

FOREST MANAGEMENT PLAN

Tamarac National Wildlife Refuge

Rochert, Minnesota 56578

Prepared by: Gym L. Brock Date: 3/15/88
Refuge Forester

Submitted by: David J. Wall Date: 3/16/88
Refuge Manager

Concurrence: John P. Galt Date: 4/14/88
Regional Forester

Approval: John L. Eli Date: 4/85/88
Division Supervisor

FOREST MANAGEMENT PLAN

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FOREST MANAGEMENT PLAN
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FOREST MANAGEMENT PLAN

INTRODUCTION

This plan consists of two sections. Section I pertains to the general management of the forest. Section II deals with the data and specific prescription or cultural treatment planned for each forest compartment on the refuge. Portions of Section II will be updated each year. All appendices to this document will also be included in Section II.

I. MANAGEMENT PLAN

A. REFUGE AND FOREST OBJECTIVES

Tamarac National Wildlife Refuge (Exhibit 1) was authorized by Executive Order in 1938 under the authority of the Migratory Bird Conservation Act and the Migratory Bird Hunting Stamp Act. The original purpose for establishment of the refuge was to provide resting, feeding and breeding grounds for migratory birds and habitat for all other species of wildlife native to the area.

The original intent for the refuge remains the primary goal of the present management objectives. In priority order these are:

1. Provide the habitat, food and protection necessary for the endangered/threatened species of the area (bald and golden eagles, osprey and timber wolf);
2. Provide suitable habitat for nesting waterfowl (chiefly wood ducks, mallards, ring-necked ducks, blue-winged teal and Canada geese);
3. Provide food and protection for concentrations of molting ducks;
4. Provide food and protection for spring and fall concentrations of migratory waterfowl;
5. Maintain a favorable ecological balance between game and non-game species and their habitat;
6. Provide for public hunting and fishing in accordance with applicable laws when such use will not interfere with the primary objectives of waterfowl management; and,
7. Provide the general public with the opportunity to observe all species of wildlife in their natural habitat.

Refuge forest management practices impact on most of these objectives, but those practices affecting waterfowl nesting and wildlife diversity are of primary concern. Forest lands total more than 22,000 acres of the refuge's 42,724 acres and the benefits realized from the proper management of this large a forested area can be many and varied.

The objectives of the Tamarac Forest Management Plan are as follows:

1. Provide protection and generate new habitat areas for endangered species (bald eagle perch and nesting sites);
2. Encourage growth and retention of an abundance of cavity-prone trees for waterfowl nesting;
3. Provide improved wildlife habitat conditions for a variety of species, utilizing sustained yield principles of timber management; and,
4. Promote the development of open crown canopies and block clearcuts to provide habitat for game and non-game species.

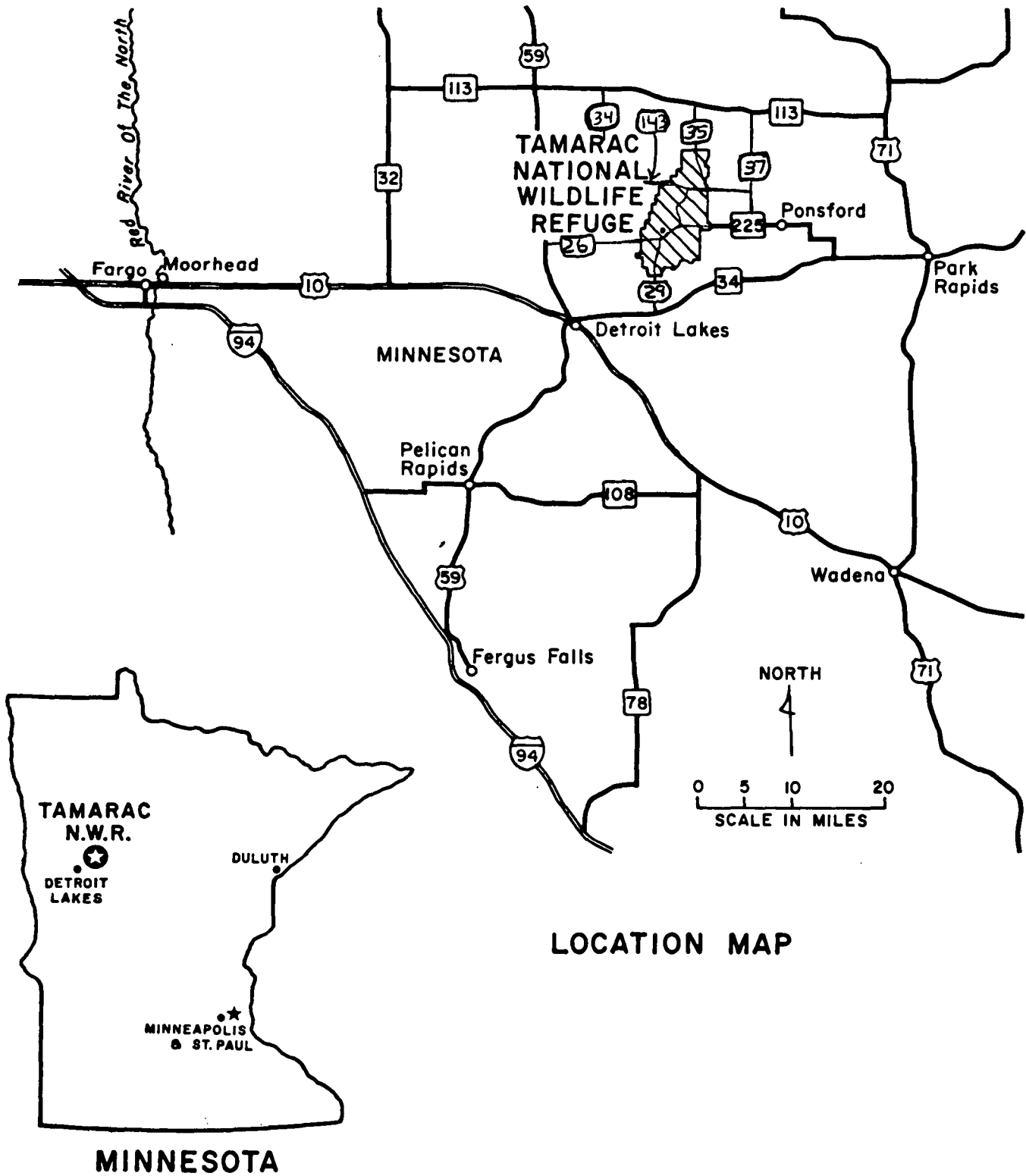
These objectives can be met by using the following management practices:

1. Management of upland and lowland hardwoods will be directed toward mixed, multi-aged stands. All ages will be represented to insure a continuous supply of natural cavities. Cavity-prone species, including basswood (*Tilia americana*), aspen (*Populus* spp.), and elm (*Ulmus* spp.) will often be allowed to stand to over mature ages. Northern red oak (*Quercus rubra*) will be encouraged if none of the above cavity-prone trees are present in a given area. Harvest techniques used will include clearcutting and selective cutting*;
2. Management of the remaining forest will be directed toward a sustained yield system. Overall management will be all-aged, but generally in individual even-aged stands of one to 30 acres each. Harvesting techniques will include clearcutting and selective cutting with emphasis on clearcutting; and,

*Clearcutting method-removal of the entire stand in one cutting with reproduction obtained artificially or by natural seeding from adjacent stands or from trees cut in the clearing operation.

Selection method-removal of the mature timber, either as single scattered individuals or in small groups at relatively short intervals, repeated indefinitely, by means of which the continuous establishment of reproduction is encouraged and an uneven-aged stand is maintained. Trees containing cavities will be saved.

**TAMARAC
NATIONAL WILDLIFE REFUGE
BECKER COUNTY, MINNESOTA**



3. Representative areas of all timber types will be allowed to develop into overmature stands with no treatment in an effort to insure that the needs of all wildlife species are being considered. The specific areas are shown on Exhibit 2 (Reserved Stands Map).

As a general rule, woody vegetation will be discouraged from encroaching on existing openings unless so specified in the "Grasslands Management Plan." Many of these existing openings are essential for waterfowl nesting cover. Wildlife diversity objectives are enhanced by a maximum of "edge".

B. LAND AND FOREST DESCRIPTION

The land classification at Tamarac is shown in Exhibit 3 (Refuge Land Classification Table). A pictorial diagram of the land and forest classification is shown in Exhibit 4 (Refuge Land and Forest Classification). Exhibit 5 (Forest Type Map) shows the location of the tree species throughout the refuge. Symbols for the forest type map are listed in Exhibit 6 (Symbols Used in Mapping).

The long range forest management goal is to provide diverse patterns of vegetation and openings throughout the entire refuge.

TAMARAC NATIONAL WILDLIFE REFUGE

BECKER COUNTY, MINNESOTA

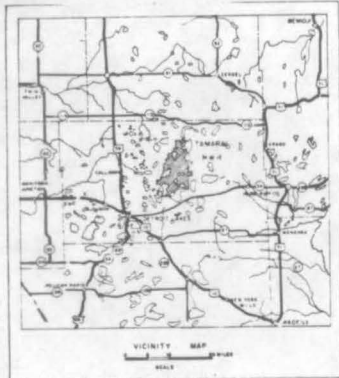
UNITED STATES
DEPARTMENT OF THE INTERIOR
95°45'

R40W R39W

R39W

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
R38W 95°30' 5

EXHIBIT 2 - RESERVE STANDS MAP



LEGEND

- WILDERNESS AREA
- REFUGE BOUNDARY
- PUBLIC LAW 94-557
(Oct. 19, 1976)
- COUNTY ROADS
- REFUGE ROADS

Indian Lands

Wilderness Area

Research Natural Area

DETROIT LAKES
13 MILES

Wilderness Area

Research Natural Area

R40W R39W

95°35' R39W R38W

95°30'

COMPILED IN THE BRANCH OF ENGINEERING
FROM AERIAL PHOTOGRAPHS AND SURVEYS
BY U.S.G.S., G.L.O. AND B.S.F.W.

MINNEAPOLIS, MINNESOTA

JANUARY 1962

FIFTH PRINCIPAL MERIDIAN

Scale 0 40 80 160 240 320 CHAINS
0 1/2 1 2 3 4 MILES

615141211
7189101113
4811718151413
191051222324
302928272625
5112733343536

TOWNSHIP
DIAGRAM

TRUE NORTH
MAGNETIC N
MEAN DECLINATION
1960

Exhibit 3

REFUGE LAND CLASSIFICATION TABLE

FOREST

<u>Commercial</u>	<u>Acres per Species</u>	<u>% of Refuge</u>
Aspen	10,617	25
Upland Hardwoods	4,229	10
Pine (Jack, Red, White)	2,383	6
Balsam Fir-White Spruce	1,240	3
Birch	1,064	2
Oak	832	2
Tamarack	810	2
Black Spruce	626	1
Lowland Hardwoods	494	1
Subtotal	22,295	52
<u>Non-Commercial</u>	4,172	10
TOTAL FORESTED ACRES	26,467	62
<u>ROADS, GRASS, FIELDS, MISC.</u>	2,481	6

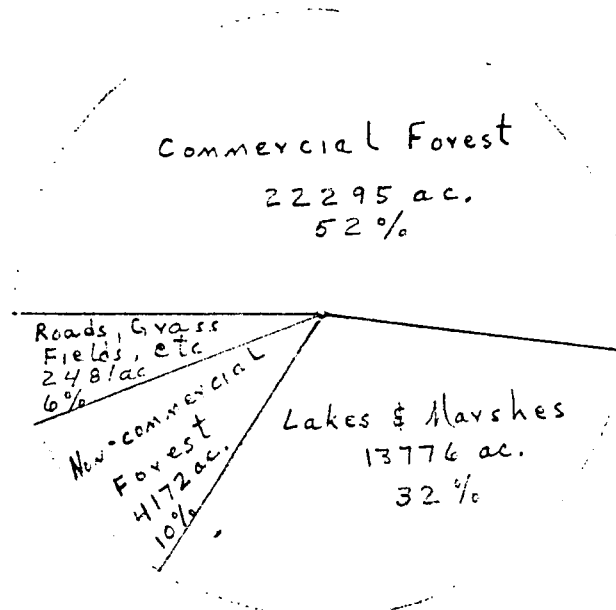
WETLANDS

Refer to Management Plan - Parts I & II for wetland acreage. Acreage summations will be greater than 42,724 since some acres will be included in both wetland and forested types.

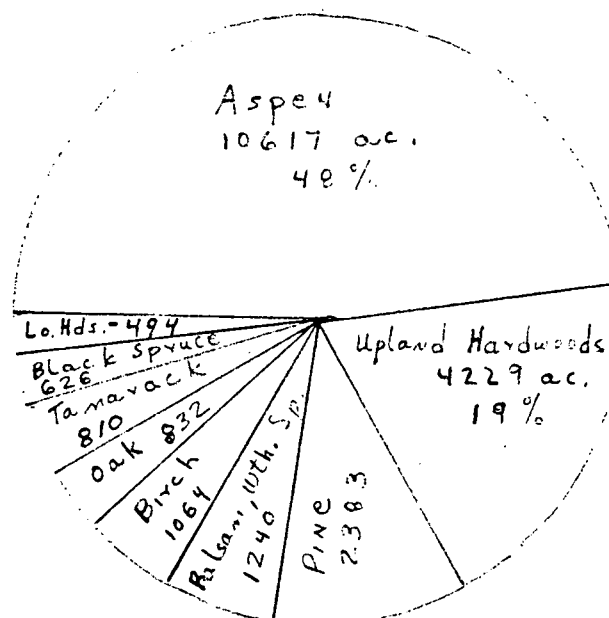
Exhibit 4

REFUGE LAND AND FOREST CLASSIFICATION DIAGRAM

Land Classification
(Percentage of Refuge Land)



Forest Classification
(Percentage of Forested Land)



Map is for reference use only.
Working map will be contained
in the Appendix.

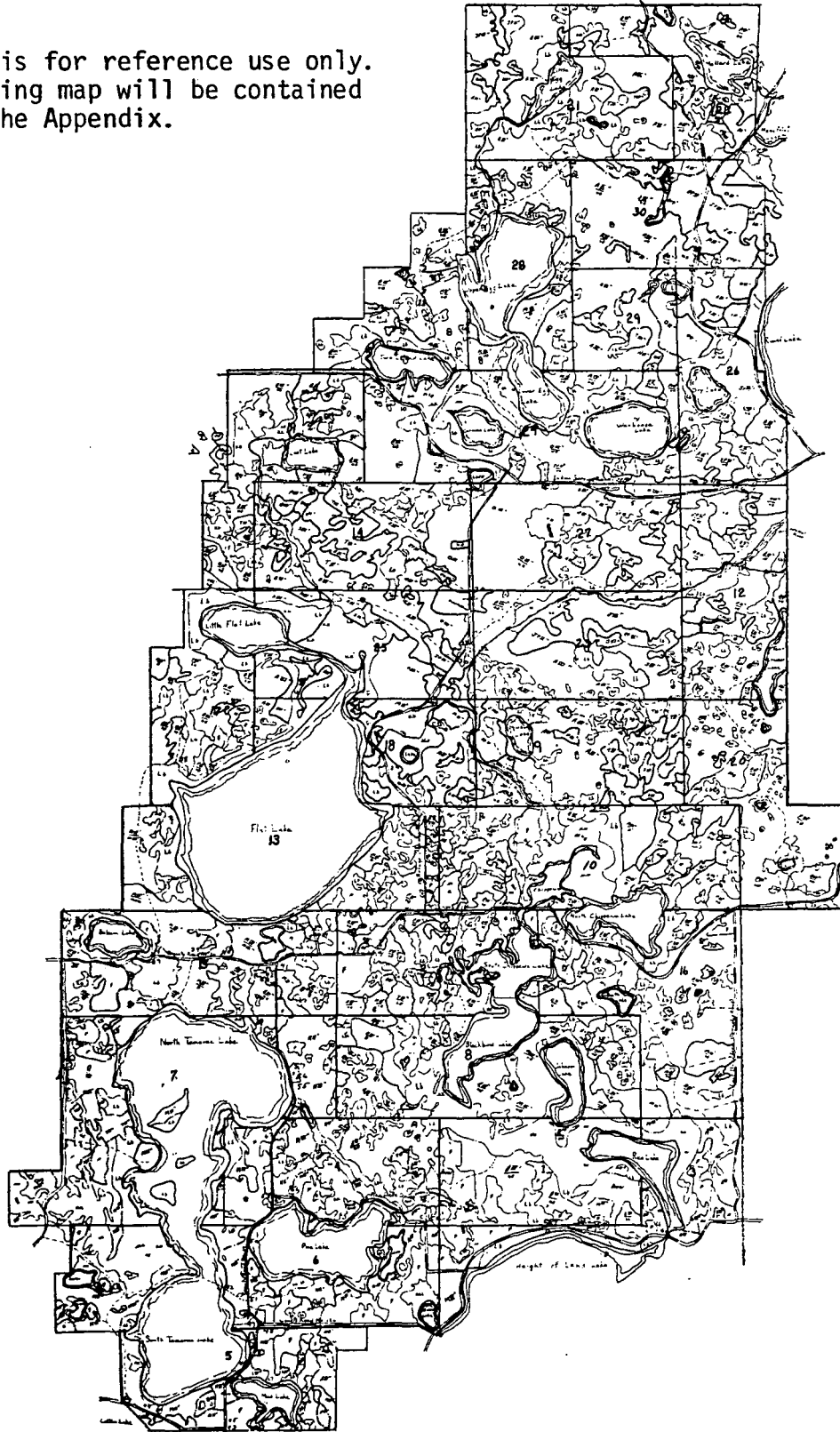


Exhibit 6

LEGEND OF SYMBOLS USED IN MAPPING

<u>Type Symbol</u>	<u>Forest Types</u>	<u>Type Symbol</u>	<u>Non-Forest Types</u>
A	Aspen	G	Grass
M	Upland Hardwoods	UB	Upland Brush
L	Lowland Hardwoods	LB	Lowland Brush
J	Jack Pine	D	Duff
R	Red Pine	Sx	Non-Productive Swamp-Spruce
W	White Pine	Tx	Non-Productive Swamp-Tamarack
O	Oak	R	Recreational
T	Tamarack	F	Field
B	Balsam Fir & White Spruce ,	RD	Road
S	Black Spruce		
P	Paper Birch		
PL	Plantation		

Size ClassesDensity Classes

I	Seedlings 0-1" DBH	'	Understocked
II	Saplings 1-5" DBH	''	Adequately Stocked
III	Poles 5-9" DBH (Conifers) 5-11" DBH (Hardwoods)	'''	Overstocked
IV	Sawlogs all diameters above pole size		

C. TREE SPECIES AND PARAMETERS

The following list shows the main groupings of tree species on the refuge.

1. Aspen and Paper Birch (10,617 and 1,064 = 11,681 acres)
 - a. Species. Trembling aspen (*Populus tremuloides*), big tooth aspen (*Populus grandidentate*) and white birch (*Betula papyrifera*) are found in pure stands and in mixture with balsam fir (*Abies balsamea*) and upland hardwoods.
 - b. Site. Aspen and birch are located on nearly all sites on the refuge. Management emphasis, initially will be directed at those areas having a site index greater than 50*. As markets permit sites with indices lower than 50 will be addressed.
 - c. Size and Age Class. All ages and size classes of aspen and birch are represented. Pole and sawtimber trees are most abundant with most aspen stands classed as over-mature.
 - d. Wildlife Uses. Cavity nesting birds, ruffed grouse, white-tailed deer and rabbits use the aspen areas extensively. Food availability from new growth of aspen and birch are steadily decreasing because the mature sites are preventing aspen and birch regrowth. Seedling and sapling sites are heavily used when available.
 - e. Management Strategy. Harvest aspen and birch with site indices of 50 to 65 at 30 to 35 years of age and sites with indices above 65 at 50 years of age. Harvest method will be clearcutting in blocks of less than 30 acres each. The management objective is to balance the age structure, thus increasing the amount of desired wildlife vegetation. Adjacent clearcuts of aspen, separated by ten year cutting intervals, are desirable.
2. Upland Hardwoods (4,229 acres)
 - a. Species. Species composition includes basswood, sugar maple (*Acer saccharum*), northern red oak, American elm (*Ulmus americana*), white birch and aspen.
 - b. Site. The upland hardwoods are located mostly on good to medium sites. Site indices range from 60 to 80.

*Site index is a measure of the quality of the aggregate of all environmental conditions affecting the survival and growth of specific tree species.

- c. Size and Age Class. An unbalanced age structure of upland hardwoods exists with pole and saw timber sizes predominating.
- d. Wildlife Uses. Upland hardwoods with their associated cavities provide major use areas by nesting wood ducks.
- e. Management Strategy. Forest management within the upland hardwoods will be to provide wood duck and upland game habitat needs. Cavity prone tree species will be encouraged; that is basswood, aspen, red oak and elm. Trees with cavities will be left. Management is geared toward a mixed uneven aged stand. The patch cut system will be used to harvest timber. This harvesting technique is designed to create small openings or clear cuts adjacent to acceptable and/or potential nesting sites. Another beneficial result of this type of cut is the growth of herbaceous and woody shrubs for upland game. The selective cut method, where only a portion of the trees are removed can change the composition of the stand to shade tolerant species, such as sugar maple and basswood. If maple is removed during the selective cut, basswood, a cavity prone tree, will be favored.

3. Lowland Hardwoods (494 acres)

- a. Species. Species composition includes green ash (*Fraxinus lanceolata*), black ash (*Fraxinus nigra*), American elm and balsam poplar (*Populus balsamifera*).
- b. Site. The lowland hardwoods are located mostly on medium sites which are found along sluggish streams, swamp edges and in depressions within the upland hardwoods.
- c. Size and Age Class. The lowland hardwood age structure is pole and small saw size trees 45 to 80 years of age.
- d. Management Strategy. Refer to text under upland hardwoods.

4. Lowland Conifers (1,436 acres)

- a. Species. Species composition includes tamarack (*Larix laricina*), found in pure stands and balsam fir and black spruce (*Picea mariana*) found in mixed stands.
- b. Site. The lowland conifers are located mostly on poor to medium sites. Site indices range from 30 to 55.
- c. Size and Age Class. Tamarack is pole and saw timber size with an age span from 35 to 100 years. The balsam fir and black spruce is mostly small pole size in a 35 to 100 year age span.

- d. Management Strategy. Rotation age on tamarack will be 80 to 100 years for pulpwood and sawlogs. One or more thinning cuts can be made prior to the harvest cut. Harvest will be made by a seed tree cut. To expand the size of the tamarack stand, balsam fir and spruce can be clear cut at the fringe of the tamarack stand while leaving some tamarack as seed trees.

Balsam fir and black spruce are found in mixed stands. Recommended rotation age on black spruce is at least 100 years while balsam fir is 50 years. Both species are found on shallow swamp sites and are in danger of loss from windthrow. The productivity of the stand varies greatly even within the same swamp. Cutting should be done to maintain a mixed species stand.

Objective of management is to provide winter cover for upland wildlife.

5. Red and White Pine (733 acres)

- a. Species. Species composition includes red pine (*Pinus resinosa*) and white pine (*Pinus strobes*) which are found in pure stands, mixed stands, plantations and as wolf trees throughout the refuge.
- b. Site. Red and white pine are located on medium sites with site indices between 50 and 60.
- c. Size and Age Class. Age structure of red and white pine plantations is from three to 30 years of age while the trees of saw timber size range in age from 50 to 100 years plus. Natural regeneration of pine is to be preferred to plantation planting.
- d. Wildlife Uses. Red and white pine plantations provide excellent cover for upland wildlife while mature stands provide eagle roost and nest sites.
- e. Management Strategy. Management of red and white pine will be by selective cutting with intermediate cuts at 10 year intervals. The stocking level for the smaller DBH trees will be basal area (BA-i.e. sum of cross-sectional area in square feet of individual trees for a given acre) of 80 and for larger trees BA of 110. Rotation age is 120 to 140 years. Shelterwood cuts (BA of 10 to 20) should be used to regenerate the stand.

6. Jack Pine (1,650 acres)

- a. Species. Jack pine (*Pinus banksiana*) is located in pure stands on dry sandy soils. In heavier soils it is mixed with oak (*Quercus* spp.), red pine and aspen.
- b. Site. Jack pine is located on poor to medium sites. Site indices range from 40 to 55.
- c. Size and Age Class. Age structure for jack pine plantations is from three years to 30 years while the trees of pole and saw timber size range from 50 to 85 years plus.
- d. Wildlife Uses. Younger trees provide shelter and some food for most upland game, particularly deer and rabbits.
- e. Management Strategy. Even aged management through clear cutting will be practiced. Rotation will be between 50 to 65 years. Intermediate cuts at 10 year intervals can be made on the better sites. Stocking levels of 70 to 90 square feet of basal area per acre will be maintained to provide optimum growing conditions.

Regeneration can be promoted by prescribed burning after harvesting and by seeding or planting.

7. Balsam Fir and White Spruce (1,240 acres)

- a. Species. Species composition includes balsam fir, which makes up 90% of the type, white spruce (*Picea glauca*) and aspen.
- b. Site. Balsam fir and white spruce are located mostly on medium to good sites. Site indices range from 50 to 70.
- c. Size and Age Class. The balsam fir and white spruce age structure is pole and small saw size trees 35 to 60 years of age.
- d. Wildlife Uses. The balsam fir and white spruce sites provide wintering areas and some low quality browse for white-tailed deer.
- e. Management Strategy. Even aged management through clear-cutting will be practiced. Rotation age will be between 40 to 50 years of age. Objectives of management are to develop adequately stocked stands and improve species composition by increasing the percent of white spruce and red pine.

8. Oak (832 acres)

- a. Species. Species composition includes burr oak (*Quercus macrocarpa*) and red oak.
- b. Site. Most of the oak are located on dry sandy soils that at one time supported jack and red pine. Most of the areas have a site index of 40.
- c. Size and Age Class. The oak age structure is small pole size with an age of 50 to 60 years.
- d. Wildlife Uses. The oak sites provide good cover, browse and acorn production for upland wildlife.
- e. Management Strategy. Undisturbed oak areas can be used as overstory sites for scattered plantings of red and white pine seedlings. Sites should not be converted to pine plantations. Areas where red oak has been removed can be used as browse areas.

D. Continuous Forest Inventory

The Continuous Forest Inventory (CFI) is a system of randomly selected plots, permanently established that are relocated and remeasured on a ten year basis which provide general volume and trend information for the entire refuge (See Appendix A). Data collected are computer processed and the summaries are placed in the appendix of this document (See Appendix B-detailed summary in forestry file).

The CFI plots are distributed proportionally by acreage of each forest type. Approximately 500 acres of timber types are represented by one plot. Using a grid, random numbers and type map, plot locations were established. The locations will be transferred to aerial photographs. Plot centers were located on the ground and referenced for future relocation (See Appendix C).

Sample trees on CFI plots are selected by using 10 factor angle gauge or prism beginning north of the plot center and working clockwise around that point. "In" trees were marked as to number beginning with one on each plot and the DBH, merchantable height, total height, species and tree class were recorded. The tree class indicates that a tree is sapling, pole, saw timber or cull and whether it is in the hardwood or softwood group. All measured trees were marked with a numbered tag to facilitate remeasurement.

CFI plots will not receive special protection from forest management operations. Part of the value of this system is the consideration of both man's and nature's disturbance of the habitat.

E. Forest Compartments

The refuge is divided into 30 forest compartments as shown in Exhibit 7 (Compartment Map). Several portions of the refuge have been placed in reserve status where no active management will take place. These areas are:

- a. Compartment 21 - Wilderness Area
- b. Part of Compartment 3 and 15 - Research Natural Areas
- c. Three islands in North Tamarac Lake - Wilderness Area
- d. NW, SE, Sec. 17, T141N, R39W - 40 acres and two islands in Big Egg Lake - See Exhibit 2.

The remaining compartments will receive normal forestry treatments.

Three compartments will be reviewed each year preferably in winter or spring, to prepare the prescription (proposed forestry activities) for those compartments for the coming fiscal year. This procedure will be followed until all cutting compartments have been analyzed once every ten years. For example, the compartments to be analyzed during FY-1985 will be those compartments ending in 6 (i.e. Comp. 6, 16, 26). These compartments will then receive a cultural treatment during FY-1986. The prescription will be prepared by the Area Forester. In general, sales will be set up during the treatment year for that compartment.

The compartment review will be conducted by taking line sample plots in each timber type in a given compartment. Sufficient data (volume, basal area, stem condition) will be collected so that the prescription can be written. This data will then be placed in Section 2, Appendix B. The prescription is to specify what should be done to which portion of the compartments for the coming year. Data needed to update the compartment type map will be collected at the same time.

F. Timber Sales

The demand for stumpage from the refuge fluctuates widely from year to year. Stumpage prices used on refuge sales are correlated to the State of Minnesota Stumpage Price Guide and the County Price Guide. Even though there is wide fluctuation in stumpage demand and subsequent sales, all timber sales are designed to accomplish specific refuge objectives in wildlife/forestry habitat management.

A Special Use Permit (sample in Appendix D) will be prepared in accordance with 6RM3 by the Area Forester for approval by the Refuge Manager. This permit will be based on the data collected during the annual compartment analysis/review and some additional data collected at that time. The permit will clearly indicate the cutting area and amount and size of timber to be cut, species involved, type of

TAMARAC NATIONAL WILDLIFE REFUGE

BECKER COUNTY, MINNESOTA

UNITED STATES
DEPARTMENT OF THE INTERIOR
95°45'

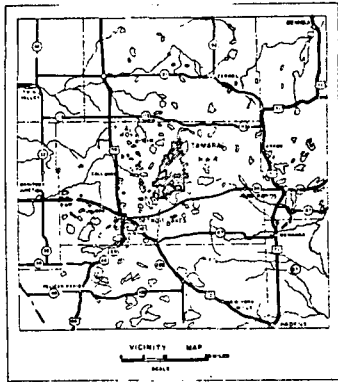
R40W R39W

R39W

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
R38W 95°30'

16

EXHIBIT 7-COMPARTMENT MAP



LEGEND

WILDERNESS AREA

REFUGE BOUNDARY

PUBLIC LAW 94-557
(Oct. 19, 1976)

COUNTY ROADS

REFUGE ROADS

T 142 N
T 141 N

T 142 N
T 141 N

47°00'
N

47°00'

T 140 N

T 141 N
T 140 N

46°55'

46°55'

T 140 N

T 140 N

T 139 N

T 139 N

DETROIT LAKES
13 MILES

COMPILED IN THE BRANCH OF ENGINEERING
FROM AERIAL PHOTOGRAPHS AND SURVEYS
BY USGS, GLO, AND BS&W

R40W R39W

R39W R38W

95°30'

FIFTH PRINCIPAL MERIDIAN

Scale 0 40 80 160 240 320 CHAINS
0 1/2 1 2 3 4 MILES

6	5	4	3	2	1
7	6	5	4	3	2
8	7	6	5	4	3
9	8	7	6	5	4
10	9	8	7	6	5
11	10	9	8	7	6
12	11	10	9	8	7
13	12	11	10	9	8
14	13	12	11	10	9
15	14	13	12	11	10
16	15	14	13	12	11
17	16	15	14	13	12
18	17	16	15	14	13
19	18	17	16	15	14
20	19	18	17	16	15
21	20	19	18	17	16
22	21	20	19	18	17
23	22	21	20	19	18
24	23	22	21	20	19
25	24	23	22	21	20
26	25	24	23	22	21
27	26	25	24	23	22
28	27	26	25	24	23
29	28	27	26	25	24
30	29	28	27	26	25
31	30	29	28	27	26
32	31	30	29	28	27
33	32	31	30	29	28
34	33	32	31	30	29
35	34	33	32	31	30
36	35	34	33	32	31

TOWNSHIP
DIAGRAM



MEAN
DECLINATION
1960

harvest, harvest objectives, stumpage prices, scaling provisions and any other special requirements. One copy will be given to the permittee, another copy sent to the Regional Forester and the remaining copy retained for refuge records.

The Area Forester will actively pursue prospective permittees to accomplish the cultural treatments specified for that fiscal year. The economic climate will determine, to a great extent, the amount of timber that loggers will cut in a given year.

Appendix A. CFI Instructions (11/24/87)

The following instructions are to be used for conducting Continuous Forest Inventory (CFI) activities in Region 3.

1. Data to be collected includes the following:
 - a. Diameter at breast height (4.5 ft. above ground)
 - b. Total tree height
 - c. Merchantable height to a variable top diameter depending on tree class
 - d. Tree class; reproduction, pulp-size, sawlog-size, cull
 - e. Species
 - f. Plot/tree number
 - g. Wildlife class (hole present or absent for now)
2. Procedures
 - a. All plots will be randomly selected on type maps of the refuge, distributed in accordance with acreage, operability and other factors. There should be approximately 1 plot for 500 acres of manageable type on refuges with less than 10,000 acres of forestland. One plot should be established for each 1,000 acres of manageable type on other refuges. In all cases one plot should be established for each distinct forest type.
 - b. Starting points to the plots will be referenced from identifiable points that will not likely be disturbed.
 - c. The compass bearing and distance to the plot will be documented so that the plot can be easily relocated. The line followed should be painted or otherwise marked so that variations in compass or pacing work will not cause the plot to be lost.
 - d. Plot centers will be marked with a post deemed suitable by the refuge manager.
 - e. The inventory will be conducted by starting with the closest tree to the center and north of it. Each tree will be selected using a 10 factor angle gauge or prism. Trees will be numbered using aluminum tags.
 - f. Multiple stem trees will be treated as individual trees if the junction falls below DBH. If the junction is above DBH the best stem will be numbered using aluminum tags.
 - g. Plots will be measured in the fall after active growth is completed, preferably in October and/or November and prior to extremely cold weather. Some refuges (Shiawassee, Big Stone) may require winter measurements due to access or scheduling needs. These stations should be remeasured at the same time of year that the original plots were established to provide the least degree of variance due to weather.

Appendix A Continued

3. Codes

a. Species codes

AMB	American Beech
ASP	Aspen (all varieties except Cottonwood)
BKS	Black Spruce
BLA	Black Ash
BLO	Black Oak
BOX	Boxelder
BSF	Balsam Fir
BSW	Basswood
BUR	Oak
BUT	Butternut
CBO	Cherrybark Oak
CED	Red/White Cedar
CHO	Chestnut Oak
CHY	Cherry
CTW	Cottonwood
ELM	All Elm
GRA	Green Ash
GUM	Sweet/Black Gum
HAC	Hackberry
JKP	Jackpine
LOB	Loblolly Pine
LOC	All Locust
MKH	Mockernut Hickory
NRO	Northern Red Oak
OVO	Overcup Oak
PEC	Pecan
PER	Persimmon
PNO	Pin Oak
RDP	Red Pine
SFM	Soft Maple (Red Maple)
SGM	Sugar Maple
SHB	Shagbark Hickory
SHP	Shortleaf Pine
SIL	Silver Maple
SRO	Southern Red Oak
SYC	Sycamore
TAM	Tamarack
WAL	Walnut
WHA	White Ash
WHB	White Birch
WHO	White Oak
WHP	White Pine
WHS	White Spruce
WIL	All Willow
WIO	Willow Oak
YLB	Yellow Birch

Appendix A Continued

b. Type codes

1. Mixed Hardwoods
2. Lowland Hardwoods
3. Oak
4. Aspen
5. Tamarack
6. Black Spruce
7. Birch
8. White Pine
9. Cedar
10. Red Pine
11. Red-White Pine
12. Jackpine
13. Hemlock
14. Oak-Hickory
15. Oak Bottoms
16. Balsam Fir

c. Tree classes

1. Softwood reproduction 1.0" to 4.9"
2. Hardwood reproduction 1.0" to 4.9"
3. Softwood pulp 5.0" and up
4. Hardwood pulp 5.0" and up
5. Softwood sawlogs 9.0" and up
6. Hardwood sawlogs 11.0" and up
7. Cull trees of all species and sizes

d. Wildlife classes

At this time the wildlife class will be either one or zero. One means that a hole(s) can be seen from the ground as each tree in the plot is examined. There is no relationship between "holes" and cavities unless or until a study has been conducted to determine the percent of "holes" that lead to suitable nesting cavities.

0. No visible holes
1. Visible hole(s)

It should be made clear to anyone who asks that the inventory figures produced from this work are not statistically sound. The information is gathered to provide long-term (20-50 year) trend data only. This includes the data regarding wildlife values.

GRAND TOTAL VOLUME SUMMARY

TAMARAC NWR				
SPECIES	CORDS	BOARD FEET	CUBIC FEET	BASAL AREA
ASP	104,116	1,596,178	9,165,065	396,320
BKS	5,284	0	437,851	24,770
BLA	0	550,471	228,461	8,256
BSF	11,146	858,693	1,241,554	66,053
BSW	17,504	4,338,135	3,182,367	156,876
BUR	16,843	3,353,114	3,472,093	173,390
ELM	20,146	516,041	3,143,643	189,903
GRA	5,119	576,563	754,163	41,283
IRN	6,522	0	1,370,936	90,823
JKP	37,320	0	3,072,057	132,106
RDP	0	10,069,995	1,803,999	66,053
SGM	17,173	0	3,237,026	165,133
TAM	2,229	707,678	390,292	16,513
WHA	1,981	0	159,849	8,256
WHB	23,944	471,785	2,578,722	123,850
TOTAL CORDS	269,332	TOTAL BOARD FEET	23,038,659	
TOTAL CUBIC FEET	34,238,084	TOTAL BASAL AREA	1,659,590	
TOTAL ACRES INVENTORIED	22,293			
TOTAL PLOTS TAKEN	27			

FOREST VOLUME SUMMARY
by DIAMETER CLASSES

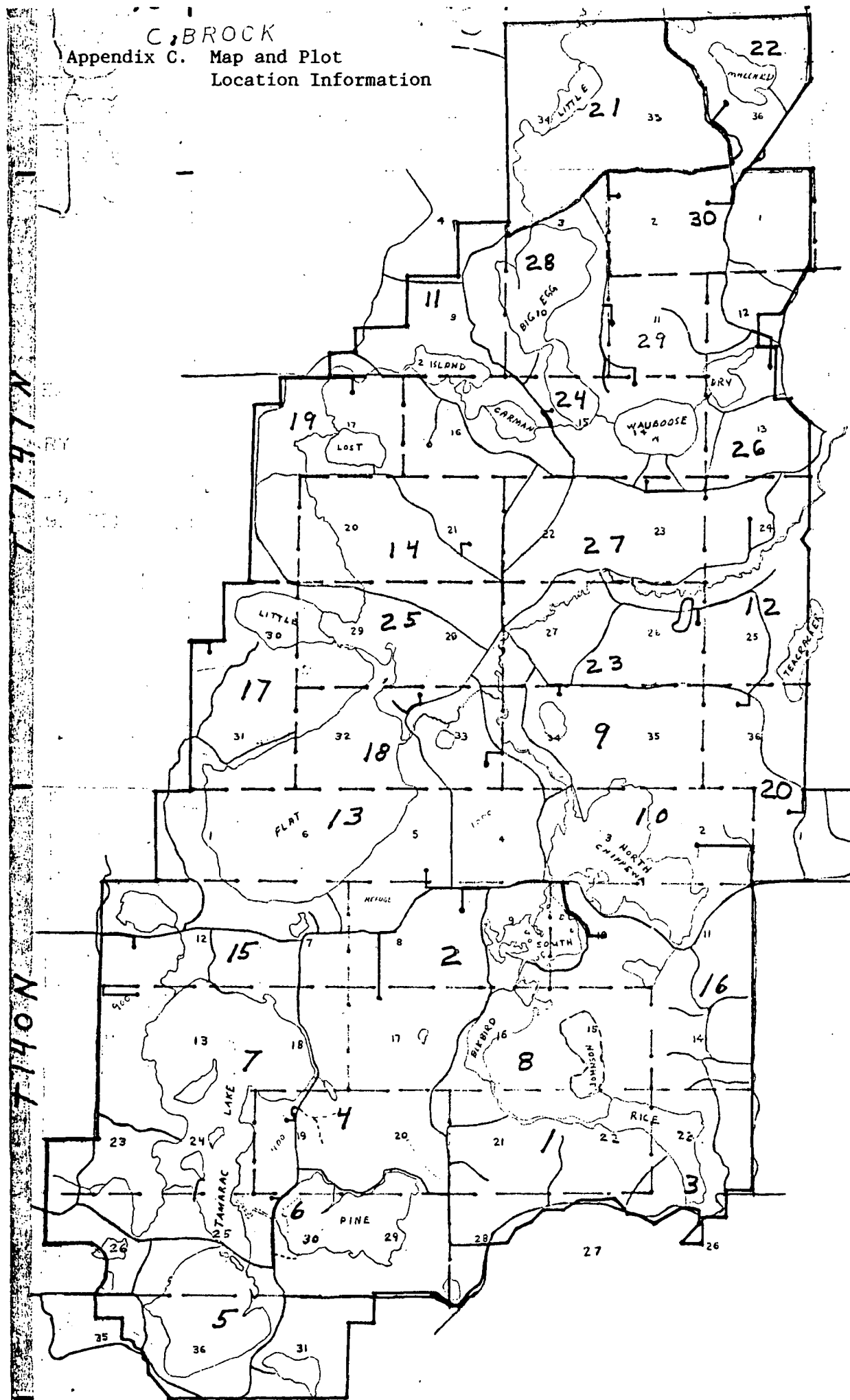
TAMARAC NWR				
DIAMETER	CORDS	BOARD FEET	CUBIC FEET	BASAL AREA
2	0	0	623,956	66,053
4	0	0	1,845,530	148,620
6	47,228	0	5,623,120	338,523
8	87,603	0	8,317,353	429,346
10	79,098	0	7,228,876	313,753
12	47,393	3,082,709	5,084,372	214,673
14	20,476	8,912,658	3,814,910	156,876
16	1,733	3,366,408	1,333,451	49,540
18	8,256	4,154,672	1,774,275	66,053
20	0	1,439,054	221,443	8,256
22	0	1,376,138	402,182	16,513
24	0	630,231	228,957	8,256
26	0	867,445	228,709	8,256
TOTAL CORDS	291,790	TOTAL BOARD FEET	23,829,317	
TOTAL CUBIC FEET	36,727,139	TOTAL BASAL AREA	1,824,723	
TOTAL ACRES INVENTORIED	22,293			
TOTAL PLOTS TAKEN	27			

FOREST CAVITY SUMMARY
by DIAMETER CLASSES

TAMARAC NWR			
RANGE (")	CAVITIES	CUBIC FEET	BASAL AREA
10 - 15	36,989	12,324,148	520,170
15 - 20	16,265	3,329,170	123,850
20 - 42	9,908	859,849	33,026
TOTAL CAVITIES	63,163		
TOTAL CUBIC FEET	16,513,168	TOTAL BASAL AREA	677,046
TOTAL ACRES INVENTORIED	22,293		
TOTAL PLOTS TAKEN	27		

C. BROCK
Appendix C. Map and Plot
Location Information

Sheet 1



Spruce	NW1/4 S.9,T140N,R39W,5th P.M. Compartment 2 West 19 chains from Blackbird Trail on County Road 26 South 13 chains to plot
Upland Hardwoods	NW1/4 S.19,T140N,R39W,5th P.M. Compartment 4 South on County Road 29-3 chains from south edge of grass field West 4 chains to plot from County Road 29
Upland Hardwoods	NW1/4 S.30,T140N,R39W,5th P.M. Compartment 6 North on County Road 29-57 chains from Dike Road West 8 chains from County Road 29
Lowland Hardwoods	NE1/4 S.14,T140N,R40W,5th P.M. Compartment 7 South 8 chains from Governor's Consent Line East 25 chains from West Boundary Road
Balsam Fir	NW1/4 S.17,T140N,R39W,5th P.M. Compartment 8 West 12.5 chains from east edge of field on County Road 26 South 52 chains from south side of County Road 26
Jack Pine	NE1/4 S.34,T141N,R39W,5th P.M. Compartment 9 East 8 chains from road corner on Teacracker Trail South 2 chains from road
Aspen	SW1/4 S.2,T140N,R39W,5th P.M. Compartment 10 North 30 chains from Long fields on County Road 26 West 45 chains from trail
Aspen	NW1/4 S.24,T141N,R39W,5th P.M. Compartment 12 North 15 chains from bend in North River Road
White Birch	SE1/4 S.5,T140N,R39W,5th P.M. Compartment 13 West 22 chains from Refuge Service Road North 10 chains from County Road 26
Aspen	SE1/4 S.21,T141N,R39W,5th P.M. Compartment 14 North 3 chains from jack pine to type break (1/2 mile from Refuge Service Road) East 4 chains to plot-on Lost Lake Trail
Upland Hardwoods	SE1/4 S.11,T140N,R40W,5th P.M. Compartment 15 East 16 chains from West Boundary Line along County Road 26 South 6 chains from County Road 26
Aspen	NW1/4 S.10,T140N,R39W,5th P.M. Compartment 16 South 45 chains from County Road 26 on Chippewa Control Structure Trail East 9 chains from trail

Tamarack	SW1/4 S.30,T141N,R31W,5th P.M. Compartment 17 East 15 chains from West 1/4 corner of Section 30 South 5 chains from boundary
Aspen	SE1/4 S.33,T141N,R39W,5th P.M. Compartment 18 West 6 chains from junction on Flat Lake Control Structure Trail South 3 chains from trail
Upland Hardwoods	NW1/4 S.33,T141N,R39W,5th P.M. Compartment 18 East 12 chains from Cabin Point along Refuge Service Road North 5 chains from Refuge Service Road
Balsam Fir	NW1/4 S.17,T141N,R39W,5th P.M. Compartment 19 East 60 chains from gate of West Boundary Trail and County Road 143 South 27 chains from County Road 143
Aspen	NW1/4 S.36,T141N,R39W,5th P.M. Compartment 20 South 4 chains from Trail junction Teacracker Trail and Teacracker Lake Trail. West 2.5 chains from trail
White Birch	NW1/4 S.1,T140N,R39W,5th P.M. Compartment 20 South 21 chains from Teacracker Trail and refuge boundary corner West 9 chains to plot
Aspen	NW1/4 S.36,T142N,R39W,5th P.M. Compartment 22 Northwest 10 chains from North edge of gravel pit on County Road 35 North 45 East 19 chains to plot
Jack Pine	NE1/4 S.26,T141N,R39W,5th P.M. Compartment 23 East 8 chains of east edge of clearcut South 6 chains from trail
Aspen	NW1/4 S.14,T141N,R39W,5th P.M. Compartment 24 South 4 chains from logging trail end
Upland Hardwoods	NE1/4 S.15,T141N,R39W,5th P.M. Compartment 24 North 13 chains along trail from Egg Lake Trail Bridge East 2.5 chains
Aspen	SW1/4 S.12,T141W,R39W,5th P.M. Compartment 26 South 9 chains along County Road 35 from Dry Lake Trail South 10 chains from County Road 35
Oak	NE1/4 S.23,T141N,R39W,5th P.M. Compartment 27 West 31 chains along County Road 143 from trail between Wauboose and Dry Lakes. North 7 chains to plot

Aspen	NE1/4 S.10,T141N,R39W,5th P.M. Compartment 28 North 7 chains from E 1/4 corner 10/11 West 4.5 chains to plot
Red Pine	NW1/4 S.1,T141N,R39W,5th P.M. Compartment 30 South 6 chains from junction County Road 35 and Many Point Road West 12 chains
Aspen	NW1/4 S.2,T141N,R39W,5th P.M. Compartment 30 South 10 chains from bend in Egg Lake Trail East 2 chains to plot

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service

Tamarac

National Wildlife Refuge

SPECIAL USE PERMITPermit number PWT 84-21
Sta. No. to be credited 32560

Contract number

Date 1/7/84

Permittee (Name and address)

John Logger
Rochert, MN 56578

Period of use (inclusive)

From 1/7 19 84

To 12/31 19 84

Purpose (Specify in detail privilege requested, or units of products involved)

To harvest the following timber in accordance with the Forest Management Plan:

<u>SPECIES</u>	<u>VOLUME</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
Aspen-Cordwood	110 cords est.	\$2.00/cord	\$220.00
Red Oak-Pulp	10 cords est.	\$3.25/cord	32.50

Description (Specify unit numbers; metes and bounds; or other recognizable designations)

P.O SW-21-141-39, 5th PM, Becker County, MN, Compartment 14 (Lost Lake Trail)

Amount of fee \$ 252.50 If not a fixed fee payment, specify rate and unit of charge:

Timber will be paid per mill scale. Any overage will be paid at unit price, also.

☐ Full payment☒ Partial payment-Balance of payments to be made as follows:

Record of Payments

Special Conditions

1. The permittee must comply with applicable State and Federal Occupational Safety and Health Administration requirements.
2. Additional permit regulations to be followed are noted in the following attachments:
 - a. Timber Sale Appraisal Report and Prospectus;
 - b. Conditions Applicable to Timber Harvesting Permits; and
 - c. Special Permit Regulations.

This permit is issued by the U.S. Fish and Wildlife Service, and accepted by the undersigned, subject to the terms, covenants, obligations, and reservations, expressed or implied therein, and to the conditions and requirements appearing on the reverse side.

Permittee (Signature)

John Logger

Issuing Officer (Signature and title)

Omer N. Swenson, Refuge Manager

SPECIAL USE PERMIT

TIMBER Sale Appraisal Report & Prospectus

Permit No. PWT 84-21

Refuge: Tamarac NWR

Appraiser: C. Brock

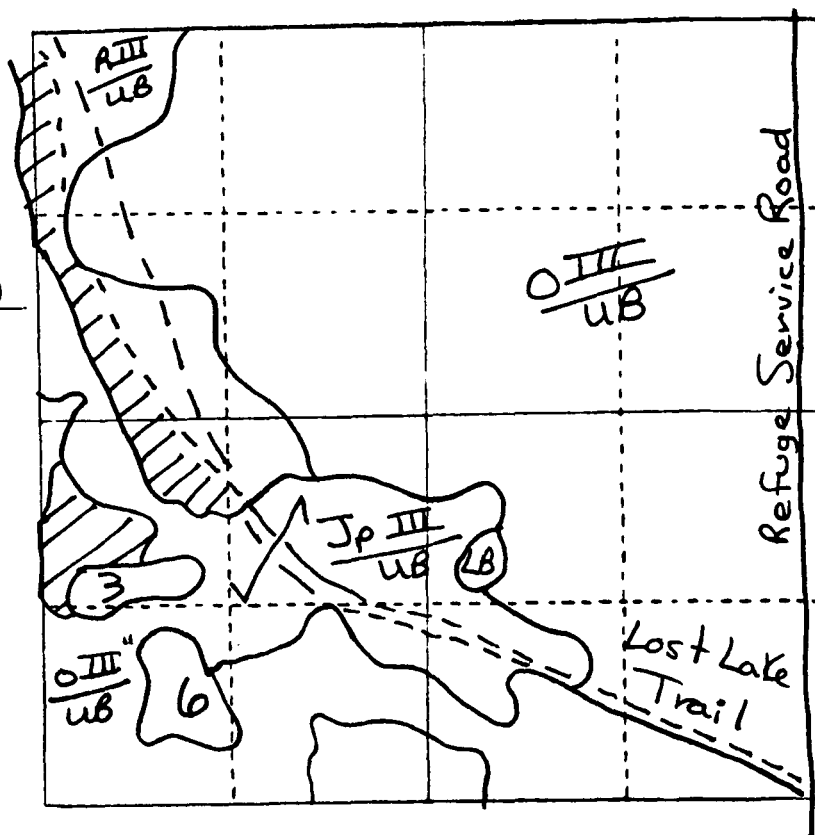
Date: 1/7/84 Total Value \$ 252.50
est.

Cutting Regulations:

 Clear cut aspen and red oak

Scaling Provisions:

Mill scale



SW SEC. 21 T 141 R 39

Compartment No. 14

Scale: 8" = 1 mile

Objectives: Cut mature aspen to provide more diverse habitat for upland wildlife.

FLUP PRESCRIPTION: Clear cut

[illegible]

Approved By Carol M. Swenson Date 1/7, 1984

Total Value	\$252.50
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Omer N. Swenson, Refuge Manager

1952-1953

This form is to be submitted with all Special Use Permits involving commercial harvest activities.

408 (15)

SPECIAL PERMIT REGULATIONS
Tamarac NWR
Permit No. PWT 84-21

- Area: Approximately 8 acres.
- Boundary: Commercial size aspen and red oak pockets adjacent to and south of Lost Lake Trail.
- Special Cutting Requirements: Clear cut all aspen containing two or more 8-foot sticks to a 5-inch top diameter and clear cut scrub red oak.
- Roads and Trails: Road construction and maintenance are the responsibility of the permittee. Haul roads will be cleared no wider than necessary. Location of roads and landings must be approved by the Refuge Manager. Trail shall be kept free from all limbs and logs resulting from the logging operation.
- Litter: All litter (cans, bottles, etc.) created by the permittee shall be removed by him from the logging site and refuge.
- Potholes: No tree tops are to be left in potholes or marshes on the sale area.
- Environmental Assessment: The performance of this sale will result in added sunlight penetration to the forest floor. No significant adverse environmental impact is expected.
- No cutting will be done that will adversely effect eagle habitat.

TAMARAC NATIONAL WILDLIFE REFUGE
ROCHERT, MINNESOTA

CONDITIONS APPLICABLE TO TIMBER HARVESTING PERMITS

1. If requested, satisfactory scale tickets for timber products shall be submitted by the permittee to the refuge officer-in-charge.
2. Trees shall be cut so as to leave a stump not more than 12 inches high for sawtimber and 6 inches high for pulpwood, on the side adjacent to the highest ground. Ground level paint spot must be visible after the tree has been cut, where applicable. Liquidated damages for high stumps will be charged at the rate of \$0.25 per stump.
3. Trees and tops cut shall not be left hanging or supported by any other living or dead tree or brush and shall be removed immediately after felling operations. Slash shall be lopped so that it's maximum height will be 36 inches.
4. Tops and logging debris shall be pulled back 50 feet from roads.
5. All roads, road right-of-ways, fields, openings and streams must be kept clear of tops and debris. The permittee shall pay the United States for any unnecessary damage to roads, fields, openings and ditches resulting from operations conducted by himself or employees.
6. Additional trees marked for road or mill site or loading site will be paid for at bid price. Unmarked trees which are cut or injured through carelessness shall be paid for at double the stumpage price bid in the contract.
7. The permittee and his employees will do all in their power to prevent and suppress forest fires. The Refuge Manager or his agent shall have authority to temporarily close down all or any part of the operation during a period of high fire danger, inclement weather, safety reasons or any other reason granted to the permittee for completion of operations.
8. Road construction and maintenance are the responsibility of the permittee. Location of roads and landings must be approved by the Refuge Manager.
9. All tops and portions of trees marked for sale and left in the woods, upon completion of operations in each logging unit and/or entire sale area, will revert to the U.S. Government.
10. No loading or stacking of wood products is permitted within a regeneration area.

File: Tamarac
Bosque

FWS/ARW-RF1

APR 27 1988

Memorandum

To: Refuge Manager, Tamarac National Wildlife Refuge
From: Regional Refuge Supervisor, RF1
Subject: Forest Management Plan

The subject plan was reviewed in this office and by Regional Forester Cal Gale and is approved as written. The plan is well written and addresses both forest and wildlife needs.

/s/ John W. Ellis

John W. Ellis

Attachment

cc: Regional Forester

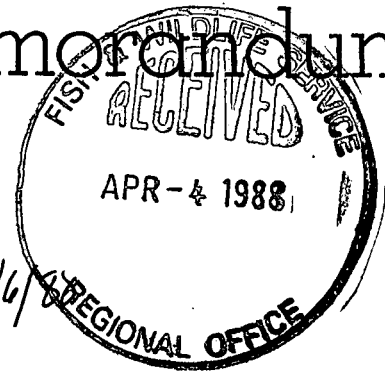
memorandum

DATE: April 1, 1988

REPLY TO
ATTN OF: Refuge Manager, Tamarac NWR, Rochert, MN 56578

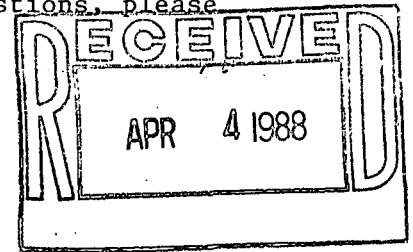
SUBJECT: Draft Forest Management Plan

TO: Regional Director, FWS, Twin Cities, MN (RF-1)



Copy of Draft Forest Management Plan for Tamarac NWR has been updated per comments of February 3, 1987 (see attached copy of review comments). Original draft document with handwritten revisions is included to facilitate your review of the corrected document. If you have any questions, please call Cyrus Brock.

Darold T. Walls
Refuge Manager



memorandum

DATE: FEB 8 1987

REPLY TO
ATTN: FEB 08 1987

Regional Refuge Supervisor, FWS, Twin Cities, MN (RF1)

SUBJECT: Forest Management Plan
TAMARAC N.W.R.

Manager	_____
Asst. Mgr.	_____
Asst. Dir.	_____
Forester	_____
I & R	_____
Maint.	_____
Clerk	_____
_____	_____
_____	_____

TO: Refuge Manager, Tamarac NWR, Rochert, MN

The Draft Forest Management Plan for Tamarac NWR has been reviewed. For the most part it is a good document and only a few revisions are needed.

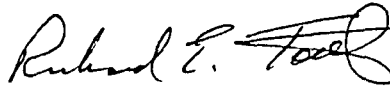
A very positive aspect of the plan is the repeated emphasis of the fact that forestry management practices at Tamarac are directed at enhancing wildlife habitat. Almost without exception, the management program laid out in the plan should benefit wildlife.

The following comments should be addressed in your revision of the draft plan.

- ✓ 1) Because people unfamiliar with forestry management jargon may be using this plan, you should explain the terms "patch, clear, select, and shelterwood cuts " where they are first used on page 4.
- 2) In the discussion of management strategies for lowland conifers on page 12, it is suggested that mixed stands of balsam fir and black spruce will be managed such that eventually they will become pure stands of black spruce. It is questionable that this would be preferable for wildlife. These lowland conifer swamps should be managed to maintain diversity and to maximize their value for wildlife. Some experimentation may be necessary to determine how to best maintain diversity in these stands.
- ✓ 3) In the section on red and white pines (page 12) the statement "Red and white pine plantations provide excellent cover for upland wildlife . . ." appears. Perhaps this is true during the first few years after planting, but I question its validity after the trees get big enough to shade out the ground cover. We do want to manage red and white pines on Tamarac for eagles, but plantation plantings are very questionable. Natural regeneration should be the preferred restocking method for red and white pines.
- ✓ 4) On page 14, unless we are short on pines for eagles, the oaks should be maintained for their wildlife values rather than converting these sites to red and white pines.
- ✓ 5) Because of revisions of the Continuous Forest Inventory (CFI) instructions since the plan was drafted, the Forest Inventory Data section needs to be updated to reflect the changes. You should be sure to include a cavity inventory as a part of the CFI.

- ✓6) In the discussion of timber sale Special Use Permits on page 17, you should add that the minimum and/or maximum size of trees to be cut will be stated as a condition of the permit.

Please consider these comments in your revision of this plan. The due date for the revised plan is April 1, 1988.


Richard E. Toltzmann

Attachments