ROUTING SLIP — DIVISION OF WILDLIFE REFUGES — DATE: 12-4 1940

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✓	~~MR. ELMER~~	G		~~Mr. Smith~~	PNS
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	~~Mr. Earachaw~~	EB		Miss Price	
	~~Mr. Ackerknecht~~	Eva		~~Miss Whorley~~	VW
✓	SECTION OF STRUCTURES:				
	~~Mr. Taylor~~	RWT.			
	~~Mr. Gustafson~~	WG			

REMARKS: Bombay Hook Quarterly Request - October 1940

Return to: Cook

IN REPLY REFER TO
R
Bombay Hook
Quarterly
Narrative
Report
Aug.-Oct. '40

REGION No. 5
NEW ENGLAND STATES
NEW YORK
PENNSYLVANIA
NEW JERSEY
DELAWARE

UNITED STATES
DEPARTMENT OF THE INTERIOR
~~BUREAU OF BIOLOGICAL SURVEY~~
Fish and Wildlife Service
OFFICE OF REGIONAL DIRECTOR
1140 PARK SQUARE BUILDING
BOSTON, MASSACHUSETTS

December 2, 1940.

Director,
Fish and Wildlife Service,
U. S. Department of the Interior,
Washington, D. C.

Dear Sir:

We are submitting herewith the Quarterly Narrative Report for the Bombay Hook National Wildlife Refuge for the period August 1 to October 31, 1940. This report has been carefully reviewed and we are forwarding it without comment.

Very truly yours,

John H. Sutherlin

John H. Sutherlin,
Regional Refuge Supervisor.

Enclosure

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Quarterly Narrative Report
August, September, and October, 1940

INDEX

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1. General

A. Weather Conditions.

	Rainfall	Maximum Temp.	Minimum Temp.
August	5.98	93	54
September	4.47	90	41
October	1.68	80	29

The rainfall records shown above were obtained at the official weather station at Dover, Delaware, located approximately 7-3/4 miles southwest of the refuge headquarters.

The month of August marked the end of the summer drought, with rain on the first, then seventh, and on seven other days during the month. There were a few hot days during the month, but for the most part, August can be described as "good mosquito weather", that, is very moist, with easterly winds.

The month of September also opened with heavy rain, but this time the rains were accompanied by extremely high tides. The heavy rain which started Saturday night, August 31, and continued until Sunday noon, September 1, caused enormous damage to private and public property throughout New Jersey and Delaware. Dams were washed out, causing the destruction of super-highways, bridges and towns. The nearest destruction of this sort

occurred at Smyrna, Delaware, about 8 miles northeast of the refuge, where a dam was washed out. Water from the burst~~ed~~ Highway Bridge-Dam at Lake Como in Smyrna did not flow through any part of the Refuge, as was assumed by certain officials. Water from Lake Como enters another divide known as Smyrna River, not connected with the Refuge.

Clear weather prevailed until the night of September 8th, when the most severe electrical and rain storm of the season occurred. In fact, lightning struck our equipment shed, and burned it and its contents to the ground. Rain next occurred on the eleventh, followed by fourteen days of hot, sultry weather, during which the insects were dreadful. On September 25th, the spell was broken with north west winds of almost tornado force, and heavy rain. Corn fields were damaged greatly, and trees were uprooted. During the wind storm the temperature dropped from 86 degrees to 54 degrees, and the following morning the mercury stood at 42 degrees, a record for this locality.

Delightfully cool weather, with six rainy days evenly distributed throughout October, completed the quarter. Another weather record that deserves mention is; a light snowfall occurred on the night of October 19th, but disappeared by 9:00 A.M. the following day.

B. Water Conditions.

The refuge was not entirely immune from the effects of the Labor Day-Weekend flood. Buildings were not damaged, but a 6' section of the

Finis Swamp causeway was washed out, and backwater from the causeway inundated privately owned lands which are in the process of acquisition. Recommendations have been made to increase the size of the spillways in the Finis Swamp causeway.

Shortly after daylight on the morning following the deluge, the rainwater runoff was flowing through Finis Swamp at elevation 4.7, which is about three feet above normal water elevation. The flow remained at about elevation 4.7 for three hours, and then slowly dropped. Incidentally, most of the local damage occurred before daylight, so it is reasonable to believe that the water in Finis Swamp was at elevation 4.7 or above, for considerably longer than three hours.

However, a very great amount of fresh water flowed through our proposed impoundment areas, and it is certain that had the dikes been completed, our pools would now be filled to the required elevation.

During the month of September, extremely high tides occurred with each rain and east or northeast wind. Normal high tide is about elevation 1.5, and the tides during the equinox reached elevation 2.5 regularly. On three different occasions, during storms, high tide covered a bench mark set at elevation 3.77. No damage was caused by the high tides, but a great amount of benefit was realized from them. All sections of the marshland were thoroughly inundated, leaving shallow standing water in all depressions not connected to tidal streams. This of course is a very desirable condition,

especially when it occurs immediately before the fall migration of waterfowl.

The water in our one completed impoundment, Raymond's Pool, is at an all time high, now at the close of the period. Heavy fall rains, gathered from a very small water-shed area of about 50 acres, have raised the water from marsh elevation to 18" above average marsh elevation. This is an increase of three inches more than the previous record, obtained after the spring thaw, 1940.

2. Wildlife

A. Waterbirds, Shorebirds, Upland Game Birds and Birds of Prey.

All species which have been observed during this period are listed below in the order of the American Ornithologists' Union check list.

As in the past, it must be remembered that there are no large concentration areas on the refuge, where large numbers of waterbirds can be observed and numbers estimated at one time. Waterfowl are found in scattered flocks, throughout vast areas of broken grassy marsh; and estimates with any degree of accuracy are impossible. The figures which are shown in the following accounts are used to indicate relative abundance, and convey the most accurate impression possible of our waterfowl population.

Pied Billed Grebe. Six young and two adults were seen repeatedly

during the first part of the period. Now, at the close of the period the Pied Bills are of course, more wary, and are seen less frequently They are indigenous to only small sections of the area, namely the fresh-water pools, where they can be considered common.

Cormorant, Double-crested only. First seen on October 5th, this year, one bird. It was seen flying over the open baywaters, then perching on an old piling. Small flocks have been seen since then, but all have occurred over the Bay, and not on the Refuge. They are scarce in number.

Great Blue Heron. This species has been abundant throughout the entire period, on all water areas of the refuge. There was no nesting activity on the refuge, but a large nesting rookery has been located about 25 miles north of here. With the advent of colder weather, the number of Great Blues has increased, and they are more numerous on the salt marshes, along tidal streams, than elsewhere.

Egret, American. Summer resident, but not a breeder. Although present on the refuge since early spring, these birds did not start to become numerous until late in July. Their numbers increased steadily until early October, when they appeared to reach the peak of their abundance. Although no accurate counts could be made, it is estimated that about 3,000 American Egrets were on the refuge area at that time. On October 30th, their number is estimated at 500.

Snow Egret. The only Snowies that were seen this year were two birds which appeared on August 2nd, and were seen frequently until October 6th.

Louisiana Heron. One Louisiana Heron was seen on September 8th. There were no other records this period.

Little Blue Heron. Little Blues were numerous throughout the entire period. They did not nest on the refuge, but both adult and immature birds reached the peak of their abundance in late September. At the close of the period their numbers were greatly decreased.

Little Green Heron. A few pairs of Little Greens nested in the Refuge swamps, and they were quite common in those sections throughout August and September. The last seen was one bird on October 5th.

Black Crowned Night Heron. This species was abundant during the entire period. They frequent all sections of the refuge, and an estimate of their numbers is impracticable. There was no nesting on the refuge, and the peak of their abundance occurred about October 1st.

American Bittern. This is a nesting species on the refuge. It is a solitary nester, and most nests occur in salt marsh, near an upland fringe. The bird has no conspicuous habits, and is usually seen only when flushed, and flushing occurs quite frequently. Therefore their abundance can be given as common.

Least Bittern. This species is quite rare on the refuge. They occur during the spring migration, are only occasioned during mid-summer, and then occur more frequently during late summer. The last seen on the refuge was one bird on October 9th.

Canada Goose. The migration of Canada Geese was first noticed on October 10th, when a flock of 126 passed over the refuge. Similar flocks have been seen almost daily, since that date. No Canada Geese have been seen to alight on the refuge, or use the area in any way during this period. Our two adult birds that were found crippled last year, and nursed back to health, are still on the new impoundment. Other birds join them occasionally, but in small numbers, and it is believed that these birds are semi-wild, and not migrants. No Canada Geese were known to have nested on the refuge this year.

Mallard. This species has, in the past, been comparatively rare on the refuge. There was no evidence of wild Mallards having nested on the refuge this season, and the first migrating birds, about thirty in number, were seen on September 26th. Mallards did not remain on the area very long. They seemed to be most abundant about October 10th, with a possible population of 500 to 600 birds. Although small flocks of just Mallards have been seen, they are usually found among the Baldpates, Gadwalls, Blacks, and Pintails. Their numbers are now greatly reduced, and at the close of the period our Mallard population appears to be about 300.

Black Duck. The fall migration of native Blacks was noticably under way in late August and early September. Flocking began at that time, but the first influx of the northern (Red-legged) Blacks was first noticed on October 10th, when they occurred with regularity throughout the entire refuge. The Red-legged variety appears to be in the minority, although a break-down showing the number of each is impossible. The estimated number of Black ducks on the refuge at the close of the period was 4,000 to 5,000.

Gadwall. The Gadwall was one of our earliest migrants this fall. Small flocks totalling 168 birds were seen and counted on September 26th. Their numbers increased steadily until on October 16th, they appeared to have reached their peak, with an estimated 500 birds. They are still present, and their numbers appear to be fluctuating slightly.

Baldpate. The Baldpates arrived with the Gadwalls. On September 26th, a flock of 32 were seen, and further checks the following days, revealed that about 3 to 4 hundred were here during the last few days in September. A rapid increase in the numbers of Baldpates occurred during the second week in October, and then again during the last week in October. Their numbers are now estimated at 2,000.

Pintail. The first Pintails to be seen this fall were 14, on September 29th. Their numbers were not all consistant, and a dependable population of

Pintails was first noticed on October 10th, with an estimated 300 birds. Inconsistancy still remains, and the largest Pintail count on the refuge was taken on October 27th, with an estimated 500 birds recorded.

Green Winged Teal. The first Green-winged Teal were seen on September 30th, when they occurred in a small flock of 19 on Raymond's Pool. A few days later, they were noticed on the tidal sections of the refuge, and their numbers by October 30th, had increased to what appeared to be 5,000 to 6,000 or, abundant.

Blue Winged Teal. The fall migration of Blue-wings was first noticable in late August, when our locally reared birds began to flock. The influx of migrating birds was hardly noticable, and lasted for only a short time. In fact, to illustrate the fluctuation we can say that early in September the Blue-winged Teal appeared to be about 1,000 strong. By the first of October they were almost outnumbered by the Widgeon, and by October 16, they were scarce. They are still present, but seen only occasionally, and in two's and three's.

Shoveller. Here also, the first of the fall migration was signified by the flocking of our locally reared birds, first noticed in late August. However, unlike the Blue-wings, there was, and still is, an ever increasing movement of Shovellers through the refuge. In early September, the numbers of Shovellers had increased from about 250 to 400. The number appeared to remain about the same from September 10th to October 10th when huge, abrupt

changes were noticed. On October 16th an estimated 1,200 Shovellers were within the refuge boundaries. Unlike the Green-wing's, the migrant Shovellers first appeared on the tidal streams and outer marsh areas. When they became numerous, they too showed a preference for the new Raymond's Pool area. Now at the close of the period, Shovellers are still abundant, and an estimate of their numbers is 1,500.

Wood Duck. The first fall migration of waterfowl species, not reared on the refuge, was a flock of 32 Wood Ducks, which appeared on September 15th. The flock was seen almost daily on the new impoundment, Raymond's Pool, and increased to 87 on October 12th, when this flock was last seen. Occasional single birds are seen now at the close of the period.

Canvas-back. No Canvas-backs have been seen within the refuge boundaries this period, but the first flocks of migrants passing through this vicinity, were seen on October 16th, when long lines could be seen flying south, far off shore, over Delaware Bay. These lines of birds can be seen almost daily, particularly on cold, windy, and rainy days.

Scaup, Greater and Lesser. We have a very important record to report on the Scaup. On September 10th, one Scaup duck was seen on Leipsic River, within the refuge boundaries. This Scaup was in its summer, or immature plummage, and its sex was not detected. This incident, I believe, does not indicate the first of the Scaup migration, since no Scaup were seen thereafter until October 16th. Here again, the large numbers were

seen off-shore, in the bay. Flocks of 10 to 100 were often seen in the large tidal streams within the refuge, and are always found a short distance off-shore. Their numbers are so inconsistant that figured estimates may be misleading. However, on October 27th, 650 Scaup were counted on the river, and there were probably 500 to 600 more along the bayshore, making an estimated total on that day, of approximately 1,250 Scaup.

Ruddy Duck. Another record was obtained on the Ruddy. After the spring migration had drawn to a close, one male Ruddy duck was seen on the new impoundment. He appeared intermittently during the late spring, and was last seen alone on June 27th. On June 29Th, there were two. It was quite obvious that they did not nest. They were seen almost daily until July 28th, and then absent until August 29th, when they re-appeared, and remained until last seen on September 10th. Migrating Ruddies appeared in a flock of 18, on October 31st.

Mergansers, Hooded. First seen on October 16th, in small numbers. Slight increase noted to date, such as 10 to 26.

Mergansers, Red-brested. First seen on October 18th, one flock of four, a slight increase has been noticed since then.

Turkey Vulture. Very abundant as usual. No black Vultures have been recorded during this period.

Cooper's Hawk. The Cooper's Hawk was not seen during the summer, but the first fall record is on August 23rd. They are rather scarce, but appeared most frequently from September 10th to October 16th. Only one has been seen since then.

Red Tailed Hawk. One pair raised two young this summer, and the first migrants were noticed on September 10th. We can frequently count 5 or 8 Red Tails in a few hours, and be reasonably certain that none have been counted twice.

Red Shouldered Hawk. This species has been more frequent this year than before. Onepair nested, that I know of, although others were present during the nesting season. Fall migrants were noticed on September 16th, and three were the greatest number seen at one time.

Rough-legged Hawk. The first of this species to appear on the refuge this fall was one bird on October 23rd. One more appeared on October 28th, making a total of two at the end of the season.

Bald Eagles---are always common on the refuge. One nesting pair reared one pair, and the young, and adults were seen regularly until about August 15th. Adults only have been seen since September 1st.

Marsh Hawks---are always abundant, so much so that a fall migration is hardly noticable, except for the color.

Ospreys---raised two nests of young on the refuge, supplied fish for the young eagles as well as for themselves and their young, and were last seen on September 29th.

Duck Hawks---are exceedingly scarce, so far this fall, either the migration is late, or the birds have decreased. I have only 4 records so far, all single birds, seen on October 10th, 18th, 19th, and 29th.

Sparrow Hawk. Breeder, always abundant, especially after October 1st. on.

Bob White. What appeared to be a very favorable season for the quail, turned out not so good. Nesting appeared up to par, and hatching appeared very favorable, but rearing was extremely unsuccessful. A very complete upland game census was attempted on September 29th, and particular areas were covered at various later dates. A total of three covies were found, containing 47 birds. The covies are not hard to find, and seem contented to remain on about 50 to 75 acres of ground.

Pheasant, Ring Neck. Pheasants were plentiful until well after the nesting season. Three broods were raised on the refuge, but here again, the rearing does not appear to have been successful. Out of thirteen adults, (nine males and four females), this apring, three clutches were hatched, one of 11, one of 13, and one of 8, and now only three males, and two females can be found on the refuge! Perhaps they are moving out to other lands, less heavily populated? (See statement under Groups, Upland Game.)

King Rail. This species was quite plentiful on the refuge during the summer. The last King Rail seen this fall was on October 18th.

Clapper Rail. This species was quite plentiful on the refuge during the summer. The last Clapper Rail seen this fall was on October 18th.

Virginia Rail. More scarce than the King or Clapper, and also last seen this fall on October 18th.

Florida Gallinule. One of the species which nested on refuge, became very abundant during September and early October, and last seen on October 18th.

Coot. Also a nesting species. Fall migration of Coot was first noticable on September 29th, when they were "common". They have increased steadily, and there now appears to be about 150 on the refuge.

Killdeer. Abundant all period.

Black Bellied Plover. Rare, very rare. Seen only once during the period, October 3rd, 11 birds in one flock.

Woodcock---have been very scarce this fall. The first seen on the refuge was on September 29th. Two were flushed later, on October 18th. That's all.

Wilsons Snipe---have occurred with usual punctuality, the first hard rain in the fall, which occurred on September 1st. Following this rain, nine Snipe were located. They are seen frequently now, both on the salt marsh, and upland pools.

Spotted Sandpiper. This is one of our nesting species, which did not figure in a fall migration, except to leave here. Spotties were plentiful until October 16th, when they decreased greatly, and are seen only occasionally now.

Willets. Willets were "all over the place" during the first part of the period. Young which were hatched late, were learning to fly, others could and did fly, and the adults were here, all were making a terrible din whenever observed. Their numbers can be described as plentiful. The fall migration for this species was also a gradual reduction in summer birds, which began about August 15th, and the last Willet was seen on October 10th.

Yellow Leggs, both Lesser and Greater. A slight increase in the numbers of summer residents, during late August and early September, marks the fall migration of Yellow Leggs. A slight decrease was noticed about October 18th, and now at the end of the period, Yellow Leggs are "plentiful".

Sandpipers, Least and Semipalmated. Same as above.

Herring Gull. Always present. "Common".

Terns, Least and Common. Accidental during August and September only. Rare in early October.

Mourning Dove. The fall migration of doves during this season is much larger, proportionally than the nesting population. The fall migration began in late August, with the first noticable flockings, although small at that time. On September 4th, 68 doves were counted in 15 minutes of watching a quarter-mile section of Osage Orange hedgerow. The migration apparently reached its peak on October 1st, with an estimated 400 doves on the refuge. They are greatly diminished now, and it appears as though we might have about 150 left.

Black Billed Cuckoo. Nesting species, common, prefers the thick Osage Orange hedgerows and Crataegus spp. which are overgrown with honeysuckle. Departed in number by August 15th, seen very occasionally throughout the remainder of the period. Last one seen on October 29th.

Barn Owl. Nested in old buildings on the refuge, and still present in numbers at close of period.

Screech Owl. Common throughout period. No migration.

Barred Owl. Nested in the refuge woodlands, quite common at all times.

Great Horned Owl. Year round resident, two at all times.

Short Eared Owl. Nested on the marshland, plentiful in September. Slight decrease in October. Common at present.

PASSERINE BIRDS

Species Recorded this Period	Remarks
Whip-poor Will	Common in late August and September only.
Night Hawk	Common in late August and September only.
Chimney Swift	Breeder, departed September 9th.
Humming Bird	Breeder, departed August 15th.
Kingfisher	Year round resident, common.
Flicker	Breeder, year round resident, common.
Red Bellied Wood Pecker	Breeder, Rare, still present.
Hairy Woodpecker	Summer resident. Rare this period.
Downy Woodpecker	Breeder, common year round.
King Bird, eastern	Breeder, common, departed September 10th.
Crested Flycatcher	Breeder, common, departed by September 10th.
Least Flycatcher	Breeder, common, departed by September 1st.
Wood Pewee	Breeder, common, departed by September 10th.
Norther Horned Lark	A very rare record was obtained this period. One male Northern Horned Lark was seen from my office window on July 30, and August 3rd. I called my assitant, and we both observed it very carefully, and immediately agreed as to species. Ordinarily, these birds occur in this vicinity after the onset of cold weather, or next period.

Species Recorded this Period	Remarks
✓ Tree Swallow	Breeder, common, departed by September 10th.
✓ Barn Swallow	Breeder, common, departed by September 10th.
✓ Purple Martin	Transient. Late August and early September.
✓ Blue Jay	Breeder, year round resident; rare.
✓ Crow	Always abundant. Flocking started August 16th.
✓ Fish Crow.	Always abundant, flocking started August 16th.
✓ House Wren	Breeder, always present, scarce.
✓ Carolina Wren	Breeder, always present, scarce.
✓ Long Billed Marsh Wren	Breeder, common; departed on September 29th.
✓ Short Billed Marsh Wren	Breeder, common; departed on September 29th.
✓ Mocking Bird	Rare breeder; Fall migrant in small numbers.
✓ Cat-bird	Breeder, scarce; still here.
✓ Brown Thrasher	Breeder, common; departed by September 1st.
✓ Wood Thrush	Breeder, scarce; still present.
✓ Robin	Breeder, common in summer; abundant in spring and fall.
✓ Blue Bird	Breeder, fairly common; very abundant on October 28th, the peak of the fall migration.
✓ Shrike Northern	Transient, arrived September 15th, Common October 31st.
✓ Starling	Always abundant.
✓ Northern Yellow Throat	Breeder, common; departed by August 15th.
✓ English Sparrow	Always Abundant
✓ Bobolink	Fall migrant, September 10th to October 15th.
✓ Eastern Meadow Lark	Breeder, also migrant. Most numerous from September 10th to end of period.

	Species Recorded this Period	Remarks
✓	Red-winged Blackbird	Breeder. Most numerous after September 1st. Males only after October 21st.
✓	Orchard Oriole	Breeder, scarce; departed by September 1st.
	Purple Grackle	Breeder, common; flock for winter October 10th.
✓	Cowbird	Egg layer; fall increase noticable on September 10th.
	Cardinal	Breeder, scarce; migrant after September 20th, plentiful.
✓	Indigo Bunting	Breeder, scarce; departed by August 15th.
✓	Goldfinch	Late summer visitor; fall migrant.
✓	Towhee	Breeder, common; departed August 22nd.
✓	Savannah Sparrow	Breeder, scarce; fall migrant, common.
✓	Henslow's Sparrow	Summer visitor, rare; fall migrant, common.
✓	Sharp-tailed Sparrow	Breeder, common; migrant, scarce.
	Seaside	Breeder, scarce; migrant scarce.
	Vesper	Summer visitor, fall migrant.
✓	Junco	Summer resident, rare, fall migrant, abundant.
✓	Tree Sparrow	Summer visitor, common; fall migrant, abundant.
✓	Field Sparrow	Breeder or summer resident, undertermined as yet, but rare in summer. Common in fall migration.
✓	White Crowned Sparrow	Fall migrant, common
✓	White Throated Sparrow	Fall migrant, common
✓	Fox Sparrow	Fall migrant, common
✓	Swamp Sparrow	Breeder, rare; fall migrant, rare;
✓	Song Sparrow	Breeder, always abundant.

Waterfowl Group, and the Opening of Duck Shooting.

The fall migration of waterfowl was a great event in this vicinity. During early October, the migration was not spectacular, and the prospects for a good waterfowl season, were rather slim. However, the first day of the shooting was very cold, with strong northeast wind, and plenty of rain, followed by a number of days of strong wind and rain. This condition ushered in our first big movement of waterfowl. It was the most ducks that have been seen by many, in one day, even for the "old-timers". Gunners were very successful, but the outstanding event of the day was the huge, continuous lines of Pintails and Scaup, which passed high overhead. Moving southward. This same condition was noticed on many following days, and it is very apparent from this observation point, that waterfowl have increased tremendously this year; or, there has been a complete change of flyways.

On the first day of shooting, I checked 28 duck blinds on streams adjacent to the refuge. There was a total of 61 men in the blinds and parties, and I counted 246 dead ducks (none banded). Many of the gunners had not been shooting, at least at ducks, due to inexperience in some cases, and drunkedness in others. In other cases, some gunners had their limit by 8:00 o'clock, and were on-the-way toward shore. In other words, the sportsmen have nothing about which to complain, during the first two weeks of waterfowl shooting in this vicinity. Ducks were plentiful, and it appears that we are fulfilling our obligation to the taxpayers.

The impoundment of water in the Raymond's Pool area has been a great attraction for waterfowl. This area is on the west side of the refuge, farthest from the waterfowl shooting areas. After the first day of bombardment, the new pool area was well populated, and has remained so; notwithstanding the fact that one large dragline, one dredge, and one Diesel caterpillar tractor, plus CCC trucks and crews are contantly working on the bank of this 100 acre area. The disturbance caused by the construction facilities mentioned above, is in most cases, sufficient to frighten wild ducks from resting or feeding areas within a one mile radius. Notso here, three to four thousand ducks can always be seen, ranging from 300 to 700 yards from the roaring, screeching, grinding machinery, with emit explosions not unlike rapid gun fire. On Saturdays and Sundays, spectators by the dozens stand, stare, and remark at the numbers of ducks, and their tranquility.

This impoument, the new Raymond's Pool, is by far the most heavily populated 100-acre-section on the refuge. Very little feeding goes on here, since food plants have not become established in this newly altered salt marsh. Much gravel is taken from the banks, and along the borrow pits, since every night, when walking the banks, birds can be seen, heard, and flushed along the entire length.

Formerly, great numbers of ducks could often be seen at high tide, resting or feeding on the large, practically bare mudflats which go dry

at low tide. This season, the waterfowl appeared to have forsaken these mudflat areas, for the stable-water area in the new pool. Heavy feeding was noticed again this fall in the broken, tide-flooded marshes and brackish pools throughout the entire salt marsh area. The greatest number of waterfowl seen on the refuge to date was an estimated 16,500, and about one fourth of these were seen on the new 100-acre impoundment.

Wader Group

The Herons, Egrets and Bitterns, which formerly occurred in small scattered numbers throughout the refuge, or wherever their particular habitat prevailed, have also shown a preference for the new impoundment. Every night the croaks, squaks, and hoarse guttral screams of hundreds of Great Blues, American Egrets and Black-crowns, can be heard as never before, on any section of the refuge. This is something entirely new, and very much of a spectacle to us as well as our Natural-History minded friends. It is my prediction that a nesting rookery of Herons will very likely be established near this impoundment during the coming nesting season.

The Heron and Egret populations on other section of the refuge seem not to have been changed, and it is therefore believed that our Heron population has been greatly increased, due to the completion of the new impoundment.

Shorebirds, Terns and Gulls.

The population and behavior of shorebirds appears to be unchanged. No exotic species were recorded this period, and the new impoundment provided nothing particularly attractive except an increased amount of shoreline. Only a few Terns, least and Common were on the refuge during this period. They were seen on the new impoundment more frequently than elsewhere.

Disease.

Two sick black ducks were caught on the salt marshes of the refuge, on August 9th. The ducks were crated immediately, and shipped to the Patuxent Research Station in Maryland, where they were examined and treated by Dr. Colburn. Dr. Colburn communicated with us, advising that, "These ducks were suffering from botulism. No determination of the type of bolulism present was made though it was very probably type C". One of the ducks was dead upon arrival and the other recovered following a water flushing and rest period. No other sick ducks were in evidence on the refuge.

The summer period, before the ducks were found, had been very hot and dry, although tides kept the ground water-table in the marsh high enough to maintain water in some of the deeper pools. Much dryer conditions

have prevailed in the past, and water is always available in the tidal streams. If the disease was botulism, it was not caused by lack of water.

B. Upland Game Birds. (In accordance with instructions contained in Division Memo #91, all upland game birds were included in the bird record portion of the report, and listed in the order of the A. O. U. check list.)

Upland game foods were very abundant this season, and very mild weather conditions have made food patches unnecessary as yet. Cover is also excellent, as usual. The great decrease in Pheasants and Quail on the refuge was first noticed in the early fall, when investigations could safely be made with a dog. Broods were often seen along the refuge roadways in early summer, but the fall population indicates a movement outward. Great damage was caused by foxes, which are ever-increasing, and this might account for the upland game which was supposedly reared on the refuge.

C. Big Game. No big game.

D. Fur Bearing Animals.

Cotton-tails, which seemed to be so numerous this spring, have shown the same alarming decrease as the Quail and Pheasant. With food and cover conditions very good, and disease unnoticable, it is reasonable to assume the heavy depredations by foxes have influenced the population trend of Cotton-tails.

Foxes--as mentioned above, the number of foxes on the refuge has increased greatly. Four or five can be seen each morning along the refuge roadways, and they are becoming so bold that they are often seen during mid-day, around the headquarters buildings. Signs of depredations, that is, fox-killed ducks, rabbits, muskrats, quail and pheasant appear frequently along hedgerows, on brush areas, and along the border of the marsh, and on the marsh proper. Foxes are often seen on the marsh, in fact, one day while riding on a small stream at high tide, a fox was seen running along the bank, parallel to the stream. He seem reluctant to run through water, and clung to the higher marsh which bordered the stream. We chased him for about one-half mile when he finally veered off across wet broken marsh, heading for George's Island.

Muskrats. The population of muskrats on most areas in the refuge is greatly reduced this fall. Signs of muskrat activity noticable this summer were quite misleading. However, the muskrats are now preparing their winter quarters, and their numbers are clearly discernable. The muskrat population on the refuge area, as a whole, appears to be about one-third that of last year, and this I believe, can be attributed directly to "winter kill", plus hard trapping after the extreme cold period of last winter. Muskrat foods are abundant, with absolutely no signs of "over grazing."

Skunks--have shown a considerable increase over their last years' abundance, and control methods may be required in the future.

Raccons, Opposums, and Grey Squirrels---are numerous, and their population appears to remain the same.

3. Refuge Development and Maintenance.

A. Physical Development.

The construction of the refuge boathouse, on Whitehall Landing, comprises the most important work project this period. Most of our CCC Camp has been used thereon during this period. The boathouse is not completed.

Much hand labor has been used in levelling the top of the New Raymond's Pool dike, and ditches have been dug adjoining concrete water-control structures on the proposed major impoundment areas.

Most of the fill for the new boathouse roadway was hauled and placed this period, and considerable grading was performed around the boathouse.

Another unit of the Experimental Mosquito Control Research Project was undertaken and completed this period.

Very little was done on the marsh water-control structures (Gut structures) this period, because men and equipment were "tied-up" on the boathouse.

A new grease rack and oil house were built by CCC at the headquarters this period.

The observation tower, which was started in March, is now nearing completion.

Refuge funds and personnel were used to install plumbing facilities necessary to drain the water lines in the refuge buildings.

NYA boys were used to sheath the inside of the work shop in the Service Building; repair and up keep on trucks and the refuge tractor; seed the headquarters lawn; shell corn; sharpen tools; clearing land for cultivation; preparing materials for boundry gate; carrying posts for marking test-type plots; repairing fence; discing and plowing; seeding; repairing farm equipment; and repairing bird banding traps.

A large old hay boat, the hull of which was very badly decayed, and about to sink, was obtained from a local private boat owner. This hull was towed to the mouth of Hay Ditch, on the bayshore, and sunk in the stream. In this way we hope to affect a dam in the stream, and hold tidewater in a stabilized manner, on a large area of salt marsh which is drained twice daily by tide action in Hay Ditch. A severe storm occurred on the day the hull was left in the stream, and strong winds and tide broke her bonds, so she didn't sink exactly where we had intended. It cannot be moved now of course, but we have hopes that sufficient silting will occur to cause an effective dam.

B. Plantings.

No aquatic plantings were undertaken this period. (I assume that volunteer stands of important plants should be mentioned under this heading). Wild Rice, Zizinia acquatica was found on the refuge this summer for the first time. I found it while attempting to locate the beavers that were in Finis Swamp last winter and spring. No beavers were found, but wild rice was found growing in small openings in a dense woodland swamp. The seeds had fallen, but it was unmistakably wild rice. Stands were very thin, sparce, and small. Nevertheless, we now have wild rice growing within the proposed impoundment area.

Approximately 20 acres of brush-covered, over grown fields were cleared by NYA, ploughed, disced, and planted with a mixture of soybeans, corn, millet, oats, rye, barley, and wheat. Seeding was done with a hand operated seed sower (cyclone). Because of the many low, wet areas, this land had to be ploughed during dry weather. Share croppers will use these lands for corn next year, after the cover crop (mixture mentioned above) has been ploughed under.

The refuge cornfields have not been harvested to date, but it is estimated that approximately 600 bushels of corn will be surplus to our needs, from the present crop.

The soy beans, which are to be retained by the share croppers, turned out rather poor, due to dry weather, and poor land. As a whole they should average about 9 bushels per acre. Cutting operations have just started, and a more complete report will be submitted later.

4. Public Relations.

During most of the period, mosquitoes and flys were so numerous, and annoying that visitors, although quite numerous did not tarry long, or else they were deeply interested in wildlife subjects. During the last part of the period, the usual bird study groups resumed their usual trips to the Refuge. During this period there were 97 visitors which were greeted and feted by Refuge personnel.

Officials visiting the Refuge this period were:

Mr. Lundeen, CCC Inspector. August 20 and October 31st. (Mr. Lundeen was here at other times during the period, but spent time with me on the dates mentioned above only.)

Mr. R. O. Gustafson. September 9th, about 3.00 to 5:00 P.M.

Mr. W. P. Schaefer. August 30th. 8:30 A.M. to 9:00 A.M. (Delivered a Panel Truck from Harry Bailey at Backbay, Va.

Mr. Tonkin. September 18th at 4:30 P.M. to September 19th about 2:00 P.M.

Mr. Risman. October 2nd. 2:00 P.M. to 4:00 P.M.

Mr. E. Radway. October 4th to October 7th.

Mr. A. C. Elmer. September 27th, 8:00 A.M. to 5:30 P.M.

Mr. John Sutherlin. September 27th, 9:00 A.M. to 5:30 P.M.

Dr. Cottam and Dr. Bourn. October 23rd, 8:00 A.M. to October 24th, 5:00 P.M.

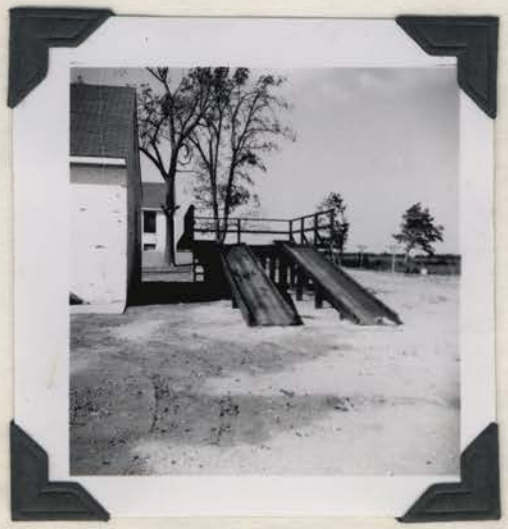
Mr. R. E. Griffiths. October 23rd, 8:00 A.M. to October 24th, 10:00 P.M.

Respectfully submitted:

John F. Herholdt
Jr. Refuge Manager

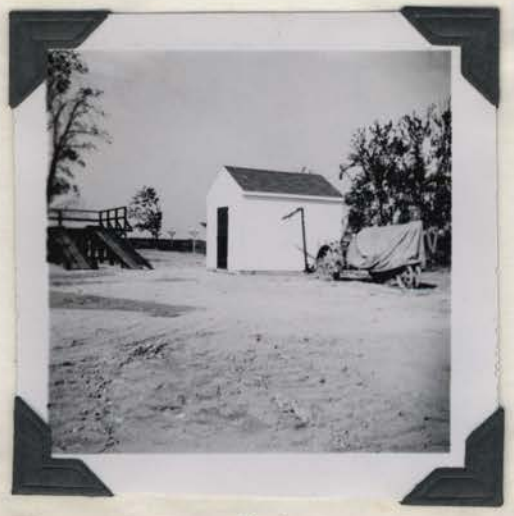
7.

The impoundment formed by Raymond's Dike. The water in the empoundment is now at elevation 2/6/ The small pool in the foreground is the display pool in which the "flop" artesian well is located. The well incidentally is still flowing 3.5 gallons per minute. The display pool is yet to be fenced and landscaped. Picture taken 9/20/40.



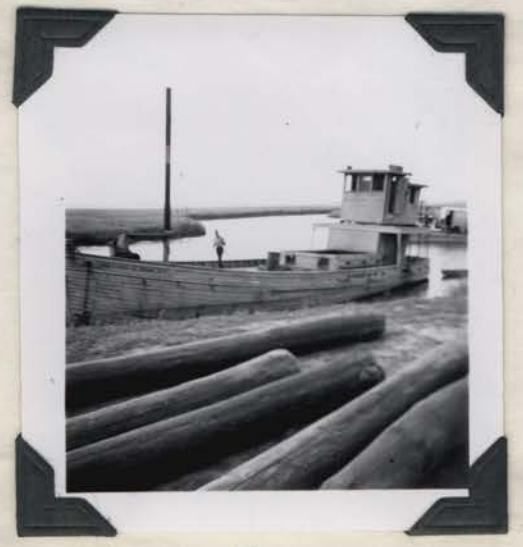
8.

The grease rack built this period by CCC. This rack is built of pine which has been painted with creosote. Picture taken 9/20/40.



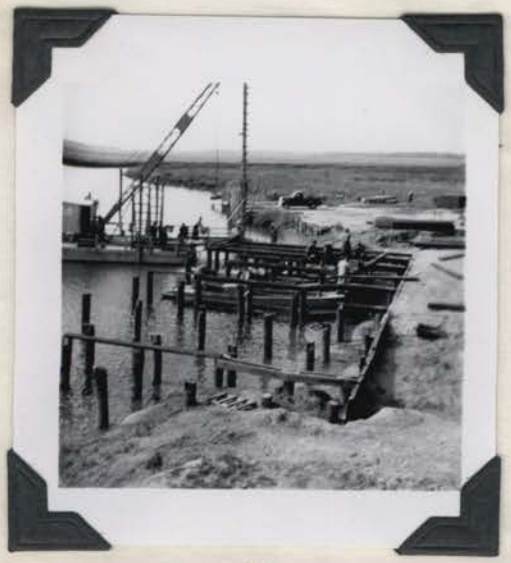
9.

Our new oil house built by CCC. Conveniently adjacent to the grease rack. The farmall is shown in its new stall since the service building burned. Picture taken 9/20/40.



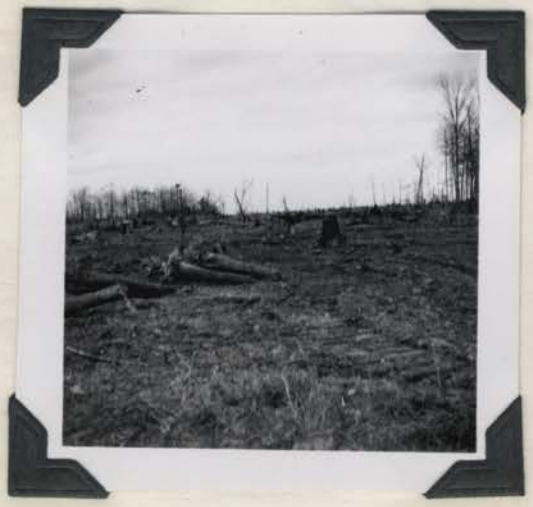
10.

The old hay boat hull which was given to us, and which we sunk in the mouth of a tidal stream, thus effecting a dam to retain water on a large area of salt marsh. Picture taken 9/20/40.



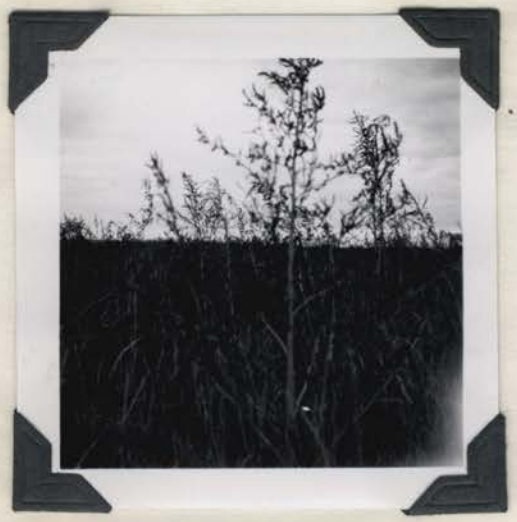
11.

The foundation of the boat house under construction. The dredge is being used as a pile driver. The bucket has been removed and replaced by a 50 gallon oil drum fill with concrete. Picture taken 9/20/40.



12.

Trees being removed from the dike right-of-way at the northeast corner of the proposed north Dutch Neck dike. A CCC project. Trees were cut by saw, shoulder high, the ground dug away by hand at the base, the roots cut through with an axe, and the stump pulled by means of the Camp R-7 Diesel Bulldozer. A very long drawn-out process. 10/29/40.

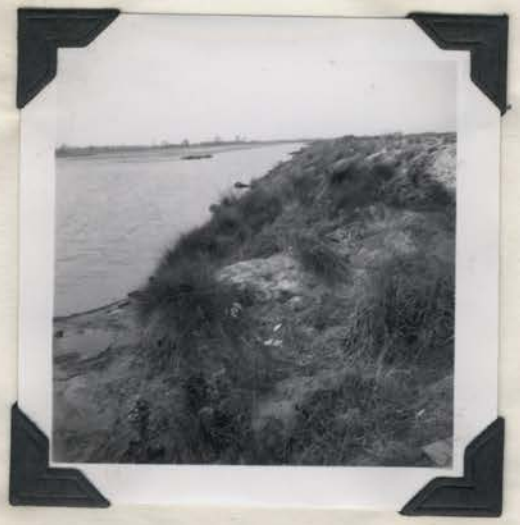


13.

This is the way Acnida cannabina grows on our refuge. Many acres of marshlands are dominated with this excellent duck food, and it is in areas like this that our ducks feed most heavily. Feature trying to count flocks of ducks as they take flight, then alight in vegetation as dense as this. Picture taken 10/29/40.

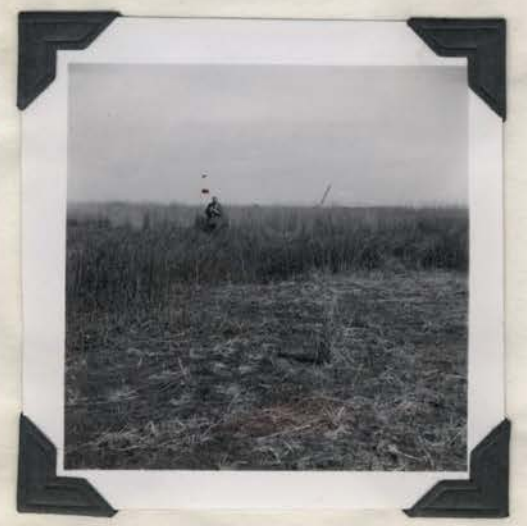
14.

A single stalk of the Acnida shown in the preceeding picture. Picture taken 10/29/40.



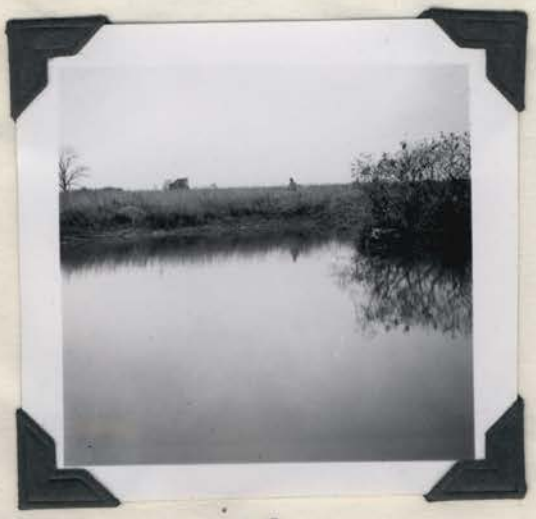
15.

Complete control of erosion is shown in this picture of Raymond's Dike, south end. This voluntary growth of Spartina patens and Juncus spp. has taken place on the sandy soil dredged from the borrow pits, and piled from elevation 2.0 to elevation 8.0. In many places at elevation approximately 8.0 volunteer stands of Spartina cynosuroides. Picture taken 10/29/40.



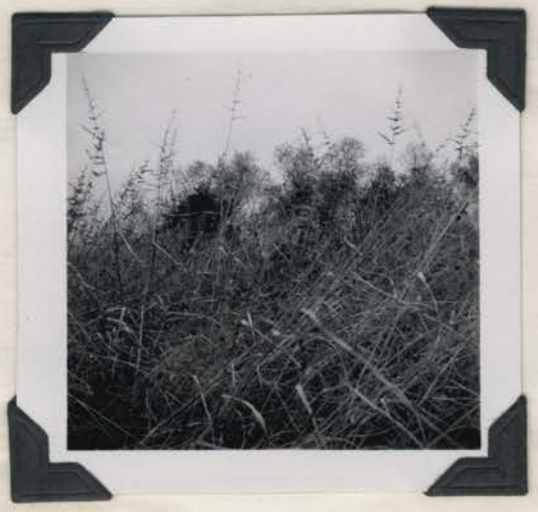
16.

A change in plant succession occasioned by Raymond's Dike. The 75' boom of the dragline can be seen in the background. The Raymond's Pool impoundment lies between the boom and the tall dead Panicum virgatum directly in back of the person. Directly in front of the person there is a new stand of pure Scirpus americanus growing on what formerly was tillable land. Before the impoundment was completed, the Panicum virgatum marked the upper rim of moist ground. Picture taken 10/29/40.



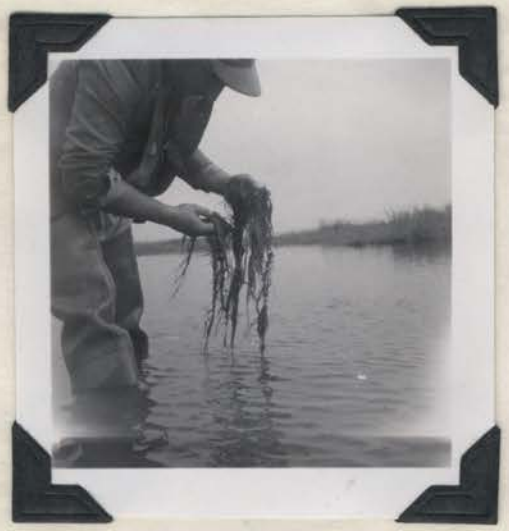
17.

This is the small pool from which fill was excavated last spring. Two pictures of this pool were taken and included in my narrative report for the period May 1, 1939 to July 30, 1939, and they are designated as exposure #117 and 118, and shown on the 15th page of pictures in that report. The small island in the center of the 1939 picture is shown on the right in the above picture. The person in the background is walking through a dense stand of Echinochloa, which produced this volunteer stand on bare sub strata. A rather sparce volunteer growth of a submerged acquatic, Callitriche autumnalis, appeared for the first time this season growing on the steep sloping bottom of the pool edge. Picture taken 10/29/40



18.

A close up of the Echinocchloa shown above. Note the man whose head and shoulders can be seen through the most dense portion. Picture taken 10/29/40.



The person in the picture is holding a fist full of pure Ruppia maritima minus Algae. This picture was taken in the borrow pit on the outside of Raymond's Dike, south east corner. This picture indicates that Ruppia, grown under the conditions prevailing in the borrow pits is still luxuriant, and available for waterfowl long after it has disappeared and gone into winter dormancy in the more shallow and ever so numerous salt marsh pools. Picture taken 10/29/40.

19.