

NARRATIVE REPORT
ARAPAHO NATIONAL WILDLIFE REFUGE
JANUARY - DECEMBER 1986

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
WALDEN, COLORADO

ARAPAHO NATIONAL WILDLIFE REFUGE
Walden, Colorado

also

BAMFORTH, HUTTON LAKE AND PATHFINDER NWR's
administered from Walden, Colorado

ANNUAL NARRATIVE REPORT

Calendar Year 1986

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

REVIEW AND APPROVALS

ARAPAHO NATIONAL WILDLIFE REFUGE
Walden, Colorado

also

BAMFORTH, HUTTON LAKE AND PATHFINDER NWR's
administered from Walden, Colorado

ANNUAL NARRATIVE REPORT
Calender Year 1986

Eugene Patton 2-18-87 [Signature] 2/23/87
Refuge Manager Date Refuge Supervisor Review Date

[Signature] 3/2/87
Regional Office Approval Date



86 NR 1

1/10/86.

J. Solberg

Aerial view of Refuge HQ looking east toward the Medicine
Bow Range and Rawah Wilderness Area.

ARAPAHO NATIONAL WILDLIFE REFUGE

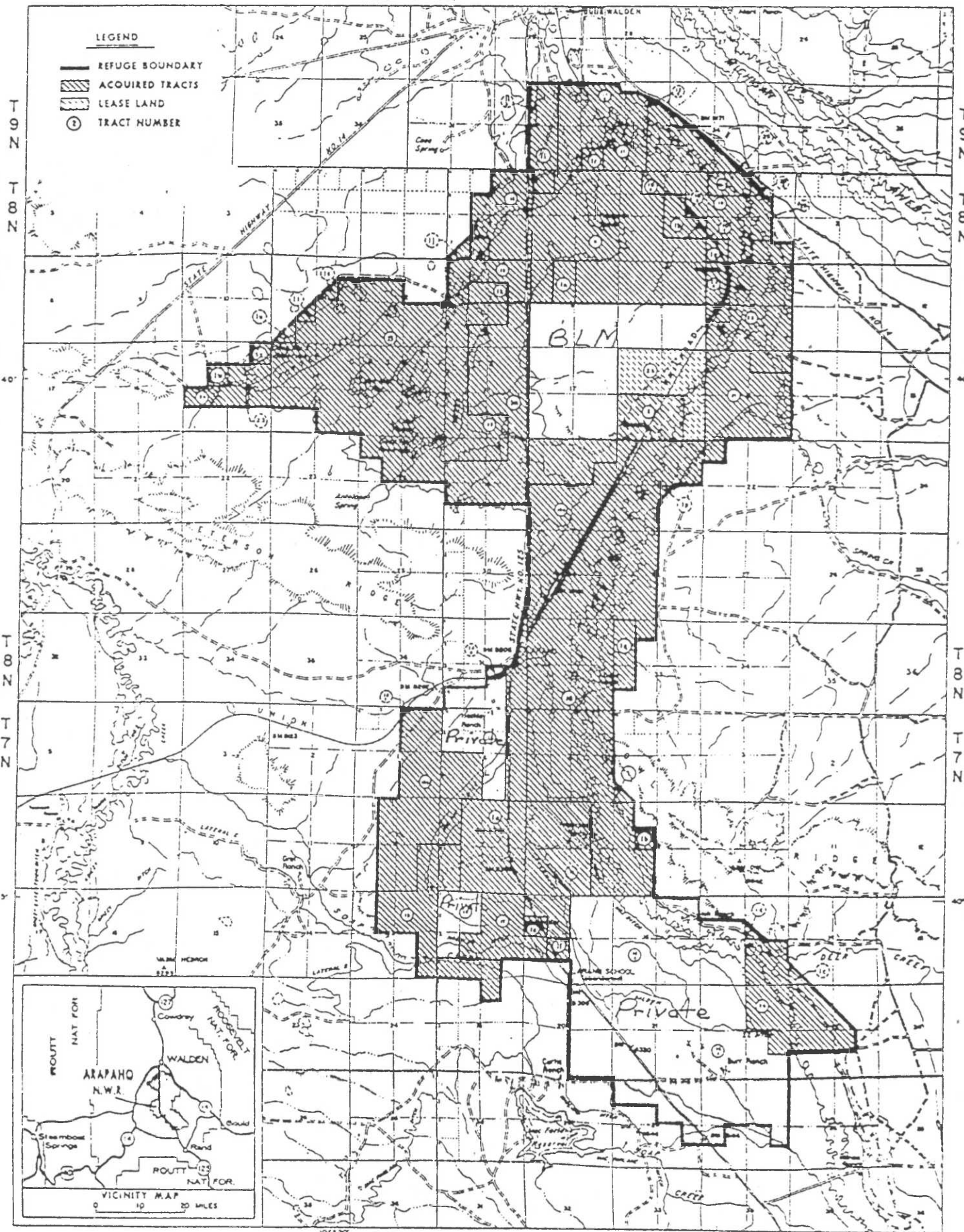
JACKSON COUNTY, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE

106° 20' R80W R79W

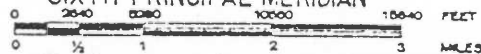
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COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY BLM USGS AND FWS

R 80W R 79W

SIXTH PRINCIPAL MERIDIAN



DENVER, COLORADO

MAY, 1944

MEAN
DECLINATION
1975

INTRODUCTION

Arapaho National Wildlife Refuge was established in 1967 primarily to furnish waterfowl with a suitable place to nest and rear their young. The refuge was created to offset, in part, losses of breeding and nesting habitat in the prairie wetland region of the Midwest. Most of the land was purchased with funds derived from the sale of Duck Stamps to hunters and other individuals.

Arapaho National Wildlife Refuge is located in an intermountain glacial basin immediately south of the town of Walden, the county seat of Jackson County, Colorado. The basin is approximately 35 miles wide and 45 miles long. Since it is the most northern of four such "parks" in Colorado, it is known locally as "North Park."

The Ute Indians referred to North Park as "Cow Lodge" and "Bull Pen." They were the first visitors to the area and remained only during the summer months to hunt bison, abandoning the valley during the long, snowy and icy winters. Their small numbers and nomadic life style left but a small imprint on the land.

The first recorded exploratory footsteps to appear in North Park belonged to Jacques Bijeau in the year 1820. Like many of his French countrymen, Bijeau was lured by the promise of profit in trapping beaver. In 1844, Lieutenant John F. Fremont transversed the park from Northgate to Willow Creek Pass and recorded the following in his journal:

"The valley narrowed as we ascended and presently divided into a gorge, through which the river passes as through a gate - a beautiful circular valley of 30 miles in diameter, walled in all around with snowy mountains, rich with water and grass, fringed with pine on the mountain sides below the snow, and a paradise to all grazing animals."

Others, like James O. Pinkham, came to exploit mineral wealth. Miners preferred the summer months for their endeavors. The first residents to brave the cold were Jacob Fordyce and his family. They stayed during the winter of 1878, 2 years after Colorado became a state and a full 50 years after the first explorers entered the valley.

Jackson County was formed in 1909 and currently supports a rural population of approximately 1,800 people of which about half live in Walden, one mile north of the refuge. The economy of North Park relies on four main resources. The largest and most stable of these is ranching followed by lumbering. Recreation is a growing industry while mining, once a thriving industry in North Park, has slowed down to a much reduced scale during the past couple of years. Nearly one-half of the North Park population lives on ranches which indicates the importance of ranching to the economic stability of North Park.

The high elevation and northern latitude provide North Park with a unique climate. The refuge elevation ranges from 8,100 to 8,700 feet. North Park is classified climatically as a cold desert. Winters are very cold and normally have 60 inches or more of snow while the surrounding mountains receive at least 120 inches of snowfall. Summers are cool and dry with high temperatures in the 80's and average lows nearly 40°F. Mean annual precipitation is only 9.6 inches and mean annual temperature is 36.5°F. There is an average of only 30 consecutive frost free days each year.

The refuge encompasses 18,253 acres and when proposed lands are fully acquired, the refuge will consist of approximately 19,813 acres. The refuge presently consists of 7,900 acres of irrigated and sub-irrigated meadows, 9,350 acres of sagebrush-grassland uplands, 602 acres of ponds, 180 acres of riparian willow, 120 acres of stream or river habitat and 101 acres of administrative lands including building sites and roads.

The refuge currently produces an average of about 9,500 ducks and 150 to 250 Canada geese annually although production varies from year to year. The current refuge objective is to produce 11,000 to 12,000 ducks and 500 Canada geese annually. To meet waterfowl production objectives and provide optimum habitat conditions for other species of wildlife, the refuge utilizes several habitat manipulation techniques such as pond development, water level manipulation, irrigation, rest-seasonal grazing systems and prescribed burning to create habitat diversity and maintain vegetative vigor, growth and density.

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86 NR 3

12/06/86

E. Patten

Volunteer Pam Rizor.



86 NR 4

9/11/86

R. Varney

Fencing crew; left to right: Richard Byrd, Don Gore, Jim Allard.



86 NR 5

8/12/86

R. Varney

YCC CREW

Top to bottom; left to right:

- Top: Bob Barrett, Crew Leader
- Row 1: Larry Kalb, Jr., Matt Schneider, Tony Gallegos, Farley Brewer.
- Row 2: Traci Bourbeau, Karen Murry, Stormy Skalla, Kim Hampton
- Row 3: Todd Perkuhn, Marc Porter, Tonya Murdock (Youth Leader), Eddie Smercina, Serena Brinker

A. HIGHLIGHTS

- Water conditions again excellent for habitat maintenance. (B.)
- Refuge personnel continue upwardly mobile. (E.1.)
- Another banner (if not record) year of waterfowl production. (G.3.)
- Refuge Manager Patten attains 20-year plateau. (J.3.)

B. CLIMATIC CONDITIONS

Despite (or perhaps due to) above average temperatures during the first four months of 1986, the winter of 1985-1986 was the snowiest on record for North Park. Between September 22, 1985 and May 16, 1986 a total of 104.9 inches of snow fell on the refuge. This, coupled with above average precipitation during five of the next seven months resulted in a good water year for Arapaho NWR with over 12 inches of precipitation received during 1986. Although this total is over 4 inches less than the record amount received in 1985, it's still nearly 3 inches better than normal and continued the relatively wet cycle that's been experienced here for the past 4 years.

Spring break-up began in March for the second consecutive year. There was 125 cfs in the Illinois River at the Refuge HQ on March 24 when the first flow measurement was recorded. The river rose steadily and rapidly until it peaked at 445 cfs only one week later. Flow tapered off during April but peaked for a second time at 540 cfs on May 5 following some late April precipitation. The third, and highest, peak occurred on June 11 when the Illinois River, swollen with nearly 1.5 inches of rain over five days, crested at over 658 cfs. Flow then dropped off fairly steadily throughout the summer, but was more than adequate to maintain refuge ponds at optimum levels.

A combination of several factors (above average precipitation, below average temperatures in September and October, and termination of irrigation) resulted in sufficient water to provide good staging areas for migrating waterfowl. Because most of the refuge ponds were nearly full going into freezeup, we should have adequate water for spring breeding and nesting in 1987. However, less than 0.5 inches of precipitation fell during the last seven weeks of the year and, with sunny, warm days in December removing what little snow had accumulated, we head into 1987 with a scarcity of snow and some skepticism about next year's water supply. With mixed emotions we scan the horizons for signs of moisture as the new year begins.

Table 1 - 1986 Weather Data: Walden, Colorado (NOAA)

Month	Precipitation (inches)			Max.	Temperatures (°F)			
	1986	Normal	Snow		Min.	Avg.	Normal	Avg.
Jan.	.05	.51	1.5	48	-12	20.2		15.7
Feb.	1.76 ^a	.46	20.1	52	-26	23.5		18.4
March	.71	.67	5.4	62	8	32.9 ^b		24.6
April	.98	.87	12.0	66	11	36.9		35.4
May	.87	1.14	4.2 ^c	73	19	43.7		45.0
June	1.66	.96	--	85	28	56.2		53.6
July	.94	1.06	--	84	31	57.6		59.0
August	1.50	1.23	--	90	31	57.6		56.6
Sept.	1.07	.94	0.8	73	21	47.0		49.3
Oct.	1.75	.68	10.6	64	9	38.2		39.2
Nov.	.92	.52	11.2	50	1	27.2		26.8
Dec.	.13	.51	1.6	45	-22	20.0		18.5
Totals	12.34	9.55	67.4					
Extremes				90	-26			

a. Wettest February on record.

b. Warmest March on record.

c. Winter of 1985-1986 snowiest on record: 104.9".

C. LAND ACQUISITION

1. Fee Title

Two private land tracts totalling approximately 1,560 acres remain to be acquired to round out the refuge boundary. No action initiated this year on acquiring these two tracts.

3. Other

The refuge leases two tracts of State school land totalling 640 acres from the Colorado State Land Board. Future plans call for a cooperative exchange of lands between the Bureau of Land Management and the State in which the two tracts of leased land would become property of the Service.

D. PLANNING

2. Management Plan

The Annual Water Management Plan, Prescribed Burning Plan and Trapping Proposal were prepared and forwarded to the Regional Office. Revision of the refuge Hunting Plan was initiated late in the year and will be completed in early 1987.

5. Research and Investigations

ARAPAHO NR 86 - EVALUATION OF THE 3-YEAR ROTATION GRAZING PROGRAM ON ARAPAHO NATIONAL WILDLIFE REFUGE RELATIVE TO IMPACTS UPON NON-GAME BIRD HABITAT QUALITY - Fritz L. Knopf, Principal Investigator, National Ecology Center.

This is an ongoing study that was initiated in June 1980 in an effort to:

1. Monitor the avian community and population densities.
2. Quantify habitat structure.

Progress to date: Pretreatment field work indicated that the pastures were not similar prior to initiation of the study. The two pastures are dramatically different in their vegetative structure, but not in their floristic composition. Avian community analyses indicate that 9 species of birds compose >95% of the bird community. Some species are habitat generalists and do not occur in sites historically grazed in the summer. Densities of some species fluctuate 3-fold annually while other species are remarkably stable. These differences appear to be related to differential mortality patterns of the species on their Central America wintering grounds. FY 86 activities continued the monitoring of the avian populations plus concentrated on generating specific information on nesting habitats of willow flycatchers for a management model. A grazing-followup survey of the vegetative community is planned for FY 87.

ANNUAL REPORT - ARAPAHO NR 86: "The Role of Life History Traits in the Evolution of Sociality in the White-tailed Prairie Dog (Cynomys leucurus)" - Lynn A. Cooke, Principal Investigator, Department of Systematics and Ecology, University of Kansas, Lawrence, Kansas 66045.

This ongoing study was initiated this summer and will continue next year:

Population demography

Population structure of the two study colonies was determined by counting the numbers of individuals in each of three age classes, juvenile, yearling, and adult. Since this is the first year of the study, only non-reproductive yearling females could be assigned to the yearling class. Reproductive yearling females and yearling males were indistinguishable from adults and were included in the adult totals.

The adult sex ratio of both colonies was female biased; the proportions of males in Hampton and Allard colonies were 0.39 and 0.26 respectively. The juvenile sex ratio in the Hampton colony was slightly female biased, however, this bias is not statistically significant ($X = 0.261, >p > 0.05$).



86 NR 6

10/07/86

E. Patten

Fritz Knopf (5th from left), USFWS National Ecology Center, explaining his research on riparian ecosystems to a variety of agency personnel and local ranchers.

COLONY	AGE CLASS	#MALES	#FEMALES	PROP. MALE
Hampton	adult	12	19	0.39
	yearling	--	2	
	juvenile	66	72	0.48
Allard	adult	5	14	0.26
	yearling	--	2	
	juvenile	46	30	0.61

Comparison of juvenile emergence body weights and growth rates between colonies

Significant differences exist in juvenile emergence body weights between study areas. Juveniles on the Hampton site (grazed) were significantly heavier than those on the Allard site (ungrazed) during the first two weeks post emergence ($t=2.08$, $p=0.040$, two tailed test). In addition, differences also exist in the growth rates between sites. Juveniles on the Hampton site grew at a faster rate than those on the Allard colony. Slopes of the regression lines, 9.7 and 7.5 for Hampton and Allard colonies respectively, differ significantly ($F=60.938$, $p<0.001$). (Regression calculated for weights zero to 60 days post emergence.)

E. ADMINISTRATION

1. Personnel

Arapaho NWR obtained its third Assistant Manager in 18 months when Ray Varney arrived from Devils Lake WMD, North Dakota. Lest someone read this who doesn't know Gene Patten let there be no mistake. Gene isn't all that tough on his employees. As John Solberg said while encouraging Varney to move to Arapaho, "Gene's as easy to work for as that other General Patton". (Only kidding, Gene).

Ray and his family arrived in Walden early in July and set up residency in refuge housing. Locals tried to impress the Varneys with horror stories of North Park winters forgetting that the newcomers spent the previous four winters in North Dakota. Not to be caught off-guard, however, Ray set about stockpiling some 10 cords of firewood - just in case. As of this writing the Varneys have immensely enjoyed Colorado's scenery, fishing, and X-country skiing and, oh yes, hardly made a dent in their wood pile.

Solberg, after coercing Varney into taking his place, left Arapaho for the city lights of Denver. John, semi-reluctantly, accepted a training position with the Office of Migratory Bird Management which will enable him to use his piloting skills as a Flyway Biologist. John had second thoughts about leaving the refuge system but his love of flying won out. Those of us who know and worked with John know he will do an excellent job. We wish him good luck.

Gale Brewer, formerly a Biological Technician, was converted to Maintenance Worker in the Wage Grade series. This more accurately reflects Gale's duties and compensates him better for his excellent work with Arapaho's machinery.

Mark Lamb, SCA volunteer in 1984 and a Bio-Aide in 1985 returned in April as a Bio-Tech. Mark's duties would have included supervision of the YCC enrollees, but Mark left Arapaho late in May to accept a permanent position with the Colorado Division of Wildlife (CDOW). Mark did an excellent job for us during his temporary appointments. We're looking forward to working with him as a CDOW employee.

Refuge Clerk, Terri Follett was promoted to Refuge Assistant GS-5 effective May 25.

John Eisemann returned to Arapaho NWR in 1986 as a Biological Aide. John had worked in 1985 as a volunteer from Colorado State University. John's ability on refuge equipment along with his biological knowledge and concern for the resource made him a welcome and valuable member of the refuge staff.

Anna Vos, a Co-op Student from the University of Montana also spent the summer at Arapaho NWR as a Bio-Aide. After assisting with many biological, operational, and public use activities (and doing a commendable job), Anna returned to college where she graduated in December. Anna subsequently has accepted a position as an Assistant Refuge Manager at J. Clark Salyer NWR.

The refuge also staffed a 1-3 man fencing crew during part of the year. Much fencing activity was accomplished but much more remains to be done.

The following table depicts refuge staffing over the past five years:

	<u>Permanent Full Time</u>	<u>Temporary</u>	<u>Volunteer</u>
1986	4	6 ^a .	2
1985	4 _b .	3	1
1984	5 ^b .	2	2
1983	4	5	2
1982	4	5	1

a. Includes fencing crew

b. Temporary Bio-Tech position converted to Clerk/Typist (PFT) in 10/84.

2. Youth Programs

Bobbie Barrett, Biological Technician, served as crew leader for this year's 13-enrollee, non-residential YCC camp. It was a successful, productive year for the kids who learned a little about resource management and alot about cooperation. This year's program ran for nine weeks, from June 15 to August 15.



86 NR 7

8/06/86

B. Barrett

Fence construction by YCC crew..



86 NR 8

6/25/86

E. Patten

YCC crew painting trim on Quarters #56.

This year's YCC program received additional funding from the U.S. Forest Service, Routt National Forest. (See Funding Table in Section E.5.). In return, the YCC enrollees spent several days on forest and stream improvement projects on nearby Forest Service lands. The additional funding enabled us to employ four additional enrollees plus a youth leader. Bob Barrett remained on in his Bio-Tech position until November, following completion of the 1986 YCC program.

Following are the major YCC projects accomplished in 1986:

Refuge Projects:

1. fence construction/removal;
2. construct rail fence for visitor parking lot;
3. building maintenance/painting;
4. transplant emergent vegetation.

Forest Service and Other Agency Projects:

1. reforestation surveys/monitoring;
2. streambed improvement/fisheries habitat;
3. erosion control;
4. fence removal;
5. emergent vegetation transplant - BLM;
6. reforestation, slash disposal - Colorado State Forest;
7. maintenance of public use facilities - Colorado State Parks.

Community Projects:

1. repaint historic building and landscape building site in Walden;
2. construct decorative fence and help construct trap-house at local 4-H Shooting Range;

Environmental Education Projects:

1. tour Saratoga NFH;
2. participate in waterfowl brood counts at Arapaho NWR.

4. Volunteer Programs

Once again in 1986, Arapaho NWR hosted a student volunteer from Colorado State University. Sandy Abraham, an undergraduate participating in the student internship program at the university, did an excellent job for us during the summer.

Pam (Johnson) Rizor returned to Arapaho NWR as a volunteer in October. Pam had worked here previously as a YCC crew leader in 1985, then moved to Utah where she was employed by the National Park Service. Following her marriage to a Walden man in August, Pam returned to North Park. She added very capable assistance during our pre-freezeup scramble to complete fencing projects, pond construction, and various other maintenance duties.



86 NR 9

7/28/86

E. Patten

YCC crew and Forest Service personnel constructing log check dam to improve fish habitat on Jack Creek, Routt National Forest.



86 NR 10

7/28/86

E. Patten

Completed check dam.



86 NR 11

6/25/86

E. Patten

YCC building and site beautification project in Walden.
(See news article on last page of report).



86 NR 12

6/23/86

T. Follett

YCC touring Saratoga NFH.

Both Sandy and Pam received subsistence allowances for their volunteer efforts.

5. Funding

Operational funding for Arapaho NWR comes from four basic sub-activities (1260, 6860, 1520, and 8610). In recent years construction money, earmarked for fence construction, has augmented our budget. Default on a fencing contract by the contractor in 1985 left several thousand dollars for us to use in 1986, but by the time we finally were notified of an amount and issued authority to spend it, the year was nearly over. Fortunately, it carried over into FY 87 and we'll be sure to spend it then.

The following table summarizes funding during the past five years.

<u>FY</u>	<u>1260</u>	<u>6860</u>	<u>1520</u>	<u>8610</u>	<u>BLHP</u>	<u>Const.</u>	<u>Total</u>
83	162,000	10,000	13,000	1,600	215,843 ^{a.}	--	186,600 ^{b.}
84	175,000	10,000	14,000	3,900	215,843 ^{c.}	183,000 ^{d.}	385,900 ^{b.}
85	174,000 ^{e.}	5,000	15,116 ^{f.}	5,000	--	130,000 ^{d.}	329,116
86	257,000 ^{e.}	5,000	20,400 ^{f.}	4,000	--	36,000 ^{g.}	322,400
87	190,000 ^{e.}	4,000	15,000 ^{h.}	3,500	--	24,000 ^{i.}	236,500

a. Carryover from FY 82.

b. Excluding BLHP.

c. Carryover from FY 83.

d. Carryover from FY 84.

e. Includes ARMM & RRP \$'s.

f. Includes \$5,400 from U.S.F.S.

g. Carryover from FY 85.

h. Estimated.

i. Carryover from FY 86.

6. Safety

The permanent staff and YCC program enjoyed an accident-free year.

Don Gore, foreman of the fencing crew, strained his back while lifting a fence post and spent the better part of a week convalescing at home.

Pam Rizor was struck in the head by a handyman jack while trying to extricate a pickup from a mud hole. Because our local doctor was out of town, Pam had to travel to Laramie, Wyoming for medical attention. She received several stitches to close the scalp wound, but was back at work the following day. (The handyman jack had to be destroyed.)

Monthly safety meetings were held with topics of discussion ranging from installation and use of woodburning stoves (a popular safety topic here at Arapaho) to planning a safe vacation (perhaps an even more popular topic, although not necessarily for safety meetings).

7. Technical Assistance

In addition to the YCC projects accomplished (see Section E.2.), the following list reflects assistance and/or services provided by Arapaho NWR staff to various agencies throughout the year:

A. Bureau of Land Management

1. Maintained Memorandum of Understanding (MOU) - regarding the sharing of heavy equipment to the benefit of both agencies. Provided secure temporary storage site for BLM equipment.

B. U.S. Forest Service

1. Temporary Housing - provided Case Ranch cookhouse for temporary and volunteer USFS employees.

C. Colorado Division of Wildlife

1. Big Game Aerial Census - provided observers and HQ as base of operations.
2. Elk Trapping, Tagging, Collaring - provided labor, snowmobiles, and trailer parking.
3. Moose Hunt Meeting - provided conference room for CDOW personnel to conduct pre-hunt meeting with successful applicants to Colorado's second moose hunt.
4. Law Enforcement - provided assistance in law enforcement and bag check during fishing, sage grouse, pronghorn, waterfowl and big game seasons. Collected grouse wings from hunters and submitted to CDOW biologist for sex/age analysis.
5. Prescribed Burning - provided labor and equipment for prescribed burn at Lake John State Wildlife Area.
6. Miscellaneous services included: plowing snow fence to move concentrations of wintering deer to reduce road kills and crop (hay) depredation; assist in the Annual Audubon Christmas Bird Count.

D. Jackson County 4-H Clubs

1. 4-H Shooting Club - provided personnel and labor for instruction on the .22 and trap range.
2. 4-H Wildlife Club - provided personnel to act as Club Co-Leader.

8. Other Items

A check in the amount of \$29,806.00 was presented to Jackson County as its Revenue Sharing payment for FY 85. The payment, delayed until May of this year, represented 64.36 per cent of full entitlement.

F. HABITAT MANAGEMENT

1. General

For the fifth consecutive year spring run-off was above normal which provided excellent waterfowl habitat conditions throughout the spring and summer months. Some flooding of riparian and meadow habitat along the Illinois River occurred during the second week of June as heavy rains swelled the river to over 650 c.f.s. Some Canada geese and mallards lost their nests from the flood waters, but overall, goose and duck production was not adversely affected.

2. Wetlands

Spring break-up began during the third week of March. Heavy run-off by the end of the month enabled us to fill Muskrat Pond, a new 99 surface acre pond completed last fall, in less than five days. By the third week of April the Illinois River was completely ice free and most refuge ponds filled to capacity via various water distribution systems. Excellent water supplies allowed us to maintain good water levels in the ponds throughout the summer and early fall months.

Our revised Water Management Plan incorporates planned drawdowns of specific ponds each year to maintain vegetative and invertebrate productivity. The planned drawdown of Reservoir #1 this year was only partially successful due to siltation and a faulty water control structure. The dike and water control structure associated with the reservoir have been identified by the State Engineer as requiring complete rehabilitation in the near future. Until the necessary rehabilitation work can be accomplished, the reservoir water level will be maintained at a drawdown level as much as possible. Wilson's, 76, Birdie and Reservoir #2 ponds are scheduled for drawdown next spring. The ponds will remain drawn down until the spring of 1988 when they will be re-filled, providing water is available.

Efforts to maintain, improve and expand water management capabilities on an annual basis have always received top priority at Arapaho. Water diversion points and water distribution systems have been improved through the installation of various water control structures and monitoring wiers. New wetland habitat is continually created by constructing new small dams and contour dikes. The opportunity to create new wetland habitat is unlimited and is restricted only by available manpower, equipment, funds and construction time in relation to weather and habitat conditions.

5. Grasslands

a. Irrigated and sub-irrigated meadows

The refuge receives irrigation water via 49 full or partially owned refuge water rights involving 321.471 c.f.s. of water. The primary source of water is the Illinois River while Spring Creek, Potter Creek and Antelope Creek provide only small amounts. Fourteen different structures divert water out of the Illinois River into more than 70 miles of primary irrigation ditches. Secondary ditches are used to flood irrigate



86 NR 13

5/20/86

E. Patten

Muskrat Pond, constructed in 1985, was filled in the spring of '86 and was an immediate success with Arapaho NWR waterfowl.



86 NR 14

8/27/86

E. Patten

A Parshal flume installed in one of our irrigation
ditches to measure water flow.

nearly 8,000 acres of meadow to maintain and perpetuate quality waterfowl breeding and nesting habitat. Although most of the meadow acreage is technically classified as wetland, it is addressed as grassland in this report, since most management strategies for meadow are closely associated with other adjacent upland habitat. Characteristic native flora include tufted hair grass, Nebraska sedge, ovalhead sedge, Baltic rush, Thurber fescue, slender wheatgrass and various species of willows. Common introduced species include red top, timothy, smooth brome, alta fescue, alsike clover and foxtail barley.

The primary objectives of meadow management are to provide shallow open water as soon as possible in the spring to attract migrating waterfowl and other migratory birds and to provide high quality nesting habitat for waterfowl and other wildlife.

Flood irrigation efforts began in late April, peaked in late May and basically ended by mid-July. An abundance of water enabled us to irrigate nearly all of the 8,000 acres of meadow this year.

After a year or two, winter snowpacks and wind tend to mat down residual meadow vegetation hindering new plant growth and ultimately reducing the desirability of the meadows for wildlife. Livestock grazing and to a lesser extent, prescribed burning, are periodically applied as management tools to rejuvenate meadow habitats. By using one or both of these management tools to remove old vegetation and flood irrigating the following spring, wildlife nesting and brood rearing habitat is enhanced for a couple more years.

b. Uplands

Several livestock grazing systems are used to manage the sagebrush-uplands. Depending upon vegetative growth and weather conditions which may vary considerably from year to year, most upland grazing is restricted until after June 1 each year. Grazing intensities vary for most units and some units are rested for several years or are part of a three to four unit rotational grazing system. Periodic grazing during the summer and fall allows most plants to complete their growth cycle and still provide adequate habitat for various species of wildlife such as sagegrouse and pronghorn.

Heavy winter snows and timely spring and summer rains maintained most refuge uplands in a good to excellent condition. Exceptions are scattered alkali areas and those uplands associated with the numerous white-tailed prairie dog colonies on the refuge.

7. Grazing

Livestock grazing is the primary management tool applied to refuge meadows and uplands. Generally the uplands are not grazed until after June 1 or until there has been sufficient new plant growth while refuge meadows are not grazed until after August 1, when approximately 90% of the waterfowl and other migratory bird nesting activities have ceased. Most permittees remove their cattle from the refuge by the end of October even though they may not have used their entire AUM allotment as heavy snowstorms accompanied by strong winds can be expected anytime in North Park after the middle of October. Winter grazing is not a normal practice or management tool used on the refuge because of deep snow and severe winds during most years.

About 45% of the refuge was grazed at various intensities in 1986 utilizing 4,699.38 AUM's from 8,274 acres. Grazing data is summarized in the following table:

Table 2 - Summary of 1986 Grazing Program

Unit	Acres		Total Acres	AUM's	AUM's/ Acre	Permittee
	Upland	Meadow				
A3*	231	43	274	68	.25	Hudspeth
A4	187	--	187	36	.19	CDOW
A5	115	334	449	538.22	1.20	Stephens
A8*	940	20	960	102	.11	Hudspeth
B1	425	--	425	20.27	.05	Hampton
B2	69	221	290	233.60	.81	Hampton
B5	32	254	286	149.43	.52	Hampton
B7	--	212	212	255.12	1.20	Hampton
B11	615	--	615	98.13	.16	Hampton
B12	43	215	258	376.06	1.46	Stephens
B13	49	238	287	300.00	1.04	Ogburn
B14	46	219	265	250.05	.94	Ogburn
B15	117	35	152	78.08	.51	Hampton
B19	16	75	91	82.19	.90	Wyatt
C2	215	130	345	86.94	.25	Willford
C3	86	135	221	86.95	.39	Willford
C9	--	80	80	127.20	1.59	Willford
C18	72	300	372	730.97	1.96	Burr
C19	110	--	110	18.81	.17	Anderson
D2	167	308	475	3.45	.01	Anderson
D4	123	28	151	45.61	.30	Stephens
D5	378	--	378	25.84	.07	Anderson
D6	148	127	275	238.31	.87	Anderson
D8	286	87	373	176.28	.47	Burr
D9	99	24	123	54.73	.45	Stephens
E2	120	500	620	528.38	.85	Burr
Totals	4,689	3,585	8,274	4,699.38		

* AUM's provided BLM grazing permittee per BLM withdrawal agreement.

Approximately 55% of the refuge was deferred in 1986, with the remaining acreage being grazed at various intensities. Grazing intensity ranged from 1.96 AUM's/acre to .01 AUM's/acre on meadow dominant units and from .87 AUM's/acre to .05 AUM's/acre on sagebrush-upland dominant units.

The current grazing program utilizing seasonal rotation and rest rotation at various grazing intensities provides a mixture of different vegetative treatments to refuge grasslands. We realize however, that our current grazing program is not sacrosanct and that continued experimentation will be necessary to refine the program to complement refuge objectives. In the future we plan on experimenting with some Holistic Resource Management (HRM) grazing management techniques and hopefully the system can be incorporated into our grassland management program.

Grazing fees for 1987 will be \$5.40 per AUM, an increase of \$.05 over this year's rate. A three year average of prices of beef cattle and calves for September, October and November is used to adjust future annual grazing fees. The average fall beef prices received in Colorado in 1984 provides the base from which annual grazing fees will be determined through 1994.

8. Haying

One Cooperative Farming Agreement involving haying on 138 acres of irrigated meadow was issued this year. This is the first haying activity permitted on the refuge since 1969. Permittee's harvested share was 75% and the refuge received 25%. Most of the refuge's share was stacked in the field with one load of bales delivered to refuge headquarters for storage. Objectives of this small haying operation were as follows:

- a. Provide a resident refuge elk herd of 20 animals an alternative severe winter food source than that of an adjacent landowner's hay stackyard which has received considerable amounts of elk damage in the past.
- b. Provide the refuge with a source of hay to utilize as nesting material in goose nesting structures each year.
- c. Provide a wet hayed meadow on the refuge each spring to attract migrating waterfowl and other water birds.

9. Fire Management

The refuge's first Fire Management Plan and associated Environmental Assessment were completed and approved in 1984. The plan addressed prescribed burning as a grassland management tool to be used initially on a small scale and then gradually expanded as the local community and general public became more familiar and accustomed to its use in grassland management.



86 NR 15

10/09/86

T. Follett

Prescribed burn of a mixed grass meadow. Residual vegetation was heavily lodged prohibiting optimum regrowth. Success of the burn won't be fully evident until spring of 1987.



86 NR 16

10/10/86

E. Patten

A second burn immediately south of the October 9 burn. This experimental burn in grazed meadow was conducted to evaluate the effects of fire and grazing on vegetation vs. fire or grazing alone.

A small burn of approximately 15 acres of decadent meadow was accomplished in the fall of 1984. The burn was only partially successful due to poor weather conditions. The following year a planned burn of 65 acres was abandoned entirely because of rain and snow. Finally this fall, we were able to burn 33 acres of matted meadow and another 175 acres of meadow that had previously been grazed.

Prescribed burning is a wildlife management tool used to manipulate habitat for wildlife in association with other recognized management tools such as grazing and haying. Although some of the effects of fire can be simulated through the use of livestock grazing, haying, chemical spraying and other mechanical practices, fire is unique in many ways and is often the superior means of treating habitat for the benefit of wildlife.

10. Pest Control

This past year several patches of Leafy Spurge were discovered in North Park. Fortunately for us, none were located on the refuge. The County has taken action to control the known patches through an extensive spraying program and hopefully the plant will never spread to refuge lands.

Canada thistle is the primary noxious weed found in small but numerous patches throughout the refuge. Irrigation ditch banks, disturbed landsites and the riparian willow habitat along the Illinois River are areas where it is especially common. Because of the topography and wetness of most of these areas, access to them with spraying equipment is often difficult.

A total of approximately 7 acres were sprayed using Esteron 99 concentrate (2,4-D) at a rate of 2 quarts/acre. Spraying efforts were concentrated along public roads and access areas with good control results achieved.

11. Water Rights

In 1982, a proposed point of diversion change involving 75 c.f.s on the McFarlane Ditch was applied for in District Court in and for Water Division 6 by the Shawver estate. The proposal could have affected water availability involving refuge water rights and was protested by the Fish and Wildlife Service and other private interests with water rights on the Illinois River in 1983. After several delays, a pre-trial meeting was held with the judge for Water Division 6 in April 1985 to determine what issues will be decided upon on the trial date set for December 5-6, 1985. Before the trial could be held, it was postponed for sometime in 1986 so that parties on both sides could have an opportunity to arrange a settlement conference. During the year several meetings and discussions were held but no agreement could be reached. Finally a trial date was set for January 8-9, 1987. However, in late December a settlement was arrived at and the District Court agreed. As a result of the agreement, refuge water rights and water management operations should not be adversely affected.

In December, the refuge was informed by the local water commissioner that a private party was planning on purchasing some private land north of the refuge. The individual had stopped in to see the water commissioner in regards to questions concerning water rights associated with the land he was planning to purchase. One of the water rights he mentioned was the Home Ditch #1 which our records showed was entirely owned by the refuge and involved a total of 4 c.f.s. of water. The water right in fact was our number one water right in priority on the Illinois River. The individual claimed that one-half of the water right was attached to the land he was proposing to purchase.

After many hours and several days of searching water rights and land deeds in the County courthouse, we discovered he was correct. So although we lost 2 c.f.s. of water right that we thought we had owned for over 10 years, we will not lose any of our water management capabilities as the entire 4 c.f.s. must flow through the refuge first and 2 c.f.s. of that flow leaves the refuge and has always historically been delivered to the land he is purchasing even though it has not been utilized in recent years.

G. WILDLIFE

1. Wildlife Diversity

Although the refuge's primary objective is the production of waterfowl, the protection, maintenance and perpetuation of all other indigenous wildlife and plant communities is also important. Most habitat management techniques such as prescribed burning, grazing, irrigation, pond construction and plant seeding benefit all native species, plant and animal in one way or another.

2. Endangered and/or Threatened Species

Two peregrine falcons were observed on April 28, 1986. Interestingly a falcon had been observed on the same date the previous year. You can bet we'll have our binoc's out on April 28, 1987.

Two observations of bald eagles were recorded: November 7 and December 5.

Greater sandhill cranes, listed as a threatened species by the State of Colorado, were observed on October 8. A flock of 43 were seen flying over the refuge, but were not observed to land.

3. Waterfowl

a. Ducks

With the arrival of spring on March 21, the first waterfowl were observed at the refuge. A few days later when open water began to appear on the Illinois River and ponds on the Case flats, the number of ducks had grown to about 100. By the end of March the total number of ducks on the refuge was approximately 1,000. The spring migration peaked at approximately 6,000 ducks during early May.

Breeding pair counts conducted on the 3rd and 4th weeks of May revealed 2.25 pairs per wetland acre, essentially unchanged from 1985. Nesting activity was again earlier than normal as evidenced by two duck broods (Mallard and Green-winged teal) observed on May 30, two weeks ahead of usual.

For the second consecutive year refuge personnel conducted "dummy nest" transects on the refuge. Purposes of the exercise are: 1) to obtain an estimate of waterfowl nest predation rates; 2) to compare annual nest predation rates; 3) to measure the effectiveness of predator control activities; 4) to determine the species of waterfowl nest predators. This information can also lend support to waterfowl production estimates. Nest sampling at Arapaho NWR has followed a three-year cycle with two years of dummy nest studies followed by more extensive nest transects in the 3rd year. Thus, nest transects are scheduled for 1987.

A total of 200 dummy nests were established along 10 transects using one fresh chicken egg per nest. Nests are spaced 200 feet apart with the eggs placed 15 feet alternately right or left of the transect center line. The sample period was thirty-five days in length and coincided with peak nesting activity.

Results from the 1986 study showed 74 percent (148) of the 200 nests undisturbed which is interpreted as "successful". The remaining 26 percent (52) were either destroyed or missing (assumed removed from the nest site by a predator). Two inherent fallacies obvious with this procedure are: 1) some eggs may be listed as missing due to the inability of the searchers to find them in dense vegetation. This then would bias the results, indicating greater nest predation than actually occurs; 2) on the other hand, the rate of nest predation by mammalian species would, I believe, be significantly underestimated due to the nature of the study. The scent produced by a nesting hen would enable mammals to "home in" on the nest which obviously would not happen with dummy nests. Depending upon results obtained from nesting transects in 1987, the dummy nest studies may be modified or discontinued.

Waterfowl production at Arapaho NWR is based primarily on brood counts. As a result of this year's counts and correction factors for observability as described by Hammond (1970), duck production was estimated at 9,528, a slight (2.5%) decline from 1985's record production. The total number of broods observed this year was slightly greater than in 1985, but average brood size was smaller in 1986. Table 3 lists duck production estimates for the past 18 years at Arapaho NWR.

Early fall migrants raised the duck population to about 13,500 in September, but by the end of October less than 2,000 remained. Colder temperatures and a winter storm on November 7 encouraged all but a few ducks to depart the area.



86 NR 17

7/86

J. Eisemann

Duck broods on '76 Pond.



86 NR 18

7/09/86

G. Brewer

One of many wigeon broods produced on Arapaho NWR in 1986.

Table 3. Estimated duck and Canada goose production on Arapaho National Wildlife Refuge, 1969 - 1977.

Species	1969	1970	1971	1972	1973	1974	1975	1976	1977
C. merganser	0	0	10	0	6	8	0	8	8
Mallard	40	100	525	700	627	650	517	566	363
Gadwall	25	20	140	145	235	247	337	483	446
Am. wigeon	65	65	350	220	322	345	412	402	224
Green winged teal	25	55	150	185	140	244	295	354	352
Blue winged/ Cinnamon teal	5	20	145	105	83	196	218	402	507
N. shoveler	0	10	80	140	138	247	167	113	210
Pintail	10	35	500	280	449	555	472	661	275
Canvasback	0	0	0	0	0	0	7	0	0
Redhead	0	0	75	10	17	52	20	85	128
L. scaup	0	0	0	345	386	570	410	635	156
Ruddy	0	0	65	35	42	50	59	77	76
Ring-neck	0	0	0	0	0	0	0	0	0
Unidentified duck	0	0	0	0	0	0	0	0	0
Canada goose	0	0	0	5	5	4	0	7	0
Total Ducks	170	305	2,040	2,165	2,445	3,164	2,914	3,786	2,745

Table 3. Estimated duck and Canada goose production on Arapaho National Wildlife Refuge, 1978 - 1986.

Species	1978	1979	1980	1981	1982	1983	1984	1985	1986
C. merganser	13	0	0	0	40	0	0	10	30
Mallard	663	245	48	435	922	408	414	249	383
Gadwall	856	476	291	663	1,414	1,536	2,394	2,863	2,293
Am. wigeon	821	98	137	263	1,045	1,497	1,012	1,557	1,423
Green winged teal	500	219	13	247	737	713	507	302	455
Blue winged/ Cinnamon teal	421	376	82	174	193	996	696	1,154	857
N. shoveler	515	80	187	233	859	1,340	688	968	552
Pintail	400	373	63	430	1,291	958	1,626	733	782
Canvasback	7	23	0	0	0	5	30	0	0
Redhead	289	190	49	25	328	491	182	300	563
L. scaup	510	474	291	77	748	1,046	1,174	1,266	1,638
Ruddy	138	13	9	12	178	242	316	364	527
Ring-neck	0	8	0	0	7	0	7	0	0
Unidentified duck	0	0	0	0	49	38	15	8	25
Canada goose	21	48	114	100	125	127	148	212	253
Total Ducks	5,133	2,575	1,170	2,559	7,811	9,270	9,061	9,986	9,528

b. Geese

The first Canada goose observation of the year occurred on March 3, but most arrived several weeks later. Three broods were spotted on May 14, six days earlier than in 1985. Most of the hatch took place in June, however. There were 76 goose nesting structures available for use in 1986; 65 of them (85.5%) were utilized. In addition, 3 of 6 islands with hay were also used by nesting geese. Two of the three nests on the islands hatched, and 47 of the 65 nests on structures were successful. One goose nest on a muskrat house was also successful as was one (albeit crowded) in a mallard nesting structure on the Illinois River. All tolled there were an estimated 253 Canada geese produced on Arapaho NWR in 1986. This surpassed the record production of 1985 by 41 geese.

4. Marsh and Waterbirds

As in 1985, great horned owls and probably magpies decimated the black-crowned night heron rookery. On June 6 there were 92 active heron nests with 8 chicks and 153 eggs. By July 7, all eggs and chicks had been destroyed.

A nesting colony of eared grebes is located on one of the ponds in the Case tract. In 1986, there were 10 active nests when checked in mid-July. Both the black-crowned and grebe colonies were reported to Cornell University for the Colonial Nesting Bird Survey.

One great blue heron nest was found on the refuge; three young were raised.

Sightings of white-faced ibis continue to increase. Five separate sightings were recorded in 1986 with as many as 11 birds observed in one flock. We have not documented any nesting attempts yet.

Double-crested cormorants were observed for the second consecutive year. Last year's single observation was a first for the refuge; this year a single individual was seen on June 6 and September 18.

An unusual sighting of a cattle egret was made during the year.

Other birds within this group which are more or less common at Arapaho NWR include: western and pied-billed grebes, snowy egret, American bittern, Sora and Virginia rails, and common snipe.

6. Raptors

Prairie falcons were observed on occasion during the warmer months. Birds are known to nest in the rocky buttes and bluffs west of the refuge, but nesting on the refuge has not been documented.

In addition to the great-horned owls which nest on the refuge and wreak havoc amongst our black-crowned night heron colony, short and long-eared owls are summer residents and no doubt produce a few young also. We also observed a burrowing owl for several days near a pond on Case flats. Whether it was the same individual each time is debatable.



86 NR 19

7/12/86

S. Abraham

Some of the Canada geese raised on the
refuge.



86 NR 20

6/25/86

J. Eisemann

The one and only Great Blue Heron nest on the refuge was
located in a cottonwood near the Boyce Bros. ditch.

Swainson's hawks and northern harriers also nest on the refuge. Red-tailed hawks and golden eagles are regular visitors.

8. Game Animals

A resident herd of 15-20 elk remains on the refuge along the Illinois River bottom year-round. Other elk, up to about 150, wintered on and adjacent to the refuge in the Owl Ridge area. With the record amount of snowfall received during the winter of '85-'86, the elk came early and stayed late. The winter of '86-'87 proves to be different, however. Through December 1986, only one small herd of 16 elk had approached the usual wintering area and they may well have been the resident herd mentioned above.

Moose numbers are gradually increasing on the refuge as they are throughout North Park. Moose #23, one of the cows released in North Park in 1979, once again was observed with a calf. She has raised at least one calf every year since released on the Illinois River upstream from the refuge. Several other cows and calves were observed in 1986 as well as several bulls, varying in size. We estimated the summer moose population at 12 individuals. Most of the refuge moose migrate up-river into the timbered area of the Illinois River during the winter.

There were three moose hunting permits issued in 1986. All three were filled in the first two days of the season. There were four moose killed illegally in 1986 (3 bulls and 1 cow), none of which were killed on the refuge.

Mule deer are present on the refuge throughout the year. Like elk, mulies gather in considerable numbers to winter on the windswept ridges east of the Illinois River near refuge HQ. Depending on the severity of the winter 200 to 500 deer may gather, often requiring supplemental feeding by the CDOW. About 250 mule deer wintered on the refuge during January through March, none during November and December. We estimate 30-40 mule deer stay on the refuge during the summer months.

Once every 4-5 years a few white-tailed deer are seen on the refuge. None were observed in 1986, however.

Pronghorn are residents of the refuge and depending upon winter conditions may be present year-round. As they wander on and off the refuge, their numbers vary between 50-200 on any particular day. In winter, as many as 300 animals may gather on the Case flats area of the refuge. The heavy snowfall during the winter of '85-'86 caused North Park pronghorns to migrate completely out of the Park down the North Platte River into Wyoming. This is the first time anyone recalls that happening.



86 NR 21

1/86

J. Solberg

A few of the mule deer that frequented the HQ area during the winter of '85-'86.



86 NR 22

3/86

G. Brewer

Affectionately known as "Scarface", this critter couldn't be bothered to wait for CDOW personnel to distribute supplemental feed.



86 NR 23

7/22/86

S. Abraham

Sage grouse weren't usually this easy to find on the refuge. These broods were spotted along one of our back roads near the Illinois River.

10. Other Resident Wildlife

The refuge sage grouse population, indeed the North Park population, continues in a depressed state. Brood counts conducted on the refuge did not appear to reflect even the little recruitment which occurred. We estimated production on the refuge at 100 grouse. Perhaps the mild winter experienced at the end of the year will be beneficial for the grouse population.

Each year we survey the Illinois River for signs of beaver activity (dams, lodges, food caches, fresh cuttings) to determine relative status of the population. In 1986 we found 20 dams and 6 dens, most along a three-mile stretch of river adjacent to, and south of HQ. So far no problems have resulted from beaver activity but a close watch will be maintained.

Other resident species found at Arapaho NWR include coyotes, striped skunks, badgers, mink, weasels, red fox, and raccoon. No information on the relative abundance of these species has been obtained for several years. A survey for such data is planned for 1987.

11. Fishery Resource

The Illinois River provides good to excellent habitat for brown trout. Due to excellent water conditions during the past 4-5 years, the trout fishery has improved annually. Several 3-5 pounders have been harvested on the refuge during recent years.

15. Animal Control

Removal of nest predators was conducted through an approved Predator Management Plan. During the year the following animals were removed from the refuge: 7 skunks, 60 magpies, 3 crows, and 3 ravens.

17. Disease Prevention and Control

By most standards waterfowl losses due to botulism at Arapaho NWR are small. Even in a normal year we generally lose only 20 to 30 ducks to botulism during August as water levels in refuge ponds begin to recede. In 1986, however, we experienced practically no botulism losses due, we believe, to the availability of water throughout the summer months. Less than a dozen ducks were picked up from ponds on the Case flats and although we suspected botulism as the cause of death, it was not verified.

H. PUBLIC USE1. General

Arapaho NWR receives relatively little visitor use compared to many other refuges nationwide. Virtually all of our visitor use is wildlife related. Much of our visitation spurred by wildlife

observation is due to the presence of two bird species: sage grouse and rosy finches. Many birders looking to add these species to their life lists do so at Arapaho NWR. Hunting and fishing are popular activities of refuge visitors during appropriate seasons.

A relatively young refuge, Arapaho is currently in the midst of upgrading and adding public use facilities. A former residence converted to the office/visitor contact station in 1985 has improved our capability to meet refuge visitors and expound the finer points of the refuge system in general and Arapaho NWR in particular.

5. Interpretive Tour Route

The self-guided auto tour route is open year-round subject to road conditions. The six-mile route makes a loop through part of the Case tract and takes in much of the best waterfowl habitat on the refuge. Sage grouse, pronghorns, raptors, prairie dogs and various other wildlife can usually be observed on the tour route on any particular day.

Approximately 1,600 visitors used the tour route in 1986.

6. Interpretive Exhibits/Demonstrations

Two kiosks for interpretive displays were erected on the refuge this year. One stands just off State Highway No. 125 at the Case entrance road and the beginning of the tour route. The second was placed along the HQ entrance road on the hill overlooking the Illinois River. Each of the kiosks is designed for interchangeable display panels which explain habitat management on the refuge or information regarding refuge wildlife. Crushed gravel parking lots with guardrails further enhance the display areas.

Our temporary employees constructed and displayed a float for the Annual North Park Rodeo Weekend Parade in June. Carrying the message "Take Pride in America," the float depicted a refuge employee censusing waterfowl. It was a job well done and received many favorable responses. Hopefully we'll have future employees with the talent and ingenuity to continue this worthwhile effort (personally, I could take lessons from these people).

7. Other Interpretive Programs

The following programs and/or tours were given by refuge personnel during the year.

March - Solberg made 3 presentations for National Wildlife Week to 13 teachers and 188 students at the Walden Elementary school. This year's theme was "Discover Wildlife in Your World". Solberg also promoted Secretary Hodel's "Take Pride in America" campaign.

May - Patten presented a talk and slide program and conducted a refuge tour for 15 CSU wildlife students.



86 NR 24

8/19/86

R. Varney

One of two informational kiosks constructed in 1986. This one, standing at the entrance of the tour route on Case Flats, needs only the information panels installed.



86 NR 25

8/19/86

R. Varney

The completed product. Interchangeable displays lend versatility to these attractive public information exhibits.



86 NR 26

6/29/86

E. Patten

Refuge float entered in the North Park Rodeo Weekend Parade.

- June - Eisemann, Vos, and Abraham gave a talk and interpretive tour to 14 youngsters and 4 adults from the Walden Lots-O-Tots Day Care Center.
- July - Eisemann gave a refuge slide show and interpretive tour to four YCC youths and the Refuge Assistant from Saratoga NFH.
- July - Patten conducted a tour of the refuge as part of the activities of the Colorado Chapter of Wildlife Society's summer meeting.
- August - Eisemann, Vos, and Abraham conducted a refuge tour for the "Fun in the Sun" kids, a local summer recreation group.
- Varney and Abraham gave a slide presentation and refuge tour to a group of 20 Wyoming school teachers enrolled in an environmental education workshop sponsored by CSU.
- September - Eisemann conducted a refuge tour for 40 students from the Oak Creek elementary school.
- Eisemann also conducted a tour for two exchange students from Holland.
- October - Patten conducted a tour of the refuge for 18 members of the Colorado Cattlemen's Association.
- December - Patten gave a presentation to the North Park Stock-grower's at their annual winter meeting.

Several news releases were submitted to the local Jackson County newspaper during the year. Subjects included: prescribed burning and trapping on the refuge, YCC activities, and the Audubon Christmas Bird Count.

8. Hunting

Arapaho NWR is open to hunting of sage grouse and pronghorns only, at the present time. We are in the process of preparing a new hunting plan in which we propose the hunting of ducks, rails, etc., and other upland species. The plan will be submitted to the Denver RO for review early in 1987.

The archery seasons for pronghorns ran from August 16 through the 31st for bucks only and from September 1-20 for either sex. Hunting pressure was light with only 8-10 archers participating. We were not aware of any animals harvested.

The rifle season for pronghorns was September 27 - October 3 for permit holders. A state drawing determines which licensed hunter receives a pronghorn permit. Permit-holders are restricted to specific hunting units and sex to be taken. There were approximately 30 permits issued for the hunting unit which includes the refuge.



86 NR 27

6/18/86

S. Abraham

"Lots-O-Tots" day care kids enjoying the tour conducted by Bio-Aid John Eisemann. (John's the one with the cap).



86 NR 28

7/19/86

S. Abraham

Members of the Colorado Chapter of the Wildlife Society look for moose along the Illinois River from atop the refuge's Owl Ridge.

We estimated that half of these hunters hunted on the refuge at one time or another. No hunters checked on the refuge had harvested a pronghorn. One small buck was found shot and abandoned along a county road three miles east of the refuge. The animal had been dead for several hours and the lack of any evidence at the scene precluded further investigation.

Sage grouse hunting is popular on the refuge and throughout North Park, at least during the opening weekend. The season opened on September 13 and closed on October 5. During the first weekend, refuge personnel checked 112 hunters on, and immediately adjacent to, the refuge. Hunting pressure on opening weekend was down slightly (14%) from 1985, perhaps due to the general consensus that the grouse population is so depressed. Hunter success was essentially unchanged from the previous year (0.62 birds per hunter in 1986 vs. .060 in 1985) but the hunting time expended in bagging birds declined significantly (from 7.5 hrs. per bird in 1985 to 4.4 hrs. per bird this year). Either the grouse population isn't as depressed as everyone seems to think or this year's hunters did a better job of finding them. No statistics were kept on hunter success regarding those hunting with a dog vs. those without. (We'll check that out next year).

9. Fishing

The Illinois River is open to fishing year-round except during June and July when a refuge fishery closure is in effect to minimize disturbance to nesting waterfowl. Good to excellent water conditions throughout the summer months over the past four years have improved the fishery on the refuge.

Between March 21 and September 11, 24 creel checks were obtained by refuge personnel. A total of 75 brown trout were caught in 146 fishing hours for an average of .051 fish per hour. Trout ranged in size from 6" to 22", with the majority (71%) falling in the 10-15" range. Most (63%) of the fishermen checked used artificial lures for bait. Thirty percent used garden hackle while seven percent used flies. Surprisingly (at least to me) fishing success based on choice of bait corresponded to the frequency of the bait used. That is, 64 percent of the fish caught were caught on lures, 29 percent on bait and 7 percent on flies. (I would have lost some money on that one). The larger fish appeared to prefer artificial lures as all fish caught over 13" were caught on lures. Smaller fish seemed to prefer bait (only 4 fish under 10" were caught on lures vs. 10 on bait). No fish larger than 11" was caught on a fly. The moral of the story is - if you want to catch fish in the Illinois River on Arapaho NWR, it doesn't matter what technique you choose, but for trophy fish use lures.

10. Trapping

The refuge is divided into two trapping units with permittees selected by a public drawing. Trapping permits cost \$25.00 and permittees are allowed to keep their entire harvest. The refuge trapping season starts on the third Saturday of October and extends through March 20 of the following year as specified in the refuge trapping plan.

For all intents and purposes, however, the season is over when the refuge freezes up which is generally prior to Thanksgiving. Refuge trappers are subject to state regulations and limits.

Through December, refuge trappers had harvested 401 muskrats, 1 mink, and 1 coyote. An emaciated hen mallard was the only non-target species caught.

17. Law Enforcement

There were few enforcement problems encountered on Arapaho NWR in 1986. Refuge personnel conducted enforcement/bag checks during the sage grouse, waterfowl and antelope seasons as well as creel checks during the fishing season. Only one citation was issued to a grouse hunter who turned himself in upon realizing he had illegally killed mourning doves on the refuge. He had his young son with him and stated that he wanted to set a good example for the boy, thus he informed on himself.

Refuge officers are also issued L/E credentials by the State of Colorado for fish and game laws/regulations. Thus we occasionally work off-refuge either with State conservation officers or independently during the opening of selected hunting seasons. Two citations were issued as a result of off-refuge enforcement activities. Seems like eared grebes look alot like "baby coots" on Walden Reservoir.

I. EQUIPMENT AND FACILITIES

1. New Construction

Major force account construction activities this year involved the creation of new wetlands on the refuge. Five new ponds were constructed on former BLM lands which were withdrawn from the public domain in 1984. Sites were selected along natural drainages, surveyed, and then dikes constructed with fill from adjacent barrow areas using refuge equipment. Stop-log water control structures were built and installed in the dikes and then the dikes and barrow areas were seeded with various grass seed mixtures. Two water take-out structures were fabricated and installed in the Hubbard #2 irrigation ditch system upstream from the new ponds to provide an additional source of water for the ponds. Finally, several goose nesting structures were installed around the high water line of each new pond. We are eagerly waiting the arrival of next spring, and hopefully, to realize the "fruits" of our time and effort.

The kiosk along the headquarters entrance road was completed prior to the summer public use season. Work included staining and sealing the kiosk, fabricating interpretive sign frames and leaflet dispenser and installing interpretive display panels. Construction of a kiosk along the self-guided auto tour route was initiated later in the summer. Selected site was landscaped and a parking area developed with 60 ton of 1½ inch washed rock. A concrete foundation base was poured and the kiosk frame structure constructed, followed with cedar siding. Construction and installation of sign frames and installation of interpretive display panels will be completed in 1987.



86 NR 29

11/14/86

E. Patten

Bio-Aid Eisemann helping construct one of five new ponds. It's gratifying to see one's efforts produce something beneficial to the resource and if you're lucky the finished product may bear your name for posterity, hence, "Eisemann Acres".



86 NR 30

8/26/86

E. Patten

Installation of a water control structure in one of the new dikes. Structures were placed to facilitate draw-downs which we anticipate accomplishing on a regular schedule.

The cold storage area (30'x60') of the refuge shop was completely insulated and two overhead heaters installed. We will now have a minimally heated bay area to store our "ready to go" fire truck for emergency purposes and also extra room to conduct winter construction and maintenance activities.

Thirteen new goose and 18 new mallard nesting structures were fabricated and installed at various locations on the refuge. We know that most of the goose nesting structures will be utilized by Canada geese but really don't know what to expect from Paddy "O" Mallard.

Two miles of new interior fence were constructed on the Hampton tract and 9 new cattleguards installed at several locations on the refuge. The new cattleguards were associated with the new boundary fence contract nearly completed late last year.

A new Parshal measuring flume was installed in the Riddle irrigation ditch system. Although we have partial water rights in the ditch along with that of a private landowner, there never has been a way or method to measure the actual flow in the ditch and how much we use each year.

2. Rehabilitation

The refuge entrance sign along State highway 125 was removed, repainted, new letters applied and then re-installed.

A local contractor re-graveled one half mile of the refuge entrance road with 3/4 inch road base gravel.

New propane gas detector systems were purchased and installed by a local contractor in the refuge office and in temporary Quarters #28.

Quarters #2 received major rehabilitation work this year. First the ceiling was insulated and then the old deteriorated roofing was removed and replaced with new roofing material. Next the old tile siding was removed and new steel siding installed. Finally, a bathroom shower system was purchased and installed and the interior walls and ceiling repainted. Quarters #2 provides housing for some of our temporary employees and volunteers during the work season.

Quarters #28 which also provides temporary housing, received a new bathroom shower system. A faulty underground electrical line between the quarters and a Mountain Parks Electric Company utility pole was removed and replaced with a new underground line.

Quarters #56 which also provides housing for the Assistant Refuge Manager received a new exterior paint job. The nearly nonfunctional wood garage door was replaced with a new fiberglass door.



86 NR 31

9/11/86

E. Patten

Several miles of fence were constructed in 1986. Smooth wire used for the bottom strand allows pronghorn to slip underneath without injury.



86 NR 32

5/13/86

E. Patten

Anna, Mark, and Gale installing cattleguard above Illinois River.



86 NR 33

8/08/86

R. Varney

Quarters #2 receiving face lift with new shingles on the roof, a new coat of paint for the trim, and new aluminum siding.



86 NR 34

8/19/86

R. Varney

Since we don't have a "before" photo to go along with the "during" and "after", you'll have to take our word for it that the improvement is considerable.

3. Major Maintenance

The Hubbard #2, Oklahoma #1, Dreyer, Riddle and Ward #1 irrigation distribution systems received major maintenance work in the form of washout repairs and silt removal.

The North Park #6 measuring flume required re-setting and repairs of back washouts around the structure.

A washout on the South Allard contour dike was repaired and a portion of the dike was raised to prevent any future washouts.

One mile of old fence was repaired and 4.5 miles of old fence remaining from the defaulted fence contract of last year was removed by laborers hired with the remaining fencing contract funds.

Nesting transect signs were repainted and replaced as necessary in preparation for next year's nesting study.

4. Equipment Utilization and Replacement

Two new 5 to 6 yard dump trucks that were requisitioned last year and were supposed to be received this year were delayed until sometime in the future because of specification problems with GSA. The cost of the two trucks originally requisitioned was nearly double the amount of funds programed for the acquisition.

A 4x4 utility passenger vehicle requisitioned last year will hopefully be received sometime in 1987.

A heavy duty bumper was fabricated and installed on the 1985 Dodge one ton 4x4. A Warn 8,000 lb. winch was purchased and then installed on the truck.

A 1974 Chevrolet 4x4 pickup was transferred to Malheur NWR and an air compressor transferred to ADC in Grand Junction, CO.

A TV satellite dish and receiver system was purchased and installed at Quarters #56 using Quarters Maintenance funds.

5. Communication Systems

AT&T finally installed a new Merlin phone system at the refuge headquarters in September. The system had been ordered in June. This system takes some getting used to, but it sure is fun.

6. Computer Systems

After several years of being told that we will receive a computer system, we have none. Now we are being assured that we will receive a system in 1987. Page two!



86 NR 35

11/14/86

E. Patten

Maintenance Worker Brewer putting finishing touches to repairs on one of our contour dikes. "Scraper" was a blasphemous word in North Dakota, but in the right hands they can be excellent tools for habitat development.



86 NR 36

11/26/86

E. Patten

A new satellite dish improved TV reception in Quarters #56 and added hours of immeasurable enjoyment of basketball viewing by a die-hard Celtic's fan. (Please, no tasteless comments about the Playboy Channel - I get enough of those at the office, RNV).

7. Energy Conservation

The ceiling in temporary Quarters #2 received 6 inches of insulation and the cold storage area of the refuge shop was completely insulated and two overhead heaters installed.

8. Other

Buildings received with the acquisition of the Anderson tract were surveyed and sold through the informal bid process. Hopefully, we can get most of the former homestead site cleaned up in 1987.

J. OTHER ITEMS3. Items of InterestCommunity Involvement

Patten and Brewer are active members of the Jackson County Lions Club; Varney joined toward the end of the year.

Patten is a member of the Oddfellows Lodge.

Solberg was a leader for the Jackson County 4-H Shooting and Wildlife Clubs.

Brewer judged a county 4-H competition.

Follett is a Cub Scout Den Leader.

Eisemann was an Assistant Boy Scout Leader.

Eisemann, Vos and Abraham assisted the Jackson County Sheriff's Department with the Annual Bicycle Rodeo.

Personnel Training

Patten - attended two courses on Holistic Resource Management: a three day course in February and a 5½ day course in August.

- attended a steel shot seminar sponsored by CDOW at their HQ in Denver during May.

- attended a three-day planning workshop at LaCreek NWR in August.

Solberg - attended OPM course Introduction to Supervision in Denver during February.

Follett - attended a GSA course on procurement methods and programs in Fort Collins in April.

Patten - all attended L/E refresher training either in Denver or North Dakota during the year.

Solberg -

Varney -

Brewer -

Refuge Manager Patten received his 20-year certificate from ARD Kverno at a presentation ceremony in July. Gene had to wait a month to celebrate, however, since his service computation date falls in August.

3. Credits

Patten - Sections: C,D,F,I, Editing

Varney - Sections: A,B,E,G,H,J, Editing

Follett - Typing, Photocopying, Assembly

Photos - As noted.

K. FEEDBACK

Yes, we had our share of problems along with a few gripes this past year. Most were resolved in one way or another and some are just an inherent part of the system. But overall, we had another good year and most of us are satisfied if not happy. We are satisfied because in spite of bureaucratic red tape that is often encumbering, we know that we accomplished some good for the "Resource". Yes, it is satisfying and we do "Take Pride".



86 NR 37

7/17/86

R. Varney

ARD Nels Kverno presenting Manager Patten with his 20-Year Length of Service Award.

Pump House Wins

Last Friday, the North Park Chamber of Commerce received word that the "pump house" has placed FIRST in the state in the "Make America Beautiful Contest." The yearly contest is sponsored by Hyponex Garden Projects and 'Family Circle' magazine and featured in the magazine.

The Chamber will receive \$100 and a commemorative plaque for its winning garden. The "pump house" will now go on to compete for the regional prize against the winners from Montana, Utah and Wyoming. The national grand prize is \$4,000 plus another \$4,000 worth of garden products from Hyponex. "We will also be featured in "Family Circle," said an excited Patty Lutz, Chamber secretary.

Patsy Bunge, Chairman of the Beautification Committee, brought the contest to the Chamber's attention originally. Members decided it was a good idea hoping that if the Chamber started a beautification project perhaps others in the community would start one as well.

Bunge volunteered to chair the project and picked five people from various organizations throughout the community to serve on her committee: a member of the Walden Town Council; a member of the North Park Economic Development Council; an employee of the Soil Conservation District; a member of the Chamber; and, a senior citizen known for his abilities as a rock painter.

The committee held its first meeting on April 24 and the "pump house" was chosen as the best site because it was a main approach into our community; it was a small area; and it was beginning to look run down. Taking into consideration an altitude of over 8,000 feet and a growing season of only 45-50 days, the committee planned to use only hardy perennials and annuals that had been started inside. A pioneer theme was chosen - to fix up the pump house to resemble a "little red school house."

The Town Council was approached for permission to use the site; for a donation of paint; and, to take down the fence with the understanding that a fence would be put back later to establish boundary lines. The Council agreed to all proposals and offered to assist further in any way they could.

Responding to a newspaper article, flowers, an old pump, an old wagon and an old bell were donated by local citizens. The YCC kids working as summer help out at the National Wildlife Refuge worked for two days helping to prime, paint and



At the north edge of Walden, the redecorated Pump House is a tribute to the efforts of many North Park volunteers this summer. This winning State of Colorado entry in the Make America Beautiful Contest now goes on to regional competition.

landscape the area. Perennial columbines, delphinium, bachelor buttons, iris, roseum, johnny jump-ups, shasta daisies and sedum; and, annual petunias, marigolds, silver dust and snapdragons were planted.

Not only the Town, the Chamber and the Refuge were involved in the project. Those groups were joined by Wyatt Redi Mix and

Sessions and Sons, and the Jackson County Road and Sheriff Departments. Expenses were covered by donations from those organizations and individuals.

"North Park certainly thanks everybody who put in time and effort on this project," Lutz concluded. "Stay tuned because we have only just begun."

HUTTON LAKE NATIONAL WILDLIFE REFUGE
Wyoming

Administered by Arapaho N.W.R.
P.O. Box 457, Walden, Colorado

Introduction

Hutton Lake National Wildlife Refuge is in Albany County, southeastern Wyoming, 12 miles southwest of Laramie, 10 air miles north of the Wyoming-Colorado border. Established in 1932 primarily as a resting and breeding ground for migratory birds and to provide haven for other indigenous wildlife, the refuge is a satellite of Arapaho National Wildlife Refuge.

Situated in the southern part of the Laramie Plains, a montane, park-like geographic entity surrounded by mountains, the refuge is at an elevation of 7,150 feet. The area embraces 1,968 acres, consisting of 1,408 acres of upland and 560 acres of open water and marsh. The five small lakes on the refuge (Hutton, Creighton, George, Rush and Hoge) are arranged in a half-moon and were developed from natural sumps by private, and later, wildlife interests.

Sand Creek, spawned in Colorado and seasonal nourisher of refuge lakes, snakes a northward course through a small west portion of the refuge. Meadowlands, lush with a wide variety of semiaquatic plants, are situated to the west and north, while native grass rangelands, interspersed with greasewood-dominated alkali flats and draws, lie to the east and south.

1986 Activities

Hutton Lake NWR was visited several times during the year. Waterfowl censuses during the spring migration revealed 1,331 ducks and 19 geese in March, increasing to 3,217 ducks and 41 geese in mid-April, then declining to 1,940 ducks and 33 geese by late April. By the end of May, all waterfowl had departed except for 267 ducks and 24 Canada geese. Based on brood counts conducted late in July, waterfowl production at Hutton Lake NWR was estimated at 427 ducks and 20 Canada geese.

In October, a three-member maintenance crew repaired boundary fence to prevent cattle trespass and attempted to clean out a clogged water control structure. On the latter project they met with little success.

Several years of spring flooding has taken a toll on refuge water development. We need to spend several days of serious rehab work at Hutton Lake; we're shooting for 1987.

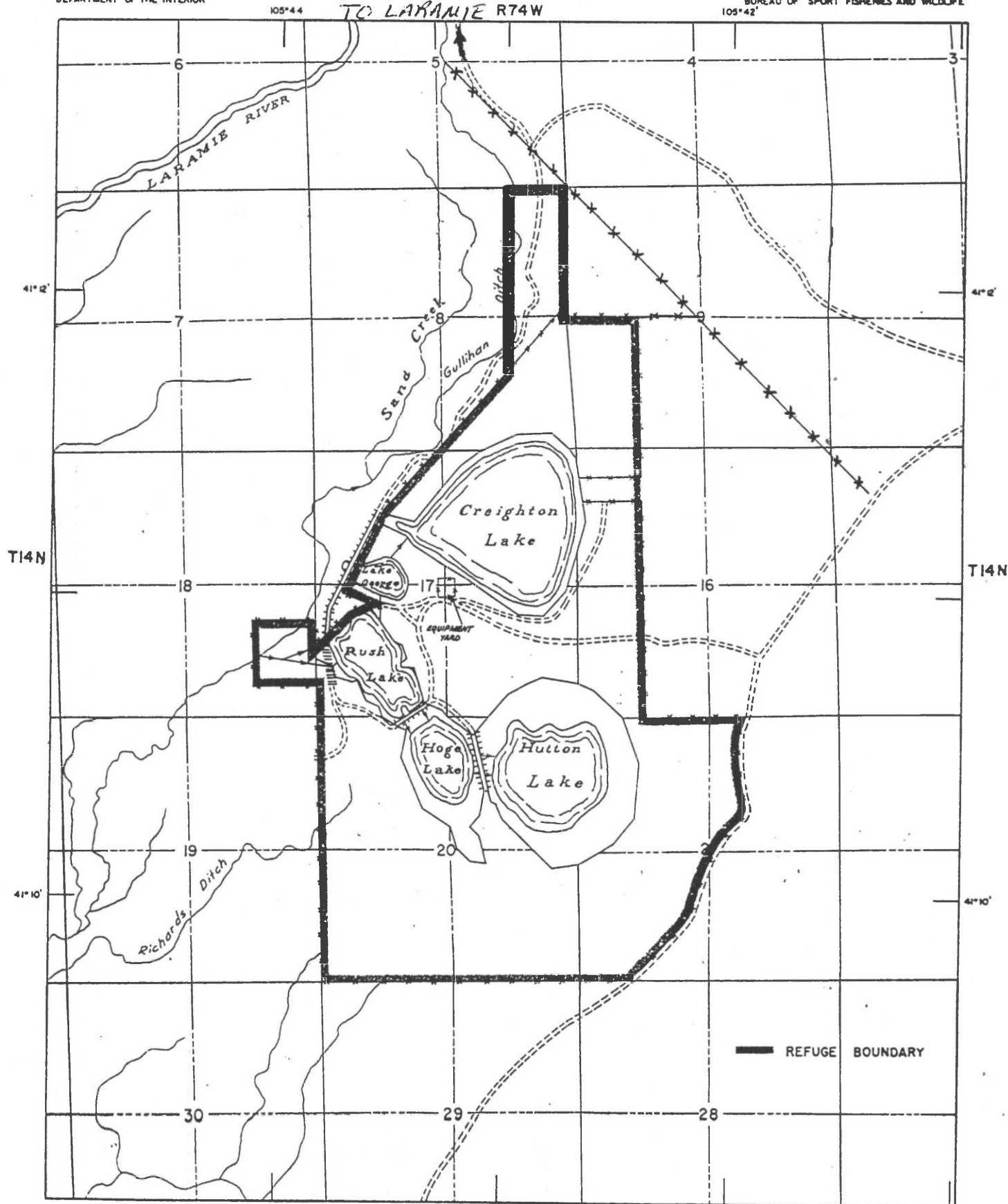
A check for \$1,472.00 was presented to Albany County as an in-lieu of tax payment for Hutton Lake and Bamforth NWR's.

HUTTON LAKE NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

ALBANY COUNTY, WYOMING

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



COMPILED IN THE BRANCH OF ENGINEERING
FROM SURVEYS BY U.S.G.L.O. AND F.W.S. MAP
DATED AUG 1956 WITH FIELD REVISIONS
FEB. 1964
ALBUQUERQUE, NEW MEXICO MARCH 1964

Scale 0 20 40 60 80 CHAINS
1/4 1/2 3/4 1 MILES

SIXTH PRINCIPAL MERIDIAN



TOWNSHIP
DIAGRAM



MEAN
DECLINATION
1960

2R WYO 140 40

PATHFINDER NATIONAL WILDLIFE REFUGE
Wyoming

Administered by Arapaho N.W.R.
P.O. Box 457, Walden, Colorado

Introduction

Pathfinder National Wildlife Refuge is an overlay on part of the Bureau of Reclamation's Pathfinder Reservoir in south-central Wyoming. This isolated refuge is 50 miles southwest of Casper and 20 miles from the small settlement of Alcova, Wyoming. Refuge headquarters for Pathfinder Refuge is at Arapaho NWR, about 200 miles to the north.

The refuge was established on August 1, 1936 as an overlay on the entire reservoir but it was reduced to its present four smaller units containing 16,807 acres, to facilitate more intensive management by Public Land Order in 1965. The largest unit of the refuge lies astraddle of what is known as the Sweetwater Arm of the reservoir. The three smaller units are to the south of the large one at Goose Bay, DeWeese Creek and at the junction of Sage Creek and the North Platte River.

Pathfinder Refuge is an established feeding, resting and nesting ground for both ducks and Canada geese, providing for as many as 8,500 ducks and 500 geese on their annual migrations.

In addition to migratory birds, the refuge provides habitat for hundreds of antelope, cottontail rabbits, a few mule deer and sage grouse. It is typical of much of the semi-desert lands of Wyoming, except that the reservoir furnishes more water. Since the reservoir fluctuates as much as 50 feet per year, it is difficult to provide food and cover for waterfowl near the water line.

1986 Activities

Due to its relative isolation and distance from Arapaho NWR, Pathfinder NWR is seldom visited. Refuge personnel traveled to Pathfinder NWR twice during 1986. In June, Patten visited the refuge to assess grasshopper populations, then met with County, State and other Federal personnel in Rawlins, Wyoming to discuss control of the little critters. As a result of this and other 'hopper problems in Region 6, the R.O. granted permission for selected spraying operations where damage was evident or imminent.

Patten and Varney toured the refuge in September to orient Varney to the area and check out the possible impacts of a proposed dam. State and Federal agencies in Wyoming are considering raising the water level in the south half of the reservoir by constructing a dam near the DeWeese Creek Unit of the refuge (see map). Based on preliminary information we determined little adverse impact to refuge interests.

The FY 85 in lieu of tax payment to Carbon County amounted to \$350.00 and was presented to County Commissioners in May 1986.

PATHFINDER NATIONAL WILDLIFE REFUGE

CARBON AND NATRONA COUNTIES, WYOMING

UNITED STATES
DEPARTMENT OF THE INTERIOR
R 86 W

R 85 W

104°55' R 84 W

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
104°50' R 83 W

T 30 N

T 29 N

T 28 N

T 27 N

T 26 N

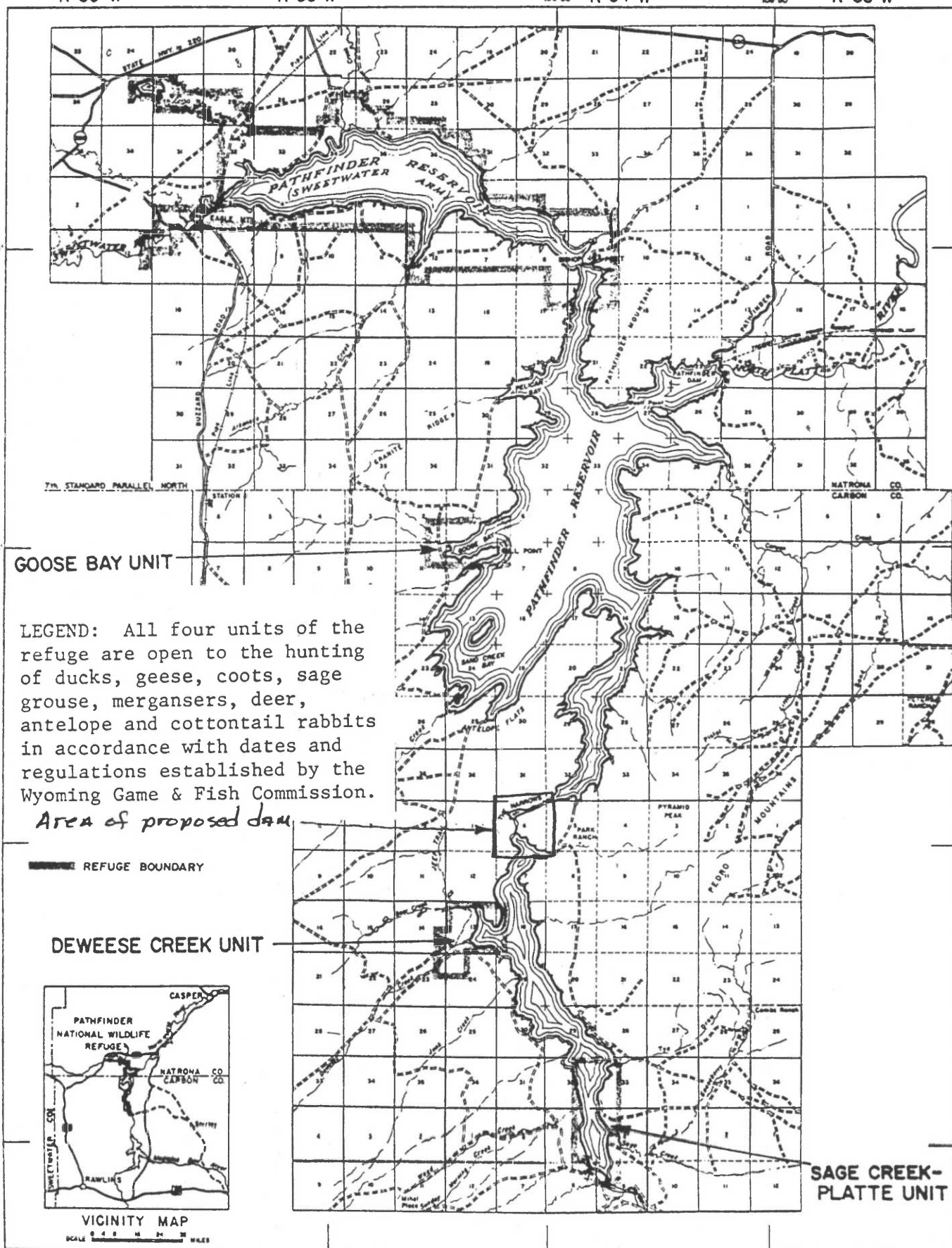
T 30 N

T 29 N

T 28 N

T 27 N

T 26 N



GOOSE BAY UNIT

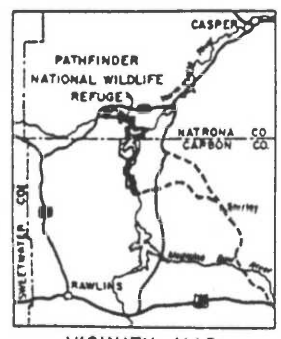
LEGEND: All four units of the refuge are open to the hunting of ducks, geese, coots, sage grouse, mergansers, deer, antelope and cottontail rabbits in accordance with dates and regulations established by the Wyoming Game & Fish Commission.

Area of proposed dam

REFUGE BOUNDARY

DEWEESE CREEK UNIT

SAGE CREEK-PLATTE UNIT



BAMFORTH NATIONAL WILDLIFE REFUGE

Wyoming

Administered by Arapaho N.W.R.
P.O. Box 457, Walden, Colorado

Introduction

Bamforth NWR, located in the southern part of Albany County, Wyoming is small; the total number of acres is 1,166 consisting of 960 acres of grassland and 206 acres of marsh and water areas. A maximum of 206 acres of marsh and water areas is possible only under excellent run-off conditions during years when precipitation for the drainage area is high.

The principal use of the refuge and surrounding lands is grazing of cattle. There is no possibility of growing grains for waterfowl food because of the high alkalinity of the soil and undependable water supply.

The refuge is broken up into three disconnected parcels of land, which would make posting costs high, enforcement of hunting regulations impractical, and effective management almost impossible.

No development of the area has been done in the past, nor is any planned for the future, because of the lack of an adequate water supply.

Waterfowl use of Bamforth Refuge is sporadic, and then only for resting and feeding.

1986 Activities

Bamforth NWR was visited only once during the year. Patten and Varney stopped briefly on July 29 so Varney could observe the area. There was actually water on the refuge which, according to Patten, was the first such occurrence that he could remember that late in the year.

One grazing permit for 99 AUM's at a rate of \$2.00 per AUM is issued on an annual basis to a neighboring landowner. A condition of the permit is that the permittee irrigate refuge lands where water is available.

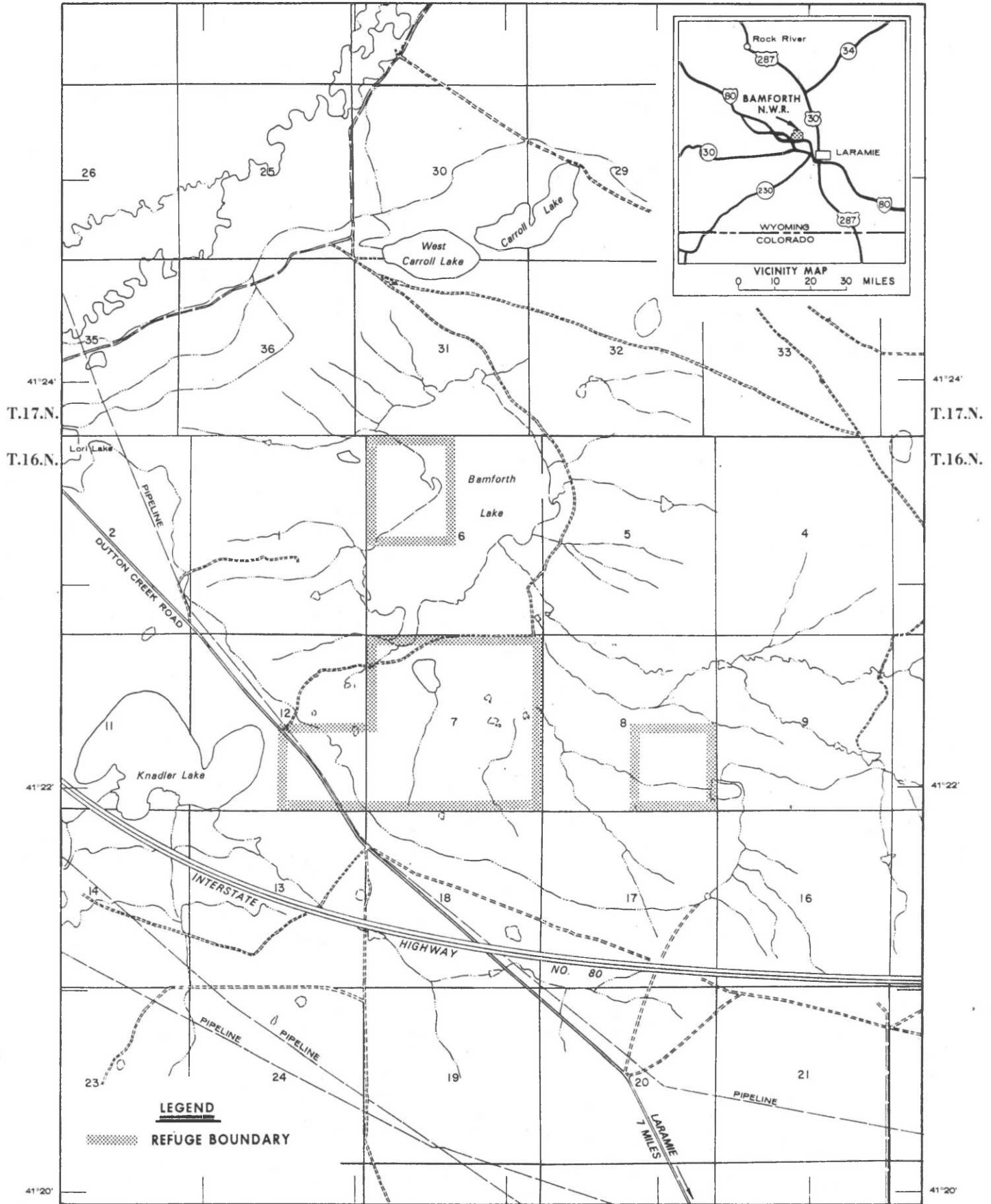
BAMFORTH NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR
105°46'

ALBANY COUNTY, WYOMING

UNITED STATES
FISH AND WILDLIFE SERVICE
105°42'

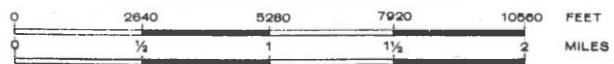
R.75.W. R.74.W.



LEGEND
REFUGE BOUNDARY

COMPILED IN SURVEYS AND MAPS
FROM SURVEYS BY U.S.G.S.

R.75.W. R.74.W. 105°44'
SIXTH PRINCIPAL MERIDIAN



DENVER, COLORADO MARCH, 1976

True North
Magnetic N
MEAN DECLINATION
1963