

NATIONAL ELK REFUGE

Jackson, Wyoming

ANNUAL NARRATIVE REPORT

Calendar Year 1989

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

REVIEW AND APPROVAL

NATIONAL ELK REFUGE

Jackson, Wyoming

ANNUAL NARRATIVE REPORT

Calendar Year 1989

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Regional Office approval (date)

INTRODUCTION

The 24,700 acre National Elk Refuge lies in the Jackson Hole area of northwestern Wyoming. The refuge was established by Congress on August 10, 1912, to acquire, preserve, and manage lands for wintering elk. The elevation of the refuge varies from 6,200 feet to 7,200 feet. The Tetons to the west rise to 13,766 feet at the summit of Grand Teton. The valley and the surrounding mountains show classic examples of glaciation. The refuge is within Teton County and is bounded on the north by Grand Teton National Park, on the east by Bridger-Teton National Forest, and on the south by the town of Jackson.

Soils at the lower elevations are alluvial, generally sandy loam or loam, and are shallow and permeable. The soils at the higher elevations are also loamy but there are considerable areas of gravelly soils and cobblestone on the south slopes and ridges. The northern half of the refuge consists of steep rolling hills. The southern half is glacial outwash material, with one resistant formation (Miller Butte) rising approximately 500 feet above the valley floor.

There are two major streams flowing through the refuge. The Gros Ventre River forms much of the northern boundary and Flat Creek, flowing east to west, nearly bisects the refuge. As Flat Creek approaches the western boundary, it turns south and leaves the refuge in the southwest corner.

The climate is typical of high valleys in the northern Rocky Mountains; summers are cool and winters are long. Snowfall patterns form a gradient from 6 to 18 inches on the lower half of the refuge up to four feet on the north end. Annual precipitation is 15.2 inches with about half received as snowfall. Temperature extremes vary from a summer high of 92-94 degrees Fahrenheit to winter lows of 35-40 degrees below zero. Record high is 101 degrees Fahrenheit and record low is 52 degrees below zero.

Much of the refuge consists of grassy meadows and marshes on the valley floor with sedges, bluegrasses, and brome grass being important components of the communities. The flood plain forest along the Gros Ventre River contains blue spruce, narrowleaf cottonwood, red osier dogwood, and balsam poplar as major species. There are extensive areas of big sagebrush and rock outcroppings. The forested areas of lodgepole pine, Douglas fir, and aspen are mostly on the northern slopes of the Gros Ventre hills.

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1A. HIGHLIGHTS

Director John Turner sworn in by Secretary of the Interior Manuel Lujan, Jr., on the refuge (Section E).

John Wilbrecht, Refuge Manager for 12 years, retired December 2 (Section E1).

Three refuge employees receive Special Achievement awards (Section E8).

Ten cygnets fledged by two pairs of trumpeter swans, broods of four and six (Section G3).

Control of bison herd carried out (Section G8).

Study continued on a new visitor center at National Elk Refuge (Section H1).

Another record visitation year at the Sleigh Ride Visitor Center (Sections H1, 5 and 6).

Two new pellet sheds constructed (Section I).



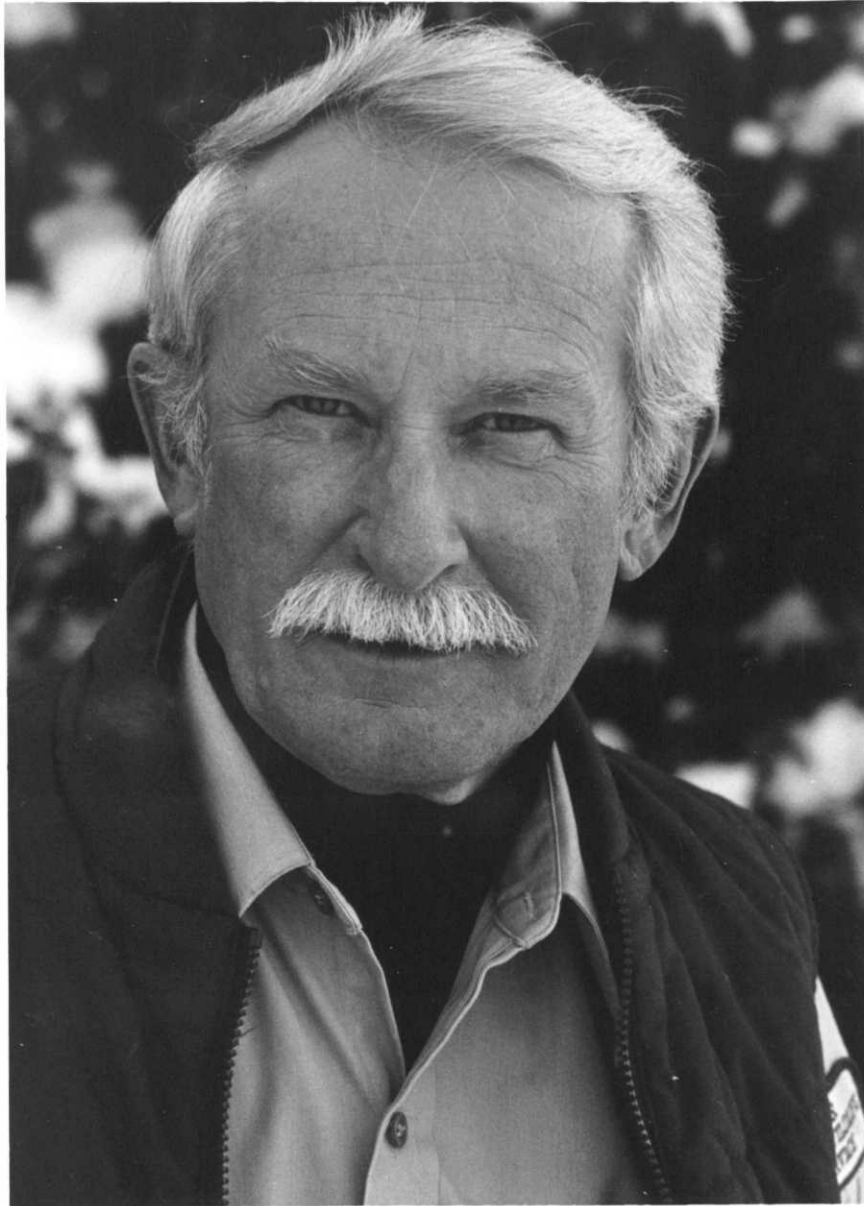
Newly appointed USFWS Director John Turner stands with his family during the swearing-in ceremony with Secretary of Interior Manuel Lujan, Jr, on National Elk Refuge land.
(Jackson Hole News photos, 8/4/89, B. Willcox)



Director John Turner and his family with Secretary of Interior Manuel Lujan, Jr., at swearing-in ceremony. (Jackson Hole News photos, 8/4/89, B. Willcox)



Director John Turner and Secretary of Interior Manuel Lujan, Jr, swearing-in ceremony on National Elk Refuge. (Jackson Hole News photos, 8/4/89, B. Willcox)



Refuge Manager John E. Wilbrecht retired on December 2 after 32 years of government service. John plans to spend a lot of time pursuing the wily trout, researching different fly patterns, and perfecting his turkey call.

(Jackson Hole News photos, 11/89)

B. CLIMATIC CONDITIONS*

Weather data for 1989 is shown in Table 1. Total precipitation for the year was above normal. Six months were below normal and six months were above normal with twice the amount of normal precipitation occurring in both March and August. March set a record for precipitation with 2.59 inches (old record was 2.17 inches) and only three days with sunshine. December was an unusually dry month.

The snowfall total for the year was below that of 1988. The highest monthly snowfall total was 29 inches in January. Average snowpack for the Snake River drainage above the Gros Ventre River for the year was 103 percent of average for the previous 25 years. The snowpack produces 75 to 85 percent of the area's streamflows.

The frost-free period started June 22 and ended August 25 giving us 64 days of growing season in 1989. The average length of the growing season is 60 days.

Maximum temperature for the year was 93 degrees Fahrenheit on July 7 and the minimum was -28 on both January 25 and February 7.

Table 1. Weather data from Tom Dunham, weather observer, located one-fourth mile west of the National Elk Refuge.

MONTH	PRECIPITATION(inches)			TEMPERATURE(degrees F)		
	Normal	1989	Snowfall	Maximum	Minimum	Average
January	1.57	1.80	29.00	34	-28	12.05
February	1.32	0.98	10.50	46	-28	9.00
March	1.35	2.59	20.50	56	-11	31.45
April	1.76	1.04	0.00	72	11	39.45
May	1.35	1.85	0.00	74	18	45.96
June	1.35	1.32	0.00	86	25	54.45
July	0.92	0.69	0.00	93	37	66.61
August	1.43	2.31	0.00	88	32	59.88
September	1.48	1.34	0.00	80	27	52.60
October	1.19	1.32	1.75	70	14	43.11
November	1.04	1.40	17.25	58	-15	30.38
December	1.53	0.10	5.25	44	-09	18.27
TOTALS:	16.29	16.74	84.25	(93)	(-28)	38.60
				(extremes)		

*Edwards

C. LAND ACQUISITION*1. Fee Title

Interest in negotiations for a 30-acre tract on Twin Creek Ranch continued as owner Hugh Soest indicated he wanted another appraisal. FWS has had \$510,000 in designated acquisition funds available but Twin Creek had to resolve estate and other interest differences before proceeding. Rich Johnson, RE at CMR NWR, did a reappraisal at the owner's request and it is now in the regional office for further negotiations.

3. Other

Our share of road maintenance, primarily snow removal, is illustrated in the following table. Beginning in 1988, the Architectural Committee of Teton Valley Highlands agreed to let us use our CAT maintainer and operator on the road and charge the cost toward our share of road maintenance, including contracted snow removal.

Table 2. Road Maintenance

<u>FY</u>	<u>Teton Wildlife Ranch</u> Calkin's drive	<u>Teton Valley Highlands</u>
80		760.00
81		779.00
82		1,848.00
83	45.00	2,437.00
84	90.00	1,580.99
85	300.00	2,113.75
86	900.00	3,109.50
87	435.00	1,124.99
88	270.00	2,817.71
89	<u>1,316.25</u>	<u>4,391.14</u>
	\$3,356.25	\$20,962.21
	\$479.46 (7-yr average)	\$2,096.21 (10-yr average)

D. PLANNING

2. Management Plan*

Fisheries Management Plan* This refuge has been slated to have a Fishery Management Plan (FMP) since 1957. In 1969, the Lander field station became involved in technical assistance to this refuge's fishery program. Various surveys, recommendations, and considerable correspondence and directives then occurred into 1982. Still no plan was developed. In Fiscal Year 1983, the Fishery Program Advice directed the Lander office to work on "fishery issues" on the National Elk Refuge and the Project Leader in Lander indicated that "he would take the lead." The process has been delayed several times with a draft plan sent back and forth between the refuge, Lander Fishery Assistance Office (FAO), and the Regional Office.

In December 1989, the draft fisheries management planning documents were incorporated into one refuge management document. The Fishery Management Plan was designated as Part I and the Sport Fishing Plan as Part II. These documents were sent to RW in the Regional Office and approved. A copy was then sent to the Lander FAO for their review and comments and then it will be sent to the Regional Office (Fisheries). It will then be sent to Wyoming Game and Fish Department for their comments and the final FMP completed.

Grassland Management Plan* Mark Lanier is writing the Grassland Management Plan when not occupied with more pressing duties. The bulk of the plan has been completed and a draft should be coming out shortly. A lot of important information was taken from a study done by Dave Griffel in 1980. The title of Griffel's report is "Forage Production on Dry and Irrigated Lands for Elk Winter Range Improvement, National Elk Refuge."

Water Management Plan* A draft water management plan is due in the Regional Office by September 15, 1990. Some preliminary work has been done on this plan. Our past Annual Water Management Plans will be very valuable in writing this plan.

Bison Management Plan** In February 1988, the USFWS and the NPS completed a joint agency draft "Environmental Assessment/Bison Management Plan." The public response was varied and there was not a general consensus for any one of the proposed alternatives. Following analysis of the public comments, the agencies agreed that additional investigation and monitoring of the bison herd, as well as more complete exploration and evaluation of the EA alternatives were needed. The decision was made by the agencies (NPS, WGFD, FWS) to use an "Interim Management Plan" as a guide for management of the herd. An "Annual Interagency Bison Management Program" will address details of each year's operations under the Interim Management Plan.

The Interim Agreement for the Management of the Jackson Bison Herd states that this herd will be managed for an interim population objective of 90 to 110 animals. Based on a wintering herd of 119

animals on the NER, the removal of 16 bison (eight adults of each sex) by agency personnel was carried out in March 1989.



The buddy system was used to field dress bison taken during the WGFD hunt conducted on the refuge. (35mm print, 11/89, JMG)

The removal served to stabilize the herd size and left a minimum of 105 bison, 103 on the National Elk Refuge and two in Grand Teton National Park. Earlier in the winter, one adult female bison had died of natural causes on the NER and two adult bulls were killed by private citizens on the Twin Creek Ranch, a private inholding on the NER. Those two bulls were part of a larger group that had regularly been crossing the cattleguard and entering the ranch. During summer 1988, two other bison were killed. One was an adult male that was shot by a citizen near Marbleton, Wyoming. The other was also an unmarked adult male destroyed by the Fremont County brand inspector west of Lander, Wyoming, on July 23, 1988. The latter bison had been observed earlier in the summer north of Lander on the Wind River Indian Reservation by Tribal game wardens. Two additional bison of unknown age and sex, which apparently dispersed from either the Jackson or Yellowstone National Park herds, were observed near Togwotee Pass during August 1988.

WGFD personnel collected diagnostic tissue samples from the 16 bison removed from the refuge. At present, the only results completed are from the blood genetic analyses and from brucellosis testing. Eleven of the 16 bison (69%) tested positive for brucellosis. This is somewhat higher than the 55 percent incidence of brucellosis among bison harvested from the northern herd of Yellowstone National Park. Ages of the removals from the Jackson bison herd are illustrated in Table 3.



The meat, hides, etc., were donated to the Arapaho Indian Tribe (5 animals) and Shoshone Indian Tribe (5 animals), Wind River Reservation, Wyoming; Sho-Rap Indian Tribes, Fort Hall, Idaho (4 animals); and Western Wyoming College, Rock Springs, WY (2 animals).
35mm print, 3/28/89, JEW

Table 3. Bison sex, age, & brucellosis results in reduction program, 1989

<u>Animal #</u>	<u>Sex</u>	<u>Age</u>	<u>Brucellosis</u>	<u>Pregnant</u>
1	M	5	+	NA
2	F	9	-	Yes
3	M	4	+	NA
4	F	4	-	Yes
5	M	5	+	NA
6	F	3	-	Yes
7	M	9	-	NA
8	F	4	+	Yes
9	M	4	+	NA
10	F	4	-	No
11	M	5	+	NA
12	F	2	+	recently aborted
13	M	5	+	NA
14	F	4	+	No
15	M	5	+	NA
16	F	?	+	Yes

Mean age males = 5.25

Mean age females = 4.30

1989-1990 Reduction Bison in the Jackson herd are classified as wildlife on all federal lands in Teton County, Wyoming, except for that portion of Teton County south of US Highways 89 and 189/191 south of Hoback Junction. In 1989, the Wyoming State Legislature enacted a statute establishing license fees for taking of bison. The Wyoming Game and Fish Commission subsequently adopted a regulation to conduct a hunt to stabilize the Jackson bison herd.

The first reduction by Wyoming Game and Fish Department licensed hunters occurred on the refuge at the north end of McBride Ridge on October 26 when two bulls and two cows were taken. By the end of the year, thirteen bison had been harvested on the refuge with plans to take seven more in early 1990 for a total reduction of 20 by WGFD licensed hunters. WGFD personnel accompany recipients of a bison permit, selected through a computer drawing, to insure that the proper age/sex animals are harvested.

3. Public Participation*

On March 8, 1989, a public workshop was conducted by officials of the USFWS, National Park Service, Wyoming Game and Fish Department, and the US Forest Service to discuss the 1988-89 "Annual Interagency Bison Management Program" for the Jackson bison herd. Two workshops were conducted, one from 2-4 pm and the other from 7-9 pm at the 49er Motel Conference Room in Jackson. At the afternoon meeting, there were 36 people present and at the evening meeting there were 33 people. Barney Schranck, Associate Manager for District I, and Chris Franson from the Wildlife Health Center, Madison, WI, were in attendance.

Comments ranged from: "Get rid of all the buffalo and leave the refuge to the elk" to "Truck in more bison to insure genetic diversity."

4. Compliance with Environmental and Cultural Resource Mandate*

The Town of Jackson plans to do some street and storm drainage improvements in the east Jackson area. The proposed project includes reconstruction of East Broadway, Nelson, Rancher and Hansen Streets. Storm drains and culverts will be placed under Broadway in order to stop the ponding of water along the south side of Broadway. Project also includes the construction of a stormwater retention/infiltration structure on the refuge immediately north of St. John's Hospital (approximately two acres).

The Town of Jackson wrote an environmental analysis of this project to enable us to do an environmental assessment. Several letters have been exchanged between the NER and the Town regarding compatibility and suggesting other sites for the project rather than on the NER. If another site cannot be found, we may be looking into a mitigation or land exchange deal with the Town.

Work continued on the development of waterfowl habitat on the NER for habitat loss mitigation for the Jackson Lake Safety of Dams Project. Eight of the projects are on the refuge and will be funded by the Bureau of Reclamation at a cost of over \$200,000.

This will involve developing or enhancing approximately 100 acres of wetlands using dikes with water control structures to impound water and control water levels. Contouring the wetland basins to optimize water depths and creating islands will be necessary. Primary purpose of this project is the enhancement of trumpeter swan habitat.

Project developments will also enhance wetlands and habitats for other species such as waterfowl, shorebirds, waterbirds, furbearers, fish, amphibians, and invertebrates that are dependent on wetlands. Endangered bald eagles and peregrine falcons will be benefitted by anticipated increases of fish and water-oriented birds.

The other project is the development of approximately 20 acres of open water using explosives and/or heavy equipment in a marshy area near the Flat Creek Bridge that now has very little open water.

Cultural resources in the project areas were described by the Midwest Archaeological Center, Lincoln, Nebraska, following a CLASS 3 intensive inventory in 1989. The project sites have been selected to avoid all significant archaeological and historical sites.

The Environmental Assessment is being written by Steve Oddan from the Fish and Wildlife Enhancement Office in Billings, Montana, with consultation with NER personnel.

5. Research and Investigation*

Abundance and Distribution of Ectoparasite on Wapiti of the National Elk Refuge, Wyoming (WMS-86-2)

Additional parasite collections will be made during winter 1989-90 with a manuscript completed and submitted in 1990.

Elk - Bison Winter Foraging and Interactive Behavior (WMS-89-1)

Bill Helprin, a graduate student at Utah State University, completed observation of bison and elk interactions at NER feedgrounds during winter 1988-89. He will complete his thesis during 1990.

Genetic Status of North American Elk (WMS-87-1)

Mr. Joe Cziglenyi collected measurements and weights on elk antlers taken from the NER prior to the annual elk antler auction of 1989. He will be completing his graduate thesis in 1990.



Joe Czigleny, a graduate student antler researcher with Washington State University studied genetic characteristics of antlers and helped the Boy Scouts sort and bundle antlers for the antler auction.
(35mm, 5/89, JMG)

Wildlife management studies ongoing at the National Elk Refuge

A. Winter Range Carrying Capacity of the National Elk Refuge

The project leader is John Oldemeyer (US Fish and Wildlife Service, Fort Collins, CO). Tom Hobbs (Colorado Division of Wildlife) has been assisting with technical advice. Dr. Hobbs completed a prototype of a computer model in December 1987 to predict when supplemental feeding should be initiated on the refuge each year. Initial calculations of winter range carrying capacity were completed by Bruce Smith in December 1987. Dr. Hobbs is presently making additional modifications in a model developed for mule deer that can be applied to elk.

B. Migrations and Management of the Jackson Elk Herd, Wyoming.

A draft report was submitted to the Refuge Manager in March 1988. Peer and agency reviews were obtained and the manuscript was submitted for publication in 1989 to Wildlife Monographs.

C. Relationships Between Supplemental Feed Rations on Weight Dynamics and Reproductive Success in Elk

These feeding trials were conducted from 1975-1982 at NER. The results were presented by Biologist Smith at the 1988 Western States and Provinces Elk Workshop and will be published in the Workshop Proceedings.

Oldemeyer, J.L., R.L. Robbins, and B.L. Smith. 1990. Effects of Feeding Level on Elk Weights and Reproductive Success at the NER. Proceedings Western States and Provinces Elk Workshop. In press.



Interagency pack trip into the Teton Wilderness area and Yellowstone National Park. Biologist Smith participated to observe aftermath of the 1988 forest fires. (35mm, 8/89, BLS)

E. ADMINISTRATION *

9 3 7 10 2 5 6 1 4 8

NATIONAL ELK REFUGE PERMANENT EMPLOYEES

<u>Employee</u>	<u>Position and Grade</u>	<u>EOD</u>
John E. Wilbrecht	Refuge Manager, GM-0485-13 Retired: 12-02-89	07-31-77
1 James A. Creasy	Ass't Refuge Manager, GS-0485-11	07-05-87
2 James M. Griffin	Ass't Refuge Mgr., (Public Use) GS-0485-11	06-03-79
3 Bruce L. Smith	Wildlife Biologist, (Mgmt) GS-0485-11	06-13-82
4 Betty L. Parrish	Administrative Officer, GS-0347-07	01-11-81
5 Janice L. Edwards	Refuge Assistant, GS-0322-05	05-02-88
6 Roger D. Pape	Heavy Mobile Equip. Mechanic, WG-5803-11	03-30-67
7 Robert R. Rowley	Maintenance Worker, WG-4749-08	12-18-67
8 Albert D. Ridgway	Biol. Technician (Wildlife), GS-0404-07	10-14-84
9 K. Mark Lanier	Biol. Technician (Wildlife), GS-0404-05	09-11-88
10 Roxane L. Rogers	Biological Aid, GS-0404-04	10-08-87

1. Personnel *

Our 1988-89 season Sleigh Ride Visitors Center Interpreters began tours of duty as follows: Roxane Rogers 12-13-88, Jackie Gilmore and Rick Wallen 12-16-88. Altogether they worked a total of 879 hours (56 hours more than the 823 hours worked during the 1987-88 season). Salary costs totaled \$6,709 (up \$821 from previous season's cost of \$5,888). This is the sixth year the Grand Teton Natural History Association has paid these employees' salaries because of FWS budget shortages.



Cynthia Wolf, Park Ranger (LE) and Visitor Center Interpreter (35mm, JMG)

March 13, 1989, Cynthia Wolf entered on duty March 13 as a temporary Park Ranger (LE), GS-4, to conduct night patrol on the refuge in an effort to discourage elk antler poaching. In addition to night patrol, this year a new approach to deterring antler poaching was tried. Some afternoons Cynthia worked with local boy scouts and refuge personnel picking up antlers; unavailability of antlers on the ground being another method of discouraging trespass onto the refuge. Cynthia worked through May 2, a total of 38 days, performing these duties.

Due to lack of funds this year, we were unable to rehire the three irrigators who have worked for us the past two summers. Chet Miller, our most experienced irrigator, was rehired and entered on duty April 23. He has worked for us each summer as Farmhand, WG-6, since 1982. Chet completed the irrigation season working until July 14, a total of 39 days. This was probably Chet's last season with us; he is 74 years of age.

Refuge Biologist Bruce Smith was put into leave without pay status October 23, 1988, while he attended the University of Wyoming during the fall 1988 and spring 1989 semesters to complete course work required toward his doctorate. Bruce returned to duty at the National Elk Refuge May 15.

May 2, 1988, Janice Edwards, reported for work as our new Refuge Clerk. Janice transferred from Fort Niobrara National Wildlife Refuge where she had worked for fifteen years. June 4, Janice was promoted to Refuge Assistant, GS-5, a well-deserved promotion.

Albert Ridgway, Biological Technician, whose law enforcement authority was rescinded in 1988, had that authority reinstated July 28, 1989.

Mark Lanier, Biological Technician, graduated from FLETC August 3 and received his law enforcement commission. MARK was promoted September 24 to GS-6, and became a career employee November 23.

October 10, Roxane Rogers' temporary appointment was extended for another year (NTE October 10, 1990) and she was promoted from Biological Aid, GS-3, to Biological Aid, GS-4. Roxy work 159 days on her temporary appointment in FY 89.

December 2, 1989, saw the retirement of John A. Wilbrecht, a 32-year veteran of government service. John had been Manager of the National Elk Refuge, since July 31, 1977, 12 years.

Appointed Acting Refuge Manager upon John's retirement, James A. Creasy received a temporary promotion December 17 to GS-12. Jim's promotion is effective until a new refuge manager is appointed, or until April 15, 1990.

Sleigh Ride Visitor Center Interpreters beginning 1989-90 season tours of duty December 14, 1989, were Tanna Rogers-Clover, Roxy Rogers, and Cynthia Wolf.



Tanna Rogers-Clover, 1989-90 season Visitors' Center Interpreter
(35mm, JMG)

A five-year comparison of the refuge work force is shown below:

Refuge Work Force. Five-Year Comparison			
Calendar Year	Full-time	Part-time	Temporary
1989	10	0	6 ^{1/}
1988	10	0	11
1987	10	0	16
1986	10	0	15
1985	10	0	17

^{1/} One biological aid, three Sleigh Ride Visitor Center interpreters (paid by GTNHA); one park ranger (LE), and one farmhand (irrigator)

2. Youth Programs

With no YCC funding for the fiscal year and the disaster we experienced trying to hire just two YCC corpsmen in 1988, we had no program this year. The Jackson area has an abundance of summer temporary jobs available to young people, all of them paying \$4 to \$5 an hour or more.

3. Other Manpower Programs

The Community Work Services Program initiated in 1982 continues to benefit the refuge with volunteer labor for general cleanup and maintenance, sign painting, road patching, brush removal, fence building, cutting and stacking firewood, cleaning and repairing horse tack, picking up litter, lawn raking, and lawn mowing. The program is comprised of individuals convicted of non-violent crimes that the court sentences to a certain number of hours of community service in lieu of fine or imprisonment. This year three people worked a total of 42 hours. This figure is down 12 hours from the 54 hours worked by four people last year.

4. Volunteer Programs

The number of volunteer hours worked in 1989 at 2,439 is up 71 percent from 1,430 volunteer hours worked in 1988.

December 1988 to April 1, 1989, Bill Helprin donated 260 hours doing bison research. During our elk classification count in February, 20 people each donated four hours of their time. In March four local volunteers donated an hour each judging our wildlife poster contest.

The Jackson District of the Boy Scouts and their leaders contributed 1,991 hours (378 volunteers participated, 272 boys and 106 adults) in April and May picking up antlers and trash on the refuge, bundling and weighing antlers, and conducting the antler auction. Their antler auction was held May 21.

In May 1989, Joe Cziglenyi contributed 30 hours sorting antlers. See photo on Page 12.

We are restricted in our use of the volunteer program because we are not able to furnish quarters to volunteers from outside the Jackson community. We receive over 10 letters a year from people outside the Jackson area who want to do volunteer work for us, but would require housing. As Jackson is a tourist community, rentals are difficult to find and expensive; so free housing is a must for nonresident volunteers.

5. Funding*

Alfalfa pellets for our supplemental feeding program were purchased for \$278,522 from RW/RO funds and with \$69,150 from 1262 funds, with an additional \$349,985 worth of pellets purchased by the Wyoming Game and Fish Department. In addition to the feed purchase from RW/RO funds, the Jackson District Boy Scouts purchased \$84,176 worth of alfalfa pellets.

Other outside funding included \$6,709 in salaries for Sleigh Ride Visitor Center Interpreters paid by the Grand Teton Natural History Association and the GTNHA also donated \$15,157 for Region 6, Refuges and Wildlife, leaflets and posters; savings bonds and prizes for National Wildlife Week poster contest winners; computer software; and for binoculars, flashlights, spotting scope and mobile radio for the refuge. Donations in the amount of \$898 were received and used on our aspen inventory project.

We continue to experience difficulty in getting funds to support research (formerly funded by the Denver Wildlife Research Center). This year we were short our wildlife biologist's salary cost \$40,000 plus. O&M (1261) funds were reduced this year (over 1988 funding) by \$69,000 with an increase of only \$15,000 in 1262 Maintenance funding to help offset the O&M fund deficiency.

See Table 4 for past five years funding and projected FY 1990 funding.

* Parrish

Table 4. National Elk Refuge funding

FY	1261 O&M	DONA- ^a TIONS	1262 MAINT	ELK FEED					1260 TOTAL	9120 Fire	1979 YCC	8610		OVERALL TOTAL
				NER	^b RO/RW	^b WGFD	^b SCOUTS	DONA- TIONS				QTRS REHAB	Carry ^a Forward	
85	419.5	20.5	13.0	144.5	163.9	163.9	69.6	0.0	577.0		10.0	6.0	5.3	593.0
86	403.3	10.7	99.0		122.3	122.3	21.0	0.0	502.3		9.9	10.0	5.1	522.2
87	405.0	5.7	102.0		114.7	114.7	26.9	0.0	507.0		3.2	7.5	7.7	517.7
88	364.1 ^c	12.4	110.0		119.8	119.8	35.3	0.0	474.1		1.3	5.9	15.0	481.3
89	295.0	22.5 ^d	425.0 ^e	69.2	279.6	348.8	84.2	0.25	450.1 ^e		0	10.6	16.0	460.6
90	275.0		179.2						454.2	15.5 ^f				454.2

^a Not included in 1260 totals.

^b Feed purchases made with RO/RW funds. Wyoming State purchases half of Feed. Boy Scouts purchase feed with proceeds from antler sales. (These amounts are not included in 1260 totals).

^c In FY 1988, \$20,000 of 1261 funding was designated to be spend on "resource problems only."

^d In FY 1989, GTNHA donated \$6,709 for Visitor Center interpreters salaries and also donated \$15,157 worth of miscellaneous printing for Region 6 RW, savings bonds and prizes for National Wildlife Week, computer software, binoculars, flashlights, sporting scopes, mobile radio, and for purchase of videos and books for NER library. In addition, NER received \$600 in donations designated for habitat management.

^e In FY 1989, \$223,300 of the total 1262 funding is designated for feed storage shed replacement and \$69,150 for elk feed for a total of \$292,450. Subtract this amount from our total of \$742,500, and we were left with a \$450,100 operating budget.

^f In FY 1990, designated for purchase or 4X4 3/4-ton pickup and portable pump only.

6. Safety*

Safety meetings were held on the last Tuesday of every month during 1989. A set agenda was followed to ensure coverage of all important topics. An annual schedule gave each employee the chance to conduct at least one safety meeting during the year.

The following items are covered at meetings: 1) problems resolved during the month, 2) current problems & close calls, 3) assignments for correction, 4) demonstration or review, 5) film, & 6) discussion.

The person conducting the meeting usually presents a demonstration or review of some aspect of safety, first aid, common hazard, etc.

One accident involving the staff was reported in 1989. Mark Lanier, while at FLETC, cut his head. He dove into four feet of water in their swimming pool and struck his forehead on the bottom. As EMTs were present, he was treated immediately for a one-inch cut and saw a physician the next day.

8. Other Items*

Revenue Sharing Manager Wilbrecht presented Teton County with a revenue sharing check (FY 1988 payment) for \$258,913 on April 11. This payment was 71 percent of Teton County's full entitlement. FY 87 payment was \$214,734 (59 percent); FY 86 payment was \$214,084 (61 percent); FY 85 payment was \$223,759 (65 percent); FY 84 payment was \$258,113 (74 percent); FY 83 payment was \$213,453 (77 percent); and FY 82 payment was \$251,111 (91 percent).



Jim Creasy presents Al Ridgway with his 20-year pin and certificate.
(35mm, 12/89, JMG)

Employee Awards

Roxane Rogers, our temporary biological aid, received a \$500 award for performing her normal duties in an exemplary manner as well as additional technical work for the five months during which our biologist was absent. James Creasy received a \$500 award and Albert Ridgway, a \$250 award, for their superior performance in acting as construction inspector and alternate, respectively, on our new feed storage contract.



Biologist Smith presents Roxy Rogers with performance award for work performed in his absence, summer 1989. (35mm, 3/90, JAC)

Community and Professional Involvement

Assistant Refuge Manager Jim Creasy is a member of the Wyoming Wildlife Federation, National Wildlife Refuge Association, Rocky Mountain Elk Foundation, Ducks Unlimited, Audubon Society, and the Teton County Peace Officers Association.

Assistant Refuge Manager (Public Use) James Griffin is a member of the Teton County Peace Officer's Association, National Wildlife Federation, Visitor Center Planning Team, Coordinating Committee member of the Wyoming Travel Information Center, and belongs to the Jackson Hole Alliance for Responsible Planning.

Refuge Biologist Bruce Smith is President of the Jackson Hole Toastmasters International, legislative committee member of the Wyoming Wildlife Society, and church council member of the Shepherd of the Mountains Lutheran Church.

Heavy Mobile Equipment Mechanic Roger Pape has been a member of the Teton County Volunteer Fire Department for over 19 years.

Biological Technician Mark Lanier is a member of the Teton County Peace Officers Association, the Wyoming Chapter of the Wildlife Society, Rocky Mountain Elk Foundation, and Ducks Unlimited.

Training attended by refuge personnel is listed in **Table 5.**

Table 5. Training*

Employee	Hours	Dates	Subject
Wilbrecht Creasy Griffin	40	1/24-30/89 1/24-30/89 2/21-27	In Service LE, Marana, AZ (including firearms requalification)
Pape	8	4/3/89	Midland Air Brake Seminar, GTNP, Moose, WY
Creasy Ridgway Lanier Rowley Pape	8	5/4/89	Water Control Structures- Inspection & Maintenance Workshop, Jackson, WY
Lanier	10 weeks	6/1-8/6/89	Law Enforcement for Land Managers, Glynco, GA
Ridgway	16	6/9-10/89	Driving Techniques & Stress Management, for LE purposes, GTNP, Moose, WY
Creasy Edwards Rowley Wilbrecht	8	7/12-13/89	Standard First Aid, Red Cross, Jackson, WY
Creasy Ridgway		10/18/89	Firearms requalification, Grand Teton National Park, Moose, WY

* Edwards

F. HABITAT MANAGEMENT1. General*

Major habitat types are shown in Table 6 and discussed in following subsections. The refuge is divided into ten management units (Figure 1) based upon established fields or site characteristics.

Table 6. Major habitat types, National Elk Refuge, 1989

<u>Habitat</u>	<u>No. of Acres</u>	<u>Percent of Total</u>
<u>Open water:</u>		
Ponds	41	0.2
Streams	285	1.2
<u>Marshlands:</u>	1,260	5.1
<u>Grasslands:</u>		
Subirrigated	975	4.0
Upland	6,988	28.5
<u>Shrublands:</u>		
Subirrigated riparian	1,413	5.8
Upland	8,003	32.6
<u>Woodlands</u>		
Aspen	1,846	7.5
Juniper	30	0.1
Douglas fir/Lodgepole pine	130	0.5
Cottonwood riparian	1,091	4.4
<u>Cultivated fields:</u>	<u>2,457</u>	<u>10.0</u>
TOTAL	24,519	99.9

2. Wetlands*

There is a total of 1,586 acres of wetlands on the refuge at this time. This year we got involved in habitat loss mitigation for the Jackson Lake Safety of Dams Project. Several of the projects are planned for the refuge and will be funded by the Bureau of Reclamation at a cost of over \$200,000.

One of the actions involves developing approximately 100 acres of wetlands using dikes with water control structures to impound water and control water levels. Contouring the wetland basins to optimize water depths and create islands will be necessary. The primary purpose of this element is the enhancement of trumpeter swan habitat. Other migratory and breeding waterfowl will also benefit.

*Creasy

The other project is the development of 20 acres of wetland habitat using explosives and/or draglines to create open water areas.

The current refuge wetlands are regulated naturally. Several impoundments are diked and have water control structures for manipulating levels for irrigation purposes. Water diversion structures are maintained on Cache Creek, Nowlin Creek, Flat Creek and the Gros Ventre River

3. Forests*

The refuge has 3,097 acres of deciduous and coniferous forests including 1,860 acres (143 stands) of aspen woodlands. Due to suppression of wildfires and heavy browsing by ungulates during the past century, many of these stands are declining in condition, or succeeding to coniferous forest. Because of the ecological and aesthetic importance of aspen on the NER and in the Jackson Hole Valley, all 143 stands were inventoried during summer 1987. Of the 143 stands, 68 (totalling 825 acres or 334 ha) were recommended for treatment.

In April, 1988, nine stands totaling 65.01 acres (26 ha) were selected for treatment by clear-cutting due to their location and cost-effectiveness of the treatment method. Stands ranged in size from 2.86 acres (2 ha) to 14.61 acres (6 ha). Refuge personnel conducted the treatment within a total of 67 hours and at a cost of \$1,207.

Specific guidelines were followed by personnel for treatment of the stands. All live standing aspen greater than 5 cm dbh near ground level were cut with the exception of those trees identified by an emblem at the beginning and end of the sampling transect. Invading conifers of all sizes were cut to limit competition and eventual succession. Snags were left standing to provide habitat for cavity-nesting birds.

In three stands, big game exclosures were erected to evaluate the influence of ungulate browsing on aspen regeneration. The rectangular exclosures measure about 6 m per side. Fencing is supported by aspen cut 3 m above the ground that serve as fence posts. In July 1989, two exclosures were reconstructed replacing the plastic fencing with woven wire. This material was chosen to withstand snow accumulation and loading.

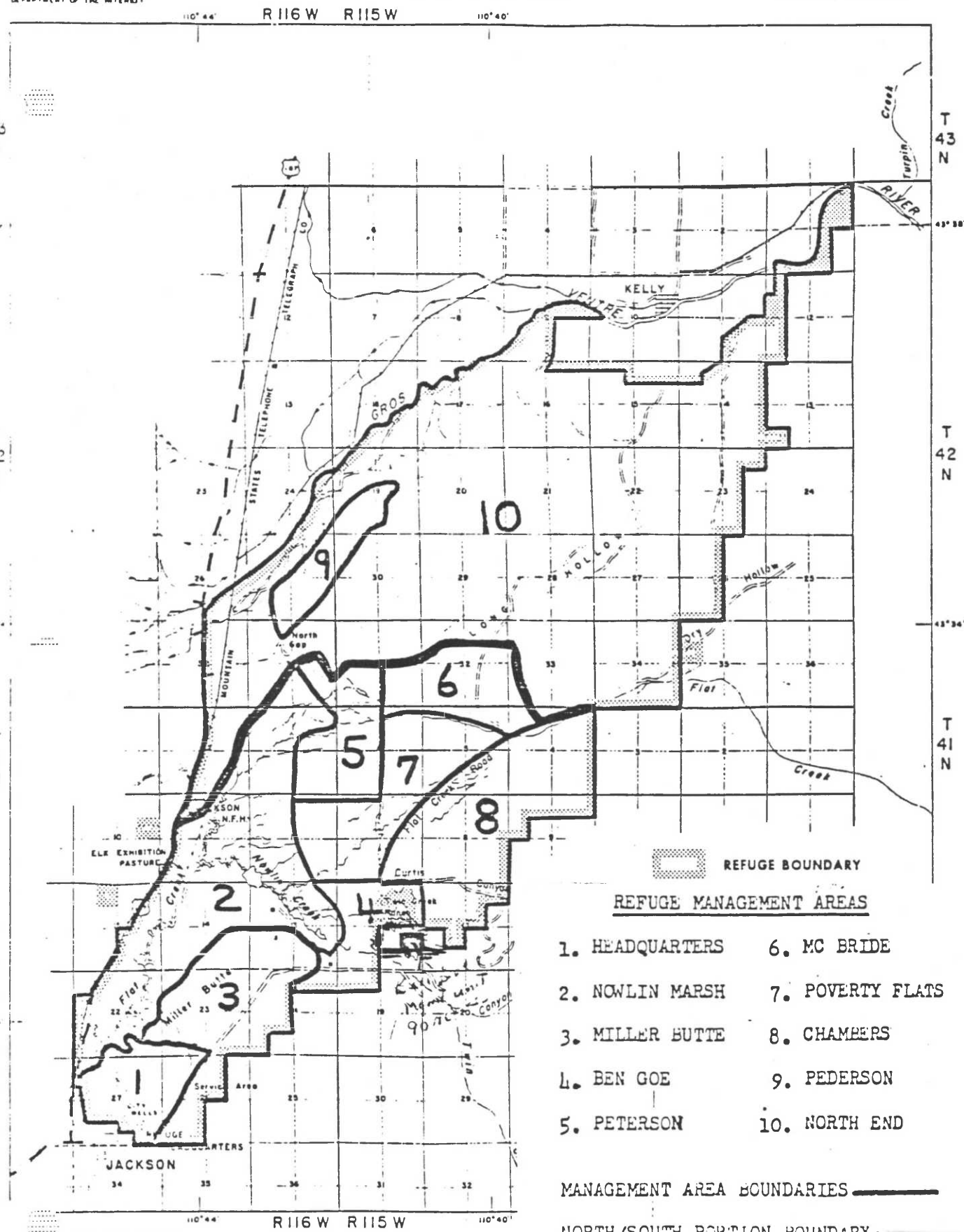
In summer 1989, permanent plot markers were placed along the sampling transect and within the three exclosures. The markers locate the center point of each 0.5 milacre plot. Each exclosure was divided into quadrants and five plots were located. One plot marker was centered in each quadrant and the fifth plot marker was placed at the exclosure's center point. Sampling of the nine treated stands occurred twice, once in May/June and once in

NATIONAL ELK REFUGE

TETON COUNTY, WYOMING

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE



LAND IN THE DIVISION OF REALTY
FROM MAPS BY USGS AND
USFS

LEWIS CLARK

OCTOBER 1975

SCALE

SIXTH PRINCIPAL M

0 1 2 3 4 5 6 7 8 9 10 MILES

Figure 1

1/1

6R WYO 74 406

September. In May/June, sucker regeneration was analyzed by obtaining density and a proportion of the 1988 sprouted suckers that were browsed and unbrowsed. Heights of browsed and unbrowsed (cm) suckers were also recorded. In the three stands, total suckers/acre (1988 and previous years' suckers combined) ranged from 7,200 to 8,000. At the close of the growing season in August/September 1989, a post treatment inventory was conducted in all nine treated stands. Identification photos were taken at the beginning and end of the sampling transect.

During the inventory line intercept sampling (0.5 milacre plots), information on abundance and height measurements of regenerating aspen was again collected to record response to treatment. Along the transect the number of regenerating stems, <5 cm dbh and <2 m tall, ranged from 1 to 40 per plot ($x = 7$) in comparison to 1 to 37 per plot ($x = 6$) found during 1988 sampling. In general, the 1988 treatment continues to enhance aspen regeneration with apparent stabilization of new sucker regeneration post treatment.

For future sampling, total sucker regeneration and height measurements will be recorded in all nine treated stands and three exclosures during a fall inventory. Additional observations of wildlife usage of the stands will be documented. The remaining 59 stands, previously considered for treatment, may be reevaluated for future management if data, collected from 9 stands, continues to demonstrate a positive response to treatment. For successful regeneration, it is desirable for a stand to maintain a density >400 stems per acre (1,000 per ha) with a height >4 m for stand replacement (DeByle and Winokur, 1985).

DeByle, N.V., and R.P. Winokur, eds. 1985. Aspen: Ecology and management in the western United States. USDA Forest Ser. Gen. Tech Rep. Rocky Mtn. Forest and Range Exp. Sta., Ft. Collins, CO. RM-119: 283 pp.

5. Grasslands

Grassland Renovation*

Peterson Subunit 5-1 (Simpson Field) was planted in October 1985 to three grass species. The northern 10.1 acres was planted to Alkar tall wheatgrass; the middle 17.8 acres to Magnar basin wildrye; and the southern 17.4 acres to Oahe intermediate wheatgrass. The two wheatgrass plantings did very well, however, the wildrye seeding failed as production was only 196 pounds per acre.

Soil Conservation Service (SCS) Plan Materials Specialist Larry Holzworth speculated that the 37 consecutive days of dry weather in June and early July of 1986 caused the wildrye seedlings to wither and die. The two tall wheatgrass varieties sprouted earlier when soil moisture was still present and were able to become established before the drought.

* Creasy

The Magnar basin wildrye was re-seeded October 28 and October 30, 1987, using a rangeland grass drill borrowed from the Targhee National Forest. The seeding rate was six pounds per acre (5.8 pounds pure live seed {PLS}). The SCS recommended that we apply herbicide to the seeding in the late spring to eliminate competition from weeds for the moisture. However, we were turned down by the Regional Office for our pesticide application. We were able to irrigate the field once with the "big gun" irrigation system. The Magnar basin wildrye strip appeared to increase in vigor and number of plants with the increased moisture this year. We will evaluate it further in 1990.

An experimental planting of two five-acre plots of Jose tall wheatgrass were planted in the Peterson field in June. We seemed to get good germination but will have to wait until 1990 to see if the seedlings survived. We will evaluate it further to see if it will be useful in our range renovation.



Sprinkling one of the two experimental plots of Jose tall wheatgrass we planted in Peterson field. (35mm, 6/28/89, JAC)

Irrigation**

Flood irrigation data is summarized in Table 7. An estimated 1,661 acres were flood irrigated. Precipitation for the entire year was 16.74 inches. This was a normal rainfall year for this area. Irrigation water comes from streamflows which are determined by winter snowpack conditions. Spring weather conditions influence the

**Ridgway

rate of run-off. This summer we received some rain at opportune times which greatly benefitted our grasslands. This moisture along with last fall's late irrigation season seemed to help us with our record forage production for 1989.

Irrigation in the past was usually discontinued near the end of July. However, in the fall of 1988, we irrigated well into September where water was available to get as much moisture as possible into the soil to promote early 1989 spring growth. With snowpack at about 80 percent of normal, we are looking forward to a below average water year.

Maintenance of irrigation facilities was carried out as time permitted. Several wooden irrigation structures were replaced. With the purchase of a Honda four-track ATV, the flood irrigation was made a lot easier and more efficient. One person using the Honda was able to cover twice as much ground in a day as a person could without it. We purchased another 4X4 ATV for the 1990 irrigation season. Major rehab of the irrigation facilities is on hold until the completion of a grassland management plan which will assess future irrigation needs.

We began harrowing on April 13 with the 36-foot Fuerst blanket harrow. We harrowed approximately 1,900 acres of irrigated fields, meadows, and other grasslands on the elk winter feedgrounds. It did a good job of breaking up and distributing the accumulated elk manure and matted vegetation.

Table 7. Flood irrigation data, National Elk Refuge, 1989.

Management Unit	Begin	End	No. Days	No Acres Irrigated	CFS ¹	Source
Headquarters						
1-1	5/23	8/23	90	65	.92	Cache Creek
1-2	8/23	9/18	26	40	.57	Cache Creek
1-3	6/23	8/23	61	155	2.21	Cache Creek
Nowlin						
2-1	7/10	9/6	58	226	3.20	Nowlin Creek
2-2	6/15	8/1	46	160	2.28	Nowlin Creek
2-3	8/1	9/6	37	200	2.85	Nowlin Creek
Ben Goe						
4-1	6/1	9/7	98	120	1.71	Flat Creek
4-2	6/5	7/1	26	155	2.21	Flat Creek
4-4	6/27	9/7	73	50	.71	Flat Creek
Peterson						
5-2	6/6	8/4	59	116	1.65	Flat Creek
McBride						
6-1	5/22	6/4	13	120	1.71	Flat Creek
6-4	6/4	6/23	19	62	.88	Flat Creek
Chambers						
8-3	7/1	7/15	14	40	.57	Flat Creek
8-4	6/5	7/15	40	82	1.17	Flat Creek
8-5	6/5	7/10	35	70	1.00	Flat Creek
Totals				1,661	23.64	

¹ Based on Wyoming legal appropriation of 1 cfs per 70 acres.
Additional use: Overflow water from Lost Springs pond was diverted onto field 8-1 from January 1 to April 30 and from October 15 to December 31.

Forage Utilization*

In 1989, the forage utilization survey was conducted between April 18 and May 22. A total of 48 transects were sampled. For the fourth year, the utilization surveys were conducted at permanently marked transects.

Forage utilization during winter 1988-89 was light on the southern 10,000 acres of the NER with an increase on the north end, Units 9 and 10 (Table 8). With the exception of Units 1, 9, and 10, utilization levels were below the 6-year average, due to heavy snowfall accumulations in November and early initiation of the elk feeding program.

In Units 1 and 2, 2,500 to 5,000 elk wintered from early December to the end of March; a considerably larger number of elk than in the past.

One of three (8-26-1) transects sampled on the north side of Curtis Canyon Road (Figure 2) showed 62 percent utilization (for winter 1988-89). The transect south of the Izaak Walton League Sign (4-26-1) showed 28 percent utilization (Table 9). This figure is lower than in the past three winters. The new transect established in spring 1987 adjacent to the north boundary fence of Twin Creek Ranch (4-26-3) showed an increase to 50 percent utilization.

Forage Production*

Annual forage production measurements were made in August and September 1989 by Roxane Rogers. Table 10 shows forage production by plant community on the NER. Herbaceous forage production totaled 20,825 tons (Table 11). Current annual growth of woody vegetation measured 4,544 tons for a grand total production of 25,369 tons (Table 10).

Total forage production for 1989 is the highest figure recorded on the NER since the SCS double sampling technique was first adopted in 1983 (Table 12). Increased forage production is due to the heavy snowfall accumulations in winter 1988-89, consistent precipitation in spring and summer months, and an extended irrigation season.

In all, 51 transects were sampled. Of those, three transects (7-6-1, 8-25-1, 8-27-1) were added to the 48 transects sampled in previous years. Forage production data from transects 7-6-1 and 8-27-1 was collected to obtain additional information on animal use in the Curtis Canyon area and in the newly acquired 90 acres on the NER. Transect 8-25-1 will provide data for animal use in a riparian community type.

Total tons of forage produced were higher in all management units except in Unit 8, compared to total tons of forage produced in 1988 (Table 12).

* Rogers & Smith

Table 8. Annual Forage Utilization Survey by Management Unit, National Elk Refuge, Percent Forage Utilization (No. Transects sampled).

Management Unit	Acres	1984	1985	1986	1987	1988	1989	1984-89 Average	1990
1 - Headquarters	778.3	60 (5)	5 (5)	NS ¹	69 (5)	76 (5)	47 (5)	43	80 (5)
2 - Nowlin	3,297	55 (7)	45 (3)	43 (3)	57 (5)	56 (5)	48 (5)	51	74 (5)
3 - Miller Butte	1,361	21 (2)	30 (2)	42 (2)	39 (3)	31 (3)	6 (3)	29	31 (3)
4 - Ben Goe	580	81 (3)	40 (3)	28 (3)	55 (3)	62 (3)	33 (3)	50	84 (3)
5 - Peterson	999	55 (3)	45 (2)	48 (2)	46 (5)	68 (5)	53 (5)	53	66 (5)
6 - McBride	734	78 (5)	45 (3)	57 (3)	67 (5)	82 (5)	54 (5)	64	77 (5)
7 - Poverty Flats	1,233	62 (3)	50 (3)	71 (3)	53 (2)	66 (1)	14 (1)	53	21 (2)
8 - Chambers	1,941	65 (4)	45 (4)	54 (4)	75 (7)	95 (6)	63 (6)	66	77 (6)
9 - Pederson	500	4 (1)	3 (1)	NS	4 (1)	14 (1)	50 (1)	13	38 (1)
10 - North End	13,095	16 (3)	10 (3)	NS	5 (11)	18 (14)	20 (14)	12	25 (14)
TOTALS	24,518.3 ²	(34)	(29)	(20)	(47)	(48)	(48)		(51)
MEAN		50%	32	49	47	57	48	39	57
MEAN (weighted)		35%	32%	22	49	27	39	34	42

1 NS = not sampled

2 Total refuge acreage is 24,700 acres. The difference is comprised of ponds and streams.

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Table 9. Annual forage utilization measurements on transects in the Curtis Canyon Road vicinity, 1986-90.

In the Carls Canyon Road vicinity, 1980-90			
Transect	Plant Community Type	Year	Percent Utilization
4-26-1	Smooth Brome/Alfalfa	1984	76
		1985	NS
		1986	38
		1987	70
		1988	82
		1989	28
4-26-3	Smooth Brome/Alfalfa (first established)	1987	48
		1988	32
		1989	50
7-6-1	Native Wheatgrass/Bluegrass	1984	66
		1985	NS
		1986	70
		1987	80
		1988	38
		1989	NS
8-26-1	Smooth Brome/Alfalfa	1984	60
		1985	NS
		1986	46
		1987	90
		1988	94
		1989	62
8-27-1	Smooth Brome/Mixed Tame Grass	1984	62
		1985	NS
		1986	28
		1987	82
		1988	86
		1989	NS
All five transects averaged :		1984-88	67
		1989	59
NS = not sampled			

Table 10. Total forage production available to elk (includes herbaceous and current annual woody production on the National Elk Refuge, 1989, by plant community type.

Plant Community	No. Acres	Average Pounds/Acre	Total Production (Tons)	Herbaceous Production
MARSHLANDS				
<u>Typha-Scirpus</u>	132.5	6,383	422.9	422.9
<u>Carex-Juncus</u>	1,127.3	6,214	3,502.5	3,502.5
GRASSLANDS				
Subirrigated <u>Poa</u>	967.0	3,832	1,852.7	1,852.7
<u>Agropyron Poa</u> (Poverty Flats, Chambers, and north end flats)	2,764.5	714	988.3	856.9
<u>Agropyron-Stipa</u> (Gros Ventre Hills and slopes)	3,727.7	1,610	3,000.8	1,412.8
<u>Agropyron-Poa</u> (Miller Butte)	495.6	832	206.2	138.0
SHRUBLANDS				
<u>Artemisia tridentata-Poa</u> (on flats)	1,207.8	1,090	658.3	428.2
<u>A. tridentata-A. tripartita</u> (on slopes)	3,990.2	1,542	3,076.4	2,607.6
<u>Potentilla fruticosa-Carex</u>	1,093.1	2,261	1,235.7	816.5
<u>Salix-Carex</u>	244.3	4,234	517.2	512.3
<u>Salix-Bromus</u>	75.3	2,168	81.6	77.4
<u>Symphoricarpos-Rosa</u> (mixed shrub)	2,732.0	2,111	2,883.6	1,763.5
<u>Artemisia tridentata-Bromus</u>	74.3	902	33.5	31.3
WOODLANDS				
<u>Populus tremuloides-Calamagrostis rubescens</u>	469.0	1,973	462.7	450.9
<u>P. tremuloides-Symphoricarpos</u>	725.7	1,475	535.2	391.9
<u>P. tremuloides-Salix</u>	185.3	2,794	258.9	67.2
<u>P. tremuloides-Pseudotsuga</u>	465.6	7,872	1,832.6	1,810.3
<u>Juniperus scopulorum-Agropyron</u>	30.1	1,451	21.8	20.2
<u>Pseudotsuga menziesii-Pinus contorta</u>	130.0	599	38.9	37.6
<u>Populus angustifolia-Poa</u>	55.4	735	20.4	20.4
<u>P. angustifolia-Artemisia tridentata</u>	245.0	1,034	126.7	77.7
<u>P. angustifolia-mixed shrub</u>	701.0	1,026	359.6	285.7
<u>P. angustifolia-deciduous shrub</u>	89.6	1,603	71.8	61.1
CULTIVATED FIELDS				
<u>Bromus inermis-Medicago sativa</u>	883.7	2,077	917.7	917.7
<u>Bromus inermis-mixed grass</u>	456.2	3,164	721.7	721.7
<u>Elymus junceus</u>	163.4	1,629	133.1	133.1
<u>Elymus cinereus</u>	76.1	1,421	54.1	52.9
<u>Poa pratensis</u>	197.0	2,435	239.8	239.8
<u>Agropyron-mixed grass</u>	336.2	4,597	772.8	772.8
<u>Alopecurus arundinaceus</u>	41.8	4,593	96.0	96.0
<u>Phleum pratense-Poa</u>	235.0	1,437	168.8	168.8
<u>Agropyron intermedium</u>	63.8	2,221	70.8	70.8
<u>Agropyron elongatum</u>	5.5	2,103	5.8	5.8
GRAND TOTALS	24,187.0	80,132	25,369.0	20,825.0

Table 11. Herbaceous forage production (tons), NER, 1982-1989

<u>YEAR</u>	<u>TONS</u>
1982	13,577.3
1983	15,889.0
1984	15,468.0
1985	19,706.6
1986	17,599.3
1987	14,821.0
1988	14,791.0
1989	20,825.0

Table 12. Forage Production, National Elk Refuge, 1983 through 1989

<u>Management Unit</u>	<u>TONS OF FORAGE PRODUCED</u>						
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>5-Yr Avg</u>	<u>1989</u>
Headquarters(1)	1,168.8	1,517.3	1,457.0	1,445.0	939.0	1,071.7	1,606.8
Nowlin Marsh(2)	3,064.7	5,979.6	5,689.3	4,892.6	4,658.9	4,244.1	6,613.0
Miller Butte(3)	1,164.9	746.6	916.3	626.1	647.6	587.3	1,165.1
Ben Goe (4)	341.1	791.8	738.8	728.8	378.5	527.8	701.3
Petersen (5)	169.5	566.7	629.3	456.0	372.9	405.0	524.4
McBride (6)	536.0	514.1	454.0	440.9	292.3	340.3	471.2
Poverty Flats(7)	239.8	467.8	426.5	528.8	407.4	366.1	528.4
Chambers (8)	442.7	1,209.9	1,236.4	1,061.0	827.0	866.9	349.8
Pederson (9)	611.7	829.1	422.3	399.7	303.7	391.0	1,329.8
North End(10)	<u>14,613.8</u>	<u>10,122.6</u>	<u>10,479.0</u>	<u>7,370.5</u>	<u>7,980.4</u>	<u>7,190.5</u>	<u>12,078.2</u>
TOTAL:	22,353.0	22,745.5	22,448.9	17,949.4	16,807.7	15,990.3	25,368.0

9. Fire Management*

Prescribed Burning This year we planned on burning 690 acres in Refuge Management Unit 2 bounded by Flat Creek, Highway 26 and the Jackson National Fish Hatchery entrance road. However, because we wintered a large number of elk and they consumed so much of the vegetation in that area, there was not enough left to carry a fire. Also, we had a very wet spring and it was too wet to burn so we put off burning this area until 1990.

Wildfires This year we were very lucky and did not have any wildfires.

Cooperative Fire Agreement(s) An Interagency Agreement between NER and the Bridger-Teton NF for "cooperating in the suppression of fires on lands within and adjacent to the NER...." was signed January 11, 1988. It will be in effect for five years (August 1, 1987 - July 31, 1992).

We are still attempting to get a Cooperative Agreement (or Cooperative Aid Agreement) with Teton County. Past problems were caused by our inability to accept each other's form of a document. FWS-CGS will now support either type of agreement, but we have been unable to arrange for a meeting with the Deputy County Attorney.

10. Pest Control*

In 1989, the refuge did not use any herbicide to control noxious Canada and musk thistle which are the two main noxious weeds on the refuge.

In 1987, the YCC crew collected weevils on BTNF, Jackson District, and transplanted them to the only three known patches of musk thistle on NER. Weevils were already present in the thistle patches even though they had not been introduced previously. Some patches of thistles were checked this year and weevils were found. Weevils do not kill musk thistle, but inhibit reproduction when the larvae feed on the developing flowers. The only other plant species the weevil is known to attack in this area is the native elk thistle.

11. Water Rights*

The refuge has water rights for the irrigation of 7,539.85 acres plus a supplemental supply for an additional 402 acres (Table 13). In 1988, we flood-irrigated 1,666 acres, 22 percent of our allotment. Reasons for irrigating such a small percentage are: 1) diversion structures, ditches, and headgates on some areas are badly deteriorated; 2) some areas with water rights do not have the potential to yield returns when considering the costs of maintaining and operating a flood-irrigation system; 3) current funding levels prevent increasing irrigation activities; and 4) a water rights dispute with Twin Creek Ranch has prevented us from using our rights to Twin Creek water (6.68 cfs) for the irrigation of 470 acres.

* Creasy

A meeting was held at refuge headquarters on August 14, 1984, in an effort to resolve the Twin Creek situation which has been ongoing since the 1960s. Attendees included the RO Engineering staff, refuge personnel, Wyoming water rights people, and representatives from Twin Creek. A Plan was developed which called for the mapping and inspection of the Twin Creek Ranch irrigation system and installation of measuring devices to determine quantity of water delivery. The Wyoming Engineer's Office was to monitor the flows and enforce the state water laws. So far, the State Superintendent of Water for Division 4 (who represented the state at the meeting). has not even filed a report.'

Cheryl Williss, RO Water Rights Specialist is attempting to get us water storage rights for our Jackson Lake Dam mitigation projects.

Table 13. Water Rights. National Elk Refuge. 1989

<u>SOURCE</u>	<u>QUANTITY (cfs)</u>	<u>IRRIGATED ACRES</u>
Gros Ventre River	4.33	304
tributaries	7.63	534
Flat Creek	74.42	5,216.85
tributaries	2.77	195
Swamp Creek	4.07	285
Twin Creek	6.68	470
Sheep Creek	0.24	17
Cache Creek	<u>7.38</u>	<u>518</u>
TOTAL	107.52	7,539.85

Plus supplemental supply for 402 acres.

G. WILDLIFE *1. Wildlife Diversity

A wide variety of mammal and bird species are found on the NER. This is attributable to the diversity of habitats ranging from marshlands to Douglas fir/aspen forest. The refuge's location in the valley bottom attracts many species during spring, summer, and fall. It is notably important as winter range for elk, mule deer, moose, bighorn sheep, sage grouse, trumpeter swan, and waterfowl.

2. Endangered and Threatened Species

Peregrine Falcon Peregrine falcons were again hacked in July 1989 at the NER tower. Five chicks, two male and three females, were placed in the boxes atop the tower by Peregrine Fund personnel on July 12. Four of the five fledged with one bird being returned to Boise July 26 after personnel discovered it injured. One bird dispersed July 20 while the other three dispersed August 28 and 29.

Unlike previous releases, no adult or subadult Peregrine falcons returned to the hack site. In July, one Peregrine tail-chased a prairie falcon from the Long Hollow area. There were 10 additional sightings of Peregrines during the summer months.

Whooping cranes On April 15, 1989, Jim Griffin observed a whooping crane south of the KSGT tower on the refuge. After his sighting the same crane was observed in June on several occasions in the Flat Creek marsh area.

Bald Eagles In February and March, one bald eagle was observed near the Sleigh Ride Visitor Center on several occasions. In June, two adults and one young bald eagle were observed on the nest site on east Gros Ventre Butte across from the refuge. During the 1989 Christmas bird count, 25-30 bald eagles and two golden eagles were observed on the NER. Elk mortalities provided a winter food source for bald and golden eagles. Warm water springs, open water areas of Flat Creek, and the Gros Ventre River may also provide hunting and fishing areas for eagles.

3. Waterfowl

Swans The maximum number of trumpeter swans observed on the NER during winter 1989 was 122 on December 15, 1989, during the monthly waterfowl count conducted by Roxy Rogers. From October to December, 67 to 117 swans were regularly seen on the refuge.

On December 18, 1989, 111 swans were counted by John Squires of the Wyoming Cooperative Wildlife Research Unit. It was estimated some 20 percent of those counted were tundra swans.

During the annual Tri-State Trumpeter Swan Survey conducted in September 1989, personnel from the Red Rock Lakes NWR counted thirty-seven swans (27 adults and 10 cygnets) on the NER and 75 in the Jackson Hole Valley. The numbers on the refuge are up from the 29 swans counted on the NER and down from the 124 in the Jackson Hole Valley during the September 1988 survey. It was hypothesized by Red Rock Lakes personnel that the harsh winter of 1988-89 resulted in the breeders' poor physical condition, thus affecting overall cygnet production.



Unhatched eggs from one of the refuge's two trumpeter swan nests. Although two of the six eggs in this nest did not hatch, all six in the second nest hatched for a record production this year of 10 birds.
(35mm, 6-23-89, BLS)

Three pairs of adult trumpeter swans were observed on NER during late spring and summer 1989. One pair was observed on Pierre's Pond but did not perform any nesting attempts. On May 30, 1989, John Squires of the Wyoming Coop Unit conducted an aerial survey on the NER and reported two pair of trumpeter swans incubating at nest sites. One pair was observed on the "old nest" site adjacent to

Highway 89 in the Flat Creek marsh area. This is the same pond where the pair had nested in 1985. They laid a total of six eggs, four hatched on June 19, and four young fledged successfully. This is the same estimated hatching date for this pair in 1988. The other pair had established a nest site at the "eclipse pond" about 200 yards north of their 1988 nesting site. They laid a total of six eggs. The eggs hatched June 9 or 10, and all six cygnets fledged. This is the greatest number of young hatched and fledged successfully on record for the refuge.

Ducks A breeding pair count was conducted on May 17, 1989 (Table 14). As in the past, members of the Jackson Hole Bird Club were invited and did participate.

Monthly waterfowl censuses were conducted February through December. The maximum number of ducks observed was 1,943 on October 17, 1989, compared to 2,118 ducks observed October 18, 1988. The fewer numbers observed may be due to the increased height in vegetation in the main marsh/Miller Springs area thus reducing the total number of ducks tallied.

A one-day brood count was conducted July 21 (Table 14). A total of 138 ducklings were counted but because of the amount of emergent vegetation available as escape cover, it is believed that only half the broods of dabblers may have been seen. Thus, production probably exceeded 300.

Geese During the July brood census, two broods and 14 young were located on the NER. In November, a maximum number of 89 geese were observed feeding in the main marsh area.

Table 14. Breeding Pair and Brood Observation Data, 1989.

Species	Estimated No. Breeding Pairs	No. Broods Observed	No. Young Observed	Average Brood Size
Trumpeter swan	3	2	10	5.0
Canada geese	28	2	14	7.0
Gadwall	101	11	60	5.5
Mallard	49	8	43	5.4
Green winged teal	41	4	28	7.0
BW/Cinnamon teal	1/85	0/0	0/0	0/0.0
Barrow's Goldeneye	10	0	0	0
Common Goldeneye	0	0	0	0.0
Ring-necked duck	19	0	0	0
Northern shoveler	15	0	0	0.0
American widgeon	10	0	0	0.0
Common merganser	2	2	7	3.5
Ruddy duck	none observed			
Redhead	4	0	0	0
Lesser scaup	none observed			
Pintail	none observed			
Bufflehead	none observed			
Coots	1	0	0	0.0
TOTALS:	339	25	138	5.5

4. Marsh and Water Birds

During the late spring and summer months, sandhill cranes were observed on the NER. During the breeding pair bird count in May, two separate sandhill crane nesting sites were observed at Nowlin Pond 2. By the end of May, coyote predation resulted in egg loss at these sites. Only one sighting of a sandhill crane colt was reported in August. The maximum number of sandhill cranes was 18 observed flying over the refuge in September.

5. Shorebirds, Gulls, Terns, and Allied Species

Willetts, common snipe, and Wilson's phalaropes were among the most common shorebird species on the refuge in 1989. Greater yellowlegs, Sora rail, a Pied-billed grebe and a Long-billed dowitcher were observed during the May waterfowl breeding pair count. In May and June, a Black tern and a Caspian tern were sighted in the main marsh area.

6. Raptors

A ferruginous hawk, Cooper's hawk, and a sighting of a rough-legged hawk were reported in summer/winter 1989. Swainson's, red tailed, marsh hawks, kestrels, and prairie falcons were observed on NER in 1989.



Refuge aspen stands are important nesting sites for many species of birds, such as goshawks. Our aspen management program is aimed at regenerating and maintaining present distributions on NER. (35mm, BLS)

8. Game Mammals**

Elk - Fall 1988 The first fall migrants arrived on November 5 when 75 to 100 elk moved south out of the Gros Ventre hills and onto the national forest east of Miller Butte. Another 25 moved onto Nowlin meadows. There was no snow on the ground. A snowstorm struck on November 8 and 305 elk were on the refuge. By November 11 there were three inches of snow on the ground and 1,264 elk on NER. A large movement of elk onto the refuge occurred the morning of November 13 during heavy snowfall - 2,700 elk on NER.

**Smith

This snowstorm continued until November 16 when 15 inches of snow covered the NER and 5,660 elk were counted. By the initiation of supplemental feeding on December 7 (the earliest starting date ever) some 8,000 elk were on the refuge. A count from feed trucks on December 21 totaled 9,120 elk and 109 bison on feed.

Elk - Winter 1988-89 The 1989 winter elk classification count was conducted February 7 and 9. Twenty-four persons conducted the count on feed trucks at four feeding areas. Table 15 compares the 9,486 elk classified in 1989 to the classified counts since conversion to pelleted alfalfa in 1975, and to classified counts during the years 1941-74 when elk were fed baled hay on the NER.

On February 11, Garvice Roby, Wyoming Game and Fish Department, made a helicopter census of elk on the north end of the refuge and on the national forest slopes east of the refuge. An additional 604 elk were counted during the aerial count. Thus, the combined results of the feedground counts and the aerial count equals 10,090 elk on and adjacent to the NER.

During the fall of 1988, 1,836 tons of alfalfa pellets were purchased from SEBs Feed and Supply of Terreton, Idaho. The refuge had 1,836 tons of feed on hand. Thus, 3,672 tons of feed were in storage when supplemental feeding began on December 7.

Feeding commenced on December 7, 1988, at the Shop and on December 8, 1988, at Nowlin, Poverty Flats, and McBride, and ended on March 3 (87 days total) at the Shop when that herd moved north and April 7, 1989, at all other feeding areas. The 122 day feeding period was the second longest on record. In addition to 9,500 elk, 107 bison were fed.

Because of the large numbers of elk on feed and the duration of the feeding season, an emergency purchase of an additional 1,199 tons of feed was necessary in February 1989 to see us through the winter. Also, the decision was made in March to feed out about 100 tons of baled hay that had been stored in the Chambers hay shed since the mid-70s. Altogether we fed a total of 4,772 tons of pelleted hay (4,364 tons to elk and 143 tons to bison) plus the 100 tons of baled hay. The daily feed ration averaged 8.4 pounds/elk/day and 22.5 pounds/bison/day. The average number of elk fed per day was 9,050 and the average number of bison fed per day was 104.

Elk - Summer 1989 The first major movement of elk off the refuge in 1989 occurred during the third week of April. By the first week of May, over half the elk had left. On May 22, an estimated 2,000+ elk that were still in the Gros Ventre hills were moved by agency horseback riders onto the national forest slopes east of the NER near Waterhole 3. At least 700 had returned to the refuge the next day. On May 26, riders moved 400 elk onto the forest slopes again. At least 150 elk that were in the Gros Ventre riverbottom were not moved.

Table 15. Compared results of elk classification counts, 1940 to present, NER.

Winter	Date of Count	CLASSIFIED ELK (on feed - day of count)					UNCLASSIFIED ELK		
		Number (percent of herd)					Outliers ^a	Adjacent to NER	Number on and adjacent to NER
		Bulls	Spikes	Cows	Calves	Total			
1940-41 to 1973-74	^b	919 (12)	450 (6)	4,634 (62)	1,447 (19)	7,450	-	941	8,228 ^c 8,313 ^d
1974-75	03/03	745 (10)	522 (7)	4,768 (64)	1,415 (19)	7,450	No count	No count	7,450
1975-76	03/05	980 (12)	511 (7)	4,725 (60)	1,642 (21)	7,858	0	515	8,373
1976-77 ^e	03/15	616 (11)	459 (8)	3,511 (61)	1,146 (20)	5,372	No count	No count	5,372
1977-78	02/23	1,393 (16)	424 (5)	5,073 (60)	1,541 (18)	8,413	82	396	8,891
1978-79	02/23	1,503 (19)	544 (7)	4,347 (55)	1,434 (18)	7,828	130	594	8,552
1979-80	03/04	1,680 (22)	441 (6)	4,443 (57)	1,185 (15)	7,749	25	206	7,980
1980-81	None								
1981-82	02/24	1,161 (19)	405 (6)	3,801 (58)	1,063 (16)	6,530 ^f	216	489	7,235
1982-83	02/24	1,118 (19)	488 (8)	3,312 (56)	960 (16)	5,878	45	346	6,269
1983-84	02/23	1,073 (21)	345 (7)	2,886 (58)	706 (14)	5,010	45	311	5,366
1984-85	02/22	984 (17)	293 (5)	3,500 (61)	981 (17)	5,758	106	302	6,166
1985-86	02/20	819 (13)	350 (5)	4,039 (63)	1,222 (19)	6,430	-	296	6,726
1986-87	02/17	928 (12)	569 (7)	4,889 (63)	1,434 (18)	7,820	93	435	8,348
1987-88	02/18	922 (12)	574 (7)	4,785 (62)	1,472 (19)	7,753	203	903	8,859
1988-89	02/07	1,200 (13)	601 (6)	5,715 (21)	1,970 (21)	9,486	306	298	10,090

^a From feedgrounds and those free-ranging on the north end of the refuge.^b Of the 34 years between 1941 and 1974, elk were classified during only 24 winters.^c Average calculated for the 24 winters in which elk were classified.^d Average calculated for 33 winters from 1941 to 1974 (no total count for 1944).^e No feeding and not an official classification count. Count conducted by T.Toman and G.Roby (WGFD).^f Does not include 23 cow and 14 calf elk trapped in January and trucked to Sybille.

An estimated 300 elk remained on the refuge during summer 1989. A good classification was not obtained but at least half were yearling males with yearling and adult females contributing the remainder. At least three branch-antlered bulls summered on the NER. Groups of up to 150 elk often utilized the McBride and Simpson irrigated fields during the summer, mostly at night.



A pair of trumpeters with elk grazing in the background.
(35mm, 11/27/89, Jeff Foote)

Other Big Game On February 12, 1989, Garvice Roby of the WGFD flew the annual moose survey. A total of 22 moose were observed in the Gros Ventre riverbottom. One cow and calf moose and a large bull were regularly seen on the southern half of the refuge throughout the summer.

A maximum of 40 mule deer were counted on Miller Butte during winter 1988-89. On January 19, 1989, nine deer first showed up on Miller Butte. The number gradually increased to 40 on March 2, 1989. January is very early for the deer herd to appear on the refuge. Generally, the first deer move off the national forest lands east of the NER and onto Miller Butte during February. This indicates just how tough the snow conditions were in Jackson Hole in early 1989.

Mule deer were regularly observed in small groups throughout spring and summer on the north end of the refuge.

At least five pronghorn antelope (one male, two females and twin fawns) spent summer and fall on NER. The twin fawns were probably born on the refuge. During the mild winter of 1986-87, 32 pronghorn wintered on NER. Small groups of pronghorn were commonly observed

on the refuge the following summer. Apparently a pattern of use on the refuge by pronghorn is developing beginning with the mild winter of 1986-87 and the expansion of the herd size.

The first bighorn sheep, a lone ram, was seen on Miller Butte during winter 1988-89 on November 21, 1988. On December 5, a ram and two ewes were observed. A maximum of six sheep wintered on the Butte, including two males, two females, one lamb, and one unclassified.

In May 1989, groups totalling as many as 35 sheep, were seen near the Chambers salt lick. Eighteen sheep were again observed there on November 27.

A 5/8-curl ram was observed just east of Miller Butte on the NER on December 15, 1989. Later in December, three sheep were observed on Miller Butte on several occasions, two females and one young. Nine bighorns were ranging across the Butte during January 1990.

Recolonization of Miller Butte, which is historic bighorn winter range, began during winter 1983-84 when a ewe and her lamb wintered on the Butte. Winter 1987-88 six bighorn spent the winter there and then six again during winter 1988-89. This is an exciting occurrence because recolonization of former ranges by bighorn has been a rare event in recent decades. Bighorns had not wintered on Miller Butte for at least 20 years.

The first bison observed on NER during fall 1988 was a lone bull seen north of McBride shed August 30. Two different bulls were seen in the Pedersen fields the next day. On September 24, 59 bison were in the irrigated fields at Chambers. One hundred-three bison were on the refuge at Lost Springs and Chambers fields on October 25. This arrival date for the bulk of the herd is comparable to the previous year. It continues the trend that began in the late 70s for earlier fall arrival of bison on the refuge. A maximum of 119 bison were observed on NER during winter 1988-89.

On January 11, 1989, 116 bison were classified (47 bulls, 49 cows, and 20 calves). Bison used both the McBride and Poverty Flats feedgrounds during the supplemental feeding period.

Based upon the Interim Agreement for the Management of the Jackson Bison Herd, the herd will be managed for an interim population objective of 90 to 110 animals. The 1988 Annual Interagency Bison Management Program called for an agency reduction to maintain a herd size within this range. The removal of 16 adult bison (eight males and eight females) by agency personnel was carried out on March 28 and 29, 1989. Animals were humanely killed with high-powered rifles and carcasses were donated to Wind River Indian Reservation (five to Shoshone Tribe and five to Arapahoe Tribe), four to the Shoshone-Bannock Tribe of Ft. Hall Reservation, and two to the Archeology Department of Western Wyoming College in Rock Springs, Wyoming. The removal left a minimum of 105 bison, 103 on NER and two that wintered in Grand Teton National Park. Prior to the reduction, one adult female bison had died of natural causes on the refuge

and two adult bulls were killed by private citizens on Twin Creek Ranch, a private inholding on the NER. Those two bulls were part of a larger group that had been regularly crossing the cattleguard and entering the ranch.

Diagnostic tissue samples were collected from the 16 bison removals. Eleven of the 16 (69%) bison were infected with brucellosis. This is somewhat higher than the 55 percent incidence of brucellosis among bison harvested from the northern herd of Yellowstone National Park. No significant lesions were found. The bison ranged from two to nine years of age. Five of the eight females were pregnant and another had recently aborted. (See Table 3, Page 9)

The bison were herded off the refuge during late April and early May 1989. Nineteen calves were known to be born into the herd during spring 1989. This would potentially result in a 1989-90 wintering herd on the refuge of 124 animals. Therefore, a reduction of 20 animals was planned for winter 1989-90.

In 1989, the Wyoming Legislature enacted a statute establishing license fees for taking of bison. The Wyoming Game and Fish Commission subsequently adopted a regulation to conduct a hunt to stabilize the Jackson bison herd. The hunt began during October 1989 on the NER, under a special use permit issued by the Fish and Wildlife Service to Wyoming State. Wyoming Game and Fish Department personnel accompanied recipients of a bison permit, selected through a computer drawing during September 1989, to ensure that the proper age/sex animals were killed. As of December 31, 1989, 17 bison (nine males and eight females) had been harvested.

The first bison observed on the NER during fall 1989 actually arrived in summer. An adult male was first seen August 18, on the north end of the refuge. By the October 12, at least 91 were on the refuge. Four bison were harvested by hunters in October, seven in November, and six in December. Blood samples were taken from all animals so that analyses of genetic variability and brucellosis diagnoses could be made.

The annual meeting of agency biologists and resource managers from the Wyoming Game and Fish Department, National Park Service, and US Fish and Wildlife Service to develop the 1990 Annual Interagency Bison Management Program will take place in early August 1990, and will be hosted by the National Elk Refuge.



Some bison control work was done on March 28 and 29 by WGFD and refuge personnel.
(35mm print, 3/28/89, JEW)



Blood and tissue samples were taken by the WGFD with help from NER and NPS employees.
(35mm print, 3/28/89, JEW)

10. Other Resident Wildlife*

During summer months, badgers, and beavers, were common sightings on the NER. On August 8, 1989, a longtail weasel was observed as a resident underneath the Miller House.

Ruffed, blue, and sage grouse are resident on the refuge and were regularly observed in 1989. Ruffed grouse were observed in quaking aspen stands/mixed shrub on the northeast portion of the refuge.



Sage grouse, North Gap Lek (35mm print, BLP)

During the spring of 1989, the annual sage grouse lek survey was conducted on the NER. The count occurred during a coordinated survey with other government agencies to record spring sage grouse attendance on all leks in the Jackson Hole Valley. On April 29, 1989, a total of nine male sage grouse were observed on the North Gap lek. During an earlier count by Garvice Roby, WGFD, 13 females and eight male sage grouse were attending the North Gap lek. During the Christmas bird count, 24 sage grouse were observed on the NER.

* Rogers

11. Fishery Resources* (see Section H. - Public Use, 9. Fishing)

Flat Creek Habitat Improvement Project A Flat Creek Restoration Plan was drafted by Dr. Allen Binns, WGFD, in 1983. The Jackson Hole Chapter of Trout Unlimited (TU) adopted and raised money to fund this project. Initial implementation to ascertain structure design applicability and function started in October 1984. Sites 10-33 were treated in October 1985 following an adjusted prescription. Major construction effort was deferred for a two-year evaluation period. During October 1987, Sites 34-38 were treated using boom cover deflectors and a rock funnel to enhance the evaluation of other applications. Design, administration, evaluation, supervision, and some of the construction were the responsibility of WGFD. WGFD costs were about \$37,910.

USFWS (NER) provided the Environmental Assessment (EA), some equipment, and manpower in moving material to the location at an approximate cost of \$9,000. Jackson Hole TU provided funding amounting to approximately \$32,160 for material and contracted construction cost, and approximately 30 mandays of voluntary labor.

On April 18, an evaluation and planning inspection trip was made along Flat Creek with FWS, WGFD, and TU personnel participating. The conclusions and recommendations reached following the evaluation follow.

The hydraulic process of agitating sediment from the substrate and manipulating flow pattern using deflectors has developed a deeper, curved thalweg through the straight, shallow stream reaches. The low flow channel width has been reduced from over 30 feet to 23 feet, and sediment has been trapped downstream from deflectors, in point bars, lateral bars, and in the tree revetments.

Streambanks were stabilized using tree revetments, boom cover deflectors, and riprap. Excavation along bendways was effective in reducing flow pressure against the bank, which acts to reduce bank slumping. The bank stabilizing structures also provided cover for trout relative to water depth and velocity.

Brook trout and young cutthroat trout numbers increased dramatically to the cover provided. Spawning has not increased noticeably. In the treated section, angler use increased while catch remained fairly constant.

The estimated trout population increased from 141 to 230 trout per mile, while cutthroat trout biomass increased from 12 to 54.6 pounds/mile between 1985 and 1988. The trout population increased in the nine sites upstream from 40 to 401 between 1984 and 1985, but samples were dominated by brook trout. Cutthroat trout increases were generally represented by young-of-the-year. Apparently brook trout are being displaced as the cutthroat trout attain larger size.

* Creasy

The habitat structures have improved potential recruitment by providing areas to hold young fish in the system. Mature cutthroat continue to dominate the more desirable habitat niches.

Tree revetments and excavated pools have provided improved cover for trout. The boom cover deflectors have provided escape cover, but not the desired resting cover due to the higher than optimal velocities.

Cutthroat trout spawning effort has not appreciably increased, but as hydraulic cleaning and sorting of the substrate continues, more suitable spawning areas and activity should be evident. Macro-invertebrate fish food production is good. However, sediment tolerant taxa dominate the macroinvertebrate community. Changes in the stream substrate due to sediment scour and deposition are expected to alter the macroinvertebrate community to taxa that prefer a sediment-free habitat.

The cost per lineal foot of stream treated was high for Flat Creek. Total cost to treat a mile of stream exceeded \$79,034 (Table 16), or about \$15/foot of stream. The high cost relates to the intensity of treatment and the experimental nature of this project. The project would not have been done without the contribution of more than \$32,100 from the Jackson Hole Chapter of TU. Some disappointment has been expressed that more larger fish are not yet evident in the population. Concern about overharvest has also been expressed.

Table 16. Cost accounting-Flat Creek Project, National Elk Refuge

YEAR	TROUT UNLIMITED	WGFD (FY) ²	NER USFWS
1984	\$ 6,447		\$2,058
1985	17,984	\$11,899	6,405
1986	1,764	16,034	
1987	4,614	7,477	
1988	1,350 ¹	500	
1989			
Total:	\$32,161	\$37,910	\$8,963

¹ Estimated cost of invertebrate analysis \$1,350.

² by fiscal years, 7/1 to 6/30.

It is recommended that that the project be completed to the mouth of Nowlin Creek and that evaluation continue. The design of the structures downstream of Site 38 should be changed with commercial gravel and natural gravel rejuvenation to enhance spawning area. Additional cover for mature cutthroat trout should be provided.

Monitoring of streambed development in the treated area should include cross-sectional and longitudinal profiles. Habitat quality index (HQI) attributes should be measured periodically as the stream recovers. Sampling for population estimates should be done before the first of October to minimize bias due to fish movement. The population should be sampled before the fishing season to yield data relative to impacts of catch-and-release handling and harvest. Additional Surber net samples during the February period would continue the macroinvertebrate trend analysis.

In FY 1990, the USFWS is providing a \$10,000 Challenge Grant for improvement of the Flat Creek fishery. With matching funds from Trout Unlimited, this will provide for continued improvements along Flat Creek.

Spawning effort on Flat Creek and Nowlin Creek have been mapped and estimated from Redd counts on a regular basis since 1980 by Jackson District, WGFD, (Table 17). The sample area includes Nowlin Creek downstream from the first reservoir to Flat Creek and Flat Creek from the confluence of Nowlin Creek upstream to the hatchery outfall. The Redd counts indicate more than 300 cutthroat spawners each year from 1980-1982. In 1983, about 167 cutthroat spawners were present. From 1984 through 1988, the estimated number of spawning cutthroat ranged from 194 in 1984 and 1985, to 257 in 1986.

Table 17. Summary of spawning effort on Flat and Nowlin Creeks, estimated from Redd mapping.

F L A T C R E E K				
<u>Year</u>	<u>Redds</u>	<u>Minimum pairs</u>	<u>Maximum pairs</u>	<u>Estimated spawners</u>
1980	25	58	93	157
1981	36	52	80	140
1982	51	55	79	149
1983	17	19	29	51
1984	34	40	63	108
1985	37	48	69	130
1986	44	48	74	130
1987	50	51	71	138
1988	42	42	61	113
1989	33	33	49	89
			10 year average =	121

N O W L I N C R E E K				
<u>YEAR</u>	<u>Redds</u>	<u>Minimum pairs</u>	<u>Maximum pairs</u>	<u>Estimated spawners</u>
1980	46	63	105	170
1981	50	63	89	170
1982	51	59	89	159
1983	38	43	67	116
1984	28	32	44	86
1985	20	24	32	65
1986	44	47	68	127
1987	35	38	54	103
1988	49	50	77	135
1989	32	36	49	97
			10 year average =	123

On October 26 and 27, the WGFD with assistance from the Lander Fishery Assistance Office and several volunteers, conducted electro-shocking surveys on five sites on Lower Flat Creek, including the habitat improvement projects completed to date and areas downstream.

The average trout population estimate for a three-year period (1986-1988) is 230 trout per mile. Of this estimate, 103 were cutthroat trout of which 21 were mature. The estimated cutthroat biomass increased from 12 pounds per mile in 1985 to 54.6 pounds per mile in 1988.

Brook trout numbers were greatest the first year after treatment. They are evidently being displaced by cutthroat and currently constitute 45 percent of the trout population. In general, brook trout are found only in the upper sample reach.

17. Disease Prevention and Control*

During winter 1988-89 a total of 134 elk died of natural causes. This is 1.4 percent of the herd. This figure matches the long-term average.

Scabies has remained at a relatively low incidence among mortalities compared to the early 1980s. This is attributed to the reduced bull:100 cow ratio now (a reflection of hunting season regulations) compared to earlier in the decade. The number of total bull mortalities has declined annually from a high of 102 during winter 1982-83 to 13 adult bulls (six with scabies) during winter 1987-88. During winter 1988-89, 28 bulls died, 15 with scabies. Three of 42 cow mortalities also had scabies.

The annual scabies survey was conducted on January 11, 1989. Twenty-three of 1,200 adult bulls (1.8%), three of 5,715 cows (<0.05%), and no spikes or calves had scabies. These figures also represent a substantial decline in the incidence of scabies among the herd. Current hunting seasons, and likely those hunting seasons planned for the next few years, are designed to reduce the female segment of the population. This will lead to higher bull:100 cow ratios. We would speculate that a coincident increase in scabies and the percentage of bulls among total mortalities will follow.

* Smith



Three male bison in Dry Hollow

(35mm, 11/27/89, JAC)

H. PUBLIC USE*

1. General

The highlight of the public use program for the year was the swearing-in ceremony for **John Turner** as **Director of the US Fish and Wildlife Service** which was held on the refuge (North Park) Friday, August 4. Secretary of the Interior Manuel Lujan, Jr., conducted the swearing-in ceremony. Other speakers included Galen Buterbaugh, Region 6 Director, and Refuge Manager John Wilbrecht. Many other dignitaries were on hand including Secretary of Defense Dick Cheney. A reception was held for John Turner after the ceremony and John Turner and the Secretary toured the refuge and visited the hatchery. The ceremony went well and the refuge received many complements. Several hundred people attended including guests, friends, and visitors.



John Turner, Director

(35mm print, 8/89, JMG)



John Turner poses for photographs near refuge wetlands and visits with John Wilbrecht, Refuge Manager; Galen Buterbaugh, Region 6 Director; and Manuel Lujan, Jr., Secretary of the Interior. (35mm print, 8/89, JMG)

The most significant public use effort occurring during 1989 was that of planning for the new visitor center and administrative offices for the refuge. Past visitor center planning finally got off "dead center" and took a different direction in 1989. A summary of what took place during the year follows.

On January 13 a meeting was held with RO staff in Denver, and Jim Griffin gave a briefing about the history, progress, and status of visitor center planning. This meeting was in light of the past years' events which put our visitor center construction as a number one priority status in the Service and the interest of the National Fish and Wildlife Foundation in possibly sponsoring and funding part of this project. Attending the meeting were Galen Buterbaugh, Barney Schranck, Jack Hallowell, Carol Lively, Maury Wright, Bob Nagel and Ty Berry. Three points were discussed after the briefing: 1) current status of the project with the Foundation, 2) final decision on a site, and 3) incorporation and use of past planning efforts and documents. The RD set up a committee to decide on a final site for the building.

The site committee met on February 15 to evaluate previous site planning documents and review site selection. Committee members were John Wilbrecht, Kris LaMontagne, Maury Wright, Carol Lively, Kent Olson, and Barney Schranck. The committee made recommendations for a visitor center site. The Rising Sage site (on the west side

of Highway 26/191) remained the highest priority location. The committee recommended that land acquisition or other alternatives be reopened for discussion with the property owner, Mr. William Kerr. If the Rising Sage was not available, the committee recommended the following sites in priority order: 1) Jackson National Fish Hatchery location, 2) west side - on refuge location across from Rising Sage (1965 Master Plan), and 3) Boucher Hill site above the fish hatchery.

The committee suggested that "aggressive support at the regional and Washington levels of the Service is critical in bringing the visitor center at National Elk Refuge to reality" and that a strategy should be developed to secure funding for the visitor center.

By mid-year, an earlier proposal surfaced again and our entire planning process began to take another direction. A memo to the Refuge Manager from the Superintendent of Grand Teton National Park dated April 11, 1989, and a subsequent meeting on June 9 involving the Park Service, Fish and Wildlife Service, and Forest Service discussed the possibility of an interagency "joint visitor center" to be located at the Boucher Hill site. The FWS responded to this proposal stating that due to our own visitor center planning and various alternative sites including the Rising Sage, the refuge did not want to enter into a planning process for a joint facility at the time. The FWS stated it would consider reopening discussions about a joint visitor center concept pending the outcome of our own planning venture.

An August 31 meeting was held in the RO to discuss the joint visitor center concept. The Regional Director was not in favor of further consideration of the Rising Sage site. Some major concerns of RO staff included the refuge sleigh ride winter operations and a site capable of meeting this need as well as the potential for new refuge offices. The FWS was in favor of pursuing the joint endeavor from a support and funding aspect. It was generally felt in our RO that funding for a sole FWS visitor center in Jackson would continue to be a major stumbling block.

Jim Griffin and RO staff met with NPS staff at the NPS regional office in Denver on September 1. The agencies decided to develop a joint task force (three members from each agency) to research the needs and functions of a visitor center for each agency and develop planning criteria. Attending the meeting were NPS and FWS Regional Directors who both endorsed a joint endeavor in Jackson and agreed that support and funding should be forthcoming for such a joint proposal.

A follow-up meeting was held at the NPS regional office in Denver on October 19 with representatives of the FWS, NPS, and FS. The meeting was facilitated and the outcome was that the three agency visitor center concept was considered feasible and would be pursued through the NPS planning process. Three people from each agency will be on a planning team for the joint visitor center project. Jim Griffin, Sheri Fetherman, and Carol Lively represent the FWS.

The refuge's immediate needs for new offices and for a sleigh ride visitor contact facility are being incorporated into the planning process.

A meeting between the regional directors of the three agencies was held on November 29 and an initial agreement between the three agencies was drafted outlining the process to be used to evaluate and plan for a joint visitor center.

Total annual visitation to the NER was 627,060 in 1989. This represents an increase of 31,899 visitors from 1988. Total visitation to the Jackson Hole area increased in 1989. Visitation to nearby Grand Teton National Park and Yellowstone Park increased with Grand Teton reporting a 15 percent overall increase for the year. The visitor tally for Grand Teton was 2,438,131 visits in 1989 compared to 2,076,698 in 1988. The Park recorded 2,104,480 visitors entering the park from the south, which was up 376,323 from 1988. The great fires in and around Yellowstone during the summer of 1988 may have attracted more visitors to the area in 1989.

Visitors entering the Park from the south pass directly by the National Elk Refuge on the main highway between Jackson and GTNP. Considering this heavily-travelled corridor, potential visitation to the refuge and to a new US Fish and Wildlife Service Visitor Center is tremendous. Viewing refuge lands and wildlife from refuge roads and highway pullouts accounted for nearly half of the total refuge visitation. Table 18 shows yearly and monthly visitation comparisons on the refuge for a ten-year period. Table 19 summarizes public use activities on the Refuge for the Calendar Year 1989 listing total visits and activity hours for each activity category.

The Wyoming Travel Information Center received a total visitation of 218,827 in 1989. This figure is down 17,315 visitors from 1988. The building is located on refuge lands along the main highway north of Jackson. Refuge exhibit panels are located on an outside balcony overlooking refuge lands. There is one refuge exhibit panel inside the building. The only direct interpretation of the refuge at the Center is through these exhibits. The building is owned by the Wyoming State Highway Department and is operated under agreement through the Wyoming State Travel Commission by the Jackson Chamber of Commerce. The Jackson Chamber of Commerce has made the Center its base of operations since 1976.

Table 18. Total visitation - yearly/monthly comparisons for ten years, National Elk Refuge.

Month	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Jan	20,599	24,159	21,836	23,533	23,778	22,394	24,263	25,343	17,130	30,350
Feb	22,680	27,210	25,597	27,454	27,052	25,051	24,391	27,688	29,071	33,205
Mar	25,331	31,206	33,583	33,058	33,860	33,583	31,318	32,355	34,460	35,688
Apr	26,524	29,274	26,982	27,102	26,769	25,239	26,013	25,757	31,320	33,925
May	35,990	36,479	32,646	30,401	22,893	32,397	23,599	30,415	44,633	46,295
Jun	53,891	79,731	75,189	66,123	64,264	60,436	63,698	60,082	78,578	82,520
Jul	71,748	97,021	95,146	88,372	92,059	108,862	97,629	99,012	104,302	104,632
Aug	75,957	91,605	94,860	66,692	72,878	75,346	102,214	95,076	97,053	103,360
Sep	44,691	44,423	48,117	39,283	43,354	45,484	46,222	56,346	53,028	56,920
Oct	23,876	27,258	27,406	23,838	24,577	24,632	22,810	29,515	28,666	30,536
Nov	15,834	24,644	25,896	31,594	29,305	28,615	28,380	31,962	30,321	31,915
Dec	14,376	24,036	25,842	24,907	26,307	27,969	29,014	34,481	36,489	37,714
Dec	14,376	24,036	25,842	24,907	26,307	27,969	29,014	34,481	36,489	37,714
Totals	431,497	536,956	533,100	482,357	487,096	510,008	519,551	548,032	595,161	627,060

Table 19. Summary of public use activities, Calendar Year 1989, National Elk Refuge

Activity and Description	Number of visits	Activity hours
<u>A. Interpretation</u>		
1. Wildlife Tour Routes - Conducted: Sleigh Rides and Sleigh Ride Visitor Center	29,201	29,201
2. Visitor Contact Stations: Wyoming Travel Information Center and Refuge headquarters	22,227	55,556
3. Interpretive Exhibits - Self-Guided: Bulletin board & wayside exhibits at Refuge entrance and headquarters	8,200	410
4. Other on/off Refuge programs: talks/tours to schools and other groups	4,746	4,568
<u>B. Environmental Education</u>		
1. Students and Teachers: Use of Environmental Study Area	850	1,625
<u>C. Recreation - Wildlife Consumptive</u>		
1. Hunting Resident Game - Elk - Gun	1,506	9,226
2. Fishing - Coldwater	2,730	7,550
<u>D. Recreation - Wildlife Non-Consumptive</u>		
1. Wildlife/Wildlands Observation - Vehicles: vehicles on Refuge Road and highway pullouts	05,100	32,300
2. Photography: Professional photography by permit and bird blind use	20	120
<u>E. Recreation - Non-Wildlife</u>		
1. Picnicking: Wyoming Travel Information Center - North Park Picnic Area	32,545	16,238
2. Other: Joggers/Walkers on Refuge Road	19,935	9,967
	627,060	166,761

The Miller Cabin-National Elk Refuge Historic Site has been preserved and stabilized for adaptive use as a living quarters. Using the Miller House as a quarters is a practical solution to preventing deterioration of the historical structure in light of requirements under the National Historic Preservation Act to protect cultural resources. The site is interpreted by a large sign at a pullout along the refuge road.

Public Information activities were highlighted by a variety of news releases, magazine, TV, and radio interviews, and other contacts during 1989.

The Refuge staff responded to 1,845 public inquiries in 1989 including phone calls and letters. Eleven news releases were issued directly by the refuge and another 140 or more releases about the refuge were generated indirectly on local, regional, national, and international levels. Headlines of refuge releases included the following:

"Refuge Sponsors Wildlife Week Poster Contest with Local Schools"
 "Refuge Counts Wintering Elk"
 "Agencies Conduct Public Workshop on Annual Bison Management Program"
 "Wildlife Week Poster Contest Winners Announced"
 "Elk Refuge Sleigh Rides End April 1"
 "Teton County Receives \$259,913 in Revenue Sharing From Refuge"
 "Ceremony for USFWS Director John Turner on National Elk Refuge"
 "Jackson Bison Herd Annual Management Program Available"
 "Refuge Hunt Drawings Begin October 27"
 "Winter Road Closure to Protect Wildlife"
 "Elk Refuge Sleigh Rides to View Elk Begin December 16"

News releases were most commonly issued to the Jackson Hole News, Jackson; Jackson Hole Guide, Jackson; Jackson Hole Daily, Jackson; KMTN FM Radio, Jackson; KSGT AM Radio, Jackson; the Post-Register, Idaho Falls, Idaho; KIDK-TV, Idaho Falls, Idaho; and KIFI-TV, Idaho Falls, Idaho.

During 1989 news releases, articles, stories, and coverage of the Refuge, of which we are aware of, also appeared in:

"Bugle," Rocky Mountain Elk Foundation magazine
 "Wapiti," Rocky Mountain Elk Foundation newsletter
 National Geographic Explorer
 Casper Star Tribune
 "Sunset" magazine
 "Air Destinations" magazine
 USA Today newspaper
 Wyoming Journal
 "Pronghorn" magazine
 Teton County Heritage Society newsletter
 KVPI Channel 6 TV
 "Jeopardy" TV Game Show
 "Paul Harvey" radio news

ABC TV national news - Peter Jennings
 UPI
 Washington Post
 Albuquerque Tribune
 Rocky Mountain News
 Denver Post
 National Geographic Book: "Yellowstone Country"
 KUTV - Salt Lake City, UT
 Greater Yellowstone Report
 New York Times
 "Sesame Street" TV show
 "Spokesman Review" newspaper, WA
 Jackson Hole Winter Visitor Guide
 National Geographic "Traveler" magazine
 National Wildlife Federation book "America's Wildlife
 Hideaways"

The refuge received numerous written and phone inquiries and requests regarding the antler pickup and auction and acquisition of elk antlers. In 1989, antlers were donated for educational, interpretive, or scientific purposes to:

Jackson District Boy Scouts of America for crafts;
 Great Meadows National Wildlife Refuge for natural history collection and interpretation;
 Washington State University for research and genetics studies;
 Hillsboro, Ohio, Boy Scouts of America (skulls for arts and craft);
 Jackson Junior High School for crafts and scrimshaw; and
 Muskingum College, Ohio, for scientific research on trace elements.

Antlers were not given for all requests and donations had to meet legitimate non-profit, public educational criteria. In 1989 a total 71 pounds of antlers valued at approximately \$994 were donated.

Information programs such as National Wildlife Week and National Hunting and Fishing Day were promoted by visits to local schools, and by distributing information releases, kits, and posters.

In March, a Wildlife Week poster contest was sponsored by the refuge and our cooperating association, the Grand Teton Natural History Association (GTNHA). Prizes were awarded to those entries which best illustrated the theme of the contest. The theme for 1989 was "Predators! They're Part of the Picture." Local schools participated and there were seven classes of competition: grade 1, grade 2, grade 3, grades 4-5, grade 6, grades 7-8, and grades 9-12.

Over 375 entries were received and winning posters were selected by a panel of five volunteer judges from the cooperating association, Forest Service, Park Service, FWS, and a local artist. Names of winners appeared in a local newspaper during Wildlife Week.

Prizes were donated to the students by the cooperating association and included a \$100 savings bond for grand prize, and \$50 bonds for first-place entries. Honorable mention prizes (Refuge pins, T-shirts, and posters) were also awarded. Winning posters were displayed at the Sleigh Ride Visitor Center during Wildlife Week.

Migratory Bird Hunting and Conservation Stamps were available at the refuge in 1989 and 14 stamps were sold for collecting and conservation purposes (July 1, 1988-June 30, 1989, reporting period). Duck stamp displays are featured at refuge headquarters and the Sleigh Ride Visitor Center. Visitors wishing to make contributions are encouraged to purchase stamps.

No new publications were produced during 1989. Brochures were reprinted providing a stock of complimentary information for the public. The following were revised and reprinted during 1989: "Hunting Information," "1989 Hunt Season General Information," "Elk of National Elk Refuge," and "National Elk Refuge" general leaflet. Brochures are dispensed at leaflet holders at refuge headquarters, refuge entrance and at the Sleigh Ride Visitor Center. Limited quantities are provided as requested to the Wyoming Travel Information Center, the Moose Visitor Center in Grand Teton National Park, hotels and motels around Jackson Hole, and mail requests.

The refuge received several requests for professional/commercial filming in 1989. The staff also dealt with many photographers and photography requests and correspondence in which no permits were involved. Six photography permits were issued:

Wolfgang Bayer Productions, Jackson;
C.F. Glover, Focus on Wildlife, Jackson;
R.T. Eastman Productions, Jackson;
Jack Acrey, Acrey Gallery, Colorado;
Shane Moore Cinematography for Marty Stouffer Productions,
Colorado; and
Franz Camenzind, Jackson

2. Outdoor Classrooms - Students

The refuge cooperates with the Bridger-Teton National Forest in the operation and maintenance of a jointly-sponsored Environmental Study Area (ESA) along the south boundary of the refuge. The area is most heavily used by the Jackson Elementary and Junior High Schools as an outdoor classroom. During 1989, approximately 850 students and teachers used the area for 1,625 total activity hours.

3. Outdoor Classrooms - Teachers

The refuge involves teachers in many aspects of refuge activities, particularly during winter months with the sleigh rides and Sleigh Ride Visitor Center. A study guide entitled, "Elk Refuge Visit Study Guide," is provided to teachers, and the film, "Season of the Elk," is loaned to teachers prior to their visit. Some teachers develop a thorough lesson plan about the elk and refuge

before bringing their students to the area. This, in combination with the sleigh ride, slide show, exhibits, touch-and-feel table, and talk with refuge employees, gives class a thorough experience. The refuge and sleigh ride concessionaire have a policy whereby Jackson first or second grades and outlying elementary schools can take the sleigh ride free and other schools studying the elk and refuge receive a discount. As a result, hundreds of students each year take the sleigh ride and have "first-class" outdoor classroom experience. Also, most of the Jackson preschool and kindergarten classes bring their kids to the Refuge Visitor Center and sleigh rides since children under six years of age receive free rides.

The Teton Science School (within Grand Teton National Park) has an extensive local environmental education program and conducts numerous outdoor activities. This school provides environmental education programs for all levels of education. Refuge personnel are actively involved with the school and its staff, coordinating trips, talks, and activities. Most classes tour the refuge and visit the Sleigh Ride Visitor Center. Talks are also given at the Science School.

4. Interpretive Foot Trails

There are no interpretive foot trails on the refuge.

A winter access ski trail through the refuge to the Forest Service Goodwin Lake ski cabin, although not interpretive, has been in operation since March 1986. A permit system was implemented to allow skiers access on a designated trail across the refuge to the forest cabin from December 1 through April 30 each winter. This access was put into effect because of public interest in the cabin and as a means to control usage as part of the general winter closure of the Curtis Canyon area to protect wintering wildlife. A non-fee refuge ski access permit is available at refuge headquarters, Monday-Friday. On weekends and holidays ski access permits are available at the Sleigh Ride Visitor Center.

The refuge is evaluating the effectiveness of the permit system and working with the Forest Service regarding future use. Hopefully, the Forest and interested users will develop possible alternatives. The permit system allows interested people access to the ski cabin (a traditional use) while giving the refuge an opportunity to personally contact users about wildlife disturbances, permit conditions, route of travel, and the limited nature of this alternate access.

In the spring of 1986, 10 permits were issued between March 23 and April 30. During the 1986-87 winter (December 1 - April 30) 19 permits were issued; during the 1987-88 winter, 21 permits were issued; and during the 1988-89 winter, 29 permits were issued.

5. Interpretive Tour Routes

The sleigh/wagon rides into the elk herds are a unique interpretive experience for refuge visitors. The rides are concession operated through an agreement with our cooperating association, the Grand

Teton Natural History Association. The rides operated between December 17, 1988, and April 2, 1989. During the 1988-89 winter season, 29,201 people visited the sleigh rides and Sleigh Ride Visitor Center (the 1988-89 season figure is used for the Calendar Year 1989). Visitation was up 447 from the 1987-88 season. See Page 83 for a summary of sleigh ride visitation over the years.

6. Interpretive Exhibits/Demonstrations

The Sleigh Ride Visitor Center (contact station) began operations on December 20, 1980, and had its ninth season of operation in 1989 (season was December 17, 1988 through April 2, 1989). Over 29,000 visitors entered the building during the three and one-half month season. The Center was open to the public from 10 AM to 4 PM daily, the same hours as the rides. Four employees worked at the Sleigh Ride Visitor Center during the season. Assistant Manager Griffin usually worked one day per week, and Roxy Rogers, Rick Wallen, and Jackie Gilmore worked two days each per week (hired through GTNHA).

The 25-seat AV room was filled to capacity most of the time. In addition to the 12-minute "Elk Refuge Slide Program," various video programs were shown upon request. During the season, a total of 1,541 slides shows were shown to the visitors.

Every state was represented in visitation through the Center's guest register. Twenty foreign countries were also represented (see Table 20). The states which had the greatest recorded visitation were (in order): Wyoming, Idaho, California, Colorado, Texas and Utah.

In addition to the visitation to the Sleigh Ride Visitor Center and Wyoming Travel Information Center, 3,400 visitors stopped at refuge headquarters in 1989 to receive information and ask specific questions. The headquarters office is busiest during the hunting season.

The bulletin board and kiosk exhibits at refuge headquarters and at the entrance to the refuge road are changed during the year to update information and regulations. The kiosk exhibit panels are changed seasonally to include information about hunting, fishing, seasons of the elk, sleigh rides, antler dropping, etc. The wayside exhibits along the highway are changed seasonally with information about swans, elk, and elk winter range. Over 8,000 people view these bulletin boards and exhibits annually. Three information exhibits at the overlook balcony of the Wyoming Travel Information Center are very popular with visitors.

Table 20. Sleigh Ride Visitor Center guest register summary, 1989
season visitation, National Elk Refuge.

Alabama:	4	Montana:	79
Alaska:	8	Nebraska:	28
Arizona:	10	New Hampshire:	3
Arkansas:	6	New Jersey:	39
California:	221	New Mexico:	8
Colorado:	174	New York:	45
Connecticut:	27	Nevada:	13
Delaware:	7	North Carolina:	20
Florida:	105	North Dakota:	2
Georgia:	40	Ohio:	27
Hawaii:	2	Oklahoma:	20
Idaho:	262	Oregon:	42
Illinois:	38	Pennsylvania:	42
Indiana:	15	Rhode Island:	0
Iowa:	12	South Carolina:	9
Kansas:	27	South Dakota:	14
Kentucky:	30	Tennessee:	24
Louisiana:	17	Texas:	135
Maine:	11	Utah:	133
Maryland:	19	Virginia:	31
Massachusetts:	18	Vermont:	2
Michigan:	29	Washington:	36
Minnesota:	56	West Virginia:	2
Mississippi:	17	Wisconsin:	27
Missouri:	28	Wyoming:	611

Outside United States

Australia	12	Japan	2
Brazil	15	Kenya	1
Canada	19	Mexico	8
Cuba	2	New Guinea	3
Demark	2	New Zealand	5
England	5	Saudi Arabia	4
Finland	1	South Africa	11
France	5	Sweden	3
Guam	3	Virgin Islands	4
Holland	6	West Germany	2

Four interpretive plaques for the Jackson Town Square antler arches produced by the refuge and installed by the Town of Jackson interpret the antlers, the refuge and mention a fine for antler theft.

7. Other Interpretive Programs

The refuge staff gave orientations, talks, tours, and programs to the public and various groups on and off the refuge during the year. Recorded visits tallied 4,746 for 4,568 activity hours. These presentations were given to the following:

- Teton County Intergovernment Meeting
- U.S. Marshall
- Jackson Elementary School
- Greenville College, Colorado
- Wilson School
- Washington State University
- University of Minnesota
- Jackson Schools (Wildlife Week)
- University of Nebraska
- Lander High School
- Gillette High School
- Ricks College
- Teton Science School
- Journalists - England
- Jackson Cub Scouts
- Judge from Holland
- Jackson Kiwanis Club
- Forest Service - Public Affairs Conference
- Jackson Boy Scouts
- Boy Scout EXPO
- Grays Lake School
- Jackson Antler Auction
- Colorado State University
- Snake River High School, Idaho
- American Wilderness Leadership School
- University of Wyoming Research Center
- Hart-Six Ranch
- Teton Valley Ranch Camp
- Questers Tours
- Association for Conservation Information
- Brainerd Technical School
- Wyoming Agricultural Extension Agents
- Cananduiqua High School, New York
- Under Secretary of Interior, Frank Bracken
- FWS Project Leader's Meeting
- FWS Office Information Transfer
- FWS Director, John Turner
- Secretary of Interior, Manuel Lujan, Jr.
- NPS Rangers
- Public hunt drawings
- Jackson Junior High School
- Bighorn Sheep Society
- GTNHA Board of Directors
- Jackson Hole Chamber of Commerce

Sleigh Ride Concessionaires
 Tours of feeding operations to various individuals & groups
 Public groups at Wyoming Travel Information Center

Signs: The National Elk Refuge was supposed to be used as a "model" refuge for signing. In past years the FWS National Sign Committee had agreed to produce all new signing for the National Elk Refuge according to the new FWS Sign Manual specifications. The refuge was to be used in a videotape produced for the Service about sign standards, safety, and liability. However, the National Sign Coordinator and the National Sign Committee made no final plans or orders for NER signs during 1989. Apparently, the plan to use the NER as a prototype refuge for signing has been abandoned.

8. Hunting

Introduction - The refuge elk hunt began on Saturday, October 28, 1989, and ran through Sunday, December 10 (44 days). This year's season was nine days longer than last year's.

The season ran the full length scheduled for the Refuge with 424 animals taken on the refuge (394 hunter take including salvaged cripples given to hunters plus 30 others including illegals given to WGFD and other hunt related mortalities not salvaged). The harvest in GTNP was 729 bringing the combined refuge and Park total to 1,153. The established harvest quota for the Park and refuge was 2,400 (1,800 for Park; 600 for the refuge). The overall harvest was far from meeting objectives.

Drawings - The procedures were the same as in 1988. Six drawings were held at the Jackson Rodeo Grounds. The first hunter drawing

was held at 3 PM on Friday, October 27, 1989, with 459 people hoping to draw one of 180 available "any elk" permits. In the following five drawings, there were 385, 420, 340, 422 and 140 attending. At the last drawing only 140 people showed up to draw for 240 available permits for four hunt periods. An announcement was made on the radio and permits were issued that week from headquarters on a first-come, first-serve basis.

A total 2,166 people attended the drawings during the season, only 33 more than in 1988. The Rodeo Ground location was excellent, providing plenty of space for people, parking, and crowd control. A combination of "any elk" and "antlerless only" permits were issued. All "any elk" permits were issued during the first week. In anticipation of migration and the desire to harvest cows for herd reduction, the switch was made to all "antlerless only" permits at the second drawing and remained so for the remainder of the season.

Also, to maximize harvest and to keep a sufficient number of hunters in the field, alternate permits were issued during the entire season. A list of 20 to 30 alternate names was established at each drawing. Based on confirmed kills and/or "no shows" in the field, alternate permits were issued each period from the list at refuge headquarters or in the field at the Ike Sign on weekends and holidays. A total of 352 alternate permits were issued in addition to the 60 regular permits each period.

This season, 10 permits of the 60 issued each period were stamped "noon opening," which took effect on the first day of the period. This system was begun in 1987 and was designed so that 10 successful hunters would be replaced by 10 new hunters, thus keeping the number in the field at 50. This was designed as a "built-in alternate system." If elk are present, the system of noon opening has worked fine as far as keeping hunters in the field.

Licenses and hunter safety cards were checked prior to each drawing. It was also helpful to have a roped-off chute area for people to walk through while lining up to get tickets. The entire drawing area was not roped off, only the area where hunters pick up their permits, fill them out, and have them validated.

Hunter Success and Elk Movement - This season differed from last season because hunter success was up during the first week and then dropped during the remaining five weeks. Hunter success is directly related to weather and movement/migration of elk.

On October 28, we had 2 to 3 inches of snow and by October 30, 700 to 1,000 elk migrated onto the refuge by 8 AM. October 31 at 6:30 AM, approximately 500 elk were streaming into the Nowlin area. By Oct 31, 2,000 elk were already established in the closed area at Nowlin. This information is provided by refuge hunt patrol officers' daily diaries. As a result of this movement and the culling of some of the elk from a large resident summering herd, the harvest the first week (October 28-November 3) was 135 elk.

By November 10, it is estimated that 5,000 elk had moved into the south portion of the refuge. Garvice Roby, WGFD biologist, estimated that by November 7, most of the Grand Teton Park elk had already moved onto the refuge. During week 2 (November 4-10) refuge harvest was 29 elk.

By the November 7 date, only 150 total elk had been taken on the refuge, which represents the approximate harvest the refuge contributed from the GTNP herd segment. This is important information considering that one of our major objectives of the NER hunt is to harvest animals from the GTNP herd segment. It is apparent that elk are developing a conditioned response to move early in the season and to do it under the cover of darkness. Week 3 of the hunt produced a harvest of 64 elk.

Weather remained clear and warm from November 17 to November 23. There was little elk movement and little harvest - 31 elk during week 4 were harvested (November 18-24).

On November 25, there was some snow and approximately 300 elk moved onto the refuge by 7 AM. On November 26, we received 12 inches of snow in the morning. Approximately 800 to 1,000 elk moved over McBride and toward the closed hunt area in the morning. It is believed these elk had moved from the Nowlin area into Long Hollow the night before to graze. The snow and the morning hunting pressure drove them back into the closed area. During week 5

NATIONAL ELK REFUGE

1989 HUNT SEASON

GENERAL INFORMATION

—Firearm and archery hunting of elk on the Refuge is permitted from October 28 through December 10, 1989, unless the Area 77 season closes earlier.

—A non-fee Refuge Hunting Permit is required, which is obtained by participation in a weekly public drawing at the Jackson Rodeo Grounds. (See map on reverse for directions.) There will be no pre-application for permits.

—Individuals wishing to draw for a Refuge Hunting Permit must be present at the drawing, possess a valid State of Wyoming "GENERAL" Elk HUNTING LICENSE (resident or non-resident), and a valid HUNTER SAFETY CARD (or certification) or a current Hunter Safety Instructor Card issued by a state.

—Drawings will be held at the Jackson Rodeo Grounds at 3 PM on Fridays (October 27, November 3, 10, 17, 24, and December 1) unless Area 77 closes earlier. Participants should come to the Rodeo Grounds at 2:30 PM in order that licenses and hunter safety cards can be checked and a numbered ticket issued prior to the drawing. Instructions will be given there.

—One hundred and eighty (180) "ANY ELK" or "ANTLERLESS ONLY" Refuge Hunting Permits will be issued each week to qualified individuals via the drawing.

—Permits will be drawn for three hunt periods each week: 60 permits will be valid for Saturday and Sunday; 60 permits valid for Monday and Tuesday; and 60 permits valid for Wednesday, Thursday, and Friday.

—Ten permits of the 60 issued each period will have a noon opening on the first day of the period.

—It is the responsibility of each hunter to use proper hunter ethics and to report all accidents and crippled animals to Refuge personnel.

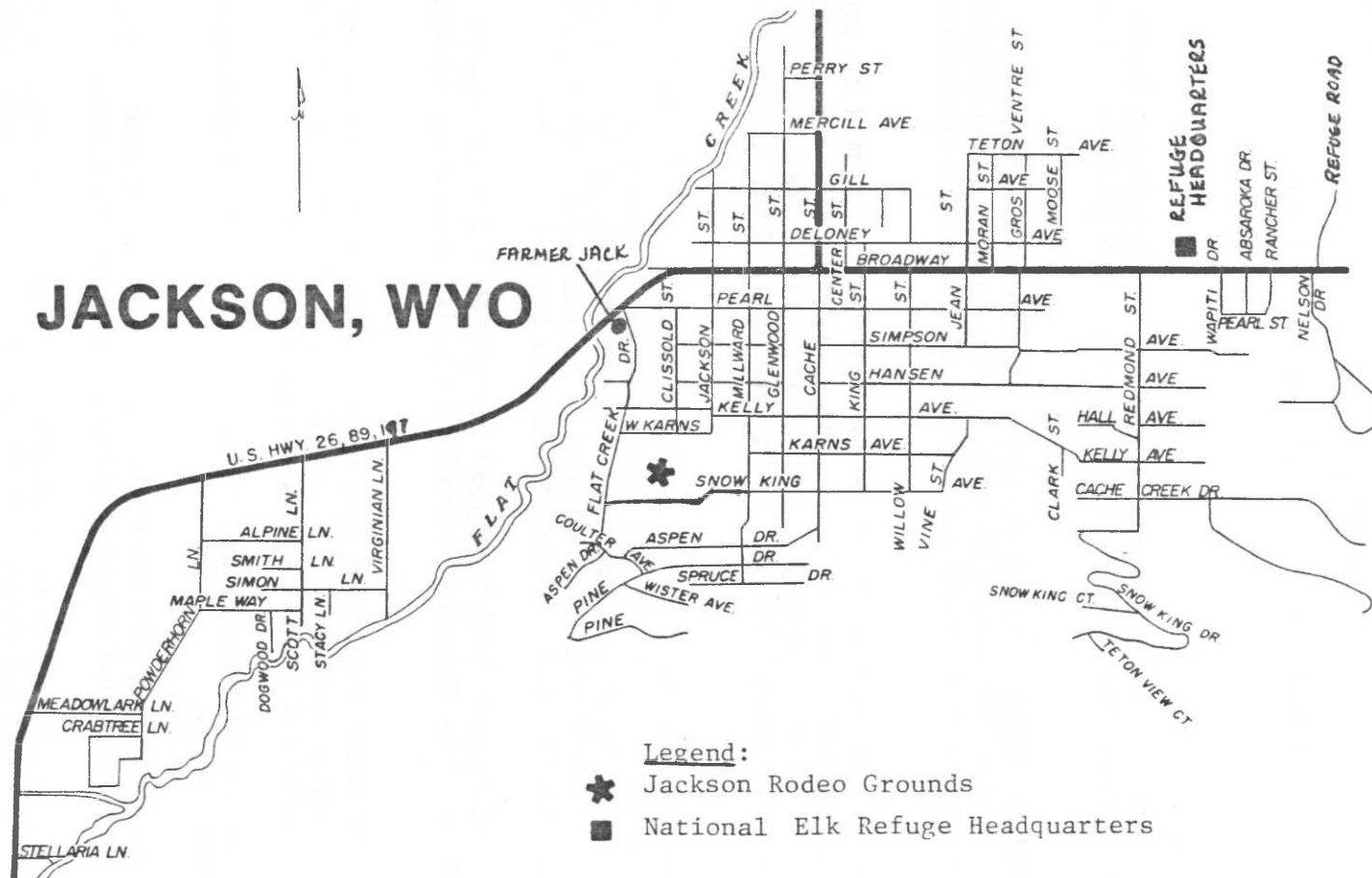
—If you have any questions or need additional information, contact Refuge headquarters: National Elk Refuge, PO Box C, 675 East Broadway, Jackson, WY 83001, Phone 307/733-9212.



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE



JACKSON, WYO



Legend:

- * Jackson Rodeo Grounds
- National Elk Refuge Headquarters

(November 25 to December 1), 112 elk were harvested. The tally for the last week (#6) was 53 elk which included eight mortalities discovered from earlier in the season.

The hunt on the three special permit areas of the park started the same date as the refuge hunt. Hunter success on the refuge for the season was 36 percent. Table 21 shows that 1,065 total hunters who reported that they hunted took 384 elk. The total kill on the refuge was 424. Of this total, 10 elk were crippled elk salvaged by, or given to, hunters by refuge personnel. Another 22 animals were hunt mortalities not salvaged and eight were salvaged illegals or other animals salvaged and given to the WGFD for disposition.

Problems - The hunt season went smoothly despite the longer season and more hunters. This year and last, there has been the highest incidences of crippling, unsalvaged mortalities, illegals, and hunter violations. A total of 40 animals were crippling loss or a result of hunt violations this year. It is believed that increased numbers of permits and hunters along with large numbers of concentrated hunters (people hunting where elk are moving through) results in this type of activity. It is interesting to note that this season there were 469 more permits issued and 363 more permits used as well as nine more days of hunting than in 1988, but the harvest was only 23 more elk.

The 10 noon-opening permits seemed successful in spreading out the 60 hunters per period. However, not much hunting success occurred during afternoons and many of the noon hunters were discouraged, did not hunt, or started the next day.

Conducting the drawings at the Rodeo Grounds is advantageous because it provides plenty of space for people and parking. The alternate permit system was effective but on weekends, patrol officers spent a lot of time answering questions about alternates and administering and issuing permits.

Hunting Violations - During the 1989 hunt season, 26 violations were reported by refuge law enforcement personnel. Thirteen of these were issued violation notices, 11 were warnings, and two were pending. The following specifies the number of incidents for each violation and whether a warning (W) or notice of violation (NOV) was issued and the total amount of the fines.

<u>Incident</u>	<u>No. Incidents</u>	<u>Action</u>
Dog in Hunt Area	1	W
Hunt Special Regulations	2	1 W; 1 NOV(\$25)
Improper Tagging	3	W
Orange Clothing Required	2	W
Hunter Safety Card	1	W
Hunter Parking	1	W
Bull Taken In Antlerless period	3	1 NOV (\$210) 2 (Invest. Pending)
Fail to Retain Evidence of Sex	1	1 NOV (\$60)
Hunt - Terms of Permit	3	3 NOV (\$75)
Hunt Closed Area	3	3 NOV (\$630)
Hunt Wrong Area	2	2 NOV (\$220)
Hunt - Unauthorized Use of Vehicle	1	1 NOV (\$100)
Hunt - Without Conservation Stamp	1	1 NOV (\$65)
Hunt - Wrong Season	2	W (1 juvenile)

Table 21. National Elk Refuge 1977-89 Hunt Summary

Hunt Period	1977 10/29-12/6	1978 10/28-12/8	1979 10/20-12/9	1980 10/25-12/21	1981 10/30-12/6	1982 10/30-12/5	1983 10/29-11/30	1984 10/27-11/11	1985 10/27-11/15	1986 10/25-11/14	1987 10/24-11/22	1988 10/29-12/02	1989 10/28-12/10
No. Days in Season	32	42	51	52	38	37	33	16	21	21	30	35	44
Any Elk Permits	0	0	246	1,269	596	385	320	280	361	360	470	240	253
Antlerless Elk Permits	481	639	778	280	530	646	447	0	0	0	310	776	1,232
Permits Issued	481	639	1,024	1,549	1,126	1,031	767	280	361	360	780	1,016	1,485
Resident	-	-	-	-	1,047	949	718	255	319	309	696	935	1,393
Non-Resident	-	-	-	-	79	82	49	25	42	51	84	81	92
Permits Used	314	466	777	1,152	883	735	614	205	290	257	505	702	1,065
Permits Not Used	41	70	145	138	83	41	31	18	9	18	79	105	125
Permits Not Returned	126	103	78	259	160	255	122	57	62	85	196	209	295
Activity Hours	3,678	3,909	6,013	8,460	5,809	6,637	5,271	1,774	2,586	2,351	4,674	5,631	9,235
Hunter-Days	614	679	1,053	1,485	1,150	1,208	936	317	453	431	777	1,044	1,732
Hunter Kill:													
Bulls	-	-	7	235	132	61	73	80	104	79	51	35	75
Spikes	-	-	23	54	19	30	39	20	19	23	41	19	17
Cows	146	146	175	140	254	157	132	15	28	18	56	238	242
Calves (M)	15	17	15	16	37	23	23	2	1	1	3	25	22
Calves (F)	27	21	22	27	26	22	28	5	3	3	6	28	28
Calves (Unk.)	2	1	-	-	-	-	-	-	0	0	0	0	0
Hunter Take	190	185	242	472	468	293	295	122	155	124	157	345	384
Salvaged to Hunters	18	20	23	21	5	11	12	4	16	5	7	18	10
Other Hunt Related Mortality*	12	22	15	20	8	19	10	6	7	11	12	38	30
Total Kill	220	227	280	513	481	323	317	132	178	140	176	401	424
Hunter Success	51%	40%	31%	41%	53%	40%	48%	59%	53%	48%	31%	49%	36%

* "Other" hunt related mortalities: crippling loss (not salvaged) or illegals (salvaged - given to WG&FD).



Technician Roxy Rogers helps refuge officers investigate two bulls shot outside of the refuge hunt area. (35mm, 11/3/89, JAC)

9. Fishing

Fishing for Snake River cutthroat, brook trout, and other species is a popular summer and fall activity on the refuge. Fishing occurs on the Gros Ventre River along the north boundary of the refuge and on Flat Creek through the refuge. In 1989, fishing was permitted May 21 through October 31 on the Gros Ventre River and the upper portion of Flat Creek, and August 1 through October 31 on lower Flat Creek. A three-mile portion of lower Flat Creek is open to fly fishing only. An estimated 2,730 fishermen spent 7,550 activity hours fishing refuge waters this year.

The refuge did not conduct its own voluntary creel census survey of Flat Creek in 1989 at the request of WGFD. The refuge had conducted a survey from 1982-1987. The WGFD conducted a one-year programmed census using an "instantaneous count" system during 1988. Apparently, according to their fisheries biologist, the figures used for the number of anglers and activity hours for Flat Creek for 1988 was too high. They had based the entire season on some counts early in the season when typically, there is very high usage.

In 1989, the WGFD did not conduct a creel census on Flat Creek. However, based on their recalculated 1988 survey, 1,886 anglers used Flat Creek for about 4,532 hours. The WGFD concluded that Flat Creek provides an important local fishery that meets the standards of a "Trophy Concept." The average size of cutthroat trout caught was 15.5 inches in 1988. Catch-and-release is practiced by most of the fishermen, and the size of fish being creeled is selected from the larger fish.

Interview data suggests that every available cutthroat trout in Flat Creek is caught and released about six times. The WGFD suggested that the volunteer survey conducted by the refuge from 1982-87 gave good estimated angler use and success rates, while harvest estimates and size of creeled fish was low by this method. More restrictive regulations for 1990 are recommended by WGFD to help reduce removal of the larger fish through harvest.

Moving the hatchery Flat Creek fishing access in 1988 proved to be a good idea. The new location along the fish hatchery road on the refuge has worked out well and seems to keep anglers and the threat of fish disease transmission from the immediate hatchery area.

11. Wildlife Observation

Wildlife observation accounted for approximately 305,100 visits to the refuge in 1989. This figure represents about half of the total refuge visitation. A large portion of this visitation occurs as vehicles stop at turnouts along US Highway 26/191 on the west side of the refuge, or when vehicles travel on the interior refuge road. Several paved pullouts along the highway aid travelers who enjoy observing and photographing the refuge and wildlife. Viewing swans and other waterfowl at the Flat Creek turnout is popular year around, and viewing elk from all turnouts is very popular from October through May. The highway wayside exhibits have added to visitors' appreciation and understanding of the refuge.

12. Other Wildlife Oriented Recreation

During 1989, fourteen people used the refuge photography bird blind and six professional photographers obtained special permits for a total of 120 activity hours.

14. Picnicking

The North Park picnic/rest area, located on refuge lands near the Wyoming Travel Information Center, accommodated 32,545 picnickers in 1989. This is a major summer rest area for visitors traveling north-south along the main highway on the west side of the refuge. The park is operated by written agreement with the Town of Jackson and Teton County who maintain the area.

16. Other Non-Wildlife Oriented Recreation

The Refuge Road which begins at the end of East Broadway in Jackson is a popular road for walkers, joggers, bikers, and runners. An estimated 19,935 people used the Refuge Road in 1989 totalling 9,967 activity hours. Recreationists are on the road from early morning until after dark in all seasons of the year, and this type of use is increasing annually.

Although the road provides an excellent pathway for runners off the congested streets of town, there are times when wintering elk are disturbed by runners, particularly in evening hours. Through press release information, public contacts, and kiosk exhibits, we ask for

public cooperation in curtailing use of the Refuge Road from sunset to sunrise during winter months. We want to minimize disturbance to free-ranging elk, and encourage use of roadside winter range.

17. Law Enforcement

During 1989, 119 law enforcement related incidents/cases were recorded on the NER. Most of these incidents (92) were handled by verbal or written warnings and one was reported to, and handled in cooperation with the Jackson Sheriff's Department. The most frequent violations were people, animal, and vehicle trespass. Twenty-six violation notices or complaints were issued, of which 25 were paid through the Central Violations Bureau in Denver, and one was handled by the US Magistrate Court in Jackson. See Table 22 for a summary of violations.

The refuge had five commissioned law enforcement officers in 1989. These were Jim Griffin (Refuge Law Enforcement Coordinator), John Wilbrecht, Jim Creasy, Al Ridgway and Mark Lanier, who received his LE Commission in 1989.

Regularly scheduled patrols occurred only during the hunting season, which is the peak of enforcement activity on the refuge. Extra patrol efforts occurred during the spring antler pickup, storage, and auction time in March, April, May, and during the July holiday weekend. Most patrols and law enforcement matters during the remainder of the year were incidental to other duties.

Law enforcement efforts on the Refuge Road continued to be handled in a "low key" manner by refuge officers and routine road patrols, radar usage, and accident investigations on the road were handled by the Teton County Sheriff's Department.

In an effort to reduce antler poaching in the spring, one temporary Park Ranger with law enforcement authority, Cynthia Wolf, was hired for night patrol. This is the sixth year that seasonal enforcement personnel have been hired to help deter antler poaching. After several past arrests and Lacey Act cases, we believed it was necessary to continue active and preventative law enforcement.

The seasonal patrolled during the hours of 7 or 8 PM until 3 or 4 AM. She patrolled the roads and refuge boundary, observed the refuge with a night-vision scope, checked the security of buildings and the antler storage areas, and coordinated LE activities with other agencies. The patrol was scheduled between mid-March and the end of April during the height of antler shedding. No major incidents or cases involving antler poaching occurred during 1989.

In the spring of 1989, the seasonal park ranger also worked afternoons with boy scouts using the thiokol to pick up antlers in areas where elk had moved off. The LE technique regarding antlers is becoming one of prevention. We prevent the theft of antlers and disturbance to the elk at night by having refuge personnel and the scouts remove the antlers during the daytime. If thieves cannot see or find antlers, we believe they will be less likely to trespass now or in the future.

Table 22. National Elk Refuge summary of violations (number of incidents, 1989).

Type of Violations (Incidents)	Totals			DISPOSITION OF VIOLATIONS - 1989				
	1989	1988	1987	Warnings	Violation Notices (Paid Amts)	Court (Paid Amts)	Court dismissed or Suspended (Amts)	Pending VNs (Amts)
Trespass (animal)	10	9	12	7	3(300)			
Trespass (people)	51	56	59	45	5(250)		1(50)	
Trespass (vehicle)	19	22	22	15	4(175)			
Trespass (camping)	2	6	11	2				
Disturb. WL (animal)	0	0	0					
Disturb. WL (people)	1	0	1		1(50)			
Disturb. WL (vehicle)	2	0	0	2				
Disturb. WL (aircraft)	1	2	0	1				
Taking plants/animals	0	0	3					
Improper hunting license	2	0	1	1	1(65)			
Hunt in wrong area	4	3	2	2	2(220)			
Hunt in closed area	3	5	0		3(630)			
Hunt - Special Regs.	6	1	2	2	4(100)			
Improper tagging	3	2	3	3				
Hunt - overlimit	0	1	2					
Hunt - bull in antlerless	1	2	0		1(210)			
Hunt - orange clothing	2	3	1	2				
Hunt - evidence of sex	1	0	0		1(60)			
Fire from/upon/across road	0	0	0					
Firearm in closed area	1	1	4	1				
Fireworks/explosives	1	0	0	1				
Spot lighting	0	0	0					
Fishing - closed area	0	0	0					
Speeding	2	1	3	2				
Careless driving	2	0	0	2				
DUI	1	3	3	1(SO)*				
Improper licensed vehicle	0	1	1					
Opr. MV w/o license	0	1	2					
Opr. motorcycle w/o lights	0	0	0					
Unlawful parking (night)	4	8	5	4				
Littering	0	1	1					
Alcohol - under influence	0	0	0					
Destruct./removal of property	0	0	5					
Lacey Act	0	0	0					
Totals	119	128	143	93	25(2,060)	0	1(50)	

*(SO) Cooperation with Sheriff's Office.

This method must be working because the refuge recovered over 9,000 pounds of antlers in 1989. The percentage of antlers unaccounted for was 17 percent this year which is one of the lowest figures in 13 years.

We believe our seasonal law enforcement effort to prevent antler theft was productive even though no cases were made. A lot of intelligence was gathered and interagency cooperation accomplished. Grand Teton Park rangers made contacts in two incidents where people had antlers -- once along the Gros Ventre River and once along the highway game fence south of the hatchery.

Evidence and information indicates refuge antlers are being stolen particularly by trespass through **closed** forest areas to the east. Informants' information, refuge patrol information, and Forest Service apprehension of individuals in forest **closed** winter range indicate extensive antler theft. Refuge personnel assisted the Forest Service and WGFD in apprehending four individuals with antler caches who were picking up and hiding antlers on the forest just off the refuge. They were in an area **closed** because it is elk winter range.

These individuals received \$25 trespass fines from the Forest through US Magistrate Court. Later, one of these individuals was reported as having made \$1,500 selling antlers on the Town Square the day of the antler auction and joking about his \$25 fine.

The refuge acted on several informant tips and followed up on the information. One individual was interviewed in Grand Teton Park near the north end of the refuge with no success. Two bundled caches of antlers (about 50 pounds) were confiscated on the north end of the refuge.

On May 1, when the refuge roads into the Forest opened after the winter closure, twenty or more vehicles went into the forest. Several returned within a few hours with over 100 pounds of antlers. One person driving out with a pile of brown antlers was one of the individuals from the trespass case mentioned above.

There were few reported auto accidents on the Refuge Road during 1989 and the couple of minor mishaps were due to DUI. These were handled with cooperation from the Jackson Sheriff's Department.

In January and February, our LE officers attended the 40-hour law enforcement refresher course in Marana, Arizona (which included firearms qualification). Our officers are scheduled to attend 40 hours refresher every year. Employees received firearms qualification again in October at Grand Teton National Park. Refuge officers (Jim Creasy and Jim Griffin) were members of the Teton County Peace Officers Association in 1989. This is a local non-profit, community service organization composed of the Wyoming State Highway Patrol, Teton County Sheriff's Department, Jackson Police Department, Wyoming Game and Fish Department, National Park Service, and US Forest Service.

18. Cooperating Associations

The cooperating association for the refuge, Grand Teton Natural History Association (GTNHA) through Grand Teton National Park, had its ninth season of operations during 1989. The refuge cooperates with the GTNHA and works closely with the Association's Executive

Director, Sharlene Milligan, and GTNHA's Board of Directors. In 1989 the refuge sales outlet offered 61 different products for purchase including books, postcards, slide sets, T-shirts, posters, and pins. Gross sales for 1989 were \$20,292.72 (\$5,823.23 profit).

In addition to the sales, this was the eighth season that the winter sleigh rides on the refuge have been under the management of the GTNHA. The rides are managed through a supplemental agreement with the FWS and GTNHA and a sub-contract agreement with the GTNHA and a concessionaire. Through the agreement, the GTNHA receives a franchise fee from the concession, which is seven percent of the season's gross ticket sales. Gross sales for the season's sleigh ride tickets were \$121,480 (\$8,291.50 profit for refuge)

From book sales profit, sleigh ride franchise fee, and other donations, the NER (through GTNHA) realized a net profit of \$14,214.73 in 1989. The GTNHA received \$2,241.37 in 1989 as a franchise and administrative fee for handling the NER sales outlet and sleigh ride contract. The refuge profit is used by GTNHA to enhance information, education, and interpretive efforts, and services for the refuge. In 1989, the refuge received \$21,866.48 in donations from the Association which included Savings Bonds and prizes for National Wildlife Week school poster contest winners; library books; gifts to schools, volunteers, and other agencies; film; salaries for Visitor Center employees; computer components; printing brochures; RO projects-leaflets and posters; binoculars; flashlights; spotting scope; and mobile radio.

19. Concessions

Brad and Joanne Luton continued to operate the sleigh/wagon ride concession during the winter months on the refuge. See Section H.5, Interpretive Tour Routes, and Table 23 for statistical information on this season's rides.

The 1988-89 season was the Lutons' thirteenth season as concessionaires. It was the eighth season that the operators conducted the rides under agreement with the GTNHA.

Facilities and services offered in 1989 were essentially the same as in 1988. The Lutons had six sleighs and five wagons. The cost of the rides was \$5 for adults and the cost for children (ages 6 through 12) was \$2.50. Children under six were free. Some schools and special groups received a discount or participated at no charge. The rides ran from 10 AM to 4 PM daily on a continuous basis. The 1988-89 season was December 17, 1988 to April 2, 1989.

Table 23. Sleigh ride visitation and concession seasonal summary, National Elk Refuge.

Season	Adults	Children (6-12)	Children (0-6) free	Schools or Groups Free/Discount/ Special (additional SRVC)	Visitor Total	Ticket Prices Adult/Child	Expenses	Income
1965-1966	1,895	558	est. 500		2,593	\$ 1.00/.50	\$5,159	\$2,921
1966-1967	3,125	734	1,607		5,466	1.00/.50	4,729	4,638
1967-1968	2,618	665	821		4,104	1.50/.75	5,437	4,426
1968-1969	3,905	807	1,111		5,823	1.50/.75	3,816	6,510
1969-1970	3,670	712	1,110		5,492	1.50/.75	5,586	6,039
1970-1971	3,285	602	748	193	4,828	1.50/.75	2,272	5,572
1971-1972	3,190	536	616	261	4,603	1.50/.75	2,915	5,449
1972-1973	6,277	1,248	1,585	164	9,274	1.50/.75	5,125	10,515
1973-1974	4,554	701	887	88	6,230	1.50/.75	5,355	7,444
1974-1975	5,794	813	726	34	7,367	1.50/.75	6,518	9,326
1975-1976	6,934	833	206	530	8,553	2.00/1.00	9,418	15,616
1976-1977	4,130	488	488	150	5,256	2.00/1.00	7,198	8,921
1977-1978	15,790	2,323	2,330	275	20,718	2.00/1.00	17,020	34,111
1978-1979	14,324	1,855	1,855	322	18,356	2.00/1.00	16,204	30,931
1979-1980	12,104	1,368	1,368	429	15,269	2.00/1.00	14,081	25,688
1980-1981	11,520	1,483	1,483	133	14,619	2.50/1.50	23,389	31,325
1981-1982	14,783	1,845	1,845	333	18,806	2.50/1.50	34,659	40,960
1982-1983	18,405	2,337	2,472	699	23,923	3.50/2.50	52,852	71,997
1983-1984	17,798	2,048	2,092	786	22,724	3.50/2.50	50,797	69,559
1984-1985	17,857	2,118	2,118	517	22,610	3.50/2.50	55,689	69,253
1985-1986	16,042	1,982	1,982	361(200)	20,567	5.00/2.50	52,995	83,872
1986-1987	20,500	2,579	2,579	583(350)	26,591	5.00/2.50	63,069	110,805
1987-1988	22,395	2,577	2,577	715(490)	28,754	5.00/2.50	74,942	121,016
1988-1989	22,642	2,644	2,644	501(770)	29,201	5.00/2.50	85,681	121,480

I. EQUIPMENT AND FACILITIES*

1. New Construction

Two new steel arched buildings were constructed to replace two of the old pellet sheds which were old hay sheds that had been enclosed in order to hold pellets. Westec, a firm out of Salt Lake City, Utah, was the low bidder (\$225,522). This bid was for the construction of two steel-arched buildings and tearing down of one of the old pellet sheds (shed 11). Refuge personnel tore down the other shed (shed 4). The cement slabs of the old pellet sheds were left intact and reused.



Cement slab after pellet shed 4 was demolished, burned, and buried by refuge personnel.
(35mm, 5/8/89, JAC)

Nelson Engineering, a local firm, dug some test holes on April 21 to do the soil profile for design work for the foundation. Actual construction at shed 4 and demolition of shed 11 did not get started until June 13. After much haggling, hassling late submittals, and various other problems with a contractor, who had never done any new construction, we finally accepted the completed sheds on September 8. They were supposed to have been completed on August 23 (shed 4) and August 28 (shed 11).

Shed 4 is a 12,240 square foot steel-arched building that cost \$159,900 to complete and shed 11 is 5,100 square feet and cost \$63,400 to complete. Shed 4 was supposed to be capable of holding 2,500 tons of pellets and shed 11 capable of holding 1,000 tons. We were able to get 2,588 tons of pellets in shed 4 and 841 tons in shed 11. We could have gotten more in shed 11 but the delivery drivers were not piling the pellets high enough when they started filling the shed.

* Creasy

One problem we have encountered is that frost forms on the inside of the metal roofs during very cold weather. When the roof warms up, the frost melts and the moisture drips onto the pellets damaging them. The engineers in the Regional Office are considering various ways to correct this problem. We ended up with a good product considering the many problems we encountered with the contractor, who was inexperienced in new construction.



New pellet shed 4 after completion with refuge storage area in foreground.
(35mm, 9/8/89, JAC)



Shed 11 before it was demolished.

(35mm, 6/13/89, JAC)



John Wilbrecht (Refuge Manager), Dave Clack (CGS), Wade Payne (Westec Foreman), and Ernie Husmann (EN) inspect shed 11 and compile a punch list. (35mm, 9/8/89, JAC)



Unloading pellets in new shed 11.

(35mm, 10/3/89, JAC)



Al Ridgway looks over pellet piling in shed 11.

(35mm, 9/26/89, JAC)

2. Rehabilitation

Our biological lab has not been used for several years. The Jackson Fisheries Research Lab needed a place to do some testing and requested use of the lab. They said they would purchase the materials needed to put it into working order. Our Maintenance Worker Bob Rowley and Bob Knowlton (a lab employee) did most of the work. The electrical system was upgraded with installation of a new heater, 14 additional outlets and three groundfault breakers. A new pump was installed in the well by a local well driller.

The Sleigh Ride Visitor Center received some major rehab work. A new door was installed in the rear of the building for use as a fire exit. New steps were built and the sagging floor was shored up.

3. Major Maintenance

Repair work on cables, braces, and pellet shed walls was performed on sheds 3 and 6. These two sheds were used for pellet storage again this year along with the two new sheds. The fences and gates around the pellet sheds were repaired as needed.

Lateral irrigation ditches were cleaned of brush and grass. The creek channel and irrigation head ditches were cleaned of blown down trees and brush. Irrigation headgates were repaired/replaced as needed.

The exterior of all the log buildings except the Miller House, was treated with corvis and linseed oil. Table 24, Major Construction or Rehabilitation also describes all work done on refuge residences.

Table 24. Major Construction and/or Rehabilitation, Jan-Dec 1989 *

Projects	Material	Labor	Funding
Replaced feed storage shed 4 with new 12,240 sq.ft. steel arch bldg. with concrete floor. CGS contract - WESTEC, SLC, UT	\$159,900		1262
Replaced feed storage shed 11 with new 5,100 sq.ft. steel arch bldg. with concrete floor CGS contract - WESTEC, SLC, UT	\$63,400		1262
<u>Qtrs 1 - Office</u> Replaced front entry door; repaired walls and painted 3 rooms, hallway, and basement stairway; replaced 4 light fixtures; varnished walls in entry and two rooms; installed additional breaker box and circuitry for four computers; installed wooden cover over outside basement stairway; treated log exterior with Corvis and linseed oil. <u>Qtrs 1 Total: \$4,109</u>	\$1,214 305	\$1,509 1,081	8610 1262
<u>Qtrs 3</u> Installed radon exhausting system; replaced bathroom sink, faucet, and countertop; replaced broken blinds; installed ceiling fan in livingroom; treated log exterior of house and garage with Corvis and linseed oil. <u>Qtrs 2 Total: \$2,658</u>	\$1,272 250	\$ 640 496	8610 1262
<u>Qtrs 9</u> Replaced wornout sump pump, installed new phone jacks; replaced broken blinds; purchased carpet and padding for livingroom, hallway, and two bedrooms; treated log exterior with Corvis and linseed oil. <u>Qtrs 3 Total: \$3,290</u>	\$2,256 125	\$ 721 188	8610 1262
<u>Qtrs 11</u> Replaced toilet fixture and repaired broken water pipes; treated log exterior w/Corvis & linseed oil. <u>Qtrs 11 Total: \$ 813</u>	\$ 140 125	\$ 360 188	8610 1262
<u>Qtrs 12</u> Repaired sink and installed shelf in kitchen and bath; installed metal exterior basement door; installed ceiling fan in livingroom; installed new exterior entry door and stormdoor; treated log exterior w/Corvis & linseed oil. <u>Qtrs 12 Total: \$2,014</u>	\$1,101 125	\$ 600 188	8610 1262
<u>Shop oil house</u> and blacksmith shop log exteriors were treated with Corvis and linseed oil. <u>Total: \$ 626</u>	\$ 250	\$ 376	1262
<u>Sleighride Visitor Center</u> Installed new door (for use as fire exit); built new steps; shored up sagging floor; built oak 3' X 6' book display rack; built 18"X 6" X 12" plexiglass feed donation box. <u>Total: \$2,221</u>	\$ 900	\$1,321	1262
<u>Shop</u> Remove and replace electrical ceiling heater <u>Total: \$ 701</u>	\$581	\$120	1261
<u>Biological Lab</u> Installed new heater, water pump, and upgraded electrical system, installing 14 additional outlets and three ground fault breakers. Materials were furnished by the Jackson Fisheries Research Lab. <u>Total: \$1,201</u>		\$1,201	1262

4. Equipment Utilization and Replacement

Because of effects of the drought, lack of natural forage, and early snow cover, we had to start our supplemental feeding program (1988-89 season) on December 7, 1988, which is earlier than usual. We fed until April 7, 1989, for a total of 122 days.

During March our pellet supply was getting low and we had some old hay stored in the Chambers shed. We fed about 100 tons of hay over a period of ten days to help stretch our pellet supply. The hay fed amounted to about 2.6 pounds/elk and 5.2 pounds/bison per day. On the feedground where we fed the hay, we fed an average of 6,050 elk per day along with 112 bison per day for the 10 days. We were also feeding pellets at a rate of 5.8 pounds/elk at the same time.

With the longer feeding season and harsher winter weather, we had more problems than last year with the equipment. We had the most problems with the 20-ton Kenworth since it is getting older and harder to find parts for. This year, the front transmission had to be repaired. While it was down, we also had the clutch replaced. The air compressor quit working but Roger salvaged one off another truck and we were able to use it. The heater fan motor and the tie rod ends had to be replaced. A tire and rim were ruined but we had an extra. The discharge chutes and mud flaps needed repair after it got "buried" in mud up to the bed while feeding at Poverty Flats. While the Kenworth was broken down, we used the Caterpillar Model 830 MD, 4x4, wheeled tractor to pull the feed trailer that Roger and Al built. The CAT 830 worked well with the new radial tires and tire chains.

Except for maintenance on the TD-20s, we had few problems. The drive clutch and steering clutches had to be adjusted and a spring replaced. Two broken pads were replaced and a burned-out oil pan heater replaced. A hole in the muffler was patched. The winch handles as well as the rear view mirrors vibrated loose and had to be repaired. Electric control switches on the feed trailers were replaced.

The cold weather took its toll on the hydraulic systems on the forklifts. Two of the cylinders cracked and had to be welded. Hydraulic hoses split and clamps blew off due to excess pressure caused by cold.

We had more problems with the Allis Chalmers front-end loader that we picked up from the military last year. The fuel system was drained and the fuel filter, fuel line fittings, primer pump, starting fluid injector, flashing warning lights, electric fuel pump, two new batteries and a fuel injector pump were replaced. This seemed to alleviate the fuel system problem.

We received a D-8 CAT from Medicine Lake NWR in exchange for our D-6 CAT. A private transportation company moved the CATs for us as neither refuge had the capability to move them.



The D-8 we got from Medicine Lake NWR in exchange for our D-6. (35mm, 6/13/89, JAC)

A new Myers snowplow was purchased and installed on the 1984 1-ton Dodge that is used as a fire truck in the summer.

We received two new pickups which were ordered in FY 1988. The 1989 Dodge, 3/4 ton, 4x4, with automatic transmission cost \$11,693 and the 1989 Chevrolet, 3/4 ton, 4x4, with manual transmission cost \$10,074.

We also purchased a Honda 300 ATV 4x4. It should improve irrigating efficiency and cut down on pickup fuel consumption.

Maintaining our vehicle and heavy equipment fleet requires many hours of routine servicing, maintenance, and repairs. We are very fortunate to have staff personnel to repair equipment as well as the facilities and structures. Equipment repairs are described in **Table 25**, Major Equipment Acquisition and Rehabilitation, January-December 1989.

6. Computer Systems

The computer capability at the refuge improved greatly this year. Computers and software acquired is listed in **Table 25**.

7. Energy Conservation

Because of the cold climate, most of our efforts to save energy are directed at preventing heat loss from the buildings and residences.

All furnaces were checked out in October at the beginning of the heating season, filters changed, and furnaces repaired if needed.

The condition of weather stripping around doors in our office, shop, and residences was checked and if deteriorated, the weather stripping was replaced.

An inventory and energy conservation study of the heating systems in residences and our office was done by Bob Rowley. After consulting Region 6 Engineers and Refugees and Wildlife, and occupants of the quarters, we decided to replace our ancient fuel oil furnaces with baseboard electric heat. This study was brought on by the RW memo instructing us to get rid of all underground tanks on the refuge including the fuel oil tanks at the office and at quarters. Furnaces in the office and quarters are all old and inefficient. They need to be replaced anyway. - Conversion to electric baseboard heat will be completed in the summer of 1990.

See Tables 26, 27, 28, and 29 for regular and unleaded gasoline, diesel, heating fuel oil, and electricity use for the year.

Table 25. Major Equipment Acquisition and Rehabilitation, Jan-Dec 1989 *

Item	Source	Cost		Funding
		Material	Labor	
KENWORTH 20-ton truck Replaced transmission and clutch, tie rod, air compressor; spare tire was studded and mounted on Kenworth TOTAL: \$3,469	Fred's Diesel (\$2,234)	\$2,501	\$968	1261
ATV-Thiokol (Spryte) Flushed out steering hydraulic system, installed converta-comm, repaired exhaust system; tightened all bolts on the tracks TOTAL: \$975		\$100	\$875	1261
Loader, front-end, 4WD, Allis Chalmers Drained fuel system, replaced fuel filter, fuel line fittings and primer pump, installed starting fluid injector, installed flashing warning lights and electric fuel pump; rebuilt battery holder and installed two new batteries; installed fuel injector pump TOTAL: \$1,951		\$951	\$1,000	1261
D-4 CAT Replaced rollers TOTAL: \$569		\$249	\$320	1261
D-8 CAT Exchanged our D-6 CAT with Medicine Lake NWR (transportation costs only) TOTAL: \$3,147	Christensen Construction	\$368 \$2,234	\$545	1262 1261 flexible
CAT-12 grader Balderson snowplow repaired/welded cracked frame. Cutting edges and wear shoes were replaced & mounted on CAT 12 grader together with tire chains. Replaced fan & generator belts and control valve TOTAL: \$1,222		\$607	\$615	1261
1971 Int'l dump truck Installed six new tires & tubes TOTAL: \$915	Goodyear Tire & Rubber	\$855	\$60	1261
1978 Dodge Replaced clutch, repair door latch, replace battery, rebuild starter, and replace window and track. TOTAL: \$1,091		\$456	\$635	1262
Meyers Snowplow Installed on 1984 Dodge 1-ton pickup original acquisition \$1,641	FSS - Layton Equipment	\$1,641		1261 flexible
1989 CHEVROLET 3/4-ton 4X4 pickup. Installed new radio, headache rack, tool box and light bar original acquisition \$10,074	GSA (FY88) - General Motors	\$11,156	\$900	1261
1989 DODGE 3/4-T 4X4 pickup Installed radio, hitch, headache rack and spotlight. original acquisition \$11,693	GSA - Chrysler Motors	\$11,922	\$225	1261

* Parrish

Table 25. Major Equipment Acquisition and Rehabilitation, Jan-Dec 1989 (continued) *

Item	Source	Cost		Funding
		Material	Labor	
Alfalfa pellets - 500 ton	CGS contract-Montana Alfalfa	\$69,195		1261
ATV-Honda, 4-wheeled, 4X4	FFS-Honda of Russelleville	\$4,165		1261
Portable fire pumper unit 200 gallon	FSS-Wajax Pacific Equipment	\$6,248		1261 flexible
Hydraulic floor jack and two pairs heavy-duty (6.6-ton capacity) support stands for shop	FFS-SEFAC Lift&Equipment Corp	\$818		1261
Track jacks (Thiokol)	Peterson Equipment	\$734		1261
Road marker posts, sign support posts and drivers	FFS-Carsonite International	\$1,210		1262
Four 3'X 3' interpretive display panels (fiberglass embedded)	Wilderness Graphics	\$2,317		1262
Printing of NER brochures	GPO, Denver, CO	\$2,349		1261
Two Ektagraphic projectors and Ektanar Zoom lens	FFS-Eastman Kodak Company	\$929		1262
LE ammo and 12-gauge cracker shells	Olin/Winchester & Pyrodyne	\$690		1261
Portable outhouse for hunt parking lot	Porta-John Corporation	\$660		1261
Two Win computers, two color monitors, one NEC 5300 24-dot matrix printer, Wordperfect, Lotus 1-2-3, dBase III, and Q-Dos software	FFS - GTSI (software & printer) CGS - Win Corp (computers)	\$9,600		RO/RW
Novell 8-user network software and two powered keyboards	GTNHA	\$4,545		donation
SyStat software for IBM PC/AT	FSS - GTSI	\$589		1261
Power system (UPI) Emerson PC-ET360	FFS - Collins Corporation	\$988		1261
Repairs/support/supplies for computers and printers	Unilink	\$849		1261
Repair to IBM Selectric typewriters	IBM Corporation	\$665		1261
Repairs/service to Xerox photocopier	Xerox Corporation	\$750		1261

* Parrish

Table 26. Regular and unleaded gasoline - gallons used.

	<u>Base (FY-80)</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Jan, Feb, Mar	628	1,125	1,259	1,154	1,254
Apr, May, Jun	1,563	1,369	1,832	1,645	1,542
Jul, Aug, Sep	1,738	1,852	1,172	1,309	899
Oct, Nov, Dec	1,152	1,231	1,195	1,460	1,548
Total Used:	<u>5,081</u>	<u>5,577</u>	<u>5,458</u>	<u>5,568</u>	<u>5,243</u>

Table 27. Diesel - gallons used.

	<u>Base (FY-80)</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Jan, Feb, Mar	1,178	2,113	2,332	1,452	2,954
Apr, May, Jun	375	232	723	1,139	831
Jul, Aug, Sep	0	133	803	761	157
Oct, Nov, Dec	357	443	418	1,276	152
Total used:	<u>1,910</u>	<u>2,921</u>	<u>4,276</u>	<u>4,628</u>	<u>4,094</u>

Table 28. Fuel oil - gallons used to heat office (Qtrs 1)^a

	<u>Base^b</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Jan, Feb, Mar	543	273	321	74	297
Apr, May, Jun	86	36	30	24	64
Jul, Aug, Sep	19	71	51	39	37
Oct, Nov, Dec	163	305	325	343	353
Total Used:	<u>811</u>	<u>685</u>	<u>727</u>	<u>480</u>	<u>751</u>

^a No buildings heated with fuel oil except office since oil furnace in our bunkhouse (Qtrs 11) was replaced with baseboard (electric) heaters in December 1983.

^b Base period used is the first full year after conversion of shop from oil to electric heating.

Table 29, Electricity - kWhs used. *

	<u>Quarter II</u> Jan, Feb, Mar	<u>Quarter III</u> Apr, May, Jun	<u>Quarter IV</u> Jul, Aug, Sep	<u>Quarter I</u> Oct, Nov, Dec	<u>TOTAL</u> kWhs USED
<u>OFFICE</u>					
BASE ^a	1,260	1,212	1,324	1,267	5,063
1987	3,819	2,682	2,531	3,106	12,138
1988	4,148	3,548	2,424	3,881	14,001
1989	4,194	3,924	1,073	1,302	10,493
<u>SHOP</u>					
BASE ^a	20,440	34,880	14,760	2,640	72,720
1987	48,240	6,720	2,760	34,320	92,040
1988	47,960	8,920	3,280	38,160	98,320
1989	47,760	11,680	2,160	18,240	79,840
<u>OTHER</u>					
BASE ^a	1,800	3,800	9,444	921	15,965
1987	14,655	1,085	646	8,631	25,017
1988	15,199	1,961	912	8,031	26,103
1989	20,426	4,961	2,542	7,660	35,589
<u>REFUGE TOTAL</u>					
BASE ^a	23,500	39,892	25,528	4,828	93,748
1987	66,714	10,487	5,937	46,057	129,195
1988	67,307	14,429	6,616	50,072	138,424
1989	72,380	20,565	5,775	27,202	125,922

^a BASE period used is the first full year after conversion of shop from oil heating (FY80, Qtrs II, III, IV, and FY81, Qtr I).

J. OTHER ITEMS

1. Cooperative Programs

The annual antler pickup by the Jackson District of the Boy Scouts was accomplished on April 22. Antler pickup was also conducted on eight other days in April by scouts working afternoons and weekends with our LE seasonal employee as a preventive measure to antler theft. The pickup was authorized by a Special Use Permit issued to the Scouts for the period, April 6 through May 31. Per terms of the Special Use Permit, the Scouts also conducted a clean-up campaign along roads and on refuge lands.

The total of all antlers collected on the refuge for the year was 9,119 pounds, including heads, matched pairs, white antlers, and donations to the Town and others. The total weight of bundled antlers was 2,402 pounds, and 4,020 pounds of loose antlers were left in one big lot. There were 80 heads and matched sets (1,417 pounds), as well as 1,090 pounds of white antlers. White antlers were donated to the Town of Jackson for the Town Square antler arch repairs. Total pounds of antlers set aside for donation during the year by the refuge for scientific/educational purposes was 190 pounds. Refuge personnel and sleigh ride personnel had picked up over one-half of the antlers along with the Scout pick-ups as a security measure. All antlers picked up were stored at refuge headquarters prior to bundling by the Scouts.



Jim Griffin organizes the boy scouts by troops/packs and gives an orientation/safety talk before the antler pick up. (35mm, 4/22/89, JAC)

During several days in May antlers were separated into 149 bundles and one large loose lot for the auction. The scouts accomplished considerable marketing of the antlers before the auction.

During the entire antler project, 272 boys and 106 adults participated. A total of 1,991 person-hours were spent during the antler and trash pickup, antler bundling and weighing, and sale.



Boy Scouts with adult leaders pile antlers on thiokols used to reach hard-to-get-to areas of the refuge during the antler pickup. (35mm, 4/22/89, JAC)

The annual antler auction was held on May 20, 1989, at 10 AM in the street just east of the Jackson Town Square. All bidders were required to register with the Scouts prior to bidding. Each was assigned a card with an identifying number. All antlers and matched sets were sold at the auction this year at an average price of \$14.07 per pound for all brown antlers. The average price paid per pound for heads and matched sets was \$14.09 per pound. An extra effort is made to match the biggest antlers and the marketing benefit shows in the price per pound compared to bundled antlers (\$13.53). The big lot went for an astonishing \$14.70 per pound which helped raise the average price for all brown antlers. A total \$110,757.50 was collected by the Scouts this year for antlers sold.

The provisions of the Special Use Permit were changed in 1989 and the fee formula now reads: "From gross antler auction receipts, it is agreed that after the five percent FWS fee for the SUP, the BSA will retain 20 percent of the balance, and the remainder will be donated to the refuge/WGFD feed fund managed by the BSA. Quite a lot of negotiating with the scouts led to this new fee formula

which everyone thought was more equitable. A check for \$5,537.88 was paid to the FWS in 1989. The scouts received \$21,043.92 and the remaining \$84,175.70 was added to the Boy Scout's "elk supplemental feed fund." See Table 30 for 1968-1989 antler proceeds.

The antler auction received a lot of media attention this year. A report appeared on National ABC Nightly News-The Peter Jennings Report. Barry Sarifin interviewed us in Jackson. Also, interviews were conducted with the UPI, Albuquerque Tribune, Washington Post, and National Geographic Magazine.

Table 30. Antler project statistics and proceeds - National Elk Refuge

Date	Total \$	Scout \$	FWS \$	Feed \$	Total Antlers (lbs.)
1968	\$ 3,000	\$ 3,000	\$	\$	
1969	4,000	4,000			
1970	3,000	3,000			
1971	3,400	3,400			
1972	4,600	4,600			
1973	19,600	19,600			
1974	5,800	5,800			3,512
1975	13,000	11,700	1,300	5,064	
1976	18,000	15,400	2,600	4,109	
1977	7,400	7,400			1,560
1978	47,600	37,600	10,000	7,900	
1979	51,500	9,000	11,000	31,500	8,793
1980	50,000	9,500	2,000	34,500	8,422
1981	10,400	7,600	145	2,600	2,390
1982	50,430	9,539	2,146	38,744	7,669
1983	34,715	8,793	1,361	24,561	4,649+67 heads
1984	44,083	9,237	1,829	33,017	6,930+30 heads
1985	51,378	9,584	2,194	39,600	7,210+23 heads
1986	30,832	8,608	1,167	24,057	5,050+ (800 white)
1987	37,257	8,913	1,487	26,856	5,568+ (500 white)
1988	46,619	9,358	1,955	35,304	5,225+ (672 white)
1989	110,757	21,044	5,538	84,175	8,029 (1,090 white)

2. Other Economic Uses

The refuge receives a monthly lease payment of \$40 from local radio station KSGT for their radio tower which is located near the west boundary of the refuge. This year we got the attention of Mr. Ned Crecelius who is owner of the KSGT AM radio transmitter tower located on the refuge. We have experienced problems with late payment of the \$40 per month lease payments since Mr. Crecelius bought the station in 1987. He was sent an eviction notice by Region 6 Realty, for lack of payment of his lease. He immediately called the refuge and sent a check for back payment, and blamed his accountant for the problem. The lease expires in 1992.

4. Credits

See individual sections for author credits. James Creasy edited the report, assisted by the authors. Janice Edwards and Betty Parrish typed and compiled the report.

MANAGING A WILD ANIMAL

Q. What is the purpose of the National Elk Refuge?

A. The Refuge provides a winter home for thousands of elk which spend the summer in the surrounding mountains.

Q. Why was the Refuge created?

A. For two reasons. First, conflicts arose when ranchers entered Jackson Hole and the elk competed with cattle for forage. This conflict was alleviated when Congress created the National Elk Refuge on August 10, 1912. Second, there was concern for the welfare of the elk because their habitat was being converted to homesites, townsites, and roads. The 1,760 acres of purchased private land and 1,000 acres of reserved public land initially set aside as elk winter range between 1912 and 1916 were expanded by other acts, land acquisition, and donations. The Izaak Walton League launched a nationwide fund raising campaign and purchased an additional 1,760 acres which were turned over to the Government in 1927. The Refuge has since been enlarged to over 24,000 acres.

Q. Who manages the National Elk Refuge?

A. The U.S. Fish and Wildlife Service, which is part of the Department of Interior.

Q. What are the major management practices?

A. The Refuge uses irrigation, seeding, prescribed burning, and other practices to grow as much natural forage as possible. This enhances elk winter habitat and reduces the need for supplemental feeding. To help the elk survive the critical winter months, they are fed alfalfa pellets or cubes for about 2 months during an average winter.

Q. How are elk numbers controlled?

A. The problem is an excess of elk and a limited winter range. Feeding 8,300 animals (10 year average) is expensive, so a goal is to reduce the wintering herd to 7,500 animals. Controlled hunting is allowed on the Refuge and on surrounding land to reduce the herd. The herd reduction will decrease the quantity of supplemental feed required and protect the winter range from overuse.



FROM SEASON TO SEASON

Q. How are elk recognized?

A. Bulls are 4½ to 5 feet tall at the shoulder and weigh approximately 550 to 800 pounds. Cows weigh from 450 to 600 pounds. Elk are the second largest antlered animal, exceeded only by moose in size. Elk are light brown with darker heads and legs and lighter rump patches. In winter, the coats turn to grey. Adult bulls have large branched antlers.

Q. Where are the elk in the summer?

A. Elk leave the lower elevations on the Refuge in April and May and follow the receding snowline back into the higher country where they spend the summer. The elk travel distances varying from a few miles to 65 miles (straight line) from the Refuge to Grand Teton National Park, southern Yellowstone National Park, and National Forest lands to the north and northeast. The higher slopes and meadows are cooler and there are fewer bothersome insects. There also is a widely abundant food supply and a large undisturbed territory over which elk can roam and graze. A few elk remain on the Refuge during summer months and usually seek shelter in the wooded areas.

Q. When do elk return to the Refuge?

A. From October through December, elk follow traditional migration routes from their higher summer ranges to the lower winter ranges. Deepening snows force the elk to seek food and shelter at lower elevations and early blizzards can hasten the migration.

Q. When is the breeding season?

A. The breeding season (or rutting season) occurs in September and early October while the elk are in the high country. At this time, the "bugling" sound of the mature bulls fills the mountains as they gather harems of cows and challenge rival bulls. During the rut, bulls vigorously defend their harems which may include up to 15 cows. The gestation period, from conception to birth, is 8½ months.

Q. What time of year do they calve?

A. Between May 25 and June 15, cows seek secluded thickets on higher terrain to bear their young. The calves are reddish colored and spotted at birth and weigh 30 to 45 pounds. Cows typically have one calf. Twin births are very uncommon.

Q. Do they calve on the Refuge?

A. Very few calves are born on the Refuge since the majority of the herd migrate off the Refuge during May and calving occurs during late May and early June.

LIFE AND DEATH

Q. What percentages of the herd are bulls, cows, and calves?

A. The Refuge elk herd consists of approximately 40 percent bulls, 20 percent calves, and 60 percent cows.

Q. What animals prey on elk?

A. Grizzly bears, black bears, cougars, and bobcats prey on elk on their summer range. On the Refuge, coyotes, eagles, magpies, and ravens clean up the carcasses of dead animals. By weeding out the weak and unfit, predators help maintain the herds in a healthy vigorous condition.

Q. What is the average age and how is it determined?

A. The majority of adult cows and bulls on the Refuge are between 3 and 10 years old. The oldest animals in the herd are 15 to 20 years old, but these represent a very small part of the herd. The age of an elk can be determined by examining tooth replacement and wear.

THE ANTLER STORY

Q. Can you tell the age of an elk by the antlers?

A. Contrary to popular belief, there is no exact relationship between age and number of antler points, but the

number of points can be used, in a general way, to determine the age of an animal. Young bulls between 1 and 2 years old have short, unbranched antlers called spikes. Young bulls can also have short forked antlers. The next year, the antlers usually have four points on each side. Older bulls display five, six, or sometimes seven points on each side. Bulls with six points per side are called royal bulls and those with seven points are called imperial bulls.

Q. What time of year do elk lose their antlers?

A. The largest bulls usually shed their antlers during March and April. The smaller bulls lose their antlers during April or early May.

Q. How long does it take to grow antlers?

A. New antlers begin to grow as soon as the old antlers are lost. New antlers grow during the summer and they reach maturity by mid-August. By this time, the "velvet" or outer blood-rich skin has dried and is rubbed off on small trees and shrubs. A bull's antlers are hard and shiny by the fall rutting season.

Q. What happens to the antlers after they are shed?

A. Antlers are chewed upon by mice, and squirrels for their rich mineral content. Antlers shed on the Refuge may not be collected or removed by the public. They are gathered by local Boy Scout troops operating under a Special Use Permit issued by the Refuge. The antlers are then sold at public auction in the town square in Jackson. This annual event attracts people from all over the world. Bidding is lively as people purchase antlers for decorations, belt buckles, bolos, buttons, and love potions. Some funds collected by this project help the Scouts and some are recycled to the elk through the purchase of supplemental elk feed.

THE SEARCH FOR FOOD

Q. What do elk eat?

A. Most members of the deer family such as mule deer are primarily browsers feeding on the twigs and leaves of shrubs and trees. In contrast, elk are both browsers and grazers, feeding extensively on grasses and weeds as well as shrubs.

Q. Why are elk fed and what does the Refuge feed them?

A. Supplemental feeding is necessary when natural forage is scarce and during severe winters when forage is covered by deep, crusted snow or ice. The herd is fed alfalfa pellets or cubes which are made from pressed alfalfa hay. The 2 to 3 inch pellets or cubes are simply hay in another form. Both are easier to handle than baled hay and can be distributed over a larger area to disperse the elk better. Both have higher nutritional quality and are less wasteful than baled hay.



Q. How long does the Refuge feed them?

A. Elk stay on the Refuge for approximately 6 months each winter. They receive supplemental food for approximately 2 months during the most severe winter weather. During most years, elk free-range on natural forage for 4 to 4½ months. Feeding has been necessary during all but 8 years since 1912. During those eight winters, fewer elk were on the Refuge and milder weather and reduced snow cover allowed those elk to feed entirely on natural vegetation.

Q. How much are the elk fed?

A. Elk are usually fed about 7 pounds of alfalfa pellets or cubes per animal per day or about 30 tons per day for the entire herd.

Q. Where do the funds come from for feeding?

A. The National Elk Refuge does all of the feeding, furnishes the equipment, and pays for nearly one-half of the pellets. The Wyoming Game and Fish Department pays for about one-half of the feed with money derived from the sale of hunting licenses. The balance is paid for by Boy Scouts with money derived from antler sales. In the winter of 1977-78, the cost of supplemental feed for one elk for a day was 26¼ cents or \$19.00 per animal for the winter. Thus, it cost approximately \$160,000 during that winter to feed an average of 8,300 elk.

AN ELK LEGACY

Q. What did the elk do before white man arrived?

A. Some archaeologists believe that elk have wintered in Jackson Hole for 500 years. When white men settled in Jackson Hole at the turn of the century, there may have been as many as 25,000 elk in the valley. It is speculation whether or not Jackson elk migrated as far between summer and winter ranges as they do today and to what extent man's influence has altered their original behavior. Thousands of elk may have starved to death during severe winters.

Q. Are elk an endangered species?

A. No. About 300,000 elk are spread across 10 western States and four Canadian Provinces with small populations in several other States.

Q. Is their future secure?

A. Throughout the West, most elk summer range is on public land and is secure, but most winter range is in the privately owned valleys which are open to development. The Jackson elk herd is threatened by land developments on the migration route between summer and winter ranges. The U.S. Fish and Wildlife Service continues to purchase land within the boundaries of the Refuge to safeguard the migration route and preserve the last remaining elk winter range.

Q. Are elk found only in the West?

A. Elk herds once ranged through large parts of North America including several eastern States. As civilization slowly pushed westward, elk distribution was rapidly reduced to the western mountainous regions. By the turn of the century, elk had disappeared from over 90 percent of their range.

Q. Will elk ever return to their original ranges?

A. Probably not. Elk require large, undisturbed areas which no longer exist in their former ranges. Elk have been reintroduced in most suitable habitats in the West, but attempts to reintroduce elk in the East have been only partially successful.

ENJOYING ELK

Q. How can I see elk?

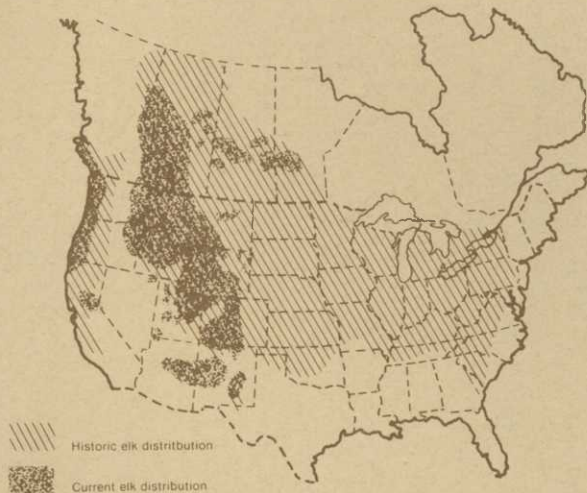
A. In winter, a concessionaire takes visitors through the herd on horsedrawn sleighs. Hundreds or thousands of elk may be seen at close range. During summer, small herds of elk may be seen in Grand Teton and Yellowstone National Parks and in Bridger-Teton National Forest. Dusk and dawn are the best times to see elk during the warm months.

ELK

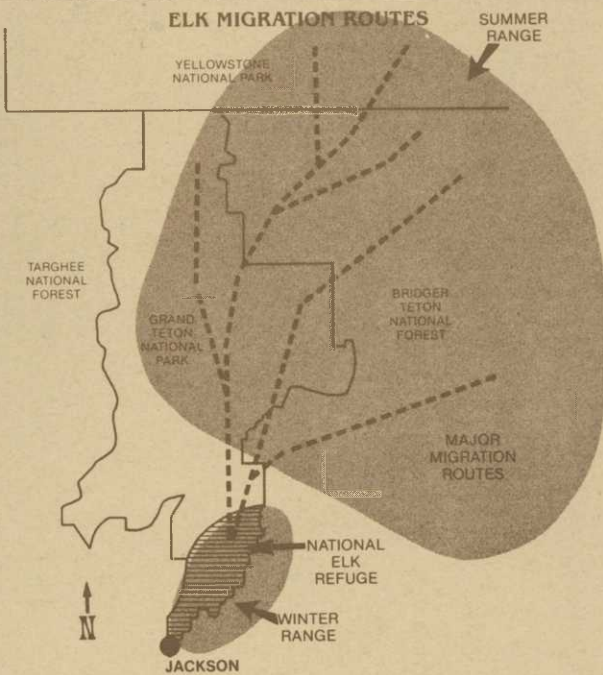
OF THE NATIONAL ELK REFUGE



ELK DISTRIBUTION



ELK MIGRATION ROUTES



U.S. FISH AND WILDLIFE SERVICE
Department of the Interior

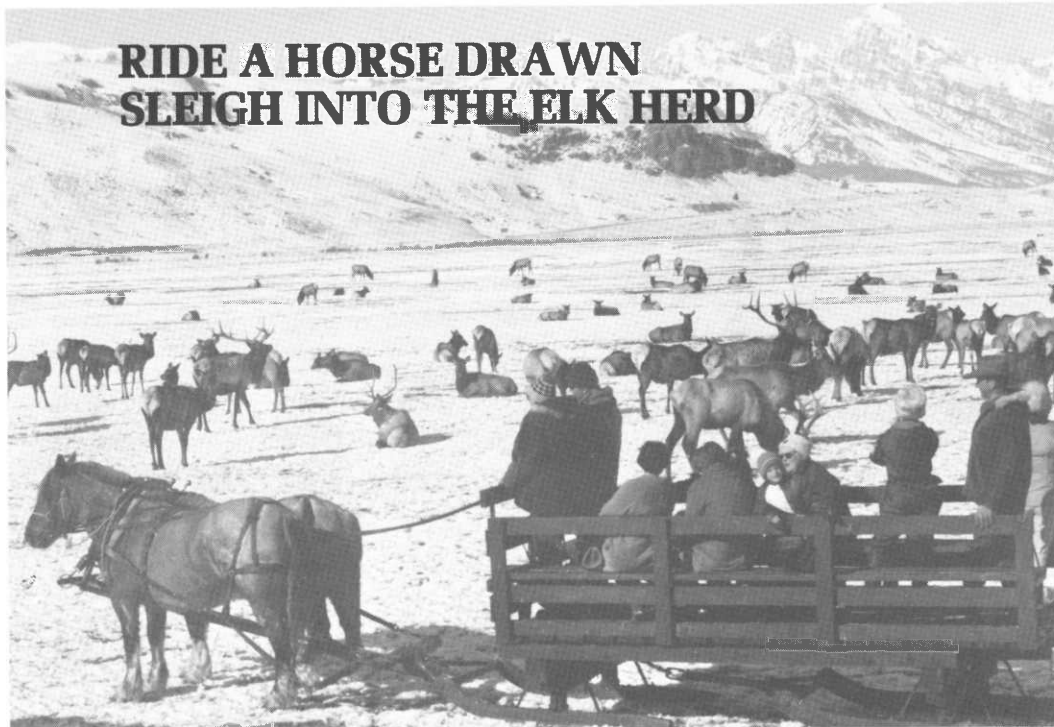


RF6-61550-6



Reprinted Aug. 1983

RIDE A HORSE DRAWN SLEIGH INTO THE ELK HERD



Follow the signs from Refuge Entrance at Broadway Street to Sleigh Rides.

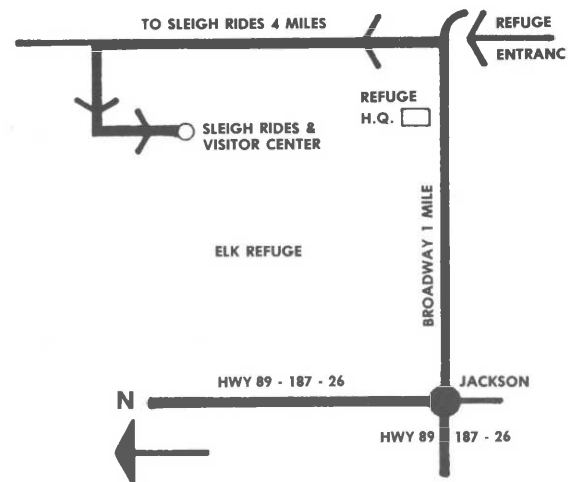


Photo Courtesy U.S. Fish and Wildlife Service

LARGEST ELK HERD IN NORTH AMERICA

JACKSON HOLE, WYOMING

*RIDE A HORSE DRAWN
SLEIGH IN THE ELK HERD
AND PHOTOGRAPH THESE
BIG GAME ANIMALS*

**AN AVERAGE OF 7,500 ELK
WINTER ON THE
NATIONAL ELK REFUGE**

*Sleighs run continuously 7
days a week - Late December
thru Late March*

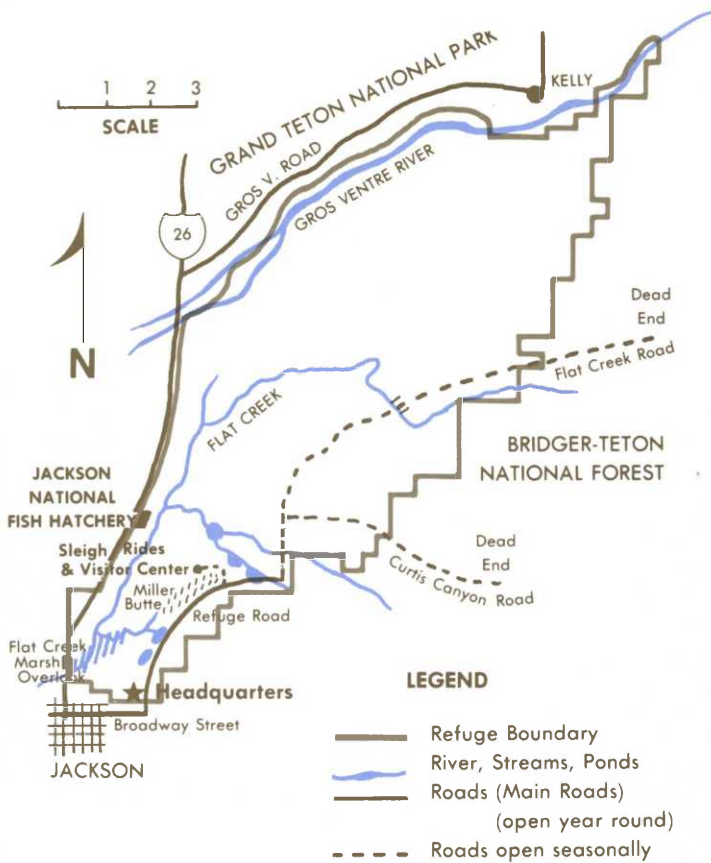
Hours 10:00 AM — 4:00 PM

RATES

ADULTS \$6.00 CHILDREN (6-12) \$3.00

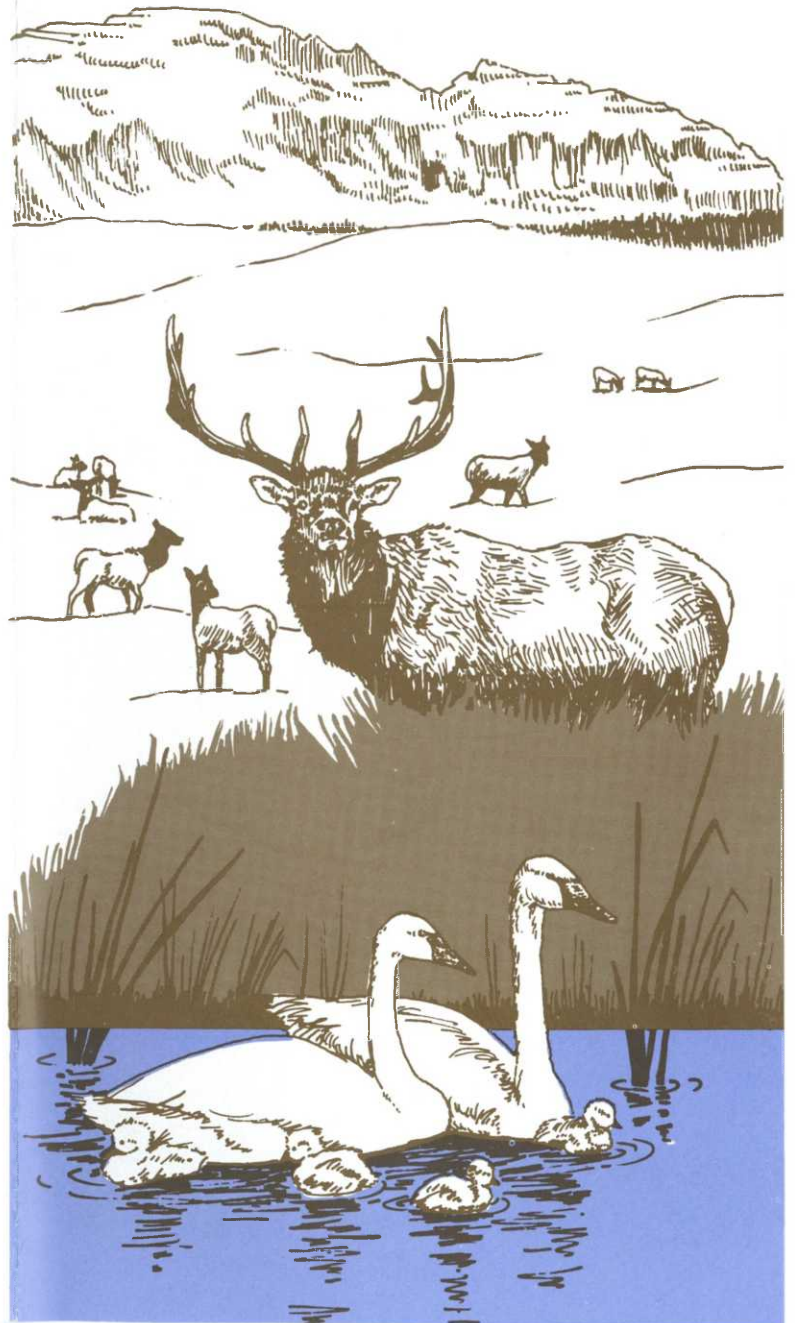
See map on reverse side

NATIONAL ELK REFUGE JACKSON, WYOMING



LEGEND

- Refuge Boundary
- River, Streams, Ponds
- Roads (Main Roads)
(open year round)
- - - Roads open seasonally



U.S. Department of the Interior
FISH AND WILDLIFE SERVICE



RF6-61550-1



REPRINTED JUNE 1989

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Created in 1912 as a result of public interest in the survival of the elk herd, the National Elk Refuge continues to preserve the last of the elk winter range in the valley. The nearly 25,000 acre National Elk Refuge is administered by the U.S. Fish and Wildlife Service and is one of over 400 Refuges in the National Wildlife Refuge System.

MANAGING THE ELK HERD

Late in October and early in November, when snow comes to the high passes, elk begin their traditional migration from high summer range in the Tetons and South Yellowstone to lower winter range in the valley. Heavy snows force the animals to lower elevations in search of food. Many of the elk make their way to the National Elk Refuge. The Refuge is managed to provide a winter home for an average of 7,500 elk, over half of the Jackson Hole population.

The Refuge protects approximately one-quarter of the original elk winter range in the valley. The grasslands of the Refuge are managed by extensive irrigation and by prescribed burning. Large stockpiles of pelleted alfalfa hay are fed to the elk when deep or crusted snow prevents them from grazing. An eight foot high fence along the main highway and north of town was erected to prevent elk from moving through Jackson and onto private lands.

Elk stay on the Refuge for approximately six months each winter. During the very hardest part of the winter, as natural forage is less available, they are fed supplementally. When spring arrives in late April and early May, the elk begin their trek back to the high country. Calves are born from late May to mid-June, off the Refuge.

In the summer months, elk can be seen throughout Grand Teton and Yellowstone National Parks and in the Bridger-Teton National Forest. Look for them at dawn and at dusk when they emerge from the forest to graze.

A DIVERSITY OF WILDLIFE AND PLANTS

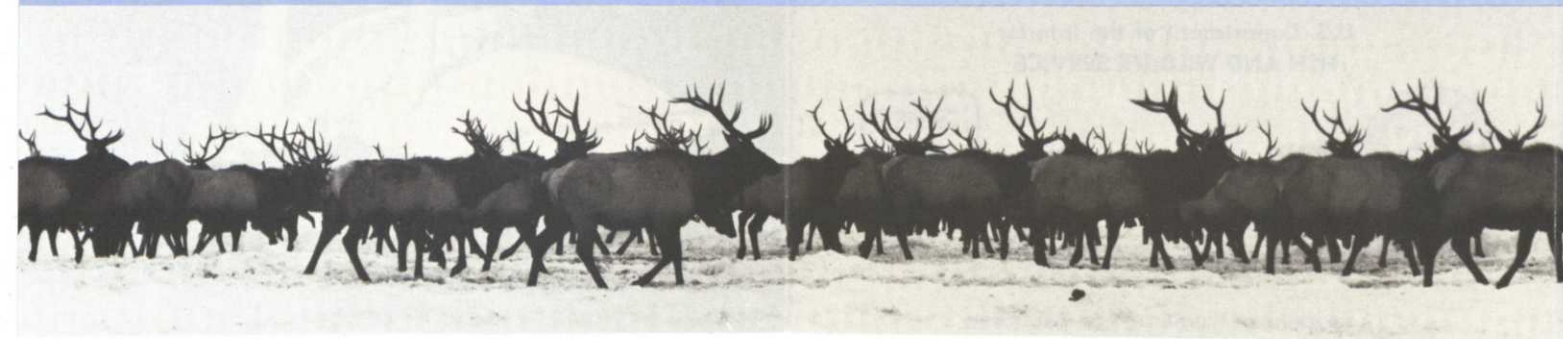
While elk are the primary reason for the Refuge, other animals of the high country are found on the area year around, or during seasonal migration to and from surrounding areas. Moose, bighorn sheep, and mule deer are found on the refuge (generally in winter) and coyotes, badgers and Uinta ground squirrels are often seen. Other common wildlife species include muskrats, beaver, porcupines, longtail weasels, and voles or meadow

mice. Nearly 175 species of birds have been observed on the Refuge. Waterfowl commonly seen on pond and marsh areas include the mallard, pintail, gadwall, Barrow's goldeneye, bufflehead, green-winged and cinnamon teal and Canada geese. For a birding highlight, stop at the Flat Creek Marsh along U.S. Highway 26 and look for nesting Trumpeter Swans and their young.

Bald eagles, ravens and magpies are common winter birds and, like the coyotes, are scavengers of elk that have died during the winter. Hawks include the kestrel, harrier, red-tailed, Swainson's and rough legged. You may even catch a glimpse of a golden eagle. The marsh edges attract long-billed marsh wrens, yellow-headed blackbirds and yellowthroats, while sandhill cranes and long-billed curlews are found in open marshes or grassy meadows.

What makes the Refuge a home for such a diversity of wildlife? It is due primarily to habitat. The Refuge encompasses areas of grassy meadows and marshes along the valley floor, timbered areas along the Gros Ventre River, and sagebrush and rock outcroppings along the foothills. A diversity of food and shelter provides for the rich mixture of wildlife species found at the National Elk Refuge.

*U.S.F.W.S. Photos by:
Bottom left to right; Bull elk, John Wilbrecht.
Sleigh rides to view elk, Jim Griffin.*



WELCOME TO THE NATIONAL ELK REFUGE

The National Elk Refuge lies just northeast of the town of Jackson and directly south of Grand Teton National Park. Refuge Headquarters is located on Broadway St. one mile east from the Jackson town square. The office is open year-round, Monday through Friday from 8:00 a.m.-4:30 p.m.

The winter season, between November and May, is the best time to visit and view elk and other wildlife on the Refuge. Because of management needs, public use activities are confined to the main, unpaved roadways through the Refuge. Paved turnouts on the west side of the Refuge, along U.S. Highway 26 (leading to Grand Teton and Yellowstone National Parks) offer an opportunity to view and photograph various Refuge wildlife.

In winter, from late December through late March, *horse-drawn sleigh rides* are available daily to transport visitors for a close-up look at the elk herd. A *Sleigh Ride Visitor Center* features a slide show, movie, exhibits and information. Here visitors can learn many intriguing facts about the life history of the elk and management of the Refuge. Follow signs from Refuge headquarters four miles to the sleigh ride area.

Elk hunting and trout fishing are popular activities on portions of the Refuge during certain season. All State and Federal regulations apply, and some special regulations are also in effect. Brochures and pamphlets containing regulations and information on the Refuge and its wildlife are available at Headquarters.

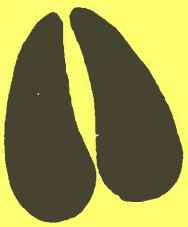
There are limited hiking opportunities on the Refuge but there is no overnight parking or camping. Many camping areas are available in nearby National Forests and National Parks.

For more information on the National Elk Refuge and its activities, please contact the Refuge Manager, National Elk Refuge, P.O. Box C. Jackson, Wyoming, 83001, Telephone: 307/733-9212.



National Elk Refuge

Jackson, Wyoming



The National Elk Refuge is in Wyoming's historic mountain-rimmed Jackson Hole with the rugged Teton Range in the northwestern background. The town of Jackson adjoins its south boundary. The refuge is administered by the U.S. Fish and Wildlife Service of the Department of the Interior.

The refuge was created in 1912, primarily for winter range and care of the Jackson elk herd. The nearly 25,000 acres of grassland meadows, swamps, and uplands provide fall, winter, and spring elk forage, while supplemental alfalfa hay pellet rations are fed in midwinter when natural forage is less available below deep or crusted snow. As many as 7,500 elk may winter on the refuge.

The spectacle of thousands of wild animals concentrated in a small area attracts winter visitors, many of whom ride sleighs or wagons to view and photograph the elk at close range. The Elk Refuge provides protected habitat for all forms of wildlife. Therefore, all human activity is confined to the main roadway through the refuge. The refuge road, as well as turnouts on Highway 26/191 north of Jackson, offer viewing and photography of various animals and birds on the refuge.

While the elk, or wapiti, are outstanding and the primary reason for the refuge, other animals of the high country live on the refuge yearlong or use it seasonally in passing to and from higher elevations. Forty-seven different mammals have been observed on the refuge. Moose, bighorn sheep, and mule deer occur. From these larger and easily recognized animals, size scales down to the tiny, masked shrew, smallest of the refuge animals.

Coyotes are common over the refuge. During the winter months when elk are concentrated on the refuge these carnivores act as an "elk disposal unit." Any animal that dies is soon consumed by these scavengers. Badgers are present in moderate numbers. In late fall they dig into burrows to catch and eat various hibernating rodents. Among the latter are the Uinta ground squirrels which spend two-thirds of the year sleeping underground and one-third raising families and fattening for the big sleep. Locally these rodents are known as "chisellers." Refuge records reveal that these animals vary greatly in numbers. One year they may be common while in another they may become comparatively scarce. Voles, or meadow mice, are common but rarely seen. They furnish food for hawks, owls, and other flesh-eating wildlife. Other wildlife forms present include the snowshoe hare, yellow-bellied marmot, and porcupine.

Beaver are common on the refuge. Many of their ponds help produce marsh areas favored by the moose. Red squirrels and chipmunks are found in suitable habitat. Trumpeter swans sometimes use the muskrat houses of Flat Creek marsh for nesting sites.

Bison, or buffalo, once ranged in Jackson Hole and a reintroduced herd from Grand Teton National Park winters on the National Elk Refuge. Buffalo skulls have been excavated from the mud of Flat Creek marsh. A few whitetail deer inhabit the area but are rarely seen. The antelope or pronghorn once was common. After an absence of many years a few pronghorns are again drifting into the refuge from their ranges east of the Continental Divide. Mountain lions are scarce and timber wolves and grizzly bears, once present, are now absent in Jackson Hole.

The following is a listing of Refuge mammals:

Masked Shrew (Sorex cinereus). Common. These little insect-eaters live in streamside areas.

Vagrant Shrew (Sorex vagrans). Common.

Northern Water Shrew (Sorex palustris). Common, but rarely seen.

Little Brown Myotis (Myotis lucifugus). This bat is commonly found in old buildings, hollow trees, and rock ledges. Most often seen flying over or near water on summer evenings.

Long-eared Myotis (Myotis evotis). Status unknown.

Silver-Haired Bat (Lasiorycteris noctivagans). Common. Occupies forest areas.

Hoary Bat (Lasiurus cinereus). Rare. Only six specimens known from Wyoming and one was from Refuge.

Townsend's Bat (Plecotus townsendii). Uncommon. Feeds late at night near water.

Pika (Ochotona principis). Uncommon. These little "rock rabbits" inhabit the higher, rockier portions on the refuge. The small, haystack-like food caches of this rabbit-like rodent may be found near their homes.

Whitetail Jackrabbit (Lepus townsendii). An uncommon resident of the sage brush meadow; turns white in winter.

Snowshoe Hare (Lepus americanus). This forest-loving species is rare on the refuge. This species is grayish-brown in summer and white in winter.

Yellowbellied Marmot (Marmota flaviventris). Normally found on rocky slopes. These 'rockchucks' sometimes burrow homes in stored hay.

Uinta Ground Squirrel (Spermophilus armatus). 'Chisellers' are the most common mammal seen on the refuge in the summertime. Their colonies resemble a miniature prairie dog town.

Golden-mantled Squirrel (Spermophilus lateralis). Uncommon. This colorful species is often mistaken for a chipmunk, but is larger in size.

Least Chipmunk (Eutamias minimus). Uncommon.

Yellow-Pine Chipmunk (Eutamias amoenus). Common in pine trees.

Red Squirrel (Tamiasciurus hudsonicus). This tree-climber is also called chickaree or pine squirrel. It is common in pine and spruce forests of the northern part of the refuge.

Northern Flying Squirrel (Glaucomys sabrinus). Common in aspens and pines. Seldom seen.

Northern Pocket Gopher (Thomomys talpoides). Gophers spend most of their time underground; their burrow mounds are more commonly seen than the animals themselves.

Beaver (Castor canadensis). Beaver dams and houses are commonly seen along the higher streams of the refuge.

Deer Mouse (Peromyscus maniculatus). Common.

Bushytail Woodrat (Neotoma cinerea) (Pack Rat). Frequently invades cabins and buildings.

Meadow Vole (Microtus pennsylvanicus). Common. Inhabits willows, meadows, and wet areas.

Longtail Vole (Microtus longicaudus). Common. Inhabits drier areas.

Mountain Vole (Microtus montanus). Common.

Sagebrush Vole (Lagurus curtatus). Rare.

Red-Backed Vole (Clethrionomys gapperi). Common in conifers and aspens.

Muskrat (Ondatra zibethicus). This fur-bearing marsh species is commonly found in refuge ponds.

House Mouse (Mus musculus). This introduced European is not common on the refuge and is found only in or close to houses and barns.

Western Jumping Mouse (Zapus princeps). Common in wet willow areas and in wet aspen stands.

Porcupine (Erethizon dorsatum). Common. Porcupines chew on old saddles, leather straps, and wooden boxes as well as trees in their never-ending search for food and salt-flavored objects.

Coyote (Canis latrans). Abundant refuge resident.

Red Fox (Vulpes fulva). This fox is rare; most of its time is spent at higher altitudes.

Black Bear (Euractos americanus). Rarely seen on the refuge.

Shorttail Weasel (Mustela erminea) (Ermine). A brown-backed mouse-catcher in summer but turns white in winter.

Longtail Weasel (Mustela frenata). Common. Similar to, but larger than, the ermine.

Mink (Mustela vison). An uncommon inhabitant of marshes and streambank areas.

Badger (Taxidea taxus). Abundant. They dig out ground squirrels even when the latter are in their winter sleep. Sometimes coyotes are seen hunting with badgers.

Striped Skunk (Mephitis mephitis). Uncommon.

River Otter (Lutra canadensis). Rare. Occasionally found along streams.

Bobcat (Lynx rufus). Rare. Cat tracks in the snow are more commonly seen than actual observations of this native flesh-eater.

Elk (Cervus elaphus). The refuge is a principal winter range for the Jackson Hole elk.

Mule Deer (Odocoileus hemionus). Like the elk, deer are more numerous on the refuge in winter when they descend from the high country. Frequently seen during winter months on buttes or hillsides.

Moose (Alces alces). Moose, the largest of the American deer family, frequent the refuge river bottoms. Occasionally one of these animals is seen crossing open meadows or in ponds during the summer season.

Pronghorn (Antilocapra americana). Also known as antelope, these white and tan speedsters are rare and in many seasons are not present.

Bighorn Sheep (Ovis canadensis) (Mountain Sheep). Bighorn are occasionally on the refuge during the colder months, moving from the higher country.

Hunting Information

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

For further information write to:
Refuge Manager
National Elk Refuge
Box C
Jackson, Wyoming 83001
(307) 733-9212

U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR



RF6-61550-6



Reprinted July 1989

GPO 859-893

National Elk Refuge

Jackson, Wyoming



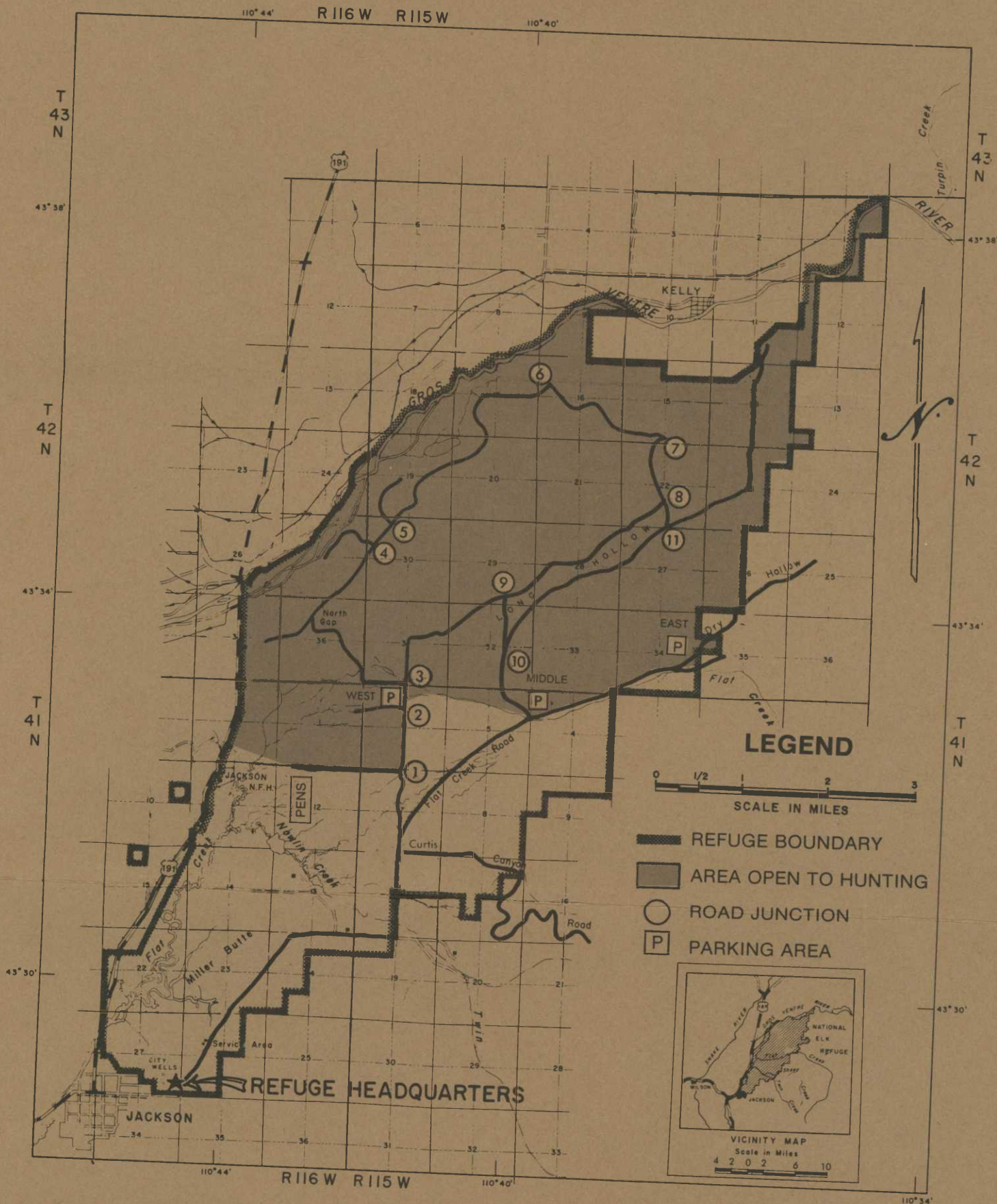


The National Elk Refuge, established August 10, 1912, is administered by the U.S. Fish and Wildlife Service, Department of the Interior. The nearly 25,000 acres provide winter range for about 60 percent of the Jackson Hole elk herd. The elk migrate onto the refuge in late October and during November, and leave the refuge for summer range about May 1.

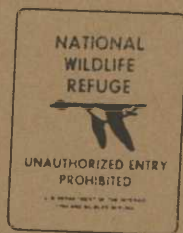
Providing wildlife related recreational opportunities such as hunting is but one of the management objectives of the National Elk Refuge. Refuge areas open to hunting are designated on the map. Special hunting regulations listed in this leaflet are terms and conditions of the hunt permit and are necessary to avoid conflict with other refuge objectives. Please review these regulations prior to hunting!

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

National Elk Refuge



REFUGE SIGNS—KNOW THEIR MEANING



REFUGE BOUNDARY SIGN—ENTRY BY PERMISSION ONLY



AREA OPEN TO HUNTING AT SPECIFIC TIMES



SANCTUARY AREA—OFF LIMITS TO THE PUBLIC UNLESS OTHERWISE SPECIFIED

National Elk Refuge

Jackson, Wyoming

SPECIAL REGULATIONS (Special Permit Area No. 77)

- All State regulations are in effect and will be enforced.
- A Refuge Hunting Permit and a valid State license are required and must be carried while hunting. A valid hunter safety card or certification is required.
- Targeting your weapon, practice shooting, or shooting wildlife other than elk is prohibited.
- The only access to and from the Refuge hunting area is through the main gate east of Refuge headquarters in Jackson.
- Motorized vehicle travel in the hunting area is prohibited except as noted below in "Retrieval of Kill." Horses are permitted in the hunt area.
- Only one person without a permit may accompany a hunter and must stay with the hunter at all times. Only the hunter may be armed.
- Fluorescent orange exterior garments as defined by State regulations must be worn by *anyone* entering the hunting area.
- Parking along refuge roads is prohibited. Vehicles must be parked in the two designated parking areas.
- Hunters may not be let out of vehicles on roads between hunter parking areas.
- Hunters are prohibited from pursuing or following elk by vehicle between parking areas.
- Shooting from parking areas or refuge roads is not allowed.
- No overnight camping or parking is allowed on the Refuge including in parking lots or hunt area.
- Use of Citizen Band (C.B.) radios is not allowed in the hunt area.
- Hunting permits will be revoked in the event of improper hunter conduct or violation of regulations. This can result in denial of future privileges on the Refuge.

RETRIEVAL OF KILL

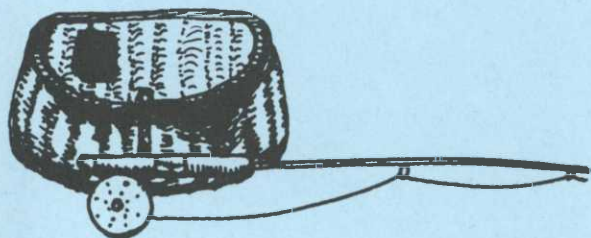
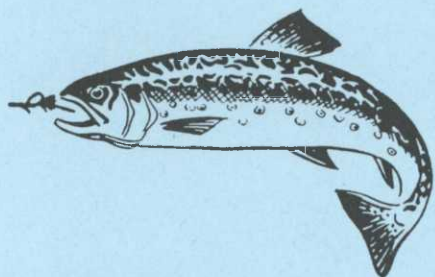
Information to assist successful hunters in getting their elk out of the hunt area:

- Designated roads will be open to vehicle travel beginning at 3:00 p.m. to dark.
- Drag your elk to the nearest main loop road (see map). Return by most direct road to parking lot. Driving off designated roads will constitute Refuge trespass.
- Only successful hunter and helper(s) may be in vehicle. Rifle must be unloaded, cased or broken down and not accessible to occupants of vehicle.
- Successful hunters may not transport other hunters into hunt area.
- If wet weather conditions make roads slippery and hazardous, the Refuge will close the roads.

FISHING INFORMATION

National Elk Refuge

Jackson, Wyoming



FISHING INFORMATION AND REGULATIONS

GENERAL INFORMATION

Fishing is permitted on the National Elk Refuge in conformance with laws and regulations of the State of Wyoming, subject to the regulations of the U.S. Fish and Wildlife Service. Carefully regulated fishing is allowed within the refuge to the extent that it does not conflict with refuge objectives. Refuge waters support a wild population of Snake River Cutthroat trout. These fish are a unique variety of the cutthroat species and are the only trout native to the area. Small numbers of brook and rainbow trout are also present. The refuge promotes quality angling for wild fish and is working in cooperation with the Jackson Hole Chapter of Trout Unlimited and the State on a stream habitat improvement project on Lower Flat Creek. Many fishermen release all fish caught, and catch and release fishing is one means of preserving quality angling for wild fish.

LICENSES

No special refuge permit is required. A Wyoming State fishing license and conservation stamp are required for residents and non-residents. Refer to the annual Wyoming Fishing Regulations for specific State requirements.

WATERS OPEN TO FISHING AND SEASONS

The Gros Ventre River along the north boundary of the refuge is open to fishing from May 21 through October 31.

Upper Flat Creek northeast of McBride and east toward the Bridger-Teton National Forest is open to fishing from May 21 through October 31.

Lower Flat Creek between the "Old Crawford Bridge" site and the McBride Bridge is open to fishing from August 1 through October 31. Signs indicate the boundaries.

CLOSED WATERS

Flat Creek drainages from the "Old Crawford Bridge" site downstream to the refuge boundary fence and all of Nowlin Creek are closed to fishing.

ACCESS

Gros Ventre River has access south from the Gros Ventre (Kelly) road within Grand Teton National Park.

Upper Flat Creek access is at McBride Bridge and along Flat Creek road northeast of McBride Bridge. Parking is allowed along Flat Creek road northeast of the bridge so as not to block the road or other refuge roads. Off-road driving is prohibited.

Lower Flat Creek has two public access points: (1) at a gate through the refuge fence, 2½ miles north of town at a Highway 26/191 turnout; (2) at a gate through the refuge fence adjacent to the Jackson National Fish Hatchery parking lot.

FISHING HOURS

Fishing and access to refuge waters are permitted during daylight hours only. Night fishing is not allowed.

CREEL LIMITS

Refer to current Wyoming Fishing Regulations for fish harvest and possession limits.

LEGAL FISHING TACKLE AND BAIT

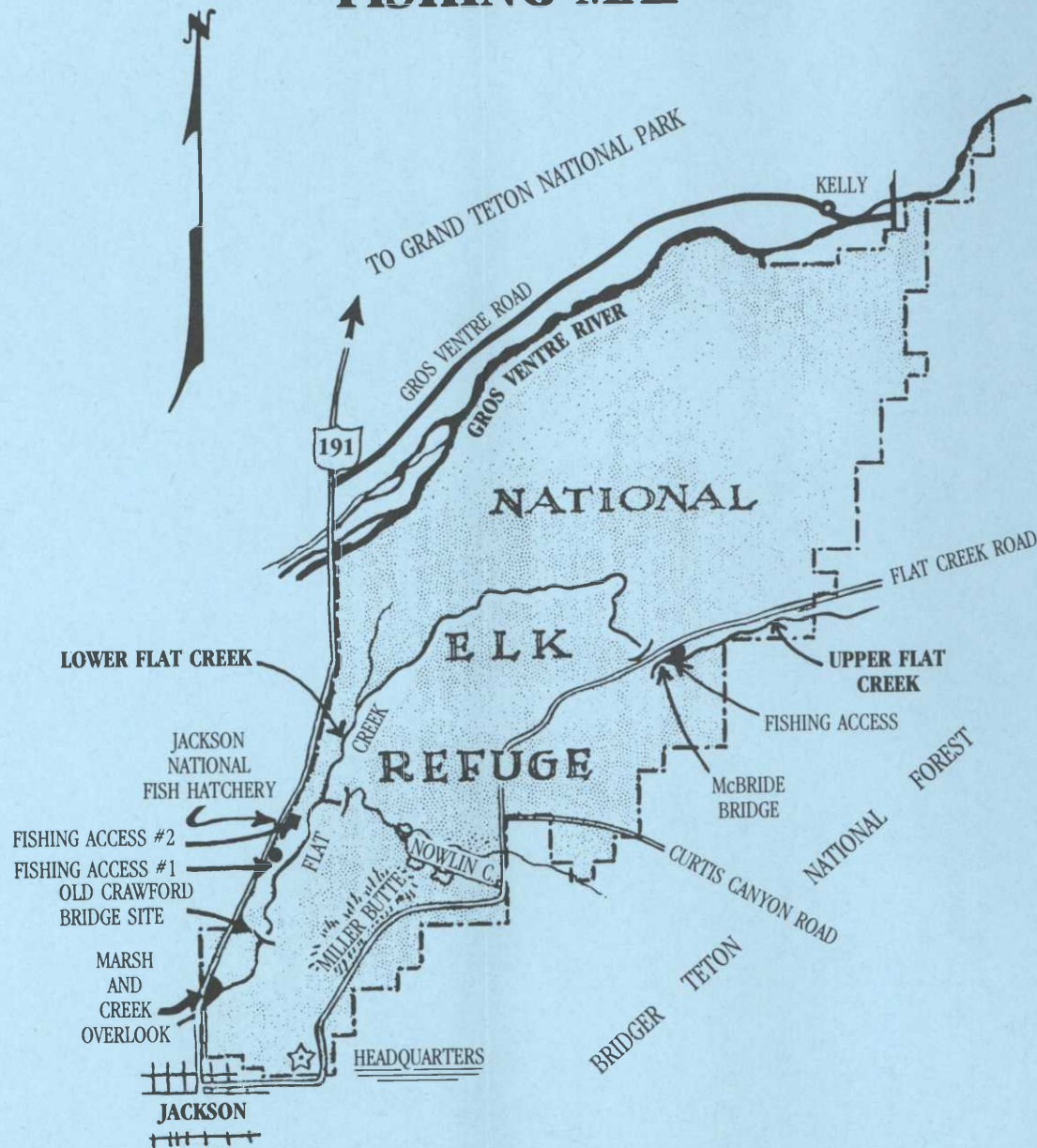
Consult State Regulations for descriptions of legal tackle. The use or possession of live fish for bait is prohibited in all refuge waters. Other types of live bait (worms, grasshoppers, etc.) are permitted on Upper Flat Creek and the Gros Ventre River. Angling on Lower Flat Creek is limited to the use of artificial flies only.

OTHER REGULATIONS

Use of boats or other floating devices, overnight camping and fires is prohibited.

FISHING MAP

LOWER FLAT CREEK STREAM IMPROVEMENT PROJECT



Flat Creek is an important spawning stream for the Snake River Cutthroat trout. Flat Creek's contribution as a spawning stream was diminished in the past because of siltation from irrigation water diverted into the stream. The objectives of the Improvement Project are to improve overhead cover for trout, stabilize eroding stream banks and deepen existing holes that were buried by unnatural volumes of sediment which entered the creek in the past. The results should be improved trout habitat, better spawning beds and increased fish populations. The Project is accomplished by such techniques as rip rap, diversions, dredging, tree revetments, velocity deflectors, etc. This effort is a joint cooperative venture of interested citizens (such as the Jackson Hole Flyfishers and the Jackson Chapter of Trout Unlimited), the Wyoming Game and Fish Department, and the Fish and Wildlife Service (National Elk Refuge).

For further information write to:
Refuge Manager
National Elk Refuge
Box C
Jackson, Wyoming 83001

U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR