BOMBAY HOOK NATIONAL WILDLIFE REFUGE

Annual Water Management Program - 1985

Introduction

This program describes the results of 1984's water management and outlines the 1985 regime. The station's water management plan was revised and submitted for Regional Office approval in April 1984, however, no feedback has been received to date. New fish screens were installed within the control structures of all impoundments and prevented the intrusion of most carp and white perch into the pools. No significant fish kills were noted during the year. Most of the pool fringes were aerially treated with the herbicide rodeo during the fall for the second consecutive year in an effort to control Phragmites.

Weather

Total precipitation for 1984 (through November) has been in the normal range; however distribution by season has shown great variance. Normal annual precipitation for this locale is 42.30" and through November 39.92" had been received. A very large percentage of rainfall fell from February through May (22.89"). The dry season occurred from August through November when only 8.9" was recorded. Temperature extremes during both winter and summer were in the normal range, although the $-4^{\circ}F$ recorded on January 25 was slightly below the average minimum for this area.

Managed Impoundments - 1,100 acres

Raymond Pool - 95 acres

Constructed in 1939.

Water levels exceeded those which were proposed for much of the year. Frequent and heavy precipitation during the spring maintained high levels which could be lowered only during periods of low tide. However, water levels were maintained at near objective levels from mid-July through October and excellent stands of emergent, principally millet, Cyperus, soft-stem bulrush, and three-square grew around the pool fringes. Use of this pool by shorebirds, wading birds, and ducks during late summer and early fall was the heaviest that it has been in many years.

The 1985 water management scheme for Raymond Pool will be similar to the 1984 program except that plans call for a complete de-watering during mid-summer in an effort to create a more favorable environment for emergent vegetation growth over the entire pool. Pool levels will be gradually raised during August to flood a protion of the emergent vegetation and create suitable habitats for shorebirds and early waterfowl migrants. Levels will be gradually raised throughout the fall to make more of the area suitable for feeding ducks and geese.

Shearness Pool - 560 acres

Constructed in 1956.

Despite the heavy rains and high water levels of early spring water levels were reduced to near objective or below from July through early October. Many mudflat islands as well as pool fringes were exposed. Excellent stands of millet, wild rice, and Cyperus covered virtually every square inch of exposed mud flat. As water levels were raised during the fall large numbers of teal, pintail, and gadwall arrived and fed heavily. Whereas in recent years the pool had been virtually nothing but a large open water area with virtually no emergent or submergent vegetation and virtually no duck use, the area this year was heavily used by both ducks and geese.

Plans for 1985 are similar to those for 1984. However, as is the plan for Raymond a complete de-watering during mid-summer is planned in an effort to create a more favorable environment for emergent vegetation growth. Pool levels will be gradually raised during August to flood a portion of the emergent vegetation.

Bear Swamp - 240 acres

Constructed in 1961.

The pool was drained during January and plans called for the burning of extensive cattail stands. Planned burning could not be accomplished, therefore the pool was re-flooded and near objective levels were maintained until August when dry weather resulted in very low water levels. These low levels were maintained through August and September and resulted in good stands of spikerush and millet. Both the Phragmites and cattail within the pool were aerially treated in September with the herbicide Rodeo. An attmept was made during early October to burn sections of the cattail in an effort to lure snow geese from the salt marsh into the area. The vegetation remained too green; however, and it could not be burned prior to the time for reflooding. Reflooding of the pool occurred in November and near objective levels were maintained through the remainder of the year. Waterfowl use for the year was average with an increase shown in snow goose use.

Plans for 1985 call for the de-watering of the pool during Janurary and a control burn of all cattail and Phragmites stands. The pool will then be re-flooded and relatively constant water levels maintained through June. A gradual lowering of the water levels during July and August should encourage growth of millet and spikerush. The pool will be re-flooded in September and constant levels will be maintained through the remainder of the year.

Finis Pool - 205 acres

Constructed in 1944.

Near objective water levels were maintained except during the period May - August when above objective levels occurred primarily as a result of beaver activity preventing the exodus of excess water from the pool. Production of smartweed was again excellent within this pool. Scattered stands of cattail began to appear in the pool for the first time. We will keep a watchful eye on these areas to hopefully prevent this plant from becoming a problem. Duck use of the pool was good. Wood ducks accounted for the major duck use within the pool during spring, summer, and early fall, while mallards and blacks predominated during late fall and winter.

Relatively constant levels are planned for 1985. A slight lowering of the water level during the late spring and summer months should encourage smartweed production. Plans to beaver proof one of the control structures should reduce the maintenance time associated with debris removal from the structures.

ANNUAL WATER MANAGEMENT PROGRAM [illegible] 85

Refuge Bombay Hook Water Unit [illegible] Number Finis Pool

Maximum w.s. elevation permissible 6.20 MSL

Flowline elevation of lowest drain structure 1.20 MSL

Average elevation of pool bottom (not borrow [illegible]).

Date	I. A. Water Surface Elevations and Salinity for Past Year: Actual 1984 Water Surface Elevations	Planned 1984 Water Surface Elevations	II. A. Planned Elevation and Salinity for Progress Year: Water Surface Elevation	*Salinity Objective
Jan 1	4.60	4.70	4.70	
15	4.55	4.70	4.70	
Feb 1	4.70	4.70	4.70	
15	4.94	4.70	4.70	
Mar 1	4.60	4.70	4.70	
15	5.50	4.70	4.70	
Apr 1	4.60	4.70	4.70	
15	4.68	4.70	4.70	
May 1	5.00	4.45	4.45	
15	4.76	4.15	4.15	
June 1	4.74	4.15	4.15	
15	4.60	4.15	4.15	
July 1	4.52	4.15	4.15	
15	4.70	4.15	4.15	
Aug 1	4.72	4.15	4.15	
15	4.66	4.15	4.15	
Sept 1	4.37	4.30	4.30	
15	4.38	4.40	4.40	
Oct 1	4.48	4.50	4.50	
15	4.54	4.60	4.60	
Nov 1	4.50	4.60	4.60	
15		4.60	4.60	
Dec 1		4.60	4.60	
15		4.60	4.60	
31		4.60	4.60	

*[illegible]

ANNUAL WATER MANAGEMENT PROGRAM [illegible] 1985

Refuge: Bombay Hook — Water Unit Number or Name: Bear Swamp Pool

Maximum W.S. elevation permissible: 4.50

Flowline elevation of lowest drain structure: -1.17 MSL

Average elevation of pool bottom (not borrow pit bottom): 1.25 - 2.90

Date	I. A. Water Surface Elevations and Salinity for Past Year: Actual 1984 Water Surface Elevations	Planned 1984 Water Surface Elevations	II. A. Planned Elevation and Salinity for Program Year: Water Surface Elevation	*Salinity Objective
Jan 1	Pool Drained	1.50	De-Water	
15	Pool Drained	1.50	De-Water	
Feb 1	Pool Drained	1.50	1.30	
15	0.32	1.50	1.40	
Mar 1	1.14	1.50	1.50	
15	1.54	1.50	1.50	
Apr 1	2.00	1.60	1.50	
15	1.62	1.70	1.50	
May 1	1.44	1.70	1.50	
15	1.50	1.75	1.50	
June 1	1.46	1.75	1.50	
15	1.60	1.60	1.50	
July 1	1.54	1.20	1.20	
15	1.30	1.00	1.00	
Aug 1	1.06	1.00	1.00	
15	0.80	1.00	0.90	
Sept 1	0.96	1.50	1.20	
15	0.80	1.55	1.30	
Oct 1	1.10	1.60	1.50	
15	1.08	1.60	1.50	
Nov 1	1.30	1.75	1.50	
15		1.75	1.50	
[illegible]		1.75	1.50	
Dec 1		1.75	1.50	
15			1.50	
31		1.70	1.50	

* [illegible]

ANNUAL WATER MANAGEMENT REPORT

Refuge Bombay Hook Water Unit Raymond Pool

Maximum W.S. elevation permissible 4.00 MSL

Flowline elevation of lowest drain structure -3.00 MSL

Average elevation of pool bottom (not borrow pits). 1.00 to 1.50 MSL

Date	I. A. Water Surface Elevations and Salinity for Past Year: Actual 1984 Water Surface Elevations	Planned 1984 Water Surface Elevations	II. A. Planned Elevation and Salinity for Program Year: Water Surface Elevation	*Salinity Objective
Jan 1	2.10	1.85	1.80	
15	1.96	1.85	1.80	
Feb 1	2.34	1.85	1.80	
15	2.34	1.85	1.80	
Mar 1	2.06	1.85	1.80	
15	1.92	1.85	1.80	
Apr 1	2.72	1.85	1.80	
15	2.62	1.85	1.80	
May 1	2.44	1.85	1.80	
15	1.82	1.85	1.80	
June 1	1.78	1.50	1.50	
15	3.00	1.00	1.00	
July 1	2.00	1.00	De-water	
15	1.60	1.00	De-water	
Aug 1	1.50	1.15	De-water	
15	1.46	1.30	0.75	
Sept 1	1.46	1.40	0.90	
15	1.42	1.50	1.25	
Oct 1	1.68	1.60	1.25	
15	1.66	1.65	1.25	
Nov 1	1.75	1.70	1.40	
15		1.75	1.50	
Dec 1		1.80	1.60	
		1.85	1.70	
31		1.85	1.70	

*Must be approved for program agreement.

Refuge Bombay Hook — Shearness Pool

Maximum allowable elevation of pool [illegible] 4.00

Elevation of lowest [illegible] structure -3.00 MSL

Average elevation of pool bottom [illegible] 0.75 to 2.90

Date	I. A. Water Surface Elevations and Salinity for Past Year: Actual 1984 Water Surface Elevations	Planned 1984 Water Surface Elevations	II. A. Planned Elevation and Salinity for Program Year: Water Surface Elevation	*Salinity Objective
Jan 1	3.30	2.50	2.50	
15	2.50	2.50	2.50	
Feb 1	3.12	2.50	2.50	
15	3.24	2.50	2.50	
Mar 1	3.20	2.60	2.60	
15	2.90	2.80	2.70	
Apr	3.48	2.90	2.80	
	3.20	2.90	2.80	
May 1	2.88	2.90	2.80	
	2.52	2.90	2.80	
	2.52	2.85	2.80	
	3.20	1.80	1.80	
July	2.36	1.70	De-water	
	2.30	1.60	De-water	
Aug	2.18	1.60	De-water	
15	1.88	1.80	De-water	
Sept 1	1.86	2.25	1.50	
15	1.84	2.25	1.80	
Oct 1	1.80	2.50	2.20	
15	2.30	2.80	2.30	
Nov 1	2.45	2.80	2.50	
		2.70	2.50	
Dec		2.60	2.50	
		2.50	2.50	
31		2.50	2.50	