LAND USE PLAN

OTTAWA NATIONAL WILDLIFE REFUGE

OAK HARBOR, OHIO

United States Department of the Interior

Fish and Wildlife Service

Bureau of Sport Fisheries and Wildlife

LAND USE PLAN

PART I

Ottawa National Wildlife Refuge is located along the south-western shore of Lake Erie in north-central Ohio. It lies about half and half in Lucas and Ottawa Counties almost midway between Toledo and Port Clinton. When fully acquired, Ottawa Refuge will encompass about 5,000 acres.

Primary objectives of the refuge are to provide food, cover, and protection for nesting, migrating, and wintering waterfowl associated with this portion of Lake Erie. Management will be directed towards establishing a proper balance between seasonal use based on Flyway needs and the capabilities of the area. Secondary objectives are to provide food, cover, and protection for colonial nesting water and marsh birds, bald eagles, and resident game species.

Economically, Ottawa Refuge makes quite an impact on the surrounding community. Acquisition and development will cost over two million dollars. Operation and maintenance costs will also be high. In addition, the refuge will undoubtedly attract a lot of visitors to the area. Conversely, the refuge removes land that has a rather high tax value from the tax roles.

There is another factor that is difficult to assess. The shores of Lake Erie have long been in great demand. Industrial, recreational, agricultural, and housing interests have all been in keen competition for these valued acres for the past century. Presently, recreational interests hold sway. A rapidly expanding population and industries are, however, making rapid inroads into this "vacationland". Toledo suburbs now extend to the refuge area which is some 20 miles from the downtown section. Just what effect "removing" about 5,000 acres from this competition will have on the future development of the area cannot be foreseen at this time.

Ottawa Refuge lies in an old Lake Plain that was at one time a prairie-marsh that extended from Sandusky, Ohio to Detroit, Michigan. It has a common boundary with Crane Creek Wildlife Experiment Station, a State-owned and managed marsh of some 2,600 acres, on the east. It also has a common boundary with Metzger Marsh, another State-owned marsh of some 560 acres, on the northwest.

Lake Erie moderates the local climate. The average frost-free period is 190 days between April 20 and October 30. This is about a month longer than inland areas of similar latitude. Precipitation averages about 34 inches annually and is generally well distributed.

Soils are of glacial and lacustrine derivation. They are dark colored and fertile, but are heavy textured and only slowly permeable. They are classified as silty-clays and are over 40 percent clay. Being part of the Lake Plain, the topography is extremely flat with little gradient. Slow permeability and lack of gradient results in very poorly drained soils.

All of the soils have been typed, but capability classifications have not been completed and are even now in the process of being revised. Enough has been done, however, to make a reasonable estimate of the present and future classifications. Presently about 2,000 acres are in Class II, 500 acres in Class III, and 2,500 acres in Class V. The revision underway will downgrade almost all Class II land to Class III. Poor drainage and flooding hazards rather than slope or lack of profile prompted the downgrading. Toledo silty clay and Bono silty clay soils predominate.

Land-use practices have been a hodge-podge for many years. Prior to settlement, commercial hunting and trapping predominated. With settlement, some areas are still held for hunting and trapping. A large part of the old marsh, however, was usurped for industry and agriculture.

Farming has continued to be a hodge-podge. With proper drainage the climate and soils are favorable for growing fruits, truck crops, corn, soybeans, sugar beets, cereal grains, and hay. It is not uncommon for one farmer to be producing all of these crops and also have livestock including dairy cattle. This diversity is influenced by more than the soils and climate. This particular area straddles the borders of the Midland Feed Region or corn belt, the hay and dairying region of the Northeast, and the general farming of the East-Central Uplands; regional delineations are as described in the Yearbook of Agriculture, Soil, published in 1957. Because of the climate, soils, and location; prices and demands greatly influence the land-use and crops grown from year to year.

Land-use with some modifications will be retained in its present state. Approximately 2,500 acres of Class V will remain marshland. Roughly 2,000 acres will be retained as cropland. The other 500 acres is composed of ditches, dikes, roads, woods, homesteads, orchards, and "islands" of slightly higher ground in marsh areas.

There are five major and five minor marshes or water-management areas in the refuge. These marshes are diked and water levels are controlled by pumping water in and out of them. Over half of these marshes also contain interior dikes for sub-impoundment control. Crane Creek and its flood plain contributes about 200 acres of marsh and water.

Food production in these marshes can be increased with water draw-downs which permit natural and cultural propagations of preferred waterfowl food plants. Draw-downs at Crane Creek Wildlife Experiment Station resulted in tremendous natural regrowth of smartweeds. Areas in which natural vegetation is insufficient; millet, buckwheat, or other desirable species with and without soil disturbance will be sown. Draw-downs, however, permit encroachment of undesirable vegetation. Records at Crane Creek Wildlife Experiment Station show that woody vegetation starts to encroach after three successive years of draw-downs. These records

also indicate that one year of holding water levels high will not only kill this woody vegetation but also curtail cattails. Draw-downs also reduce the amount of water available to nesters and their broods. Consequently, a balance between food production, undesirable encroachment, and duck production must be maintained.

This plan proposes a three-year rotation on each of the major and two of the minor marshes as follows. First year, draw-down for food production reflooding prior and during fall migrations. Second year, hold water level at moderate elevation for most desirable food, cover, open water relationship. Third year, flood to maximum to reduce undesirable vegetation.

The two most important minor marshes can be worked together, and for all intents and purposes be considered another major marsh. Working these units together makes six major marshes which will be paired. A three-year rotation will be established with one pair in each of the phases. The areas of the pairs will vary from about 520 acres to 640 acres.

This plan further proposes that a stable water level be maintained in a portion of one of the minor marshes to determine the species and extent of vegetation resulting from this condition. This is proposed to determine whether or not aquatic vegetation and conditions desirable for diving ducks can be produced. The remainder of the minor marsh areas will be maintained primarily for nesting areas.

Fringes and high spots of marsh areas will be sown to desirable grasses and legumes to encourage duck nesting instead of being cropped or permitted to revert to woody vegetation as in the past. These areas will total about 500 acres and be designated "wet meadows". These areas will be retained in a desireable state by mowing as necessary. Hay-making will be encouraged to reduce refuge costs of maintaining the meadows.

Approximately 2,000 acres will be intensively farmed to produce food for wildlife. Modifications of present uses concerning croplands are to establish desireable crop-rotations, eliminate burning crop residues, establish better flood protection and drainage, and increase soil fertility. All of these are necessary to produce good yields year after year with a reasonable degree of dependability. Many serious problems could develop and the refuge lose much of its value if a reasonable amount of food is not assured.

The only timber on the area is in a few small woodlots. These will be held to provide variety of habitat, and to provide for wildlife species dependant upon them.

Blackbirds pose one of the most serious special problems of the area. Their depredations seriously reduce the amount of food available for other wildlife, directly and indirectly. Directly, large flocks of blackbirds consume a tremendous amount of preferred wildlife foods both wild and cultivated.

Indirectly, much less corn, millet, buckwheat, and other desireable wildlife foods are grown on private holdings because of the inevitable and severe damage by blackbirds. Cooperative farmers on the refuge have to be permitted to substitute other crops for corn. Farmers as far from the marshes as 15 miles no longer attempt to grow corn because of blackbird damage.

Growing alfalfa in the crop-rotation also poses special problems. Alfalfa is an excellent soil conditioner, is the normal hay crop of the area, has good sale value, is readily eaten by geese, and provides nesting cover for many species of wildlife including ducks. Conversely, its very attractiveness as nesting cover to ducks and other wildlife often makes it a "death trap". Many nests and the brooding hens are destroyed when the fields are cut for hay or processing. Also, alfalfa provides nesting cover for blackbirds.

Truck crops, particularly tomatoes and cucumbers, are grown throughout the area. Permitting these crops to be grown on the refuge also has advantages and disadvantages. Tomatoes and/or cucumbers may be substituted for soybeans in the crop rotation. Advantages are, neither of these are price-supported or acreage allotted crops. Both are high-value crops. Both are harvested early which allows ample time to follow them with winter grains. Disadvantages are these crops require much hand labor and pesticide sprays. So many laborers are used in their care that there is danger that the refuge may have trouble controlling illegal trespass. The problem of using pesticides on a wildlife refuge is obvious.

PART II

I. Farming

A. General. Farming for wildlife is an accepted practice. Generally more food per acre can be produced with than without cultivation. A greater diversity of food can be produced by farming part of an area. Cultivation thwarts encroachment of undesirable vegetation. Farming about 2,000 acres is considered essential to provide the amount and diversity of food necessary to meet the refuge's objectives. Grains and greens are the primary types of foods to be produced for wildlife. An estimated 7,500 bushels of corn and/or sorghum, and about 50 tons of green browse will be needed each year to feed the wildlife. Under the proposed crop-rotations and share-cropping practices, these amounts will be attained.

A five-year crop-rotation will be used throughout all farm units. The basic rotation will consist of corn, soybean, cereal grain, alfalfa, alfalfa. Several modifications will be permitted within this basic rotation. Farm cooperators will be permitted to substitute soybeans or other suitable crops for their shares of the scheduled corn acreage. Tomatoes and/or cucumbers may be substituted for soybeans. Farm cooperators have the option of making hay or chopping the alfalfa for processing.

Under the proposed five-year crop-rotation, cropland will be the chief source of hay for harvesting. As such, farm cooperators will be the primary harvesters. The establishment and care of approximately 500 acres of wet meadow which could possibly be another source of hay, will be a refuge operation. These areas will be harvested only when advantageous to the refuge programs since they will be established primarily to encourage duck nesting. No livestock grazing is presently planned for several reasons. If it becomes apparent that grazing can be advantageous, this plan will be amended accordingly.

Enough interest in cropping refuge lands has already been shown to insure an adequate supply of cooperators. As the value and benefits become more apparent, even more interest is anticipated. Real estates values are extremely high and cropland is at a premium. Few bonified "dirt Farmers" can afford to purchase more farmland. Present machinery capabilities and high prices prompt farmers to constantly seek more land to farm. They cannot afford to permit the machinery to be idle, and they can farm large acreages.

Ottawa County's economy is still closely tied to agriculture. Although Lucas County's economy is much more industrial, the immediate refuge area is still largely agricultural. Farms are well kept, intensively managed, and apparently prospering. There are no "vacant" farms in the area.

Soils are fertile and the terrain flat. With proper drainage and flood protection the land is very productive. Some fields show a phosphate deficiency, and just recently some liming has been recommended in connection with alfalfa production. Tiling is necessary to insure good crops year after year. Correcting phosphate and calcium deficiencies, along with maintaining a high level of fertility will be accomplished through normal share-crop reductions. Some tiling may also be done through this measure, but much of the tiling will have to come from other sources. The need for tiling to assure good crops year after year cannot be over emphasized.

B. The Program. All of the area designated "cropland" (see land-use map, appendix 1.) will be farmed under cooperative farming agreements. These agreements are for one-year periods, and renewed annually at the discretion of the refuge manager. The agreement period will cover from March 1, to the following February 28. If for any reason an agreement is not renewed and the cooperator has a crop or crops planted, he shall be permitted to harvest this or these crops under a special use permit to the extent of his previous agreement (i.e., two-thirds or three-fourths, etc., whatever his normal share would have been). This situation will arise with winter grains and meadows established in the normal and prescribed crop-rotation. In the event a cooperator defaults in part or in whole, he shall forfeit a portion of his crops equal to the value of his default (i.e., does not apply fertilizers as per the cooperative agreement). Values to be determined at current prices. If an agreement as to "equal values" cannot be reached between the cooperator and refuge manager, a qualified, impartial third party will be contacted to make the determination.

Owners or bonified tenants of the land when purchased will be given the first opportunity to farm this same land for the refuge. As these original cooperators decline or dropout, their acreages will be incorporated or divided as necessary to establish farm units that approximates 160 acres of cropland. Each unit assigned one cooperator. A list of prospective and eligible cooperators names will be kept on file to fill vacancies. Unless by mutual agreement to the contrary, new cooperators will be selected from the list in the order in which they applied. Prior to, or at the time cooperative farming agreements are signed, each farm unit will be discussed and/or examined with the respective cooperators to determine conditions, obligations, and responsibilities to avoid misunderstandings.

The normal and accepted shares will prevail, i.e., the refuge retains one-third of unharvested and one-fourth of harvested crops. Many aspects of the farming program are contingent upon crop yields and prices. The preceding five-year averages will govern values anticipated for the current crop year. An average of lesser periods will be used until the refuge's history equals five years. This method is proposed because "firm" cooperative agreements must be made in advance of operations and before exact yields and prices are known. If current-year crop yields and/or prices are higher than the previous five-year average the cooperators gain and "pocket" the money. If, however, prices and/or yields are below the five-year average, cooperators lose.

To maintain soil-fertility levels, cooperators must apply fertilizers in amounts at least equal to the nutrients removed by the crops. As an example, 70 bushels of corn (grain only) removes approximately 65 pounds nitrogen (N), 26 pounds phosphate (P_2O_5), and 17 pounds potash (K_2O). If the five-year average yield is 70 bushels of corn per acre, the cooperator must apply fertilizers of sufficient quality and quantity to at least replace these nutrients. This is the agreement regardless of the yield in the agreement-year.

All farm units are more or less dependant upon pumping water out of collection ditches for proper drainage. Cooperators will operate and assume the costs of operating the pumps. The refuge will furnish the pumps and assume the costs of repairs unless negligence or misuse by the cooperator is indicated. This is proposed to permit maximum freedom to the cooperator, and minimum responsibility to the refuge in determining when and how long the pumps should be operated. The refuge will assume operation and costs of pumps if used for other than normal agricultural use.

Cooperators will be responsible for operating and maintaining their respective units in a neat and orderly manner. This includes mowing and respecting established waterways, headlands, ditches, dikes, etc., to control and prevent encroachment of noxious weeds and brush. The refuge will assume all responsibility and costs of locating, establishing, and repairing dikes, ditches, and other major appurtenances.

The refuge will confine its farming operations to marginal-cropland and marshes. Approximately 500 acres of wet meadow will be established and maintained to encourage duck-nesting and goose-feeding (see map, appendix 1). Also, some non-productive areas within the marshes will be sown to highly preferred waterfowl-food producing vegetation.

C. Description of Individual Farming Units. All cropland, hence all farm units, will have the same basic program. This can and will be done for several reasons. All land designated as cropland is essentially the same. The basic program will reduce erosion and maintain fertility. The five-year-rotation is well within the limits of the soil capabilities according to Soil Conservation Service standards. It will fulfill the refuge's needs. It will cause less dissension among cooperators.

The following is a detailed description of the proposed method that will stand for all farm units. Each farm unit will be divided into five areas as equal in size as practical to facilitate the five-year rotation. Each year then, one-fifth of each unit will be scheduled for corn, one-fifth for soybean, one-fifth for cereal grain, and two-fifths for alfalfa.

Beginning with corn, each cooperator has the choice of planting the entire acreage scheduled for corn to corn; or, he may plant the refuge's one-third to corn and substitute sugar beet, soybean, tomato, or cucumber on his two-thirds of the acreage. If he does not substitute, he must harvest his share of the corn in strips. This opens the fields to encourage wildlife feeding, and assures a more equitable division of "good" and "poor" corn. Harvested to unharvested ratios of 8:4, 10:5, and 12:6 rows are recommended. Staying within these ratios "opens" the fields sufficiently for wildlife, and yet is close enough to assure a reasonably equal division. The cooperator must apply at least the minimum amount of maintenance fertilizers according to the five-year average yields as previously described. He also must interseed ryegrass or other designated crop at the time of the last cultivation. All work, fertilizers, and seed to be furnished by the cooperator except the ryegrass or other designated seed used to interseed the corn rows which will be furnished by the refuge. In the event that all of the refuge's share of the standing corn is not needed or eaten prior to the following planting season, the cooperator will be given the first opportunity to harvest the surplus for the refuge. This to be on a cash or half-and-half share basis depending upon the needs of the refuge. All of the refuge's corn will be left standing in the fields for wildlife food. Consequently, there is no opportunity to increase soil fertility or other improvements through share-crop reductions on corn acreages. If the cooperator substitutes another crop for his share of the corn, he will be required to sow a green-browse, cover crop on this acreage. The refuge will furnish the seed and the cooperator the work.

Soybean follows corn in the rotation. Each cooperator has a choice of planting soybeans or substituting part or all of this acreage to tomatoes and/or cucumbers. None of these crops will be left standing in the fields to feed wildlife. All are "short season" crops and are included to meet the normal and accepted crop rotation of the area, and act as a "bridge" to change from row-crops to cereal grains and meadow.

All work, seed, and fertilizers will be furnished by the cooperators. The minimum amount of fertilizers to at least equal the nutrients removed as per the five-year average yield indicates. The cooperator will harvest and retain the entire crop or crops and apply land-use practices equivalent in value to the refuge's share. With soybeans this is one-fourth of the five-year averages for prices and yield. As an example, if the five-year averages were 20 bushels per acre and worth $2.00 per bushel, the cooperator would apply $10.00 worth of lime, fertilizers, tile, or other specified practice for each acre of soybeans grown. This is the method to be employed to increase fertility and gain other improvements. The land practices to be applied will be determined during the discussions with the cooperators at or before the signing of the cooperative agreements. If tomatoes or cucumbers are substituted, they will be handled essentially the same as soybeans except the refuge's share will be reduced to one-tenth. This is proposed because of the much higher costs, risks, and profits involved in these crops. A much higher rate of fertilizer is applied to "tomato ground", and generally about one-fourth of the crop goes to the "itinerant laborers" who take care of the extensive hand labor involved. Presently, tomato growers gross between $250 and $450 per acre, and good "tomato ground" cash rents for $30 to $35 per acre. A one-tenth share of the gross closely equals the cash rental rates.

Refuge must receive at least a small percent of the crop - if no crop - see memo FRM-4-9-64

Cereal grains will follow soybeans or its substitutes. As many acres as possible will be sown to winter grains to provide goose-browse and ground-cover. Because of the preference shown by geese and farm cooperators, wheat will be sown to the extent of the refuge's allotment. The allotted acreage, however, will not be enough to sow the entire one-fifth of the cropland scheduled for grains. Consequently, the remainder will be sown to rye, barley, and/or oat crops. All work, fertilizers and seed will be furnished by the cooperators. The minimum amount of fertilizers applied to be at least equal to the nutrients removed as per the five-year average yields. As with soybeans, the cooperator will harvest and retain the entire crop or crops and apply land-use practices equivalent in value to the refuge's share. With cereal grains this is one-fourth of the five-year averages for prices and yields. In addition, the cooperator will make a seeding of alfalfa in the grain, and mulch the grain stubble after harvesting. This latter condition is proposed to benefit the soil, young alfalfa, and the quality of the following years hay. It also helps control weeds.

Refuge must receive at least a small percent of the crop - see memo FRM 4-9-64

Alfalfa will not be harvested in the year sown but will be held and harvested for the following two years. Each cooperator has the choice of selling the crop to an alfalfa processing mill, or baling it for hay. The difference is that alfalfa sold to a mill is "chopped" more often than if cut and baled for hay. All work, seed, and fertilizers will be furnished by the cooperator. The minimum amount of fertilizers to at least equal the nutrients removed as per the five-year average yield indicates. The cooperators will harvest and retain the entire crop for both years with one notable modification. The refuge's share may be withheld from the harvest long enough to protect duck and pheasant nests. This plan proposes that cooperators apply land-use practices equivalent in value to the refuge's one-fourth share the first year, but pay cash for the second-years harvest. The cash price to be the same as if they applied land use practices. This is proposed to enable some money to be returned to the counties since there will be little opportunity for any other cash revenues at Ottawa Refuge. As needed land-use practices are accomplished this plan may be amended to sell both years alfalfa crops for cash to provide larger returns to the counties.

Acreages designated with asterisks in the summary table are subject to change. Acreages of several tracts yet to be purchased are still subject to negotiations.

SUMMARY TABLE

Farm Unit	Cropland Acreage	Soil Capability	Crops and Rotations	Increasing Fertility
1	207*	III	Reg. 5 yr.	Crop-share reductions
2	183*	III	Reg. 5 yr.	Crop-share reductions
3	180	III	Reg. 5 yr.	Crop-share reductions
4	177	III	Reg. 5 yr.	Crop-share reductions
5	170	III	Reg. 5 yr.	Crop-share reductions
6	187*	III	Reg. 5 yr.	Crop-share reductions
7	150	III	Reg. 5 yr.	Crop-share reductions
8	165	III	Reg. 5 yr.	Crop-share reductions
9	135*	III	Reg. 5 yr.	Crop-share reductions
10	115	III	Reg. 5 yr.	Crop-share reductions
11	146	III	Reg. 5 yr.	Crop-share reductions
12	130	III	Reg. 5 yr.	Crop-share reductions
13	130	III	Reg. 5 yr.	Crop-share reductions
14	185	III	Reg. 5 yr.	Crop-share reductions
Total	2260			

II. Grassland Management

A. General. Major factors of the primary objectives of this refuge are to increase goose-use and duck-nesting. Grass-legume meadows encourage both, particularly if the meadows are in close proximity to marsh and food areas. Some 500 acres of wet-meadow will be established under these conditions. Grasslands will be managed for wildlife rather than economic use. Consequently, no hard and fast rule will be set as to when or how often harvests should be made.

Ducks prefer taller vegetation for nesting-cover than geese do for feeding. A desired situation then, would be to delay harvesting until duck-brooding is completed, then harvest the meadows to place them in a condition conducive to geese. This will be done if possible. If conditions do not permit, then harvests will be placed on a rotational schedule. Duck-nesting will take precedence over goose-grazing because there will usually be sufficient browse available to geese on the cropland.

Several alfalfa processing mills are located within 20 miles of the refuge. They create a good demand for alfalfa. This makes it a good-paying cash crop, and many land-owners devote a large percentage of their lands to growing alfalfa. Presently, there is little demand for pasture.

There is almost no wild hay, and little demand for it. Dikes and pumps make the area quite artificial and vegetative cover changes abrupt. Dikes are often the boundary between marsh and cropland. With few exceptions, ecological succession of moist soils is from cattails to brush. The meadows to be established will replace these undesirable types.

B. Grazing. None is presently planned.

C. Haying. As previously described, the farm cooperators will be the chief hay-harvesters. There will be little hayland per se on the refuge.

A list of prospective permittees will be kept on file. They will be contacted as per their application dates as hay other than that produced in the crop-rotation becomes available. It is doubtful that the processing mills will be interested in hay produced on wet-meadows. Straight alfalfa cut often to gain protein and reduce fiber is much preferred for processing. Meadows on the refuge will be a grass-legume mixture. They also will be held unharvested well beyond the state desired by the mills in order to provide duck-nesting cover. If a lack of interest in harvesting these meadows develops, the refuge will mow them periodically to control brush and weeds.

Alfalfa prices vary greatly. Consequently, a wide range in the schedule of rates is necessary to be able to meet conditions. Some hay is sold by-the-ton. More is sold by-the-acre. This plan proposes the latter with a price-range of $20 to $40. Cutting will be forestalled until duck-nesting is completed and concluded prior to waterfowl hunting season.

III. Timber Utilization

Timber covers about 125 acres of Ottawa Refuge. Nine woodlots ranging in size from two to forty acres contain most of it. In addition, narrow bands of trees fringe some sections of marshes, ditches, trails, croplands, Crane Creek, and Lake Erie. Almost all timbered areas will be preserved in a natural state.

This plan proposes that the present wooded areas neither be expanded nor reduced. Exceptions will be removal of brush and trees that interfere with dike reinforcement, trail maintenance, and wet-meadow establishment.

1. Objectives. Objectives are to retain these wooded areas to provide for the species of wildlife dependant upon them. Of equal importance is to preserve these few areas for esthetic values.

   The total acreage and individual woodlots are too small to bias management in favor of any particular species of wildlife. Wildlife and the refuge probably can best be served by permitting nature to take its own course.

   There are few large and not many small woodland tracts left in Ohio. Consequently, "a-walk-in-the-woods" takes on added significance. The refuge's proposed "nature trail" transects the largest and borders the second largest woodlot on the refuge. Accordingly, retaining the woodlots in a natural state probably constitutes their highest and best use.

2. History and Description. Forest types, composition, and regional delineations for this area vary to some extent with the various writers. All seem to agree, however, that oaks predominate. According to the map of "Forest Types of the United States" printed in the "YEARBOOK OF AGRICULTURE, TREES," the refuge is located in the oak-hickory forests of the Central Hardwood Region. Actually oaks and/or oak-hickory associations do dominate the woodlots. Dead and dying elms, soft maples, sycamores, cottonwoods, walnuts, hackberrys, dogwoods, and ashes also make up a significant part of the composition.

All wooded areas on the refuge have been cut and harvested sometime in the past. Some areas contain mature and over-mature trees. Others have been harvested within the last two years and are little more than slash-heaps and brush.

Sections 3, 4, 5, 6, and 7. Since there is so little timber on the area, and this plan proposes no intensive management these sections are not applicable, and completing them would serve no practical use. If and when the need arises, this plan will be amended to include them.

SIGNATURE PAGE

Submitted by:

Alfred O. Manke

(Signature)

Alfred O. Manke
Refuge Manager

(Title)

Date: April 3, 1964

Approved, Regional Office:

Date: 4-5-64

(Signature)

Regional Refuge Supervisor

UNITED STATES
DEPARTMENT OF THE INTERIOR

R9E R10E

83°16'

41°40'

41°38'

30

31

32

6

5

7

8

Reno Beach

Lake

Bono

CUT

PARK

COLONY

BLVD

SIDE

ROAD

RENO

TEACHOUT

VAN DYKE

AVE

RACHEL

ROAD

WARD

CANAL

WARD

CANAL

BOAT
DOCKS

VELAR

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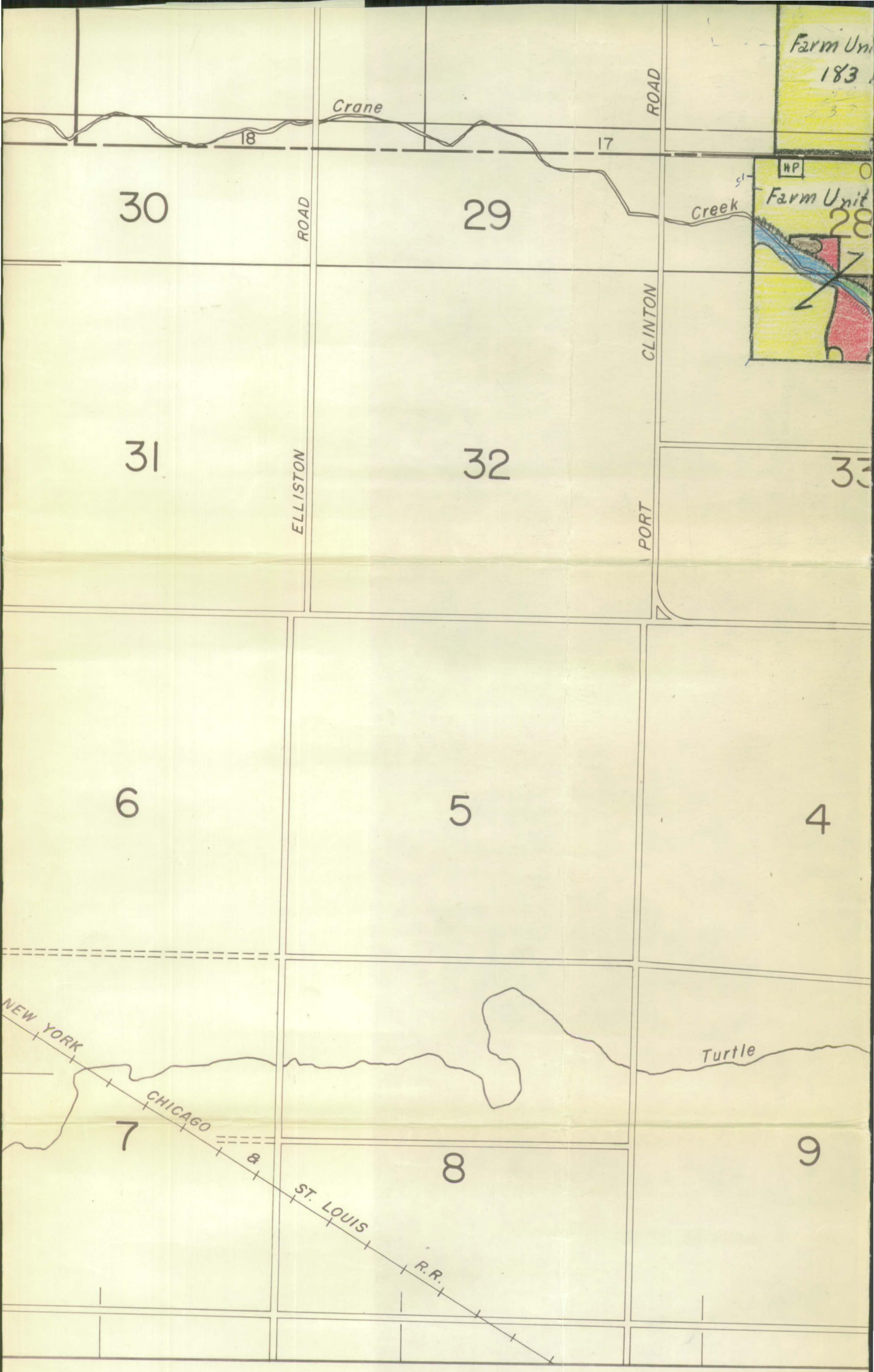

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NNEAPOLIS, MINNESOTA

SEPTEMBER, 1960

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LAKE

Reno by the Lake

Unit No. 1 - 207 Acres

Pool 3. Rintail Marsh

Pool 4. Willow Point

ROAD

TANK

DITCH

Orchard

HF

t No. 2
Acres

Farm Unit No. 3
180 Acres

HP
Farm Unit No. 4
177 Acres

Farm Unit No. 5
170 Acres

Pool 5 Redhead Flat

Crane

LUCAS CO. 16

5

14

TTAWA CO.
No. 6 - 187 Acres

8

27

1

Pool 2. Swandive

26

Pool 6 Mallard Bay

HP

HP

Farm Unit No. 7 - 150 Acres

HP

HP

Farm Unit No. 8
165 Acres

DITCH

HP

34

Farm Unit No. 9
135 Acres

Farm Unit No. 10
115 Acres

35

Farm Unit No. 11
146 Acres

Farm Unit No. 12
130 Acres

ROAD

OHIO

HP

HP

STATE

HP

HIGHWAY

HP

NO.

HP

STANGE

3

2

Creek

10

11

83° 14'

83° 12'

MICHIGAN AND FIRST PRINCIP

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DLIFE REFUGE

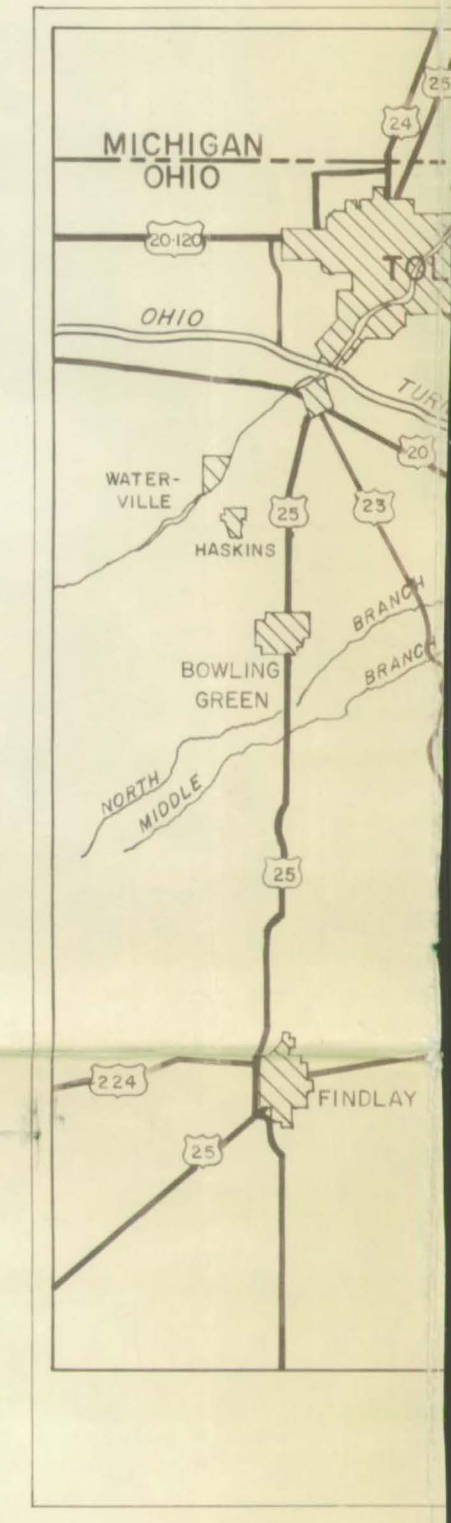
IES, OHIO

BURE

R10E R11E

LEGEND

- Managed Pool and Marsh
- Wet Meadow
- Cropland
- Timber
- Uncontrolled Water and/or Marsh
- Sand Beach
- Conducted Tour Route (Vehicles)
- Nature Trail (Foot Path)
- * Observation Tower
- Headquarters



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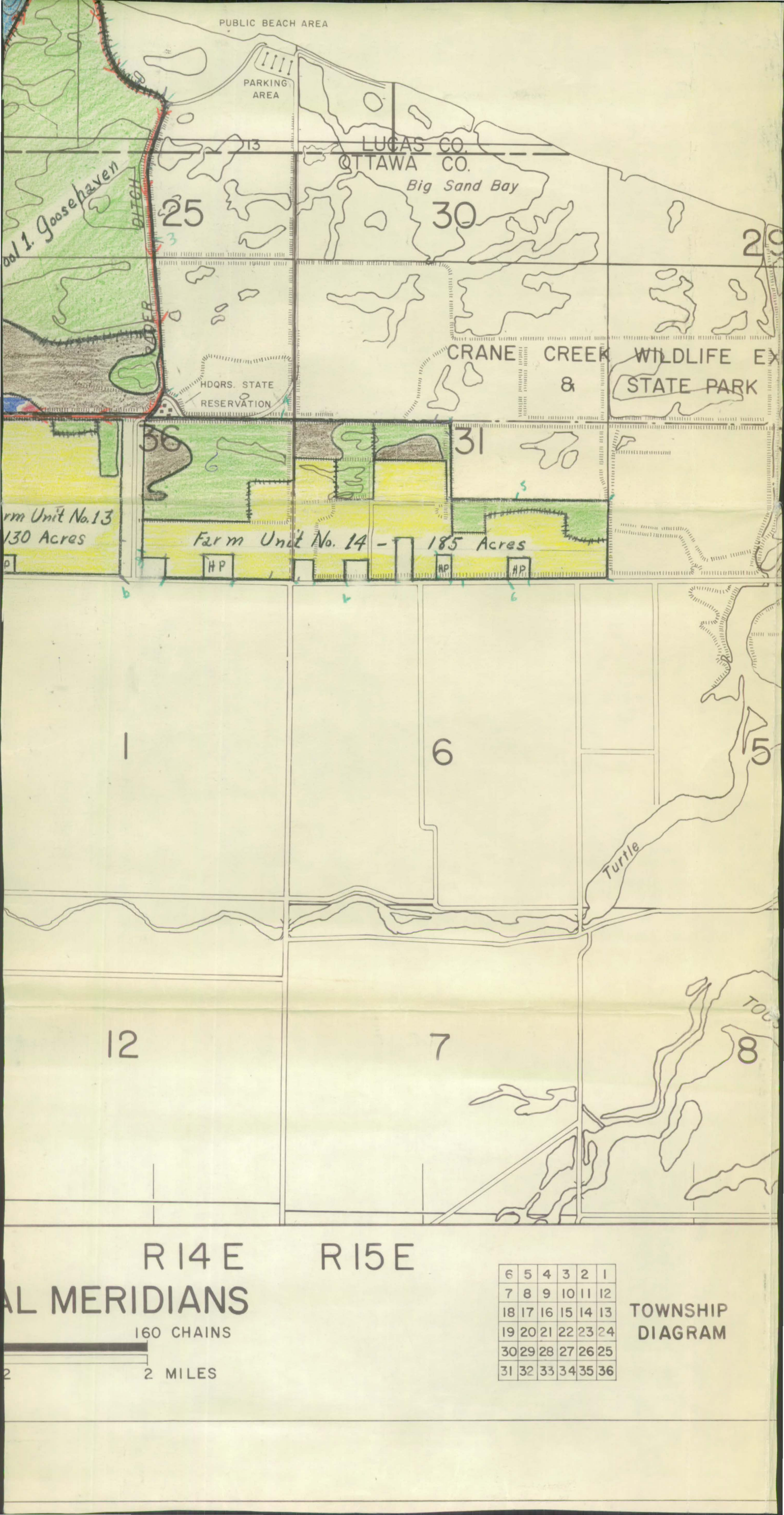
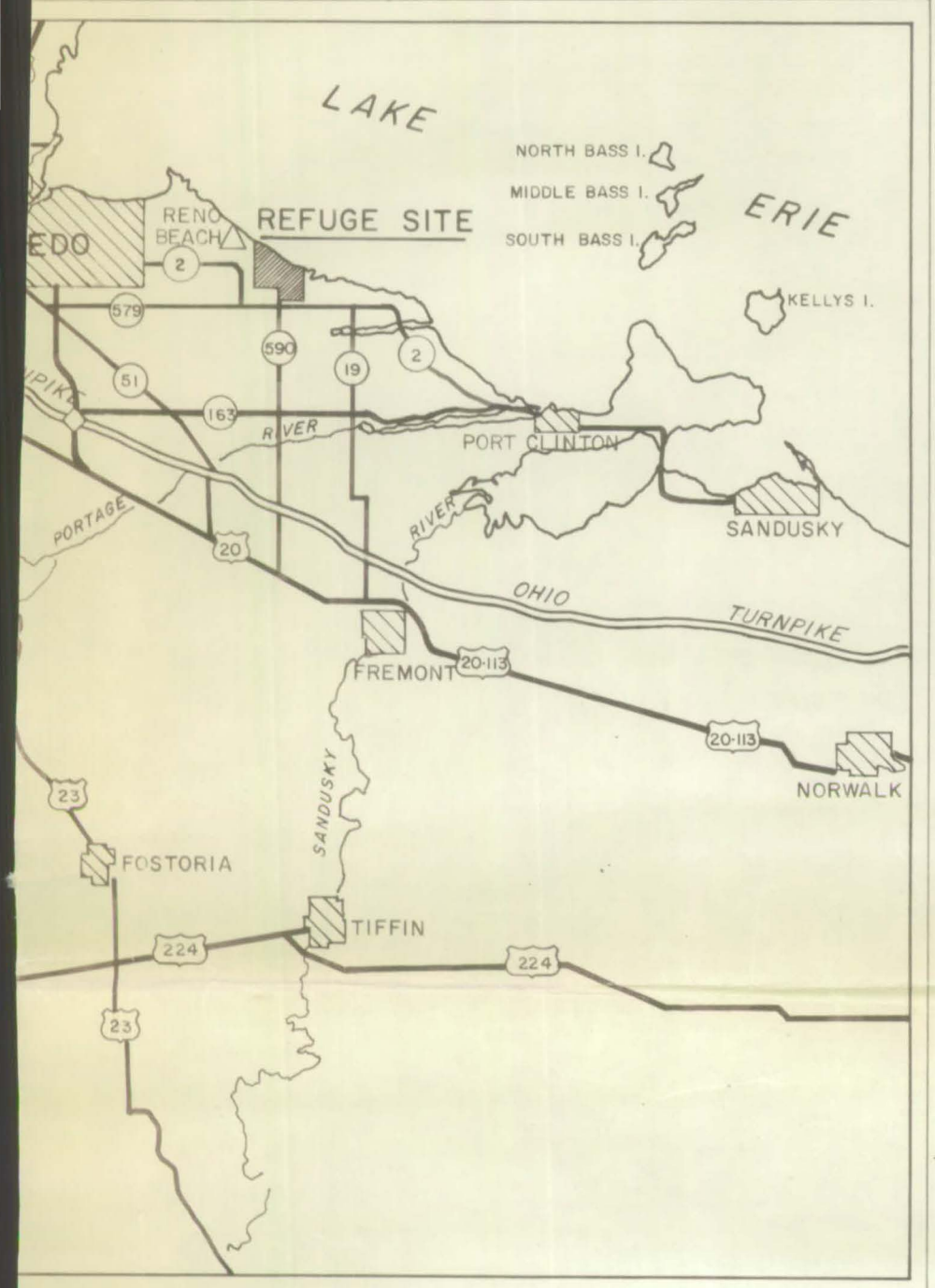

PUBLIC BEACH AREA
PARKING AREA
13
LUCAS CO.
OTTAWA CO.
Big Sand Bay
ool 1. Goosehaven
DITCH
25
30
29
CRANE CREEK WILDLIFE EX
& STATE PARK
HDQRS. STATE RESERVATION
36
31
rm Unit No. 13
130 Acres
Farm Unit No. 14 - 185 Acres
HP
HP
HP
HP
1
6
5
Turtle
12
7
8
R 14 E
R 15 E
AL MERIDIANS
160 CHAINS
2
2 MILES
6 5 4 3 2 1
7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36
TOWNSHIP DIAGRAM

FISH AND WILDLIFE SERVICE
AU OF SPORT FISHERIES AND WILDLIFE

83° 08'

41° 40'



VICINITY MAP
Scale 1 inch = 10 miles

41° 38'

T 10 S

T 8 N

T 7 N

Locust Point

P. STATION

32

33

Creek

4

SAINT

9

RIVER

83°08'

TRUE NORTH

2 1/2°

MAGNETIC N.

MEAN DECLINATION 1960

3R OHIO