additional observations to be monitored beginning in 1989 include several water quality variables (i.e. pH, alkalinity, hardness). Annual observations will be recorded on individual Wetland Unit Evaluation forms.

A synopsis of the management accomplishments are listed as follows:

#### Martin & Ramelli Lakes

These lakes were in drawdown in 1983 and 1984 and allowed to naturally fill throughout 1985. In March of 1986, a private lake immediately north of the refuge was pumped into Martin and Ramelli Lakes placing the water elevations in both lakes at near maximum capacity. During 1987 and 1988, water in these lakes was held at the maximum levels that natural spring and watershed runoff would permit. The objective of this water regime is to open the dense stands of cattail and bulrush in these lakes and create a better interspersed area for waterfowl.





Figure 7. Annual aerial photos will provide documentation of wetland dynamics -- Martin Lake. 6NR-88-RRH

#### Smith Lake

This lake was partially drained in 1985 when the new water control structure was built. It has been held at the maximum permissible water levels in 1986, 1987 and 1988. The objective of this water regime is to improve interspersation in this lake. Erosion and seepage around the structure have been a problem since construction. In 1987, one hundred fifty yards of dirt, 500 pounds of bentonite and twenty-five tons of rip-rap were placed to correct this problem. In 1988, an additional two hundred yards of dirt was placed to correct erosion damage near the water control structure.

#### Bean Crossing

A four foot water control structure with wing walls was constructed at this site late in 1987. The placement of this structure rectified the drainage of several wetlands when the Moore Valley drainage ditch was dug in the early 1920's. This structure is now functioning at full capacity which will reestablish a portion of the former wetlands.

### Perrin Lake

This lake was put in drawdown late in 1985 and remained in drawdown throughout 1986-1987. This action stimulated sufficient moist soil plant growth to permit the reflooding of this lake in early 1988. Water levels were manipulated to vary from 4" to 12" during the spring, gradually decreasing in depth throughout the summer. Good growths of sago, chara, and bulrush were experienced and utilized by heavy concentrations of waterfowl during the spring and fall.

Two islands built in 1986 have been very productive sites for American avocets. During the vegetative survey in 1988, 20 avocet nests were observed on these islands.

### Upper Harrison & Redhead Lakes

These lakes were put in partial drawdown late in 1985 and remained in partial drawdown throughout 1986, 1987, and 1988. The gravity drawdown of Upper Harrison is limited by the downstream lake (Lower Harrison) which is located primarily on private land. Vegetative enhancement has been very limited in Upper Harrison and this trend will continue until FWS has water management control of Lower Harrison. Lower Harrison is one of the lakes that will be affected by the proposed Eldred lake easements (Section F-11). In 1986 Upper Harrison Lake was pumped utilizing a 16" Crisafulli pump to achieve a complete drawdown which resulted in the winter kill of all rough fish in the lake. Due to severe water and wind erosion 500 yards of the Upper Harrison control levee was upgraded in 1987. Approximately 2,700 yards of dirt and 200 tons of rip-rap were placed along the windward side of the levee.

### West Jones Lake

In 1986 West Jones Lake was the only lake completely within the refuge boundary to contain a population of carp. In 1986 a bypass ditch was rehabilitated so that water contaminated with carp would bypass the lake. Additionally, 3/4 mile of outlet ditch below West Jones Lake was rehabilitated allowing West Jones Lake to be placed in drawdown. This drawdown allowed for the removal of rough fish and during 1987 stimulated moist soil vegetation. In 1987 a seven foot water control structure with wingwalls was constructed at the west side of the lake. In the fall of 1987 a one-quarter acre island was constructed in West Jones to serve as a nesting and loafing area for waterfowl. In 1988 water levels were manipulated to vary from 4" to 18" during the spring, gradually



decreasing in depth throughout the summer and again increasing in depth in the fall. The vegetation has responded well and continued manipulation of this area, in the same manner as 1988, will make this an attractive waterfowl area.

#### Duck Slough

This wetland was lost in the 1920's when natural drainage was lowered by the Blue Creek Irrigation District to allow passage of water from Swan Lake. An 11 foot water control structure was erected at the edge of this former wetland in 1988. The 1989 objective will be to reestablish this 30 acre wetland to improve pair and brood habitat for waterfowl and reduce soil erosion from spring runoff.

#### Eldred Diversion

In 1985 a construction and maintenance easement for approximately seven miles of ditches was obtained from Victor Eldred. In exchange for maintenance of the ditches the refuge obtained a water right for 13 c.f.s.

A Parshall water measuring flume was installed in the Diversion ditch in 1986. Average inflow for 1988 was approximately 2.27 c.f.s.. Over 60 million cubic feet of fresh water was diverted into the refuge during 1988.

Monthly lake elevations are recorded in Table 6 and flow readings from the Eldred diversion in Table 7.

Table 7. 1988 Monthly average flow readings (Parshall Flume) Eldred Diversion

Date	Flume Reading	Cubic Feet Per Second
1/88	.52	3.65
2/88	.65	5.11
3/88	.33	1.78
4/88	.28	1.38
5/88	.24	1.08
6/88	.33	1.78
7/88	.22	0.94
8/88	.24	1.08
9/88	.20	0.81
10/88	.32	1.69
11/88	.35	1.95
12/88	.39	2.30

Table 6. Monthly Lake Elevation for 1988

Lakes	Martin	Ramelli	Smith	Perrin	Upper Harrison	Island	Crane	Roundup	Hackberry
Jan	---	---	3826.00	Moist <sup>1</sup>	---	---	---	---	---
Feb	---	---	---	Moist <sup>1</sup>	---	3791.82	3787.30	3801.89	3782.49
Mar	3843.50	3838.16	3838.64	3825.84	3816.70	3791.86	3787.42	3802.05	3792.51
Apr	3843.65	3838.30	3838.70	3825.76	3816.70	3791.80	3787.40	3801.99	3792.49
May	3843.90	3838.68	3839.00	3826.20	3817.16	3791.94	3787.54	3802.19	3792.55
Jun	3844.30	3838.88	3838.46	3825.60	3816.58	3791.86	3787.34	3801.95	3792.37
Jul	3843.86	3837.74	3838.00	3824.90	3815.42	3791.70	3787.18	3801.82	3792.31
Aug	3843.70	3838.14	3837.86	3824.90	3815.10	3791.54	3787.08	3801.77	3792.29
Sep	---	---	---	---	---	3791.22	3786.68	3801.37	3791.89
Oct	3843.02	3836.36	3837.42	3824.80	3814.10	3791.14	3786.66	3801.27	3791.91
Nov	3843.06	3837.40	3837.50	3824.00	---	3791.22	3786.68	3801.35	3791.95
Dec	3843.18	3837.38	3837.74	3824.92	---	3791.18	3786.84	3801.39	3791.93

<sup>1</sup>Unable to read staff gauge

### 3. Forests

Crescent Lake NWR supports approximately 70 acres of trees. The refuge trees are limited to those around headquarters and small groves around Crane Lake, Hackberry Lake, Island Lake, Little Soddy, Lower Tree Claim, Seven Ponds, South Boyd, Roberts and Martin Lake.

In 1985-86, a total of four tree belts were planted around refuge headquarters. The plantings consisted of ponderosa pine, Austrian pine, red cedar, green ash, hackberry, honey locust, chokecherry, American plum, nanking cherry, cotoneaster, and buffaloberry. In addition to the plantings a drip irrigation system was installed to insure survival of the young trees in this arid weather and sandy soil. The tree belts were also fenced with a seven strand electric fence to reduce deer depredation on the saplings.

A combination of rodents (rabbits, mice), competition from weeds and unusual high water in low areas resulted in a moderate survival rate. In 1988 additional trees and shrubs were planted. Moisture tolerant species such as willow and Russian olive were planted in low areas, to replace those that succumbed to the elements. This year all saplings planted and all existing trees and shrubs were treated with Ro-Pel, a non-toxic animal repellant, to reduce rodent damage. Effectiveness of the repellant will be monitored.

### 5. Grasslands

Grasslands are the dominant feature at Crescent Lake NWR and comprise about 82% (37,453 acres) of refuge lands. The refuge grasslands have been delineated into five rangeland sites including choppy sands, sands, sandy, subirrigated meadows, and wetlands. Vegetation on these rangelands is typical of mixed prairie with interspersed forbs. Common grass species include prairie sand reed, sandhills muhly, switchgrass, Indiangrass, big bluestem, sand bluestem, green needle, needle and thread, and Kentucky bluegrass.

Management objectives for refuge grasslands are to increase vigor and diversity of tall warm season native grasses to provide optimum waterfowl nesting habitat in the subirrigated meadows. Objectives for grasslands deemed low priority for waterfowl nesting are to enhance vigor and extent of native species and to create a diversity in grassland habitats to accommodate a variety of wildlife species. Grazing, rest and burning are management techniques employed on refuge grasslands and a more complete discussion of each technique can be found in the appropriate sections (i.e., Sections F-7, F-8, F-9).



A new grassland monitoring technique was initiated this year to assist in the evaluation of the various habitat manipulation practices occurring on the refuge (Figures 8 & 9).

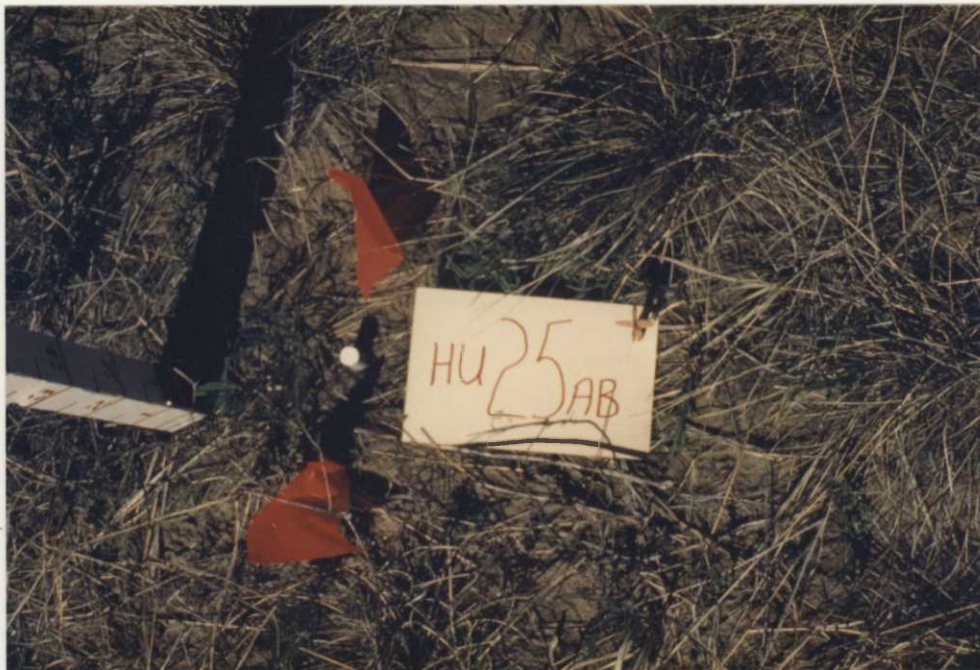


Figure 8. Features of the point sampling method are photos of both surface conditions .... 7NR-88-BWM



Figure 9. .... and landscape characteristics. 8NR-88-BWM

The point-sampling method of Savory (1986) along with visual obstruction readings and exclosures will be used in selected habitat units to provide base line data and habitat documentation.

## 7. Grazing

Prior to its inception and since that time, grazing has taken place on the refuge. When the refuge was acquired in the thirties, part of the purchase agreement stipulated that the sellers had the right to graze cattle for the next ten years. The only restrictions were that no more than 4,000 head of cattle could be placed on the refuge at any one time and certain meadows could be fenced out for waterfowl production. It has been estimated that nearly 45,000 AUM's were removed annually during those ten years and, as might be imagined, little was left of refuge grasslands. It was obvious that a reduction in grazing was necessary. By the 1960's permittees were utilizing 28,000 AUM's. More reductions were made so that by 1970 permittees were removing 19,000 AUM's. Reductions continued through 1988 when 2,803 AUM's were utilized by grazing during the year.

Major developments in the grazing program this year were a reduction in exposure time of any unit to grazing and the incorporation of a bid system to determine permittee and grazing rates on certain habitat units.

Refuge habitat units were geographically divided into 6 habitat cells and biological plans, following the guidelines of the Holistic Resource Management Center, were developed for each cell. A habitat treatment of short duration spring grazing was formalized and 3 habitat cells were advertized for public bid according to specifications delineated in the bid application form. Bids were accepted for Habitat cells #1 and #3. Habitat cell #2 did not receive a bid and was placed in rest for the remainder of the year. Permittees that were still an active part of the refuge grazing program were given a choice of bidding on habitat units or retaining their historic usage. Victor Eldred was the only permittee to retain his historic grazing usage of up to 1,863 AUM's at \$9.00/AUM, the 1988 grazing rate established by the Regional Office. As in past years, economic incentives were given to permittees, which in this case was only Mr. Eldred, to defray the cost of frequent moves, poor quality forage, nonuse of insecticides, reduced weight gains and for mismated cows and calves resulting from the frequent moves. In habitat cells #1 and #3 the bid system eliminated economic incentives because prospective bidders knew in advance the prescription, habitat conditions and location involved. Bids in these cells varied from \$0.00 to \$0.50 an AUM.



The planned, intensive whenever possible, short duration grazing treatment appears to be having a very positive effect on upland sites. Plants show more vigor and in some habitat units blowouts are starting to heal aided in part by two years of above normal rainfall (Figures 10 & 11).



Figure 10. The right combination of techniques will sometimes produce immediate results. (Early spring "blowout")  
9NR-88-RRH



Figure 11. (Late summer conditions after short-duration graze)  
10NR-88-RRH

Subirrigated meadow sites have responded extremely well in vegetative quantity (mostly cool season exotics) but not in quality (i.e. native warm season grasses). It is too early in the evaluation process to determine with certainty but it does appear at this time that subirrigated sites will have to be replanned to increase stress on cool season exotics so as to favor the reestablishment of more native warm season grasses.

A total of 2,803 AUM's were utilized on 18,553 acres for a receipt in revenue of \$6,844.86. (Table 8)

8. Haying

Tim Dietlien custom cut 362 bales of hay on the refuge near Goose Lake. The refuge used many of the bales for haying public use trails and mulching the new Duck Slough water control structure. The remaining hay will be used for winterizing windmills, goose tubs and protecting several roadside erosion areas.

9. Fire Management

Crescent Lake NWR has been using prescribed fire since the 1960's on small and relatively safe areas. Acceptance or tolerance of our burning program has been and continues to be a slow and careful process. The primary objective of our prescribed burning program is to reduce cool season exotic grasses and stimulate warm season grasses for producing vegetation favorable to nesting waterfowl.

In 1988, one annual prescribed burn plan totalling 8 acres was submitted to the regional office and approved. A spotty but desirable burn was achieved.

The second part of our fire management program involves wildfires and our active role in suppression. Lightning is the primary cause of wildfires throughout the sandhills. When conditions are right, each strike can be expected to produce a fire. With sufficient winds, low fuel moisture and low humidity, a wildfire is born. The refuge maintains one 300 gallon fulltime fire fighting unit. In addition, two 200 gallon slip-on pumper units are ready for immediate use during the fire season. The refuge also maintains four cooperative fire agreements with adjacent fire districts and one cooperative agreement with the U.S. Forest Service to provide mutual assistance in the event of a wildfire.

The refuge participated in the suppression of one 330 acre wildfire in 1988. Numerous times during the year refuge personnel were on standby to assist adjacent fire districts or asked to spot smoke during lightning storms.

Table 8. 1988 Grazing Summary

Habitat Unit #s	Period of Use	Stocking Numbers	Cattle Type	AUM's*	Acres	Animal Density	Days
(14)	4/25 - 4/28	390	Y	29.25	73	5.34:1	3
(15)	4/28 - 5/2	390	Y	39.00	70	5.57:1	4
(13)	5/2 - 5/6	390	Y	39.00	449	0.87:1	4
(10)	5/6 - 5/16	537	Y	123.26	240	2.24:1	10
(11)	5/16 - 5/23	537	Y	94.01	167	3.22:1	7
(09)	5/23 - 5/27	537	Y	53.72	546	0.98:1	4
(02)	5/27 - 6/1	537	Y	67.15	219	2.45:1	5
(03)	6/1 - 6/4	537	Y	40.29	64	8.39:1	3
(04)	6/4 - 6/7	537	Y	40.29	59	9.10:1	3
(15)	6/7 - 6/10	537	Y	40.29	412	1.30:1	3
(15)	6/10 - 6/13	537	Y	40.26	70	7.67:1	3
(14)	6/13 - 6/16	535	Y	40.13	73	7.33:1	3
(10)	6/16 - 6/20	535	Y	53.48	240	2.23:1	4
(11)	6/20 - 6/28	535	Y	106.96	167	3.20:1	8
(44)	5/13 - 5/18	972	C/c	101.25	2800	0.35:1	5
(51)	5/18 - 5/21	972	C/c	60.75	362	2.69:1	3
(50)	5/21 - 5/23	972	C/c	40.50	169	5.75:1	2
(58)	5/23 - 5/28	972	C/c	101.25	648	1.50:1	5
(59)	5/28 - 6/2	972	C/c	101.25	1626	0.60:1	5
(54A)	6/2 - 6/4	972	C/c	40.50	261	3.72:1	2
(54)	6/4 - 6/8	972	C/c	81.00	2119	0.46:1	4
(57)	6/8 - 6/15	996	C/c,B	143.75	2110	0.47:1	7
(56)	6/15 - 6/18	995	C/c,C,B	63.69	1658	0.60:1	3
(46)	6/18 - 6/21	994	C/c,C,B	63.70	184	5.40:1	3



Table 8. 1988 Grazing Summary

Habitat Unit #s	Period of Use	Stocking Numbers	Cattle Type	AUM's*	Acres	Animal Density	Days
(27)	4/26 - 5/9	383	Y	124.54	507	0.76:1	13
(25)	5/9 - 5/13	383	Y	38.32	100	3.83:1	4
(16G)	5/13 - 5/16	383	Y	28.74	80	4.79:1	3
(26A)	5/16 - 5/18	383	Y	19.16	90	4.26:1	2
(26B)	5/18 - 5/21	383	Y	28.74	100	3.83:1	3
(16F)	5/21 - 5/23	383	Y	19.16	328	1.17:1	2
(16C)	5/23 - 5/28	383	Y	47.90	640	0.60:1	5
(08A)	5/28 - 5/30	383	Y	19.16	90	4.26:1	2
(08B)	5/30 - 6/4	383	Y	47.90	105	3.65:1	5
(08C)	6/4 - 6/6	383	Y	19.16	105	3.65:1	2
(19)	6/6 - 6/10	383	Y	38.32	237	1.62:1	4
(18)	6/10 - 6/21	382	Y	105.05	222	1.72:1	11
(17)	6/21 - 6/24	387	Y,B	29.28	186	2.08:1	3
(06A)	6/24 - 6/28	403	Y,B	41.72	167	2.41:1	4
(06B)	6/28 - 7/1	403	Y,B	31.29	168	2.40:1	3
(18)	5/4 - 5/10	998	C/c	124.74	222	4.50:1	6
(17)	5/10 - 5/13	998	C/c	62.37	186	5.37:1	3
(06)	5/13 - 5/18	996	C/c	103.75	335	2.97:1	5
(30)	5/18 - 5/27	994	C/c	186.39	330	3.01:1	9
(29B)	5/27 - 5/31	984	C/c	82.00	550	1.79:1	4

\* Straight item computation cannot be made due to some cattle manipulation during the grazing period.

## 10. Pest Control

Weed control for both refuges will be addressed in this section. In past years the refuge reimbursed the Garden and Scottsbluff County Weed Control Agent approximately \$500 each year for their efforts in controlling Canada thistle, a state defined noxious weed. Although these efforts never eradicated this noxious weed, it did maintain a harmonious relationship with the county and allowed us to redirect any noxious weed complaints to the agent.

In 1988 the concerns for the long term ill effects of pesticides lead the FWS Regional Office to emphasize other methods of weed control.

The Regional Office did not approve the use of any pesticides on either Crescent Lake or North Platte NWR in 1988. The county weed boards were notified of this policy change and a volume of information was transferred back and forth between the refuge and weed board agents. This involvement was positive and generally the boards were satisfied with our other methods of weed control during the year. However, the old adage "No pain, no gain" certainly applied to this year's attempt at complying with state weed laws. With two moist growing seasons back-to-back, this years noxious weed problem was the worst to date with new patches located daily.

The primary methods of control were mowing and grazing/molasses application. Three forms of molasses (liquid, block and granular) were used in grazing units to attract cattle to either eat or trample the weed. The only form that produced favorable results was block molasses (Figures 12 & 13).

When placed in clumps of thistle one block would cause 382 yearlings to affectively trample all vegetation within a 40 foot radius. However, this method is not practical in those units that have a few thistles scattered over a wide area. Hand application of liquid molasses (using roller brush and extension handles) produced minimal results (Figure 14). Very few coated plants showed signs of trampling and fewer yet were bitten. One hundred pounds of granular molasses scattered about in thistle patches produced no visible results. It should be noted that the molasses treatments were conducted mid to late June with yearlings that were unaccustomed to molasses. It is possible that more favorable results would have been achieved if application would occur earlier in the season and with cattle that are accustomed to molasses supplement.





Figure 12. Molasses blocks .... 11NR-88-BWM



Figure 13. .... were an effective control method on small patches of thistle. 12NR-88-BWM



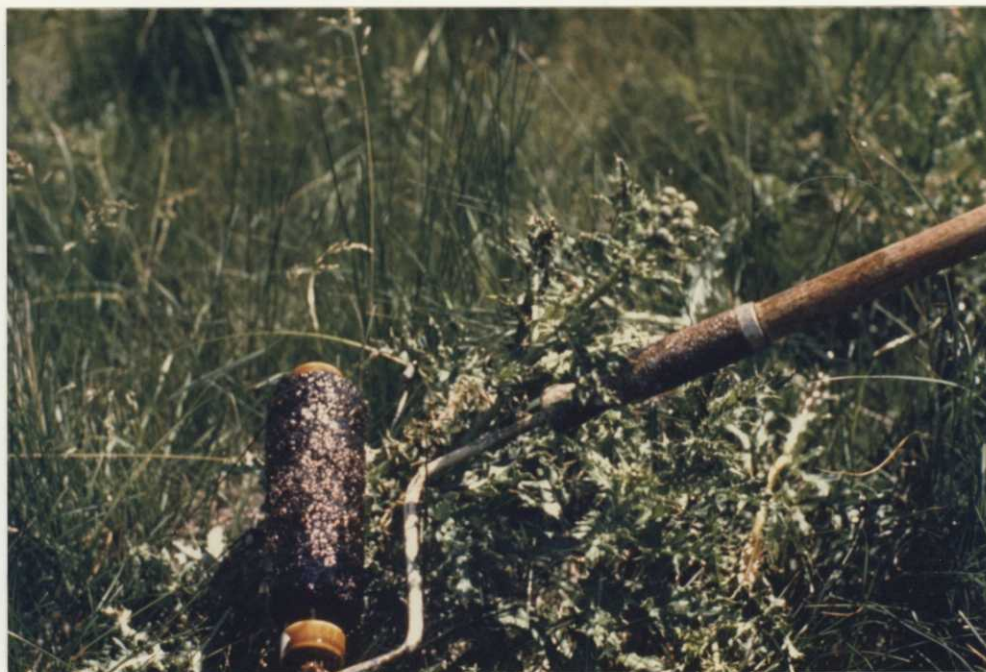


Figure 14. Salad Dressing (liquid molasses)? 13NR-88-BWM

Mike McCoy, Superintendent, Minatare State Recreation Area, made available a tractor/mower which Koenig kept busy cutting thistle on the Lake Alice and Winters Creek Units. Williams, Warrick and Johnson made two overnight trips to the North Platte refuge to hand cut thistle in and around trees that was inaccessible with the mower. Total funds expended on thistle control, including salary, fuel receipts, lodging, weed-eater rental and molasses was approximately \$3,000.

The refuge has requested information from Biological Control of Weeds, Bozeman, MT, a firm that deals in insects, concerning weevils that attack Canada thistle. Literature was received and the refuge is on the waiting list for these weevils.

Leafy spurge, also a state noxious weed, is isolated to one area of Crescent Lake NWR. Vernon Bartling, Garden County Weed Commissioner, was invited to the refuge on May 5<sup>th</sup> to discuss various chemical-free methods of eradicating leafy spurge on the refuge. The method chosen was to disk the plants under due to the low plant tolerance of disturbed soils and the relatively small meadow site of approximately 500 plants. The area was disked and personnel assigned to monitor the site for regrowth. After the first disking application nearly as many plants resprouted as were originally present. During the summer the site was disked two more times, each time prior to the plants developing

seed heads. After the third application in August only a dozen plants resprouted, hopefully an indication that progress was made.

# 11. Water Rights

In 1985, a construction and maintenance easement for a ditch and associated water was obtained from Victor Eldred, an adjacent landowner. In exchange for maintenance of approximately seven miles of ditch the refuge obtained a water right for 13 c.f.s. of water. The water comes from a subirrigated meadow located one-half mile from the refuge's Moore Valley. Mr. Eldred ditched this meadow in 1915 and has been diverting the groundwater south bypassing the refuge wetlands. Historically, this water would have flowed southeast to the refuge. The construction of a 1-3/4 mile diversion ditch in 1985 brought the water back onto the refuge. In 1986, a permit (#A16382) was issued by the Nebraska Department of Water Resources granting the Service a 13 c.f.s. flowage right. A Parshall water measuring flume installed in the Diversion ditch in 1986 was removed and relocated 400 yards upstream in October of 1987. This raised the elevation of the flume by 1.25 feet which was necessary to alleviate the influence Smith Lake water levels were having on the structure at its former location. Average inflow for 1988 was approximately 2.27 c.f.s. Over 60 million cubic feet of fresh water was diverted into the refuge during 1988.

A concern of the Refuge for decades has been water rights on Crescent Lake, a 982 acre lake located on private land one-quarter mile south of the refuge. Prior to the establishment of the refuge, the Blue Creek Irrigation District obtained storage rights on the lake, which fed Blue Creek via a man-made ditch. After establishment of the refuge in 1931, the District attempted to lower the outlet of Crescent Lake. The Service maintained that an outlet placed too low would lower refuge lakes via groundwater. An agreement was reached between the U.S. Attorney representing the Service and the Irrigation District on a mean sea level of 3776.65 for the outlet.

In the 1960's and again in the early 1970's the Irrigation District abandoned the ditch which allowed it to fall into disrepair. The Nebraska Water Resources Commission held adjudication hearings on the Irrigation District's water rights in 1984. At the hearings the Service established its use of waters originating on the refuge along with testifying to the non-use by the irrigation district. The State cancelled the irrigation district's water rights on Crescent Lake and returned the water rights to the landowner.

Negotiations with the landowner (Eldred) for a preservation easement on Crescent Lake, as well as preservation and flowage easements on Blue, Swan and Lower Harrison Lakes, were initiated in 1986 culminating in a tentative agreement in January 1987. Survey and appraisal of the property involved in the easement were accomplished in 1987. Easements were submitted for Mr. Eldred's approval in October 1987 and negotiations continued throughout 1988.

## 12. Wilderness and Special Areas

A large portion of the east end of the Refuge received nomination for wilderness consideration and was submitted to Congress in 1972, however, no final decision was ever made.

Two special areas have been designated on the Refuge, the Goose Lake (940 acre) and Hackberry Lake (172 acre) Research Natural Areas (RNA). The Goose Lake RNA has not been grazed, hayed or intentionally burned since 1948. Hackberry Lake RNA has likewise not been disturbed since 1951, with the exception of a spring burn on the northern meadow portion in 1983 and a short duration spring graze in 1988.

## G. WILDLIFE

### 1. Wildlife Diversity

Crescent Lake was purchased as a waterfowl production and maintenance refuge and management activities are directed toward meeting these objectives. However, habitat management activities (burning, grazing and water level manipulation) are conducted with consideration toward wildlife diversity as well.

High-intensity, short-duration grazing initiated in 1987 is helping restore native warm season grasses. Increased wildlife diversity is expected to follow the improvement in grassland habitat.

In recent years four tree belts have been planted in the administrative/housing area. They are made up of over 2,400 red cedar, green ash, hackberry, honey locust, chokecherry, American plum, nanking cherry, buffalo-berry and ponderosa and Austrian pine. Once established these belts will provide winter cover for resident game as well as migrational passerine bird habitat.



## 2. Endangered Species

Two endangered species, the bald eagle and blowout penstemon, are known to have utilized the refuge during 1988. Numerous sightings of single adult bald eagles were reported in February, March, November and December. Most sightings occurred at or near Blue Lake.

A mid-winter eagle survey was conducted by refuge personnel in cooperation with Nebraska Game and Parks Commission (NGPC) and the National Wildlife Federation. The January 8th survey route included 20 miles along the North Platte River from Lisco to Lewellen and 30 miles of shoreline around Lake McConaughy. A total of 26 bald eagles were observed compared to 44 eagles during the 1987 survey and 35 eagles in 1986.

At the request of the refuge and The Nature Conservancy, the Rural Electric Association disconnected a mile long section of overhead powerline that crosses the refuge and had serviced the Conservancy's Graves Ranch. This particular section of line is known to have electrocuted several bald and golden eagles in recent years.

The second annual blowout penstemon (*Penstemon haydenii*) (Figure 15) inventory was conducted on the refuge during the latter part of June. A total of 1,652 plants were located at 52 sites, down 20% from last year's count. Two wet growing seasons back-to-back may have helped heal some blowouts having an adverse affect on the endangered plant. It was noted during the survey that several individual plants had been bitten by, presumably, jack rabbits. Several others were infested with, and possibly stressed by, red mites.

Two Nebraska species were proposed for federal endangered status during the year. Neither the American burying beetle or the Western prairie fringed orchid are believed to inhabit the refuge.

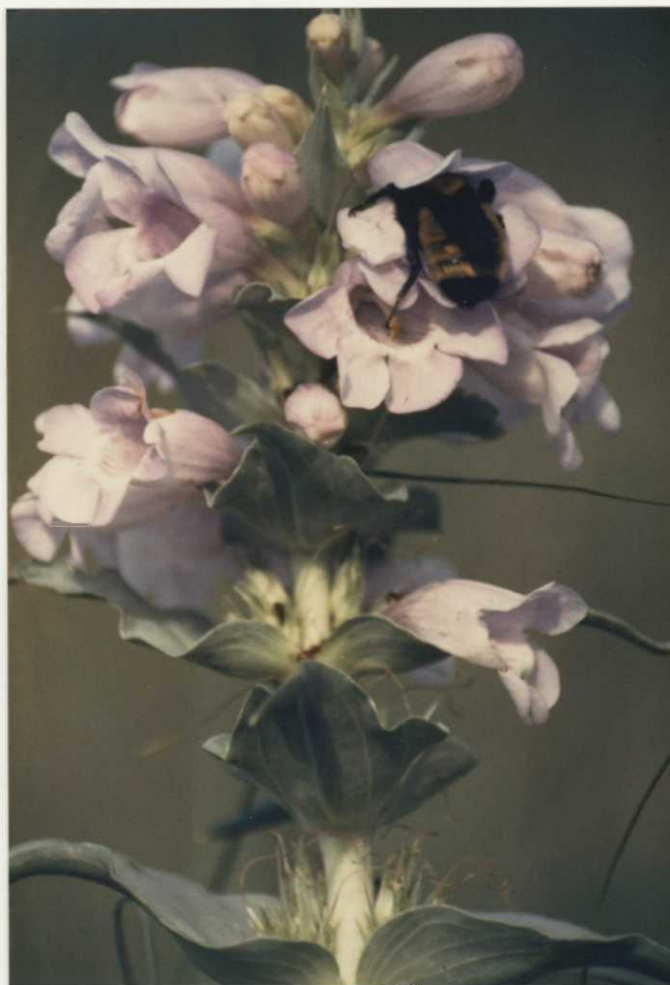


Figure 15. It is apparent that improved rangelands, partially as a result of abundant rainfall, may naturally threaten blowout penstemon. 14NR-88-GLW

### 3. Waterfowl

Waterfowl use days for 1988 were tallied at 210 swan, 65,640 goose, and 1,670,040 duck for a total of 1,735,890 use days, a 7% increase over the 1977-87 average. A record high peak fall migration occurred on September 14 when 53,958 waterfowl were censused, 14,000 waterfowl on Island Lake alone. In addition, 1,203,210 coot use days were recorded during the year. The refuge has recorded a steady increase in use days from a low of 437,946 tallied in 1984 (Table 9).



Figure 16. In its first year after renovation, Perrin Lake hosted abundant waterfowl during both migrations. Waterfowl had seldom used this lake in prior years when carp infested waters prevented an adequate food source. 15NR-88-RRH

Table 9. Annual Waterfowl Use Days (Swans, Geese and Ducks)

<u>1977-87</u> <u>Avg U/D</u>	<u>1984</u> <u>Use Days</u>	<u>1985</u> <u>Use Days</u>	<u>1986</u> <u>Use Days</u>	<u>1987</u> <u>Use Days</u>	<u>1988</u> <u>Use Days</u>
1,626,134	437,946	579,000	1,036,473	1,149,050	1,735,890

Don Hunt, Garden County Conservation Officer, contacted the refuge concerning an injured juvenile trumpeter swan that he retrieved from a marsh along the Platte River. The bird was transported to Dr. Stephen Kerr, DVM in Scottsbluff for medical care on November 22. The swan succumbed to injuries the following day.

A pair of black ducks were observed using Rush Lake in early March. This is the first sighting of the species on or near the refuge since the fall of 1977.

Duck production has been estimated for the last 18 years using the method outlined in Hammond (1970). Production estimates were based on a pair count conducted on the

refuge during early May (755 pairs) and a brood count taken during the week of July 11th (44 broods, average size of 5.3). Estimated production for the year amounted to 1,313 ducks, the lowest refuge duck production since 1982--a disappointment following last year's highest production since 1974 (Table 10). Substantiating our findings was an independent study conducted by the Nebraska Game and Parks Commission. John Sweet, Waterfowl Specialist for NGPC, reported that duck production in Nebraska's Sandhills was substantially below that recorded in 1987. Sweet said the annual index of production on survey routes driven by NGPC personnel in mid-July showed that the Sandhill brood count was down 58% and the duckling count was down by 68% from last year. At the same time, Sweet said wetlands had increased 9% along the same routes. No explanations were provided for the decline.

Nest dragging activities were conducted during the last week of May and included two sites protected from bullsnake predation by snake fence and traps (121 acres northwest of Smith Lake and a 40 acre enclosure near Hackberry Lake) as well as 94 acres around Smith Lake unprotected from predation. A total of 57 nests were located and monitored. Apparent nest success in areas protected by snake lead was 80% compared with 25% apparent success in unprotected areas.

Analysis of the nest dragging data submitted to Northern Prairie Wildlife Research Center was returned showing a Mayfield hatch rate of 71% in those areas with predator control. This is a dramatic increase over the 16.4% Mayfield in 1986 and the 5-7% Mayfield of other years, underscoring the benefit of controlling bullsnake depredation (Table 11). During the nesting season, 80 bullsnakes were trapped along the Smith Lake snake fence and removed. Given optimistic Mayfield results over the past two years within the snake leads, an additional 1.7 miles of snake lead was erected along the east side of Moore Valley. The project, to create a 350 acre enclosure to bullsnakes surrounding the upper Moore Valley wetland, will be completed prior to the 1989 nesting season.



Table 10. Estimated Duck Production 1974 - 1988

Species	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Mallard	870	465	530	454	566	482	271	161	175	319	315	406	314	389	201
Gadwall	485	205	280	179	170	127	245	125	113	212	144	164	254	421	120
Pintail	205	130	230	237	425	203	121	36	38	90	75	131	71	97	54
Green-winged Teal	25	25	-	51	28	25	28	33	7	23	15	119	90	97	27
BW/Cinn. Teal	1070	495	595	512	283	508	676	161	204	504	586	594	524	680	268
American Wigeon	25	25	-	51	-	-	33	2	9	15	8	39	5	32	13
Northern Shoveler	180	105	50	51	57	76	79	83	112	142	160	263	253	518	228
Redhead	205	75	75	102	113	152	158	220	159	159	154	107	154	324	120
Canvasback	75	50	-	128	85	178	39	14	33	13	40	37	14	32	54
Lesser Scaup	-	-	25	26	28	-	-	-	-	-	-	-	-	-	-
Ruddy Duck	360	410	130	359	396	279	160	311	177	58	201	179	401	356	228
Other Ducks	-	-	-	-	-	-	-	-	-	-	-	-	17	-	
Totals	3500	1985	1825	2150	2151	2030	1810	1101	1027	1535	1698	2039	2097	2946	1313

Table 11. 1984 - 1988 Nest Drag Summary

Species	1984		1985		1986		1987		1988	
	# Nests	Success	# Nests	Success	# Nests	Success	# Nests	Success	# Nests	Success
Blue-winged Teal	107	7.00%	32	4.92%	12	12.90%	11	34.50%	23	49.90%
Mallard	15	4.30%	7	4.26%	6	24.20%	5	33.10%	16	27.70%
Gadwall	11	6.50%	4	1.74%	-	-	-	-	1	100.00%
Pintail	4	1.00%	4	14.14%	-	-	1	100.00%	1	0.40%
Shoveler	29	1.98%	10	3.64%	4	23.90%	5	26.10%	4	100.00%
Wigeon	2	0%	-	-	-	-	-	-	-	-
Cinnamon Teal	1	0%	-	-	-	-	-	-	3	49.60%
Green-winged Teal	-	-	2	.004%	-	-	-	-	-	-
Total	169	5.50%	59	4.31%	22	16.40%*	22	32.40%*	48	45.50%*

\* Nest dragging was not limited to just predator protected units. This percentage represents all areas searched, however, the majority were protected areas.

A summary of this year's Canada goose production is shown in Table 12.

Table 12. 1988 Canada Goose Production

	<u>Refuge</u>	<u>Refuge tubs on private land</u>
Total tubs available	115/114 located	11/11 located
Total tubs used	55	7
% of tubs used	48%	64%
Total number of eggs laid	212	26
Avg. # of eggs/nest	3.85	3.71
Total dead/infertile	99	3
Total # hatched	113	23
% of eggs hatched	53%	88%

Many Canada geese were sitting on eggs as early as April 6th. A three-day cold snap and 3 inches of snow occurring mid-April may have adversely affected production. None of the refuge maintained tubs showed signs of predation.



Figure 17. Using a 4-wheel drive ATV to maintain goose tubs reduced man hours by 50%. 16NR-88-BWM

A random inspection of 25 muskrat huts for waterfowl nests was made. Projecting the findings to reflect the 720 total huts available on the refuge and accounting for a 53% success rate it is estimated that an additional 59 goslings were produced (Figure 24).

In late June, a local sportsmen's club and NGPC released 300 goslings adjacent to the refuge on the privately owned Crescent Lake. This flock spent the remainder of the year between Crescent Lake and the refuge with survivors of the hunting season pushed south in late December.

#### 4. Marsh and Water Birds

No eared grebes could be found nesting at their historical, spring-time rookery sites on Smith and Deer Lakes. High lake levels may have had an impact on submergent vegetation, their preferred nesting material. However, 27 and 12 eared grebe nests were located on Deer and Goose Lakes respectively later in the summer. The latter rookeries had been constructed in bulrush patches.

A June survey of the double-crested cormorant rookery in Goose Lake found 35 nests with 74 eggs and 9 young. Record high lake levels had reduced the size of the island nesting site considerably, hence, production fell drastically from an annual average of over 200.

Other production included great blue heron (9 nests) at Crane Lake and black-crowned night heron (12 nests) and white-faced ibis (3 nests) on Smith Lake. Last year marked the first recording of white-faced ibis production on the refuge.

Other visitors included snowy egrets (seen only every 2-5 years), large numbers of white pelicans (Figure 18), and thousands of migrating sandhill cranes.





Figure 18. During the summer, hundreds of loafing pelicans are a surprise to many first-time refuge visitors. 17NR-88-BDJ

##### 5. Shorebirds, Gulls, Terns and Allied Species

Although production could not be verified, a pair of broodish black-necked stilts were observed on Smith Lake in June. Stilt production occurred on the refuge in 1985 and 1987 with the 1985 brood marking the first recorded black-necked stilt production for the state of Nebraska.

American avocet production was abundant refuge-wide (Figures 19 & 20). Twenty such nests were found crowded onto two small, car-size, man-made islands in Perrin Lake. Other species observed on the refuge during 1988 included the long-billed curlew, killdeer, common snipe, Wilson's phalarope, willet, long-billed dowitcher, great and lesser yellowlegs, ring-billed gull, upland sandpiper and a variety of other shorebirds.



Figure 19. When danger threatens their young .... 18NR-88-BWM



Figure 20. .... one or both adult avocets will distract the intruder by feigning an injury. 19NR-88-BWM



## 6. Raptors

A variety of raptors were observed on the refuge during the year. They include the red-tailed hawk, rough-legged hawk,



Figure 21. A barn owl displays its colors during our visit to the nest site, a 100 foot fire tower, to verify production. 20NR-88-BDJ



Figure 22. Great-horned owl nests are quite visible and abundant throughout the refuge. 21NR-88-GLW

American kestrel, great-horned owl, Coopers hawk, prairie falcon, golden and bald eagles, short and long-eared owls and the ever present northern harrier. Observed nesting on the refuge were burrowing owl (1 nest), Swainson's hawk (3), barn owl (2) (Figure 21), great-horned owl (2) (Figure 22), red-tailed hawk (2) and northern harrier (1 nest).

The refuge serves as a clearinghouse for eagles found dead in the Nebraska Panhandle. January was an especially tragic month for the local population of wintering eagles. Six golden eagles were found electrocuted near Alliance during the month. In late January a seventh golden eagle was electrocuted 100 yards from the refuge headquarters by a powerline servicing the refuge radio tower. Five additional golden eagles were known to have been electrocuted near Alliance during the remainder of the year and turned over to the refuge for disposal (Figure 23).



Figure 23. The wounds of many electrocuted raptors are not immediately apparent. Others are. 22NR-88-BWM



In the past both bald and golden eagles have been found electrocuted on the refuge along the REA line servicing the adjacent Nature Conservancy's (TNC) Graves Ranch. With the full cooperation of TNC, the refuge was able to have REA disconnect this 1 mile stretch of overhead line. The refuge is also negotiating with the REA to bury a 1.5 mile stretch of overhead line, a portion of which services the refuge radio tower.

7. Other migratory Birds

The Breeding Bird Survey was conducted mid-June. The survey route starts on the refuge and runs 25 miles southwest. Forty-three species were recorded, 8 species more than were recorded the past two years.

Unusual sightings of common redpolls were made during the spring migration.

8. Game Mammals

In concert with state seasons and regulations the refuge hosts a mule deer/white-tailed deer firearm hunt and deer/pronghorn antelope archery hunt. Since 1979 data used to determine deer populations has been derived from an aerial census conducted each winter. Transects are flown at 1/2 mile intervals over the entire refuge. An unusually mild winter with no snow cover has delayed the 1988 count until, hopefully, early 1989.

Due to their low population numbers throughout Nebraska, state regulations concerning the hunting of pronghorn antelope were changed in 1987 eliminating an antelope firearm season on the refuge. Only occasional observations of 2-6 pronghorn were made this year and although several attempts were made by bow hunters, none were harvested.

The refuge will be monitoring a proposed program of the Nebraska Game and Parks Commission to rebuild the antelope population in the Panhandle. According to the commission's wildlife division, approaches being considered in achieving their goal are removing a segment of the coyote population immediately before kids are dropped, leasing agricultural units key to wintering herds, a buck-only hunting season, and shortening the season. In June, an antelope kid, estimated at 24 hours old, was spotted on the refuge northwest of Big Soddy with an adult female. Antelope production had not been documented on the refuge for several years.

#### 10. Other Resident Wildlife

The most noteworthy observation made of resident wildlife during the past two years has been the accelerating growth in the local muskrat population. Muskrat numbers had declined since the early 1970's due in part, it was believed, to disease and/or poor water quality. During the aerial deer survey of 1985 a low of only 16 rat houses were observed on the refuge. Their decline resulted in emergent vegetation overtaking and choking lake margins. Muskrats then began a dramatic recovery. The results of a muskrat-house survey conducted on the refuge in February are shown in Table 13.



Figure 24. With this year's muskrat explosion, many geese found a rat house to be an attractive nest site. 23NR-88-BWM

Table 13. 1988 Muskrat House Count

<u>Lake</u>	<u># of houses</u>
Goose Lake	75
Mallard Arm	14
Little Hackberry	6
Roundup	33
Rush Lake	24
Ramelli	27
Martin	37
Smith	187
Lower Harrison	4
Red Head	2
Hackberry	41
Shaffer	11
Christ	9
Deer	50
Island	140
Crane	59
Lower Tree Claim	1
Total	720

Prairie grouse lek surveys were conducted from April 12 through April 20. A total of 38 active sharp-tailed grounds were surveyed with 341 displaying males and an average of 13.3 birds per ground. This compares with a 10 year average of 35 grounds, 269 displaying males, and an average of 13.1 birds per ground. Sharp-tailed grouse were noted competing for an established prairie chicken ground. Only three chickens were recorded during this year's survey. Bill Vodehnal, NGPC District II Wildlife Supervisor, advised the refuge that a prairie chicken, banded and released on Crescent Lake Refuge, had been harvested 15 miles south of the refuge. The prairie chicken, band #3011, was released in February 1985. It is the second refuge-released chicken harvested well south of the refuge in as many years.

The refuge conducts a pheasant crow count along two routes (6 and 10 miles in length) twice during the spring. This year's count revealed a substantial decrease in the breeding population. Although the winter of 1987-88 was relatively mild, several wet frigid storms in April may have had an adverse affect on the population. Also, winter feeding of pheasants throughout the administrative complex (an area traversed by the crow-count survey) was discontinued the previous winter possibly dispersing the population. This year's refuge breeding population was estimated at 384 birds compared to last years all-time high count of 902 pheasants (Figure 25).



Figure 25. Pheasants offer a splash of color to winter refuge visitors. 24NR-88-RRH

#### 11. Fishery Resources

More than adequate dissolved oxygen readings of between 6 and 12 ppm were recorded for Island Lake during the 1987-88 winter months. Ice on this shallow lake was as much as 24 inches thick with 95% snow cover.

A beneficial winter kill of rough fish in Lower Harrison Lake was noted in March. While attempting to lower the water level in West Jones Lake, to induce a rough fish winter kill, a pump shaft was damaged halting the project.

Biologists from the Valentine Fishery Assistance Office surveyed Island Lake in June and found that the lake was dominated by 2+ and 3+ year class yellow perch (Figure 26).

Plans are being formulated to stock walleye and saugeye in 1989 to provide more effective predators for the large year classes of perch.





Figure 26. Valentine FAO biologists found little recruitment of largemouth bass and bluegill during the Island Lake survey. 25NR-88-RRH

#### 15. Animal Control

Predator control of those species that adversely affect waterfowl production continues to serve as an important management tool. Control efforts are concentrated on bullsnakes, raccoons, skunks, long-tailed weasels and coyotes. Control of mammalian predators is a two-phased effort with public trapping conducted during state seasons (Section H-10) combined with force account trapping during the nesting season. With an objective of controlling raccoons and skunks in North Moore Valley, refuge personnel maintained 30 conibear(220)/box traps during the spring/summer months. A total of 15 skunks, 2 coyotes, 7 raccoons, 1 mink and 4 long-tailed weasels were removed force account (Figure 27).



Figure 27. While not as tasty as an egg or hen, a pocket gopher provides an easy meal for the voracious long-tailed weasel. 26NR-88-GLW

In a continuing effort to control bullsnakes, the number one waterfowl production inhibitor on the refuge, four miles of one-foot drift fence along with over 100 snake traps were again deployed parallel to meadows near Smith, Ramelli and Martin Lakes. Eighty bullsnakes were intercepted and prevented from entering the northwest, Moore Valley nesting grounds. Given optimistic Mayfield results over the past two years within the snake lead, an additional 1.7 miles of snake lead was erected along the northeast edge of Moore Valley. The project, to create a 350 acre enclosure to bullsnakes surrounding the upper Moore Valley wetland, will be initiated in 1989.

The 40-acre Hackberry predator enclosure was maintained with 50% success in 1988. Two of four duck nests hatched. Rodent burrows under the fence continue to give access to bullsnakes that don't miss many nests.





Figure 28. Pocket gophers providing snakes with access under the lead is just one of the continuous maintenance problems associated with the snake lead. 27NR-88-BWM

#### 17. Disease Prevention and Control

On August 23, during routine monitoring for waterfowl disease, 6 dead ducks were located along the Goose Lake shoreline. All refuge and nearby private lakes were immediately inspected. By the end of the month, a two-man airboat crew had picked up a total of 485 ducks from Goose Lake and 5 from Rush Lake. Six fresh specimens were forwarded to the National Wildlife Health Center where avian botulism was determined as the cause of death.

During the outbreak, 720 diseased birds from Goose Lake and 22 birds from Rush Lake were collected and buried. Teal (primarily green-winged) and mallards accounted for approximately 35% and 14% of the losses respectively. Coot accounted for another 16% of the losses. The balance of birds retrieved were made up of pintail, widgeon, shoveler, and ruddy duck. Incidental birds included one each of C. goose, double-crested cormorant, and western grebe.

## H. Public Use

### 1. General

Crescent Lake NWR is located on the south-western edge of the Nebraska Sandhills. The nearest community is Oshkosh, population 1,040, located 28 miles to the south via a single-lane oil and dirt road. The refuge trades frequently in Alliance (population 10,000), located 45 miles northwest and accessible only by traversing even poorer roads. The nearest large community is Scottsbluff, located 111 miles to the west, with a population of about 22,000. These communities and neighboring ranches make up the base population from which 75 percent of the refuge visits are drawn.

A total of 12,469 public use visits were recorded in 1988 of which, 6,500 were recorded by consumptive users (hunting, fishing and trapping). This compares to a total visitation of 13,030 recorded in 1987 and 19,202 recorded in 1986. Visitation is calculated utilizing traffic counters located at four refuge entrances.

The public was invited to attend the first annual Crescent Lake NWR Open House on Saturday, April 23. The open house was designed to give the public an opportunity to see the refuge, meet the staff, and learn more about the objectives and activities of a Sandhill wildlife refuge. Featured attractions included a self-guided auto tour, a self-guided nature trail, a "wetlands" exhibit on loan from the Regional Office, numerous taxidermic mounts, a children's "touch and feel" corner, and wildlife films. Winter storm warnings and travel advisories throughout the Panhandle and 3" of snow prior to the open house resulted in a light turnout.

A new public use leaflet for Crescent Lake Refuge was produced during the year. The overall appearance and context has been well received.

### 2. Outdoor Classrooms - Students

Ornithology and aquatic invertebrate classes from the University of Nebraska, Cedar Point Field Station made weekly trips to the refuge during the summer. At our request, limnology instructors provided the refuge with a summary of their findings.



#### 4. Interpretive Foot Trails

The 1.5 mile self-guided interpretive nature trail and observation deck continues to attract hundreds of visitors each year. The trail, constructed in 1983, traverses portions of a subirrigated meadow, a marsh, and a large sand dune with a vista overlooking the entire refuge. Spring prairie flowers along the trail provide an irresistible attraction to photographers. Nineteen interpretive stations are scattered along the trail providing the visitor the opportunity to read and learn about their surroundings and the unique Sandhills ecosystem. Showing signs of exposure, all trail-side interpretive plaques were removed during the year and replaced with numbered, flexible posts corresponding to a leaflet available at the trail head.

#### 5. Interpretive Tour Routes

In conjunction with the open house in April, a 13-station self-guided auto tour was established and will remain in place as a year-round attraction. Computer generated auto-tour leaflets are now available at two refuge entrances and will be updated on a seasonal basis.

#### 6. Interpretive Exhibits/Demonstrations

The office serves as a visitor contact station orienting visitors, disseminating information and displaying exhibits. Additions to the exhibit collection in 1988 include 4 interpretive panels ("Spectacular Migration of Waterfowl", "Shore and Wading Birds", "White-tailed Deer", and "Kids Corner"), and the following taxidermic mounts: red head, canvasback, mallard and two sharp-tailed grouse.

Iwanski donated over 100 hours in mounting a great horned owl and long-tailed weasel for the office/visitor center. Rich also constructed a glass case for their protection.

#### 7. Other Interpretive Programs

##### On Site

During the year, 7 college, high school and grade school classes (Figure 29) and an Audubon Chapter visited the refuge where they were given a slide and/or film program and a short tour of the refuge.



Figure 29. The Bridgeport third graders have made their visit to the refuge an annual adventure. 28NR-88-BWM

#### Off Site -

Huber was a keynote speaker at the following community functions:

	<u>Topic</u>
North Platte Valley Sportsmans Club	"State of the Refuge Report
North Platte Natural Resources District's Annual Awards Banquet	Focus on soil conservation
Bridgeport Lions Club	Management of North Platte Refuge
Wildcat Audubon Chapter	Take Pride in America and North Platte Refuge

In April, the refuge displayed and manned the "America's Waterfowl Needs Wetlands" exhibit (on loan from the Regional Office) at the Annual Outdoor Film Festival in Scottsbluff. This event, sponsored by local chapters of Ducks Unlimited and Audubon Society, was attended by over 300 outdoor enthusiasts from the local community.

Incorporated into all presentations was the importance of taking pride in America's wildlife resources.

## 8. Hunting

In concert with state seasons and regulations, the refuge hosts hunting seasons for six species of game: mule deer, white-tailed deer, pronghorn antelope, sharp-tailed grouse, prairie chicken, and ring-necked pheasant. Due to their low population numbers throughout Nebraska, state regulations concerning the hunting of pronghorn were changed in 1987, eliminating an antelope firearm season on the refuge. This change in regulations will not affect overall refuge public use as pronghorn are scarce and hunter interest low. Only two antelope have been harvested on the refuge in the past five years. Nearly all visits occur on opening weekends of the respective seasons. Table 14 shows relative popularity and success for each season. Hunter visits are determined using traffic counters and the harvest figures are derived from wing and leg envelopes and check station results.

Table 14. 1988 Hunter Activity

<u>Species</u>	<u>Season</u>	<u>Visits</u>	<u>Harvest</u>
Prairie Grouse	Sept 17 - Nov 30	2,500	272
Pheasant	Nov 5 - Jan 31	600	40
Deer (Firearm)	Nov 12 - Nov 20	1,300	40
(Archery)	Sept 15 - Dec 31	550	1
Pronghorn (Archery)	Aug 20 - Dec 31	6	0

Refuge grouse hunters are requested to complete a questionnaire and, if successful, deposit one wing from each bird harvested into wing-envelope boxes located at each of four entrances. Based on a total of 267 sharp-tailed grouse wings returned, it was determined that refuge hunters harvested 158 juvenile and 109 adult grouse (1.46/1 ratio). Also returned were 1 adult prairie chicken wing and 2 sage grouse wings. Sage grouse are not native to the area and the wings are being looked at with a suspicious eye.

Harvest data is also collected via envelopes for ring-necked pheasant. Nearly identical to the grouse wing envelopes, refuge pheasant hunters are requested to answer several pertinent questions and deposit a leg from each bird into a collection box at the refuge entrances. A record high of 103 pheasant legs were submitted by 68 hunters, almost doubling last year's all-time-high of 38 hunters submitting 52 legs. This year's hunters expended 161 hours at their sport, or 1.56 hours afield for each bird harvested. The juvenile to adult ratio was 1.45/1.



Crescent Lake NWR is also a big game check station for the state of Nebraska. In addition to the information required by the state, the refuge also recorded age, weight and other measurements of the harvested deer (Table 15). Forty deer were harvested on the refuge during the November 12 - 20 Nebraska firearm deer season. Of the 20 white-tailed deer harvested, 1 was a doe, and one of 20 mule deer harvested was a doe. The largest white-tailed deer weighed in at 182 lbs. field dressed and carried a 5X5 rack. The largest mule deer brandished a 5X5 rack and weighed in at 145 lbs.. Also processed through the refuge check station were eight deer harvested from adjoining private land.

Two mule deer (a buck and doe), were also harvested on the refuge during the Nebraska archery season (Figure 30).



Figure 30. The refuge bow hunter finds stalking game in the open Sandhills an added challenge. 29NR-88-RRH



Table 15. Crescent Lake 1988 Deer Harvest Data Averages

Species	Sex	Age	Number	Weight lbs.	# Points R/L	Circumference R/L	Inside Spread	Main Beam R/L
MD	M	0.5	1	50	N/A	N/A	N/A	N/A
WTD	F	0.5	1	55	N/A	N/A	N/A	N/A
MD	M	1.5	13	103	2.2 x 2.0	2.3 x 2.4	9.8	10.8 x 10.4
WTD	M	1.5	11	105	1.9 x 2.1	2.5 x 2.5	8.3	8.4 x 9.0
* WTD	M	1.5	3	97	--- x 2.7	--- x 2.5	---	--- x 9.2
MD	M	2.5	4	124	2.8 x 3.0	2.8 x 3.0	14.6	14.6 x 14.8
WTD	M	2.5	5	127	4.8 x 4.6	3.5 x 3.5	13.9	16.0 x 15.9
MD	M	3.5	2	140	3.5 x 4.0	4.2 x 4.1	18.3	16.3 x 16.4
WTD	M	3.5	5	157	4.6 x 4.6	4.2 x 4.1	16.5	19.5 x 19.7
WTD	F	3.5	1	115	N/A	N/A	N/A	N/A
MD	F	4.5	1	90	N/A	N/A	N/A	N/A
WTD	M	4.5	1	182	5.0 x 5.0	4.5 x 4.5	18.3	24.0 x 24.0
WTD	M	6.5	1	175	7.0 x 7.0	5.3 x 5.3	20.5	24.5 x 26.0

\* Broken right antler

9. Fishing

Island Lake remains popular among the local fishing public.



Figure 31. Ice fishing is especially popular for catching yellow perch and bluegill .... 30NR-88-RRH



Figure 32. .... with fishermen returning in late spring for stringers of largemouth bass. 31NR-88-BWM

Because of its flocculent nature and high alkalinity, fisheries management of Hackberry Lake was discontinued in 1988. In closing Hackberry Lake to sport fishing, the remainder of Island Lake (northern half) was opened to year-round fishing. Future fisheries management efforts will be directed toward developing the full potential of Island Lake.

#### 10. Trapping

Trapping certain species is permitted on the refuge, with a special use permit, in concert with state trapping seasons and regulations. Trappers are selected on a bid basis with \$2, \$5 and \$10 deducted from the bid price (up to the full amount of the bid) for each long-tailed weasel, raccoon and skunk taken respectfully. Soliciting permittees to trap on the refuge continues to be a problem. The major drawback for refuge trappers is undoubtedly the requirement that traps be inspected daily--a 60 to 90 mile commute for most "neighbors".

Two bids were received for the 1988-89 season. The successful bidder, citing mechanical problems with drag chains and four-wheel drive vehicle, pulled up stakes in early December. Trapping only 12 days of the season, the permittee removed 5 raccoons, 10 coyotes, and 5 skunks. A total of \$75 in rebates was applied to his original bid of \$275.

#### 11. Wildlife Observation

The refuge maintains a portable blind on a sharp-tailed grouse dancing ground for public observation. The blind, requiring advanced reservations, continues to grow in popularity and was in use throughout April.

Marty Stouffer Productions extended a planned two-day refuge visit to three days when they were provided the opportunity to film prairie chickens and sharp-tailed grouse competing for the same ground. The Wild America episode, tentatively entitled "Dawn Dancers", is scheduled to be aired next spring. A near tragedy for Stouffer occurred during his visit when a tent pole from his personal blind sprung and cut his eye. He was rushed to the Scottsbluff hospital where eye surgery was immediately performed. The cut missed the cornea and Marty was back filming the next morning.

Another Wild America episode, "Managing Wildlife" was aired nationally on PBS in early April which featured the Crescent Lake Refuge snake trapping and goose tub programs.

### 15. Off Road Vehicling

Very few sandhill roads are surfaced and while travel with almost any vehicle is possible over the better refuge roads, the side trails are most safely traveled with four-wheel-drive vehicles. Four-wheel drive is required by regulation on some refuge sand trails. Off trail vehicling is prohibited.

### 17. Law Enforcement

Law enforcement efforts are concentrated on opening weekends of grouse, pheasant and deer firearm seasons with spot checks and weekend patrols conducted during the balance of the hunting and fishing seasons. Table 16 lists violation notices issued in 1988.

Table 16. 1988 Refuge Violations

<u>Violation</u>	<u># Violations</u>	<u>Fine</u>	<u>Disposition</u>	<u>Officer</u>
Driving off trail 50 CFR 27.31	1	\$50	Closed	Shaul
Entering closed area 50 CFR 26.21	1	\$50	Closed	Shaul

Refuge Officers attended the 40-hour in-service training at the Federal Law Enforcement Training Center, Marana, Arizona. This year's session included excellent training in "Verbal Judo", handcuffing, firearm stress course, and the use of force.

## I. EQUIPMENT AND FACILITIES

### 1. New Construction

Taking advantage of ideal winter weather conditions, 21 additional fiberglass goose nesting tubs were erected on various lakes and wetlands, bringing the total to 126 throughout the refuge and adjoining private land. Annual maintenance and rehayng of the other tubs was also performed at this time.

A cattail shear bar, designed to fit the Honda Fourtrax 4x4, was fabricated by Iwanski in an attempt to shear off cattails at the ice level and thus create open areas of water on some of the heavily infested lakes. With the inability to use heavy equipment on the thin ice, this project was hampered by excessive snow in the cattails.



During April, two 21 foot windmill towers were erected on previously drilled stock wells in units #41 and #43. A 32 foot stock tank was also set up at each site.



Figure 33. Prairie monument in a sea of grass. 32NR-88-RRH

Nelson Wells, Inc. of Alliance, NE, drilled ten new stock wells and erected a 21 foot tower at each well site. To insure compliance with contract specifications the project was supervised by Iwanski. The contractor did an excellent job of completing the project on time and for slightly less than the contract amount. The refuge staff began the work of installing 32 foot stock tanks at each site and when completed the strategically located wells will allow managers to more evenly disperse cattle by creating more efficiently sized paddocks, thus allowing better grassland management.

Taking advantage of unseasonably warm weather two of the stock tanks were set up and leveled in preparation for a cement floor. The remaining eight tanks are scheduled to

be erected in early spring or summer of 1989. Due to sandy conditions and rough terrain transporting pre-mixed concrete is not always feasible and materials usually have to be hauled out and the cement mixed by hand expending considerable time and effort.

Approximately ten miles of single-strand, high-tensile strength electric fence was built through rough hills where subdivision of some grazing units was required. About two miles of lighter poly wire was used for shorter duration grazing and for easier installation and removal. Both types of fence are powered by a 5,400 volt energizer using a 12 volt battery and a solar charging panel. Both types of fence have proven to be dependable and will be further incorporated into the grazing program.

With the Bantam excavator on loan from Seedskaadee NWR, a water control structure was installed below West Jones Lake (Figures 34 & 35) enabling water to be backed up for



Figure 34. Weather permitted rapid construction of Duck Slough water control structure. 33NR-88-RRH





Figure 35. When fully operational, critical pair habitat will be restored. 34NR-88-RRH

approximately one mile surrounding several small islands that were built along the inlet ditch and flooding low lying grassland areas. This area will be a very attractive site for waterfowl in the future. A small nesting and loafing island was also constructed in West Jones Lake using the excavator.

Approximately 80 new snake traps were constructed and will be incorporated into the 2.7 miles of wire mesh snake lead that was erected this summer. The traps will be monitored during the period that bullsnakes are active. This lead replaces the tar paper lead that was used in years past which required constant maintenance and was not permanent.

## 2. Rehabilitation

A contract was issued to A-1 Painting of Scottsbluff, NE to paint the interior of Quarters 5. The interior of Quarters 4 was repainted by refuge personnel and the carpets in quarters 4 and the office were cleaned for account.

Manual shut-off valves were installed on the automatic sprinkler system to shut off water to a low lying area that becomes flooded during lawn watering in the spring.

Quarters 4 and 5 received some badly needed combination storm windows. This will alleviate cold air entering around the windows and will be a tremendous help to the heating bill. Quarters 6 also received a new water pressure tank replacing the old one that had rusted out.

New fluorescent lights were installed in Quarters 3 to alleviate the poor lighting conditions in the basement and additional outlets were installed in Quarters 2 garage. The wiring work was certified by an electrician.

Two miles of the old Eldred Diversion ditch, which was filled in after the new diversion ditch was completed, was reseeded back to native grass along with the Upper Harrison Lake dike. The new West Jones control structure area was mulched to prevent wind and water erosion.

The refuge dump was fenced in to prevent litter from blowing around and out of the pit. This should correct the problem of having to pick up paper and other litter around the dump area.

The old weather station, located near the office, was removed. The official Weather Service rain gauge was moved to a more convenient and accessible spot.

Three cattleguard autogates located at the refuge entrances were painted fluorescent "safety" yellow to allow visitors to clearly see them both at night and during the day.

### 3. Major Maintenance

The refuge staff spent a significant amount of time performing annual maintenance on fences and windmills preparing them for the grazing season. Boundary and interior fences were inspected and repaired as required. Annual oil changes and repairs were done on the windmills and stock tanks. As in the past, several windmills were insulated with hay and allowed to pump over the winter months. The remaining mills were shut off until spring.

Several time consuming maintenance projects were undertaken this year. One such project was the island building dredge. The construction was completed by the end of January and it was moved to Gimlet Lake. The twenty ton-plus rig was slid over lightly snow covered ground using a Trojan payloader and 290M scraper. No real problems were encountered during the one mile move to the launching site. In July a few more items were placed on the barge and it was then ready for a disappointing trial run. Several problems were encountered that will need correction. The



primary pump to the dredge would not build enough pressure requiring a change in pulleys and suction hose. Thick/sticky lake bottom mud would not flow to the suction pipe. To alleviate the problem a jetting system or cutting head will have to be added to the dredge. At year's end information is still being collected from various dredge building companies.

A considerable amount of time was spent on road repair. Along with the routine grading and hole patching on the West Mail Road, approximately two miles of the road was rehabilitated to cure existing problems. Using the excavator on loan from Seedskaatee, road shoulders were pulled, ditches dug and black dirt was placed on the road surface. With the wider road and ditches it is hoped that the snow and rain will not collect in these areas as in the past. Also an area of the road that was considered a safety hazard was corrected by removing a considerable amount of dirt from hillsides on either side of the road to improve visibility (Figures 36 & 37). This area was then mulched to prevent wind erosion of the exposed sand.



Figure 36. A source of contention and accidents by Sandhills residents has been the poor condition of the refuge West Mail Road. 35NR-88-BWM



Figure 37. At least one blind spot and several small stretches were corrected during the year. 36NR-88-BWM

Several areas on refuge public use and service trails required mulching. Approximately 250 bales of hay were spread on areas of the trail where it had become soft and sandy.

The erosion damage caused by high winds, ice and water to the Smith Lake dike and control structure was temporarily repaired. Several hundred yards of dirt were hauled onto the dike to fill the washed out areas.

Due to a silting problem, work was done on the West Jones Lake by-pass and drainage ditch. The ditches were cleaned out and another control structure was installed in the drainage ditch (Section I-1). With the control structure in place, water can be backed up into the ditch thus slowing the water flow and preventing some of the washing and silting in of the drainage ditch.

A new 3/4 bathroom was installed in the bunkhouse. The temporary employees were very happy to see this addition. Most of the work was done by a local contractor and some by refuge personnel. New furniture was also received for the bunkhouse. The matching sofa, loveseat and chair were a welcome addition to the sparsely furnished seasonal quarters.

#### 4. Equipment Utilization and Replacement

The majority of equipment was utilized during the year. We were fortunate again this year to use Seedsdakee NWR's Bantam excavator for cleaning out ditches and installing a water control structure. It was also used for road repair work and pothole development.

Some major repairs were performed on several pieces of equipment while others required minor repairs and regular maintenance. The Reo/Quickway crane required replacement of the air/hydraulic unit on the brakes and some wheel cylinder kits. Also an internal boom extension was built. A front and rear wheel seal went out of the Trojan wheel loader and were replaced for account. Due to the weight of this heavy equipment and parts involved it was a difficult task to accomplish. The John Deere 4010 tractor had to be returned to the John Deere dealer for engine work. A complete overhaul was done by the dealer in 1987 but in July 1988 a knock developed. Upon return to the shop, two broken rocker arms were found.

Some new pieces of equipment were received this year. The most significant was a John Deere 950 tractor with front wheel assist and equipped with a rotary motor. Other items received were 2 gas-powered weeders, a 16 foot aluminum jon boat, an air operated gear lube dispenser, a 10 inch table saw, and a 200 gallon capacity fire unit. Also a new 3.5 inch disk drive was installed on the refuge computer.

Several items were also received from excess property. From the LE Division we received three 2-way radios and a small boat with trailer. The boat trailer was modified to fit the new 16 foot boat. Early in the year we received word that there were some graders located at the defense depot in Ogden, Utah. These graders were to be in very good condition and some had only 200 hours on them. Two graders were frozen and both arrived in very poor condition with parts missing. Each will require engine, transmission and hydraulic system repairs. Close inspection will determine which, if either, of these machines is worth repairing.

Items excessed by the refuge during 1988 include a 1972 IHC 4x2 pickup which was sold by GSA; a Swampcat airboat, two electric ranges, two 60 watt radios, and three IBM Mag-Card typewriters. After no interest was shown on the excess listing, the typewriters were donated to Garden County High School and the remaining items were reduced to scrap. A Winchester 12 gauge shotgun was also transferred to Rainwater Basin WMD in Kearney, NE.



## 5. Communication Systems

Lightning has been a problem for the AT&T Merlin telephone installed on the refuge. Close strikes either burn out the main control unit or a telephone. AT&T has installed voltage surge protectors and lightning arrestors, but to no avail. AT&T was also called upon to install a bypass switch on the telephone line for the computer modem.

The refuge received four new Motorola "Handie-Talkie" portable radios and chargers in 1988. Except for a few minor repairs and adjustments during the year all refuge radios remained in good condition and functioned properly.

Three used state band radios were transferred to the refuge from the LE Division. One of the radios will require new crystals before it can be used. The other radios have yet to be installed.

## J. OTHER ITEMS

### 1. Cooperative Programs

The refuge participated in several cooperative programs with various federal and state agencies. Most of the programs provide technical assistance to the respective agencies (Section E-7).

The refuge maintains five cooperative fire agreements with the various protection districts in the area. These five year agreements provide reciprocal, cost free assistance in suppressing wildfires (Section F-9).

### 2. Items of Interest

A revenue sharing check for \$24,321 was presented to the Garden County Commissioners at their May meeting.

Approximately 80 friends and neighbors attended the Fifth Annual Pork Feed/Get Together sponsored by the refuge families.

### 3. Credits

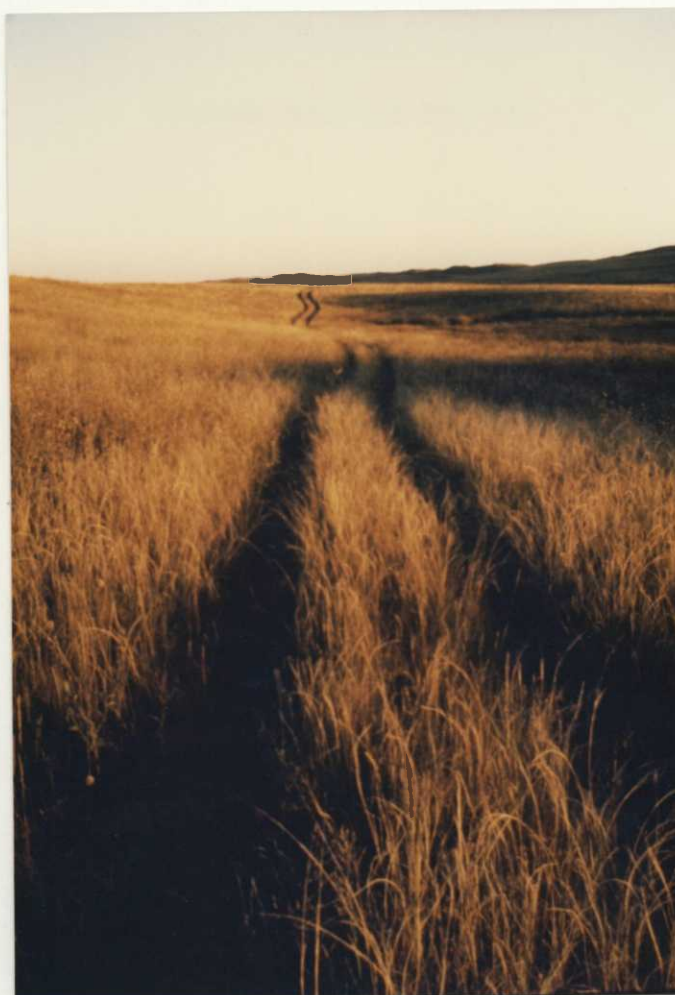
The writing of this narrative was a staff effort. Following are the sections completed by each individual: Huber - A, C, D 1-4, E-5, and F; McKinney - D-5, E-6, G, and H; Johnson - B, E 1-4, E 7-8, and J; Shaul - I 3-5; Iwanski I 1-2.



Photo credits are listed with each picture. Photographers are: RRH - Royce R. Huber, BWM - Bradley W. McKinney, GLW - Gordon L. Warrick, and BDJ - Bradley D. Johnson.

Typing and arrangement was performed by Johnson and McKinney with editing accomplished by McKinney and Huber.

FEEDBACK



HAPPY TRAILS!! 37NR-88-RRH

ANNUAL NARRATIVE REPORT

Calendar Year 1988

NORTH PLATTE NATIONAL WILDLIFE REFUGE

Minatare, Nebraska

## INTRODUCTION

The North Platte National Wildlife Refuge (NWR) was established by Executive Order No. 2446 in 1916 as "a preserve and breeding ground for native birds". The refuge was superimposed over four Bureau of Reclamation (Bureau) reservoirs and was subject to "Reclamation service uses".

Three of the four reservoirs are managed as separate units of the refuge, these are the Lake Minatare Unit (3,150 acres), Winters Creek Unit (500 acres) and Big Lake Alice Unit (1,680 acres). The Little Lake Alice reservoir was dropped by Executive Order from refuge status in the early 1960's.

Originally the wildlife, fisheries, recreation and land management responsibilities were held by the old Bureau of Biological Survey. All units, with the exception of Lake Minatare, were closed to the public as a year-round refuge. The Lake Minatare Unit had a small year-round picnic area and was open to public recreation from May 16 to September 15 with the north half of the lake closed to boating. This management scheme allowed for fall concentrations of up to 200,000 mallards, 7,500 geese, and 20 bald eagles.

Over the years the Fish and Wildlife Service's (Service) involvement faded. In 1958 the Service reduced its closure to 107 days from October 1 through January 15. A "park" development map was prepared in 1937 with major development plans prepared in 1947 and again in 1963 covering only Lake Minatare. These plans were developed by the Bureau and emphasized recreational uses such as camping, boating, picnicking, swimming, seasonal cabins, etc. The 1963 development plan allowed the Nebraska Game and Parks Commission (NGPC) to assume control of recreation, fish and wildlife administration of certain areas, and to establish a State Recreation Area (SRA) on Lake Minatare. The Service had little influence on this plan, as was evidenced by the need to amend the agreement in 1963 to recognize the fact that the Service had responsibility for wildlife. During this same time the Bureau handled the other land management activities, which consisted of intense grazing.

The Service increased its presence in 1978 when a temporary intermittent employee was hired to post boundaries and conduct censuses on the Refuge.

In 1985 the Bureau discovered the 1976 Game Range Bill, which mandates that all NWR's under the Secretary of Interior be administered by the Service. An agreement was implemented in October 1985, replacing the Bureau with the Service as the primary jurisdiction agency.

# NORTH PLATTE NATIONAL WILDLIFE REFUGE

UNITED STATES  
DEPARTMENT OF THE INTERIOR

SCOTTSBLUFF COUNTY, NEBRASKA

UNITED STATES  
FISH AND WILDLIFE SERVICE

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R. 54 W. R. 53 W.

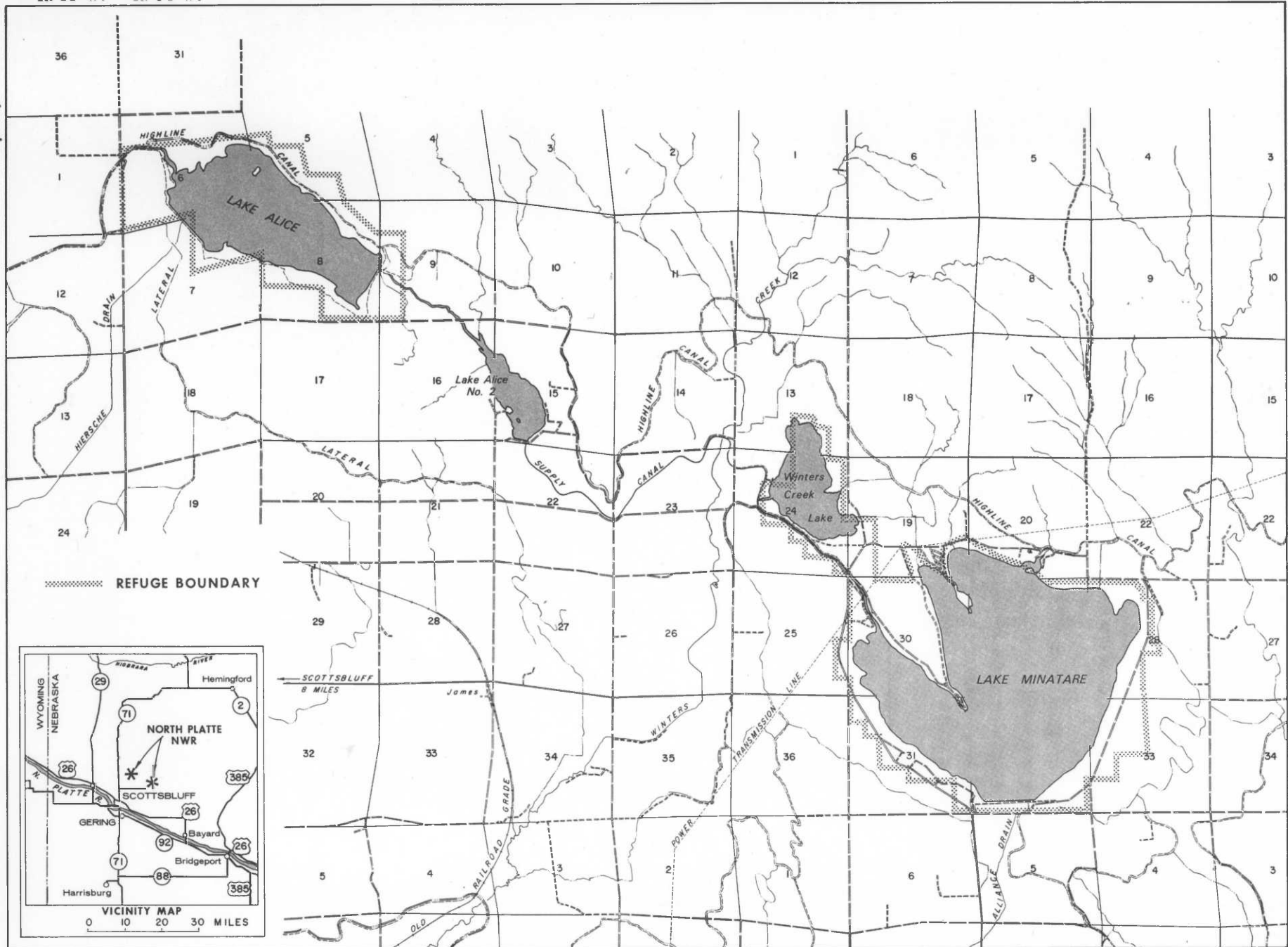
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COMPILED IN THE DIVISION OF REALTY  
FROM SURVEYS BY USGS AND FWS

SIXTH PRINCIPAL MERIDIAN

0 3000 6000 9000 12000 FEET

True North  
Magnetic N. 13°

MEAN  
DECLINATION  
1975

DENVER, COLORADO  
REVISED: JULY 1986

MARCH 1983

6R NEB. 81 403



# TABLE OF CONTENTS

	PAGE
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	1
D. <u>PLANNING</u>	2
1. Master Plan . . . . .	NTR
2. Management Plan . . . . .	2
3. Public Participation . . . . .	NTR
4. Compliance with Environmental Mandates . . . . .	2
5. Research and Investigations . . . . .	NTR
E. <u>ADMINISTRATION</u>	3
1. Personnel . . . . .	3
2. Youth Programs . . . . .	NTR
3. Other Manpower Programs . . . . .	NTR
4. Volunteers Program . . . . .	5
5. Funding . . . . .	6
6. Safety . . . . .	6
7. Technical Assistance . . . . .	NTR
8. Other Items . . . . .	7
F. <u>HABITAT MANAGEMENT</u>	7
1. General . . . . .	7
2. Wetlands . . . . .	7
3. Forests . . . . .	7
4. Croplands . . . . .	NTR
5. Grasslands . . . . .	8
6. Other Habitats . . . . .	NTR
7. Grazing . . . . .	8
8. Haying . . . . .	10
9. Fire Management . . . . .	10
10. Pest Control . . . . .	10
11. Water Rights . . . . .	11
12. Wilderness and Special Areas . . . . .	NTR
13. WPA Easement Monitoring . . . . .	NTR
G. <u>WILDLIFE</u>	12
1. Wildlife Diversity . . . . .	12
2. Endangered and Threatened Species . . . . .	12
3. Waterfowl . . . . .	12
4. Marsh and Water Birds . . . . .	13
5. Shorebirds, Gulls, Terns and Allied Species . . . . .	13
6. Raptors . . . . .	13
7. Other Migratory Birds . . . . .	NTR

G. WILDLIFE (Continued)

8.	Game Mammals . . . . .	13
9.	Marine Mammals . . . . .	NTR
10.	Other Resident Wildlife . . . . .	14
11.	Fishery Resources . . . . .	14
12.	Wildlife Propagation and Stocking . . . . .	NTR
13.	Surplus Animal Disposal . . . . .	NTR
14.	Scientific Collections . . . . .	NTR
15.	Animal Control . . . . .	NTR
16.	Marking and Banding . . . . .	NTR
17.	Disease Prevention and Control . . . . .	NTR

H. PUBLIC USE

14

1.	General . . . . .	14
2.	Outdoor Classrooms - Students . . . . .	NTR
3.	Outdoor Classrooms - Teachers . . . . .	NTR
4.	Interpretive Foot Trails . . . . .	NTR
5.	Interpretive Tour Routes . . . . .	NTR
6.	Interpretive Exhibits/Demonstrations . . . . .	NTR
7.	Other Interpretive Programs . . . . .	15
8.	Hunting . . . . .	NTR
9.	Fishing . . . . .	17
10.	Trapping . . . . .	NTR
11.	Wildlife Observation . . . . .	NTR
12.	Other Wildlife Oriented Recreation . . . . .	NTR
13.	Camping . . . . .	17
14.	Picnicking . . . . .	NTR
15.	Off Road Vehicling . . . . .	17
16.	Other Nonwildlife Oriented Recreation . . . . .	18
17.	Law Enforcement . . . . .	18
18.	Cooperating Associations . . . . .	NTR
19.	Concessions . . . . .	19

I. EQUIPMENT AND FACILITIES

19

1.	New Construction . . . . .	NTR
2.	Rehabilitation . . . . .	NTR
3.	Major Maintenance . . . . .	NTR
4.	Equipment Utilization and Replacement . . . . .	19
5.	Communication Systems . . . . .	NTR
6.	Energy Conservation . . . . .	NTR
7.	Other . . . . .	NTR

J. OTHER ITEMS

20

1.	Cooperative Programs . . . . .	NTR
2.	Items of Interest . . . . .	NTR
3.	Credits . . . . .	20

K. FEEDBACK

NTR

### HIGHLIGHTS

A total of 3,738,690 waterfowl use days were tallied for 1988 (Section G-3).

Refuge Manager presented an affidavit to the U.S. Supreme Court concerning the effect on public use and wildlife use given certain proposed water right scenarios (Section D-4).

Volunteer Lucy Koenig is awarded with Nebraska's Take Pride in America Award (Section E-4).

A Memorandum of Understanding was signed between the Minatare Fire Department and the Service for wildfire suppression on the refuge (Section F-9).

### B. CLIMATIC CONDITIONS

A weather station is located at the Scotts Bluff County Airport, four miles southeast of the refuge. The weather data and patterns for 1988 are quite similar to those reported for Crescent Lake NWR. Total precipitation for the year was 15.36 inches, 0.77 of an inch above normal.

### C. LAND ACQUISITION

In December 1987, David Wilde, North Platte River Project Leader for the Bureau of Reclamation (BR), provided confirmation that the BR had indeed relinquished jurisdiction and properties to the FWS. Prior to this notification there had been some question as to whether or not the 1985 Memorandum of Agreement Between the Bureau of Reclamation and Fish and Wildlife Service Concerning the Operation and Maintenance of the North Platte National Wildlife Refuge Lakes was actually in effect since it had not been signed by the Secretary of the Interior. Wilde advised that the BR Field Solicitor had confirmed that respective Regional Directors' signatures fulfilled the legal requirement ratifying the agreement.

Under the agreement, the FWS has gained in several areas. The Service acquired land management of all lands within the refuge boundaries with the exception of approximately 137 acres on Lake Minatare reserved by the BR as operations areas. Approximately 300 acres of BR lands previously not closed to hunting will now be posted closed by the Service; of this, refuge status will be conferred on approximately 160 acres.

## D. PLANNING

### 2. Management Plan

Since obtaining primary jurisdiction over the refuge, objectives for the refuge were formulated as follows:

1. To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.
2. To perpetuate the migratory bird resource.
3. To preserve a natural diversity and abundance of fauna and flora on refuge lands.
4. To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment, and to provide refuge visitors with high quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

Biological plan and control charts were drafted for the grazing program.

A Sign Plan for both Crescent Lake and North Platte Refuges was completed and submitted for approval.

### 4. Compliance with Environmental Mandates

A new reservoir is being considered by the Corps of Engineers and the Bureau of Reclamation on the North Platte River in Wyoming. The project, referred to as the Deer Creek Project, is designed to provide the City of Casper, Wyoming with a reliable drinking water supply. The project could affect the operation of the North Platte NWR reservoirs. The Ecological Services Office in Grand Island, Nebraska is coordinating and compiling the information as it relates to the refuge. The project has received harsh criticism from the state of Nebraska, media sources and the FWS. Specifically, Nebraskans are concerned about the amount of water short-stopped from entering their state and Ecological Services found inconsistencies in how inland waters were addressed in several hydrology scenarios presented in the Deer Creek Environmental Impact Statement.



As a result of a lawsuit between the States of Wyoming and Nebraska, in which USFWS was named a party to the suit, Huber traveled to the Regional Office in May and again in July to provide the Solicitor's Office with an affidavit concerning the impact of various water rights on wildlife and public use on the North Platte NWR. The affidavit was presented before the U.S. Supreme Court in August.

#### E. ADMINISTRATION

##### 1. Personnel

North Platte NWR is an unfunded satellite station that was unstaffed until 1978 when Sherry McCoy was hired as a Biological Aid on a temporary intermittent appointment. Sherry works fulltime for the NGPC at Lake Minatare SRA and during her off time has assisted the refuge with census work, posting the boundary, and locking gates during the closed period.

With the impending change in administrative jurisdiction over the refuge it was necessary to fund a temporary law enforcement position. In April 1986, Felix Koenig was selected as a Police Officer for the North Platte NWR. He is responsible for enforcing rules and regulations of the refuge as well as performing the various other tasks of boundary posting, maintenance of goose nesting structures, dispensing refuge information, conducting refuge programs and wildlife censuses. This temporary position is budgeted to utilize a 25 hour work week. With the Police Officer absorbing the responsibilities of McCoy's position, the intermittent Biological Aid position was terminated during 1988. Sherry has admirably filled this position for the past 10 years. She will continue to serve when needed to assist the Refuge Officer under a Special Need appointment. The switch from an intermittent position will reduce paperwork at both the regional office and field station.



Figure 1. FVK 1NR-88-BWM

PERSONNEL

1. Royce R. Huber, Refuge Manager GS-11, PFT
2. Bradley W. McKinney, Assistant Refuge Manager GS-9, PFT
3. Lydia M. Jones, Refuge Assistant GS-5, PFT  
Transferred 6/6/88
4. Bradley D. Johnson, Clerk-Typist GS-3, PFT  
EOD 10/9/88
5. Monte L. Shaul, Heavy Mobile Equipment Repairer WG-9, PFT
6. Richard J. Iwanski, Maintenance Worker WG-6, PFT
7. Felix V. Koenig, Police Officer GS-4, TPT
8. Gordon L. Warrick, Range Technician GS-5, TFT
9. Timothy G. Williams, Range Aid GS-3, TFT
10. Sherry K. McCoy, Biological Aid GS-3, TPT
11. Lucy Koenig, Volunteer



Figure 2. Lucy Koenig 2NR-88-FVK

4. Volunteer Program

A volunteer for the past three years, Lucy Koenig continues to assist with various projects such as fence repair, signing and painting. Of particular importance are her wildlife surveys. In past years, wildlife use on the refuge was largely based on assumptions and infrequent refuge inspections. The census work of Felix and Lucy has provided managers with a much better feel for what transpires in the way of wildlife movement on this distant satellite.

For contributing an average of 4 hours per week since 1986, Lucy was awarded the Service's Volunteer Certificate of Appreciation (Figure 2). Mrs. Koenig was recognized for her work conducting biweekly wildlife surveys, pair counts, brood surveys, eagle counts, and various refuge maintenance projects. For these same efforts, Lucy was also notified in December that she has been selected as Nebraska's First Place winner in the Individual category of the Take Pride in America Award.





Figure 3. Governor Kay Orr will personally present Lucy with Nebraska's Take Pride in America award at a ceremony in May, 1989. 3NR-88-FVK

5. Funding

The refuge has never been funded as a separate entity and money to maintain the area comes from Crescent Lake NWR. Considerable funds are necessary for salaries as well as a variety of materials including fencing, signing and related travel costs. With the change in administrative jurisdiction (Section C) and the additional real property responsibilities (Section H.1) North Platte NWR is expected to require an even greater portion of the Crescent Lake NWR budget.

6. Safety

Koenig participated in monthly safety meetings conducted at Crescent Lake NWR.

An incident/accident report was completed in August and submitted to the Regional Office regarding a drowning at Lake Minatare. The 23 year old victim and two companions were attempting to cross a shallow portion of the lake after their vehicle became stuck.



## 8. Other Items

Under an agreement signed by the Bureau of Reclamation and the Nebraska Game and Parks Commission and adopted by the Service, portions of the Lake Minatare Unit are managed as a State Recreation Area. The NGPC maintains a headquarters area including a shop, office and residence. The NGPC administers many of the activities in the area including cabin leases, concessionaire, boat ramps, picnicking and camping facilities, and boat dock and mooring permits.

## F. HABITAT MANAGEMENT

### 1. General

In the past, habitat management has been the responsibility of the Bureau of Reclamation. The management policies of the Bureau emphasized economic use (intense, season long grazing). With the recent transfer of administrative jurisdiction to the Service, management will alter accordingly with wildlife receiving more consideration. The initiation of a Canada goose restoration project by the NGPC and a fisheries renovation project in Winters Creek Lake has marked the beginning of this new direction.

### 2. Wetlands

The three refuge impoundments receive their water through a series of reservoirs in Wyoming and are managed almost exclusively for irrigation purposes. Exceptions sometimes include maintaining levels conducive to summer public use and winter duck use at Lake Minatare. Waterfowl brood and marsh bird habitat is limited to two small seepage marshes and some of the more secluded bays of the reservoirs. Except for the two small marshy ponds maintained by seepage, all refuge wetlands are deep reservoirs manipulated to provide maximum irrigation benefits. By late summer wide mudflats surround Big Lake Alice and Lake Minatare as they near their lows for the year.

### 3. Forests

Although no forests exist on the refuge per se, all lakes within the refuge boundary are at least partially surrounded by a belt of trees. A total of 465 acres are tree covered and about half of these areas are managed similarly to green tree reservoirs. Commercial timber harvest is not permitted.



Figure 4. Boy Scouts are interested in a restoration tree planting project to replace the growing number of over-mature cottonwood trees found skirting all three reservoirs. 4NR-88-FVK

5. Grasslands

About 1,000 acres of grasslands exist within the refuge boundaries. In the past these grasslands were leased for season long grazing by the Bureau of Reclamation. After several years of rest under Service control it was determined that a short duration/high intensity grazing program on selected habitat units would improve grassland conditions (Figures 5 & 6).

7. Grazing

The Bureau of Reclamation grazing leases on the refuge expired on December 31, 1985. Evaluation of these areas by the Service indicated that they were severely overgrazed. No grazing occurred on the refuge from 1985 through 1987. During the summer of 1987 habitat units were reevaluated. The Scotts Bluff Soil Conservation Service was asked to conduct a range and condition survey on the refuge. All of the habitat units at Winters Creek were rated as good, all but one (a gravel site) at Minatare were rated good, and the majority of Lake Alice was rated as good. A decision was made to apply a high-intensity, short-duration grazing scheme on several of the North Platte units during the spring of 1988.



Figure 5. Vegetative transects (biological monitoring) were conducted in 1988 in NPL Cell #1 (Paddock 1).  
5NR-88-RRH



Figure 6. Two cattle exclosures, each protecting sites typical to the unit, were erected in the NPL Cell #1 to better monitor habitat dynamics. 6NR-88-RRH



Of the three cells opened for grazing bids, only one, the Lake Alice Cell of 7 paddocks totalling 381 acres, received any interest from the local community. The permittee removed 139.78 AUM's using 70 cow/calf pairs and was completely satisfied with the holistic, high-intensity/short-duration approach.

8. Haying

A special use permit was issued to a local rancher for haying 44 acres on the Winters Creek Unit. The benefit of the project was two-fold: (1) the unit had been infested with Canada thistle, which refuge staff had been cutting all summer, force account and (2) hay. August haying provided the last cutting for the year necessary to keep the noxious weed in check. The refuge share of the hay (30%) will be made available this winter/early spring to any potential permittee interested in grazing a habitat unit (prairie dog town) on the Minatare Unit.

9. Fire Management

A Memorandum of Understanding (MOU) between the Minatare Fire Department and the Service was signed by both parties during the year. The MOU allows access to the Minatare FD for fire suppression on the North Platte refuge. It would seem that the agreement came about none too soon as an August grassfire occurred on the Minatare Unit, burning 2 acres. The roadside fire, suppressed by the Minatare FD, had been started by a discarded cigarette.

10. Pest Control

Pesticide proposals for 1988 were disapproved by the Regional Office. The Scotts Bluff Weed Board was notified that they would not be allowed to apply chemicals on the North Platte Refuge. Refuge staff attempted to control the noxious weed problem, primarily Canada thistle, through mechanical means (i.e., rotary mowing, haying, hand tools) and grazing. The thistle problem on Lake Alice and Winters Creek Units was quite extensive. The Superintendent of Minatare State Recreation Area made available a tractor/mower which Felix Koenig kept busy most of the summer. In addition, three temporaries from Crescent Lake Refuge made two overnight trips to the North Platte Refuge to hand cut thistle in and around trees, where it was inaccessible with the mower.





Figure 7. Spurred by several unusually wet growing seasons, the Canada thistle infestation on the refuge was extensive. 7NR-88-RRH

#### 11. Water Rights

The water in North Platte NWR reservoirs is supplied via Bureau of Reclamation works under a right to the Pathfinder Irrigation District (PID). PID performs all water management and the reservoirs are manipulated almost exclusively for irrigation purposes. However, Lake Minatare waters are sometimes maintained at levels conducive to summer public use, winter waterfowl use, and fisheries maintenance.

The Pathfinder Irrigation District wishes to continue a practice (formerly permitted by the Bureau of Reclamation) of packing coal cinders into an outlet valve at the Lake Minatare dam to help prevent the valve from leaking. Test results from coal cinder samples are being analyzed by Ecological Services to determine what, if any, threat the slurry runoff may pose to downstream water quality.

## G. WILDLIFE

### 1. Wildlife Diversity

Part of the responsibilities of the Refuge Officer has been to conduct bi-weekly wildlife censuses. These regular and complete censuses conducted by both Felix Koenig and volunteer Lucy Koenig have added much to the understanding of the North Platte NWR wildlife resource. In prior years, wildlife use on the refuge had been based on infrequent and incomplete wildlife surveys.

### 2. Endangered or Threatened Species

Bald eagles utilized all three units of the refuge in 1988. The eagles are attracted to the large waterfowl concentrations and the absence of human disturbance associated with these areas during the closure period. A peak number of 12 bald eagles were observed in mid-December.

### 3. Waterfowl

Waterfowl use days for 1988 were tallied at 203,250 goose use and 3,535,440 duck use, not including coot. The peak waterfowl population for the refuge occurred on December 20th when 70,990 waterfowl (63,071 mallards) were present. An encouraging observation has been the



Figure 8. Although all Central Flyway duck species are known to utilize the refuge, mallards account for approximately 90% of waterfowl use days. 8NR-88-FVK

increasing number of waterfowl using Winters Creek Lake. Prior to removing rough fish in April 1987, (Section G.11) waterfowl rarely used this lake. With the rough fish removed and the turbidity problem corrected the average daily waterfowl use for Winters Creek Lake during the fall migration was nearly 2,000.

Based on goose tub surveys (32 tubs), wood duck box inspections (18 boxes) and bi-weekly waterfowl surveys, it was estimated that 10 Canada geese, 18 mallards and 36 wood ducks were produced on the refuge during the spring/summer of 1988.

4. Marsh and Water Birds

A dramatic increase in marsh and water bird production occurred on the Lake Alice unit in 1988. A total of 158 heron nests, primarily great blue, were found to have been utilized during the year compared to 50 in 1987. A new rookery of 20 double-crested cormorant nests was also discovered adding to an established cormorant rookery of 32 nests.

5. Shorebirds, Gulls, Terns and Allied Species

Shorebirds took advantage of the mudflats available through the summer and fall when the irrigation district lowered Lake Alice and Winters Creek Lake. Species observed were killdeer, ring-billed, Franklin's and herring gulls, long-billed dowitcher, lesser yellowlegs, black-necked stilts, American avocet, and various sandpipers.

6. Raptors

Raptors observed on North Platte NWR during the year included great-horned owl, Swainson's hawk, rough-legged hawk, osprey, goshawk, red shouldered hawk, and both bald and golden eagles.

8. Game Mammals

Among the many benefits of controlling and enforcing public use activities on Lake Alice has been the migration of mule deer to this unit. Felix Koenig has been watching their numbers grow on this unit of the refuge and was seeing a herd of 32 deer at year's end. Prior to enforcing the annual closures, mule deer and white-tailed deer were observed on rare occasions.



## 10. Other Resident Wildlife

Ring-necked pheasants, sharp-tailed grouse and bobwhite quail occur in small numbers on the refuge, primarily on Lake Alice and Winters Creek Lake.

Common mammals on the refuge include raccoon, striped skunk, coyote, red fox, eastern fox squirrel and eastern cottontail. A black-tailed prairie dog town is located on the east side of Lake Minatare.

## 11. Fishery Resources

Fisheries management at Lake Minatare continues to be the responsibility of the NGPC. During the summer, the lake provides good fishing opportunities with good access and facilities. Lake Minatare harbours a healthy population of walleye, white bass, yellow perch, channel catfish and northern pike.

In past years, Winters Creek Lake provided little sport fishing opportunities due to an over abundant rough fish population. A 1986 cooperative agreement between the NGPC and the Service authorized the renovation of Winters Creek Lake and the construction of a fish screen at the lake's inlet. While there were initial problems associated with the screen during spring time refilling of the lake, the screen apparently worked well as only stocked game fish showed up in test nets set out in July by the Nebraska Game and Parks Commission (NGPC). NGPC released 100,000 walleye in Lake Minatare and 20,000 walleye in Winters Creek Lake during the past summer.

Lake Alice is typically drained each winter by Pathfinder Irrigation District preventing sport fisheries management and allowing for the harvest of only those fish that enter the lake in the spring via the irrigation canal.

## H. PUBLIC USE

### 1. General

The NGPC manages the Lake Minatare Unit as a SRA which receives an annual visitation of 150,000 to 250,000 visits. The state requires the purchase of a park permit in order to use the area. Problems that occur on the SRA are generally associated with uncontrolled camping, water skiing, power boating and jet skiing. Public entry during the period October 1 to January 15 is prohibited by the Service.



Winters Creek Unit is a day-use area and public use is limited to fishing, wildlife observation, photography, hiking, canoeing and rowboating. No beaches or campsites are available. The area is closed to public entry during the period of October 1 through January 15.

The Lake Alice Unit is also a day-use area with public use limited to nature observation, photography, hiking, bicycling, horseback riding, picnicking, approved studies, fishing, sailing, windsurfing, canoeing and rowboating. These activities are allowed on the eastern half of the Unit during daylight hours only. The western half of the Unit remains closed to all public entry on a year-round basis. The entire Unit is closed to public entry from October 1 through May 15 to provide an undisturbed sanctuary during waterfowl migration periods.

Traffic counters were installed at both Winters Creek and Lake Alice Units in May and have provided baseline data for quantitative public use estimates.

#### 7. Other Interpretive Programs

McKinney presented a program to 70 Boy Scouts and their leaders in February. Afterward, the Scouts assisted McKinney, Koenig and Iwanski with servicing of goose tubs and wood duck boxes on the refuge (Figures 9 & 10). The Scouts represented communities from throughout the Panhandle.



Figure 9. Goose tub .... 9NR-88-FVK



Figure 10 .... and wood duck box maintenance has become an annual project for the local Boy Scouts in recent years. 10NR-88-FVK

In May, Koenig lead members of the Nebraska Ornithologist's Union (Figure 11) on a two-day tour through Lake Alice, and the Bayard Boy Scouts on a tour of the Winters Creek Unit.



Figure 11. Members of the Ornithologist's Union spent two days on the Lake Alice Unit conducting a spring bird count. (FVK)



## 9. Fishing

Fishing is allowed on all three lakes, however, only Lake Minatare currently has a viable fishery.



Figure 12. Ice fishing for walleye on Lake Minatare is a popular winter sport drawing visitors from throughout the Panhandle/eastern Wyoming region.

Fishing opportunities will improve at Winters Creek Lake over the next few years as stocked fish obtain catchable size. This year's largemouth bass on Winters Creek were slightly shy of the 12 inch size limit.

## 13. Camping

The Lake Minatare SRA made an attempt to control campers beginning in 1987 with the construction of 50 camping pads. Campers are required to use the pads when available, however, in campgrounds without pads, camping continues to be a problem with camps set up at the water's edge denuding long stretches of lakeshore.

## 15. Off Road Vehicling

Within the Lake Minatare SRA long stretches of lakeshore are open to (virtually) uncontrolled and heavy public use. Over the years this has lead to vehicles encroaching further and further off established roadways

## 16. Other Nonwildlife Oriented Recreation

Items in this category are associated with Lake Minatare and include water skiing, power boating, jet skiing, swimming, sunbathing and other nonwildlife oriented activities.



Figure 13. The Nebraska Game and Parks Commission estimates that as many as 250,000 public use visits occur on the Lake Minatare State Recreation Area. Most visits are associated with non-wildlife oriented recreation. (FVK)

Although the majority of this use occurs on Lake Minatare, Lake Alice is also used to a limited extent for some of these activities.

## 17. Law Enforcement

The presence of Refuge Officer Koenig has helped restore compliance with refuge rules and regulations. He has also served as the primary source for disseminating information to the visiting public. These responsibilities were expanded virtually overnight with the Bureau of Reclamation transferring administrative jurisdiction to the Service (Section C). Koenig will be expected to play an even more visible role enforcing refuge regulations within the boundaries of the Lake Minatare SRA.



Table 1 lists both federal and state violation notices issued by Refuge Officer Koenig during 1988. (Koenig maintains credentials with the State of Nebraska.)

Table 1. Violation Notices Issued on North Platte NWR in 1988

<u>Violation</u>	<u># Violations</u>	<u>Fine(each)</u>	<u>Disposition</u>
Entering a closed area 50 CFR 26.21	2	\$50	(2) Pending
Illegal fire 50 CFR 27.95(a)	2	\$100	Closed
Fishing w/out permit (State)	2	\$40	Closed
Possession of undersize bass (State)	43	\$16*	Closed

\*Allowing for court costs, state fines varied. Shown is the average cost per violation notice (per fish).

#### 19. Concessions

A food, bait and beverage concession is located at Lake Minatare SRA. The operation is permitted by the State of Nebraska under their lease with the Service.

### I. EQUIPMENT AND FACILITIES

#### 4. Equipment Utilization and Replacement

With the change in administrative jurisdiction the following real properties were transferred to the Service on December 29, 1987:

1. 28'X 50' wooden shop building at NGPC headquarters (one structure)
2. 30'X 45' stone scout cabin (one structure)
3. 12'4" x 12'4" x 60' high stone light house (one structure)
4. 14' x 16' wooden picnic shelter (five structures)
5. 14' x 31' stone changing house (one structure)
6. 14' x 32' wooden picnic shelter (one structure)
7. 10' x 7'10" Restroom (two structures)

J. OTHER ITEMS3. Credits

This report was written by McKinney with input from Koenig and edited by Huber.

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