

**NWR**

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Submitted:

Date: 6-3-88

Reviewed:

Rocky Lopez

Date: 5-12-39

Reviewed:

Ga. University Press

Date: 5-22-89

Reviewed:

Date: \_\_\_\_\_

Approved:

Thomas J. Andrews

Date: 5-26-89

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## I. Program Relation to Refuge Objectives

Bombay Hook National Wildlife Refuge was established under the authority of the Migratory Bird Conservation Act in 1937 as a refuge for migratory and wintering waterfowl. A diversity of habitats are maintained or developed to provide a maximum variety of native plants and animals for public use, understanding and enjoyment.

The Refuge presently consists of 15,122 acres of which 75 percent are comprised of tidal salt marsh. The remaining acreage is comprised of wooded uplands, freshwater impoundments and croplands. The topography is very flat with almost all of the refuge lying below the 10-foot contour. The approximately 1,000 acres of agricultural land play an important role in the attainment of the wildlife management objectives and in the operation of several refuge programs.

A major wildlife objective is the provision of food for Canada geese, snow geese and ducks during the fall migration, winter, and spring migration. Much of this food is supplied by the aquatic environment. Crops are planted to furnish additional food for Canada geese, snow geese, and upland feeding ducks principally mallard, black duck and pintail. Waste grain in harvested corn and soybean fields, buckwheat, milo, and occasionally millet provide food for both geese and ducks. Winter wheat, ryegrass, and grass/clover mixtures provide browse for geese.

A second important refuge wildlife objective is duck production. Agricultural lands while in the grass/clover stage of crop rotation, especially those adjacent to the impoundments and marshes, provide nesting sites for mallards, gadwall, blue-wing teal and black duck. Other nesting covers are planned adjacent to the freshwater impoundments to further enhance nesting opportunities for ducks. Plantings of sericea lespedeza and switchgrass are proposed beginning with the 1987 growing season. The use of agricultural lands for crop production or their maintenance as grassland prevents the invasion of brush and the loss of open habitats. Open agricultural habitats provide the following:

1. Feeding areas for deer, quail and pheasant.
2. Food hunting areas for foxes, skunks, opossums, hawks and owls.
3. Grassland nesting sites for quail and pheasants.



4. Grassland areas for songbirds and small mammals e.g. meadowlark, grasshopper sparrow, meadow jumping mouse.

These benefits assist the Refuge in achieving the goal of providing habitat for a wide variety of wildlife species in addition to waterfowl. Agricultural lands also provide an area for upland waterfowl hunting. The Refuge's popular West Waterfowl Area hunting program (primarily Canada geese) is conducted on a portion of the acreage of harvested corn and soybean fields, winter wheat fields and grass/clover pastures. Browse crops (wheat, ryegrass) planted for Canada and snow geese serve to reduce or prevent serious depredation on winter wheat plantings on adjacent farms. This demonstrates to our neighbors that we, as well as they, are providing food for the geese, and that they are not incurring the total impact of the goose flock browsing on their fields.

Delaware's Canada goose flock has been declining in recent years due in part to more birds overwintering further north (primarily New York and Pennsylvania). Cropland management for geese will undoubtedly become more important in the years ahead. Croplands also take feeding pressure by snow geese off the delicate Spartina alterniflora marsh where over 1,000 acres of "eat-outs" have occurred during the last 6-7 years.

Waterfowl use days for the period 1985-87 have averaged the following per year:

Ducks	2,045,020
Canada geese	1,913,294
Snow geese	4,453,121
Total Waterfowl Use Days	8,411,435

We estimate that waterfowl by species group are dependent on Refuge croplands for the following percentage of their total feeding activities:

Ducks	3%
Canada Geese	20%
Snow geese	5%

We assume each waterfowl use day requires .5 lb of grain or equivalent nutritional source per day for bodily maintenance. Therefore to maintain our current waterfowl use we need 302,744 lbs. (5,407 bushels) of available corn or its equivalent. Assuming a yield of 100 bushels of corn per acre with 5% annually available to wildlife approximately 1,100 acres of corn



(or equivalent) would be needed to provide all of the nutritional requirements for the Refuge waterfowl population. Our plans now call for approximately 400 acres of corn and 175 acres of soybeans to be grown as cooperator's cash crops (completely harvested with estimated 5% waste) with an additional 240 acres of wheat browse, 100 acres of buckwheat/ryegrass and 25 acres of milo or similar crops which are unharvested and 100% available to wildlife. We feel these additional crops and natural available wetland foods make up the grain demand deficit while providing additional cover to non-waterfowl species. They also serve as soil builders when plowed under as green manure. An additional 25-50 acres of grass/clover or other mixes are maintained either as goose browse through regular mowing or dense nesting cover.

## II. Program Policies and Administrative Control

Most of the farming on Refuge lands is done by nearby farmers on a cooperative basis. The fundamental requirement is that there shall be a direct or indirect benefit to the wildlife using the Refuge. These benefits may be in the form of grain either harvested or left in the field for food, browse, food plots or cover crops; or in less tangible, but none the less important farming practices. The practices include green manure cropping, liming and fertilizing which increase the productivity of the land for subsequent direct benefits to wildlife. Refuge force account farming operations are limited to mowing, weed control, and occasional food plots or experimental plantings.

Cooperative farmers are selected in accordance with 5RM17 of the Refuge Manual. General and special conditions governing their farming operations as well as specific assignments of shares are documented in Cooperative Farming Agreements, utilizing Form 3-1492. A current list of cooperative farmers is attached as Appendix IV.

The general procedure for determining farm shares is as follows:

1. The cooperator is allotted a base number of acres on which to grow a specified cash crop (either corn or soybeans).
2. The total rental value of this base cash acreage is determined. The average per acre rental for similar farmland in the

area is used after discussions with the County Agricultural Extension Agent. Adjustments may be made for estimated loss to cash crops from wildlife depredation.

3. The cooperator is assigned acreage to plant in wildlife crops or on which to perform other farming services or practices. The total value of these services is equal to the total rental of his cash cropland allotment. The value of the services is obtained by using the latest farm operation rates compiled by the Extension Service (Appendix I) and current local prices for seeds, fertilizers and lime. A sample calculation of services due the refuge is also included as part of Appendix I.

### III. Program Description, Problems and Solutions

Bombay Hook National Wildlife Refuge is located in Kent County, Delaware, a primarily rural, farming area. The major cash crops are corn, soybeans, and winter wheat. Smaller acreages are planted to potatoes and truck crops. The Refuge farming program is conducted on approximately 1,000 acres of agricultural land with approximately 400 acres of corn, 175 acres of soybeans, 235 acres of wheat, and smaller acreages of milo, buckwheat, grass/clover mixes and other food plots or nest covers being grown. Because of the small cropland acreage, the Refuge has no significant effect on the overall local agricultural economy. However, the Refuge acreage is important to the small number of cooperative farmers, as it enables them to farm additional land near home and increase their incomes.

The Refuge is in the Atlantic Coastal Plain physiographic province. At the lower elevations the soils are very poorly drained because of the level topography. The better drained sites are well adapted to all crops. Given the addition of adequate fertilizer and lime, high corn and soybean yields are possible during years of normal precipitation. Sites with poorer drainage are adapted to forage crops and small grains such as buckwheat and millet.

Weed control in cash cropland is the responsibility of the cooperative farmers. Both mechanical and chemical weed control are practiced. Mechanical



control includes use of cultivators and rotary hoes. Crop rotation is an additional means by which weed competition is reduced. The herbicides permitted and the rates and periods of application are specified in the farming agreements. Cooperators are required to take soil samples for each field annually and must maintain the pH levels at 6.0 through the application of lime. Infestations of Johnsongrass and thistles in grass and fallow fields are controlled by the Refuge, primarily through the use of the herbicide "Roundup" to prevent further spread on or off the Refuge in accordance with State laws. Insecticides are applied only for emergency use as a result of a documented crop threatening outbreak. Cooperative Extension agents are consulted for recommendations and Regional Office approval is obtained prior to application.

#### IV. Program Units

The agricultural land on the Refuge is divided into three farming units:

<u>Units</u>	<u>Cropland</u>
Whitehall Neck	204
Dutch Neck	578
Fischer Tract	204
Total	986

The farm units are basic geographic areas of the Refuge and are established for ease of reference and not operational purposes, e.g. crop rotation.

A soil survey has been prepared and is on file in the Refuge Office. The soils in all the farming units are in the Matapeake-Othello soil association. They are yellowish brown to brown, deep, well-drained soils, on level to very gently sloping topography, interspersed with gray-surfaced, poorly drained soils on the more level and lower-lying areas. The well-drained Matapeake soils which occupy the major portion of the units have silt loam or very fine sandy loam surface soils. The sub-soils have slightly more clay, but not enough to make the subsoil texture any finer than silt loam or very fine sandy loam. The substrata begins at about four to five feet and consists of very fine sand which gradually grades into coarser sand.

The poorly drained Othello soils are found in the very level, low lying areas. These soils have gray surfaces and subsoils. The textures of the surface soils and



the subsoils are very similar to those of the Matapeake soils. The sandy substratum is often a little deeper under the Othello soils, usually five to six feet. The Matapeake soils are well adapted to all crops. They are fertile, have a high water holding capacity and respond well to fertilization. The Othello soils are well adapted to forage crops and to grain crops when drained. Corn and soybeans are successfully grown on these soils.

Since the waterfowl carrying capacity of refuge agricultural land is directly proportioned to the amount of food it produces, it is important to maintain the fertility of the soil. Minimum fertilizer requirements are specified in the cooperative farming agreements for all crops grown for the Refuge (e.g. wheat, grass/clover, lespedeza, milo, and buckwheat). Stalks, straw and other crop residues are plowed under to increase the humus content. All wheat is unharvested and plowed under in early spring as green manure. Early plowing prevents ducks from nesting in the wheat only to have the nests destroyed by a later plowing.

Rotation- In an effort to break-up insect life cycles, enhance weed control, and to improve the soil, a 3-year crop rotation plan for each field is maintained whereby corn, soybeans, wheat/milo, and buckwheat are utilized. Grass/clover plantings may also be substituted for the third year of the rotation. In such cases the field remains in grass/clover for three years before being returned to either corn or soybeans. Experimental plots are planned where nitrogen applications will be reduced on corn crops following grass/clover plantings.

Corn and Soybeans- Feed grain corn and soybeans are the cash crops grown by the cooperative farmers. A minimum of 400 acres of corn and 175 acres of soybeans must be cash cropped to obtain, as the Refuge share, the other farming practices desired for the benefit of wildlife, corn for banding, and waste corn (soybeans) for migratory birds. The corn growing methods are those used on private farmlands, although less use of chemical herbicides and insecticides are permitted. Harvest of corn and soybeans in fields accomodating goose blinds before the opening of the state goose season is made a condition of the cooperative farming agreements. Mechanical harvest normally results in approximately 5% of the crop yield being left in the field for wildlife use. Fields are rotated on a yearly basis with no field being planted to the same crop more than two years in a row.

Wheat- Winter wheat is planted on 200-300 acres to provide green browse for Canada and snow geese, to enrich the soil as a green manure crop and to reduce depredation on nearby private winter grain crops. Wheat is planted prior to September 1 in order to provide succulent, firmly rooted browse for the first large numbers of geese arriving in early October. Winter wheat on private farms is usually planted after corn and soybean harvest. No refuge wheat is harvested. The crop is plowed under in the early spring prior to planting of the next crop in the rotation. Winter wheat is planted at a minimum of two bushels per acre.

Buckwheat and Milo- Buckwheat and milo are planted in selected fields (100-150 acres total) in an attempt to provide additional field feeding opportunities for ducks and geese. Ryegrass is normally overseeded on the buckwheat fields about one week after the buckwheat is planted. By employing this practice green browse is available for geese after the ducks and geese have depleted the buckwheat. In this area buckwheat is sown between August 1 and August 10. Milo is sown in June or early July and is used as a crop to encourage duck feeding, rather than geese, in selected fields.

Grass, Clover, and Other Mixes- Mixes of grasses, clovers and other herbaceous species are maintained on 25-50 acres to provide nesting cover for upland birds, ducks and mammals. Dense nesting covers are planted in proximity to impoundments and the salt marsh where duck nesting opportunities are thought to be optimum. If mowed once or preferably twice during the summer (subsequent to waterfowl nesting) the grass/clover fields provide green browse for geese. Herbicidal treatment of weeds such as Canada thistle and Johnsongrass is practiced as mandated by State law. The pasture mix most frequently used is ladino clover 2 lbs./acre, alsike clover 3 lbs./acre, and orchard grass 10 lbs./acre.

Trial Plantings- Occasional food patch mixes may be planted to attract birds or mammals to strategic areas where they can be closely observed by the visiting public. Such plantings normally would range from 5 to 20 acres in total.

Evaluation- Each year a summary evaluation of the farming program is included in the annual narrative report. This summary includes a discussion of soil test



results, crop yields, herbicide use, and waterfowl use for feeding and nesting within the cropland units.

V. Physical Plant and Equipment Use Requirements

Agricultural Equipment- The basic farming practices involving the use of Refuge equipment are:

1. Mowing of grass/clover fields.
2. Weed control
3. Maintenance of cropland facilities, e.g. drainage ditches, farm roads, hedgerows, border strips and trial plantings.

To carry out this program the refuge has the following equipment:

- John Deere 300 Tractor with rear mounted rotary mower
- Massey-Ferguson 1085 Tractor with rear mounted rotary mower and side mounted ditch bank mower.
- Three spray units mainly used for the control of Johnsongrass and thistles. A pickup mounted motor-driven unit is available for field spraying and an ATV mounted sprayer and back pack sprayer are available for use in treating ditches and isolated weed infestations.

Adequate storage is available at the Refuge for all farm equipment and materials. A 7,500 square foot storage building provides indoor secure storage for all equipment.

There is no need to expand the refuge physical plan beyond the current available facilities to accommodate the croplands management program. Minimal farm equipment is on hand and should be scheduled for regular replacement according to a schedule of equipment life expectancy. A bulldozer is a piece of needed equipment which is needed for fire management as well as for ditch maintenance and similar operations within the cropland management program.

VI. Fund and Manpower Requirements



A. Administration and Maintenance

The following summary includes cost of planning, supervision of cooperatives, gathering and compiling data, maintaining equipment associated with farming (percentage of total maintenance costs), and hours of actual work for an average year.

	<u>Man Days</u>	<u>Cost</u>
Refuge Manager	5	\$ 750
Assistant Refuge Manager	15	\$ 1,500
Secretary	3	\$ 250
Maintenance Workers	25	\$ 2,500
		<u>\$ 5,000</u>
Chemicals for Weed Control		\$ 1,000
Equipment Maintenance and Supplies		\$ 2,000
TOTAL		<u>\$ 8,000</u>

## CUSTOM RATES FOR SELECTED OPERATIONS

OPERATION	ITEMS SUPPLIED					UNIT (BASIS OF CHARGE)	1986 DELAWARE RANGE
Shred Stalks	Tractor, Stalk shredder, operator, fuel, repairs					Acre	\$6.00- 8.00
Plowing	"	Moldboard Plow	"	"	"	Acre	8.00-12.00
Moldboard		Chisel Plow,	"	"	"	Acre	8.00-10.00
Chisel Plow (8-12")							
Subsoiling (2' & deeper)	"	Subsoiler,	"	"	"	Acre	7.00-12.00
Disking (Tandem)	"	Tandem Disk,	"	"	"	Acre	6.00-12.00
Harrow	"	Spiketooth Harrow,	"	"	"	Acre	6.00- 8.00
Spiketooth		Springtooth Harrow,	"	"	"	Acre	6.00- 8.00
Springtooth							
Planting	"	Corn Planter,	"	"	"	Acre	8.00-10.00
Corn		Corn Planter,	"	"	"	Acre	8.00-10.00
Soybeans		No till Planter,	"	"	"	Acre	9.00-12.00
No till corn		No till Planter,	"	"	"	Acre	9.00-12.00
No till soybeans							
Rotary Hoe	"	Rotary Hoe,	"	"	"	Acre	4.00- 6.00
Cultivating (Sweep)	"	Sweep Cultivator,	"	"	"	Acre	4.50- 7.00
Cultivating (Rolling)	"	Rolling Cultivator,	"	"	"	Acre	4.50- 7.00
Spray Crop	"	Sprayer,	"	"	"	Acre	3.50- 4.75
(Materials not included)							

CUSTOM RATES FOR SELECTED OPERATIONS (cont'd)

11

OPERATION	ITEMS SUPPLIED						UNIT (BASIS OF CHARGE)	1986 DELAWARE RANGE
Combine								
Corn (pick & shell)	Self	Propelled	Combine,	operator,	fuel,	repairs	Acre	\$18.00-24.00
Soybean	"	"	"	"	"	"	Acre	18.00-22.00
Sorghum	"	"	"	"	"	"	Acre	18.00-22.00
Small Grains	"	"	"	"	"	"	Acre	18.00-22.00
Pick Corn (Ear)	Tractor,	Picker		"	"	"	Acre	16.00-18.00
Drill (Small Grain)	"	Drill,		"	"	"	Acre	5.00- 8.00
Seed Legumes	"	Seeders,		"	"	"	Acre	6.00- 8.00
Haymaking								
Mow	"	Mower,		"	"	"	Acre	5.00- 6.50
Mow & Condition	"	Mower,		"	"	"	Acre	6.00- 8.00
Raking	"	Slide Delivery Rake,		"	"	"	Acre	2.50- 4.00
Pick up Baling								
Twine	"	Baler,		"	"	"	Bale	.30- .45
Wire	"	Baler,		"	"	"	Bale	.45- .60
Cut-Rake-Bale-Store	All men and machines for job						Bale	.55- .85
Haul & Store	All men and machines for job						Bale	.30- .40
Bale Giant Bales	All men and machines for job						Bale	4.00- 6.00
Silage Making								
Fill Upright Silo							Ton	4.00- 5.25
Fill Trench Silo							Ton	4.00- 5.00
Field Chop	One man - two wagons - one tractor							35.00-43.00
	Two men - two wagons - two tractors							37.50-45.00



1988 COSTS PER ACRE

Drilled Wheat

Plow	\$12.00
Disc	\$10.00
Drill	\$ 8.00
Seed 7.20/bu =	\$14.00
400 lbs 10-10-10 =	\$24.28
	<u>\$68.68</u>

Drilled Buckwheat

Plow	\$12.00
Disc	\$10.00
Drill	\$ 8.00
Seed 50 lbs	\$13.80
400 lbs 10-10-10 =	\$24.28
	<u>\$68.08</u>

Overseed Ryegrass

Broadcast Seed =	\$ 4.50
25 lbs/ac @ .35 lb =	\$ 9.50
	<u>\$14.00</u>

Grass/Clover Mixture

Plow	\$12.00
Disc & Cultipack	\$10.00
Drill	\$ 8.00
400 lbs 10-10-10	\$24.28
Timothy Seed 5 lbs @ 1.32 =	\$ 6.60
Alsike Clover 2 lbs @ .82 =	\$ 1.64
Ladino Clover Seed 2 lbs @ 2.70 =	\$ 5.40
Orchard Grass Seed 6 lbs @ 1.05 =	\$ 6.30
	<u>\$74.22</u>

Drilled Milo

Plow	\$12.00
Disc	\$10.00
Drill	\$ 8.00
Seed 20 lbs @ .68 =	\$13.60
400 lbs 10-10-10 =	\$24.28
	<u>\$67.88</u>

Aerially Overseed Ryegrass

25 lbs/ac @ .38 lb =	\$ 9.50
Aircraft Rental =	\$ 4.05
	<u>\$13.55</u>

Aerially Seed Japanese Millet

20 lbs/ac =	\$3.00
Aircraft Rental =	\$3.90
	<u>\$6.90</u>

Heavy Discing = \$10.00

Gamebird Mix

Plow	\$12.00
Disc	\$10.00
Drill	\$ 8.00
Seed	\$12.70
400 lbs 10-10-10 =	\$24.28
	<u>\$66.98</u>

Overseed Wheat

Broadcast Seed =	\$ 4.50
Light Disc	\$ 7.50
Seed Cost 2 bu @ 4.00 =	\$ 8.00
	<u>\$20.00</u>

Corn Price = \$2.00 Bushel

Total Acreage of Corn & Soybeans - Cooperator's Share 225.2

Value Services to Provide =  $225.2 \times \$50.00 = \underline{\$11,260.00}$

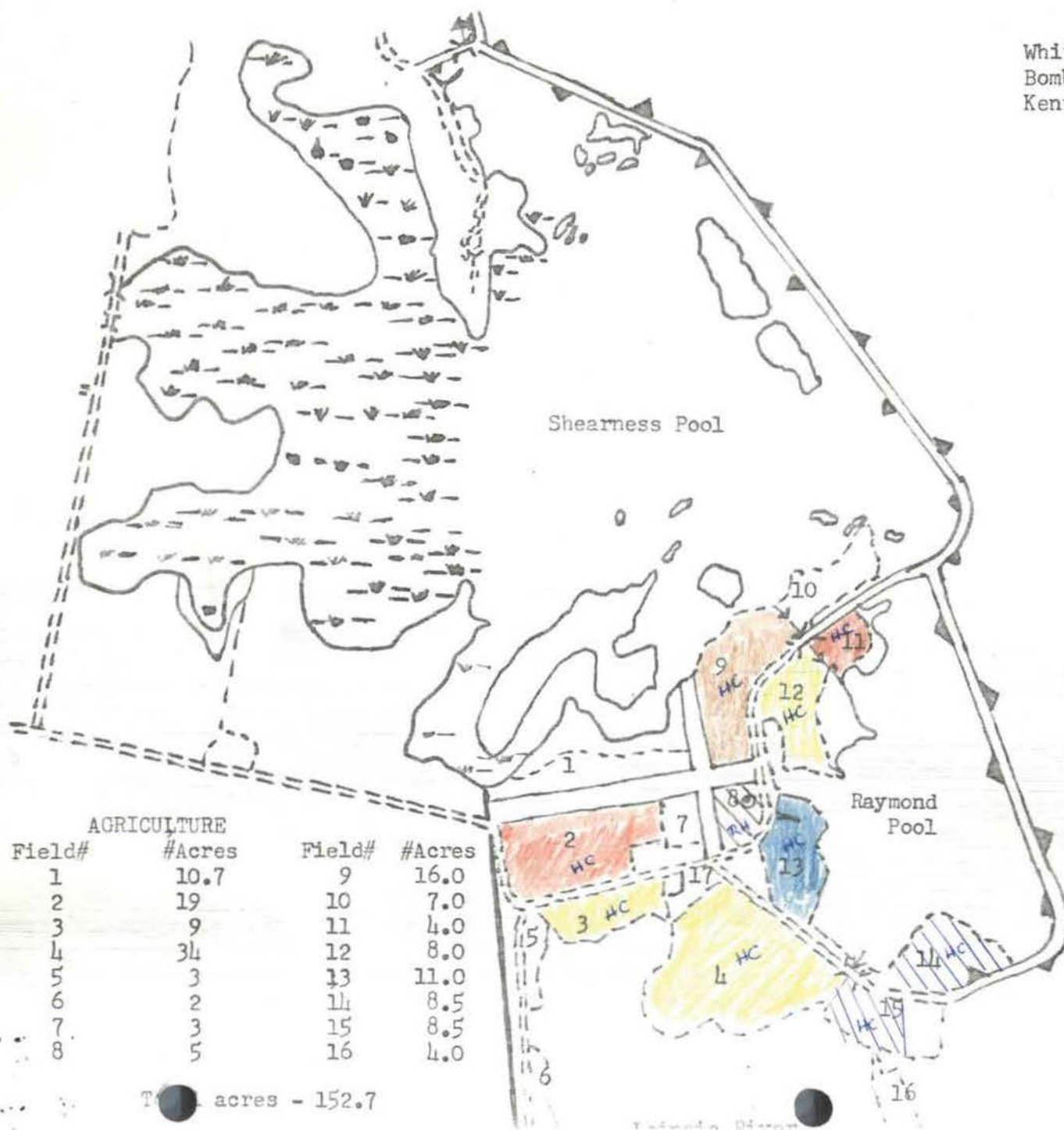
Services Provided:

Buckwheat Overseed with Ryegrass = 17.2 ac x \$68.08 + 17.2 ac x \$14.00 =	\$1,411.78
Grass/Clover = 33.7 ac x \$74.22 =	\$2,501.21
Wheat = 67.8 ac x \$68.68 =	\$4,656.50
Milo = 21.0 ac x \$67.88 =	\$1,425.48
125 Bushels of Shelled Corn @ \$2.00 =	\$ 250.00
Heavy Discing of 9 acres @ \$10.00 =	\$ 90.00
3 Gallons of Roundup @ \$81.00 =	\$ 243.00
10 Acres of Gamebird Mix @ \$66.98 =	<u>\$ 669.80</u>
	\$11,247.78





Whitehall Neck Farm Unit  
Bombay Hook National Wildlife Refuge  
Kent County, Delaware



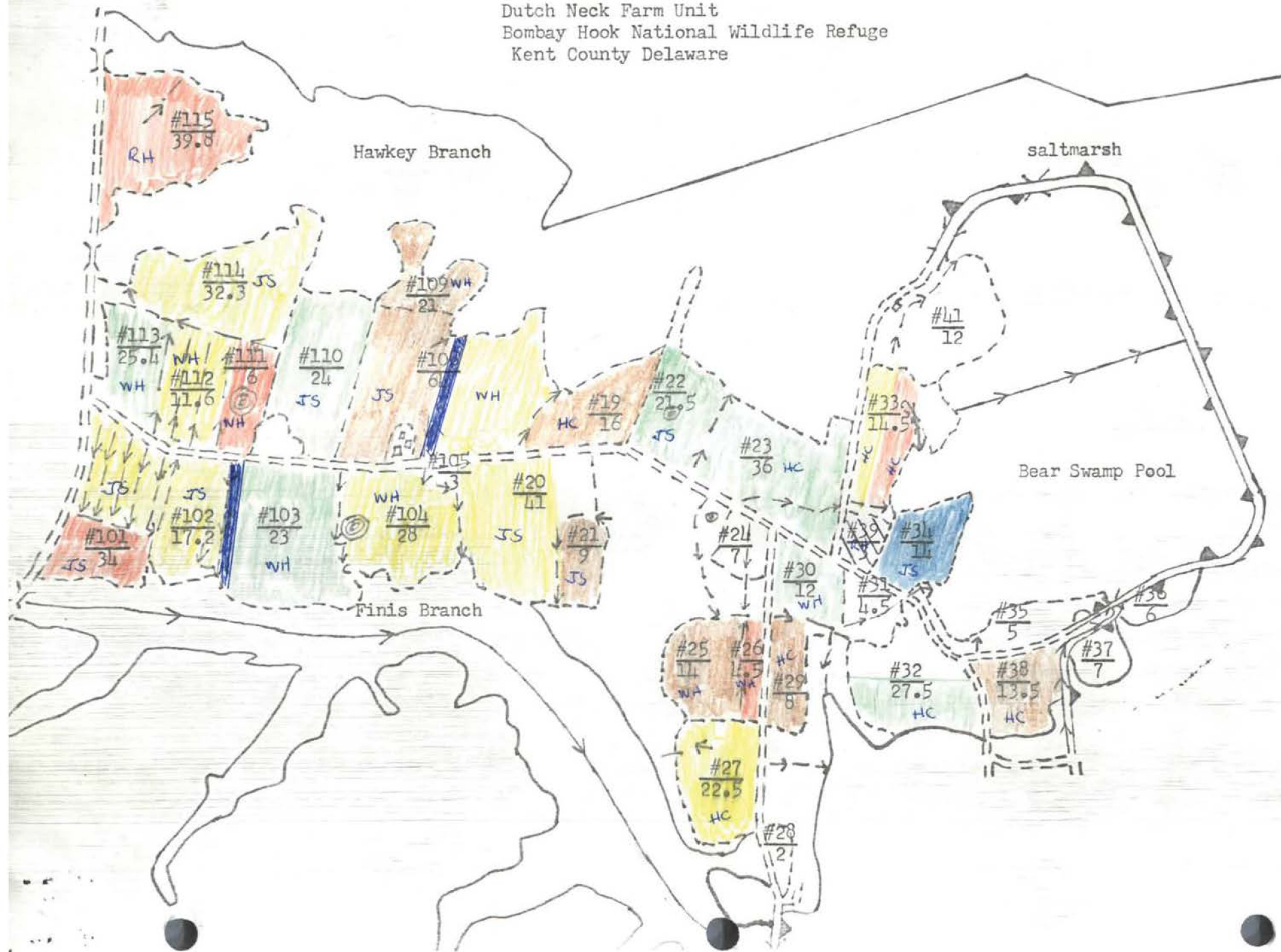
LEGEND

- Boundary line
- - - Field boundary
- ~ Stream flowing
- Canal
- ⊙ Pond
- Existing dike and road
- Road, graveled
- - - Road, dirt
- Bridge
- Building
- ~ Marsh
- Yellow = CORN
- Green = WHEAT
- Orange = BUCKWHEAT (with Ryegrass overseeded)
- Blue = MILO
- Brown = SOYBEANS (with Ryegrass overseeded)
- Diagonal lines = LESPEDEZA
- Diagonal lines & dots = LESPEDEZA & PANIC GRASS

AGRICULTURE			
Field#	#Acres	Field#	#Acres
1	10.7	9	16.0
2	19	10	7.0
3	9	11	4.0
4	34	12	8.0
5	3	13	11.0
6	2	14	8.5
7	3	15	8.5
8	5	16	4.0

Total acres - 152.7

Dutch Neck Farm Unit  
Bombay Hook National Wildlife Refuge  
Kent County Delaware







Finis Branch

RAYMOND NECK FARM UNIT  
Bombay Hook National Wildlife Refuge  
Kent County, Delaware

18



#206  
10A

WFF

#207  
37A

#208  
25A

Elkhorn Branch

#205  
3A

#209  
13.5A

#204  
55A

#203  
39A

#201  
17A

#202  
4.5A

Raymond Neck  
Ditch

Delaware Route 9



Fischer Farm Unit  
 Bombay Hook National Wildlife Refuge  
 Kent County, Delaware  
 (76)

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APPENDIX IV  
COOPERATIVE FARMERS

Harry Carrow  
RD #1, Box 145  
Smyrna, Delaware 19977  
(302) 653-7633

James Snow  
RD #1  
Smyrna, Delaware 19977  
(302) 653-7534

Wayne Hurd  
RD #1, Box 156A  
Smyrna, Delaware 19977  
(302) 653-7560



DATE: 12 May 1989

TO: Refuge Manager, Bombay Hook NWR  
U.S. Fish and Wildlife Service  
Smyrna, DE 19977

FROM: Field Biologist (South), Division of Refuges  
U.S. Fish and Wildlife Service  
Cambridge, MD 21613

SUBJECT: Cropland Management Plan

I have reviewed BMH's Cropland Management Plan and have sent it to the RO for approval. It is very well done.

Three comments are offered, but they don't really require officially changing the plan:

1. More emphasis on biological farming would have been great, but your taking the initiative to begin experimenting with biological farming systems is most welcome. Remember to keep meticulous records about field practices (dates), soil tests, crop yield data (as opposed to estimates), and weed problems. Someone on the east coast needs to take a leadership role for refuges, and I am glad to see Bombay Hook doing so. I've wanted to put together some training programs/field tours for Refuges - South related to this, but can't seem to find the time. Forge ahead!  
*ERE (TOM MCANDREWS) IS INTO THIS TOO. 5-22*
2. Regarding evaluation... You might make a pencil notation in your copy of the plan to keep soil test records and annual crop yield, waterfowl feeding, and bird nesting data by individual field. You may be doing this; the plan suggests it is done for narrative purposes by unit. Crop fields must be evaluated and managed individually.
3. At different times in the past, I have suggested that the refuge take a detailed look for other areas that may have moist soil development potential. I realize that water supply may be a problem in many areas. But, whenever I see a ditch in a farm field, I would investigate the possibility of wetland restoration/development. Leigh Fredrickson encouraged all our refuges to do this, even if the areas were small. Satellite wetland development is an excellent way to promote wetland complexes. Maybe an IPW for elevation survey work of your farm drainage system and surrounding lands would be a place to start. This is not a requirement as part of the Cropland Plan, but relates strongly to it as some land retirement could be necessary.

cc: Gavutis  
McAndrews

*Rick*