

MACKAY ISLAND NATIONAL WILDLIFE REFUGE

Virginia Beach, Virginia

ANNUAL NARRATIVE REPORT

Calendar Year 1980

NATIONAL WILDLIFE REFUGE SYSTEM
Back Bay NWR Complex
Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR



2 10 3 11 1 5

PERSONNEL

1.	Bond, Glen W.	Refuge Manager EOD 09/17/77	PFT GS-12
2.	Hundley, Allen C.	Assistant Refuge Manager EOD 07/02/78	PFT GS-9
3.	McMinn, Michael J.	Assistant Refuge Manager EOD 07/02/78	PFT GS-7
4.	Pittman, James A.	Maintenance Mechanic EOD 04/09/62	PFT WG-10
5.	Ford, Edna M.	Administrative Clerk EOD 01/18/65	PFT GS-6

(Part time for Mackay Island NWR)

Temporary Appointments

6.	Williams, Timothy G.	Laborer	700 hr. WG-3
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YACC Enrollees at Mackay Island NWR during 1980

7.	Wade, John	6 Months	Positive termination
8.	Murphy, Kim	6 Months	Positive termination
9.	Fonner, Phil	8 Months	Positive termination
10.	Fonner, Barbara	1 Year	Positive termination
11.	Balazes, Denny	2 Months	Still employed



6

4

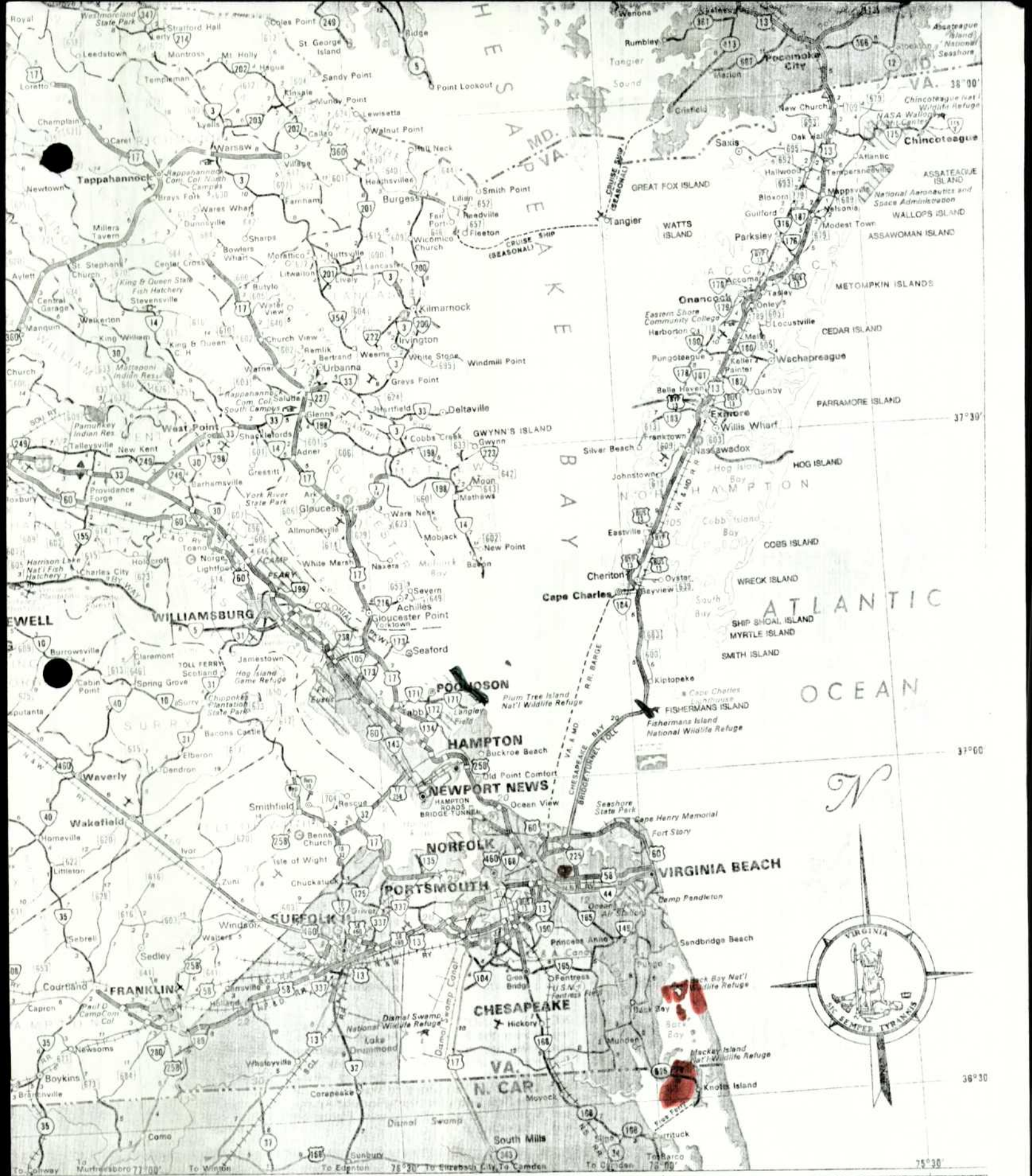
80-20 ACH




Although this may look like the maintenance mechanic has caught a poacher, it is really a very valuable 700-hour appointment laborer standing with the maintenance mechanic James Pittman.

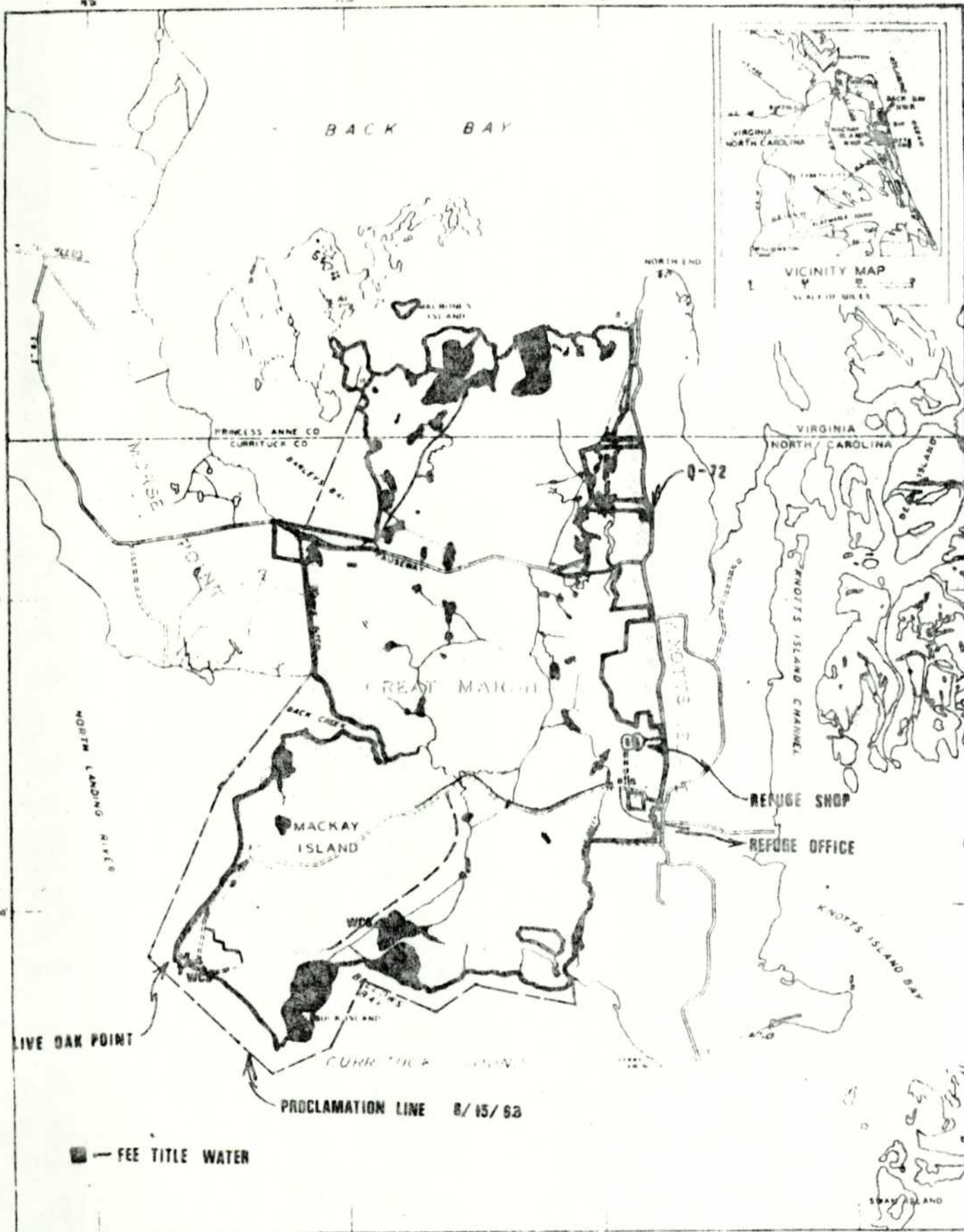
Review and Approvals

Glen W. Bond Jr. Apr. 6, 1981 Paul D. Daly 4-24-81
Submitted by Date Area Office Date

Back Bay/Mackay Island NWR's Howard D. Woom 5/5/81
Refuge Regional Office Date



-  Office Location - Back Bay Complex
-  Manned Stations
-  Unmanned Stations



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DECLINATION
1954

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I. GENERAL

A. Introduction

Mackay Island National Wildlife Refuge is actually a composite area consisting of Mackay Island, parts of Knotts Island west of Highway 615, and the fresh water marsh that connects these two islands. The refuge is bounded on the north by Back Bay, to the west by the North Landing River, to the south by Currituck Sound, and to the east by mainland Knotts Island. Connection to the mainland from Knotts Island is via Highway 615 (the "Causeway") that cuts east to west thru the middle of the refuge marsh. The refuge maintains a gravel road connecting Knotts Island and Mackay Island. Elevations on the refuge range from 0 to 10 feet above sea level.

Mackay Island and an adjacent 2,000 acres, like many refuges, was owned by a millionaire who managed the area for waterfowl. Copies of the report More Game for Mackay Island by Clyde B. Terrell of Oshkosh, Wisconsin, outlines everything that could be done to maintain the landowner's habit of shooting 150 ducks per day. Mr. Terrell was a specialist on development of attractive places for birds. Upon the owner's death in 1951, the land was offered to the state of North Carolina, but they declined the offer. After going through a few hands, the U. S. F. W. S. purchased this parcel and began buying all of the adjacent area in the Great Marsh.

The acquisition was in full swing in 1960. Mackay Island National Wildlife Refuge consists of 7,055 acres. Approximately 1,000 acres are in Virginia and the remainder in North Carolina. Table A-1 shows a breakdown of habitat types found on the refuge.

TABLE A-1

<u>Habitat Type</u>	<u>Approx. Acres</u>	<u>%</u>
Marsh	4,439.2	63
Forest-Mixed	1,445.2	20
Open Water	552.1	8
Buildings and Roads	285.2	4
Croplands	169.5	3
Brush	164.4	2
	<u>7,055.6</u>	<u>100</u>

Mackay Island National Wildlife Refuge was established primarily to maintain existing habitat for wintering greater snow geese. The largest number of the greater snow geese winter in Currituck and Pamlico Sounds with most of the remaining greater snow geese wintering in Back Bay. Historically, their use of the Great Marsh, which is included in Mackay Island National Wildlife Refuge and separates Back Bay from Currituck Sound, has been very great. With their recent trend towards field feeding and the resultant reduction in value of many winter wheat fields, the depredation reducing value of this refuge has become even more critical.

B. Climate and Habitat Conditions

Mackay Island National Wildlife Refuge does not maintain a weather station, but beginning in August, we now record rainfall at Mackay Island while temperature readings are from Back Bay NWR. Back Bay NWR is nine air miles from Mackay Island NWR.



80-1 ACH

The quiet beauty of a heavy snowfall like this is an experience which rarely occurs on Knotts Island, North Carolina.

This year will be recorded as the year of the worst snowstorm in the history of southside Hampton Roads. This area, which is not too familiar with snow, got five inches on January 31 with bitter cold temperatures which stayed until February 15. But those temperatures did not subside until the area got the heaviest snowfall of the century, 12.25 inches on February 6. To make life even more traumatic for this snowless area, four more inches fell on February 9. The ensuing paralysis of the Hampton Roads Area was complete. As if this were not enough there was more winter for the area. The last two days of February

the temperature went up to 72^o before the worst storm of the century hit here on March 2. This twenty inches of snow was accompanied by 50 MPH winds which created some awesome snow drifting. The causeway to Knotts Island was drifted shut. The refuge Thiokol Spryte (tracked snow and marsh vehicle) was the only vehicle on the island capable of getting off of the island. We hauled a load of bread and milk from the mainland to the islanders who were in need of those staples. This storm was so severe that the Governor of Virginia declared the Hampton Roads Area a disaster area. This declaration allowed for mobilization of the National Guard. An area wide 24-hour ban on walking or driving on city streets was invoked also. Judging by droppings on the Live Oak Point field after the snow, it appears that the snow geese were using the field heavily.



80-2 ACH

That quiet beauty, when rarely experienced, often becomes noisy chaos. This may look like a truck loaded with bales of controlled substance (marijuana) but it's actually a refuge truck loaded with corn. The high crowned road is difficult to stay on under those icy conditions.

Subfreezing temperatures were experienced from February 1-4. The hottest spell of the year was from August 1 to August 6 when the high temperature never went below 90^o F. The average growing season here is 244 days with the last frost usually occurring about March 22 and the first frost occurring around November 21. This year the growing season was from April 6 to November 20, thus, this growing season was 14 days shorter than the 30-year average growing season. The average temperature in February was 45^o while the average in August was a very humid 81^o.

Besides the severe winter storms it was also a year of the Virginia Beach drought. The metropolitan area of Hampton Roads has developed rapidly, but

without an adequate supply of water. This condition was headline news for the last six months of the year, as all residents were put on a rationing system in July. This consumption reduction to one-half normal use was intended to prevent the area from running out of water in 100 days. This drought caused some very serious losses of local crops of corn and soybeans. The overall precipitation for the year at the Back Bay Station was 41.68 inches or 3.13 inches below the 30-year average of 44.68 recorded at Norfolk International Airport. The following table depicts the rainfall and temperature variation throughout 1980.

	1980 Back Bay NWRC		Temperatures Fahrenheit		Mackay Island Rainfall Observations
	Rainfall (10" snow = 1" rain)	Snowfall	Maximum	Minimum	
January	3.52"	5.05"	65 ^o	18 ^o	
February	1.41"	16.25"	70 ^o	15 ^o	
March	3.14"	20.00"	73 ^o	15 ^o	
April	4.05"		82 ^o	30 ^o	
May	5.98"		86 ^o	41 ^o	
June	0.94"		95 ^o	53 ^o	
July	1.92"		95 ^o	55 ^o	
August	4.77"		102 ^o	52 ^o	4.54"
September	1.74"		93 ^o	54 ^o	3.19"
October	5.84"		82 ^o	42 ^o	4.18"
November	1.70"		75 ^o	35 ^o	1.94"
December	2.54"		70 ^o	20 ^o	1.48"
	37.55"	41.30"			

C. Land Acquisition

1. Fee Title

Mackay Island NWR is not scheduled for any land acquisition in the near future. The boundary on the Knotts Island side is still quite irregular and does not extend to the MBCC approved acquisition line. During January of 1980, an adjacent landowner called the refuge to offer his land for sale. He had purchased two lots at the end of a new road adjacent to the refuge. This new road has been subdivided and thirty lots have been sold in the last two years. The two lots he offered us would have given us direct access to the refuge at the end of the road. If houses are built, they will have immediate access to the refuge. No funding was available to pursue this acquisition.

2. Easements

"Not applicable"

3. Other

"Not applicable"

D. Systems Status

1. Objectives

Mackay Island NWR is funded under 1210, 1220, and 1240. This refuge was neglected

in funding up until 1978 when the funding finally reached a level that more than paid salaries. The primary objective of providing wintering habitat for the greater snow goose on this refuge is more of a protection of habitat than a management of habitat. The 6,100 acres of the refuge called the Great Marsh are not manipulated by the refuge in any fashion except through a prescribed burning program. It is conceivable that an attempt to reduce fragmites spread may be necessary in the far future, but control apparatus for manipulation of this marsh could never be done better than nature is doing it. With the emphasis on black duck habitat, the Mackay Island staff is developing plans and implementing some steps to maximize the high potential for black duck wintering. Mackay Island also provides ducks some very necessary refuge from the hunter's gun in this heavily hunted area of North Carolina.

A deer herd has developed on Mackay Island, thus, a new objective will be the maintenance of an optimum population of deer.

2. Funding

The funding and manpower situations at Mackay Island NWR for the past six years are as follows:

FY	1981	1980	1979	1978	1977	1976
O & M	63,000	62,000	62,000	68,500	30,000	31,000
Cyclical Maintenance	14,000	14,000	14,000	0	0	0
Rehabilitation & Construction	0	0	348,298	185,600	0	0
PFT	3	3	3	2	2	2
Other Manpower	700 hr	700 hr	700 hr	700 hr	700 hr	0
YACC	2	2	1	2	9	0

II. CONSTRUCTION AND MAINTENANCE

A. Construction

The weak cable gate at the shop entrance was replaced by a steel swinging gate twenty-four feet wide to allow farming equipment through.

The shop garage doors were insulated with cellotex. The rigid material is 3/4 inches thick and reflective on both sides. The four foot by eight foot sections provide an R factor of six, which is six times better than the fiberglass doors can do. In addition to holding heat better, this insulation reflects light, thus helping make the shop more brightly lit.

A stop log lock was built and installed on the large impoundment water control. In the past fishermen have pulled those stop logs to improve their fishing opportunity. It has been quite difficult in the past to control water levels with fishermen and trappers pulling the stop logs at their leisure.

A road was built around the perimeter of Mackay Island going along side of the

new bulkheading on the west side of the island and around Live Oak Point. This road will support better patrol of the island for landed boats. It allows access to Live Oak Point without going through the center of any water-fowl that may be feeding in the farm field.

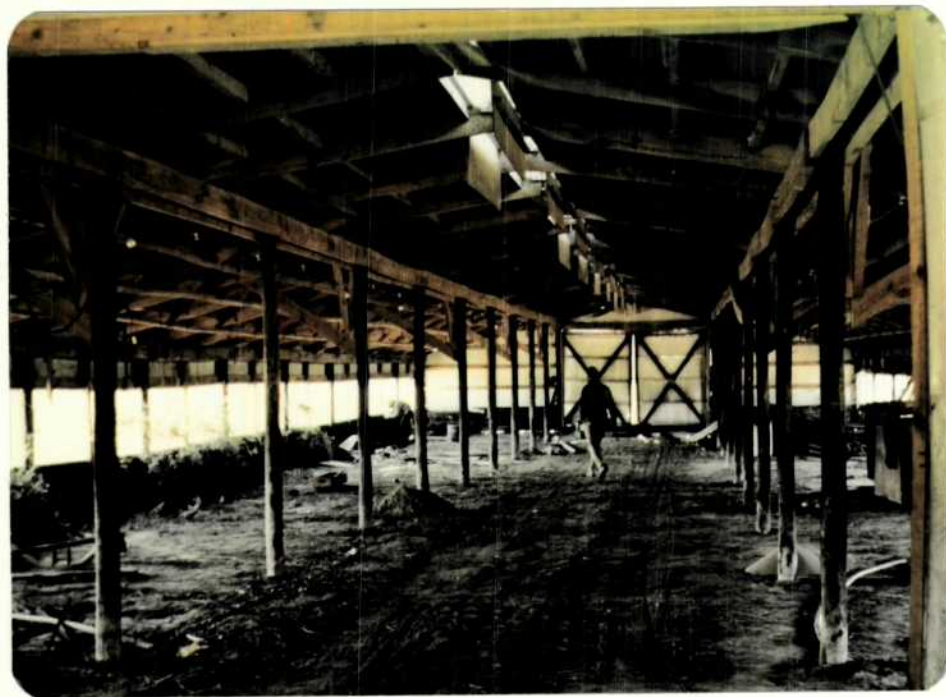


80-12 ACH

The Kaiser Aluminum Shore-All bulkhead was placed behind the deteriorated wooden bulkheading of the 1930's. The two live oak trees on the left are on Live Oak Point. Note the gravel road just behind the new bulkheading.

(now dead)
WB

The "chicken coop", which is located one mile from the refuge shop and has been used for equipment and miscellaneous storage, was dismantled this year by YACC. The building was dismantled carefully so that those materials can be used to rebuild and modify it into a storage shed in the shop compound. The site for the new shed was cleared and the search for surplus building materials has begun. Since some of the "chicken coop" lumber was rotten, not all of it could be used.



80-13 MJM

The interior of the "chicken coop" as the dismantling operation begins. The entire coop was filled with equipment and supplies before they were removed prior to the dismantling



80-14 ACH

The "chicken coop" as dismantling was beginning.



80-15 ACH

The site after the "chicken coop" was removed. The bermuda grass sod will be used as fill behind parts of the bulkheading which didn't grow grass and then this site will be incorporated into the farm field. Sorry about the color differences - I blame it on the film or the developer!



80-16 ACH

The area at the shop was cleared to be the site for a storage shed to be built with the chicken coop materials.

B. Equipment Acquisitions

This section is pretty sparse this year. The major acquisition was the delivery of a 1980 Ford Fairmont station wagon. Although this vehicle is the color of a pumpkin, it does fit our needs perfectly and averages approximately 18 mpg.

To provide the desired safety for the Fairmont operator, a new radio was purchased and installed. The station also purchased a 60 watt base radio for the refuge office. Although only a 60 watt radio, the antenna with four radial arms gives extremely good coverage.

To provide the desired security for this new radio and refuge files, a security cabinet was located on the lot of the Defense Logistics Agency. This Mosler safe required only a \$15.00 expenditure to make it operational. All refuge files, the radio, and firearms ammunition are stored in this safe which now looks brand new, thanks to the paint job.



80-8 MJM

Running lights for the seventeen-foot Polorkraft boat were purchased and installed. An electric winch was also installed on the boat trailer. Two Stearns Float Coats were purchased for winter time boat work. These camouflaged floatation coats were an invaluable addition to winter operations in the boat.

C. Maintenance

The water control structure on the large impoundment was leaking as a result of muskrat burrowing. Large steel sheets were installed beside the culvert

pipe as headwalls to prevent leakage and reduce the opportunity for further burrowing animal damage.

Various equipment implements were scraped and painted this year, including the John Deere 2010.

The poor roof work done on Q-72 reared its ugly head this year as many of the shingles blew off of the house. A local contractor repaired the damage for \$125.00.

The refuge YACC group dissolved and left us with a good storage building, but the area around the building was a dump, literally. In May the refuge cleared the lot and planted centipede grass which grows into a thick mat and allegedly only needs to be mowed once a month.



80-17 ACH

This Agway building was purchased and constructed by the YACC camp. The refuge completed the lawn work. Now the station has a fairly attractive centrally located storage building.

The last remaining building of the great Knapp estate was removed in November by the Knotts Island Fire Department. They used the old barn for fire fighting training.



80-10 ACH

The last remaining building of the Knapp estate was on its final legs.



80-11 ACH

The barn was burnt down by the Knotts Island Fire Department.

In anticipation that some BLHP funding might become available for rehabilitation work on the Hog Pen Point Road, the station began clearing the timber from one side. Initially the area adjacent to the road was opened up for the public to cut firewood adjacent to the road. After the public became bored, the YACC moved into the area and finally cleared it up. Thus far no construction work has begun on this site.



80-18 ACH

All of the trees within seventy feet of the Hog Pen Point dike were cleared away to allow dragline work to begin. Funding for this project still has not become available.

New lumber was purchased and used to replace the deteriorated bed on the Dodge 500 stake-body truck.

The Mackay Island Road is an annual maintenance problem which is aggravated by the fact that the road goes through a wooded area. The trees shade the road and prevent drying in the winter. To reduce this tree shading, the refuge opened up the area to the public for firewood cutting. Sections 25 feet wide and 100 yards long were designated for firewood cutting at a time. When each section was satisfactorily cleared of standing timber, another section was made available. This program worked very well and the road is significantly drier this winter as a result of the increased sunshine hitting the road. This program also pleased many Knotts Islanders, since they had an opportunity to get something from the "wildlife" for free. By advertising in the Hampton Roads newspapers, this program also attracted many people from that area. The refuge staff had an opportunity to talk with these people and many learned for their first time of the existence of this refuge. Over 165 loads of firewood were removed from the refuge.



80-6 ACH

This is how the road appeared before the cutting operation began. Note how shaded the road is.



80-7 ACH

The additional sunlight hitting the road has significantly dried up the road thus reducing our maintenance problem. This over exposed photo creates a biased photo but it wasn't intentional.

A thirteen-foot aluminum canoe was located on the Defense Logistics Agency surplus lot. This canoe should be helpful in the canals of the refuge when the staff tries to make breeding pair counts.

D. Wildfire

As is customary in this area, some local people set the refuge marsh on fire in November. The area they lit was the area south of the causeway and the burn was not a hot consuming type of fire. No more than two hundred acres burned. No suppression action was initiated. This unit was not scheduled to be burnt this winter.

III. HABITAT MANAGEMENT

A. Croplands

Mackay Island NWR administers a cooperative farming program which will most likely be terminated if the refuge is directed to rely entirely on organic farming. This year's agreement was reached by computing average land rental rates for farming in the area and custom farming rates to determine to what services those land values would entitle the refuge. The average land rental down this way of only \$30 per acre doesn't give a large allowance for services. Our major concern is having an attractive crop, overwinter, for waterfowl on the Live Oak Point field. This field had corn left on it each winter from 1967 to 1976. After 1976, green browse was left in the field during the winter instead of corn. The corn had been heavily used, but only for a few weeks in November and December, after which they began to deplete local farming fields. The green browse was an attempt to extend the snow goose visitation to that field. The wheat, barley or rye does re-sprout all winter, thus, providing food for the whole winter, but the wrong guests were eating the browse. The unconquerable white-tailed deer were keeping the browse short and brown.

The new approach to farming the Live Oak Point field which was tried in 1979 seemed successful. That approach was an effort to combine wheat with corn stubble. In 1979, the single cooperative farmer planted and harvested corn on the entire field, after which he planted wheat to leave on the field for wintering waterfowl. The harvesting equipment leaves three to five percent of the corn crop, thus, there was some variety in the field for the wintering waterfowl. A variation on that theme was attempted in 1980. In 1980, the cooperative farmer planted the whole field to corn, but six of the fifty acres was planted specifically for the refuge. The plan was for him to harvest his acreage and a portion of the refuge share which would give him one hundred bushels to dry, bag, and deliver to the refuge. This plan would have left occasional blocks of corn standing in the field in rows of wheat which he would plant. One of the farmer's operators was confused about the remaining blocks of corn and disced them under. He did go ahead and disc the field three times, broadcast wheat by truck, and then disced lightly once more. He planted the 200 bushels of wheat, which this refuge picked up from Pee Dee NWR and the germination was excellent. Three to four thousand snow geese fed on this wheat for five days in late November. There has only been sporadic use by 200 snow geese and 200 Canada geese since that initial feeding. The sprout-back of that wheat has not occurred as anticipated.

Because of the very dry summer and the heavy deer use, the farmer only harvested 28 bushels of corn per acre on the Live Oak Point field. The remaining

fields on the refuge did considerably better. The average wheat harvest on the refuge was 32 bushels per acre. The average soybean harvest on the refuge fields was 26 bushels per acre. The corn harvest was 128 bushels per acre on the fields near the "chicken coop" and 150 bushels per acre on the fields near the office. Many farmers in the Hampton Roads Area suffered great losses this year due to the drought, but there was sufficient rain at Knotts Island to allow acceptable harvests. The cooperative farmer is also required to keep all field ditch-banks mowed and clear, and he must maintain the soils at recommended fertility levels.

Chemicals which were used on some of the cooperative farm fields on the refuge this year include: Atrazine, Lennate, Lorox, 2,4-D, Furadan, and Treflan. In addition to these chemicals, the farmer applied 1,500 pounds of 3-9-18 fertilizer, 225 pounds of 30% nitrogen, and one and one-half tons of lime to each acre of corn that he planted.

B. Grasslands

"Not applicable"

C. Wetlands

Marsh management on most of this refuge is done by nature as she moves her waters up and down on the marsh with the winds. The refuge staff does attempt to improve on this management by periodically burning the marsh to make seeds and tubers more accessible to wintering waterfowl. The burning program calls for a rotation of burning each unit every third year to allow a fuel build-up that will carry a good fire easily. However, the local people enjoy seeing fire so much that they often burn areas of marsh with no regard for where we want to burn. During 1980 only one wildfire was set.

The refuge maintains five vegetative transect lines throughout the refuge. The transect line which bisects the small impoundment is sampled each year, since the refuge has complete control over water levels in that impoundment. The sampling done in 1980 revealed that this impoundment seemed to have converted from a primarily wild millet impoundment to fall panic grasses. Another transect, which was initiated in 1979, bisects Buck Island Bay to help monitor submergent vegetation. The major plant species identified in each of these transects is as follows:

Small Impoundment	
1979	
Saltmarsh Fimbristylis (<u>Fimbristylis spadicea</u>)	20.9%
Wild millet (<u>Echinochloa crusgalli</u>)	19.0%
Panic grasses (<u>Panicum spp.</u>)	14.1%
Cyperus (<u>Cyperus spp.</u>)	11.8%
1980	
Panic grasses (<u>Panicum spp.</u>)	27.3%
Wild millet (<u>Echinochloa crusgalli</u>)	8.8%
Buck Island Bay	
1979	
Niaids (<u>Najas spp.</u>)	33.7%
Wild celery (<u>Vallisneria americana</u>)	24.7%
Eurasian milfoil (<u>Myrophyllum spicatum</u>)	14.6%

Buck Island Bay

1980

Niaids (<u>Najas spp.</u>)	36.5%
Littorella (<u>Littorella spp.</u>)	19.3%
Eurasian milfoil (<u>Myrophyllum spicatum</u>)	19.3%
Wild celery (<u>Vallisneria americana</u>)	16.5%

The remaining three transects are found in each of the major sections of Great Marsh. Since the refuge has little control over this marsh, these transects are only sampled once each third year. Because of the many variables in the marsh burning, it is difficult to accurately evaluate the effectiveness in marsh plant composition. The graphs on the next three pages depict the percentages of total plant composition discovered over the past seventeen years. The straight vertical lines indicate when the area burned.

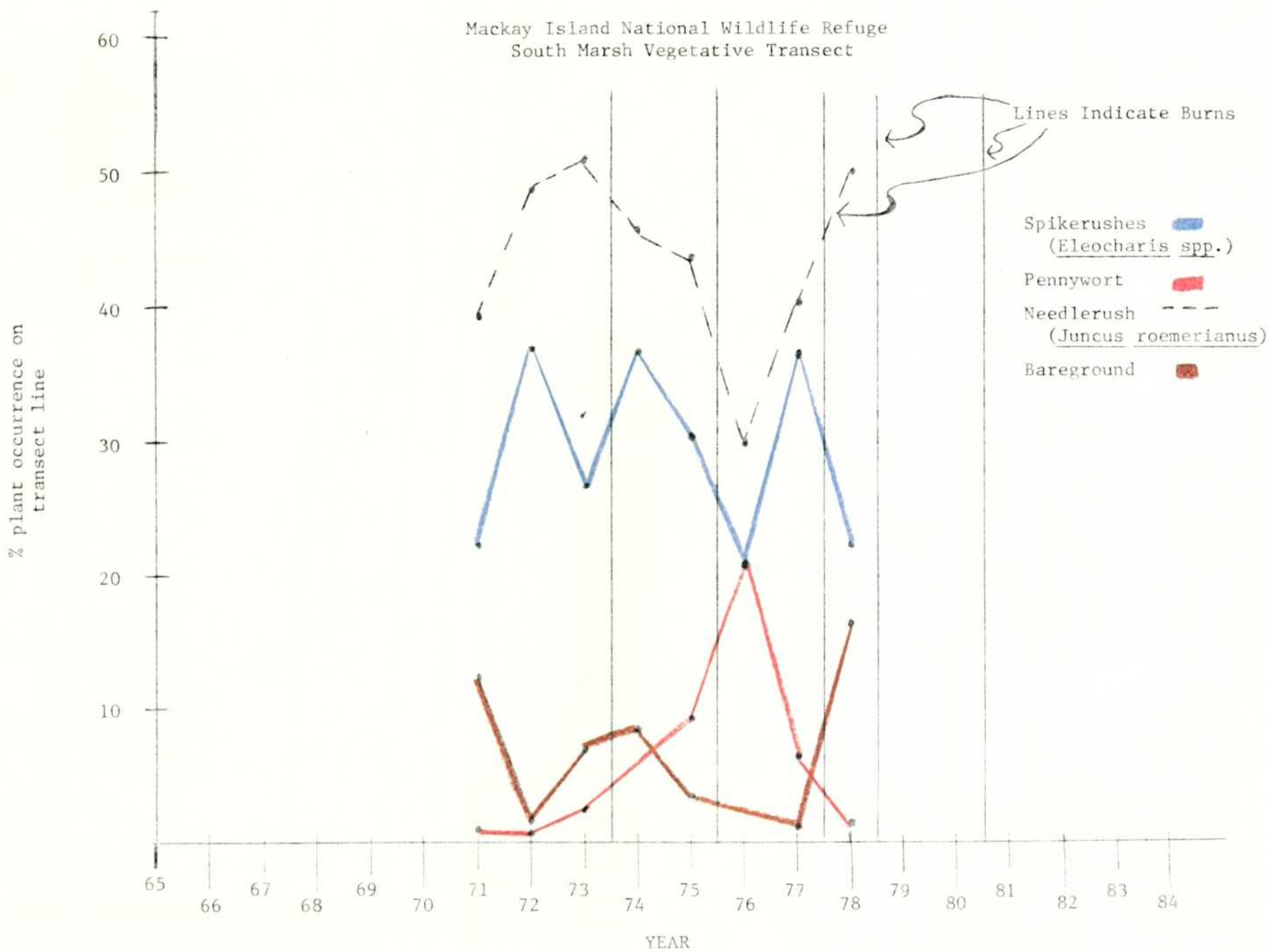
Prescribed burning on the Great Marsh of Mackay Island NWR has gradually become more hazardous each year. The canals which have served as fire breaks in the past are silting in, allowing vegetation bridges to develop across the canals. Besides these historical firebreaks' deterioration, is the increasing number of residences adjacent to the refuge boundary. Many of these homes are right up against the marsh and most of these people do not clean fire-fuel materials away from their homes. The station does have a tracked marsh vehicle which can travel in the marsh, but it is quite limited in where it can actually travel. Records on conditions present at the time of past prescribed burns are nearly non-existent, thus, the present staff is unable to learn from observations and experiences of the past. Data is now being recorded at each prescribed burn so that the staff may be better able to recognize conditions conducive to a good burn. During 1980, burns occurred on Mackay Island NWR as shown on Page 20.

The locking device on the 820-acre impoundment water control structure allowed us to keep this impoundment very dry all summer so that the fuels would dry enough to allow a good consuming fire in the late fall. The fire which was set on December 4 was exactly what was needed on that marsh impoundment. The burn was excellent that day and the marsh was burnt right on to the mud. Stop logs were then put into the water control structure to trap rainfall for flooding the impoundment. As noted in the climate section there was not enough precipitation in the fall and the desired flooding was not accomplished. With the onset of spring will come another effort to drain this impoundment to encourage mast production. We will also try some mechanical scarification of a portion of the marshy area.

A cross dike is proposed for this impoundment and the engineering is presently scheduled for FY 82. The engineering for this project has been estimated to cost \$75,000. A proposal submitted to the Regional Office to have all engineering for this project done by the local Soil Conservation Service has been well received and the SCS has completed their field work and the drawings. The environmental assessment for this project has been completed and the Corps of Engineers permit application will be submitted in 1981. If the SCS engineering is acceptable then it is hoped that the \$75,000 will be used to initiate actual work on the crossdike. The SCS has also volunteered to provide the technical assistance in overseeing the construction work.

Vegetation in the 26-acre impoundment, as noted earlier, changed from primarily wild millet to panic grasses in just one year. It appears that the severe dry conditions simply did not provide good conditions for millet

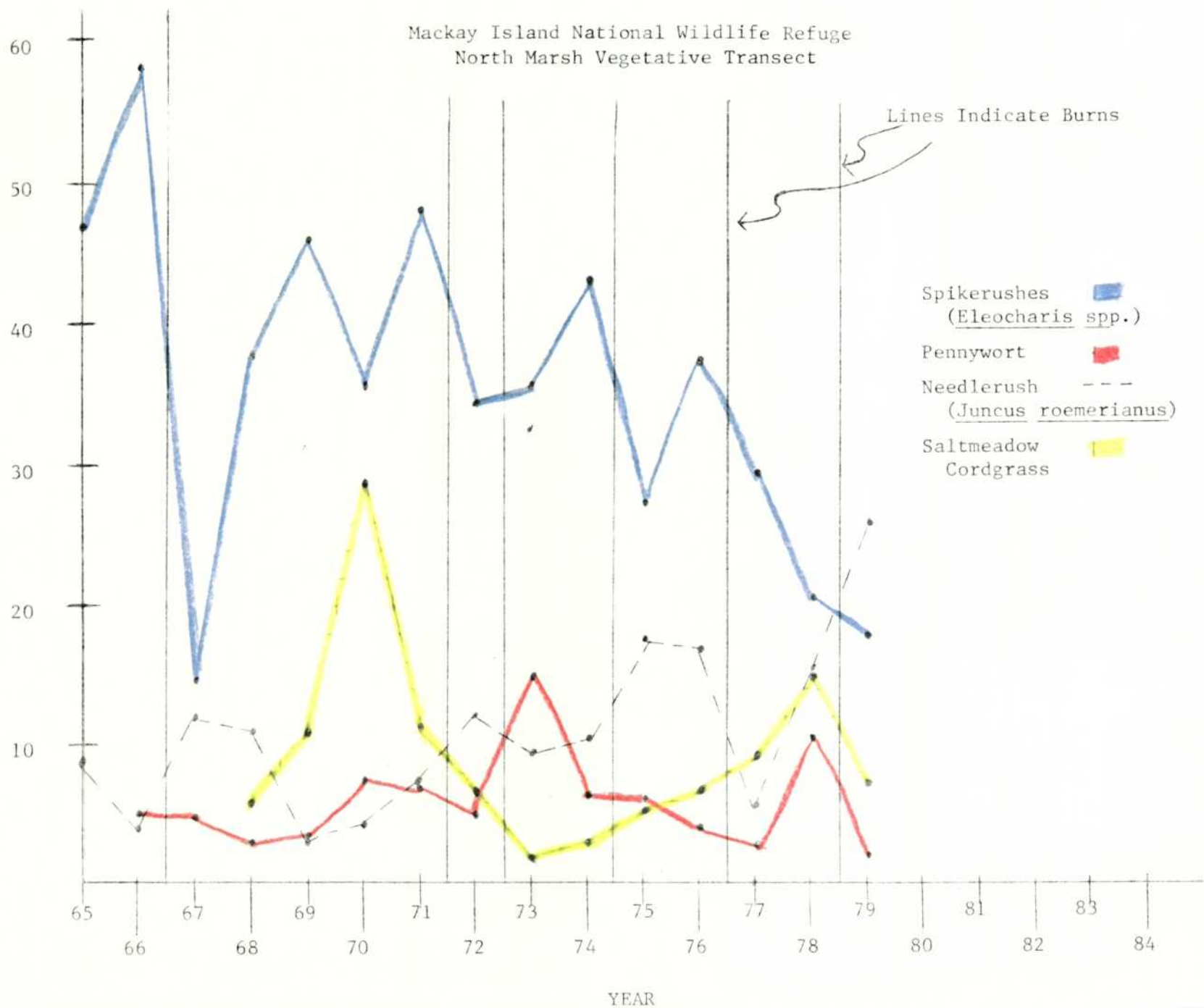
Mackay Island National Wildlife Refuge
South Marsh Vegetative Transect

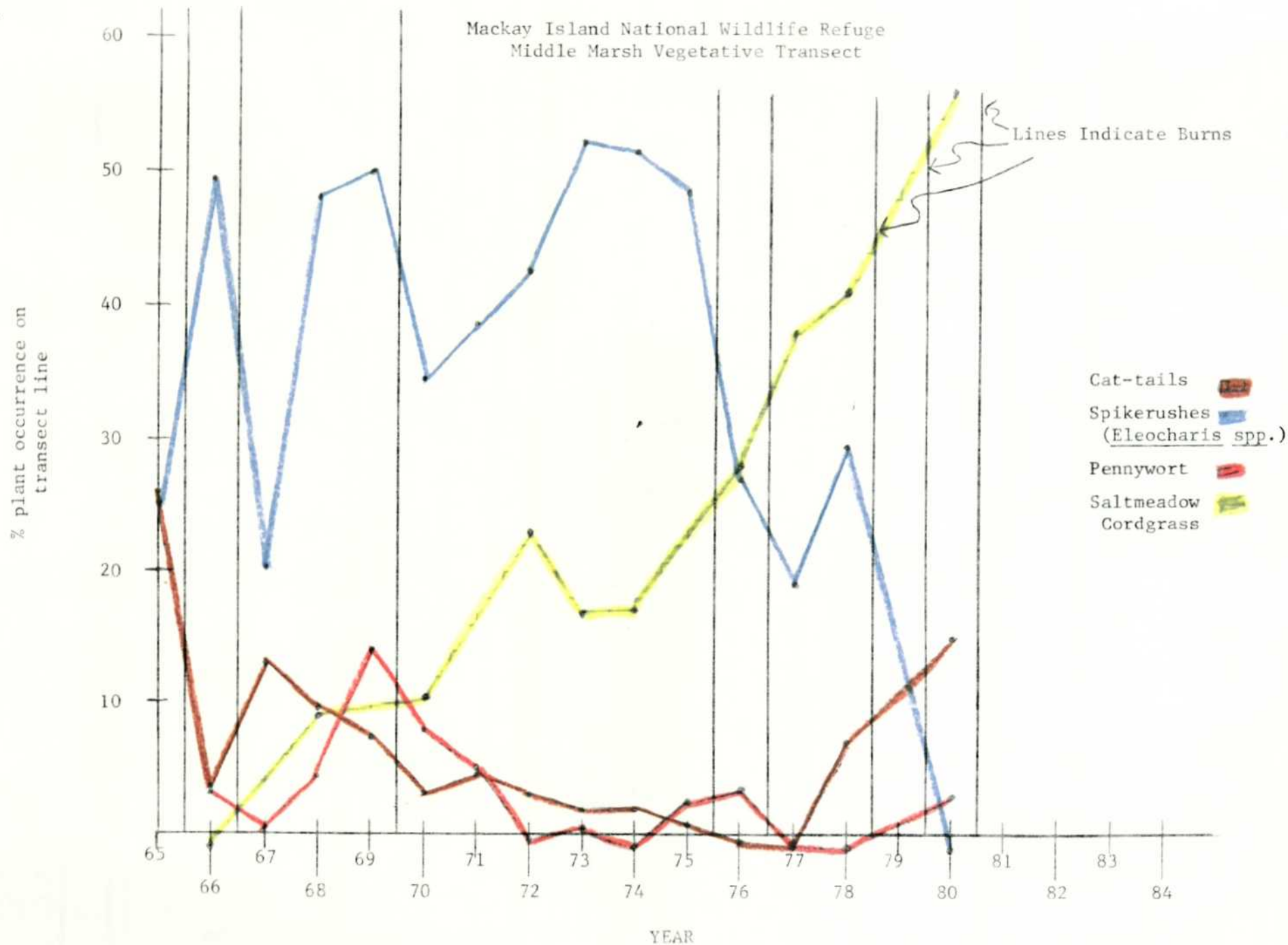


Mackay Island National Wildlife Refuge
North Marsh Vegetative Transect

Lines Indicate Burns

% plant occurrence on
transect line





Burn Unit	Date 1980	Wind Direction	Speed	Time	Sky	Build-up Index	Relative Humidity	Water Level	Burn Quality And Coverage
7	01/10	NE	20	1400	Sunny	10	50%	Very High	Poor - 10%
5	01/21	SW	15	1400	Sunny	12	50%	High	Good - 80%
4	02/01	NE	10	1400	Sunny	10	50%	High	Fair - 40%
6	02/01	NE	15	1600	Ptly. Cldy.	10	55%	High	Poor - 20%
7	12/04	NNW	15	1330	Sunny	22	28%	Very Low	Excellent - 10%
9	12/04	NNW	15	1315	Sunny	22	28%	Very Low	Excellent - 30%
3	12/04	NNW	15	1530	Sunny	22	28%	Moderate	Poor - 20%
* 2	12/05	NW	15	1200	Sunny	25	50%	High	Poor - 40%

* Wild fire

regeneration. The dryness did provide good conditions for the panic grasses. On December 1, the Crisafulli pump was set up at the water control structure to pump water from Currituck Sound into the dry impoundment. In 1979 thirteen inches of water were held on the impoundment and it seemed that maybe it was a little too deep, so in 1980 it was filled to seven inches deep. To fill this pool to seven inches of water required pumping 17 hours with the John Deere 2640 tractor. Fuel and time consumed in flooding this impoundment over the past four years is as follows:

1977 pumping fuel consumption	153 gallons	Ford with 8" pump	200 hours
1978 pumping fuel consumption	108 gallons	Ford with 8" pump	166 hours
1979 pumping fuel consumption	86 gallons	JD 4240 with 16" pump	32 hours
1980 pumping fuel consumption	51 gallons	JD 2640 with 16" pump	17 hours

Some rainfall was anticipated that would have increased the depth to at least ten inches but that rainfall never materialized. The waterfowl use on this impoundment was well below the use experienced during the winter of 1979. There are many possible reasons for the reduced use of the small impoundment. These include the plant composition changing from millet to panic grasses, the heavy icing experienced in December, or the low water in the impoundment.

D. Forestlands

During the summers of 1978 and 1979, four one-acre clearings were created by the YCC camp in the wooded swamp area of Mackay Island. Two of these clearings were cleared by the bulkheading contractor with a D-5 bulldozer after the YCC has cut the trees. These clearings had standing water during December and there was some panic grasses, smartweeds, and some wild millet in these clearings.

It was anticipated that these clearings would be attractive to wintering black ducks, but they have not thus far attracted as many birds as was hoped. They have only held five to ten ducks each.



80-3 ACH

This block was bulldozed clean in March which provided ducks with a good source of smartweeds, wild millet and panic grasses.

E. Other Habitat

"Not applicable"

F. Wilderness and Special Areas

"Not applicable"

IV. WILDLIFE

A. Endangered and/or Threatened Species

1. Endangered

The wooded area that would be flooded by a proposed cross dike on Mackay Island was searched carefully for any sign of red-cockaded woodpecker activity. No sign was found. Many pileated woodpecker holes were found in live trees, but none with resin wells.

Only one peregrine falcon was seen flying over the refuge. Similar to last year, 100 peregrines were seen within 10 miles of the refuge and 23 were banded. Both assistant managers Hundley and McMinn took time off to assist in this banding project on the Currituck Outer Banks. Hundley and McMinn also put in some off-duty time in the hacking and banding of peregrines in downtown Norfolk and on Fisherman Island.

Immature bald eagles were seen twice flying over the refuge. No regular use was noted.

2. Status Undetermined

Osprey made four nesting attempts this year with the following results:

Live Oak Point: Artificial platform - Hatch 3 - Fledge 2
Half Way Point: Nest tree blew down - Unknown hatch
Hog-Pen Point: Dead tree - Fledge 2
Bay Tree Point: Dead tree - Unknown hatch - No fledge

Tree limbs were placed on the artificial structure this year for the first time. This seemed to be helpful in getting the osprey use.

As in the past many abandoned duck blinds surrounding the refuge were used by osprey again this year. Materials have been scrounged up to build at least five more platforms before next season. Arrangements are now being made to have the local chapter of the Audubon Society erect these structures for us. The station will provide the structures and give them the locations - they will do the rest.

B. Migratory Birds

1. Waterfowl

This year's waterfowl use-day figures are not encouraging. 1978 showed a 48% decrease, 1979 a 24% decrease and 1980 a 21% decrease. Total use-days were 1,557,842. The following tables outline the use-day picture at this refuge only. We have no data on surrounding areas which are open to hunting and have more suitable habitat than exists within the refuge boundary.

	1980 Use-Days	% Change from 1979	19 Yr. Average 1961 - 1979	% Change
Coot	88,550	- 51%	611,747	- 86%
Swan	75,404	+ 38%	136,638	- 45%
Snow Geese	465,800	- 43%	793,903	- 41%
Canada geese	19,677	+ 47%	230,665	- 91%
Ducks	907,667	+ 01%	1,418,969	- 36%
Dabbling	783,806	- 05%	1,231,098	- 36%
Diver	123,861	+ 76%	187,871	- 34%
Hooded Merganser	744	+ 1140%	1,168	- 36%
	<u>1,557,842</u>	- 21%	<u>3,193,093</u>	- 51%

The following table breaks down the duck use-day figures into species.

Species	19 Yr. Average Annual Use-Day 1961 - 1979	1980 Use Day	% Change
<u>DABLERS</u>			
Mallard	134,597	147,947	+ 10%
Black duck	174,275	106,336	- 39%
Pintail	150,121	63,170	- 58%
Gadwall	86,922	143,205	+ 65%
Wigeon	449,860	137,895	- 69%
Green-winged teal	165,111	66,350	- 60%
Blue-winged teal	26,121	10,175	- 61%
Shoveler	11,992	25,360	+111%
Wood duck	32,099	55,879	+ 74%
<u>DIVERS</u>			
Red head	2,744	910	- 67%
Ring-necked	38,980	34,275	- 12%
Canvasback	6,131	4,600	- 25%
Scaup	13,971	16,175	+ 16%
Ruddy	125,119	40,370	- 61%
Bufflehead	368	6,450	+ 1653%
Goldeneye, Common	558	31	- 94%

Coot - We are losing about 50% a year which, if it continues, would mean no coots here within five years. In 1975-76 we peaked out at 3.5 million. A disease hit and the numbers have been dropping ever since. No evidence of die-offs have been found since 1975.

Swan - There has been talk of allowing swan hunting in this area. The numbers seen on the refuge do not support the idea that there is a surplus, as the population has decreased each of the last four years from 227,073 use-days to 75,404. There have been five years where use-days were over 200,000 since 1967.

Snow geese - One major reason for the decrease in use is that the most attractive marsh units were not burned. Snow geese did feed on the Live Oak Point wheat for five days in late November.

Canada geese - Even though we show an increase of 47% over last year it must be put into the proper perspective. In the late 60's we had over

1,000,000 use-days. With the switch from truck crops to grains on the lands north of here these geese are effectively short stopped. Now only a flock of 100-300 geese can be seen at any one time in this area.

Ducks - The total number of ducks may not have changed but species composition is very different from last year. For example:

Canvasbacks - up 28 times
Ring-neck - up 10 times
Bufflehead - up 7 times
Scaup - up 2 times
Red head - up from 0 to 910 use-days

Last year gadwall were the most common. This year they are number two with mallards number one, up from number four.

There are many environmental variables which are not recorded that may effect these numbers. When added to the flyway population fluctuations, these may explain our erratic use-day figures over the years. However, the number one variable that is suspected here as causing much of the variation is the continual changing of the persons doing the counting and the level of coverage and accuracy used from year to year.

Other - Several local watermen described and identified two mute swans in Knotts Island Channel. We explained the problems that areas to the north are having and that it would be nice if these exotics did not become established. None have been reported since that time.

Duck Production - Because of suspected inaccuracies of checking wood duck boxes during the annual cleaning in the winter, it was deemed useful to check the boxes throughout the nesting season. Several items came to light substantiating this claim.

1. Counting membranes is totally inaccurate. One nest was checked and had 14 young only a few hours old. Two weeks later that box was checked and had only one egg and 3 membranes.
2. Some boxes are cleaned out by something so that no trace of a known nesting was left by the end of the checking period.
3. We had double the reported use over the last two years with the same number of boxes.

The YACC provided the majority of manpower. The refuge staff and YCC supplied the rest.

The following checks were made:

<u>Date</u>	<u>No. of nests that had hatched</u>
April 24-28	0
May 16	3 (8 screech owls)
May 29	11
June 23	21
July 14-28	11
Sept. 16	5
TOTAL	<u>51</u>

USE DAYS

2,000,000

1,600,000

1,200,000

800,000
19 yr.
avg.

400,000

62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

SNOW GEESE

USE DAYS

3,000,000

2,500,000

2,000,000

1,500,000

1,000,000

19 yr.
avg.

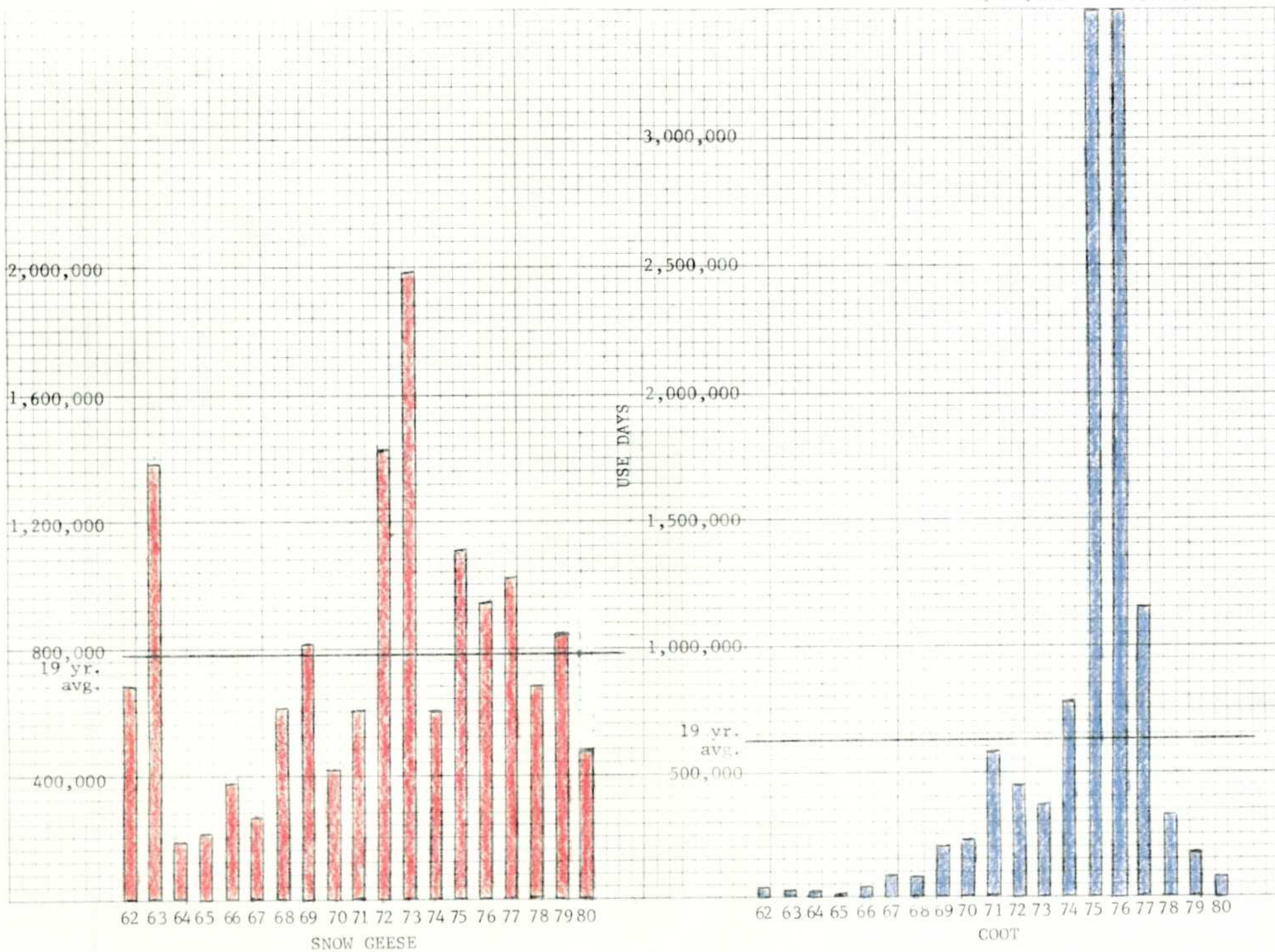
500,000

62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

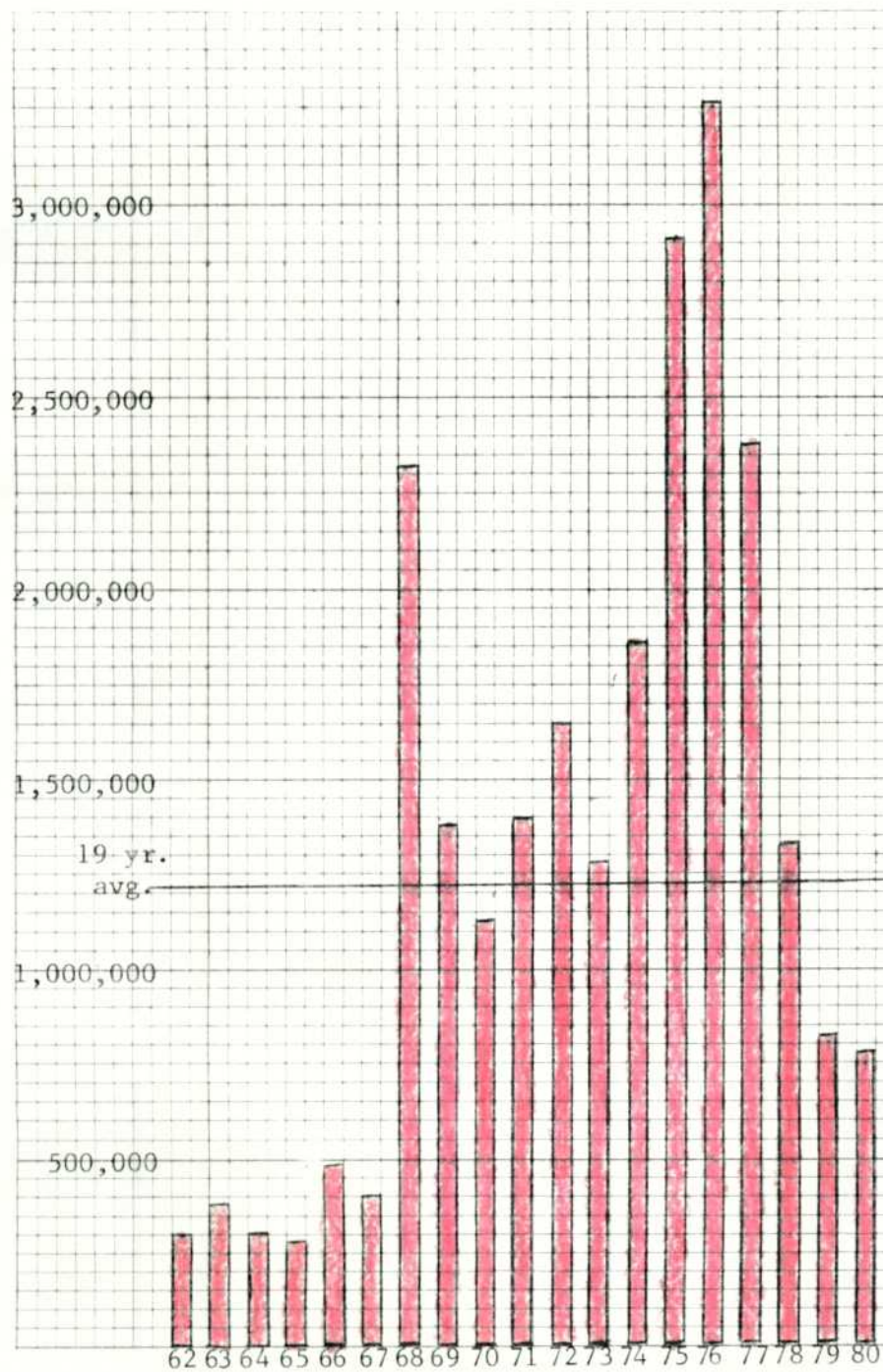
3,565,965

3,573,357

COOT

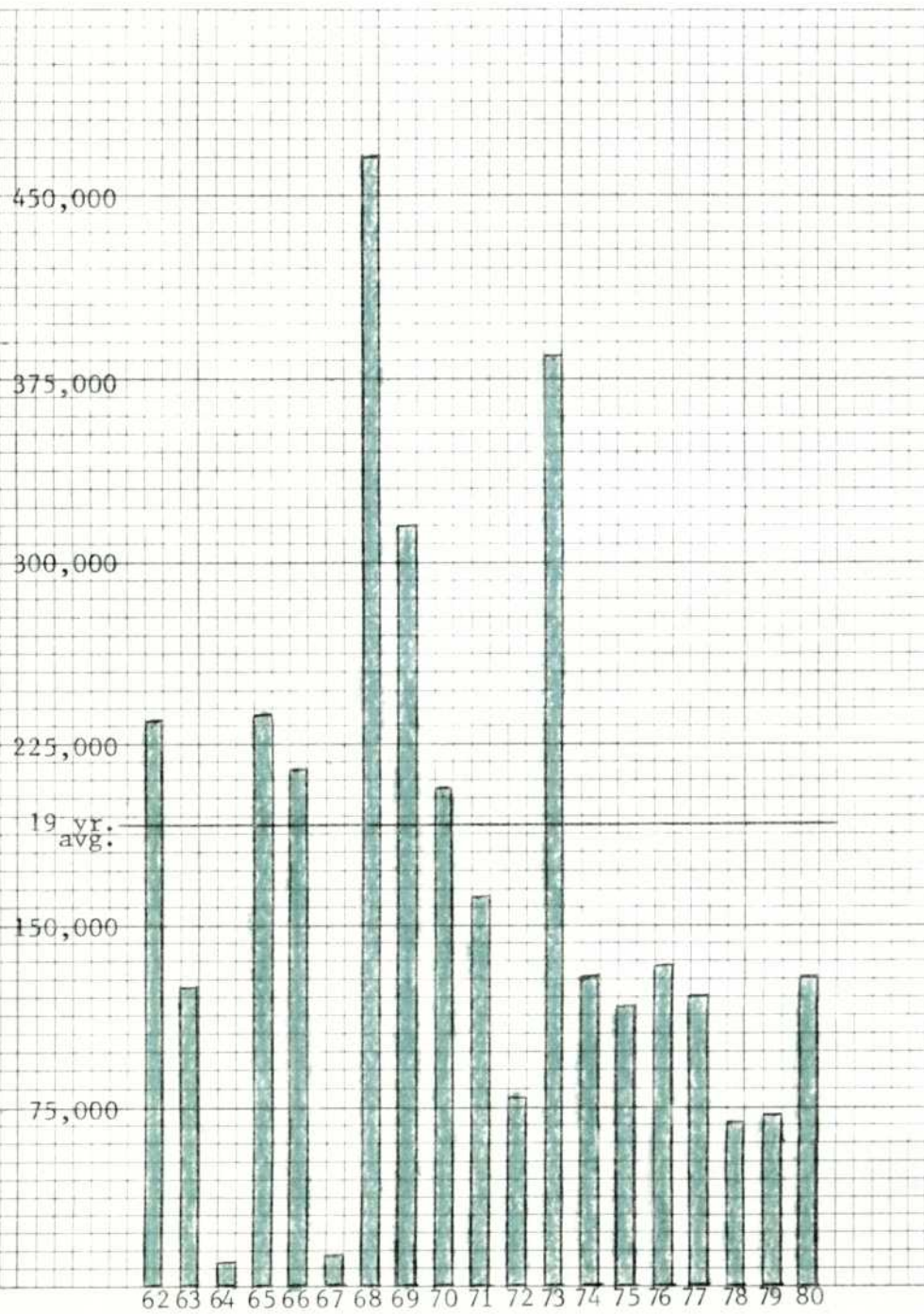


USE DAYS



DABLERS

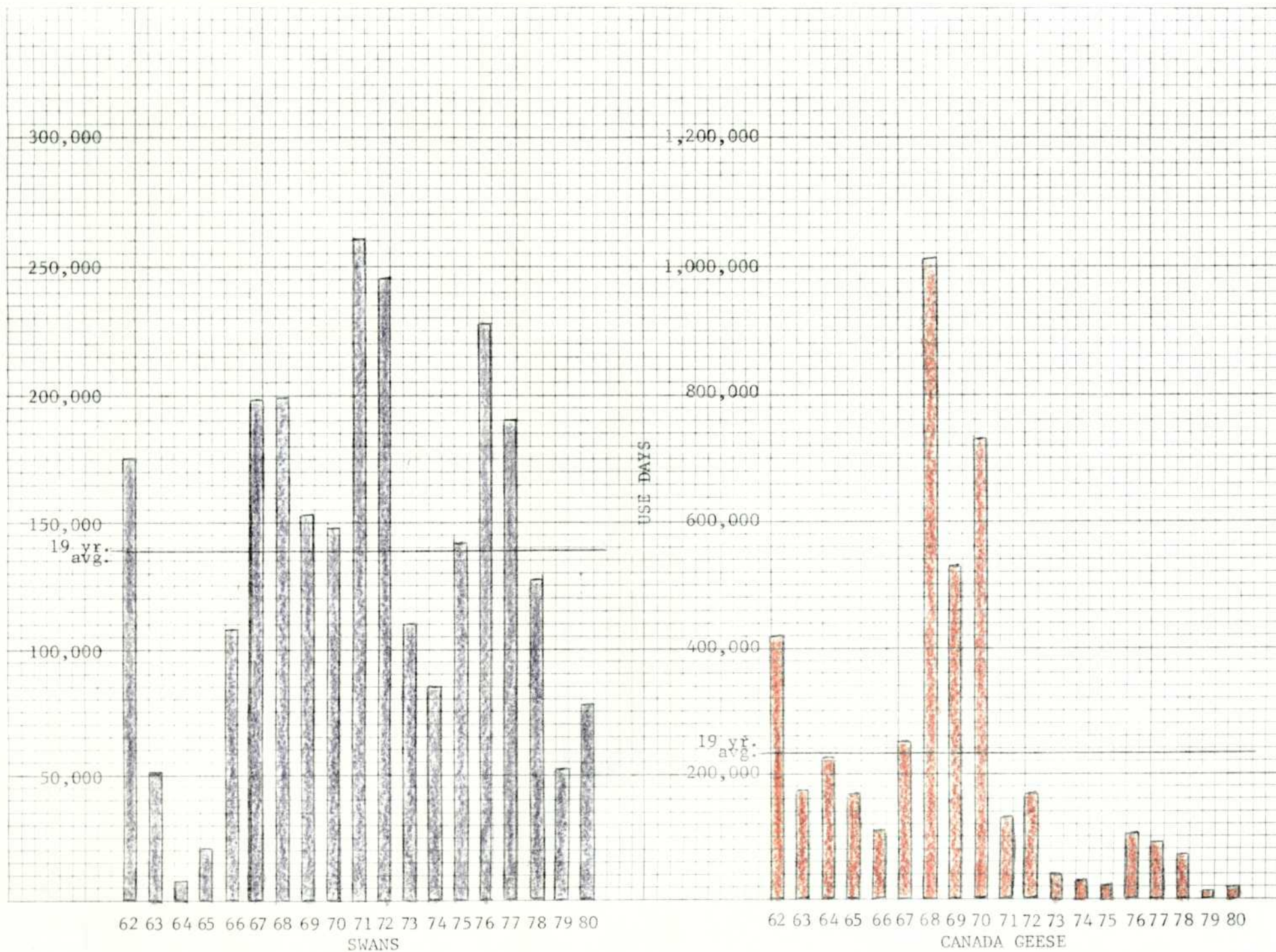
USE DAYS



DIVERS

USE DAYS

USE DAYS



3. Shorebirds, Gulls, Terns, and Allied Species

The gull and tern use is restricted to the adjacent bays and sounds, with only incidental use of the refuge. Having no tidal mudflats on the refuge, the only regular occurring shorebirds are killdeer, snipe, and woodcock.

4. Raptors

Mackay Island NWR supports a flourishing population of winter raptors. Most commonly seen are marsh hawks, kestrels, turkey vultures, red-tailed hawks, and screech owls. Osprey nest every year on the refuge with two to five nests being the average range over the past couple of years.

5. Other Migratory Birds

A new refuge bird list was completed this year. Thirty-eight species were added and already three more have been seen after the list went to print.

C. Mammals, Non-Migratory Birds and Others

1. Game Animals

a. White-tailed deer

In 1963 there was estimated to be only ten deer on the refuge and surrounding land. We estimate the population at 200 or more in 1980. The number seen on the winter wheat appear constant but the vegetation is showing the affects of over browsing. A distinct browse line has developed along the edge of the winter wheat field. This 50-acre field is a very attractive feeding area to about 80 deer all winter long. Free roaming dogs and poachers are still the main population control.

The over abundance of deer has interfered with natural plant succession and our farm crops planted to help alleviate goose depredation. This year they have learned to eat corn placed in 12-inch deep water used for luring ducks into traps for banding. The deer walk right into the large traps and then destroy it trying to get out. When shorter traps were used, the deer still hung around causing the trap success to be dismal at best.

After several unsuccessful attempts to have a hunt plan approved, a new plan and environmental assessment has been submitted. Provisions for handicap hunters and bow hunters have been written in. It is probable that this station will have some sort of deer hunt program in 1981.

In 1976 an APC (abomasum parasite count) was done on six deer collected at random. The results showed the herd to be over carrying capacity. We collected ten more in 1979. The APC showed the herd to be at or near carrying capacity. Fat deposits indicated only one animal in good condition, one animal in poor condition and eight in fair condition.

The deer browsing on the winter wheat at Live Oak Point was not as severe as it has been in the past because the firewood cutting program created many new openings and made more tender buds and browse materials available to the deer. Typically, one might see 80 deer on Live Oak Point last year, but during 1980, it was rare to see more than 20 deer.

b. Furbearers

Muskrats and nutria burrow into the dikes and roads causing leaks and general undermining, thus, collapse of these facilities. To reduce this damage, which demands many hours of time to repair, we have allowed commercial trappers to remove these animals since 1962 with the exception of 1974. Apparently, there was too heavy a take in 1973, so the manager felt that trapping would not be a wise management tool in 1974. We also allow the trapping of raccoon on the refuge. These animals have quite often disrupted our winter banding by getting into our swim-in traps and destroying the ducks in them. Raccoons are also quite adept at gaining access to the wood duck nesting boxes while they are in use.

Besides observations of muskrat, nutria, and raccoon signs of activity, the only other population data is the trapping take on the refuge since 1962. Although this information reveals a sustained yield of furbearers, it may not depict the whole furbearer story at Mackay Island Refuge because of the many changes in the trapping program and the unreliable information from the trappers. The data is shown below.

	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Nutria	365	562	260		528	324	740		489	485	581	346	941	57
Raccoon	38	104	75		119	51	189		0	2	8	5	74	15
Muskrat	0	0	10		6	2	2		203	280	283	146	214	768

In 1975 the refuge began taking 50% of the value of all raccoon captured on the refuge. The take certainly reveals the years in which the refuge was taking the 50%. In 1979 the trappers were allowed to keep their entire raccoon pelt value, but the north unit trapper was still required to remit 50% of the value of his muskrat take. In 1980 the trappers did not have to pay a share to the refuge.

Censusing the furbearer population at Mackay Island NWR is more complicated than many other Virginia and Maryland marshes because the muskrats here are mostly bank dwellers. An aerial survey only located 14 houses. Each fall the road and canal banks should be observed in an attempt to evaluate the populations. It does appear that the Great Marsh is producing a sustained yield of furbearers. Since the furbearer trapping program has been going on, the largest remittance to the Government in any one year was \$80. Usually the annual income to the Government is approximately \$25. Although necessary trapping is being carried out, it should not be done so cheaply. This year each trapper paid \$75 to trap on the refuge.

In late 1980 the refuge staff divided the refuge into four units for public bidding and each unit was bid upon for the 1981 trapping season. The following bids were awarded for 1981: Virginia North Marsh - \$233, North Carolina North Marsh - \$401, Middle Marsh - \$400, and South Marsh - \$175 for a total of \$1,209. Only two other bids were received, both on the Middle Marsh. Two of the bid winners and highest bidders were trappers that had trapped this refuge for years. We have obviously been missing a source of revenue by our past practices.

The trappers on the refuge this year and for the last few years were Eddie Fentress and Ardell Waterfield. Furs in this area are sold in the round and the average prices this year were \$7.50 for muskrat, \$3.00 for nutria,

\$10.00 for raccoon, and \$1.00 for opossum. With these price estimates it appears that the trappers not only removed many surplus animals, but they also received approximately \$5,643 for removing these furs while only paying \$150 directly to the refuge.

2. Other Mammals

Nothing to report. A species survey should be done.

3. Resident Birds

The bobwhite quail population appears constant over the years. There is no quail population data on this refuge, thus, any data on this bird is purely speculation based on casual observations over the past three summers. An old pasture adjacent to Quarters 72 is the site of some quail and songbird habitat management through staggered mowing cycles.

V. INTERPRETATION AND RECREATION

A. Information and Interpretation

Assistant Manager Hundley talked with a group of 15 Boy Scouts on Mackay Island about the U.S.F.W.S. and the part that refuges like Mackay Island play in the overall picture.

The office is taking shape as a contact point to meet the public. Assistant Manager McMinn's wife donated the time and effort to make curtains and a free carpet was acquired. We have received many complements on the office.

Assistant Manager McMinn was a guest speaker at the Knotts Island Ruritan Club meeting and showed the film "To Strike a Balance", gave a presentation to the Knotts Island Senior Citizens Club and took them on a guided tour of the refuge. Many of the ladies in the group had lived or worked on the refuge prior to its purchase. He also gave a slide show and a tour of the refuge to an enrichment class for advanced students in 3rd to 6th grades from Knotts Island and Moyock Elementary Schools.

The local affiliate of NBC interviewed McMinn in their studio for their "Tidewater A. M." show, which airs at 6:30 AM on weekday mornings. He discussed the closure of the bays and marshes on the refuge during the winter and the necessity and merits of non-toxic shot.

Twenty members of the Cape Henry Audubon Society made an all day birding hike on the refuge in November.

After years of planning and piles of paper work exercises, a modest start has been made at supplying the public with quality interpretive facilities. Money and manpower have been the major stumbling blocks. This year YACC and YCC supplied the money and manpower to complete a .3 mile self-guided loop trail. Located along the state highway that bisects the refuge marsh, it is passed by every one visiting Knotts Island. The preprinted information signs available from the sign shop worked out perfectly. We did add a thin plexiglass sheet to hold down minor vandalism.



80-9 ACH

The Great Marsh Self-Guided Nature Trail is the first foot-travel-only nature trail at Mackay Island.

B. Recreation

Fishing and crabbing in the canals and ponds throughout the refuge continues to attract large numbers of people and their trash.

It has become apparent to the staff that a refuge area not easily accessible to the public except by boat is finding an aesthetic attraction to a few sun-worshippers. So far they have fled at our approach. With time they may acclimate to our occasional passing.

C. Enforcement

About 40 gallons of gasoline was siphoned out of three refuge vehicles during the year.

Minor vandalism to rain gutters, tractor gauges, and signs around the shop indicate that children were using the area for fun and games.

Very little work on checking waterfowl hunters was done this year, as low waterfowl numbers and severe weather kept most home, including us.

Prior to opening day, we were receiving complaints of persons shooting ducks almost daily and without regard to being caught. Lady Luck smiled and a timely tip led to the apprehension of three local "sportsmen" with 17 ducks. People here don't mind anyone getting a "mess" for dinner but these boys were taking too many too often and we were called in. It was decided to seize the boat and contents, and the guns as evidence. That decision and the fact we caught them put a halt to the early season hunting in this area. We made some enemies, but many more local people came to us and thanked us for putting a slowdown to this activity.

There is a segment of the local population that thinks nothing of driving up and down the island and thru anyones fields shooting anything that moves. Most don't work regular hours so this activity can happen 24 hours a day, making enforcement chancy at best.

The following cases at Mackay Island NWR.

<u>Number</u>	<u>Offense</u>	<u>Fine</u>
3	Commercial fishing without permit	2 - \$50 each 1 - Warning letter
1	Trespass	1 - \$25
4	Illegal parking	3 - \$15 each 1 - Pending
1	No fishing license	Pending
2	Shooting over bait	\$200 each
1	Dog on refuge without leash	Pending
3	Possession of waterfowl out of season	\$200 each - 6 months suspended for 1 year, loss of hunting rights for one year (2 were fined extra \$50 each for attempting to run)
TOTAL CASH		<u>\$1,270</u>

Two juveniles were found clearing a three foot wide trail into the woods on the refuge across the street from their homes. They were given a verbal warning and also their parents were notified. What's interesting here was the parents. One was apologetic and hoped her son had done nothing wrong and assured us it would not happen again. But the other was irrate that we should concern ourselves with such normal behavior - what harm could they be doing - etc. etc. She could not understand that this is public land set aside for wildlife, not her children. Finally it had to be put to her that any further acts would be handled by the courts. She never agreed in principle, but would allow the boys to use her wood lot if they wanted to continue this activity.

VI. OTHER ITEMS

A. Field Investigations

Chris Pague, a herpetologist employed at the Norfolk City Zoo, has been given a special use permit to collect reptiles and amphibians on Mackay Island and

Back Bay NWR's. Mr. Pague is attempting to write a book on these animals in this geographical region.

A 12-foot x 12-foot deer enclosure built last year showed dramatically how much of an effect our deer herd is having on the plant community. Smaller enclosures in the winter wheat field on Live Oak Point gave the same results. No quantitative data were collected but the accompanying photographs show the difference when the deer are excluded.



80-4 ACH

The enclosure is to the left. You can easily see the difference in vegetation inside and outside of the enclosure.



80-5 ACH

This pile to the left was pulled from a 12' x 12' area near the enclosure. The right pile was pulled from inside of the enclosure. The significant difference in volume and plant diversity is easily seen here.

B. Cooperative Programs

1. Young Adult Conservation Corps

With the elimination of the ten-man camp last year, we maintained only one to four enrollees at a time and were able to pick them ourselves. We can say without hesitation that we were given more quality work by these young people than the previous camp ever tried to do.

Once these enrollees were shown how, very little supervision was needed. No more swim parties, vandalism, theft, or sloppy work. Major work accomplished: painting of nearly all the wheeled equipment, clearing brush for road construction, clearing debris from work sites, litter control and generally an extra pair of hands when needed.

2. Youth Conservation Corps

This year we had the YCC concentrate on building a trail at "Nick's Place". Brush needed clearing and the ground leveled. Wood boardwalks were built over areas too bad to fill in. This trail was discussed further under I & R.

The continued assistance of the YCC and YACC in checking wood duck boxes helped greatly in obtaining as much data as we did.

C. Items of Interest

Assistant Manager Hundley attended the following training sessions:

February - Raptor Information Course NWF - Annapolis AO - 2 days
June - Weapons Qualification - SRA Davenport - 1 day

Assistant Manager McMinn attended the following training sessions:

February - Supervisory Training Part B - Boston, Mass. - 5 days
February - FLETC, Glynco, GA - 9 weeks
June - Weapons Qualification - SRA Davenport - 1 day

Maintenance Mechanic Pittman attended the following training sessions:

March - FLETC, Glynco, GA - 4 weeks
June - Weapons Qualification - SRA Davenport - 1 day

Assistant Manager Hundley participated in his third St. John's River banding assignment in September. The assignment this year was divided among two crews, each of which was to be in Canada for three weeks. The first crew caught approximately 1,600 ducks in three weeks, and the second crew caught only 600 ducks in their two and one-half weeks there. The black duck quota of 500 was surpassed with a grand total of 810 black ducks and only 13 of those birds were adults. With a 500 black duck quota the previous four years, the Canadian station netted 24, 23, 15 and 6 AHY black ducks. Thus, the extended banding operation and the later arrival did not accomplish the intended goal. It does appear that the black duck production in that area was quite good this year.

Revenue Sharing payments for the Currituck County segment of Mackay Island NWR are as follows:

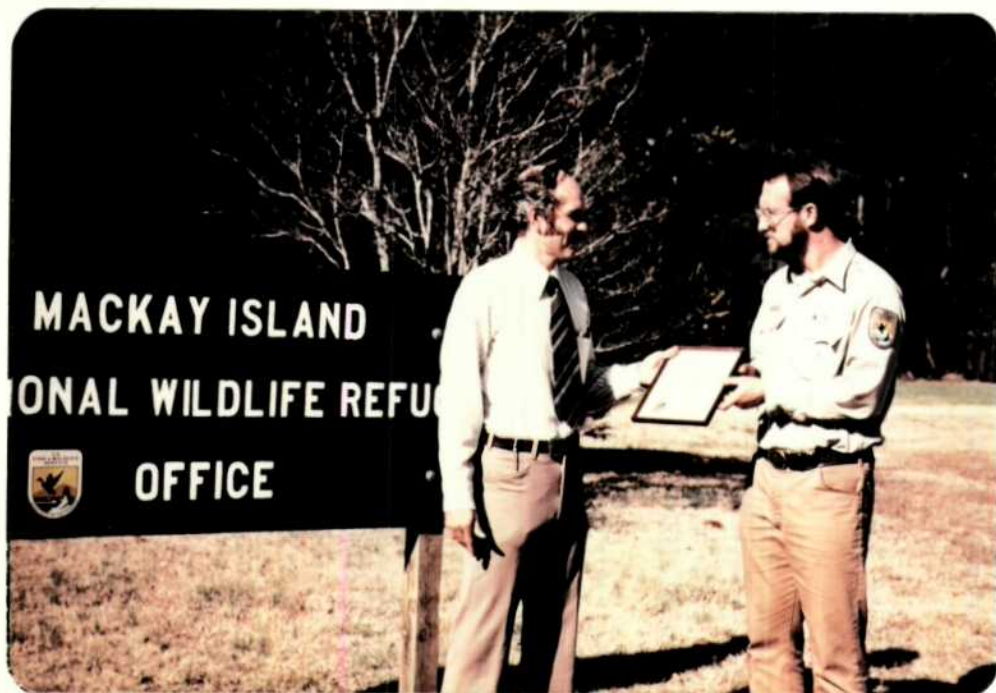
Fee Lands Appraised/ Adjusted Cost	FY	75% Appraised Adjusted Cost	% of Payment
	71	\$4,409.45	100
	72	\$4,492.45	100
	73		100
\$613,492.92	74	\$4,601.20	100
	75	\$4,601.20	100
\$1,104,624.00 (15 mo)	76	\$7,534.37	80
	77	\$6,120.00	74
	78	\$4,292.82 & \$2,201.00	78
P. 95-469 effective	79	\$4,084.00 & \$2,202.00	76
	80	\$8,285.00	100

Payments to the City of Virginia Beach are insignificant for the 800 acres of refuge marsh in that jurisdiction.

Free-use permits were issued this year for the following purposes:

Cutting Firewood	81
Cut Trap Stakes	1
BSA camp out	1
Cutting cord grass for blinds	4
Remove pieces of an old barn	1
Cut net poles	1
Wildlife Photography	1
Hiking in closed area	2
Remove excess spoil dirt	1
TOTAL	93

On December 2, the North Carolina Department of Natural Resources and Community Development incorporated Unit 6 of the refuge into the North Carolina Registry of Natural Heritage Areas. A representative presented a plaque to Assistant Manager Hundley. Local news media were notified, but most did not think it newsworthy as none showed up. A news release was published by a North Carolina paper to which almost no one in the local community subscribes.



80-21 MJM

North Carolina Department of Natural Resources representative Charles Roe presents the plaque identifying the refuge Unit 6 as a Natural Heritage Area to Assistant Manager Hundley.

As the complexity of the maintenance worker position increased, so did the skill of the person filling that position at Mackay Island. When that position was reevaluated, it was determined that the position was actually a maintenance mechanic, thus Pittman was classified a WG-10 from a WG-8 on July 27, 1980.

Your tour guides through 1980 at Mackay Island were Assistant Manager's Hundley and McMinn. Hundley wrote Sections I, II, and III while McMinn wrote Sections IV, V, and VI. The entire report was edited by Hundley, reviewed by Project Leader Bond, and typed and proof read by Mrs. Ford and Teresa Cherry. By taking advantage of an Arby's restaurant free developing program and having a personal friend who prints color film, Assistant Manager Hundley was able to get the entire photo assemblage (film, developing and duplicating) for less than \$15.00. This amounts to a savings of \$50.00 or more.

D. Safety

Another year has lapsed with no lost-time accidents to report for the staff. No lost-time accidents have occurred since the refuge was first manned on September 25, 1961, a total of 6,853 calendar days.

A YACC enrollee had a reaction to poison ivy bad enough to keep her home for two days.

A basic first aid and CPR course was given to the Mackay Island and Back Bay NWR staffs and YACC enrollees.

RO Safety Officer Jim McKnight made a visit to the refuge this year. He recommended revamping the wiring in the quonset hut. That job has been placed in the ever increasing "as funds allow" category.