MEDICINE LAKE NATIONAL WILDLIFE REFUGE
LAMESTEER NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT
Calendar Year 1978

NATIONAL WILDLIFE REFUGE SYSTEM
FISH AND WILDLIFE SERVICE
U.S. DEPARTMENT OF THE INTERIOR

5 - 9 - 2 - 7 - 1 - 4 - 8 - 3 - 6

PERSONNEL

1.	Jay R. Bellinger, Refuge Manager	GS-11	PFT
2.	Steven W. Breeser, Ass't. Refuge Manager	GS-9	PFT
3.	Roger C. DiRosa, Refuge Manager Trainee (Trans. to Cabeza Prieta NWR, Ajo, Ariz. 9/9/78)	GS-5	PFT
4.	Frances K. Larson, Clerk (Typing)	GS-5	PFT
5.	Alton W. Waller, Maintenanceman Leader	WL-10	PFT
6.	Kermit E. Bolstad, Automotive Mechanic	WG-10	PFT
7.	John E. Shellman, Maintenance Worker	WG-8	PT
8.	Carl S. Kampen, Maintenance Worker	WG-7	INT
9.	Dennis C. Nelson, Motor Vehicle Operator	WG-6	TEMP

REIVEW AND APPROVALS

Jay R Bellinger 2/9/79
Submitted by Date

Medicine Lake
~~National Wildlife Refuge~~
Refuge
Medicine Lake, MT. 59247

Burdell Rounds 3/16/79
Area Office Date

Marvin L Plenert 3/26/79
Regional Office Date

SPEDY Summer Program

1. Dale Tischmak
2. Julie Nielsen
3. Steve Erdahl

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I. GENERAL

A. Introduction

Medicine Lake Refuge lies on the heavily glaciated rolling plains of extreme northeastern Montana, between the Missouri River and the Canadian Border. Vegetation is of the mixed-grass prairie type with trees non-existent except in planted shelterbelts and along the major rivers.

The refuge contains 14,354 acres of grassland; 13,546 acres of open water and marsh; and 3,495 acres of cultivated lands(primarily former croplands and haylands). Surrounding private lands are intensively farmed for small grains.

B. Climate and Habitat Conditions

The year "78" will probably be one for the record book of north-eastern Montana. Near records were achieved for: moisture - 19.48", longest blizzard - 7 days, and number of consececutive days below freezing - 67.

Medicine Lake lies within what is known as the hi-line of Montana. The hi-line is well known for its long harsh winters and hot, generally dry, summers. The average daily temperature for January was 2 below zero. Lowest temperature for the year was -33 on January 16 and the highest temperature was 101 degrees on September 4th.

MDL-1978 CR2.3 Photo by SWB

Blizzard conditions subsiding on the 5th day of the storm (Note: Dark snow is from a "snirt" storm two weeks before.)

A real "nor-easter" started up on the afternoon of February 5 and never wound down until February 11. For four straight days the wind was blowing snow so hard we would constantly loose sight of the flag pole which is only 30 feet from the office. Severe drifting caused all roads to be blocked to all traffic for a period of 3 days until rotary plows could be brought over from the mountains. During the whole storm, only two-tenths moisture fell but drifts up to 20 feet were common around the headquarters shelterbelt and buildings.

MDL-1978 C-R2.18 Photo by SWB

Snow removal at refuge headquarters after February blizzard. Some drifts were up to 20 feet deep.

An average snowpack of 14 inches in mid-February indicated we would have above normal run-off, but warm temperatures during the day and freezes at night allowed most of the snow melt to go into the ground. There was just enough run-off water on all watersheds to fill the main lake and all of our impoundments. The extreme winter was hard on all of the resident wildlife and fish. Ice depth of over 40 inches and significant snow cover on our impoundments caused a serious fish die-off. The February blizzard hit upland game birds very hard as visible reductions were noticed in the spring.

Ice break-up on the main lake occurred on April 12. High winds out of the west pushed ice heaves up on the islands and east shoreline doing considerable damage to banks.

MDL-1978 C-R3.16 Photo by SWB

This pile of ice was over 20 feet high and growing when this picture was taken.

Significant rainfall in May and June kept all main creeks running at above normal levels and we were able to maintain spillway elevations in all major impoundments. Heavy rains on the 4th of July over the upper stretches of our main watersheds caused considerable flooding both on and off the refuge. Many areas were drenched with up to 5 inches with severe soil erosion noted on summer fallow fields. Flood waters crested so fast on the Big Muddy Creek that we almost lost one of our main dams. Water was running over and around it by the time we got it opened. This late flooding caused a major botulism outbreak which will be discussed in the waterfowl section.

Precipitation for the year totalled 19.48". The total represented an increase of 6.71" above the long term average. Sub-soil moisture remained high enough to keep the main lake level above spill elevation all summer long. The lake was still spilling as of December 31 - which was undoubtedly a record.

The main lake froze over on the 12th. of November which is about normal. Since the middle of November, temperatures have been well below normal. Mean average temperature for December was only 7.79 degrees. Snow pack as of December 31 was 14 inches. With all of our impoundments brim full at freeze-up, spring run-off will not be of critical importance in 1979.

Abundant moisture throughout the entire growing season provided excellent vegetative growth. Grass species that hadn't been noticed in years showed up and many of the ranchers said it was the best year they had ever seen for growth. The refuge was literally covered in a sea of needle and thread grass that stood belly high to white-tailed deer. The residual cover from this years' growth will provide excellent nesting cover for our early nesting mallards and pintails next spring.

C. Land Acquisition

1. Fee Title

A considerable amount of time and effort was spent on working up an acquisition plan for round-outs on the refuge and prioritizing them.

2. Easements

Nothing to report.

3. Other

Nothing to report.

D. System Status

1. Objectives

Revision of objectives was accomplished in 1977 and there is no need for further changes at this time. We are hopefully going to raise some of our wildlife objective levels in the near future as we are approaching our planned levels. Also a growing demand for hunting areas and space will probably necessitate a change in our recreation objectives.

2. Funding

Although budgets keep increasing each year, our operating base is being reduced by inflation. Inflationary raises in salaries (although small for GS grades) and in fixed cost items keep chewing away at any increases in O&M funding. In FY-73 fixed cost and salaries accounted for 51.6% of this stations budget. This increased to 84.5% in FY-78 and it accounts for 86.3% in FY-79.

A new "hooker" thrown into the process this year is cyclical maintenance which is to be considered only as a one year add-on. In reality it will probably remain part of your base, however, the loss of cyclical maintenance funds (18% of budget) would reduce operations at Medicine Lake to a custodial level.

The BLHP program, although no longer the cure-all for the refuge system, has contributed significantly to this station. This funding allowed us to repair our main control structure and to purchase a back-hoe and front-end loader. The BLHP program in FY-79 will enable us to rehabilitate our water facilities on the refuge, completely fence our WPA's, and broaden our DNC plantings both on the refuge and in the wetlands.

TABLE I: Medicine Lake National Wildlife Refuge and Northeastern Montana Wetalands District Funding FY-74 - 79

Activity	FY-74	FY-75	FY-76	FY-77	FY-78	FY-79
1100	1,800	1,000				
1200	141,700	134,970				
1210			119,000	101,000	160.800	193,000
1220			1,000	2,000	2,500	
1240					15,000	15,000
1400				900	1,000	1,000
1500	15,200	14,400	15,000	14,500		
3100		2,000	3,000		4,000	
6810					4,000	2,500
Rehab.		19,000	15,000	50,000		
Total	158,700	171,370	153,000	168,400	187,300	211,500
BLHP				8,600	140,000	334,000

II. CONSTRUCTION AND MAINTENANCE

A. Construction

The main water control structure (#4) for Medicine Lake proper was repaired this year. The steel gates on the structure (which was built in 1938) had corroded away to the point where they had become inoperable. Both gates were replaced with new cast gates with brass seatings. This job was done by contract and was made possible through the BLHP program. Now that this structure is operational, we will be able to by-pass sediment laden water from our intake canal that was rapidly silting in a portion of the lake.

Further work was again carried out on goose nesting island construction. Five new islands were constructed in the Homestead Unit and one was completed in Katy's Lake before spring break-up stopped the operation. Each of these islands contains approximately 200 cubic yards of field run rock and dirt. A finished island is about 30 feet long, 20 feet wide, and 9 feet high.

Opening up of bullrush stands was completed in the Homestead Unit. The TD-14 dozer was utilized to create alley ways in dense bullrush. As warmer temperatures thawed the frost layer in the mud - it was

scraped off. In order to keep the alleyways functional for a longer period of time, we try to scrape below the root level of the bullrush.

MDL-1978 C-R1.16 Photo by SWB

Creating waterways in dense bullrush stands using a dozer after fall drawdown.

Severe flooding in July washed out French's waterway and the newly placed culvert riser in the #10 dam. The Beaver Pond, Merganser Pond, Barsness Pond, and Lodahl's Coulee dikes were also damaged in July. All damages were repaired except for the #10 dam which was plugged at the time of the break to keep it from being completely washed away. A coffer dam was built around the structure so it could be reseated. However, we didn't have time nor equipment to complete the job this summer.

In cooperation with the Sheridan County Road Department, we replaced a decaying bridge with a culvert-riser structure. This water control will now enable us to better regulate water in our Deep Lake impoundment. We also raised the road in this area for a distance of 500 feet.

Due to the July heavy rains, washouts were repaired on refuge patrol roads in Stringer's Coulee, Bolstad's Coulee, and the Gaffney Lake access.

Total yardage of dirt and rock hauled to complete the above mentioned projects was in excess of 5,300 cubic yards. In addition, 2,860 cubic yards of dirt and rock were stockpiled during the fall for island construction.

Major equipment purchases during the year included a 3-yard International tractor-loader. This equipment will save time in truck loading as well as replace the dozer in sloping islands and breaking loose rock piles. This will take a lot of pressure off our antiquated dozers. A 1/4 yard backhoe-tractor was also purchased. This piece of equipment will finally allow us to maintain our water facilities.

B. Maintenance

Many headquarter's maintenance projects which had been put off for a number of years were accomplished this year by a fine trio of SPEDY workers. Their efforts included lawn maintenance, tree trimming, staining of the observation tower steps, painting floors and walls in the main office building and in Quarters #2, washing our vehicle fleet and keeping the insides clean, hand-picking large rocks from our patrol roads, varnishing the outhouses in the recreation area and painted the picnic tables and shelters, cleaned up old farm sites in the Homestead Unit, and continually washed our airboats during botulism work.

General maintenance was carried out on 32 miles of improved refuge roads and 77 miles of boundary fence. Boundary line posting was accomplished on 10 miles of fence along the south side of the lake. Maintenance was also carried out on 14 vehicles and 10 items of heavy and light equipment.

A new bookshelf was built for Qtrs. #1 and a new typing desk was built for the office.

Equipment breakdowns and repair consititute a sizeable chunk of our operating budget. Listed below are the major repairs completed during the year.

TD-14 - major engine overhaul, welded head, welded head for 2nd time, replaced starter and generator.

Fire truck - replaced pump motor w/new one.

International 766 tractor - pulled and replaced two cylinder sleeves, installed air conditioner.

22 Caterpilar - exchange engines w/other 22 Cat.

Tomcat Airboat - new rings and pistons and hone cylinders.

Dodge 4X4 - install 2-way radio, install auxiliary gas tank.

Jeep Wagoneer - install 2-way radio.

Air Compressor - replace diaphram

International Dump truck - replace box bottom.

International 2706 Tractor - replaced reverse gears.

Caterpilar Grader - all new tires.

The old building foundations for the CCC camp were dozed out and buried.

Ground fault interrupters (GFI) were installed in all outlets that didn't have them.

C. Wildfires

Nothing to report.

III. HABITAT MANAGEMENT

A. Croplands

Cover and food are the essentials of wildlife management. The importance of these two factors can easily be judged in the open mixed-grass prairie country of eastern Montana where cattle ranching is fading and the native prairie is being broken up for wheat production. In order for cover to be of any value in this windy and open country it must be significant in size - say at least 20 acres. Aside from a few large marsh areas, scattered water bank plantings, and some of the larger coulees - this refuge and its associated wetlands program are the only areas where these large blocks of cover can be found. Providing additional cover and food for waterfowl management is becoming increasingly more important as the surrounding countryside loses its value as wildlife habitat.

Conversion of former croplands to Dense Nesting Cover for waterfowl is one of the primary goals of this refuge. In Calendar Year 1978, 40 acres were planted to DNC, 345 acres were summer fallowed that was initially broke in the spring of 1977 and will be planted in the spring of 1979, and 145 acres were summer fallowed that was initially broke in the fall of 1977 and will be planted in the spring of 1980. Additionally, 47 acres of cropland which was retired this year were summer fallowed and will be planted in the spring of 1979.

The acreage planted this year brought our total DNC plantings to 1,505 acres. By the summer of 1980, this total will be increased to 2,042 acres.

The BLHP program provided additional funding for DNC plantings to be carried out in FY-79. Former croplands totaling 640 acres were delineated on the refuge and will be converted to DNC in this project. To facilitate the breaking of this ground next spring, we opened this acreage for haying to all ranchers in Sheridan and Roosevelt counties. Apparently most everyone had plenty of hay because we had set up 16 different 40 acre units but ended up haying the entire 640 acres with only 8 permittees. (After seeing how the winter of 78-79 has started out, I believe a few more wished they had cut hay on the refuge). This haying

program accounted for 450 tons of crested wheatgrass hay which was sold for $3/ton.

Haying of this land is a necessary step in the initial breaking. If the standing grass were left on the land, it would continuously be plugging up the equipment. Fire could be used but it would leave no litter at all. This litter becomes very important as a soil stabilizer when the sod is chisel plowed and exposed to the wind.

It should be pointed out that the "former cropland" we are converting is almost 100% crested wheatgrass. This hardy-drought resistant grass was planted into croplands during the dust bowl years to keep the land from completely blowing away. Today, this grass is of little value to wildlife as cover or food. It is such a hardy pioneer that it has infiltrated most of our native grass areas.

It takes three years to complete a DNC stand from start to finish when crested wheat sod is broken. During this time there is no nesting cover for waterfowl, however, the end result is well worth the process because there was almost no nesting habitat to begin with.

Our DNC program started in full swing after the completion of this refuges' three year study on the comparisons of different grassland types for waterfowl nesting. This study and the work that NPWRC has turned out, clearly shows that DNC is the most preferred and secure nesting cover on the prairies. (See Map 1 for locations of DNC plantings).

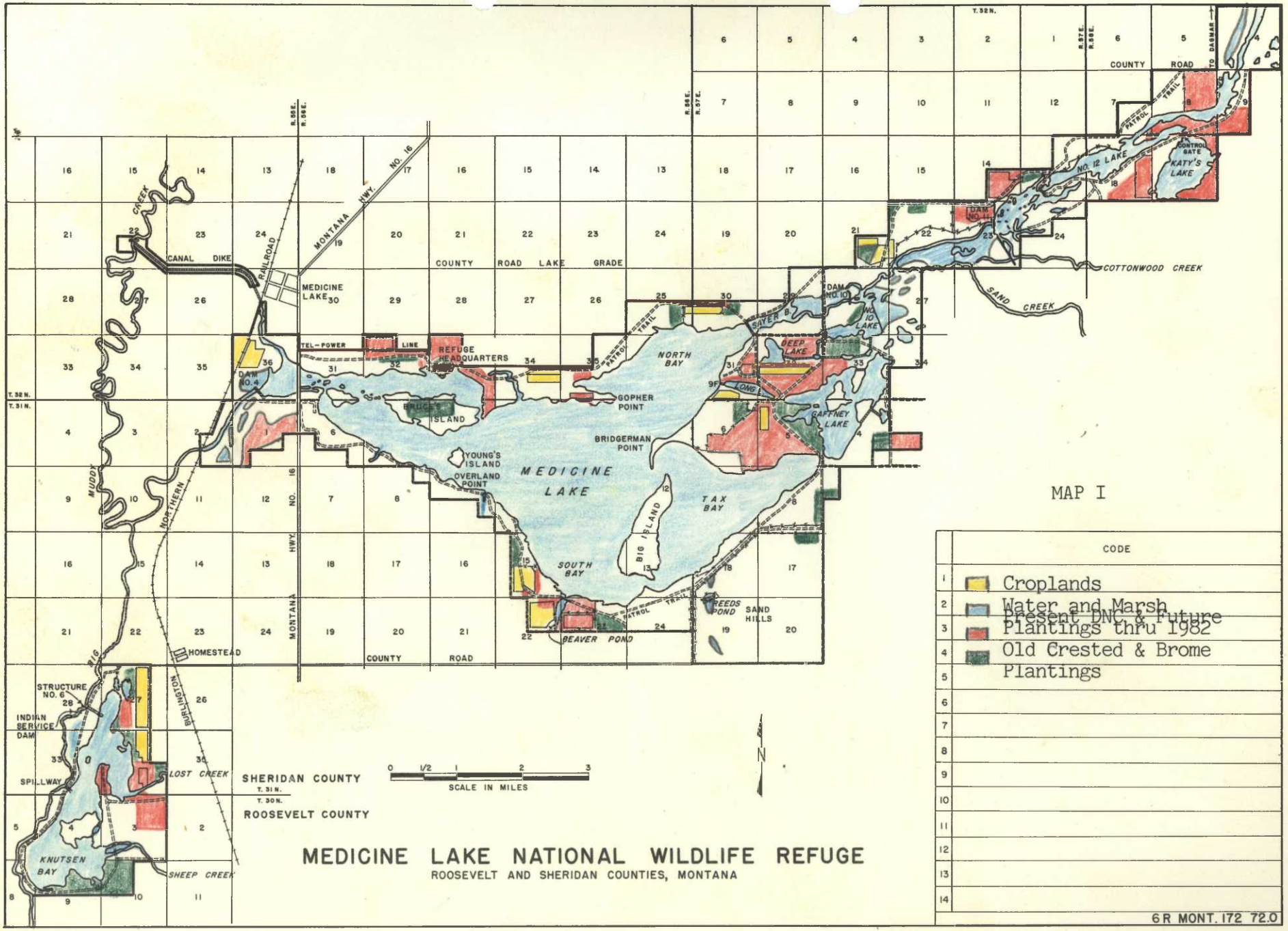
A cooperative farming program consisting of eight permittees is carried out on the refuge. This program provides: (1) mowed and standing grain as a food source for fall waterfowl migrations, (2) a fall and winter food supply for resident game, and (3) grain for our banding program.

This year the farming permittees planted 393 acres to small grains and summer fallowed an additional 403 acres.

TABLE II: Refuge Crop Utilization

Crop	Acres Planted	Permittee's Share	Refuge Share	Use of Refuge Share Left in Field	Harvested
Spring wheat	331	249	82	59	23
Barley	62	21	41	41	0
Totals	393	270	123	100	23

We believe that the use of croplands as a management tool is very important, especially if the cropland doesn't significantly reduce your acreage for production and protection. (See Map 1 on grassland restoration for farm field placement). Crops this year could be classed as excellent except excess rains drowned out part of them and a hailstorm severely damaged our barley fields. Overall wheat



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production ran about 30 bushel/acre. This average, applied to the weight of a bushel of wheat (60 lbs), left approximately 90 tons of feed in the fields for wildlife.

The hailstorm that destroyed most of the barley crop hit when the crop was about two weeks away from harvest. The storm actually helped wildlife as it shelled the grain onto the ground. Once the barley was combined it exposed the grain and attracted our resident Canada geese, mallards, and pintails.

The refuges' share of standing grain was opened up in the middle with a rotary mower to attract ducks. Heavy use of standing grain was noted during mid-October. One flock of mallards numbering between seven and nine thousand fed on 23 acres of barley for over two weeks. We were hardpressed to find a kernel of barley in this field after the birds moved out of the area. All of our grain fields received heavy waterfowl use.

Resident game, mainly white-tailed deer, ring-necked pheasants, Hungarian partridge, and sharp-tailed grouse utilized what grain was left, especially that which was standing. We believe that our farming program is directly responsible for pulling our high pheasant population thrcugh the harsh prairie winters.

B. Grasslands

At present, grassland management is either light grazing or total rest. A prescribed burning program was developed this year and will be used as a pilot during CY-1979.

Our grazing program utilizes 10 units that total 7,970 acres of grassland. Two of these units (G-1 and G-11) were totally rested this year. The grazing program was cut by nearly 20% in CY-1977. Although moisture conditions were excellent this year and forage increased considerably - this stocking rate reduction was continued. A total of 336 head of cattle utilized 1,105 AUM's at a rate of $4.50/AUM.

Again this year, we used earlier turn-in dates on most units to utilize the cool season grasses. Historically most grazing units had been season-long grazing with June and July turn-in dates. These late turn-in dates favored almost total utilization of warm season grasses and allowed cool season exotics to increase their distribution. Crested wheatgrass (Agropyron cristatum) and Canada bluegrass (Poa compressa) have extended their ranges to the point that they are now found in all of our native grass areas. Both are considered to be strong enough pioneers to crowd out native species.

We are going to try two different programs for control of these exotics - grazing and prescribed burning. With the grazing program,

we will attempt control by utilizing an early turn-in date (as soon as crested starts to green up)and a heavy stocking rate. We will also utilize portable fences to hold cattle on specific areas in the pasture so that total utilization of the target grass will be accomplished.

Prescribed burning will be utilized as a control program for the first time on this refuge. During CY-79 we have set up different areas for early spring burning in an attempt to burn crested wheatgrass and Canada bluegrass just after they green up.

To gather base data on our different grasslands and to monitor our grazing program we utilize the Robel-Height Density System. We initiated this system in 1976, to date we have three good years of grass measurements. It should be noted that measurements in 78 and 79 will not be good for comparisons because of climatic differences, (one year was drought and the other was flood). It was noted that idle grass areas showed no changes in height readings (on an average) while grazed areas showed a decrease of .16 decimeters for the CY-77 growing season.

One interesting point that showed up during the drought conditions was the influence the drought had on DNC as compared to native grasses. Native grasses showed no height differences between the 1976 and 1977 growing seasons while DNC showed a reduction of 1.41 decimeters.

A grassland management plan is being drawn up to cover the entire refuge and will be more or less species specific to a particular grassland type. Once this plan is completed the refuges' grazing program and fire management will probably have more meaning and better application.

One interesting management practice may have been discovered by monitoring growth on a burn area that was caused by lightening in May of 1977. The absence of club moss was easily observed in the burned area this year. As far as we know, fire has never been documented as a tool for controlling club moss. The burn will again be monitored in 1979. We are especially interested in this because the moss is quite competitive with native grasses on areas that have been overgrazed in the past.

MDL 1978 C-R7.3 Photo by SWB

Dead club moss as a result of an early May burn.

MDL 1978 C-R7.1 Photo by SWB

Vigorous club moss on area adjacent to burn.

C. Wetlands

The difference in water conditions between 1977 and 1978 was like night and day. Conditions were excellent until the 4th of July when heavy rains created flooding conditions. This flooding fostered the worst outbreak of botulism ever recorded on the refuge. Additional rains the rest of the year kept water levels above average.

We had water control capabilities on the Homestead Unit to reduce our botulism losses by at least one-half,but because of misunderstanding on the part of the Fort Peck Indian Agency,we were not allowed to lower water levels for a two week period. It was their contention that water releases from the refuge were flooding out Indian leased haylands. In reality, it was water that was coming from the refuge but the creek which carries the drainage for this area had several man-made constrictions that were actually causing the flooding.

Once the council chairman finally saw for himself where the problem actually was he quit blaming the refuge and remedied the problem. However, by this time, the botulism had run its course.

Aside from the botulism outbreak, water conditions were excellent. All of our impoundments received fresh water flow during the summer and fall periods which helped reduce our salinity problems from the year before.

Acquatic growth in all impoundments was probably the best its been for quite a few years mainly because of a large die-off of carp in all impoundments. Water clarity increased in all impoundments including the main lake because of this reduction in the carp population.

By manipulating water flows so that fresh water is channeled through our impoundments and by keeping the carp population reduced,we hope to produce better acquatic growth and provide more food.

The lengthening of #10 dam in 1977 created a new permanent marsh approximately 100 acres in size. The shallow water in this area coupled with numerous low level loafing sites attracted an abundance of waterfowl. The area was especially used during fall migration by ducks and shorebirds.

D. Forestlands

The shelterbelt around refuge headquarters provides both food and cover for resident game. Again this year, the Russian olive trees produced a bumper fruit crop which was utilized fully by pheasants, grouse, and Bohemian waxwings.

E. Other Habitat

Nothing to report.

F. Wilderness and Special Areas

We are to complete our Wilderness Management Plan by the end of FY-79.

G. Easement for Waterfowl Management

Nothing to report.

IV. WILDLIFE

A. Endangered and/or Threatened Species

With the inclussion of the Northern bald eagle we now have three endangered species which are periodically recorded on the refuge. The other two are the whooping crane and the Arctic peregrine falcon. Because of the number of official sightings of the whooping crane at this refuge, it has been proposed as critical habitat. However, this marks the 3rd year in a row that no whoopers have been sighted. Each year brings telephone calls from refuge neighbors concerning their observations of these cranes and although they are probably accurate, we have never been able to confirm them.

The Northern bald eagle is a common visitor in the fall and spring when they feed on crippled ducks and dead fish. These birds usually show up along the south side of the main lake and along the west side of the Homestead Unit. Both of these areas have a few trees in which the birds like to roost.

At least one peregrine falcon is observed every year on the refuge. They are probably attracted to the refuge by the high waterfowl populations present during their migration period.

The prairie falcon and Western burrowing owl, both threatened species, are quite common both on and off the refuge. The burrowing owl is known to nest at a number of different locations throughout the refuge. Because of the excellent moisture this year, high grass made it difficult to spot these ground nesters.

The prairie chicken or pinnated grouse, now extinct in Montana, was given more historical value after we provided an actual photo of one. This photo was taken in 1937 near Medicine Lake. The only other authentic Montana record was of one being shot in 1918.

The refuge cooperates with the Whooping Crane Recovery Team and the Whooping Crane Fall Flight Tracking Project.

B. Migratory Birds

1. Waterfowl

Ducks and geese were late in arriving this spring due to the

late ice break-up south of this region. Mallards, pintails, and geese were all observed on the 22nd of March - this was exactly one month later than the year before. The main spring migration didn't occur until the last week in March which is about two weeks later than normal. Ice break-up on the main lake occurred on April 12th and most impoundments held ice until the 3rd week in April.

As usual, the geese start nesting shortly after they arrived. It seems strange that these birds will nest when their sites are surrounded by ice.

A number of interesting items were noticed with our goose nesting population this year. Big Island is a natural island which always has a high number of nests. This year, during the goose nest flight, a pair of coyotes were sighted on the island. The number of nests on this island dropped from 63 in 1977 to 22 in 1978. These displaced geese were apparently mobile because the other islands in the lake showed an increase from 40 nests in 1977 to 94 in 1978.

A Canada goose successfully nested over water in a dense mat of alkali bullrush. If we could get other geese to develop this trait we would have unlimited nesting sites.

MDL-1978 C-R5.16 Photo by SWB

This goose nest was successfully hatched over water on a dense mat of bullrush.

The value of artifical nesting islands was again noted this year. Three of the five new islands built in the Homestead Unit provided nesting sites for geese. It is interesting to note these islands had absolutely no vegetative cover on them.

Total nesting goose pairs showed a considerable jump from 213 in 1977 to 281 in 1978. We believe this 32% increase occurred because of a drop in hunting mortality.

It has been noted that our resident geese are suffering less from hunter mortality at a local level. These geese are leaving the refuge much earlier than they have in the past and very few are left when the hunting season starts.

This goose population winters on the Platte River near Lisco, Nebraska. Recent band returns indicate that our geese are suffering less mortality on that area also. From previous years band returns we know that the population was suffering significant losses from hunting - if this pressure has been relieved it would correspond with an increase in returning breeders.

Excellent nesting and water conditions made 1978 another bumper production year for ducks. However, the methods used in determing production, leave a lot to be desired. There are so many factors that affect brood counts, especially when counts are made aerially, that we have decided to drop brood analysis in computing our production. After comparing aerial brood count data collected by the refuge with average brood count data collected by researchers and data collected from ground counts on this refuge, we concluded that most broods just weren't being sighted from the air. Last year, just the opposite was true when very low water levels forced all the broods out into the open.

Probably the most important aspect of figuring production is the collection of good pair count data. Pair transects were changed early in the year to sample an equal representation of all water conditions on the refuge. The number of samples was also increased to give us a 20% sample of the total water area.

By using an average productivity rate of45% and average ducks to flight stage/brood from Hammond and Kortright we can figure our estimated production. A productivity rate of 45% may be a little low these last couple of years because predation has been reduced significantly. High prices paid for fox has just about eliminated this animal from the area. These fox trappers also inadvertantly take a tremendous number of skunk.

TABLE III. WATERFOWL PRODUCTION SUMMARY

Year	Total Duck Pairs	Production Ducks	Total Pairs Nesting Geese	Production Geese
1978	11,307	31,531	281	1,124
1977	11,953	32,987	213	852
1976	10,660	13,419	175	700
1975	8,730	32,557**	240	960
1974	6,470	13,935	134	550
1973	*	20,464	236	944
1972	*	10,591	112	448

* Pair counts were not done because of PPBE during these two years.

** Census technique was changed to the use of a plane for counting broods as compared to ground counting. The expansion factor was undoubtedly too large for the new inventory technique as this production figure is unrealistic for the number of pairs.

This year provided excellent nesting for diving ducks. In the last two years, diver production was reduced because of flooding and drought. Although flooding occurred again this year, we were able to maintain near stable conditions in our better diver nesting areas. In areas where the water did rise, it went up slowly and was not destructive to the nests.

An increase in redhead pairs was obvious early in the season, production more than doubled over the previous year. More favorable nesting conditions would probably account for the increase. Aside from canvasback production, which was cut in half, our other divers showed significant increases.

TABLE IV. 1978 DUCK PRODUCTION TO FLIGHT STAGE BY SPECIES

Blue-winged teal	7,368	Ruddy	1,586
Gadwall	4,641	Redhead	1,570
Shoveler	4,471	American Wigeon	1,480
Lesser Scaup	3,872	Canvasback	270
Mallard	3,194	Green-winged teal	262
Pintail	2,717	Bufflehead	100

It was noted earlier that we were not going to use brood counts in figuring our waterfowl production. We are going to continue aerial brood flights on the refuge to obtain trend data to corralate production with our extensive DNC development. We feel that the trend data will be important in evaluating areas before and after nesting cover is introduced. Since aerial counting is the fastest and we can cover the whole refuge - we will probably fly aerial surveys for the next five years.

Food supplies were unlimited for ducks and broods this year. The

drought in 1977 produced a natural drawdown of our smaller wetlands and aerated the bottom. Plant growth occurred on many of the areas which was subsequently flooded this year. Submergents grew especially well in all of the main impoundments as a result of the large carp kill. Sago pondweed occurred in dense mats in #10 and #12 lakes. Animal food in the form of insects, crustaceans, and snails was abundant.

One food source that declined this year was green algae. Just why we have flucuations in green algae blooms is unknown. We can always tell when algae growth is high as shovelers show up in high numbers. In 1977 the lake was the consistency of pea soup because of the algae and we had 140 thousand shovelers. This year, algae growth was insignificant and we had less than 20 thousand shovelers. Word must somehow get around as to where the most food is to be found.

Botulism outbreaks were widespread this year. The refuge suffered the worst loss ever recorded - end results showed 8,700 birds picked up and buried and a total estimated loss of between 10 and 12 thousand waterfowl. Puddle ducks and coot comprised 99% of all species lost. The outbreak occurred late enough that geese weren't affected. They were feeding off the refuge and loafing out on the islands in open water. As far as we know, not one goose was lost. The feeding patterns of the diving ducks apparently kept them from contacting the toxin also, as only a handful of redheads, scaup and bufflehead were picked up.

MDL 1978 C-R 10.19 Photo by SWB

A small part of 8,700 waterfowl lost to botulism.

The Homestead Unit was the only area where we could have accomplished drawdown to move the ducks out of the area. However, at this time we were engaged in a water release controversy with the Fort Peck Indian Reservation and couldn't release any water. By drawing the water out of this unit our losses probably would have been cut by 2,500 to 3,000 birds.

We started burning the birds at first but couldn't accomplish complete burns without a tremendous amount of fuel. Finally we just started digging deep pits and burying them. Without the help of our SPEDY students we would have been hardpressed to keep up with the outbreak. Luckily we had just purchased a large airboat the year before to use for botulism. By keeping two airboats running and a ground crew walking, the outbreak was less severe than it could have been.

The refuge also furnished two airboats and personnel to work on a botulism outbreak at the Broadview Marsh near Billings, Montana. Estimated loss of waterfowl on this large shallow water area was 30,000 ducks.

Spring migration of ducks and geese was less than last year's peak on the refuge. There were probably an equal amount of birds only they were spread out in the wetlands adjacent to the refuge. Ducks peaked on the 17th of April at 35,934. Canada geese peaked on the 31st of March at 1,989 birds, while snow geese peaked on the 4th of April at 156 birds. The totals on ducks and geese represent decreases of 24% and 92% respectively from last year's peak populations.

Fall migration of ducks peaked on the 1st of September at 64,355 birds and geese peaked on the 11th of November at 1,860 birds. Mallards and geese were both late arrivals as mallards also peaked on the 11th of November at 32,925 birds.

This year was the first time that pintails were observed in large numbers throughout the fall season. Normally pintails are early migrants and only a handful remained after the first of October.

TABLE V. COMPARISON OF PEAK DUCK POPULATIONS AND TOTAL DUCK USE-DAYS

Year	Spring Duck Peak	Fall Duck Peak	Total Waterfowl Use-Days
1978	35,934	64,355	8,532,810
1977	46,960	167,781	11,668,993
1976	38,813	36,012	7,446,270
1975	34,020	127,300	9,247,800
1974	156,024	184,350	18,301,200
1973	83,600	206,000	21,120,810
1972	109,000	235,200	15,896,940

Coot production was indicative of the favorable nesting conditions experienced by divers. This was the 1st time that coot broods of 3 to 4 were commonly seen. Some broods of 6 were even noticed.

It is interesting to watch the coots add to their nests as heavy rains gradually raised impoundment levels. Some nests had enough material in them that after the water dropped, the coots would be sitting 12 to 16 inches above the water level. Production to flight stage was estimated to be 1,967 birds. This was a 35% increase over last year.

Whistling swans showed up in record numbers this fall. They were observed earlier than normal (Sept. 19) and stayed later than normal (Nov. 9). A peak population of 1,209 of these beautiful birds were counted on November 7. This is more than twice as many swans as were ever recorded. Favorite areas included the #11 Lake, Katy's Lake, Gaffney Lake, and Homestead Lake.

As usual, banding quotas were not met this year. Goose banding resulted in only 56 birds being captured. Flooding conditions just when we were going to cannon net fouled us up. Airboats were used this year in an effort to round up geese but were found to be unsatisfactory on small water bodies which had emergent vegetation along the shoreline. If airboats could be used on the main lake, where most broods are found, we probably would have more success, but the lake is part of our wilderness area.

2. Marsh and Water Birds

Colonial nesting birds have always made up a large portion of the wildlife population on the refuge. Medicine Lake is home for one of the largest white pelican rookeries in the U.S. and has large nesting colonies of western grebes, eared grebes, and double-crested cormorants.

The past two years have seen drastic declines in the production of pelicans. This decline can probably be attributed directly to harassment by coyotes. The pelicans nest either on Big Island or on Bridgeman's Point which is near the island. When the goose nest search was flown a pair of coyotes were noted on the island and the pelicans were nesting on Bridgeman's Point which would be logical. The pelicans were already incubating when they suddenly moved over to the island and started re-nesting. Their move from the point was undoubtedly from harassment and their nesting on the island also proved futile. A few pelicans nested on a rock island close to Big Island and produced about 60 birds.

A method to provide a more secure nesting site will have to be found or we will face the possibility of loosing the pelican colony. These methods are being worked out at the present time.

TABLE VI. MARSH AND WATER BIRD PRODUCTION

Year	White Pelicans	Double-Cr. Cormorants	G. Blue Heron	Horned Grebe	Eared Grebe	Western Grebe
1978	60	80	40	60	800	400
1977	830	140	50	100	500	500
1976	3,050	324	51	150	1,350	600
1975	1,180	80	12	*	*	*
1974	2,300	200	55	100	250	400
1973	2,400	200	55	100	450	1,000
1972	1,700	350	90	100	500	1,100

* Data not available.

MDL 1978 C-R 6/8 Photo by SWB

Renesting attempt by pelicans on Big Island.

A new eared grebe colony was located in Katy's Lake this year while running duck pair transects. The colony was estimated to have over 150 nests.

Production of western grebes declined this year because the nesting colony on the main lake experienced flooding conditions which destroyed many nests.

We also have significant nesting by the pied-billed grebe, black-crowned night heron, American Bittern, Virginia rail and Sora rail.

3. Shorebirds, Gulls, Terns, and Allied Species

Information collected on these species is generally from the arm chair. Large colonies of gulls and terns nest here and the refuge provides an important stop-over in migration for many species. However, we do not have the time to collect detailed information on these species.

4. Raptors

No special census work is carried out on this category of birds except for the mid-winter eagle count and a cooperative raptor survey performed twice a year for the State of Montana. A pair of ferruginous hawks fledged three young in a nest by the north windmill in the Sandhills and a pair of Swainson's hawks fledged at least two young in the old tower tree grove.

Short-eared owls apparently had a good nesting year. Five nests located from casual observations produced a total of 20 young to flight stage.

5. Other Migratory Birds

The mourning dove is a common nester in the headquarters shelterbelt and in the scattered tree groves around the refuge. Estimated production was 320 birds.

C. Mammals, Non-migratory Birds and Others

1. Game Mammals

White-tailed deer are by far the most numerous and important big game animal on the refuge. Medicine Lake has always been known for its large deer population and number of trophy animals.

Increased hunting pressure and severe winters the past two seasons has brought the herd down to a more manageable level. Deer numbers were high enough to cause considerable damage to their winter range and to our DNC plantings. From the ground, little damage was noticeable but from the air we could see that our cover plantings were laced with deer trails which provide excellent predator lanes.

Because of a limited amount of traditional winter range and a high deer population, we have initiated a browse analysis within this winter habitat. Analysis in the spring of 1977 showed a total browse utilization of 73.1%. It was observed at that time that there was almost 100% utilization of browse the previous winter. Analysis in the spring of 1978 showed a drop in use to 51% of available stems.

Our January flight showed 454 deer actually on the refuge and 521 additional deer within the immediate vicinity of the refuge. This total represented a 21% decrease from the January 1977 flight but

was still a larger population than we wanted to carry. After the count we started planning a special hunt in cooperation with the State of Montana. The hunt would be a special season after the regular hunting season. We initially planned for 100 antlerless permits to be issued. By going with antlerless permits we would force the hunters to take does. Past data has always shown that at least 70% of the kill was bucks.

The hunt was all set and ready to go until the area was flown again in November just after the regular season. On this flight we came up with 200 less deer in the same count area as the year before. This loss could be attributed to two different reasons (1) winter kill was much more severe than we thought or (2) the deer had moved into outlying areas because of the additional cover that was produced by the wet year. Since we did not know the real answer the special season was cancelled.

In an attempt to increase deer kill during the regular season a new portion of the refuge was opened along the south side of the lake. This area, the previous year, held over 200 deer throughout the season. Needless to say, the new area attracted the most hunters.

Hunting pressure was up 16% from the 1977 season. Although there was an additional 947 acres open for hunting and more deer available to the hunters in the open hunting area, the kill dropped by 17% (107 in 1977 - 89 in 1978). Most of the pressure was concentrated on the new area, which had hunters every day of the season, while other areas had plenty of deer but no hunting pressure.

TABLE VII. DEER HUNTER SUCCESS AT MEDICINE LAKE

Year	Deer Herd Sept. 1	# of Visits	Deer Killed	Success	Deer Herd Dec. 31.
1978	393	342	89	26%	282
1977	680	295	107	36%	454
1976	575	160	41	26%	599
1975	500	170	61	36%	434

Severe winter conditions in January and February caused significant stress on the deer herd. However, doe/fawn counts flown in August showed 108fawns/100 does. This ratio, at this time of the year, indicated that the does wintered better than we expected.

With the use of the grader and TD-14 dozer, we plowed alleyways in the snow to open up the hard crust that had developed from the blizzard. The deer readily took to these cleared out areas in search of the grass. Browsing of twigs up to 1/2 inch in diameter was quite common in late February. An autopsy of an adult buck, that was hit by a car in early April, showed signs of advanced starvation.

Fat in the bone marrow had been almost completely utilized and the marrow itself looked like red jelly.

In cooperation with the State of Montana, we are conducting a movement study of white-tailed deer from wintering ranges to summer ranges. The deer are being captured with a drop-door trap made up of heavy duty netting. The trap is approximately 30 feet in diameter and is tripped by the deer themselves. The captured deer are ear-tagged in both ears (one metal and one colored plastic) and in addition the adult does are neck-collared. Our objective is to mark at least 30 different animals so we can identify just how big of an area the refuges' winter range serves.

The pronghorn antelope, which were making a strong comeback from severe winters in 1967 and 1968, suffered heavy winter kill in this area. An aerial count this summer showed only 24 antelope. This same count area in 1977 showed 77 antelope.

Long-haired fur bearers are sought after by everyone, (red fox are bringing $100.00, coyotes $200.00, badger $70.00, and raccoon $40.00). Red fox have been reduced to the point that even a track is rarely sighted. Non-resident professional trappers have found Montana to their liking. No trapping license is required for predators, which includes all of the previous mentioned animals, and there is no closed season on these animals. Several years ago when these furs were worth very little, the farmers and ranchers couldn't get rid of them fast enough - now they are jealously guarded and some gun confrontations have arisen between landowners and non-resident trappers.

Refuge trapping permits were issued to five different individuals for removal of predatory animals and muskrats. Early snow before the season even started, (no trapping is allowed on the refuge until the general trapping season starts on November 10) made conditions difficult. No predatory animals were taken and only a little over 100 muskrats were harvested. The muskrats were being taken from shallow water areas which experience winter kill.

Although no data has been collected, general obserservations indicate a significant increase in the white-tail jackrabbit population. This population is apparently cyclic but no high or low years have ever been recorded.

MDL 1978 C-R 2.4 Photo by SWB

Long-tailed weasels are fairly common on the refuge.

3. Resident Birds

Sharp-tailed grouse dancing grounds were censused again this year. The total number of dancing males dropped by 33% from 406 in 1977 to 270 in 1978. The winter of 77-78 probably influenced this large decrease. Of the 13 grounds on the refuge, 11 decreased and 2 increased slightly. The largest loss occurred on the Katy's Lake ground, from 71 males in 1977 to 44 males in 1978.

Crow counts for ring-necked pheasants were initiated this year in an attempt to corralate their population with DNC plantings. Winter cover is the primary limiting factor on our population. The routes are set up so that they run through all the different habitat types on the refuge. Many of these areas do not have significant winter cover at this time. However, when we are finished with the DNC program these areas will have large blocks of winter cover. Our objective is to keep track of the pheasant response to these plantings.

Only one route was established this year. This transect runs for 20 miles and had an average of 9.35 crows/stop. There was a high of 51 crows at one stop to a low of 0 at other stops. It should be noted that the two highest counts were associated with DNC.

This transect was run twice - the 2nd time we used the end point as the starting point. Literature reviews suggested a difference in crowing activity in regard to the amount of light. We found that by reversing the route more crows were recorded on that end and less crows were heard on the end which had been the starting point. This finding makes it important to always run these crow counts from the same direction each year. A peak population of 540 pheasants was recorded this year.

4. Other Animal Life

A massive winter-kill of fish on the refuge both helped and hurt our fishery program. Low water, thick ice, and snow cover all combined to produce this kill.

MDL 1978 C-R5.5 Photo by SWB

A small portion of the winter-kill that occurred in Medicine Lake.

About 99% of the kill was carp. The other 1% was made up of suckers, northern pike, and walleye. Test net sampling in the spring indicated a total loss of our walleye fishery, an almost total loss of large carp, and almost no loss in the northern pike population.

There is no way of knowing just what percent of the carp population died-off but the loss was certainly evident in the clarity of water throughout the year. The carp population was further set back this spring when very little reproduction took place because of cool

weather during the spawning period.

It became evident in mid-February that we would experience winter-kill. Dissolved oxygen readings taken on the main lake found only traces of oxygen. We began to wonder, as the lake opened up and dead fish started floating all over the place, whether we had any fish left at all.

The dead fish problem came to everyones' attention after easterly winds blew many of the dead fish in along the main highway crossing the refuge. Some people were even known to become sick from the smell as they drove along the road. The smell precipitated many calls from the surrounding community as to what and when we were going to do something with "those dead fish". We offered to give them away free for fertilizer but no one took us up on the offer. Within a matter of three weeks most of the fish had decomposed and sank. Just what do you do with over a hundred thousand ton of dead fish??

Over 350,000 northern pike fingerlings were planted on the refuge this year. The pike are being stocked in an attempt to control our carp population. In addition to the pike stocking, we also received 8,200 small mouth bass and 8,200 large mouth bass which were planted in the Gaffney's Lake Unit. The pike were received from Garrison National Fish Hatchery and the bass came from the Miles City National Fish Hatchery.

V. INTERPRETATION AND RECREATION

A. Information and Interpretation

1. On-Refuge

The refuge provides to the public a 14 mile self-guided auto tour route, observation blinds, lookout tower, information stations, picnic area, two native prairie study areas, and a wilderness area.

Visits on our auto tour route were almost identical to last year (950 in 1977 and 951 in 1978). Approximately 1/3 of these visits are conducted and include biology classes from surrounding schools. Visits by bird-watching enthusiasts increased again this year. Most of these birders are attracted by the variety of sparrows which inhabit the refuge especially the Baird's sparrow and the LeConte's sparrow.

Observation blinds were set up on sharp-tail dancing grounds and in waterfowl loafing areas for photography purposes. Very little use was made of sharp-tail blinds probably because of the cool wet weather we had this spring.

The Montana Hunter Safety Course for this area was conducted by Manager Bellinger and Mechanic Bolstad for twelve young and aspiring hunters. The course consisted of five classroom days and a field day to which all parents were invited. As you can tell from the picture below the instructors tends to get carried away.

MDL 1978 C-R 6.11 Photo by SWB

Field day for Hunter SAFETY students and instructors.

Refuge personnel conducted outdoor classrooms for two days in cooperation with the Regional 4-H Camp. Over 140 young people attended these sessions.

2. Off-Refuge

National Wildlife Week programs were presented to 187 students in five area schools. In addition to on-refuge programs conducted for the Regional 4-H Camp, slide shows and films were presented to the 4-H groups before they came to the refuge.

Refuge personnel participated with and presented programs to numerous sportsman's groups and civic organizations in the tri-county area. Meetings were held with the local county ASCS office to coordinate Water Bank Programs and various other wildlife enhancement programs.

B. Recreation

1. Wildlife Oriented

Since the refuge is located in a sparsely populated area and is not adjacent to major travel lanes, most recreation comes from local residents. The main drawing card to the refuge has always been hunting. Deer and geese are the two species which draw the most people. Although upland game birds and ducks are abundant on the refuge, most local hunters don't care about the ducks and are just now recognizing the hunting potential for pheasants. Total activity hours devoted to sport hunting was 2,862 hours this year, this represents a 53% increase over 1977.

2. Non-wildlife Oreiented

Nothing to report.

C. Enforcement

With the low amount of public use that the refuge receives, enforcement has never really been a problem. An active enforcement program is generally carried out only on the opening weekends of deer and waterfowl seasons. A total of ten violation notices were written this year during the hunting season and all were successfully disposed of in either State or Federal court.

The preventive part of law enforcement by just being out on the refuge keeps many hunters honest. The fact that you can see for miles makes many hunters think before they act.

VI. OTHER ITEMS

A. Field Investigations

Two different studies are being carried out on the refuge at this time. A DNC Study is being carried out by Ken Higgins from the NPWRC and a grasshopper research project is being carried out by George Hewitt, a research entomologist from Montana State University.

B. Cooperative Programs

A total of 534 bee hives was placed on the refuge adjacent to DNC plantings. It may be possible that the bees can tell us something about the condition of these stands. Assuming that honey production is directly correlated to the vigor of the stand (keeping in mind extreme weather variances), when production of honey starts dropping off, it may be a good indication that the DNC stands needs rejuvination.

A YACC Camp was started up at Glasgow, Montana this year. The camp was to provide personnel and materials for various refuge and wetland BLHP projects. Because of administrative difficulties, the camp has not been able to provide the services we had planned for. Hopefully, we will be able to use their services in 1979.

C. Items of Interest

On Septemper 10, 1978, our Refuge Manager Trainee, Roger DiRosa transferred to Cabeza Prieta NWR in Arizona. Roger will be missed in more ways than one because after he transferred the trainee position was abolished. He assumed the Assistant Manager position at a time when the refuge manager had just moved and there was no clerk present. We wish all the luck to Roger!

This summer we had the distinction of presenting a 30 year pin to Maintenance Leader Alton Waller. Alton has had a part in almost all the development of this refuge. His knowledge and dedication has made this refuge what it is today.

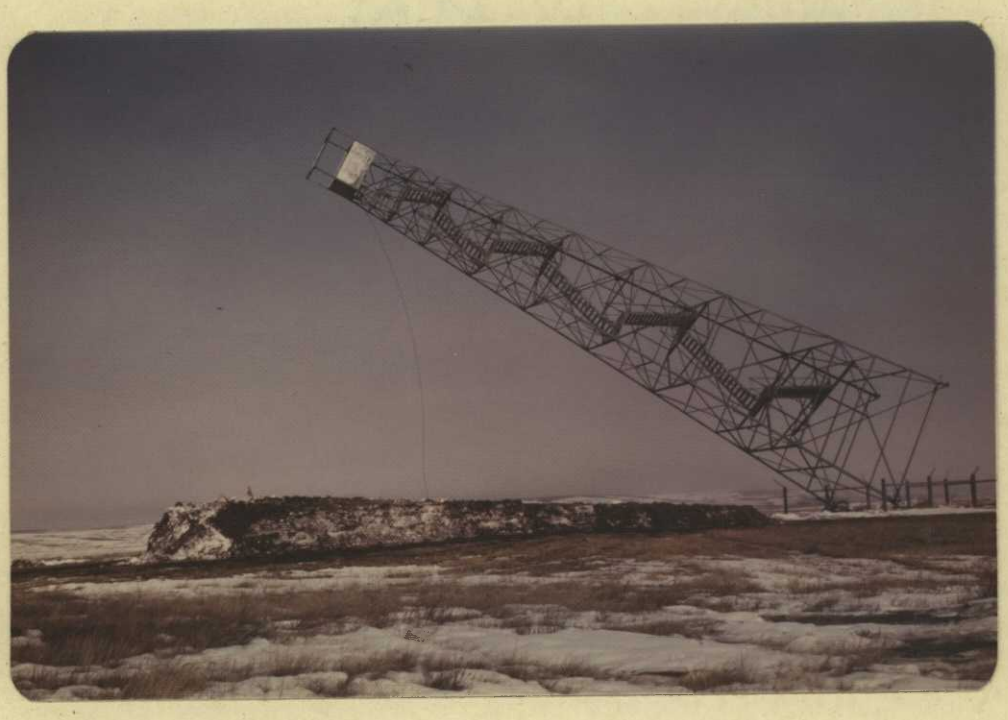
MDL 1978 C-R 8.10 Photo by SWB

Manager Bellinger presenting Alton Waller with his 30 year certificate.

Clerk Frances Larson received a 15 year certificate from the National Weather Service thanking her for the dedicated service she has shown in operating the weather station at the refuge.

A refuge landmark bit the dust this year when we sold the 100 foot observation tower on the east end of the lake. The tower had not been

used for over 10 years and had become a real SAFETY Hazard because of its remoteness from headquarters and its close proximity to our auto tour route.



MDL 1978 C-R 1.20 Photo by SWB

After standing for 40 years it only takes 10 seconds to fall.

Assistant Manager Breeser wrote the entire narrative report. Manager Bellinger edited the report and Clerk Larson typed it and bound it.

D. SAFETY

SAFETY meetings were held monthly throughout the year. During these meetings,current SAFETY problems were discussed and remedies sought regarding our day-to-day operations. A primary topic is presented through the use of films, handouts and oral presentations at the meetings with everyone participating as a leader.

As of the end of the year, the station has accumulated 8,896 days without a lost time accident.

LAMESTEER NATIONAL WILDLIFE REFUGE

WIBAUX, MONTANA

This 800 acre easement refuge is located 20 miles southeast of Wibaux, Montana and 160 miles away from Medicine Lake National Wildlife Refuge which administers it. The distance factor makes visits, much less biological record keeping, very difficult on this satallite.

The easement status of the refuge concerns the water only. The upland continues to have a history of total use through over-grazing by cattle.

Several trips were made to Lamesteer this year in an attempt to settle an irrigation request by the new landowner. When the refuge was established, one of its purposes was for irrigation. This fact had apparently gone unnoticed by the previous owner.

The new landowner had purchased a complete sprinkler irrigation outfit for watering alfalfa. His request would have taken approximately 70% of the water capacity that the dam used to impound in 1942. However, in checking water depth this spring and recalculating acre feet,we discovered that the capacity of the dam had shrunk by 60%.

Because we had to honor the irrigation request but also protect the Fish and Wildlife interests, we set up a pumping timetable which was based on average water levels from past readings. In effect, irrigation will be permitted if an excess of moisture falls during the year.