WATER MANAGEMENT PLAN

IROQUOIS NATIONAL WILDLIFE REFUGE

1970

U.S. FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

BASOM, NEW YORK 14013

WATER MANAGEMENT PLAN

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Iroquois National Wildlife Refuge

INTRODUCTION

Land acquisition for the Iroquois National Wildlife Refuge was initiated in 1957 for the purpose of providing breeding and migration habitat for migratory waterfowl. Attainment of these primary objectives necessitates the construction of dikes and water control structures to provide the management capability to retain water where and when needed. Historically thousands of ducks and geese have visited the flooded woods and fields of the refuge area during the spring migration. Immediately following the spring floods, and for most of the year, the swamp was truly idle land - too wet to cultivate and too dry for significant waterfowl use. The Refuge Master Plan outlines the development of 5,370 acres of controlled water areas for management toward the meeting of waterfowl objectives.

As of the date of this plan, development permits the control of water on 1,354 acres of major pools within the swampland basin, and on 449 acres of upland marshes on tributaries leading to the swampland - for a total of 1,803 acres. In addition to these completed developments, this plan considers also the management of water within Master Plan Units 4 and 5 totaling 2,070 acres which are under development at this time.

With the welfare of waterfowl as a major refuge objective, the proper management of the water resource is a primary refuge responsibility.

I. Long-term Objectives.

The Oak Orchard Swamp lies in a relatively flat terrain and has historically served as a natural flood control reservoir. In addition to furthering the primary refuge objectives in providing waterfowl breeding and migration habitat; the following list of water management objectives also considers the fact of spring flooding and the interests of refuge neighbors and downstream water users.

Water will be managed on the Iroquois National Wildlife Refuge to:

A. Provide high-quality habitat for waterfowl nesting and brood production.

B. Provide adequate water areas for migrating waterfowl.

C. Provide water areas for the public enjoyment of wildlife, including bird-watching and waterfowl hunting.

D. Maintain normal pre-development storage capacity for flood waters from Oak Orchard Creek.

E. Maintain an adequate minimum flow in Oak Orchard Creek.

F. Prevent interference with drainage from private lands, including the extensive muckland areas on Oak Orchard Creek east of the Refuge.

G. Promote the growth of desirable aquatic vegetation.

H. Control undesirable vegetation.

I. Control trash fish.

J. Discourage waterfowl use of the refuge after mid-November.

K. Minimize ice damage to dikes, water control structures, and nesting islands.

L. Maintain an adequate population of small fish for fish-eating birds and mosquito control.

II. Physical Facilities and Resources for Each Unit.

Refuge impoundments fall naturally into two categories - those obtaining their water by the flooding of Oak Orchard Creek, and those dependent on local tributaries to the swampland. As these two types of impoundments require different principles of management, they will be discussed separately. Five water areas fall into the first category and seven into the second category. Names of water areas are presented in Tables 1 and 2 of this plan.

IIA. Impoundments Having Primary Source of Water from Oak Orchard Creek.

1. Water Sources.

Oak Orchard Creek at the refuge boundary has a drainage area of over eighty thousand acres. During one three-year period, its flow in the vicinity of the refuge varied from 884 c.f.s. to 8 c.f.s. The maximum flow figure was recorded in March and the minimum flow figure was recorded in September. All impoundments except Oneida Pool (Unit 5) require that the Oak Orchard Creek be overflowing its banks in order to fill the impoundment. Overflow water is usually available during March and April.

For sources of water other than Oak Orchard Creek see Table 1 of this plan.

2. Drainage Routes.

Mohawk Pool (Unit 4) will drain into the Feeder Canal and drainage water will flow northward in the canal between dikes for Seneca Pool (Unit 6A) and Oneida Pool (Unit 5). Oneida Pool (Unit 5) will drain directly into the main channel of Oak Orchard Creek. Seneca Pool (Unit 6A) drains into an outlet channel that drains into the north end of the Feeder Canal. The drainage of all three of the above pools is

influenced by the level of Oak Orchard Creek. Cayuga Pool (Unit 6B) drains south, through culverts under Lewiston Road (Highway #77), into the Tonawanda Game Management Area. Drainage of this unit will be subject to the water level of certain managed pools in the Tonawanda GMA. Swallow Hollow Marsh can be partially drained through 12" pipes in the south dike into a natural marsh adjacent to Oak Orchard Creek. As the bottom of the borrow pit is below the level of the pipes, the area can never be completly drained with the present facilities. Drainage is also influenced by the level of Oak Orchard Creek.

3. Maximum Management Elevations and Flowline Elevations.

See table 1 of this plan.

4. Structure Capacities -- Time to Fill or Drain Units.

All impoundments except Oneida Pool (Unit 5) are dependent on overflow water from Oak Orchard Creek to reach full capacity. Even Oneida Pool requires an appreciable flow in the creek in order to fill. The flood crest on Oak Orchard Creek normally occurs in March or April and at this time there has always been sufficient water available to fill all major impoundments. As a rule, major pools farthest from the creek are filled first. Thus Seneca Pool and Cayuga Pool would usually be filled first, followed by Mohawk Pool (Unit 4). Oneida Pool (Unit 5) would be filled last, at the end of the spring flood. If filled earlier, this pool may contribute toward a slowing of drainage that would adversely affect the muckland area east of the refuge. Swallow Hollow Marsh receives water from the outlet structure for the North Marsh on the Oak Orchard Game Management Area which is always discharging during the spring flood period. During flood periods the low dike around Swallow Hollow is usually topped by high water in the adjacent Oak Orchard Creek.

If any of the major pools are managed as Green Timber Impoundments, drainage should start by the middle of June and be completed by July 1 in order to keep the trees alive. It should be noted, however, that usually there would be insufficient water to recharge such pools from Oak Orchard Creek prior to the fall migration and/or the waterfowl hunting season. Thus, without sacrificing water from another impoundment, Green Timber Impoundments will normally be of use to waterfowl only during the spring migration, nesting, and early brood-rearing periods.

All major pools will be drained prior to and during the winter months to the extent allowed by backwater conditions existing at that particular time. The reason for this is to provide normal pre-development storage area capacity for flood waters. Usually the drawdown should start immediately following the end of the waterfowl season on the refuge (about the middle of November). Exceptions might be made for pools that develop a substantial muskrat population that could be harvested by delaying the drawdown until early winter. This should not be done, however, unless the drainage facilities of the pool under consideration are such that the area can be rapidly drained in the event of a flood threat.

5. Area Capacity Curves.

Area capacity curves for Mohawk, Oneida, Seneca, and Cayuga Pools (Pools 4, 5, 6A and 6B respectively) are shown on SHEET 4 of 11 of Part II of the MASTER DEVELOPMENT PLAN. There is no area capacity curve available for Swallow Hollow Marsh.

6. Trash Fish Populations -- Potential and History.

Species of trash fish that are present in Oak Orchard Creek are Carp and Bullheads. Carp numbers, however, are relatively small. The small number of Carp, however, may be due to the relatively large population of Northern Pike, which are known predators on young Carp. Of interest, also, is the fact that Swallow Hollow Marsh has been in existance for many years and to our knowledge has never developed a trash fish problem. Carp, in small numbers, and Bullheads have been observed in both Cayuga and Seneca Pools.

7. Status as of December 1969.

Swallow Hollow Marsh was operated by a private hunting club for many years before it was acquired by the government. It needs, however, more adequate water control structures to achieve its full potential.

Seneca Pool (Unit 6A) has been operated as a Green Timber Impoundment from March 1968 to the present. Cayuga Pool (Unit 6B) has been operated as a Spring-Summer-Fall impoundment from March 1969 to the present. Mohawk Pool (Unit 4) is under construction and should be operational by March 1971. A 285 acre section of Mohawk Pool, known as Beaver Marsh, has been flooded by an active beaver dam since the summer of 1964. The development of Oneida Pool (Unit 5) should start during 1970 and should be operational by March 1973.

IIB. Impoundments Primarily Dependent on Local Drainage Areas-(Upland Marshes).

1. Water Sources.

All of the Upland Marshes are dependent on runoff water from their local drainage areas as their main source of water. Springs and/or seeps may contribute some water, especially in the case of Long and Sutton's Marshes.

2. Drainage Routes.

Galaxie Marsh drains into Beaver Marsh, which will become part of Mohawk Pool (Unit 4). Complete drainage would be dependent on the level of Beaver Marsh and later on the level of Mohawk Pool. Long, Knowlesville, and Ringneck Marshes all drain into tributaries of Oak Orchard Creek. Both Long and Knowlesville Marshes are far enough up the tributaries so that drainage would not be affected by floods on Oak Orchard Creek.

Drainage of Ringneck Marsh would only be affected by extreme flood conditions on Oak Orchard Creek that might occur once in ten years. Schoolhouse Marsh drains into a tributary that will flow directly into Oneida Pool (Unit 5). Schoolhouse Marsh, however, is far enough up the tributary so that drainage will not be affected by either the water level of Oneida Pool or by flood conditions on Oak Orchard Creek. Center Marsh drains into Ringneck Marsh. The flowline of Center Marsh, however, is above the management level of Ringneck Marsh so that drainage down to the flowline elevation will not be affected by the elevation of Ringneck Marsh. Center Marsh, however, cannot be completely drained as a portion of the marsh adjacent to the main dike is below the flowline elevation of the structure. Sutton's Marsh drains into Mohawk Pool. It can only be drawn down about 6 inches by means of pipes through the dike. These pipes are high enough so that they will not be affected by the management levels of Mohawk Pool (Unit 4).

3. Maximum Management Elevations and Flowline Elevations.

See Table 2 of this plan.

4. Structure Capacities -- Time to Fill or Drain Units.

All Upland Marshes are normally operated as constant level pools. It is usually not possible, however, to maintain them at full pool level during late summer and early fall if rainfall is normal or below average. The slight drop in water levels that has been observed during this period does not affect the utilization of the areas by waterfowl and is actually beneficial from the standpoint of shorebird use.

Upland Marshes, excluding the few exceptions covered under the section on drainage routes, can be drained at any time. If completely drained, however, they can be filled only during periods when abundant runoff water is available as these small watersheds do not maintain year-round streams. Although conditions creating runoff water can occur at any time of the year, the presence of such water is assured only during early spring. Thus if an area is drained during the summer, it may have to remain below management elevation until the first winter thaw or the spring breakup.

5. Area Capacity Curves.

No area capacity curves are available for the Upland Marshes. The need for this information in our management would not be worth the cost of development of the data.

6. Trash Fish Populations -- Potential and History.

To the best of our knowledge, none of the Upland Marshes contain a carp population. There is the possibility that some carp may be present in Ringneck Marsh, (although unobserved to date), because when

that area was under construction a portion of the borrow pit was inundated by flood waters from Oak Orchard Creek. The older Upland Marshes all contain a population of small fish but neither carp nor bullheads have been observed. The water has remained clear in these impoundments, which would indicate that there is no large population of bottom-feeding fish, such as carp and/or bullheads. If these species are not already present in these impoundments, the likelihood of their becoming established in them would appear to be unlikely. The construction of dikes and water-control structures has cut off access from Oak Orchard Creek, the most likely source of trash fish.

7. Status as of December 1969.

See Table 2 of this plan.

III. Long-term Action Plan.

A. Provide high-quality habitat for waterfowl nesting and brood production.

High quality habitat for waterfowl nesting and brood production on Upland Marshes can usually best be achieved by keeping the impoundments at or near full pool level from April through at least the middle of August. In the case of the larger major pools, the pools should contain water during the above period but the best level will depend on the individual pool. For instance, the maximum number of nesting locations are available when Cayuga Pool is carried at full pool level and when Seneca Pool is held 1.4' below full pool level.

B. Provide adequate water areas for migrating waterfowl.

Due to flood conditions on Oak Orchard Creek, there is usually no lack of water during the early part of the spring migration. In some years, there is scarcity of water in undeveloped sections of the refuge in late April and May. Management of refuge pools for waterfowl nesting and brood production will at the same time provide adequate water for migrating waterfowl during the entire spring migration period.

There is usually a scarcity of water in undeveloped sections of the refuge during the early part of the fall migration and, in some years, for the entire period. Maintaining water in all pools through the middle of November would provide adequate water for all migrating waterfowl. When development is complete, one of the major pools could be drained without seriously affecting waterfowl use during the migration periods.

C. Provide water areas for the public enjoyment of wildlife, including bird-watching and waterfowl hunting.

During most years, the normal operation of refuge impoundments will provide for the above objective. In the case of an unusually wet fall,

it is possible to draw down an impoundment, such as Ringneck Marsh, so that enough shoreline would be exposed to be attractive to shorebirds. In some years, it may be necessary to discharge water from an impoundment so that water will not be too deep in the vicinity of waterfowl hunting stands.

D. Maintain normal pre-development storage capacity for flood waters from Oak Orchard Creek.

If this objective is not carried out, property downstream from the refuge might be damaged and the government blamed for such damage. Oak Orchard Creek is most likely to overflow its banks in the period from December through April. If all major pools (Cayuga, Seneca, Mohawk, and Oneida) are drained prior to and during the winter months to the extent allowed by backwater conditions existing at that time, this objective should be fulfilled. Cayuga Pool, if conditions warrant, could be made an exception to this rule, as experience has shown that this impoundment is capable of being drained in the period between the appearance of flood waters on the upper section of Oak Orchard Creek and the time that such waters actually reach this pool. As a rule, drainage of the major pools should start by the middle of November, so that it will be essentially complete by the first of December - well in advance of the first winter thaw.

E. Maintain an adequate minimum flow in Oak Orchard Creek.

The importance of this objective is obvious, both from the standpoint of downstream users and the maintenance of existing sport fishing. Low water conditions may occur in Oak Orchard Creek anytime in the period between the end of June and November. No plans should be made for using water for off-stream impoundments during the above period. A normal flow of water should be released from the outlet of Oneida Pool during this period. In times of extreme drought it may be necessary to gradually release water from Oneida Pool in order to maintain an adequate flow in the creek (or from the most practical source at the time depending on the priority need for water).

F. Prevent interference with drainage from private lands, including the extensive muckland areas on Oak Orchard Creek east of the refuge.

Oneida Pool should not be filled until near the end of the spring flood surcharge, so that there would be no danger of water being backed up in Oak Orchard Creek beyond the refuge boundary. In the case of a threat of a flood during the period that Oneida Pool (Unit 5) contains water, refuge personnel should be prepared to discharge water before there would be any chance of backing up water beyond the refuge boundary. Knowlesville Marsh should not be allowed to rise above the 632.5' level in order not to interfere with drainage from the septic system of an adjoining landowner. All other refuge impoundments have been planned so that there is no chance that they will interfere with drainage from private land.

G. Promote the growth of desirable aquatic vegetation.

Refuge impoundments have been designed so that the water depth would be favorable for aquatic plant growth. If trash fish are not plentiful, there should be no problem in the establishment of aquatic plants that are benefical for waterfowl. It may be necessary to regulate water depths to manage emergents, such as cattail, that are valuable for brood cover. If cattails become too thin, they can often be brought back by draining the affected impoundment so that moist mudflats are exposed at the period of cattail seed germination. Holding the water up during the start of the muskrat trapping season, followed by winter drainage, will reduce muskrat damage to stands of cattail.

H. Control of undesirable vegetation.

Manipulation of water levels can sometimes be used to control undesirable vegetation. If cattails are too thick, they may be controlled by maintaining a sufficient depth of water during the winter months so that muskrats can move around under the ice and feed on the winter buds. Invasion of pool margins by such plants as purple loosestrife or cottonwood may be prevented if water levels are maintained at a constant level during the growing season. Under normal climatic conditions at this refuge, however, this is usually not possible.

I. Control of trash fish.

The planned winter drawdown of the major pools for the purpose of maintaining the storage capacity for flood waters should also prevent a buildup of trash fish population in these water areas. It is unlikely that we will have a trash fish problem on our Upland Marshes. If such a problem develops, it can be solved by winter drainage and the treatment of any remaining water with rotenone with no loss to the primary objectives of the impoundment.

J. Discourage waterfowl use of the refuge after mid-November.

The above is an important objective as it is against Bureau policy to either short-stop or winter waterfowl at a northern refuge. It is likely, however, that by mid-November climatic factors, especially ice forming on impoundments, will have more effect than water control practices on discouraging waterfowl use of the refuge. In any case, however, drawdown of our major pools, starting in mid-November, will contribute to this objective.

K. Minimize ice damage to dikes, water control structures, and nesting island.

Initiation of the winter drawdown of major pools by mid-November before the formation of thick ice should preclude ice damage on these units. Of the upland marshes, only Ringneck Marsh has shown a tendency for ice damage both to the half-circle riser and the dike slopes and

nesting islands. It is necessary to keep a flow of water passing through the water control structure throughout the winter to prevent the growth of ice on the large expanse of open water from exerting a damaging force. A winter level 18 - 24" below the top of the riser should prevent damage to dike, nesting island, and highway slopes.

L. Maintain an adequate population of small fish for fish-eating birds and mosquito control.

Management of fishes cannot be practiced on our major pools as long as we plan to have winter drawdowns. It is expected, however, that these pools will be restocked annually by flood waters from Oak Orchard Creek. The stocking of beneficial fish should be considered, however, in the event it should become necessary to drain any of our Upland Marshes. If any Upland Marshes should be drained, it would be necessary to restock the unit as natural restocking would not occur. Restocking of small fish might also be necessary if a prolonged period of snow-covered ice should cause a complete winter kill. Restocking would also be necessary in the case of a summer die-off in an Upland Marsh, such as occurred on Beaver Marsh in 1969.

IV. Program Costs.

This Water Management Plan is prepared as the refuge is involved in the development program. A higher level of funding has been shown for Marsh and Water Management on recent Program Schedules than would be the case if development were complete. Some of the supervisory costs in carrying out refuge marsh and water development through the Narcotic Commission work program are currently being assigned to this category as are certain maintenance costs of refuge heavy equipment being utilized for marsh and water development. The following tabulation follows the format of the current Operations Planning and Accomplishment Report and represents our best estimate of the annual management costs for the water developments covered in this plan. The tabulation is presented in two sections which add up to the amounts currently programmed under Management of Marsh and Water. The first portion of the tabulation covers those cost items strictly concerned with the management of water and water management structures with the last portion devoted to what may be termed biological management within the marsh and water category.

DESCRIPTION	UNITS	FUNDS
Annual Water Mgt. Programming	1 man week	275.00
Water level regulation and water gauge reading	3 man weeks	600.00
Dike Maintenance:		
Annual mowing	7.6 miles	760.00
Avg. Annual Repair		1,000.00
Water Control Structures:		
Annual Maintenance	20 each	500.00
Annual Equipment Maintenance:		
12' skiff	1 each	20.00
Caterpillar D-7 bulldozer	1 "	500.00
Bucyrus Erie 15-B dragline	1 "	300.00
LeTourneau 8 yd. Scraper	1 "	250.00
Pro-rated share of annual equipment replacement (Average Annual)		750.00
Portion of General Refuge Maintenance assigned to Water Management		1,750.00
	Sub-Total	6,705.00

MARSH AND WATER MANAGEMENT (Biological Management)

DESCRIPTION	UNITS	FUNDS
Erect new nesting devices	50 each	600.00
Annual Servicing:		
Wood Duck boxes	300 each	
Hammock nests	1,500 each	
Nesting platforms	30 each	850.00
Nesting islands, brush control	162 each	500.00
Shoreline vegetation control		500.00
Annual Equipment Maintenance:		
Canoes	2 each	50.00
Outboard motor	1 "	25.00
Snowmobile	1 "	80.00
Mistblower	1 "	50.00
Pro-rated share of annual equipment replacement (avg. annual)		1,500.00
Portion of General Refuge Maintenance assigned to Marsh and Water (Biological Mgt.)		1,750.00
	SUB-TOTAL	5,905.00
	TOTAL	12,610.00

ATTACHMENTS: Tables 1 and 2
Map of Developed Water Areas

_____
(Signature)

_____
(Date)

Regional Office Approval:

_____
(Signature)

_____
(Date)

TABLE I IMPOUNDMENTS HAVING PRIMARY SOURCE OF WATER FROM OAK ORCHARD CREEK

Name	Master Plan Designation	Maximum Management Elevation *	Flowline Elevation	Maximum Surface Area	Local Drainage Area**	Other Water Sources
Mohawk Pool - First impounded in 1974. (Recon. marsh section in 1964)	Unit 4	614.5	607.0	1,370 acres	3,250 acres	Seneca & Oneida Pools
Oneida Pool (First impounded Spring 1979 CURB - Stn L = 617.88)	Unit 5	614.5	606.0	~~780~~ 770 acres	76,000 acres***	Seneca & Mohawk Pools
Seneca Pool - First impounded in March 1968	Unit 6A	~~614.0~~ 613.4	608.0	935 acres	1,500 acres	Mohawk & Oneida Pools, Tonawanda GMA pool west of Salt Works Rd., Cayuga Pool ****
Cayuga Pool - First impounded Spring of 1969	Unit 6B	613.0 614.0	608.0	365 acres 380 ← Master Plan, Part II	650 acres	Mohawk Pool, ~~Tonawanda~~ GMA pools, Seneca Pool ****
Swallow Hollow Marsh - impounded prior to acquisition by the government		619.5	618.5	54 acres	100 acres	North Marsh of Oak Orchard GMA

* Top of half-circle riser or elevation of the emergency spillway, whichever is lower.

** Includes surface area of the pool or marsh.

*** Oneida Pool (Unit 5) is on the creek and its drainage area includes the entire drainage of Oak Orchard Creek less the area of the other pools.

**** Water can be interchanged between Cayuga and Seneca Pools when a planned structure is installed in the County Line Dike.

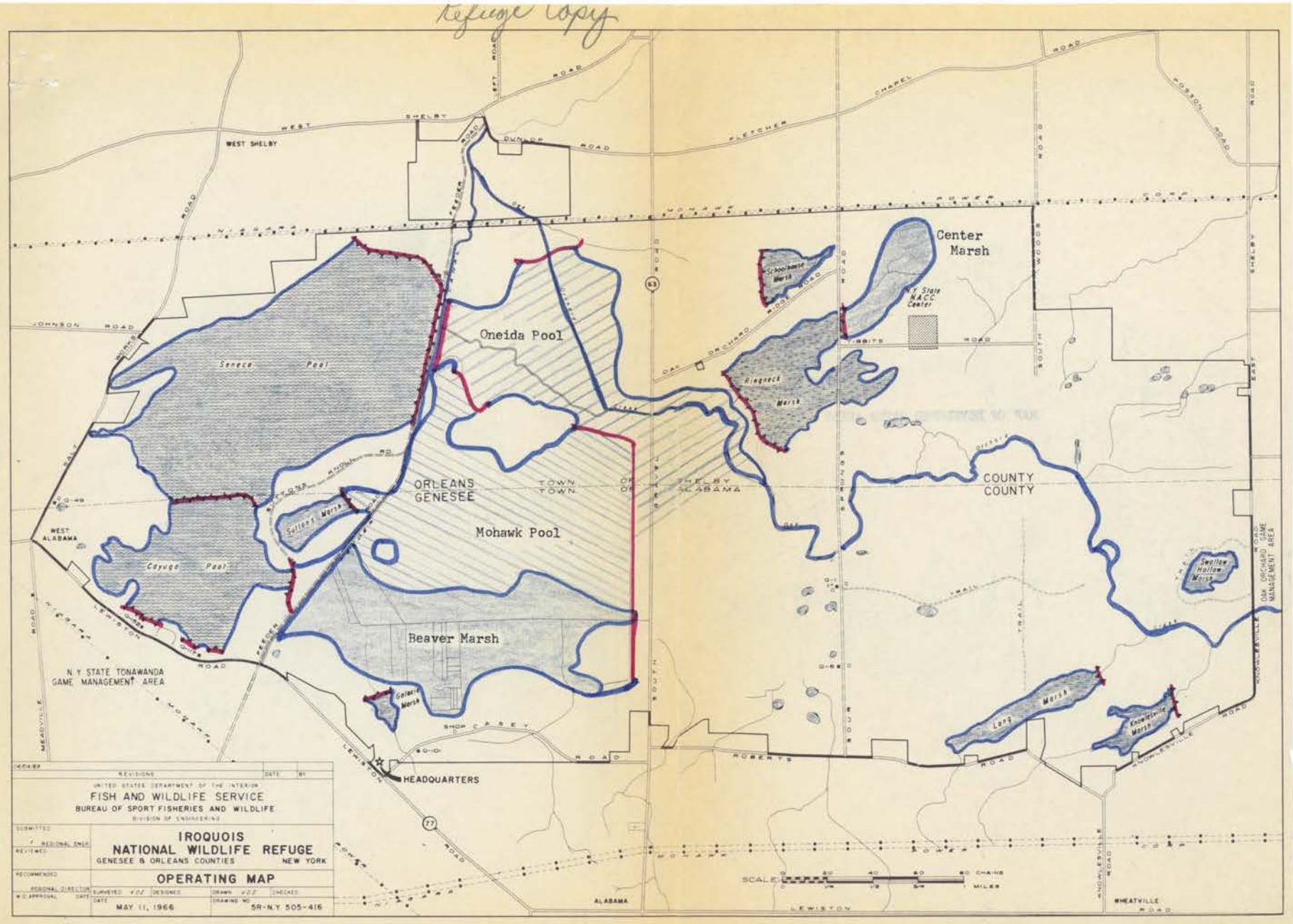
TABLE 2 UPLAND MARSHES

Name	Letter Designation		Maximum Management Elevation *	Flowline Elevation	Maximum Surface Area	Drainage Area	Status as of December 1969
Galaxie Marsh	K	7	616.6	611.6	10 acres	250 acres	Filled in 1965
Long Marsh	D	1	633.0	626.5	69 acres	400 acres	Filled in 1965
Knowlesville Marsh	C	2	632.5	626.5	46 acres	395 acres	Filled in 1966
Schoolhouse Marsh	H	4	623.0	620.0	40 acres	369 acres	Filled in March 1967
Ringneck Marsh	G	5	622.0	615.5	172 acres	552 acres	Filled in March 1969
Center Marsh	A	3	627.0	622.5	84 acres	203 acres	Main dike & water control structure completed. Can operate at 625.0 level. Full potential requires additional land and auxiliary dike. - Completed 1971
Sutton's Marsh	--		615.8	no drainage structure	28 acres	60 acres	Filled in 1966

* Top of half-circle riser. Emergency spillway elevation permits an additional one foot of water.

MAP OF DEVELOPED WATER AREAS

Refuge copy



REVISIONS	DATE	BY

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
DIVISION OF ENGINEERING

IROQUOIS NATIONAL WILDLIFE REFUGE

GENESEE & ORLEANS COUNTIES NEW YORK

OPERATING MAP

SUBMITTED — REGIONAL ENGR.
REVIEWED
RECOMMENDED — REGIONAL DIRECTOR
W.O. APPROVAL — DATE
SURVEYED — DESIGNED — DRAWN — CHECKED
DATE: MAY 11, 1966
DRAWING NO. SR-N.Y. 505-416