

NARRATIVE REPORT
ARAPAHO NATIONAL WILDLIFE REFUGE
JANUARY - DECEMBER 1990

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

ARAPAHO NATIONAL WILDLIFE REFUGE
Walden, Colorado

also

BAMFORTH, HUTTON LAKE and PATHFINDER
National Wildlife Refuges
administered from Walden, Colorado

ANNUAL NARRATIVE REPORT
Calendar Year 1990

U.S. Department of the Interior
Fish and Wildlife Service
National Wildlife Refuge System


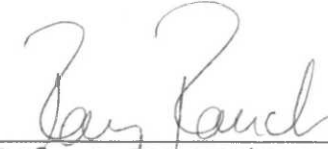
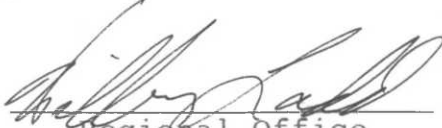
REVIEW AND APPROVALS

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Calendar Year 1990

 _____ Refuge Manager	<u>3/1/91</u> _____ Date	 _____ Refuge Supervisor	<u>3/29/91</u> _____ Date
		Review	
 _____ Regional Office		<u>4/1/91</u> _____ Date	
Approval			

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 (NWR) is located in an intermountain glacial basin immediately south of Walden, the county seat of Jackson County, Colorado. The basin is approximately 30 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 Bibeau in the year 1820. Like many of his French countrymen, Bibeau 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, two years after Colorado became a state and a full 50 years after the first explorers entered the valley.

The high elevation and northern latitude provides 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. Extreme low temperatures of minus 50 degrees Fahrenheit have been recorded. Summers are cool and dry with high temperatures

in the 80's and the average lows near 40 degrees Fahrenheit. Mean annual precipitation is only 9.6 inches and the mean annual temperature is 36.5 degrees Fahrenheit. There is an average of only 30 consecutive frost-free days each year.

Jackson County was formed in 1909 and 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. Tourism and recreation are growing activities in North Park while mining currently is in a slump. 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 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 7,996 acres of irrigated and sub-irrigated meadows, 9,294 acres of sagebrush-grassland uplands, 711 acres of wetlands, 188 acres of riparian willow and stream habitat, and 64 acres of administrative lands including building sites and roads.

The refuge currently produces an average of about 9,500 ducks and 250 to 300 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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K. FEEDBACK

L. INFORMATION PACKET

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2. 1. 3.

90 NR1

7/25/90

ECP

1. Eugene C. Patten, Refuge Manager, GS-11, PFT
2. Raymond N. Varney, Refuge Operations Specialist, GS-9, PFT (Transferred to Sunkhaze Meadows 8/90)
3. Gale F. Brewer, Maintenance Worker, WG-8, PFT
4. Terri L. Follett, Refuge Assistant, GS-5, PFT
5. Pamela S. Rizor, Refuge Operations Specialist, GS-7, PFT
6. Vic Elam, Biological Technician, GS-5, TFT (4/23/90 - 12/08/91)
7. Laura Umbright, Biological Aide, GS-4, TFT (5/29/90 - 10/13/90)
8. Craig Miller, Biological Aid, GS-4, TFT (5/29/90 - 10/06/90)
9. Sherri Lebeda, Biological Aide, GS-3, TFT (5/21/90 - 10/06/90)
10. Troy Spadley, Co-op Student, RO Realty (7/02/90 - 7/27/90)



90NR2

90

Unknown

1. Front Row L-R: John Vanlaningham, Trent Martin, Jody Myers, Venessa Sellers, Rachael Lowery (Youth Leader), John Quigly.
2. Back Row L-R: Michelle White, Steve Geer, Jenny Varney, Jenny Vanlaningham, Robin White, Vic Elam (YCC Crew Leader)

A. HIGHLIGHTS

1. The water shortage continued. (Section B.)
2. Railroad acquisition still on hold. Proposals and assessments completed for the Stelbar Ranch Joint Venture acquisition. (Section C.1.)
3. Refuge Assistant Manager transfers. (Section E.1.)
4. Three Wildlife Extension Agreements for pond construction were negotiated. (Section E.7.)
5. HRM grazing program continues. (Section F.7.)
6. Waterfowl production declines again this year due to continued drought. (Section G.3.)
7. Refuge participation in Rodeo Parade celebrating Walden's Centennial. (Section H.6.)
8. Progress on the proposed acquisition of Mortenson National Wildlife Refuge in Wyoming continues. (See Hutton Lake NWR portion of narrative.)

B. CLIMATIC CONDITIONS

Precipitation during the year totalled 12.31 inches, 2.71 inches above normal. Although precipitation levels were up overall, the amount of available water during the growing/nesting season was not enough to fill all of our ponds or keep other ponds full.

The Illinois River opened up in March with low water levels and never did approach floodstage as in normal years. Even during relatively dry years, early spring runoff usually peaks at or around 600 cfs, but in 1990, 180 cfs was as high as we got and this was in early July. The river then went down averaging around 65 cfs for the rest of the season. In the fall after the willows became dormant and irrigation demands decreased we diverted some water to the Allard Contours, McCammons and Home ponds to prepare for fall migration and to help out for the next summer.

Precipitation was heavier than normal during February through March. During the four month period of May-August there was less precipitation than normal which contributed to the low water levels of the ponds and the river. September and October had high precipitation but warm weather melted most snow leaving very little snow

pack. The last two months of the year were just under average for precipitation. Looking ahead to 1991, water will again be low unless we receive heavy snows in the first months of the new year.

Arapaho NWR had a short blast of arctic air in December, a low of -36F right before Christmas chilled everyone. This was unusual as the arctic cold blast usually comes in January or February.

Table I. 1990 Weather Data: Walden, Colorado (NOAA)

<u>Precipitation (inches)</u>				<u>Temperatures (degrees fahrenheit)</u>			
<u>Month</u>	<u>1990</u>	<u>Normal</u>	<u>Snow</u>	<u>Max.</u>	<u>Min.</u>	<u>Avq.</u>	<u>Normal Average</u>
January	.24	.51	4.8	44	-15	21.0	15.7
February	1.58	.46	22.6	48	-18	18.8	18.4
March	1.19	.67	13.4	53	- 8	30.3	24.6
April	1.05	.87	1.9	66	9	38.2	35.4
May	1.18	1.14	4.0	74	14	43.0	45.0
June	.64	.96		91	27	55.7	53.6
July	1.87	1.06		91	33	58.5	59.0
August	.56	1.23		85	28	56.6	56.6
September	1.29	.94		87	24	53.8	49.3
October	1.85	.68	8.5	70	- 1	39.1	39.2
November	.54	.52	5.2	60	- 8	30.6	26.8
December	.32	.51	4.5	50	-36	14.8	18.5
Totals	12.31	9.55	64.9				
Extremes				91	-36		

C. LAND ACQUISITION

1. Fee Title

In late 1987, the Union Pacific Railroad Company sold its North Park spur line to the Wyoming-Colorado Railroad Company, Inc. A portion of this railroad line transverses through the refuge. During the summer of 1988 the Wyoming-Colorado Railroad Company decided to abolish the railroad line south of the Town of Walden including that portion that ran through the refuge. By late that fall all of the rails and ties had been removed. The Denver realty office contacted the company in regards to selling to the Service, the 80-90 acres of land that lies within the approved refuge boundary. Although contacts were initiated in 1988 and in 1989, no responses were received.

Evidently, proper legal procedures were not followed when the tracks were removed in 1987 forcing the railroad right-of-way to remain in a non-abandoned status until legal problems could be solved.

On June 13, 1990 the Wyoming and Colorado Railroad Company, Inc. filed a Notice of Intent to Abandon the railroad line between Laramie, Wyoming and Walden, Colorado, including the railroad right-of-way that transverses through the refuge. The Notice indicated the company intended to file its formal application on or about June 28, 1990.

After numerous letters of protest from Laramie and Walden, as well as protests from members of the Wyoming and Colorado Congressional Delegations and others, the company decided not to file for abandonment with the Interstate Commerce Commission by the July 13th deadline.

What happens next remains to be seen. The Wyoming-Colorado Railroad Company could initiate another abandonment action in the future. In the meantime, the acquisition of the right-of-way by the Service is on hold and the refuge is prevented from developing additional wetland habitat on the refuge.

On September 11, 1990 a multi-agency meeting, involving the U.S. Fish and Wildlife Service (FWS), Bureau of Land Management (BLM), Colorado Division of Wildlife (CDOW), and the Colorado Chapter of Ducks Unlimited (DU), was held at the refuge headquarters to discuss mutual concerns and interest for the protection of wetland and other waterfowl habitats in North Park, Colorado. The primary focus was on how to enhance existing waterfowl habitat on State and Federal land and adjacent private lands through the acquisition of additional lands and/or water rights.

The current listing for sale of the Stelbar Ranches (14,470 acres) which is adjacent to the refuge, provides an opportunity to acquire lands and a major source of water from McFarlane Reservoir that would enhance the BLM's Hebron Slough Project which involves both the CDOW and DU; be an excellent addition to the refuge; provide land for exchange with the BLM and possibly State School Board lands within the refuge; and provide public access and consolidation to other State and BLM land ownerships outside the refuge.

After considerable discussion involving all parties present, it was mutually agreed that there is an excellent opportunity to protect some of the most

important wetland habitat in North Park, and at the same time significantly enhance management capability and public benefits on existing BLM and FWS lands. Political and funding support and cooperation from all agencies involved would be necessary to successfully complete this project.

Refuge personnel, together with BLM and CDOW field personnel agreed to work together and develop a complete basic project concept proposal. The concept proposal was completed in November and basically involves the acquisition of approximately 5,430 acres of the Stelbar Ranches by Government agencies and another 3,100 acres would be acquired by one of the current ranch lessees. Water rights would also be purchased and divided amongst the parties involved on an agreed to basis.

By year's end, several other action items were completed by various FWS personnel including a Preliminary Project Proposal which was submitted to Washington, a gross cost analysis of the Stelbar property and a rough draft Environmental Assessment of the proposal. To date the proposal has run into very few problems and basically has the blessing of the local politicians, at least so far. By the end of next year we should have a very good idea whether the project will eventually become a reality.

Contact was not made this year with owners of two privately owned tracts totalling approximately 1,560 acres left to acquire within the approved refuge boundary.

2. Easements

Two Farmers Home Administration tracts in Wyoming which were field inspected last year for potential conservation easements were finalized during the year. Both tracts contained riparian areas with associated wetlands that had a history of heavy season-long grazing. Conservation plans that addressed this problem were mutually developed in cooperation with the local Soil Conservation Service and approved by the FmHA.

One other tract in Wyoming was field inspected during the year and contains some small wetlands and associated grassland. The Fish and Wildlife Service Enhancement Office in Cheyenne, Wyoming inherited the program in Wyoming beginning in 1991 and will complete negotiating an easement on the tract.

3. Other

The Service leased two tracts of State school land totalling 640 acres from the Colorado State Land Board. Eventually we hope the two tracts will become Service property through a cooperative land exchange involving the Bureau of Land Management and the State.

D. PLANNING

2. Management Plan

The following plans were prepared or updated during the year: Stelbar Ranch Joint Venture Concept Plan, HRM Plan and Water Management Plan (Arapaho, Hutton Lake and Bamforth NWR's).

5. Research and Investigations

ARAPAHO NR 90 - Evaluation of the Three Year Rotation Grazing Program on Arapaho National Wildlife Refuge Relative to Impacts Upon Nongame Bird Habitat Quality - Fritz L. Knopf, Principal Investigator, National Ecology Center, Fort Collins, CO.

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

- a. Monitor the avian population densities within the Illinois River shrub-willow riparian zone.
- b. Describe species habitats within the willow community.
- c. Interpret the avifaunal composition relative to historical (pre-refuge) grazing practices.
- d. Evaluate consequences of the grazing program to the avian community and species habitats.

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 nine species of birds compose >95 percent of the bird community. Some species are habitat generalists and occur across the refuge whereas other species are specialists 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.

1990 was the second growing season following the fire which occurred in the spring of 1989. Monitoring breeding success of Yellow Warblers continued this year in the burn and in the control (unburned) site south of the burn. From 15 June through early August breeding success, cowbird parasitism, and nest predation at 78 Yellow Warbler nests was monitored in the willows along the Illinois River. Due to time constraints, avian censusing in the willows was limited to the study area (pasture 1) instead of all four "pastures" censused in previous years. New growth was measured on the willows in the burn at the end of the growing season to quantify recovery of those willows in their second growing season.

Territories and Nests - A total of 23 Yellow Warbler territories were established in the burn this year, an increase of two over 1989 (but down from 37 prior to the fire). Thorough surveys of the control site revealed at least 48 territories, probably not different from the 43 territories estimated in 1988 and 1989 from less intensive searches in those years. Thirty-four nests in 23 territories were located and monitored in the burn, and 44 nests in 35 territories in the control area.

Breeding Success - The percentage of nests successfully fledging young in the burn improved markedly over 1989, from two of 27 nests that year (7.4%), to seven of 34 nests in 1990 (20.6%). A reduction in nest predation was seen as the primary factor in the increased fledging rates. Nest sites were more cryptic this year due to over one meter in live growth being present at the start of the 1990 breeding season on many of the burned willows. That growth was not present at the beginning of the 1989 season. Nest depredations (primarily by magpies and grackles, but a few by unidentified mammals) dropped from a probable 84% in 1989 to 67.6% in 1990, and nest failures from all sources combined dropped from 92.6% to 79.4%.

High predation rates in the control area resulted in those nests faring more poorly than they did in 1989, but still were more successful than those in the burn. Forty-four percent of this year's warbler's nests fledged young, down from 63.9% in 1989. Fifty percent of the nests were depredated, compared with an unusually low 27.8% in 1989.

Parasitism by Brown-headed Cowbirds - The incidence of nest parasitism within the burn was nearly identical to that observed in 1989, remaining at the fairly low level of 20.6%. No cowbirds fledged from the seven parasitized nests in the burn. Cowbird eggs hatched in three of those nests (eggs in the other four parasitized nests were either depredated prior to hatching or were buried in the nest lining). Two nests containing nestling cowbirds were depredated, and the nestling in the third nest died of exposure during heavy rains.

Cowbird parasitism on warbler's in the control area increased markedly in 1990, from 20.8% in 1989 to 42.5% this year. The latter figure is comparable to that observed in warbler populations in other parts of the warbler's range. An increase in cowbird density from 1.36/ha in 1989 to 1.73/ha in 1990 may in part be responsible for the higher parasitism rate. A total of seventeen warbler nests were parasitized in the control area. The eggs were buried in seven nests, one nest was abandoned, in one nest the cowbird egg did not hatch, four nests were depredated prior to hatching, and three were depredated after hatching. One warbler nest may have fledged one cowbird, but this is uncertain.

Growth of Willows in the Burn - At the end of the 1989 growing season, the average height of live growth on 124 randomly selected willows in the burn was 1.24 meters. This is therefore their approximate height at the beginning of the 1990 nesting season. At the end of the 1990 season, average height of these same willows was 1.65 meters. This figure would have been higher were it not for the effects of browsing by moose. Because Yellow Warbler's will be starting out the 1991 breeding season with an average willow height of roughly 1.65 m, it is predicted that breeding success should increase over 1990 due to the greater availability of cryptic nest sites.

ARAPAHO NR 89 - "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, KS 66045.

This on going study was unexpectedly canceled, at least temporarily, as one of the prairie dog towns (Hampton tract) involved in the study, suffered a severe die off during the winter months prior to the 1990 field season. At this time, we are not sure whether this research project will continue at some point in the near future.

E. ADMINISTRATION

1. Personnel

This year brought several changes to the immediate permanent staff on the refuge. In March of 1990 the permanent part-time Biological Technician position was converted to a full-time Refuge Operation Specialist trainee position.

In August, Asst. Manager Varney transferred to Sunkhaze Meadows National Wildlife Refuge in northern Maine. We will miss the Varney family, particularly Ray's letter writing contests and prescribed burning programs. We wish them the best in their new venture.

Denise Fehribach from Seney NWR, Michigan was selected to fill the vacant Refuge Operations Specialist position and will arrive at the beginning of the New Year.

Vic Elam returned as a biological technician in April to help install electric fence and to get other maintenance activities accomplished for the upcoming summer season. Vic spent most of the summer as the YCC Crew Leader and did a great job.

Vic was the only past seasonal to return to Arapaho this year. We hired three new temporary personnel this year. Sherri Lebeda, Laura Umbright and Craig Miller all entered on duty in May. Sherri, Laura and Craig all did great work for us, learning their way around the refuge quickly. They spent their time conducting biological activities (nest dragging, general census, brood counts, etc.) or maintenance efforts including fence building and repair (electric and barbed-wire), dike repair, and building and vehicle maintenance.

Troy Spradley, a Co-op student from Humbolt State University worked at Arapaho for a month. He was on loan from the Regional Office Realty Division. He came to the refuge to learn about managing and working in the field. Troy helped out with fencing, duck nest searches, brood counts and several other wildlife surveys.

Table II.

Refuge 5-Year Staffing Summary

<u>Year</u>	<u>PFT</u>	<u>PPT</u>	<u>Temporary</u>	<u>Volunteer</u>
1990	5	0	4	0
1989	4	1	4	1
1988	4	1	3	4
1987	4	0	7*	2
1986	4	0	6*	2

* Includes fencing crew.

2. Youth Programs

This year's non-residential YCC program ran from June 11 through August 7, a total of eight weeks and two days, with the last two days optional. The crew was made up of 10 enrollees and one youth leader. Vic Elam was the YCC crew leader.

Again in 1990, the Routt National Forest, USFS, contributed funds to the YCC budget allowing more youths to participate in the program. The Forest Service in return gets some valuable help from the YCC on projects which may otherwise not get completed.

Following is a synopsis of the projects accomplished by this year's YCC crew:



90 NR3

7/23/90

VE

YCC transplanting aquatic vegetation.

Arapaho NWR Projects

1. Planting shrubs on pond islands for waterfowl nesting cover.
2. Litter pick-up on stretch of highway adopted by the refuge.
3. Removal of old fence and stackyards.
4. Walk perimeter of refuge ponds searching for duck nests.
5. Assisted in building fence around public parking areas.
6. Removed snow-fence and erected a sign at Hutton Lake NWR.
7. Transplanted emergent vegetation.
8. General facilities maintenance - ie. painting, trash removal, custodial maintenance, grounds maintenance.



90 NR4

7/23/90

VE

YCC placing riprap on Muskrat control structure.

U.S. Forest Service Projects

1. Built a handicapped accessible group campsite.
2. Rehabilitated a fire break, hauled and stacked slash.
3. Built a buck and pole fence to prevent bank erosion due to disturbance from cattle and humans.
4. General campground rehabilitation, including litter pick up, painting signs, and cleaning fire rings.
5. Lake shore cleanup.

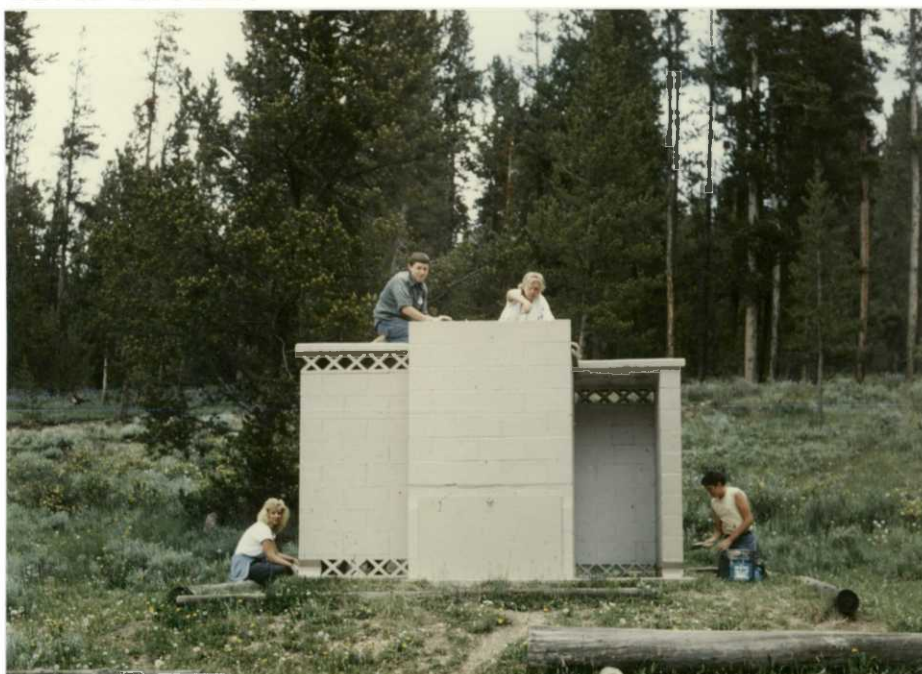


90 NR5

7/30/90

VE

YCC building buck and pole fence at North Platte river access.



90 NR6

7/05/90

VE

YCC painting restrooms at North Michigan Reservoir.

Projects for Other Agencies

1. Fenced off archeological sites at the Sand Dunes (a local recreation area) - BLM.
2. Trash pickup at the Sand Dunes - BLM.
3. Plant trees in a clear cut - Colorado State Forest.
4. Piling of slash - Colorado State Forest.
5. Tree thinning - Colorado State Forest.
6. Painting of restrooms - Colorado State Parks.
7. Fire grate installation, reconstruction of a high use pad - Colorado State Parks.
8. Trash pick-up and removal of snags from lakes - Colorado State Parks.
9. Trail, corral, and shore erosion barrier construction - Colorado State Parks.
10. Assisted with the construction of fish structures to improve habitat in a mountain stream - Colorado Division of Wildlife.
11. Constructed a buck and pole fence in cooperation with U.S. Forest Service - Colorado Division of Wildlife.



90 NR7

7/26/90

VE

YCC constructing a retaining wall at Ranger Lakes.



90 NR8

6/28/90

VE

YCC litter cleanup of Ranger Lakes area.

Environmental Projects

1. Tour of Sybille Wildlife Research Unit.
2. Learned about the geology and history of the sand dunes from a BLM archaeologist.
3. Various discussions in conjunction with other projects including: waterfowl identification, waterfowl habitat development, forest re-vegetation, and fish ecology.

4. Volunteer Programs

Nothing to report.

5. Funding

In FY '90 the refuge again received Farm Bill money. This year the money was used to construct several dikes and ponds on private lands (see next Section - Technical Assistance).

Table III.

Refuge 5-Year Funding Summary

<u>Fund</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY90</u>	<u>FY91</u>
1260	190,000a.	227,000a.	214,000	242,000	335,000h.k.
6860	4,000	4,000	4,000	---	---
YCC	19,000b.	18,050d.	18,000f.	18,600g.	19,200
8610	3,500	5,000	3,600	4,480	2,232
Const.	21,000c.	1,888e.	---	---	75,000i.
Farm Bill	---	---	8,000	27,500	10,000j.
Fire	---	---	---	13,500	700
Total	237,500	255,938	248,600	300,480	442,132

a. Includes ARMM +/- or RP

b. Includes \$6,000 from USFS.

c. Carryover from FY86.

d. Includes \$5,050 from USFS.

e. Carryover from FY87.

f. Includes \$5,000 from USFS.

g. Includes \$5,898 from USFS.

h. Includes \$85,000 Flex (MMS) funds.

i. DU/CDOW fund for Fox Pond construction.

j. Includes \$6,200 from construction.

k. Includes \$10,000 from Private Partners Cost Share

6. Safety

No lost-time accidents occurred in 1990. There were the usual scrapes and bruises, but overall it was a good year health-wise.

All new employees were instructed in the proper operation of the 4x4 ATV's. The instruction was informal, we just set up an obstacle course as suggested in the owner's manual. We also went over all parts of the machines and proper up-keep.

Safety meetings were conducted once each month with a different employee acting as chairperson. Topics of discussion included: stress management, holiday safety, driving hazards, handgun safety lightning, avoiding collisions, personal fitness and safety with wood burning stoves. Most safety meetings also featured a safety film with such topics as: proper use of hearing protection, kitchen fires, water rescue, seatbelt usage, forklift safety and liquids can burn.

7. Technical Assistance

Three private land Wildlife Extension Agreements for the construction of small wetlands were completed during the year. Although three wetlands with associated water control structures were developed on two of the private land tracts, construction work on the other private land tract was delayed until next year because of poor fall weather conditions.



90 NR9

5/11/90

ECP

First year with water in the 1989 constructed
Ginger Quill Pond (Farm Bill).



90 NR10

5/11/90

ECP

Ginger Quill Pond completed dike.

Assistant Refuge Manager Varney ramrodded the program by meeting with the interested landowners, field inspecting potential construction sites and preparing all the paper work including obtaining approval from the Corps of Engineers. Maintenance Worker Brewer assisted by Assistant Refuge Manager Trainee Rizor and several temporaries conducted the dirty work of constructing the dikes, installing the water control structures and associated CMP and seeding the dikes and barrow areas.

Three ponds totalling approximately seven surface acres were constructed on the Verl Brown and Rosa Mae Dowdell properties near Rand, Colorado. Two small springs with less than one cfs flow provide the source of water for the two small ponds on the Dowdell property while Sutton Creek with less than five cfs flow provide the necessary water for the new pond on the Brown property. Under the terms of the Extension Agreement the cooperator agrees to maintain the ponds for a minimum of 10 years after which the development becomes the property of the landowner and he can either maintain or remove the development.



90 NR11

8/21/90

ECP

Brewer in dozer constructing Dowdell Pond dike.

Again in 1991 we have several landowners who are interested in developing some wetland habitat on their land. These areas will have to be field inspected to see if they merit further consideration. We still will probably do the work ourselves keeping our projects small and completing them by force account.



90 NR12

9/12/90

ECP

Completed Dowdell Pond dike.



90 NR13

8/21/90

ECP

Dowdell Pond island construction.



90 NR14

9/12/90

ECP

Finished Dowdell Pond.

Following is a list of services or assistance provided by Arapaho NWR staff to various agencies throughout the year:

A. Bureau of Land Management

1. Memorandum of Understanding - in place document which governs the sharing of heavy equipment to the benefit of both agencies. The MOU has not been exercised for the past two or three years.

B. U.S. Forest Service

1. Temporary housing - the Case Cookhouse is used by temporary and volunteer USFS employees.

C. Colorado Division of Wildlife

1. Law Enforcement - mutual assistance provided in law enforcement and bag checks during fishing, sage grouse, pronghorn, waterfowl, and big game seasons.
2. Study - the temporary staff and Rizer assisted the Division with a moose carrying capacity study for North Park.

3. Habitat Development - Patten assisted the CDOW in Hayden, Co in the form of suggestions on how to develop wetland habitat on state-owned lands.

D. Wyoming Game and Fish

1. Survey - Rizor and Umbright assisted the Game and Fish for one day with a colonial nesting survey at Hutton Lake NWR.

E. Jackson County Fire Department

1. Cooperative Agreement - mutual assistance provided in fire protection and suppression.

F. Jackson County Lions Club

1. Wetlands - Patten and Al White (Soil Conservation Service) assisted in mapping wetland boundaries in association with the construction of the Jackson County Lion's Club Park.

8. Other Items

A check in the amount of \$21,934.00 was presented to Jackson County as its Revenue Sharing payment for FY89. The payment, delayed until April of this year, represented 78 percent of full entitlement.

Refuge Assistant Terri Follett was a major contributor to the setting up of the budget tracking program. She also spent many hours giving technical assistance to other refuges for the budget tracking program and other computer systems problems.

F. HABITAT MANAGEMENT

1. General

Overall, weather conditions were extremely poor again in 1990. A well below normal snowpack in the mountains coupled with dry spring and summer months provided little water when it was needed to fill refuge ponds and irrigate meadows for the benefit of migratory birds. Refuge uplands also suffered from a lack of precipitation during the growing season.

2. Wetlands

Those refuge ponds with water began to open up during the month of March, and by the middle of April all refuge ponds were ice free. In March, the Illinois River opened up and although the flow was minimal compared to other spring flows (180 cfs), we immediately began diverting some of the flow to fill refuge ponds as we knew

water was going to be in short supply again this year. We continued to divert small amounts of water to refuge ponds and attempted to irrigate what meadowlands we could with the amount of water available through the month of May and into the first couple weeks of June.

Despite our efforts, not all of the refuge ponds were filled this year and approximately only three quarters of the meadow lands received adequate irrigation water. By the end of June water levels in many of the refuge ponds were beginning to recede and no water was available to divert. With little precipitation during the summer months and a lack of water in the Illinois River to divert, habitat conditions continued to deteriorate. By the end of August most of the refuge ponds were bone dry. Some water became available in the Illinois River in late September and October and we were able to refill a few ponds prior to fall freeze-up.

Arapaho's Water Management Plan incorporates planned draw downs of specific ponds each year when possible to aid in the production of emergent and sub-emergent vegetation and encourage invertebrates as sources of cover and food for wildlife. During the past four years a number of the scheduled draw downs were canceled or postponed, usually due to the prevailing water situation. Sometimes the lack of water effectively resulted in an unscheduled draw down for certain ponds, so although the timing may have changed, the end results were achieved.

As we continue to monitor vegetation growth and invertebrate populations within refuge ponds, planned draw downs will be adjusted accordingly. Occasionally water management is dictated by priorities set for rehabilitation of dikes and water control structures.

5. Grasslands

a. Irrigated and Sub-irrigated Meadows

Arapaho relies heavily upon irrigation water for habitat management purposes via 49 full or partially owned water rights involving 321.471 cfs of water. The Illinois River is the primary source of refuge water (over 300 cfs), while Spring Creek, Potter Creek and Antelope Creek provide a combined total of less than 20 cfs of water. Fourteen headgates located at various points along the Illinois River divert water into more than 70 miles of primary irrigation ditches. Secondary and spreader ditches flood irrigate up to 8,000 acres of meadow to maintain and perpetuate quality migratory bird breeding and nesting habitat.

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

Flood irrigation efforts began in mid March and continued into early June when most headgates were shutdown due to a shortage of available water in the Illinois River. Although we were able to irrigate approximately three quarters of the meadow lands, we were not able to irrigate all of the meadows again this year. For the year, a total of only 12,941 acre feet of water was diverted for irrigation and pond filling purposes, about double that of last year. Although water conditions were better than the previous two years, overall conditions remain dry.

After a year or two, winter snows and wind tend to mat down most residual vegetation inhibiting new plant growth and ultimately reducing the desirability of the meadows for most wildlife species. Livestock grazing and to a lesser degree, prescribed burning, are utilized as management tools to manipulate, rejuvenate and promote a diverse meadow community. Using these management tools, followed by spring flood irrigation, we are able to enhance migratory bird breeding, nesting and brood rearing habitat on an annual basis.

b. Uplands

The refuge's sagebrush-grassland uplands are managed primarily to provide a diversity of grasses, forbs and shrubs as habitat for various species of wildlife such as the Brewer's sparrow, sage grouse and pronghorn. Cattle grazing and prescribed burning are the two major management tools utilized to manage the refuge's uplands.

Above normal precipitation during the late winter and early spring provided ample moisture to promote good early season plant growth. The summer months, particularly June, were generally both hotter and drier than normal and refuge uplands deteriorated accordingly. September and October brought some much needed precipitation (1.29 and 1.85 inches respectively) but by then the growing season was essentially over. Heavy winter snows along with numerous timely spring and summer rains are needed next year for the refuge uplands to recover.

7. Grazing

Cattle grazing is the primary habitat manipulation tool applied to refuge uplands and meadows to promote vigorous plant growth and maintain plant diversity. Generally, the uplands are grazed in the spring after there has been sufficient new plant growth and then the cattle are removed prior to the end of the growing season to allow grazed plants to recover with new growth before the end of the growing season. Most of the refuge meadows are not grazed until after August 1, or when a majority of the waterfowl and other migratory birds have completed their nesting activities, which may vary by several days or a week from year to year.

Refuge personnel determine the maximum number of AUM's to be removed from each grazing unit. The permittee is then free to determine how he will utilize the AUM's allotted to him within the time frame specified on his grazing permit. When possible we try to encourage the permittee to run larger herds and to utilize the available AUM's as soon as possible. The permittee is furnished fencing supplies by the refuge but is responsible for conducting all minor fence repairs. Most permittees remove all of their cattle from the refuge prior to, or during, the month of October as heavy snowstorms accompanied by strong winds may develop in North Park anytime after the middle of October.

The general grazing program for 1990 is summarized in the following table:

Table IV.

SUMMARY OF 1990 GENERAL GRAZING PROGRAM

Unit	Upland Acres	Meadow Acres	Total Acres	AUMs	AUMs/ Acre	Permittee
A1	329	40	369	85.92	.23	McNaughton
A3	231	43	274	47.12	.17	Hudspeth *
A5	115	334	449	467.11	1.04	Stephens
A8	915	15	930	204.17	.22	Hudspeth *
C1	300	11	311	31.41	.10	Hudspeth *
C2	215	130	345	190.44	.55	Stephens
C3	86	135	221	203.44	.92	Stephens
C6	---	236	236	259.29	1.10	Willford
C10	190	3	193	42.07	.22	Willford
C11	167	253	420	254.26	.61	Stephens
C19	110	---	110	3.0	.03	Anderson
C20	71	13	84	8.09	.10	Anderson
C4	33	470	503	688.84	1.37	Burr
C5	49	27	76	54.87	.72	Burr
D2	167	308	475	492.69	1.04	Burr
D4	123	28	151	50.04	.33	Stephens
D5	378	---	378	38.94	.10	Burr
D8	286	87	373	114.00	.31	Burr
D9	99	24	123	41.70	.34	Stephens
E2	120	500	620	202.13	.33	Burr
Totals	3,984	2,657	6,641	3479.53		

The current grazing program utilizing complete rest for a year, seasonal rotation and rest rotation at various grazing intensities provides a mixture of different vegetative treatments on refuge grasslands. Although this grazing program has basically provided desired habitat results over the years, there is always room for improvement and changes.

In 1988 we initiated HRM (Holistic Resource Management) on the former L. Hampton tract which involved establishing goals, setting objectives, installing vegetative transects and locating a grazing permittee who would be willing to work with us in utilizing HRM concepts on the unit. The initial program worked out fairly well although the overall benefits to wildlife and the habitat will take several years to determine.

We have continued the program each year since with some adjustments. In 1989 we incorporated some additional nearby fields into the planned grazing program and also applied HRM on a new unit involving another grazing permittee. The dry weather during the past three growing seasons however, has forced us to continually make adjustments in our planned grazing program annually. Lack of adequate stockwater, irrigation water and a long period of non-growth on refuge meadows and uplands has really kept the permittees and ourselves busy planning, replanning, and moving cattle.

Despite several problems encountered again this year, we are beginning to observe some positive results, particularly on the sagebrush-grassland uplands which have had a history of over-grazing and over-resting in the same fields. The amount of bare ground in these fields appears to be decreasing while ground litter is increasing. Hopefully, more new grass seedlings and forbs will become established in the next few years.

Although we were only able to gather limited duck nesting density and success this year because of the drought, it does appear that cattle do not seriously affect the success of nests as long as the nests were initiated before the cattle entered the field. Our past, and much of our current meadow grazing program has been based on the assumption that grazing during the nesting season severely reduces nest success. Based on this assumption we have always delayed any meadow grazing until after August 1st, when the majority of the nesting activity has ceased. Management strategies may change in the future.

HRM grazing activities for 1990 are summarized in the following tables:

Table V.

HRM GRAZING (Hampton, Fox, & Brocker tracts) 1990

Field or Paddock #	Meadow	Riparian	Upland	Acres Total	Dates	Days	Grazing AUMs** Used	AUMs/ Acre
1	---	1	230	231	6/20-22	3	45.96	.20
2	---	1	175	176	6/23-24	2	31.44	.18
5	131	3	108	242	6/25-28	4	62.88	.26
6	45	-	121	166	6/29-7/2	4	63.28	.38
7	---	-	157	157	7/3-4	2	32.46	.21
13	30	-	12	42	7/5-6	2	32.46	.77
14	53	-	5	58	7/7-10	4	64.84	1.12
15	90	-	5	95	7/11-17	7	113.47	1.19
16	75	-	5	80	7/18-23	6	97.26	1.22
17	74	-	10	84	7/24-29	6	97.26	1.16
11	67	-	95	162	7/30-8/4	6	97.26	.60
8,9*	---							.21
21	44	5	121	170	8/9-16	8	129.68	.76
B17	110	4	2	116	8/17-24	8	129.68	1.12
22	141	4	4	149	8/25-9/6	13	205.66	1.38
23	88	6	42	136	9/7-12	6	94.92	.70
24	119	10	25	154	9/13-21	9	142.38	.92
25	109	10	24	143	9/22-10/1	10	158.20	1.11
27	103	5	20	128	10/2-10	9	142.38	1.11
26	102	5	23	130	10/11-19	9	138.96	1.07
18	59	6	8	73	10/20-24	5	75.20	1.03
20	44	-	37	81	10/25-11/1	8	120.32	1.48
5	2nd Graze thru				11/2-8	7	102.24	.42
4	36	4	56	96	11/9-13	5	58.44	.61
19,3*	84	9		215	11/14-12/3	20	233.73	1.08
	1,604	73	1,718	3,395			2,535.20	

* Individual fields combined.

** AUMs vary as cattle herd composition changed throughout the grazing period

Table VI.

HRM GRAZING (Anderson and Allard tracts) 1990

Field or Paddock#	<u>ACRE</u>			<u>GRAZING</u>								
	Meadow	Upland	Total	<u>1st Period</u>		AUMs Used	<u>2nd Period</u>		AUMs Used	Rest Period Days	Total AUMs Used	AUMs/ Acre
				Dates	Days		Dates	Days				
E	29	21	50	6/7-13	7						58.46	1.17
F	34	18	52	6/14-19	6	62.04					62.04	1.19
G	42	52	94	6/20-22	3	31.02	7/18-22	5	53.65	25	84.67	.90
H	63	19	82	6/23-26	4	41.36	7/23-28	6	64.38	26	105.74	1.29
M	33	--	33	6/27-7/1	5	51.70					51.70	1.57
I	84	--	84	7/2-6	5	51.70	7/29-8/5	7	75.11	22	126.81	1.51
J	86	--	86	7/7-11	5	52.48	8/6-12	7	75.11	24	127.59	1.48
K	45	9	54	7/12-14	3	32.19	8/13-16	4	42.92	28	75.11	1.39
L	48	3	51	7/15-17	3	32.19	8/17-19	3	38.69	29	70.88	1.39
TOTALS	464	122	586			413.14			349.86		763.0	1.30 AVG.

In 1991, grazing fees will increase to \$7.40 per AUM, an increase of \$.30 over this year's rate. The 1988-1990 three year average fall cattle and calf price of \$85.10 per CWT represents a 38.2 percent increase over the 1984 base survey price of \$61.33 per CWT. The 1991 approved grazing fee is adjusted to the 1984 base survey rate of \$5.35 per AUM.

8. Haying

One cooperative farming agreement was issued for haying 138 acres of irrigated meadow on the Anderson tract. The permittee's harvested share was 75 percent and the refuge received 25 percent. A good crop was produced this year nearly doubling last year's production. All of the refuge's share (53 ton) was stacked in the field this year for winter utilization by elk and mule deer. The small haying operation serves several purposes as follows:

- a. Provides a resident refuge elk herd of 30 to 50 animals, another 75 to 200 non-resident wintering elk, and up to 300 mule deer, a harsh winter food source and at the same time reduces big game damage to haystacks on adjacent private lands.
- b. Provides a source of hay to utilize on cooperative basis with the Division of Wildlife in preventing or minimizing big game damage complaints from other landowners in the local vicinity as the need arises.
- c. Provides the refuge with a source of hay to utilize as nesting material in goose and duck nesting structures and on constructed nesting islands.
- d. Provides a wet hayed meadow on the refuge each spring to attract migrating waterfowl and other migratory birds.

9. Fire Management

The refuge's Fire Management Plan addresses prescribed burning as a grassland management tool to be utilized on an expanding scale as the local community and general public become more familiar with managed burns and accept its use as a land management tool.

Due to the extreme dry conditions experienced during the year along with a State and County imposed fire ban through out much of the summer, no prescribed burns were planned.

10. Pest Control

Canada thistle is the primary noxious weed found throughout the refuge although yellow toadflax has also been identified on one area in the southwest corner of the refuge. In the past, efforts have been made to control Canada thistle with 2,4-D along roadsides and public access areas. These efforts were minimally successful.

In 1988 we decided to eliminate all chemical spraying for noxious weeds and attempt to use some type of biological control on the refuge. Several individuals and agencies were contacted and all suggested a stem mining weevil, Ceutorhynchus litura, might be worth a try. The weevil attacks the young Canada thistle plants as they emerge from the soil in the spring. The larvae burrow down the stem finally exiting the stem at or below the soil surface. This opening leaves the plant susceptible to disease and other insects which usually kills the plant over winter.

In May 1988, approximately 300 adult weevils were collected by refuge personnel on a trip to Bozeman, Montana. The weevil's were transported back to Colorado and released at two different sites on the refuge. The sites were monitored during the summer months and apparently the weevils survived at one of the release sites as signs of dying Canada thistle and larvae burrowing activity in several thistle plants was observed. In 1989 we made another trip to Bozeman, Montana but were unable to collect any additional weevils to release on other parts of the refuge. Meanwhile, our small population of weevils continued to survive and appeared to be controlling Canada thistle, at least to some degree on one refuge site.

This year we purchased approximately 300 weevils and 200 gall flies Urophora cardui, and released them on other major Canada thistle infestation sites on the refuge. Next year we should know if any of these weevils and flies survived and if they are controlling Canada thistle.



90 NR15

6/21/90

PR

Release of gall flies (Urophora cardui).



90 NR16

6/21/90

PR

Gall fly (Urophora cardui) on Canada thistle.

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 bald eagle sightings were reported this year in March.

Greater sandhill cranes are listed as an endangered species by the State of Colorado. Unconfirmed reports indicate they are nesting in North Park (but not on the refuge). A flock of approximately 130 cranes were observed on the refuge in late October. Several small groups were also seen in November.

3. Waterfowl

a. Ducks

The first migrants of the year, a pair of Mallards on the Illinois River and a group of ducks on Potter Creek pond, were sighted on March 22. This flock of about 40 ducks arrived about a week later than

the first birds of last year. By the end of March the duck population was up to around 3,650, and peaked at 6,000 in May.

Breeding pair counts were conducted on May 16 and again on May 30. The results of 2.8 pairs per wetland acre was lower than last year, but this year we had the meadows partially irrigated. Last year was a dry year and most of our meadows were not irrigated. Our theory is that the ducks are more concentrated on the available water (in the ponds) during dry years, hence more likely to be observed during the census. The decrease in the number of pairs observed (during 1990 for example) is not reflected in a corresponding decrease in production; evidence that the 2.8 pairs per wetland acre figure is misleading and probably biased.

The first duck brood of the year was observed on June 26, nearly two weeks later than last year. We're beginning to suspect that nesting chronology on the refuge is quite variable from year to year. Based on past experience, we started nest dragging this year in late June. We again were very successful finding mostly our common nesters gadwall and scaup.

This was the second year that we used nest dragging to monitor nest success/predation rates. Since this was not an attempt to determine waterfowl production we sampled areas where we believed there was a better chance of finding nests, rather than a representative sample of the refuge. Between nest dragging and random circumstances, we located 135 nests, ten more than last year, which were used in the analyses. Results are summarized in Table VIII.

There are 17 elevated nest baskets scattered throughout the refuge in an attempt to increase our mallard production. We have had little luck with these structures as far as mallards are concerned. The Canada geese seem to find them attractive, utilizing four structures this year.

Based on our brood counts, duck production on the refuge was estimated at 4,092. This represents a 33 percent decrease from 1989 and a 57 percent decrease from 1988. Our guess as to why this decline occurred is that fewer birds are nesting on the refuge due to low water levels. We also think that some birds abandoned their nests as water level retreated. Although we had more precipitation this year than the past few years, water levels have not recovered. We were not able to fill some of our ponds and could not maintain full levels in others. This trend may continue into the next year unless precipitation drastically increases.

The refuges' fall population of ducks averaged about 5,700 in early September and dropped to approximately 1,400 in late October. By early November all the refuge ponds were frozen and the ducks had headed south.

b. Geese

The first Canada geese arrived on March 5 this year. This was a week earlier than last year but about normal compared to most years. By the end of the month there were around 200 geese on the refuge. In May the population peaked out at approximately 400 geese.

Of the 100 elevated nesting structures available for geese in 1990, 66 were used. Utilization has been up and down for the past several years (80 % plus in '86 and '88; less than 70 % in 89 and 90), the reasons for the fluctuation are unknown. Nest success rates on the structures this year was 70 percent, which fluctuates also but has remained in the 70 to 85 percent range for the last four years. Four Canada geese used mallard nesting structures this year, three were successful and one was predated. One Canada goose used a raptor nesting pole for a nesting structure. We don't know if she was successful or not as there was no access to the high nest. Several ground nests were observed but all were predated.

Table VII.

1990 NEST DATA

- Approximately 477 acres dragged and/or walked
- 135 nests located
- 0.28 nests/acre
- or
- 1 nest per 3.57 acres

118 nests found by dragging
 +17 nests found by random

135 total nests located

		Apparent Percent
Hatched	= 87	(64.2)
Destroyed (predator)	= 31	(23.1)
Abandoned	= 7	(5.2)
Destroyed/Abandoned	= 9	(6.7)
due to search		
Could not relocate	= 1	(1.0)

	Nests	Percent	Actual Broods Counted	Percent
Mallard	15	(11)	17	(4.7)
Pintail	6	(4.5)	26	(7.3)
Gadwall	39	(29)	88	(24.6)
Wigeon	2	(1.5)	50	(13.9)
Cinn/BWT	17	(12.5)	49	(13.7)
Shoveler	9	(6.7)	25	(7.0)
L. Scaup	27	(20)	51	(14.2)
Redhead	10	(7.4)	15	(4.2)
Ruddy	3	(2.2)	11	(3.1)
GWT	3	(2.2)	15	(4.2)
Canvasback	0	(0)	0	(0.0)
Unknown	4	(3)	11	(3.1)
	<hr/> 135	<hr/> (100)	<hr/> 358	<hr/> (100.0)

Table VIII.

1990 NEST DATA

SPECIES	# NESTS FOUND	# SUCCESSFUL	# DESTROYED (predators)	# ABANDONED	# ABANDONED/DESTROYED DUE TO SEARCHES	APPARENT SUCCESS	MAYFIELD SUCCESS
Mallard	15	11	2	1	1*	30	8.6
Pintail	6	2	1	2	1	50	34.8
Gadwall	39	31	7	1	3	45	36.4
Shoveler	9	8			1	67	62.3
Cinn/BWT	17	11	4	1	1	75	72.6
Wigeon	2		2			67	55.6
L. Scaup	27	16	8	2	1	38	24.1
Redhead	10	2	3	1	4	29	32.2
Ruddy	3	2		1		50	22.0
Unknown	8		5		1	0	
Total	135	87	31	7	11	42	31.3

*This nest was not abandoned, just could not relocate it.

Table IX.

Arapaho National Wildlife Refuge
ESTIMATED DUCK AND CANADA GOOSE PRODUCTION, 1971-1990

Species	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
BW/Cinn Teal	145	105	83	196	218	402	507	421	376	82	174	193	996	696	1154	857	1551	719	570	658
Canvasback	0	0	0	0	7	0	0	7	23	0	0	0	5	30	0	0	0	0	0	0
Gadwall	140	145	235	247	337	483	446	856	476	291	663	1414	1536	2394	2863	2293	1695	2383	1127	804
GW Teal	150	185	140	244	295	354	352	500	219	13	247	737	713	507	302	455	450	588	577	106
Mallard	525	700	627	650	517	566	363	663	245	48	435	922	408	414	249	383	617	418	358	224
Pintail	500	280	449	555	472	661	275	400	373	63	430	1291	958	1626	733	782	782	738	389	508
Redhead	75	10	17	52	20	85	128	289	190	49	25	328	491	182	300	563	216	199	66	117
Ring-neck	0	0	0	0	0	0	0	0	8	0	0	7	0	7	0	0	0	0	0	0
Ruddy	65	35	42	50	59	77	76	138	13	9	12	178	242	316	364	527	267	641	160	89
L. Scaup	0	345	386	570	410	635	156	510	474	291	77	748	1046	1174	1266	1638	1193	1194	707	338
W. Shoveler	80	104	138	247	167	113	210	515	80	187	233	859	1340	688	968	552	1393	1010	1044	494
Am. Wigeon	350	220	322	345	412	402	224	821	98	137	263	1045	1497	1012	1557	1423	1205	1528	1077	667
Unidentified	0	0	0	0	0	0	0	0	0	0	0	7	0	7	0	0	0	14	0	86
Total Ducks	2030	2129	2439	3156	2914	3778	2737	5120	2575	1170	2559	7729	9232	9053	9756	9473	9369	9432	6075	4091
Canada Goose	0	5	5	4	0	7	0	21	48	114	100	125	127	148	212	253	300	457	225	275
C. Werganser	10	0	6	8	0	8	8	13	0	0	0	40	0	0	10	30	30	0	0	25
Totals	2040	2134	2450	3168	2914	3793	2745	5154	2623	2317	2659	7894	9359	9201	9978	9756	9699	9889	6300	4391

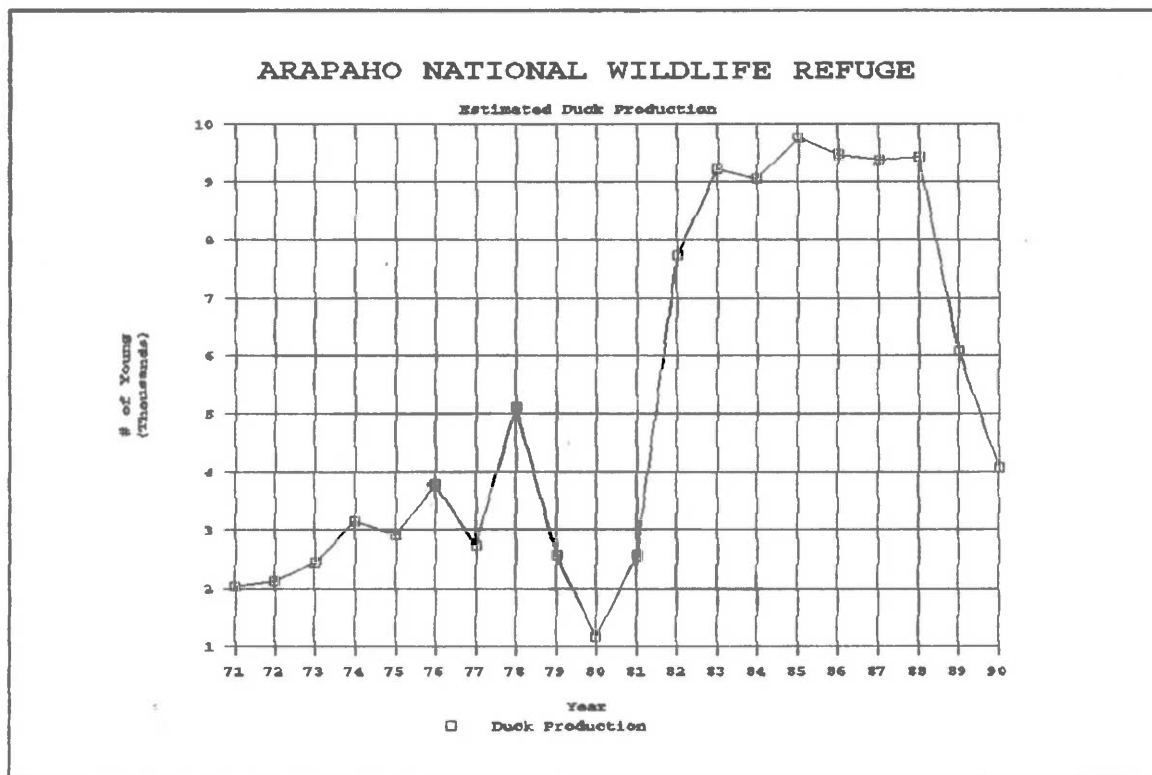


Figure 1

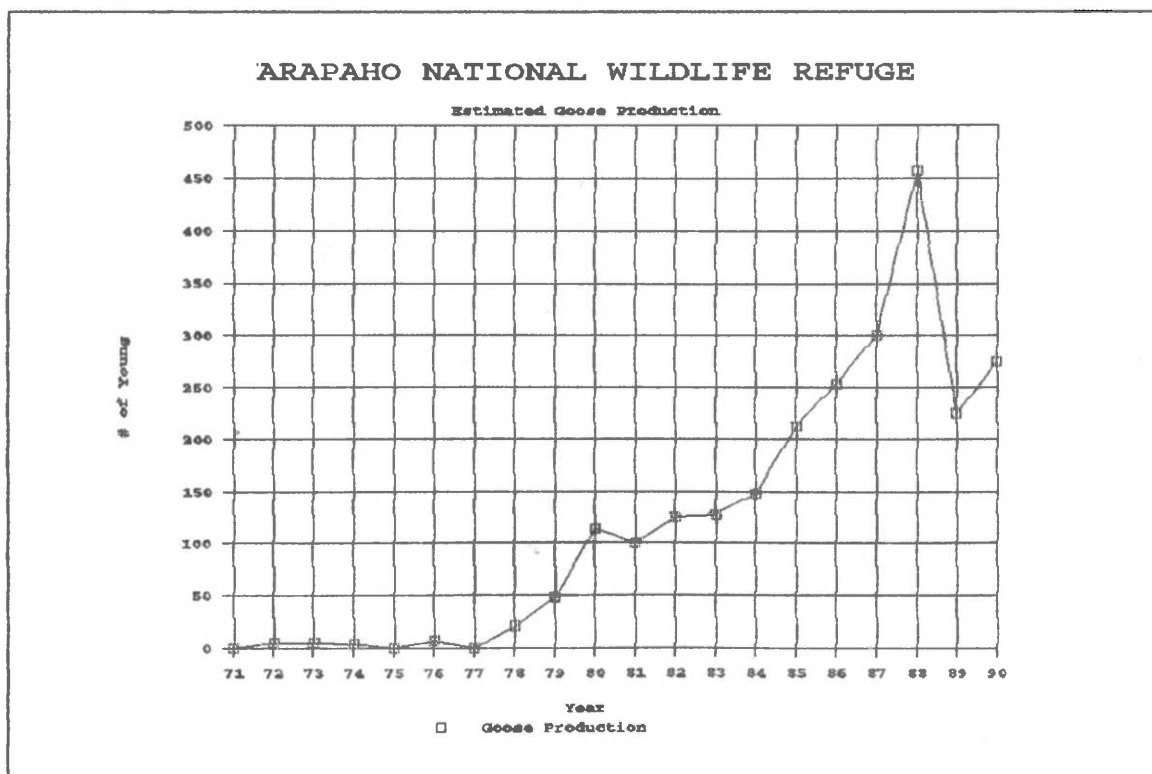


Figure 2

Actual goose production was estimated at 275 on the refuge this year. This was up from last year but still low compared to 1989's production of 360.

Fall numbers of geese peaked at 500 in September, dropped to 270 in late October, and zero by the first of November.



90 NR17

6/28/90

ECP

Skip Ladd, ARD, and Ray Rauch, Zone III Associate Supervisor discussing wetland management with Arapaho's Wetland Management Consultant.

4. Marsh and Water Birds

The refuge has one black-crowned night heron colony found in Smith pond. We survey it every year to get a estimate of the population. This year there were 54 active nests compared to 73 active nests in 1989. Only one survey is made to limit disturbance of the colony. This year refuge personnel tried measuring bill length to establish age of young. Only the young of two nests were measured we felt we were disturbing the colony by spending too much time at each site. Results indicated that the young in one nest varied in age from 1 day to 10 days old. In the second nest the young varied in age from 6 to 7 days old. We most likely will not continue with measurements in the future as our main concern is to monitor the population index.



90 NR18

6/27/90

SL

A young black-crowned night heron in nest.

The refuge also has several small eared grebe colonies, nesting on several ponds on the refuge. We censused the colonies in July and found a total of 80 active nests. The census may have been a bit late in the season, for a good estimate, as there were approximately 30 nests found empty with no way of knowing if they had been successful or not. Next year we will try to census the colonies early enough to catch the birds still incubating, to get a better estimate of active nests.

White-faced ibis were observed several different times on the refuge. They seem to like one area of the refuge and usually are not observed anywhere else. No evidence of nesting has been observed on the refuge.

Several double-crested cormorants were observed in April this year. This was the only time they were observed on the refuge which was less frequent than previous years. They are not known to nest on the refuge.

A group of 30 white pelicans were observed on Germ pond in June, utilizing the pond for several days. Small groups of white pelicans were also seen in the spring and fall.

One American bittern was observed near the Illinois River this year.

A small colony of great blue herons nest on the refuge. The colony is found along the Illinois river in a small group of cottonwood trees. The only censuses conducted involved a count of the adults visible in the nests.

Other marsh and water birds observed include: sora and virginia rails, and pied-billed grebes.

5. Shorebirds, Gulls, Terns and Allied Species

Among some of the more common members of this group observed during the year were: American avocet, black tern, Forster's tern, killdeer, common snipe, long-billed dowitchers, Wilson's phalaropes, and a number of peeps. Two more uncommon species were also observed on the refuge. One long-billed curlew was sighted in July and four marbled godwits were observed in June.

6. Raptors

The two most common raptors on the refuge are Swainson's hawks and golden eagles. Both species can be observed daily in the summer. Other raptors seen somewhat less frequently are: Northern harriers, kestrels, short-eared owls, red-tailed and rough-legged hawks, and turkey vultures.

Prairie falcons were sighted occasionally during the summer.



90 NR19

6/90

SL

Northern harrier nest.

The refuge has two known resident great horned owls. These owls live in the Case barn where disturbance is minimal. We found two eggs in a nest this year but as far as we know they never hatched. One great horned owl was seen several times on the office roof during the summer.

Burrowing owls were observed this year in October. Usually we see several during the summer months but none were observed this year.



90 NR20

7/90

SL

A pair of Swainson hawks on the back entrance to the refuge early one morning.

7. Other Migratory Birds

Mountain bluebirds used several of our bluebird nesting boxes this year. Tree swallows take advantage of the rest of the nesting boxes.

Rosy finches and dark-eyed juncos take advantage of our bird feeder during the winter months. The feeder also attracts an occasional tree sparrow.

Rufous and broad-tailed hummingbirds are common visitors to the nectar feeders at refuge headquarters during the summer. An occasional black-chinned hummingbird is also observed.

A western tanager and brown thrasher were spotted several times at the Case temporary quarters. Although sage thrashers are common, we finally found a nest on the Case flats, a first observation. We also found a confirmed vesper sparrow nest.

A unusual observation was that of a Northern Oriole near the refuge headquarters. A female oriole was enjoying the ripe berries in a bush next to the office. This was the first observation of that species on the refuge.

The refuge participated in the Colorado Breeding Bird Atlas for the second year. This year the main priority was up-grading the nesting status of birds which we had observed last year. The project divides the state into geographical blocks and seeks to determine what species of birds breed in Colorado, where, in what habitat, and in what numbers. We spent six days searching our priority blocks this year. We updated the breeding status of 13 species. Ten of the thirteen species were confirmed as nesting, the other three were considered probable nesters. We also updated several species in three other blocks. We will continue supplying information for the survey for the next several years.

8. Game Animals

A herd of approximately 60 elk could be found on the Anderson tract in January. We spread hay for the elk during the first two months of the year although they didn't use much of the feed as snow cover was light. Elk moved on and off the Case flats during the month of February. A herd of roughly 90 elk were observed on the Anderson tract during the fall and winter months. In late November through December we scattered hay for the elk, but again they didn't utilize much of the hay.

Three or four moose were occasionally observed feeding on willows along the Illinois River near the headquarters during January and February. Several sets of twins and some single calves were observed this summer along the Illinois River. Several large bulls (at least large for the refuge) were observed hanging out near the headquarters in the early fall. The North Park moose population is healthy and stable and, according to CDOW personnel, is at or near 300 animals.

The Colorado Division of Wildlife conducted willow transects this summer, hoping to establish a carrying capacity level for moose in North Park. Three of the transects were conducted on the refuge. To date we have not received any information on the outcome of these transects.



90 NR21

5/90

ECP

Mule deer as frequently seen from the headquarters office.



90 NR22

6/1/90

ECP

Young pronghorn found on Hampton tract.

Probably because of the mild winter, mule deer were observed at the refuge headquarters only once during the winter. Several deer were seen along the river near headquarters throughout the summer. One large buck was observed on the northern boundary of the refuge this summer. Our guess was that it was at least a five point but no one got a real good look. No white-tailed deer were seen on the refuge in 1990.

Large groups of pronghorn were observed on the refuge during the winter months. In January a group of 475+ were seen on the Case Flats. A group of about the same size was seen again in November and December of this year. Production was good this summer.

10. Other Resident Wildlife

Sage grouse are important resident species as the refuge receives many visitors throughout the spring and summer season looking for sage grouse. Of course, the best place to see a sage grouse is on a lek, of which there are none on the refuge although there are several near by. Several sage grouse broods were spotted on the refuge this year.

The refuge beaver population continues to do well. A beaver census in August found 35 active beaver dams. We have had some problems with beaver involving our water management program during low water years like this year. Getting water through the beaver dams and down river in the late summer becomes a challenge. In general we remove enough of the beavers dam to allow some flow to continue down the river.

We did not conduct a predator abundance survey this year due to lack of proper equipment. From general observations, coyote populations seem to be doing great and expanding. Also, the refuge porcupine population seems to be doing well based on willow use. Badgers are seen occasionally as well as weasels and skunks. We did set out a livetrapped trapline this spring to catch waterfowl nest predators such as skunks. Success was very low as the only species we caught was one prairie dog.

Other resident wildlife include: white-tailed jackrabbit, cottontail rabbits, prairie dogs, ground squirrels, and other small rodents. The cottontail population is doing well around the refuge headquarters area. We feel that the prairie dog population may be decreasing. There were two prairie dog towns on the refuge that have been included as a research area the last three years. This year the graduate student who was conducting the studies found both prairie dog towns basically empty. The prairie dogs have either died off or have moved to a new area. We are not sure which has happened.

11. Fishery Resource

The Illinois River is the refuge's only fisheries resource. The brown trout is the primary game fish found in the river although a few rainbow trout are also present. Other than one stocking in 1989, the Illinois River is a natural reproduction fisheries. In dry years the lower half of the river dries up and is unable to sustain fish. Beaver dams in the upper half of the river help to sustain a good population of large trout. Creel checks conducted this year showed a slight decrease in over all size of fish checked with the largest fish being a 17" brown trout.

15. Animal Control

The refuge issued a special trapping permit again this year to try and keep the beaver population in control. A local trapper removed ten beaver from the Illinois River near the headquarters area. The following animals were removed from the refuge in accordance with the approved Predator Management Plan: 36 magpies, 4 crows.

H. PUBLIC USE

1. General

There was an estimated 6,600 visits to the refuge in 1990, about the same as 1989. Most visitors drive the auto tour route with an increasing number stopping in at the office for information or gathering pamphlets from our three leaflet dispensers at the kiosks.

5. Interpretive Tour Route

The refuge maintains a six-mile, self-guided auto tour route on the Case tract on the west side of the refuge. Many of the best waterfowl viewing areas are included on the tour route as are interpretive stops relating to prairie dogs, pronghorns, and other refuge fauna and flora.

6. Interpretive Exhibits/Demonstrations

The refuge's three interpretive kiosks are a popular attraction to refuge visitors. The kiosks have interpretive panels that describe activities from wildlife viewing opportunities to habitat management programs occurring on the refuge. One kiosk and parking area, the Bocker overlook, was completed this year. Once we installed the highway directional signs for the new Bocker overlook, visitor use increased approximately 80 percent.



90 NR23

7/1/90

TLF

The refuge's contribution to Walden's Centennial Rodeo Parade.



90 NR24

7/1/90

TLF

Temporaries 'ducking' around at Centennial parade.

The refuge entered a float in the Annual North Park Rodeo Weekend Parade again this year. The theme this year was Walden's Centennial. We tried to follow the theme somewhat with a float wishing the town happy birthday. Several temporaries also participated as 'duck farmers' riding a goose and a mallard.

A new interpretive exhibit involving an egg display case was designed and constructed by one of the temporaries.

7. Other Interpretive Programs

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

- April - Varney, Rizor, Patten and Follett all participated in Earth Day activities at the local Jr-Sr High School and Elementary school. A slide show was shown to the elementary school children. An environmental knowledge bowl contest was set up for the high school with awards for the top three teams in Junior High and the top three in Senior High.
- May - Varney and Rizor gave two tours to natural resource college groups. One group was from Colorado State University the other group was from Oklahoma State University.
- June - Patten, Varney, and Rizor conducted two tours for the American Birding Association. Approximately 225 people attended the tours.



90 NR25

6/20/90

ECP

American Birding Association Tour on refuge tour route.



90 NR26

6/20/90

ECP

Members of the American Birding Association Tour observing refuge wildlife.

- July - Rizor presented a slide show on refuge wildlife to a campfire group at the Colorado State Parks.
- August - Umbright and Lebeda gave a refuge tour to the Walden Recreation Department.
- September Rizor conducted a tour of the refuge for two representatives of the Northwest Tourism board and two free-lance writers.

Follett and Lebeda assisted the Colorado State Forest with a nature program for fourth, fifth, and sixth graders.

Employees from the Denver RO, mostly the clerical staff visited the refuge in conjunction with a BBQ pork roast lunch courtesy SAC Terry Grosz.

Two news releases were submitted to the local Jackson County newspaper during the year: one concerned recruitment for the YCC program, and the other was a general article about visiting the refuge.



90 NR27

8/1/90

TLF

Temporaries Lebeda and Umbright playing a Project Wild game with the Walden Recreation group.



90 NR28

9/18/90

UNK

Head cook Terry Grosz and assistants preparing lunch for the Regional Office picnic.



90 NR29

9/18/90

UNK

Regional Office personnel enjoying Arapaho's sunny fall weather.

8. Hunting

This was the third year of waterfowl hunting on the refuge. Habitat conditions were poor again this year from a lack of water. We were not able to monitor the opening of the hunt this year, because Congress could not agree on the budget. We think hunting pressure was about the same as last year.

The refuge Canada goose season ran from September 29 through October 7. We worked the opening weekend conducting bag checks and law enforcement. Pressure was low with approximately ten hunters and a total bag of around two geese.

Pronghorn archery season opened on August 15 and ran through September 20. Hunting pressure on the refuge was low with maybe 10 hunter visits. One buck antelope was known to have been harvested.

The pronghorn rifle season opened September 29 and extended through October 5. The refuge is in a permit only area, 110 permits were issued for 50 does and 60 bucks. There were 10 to 12 animals taken legally on the refuge.

Sage grouse season ran from September 8 through October 7. The daily bag limit this year was three birds with a possession limit of six. Hunter bag checks were conducted the opening weekend, results were similar to 1989. A total of 40 hunters checked spent 121 hours hunting to harvest 19 grouse.

9. Fishing

The Illinois River is open to fishing on the refuge year-round except during June and July when it is closed to limit disturbance of nesting waterfowl. We estimated approximately 70 fishing visits to the refuge in 1990.

Creel checks were conducted throughout the open seasons. Approximately 62 fish were caught by 41 anglers, fishing about 77.4 hours. The average visit was 1.89 hours which is lower than the last several years which averaged 2.1 to 2.5 hours. The largest fish checked was a 17" brown trout with most of the fish measuring from 12-14 inches. Lure fishing was preferred the most with 56% of the fisherman using artificial lures. Bait fisherman made up 32% and fly fisherman 12% of the user group. Brown trout were the only trout caught. A few chubs and suckers were caught also.

10. Trapping

In previous years the refuge was divided into two trapping units, HMU A as one unit, HMU's B & C as the other. In 1990 due to a general lack of interest the refuge units were combined and one permit was issued. Six coyotes, three fox, two badgers, one skunk and one long-tailed weasel were removed. The trapper keeps all animals harvested after purchasing a \$25.00 trapping permit.

17. Law Enforcement

Nearly all of our law enforcement efforts take place during the opening weekends of the various hunting seasons. However, this year we did not work the opening of the State duck season due to the lack of a Federal budget. Normally our law enforcement activities on that weekend involve checking duck hunters both on and off the refuge.

Occasional creel checks or hunter contacts are made at other times also. We often assist Colorado Division of Wildlife personnel on off-refuge patrols under Colorado State Law Enforcement authority. Three penalty assessments and two violation warning notices were issued in 1990 and are summarized below:

Table X.

Violation Notices, Arapaho NWR - 1990

<u>Date</u>	<u>Violation</u>	<u>Officer</u>	<u>Disposition</u>
11/3/90	Take wildlife on private land without permission.	Patten	\$100 (fine) \$37(surcharge)
11/3/90	Unlawfully take big game (elk).	Patten	\$700 (fine) \$259(surcharge)
	Take wildlife on private land without permission.		\$100 (fine) \$37 (surcharge)
11/4/90	Hunt big game (elk) in closed area of refuge.	Patten	\$100 (fine) \$37 (surcharge)
11/5/90	Hunt waterfowl in closed unit of refuge.	Brewer	Warning issued
11/5/90	Hunt waterfowl in closed unit of refuge.	Brewer	Warning issued

I. EQUIPMENT AND FACILITIES1. New Construction

The Brocker parking area and visitor display area was completed in 1990, with a pole fence surrounding the area. Railroad ties and gravel were placed to outlining the parking lot and walkway to the kiosk.

A fisherman access area was constructed on the Anderson tract. The parking area was enclosed with a barbed wire fence with a walk through and an informational sign.

Brewer constructed two small nesting islands in Antelope Pond.

2. Rehabilitation

Antelope pond was drawn down this year to rehabilitate the water control structure and outlet. Rip-rap was placed around the outlet and gabions were placed in the spillway to help control erosion.

The road into the East Fish Hatchery Pond was built up and graveled while the dike was raised and extended in width, to accommodate the increased depth of the pond.



90 NR30

4/6/90

RNV

Here today...



90 NR31

4/6/90

RNV

Gone tomorrow...

Several ditches including the Riddle, Hackley, and lower Ross were either cleaned out and/or water control structures repaired.

Another reclamation phase of the Hampton ranch site was accomplished in March when we burned the last of the buildings.



90 NR32

8/90

UNK

Antelope Dike outlet rehab.

3. Major Maintenance

The "guest house" (quarters #4), which we use as a temporary housing, received new indoor/outdoor carpeting this year in the living room and two bedrooms.

In September, a private contractor was hired to paint the complete interior of Quarters #56.

With over 100 miles of boundary and interior fences on the refuge, we are kept busy repairing barbed wire, gates, river crossings and similar facilities.

4. Equipment Utilization and Replacement

A 4X4 1/2 ton Dodge, ordered in FY 89, was received in April replacing the 1979 4X2 Dodge. Another 4X4 3/4 ton Dodge, ordered in FY 90, was received in June replacing the 1977 4x4 Dodge. (Note the fast turnaround on the latter order. Quite a feat when dealing with GSA!!)

A new Suzuki Four Trax 4X4 was purchased in March bringing our number of ATV's to three, which works well for nest dragging and irrigating.

A Motorola Syntor mobile radio with State and County frequencies was purchased and installed in June. Two Motorola radios with refuge frequency were purchased in October.

A replacement Magnavox television was received in October along with a Panasonic camcorder.

5. Computer Systems

A Dell 386 computer and Power Maker Micro Surge Protector were received in October, expanding our computer system.

A Rose Master Switch was received in September enabling us to network our computer system. We can't thank CMR's Randy Matchett enough for making the custom cables needed to accomplish this networking.

In November and December we received a Summagraphics digitizing tablet, along with PC Tools and Fab software, all components of the Map Info program. The last word from the RO stated that all stations would receive complete Map Info systems, accomplish needed training, and have Map Info operational by the end of FY 91.

Other

In April, a Dayton Steam Cleaner was received on excess property from Medicine Lake NWR.

J. OTHER ITEMS

1. Cooperative Programs

We have a good rapport and working relation with the Colorado Division of Wildlife. Part of the present refuge was once an old State fish hatchery where a free-flowing spring feeds two small ponds before entering an irrigation ditch and continuing on to other refuge impoundments. During the field season the CDOW parks some travel trailers at the "Fish Hatchery" where some of their personnel stay for research or law enforcement purposes.

In 1989, the CDOW approached us with a proposal to stock one of the small ponds at the hatchery with golden trout for brood stock. We had no problems with this proposal and let the CDOW drain and deepen the pond that fall. In May of 1990 the CDOW stocked 250 golden trout in the pond.

2. Other Economic Uses

Several years ago the Service issued a right-of-way to the Walden Reservoir Company to construct a pipeline to divert water from an irrigation ditch through the refuge to the Illinois River. The Company owns water rights in the ditch which originates from the Michigan River, but had no way to get the water to the reservoir. We agreed to the proposal in exchange for temporary use of the water as it flows through the refuge.

Walden Reservoir is an irrigation storage facility on BLM land lying west of the town of Walden. The water in the reservoir is diverted from the Illinois River near town and stored by shareholders who use it for irrigation of pasture and hay meadows. Since the Michigan River flows east of Walden before entering the North Platte, the water within the Michigan drainage is essentially unavailable to the reservoir. One irrigation ditch from the Michigan however flows just across State Highway #14 from the northern refuge boundary and it was there that the Company proposed to divert the water.

In November of 1989 work began on the diversion. A pipe was inserted under the highway, but that was about the extent of it. This spring the contractors resumed their work on the pipeline, building an energy dissipater and placing pipe to the bottom of the hill. The entire pipeline was completed and the site seeded in November.

The Walden Reservoir Company has stated that it plans on diverting water in the fall during low water years when it can't refill the reservoir from the Illinois River alone, but that they may use the diversion to their best advantage whenever necessary. In any event the refuge will benefit by using the water before it gets to the Illinois River.

One special use permit was issued to Halliburton Geophysical Services, Inc. in February of 1990 to conduct seismic exploration activities with vibratory methods. Two lines of a total of 17,371 feet were surveyed on the Hackley tract of the refuge. We charged \$50 for the permit with an additional \$250 per mile of line, for a total of \$872.50.

3. Items of Interest

Community Involvement

Patten, Varney, and Brewer continue to support and participate in the Jackson County Lion's Club.

Patten is a member of the North Park Oddfellows Lodge.

Follett is active in the local Boy Scout and Girl Scout Troops and their respective committees.

Rizor is a member of the North Park Hospital Board which manages the local County ambulance service.

Rizor was a judge for the Annual North Park High School Science Fair in March.

The refuge staff participated in the Colorado State Highways program 'Adopt A Highway'. Twice during the year, members of the staff (excluding Gene and Gale) picked up litter along the six mile stretch of Highway 125 running through the refuge.

Patten and Varney attended various inter-agency meetings during the year to inform others what was going on at the refuge and to keep abreast of what other agencies were doing.

Varney and Rizor attended various watchable wildlife meetings in conjunction with the U.S. Forest Service, BLM, Colorado State Parks, Colorado Division of Wildlife and local people to promote watchable wildlife in North Park.

Personnel Training/Meetings Attended

1. Varney and Brewer - attended 40 hour L/E In-service refresher at Marana, AZ in January.
2. Patten - attended 40 hour L/E In-service refresher at Marana, AZ in February.
3. Patten and Varney - attended the Project Leaders' Meeting at the RO in March.
4. Brewer - attended 40 hr Basic Fire Management Training at Jackson Hole, WY in April.
5. Patten - attended a one-day Forest Service Regional Coordination Meeting in May.
6. Follett - attended one sixteen hour Introduction to Dbase III computer class in July and one sixteen hour Dbase III Plus Programming class in August.
7. Patten and Rizor - attended the Project Leaders' Meeting at Flint Hills NWR in August.
8. Patten - attended a Predation Symposium at Jamestown, ND in August.

9. Patten, Varney, and Brewer - attended an Inter-Agency Meeting with Colorado refuges and the Colorado Division of Wildlife at Glenwood Springs, CO. All law enforcement personnel also participated in a semi-annual pistol requalification.
10. Patten and Rizor - hosted a land acquisition meeting at the refuge in conjunction with BLM, Colorado Division of Wildlife, Ducks Unlimited, and Regional Office personnel.
11. Follett - completed a 40 Hour Small Purchase Course in November.
12. Patten, Rizor, Brewer and Follett - attended eight hour Basic Aviation Safety Training at the RO in December.
13. Patten, Varney, and Rizor - attended Wyoming Toad Recovery Team meetings throughout the year in Laramie, WY.
14. Patten and Varney - each attended one Miracle Mile Coordinated Resource Plan Committee meeting in Medicine Bow, WY during the year.

Awards

Nothing to report.

4. Credits

Patten - Sections: C, D, F, editing.
 Rizor - Sections: A, B, E, G, H, I, J, Satellite
 refuges, editing.
 Follett - Word processing, editing, printing, assembly.
 Photos - As noted.

HUTTON LAKE NATIONAL WILDLIFE REFUGE
Wyoming

Administered by Arapaho NWR
PO 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.

1990 Activities

Hutton Lake NWR was visited regularly during the year. Water management activities, waterfowl and shorebird censuses and facilities maintenance activities were a few of the projects undertaken.

Water was diverted from Sand Creek into Rush Lake and subsequently into Lake George and Hoge Lake during the spring. The headgate was opened in late March with a flow of 10 cfs, this dropped to 2.4 cfs in April and the gate was closed early May with no water running. The culvert between Rush lake and Hoge lake is still silted shut but some water was diverted into Hoge through an older structure in the dike. We opened the headgate again in mid October to divert as much water as possible before everything froze up. Overall we estimated that 360 acre feet of water was diverted into the refuge in 1990.

One special use permit was issued to a professor at the University of Wyoming to conduct selenium research on Hutton Lake and Bamforth National Wildlife Refuges. The research conducted in July and August was an inventory of seleniferous soils and selenium accumulating plants on both refuges.

The YCC crew spent a day on the refuge repairing a sign and tearing down old snow fence.

One grazing permit was issued during the year for a total of 207 AUM's at \$3.28/AUM. The cattle were on the refuge for thirteen days in late July.

Waterfowl censuses were conducted at various times during the year. Over 2,000 ducks and 150 Canada geese were counted during the first waterfowl census in early April. The population peaked in late April with approximately 3,700 ducks and 70 Canada geese. In May the duck population dropped to an estimated 550 birds representing the breeding population for the year. Based on mid August brood counts, duck production was calculated at 600 and goose production at 60. During the fall approximately 1000 ducks were observed on the refuge.

Patten observed fifteen bald eagles (4 adults and 11 immature) on the refuge April 3rd.

A total of 35 white pelicans were observed on the refuge at various times during the summer and fall.

Rizor and Umbright assisted the Wyoming Game and Fish Department with a colonial bird census on Rush lake. A total of 25 black-crowned night heron nests were found.

The efforts to save and enhance the population of endangered Wyoming toads (Bufo hemiophrys Baxteri) near Hutton Lake NWR continued in 1990. Patten and Varney attended a meeting of the recovery group at the University of Wyoming in April where a technical review draft of the Wyoming Toad Recovery Action Plan was presented. Plans were discussed for the upcoming field season, including a proposal to transplant egg masses to Hutton's Lake George. No egg mass transplants were attempted in 1990 due to poor toad reproduction. Another attempt to transplant may be done in the spring of 1991 pending reproduction success.

Patten and Rizor attended a meeting of the recovery group in November to address the recent toad die-off. A total of thirteen toads died, with red leg disease thought to be culprit. Progress on the Nature Conservancy's purchase of 1,857 acres of land around and including Mortenson Lake was discussed. The final paperwork on the purchase should be completed in early 1991. The U.S. Fish & Wildlife Service is hoping to acquire the land from the Nature Conservancy in the near future, as an addition to the National Wildlife Refuge System, to protect the Wyoming toad. Manager Patten and Chris Garber of the Nature Conservancy have drafted a refuge management plan for the proposed refuge.

Wild rose and buck brush were planted on the Rush Pond islands in June.

A check in the amount of \$1,623.00 (\$563.00 for Bamforth NWR and \$1,060.00 for Hutton Lake NWR) was presented to Albany County for the 1989 revenue sharing funds.

PATHFINDER NATIONAL WILDLIFE REFUGE
Wyoming

Administered by Arapaho NWR
PO 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 south.

The refuge was established on August 1, 1936, as an overlay on the entire reservoir, but it was reduced to its present four small 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 pronghorn, 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.

1990 Activities

Patten made several trips to the Sage Creek\Platte Unit of the refuge while checking easements in the area.

Varney attended a Miracle Mile Coordinated Resource Committee meeting at Medicine Bow, Wy in June. The Miracle Mile area is a stretch of the North Platte River between Pathfinder and Seminoe Reservoirs that is a popular fishing spot and located just south of the Sage Creek/Platte Unit of the Refuge. The Miracle Mile Coordinated Resource Plan was presented and discussed at the meeting. The plan covers public and private lands and several rehabilitation phases.

In December, Patten attended a Miracle Mile Coordinated Resource Committee meeting at Medicine Bow, Wy where the resource plan was reviewed and the progress of the rehabilitation phases discussed.

A check for \$192.00 was presented to Natrona County as revenue sharing payments for FY '89. Carbon County received \$316.00 for revenue sharing payments for FY '89, this amount came from both Pathfinder NWR and Saratoga NFH.

BAMFORTH NATIONAL WILDLIFE REFUGE
Wyoming

Administered by Arapaho NWR
PO Box 457, Walden, Colorado

Introduction

Bamforth National Wildlife Refuge, 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 runoff 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 NWR is sporadic, with only limited production.

1990 Activities

One grazing permit for 99 AUM's at a rate of \$2.00/AUM is issued on an annual basis to a neighboring rancher. In exchange for the reduced grazing fee, the permittee is responsible for irrigating refuge lands when the water is available (which, due to a poor water right, is not much).

Wilma Ely and Peter Rich from the Inspector Generals Office in Washington D.C. visited Arapaho NWR in September, concerning Bamforth NWR. They reviewed all files and historical information pertaining to Bamforth NWR in an attempt to deem the U.S. Fish and Wildlife Service's role in the management of this property.

The refuge issued a special use permit to Dr. Pugesek to continue his study at Bamforth NWR of California Gulls during the 1990 season. The Wyoming Game and Fish also issued a special use permit as this study is on refuge and state lands. Due to the complaint received in 1989 this is the last year the special use permit is issued. The complaint against Dr. Pugesek was for disturbing white pelicans and other nesting water birds while conducting his study. The permit was granted for the last two years with the stipulations that Dr. Pugesek take all means necessary to protect other nesting species. According to Dr. Pugesek's research plan the study

should be completed 1990. The Wyoming Game and Fish have tentatively made plans to close Bamforth Lake to all studies disturbing colonial nesting birds from 1991 to 1994. During this period the Wyoming Game and Fish plan to evaluate the importance of Bamforth Lake to colonial nesters and prepare recommendations for future research.

Revenue sharing payments are presented to Albany County along with those for Hutton Lake NWR.