MEDICINE LAKE NATIONAL WILDLIFE REFUGE
NORTHEASTERN MONTANA WETLANDS DISTRICT
LAMESTEER NATIONAL WILDLIFE REFUGE

Medicine Lake, Montana

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

REVIEWS AND APPROVALS

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Theodore W. Gutzke 4-14-92
Refuge Manager Date

Associate Manager Date 4/16/92

Regional Office Approval Date 4/17/92

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INTRODUCTION

Medicine Lake National Wildlife Refuge

Medicine Lake National Wildlife Refuge is situated on the glaciated rolling plains in the far northeast corner of Montana. It is located in Sheridan and Roosevelt counties.

The refuge lies in the highly productive prairie pothole region and has relief typical of the glacial drift prairie, relatively gentle rolling plains with occasional shallow depressions. This is basically a prairie refuge located in the transition zone between the mixed grass and short grass prairie. Dominant native grasses include green needlegrass, needle and thread, blue grama and western wheatgrass. Native brush species consisting primarily of chokecherry, buffaloberry and snowberry are common in coulees and sandhill areas. A few old shelterbelts composed of a variety of introduced deciduous species still remain on the refuge. These trees appear to be out of place on the prairie.

The climate is typical of the northern Great Plains with warm summers, cold winters, and marked variations in seasonal precipitation. Precipitation averages 14 inches per year. Temperatures can exceed 100 degrees in the summer and may drop to -45 in the winter. Spring is generally the windiest period with velocities commonly exceeding 20 miles per hour. Passing weather fronts can bring gusty winds up to 50 mph.

The refuge encompasses 31,457 acres including 13,546 acres of open water and marsh, 14,354 acres of grasslands and 3,557 acres of cultivated lands, primarily former croplands. Surrounding private land is intensively farmed for small grain.

The refuge was established in 1935 by Executive Order with the primary purpose of providing waterfowl production and migration habitat.

In 1937, the Civilian Conservation Corps (CCC) set up camp on the refuge and 180 men began work. During the camp's four years of operation, many conservation projects were undertaken including construction of dams, dikes, shelterbelts and fences. Many of the refuge roads and buildings were also built during that time.

The 11,360 acre Medicine Lake Wilderness Area was established by Congress in 1976. This area includes the main water body of the lake and the islands within. Also included is the 2,320 acre Sandhills Unit with its rolling hills, native grass, brush patches, and a few relic stands of quaking aspen.

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B. CLIMATIC CONDITIONS

January temperatures helped to refresh our memory that northeastern Montana is truly a part of the U. S. with extreme weather patterns. Below zero temperatures visited us for 17 days during the month. The lowest reading was -26 degrees on 9 January, with a high on that same day of -8. To make a long story short, many dollar bills drifted up the chimney during the month. The only 100+ temperature greeted us on 1 September with a reading of 101 degrees.

A welcome reprieve from the bitter cold was received in February and March. Temperatures were in the 40's and 50's for the majority of the time. March brought two days in the high 60's to remind us that spring was just around the corner.

Total precipitation for the year was 14.52 inches, just a fraction above the annual average. The majority of this moisture occurred in April, May, June, July, and September---a total of 12.54 inches. January, February, and March left us with only .82 inches of precipitation in the form of snow, which contributed to little or no spring run-off.

;Figure 1. A frosty winter morn along Medicine Lake. exp 5, 1/11/91. MJR

Following is a summary of precipitation received in 1991 compared to "normal" (MT Agriculture Statistics Service records for 1951-80):

	% of Normal			% of Normal	
	90	91		90	91
January	na	29	July	66	131
February	na	73	August	66	116
March	na	89	September	58	114
April	32	116	October	56	109
May	73	139	November	na	90
June	64	134	December	na	na

na---not available

Table 1. Temperatures and precipitation recorded at Medicine Lake NWR, 1991.

Month	High	Low	Precipitation
January	43	-26	0.12
February	55	- 1	0.29
March	67	- 5	0.41
April	79	29	1.78
May	86	23	3.34
June	92	44	4.55
July	98	41	1.30
August	98	48	0.55
September	101	25	1.57
October	82	- 2	0.13
November	60	-15	0.36
December	50	-12	0.12
Total			14.52

Data presented in Table 2 were provided by U.S. Department of Agriculture's research farm located 11 miles south of refuge headquarters.

Table 2. Evaporation rates using a class "A" evaporation pan at USDA Research Farm, Medicine Lake NWR, 1980-1991.

		Inches of Evaporation						
Year	Date*	April	May	June	July	Aug.	Sept.	Total
1980	4/17	5.61	11.81	12.18	13.71	8.81	7.52	59.64
1981	4/1	7.22	8.64	7.64	10.23	10.22	9.76	53.70
1982	4/26	0.97	5.50	7.88	7.64	10.58	6.59	39.16
1983	4/19	2.89	6.67	9.38	11.70	11.99	7.70	50.34
1984	4/2	6.71	9.29	9.37	14.00	14.14	7.04	60.53
1985	4/2	6.28	9.37	10.33	11.76	10.23	4.92	52.88
1986	4/1	4.90	8.66	9.20	10.16	7.54	5.83	46.70
1987	4/6	6.16	7.94	10.81	9.55	8.48	6.73	49.69
1988	4/1	7.88	11.87	17.06	14.20	12.21	7.78	70.99
1989	4/1	4.98	7.78	9.00	13.41	10.40	8.46	54.03
1990	4/1	6.30	7.94	7.67	12.38	11.51	11.34	57.14
1991	4/1	5.34	7.14	8.81	10.43	11.99	8.71	52.41
Average for Month		5.44	8.55	9.94	11.60	10.71	7.70	53.94

* Date evaporation pan was started each year.

C. LAND ACQUISITION

1. Fee Title

When the original boundary of the refuge was established by Executive Order, several tracts along the west end of the refuge were divided by the railroad track owned by Burlington Northern. Since that time it has been difficult for the refuge to administer the small tracts which lie west of the railroad grade. One of these tracts is similar in size to a parcel owned by Bob French located east of the railroad grade. A trade was negotiated with Mr. French and finalized this year. The parcel traded lies in the NW 1/4 of the SE 1/4 of Section 2, T31N, R55E. The one received is located in SE 1/4 of the SE 1/4 of Section 35, T32N, R55E.

D. PLANNING

5. Research and Investigations

Survey of Piping Plover Nesting and Distribution in NE Montana

Winter Smith completed his Master's program at the University of West Virginia. Much of the practical information in his thesis (ie. hatching and fledgling dates, nest success and production rates, nest site locations, etc.) will be relied on frequently by managers planning to enhance habitat for, or minimize conflict with, nesting piping plovers both on the refuge and in the Wetland District. The abstract from his thesis follows:

Surveys were carried out on foot around 30 lakes in Montana from 1987 to 1990. Nests were located and monitored to determine fate of the eggs. A fledgling per pair ratio was calculated to give an index of productivity. Beach width and vegetation cover were measured to determine if used and non-used areas were different. Chick survival and productivity of brood habitats were also compared.

There were approximately 120 birds found in northeast Montana each year in the survey. The mean fledgling per pair ratio was 1.0 each year and this was similar to other studies. Used areas had wider beaches and less vegetation than did unused areas. Annual use could be predicted by these habitat parameters that changed from year to year. Wet brood habitat supported more broods than dry areas and was more productive; there was a significant difference between the medians of the brood habitat types.

Populations of piping plovers increased each year. This may have been due to increased survey efforts and/or the addition of plovers from other breeding areas. The low fledgling per pair ratio was similar to other studies and shows the need to increase productivity by nest protection and predator control. The yearly return rate to nest sites was affected by the quality of the nesting habitat that changed yearly due to fluctuating water levels of the lakes and vegetation encroachment. Poor chick survival may be another factor contributing to low productivity. Lakes became dry in the middle of summer and the chicks were left with no food or water.

Management methods to increase habitat, protect nests and control disturbances to the nesting plovers would improve productivity. Nesting habitat may be limiting, so creating habitat, controlling vegetation and water control would be appropriate techniques to increase habitat. Also, excluding cattle is an important method to increase productivity of piping plovers.

International Piping Plover Census

This systematic survey was designed to census all potential piping plover nesting areas throughout the U.S. and Canada, thereby providing a more reliable estimate of the continental breeding population. Rabenberg coordinated the survey for Sheridan County which was conducted the first two weeks of June. A total of 115 shoreline miles were surveyed on 16 private wetlands, 12 WPA's, and Medicine Lake NWR. The survey required 270 staff and volunteer hours. A total of 90 plovers (30 pair) were found on the refuge and 179 (63 pair) in the WMD. More detailed results for both the refuge and the Northeast Montana WMD can be found in Section G.2 of the respective narrative report.

E. ADMINISTRATION

1. Personnel

1.	Tedd Gutzke, Refuge Manager EOD 10/6/91	GS-12	PFT
2.	Thad Fuller, Supv. Refuge Op. Specialist	GS-11	PFT
3.	Mike Rabenberg, Refuge Operations Specialist	GS-7	PFT
4.	Joan Quarne, Refuge Assistant	GS-5	PFT
5.	Jack Snellman, Maintenance Worker	WG-8	PFT
6.	Dennis Nelson, Motor Vehicle Operator	WG-6	PS
7.	Layne Krumwiede, Biological Technician 1/22/91-12/31/91	GS-5	Temp
8.	John Stanton, Biological Technician 4/7/91-8/9/91	GS-5	Temp
9.	Heather Husband, Biological Aid 8/4/91-12/28/91	GS-4	Temp
10.	Terrence Greene, Range Aid 5/6/91-10/5/91	GS-4	Temp
11.	Rodney Christensen, Biological Aid 5/13/91-11/30/91	GS-2	Temp

Figure 2. Left to right: Fuller, Gutzke, Snellman, Krumwiede, Quarne, Rabenberg, and Nelson.

Table 3. Medicine Lake NWR staffing levels, FY 86-91.

	Number of Personnel			
	Permanent		Temporary	Total FTE
	Full-time	Seasonal		
FY-91	6	1	5	8.3
FY-90	6	1	4	9.1
FY-89	5	1	4	7.9
FY-88	6	1	4	8.9
FY-87	6	2	3	8.7
FY-86	6	2	3	8.6

Jim McCollum, Refuge Manager, departed 15 June 1991 to accept a similar position at Benton Lake NWR. Thad Fuller was Acting Refuge Manager until Tedd Gutzke arrived on 6 October.

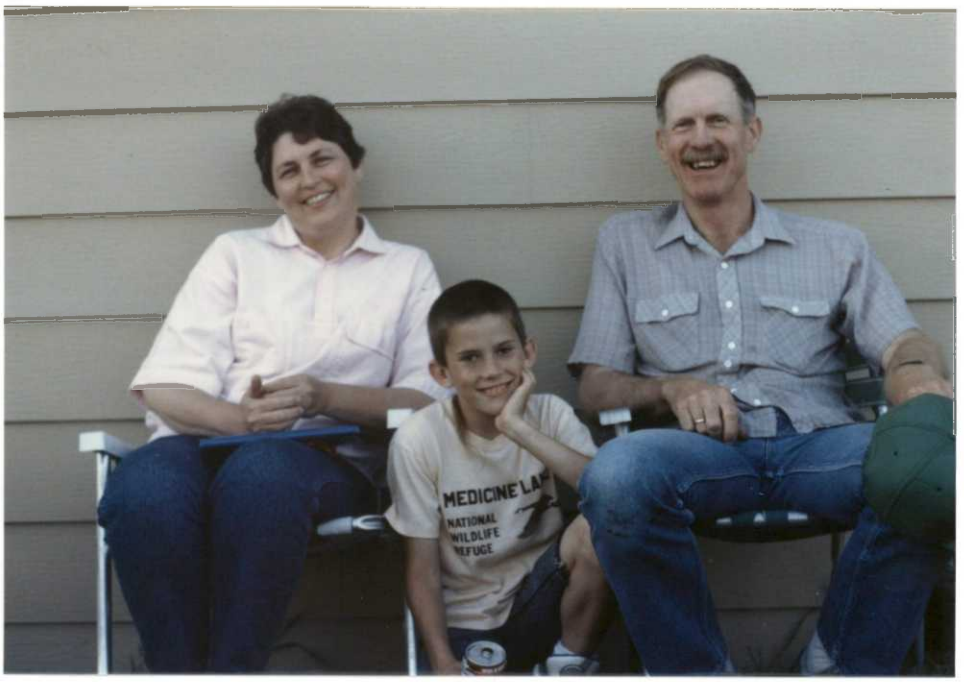

Figure 3. The McCollum's (l to r: Ann, Scott and Jim) said "so-long" to Medicine Lake NWR this year. We wish them the best at Benton Lake NWR. MJR

Figure 4. Montana Private Lands Coordinator, Jim Stutzman, presents Krumwiede with his Special Achievement Award. exp 22, 3/11/91. MJR

2. Youth Programs

The refuge has participated in the Youth Conservation Program for the past ten years. Two enrollees were hired at the refuge this summer.

Tracie Deubner, a graduate of Medicine Lake High School, was the YCC Work Leader, and Ryan Linder, a graduate of Flaxville High School, worked as the second enrollee. Tracie completed her appointment 2 August to prepare for her first year of college. Ryan continued his duties through 16 August, and is attending the University of North Dakota-Williston Branch to prepare for a career in wildlife management. Both enrollees were hard-working, good-natured, and did a great job!

Projects included waterfowl banding, botulism patrol, nest searching, removal of old fence and building of new fences, scraping and painting buildings, removal of mower-damaging rocks along trails, maintenance of the recreation area, hand-picking noxious weeds, pruning trees in the shelterbelt by headquarters, lawn-mowing, washing and cleaning vehicles, janitorial duties, office assistance in the headquarters building, and hoeing the nursery shrub plantings.

Figure 5. Seasonal refuge employees--back row: Greene, Denning, Christensen, Linder, and Stanton. Seated in front: Deubner and Husband. exp 16, 7/25/91. MJR

4. Volunteer Programs

We participated in the Student Conservation Association for the ninth year. Sean Denning hailed from Wisconsin and worked from 13 May to 2 August. Heather Husband was from Michigan and worked from 6 May to 26 July. They assisted in cable-chain nest searching, colonial nest surveys, International piping plover survey, banding, botulism patrol, vegetative transects, data entry, and maintenance projects. Both did an excellent job.

With the resignation of the Biological Technician, both were offered Biological Aid positions. Sean had commitments back home, but Heather worked until 15 November. She was then hired by the Montana Farm Bill Program and worked until 27 December.

5. Funding

Medicine Lake NWR and the Northeast Montana WMD have combined funding, which was adequate for accomplishing refuge programs this year. Table 4 indicates budget targets received for FY-91. Actual expenditures were within a few dollars in each of the subactivities except 8610. The 8610 quarters maintenance account is funded by rental receipts from refuge quarters. Funds not expended are carried over from year to year.

Table 4. Funding for Medicine Lake NWR & Northeast Montana WMD, 1987-91.

FY	1261	1261YC	1262	1262 Flex	6860	1241 1520 9120 9110	8610	2821@
1991	235,750	3,000	56,000	84,000	7,000	35,000	15,600	
1990	233,000	3,000	46,000	17,300	7,000	36,500	9,000	
1989	233,000	3,000	33,000	62,000	7,000	13,926	9,000	20,159
1988	527,000	3,000	*		7,000	2,038	9,000	20,159
1987	392,000	3,000	*		7,000	11,930	5,800	23,215

* Total included in 1261.
@ Funds carried over from previous year.

6. Safety

The first lost-time accident in many years occurred when an engine block tipped over and a manifold bolt punctured Nelson's foot.

Formal safety meetings subjects were cholesterol and its effects on the body, vehicle maintenance, loading and unloading heavy equipment, airboating, water safety, ATV safety, and fire extinguishers. Informal discussions were held at the beginning of each project alerting people to possible hazards.

After all summer people arrived, they were all given a walk through refuge buildings noting locations of fire extinguishers, electric control boxes, first aid kits, and exits.

A new eyewash receptacle was placed in the shop.

Although not lost-time accidents, several incidents occurred. A thumb was nicked while using the band saw, a knee was wrenched while walking in heavy grass cover, and a gate closing apparatus struck a chin.

"Evil Knievel" Fuller broke his ankle and separated a shoulder while riding his personal motorcycle on a Sunday.

7. Technical Assistance

The refuge has been hosting a youth Hunter Education program since 1964. This year Fuller and Rabenberg presented most of the classroom portion and refuge neighbors Doug Clark and Rick Davidson presented sections on muzzle-loaders and archery. Eleven students participated in both classroom and a field day and were certified.

We participated in a number of USDA meetings (for Roosevelt and Sheridan Counties) including SCS and ASCS work planning committees and ASCS drought disaster committees.

We assisted the Prairie Pothole Joint Venture (Northeast Montana Project) manager with landowner contacts, identifying areas with good potential for waterfowl, and placing concrete culverts on private lands.

8. Other Items

Revenue sharing checks were distributed to three counties. The amounts were Daniels - $758, Roosevelt - $1,977, and Sheridan - $30,736. Sheridan includes almost all of the refuge and WMD lands plus two producing oil wells on the refuge.

9. Training/Meetings

January

7-11: Fuller in Denver/Fort Collins for MapInfo.

February

4-7: McCollum, Fuller, and Rabenberg in Billings for Project Leader's meeting, PPJV meeting, and Basic Aviation Safety Course.

8 & 9: McCollum and Rabenberg in Billings for Holistic Resource Management National Convention.

20-26: McCollum, Fuller, and Rabenberg at Marana for LE training.

March

12-15: McCollum in Denver for S-390 fire training.

12-15: Fuller in Denver for MapInfo.

April

9-11: McCollum in Bozeman for R&W/MT Fish, Wildlife & Parks coordination meeting.

29-May 17: Rabenberg at Blair, NE for refuge manager training.

May

20-24: Quarne in Denver for Administrative Workshop.

20-24: Fuller in Fort Collins teaching MapInfo to RO staff.

June

3-7: Stanton, Christensen, and Greene in Jamestown, ND for S-130/190 fire training.

July

16 & 17: Rabenberg in Jamestown, ND for a Waterfowl Management Criteria workshop.

22-26: Fuller teaching MapInfo to refuge people in Bismarck, ND.

August

5-9: Fuller as instructor and Rabenberg as student for MapInfo training in Bozeman.

September

23 & 24: Gutzke, Fuller, and Rabenberg in Billings for Project Leader' meeting and Workforce Diversity training.

25-29: Rabenberg in North Platte, NE for Holistic Resource Management training.

October

8: Nelson in Glasgow for Pesticide Management seminar.

November

6-8: Gutzke in Lewistown for 504 training.

December

9-11: Fuller in Bismarck, ND at Four Square Mile meeting.

F. HABITAT MANAGEMENT

1. General

Rainfall returned to this part of Montana bringing 14.52 inches of moisture as compared to a 52 year average of 13.38. The added moisture provided good crops for most local farmers, and good upland cover for the refuge. Unfortunately the precipitation came at the wrong time of the year to alleviate the low water conditions in the refuge impoundments.

2. Wetlands

With a return of moisture to this part of Montana it would seem to have enhanced the water situation on the refuge, but it did not. To have a positive impact on refuge water areas a substantial amount of runoff must result from spring snow melt. That did not happen this year. Although good rains did occur in April through July, and September, much of that was absorbed into the soil and did not result in runoff into refuge water units. This produced good agricultural crops, but poor water conditions for wildlife.

Total water diversion for 1991 from Big Muddy Creek was 12,350 acre feet. That amount was small in comparison to the amount needed to meet refuge plans and objectives. There was minimal or no flow from other creeks into remaining refuge lakes which did little to recharge them. The result was that refuge impoundments started the year in fair or poor shape and declined in condition throughout the year.

Except for Big Muddy Creek, streamflow into the refuge was very poor. With minimal snow fall during the winter in the watershed, there was only a minor flow from spring snowmelt. Largest flows occurred during the summer when a few locally heavy thunderstorms sent two or three small surges down the Big Muddy Creek channel.

On 1 January 1991, the refuge water deficit was 46,259 acre feet. By year's end the deficit declined to 39,973 acre feet. Table 5 compares 1991 water deficits with streamflow, diversions, and releases.

Table 5. Summary of water deficits, diversions and releases in acre feet, Medicine Lake NWR, 1991.

Year	Water Deficit January 1	Water Diverted	Water Released	Water Deficit December 31
1991	46,259	12,562.0	1,582	39,973
1990	37,842	3,464.4		46,259
1989	40,781	22,719.5	2,745	37,842
1988	*	122.0	1,000	40,781
1987	*	9,316.0	7,123	*

* Information not available.

Indian Service Dam at the Homestead Unit remained closed all year. Diversion Dam #1 was closed from January to July. On 8 July a screw gate was opened four inches to provide water to Lyle Hove, a downstream landowner who waters cattle between Dam 1 and Dam 4. This remained open until 4 December when it was closed. Little water was diverted to the Homestead Unit. Construction of the Homestead inlet and outlet structures necessitated a drawdown in June. Total stream diversions in 1991 amounted to 12,562 acre feet. Table 6 displays this information.

Table 6. Water diversion by stream and location, Medicine Lake NWR, 1991.

Source	Acre Feet Diverted	Unit Where Used	Period of Diversion
Big Muddy Crk.	12,350 (1)	Medicine	Mar.-Sept.
Big Muddy Crk.	0 (3)	Homestead	N/A
Cottonwood Crk.	212 (2)	10, 11, Sayer, Gaffney	June
Sand Creek	0 (2)	10, Sayer, Gaffney	N/A
Lost Creek	0 (3)	Homestead	N/A
Sheep Creek	0 (3)	Homestead	N/A
Lake Creek	24 (2)	12	May
Total	12,562		

(1) Measured by U. S. Geological Survey, Ft. Peck, MT.
(2) Measured by refuge staff at stream gages.
(3) Diversion estimated by refuge staff.

Figure 6. Float gages were installed on Gaffney and Homestead Lakes. The gages allow us to record water elevations well below existing staff gages. exp 21, 7/19/91. MJR

The following is a discussion of management for each of the ten refuge impoundments.

Medicine Lake

Diversions into Medicine Lake from Big Muddy Creek continued through the winter with small amounts of water (0.5 to 2 CFS) flowing under the ice on the creek. By 5 April, ice on the creek had broken up and water was moving freely. With no spring flood conditions, all streamflow remained in the creek channel this year. Water measurements at the Dam #2 weir are a very accurate representation of actual streamflow. The creek continued to run through the spring and summer. Peak flows occurred 30 April with

23 CFS, 17 May with 115 CFS and 5 July with 573 CFS. Flow declined to less than 0.5 CFS by early October. On 4 December, the diversion weir was closed for the remainder of the year.

Lake 12

Inflow from Lake Creek was practically non-existent this year. The creek was dry when stream gages were activated in April. Starting in May, springs upstream from the refuge provided enough water to make a showing on the gage. Total streamflow was measured at 24 acre feet.

The lake started off very low, quickly fell below gaging level, and declined throughout the year. By freeze-up the remaining water consisted of several scattered shallow pools separated by wide mud flats. There was no discharge from the lake downstream to Lake 11 or to Katy's Lake.

Katy's Lake

There were no diversions and no runoff from surrounding uplands to Katy's Lake in 1991. Water levels in the lake remained below the gage throughout the year. There was sufficient water to maintain about 100 yards of very shallow open water around the island (Shawver Island) built by Ducks Unlimited in 1986. The water deficiency for the unit remained at about 2,300 acre feet throughout the year.

Lake 11

The year began with Lake 11 dry. There were no flows from Cottonwood Creek until early July when rains added water into the unit. The limited amount of water lasted only until mid-September when the unit was again dry. At year's end the water deficit was 497 acre feet.

Lake 10

Lake 10 received no streamflow. Water levels in Lake 10 are normally well supported by the water table and such was the case this year with water levels rising 1.49 feet from January to mid-July. However, lack of streamflow or significant precipitation began to take its toll by mid-summer. Water levels fell below the gage in late August. By the end of September, pools that normally support large numbers of canvasbacks, tundra swans and other waterfowl were only a few inches deep and had very little bird use. By freeze-up most of the unit was devoid of water except in old stream channels.

Gaffney Lake

Gaffney Lake received no inflow in 1991 except from natural springs. The lake remained below the Tax Bay discharge gate all year. By mid-summer declining water levels exposed sandbars which divided the lake into five pools. Waterfowl use in the fall was substantial in comparison to other small lakes but still below what is normally expected. A float gage was installed in May and made it possible to record elevations down to 1331.46. Lower than that

level, the gage was not functional.

Sayer Bay

Sayer Bay was the same as other water units in 1991; no inflow and generally declining water levels all year. By year's end the only water in the unit was found in the old creek channel.

Long Lake

Long Lake was almost dry at the start of the year, received no inflow, and dried up completely by mid-June. At both the beginning and the end of the year the water deficit in the lake was estimated at 377 acre feet.

Deep Lake

Deep Lake received no run-off this year. Even though water levels declined during the summer, it retained a good supply of water throughout the year, because of its depth. Submergent vegetation growth appeared to be good. The lake received good use by diving ducks during the late summer and fall.

The new float gage installed on the north shore of the lake in 1989 was not effective in providing water elevations this year. The water level fell below the bottom of the gage early in the year.

Homestead Lake

The year began with Homestead Lake very low. There were no inflows from Sheep Creek and Lost Creek this year. Both the Sheep Creek and Breeser sub-units, which depend upon Sheep Creek were dry throughout the year.

Diversions of water from Muddy Creek to Homestead Lake began 30 March using water discharged from Medicine Lake. It quickly became apparent that there would be insufficient water available to fill the entire lake. The WCS in the new Knudsen Bay dike was then closed to retain all diverted water in the north portion of the lake. As a result Knudsen Bay remained dry through the year. Total transfer of water from Medicine Lake to Homestead was estimated at 1,200 acre feet. There was no fall diversion into Homestead Lake from Muddy Creek.

Although the management level was not reached, water levels in north Homestead Lake held up fairly well after diversions ended in late April. By mid-summer it appeared that avian botulism would not be a serious problem and no water was discharged from the unit until late August, when the unit was drained to facilitate replacement of water control structures in the winter.

3. Forests

There are no forests on the refuge although there are a few old shelterbelts and scattered stands of stunted trees.

4. Croplands

A new Cropland Management Plan was written and approved by the Regional Office in October 1990. This plan superseded the 1972 version which was badly outdated. Major changes to the cropland program include: more diversified crop rotations including a heavier reliance on forage and green manure legumes to improve soil health and fertility, and provide weed control benefits; a movement away from a traditional crop/fallow system to encourage more flexible cropping patterns; and a call for a substantial reduction in cropland acreage over the next several years.

In actuality, there is little use of refuge cropland by waterfowl. With the easy availability of wide expanses of wheat fields covering most of northeastern Montana, waterfowl are not attracted to the small narrow strips of grain on the refuge. Geese feed on winter wheat and volunteer grains in refuge fields in early spring, but most of the use of refuge cropland is by resident wildlife.

The cooperative farming program includes six permittees farming 634 acres (Table 7). Currently, 608 acres are cropped or fallowed and 26 acres are in alfalfa. The refuge farming program has been pesticide-free since 1989 and conservation tillage restrictions are in effect.

Table 7. Cooperative farming summary, Medicine Lake NWR, 1991.

		Acres					
Permittee	Field #	Spring Wheat	Winter Wheat	Barley	Alfalfa	Mech Fallow	FWS Share
Tronson	A-1	14(a)	43	--	--	63	14
Ator	A-3	38(b)	--	--	--	41	0
	A-7	--	--	39(c)	26	15	22
Schmitz	A-6	15(d)	--	--	--	41	0
	A-15	33	--	--	--	15	12
Nelson	A-21	45(e)	--	--	--	45	13
Bolstad	A-22	--	--	45(f)	--	33	5
Haase	A-23	23	--	11(g)	--	49	11
TOTAL		168	43	95	26	302	77

(a) strip 8 (14 ac.) underseeded to sweetclover.
(b) strip 5 (13 ac.) underseeded to sweetclover.
(c) strip 2 (19 ac.) underseeded to sweetclover.
(d) strip 2 (15 ac.) underseeded to sweetclover.
(e) strip 1 (13 ac.) underseeded to sweetclover.
(f) strip 3 (13 ac.) underseeded to sweetclover.
(g) strip 2 (11 ac.) underseeded to sweetclover.

Eight inches of rainfall and moderate temperatures during May and June resulted in one of the best small grain years in recent memory. Wheat yielded 25-40 bushels/acre and barley 30-50 bushels/acre. Of the refuge's 77-acre share, 12 acres of wheat and 17 acres of barley were swathed and rolled into big, round bales. These bales are placed in strategic locations for use by resident wildlife after hunting seasons are past, both on the refuge and the WMD. Seventeen acres of spring wheat were combined and the grain delivered to the bins at headquarters. This grain will be used as bait during waterfowl banding operations. The remaining nine acres of wheat and 21 acres of barley were left standing.

The alfalfa seeded by cooperator Ator in A-7 formed a tremendous stand considering last year's drought conditions (Fig. 7). Alfalfa survival was much better in that portion of the field where last year's barley nurse crop was harvested, and much poorer where the barley was left standing. The cooperator hayed the field 17 July and it yielded 1.5 tons/acre. No alfalfa was seeded this spring because soil moisture conditions in April were so dismal. After the May and June rains, we regretted our cautious decision (hindsight is always 20/20).

Figure 7. An exceptional stand of alfalfa resulted from this 1990 spring seeding on cropland unit A-7, considering that we received less than nine inches of total precipitation last year. exp 17, 6/14/91. MJR

All six cooperators underseeded a portion of their cropland acres to inoculated yellow-blossom sweetclover, 98 acres total. The refuge-supplied sweetclover was planted at 5#/acre (bulk). Second-year sweetclover growth from 1990 seedings was poor. Most seedlings apparently succumbed to last year's drought. Only one strip of six acres in A-22 was worth incorporating as a green manure crop. All 1991 sweetclover seedings had good to excellent catches, and we anticipate better survival and growth in 1992.

We borrowed a two-row grass drill from USDA's Agricultural Research Farm at Froid to plant double-row tall wheatgrass barrier strips in A-15. Eleven barrier strips were dormant seeded in a SW to NE direction at 53-foot intervals. The wheatgrass strips are designed to improve moisture conservation, on approximately 30 acres, through improved snow catch, and to reduce soil erosion. The remaining 44 acres in A-15 will be seeded to DNC in 1992.

Thirty-four acres of former crested wheatgrass strips in A-15 and A-18 that were broken in the fall of 1990 were fallowed twice this spring. Twenty-seven acres were seeded to millet and seven acres to barley on the 18th & 19th to take advantage of the excellent soil moisture conditions. The barley "burned up", but the millet produced a fair crop. Approximately 10 acres were baled on a share basis with cooperator Schmitz. The remaining 17 acres were left standing and were a big hit with refuge doves, meadowlarks, deer, and upland gamebirds, as well as hunters. It was not uncommon to see several hundred pheasants and up to 100 grouse flush from the millet in November and December. These strips will be seeded to DNC in August, 1992.

We are hoping to expand our use of cooperators to assist in the conversion of additional crested wheatgrass to DNC in the future.

5. Grasslands

There are about 17,968 acres of grasslands in the refuge. Of this about 2,200 acres have been planted to dense nesting cover (DNC). Another 1,700 acres have been planted to naturalized grasses, primarily crested wheatgrass. The remainder is native grassland.

Abundant spring rains and moderate temperatures resulted in excellent grass growth, particularly of cool-season species. Productivity of refuge grasslands was above average, and vastly improved over the recent drought years. Residual nesting cover looks great going into 1992. Here's hoping we get wetland conditions to match!

The Service compatibility review of secondary refuge uses which was completed in 1990 found that the refuge grazing program was not being conducted in a way which was compatible with the primary purposes and goals of the refuge. McCollum completed a revision of the refuge Grassland Management Plan shortly before leaving. Major changes included:

Eliminating season-long grazing and converting to shorter duration grazing periods.

Prohibiting cattle grazing on all potential piping plover nesting areas until after 15 July.

Conducting all grassland management by "prescription". The plan would eliminate "traditional" grazing.

Figure 8. Refuge grassland conditions were much improved thanks to abundant spring rains. This series of photographs taken from the north side of Lake Creek Flats shows the sub-irrigated valley floor carpeted with bloomng sow thistle. exp 21-25, 7/29/91. MJR

Regional Office approval is being withheld until Gutzke has had a chance to review the plan and make further modifications or recommendations. We began implementing components of the plan this year (Section F.7). The final draft will be submitted in December, 1992.

Fields seeded to DNC in August, 1990 (283 acres) grew lush stands of Kochia spp. and provided great pheasant and deer habitat in 1991. Unfortunately, it does not appear the planted grasses and legumes fared as well. These fields will be evaluated in 1992 to determine whether re-seeding is necessary.

6. Other Habitats

During April we planted 150 ponderosa pine and 150 chokecherry in the shelterbelt north of headquarters. Fifty chokecherry and 50 pine were Montana origin and the remaining 100 each were North Dakota origin. We drilled six inch holes about two feet deep. Each hole was soaked with water twice before it was filled with the loose dirt four to six inches from the top. Trees are identifiable to origin. We will monitor these plantings to see if origin is related to survival.

SCS personnel in Culbertson alerted us to a new product which increases survival chances. "Tubex" was installed around each healthy tree in September (Fig. 9).

Figure 9. One row of "tubexed" trees. 9/91. HH

7. Grazing

The Service compatibility review of secondary refuge uses which was completed in January, 1990 found that the refuge grazing program was not being conducted in a way which was compatible with the primary purposes and goals of the refuge. Many years of season-long grazing have led to a decrease in plant diversity and vigor in some areas. In some locations there has been a conflict between livestock and nesting piping plovers.

Figure 10. Shorter duration grazes were implemented on several grassland units. Single-strand electric fences were extremely effective in controlling cattle. exp 13, 7/19/91. MJR

This year we began weaning cooperators away from season-long grazing. Six cooperators used a total of 1,059 AUM's on five grazing units (Table 8). Permittees, stocking rates, and the areas grazed remained essentially unchanged from last year. However, shorter duration grazes and multiple cattle moves were required on three of the five areas grazed (M-2,M-4,H-1). Grazing was delayed on all potential piping plover nesting beaches, except one, until after 15 August to eliminate any possibility of nest trampling. All cooperators will be required to make multiple cattle moves and utilize planned grazing in 1992.

Table 8. Grazing program at Medicine Lake NWR, 1991.

Grazing Unit	Permittee	Acres	Class of Cattle	Permitted AUM's	AUM's Used
M-3	Schmitz	490	25 C/c&B	125	120.33
M-3	Bolstad	2,320	72 C/c&B	375	360.50
M-4	G. Nelson & O. Nelson	722	32 C/c&B	160	163.58
M-2	O. Nelson & Wheeler	1,614	66 C/c&B	340	331.44
H-1	C. Nelson	563	17 C/cY&B	90	83.42
Totals		5,709	212 C/cY&B	1,090	1,059.27

C/c = Cow/calf pairs; B = bulls; Y = yearlings

Numerous grassland improvement projects were undertaken to facilitate our conversion to shorter duration grazing.

Fencing

Five miles of interior single-strand electric fence was constructed force-account in grassland units H-1 and M-3. Another 4.25 miles of electric cross fence were constructed by cooperator Orvis Nelson in grassland units M-2 and M-4. These fences are designed so that the wire can easily be laid down when not in use, simply by pulling a pin from each insulator.

Three miles of old, deteriorated 3-strand barbed wire fence were removed at Homestead, south of Long Lake, and north of Lake Creek Flats. These fences will be relocated and/or replaced with single-strand electric fences.

All water gaps in the Gaffaney Lake (M-2) grassland management unit were converted to electricity. Despite extremely low water levels, the water gaps completely eliminated past "walk-around" problems, a big improvement over the barbed wire fence extensions traditionally used. We anticipate using electric water gaps wherever possible in the future.

Water Development

A spring was developed in M-4 and a pipeline trenched in to gravity flow water to a stock tank.

A well was drilled and cased in M-3 across from the Roger Schmitz farmstead and a submersible pump and underground pressure tank installed. Pipelines were trenched from the well to a stock tank between M-3-2 and M-3-3, and to a tank located on the north edge of the Sandhills wilderness area.

An existing well at Homestead was developed using compressed air to provide livestock water.

Grazing fees this year were set at $9.65 per AUM. Fees have been adjusted annually from a 1982 grazing rate survey which determined the fair market value for grazing in this area. The annual fee adjustments are calculated by the Regional Office and are based on an average of the fall calf prices in Montana for the past three years.

The 1992 refuge grazing fee totalled $10,221.87. Over 73% of this amount was used to help fund many of the grassland improvements described above, and to purchase additional electric fencing materials.

8. Haying

Approximately 90 acres north of Lake #11 were hayed 14-20 July. The tract consisted of numerous narrow strips ranging from decent DNC to solid crested wheatgrass. Cooperator's Russ Torgerson and Max Aasheim each hayed about 45 acres and were charged $12.50 per ton. Yield was 1.3 tons/acre. Thirty-three of Aasheim's bales burned up in a wildfire on 17 July and were deducted from his bill. Collectively, the total haying fee was $1,141.85.

Eighteen acres of the worst crested wheatgrass strips were broken force-account with our offset disc. Torgerson will scarify the remaining acreage in April 1992 in exchange for a $10/acre reduction in the haying fee. The remainder of the fee was used to purchase Rangelander variety alfalfa which will be interseeded into DNC stands with good grass composition, but lacking legumes.

9. Fire Management

Because of the low water levels in Medicine Lake, the predator fence at Gopher Point was not activated. Instead we decided to improve the nesting habitat with a prescribed burn. Fifty-five acres east of the predator fence was burned 22 April with mostly a head fire. Approximately 150 feet on the west end was burned with a flanking fire. The fire went through the area quickly and consumed about 99 per cent of the vegetation.

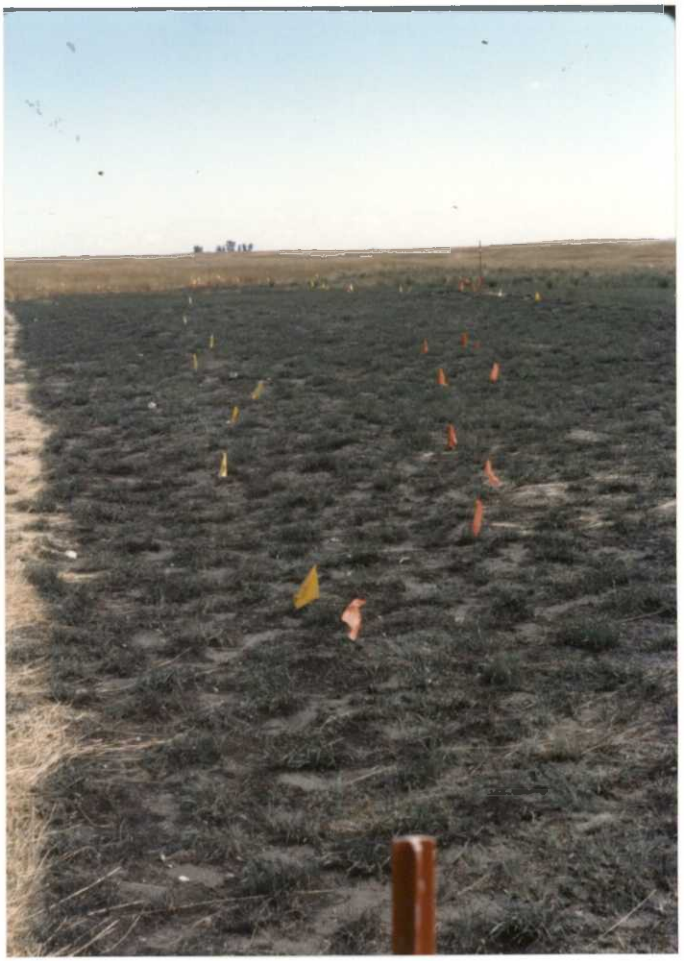

Figure 11. A test plot was established north of Lake #11 to monitor the effects of a later July wildfire on clubmoss. exp 17, 9/5/91. MJR

We responded to one wildfire. Approximately 17 acres burned 21 July north of Pool #11 when lightning stuck a large, round bale on the hay unit just recently hayed. The bale was unrolled, scattered, and soaked with water. About two and a half hours later we received another call that the fire had started again. This time winds had increased and the fire was able to carry in the hayed vegetation. The fire jumped the patrol road and carried south toward Pool #11. We worked on the flanks of the fire and let it burn to the north edge of Pool #11 where it ran out of fuel.

On the south side of the patrol road the fire burned through an area with approximately 25-30 per cent of the ground covered by club moss (Selaginella densa). Line transects were established through this area to monitor the effects of the July fire on club moss. Moss burned during April and May in past years has been monitored. The spring fires have short term detrimental effects. Hopefully a fire later in the season will do more damage to clubmoss.

10. Pest Control

We again hand-picked leafy spurge on all known areas except the Sandhills and Big Island. We appear to be making some progress on patches at Homestead, but are probably losing the battle on older, more established patches.

The Agriculture Research Station (ARS) of Sidney, MT checked on the 1989 release of flea beetles (Apthona flava) on Big Island. The insect was present in low numbers; there is no noticeable effect on leafy spurge. They also checked on their 1990 release of gall flies (Urophor cardui). No galls or flies were noted on any Canada thistle.

ARS made another release of 45 gall flies along the south boundary of Homestead. Hopefully these will do better.

Rabenberg discovered a large number of dead and dying Canada thistle plants in cropland unit A-1 in June. Closer investigation revealed caterpillars feeding and laying eggs. ARS in Sidney identified them as larvae of the Painted Lady Butterfly (Vanessa cardui). They had received a few other reports from Eastern Montana, and Sand Lake NWR in South Dakota had also noted them. While the insects did not kill many thistle plants, they were completely effective in preventing all seedhead formation.

Figure 12. ARS technicians "sweeping" for spurge flea beetles (Apthora flava) at a 1989 release site on Big Island. exp 4, 7/24/91. MJR

Figure 13. Spurge flea beetles were still present in low numbers. The insects have had no visual impact on the spurge plants as of yet. exp 6, 7/24/91. MJR

Figure 14. Larvae of the painted lady butterfly, naturally occurring, were effective in preventing many Canada thistle plants from forming seed heads. exp 19, 6/19/91. MJR

12. Wilderness Areas

In 1989, a local citizens group proposed to modify the wilderness status of Medicine Lake. The stated goal of the effort was to increase recreational opportunities in this part of Montana by opening the Medicine Lake Wilderness to powered ice augers and boats with motors of limited horsepower for the purpose of fishing.

Promises of support for the proposal from Senator Conrad Burns and Eastern District Congressman Ron Marlenee did not translate into Congressional action. Disagreements between the two Montana senators about other wilderness issues prevented a Montana wilderness bill from being considered by Congress in 1990. The issue did not resurface in 1991.

G. WILDLIFE

1. Wildlife Diversity

Wildlife diversity is maintained by management practices that are centered on waterfowl production and maintenance. Diverse plant communities ranging from xeric grasslands to mesic wetlands, not many this year, provide habitat characteristics essential to species that breed on the refuge and habitats that meet seasonal requirements for migrant species. Over 225 species of birds, 35 different mammals, and 10 species of reptiles and amphibians have been documented on the refuge.

2. Endangered and/or Threatened Species

Whooping Cranes

No whooping cranes were observed by or reported to refuge staff this year. McCollum served as a Montana FWS contact person.

Bald Eagles

Bald eagle use of the refuge was high again this spring. The first eagles were sighted 16 March which coincided with the availability of winter-killed carp as ice receded from Medicine Lake shorelines and shallow bays. By 1 April, approximately 95 eagles had taken up temporary residence. The old gravel pit area on the east end of Medicine Lake along with Tom Horn Point remain their favorite roosting sites. Eagle numbers declined quickly thereafter with 35 observed 5 April and four the 18th. The last springtime eagle observation was of two immatures 23 April.

Two to 10 bald eagles were present on the refuge between 22 October and 3 December.

Peregrine Falcons

Peregrine falcon sightings were down from last year's record of 13. Seven peregrine observations were made this year; three in May, one in August, two in October, and one in November.

Piping Plovers

Piping plover surveys for 1991 were conducted on MLNWR and the WMD from 1 to 15 June as a part of the 1991 International Piping Plover Survey. A concentrated effort was made to search all potential plover habitat in Daniels, Sheridan, and Roosevelt counties. Habitat considered to have potential for piping plovers consisted of beaches along lakes or wetlands that were sparsely vegetated with substrates containing a mixture of small rocks, pebbles and sand. Approximately 115 miles of shoreline were searched on 21 private wetlands, 13 WPA's, two state-owned wetlands, and MLNWR. The survey was conducted by Student Conservation Association volunteers Heather Husband and Sean Denning; Youth Conservation Corps enrollees Tracie Deubner and Ryan Linder; seasonal refuge employees John Stanton, Terrence Greene, and Rodney Christensen; Refuge volunteer Ted Nordhagen; BLM biologist Dale Tribby; and Rabenberg. Rabenberg coordinated the survey effort. The survey

required 250+ staff and volunteer hours.

There were a total of 302 adults found in the survey, with 33 indicated pairs found on the refuge and 63 pairs found in the WMD. These high numbers are likely a direct response to habitat conditions. On MLNWR, continued low water levels and wide beaches stayed ahead of encroaching vegetation in most areas. In the WMD, abundant precipitation in late April and May partially refilled many dry alkali wetlands, creating excellent plover habitat (refer to WMD narrative for details).

The first piping plover sighting on MLNWR was 14 May on Big Island. A total of 121 adults were found during the International survey, with 33 indicated pairs. This was a slight increase from the 28 pairs found in 1990, and is the highest breeding population of piping plovers ever documented on the refuge (Table 9).

Table 9. Piping plover pairs, Medicine Lake NWR, 1988-1991

Year	Number of pairs
1988	17
1989	5
1990	28
1991	33

A search for plover nests was conducted on selected wetlands 24-27 June. Due to manpower requirements associated with the International survey, a concentrated search for nests was not performed as in previous years. No systematic information on nest success or fledgling rates was collected in 1991. Also, measurements of the habitat at nest sites were not made. Table 10 contains the locations of the pairs, and any nests found. Using the average production rate of 0.8 fledglings per nesting pair, based on 1986-1990 data, we assume approximately 24 piping plover chicks fledged on the refuge.

Figure 15. Thirty-three pairs of piping plovers nested on the refuge, an all-time high. This pair successfully nested on Shawver Island. exp 5, 6/11/91. MJR

Table 10. Piping plover survey results, Medicine Lake NWR, 1991.

Location	Pairs	Adults	Nests*
Medicine Lake			
Big Island	7	26	
Bridgerman Point	6	22	2
Bruce's Island	2	7	1*
Gravel Pit	6	16	
South Bay	2	4	
Tax Bay	0		
Young's Island	0	0	
Other Lakes - Refuge			
Deep Lake	2	4	
Gaffney Lake	2	14	1
Katy's Lake	6	26	2
Long Lake	0	0	
Totals	33	121	6

* No systematic nest survey conducted in 1991.

Breeding Pair Census

Historically, the refuge estimated duck breeding pairs based on one count of 64 line transects. This year, no refuge breeding pair count was conducted. Little confidence was placed in previous pair counts because (1) the late May survey was too late for early nesting species like mallards and pintails; and (2) there was a tendency for non-breeders of some species, particularly gadwall, shoveler, lesser scaup, and ruddy ducks to concentrate on the refuge in some years, artificially inflating pair counts.

We feel nest search results presented later may better compare annual variations in duck densities and production.

Nest Searches

Canada geese

This was the third consecutive year that we ground-censused nesting Canada geese. In the past, an aerial census was used. Most islands, two fenced peninsulas, and all nest structures were searched (Table 12). Most areas were checked initially in late April or early May. Nest fate was determined on subsequent duck nest searches.

Eleven tub-end type goose nesting structures are distributed around the refuge. Nest material was replaced in all structures in February and early March. Five of the 11 structures were used this year. All were successful, producing an estimated 25 young.

Total goose nests found decreased 13% from last year (207 to 181) and total eggs hatched declined 15% (503 to 427). Part of this decline must be attributed to the continued reduction in available nesting sites. The islands in Lake 11, the highway islands, and most of the small islands at Homestead are "high and dry". We have no muskrats left, therefore no rat houses; and most of our nest structures have no water under them. Despite lower water levels which made our islands and peninsula exclosures even more accessible to mammalian predators, nest success improved from 40% in 1990 to 49% this year.

Goose production would have been substantially lower without the more intensive predator control implemented on refuge islands and peninsulas this year (Section G.15). Supplemental coyote control was effective in increasing production on Bridgerman Point and Big Island. On Bridgerman Point, nest success increased from 22 to 46% and the number of eggs hatched went from 25 to 70.

Five goose nests were found on Big Island (four hatched), after none were found in 1990. Coyotes had denned on the island since at least 1988 and no predator control had been conducted since 1986. In 1990, a female coyote and pups were removed in June, albeit too late for that year's goose-nesting effort. This year, a denning pair was aerial gunned in late March prior to whelping. We hope to get back to 1985-86 levels of around 100 goose nests within the next few years.

Table 12. Canada goose nesting, Medicine Lake NWR, 1991.

Location	No. of Islands	No. of Nests	% Nests Hatching	# Eggs Hatched
Pool #11 (dry)	-	@	-	-
Gaffaney Lake	-	@	-	-
Young's Island	1	75	61	211
MacDonald's Island	1	10	0	0
Gadwall Island(2)	1	11	9	6
Bruce's Extension(2)	1	3	0	0
Homestead	7	15	13	10
Highway Islands	4	1	0	0
Gull Island	1	1	0	0
Katy's Lake	1	20	80	80*
Pool #12	-	@	-	-
Bruce's Island	1	1	0	0
Big Island	1	5	80	19
Bridgerman Point(1)	-	28	46	70
Gopher Point(1)	-	@	-	-
Tom Horn's Point(1)	-	1	100	6
Nest Structures	-	5	100	25*
Totals for Islands	19	147	47	326
Totals for Peninsulas		29	48	76
Totals for Nest Structures	11	5	100	25
Overall Totals		181	49	427

* Estimated.
@ Not searched.
(1) Point cut-off with electric predator fence.
(2) Islands now connected to Bruce's Island because of low lake levels.

Ducks - Uplands

In 1990, we compared the attractiveness of the refuge's three primary upland nesting habitats; dense nesting cover (DNC), crested wheatgrass (CRWG), and native grassland (NGL). DNC was by far, the most productive upland nesting habitat type, averaging some three times more successful nests per acre than CRWG, and six times more than NGL. This trend was consistent in all search areas. All duck species, with the exception of pintails, showed a definite preference to nest in DNC. Therefore, in order to maximize the number of nests found, we confined 1991 upland nest searches to DNC fields.

Approximately 243 acres of DNC were searched for duck nests using either a cable chain drag (Higgins et al. 1977) or a single 5/16" chain drag. Search areas were:

Field 007 - east of Deep Lake
Field 051 - east of Homestead Lake
Field 052 - north of Medicine Lake near Lodahl's Coulee
Field 054 - in the Katy's Lake/Lake 12 area.

Three searches of each field were made at approximately three week intervals beginning about 10 May. A total of 72 duck nests were located. Mayfield nest success varied greatly between areas, ranging from seven percent north of Deep Lake to 71% at Homestead. Overall, Mayfield nest success in DNC averaged 26%, up slightly from 1989 and 1990 levels, but still substantially lower than average. Observed nest densities averaged 30 nests/100 acres, while total nest initiations were estimated at 57 nests/100 acres. There were 14.8 successful nests/100 acres of DNC.

Table 13. Number of nests, Mayfield success, and observed nest densities in dense nesting cover (DNC) and native grassland (NGL), Medicine Lake NWR, 1974-76, 1981, 1985-91.

	DNC			NGL		
	(N)	Mayfield(%)	Observed Nest/Ac.	(N)	Mayfield(%)	Observed Nest/Ac.
1974	6	70	0.04	29	3	0.02
1975	69	73	0.42	100	27	0.21
1976	33	60	0.20	117	42	0.24
1981	84	47	0.36	50	42	0.20
1985	99	34	0.25	78	22	0.23
1986	125	46	0.29	137	43	0.38
1987*	144	54	0.75	109	78	0.44
1988*	91	38	0.47	55	49	0.22
1989*	94	24	0.49	59	44	0.24
1990	81	21	0.36	11	19	0.06
1991	72	26	0.30	-	-	-

* Figures do not include nesting data from peninsula exclosures (change from pre-1990 narrative reports).

Ducks - Islands

Approximately 87 acres of natural and man-made islands were searched for duck nests an average of three times. Systematic searches for duck nests on Big, Bruce's, and McDonald's islands were continued this year, utilizing the transects established in 1990. On Bruce's and McDonald islands the transects were searched by pulling a 75-foot long rope drag between two searchers. This was not feasible on Big Island because of the large amounts of native brush and shrubs present. These transects were searched by five persons walking side-by-side approximately 10 feet apart. By conducting these small but systematic searches we can make educated estimates regarding what is occurring on the island as a whole. We will also be able to make meaningful comparisons between years as future years' data are collected.

A total of 88 nests were located. Nest success on refuge islands averaged 38%, identical to 1990. Estimated nest initiations declined 23% from 1990 (65.1 vs. 49.9 nests/100 acres), while the number of successful nests/100 acres declined a similar 23% (24.7 vs 19.0). Results for individual islands are shown in Table 14.

Table 14. Duck nesting effort and success on islands, Medicine Lake NWR, 1991.

Name of Island	Total Acres	Acres Searched	#Nests Found	Est. Total Nests	Mayfield Nest Success	Successful Nests/100 Ac.
Bruce's	370	20.7	5(1^)	51	.35	4.8
Big	242	17.7	14(6^)	166	.41	28.2
McDonald	48	16	14	75	.03	12.5
Young's	17	17	17	20	.60	71.0
Gull	1	1	0	0	---	0
Gadwall	4	4	3	3	.00*	0
Bruce Ext.	2	2	1	1	.00*	0
Homestead	2	2	3	3	1.00*	150.0
Shawver+	2	2	31	31	.96*	1350.0
Lake 12	not searched					
Lk. Creek Flats	not searched					
Highway	5	5	0	0	---	0
Total	693	87.4	88	350	0.38@	19.0@

* Apparent nest success values used; thorough foot search conducted.
@ Weighted by estimated total nests on each island.
\+ Formerly known as Katy's Lake Island.
^ Number of nests found along search transects.

Ducks - Peninsula Exclosures

Three peninsulas totalling 167 acres are protected by predator exclosure fences constructed in 1988. Supplemental trapping is also conducted (Section G-15). Tom Horn Point is located on the Homestead Unit and supports an excellent stand of DNC. Gopher Point is located along the north shore of Medicine Lake. Vegetation consists mostly of crested wheatgrass, with some alfalfa. Bridgerman Point is located on the east shore of Medicine Lake and is native prairie with scattered, dense patches of native shrubs, primarily snowberry.

The fence on Gopher Point was not activated this year as there was no water on the north side of the peninsula. Gopher Point was not nest searched. Tom Horn Point was searched three times with a cable-chain drag while Bridgerman Point was searched four times on foot.

A total of 101 nests were found on the 87 acres searched (Table 15). Nest success on Bridgerman Point was excellent again this year at 84% Mayfield. Early nesters on Tom Horn Point fared well,

however, at least one raccoon and one coyote got inside the fence in late June and raised heck with the gadwall and scaup. Nest success on the peninsula was only 24%. Overall, nest success on the two peninsulas averaged 38%. Despite horrid breeding habitat conditions, nest densities were higher on Tom Horn Point than in 1990 (261 vs. 183 nests/100 ac.), but were down substantially on Bridgerman Point (162 vs 306 nests/100 ac.). Despite this year's predation problems on Tom Horn's Point, fenced peninsulas remained the most efficient duck producers on the refuge (78.9 successful nests/100 acres).

Table 15. Duck nesting results on three peninsulas protected with predator exclosure fences, Medicine Lake NWR, 1991.

Peninsula	Total Acres	Acres Searched	#Nests Found	Total Nests/ 100 Ac.	Mayfield Success	Successful Nests/100ac.
Bridgerman Point	21	21	31	161.7	.84	135.8
Gopher Point	80	0	(fence not functional due to low water)			
Tom Horn Point	66	66	70	260.8	.24	62.6
Total	167	87	101	207.7	.38*	78.9*

* Weighted based on number nests found on each peninsula.

Summary and Production Estimates

Overall, peninsula exclosures had the highest densities of successful nests (78.9/100 ac.). Peninsula exclosures were over four times more productive than islands (19.0/100 ac.) and over five times more productive than refuge DNC fields (14.8/100 ac.). Individual islands (e.g. Shawver Island) raised more ducks per acre than either peninsula, but when all islands are lumped together, they come out well behind peninsulas. This is largely the result of relatively low nest densities on Big and Bruce's Islands, the refuge's two largest islands at 242 and 370 acres, respectively. These two islands account for over 60% of the refuge's island acreage.

Net duck production (expressed as number of successful nests/100 ac.) declined by 16% in refuge DNC fields, by 23% on refuge islands, and by 18% on peninsula exclosures, when compared to 1990. Adjusting our duck production estimates accordingly, we estimate that 4,770 ducklings were produced on refuge uplands, islands, and

Table 16. Nest success, total nest densities, successful nest densities and production estimates for duck nesting in dense nesting cover (DNC), islands (ISL), and peninsula exclosures (PEX), Medicine Lake NWR, 1990 and 1991.

	Mayfield Nest Success			Total Nest Initiations/100 ac.			Successful Nest Initiations/100 ac.			Production Estimates*		
Year	DNC	ISL	PEX	DNC	ISL	PEX	DNC	ISL	PEX	Upland**	ISL	PEX
1990	.21	.38	.67	83.6	65.1	142.9	17.6	24.7	95.7	4100	999	713
1991	.26	.38	.38	57.0	50.5	207.7	14.8	19.0	78.9	3500	770	500

* Production estimates assume five (5) ducklings fledged per successful nest.

** Includes all refuge uplands, not just DNC.

peninsula exclosures (Table 16). No attempt was made to determine the production of over-water nesters, but given the scarcity of suitable over-water nest sites, the numbers would be very small. A total production estimate of 4,900 ducklings would seem reasonable. Because this estimate is based on the assumption that all successful nests were found in those areas searched, it should be considered somewhat conservative.

Fall Migration

White-fronted and snow geese arrived 17 and 18 September, with tundra swans showing up the 28th. Once again, numbers of large (resident) Canada geese peaked around 1 October. By 9 October, Canada goose numbers had dropped to 225. White-fronted goose numbers peaked during the period 25 September - 5 October. Snow goose numbers remained below 200 until 27 October, when approximately 10,000 arrived that afternoon for a short rest in advance of a major cold front. Tundra swan populations were extremely low for the second consecutive fall, probably the result of dismal wetland conditions. However, several hundred swans used the Salter, Long Lake, and Mallard Pond WPA complex just north of the refuge. Ducks peaked at 27,500 on 17 October, nearly double last year's peak. Shovelers, mallards, and gadwalls, in that order, comprised 75% of that number.

Table 17. Fall peak goose, swan and duck numbers, Medicine Lake NWR, 1980-91.

Year	Canada Goose	Snow Goose	White-front Goose	Tundra Swan	Ducks
1980	1,320	20	2,110	580	94,340
1981	1,710	240	1,390	735	296,360
1982	1,180	10	725	300	61,780
1983	1,200	15	1,750	800	100,150
1984	800	550	500	350	19,000
1985	1,200	10	600	300	26,000
1986	1,200	3,000	500	300	30,000
1987	1,500	300	1,200	1,000	24,750
1988	1,200	3,000	500	50	12,300
1989	1,000	500	1,100	600	20,540
1990	1,100	900	1,600	25	14,180
1991	1,150	10,000*	1,500	90	27,500

* afternoon of 10/27/91 - one day only.

4. Marsh and Waterbirds

Some 3,913 pelican nests were located on the refuge compared to 2,613 in 1990 (+50%). This may be the greatest pelican nesting effort ever documented on the refuge. Pelicans had completely abandoned Big Island in 1990 in response to coyote harassment. This year pelicans reclaimed Big Island as their principal nesting area, initiating over 93% of their nests there. Other nesting areas included Gull Island and Bridgerman Point. A late July census found 1,700 young or 0.42 fledged/nest, substantially lower than expected.

Figure 16. Pelicans returned to Big Island this year and nested in record numbers. SCA Volunteer Heather Husband is shown demonstrating her "pelican herding" abilities. exp 31, 6/10/91. JS

Cormorant nest numbers were down 67% from 1990 levels. Sixty-three nests were on Gull Island, with the remaining 46 on Bridgerman Point. Only 10 great blue heron and seven black-crowned night heron nests were found, all on Bridgerman Point. No great blue heron nesting was noted on Big Island or the Highway Islands. No eared-grebes nested on the refuge this year, and western grebes did not nest, for the second consecutive year. Preferred grebe nesting locations in Lake 10, Sayer Bay, and the west bay of Medicine Lake were "high and dry" and therefore not used.

Table 18. Estimated number of marsh and waterbird nests, Medicine Lake NWR, 1982-1991.

Year	White Pelican	D C Cormorant	G B Heron	BCN Heron	West. Grebe	Eared Grebe
1982	700	28	20	-	-	-
1983	800	90	27	5	-	-
1984	-	14	-	10	-	100
1985	1,788	254	24	54	134	300
1986	1,699	73	20	11	174	184
1987	1,689	479	42	49	210	311
1988	1,396	85	24	10	-	-
1989	3,370	135	29	38	180	200
1990	2,613	330	34	36	0	20
1991	3,913	109	10	7	0	0

5. Shorebirds, Gulls, Terns and Allied Species

The following species are known to nest on the refuge but efforts are not made to estimate numbers; American avocet, marbled godwit, willet, upland sandpiper, killdeer, spotted sandpiper, black tern, Wilson's phalarope, and common snipe. Nesting spotted sandpipers seemed unusually abundant this year, especially along the Medicine Lake shoreline. We do monitor colonial nesting gulls and terns (Table 19).

Table 19. Number of located gull and tern nests by species, Medicine Lake NWR, 1982-91.

Year	Ring-billed Gull	Calif. Gull	Common Tern	Forster's Tern
1982	750	700	40	-
1983	580	247	71	-
1984	-	-	30	-
1985	-	-	236	-
1986	-	-	95	6
1987	1,439	1,269	62	56
1988	766	401	18	-
1989	5,615	1,300	55	40
1990	6,102	1,299	5	0
1991	2,000	875	0	0

Gull nesting efforts were greatly reduced from 1989-90 levels. The highway islands, which supported over 7,000 gull nests in 1990, only had about 500 ring-billed gull nests this year. Water levels in Medicine Lake were so low that all four islands were connected to the mainland. Evidence suggests predators did a good job of eating eggs and young gulls. The most popular nesting area was Gull Island where 759 (87%) and 1,000 (50%) of the California and ring-billed nests were located, respectively. We would like to restrict gull nesting to these islands as much as possible. Satellite gull nesting colonies were found on Bridgerman Point and Young's Island again this year. Appropriate discouragement was offered and the birds decided to abandon these ill-chosen sites.

Figure 17. Extensive areas of shallow water and mudflats provided excellent habitat for shorebirds such as this marbled godwit. exp 5, 5/31/91. MJR

No nesting terns were found on the refuge. We're not sure why tern nesting has declined so sharply over the past couple years. We assume it's drought related. Common terns were occasionally seen foraging, and two pairs of Caspian terns were observed during the summer, but no nests were discovered.

Shorebirds were attracted to the large areas of mudflats and shallow water present on the refuge this year, during both spring and fall migration. A few birders took advantage of the opportunity. Approximately 1,000 avocets and several thousand "peeps" were found on Homestead Lake in September. They were attracted by the receding water levels from the gradual drawdown we were conducting to accommodate a fall water control structure MMS rehab project. Approximately 30,000 Franklin gulls roosted on Medicine Lake in late July and early August.

Refuge volunteer Ted Nordhagen saw 13 red knots 23 May near the Sayer Bay dike. Other observations of shorebirds listed as rare or occasional included white-rumped sandpiper, red-necked phalarope, and black-bellied plover.

6. Raptors

Raptors nesting on the refuge this year included northern harrier, Swainson's hawk, great-horned owl, short-eared owl, and burrowing owl. A pair of golden eagles attended a large stick nest on the south side of the refuge Sandhills for over a week, but did not nest.

Other raptors routinely sighted each year include turkey vulture, prairie falcon, kestrel, Cooper's, rough-legged, ferruginous, and red-tailed hawks, and snowy owl. A rather late snowy owl observation was made on 12 April on the south side of Medicine Lake. Bald eagles and peregrine falcons were also observed (Section G.2). Uncommon raptor sightings included two ospreys, one on 5 April near Bridgerman Point, the other over Lake Creek Flats on 16 September. A merlin was sighted near headquarters on 30 September. Gyrfalcons arrived early advancing with a major cold front in late October. The first was observed "working" ducks on October 28th. Three additional observations were made during early November.

The National Wildlife Federation's Mid-Winter Bald Eagle Survey was conducted 11 January. Two golden eagles were seen.

No "patients" eligible for rehabilitation were received this year. A female northern harrier with multiple injuries was delivered to refuge headquarters. However, the bird died later that afternoon.

7. Other Migratory Birds

Mourning dove nesting is limited on the refuge due to the shortage of trees. Refuge shelterbelts and CCC tree plantings provide the majority of available nesting habitat.

8. Game Mammals

Montana Department of Fish, Wildlife and Parks (MTFWP) conducts annual pre-season and late winter white-tailed deer aerial surveys in two trend areas. One area includes the refuge and the other is the private Sandhills that border the southeast boundary of the refuge. The Sandhills was flown 14 January and the refuge 17 January. The survey was flown about one month earlier than normal to get an accurate estimate of the post-season population of antlered bucks. The theory was good, but many of the bucks had already shed their antlers several weeks earlier than normal.

They observed 409 deer (5.7 deer/square mile) in the private Sandhills and 440 deer (6.8 deer/square mile) on the refuge. The private Sandhills herd increased 1% from last year and the refuge herd increased 4%. Fawns/100 adults were 40 in the private Sandhills and 33 on the refuge, for an average of 35. This represents an improvement over the 28 fawns/100 adults surveyed in the winter of 1990. Survey conditions in 1990 and 1991 were similar with mild, open winters and little snow cover.

No pre-hunting season aerial survey was conducted by the State this year. The general consensus among MTFWP, refuge staff, and interviewed hunters was that 1991 deer numbers were comparable to 1990 levels, a healthy population. No EHD has been found since 1987.

10. Other Resident Wildlife

Male sharp-tailed grouse numbers on leks located on, or adjacent to the refuge, are surveyed in mid- to late April. A total of 329 grouse were counted on 19 active dancing grounds compared to 160 on 13 grounds in 1990 (Table 20). One new lek location was documented just southeast of the refuge Sandhills, and two grounds (#6,32) were rediscovered in new locations. Grouse numbers had plummeted after virtually zero production in 1988. Continued drought has hampered population re-growth, however, this year's doubling of the number of dancing males indicates a significant turnaround. While no fall population surveys are conducted, refuge hunters frequently commented on the higher number of sharptails observed.

Table 20. Male sharp-tailed grouse numbers on leks, Medicine Lake NWR, 1986-91.

Ground #	1986	1987	1988	1989	1990	1991
1	na	8	13	na	na	na
2	14	10	12	12	12	31
3	12	11	5	na	na	na
4	2	na	na	2	na	na
5	na	na	2	na	na	na
6	6	12	12	5	na	22@
7	15	19	23	12	4	na
8	16	28	45	23	22	46@
9	7	10	14	8	12	20
10	10	17	20	10	9	2
12	na	na	na	na	na	na
13	na	na	na	na	na	na
14	na	na	na	na	4	10
15	2	5	12	8	7	9
16	2	na	na	na	na	na
17	4	5	1	na	na	na
18	11	9	12	2	na	3
19	na	na	na	na	na	na
20	6	6	4	na	na	2
21	17	34	12	na	5	23
22	3	2	19	5	18	31
23	8	12	5	na	na	3
24	15	18	9	4	17	13
25	16	28	25	10	19	21
26	8	28	31	17	21	19
27	-	7*	na	na	na	na
28	-	11*	na	na	na	na
29	-	-	6*	5	5	1
30	-	-	6*	na	na	na
31	-	-	-	9*	na	18+
32	-	-	-	3*	na	40@
33	-	-	-	-	-	15*
Total	174	273	310	145	160	329
Mean	7	10	10	5	5	10

* first year ground located.
@ ground moved to new location.
\+ flush count.
na not active.

Roadside crow counts are conducted for ring-necked pheasants on three refuge routes. Numbers of crows heard per stop were similar to 1990 levels with the exception of transect #2, where some 50% fewer crows were recorded (Table 21).

Pheasants had a banner recruitment year, with large broods and persistent re-nesting evident. Fall populations were the highest since at least 1987, and hunting success was vastly improved over recent years (see Section H.8).

There is no census data for gray partridge. These hardy immigrants also suffered from the 1988 drought. Production seemed comparable to 1990 and modest population growth is suspected.

Large, round grain bales obtained from refuge croplands were placed near areas of good winter cover where upland gamebirds tend to concentrate. Well over 1,000 wintered in the dense kochia, bulrush, and phragmites in the Homestead Unit. To date the winter of 1991-92 has been exceptionally mild, and prospects for a banner pheasant year in 1992 are promising.

Table 21. Total pheasant crows and crows/stop for three routes, Medicine Lake NWR, 1978-91.

Year	Transect #1		Transect #2		Transect #3	
	Crows	Crows/stop	Crows	Crows/stop	Crows	Crows/stop
1978	187	9.4	-	-	-	-
1979	270	13.5	42	4.2	-	-
1980	354	17.7	113	11.3	-	-
1981	407	20.4	251	25.1	-	-
1982	515	25.8	305	30.5	-	-
1983	321	16.1	219	21.9	302	30.2
1984	295	14.8	297	29.7	503	50.3
1985	184	9.2	217	21.7	340	34.0
1986	104	5.2	143	14.3	145	14.5
1987	80	4.2	246	24.6	181	18.1
1988	172	8.6	441	44.1	580	58.0
1989	69	3.4	54	5.4	162	16.2
1990	116	5.8	119	11.9	95	9.5
1991	127	6.4	59	5.9	80	8.0

Transect #1: Patrol road around Medicine Lake.
Transect #2: Northeast portion of refuge.
Transect #3: Homestead Unit.

11. Fisheries Resources

Continued low water levels in Medicine Lake caused concern about another potential winter-kill of game fish. An estimated 30-40% of the lake was frozen to the bottom and the deepest hole near Big Island was only about 8 feet (5 feet of water and 3 feet of ice). Dissolved oxygen readings of 0.2-0.4 mg/l in mid-February had us anticipating a major fish kill. At ice off, we found isolated

pockets of dead fish, including some northerns, along the Medicine Lake shoreline, but not in the numbers expected. Then in April, thousands of carp from Medicine Lake ran up the Muddy Creek Diversion during the spring spawning run. Given the high tolerance of northerns to low dissolved oxygen levels, we assume that since many of the carp made it, the northerns should have also.

The Gaffney Lake shoreline was littered with dead carp after ice-off. Unlike Medicine Lake, we believe Gaffney suffered a total fish kill. Zero oxygen readings were found in February.

Entering the 1991-92 winter, Medicine Lake was at approximately the same elevation as last year, over 4.5 feet below operational level. Prospects that Medicine Lake's northern pike population will survive this winter are questionable at best. Time will tell if these charmed fish will provide recreational fishing opportunities, such as they are, in 1992.

No fish stockings were made in 1991, and none are planned until lake levels return to normal.

15. Animal Control

Predator control on the refuge is authorized by a control plan that calls for annual removal of mammalian predators that prey on nesting waterfowl.

Force-account predator removal activities on Medicine Lake NWR were initiated 20 February and continued until 30 July. Fifty-eight cubby box traps with Conibear size 220 traps were placed on the refuge as follows:

Uplands	34
Islands	19
Peninsula exclosures	5

These traps were baited with cat food and sardines, and freshened with vegetable oil. Four coil-spring leg-hold traps were placed on Big Island, two on Bruce's Island, and two on Bridgerman Point for additional canid control. The 1991 trapping effort totalled 6,763 trapnights (Table 22) requiring approximately 250 staff hours and about 1,000 vehicle miles.

Table 22. Trap nights expended for predator control, Medicine Lake NWR, 1991.

Trap Type	Uplands	Islands	Peninsula Exclosures	Total
Box Trap	3,035	2,250	889	6,174
Leghold Trap	0	429	160	589
Total	3,035	2,679	1,049	6,763

Upland trapping efforts were concentrated on the Homestead Unit this year in an effort to improve the area's chronic low nest success. Box traps were placed on the larger refuge islands shortly before ice-off and were monitored throughout the nesting season. Peninsula exclosures on Bridgerman and Tom Horn Points were also trapped. These fences were energized between 10 and 15 April. Lower water levels required considerable extensions of both fences. Gopher Point was not trapped this year as low water levels made that predator fence inoperable. Total animals removed during predator management activities are shown in Table 23.

Table 23. Animals trapped by month, 1991, Medicine Lake NWR.

Species	February	March	April	May	June	July	Total
Skunk	2	9	4	3	0	0	18
Raccoon	0	7	1	3	3	0	14
Fox	0	1	0	0	0	0	1
Badger	0	0	0	1	0	0	1
Feral cat	0	0	0	1	0	0	1
Porcupine	0	0	1	0	0	0	1
Coyote	0	2*	2	0	0	0	4
Total	2	19	8	8	3	0	40

* Aerial gunned by APHIS personnel.

Uplands

Capture rates for skunks were comparable to 1990, while raccoon capture rates declined by 50% (Table 24). Mayfield duck nest success in refuge DNC fields averaged 26% (73 nests), up slightly from the 21% (86 nests) found in 1990. In a direct comparison of the three DNC fields that were searched in both 1990 and 1991, nest success jumped from 17% (68 nests) to 41% (45 nests). At Homestead, where this year's upland trapping effort was concentrated, nest success increased from 14% (17 nests) to 71% (9 nests), although sample sizes were very small. Fourteen of 16 (88%) skunks and six of 11 (55%) raccoons taken from refuge uplands were caught on the Homestead Unit.

Table 24. Trapping effort, skunk and raccoon capture rates, and Mayfield duck nest success on Medicine Lake NWR uplands, 1985-1991.

Year	Trap Nights (TN)	Skunks (#/100TN)	Raccoon (#/100TN)	Mayfield Success DNC	NGL
1985	1,350	37 (2.7)	10 (1.3)	34	22
1986	4,600	42 (0.9)	18 (0.4)	46	43
1987	2,200	6 (0.3)	2 (0.1)	54*	78*
1988	3,400	41 (1.2)	16 (0.5)	38*	49*
1989	1,400	18 (1.2)	6 (0.4)	24*	44*
1990	5,511	15 (0.3)	33 (0.6)	21	19
1991	4,084	18 (0.4)	14 (0.3)	26	--

* Figures do not include nests from peninsula exclosures (changed from pre-1990 narrative reports).

Islands

One skunk, one raccoon, and three coyotes were removed from refuge islands (Table 25). A pair of coyotes intent on denning on Big Island were aerial gunned by APHIS personnel on Big Island 26 March, just prior to whelping. The other coyote and the raccoon were trapped on Bruce's Island while the skunk was caught on McDonald's Island.

Overall, nest success on refuge islands averaged 38%, identical to last year. However water levels were considerably lower this year, making predator access even easier. For example, McDonald's Island was only separated from the mainland by a 50-foot water barrier. Goose nest success dropped from 68% to 0%, while duck nest success dropped from 82% to 3%, despite three box traps on the island and the removal of one skunk. Most of our predation problems on islands in the main lake seem to be coyote related.

Moderate coyote densities are encouraged on refuge uplands because of their ability to displace red fox. The relatively high nest success rates of upland nesting waterfowl on Medicine Lake NWR are at least partially attributable to our resident coyote population. However, on an island situation, they can raise havoc and must be controlled. On Big Island, record pelican production and improved duck and goose nest densities and success this year, can be largely attributed to timely coyote control.

Predator control on refuge islands will be continued in 1992. Any canids present on the larger islands at ice-off will be removed. Skunks and raccoons will be controlled using cubby sets equipped with conibears.

Peninsula Exclosures

One skunk, two raccoons, and one coyote were removed from the two peninsula exclosures (Table 25). Goose production was much improved on Bridgerman Point this year thanks to canid control efforts. A yearling female coyote was trapped in mid-April shortly after the fence was energized; unfortunately not before she had destroyed six nests and caused abandonment of several others. Nest success increased from 22% to 46% while production increased from 25 to 70 eggs hatched. Duck nest success remained high at 84% Mayfield.

On Tom Horn Point, early nesting mallards, pintails, and Canada geese fared well. In June, at least one raccoon and one coyote gained access through a hole that went undetected for over a week. Many predated gadwall and scaup nests later, the raccoon was captured. Overall, nest success was only 24% Mayfield.

Table 25. Number and capture rates of animals removed from Medicine Lake NWR uplands, islands, and peninsula exclosures, 1991.

	Uplands		Islands		Pen. Exclosures	
Species	#	(#/100 TN)	#	(#/100 TN)	#	(#/100 TN)
Skunk	16	(0.5)	1	(0.04)	1	(0.1)
Raccoon	11	(0.4)	1	(0.04)	2	(0.2)
Fox	1	(0.03)	0		0	
Badger	1	(0.03)	0		0	
Feral Cat	1	(0.03)	0		0	
Rabbit	1	(0.03)	0		0	
Porcupine	0		0		1	(0.1)
Coyote	0		3*	(0.2)	1	(0.6)

* Two coyotes aerial gunned by APHIS personnel.

16. Marking and Banding

Pre-season mallard banding quotas for Zones 21 and 22 (western North and South Dakota and eastern Montana) were 1,000 birds for each sex and age class. Pintail quotas were 500 birds for each sex and age class. Three eastern Montana refuges Benton Lake, Bowdoin, and Medicine Lake, were requested to band as many of these species as possible, with Medicine Lake coordinating the banding effort. A total of 2,721 ducks were banded pre-season in eastern Montana. Mallards and pintails totalled 1,729 and 615 respectively, well below their respective quotas. Poor wetland conditions at Medicine Lake coupled with a botulism outbreak at Benton Lake were primarily responsible for the shortfall.

At Medicine Lake NWR, six salt plains (swim-in) traps, baited with small grain, were used 29 July to 3 October. Trapping locations were Lake 12, Lake 10, Gaffney Lake, Sayer Bay, Homestead Lake, Medicine Lake and Long Lake WPA. A total of 445 mallards, 198 pintails, 85 redheads, and 17 canvasbacks were banded (Table 26). Immature mallards and pintails comprised a greater proportion of the catch than in most years. Some problems with mink predation were encountered on Long Lake WPA and at Homestead resulting in the death of some 75 bandable ducks.

Table 26. Species, age, sex and total number of ducks trapped, Medicine Lake NWR, 1991.

Species	After Hatch Year Male	After Hatch Year Female	Hatch Year Male	Hatch Year Female	Local Male	Local Female	Total
Mallard	73	78	155	139	0	0	445
N. Pintail	9	35	82	72	0	0	198
Redhead	37	18	12	18	0	0	85
Canvasback	8	2	1	6	0	0	17
Total	127	133	250	235	0	0	745

17. Disease Prevention and Control

For the second consecutive year, there were no botulism outbreaks on the refuge. Only four ducks and five colonial waterbirds were picked up during patrol activities (Table 27). Extremely low water levels left many historic problem areas "high and dry." Sayer Bay was reduced to just a channel of water and no emergent vegetation.

The southern part of the Homestead Unit remained completely dry all year. We were concerned about Lake 11 which re-flooded in late June from runoff down Cottonwood Creek. Broods and molting dabblers made good use of this wetland, however, no disease problems were encountered. With the exception of Lake 11, there was virtually no attractive molting habitat, and we did not receive our normal influx of molting dabblers.

Disease control efforts this year consisted of 154 staff hours, including 25 volunteer hours during the months of July, August and September. Methods of search included walking shorelines, using spotting scopes to check open beaches, air boating, and patrolling shorelines with ATV's. Refuge cost was approximately $1,300. Manpower needs were higher than last year, primarily because shallow water conditions forced us to walk several areas where we couldn't get in with our "pig" of an airboat.

No evidence of avian cholera was found on the refuge this year after being diagnosed in a small number of California gulls in 1990.

Table 27. A summary of staff hours and birds recovered during botulism patrols, Medicine Lake NWR, 1991.

Species	June	July	August	September	Total
White Pelican		1			1
Franklin's Gull		2			2
Ring-billed Gull		1	1		2
Mallard			1		1
Lesser Scaup		1	1		2
Gadwall		1			1
TOTAL	0	6	3	0	9
Staff hours	16	95	43	0	154

H. PUBLIC USE

1. General

Volunteer Ann McCollum again met with school groups both at the refuge and in their schools. She gave 23 presentations concerning all aspects of the animal and plant kingdom to grades ranging from kindergarten to twelve. She also helped teachers prepare classes concerning the natural world. All of this excellent work was done from January to May. She then selfishly left for Benton Lake NWR with Jim. The local school districts lost a great asset.

Jim McCollum and Rabenberg gave presentations on the NWR System and employment opportunities with the USFWS to approximately 250, 5th and 6th grade students at Poplar, Brockton, Wolf Point, and Frazer on the Fort Peck Indian Reservation.

McCollum gave a tour and discussed refuge operations and management problems to the Rosebud Audubon Club of Miles City, Montana.

Two instructors and nine students from Fort Peck Community College came for a presentation and tour. Three of the students used the sharp-tailed grouse blind.

Fuller and Husband gave a slide presentation on the refuge to 38 people in the area for a family reunion.

Fuller meet with 30 area Boy Scouts to discuss wildlife management and career opportunities with the Fish and Wildlife Service.

Husband presented a program on the history and purpose of the refuge to 11 Cub Scouts.

News releases appeared in local papers concerning wildlife viewing opportunities, haying, trapping, and special hunting units on the refuge.

We received our new hunting brochure during October.

7. Other Interpretive Programs

Staff members attend the Pioneer Gun Club meetings at Dagmar. The group is always interested in happenings at the refuge and numerous questions are answered.

8. Hunting

Grouse, partridge, and dove seasons opened 1 September. Very few hunters used the refuge during the month.

Goose season opened 28 September. Many of the large Canada's were already in Nebraska, but white-fronts and snow geese keep hunters interested. Several parties off the refuge filled with dark geese opening weekend. No goose hunters were observed on the refuge during the first two weekends of the season. We quit looking for them after that.

Duck season opened 5 October but you wouldn't know it based on hunter numbers. Only one hunting party was noted on the refuge the first weekend.

Pheasant season opened 12 October. Between 30-50 hunters used the refuge for the first five days. Almost all hunters were non-residents. We noted representatives from 11 states and Saskatchewan. Limits were the norm for opening week-end. Pressure declined sharply after the first week of the season. We believe some hunters did not hunt the refuge because of the steel shot requirement.

Deer season opened 27 October. Almost all pressure was in the Sandhills by non-residents, mostly Minnesotans. Nine rigs were present opening day. They generally harvest "dry does".

Late season deer and pheasant hunting on the special units opened 15 November. Approximately 40 deer hunters and 10 pheasant hunters used the north end of the refuge and 30 pheasant and 10 deer hunters were present at Homestead. Hunter numbers were about half of last year's initial opening. Apparently the novelty wore off quickly. Hunting pressure remained light (2-4 rigs/day on the week-ends) after the opening week-end.

9. Fishing

The year began with only three ice houses on Medicine Lake off the north side of Young's Island. Cloudy water conditions and poor fishing success kept fisherpersons away the rest of the winter.

Fishing success under liquid conditions weren't much better. A few northerns were caught, but success was sporadic at best. Rumors circulated quickly that the lake had "died out". While we don't believe the winterkill was that severe (Section G.11), continued low water levels and poor success made for a dismal fishing year. In some months, you could count the total number of fishing visits on one hand.

A few persons took advantage of the large numbers of carp in the Diversion Channel to try some bow-fishing. Boundary and Closed Area signs were posted along the Diversion channel west of town to reflect the changes in the areas open/closed to fishing.

Only two parties were known to have tried ice-fishing in November and December. Reportedly, only one fish was caught on tip-ups and the water was too cloudy for spearing. No ice houses were on the lake at the end of the year.

There was little or no fishing activity on any of the other refuge lakes.

10. Trapping

Continued low fur prices have almost eliminated local interest in sport trapping. Anticipating little interest, we once again waived the $50 permit fee and issued a news release explaining current opportunities prior to the refuge trapping season. One application was received, the first in three years. A Special Use Permit was issued to Jason Arbogast. However, the permittee never set a trap on the refuge and moved to South Dakota a short time after the permit was issued.

Left without a trapper, Rabenberg decided to get rid of some "use or lose" annual leave and harvest furbearers himself. A permit was issued and he began trapping the last week of December. You'll have to wait until next year's narrative for the results.

11. Wildlife Observation

A news release was distributed to area newspapers describing the availability of a grouse photo blind on the refuge and other wildlife viewing opportunities. A total of 10 individuals used the blind on six occasions between 20 and 28 April.

Members of the Rosebud Audubon Club from the Miles City area conducted a birding excursion and made use of the grouse photo blind the weekend of 27-28 April. McCollum conducted a tour of the refuge and discussed refuge operations and management problems.

In 1990, Defenders of Wildlife, in cooperation with the FWS and other land management agencies, published the Montana Wildlife Viewing Guide. One of the 113 wildlife viewing areas described in the book is located on the refuge along Highway 16. Numerous travelers and a few locals stopped to observe the gulls and great blue herons nesting on the adjacent highway islands, as well as the large numbers of shorebirds and waterfowl that concentrate in this area.

Leisurely drives to view the white-tailed deer which concentrate on the refuge during the winter months are popular with the local folks. Most of the deer were concentrated in the Lake Creek Flats and Dagmar areas.

14. Picnicking

An estimated 50 visitors used the refuge picnic area located on Medicine Lake near Highway 16. Most picnicking is combined with a fishing trip.

17. Law Enforcement

Beginning this year, non-toxic shot was mandatory for all shotgun hunting on the entire refuge. Last year, the use or possession of lead shot while hunting upland gamebirds was prohibited only in the special late-season hunting areas. Several steps were taken to educate the public about the change in refuge hunting regulations. First, a letter was sent to local and regional MTFWP employees asking them to help spread the word. Then a news release concerning the refuge's new regulation requiring non-toxic shot for

all shotgun hunting was sent to area newspapers and radio and television stations. Hunting brochures were amended to reflect this change and signs were posted at all parking lots and contact stations prior to the 1 September grouse and partridge opener. A new hunting brochure was designed and printed with the help of Lisa Langelier in the RO which was available prior to the start of pheasant hunting, our busiest time of year.

Apparently our preventative law enforcement efforts were successful, as almost all hunters were aware of and abided by this year's lead shot ban. Rabenberg checked two parties of Canadian hunters using lead shot just as they were entering the refuge to hunt. They were lectured on their responsibility to know the regulations, and invited to come back after they had bought some steel shot shells.

Rabenberg caught a Native American just inside the Fort Peck Reservation boundary shooting ducks out of season in mid-September (with lead shot from a highway bridge no less). The gentleman didn't feel we had any right to "hassle" him on the reservation and was upset when he couldn't keep his duck. Special Agent Hanlon has forwarded the case to the U.S. solicitor to request permission to prosecute.

On opening day of deer season, Rabenberg caught a group of Minnesotans hunting, stockpiling their deer, and supposedly tagging them after everybody reported back to camp. They claimed ignorance, despite the fact they had been hunting in Montana the last 10 years. The case was turned over to our new state warden in Plentywood who issued citations to one individual for illegal take ($515) and another with failure to tag ($115). Three deer were seized.

Fuller, Gutzke, and MTFWP warden Valdon staked out the Homestead Unit one night anticipating the return of an individual suspected of poaching deer. He didn't show.

Word was received from a refuge neighbor that several townsfolk and high school students were amusing themselves this spring by shooting carp with .22 rifles from the bridge over the Diversion Channel (this is eastern Montana remember). After conferring with the state warden, Rabenberg contacted school authorities and a couple of persons plugged into the local grapevine and informed them this was a violation of Montana law. The word spread quickly. There are advantages to living in a small community.

Vandals spray painted the east kiosk and kicked the windows out of the toilets in the recreation area. The incidents were reported to the county sheriff. Fortunately, restoration was not too costly.

Figure 18. Vandalized kiosk along Lake Grade Road. ML-91-2, exp 9, 5/6/91. TF

Figure 19. Vandalized toilet at recreation area. ML-91-2, exp 15, 5/14/91. TF

I. EQUIPMENT AND FACILITIES

1. New Construction

Numerous fencing and water development projects were completed this year to facilitate shorter duration grazing on refuge grassland management units (Section F.7).

Figure 20. The new access to the office. ML-91-4, exp 9, 10/21/91. TF

Figure 21. The new storage building at headquarters. ML-91-4, exp 13, 10/21/91. TF

2. Rehabilitation

This summer the two YCC's collected all the trash (fence posts, wire, etc.) into small piles along the exposed shoreline of Medicine Lake. This winter these piles will be removed.

After removing the junk, we built shelves and paneled the walls in the "north barn". We now store only refuge and WMD signs, electrical fencing supplies, and the four-wheelers in the building.

We started transferring fence posts and barbed wire from the old to the new boneyard north of the shop.

The ceiling in the Quarters #1 garage was sheetrocked; also the walls and ceiling in the Quarters #2 garage.

Picnic tables from the recreation area were changed from green to brown and a picnic shelter roof replaced.

A $69,000 contract was awarded to Prairie Sand & Gravel, a local contractor, to rehabilitate a variety of water management structures. The project was funded through the Maintenance Management System (MMS). Work items included:

1. Tax Bay Crossing

Extend existing concrete box culvert to widen the road. Erect two concrete bullards to protect screw gate support.

2. Homestead Dike

Remove 20 trees and associated root systems. A subsequent change order authorized an additional $4,000 to remove 32 more trees.

3. Homestead Outlet Water Control Structure

Replace concrete apron, downstream side, and repair spalled and cracked concrete, primarily in the drawdown bays.

4. Homestead Inlet Water Control Structure

Replace CMP half-round risers with new concrete stoplog risers. Remove abandoned concrete water control structure from inlet channel. Re-slope, rip-rap, and stabilize banks of the inlet channel.

Construction began 15 October with a required completion date of 15 January, 1992. The project was roughly 80% complete at year's end. Nelson served as Project Inspector.

Approximately three miles of old, deteriorated interior barbed-wire fences were dismantled and rolled up by summer work crews (Section F.7).

Figure 22, Beginning of new inlet structure for Homestead. 10/91, DN

Figure 23. The concrete vaults were poured at the contractor's shop. 11/91, DN

Figure 24. These vaults were hauled to Homestead and lowered into position. 11/91, DN

Figure 25. The old cut off the Big Muddy River had to be enlarged. 12/91, DN

Figure 26. An almost finished product. 12/91, DN

Figure 27. A new concrete apron was poured and spalled concrete areas in the drawdown bays repaired at the Homestead outlet structure. exp 7, 1/2/92. MJR

3. Major Maintenance

The 1989 Jeep Cherokee met with a rock. Almost everything that could be damaged in the drive train was. After spending over $1000. on repairs, we are still trying to solve a vibration problem.

4. Equipment Utilization and Replacement

No motor vehicles or other large pieces of equipment were received.

5. Communication Systems

The high frequency radios installed last year provide us better communication to state and local government agencies, but are not as reliable as the old, low frequency system. The range of the high band radios is not as good as the low band.

6. Computer System

We received a Dell 325D desktop computer in October. Features include a 386 system with 25Mhz, 300 megabyte hard disk, super VGA color monitor, 80387 numeric co-processor, and 150 megabyte external tape backup system. The machine will be used for MapInfo among other things.

7. Energy Conservation

Table 28 compares the last five years of energy consumption. The refuge office was converted from a fuel oil furnace to a "pulse" type propane furnace in December, 1988. Coal is used to heat the shop.

Table 28. Energy consumed, Medicine Lake NWR, 1987-91.

Energy	1987	1988	1989	1990	1991
Diesel (gal)	5,834	5,788	6,074	5,210	1,915
Gas (gal)	6,275	6,732	5,367	5,361	5,598
Propane (gal)	130	560	1,472	752	1,227
Elec. (KWH)	29,926	36,692	31,979	30,053	33,779
Coal (ton)	10	15	8	11	15

J. OTHER ITEMS

2. Other Economic Uses

Yellowstone Honey, Inc., Sidney, Montana, placed 240 bee hives on the refuge at $0.50 per hive. The charge of 50 cents per hive the past two years is an increase from the 25 cents that had been charged for many years. Because of the early spring moisture, clover, alfalfa, and other nectar producing plants flourished. The apiarist said this honey crop was the best in many years.

Royalty income from the two oil wells fell sharply this year due to a decrease in production and lower prices following the Gulf War.

Table 29. Production by well and royalty income to refuge revenue sharing fund.

Year	Production				Refuge Royalty Income
	Well # 13-1		Well # 14-1		
	Oil*	Gas@	Oil*	Gas@	
1989	18,612	7,137	10,853	5,866	$56,396.36
1990	18,159	9,479	15,106	7,517	94,103.40
1991	12,743	7,195	12,637	4,427	80,064.75

* measured in barrels of oil.
@ measured in thousand cubic feet of gas.

4. Credits

Authors of various sections are Gutzke: A; C; D1-4; F1-3; and Lamesteer, Rabenberg: D5; F4-5, 7-8; G; H9-19; I1, Quarne: B; E1-2, 5; I7; Fuller: E4, 6-9; F6, 9-10; H1-8; I2-8; J1-4, editing and assembly; Gutzke, Fuller, and Quarne.

Photographers are Rabenberg-MJR, Husband-HH, Fuller-TF, John Stanton-JS, and Dennis Nelson-DN.

LAMESTEER NATIONAL WILDLIFE REFUGE
Wibaux, Montana

This 800 acre easement refuge is located 20 miles southeast of Wibaux; 160 miles south of Medicine Lake National Wildlife Refuge. The Service has no control of the upland; only water management and facilities maintenance rights are covered by the easement. Pumping for irrigation from the reservoir is allowed when surplus water is available. No pumping was requested or permitted this year. Since enforcement of a hunting closure was impractical, the refuge was opened to hunting in 1981. The landowner controls access.

Water conditions on the refuge were poor. Very little run-off occurred during the year and habitat conditions were only fair. Most emergent vegetation is separated from the water by several feet of exposed mud.

Muskrats and beavers inhabit the stream area below the spillway. A large beaver lodge is present on the north stream bank about 100 yards below Lamesteer Dam. Further down stream a well maintained beaver dam backs up about an acre of shallow water. Both the lodge and dam are built of kochia weeds, Russian thistle and mud. All the water present in the beaver pond is supplied by the leakage through Lamesteer Dam.

It is apparent that earth-fill work is needed on the crest of the dam on both sides of the primary spillway. Substantial water leakage through the dam at the spillway and at one other point is evident. The stream below the dam is full of water backed up by the beaver dam several hundred feet downstream from the spillway. A Maintenance Management System project has been submitted for rehabilitation of these deficiencies.

There has not been recent public use of the lake. Much of the hay field on the south side of the lake had been plowed up while most of the grain fields around the lake were fallowed this year.

INTRODUCTION

NORTHEAST MONTANA WETLAND MANAGEMENT DISTRICT

The Northeast Montana Wetland Management District (NEMTWMD) is located in the extreme northeastern corner of Montana. It is bounded on the north by Canada, on the east by North Dakota, on the west by the Fort Peck Indian Reservation and on the south by the Missouri River. The district is located in Sheridan, Roosevelt, and Daniels counties. During 1990 Richland, Dawson, and Wibaux were added, mainly to handle Farm Bill and FmHA activities.

This tri-county management district was entirely glaciated and could be considered a continuation of the prairie pothole region of the Dakota's. The northern portions of Sheridan and Daniels counties have terrain common to the glacial Missouri coteau, a very hilly landscape dotted with many shallow depressions.

Native vegetation is of the mixed-grass prairie type. The district lies in the transition zone between the tall-grass prairies to the east and the short-grass prairie of central Montana. Cool season grasses predominate with scattered shrub communities. Trees exist only in planted shelterbelts.

The climate is typical of the northern Great Plains, with warm summers, cold winters, and marked variation in seasonal precipitation. Precipitation averages 12 to 15 inches per year. Temperatures can exceed 100 degrees in the summer and drop to minus 45 degrees in the winter. Spring is generally quite windy with velocities exceeding 20 miles per hour about 15 percent of the time. Winds may occasionally exceed 50 miles per hour with passing weather systems.

The Wetland Management District includes 42 waterfowl production areas (WPA's) totaling 10,743 managed acres. These WPA's vary in size from four acres to 2,012 acres. An additional 7,674 acres of privately-owned wetland acres are protected from drainage, burning, and filling by perpetual wetland easements. Acquisition started in 1969, and though it has slowed since the early 1980's, easement and fee title tracts are still being acquired.

This wetland district lies within the Williston Oil Basin, which was one of the most active oil basins in the lower 48 states in the early 1980's. Oil exploration and development is widespread throughout the area. The majority of WPA tracts were acquired without the underground mineral rights. This resulted in reservations for development of the sub-surface right by the owners or their assigned third party. For this reason, seismic exploration and oil well development is common on these tracts.

INTRODUCTION

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H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

A. HIGHLIGHTS

For those of you without total recall, some highlights remain the same as in the 1988, 1989, and 1990 narrative report; another good year for piping plovers (G-2) and another terrible year for waterfowl (G-3).

Approximately 875 acres were hayed (F-8) and 260 acres were interseeded with DNC (F-8).

Farm Bill activities include restoring 155 wetland acres and seeding 2190 acres to a DNC type mixture or native grasses (J-1).

B. CLIMATIC CONDITIONS

Refer to Medicine Lake NWR narrative for recorded conditions. The weather station at Westby was finally active again and recorded 14.03 inches of precipitation for the period of April through September compared to 13.09 inches at the refuge for the same period. Refuge precipitation was 114 per cent of normal for this time period according to Montana's "Crop-Weather Report". It is great to be back to normal.

The precipitation came at an opportune time for upland vegetation. Some of the older ranchers stated prairie grasses wouldn't look any better. Unfortunately this was not true for wetlands (see section F-2).

C. LAND ACQUISITION

1. Fee Title

We are still in the process of finalizing acquisition at International Marsh WPA. Ducks Unlimited has agreed to build a water control structure, dam, and emergency spillway but the project will flood additional acreage beyond the present boundary and we are trying to either buy or take flowage easements on this acreage. Three meetings were held with surrounding landowners and Daniels County Commissioners to appease their concerns with the project. Two flowage easements were acquired, one with Dave Hanrahan for 360 acres and another with Don Marlenee for 80 acres. Now the major obstacle is with the Fort Peck Tribes concerning water rights on the Poplar River. We have agreed to pay a nominal fee for water if they can obtain federal legislation permitting the tribe to lease portions of their water rights. If unsuccessful in obtaining this legislation, the tribe has agreed not to contest FWS water application.

Table 1. Fee acres by county, NEMTWMD, 12/31/91.

County	No. Tracts	No. WPA's	Total Acres
Daniels	6	3	1,080
Roosevelt	2	1	179
Sheridan	69	38	9,484
Totals	77	42	10,743

2. Easements

A grassland easement protecting 160 acres was acquired from Vern T. Hancock along the flood plain of the Big Muddy River. This is our first grassland easement.

Wetlands protected by easement are the same as last year (Table 2).

Table 2. Wetland easement acres by county, NEMTWMD, 12/31/91.

County	No. Easements	Wetland Acres
Daniels	6	262
Roosevelt	10	1,007
Sheridan	107	6,405
Totals	123	7,674

D. PLANNING

4. Compliance with Environmental and Cultural Mandates

The Environmental Assessment concerning the trade of the north 80 acres of Wigeon Slough WPA for private lands on the east and west boundaries was approved. The trade became official this summer.

Sheridan Electric Co-op requested a right-of-way easement to cross Mallard Pond and Olsen WPA's with a 57 kv single pole power line. An Environmental Assessment determined the power line was not compatible and may affect peregrine falcons, whooping cranes, and bald eagles. Sheridan Electric was denied an easement to cross the WPA's. They routed their line east of both WPA's.

5. Research and Investigations

Refer to section G-2 for piping plover work.

E. ADMINISTRATION

Operational funding and personnel are incorporated with the Medicine Lake NWR report. No separate program is work-planned for the WMD.

7. Technical Assistance

We assisted US Department of Agriculture (USDA) SCS and ASCS offices in Roosevelt and Sheridan Counties with 1985 and 1990 Farm Bill activities.

Sheridan County SCS requested our assistance in evaluating lands for sign-up in the Waterbank program. We also assisted that office in developing criteria for renewal of expired Waterbank contracts.

We inspected numerous dugout proposals for Sheridan County SCS.

F. HABITAT MANAGEMENT

1. General

Table 3 summarizes habitats managed. These include 709 acres of BLM and Montana state school lands and is the reason for disagreement with Table 1.

Table 3. Managed habitat types, NEMTWMD, 12/31/91.

	COUNTIES			
Habitat Type	Daniels	Roosevelt	Sheridan	Total
		Acres		
Wetlands (1)				
Type 1-2	23		49	72
Type 3	82	6	466	554
Type 4	212		1,248	1,460
Type 5			360	360
Type 6		160	773	933
Subtotal	317	166	2,896	3,379
Upland				
Native prairie	420	123	2,375	2,918
Prairie brush	12	6	284	302
DNC	302	47	3,604	3,953
Tame	27		794	821
Subtotal	761	176	7,057	7,994
Shelterbelt			13	13
Roads	<1		41	41
Trails			16	16
Oil well sites			7	7
Building site			2	2
Gravel pit			<1	<1
Totals	1078	342	10,032	11,452

(1) Wetland types based on Stewart & Kantrud, 1971.

2. Wetlands

This was another terrible year for "wet" wetlands. One method of comparison is using the four square mile waterfowl census information. Table 4 is from 14, four square mile blocks. Data for federal lands are misleading because one of these blocks is Medicine Lake and another is a high water table, ground-recharged wetland complex. The percent of area being wet on the remaining federal lands would be very similar to easement and private lands, ie., between 1-3%.

Table 4. Percent of area wet by ownership in the four square mile census, NEMTWMD, 1987-1990.

	Percent of Area Wet				
Ownership	1987	1988	1989	1990	1991
Easement(1)	12	1	10	3	1
Federal(2)	68	59	65	62	58
Private	3	1	3	1	>1

(1) Areas protected by wetland easement.
(2) Either WPA or refuge.

4. Croplands

See section F-8 for interseeding of hayed WPA's.

5. Grasslands

We have WPA's that will benefit with a grazing treatment, but we don't have any water for livestock. When wetland conditions return to normal grazing and prescribed burning will be used.

8. Haying

The following WPA's were hayed during mid-July to increase the vigor of old DNC or former USDA Waterbank stands. Price/ton was established with cooperation of Sheridan County Extension Agent and based on feed value of hay. Hayer's were required to have hay removed 10 days after baling. Twelve ranchers hayed 875 acres (Table 5).

Table 5. Haying activities, NEMTWMD, 1991.

WPA	Acres	Yield (ton/acre)	$/ton	Cover
Anderson	150	1.30	17.50	Waterbank
Erickson	180	1.68	16.00	DNC
Gjesdal West	80	1.66	12.50	Soilbank
Goose Lake	60	1.34	10.00	DNC
Goose Lake	115	1.35	10.00	Soilbank
North Root	130	1.63	15.00	Waterbank
South Root	156	1.11	15.00	Waterbank

The Root WPA's were interseeded with DNC using our Lilliston drills. North Root (112 acres) was interseeded with 2.50 pounds (PLS) of Ladak alfalfa and 8.4 pounds (PLS) of tall and intermediate wheatgrass (1:1 ratio) per acre on 29 and 30 July. South Root (148 acres) was interseeded with 3.20 pounds (PLS) of LaDak alfalfa and 8.1 pounds (PLS) of tall and intermediate wheatgrass (1:1 ratio) on 31 July and 1 August.

Last year we hayed the east half of the two Root WPA's and interseeded most of the hayed areas except for a small block on each WPA. During April we shallow-disked both of these blocks with the hope of increasing frequency of both alfalfa and the wheatgrasses. Transect lines were established on both WPA's to evaluate the different management techniques used in 1990. Alfalfa frequency increased 22 per cent on North Root and 24 per cent on South Root with interseeding. Disking increased alfalfa frequency 750 per cent on North Root and 203 per cent on South Root, based on the transect data. The increase for disking is more than expected and more than what appeared visually. These transect lines will be sampled again in 1992. Although wheatgrasses were not sampled, they definitely increased on the disked areas. Unfortunately we don't have any pictures for proof.

Because of the increased frequency of alfalfa and wheatgrasses after disking, approximately 10 acre blocks were established on each Root WPA and not interseeded with DNC. The block on South Root (Fig. 1) was disked 15 August and the block on North Root will be disked next spring.

We also shallow disked the 60 acres of DNC on Goose Lake with the hope of improving nesting cover.

Figure 1. Disked portion of South Root WPA, from road facing east. ML-91-2, exp 23, 8/16/91. TF

10. Pest Control

Both Hanson and Gjesdal West WPA's received about 50 gall flies to feed on Canada thistle.

The 1990 release of gall files on Flaxville WPA does not appear to be successful.

13. WPA Easement Monitoring

We didn't find any ditching violations of easement contracts during our fall compliance flight. One landowner was notified by certified letter about a burning violation. Sheridan County Commissioners were provided with a county map showing the location of wetland easement.

We observed ditching on lands not protected by easement contracts. However, according to SCS, all ditches were on prior converted wetlands, thus no 1985 Farm Bill "swampbuster violations".

Cattle watering dugouts were permitted on Sheridan County easements 16x, 65x, and 89x-1.

An oil well site on lands protected by Roosevelt County 18x was checked for possible conflict. The drilling site avoided all wetlands.

G. WILDLIFE

1. Wildlife Diversity

Habitat diversity is an integral part of wildlife diversity within the WMD. The mixture of wetlands, uplands, and agricultural fields provide habitats for various resident and migrant birds as well as numerous mammalian species.

2. Endangered and/or Threatened Species

A concentrated effort was made to search all potential piping plover habitat in Daniels, Sheridan, and Roosevelt Counties from 1-15 June as part of the International Piping Plover Survey. This includes WPA's, Montana state lands, and privately-owned wetlands (Table 6). The thrust of the survey was to locate indicated breeding pairs but not nests. The low number of nests compared to indicated pairs is probably a reflection of the small amount of time spent searching for nests rather than nesting density. Information on nest success or fledgling rates was not collected this year.

The 63 indicated pairs is almost double the 1989 and 1990 figures, ie, 34, and 33 respectively. This rise in the number of plovers is probably in response to an increase in suitable habitat from the spring rains.

Access was denied to wetlands located north of Espen WPA and Anderson Lake (T37N, R58E, sections 16 and 21) known to used by nesting plovers. A conservative, but realistic, estimate would be another 10 pairs and 30 individuals for these two areas.

There were three sightings of peregrine falcons in the district.

Table 6. Piping plover survey results, NEMTWMD, 1991.

Location	# Pairs	# Adults	# Nests
WPA'S			
Parry	1	2	1
Dog Leg	2	4	2
Erickson	1	4	1
Goose Lake	9	27	0
Total	13	37	4
MT State Lakes			
Goose Lake	0	3	0
Private Lakes			
Upper Goose Lake	12	38	0
W. of Goose Lake	15	39	0
Round Lake (ND)	1	2	0
Salt Lake	2	7	0
N. of Flat Lake	1	2	0
Flat Lake	10	29	1
Parry's Lake	4	13	0
North Lake	2	5	0
N. of Stateline WPA	2	4	1
Galloway Lake	1	2	0
Total	50	141	2
Grand Total	63	181	6

3. Waterfowl

Breeding pairs are estimated using the four square mile technique. This technique was designed by Northern Prairie Wildlife Research Center (NPWRC), Jamestown, ND. Four square mile blocks are selected at random within the WMD. Approximately 200 wetlands are randomly selected within these blocks. Wetlands occur on WPA's, Medicine Lake NWR, private land protected by a wetland easement, and private land without protection of a wetland easement. Production estimates are made by NPWRC based on nest search data

and other information. However, production estimates are only made for mallard, gadwall, blue-winged teal, shoveler, and pintail. Production estimates are made using early 1980's data, and may not reflect the effects of the continued drought.

We census 14 plots; one count in the first part of May, another count in the latter part of May. This is our fifth year using this technique. Gene Mack, past coordinator for the census, found a problem in the computations of 1987 and 1988 data. Data in the 1987 and 1988 narrative reports should not be used. Pair estimates and number of recruits (number of ducklings produced) include the area of Medicine Lake Refuge. Unfortunately the data are lumped for the WMD and the refuge under the ownership class of federal land (Table 7). Pair density by species is presented in Table 8.

Because of the low pair density and very low nest density the last four years in the WMD, cable-chain nest searches were not conducted. In the past we have checked islands for nesting waterfowl, but because of the continued dry wetland conditions and lack of any nesting birds, only Ferguson WPA was searched. Four Canada goose nests were located 24 April; three were destroyed and one abandoned.

During December fiberglass tank ends were replenished with nesting material and checked for utilization. Also checked were large, round bales and culvert nesting structures (Table 9).

Table 7. Number of pairs and recruits by ownership in the four square mile breeding pair census, NEMTWMD, 1987-1991.

	For All Species		
	Breeding Pairs	Pairs/Area (sq-mi)	Recruits/Area(sq-mi) (Only 5 Species)*
		1987	
Easement	7,801	78	59
Federal	5,898	122	104
Private	109,339	20	15
		1988	
Easement	789	8	4
Federal	3,793	78	36
Private	30,948	6	3
		1989	
Easement	11,218	111	105
Federal	7,061	146	112
Private	144,787	27	22
		1990	
Easement	4,140	41	38
Federal	9,391	194	119
Private	79,830	15	9
		1991	
Easement	1,632	16	18
Federal	5,164	107	62
Private	36,276	7	4

* Mallard, gadwall, b-w teal, shoveler, and pintail.

4. Marsh and Waterbirds

Common nesters on the district include eared, horned and western grebe, American bittern, black-crowned night heron, sora, and Virginia rail. Great blue herons and double-crested cormorants are observed throughout Sheridan County, but we haven't located any colonies.

Table 8. Estimated pairs by species from the four-square mile census, MEMTWMD, 1987-1991.

		Pairs/Area (sq-mi)				
		1987	1988	1989	1990	1991
Mallard	Easement	14.3	1.8	19.3	7.8	3.8
	Federal	20.3	15.8	22.9	32.2	22.4
	Private	3.8	1.3	4.7	2.8	1.6
Gadwall	Easement	15.2	1.2	23.1	10.1	3.2
	Federal	33.3	17.1	42.5	69.4	34.4
	Private	3.9	0.9	5.6	3.6	1.3
Wigeon	Easement	6.2	1.0	6.8	4.8	1.7
	Federal	6.1	5.4	5.6	12.3	1.2
	Private	1.7	0.7	1.6	1.7	4.1
G-w teal	Easement	2.3	0.3	4.1	1.9	0.9
	Federal	2.2	1.8	3.4	6.4	2.9
	Private	0.6	0.2	1.0	0.9	0.4
B-w teal	Easement	14.2	1.1	22.2	5.7	3.8
	Federal	14.0	5.7	18.4	14.7	12.9
	Private	3.8	0.8	5.3	2.1	1.6
Shoveler	Easement	6.6	0.3	8.2	4.6	0.6
	Federal	11.7	3.6	12.2	24.7	4.4
	Private	1.7	0.2	2.0	1.6	0.2
Pintail	Easement	8.8	0.9	15.6	2.5	1.5
	Federal	8.6	4.6	13.0	6.6	5.0
	Private	2.4	0.6	3.7	0.9	0.6
Redhead	Easement	2.5	0.3	4.6	0.6	0.4
	Federal	6.6	5.6	10.2	4.7	6.1
	Private	0.6	0.2	1.1	0.2	0.2
Canvasback	Easement	1.1	0.2	1.0	0.7	0.1
	Federal	2.5	3.3	1.9	5.4	1.6
	Private	0.3	0.2	0.2	0.3	0.1
L. scaup	Easement	3.6	0.5	3.6	1.1	0.6
	Federal	10.4	12.9	10.4	12.6	10.4
	Private	0.9	0.4	0.9	0.4	0.2
Ruddy	Easement	3.4	0.2	3.0	0.7	0.3
	Federal	6.9	2.1	5.1	4.1	2.4
	Private	0.9	0.1	0.7	0.2	0.1

5. Shorebirds, Gulls, Terns and Allied Species

Known nesters, in addition to piping plovers, include American avocet, marbled godwit, long-billed curlew, upland plover, willet, common snipe, killdeer, and black tern. Additional species present during migration include dowitchers, greater and lesser yellowlegs, Wilson's phalarope, and various sandpipers.

Table 9. Utilization of artificial nesting structures, NWMTWMD, 1991.

WPA	Type	Water Present	Utilization
Basecamp	N. bale	Y	Successful duck
	S. bale	?	None
Bolke	Tank end	N	None
	N. culvert	N	None
	S. culvert	N	None
Chandler	Culvert	Y	None
Gjesdal East	Bale	?	None
Goose Lake	S. tank end	Y	None
	Middle tank end	Y	None
	N. tank end	N	None
Hansen	N. tank end	N	None
	S. tank end	N	None
Jerde	N. tank end	Y	None
	S. tank end	Y	None
	W. tank end	Y	None
Johnson Lake	E. bale	N	None
	S. bale	N	None
	W. bale	N	None
Northeast	N. bale	?	None
	S. bale	?	None
Parry	Tank end	Y	Successful goose
Pintail Marsh	N. tank end	N	None
	S. tank end	N	None
Redhead Retreat	N. bale	?	None
	S. bale	?	Successful duck
State Line	N. tank end	Y	Successful goose
	S. tank end	(tipped over)	
Valpone	E. culvert	Y	None
	W. culvert	Y	None

? Unknown - not checked until December

6. Raptors

Swainson's and ferruginous hawks, northern harrier, and short-eared, great horned, and burrowing owls are known to nest in the area. Golden eagles and prairie falcons are sighted throughout the year. The "breaks" along Beaver, Plentywood, Eagle, and Whitetail Creeks (tributaries of The Big Muddy) have suitable nesting habitat for both eagles and falcons. We have only documented golden eagle nesting on these tributaries.

During migration merlin, American kestrel, gyrfalcon, rough-legged hawks, accipiter species, and snowy owls may be seen. Notable sightings this year were two gyrfalcons during the fall and an osprey at Brush Lake in April. Also notable is the lack of observations of snowy owls.

The raptor survey for Montana Fish, Wildlife & Parks (MTFWP) was conducted 2 June. Species observed along the 58 mile route were: twelve Swainson's hawks (includes three young in nest), five northern harriers, five golden eagles, one short-eared owl, and five burrowing owls.

7. Migratory Birds

Mourning doves nest on several WPA's, but seem limited to those areas that contain trees for nesting. The extent of ground nesting is not known.

We conduct two coo-counts for the Migratory Bird Office; one 104 miles west (Richland-Lustre) and the other (midway area-near Sidney) about 50 miles south of the refuge. Near Sidney, 47 birds were heard (36 in 1990) and 121 were heard on the Richland-Lustre survey (24 in 1990).

10. Other Resident Wildlife

Sharp-tailed grouse, ring-necked pheasants, and gray partridge are present throughout the district. This year we checked for active sharptail dancing grounds, but numbers presented are only indicators of an active ground (Table 10). We have our farm cooperators on the refuge put up part of the government's share of small grain in large, round bales. During December we placed two bales each on Anderson, Gjesdal West, Basecamp, State Line, Erickson, Wigeon Slough, and Big Slough.

Table 10. Sharp-tailed grouse dancing ground census, NEMTWMD, 1991.

WPA	Number Observed	Comments
Anderson	17	16 males
Basecamp	?	Heard but couldn't locate
Big Slough	31+	In DNC; couldn't see well, 27 males
Erickson	28+	26 males; couldn't see entire lek
Gjesdal West	26	Flushed
Goose Lake	?	Heard but couldn't locate
Long Lake	0	Good weather to hear birds
Mallard Pond	0	Good weather to hear birds
Northeast	?	Heard but couldn't locate
Parry	0	Good weather to hear birds
Pintail Marsh	7	Along west side on private
Redhead Retreat	3	Private land near SW boundary
Rierson	20	Flushed
Salter	15	Flushed
State Line	0	Good weather to hear birds
Wigeon Slough	24	18 males, along south boundary
Wigeon Slough	20	In October, along north boundary
N. of Mallard Pond	26	13 males in section 28; 9 males in section 29; both 1+ mile from WPA

H. PUBLIC USE

1. General

Public use in the WMD is considered light and is limited almost exclusively to hunting. Total visits to the district are unknown. Some landowners aren't too happy with the hunting public (Fig. 2).

17. Law Enforcement

We patrolled the openings of waterfowl, pheasant, and deer seasons. It was a highlight to find hunters, let alone violators. Other than a few "road runners" hunting pheasant and deer, most of the WMD pressure is by either FWS or MTFWP personnel.

Reliable Exploration, Inc. paid a $50 fine for littering while doing seismic work on a WPA. I have dealt with this company before, and based on their past performances, informed their permit agent any infraction of the SUP would be enforced. They smiled and said they never caused any problems. I walked their line and found pin flags, plastic flagging, and lunch bucket items. When I gave them the citation, they grumbled and said I was being awful picky.

Figure 2. Would you test him to see if he really means it? ML-91-2, exp 3, 1/7/91. TF

Figure 3. Southwest of Wigeon Slough WPA. MJR

I. EQUIPMENT AND FACILITIES

1. New Construction

This fall we built fence along the new west and north boundaries of Wigeon Slough WPA (240 rods). The east boundary (216 rods) will wait for more favorable weather. We traded 80 acres along the north side of the WPA to M. Hellegard for 80 acres on the east and west sides. We gained some good wetland habitat and will have fences on upland instead of passing through wetlands.

2. Rehabilitation

Hanson, Basecamp, and Wigeon Slough had their recognition signs repainted.

We had to remove topsoil along the west boundary of Wigeon Slough WPA again. Landowners to the west use our fence line as a collection point for their excess topsoil (Fig. 3).

An individual was interested in salvaging the lumber from the Weiler house on Goose Lake WPA. He started removing rafters this fall.

J. OTHER ITEMS

1. Cooperative Programs

Ducks Unlimited built islands on four WPA's. Erickson and Parry WPA's have one acre islands with gravel bars for piping plovers (Fig. 4). Dog Leg WPA has a quarter acre island with two gravel bars for plovers. Northeast WPA has two half acre islands.

Figure 4. Erickson WPA nesting island. MJR

Wetland Restorations

A total of 40 natural wetland restoration projects were completed in 1991. Of these, 39 were wetlands in the Conservation Reserve Program (CRP), and one wetland in Water Bank Program.

Eight stock dams were repaired and four new stock dam projects were completed.

Table 11. Wetland and dam restoration projects, NEMTWMD, 1991.

Cooperators	Restored Wetlands	Restored Acre	Dams Restored	Restored Acres	Cost
Ray Jansen			4(2)*	8	$ 4,875
Spoklie Farms	3	8.1			950
Hedges Corp.	1	1.0			300
Richard Osksa	2	10.5	1	2	1,800
James Kisler			1	3	650
Gary Lee			1	2	300
O. Hendrickson	1	6.5			715
Bill Simonson	6	33.8	1*	2.5	4,770
C. W. Nelson	25	51.3			8,167
C. Kueffler			1	3.2	545
Jon Hoffelt			1	1.9	307
Oscar Hippe	2	14.7	1	4.4	1,400
Romstad Farms			1*	2.2	2,000
Totals	40	125.9	12	29.2	$ 26,779

* New dam construction.

Conservation Reserve Program (CRP)

Four cooperator's signed up for CRP cost sharing using U. S. Fish and Wildlife Service's private lands funding. This is a program where the USFWS will pay the landowner $3.00/acre to seed native grasses or a dense nesting cover (DNC) mixture. The DNC mixture usually consists of four pounds of tall wheatgrass, four pounds of slender or pubescent wheatgrass, two pounds of alfalfa, and one pound of sweetclover per acre.

Table 12, Conservation Reserve Program cost share contracts, NEMTWMD, 1991.

Cooperator's	Acres	Grasses	Cost
Gordon Kampen	375	DNC	$ 1,125
ParMel	1,415	DNC	2,830
Bill Bakken	112*	DNC	336
Vyrion Larsen	288*	DNC	864
Totals	2,190	DNC	$ 5,155

* CRP cost share for reseeding.

CRP cost shares in the Sheridan, Daniels, and Roosevelt counties were turned over to Mark Sullivan, the MTFWP biologist working on the Comertown Prairie Pothole Joint Venture Project. Mark not only did an excellent job in cost sharing with over ninety percent of these CRP cooperators, he also restored some excellent natural wetlands in these CRP acres. The CRP cost shares that you see above are areas in the Fort Peck Indian Reservation. The MTFWP could not cost share in these areas because of their contract specifications.

Artificial Nesting Structures

Fourteen cement culvert nesting structures were purchased by MTFWP to be put on private wetlands or WPA's, where nesting cover was in short supply. Two culverts were placed on Flaxville WPA in wetlands that are close to the highway. Our hope is to eliminate some of the vandalism problems that can occur to fiberglass style nesting structures on frequently traveled roads. We have 12 wetlands selected for placement of the other structures sometime in February 1992.

2. Other Economic Uses

We permitted an oil industry seismic line to cross International Marsh WPA during February. Reliable Exploration, Inc., crossed 0.9 miles of WPA and had seven, 65 foot deep, shotholes. They were charged $1,051.25 for the privilege, not including their fine for littering.

A seismic line crossed Johnson Lake WPA. Vehicle traffic was not allowed. They hand-carried their cables and other equipment across the WPA.

Bee hives were placed on Salter, Goose Lake, Erickson, Basecamp, and State Line WPA's.

3. Items of Interest

Although we are aware the Sodbuster portion of the current Farm Bill was not designed to eliminate the conversion of native prairie to cropland, we had hoped it would slow the process. Unfortunately, the following information from the Sheridan County SCS office doesn't reveal a reduction in the conversion. They worked on plans for 18 operators covering about 900 acres. They also stated there were about 27 operators who did not receive a plan because the conversion was considered incidental acres. This is from an SCS office that is probably more conscientious than most.

4. Credits

Fuller is responsible for the report except for Section J-1 which was authored by Krumwiede. Rabenberg and Husband provided information for Section G-2. Quarne arranged and edited the report. Photographers are Fuller-TF, and Rabenberg-MJR.