1994

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WOESTE

A Guide to Forest Genetics Field Trials at North Central Forest Experiment Station

1932 to 1994

by

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C O N T E N T S

OVERVIEW

Research in forest genetics began in the 1930's at the North Central (then Lake States) Forest Experiment Station. Over the years, hundreds of provenance tests and other genetic experiments have been planted throughout the eastern United States and Canada. The information gained from these plantings allowed forest managers to understand the genetic effects of reforestation alternatives and to use faster-growing and disease-resistant trees.

Experimental genetics plantings have been little used in recent years. But many of the trials are still relatively intact, and the genetic diversity they contain is a valuable resource.

This study is an evaluation of previously established genetic plantings at the North Central Station. Are the trees still there? Are they healthy? Our hope is that these plantations will be used for further research.

Not all of the hundreds of plantings that were established could be visited. Priority was given to (1) the larger, rangewide experiments, (2) those which had not produced a publication lately, and (3) plantings on National Forest land.

The maps included in this work are reproduced from the originals wherever possible. In some instances, an old mimeograph was the best that could be found. Many of the original maps have been used in the field and have collected various notations over time. I've cleaned these up as best as I could given the limited scope of this project. I hope they will be useful. In a few cases, I have included a quick sketch map of my own.

Complete files on Region North studies are located at the Forestry Sciences Lab in Rhinelander, Wisconsin; files for the Region Central studies are located at the Forestry Sciences Lab in Carbondale, Illinois.

Jerry R. Van Cleve

GENETIC RESOURCE EVALUATION

Study No.: G-109 Species: European larch

Date Established: 5/20/49 Date Evaluated: 5/28/93

Title: European larch provenance test

Location: Argonne Experimental Forest near Hiles, Wisconsin
Compartment 132, Eagle River RD, Nicolet NF
SESW, S33, T38N, R12E, Forest County, Wisconsin

Experimental Design: Single block, 8 seedlots, 3 to 82 trees per plot, 6 x 6 ft spacing, tamarack fill-ins and border rows. (Original design consisted of 14 plots, with one seedlot replicated 5 times throughout the planting.)

Monumentation: Many of the original wooden corner posts are down; those still standing are in poor condition. I placed orange plastic stakes with metal tags at all plot corners.

Existing Fall Measurements:
Ht '50, '51, '52, '54
DBH

Survival: Heavy initial mortality due to top mould resulted in the stand being transplanted in 1950 to the present configuration. About 60% of the seedlings transplanted in 1950 survive today.

Growth: The larches in all plots have done quite well. Heights average 75 to 80 feet, the tallest trees reaching 85 feet. Diameters average 10 to 12 inches, the largest tree being nearly 14 inches DBH.

The tamaracks in the planting have not performed as well as the larches. Tamarack heights average 65 feet, diameters 8 inches.

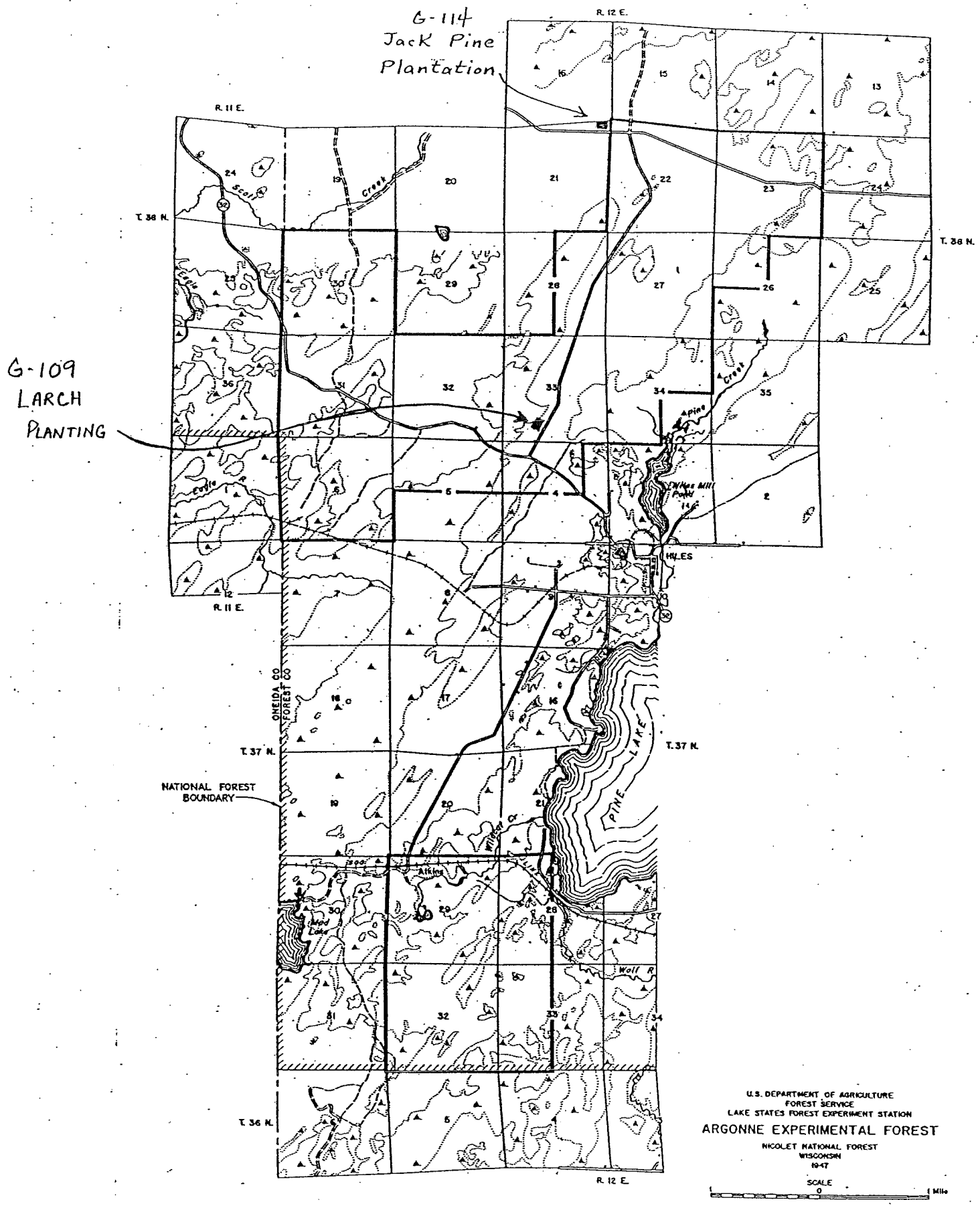
Stem Form: Most of the larches have 50 feet of clear bole to the first limb. The tamaracks have 30 feet of clear bole.

Damage: No damage was evident in the stand.

Competing Vegetation: Red maple and balsam fir saplings in the understory approach 20 feet in height.

Suggested Maintenance: This planting is too small for a thinning to be of much benefit, but the understory vegetation should be removed.

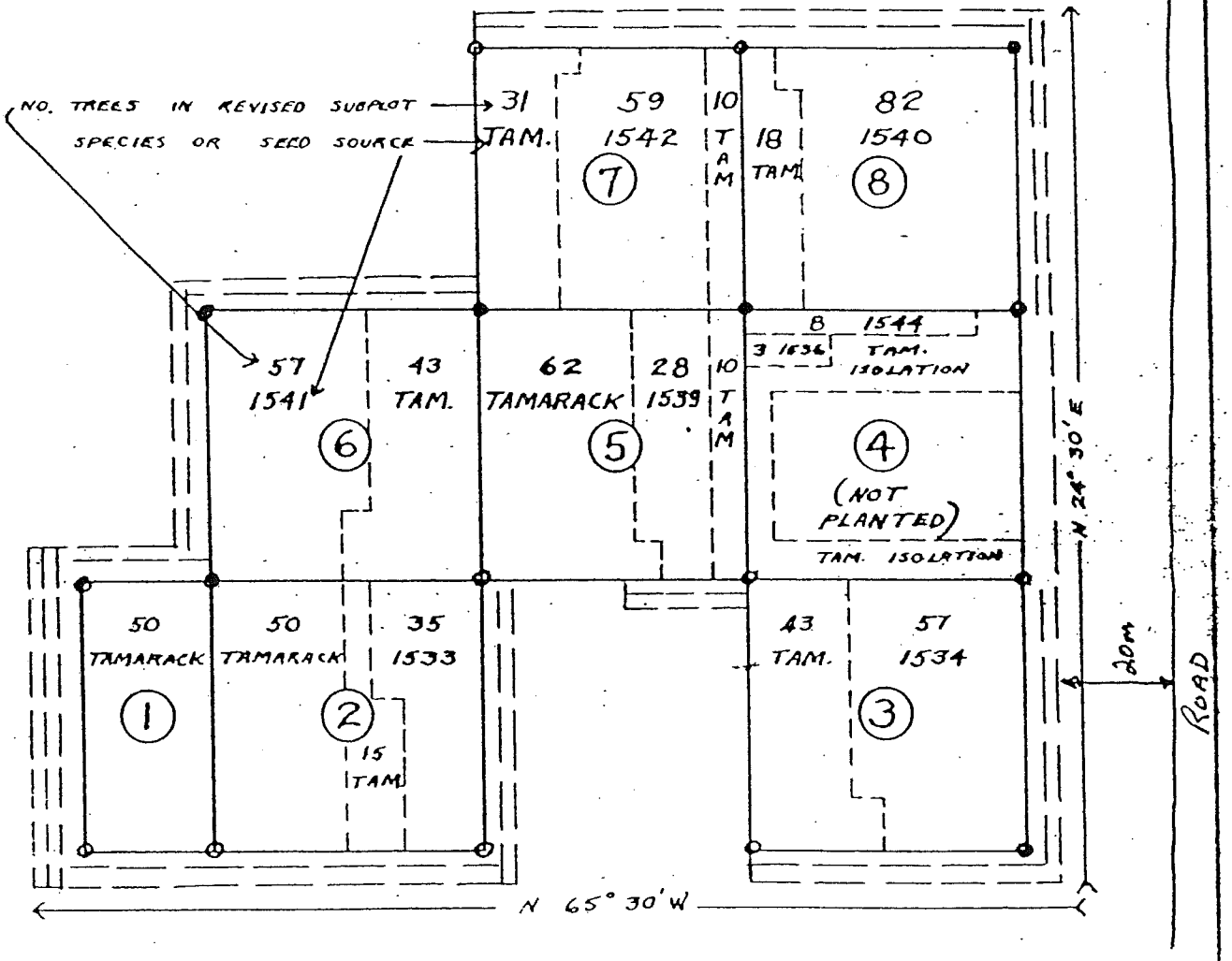
Other Comments:


G-114
Jack Pine
Plantation
G-109
LARCH
PLANTING
R. 12 E.
R. 11 E.
T. 38 N.
T. 37 N.
T. 36 N.
ONEIDA CO
FOREST CO
NATIONAL FOREST
BOUNDARY
PINE LAKE
Scott Creek
Wall R
Atkins
Mud Lake
HILES
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LAKE STATES FOREST EXPERIMENT STATION
ARGONNE EXPERIMENTAL FOREST
NICOLET NATIONAL FOREST
WISCONSIN
1947
SCALE
0
1 Mile

STUDY NO. G-109

LAYOUT OF PLOT 110
EUROPEAN LARCH SOURCE OF SEED TEST

LOCATED IN COMP. 132 ARGONNE EXPER. FOREST
SE SW SEC. 33, T 38 N, R 12 E
FOREST CO. WIS.



LEGEND

⊕	CORNER POST
— — —	TAMARACK ISOLATION ROWS
— — — —	INTERIOR PLOT SUBDIVISION
———	PLOT BOUNDARY
SCALE:	1 INCH = 40 FEET

GENETIC RESOURCE EVALUATION

Study No.: G-109 Species: European larch

Date Established: 5/5/49 Date Evaluated: 6/22/93

Title: European larch provenance test

Location: Pike Bay Experimental Forest near Cass Lake, Minnesota
Compartment 154, Cass Lake RD, Chippewa NF
NWSW, S6, T144N, R30W, Cass County, Minnesota

Experimental Design: Single block, 18 plots, 50 to 150 trees per plot, 13 seedlots, 6 x 6 ft spacing, 3 border rows of white spruce. One seedlot replicated 5 times throughout planting, another replicated twice.

Monumentation: None.

Existing Fall Measurements:
Ht '50, '58
DBH

Survival: Every single larch in this planting has died. All that remains are the isolation rows of white spruce, which are intact on all sides except for the western half of the northern rows. (Eight tamarack have survived in the tamarack plot at the west end of the planting.)

The condition report of August, 1950 showed very poor survival in four of the plots, due to flooding. A 1958 report showed only 8.0% survival overall for the larch, which explains why there are not even dead trees or rotten logs in the area now.

Growth: Of the few surviving tamarack, the largest is 6 inches in diameter and 30 feet in height.

Stem Form:

Damage:

Competing Vegetation: Sawlog aspen and bur oak occupy the area where these larch were planted.

Suggested Maintenance:

Other Comments:

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LAKE STATES FOREST EXPERIMENT STATION

PIKE BAY EXPERIMENTAL FOREST

CHIPPEWA NATIONAL FOREST

MINNESOTA

0 ¼ ½ ¾ 1 MILE

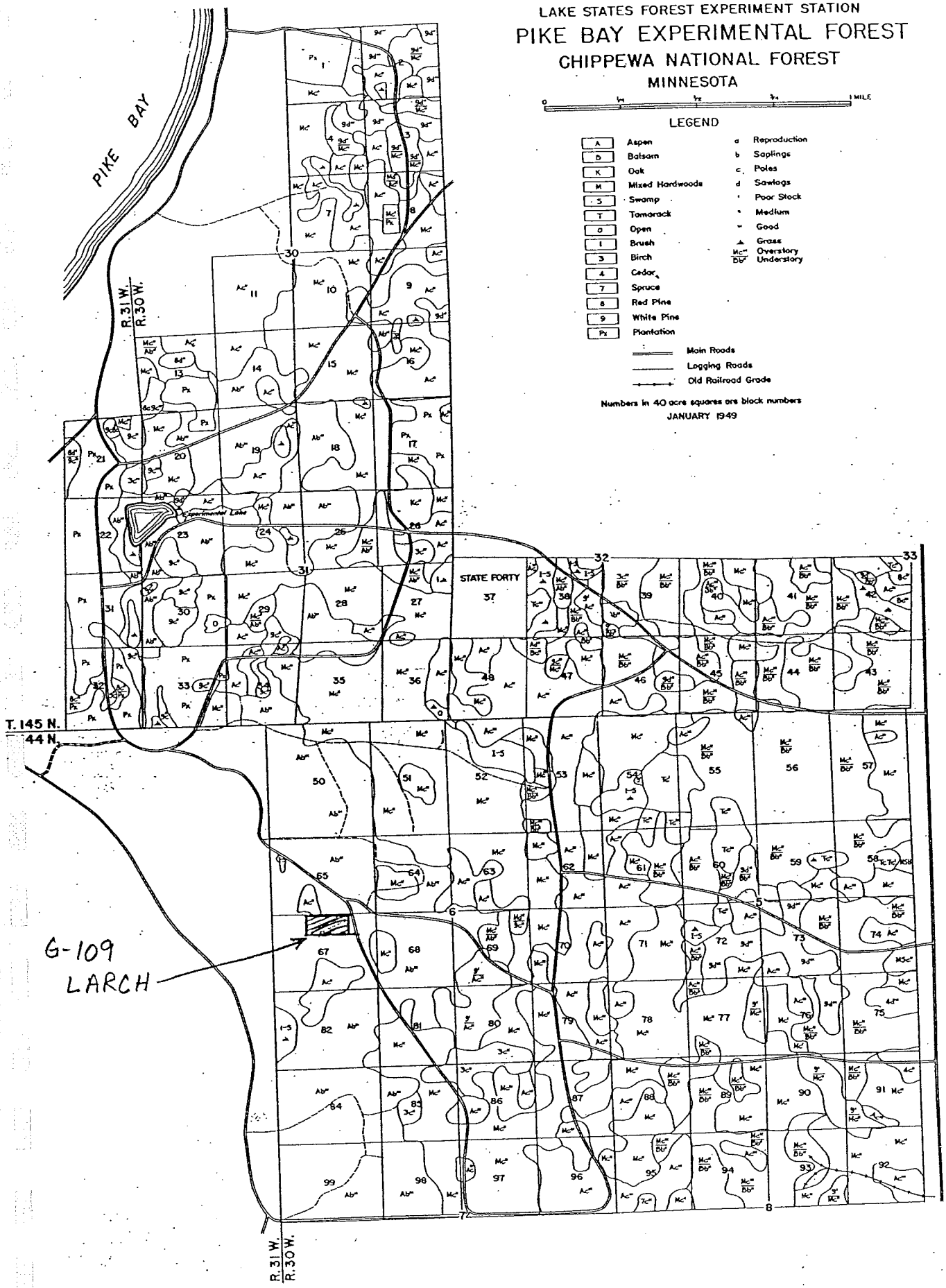
LEGEND

A	Aspen	a	Reproduction
B	Balsam	b	Saplings
K	Oak	c	Poles
M	Mixed Hardwoods	d	Sawlogs
S	Swamp	·	Poor Stock
T	Tamarack	▪	Medium
O	Open	▬	Good
I	Brush	▲	Grass
3	Birch	Mc / Bur	Overstory / Understory
4	Cedar		
7	Spruce		
8	Red Pine		
9	White Pine		
Px	Plantation		

Main Roads
Logging Roads
Old Railroad Grade

Numbers in 40 acre squares are block numbers

JANUARY 1949



RLS - Genetics

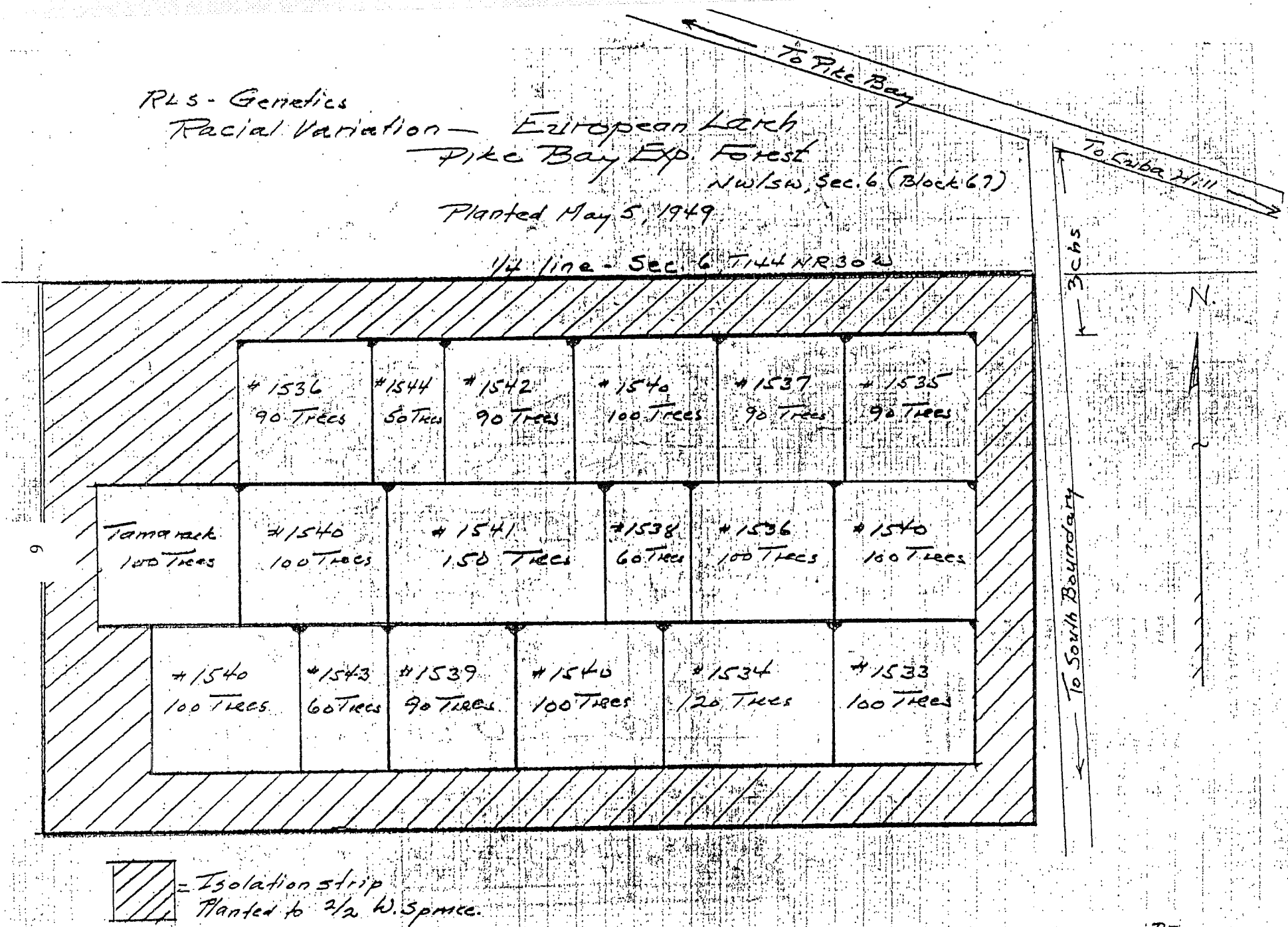
Racial Variation — European Larch

Pike Bay Exp. Forest

NW¼SW¼, Sec. 6 (Block 67)

Planted May 5, 1949

¼ line - Sec. 6 T44N R30W



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GENETIC RESOURCE EVALUATION

Study No.: G-259 Species: Tamarack

Date Established: 10/10/67 Date Evaluated: 5/20/93

Title: A rangewide study of seed source variation in tamarack

Location: State-owned land near Lake Tomahawk, Wisconsin
NESW, S10, T38N, R7E, Oneida County, Wisconsin

Experimental Design: Randomized block, 10 blocks, 4-tree row plots, 17 families, 6 x 6 ft spacing, 2 border rows.

Monumentation: Most of the cedar posts used to initially mark block corners are present, but aging. I placed orange plastic stakes with metal tags at all block corners.

Existing Fall Measurements:
Ht '70, '71, '72, '73, '77, '84, '92
DBH '77, '84, '92

Survival: Overall survival is about 60%.

Growth: Diameters run from 4 to 8 inches and are well distributed across this range. Heights are mostly 40 to 50 feet.

Stem Form: These trees are straight and have self-pruned well, creating a park-like stand.

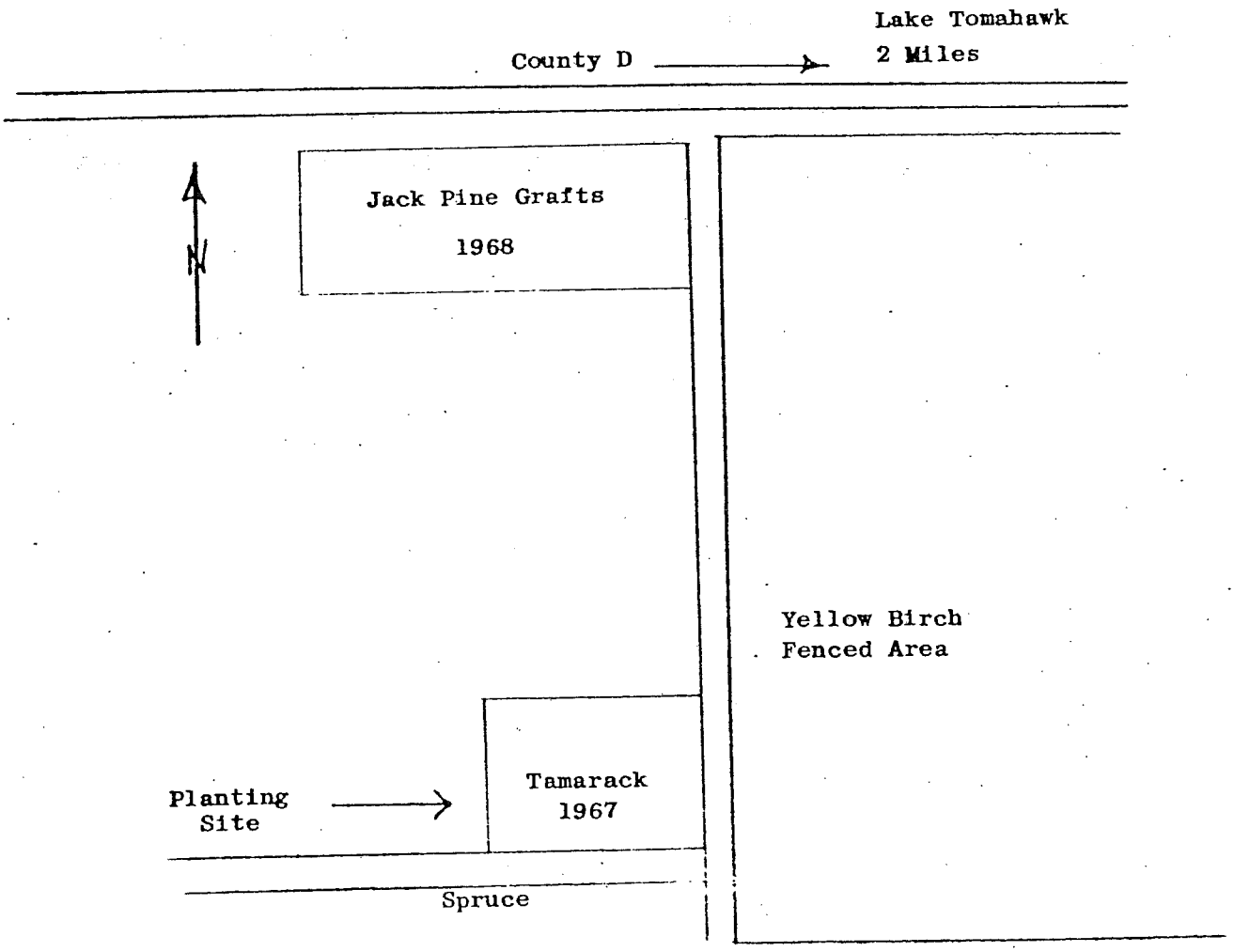
Damage: The major cause of damage in the planting is deer. Several tamaracks have fresh scars where bucks have roughed them up, and a dozen more appear to have been killed by this activity. One tree has been recently wind-thrown. Blocks 1, 6, and 10 each have pockets of missing trees, probably frost kill.

Competing Vegetation: None.

Suggested Maintenance: Repair the fence around the planting. Thin the stand while the trees are still vigorous.

Other Comments:

Location of Lake Tomahawk Planting Site



TAMARACK OUTPLANTING

LAKE TOMAHAWK

Planted Oct. 9 & 10, 1967

4 - Tree Line Plots

6' x 6' Spacing

10				9				8				7				6			
3014	3327	3320	3265	3284	3273	3282	3324	3319	3283	3284	3331	3319	3038	3330	3273	3324	3038	3273	3331
3265	3019	3038	3273	3327	3330	3331	3330	3283	3324	3330	3273	3038	3331	3011	3284	3282	3011	3330	3284
3333		3282	3283	3320	3331	3014	3283	3011		3014	3284	3283	3014	3332	3011	3011	3330	3332	3038
3324	3330	3283	3319	3038	3332	3038	3332	3284	3332	3019	3333	3332	3324	3284	3327	3265	3333	3265	3327
3284	3011	3332	3333	3283	3333	3283	3333	3330	3273	3273	3331	3327	3284	3273	3283	3014	3332	3014	3283
3273	3331	3319	3019	3319	3282	3319	3282	3331	3330	3332	3014	3014	3273	3014	3332	3283	3014	3283	3330
3320	3327		3327	3273	3265	3333	3019	3284	3333	3331	3265	3265	3331	3265	3331	3332	3320	3019	3332
3331	3273	3265	3019	3011	3333	3332	3014	3333	3011	3265	3327	3327	3332	3327	3332	3011	3330	3284	3320
3283	3319	3333	3011	3038	3011	3014	3284	3011	3332	3327	3332	3332	3014	3331	3014	3330	3019	3332	3019
3038	3282	3332	3283	3284	3324	3284	3331	3332	3265	3332	3273	3273	3331	3284	3331	3333	3327	3331	3284
3014	3284	3019	3319	3332	3283	3273	3283	3265	3327	3273	3284	3284	3273	3332	3273	3284	3283	3273	3283
3273	3331	3324	3011	3324	3265	3327	3265	3327	3284	3284	3283	3283	3284	3283	3284	3282	3011	3283	3265
3330	3011	3324	3284	3019	3014	3019	3038	3273	3014	3283	3265	3265	3283	3265	3283	3319	3283	3265	3014
3038	3330	3284	3332	3014	3333	3011	3332	3330	3273	3014	3333	3333	3014	3333	3014	3333	3332	3014	3333
3319	3014	3333	3011	3283	3011	3332	3265	3014	3333	3011	3330	3330	3011	3330	3011	3330	3011	3330	3011
3019	3283	3011	3332	3324	3332	3265	3327	3011	3332	3330	3331	3331	3330	3331	3330	3331	3330	3331	3330
	3324	3332	3265	3332	3265	3327		3332	3265	3331	3038	3038	3331	3038	3331	3038	3331	3038	3331
3331	3320	3282	3273	3265	3327		3331	3265	3327	3038			3038		3038		3038		3038
3327	3273	3265		3327		3331	3273	3327		3273	3327	3327	3273	3327	3273	3327	3273	3327	3273
5				4				3				2				1			

GENETIC RESOURCE EVALUATION

Study No.: G-259 **Species:** Tamarack

Date Established: 10/5/67 **Date Evaluated:** 5/21/93

Title: A rangewide study of seed source variation in tamarack

Location: "Kaine Lake" planting, near Eagle River, Wisconsin
Eagle River RD, Nicolet NF
NWSW, S17, T41N, R13E, Forest County, Wisconsin

Experimental Design: Randomized block, 10 blocks, 4-tree row plots, 24 families, 6 x 6 ft spacing, 2 border rows.

Monumentation: Cedar 4 x 4 posts were originally used to mark block corners; many of these are missing, especially along the perimeter of the plantation. I placed orange plastic stakes with metal tags at all block corners.

Existing Fall Measurements:
Ht '70, '71, '73, '77, '84, '92
DBH '77, '84, '92

Survival: 75 to 80%.

Growth: Height and diameter growth are both quite variable in this plantation. Height ranges from 20 to 50 feet with good representation of all sizes, the majority of the trees 35 to 45 feet. Diameter ranges from 1 to 7 inches, mostly 4 to 5 inches.

Stem Form: Boles are straight although these trees have not self-pruned as well as those in the Lake Tomahawk tamarack planting.

Damage: No pest or disease problems are evident.

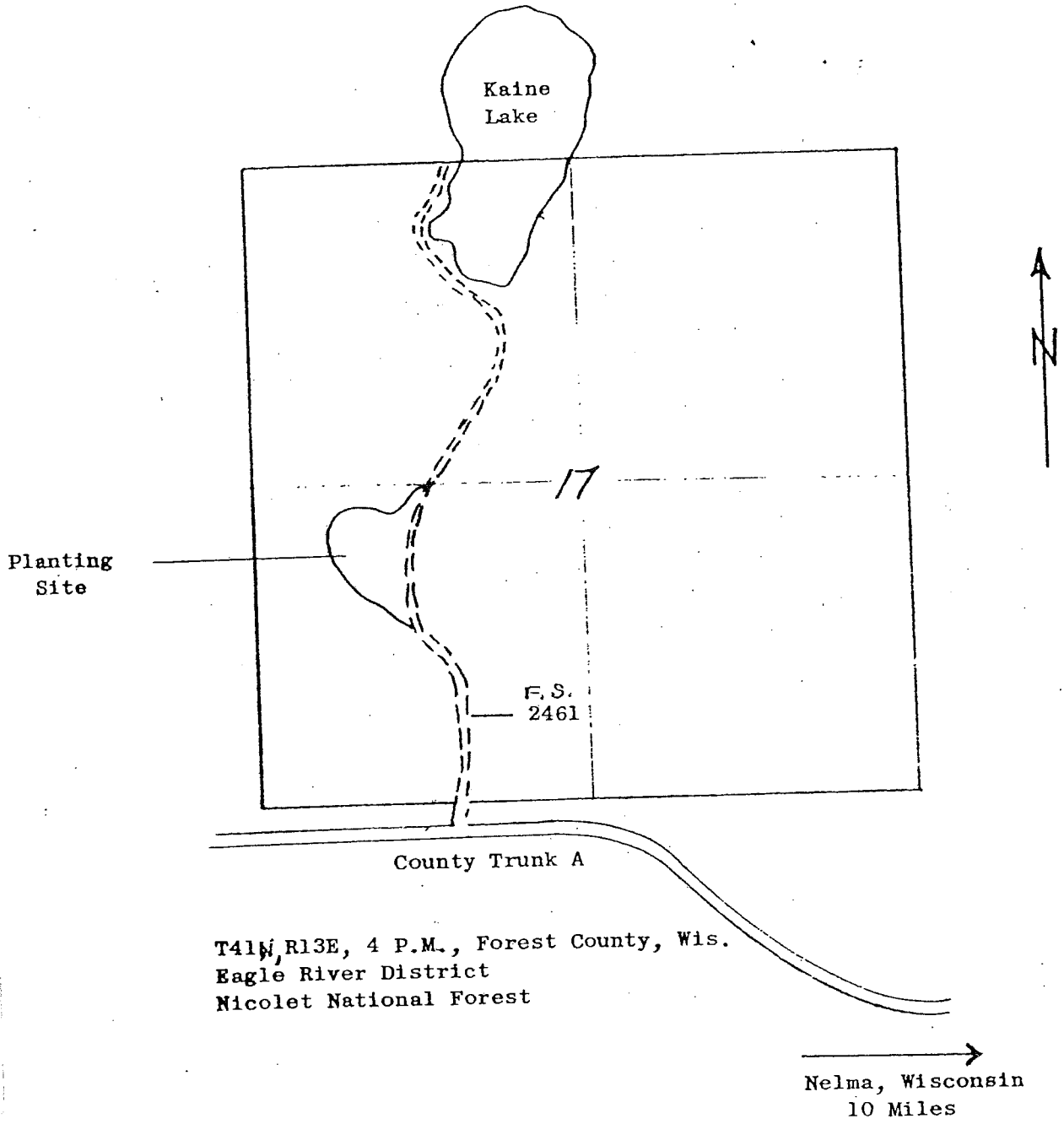
Competing Vegetation: Hardwood saplings, especially black cherry, are encroaching primarily in block 9. These do not yet seriously compete with the tamaracks.

Suggested Maintenance: The stand is ready for a thinning and cleaning.

Other Comments: Block 5 contains a small trash pile, too small to affect the trees, yet. Discarded items include worn-out camping gear - tarp, fire grate, etc. - and may have come from the deer camp located in the woods about 50 yards southwest of the plantation.

Location of Kaine Lake

Planting Site



TAMARACK OUTPLANTING

KAINE LAKE

Planted Oct. 3-5, 1967

4 - Tree Line Plots

6' x 6' Spacing

10				9				8				7				6			
3011	3265	3330	3272	3331	3319	3324	3327	3319	3011	3327	3284	3265	3323	3337	3324	3036	3337	3273	3337
3282	3273	3322	3036	3333	3019	3282	3320	3011	3324	3323	3282	3284	3337	3322	3272	3330	3273	3282	3320
3320	3266	3283	3324	3014	3284	3273	3337	3284	3273	3337	3320	3272	3337	3322	3323	3332	3282	3265	3320
3337	3007	3333	3327	3332	3011	3038	3007	3011	3038	3007	3337	3323	3007	3337	3332	3330	3265	3319	3333
3331	3038	3332	3019	3283	3330	3472	3323	3330	3472	3331	3284	3332	3331	3333	3333	3333	3319	3324	3319
3284	3323	3014	3319	3036	3322	3265	3266	3322	3265	3007	3331	3007	3333	3319	3014	3014	3324	3333	3324
5				4				3				2				1			
3323	3283	3327	3011	3319	3014	3330	3036	3038	3284	3036	3322	3322	3282	3284	3265	3283	3036	3337	3338
3019	3265	3323	3324	3282	3323	3337	3322	3320	3272	3273	3330	3007	3330	3272	3019	3327	3330	3273	3272
3272	3333	3266	3332	3011	3007	3331	3333	3332	3337	3319	3014	3337	3283	3323	3011	3011	3332	3282	3320
3038	3007	3337	3330	3272	3265	3019	3320	3283	3333	3327	3282	3332	3273	3266	3320	3272	3330	3265	3266
3330	3273	3036	3282	3284	3327	3266	3038	3284	3327	3332	3323	3324	3331	3036	3333	3324	3333	3319	3007
3014	3331	3319	3284	3273	3324	3265	3331	3273	3324	3265	3331	3327	3014	3038	3319	3327	3014	3324	3330
3266	3036	3033	3331	3038	3284	3036	3322	3265	3282	3284	3265	3323	3284	3036	3337	3283	3036	3337	3338
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3273	3324	3019	3282	3332	3337	3319	3014	3324	3265	3007	3331	3322	3282	3284	3265	3272	3038	3332	3282
3332	3323	3014	3333	3283	3333	3327	3282	3333	3011	3266	3323	3007	3330	3272	3019	3272	3038	3332	3282
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3337	3283	3273	3324	3007	3330	3272	3019	3330	3007	3272	3019	3324	3333	3333	3324	3333	3333	3324	3333
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3036	3332	3282	3266	3327	3014	3038	3319	3014	3327	3319	3333	3333	3333	3333	3333	3333	3333	3333	3333
3038	3283	3014	3323	3332	3283	3036	3337	3283	3327	3337	3333	3333	3333	3333	3333	3333	3333	3333	3333
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3007	3324	3019	3273	3007	3331	3333	3319	3331	3007	3319	3333	3333	3333	3333	3333	3333	3333	3333	3333
3330	3337	3284	3011	3284	3019	3014	3324	3019	3284	3324	3333	3333	3333	3333	3333	3333	3333	3333	3333

GENETIC RESOURCE EVALUATION

Study No.: SM-222 Species: Norway spruce

Date Established: 5/11/62 Date Evaluated: 6/22/93

Title: Norway spruce seed source study

Location: Pike Bay Experimental Forest near Cass Lake, Minnesota
Compartment 154, Cass Lake RD, Chippewa NF
SENW, S31, T145N, R30W, Cass County, Minnesota

Experimental Design: Randomized block, 10 blocks, 4-tree square plots, 11 families, 7 x 7 ft spacing, 4 border rows.

Monumentation: None. The original corner posts are gone, and no plot tags could be found. I did not place any new stakes because I was unsure whether or not border rows had been planted between this plantation and the G-113 white spruce study which lies immediately to the north.

Existing Fall Measurements:
Ht '66, '71
DBH

Survival: Survival is very good at 90%.

Growth: Diameters average about 6 inches with the largest trees 10 inches DBH. Heights are mostly about 30 feet, the tallest trees reaching 40 feet. Live crown ratios are 50 to 60%.

Stem Form: Boles are straight with persistent lower limbs.

Damage: These trees appear healthy. No damage was noticed outside of bole cankers on two trees.

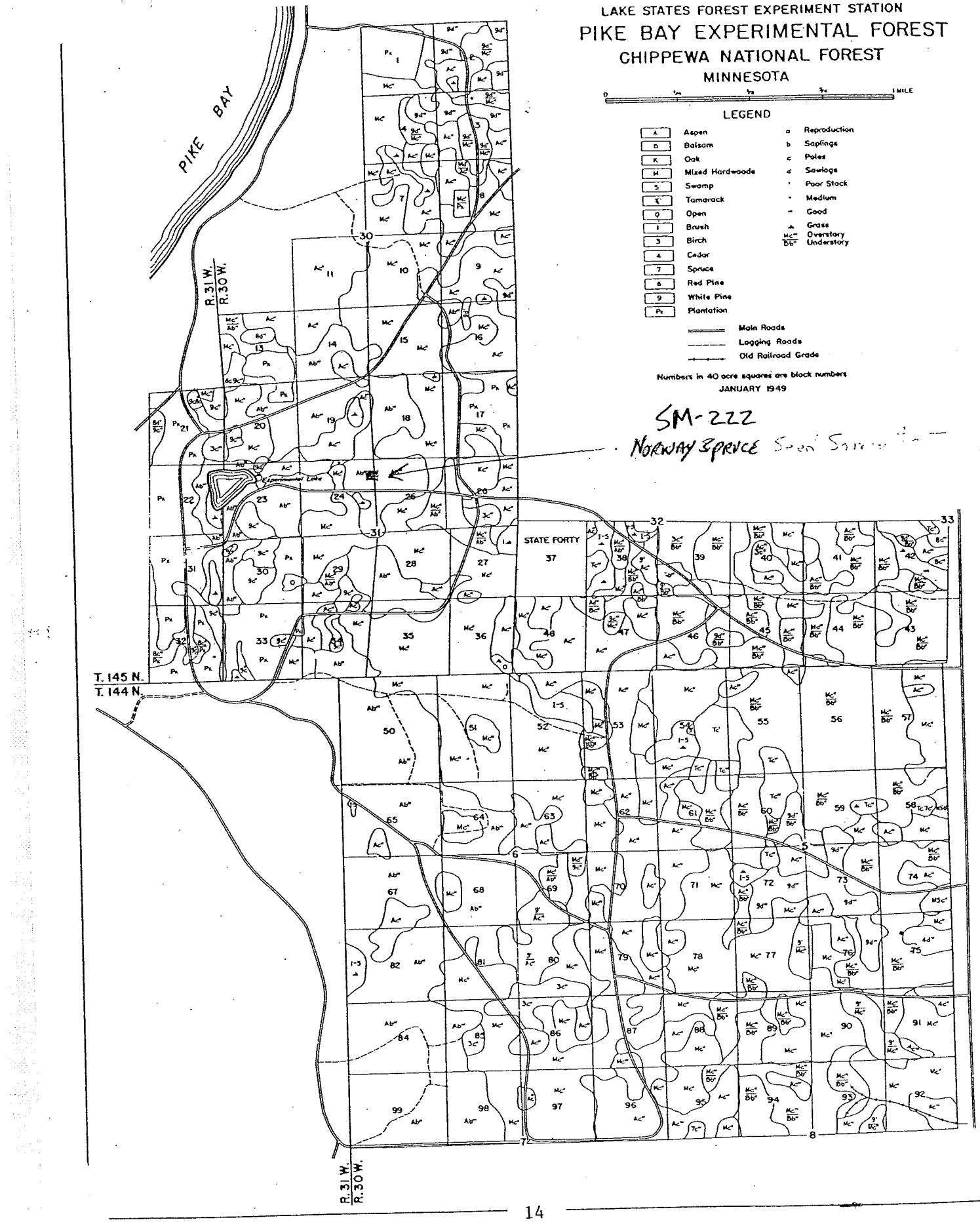
Competing Vegetation: None.

Suggested Maintenance: This stand could use a good thinning. At least half the trees need to come out.

Other Comments: Two other genetic plantations are located in the immediate vicinity. See accompanying sketch for details.

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LAKE STATES FOREST EXPERIMENT STATION

PIKE BAY EXPERIMENTAL FOREST
CHIPPEWA NATIONAL FOREST
MINNESOTA

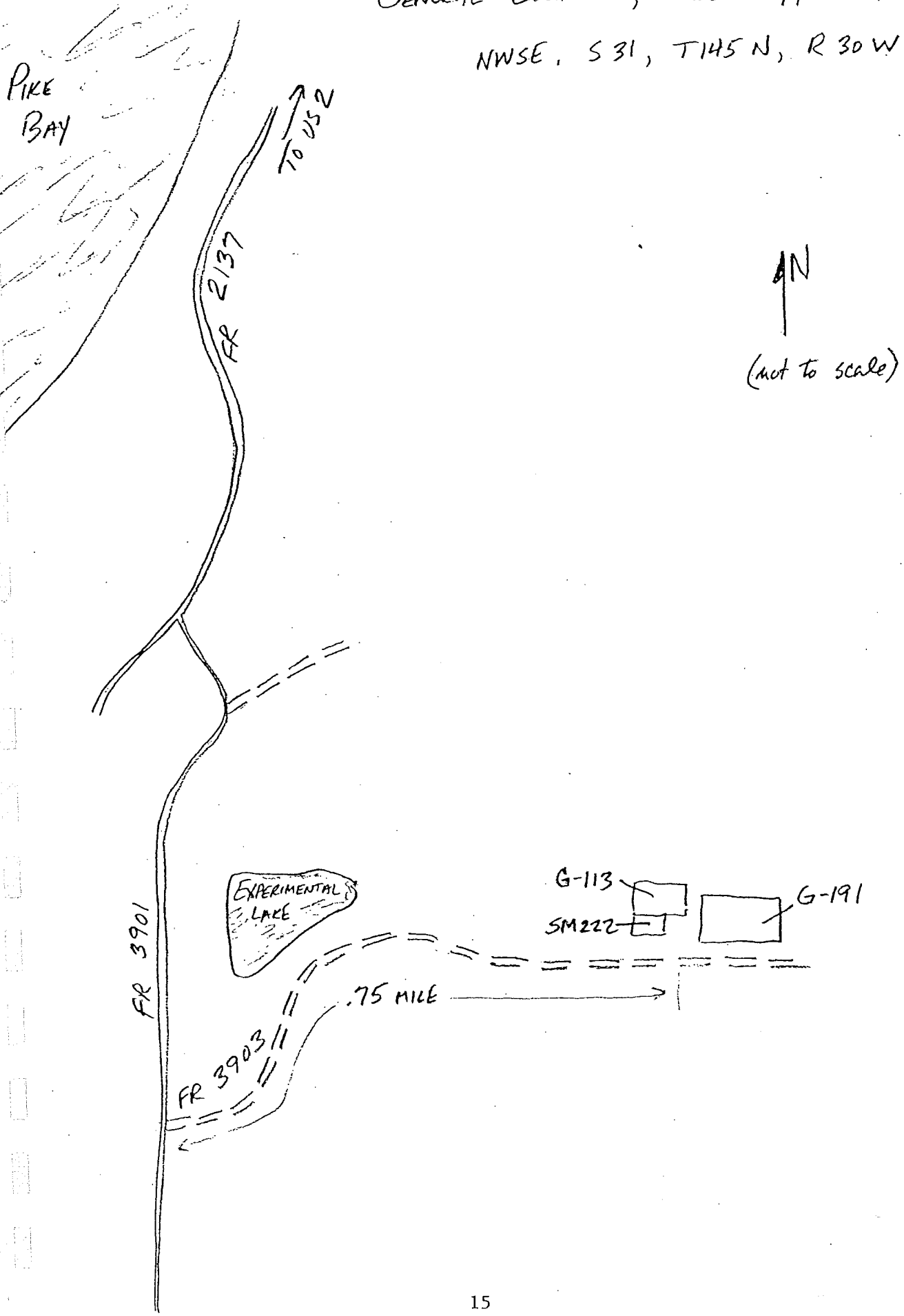


SM-222
NORWAY SPRUCE Seed Source

SCS-MILWAUKEE, WIS 1961

General Location, Pike Bay, MN Plantings

NWSE, S 31, T 145 N, R 30 W



SM-222

NIFG-

NORWAY SPRUCE Seed Source Test
Pike Bay Experimental Forest

N ↑

	1	2	3	4	5	6	7	8	9	10
1	1862	648	1863	653	1864	1863	1852	1864	1844	653
2	1853	1864	1862	1864	653	1844	1864	654	654	1853
3	653	1852	1864	1853	1853	649	1863	1862	1853	648
4	1863	1844	1844	1862	1862	1862	652	649	1863	654
5	1852	1862	654	1844	654	652	1853	653	1862	649
6	649	654	653	652	1863	1864	653	652	653	1864
7	1844	653	649	648	652	648	1862	648	649	652
8	648	1853	1852	1852	648	654	654	1853	1852	1863
9	654	1863	652	649	1844	1853	1844	1863	648	1862
10	1864	649	648	654	1852	1852	649	1844	1864	1852
11	652	652	1853	1863	649	653	648	1852	652	1844

GENETIC RESOURCE EVALUATION

Study No.: G-113 Species: White spruce

Date Established: 5/11/62 Date Evaluated: 7/7/93

Title: The establishment of white spruce seed sources from the entire range of the species

Location: Argonne Experimental Forest near Hiles, Wisconsin
Eagle River RD, Nicolet NF
SESE, S16, T38N, R12E, Forest County, Wisconsin

Experimental Design: Randomized block, 4 blocks, 49-tree plots (7 x 7 trees square), 28 families, 6 x 6 ft spacing.

Monumentation: Aluminum angle-iron stakes with embossed metal tags mark plot corners.

Existing Fall Measurements:
Ht '62, '67
DBH

Survival: Overall survival is 65%. Mortality has been patchy; families tend to be all present or all missing.

Growth: Height and diameter growth are both quite variable in this planting; the variation is strongly correlated with seed source. Diameters range from 1 to 13 inches, with most trees about 6 inches DBH. Heights range from 5 to 45 feet, with most trees about 25 feet. Live crown ratio on dominant trees is 50 to 60%.

Stem Form: Stems are straight, but dead limbs persist on these trees nearly to the ground, making it extremely difficult to walk through this stand.

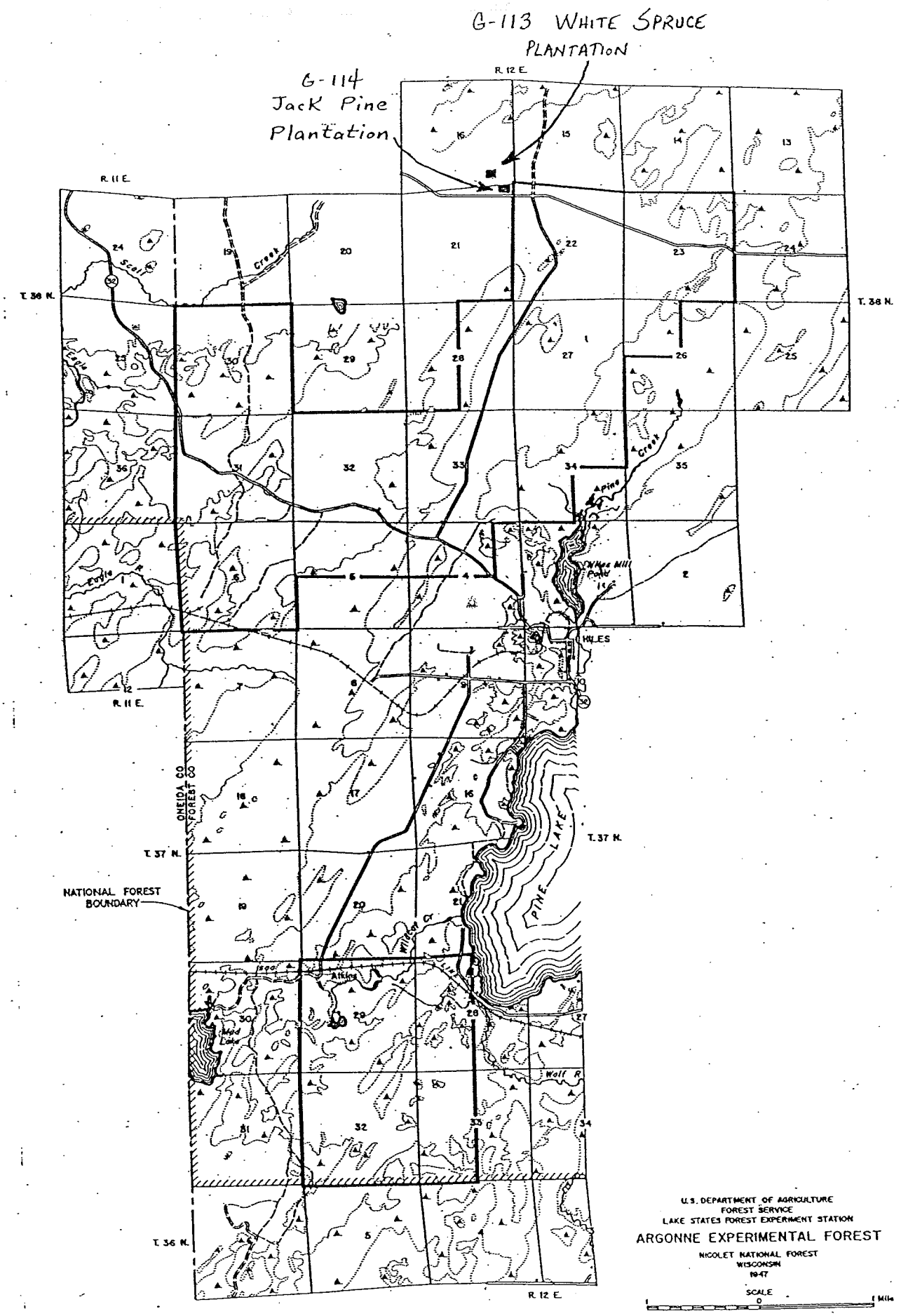
Damage: No cankers or diseases were noticed in the planting. These spruces are in good shape except for those families severely stressed by climate.

Competing Vegetation: The entire stand is overtopped by aspen poletimber. In the spaces created where a family died out, aspen have flourished. Aspen also grow among the rows of surviving spruce - they must have got a good jump on the spruce before crown closure occurred. Even the tallest spruce are beneath aspen.

Suggested Maintenance: Stand needs a thinning/cleaning. Remove the aspen. Pruning is also needed in order work in the stand.

Other Comments: This plantation is now located in the Headwaters Wilderness Area, immediately north of the Argonne Experimental Forest. Whether this precludes any manipulation of the vegetation I do not know.

From the junction of FR 2183 (Scott Lake Road) and FR 2184 (Experimental Road), proceed .3 mile west to a trail heading north. Follow this trail north along the west edge of the G-114 jack pine planting (about 5 chains). From the northwest corner of the jack pines, go about 3 chains northwest to the southeast corner of the G-113 spruce planting.


G-113 WHITE SPRUCE PLANTATION
G-114 Jack Pine Plantation
R. 12 E.
R. 11 E.
T. 38 N.
T. 37 N.
T. 36 N.
ONEIDA CO.
FOREST CO.
NATIONAL FOREST BOUNDARY
PINE LAKE
HILES
Scott Creek
Eagle R.
Pine Creek
Wolf R.
Wilson Cr.
Mud Lake
Atkins
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LAKE STATES FOREST EXPERIMENT STATION
ARGONNE EXPERIMENTAL FOREST
NICOLET NATIONAL FOREST
WISCONSIN
1947
SCALE
0
1 Mile

G-113

White Spruce Seed Source Variation Study

Nicolet National Forest, Forest County, Wisconsin

SESE Sec. 16, T38N, R12E
Argonne Experimental Forest

Block I

1661	1665	1644	1659	1687	1697	1649
1631	1678	1667	1628	1630	1662	1653
1645	1663	1657	1660	1655	1652	1647
1677	1676	1686	1664	1658	1669	1654

Block II

1661	1665	1697	1631	1663	1657	1687
1662	1678	1647	1654	1664	1653	1659
1630	1644	1655	1660	1667	1649	1677
1645	1658	1686	1669	1676	1628	1652

N

Block III

1663	1677	1667	1660	1644	1631	1661
1657	1652	1630	1647	1697	1665	1655
1662	1628	1687	1645	1658	1654	1669
1676	1664	1649	1659	1686	1653	1678

Block IV

1659	1663	1686	1676	1661	1645	1678
1669	1665	1630	1662	1654	1644	1628
1687	1667	1664	1657	1660	1653	1647
1652	1655	1677	1658	1649	1697	1631

Planted May 9 and 11, 1962 with 2-2 stock - spacing 6 x 6 feet.

Border plants white spruce #2994 Northeast Wisconsin.

GENETIC RESOURCE EVALUATION

Study No.: G-113 Species: White spruce

Date Established: 5/9/62 Date Evaluated: 6/15/93

Title: The establishment of white spruce seed sources from the entire range of the species

Location: Ottawa National Forest near Bergland, Michigan
Bergland RD, Ottawa NF
NWNW, S25, T49N, R41W, Ontonagon County, Michigan

Experimental Design: Randomized block, 4 blocks, 49-tree plots (7 x 7 trees square), 28 families, 6 x 6 ft spacing.

Monumentation: None.

Existing Fall Measurements:
Ht '62, '67
DBH

Survival: About 5%. Most of these trees are gone.

Growth: The largest survivors are 12 inches in diameter and 40 feet tall.

Stem Form:

Damage: The establishment report indicates that the site is subject to occasional, if not frequent, flooding. Some of the trees were actually planted in standing water. A ditch was constructed through the planting during the summer following establishment to promote drainage. Early reports indicate poor survival on the heavy soils. Flooding is the probable cause of the high mortality in this planting.

Competing Vegetation: All surviving spruce are overtopped by aspen.

Suggested Maintenance:

Other Comments: All that remains of this planting is a slightly higher proportion of spruce in the aspen woods. In places three or four spruces in a row can be found - evidence that a planting once existed here. I searched the entire quarter section to make sure I hadn't missed it. The heaviest concentration of surviving trees consists of four adjacent 4-tree rows in what I believe used to be block II. I could not determine where any block corners or boundaries were.

G-113
White Spruce Seed Source Variation Study
Bergland, Ontonagon County, Michigan
NW NW, Sec. 25, T49N, R41W

Block I

1661	1665	1644	1659	1687	1697	1649
1631	1678	1667	1628	1630	1662	1653
1645	1663	1657	1660	1655	1652	1647
1677	1676	1686	1664	1658	1669	1654

Block II

1661	1665	1697	1631	1663	1657	168
1662	1678	1647	1654	1664	1653	1659
1630	1644	1655	1660	1667	1649	167
1645	1658	1686	1669	1676	1628	165

Block III

1663	1677	1667	1660	1644	1631	1661
1657	1652	1630	1647	1697	1665	1655
1662	1628	1687	1645	1658	1654	1669
1676	1664	1649	1659	1686	1653	1678

Block IV

1659	1663	1686	1676	1661	1645	167
1669	1665	1630	1662	1654	1644	1628
1687	1667	1664	1657	1660	1653	164
1652	1655	1677	1658	1649	1697	163

Planted May 8 and 9, 1962 with 2-2 stock - spacing 6 x 6 feet.

Border plants white spruce #2988 Superior, 1947.

GENETIC RESOURCE EVALUATION

Study No.: G-113 Species: White spruce

Date Established: 5/10/62 Date Evaluated: 6/22/93

Title: The establishment of white spruce seed sources from the entire range of the species

Location: Pike Bay Experimental Forest near Cass Lake, Minnesota
Compartment 154, Cass Lake RD, Chippewa NF
NWSE, S31, T145N, R30W, Cass County, Minnesota

Experimental Design: Randomized block, 10 blocks, 4-tree square plots, 28 families, 6 x 6 ft spacing, 4 border rows.

Monumentation: None. No original corner stakes or tags could be found. A border row is missing on the east or west side, or else was never planted; being unsure of block corners, I left them unmarked.

Existing Fall Measurements:
Ht '62, '67, '72
DBH

Survival: Survival is 75%, the mortality occurring in patches.

Growth: Average diameters run about 8 inches, average heights about 40 feet. The best trees are 12 inches by 48 feet. Live crown ratios are reasonably vigorous for such a thick stand at 50%.

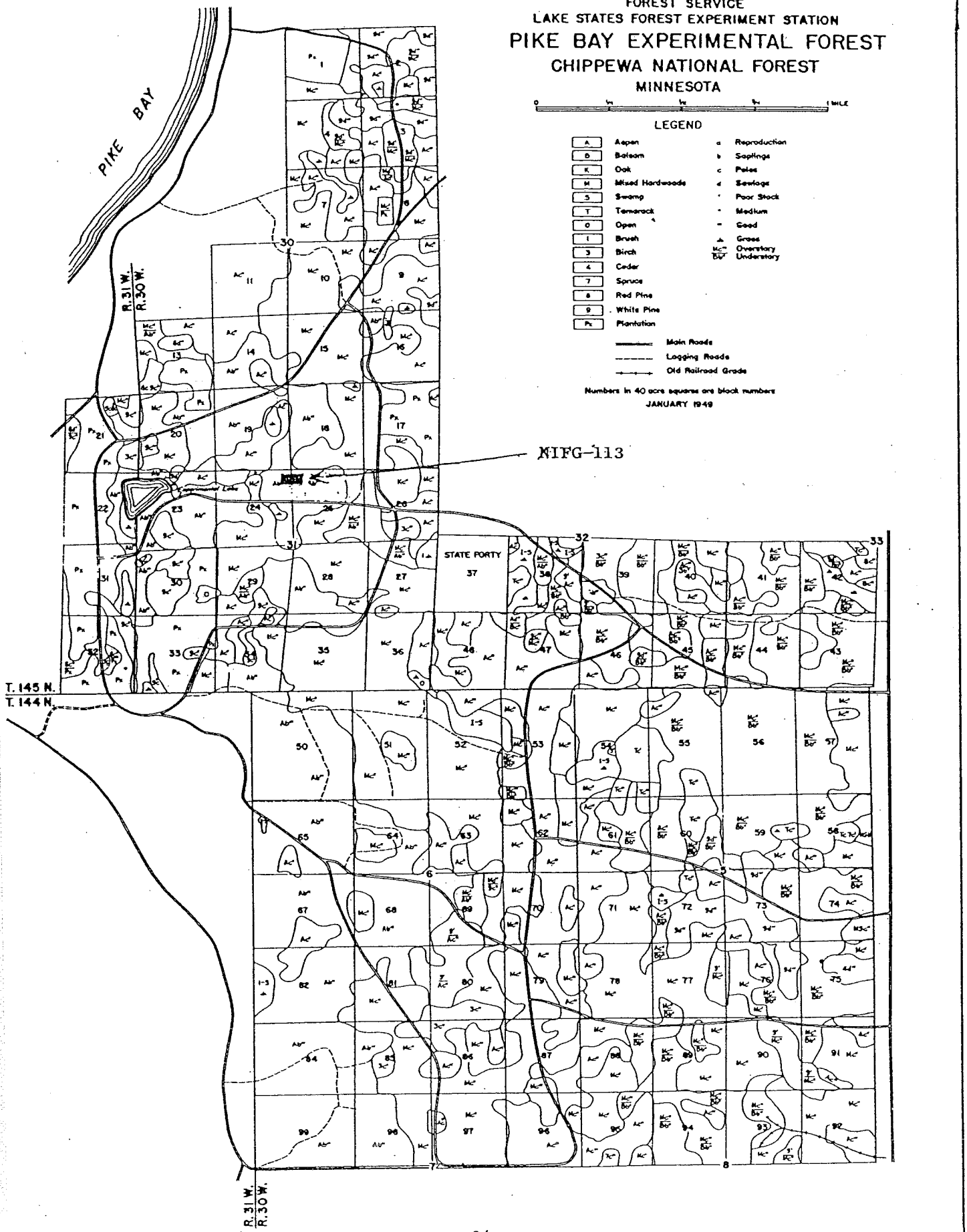
Stem Form: Boles are straight with persistent dead limbs.

Damage: No particular damage was evident in the stand.

Competing Vegetation: Hazel and mountain ash have grown vigorously in the openings created where families have died, making it difficult to move through the stand. Aspen saplings encroach in some of the openings, often overtopping the neighboring spruce.

Suggested Maintenance: A thinning is called for before stagnation sets in. Half of the spruces need to come out, as well as the encroaching aspen and understory vegetation.

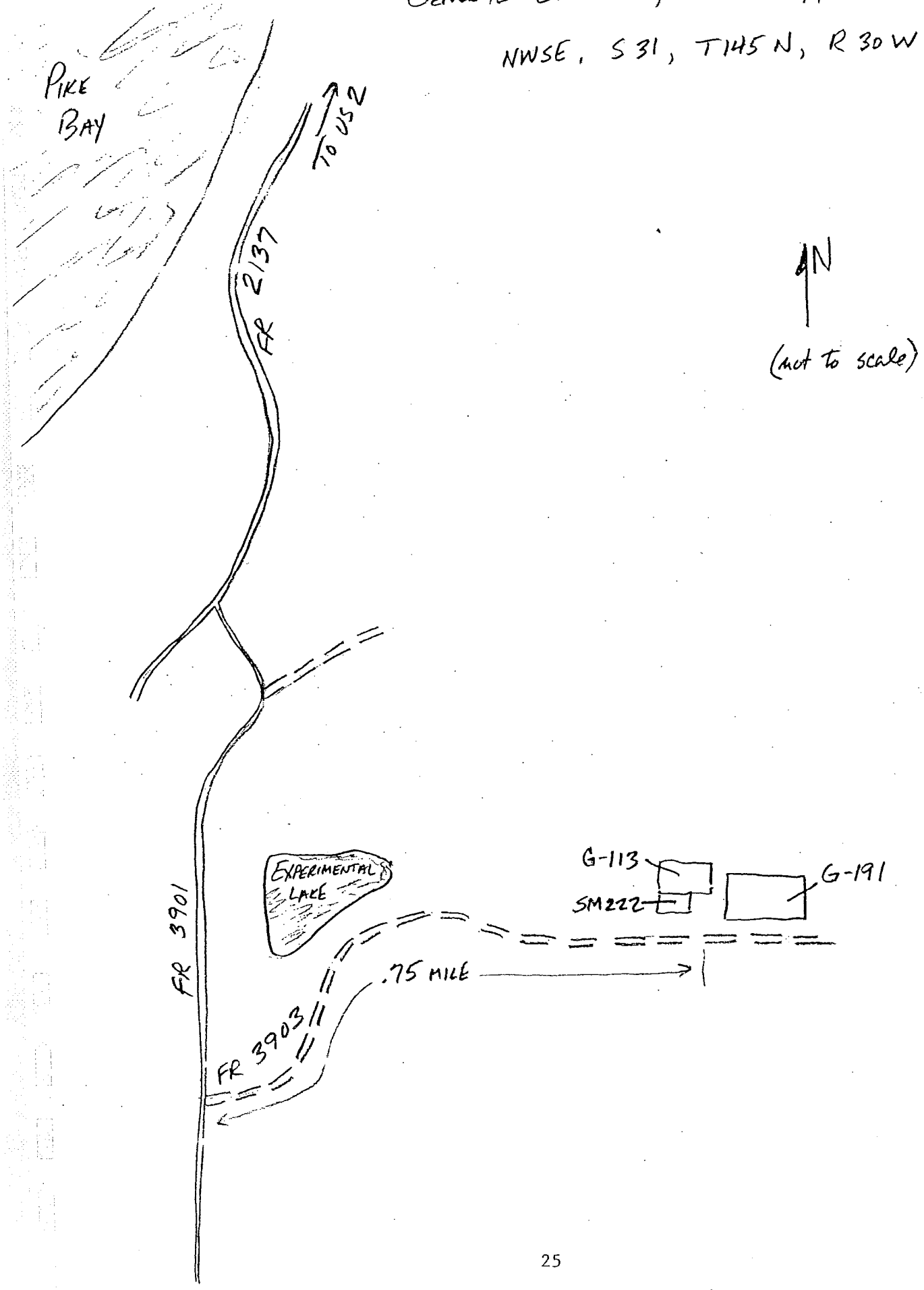
Other Comments: See accompanying sketch for general location of the stand.



A-SCS-MILWAUKEE, WIS 1961

General Location, Pike Bay, MN Plantings

NWSE, S 31, T 145 N, R 30 W



G-113
White Spruce Seed Source Variation Study
Pike Bay Experimental Forest
Cass County, Minnesota, Sec. 31, T45N, R30W

N ←

Blocks														
10	1663	1658	1628	1630	1649	1659	1686	1661	1697	1653	1631	1654	1678	1677
	1687	1647	1657	1669	1645	1664	1655	1667	1676	1662	1665	1644	1652	1660
9	1659	1658	1663	1654	1667	1660	1669	1664	1677	1631	1644	1655	1657	1649
	1662	1630	1653	1647	1652	1645	1686	1676	1678	1687	1628	1661	1665	1697
8	1652	1697	1631	1657	1630	1664	1665	1658	1659	1660	1667	1662	1655	1677
	1687	1669	1647	1676	1645	1628	1686	1663	1644	1654	1661	1649	1678	1653
7	1687	1649	1654	1678	1659	1657	1653	1667	1677	1669	1628	1664	1665	1655
	1663	1661	1658	1645	1631	1647	1660	1630	1652	1644	1676	1686	1662	1697
6	1655	1631	1697	1677	1686	1660	1678	1662	1628	1663	1645	1676	1649	1661
	1647	1644	1657	1687	1669	1659	1653	1664	1665	1652	1654	1667	1658	1630
5	1652	1653	1678	1667	1657	1697	1658	1644	1645	1631	1665	1660	1676	1677
	1687	1669	1663	1630	1664	1662	1655	1649	1628	1647	1686	1654	1661	1659
	1678	1665	1628	1658	1631	1667	1660	1657	1661	1697	1654	1663	1645	1649
	1630	1677	1676	1662	1655	1687	1659	1669	1686	1653	1647	1644	1652	1664
3	1649	1667	1647	1686	1653	1654	1678	1661	1644	1663	1645	1665	1628	1664
	1659	1630	1660	1677	(1652)	1676	1687	1658	1657	1697	1655	1669	1631	1662
2	1687	1630	1665	1662	1649	1654	1652	1658	1661	1628	1667	1647	1686	1663
	1697	1645	1676	1664	1677	1669	1660	1631	1657	1659	1678	1655	1644	1653
1	1663	1630	1652	1667	1645	1658	1678	1660	1653	1644	1677	1631	1665	1669
	1687	1655	1647	1657	1649	1686	1662	1661	1697	1628	1659	1664	1654	1676

Planted May 10, 1962 with 2-2 stock - spacing 6 x 6 feet.

Border plants white spruce # 2991 Chippewa 1944.

(1652) Circled number has one tree missing.

GENETIC RESOURCE EVALUATION

Study No.: G-113 Species: White spruce

Date Established: 5/10/62 Date Evaluated: 7/13/93

Title: The establishment of white spruce seed sources from the entire range of the species

Location: Pine River Experimental Forest near Cadillac, Michigan
Cadillac RD, Huron-Manistee NF
NWNW, S17, T21N, R12W, Wexford County, Michigan

Experimental Design: Randomized block, 4 blocks, 49-tree plots (7 x 7 trees square), 28 families, 6 x 6 ft spacing, 2 border rows around each block, drivable alleys between blocks.

Monumentation: Original wooden stakes remain at 75% of plot corners.

Existing Fall Measurements:
Ht '62, '67
DBH

Survival: Overall survival is 60%. Mortality is strongly correlated with seed source - families are either all present or all gone.

Growth: There is much between-plot variation in size. The largest spruce are 8 inches in diameter by 30 feet in height, while the smallest are only 1 inch by 6 feet. Within-plot variation is considerably less. Live crown ratio on small spruces, and on large ones bordering openings, is 90 to 100%. "Interior" large spruce have crown ratios of about 60%.

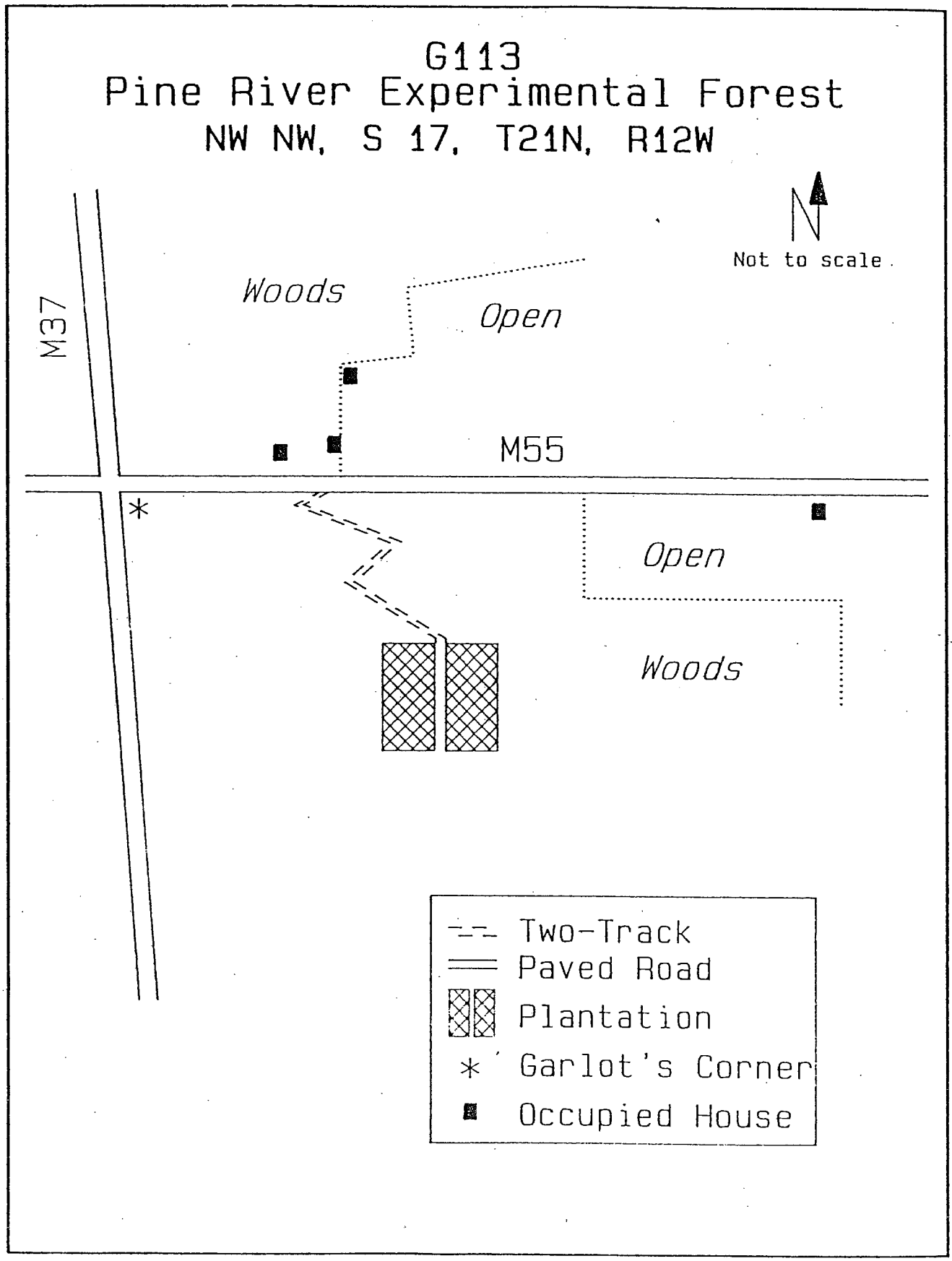
Stem Form: Boles are straight with persistent dead limbs.

Damage: No insects or disease agents were evident in the stand.

Competing Vegetation: In the openings created where families have died, the ground cover consists of sweet-fern and bracken fern. Black cherry, and to a lesser extent bigtooth aspen, have sprung up in some of the openings, but these hardwoods do not overtop the spruce.

Suggested Maintenance: This stand is very dense and difficult to move through. A thinning is needed while these trees remain vigorous. Pruning is also called for if work is to be done in the stand.

Other Comments:


G113
Pine River Experimental Forest
NW NW, S 17, T21N, R12W
N
Not to scale
Woods
Open
M37
M55
Open
Woods
Two-Track
Paved Road
Plantation
Garlot's Corner
Occupied House

G-113

White Spruce Seed Source Variation Study
Pine River Unit, Lower Peninsul Experimental Forest
Wexford County, Michigan, NW NW Sec. 17, T21N, R12W

Block I

1661	1665	1644	1659
1687	1697	1649	1631
1678	1667	1628	1630
1662	1653	1645	1663
1657	1660	1655	1652
1647	1677	1676	1686
1664	1658	1669	1654

Block II

1661	1665	1697	1631
1663	1657	1687	1662
1678	1647	1654	1664
1653	1659	1630	1644
1655	1660	1667	1649
1677	1645	1658	1686
1669	1676	1628	1652

Block III

1663	1677	1667	1660
1644	1631	1661	1657
1652	1630	1647	1697
1665	1655	1662	1628
1687	1645	1658	1654
1669	1676	1664	1649
1659	1686	1653	1678

Block IV

1659	1663	1686	1676
1661	1645	1678	1669
1665	1630	1662	1654
1644	1628	1687	1667
1664	1657	1660	1653
1647	1652	1655	1677
1658	1649	1697	1631

Planted May 7 and 9, 1962 with 2-2 stock - spacing 6 x 6 feet.

Border plants white spruce # 2989 Lower Michigan, non-specified.

GENETIC RESOURCE EVALUATION

Study No.: G-113 **Species:** White spruce

Date Established: 5/10/62 **Date Evaluated:** 6/24/93

Title: The establishment of white spruce seed sources from the entire range of the species

Location: "Wanless Farm" planting near Isabella, Minnesota
Kawishiwi RD, Superior NF
E1/2NW, S29, T60N, R6W, Lake County, Minnesota

Experimental Design: Randomized block, 10 blocks, 4-tree square plots, 28 families, 6 x 6 ft spacing, 4 border rows.

Monumentation: Most of the original wooden posts marking block corners were missing or were down and rotten. I placed orange plastic stakes at the four corners of the planting, at the midpoint of each side, and in the center. These nine locations are circled on the accompanying planting map.

Existing Fall Measurements:
Ht '62, '67, '72
DBH

Survival: 85 to 90%.

Growth: The variation in size in this plantation is tremendous. At one extreme the spruce are 1 inch in diameter by 10 feet tall with a crown ratio of 10%. At the other extreme they are 10 inches in diameter by 40 feet tall with 60% live crown. The typical tree is 6 inches by 35 feet with 35% live crown.

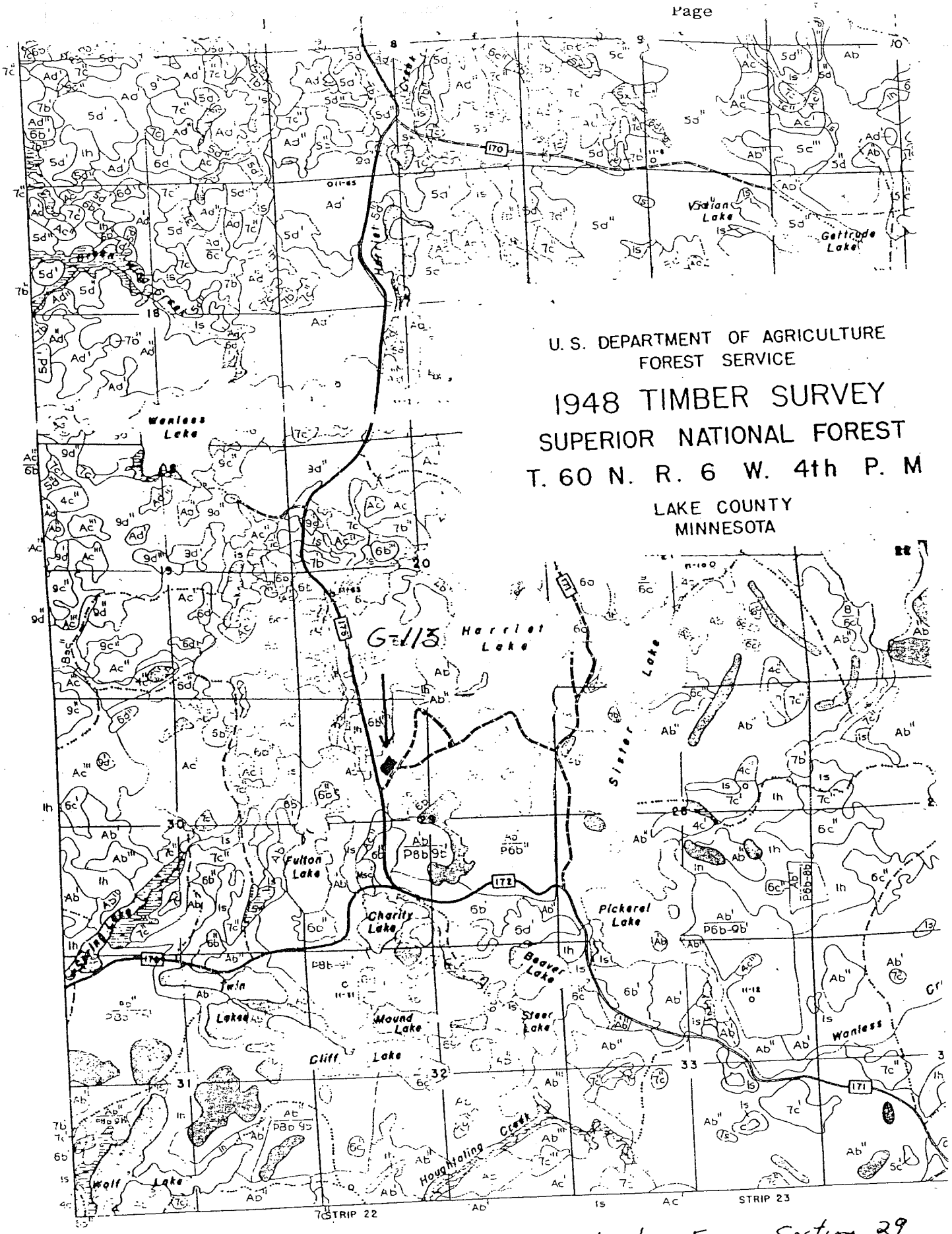
Stem Form: Boles are straight. Dead limbs, while persistent, are somewhat smaller than in many spruce plantings, making it relatively easy to walk the rows.

Damage: No problems were apparent in the stand. Even the smallest spruces seemed to be free of insect and disease.

Competing Vegetation: None.

Suggested Maintenance: Measure and thin.

Other Comments: This planting is easy to find. It is located on the northwest side of the Harriet Lake campground road, about 200 yards east of County 7. The G-114 jack pine planting is directly across the road.



Location of MIF6-113 Plantation on Wanless Farm Section 29

G-113

White Spruce Seed Source Variation Study

Wanless Farm, Superior National Forest

Lake County, Minnesota, SE SE Sec. 23, T60N, R6W

N

Blocks														
10	1655	1697	1658	1652	1667	1645	1663	1654	1662	1647	1665	1631	1687	1661
	1660	1664	1644	1669	1659	1649	1686	1677	1676	1657	1630	1628	1653	1678
9	1662	1630	1697	1665	1664	1645	1676	1678	1686	1654	1659	1653	1687	1658
	1661	1663	1649	1631	1657	1644	1669	1647	1677	1655	1660	1652	1687	1628
8	1669	1653	1647	1677	(1667)	1649	1630	1665	1697	1663	1658	1645	1676	1686
	1662	1660	1657	1628	1664	1644	1655	1631	1652	1654	1659	1661	1687	1678
7	1669	1664	1667	1647	1686	1677	1697	1645	1644	1676	1659	1628	1657	1649
	1653	1678	1663	1687	1665	1661	1631	1655	1654	1662	1652	1658	1630	1660
6	1676	1664	1677	1644	1660	1649	1697	1645	1630	1659	1665	1667	1661	1628
	1686	1657	1647	1669	1652	1654	1662	1663	1678	1687	1631	1658	1655	1653
5	1664	1658	1662	1654	1628	1677	1678	1667	1697	1647	1630	1661	1663	1657
	1659	1631	1686	1649	1655	1665	1645	1660	1669	1676	1687	1652	1644	1653
4	1667	1686	1662	1628	1631	1669	1687	1663	1660	1644	1678	1654	1676	1657
	1655	1661	1652	1649	1659	1647	1658	1645	1630	1697	1653	1665	1677	1664
3	1630	1659	1676	1655	1664	1669	1697	1645	1686	1631	1644	1665	1649	1658
	1662	1628	1657	1678	1663	1667	1677	1661	1653	1660	1687	1654	1652	1647
2	1659	1647	1630	1677	1661	1655	1669	1645	1667	1658	1644	1649	1652	1663
	1628	1687	1662	1697	1654	1631	1660	1678	1653	1686	1665	1664	1676	1657
1	1664	1652	1677	1659	1662	1669	1655	1678	1645	1687	1658	1657	1628	1665
	1697	1631	1644	1653	1686	1663	1649	1661	1654	1660	1647	1676	1667	1630

Planted May 10, 1962 with 2-2 stock - spacing 6 x 6 feet.

Border plants white spruce # 2990 Superior 1956.

(1667) Circled number has one tree missing.

GENETIC RESOURCE EVALUATION

Study No.: G-141

Species: White spruce

Date Established: 5/9/63

Date Evaluated: 7/15/93

Title: White spruce ecotype study

Location: Hiawatha National Forest near Moran, Michigan
St. Ignace RD, Hiawatha NF
SWNE, S16, T43N, R5W, Mackinac County, Michigan

Experimental Design: Randomized block, 10 blocks, 4-tree square plots, 26 families, 6 x 6 ft spacing.

Monumentation: There are no posts marking block corners. The northwest tree of each plot was tagged initially, and many of these tags remain. (The planting map is a bit confusing because what is referred to as a "row" is actually a row of plots, that is, <u>two</u> rows of trees.)

Existing Fall Measurements:
Ht '67
DBH

Survival: Overall survival is good at 90%.

Growth: Diameters range from 4 to 10 inches, with most trees 6 to 8 inches. Heights are 30 to 45 feet. Live crown ratios run about 40%.

Stem Form: Boles are straight. Persistent lower limbs are particularly stout, making it nearly impossible to walk or crawl through this plantation.

Damage: No cankers, dieback, or needlecast were noticed.

Competing Vegetation: None. The spruce are far too dense for anything to grow beneath them.

Suggested Maintenance: Thinning and pruning are both needed.

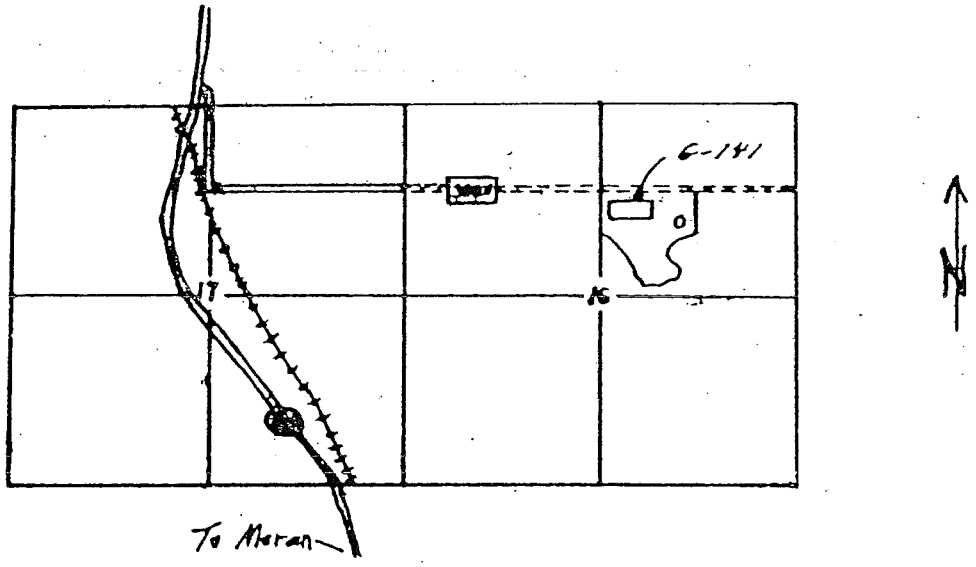
Other Comments: The road to this planting may be impassible in wet or snowy conditions.

UPPER PENINSULA WHITE SPRUCE
ECOTYPE STUDY G-141

MORAN PLOT - ST. IGNACE DISTRICT
HIAWATHA NATIONAL FOREST

SWNE, Sec. 16, T43N, R5W

Mackinac Co., Michigan



ARRANGEMENT OF SEED SOURCES FOR G-141 - MORAN PLOT

Block I		Block II		Block III	
Row 1	Row 2	Row 3	Row 4	Row 5	Row 6
692	687	671	680	691	695
681	693	686	693	673	682
674	696	676	681	675	690
699	676	689	672	685	687
671	688	699	687	699	693
686	680	696	679	1645	686
698	673	688	685	681	680
682	690	691	695	677	674
1645	678	683	676	692	676
683	678	678	698	696	688
688	679	677	690	689	671
677	681	682	674	683	678 - This column reversed - reads south to north as trees are planted in the field.
685	3062-N-X59	1645	3062-N-X59	679	3062-N-X59

Tallied from North to South - All Rows

Rows from West to East; Row 1 beginning in NW corner of planting.

3062-N-59: Local seed source plots and border rows.
Stock (2-2) of Hiawatha National Forest origin.

Block IV		Block V		Block VI		Block VII		Block VIII		Block IX		Block X	
Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	Row 19	Row 20
691	685	691	671	683	685	686	686	691	699	689	693	693	673
690	1645	677	686	681	691	671	681	674	677	696	686	683	686
679	673	686	684	689	693	687	686	682	696	1645	674	692	695
683	678	695	699	676	1645	696	1645	693	683	699	675	685	678
689	693	678	696	686	695	675	673	1645	678	673	679	677	688
677	680	689	692	688	692	690	676	673	671	691	681	682	681
674	692	681	673	677	678	689	675	679	687	683	690	690	678
675	699	693	690	687	679	683	680	675	681	695	671	674	689
682	671	682	679	675	680	677	693	690	688	680	688	680	687
687	676	687	676	671	674	695	692	680	686	682	677	675	699
685	686	680	1645	699	673	699	682	685	676	692	687	671	1645
681	696	674	675	682	696	681	674	695	689	678	676	679	691
688	3062-N-X59	683	3062-N-X59	690	3062-N-X59	679	3062-N-X59	692	3062-N-X59	686	3062-N-X59	696	3062-N-X59

3062-N-59: Local seed source plots and border rows.
Stock (2-2) of Hiawatha National Forest origin.

3062-N-59: Local seed source plots and border rows.
Stock (2-2) of Hiawatha National Forest origin.

N

GENETIC RESOURCE EVALUATION

Study No.: G-169 Species: White spruce

Date Established: 5/28/58 Date Evaluated: 6/7/93

Title: White spruce racial variation test

Location: Ottawa National Forest near Watersmeet, Michigan
Watersmeet RD, Ottawa NF
SE1/4, S19, T45N, R39W, Gogebic County, Michigan

Experimental Design: Randomized block, 2 blocks, 9-tree square plots, 20 families, 6 x 6 ft spacing, 1 border row around perimeter, 2 border rows between blocks.

Monumentation: The original stakes used to mark each plot are still in good condition. These stakes are aluminum angle iron, about two feet long, with the source number and location stamped on a tag riveted to the stake. I replaced those few that were missing with orange plastic stakes so that every plot is marked at its northwest corner.

Existing Fall Measurements:
Ht '62, '70, '82
DBH

Survival: About 90%.

Growth: Diameters are 4 to 8 inches. Heights are 25 to 35 feet. Live crown ratios are about 60%.

Stem Form: These are typical white spruce, with straight boles but many persistent dead lower limbs.

Damage: No particular pest or disease problems were evident. Someone with a hatchet has vandalized the wooden sign designating the area as an experimental forest, but no damage was done to any of the trees.

Competing Vegetation: None.

Suggested Maintenance: This stand needs to be thinned.

Other Comments: This plantation was originally established adjacent to the Toumey Nursery in Watersmeet, Michigan (SWNE, S27, T45N, R39W, Gogebic County). It was moved to the current location in September of 1962 to make way for nursery expansion. Take FR 6110 to the sharp bend in Sec. 19; the planting is about 4 chains east on a gated logging road.

TOOMEY NURSERY

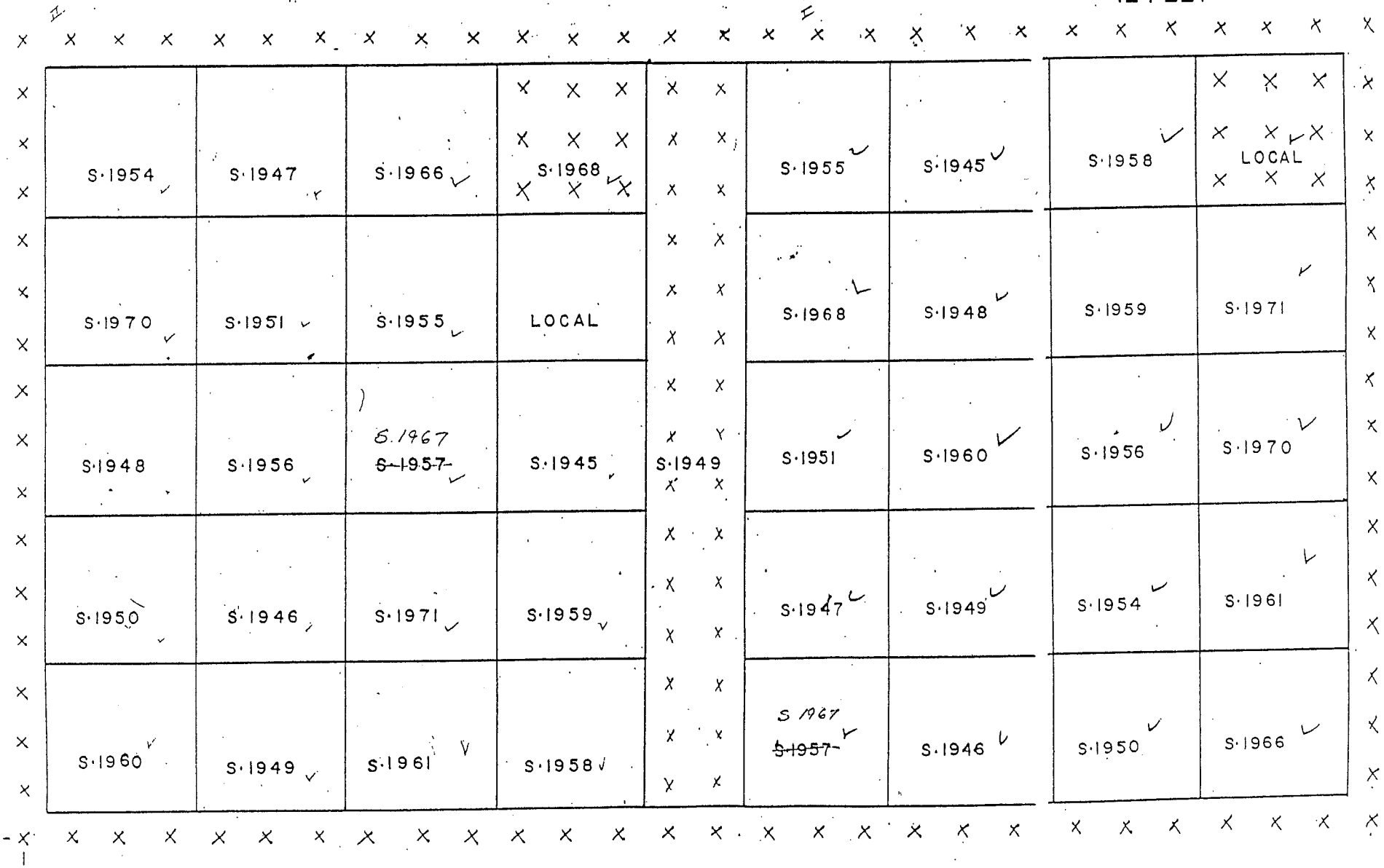
WATERSMEET, MICH.

SWNE T45N, R39W, SEE. 27

PLANTED MAY 27, 1958

N

SCALE
12 FEET



37

GENETIC RESOURCE EVALUATION

Study No.: G-251 **Species:** White spruce

Date Established: Spring, '68 **Date Evaluated:** 5/27/93

Title: Field plantings of white spruce half-sib families

Location: Argonne Experimental Forest near Hiles, Wisconsin
Eagle River RD, Nicolet NF
NWNE, S4, T37N, R12E, Forest County, Wisconsin

Experimental Design: Randomized block, 10 blocks, 4-tree row plots, 18 families, 6 x 8 ft spacing. Blocks 1-6 underplanted beneath aspen-maple overstory; blocks 7-10 planted in the open.

Monumentation: Blocks 1-6: none. Blocks 7-10: orange plastic stakes with metal tags mark all block corners; many original tags persist at easternmost tree of each plot.

Existing Fall Measurements:
Ht '72, '75
DBH

Survival: Trees in blocks 1-6, which were planted under the aspen-maple overstory, have nearly all died. Only 14 trees remain of 108 4-tree plots planted.

Trees in blocks 7-10, which were planted in the open, faired much better. Survival in these blocks is 90 or 95%. Nearly all trees are present except for a small pocket of missing trees in the northeast corner of block 8.

Growth: The few surviving trees in blocks 1-6 are only 3 feet tall. I walked past them several times before I realized they weren't balsams.

Trees in blocks 7-10 average 6 inches in diameter and 35 feet in height. Variation between families is less than usual for white spruce. Live crown ratios are 60-70%.

Stem Form: Boles are straight but rather limby.

Damage: No insect or disease activity was evident. Three trees in the border row along the east edge of blocks 7-10 were cut this winter ('92-'93) and left lying across the trail. Evidently a hunter wants to keep people out.

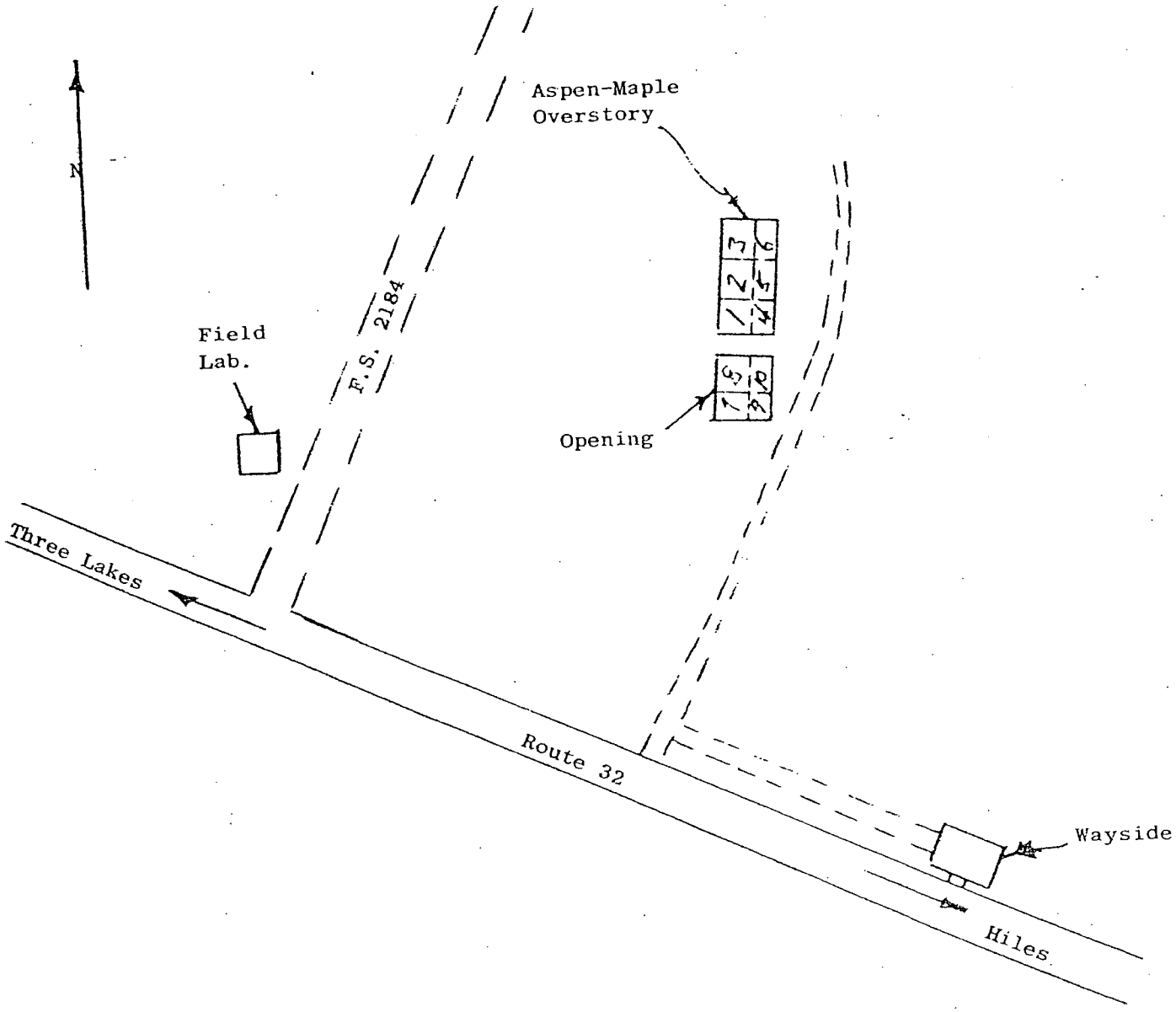
Competing Vegetation: Maple poletimber and sawtimber dominate blocks 1-6. Blocks 7-10 have no competing herbaceous or woody vegetation.

Suggested Maintenance: Blocks 7-10 need a thinning.

Other Comments:

Study No. 6-251

Location of Planting Site
Argonne Experimental Forest, Hiles, Wisconsin, Forest County
T37N, R12E, S4
SW¼, NW¼, NE¼



STUDY NO. G-251

Location of White Spruce Half-Sib Families
Planted on the Argonne Experimental Forest
Spring, 1968

3	687-2	692-10	1888	686-2
	683-1	1893	687-2	692-10
	686-2	2529	1886	1893
	691-10	691-8	2529	683-1
	1888	1887	691-8	Local
	1892	1895	683-5	1886
	Local	2526	1885	1890
	1890	683-5	2526	1895
	1886	1885	1892	691-10
2	2526	1895	1890	683-5
	691-8	691-10	1886	1885
	2529	1888	1886	687-2
	686-2	Local	686-2	Local
	683-1	696-10	1888	1893
	1886	687-2	691-8	692-10
	683-5	1893	1892	2529
	1892	1887	691-10	683-1
	1885	1890	2526	1895
1	691-10	1888	1890	683-5
	1892	686-2	Local	1885
	2526	2529	1887	1886
	691-8	683-1	692-10	687-2
	1890	1886	683-1	691-10
	1887	1885	1888	686-2
	687-2	683-5	2526	1893
	1893	1895	1895	1892
	696-10	Local	2529	691-8

Under Aspen-Maple Overstory

8	692-10	1886	683-1	1893
	2529	687-2	686-2	692-10
	1888	686-2	1895	691-10
	Local	1895	687-2	1886
	683-5	691-8	683-5	1888
	1893	691-10	1890	2529
	683-1	2526	691-8	2526
	1886	1885	Local	1892
	1892	1890	1885	1886
7	1893	2526	2529	691-10
	1888	Local	1886	683-1
	1886	1895	1886	683-5
	1892	686-2	Local	692-10
	683-1	683-5	687-2	1890
	691-8	1890	686-2	1895
	692-10	1886	1890	2526
	691-10	2529	1892	1885
	1885	6872	1888	1893

In Opening

4-tree line-plots 5-6
6' x 8' spacing

GENETIC RESOURCE EVALUATION

Study No.: G-251 Species: White spruce

Date Established: 9/27/68 Date Evaluated: 7/15/93

Title: Field plantings of white spruce half-sib families

Location: Hiawatha National Forest near Moran, Michigan
St. Ignace RD, Hiawatha NF
SWNE, S16, T43N, R5W, Mackinac County, Michigan

Experimental Design: Randomized block, 10 blocks, 4-tree row plots, 56 families, 8 x 8 ft spacing, 2 border rows.

Monumentation: Block corners were originally staked with aluminum angle-iron. All but three of these stakes are still present and in good shape; missing ones are marked on the planting map.

Existing Fall Measurements:
Ht '69, '73, '79, '81
DBH

Survival: 90%.

Growth: There is considerable variation in size in this stand. Diameters vary from 4 to 8 inches; heights range from 20 to 38 feet. Live crown ratios are about 75%.

Stem Form: These trees are straight with persistent lower limbs.

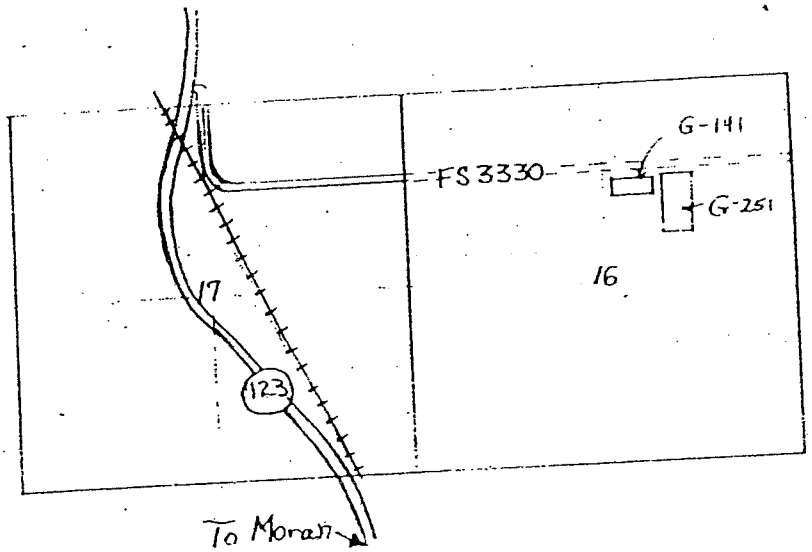
Damage: No insect or disease problems were apparent in the stand.

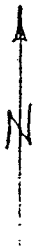
Competing Vegetation: None.

Suggested Maintenance: This plantation should be thinned while the trees are still vigorous.

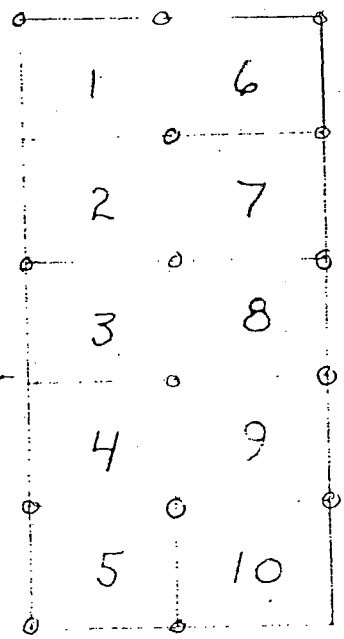
Other Comments:

G-251 White Spruce Half-Sibs
Moran Planting
St. Ignace District
Hiawatha National Forest
SWNE,Sec.16,T43N,R5W
Mackinac Co., Michigan





Replication Arrangement →



ALUMINUM STAKES PRESENT AT CIRCLED BLOCK CORNERS.

G-251 White Spruce Half-Sibs
Moran Planting
Fall, 1968

1	683-6	3313	1894	2522	3313	2511	691-3	1887	6
	1897	2523	1889	2572	689-9	1893	2526	2525	
	2510	1888	2525	3627	3625	3571	2519	690-8	
	689-3	3571	3624	691-1	3569	691-4	2513	2517	
	691-2	1895	683-2	690-8	WM	2520	2521	2522	
	691-5	1885	691-3	3569	2569	2551	683-6	691-7	
	1892	683-4	3625	2551	2572	1888	1885	3626	
	1886	2569	2520	1893	2571	2566	2524	1894	
	2517	2566	2521	2520	3628	2510	3624	1896	
	2908	1898	2511	1890	691-1	2908	683-2	2523	
	691-4	2549	689-2	683-1	689-3	683-1	1886	1889	
	2526	1896	2513	3626	1892	683-4	1897	2529	
	689-9	1887	2519	2571	2549	1898	691-5	1890	
	WM	691-7	2524	3628	691-2	689-2	3627	1895	
2	691-7	3571	WM	1890	3625	1887	2525	683-2	7
	690-8	3569	2522	691-4	2510	690-8	2519	683-4	
	2520	691-3	2549	683-2	2566	2524	689-3	3624	
	3625	2908	1893	683-1	2526	2569	1885	2572	
	1889	1887	1896	1885	1889	689-2	691-5	3627	
	691-1	2572	683-4	689-9	2571	1888	683-6	689-9	
	1895	2526	691-5	3624	2511	691-7	1895	2549	
	3628	1898	2523	2511	2521	691-3	2529	1896	
	2521	1892	683-6	1886	2522	2520	1890	683-1	
	2510	2513	691-2	2525	691-2	2908	3571	1893	
	1888	3626	689-3	3627	1897	1886	691-4	2513	
	1894	689-2	2524	2517	1892	1894	2551	3626	
	2571	2519	2566	2569	3569	2523	2517	3313	
	3313	1897	2551	2529	1898	3628	691-1	WM	
3	1893	3313	689-2	1885	1890	2571	2529	683-2	8
	2510	3571	2526	2513	2511	1886	1895	2566	
	2572	1894	1888	2569	1898	2551	2908	2517	
	2520	691-7	3626	2908	2569	2513	683-6	3624	
	1895	2551	683-6	2522	691-4	689-9	2523	1885	
	1898	1896	690-8	3628	3313	2522	1888	691-3	
	1892	2525	1887	683-4	3626	3628	691-5	2510	
	689-3	1886	691-3	1889	1897	3625	3571	689-3	
	691-4	691-2	2511	2517	1889	2524	2521	2525	
	2519	2566	2521	2529	683-4	691-1	1893	691-7	
	689-9	1897	691-5	691-1	689-2	691-2	WM	690-8	
	3569	2523	3625	3624	2520	2519	683-1	1894	
	1890	WM	683-1	2549	1887	3627	1892	3569	
	683-2	2571	3627	2524	2549	2526	2572	1896	
4	2521	2572	3571	2511	691-5	2551	691-1	1897	9
	3628	689-3	1886	2520	691-2	683-2	WM	3313	
	1897	1892	1888	2529	2629	1885	2510	2524	
	2513	2908	683-2	690-8	2549	2566	2513	3626	
	2517	2522	691-7	683-6	691-7	691-4	2525	683-4	
	1894	683-1	683-4	2526	1890	2517	1888	2521	
	691-4	3624	1885	691-5	1898	1886	1893	3569	
	691-1	2551	3626	689-9	3627	683-1	3571	690-8	
	689-2	2569	3569	2510	2519	2569	683-6	2520	
	2519	691-3	1895	1887	1892	3625	2908	2511	
	1889	3625	2566	1893	1887	1895	2522	1896	
	3627	691-2	2549	1896	3628	2572	2571	2526	
	2525	1890	2571	WM	689-3	691-3	1889	1894	
	2524	1898	3313	2523	3624	689-2	2523	689-9	
5	2569	1885	3625	3627	2520	689-3	689-2	2517	10
	2511	2513	689-3	2521	2511	689-9	3628	1892	
	691-7	2522	1892	3626	1895	683-4	2522	683-6	
	3624	1893	691-4	689-2	2521	2525	3626	1897	
	WM	683-2	3571	683-4	1894	1886	683-2	1893	
	690-8	691-3	2517	2523	691-3	3624	683-1	2510	
	1889	1897	683-1	2526	2529	3569	2523	1898	
	689-9	2519	2525	2520	2572	3627	1888	2571	
	683-6	2551	691-1	1888	2524	1885	1896	2569	
	3313	3569	1886	1896	2551	2513	690-8	691-1	
	1887	691-5	1894	2566	WM	1890	3625	3571	
	2524	1895	1898	2549	3313	1889	691-2	691-5	
	691-2	2510	3628	2908	2526	2519	2908	691-7	
	2571	2529	2572	1890	691-4	2566	2549	1887	

55 Half-sib families plus commercial source from Toumey Nursery (WM)
10 Replications
4-Tree, E-W, line plots, Tree 1 is westernmost in plot
2 Border rows (WM) surround entire planting
8' x 8' Spacing

GENETIC RESOURCE EVALUATION

Study No.: G-251 Species: White spruce

Date Established: 10/4/68 Date Evaluated: 6/18/93

Title: Field plantings of white spruce half-sib families

Location: Nicolet National Forest near Wabeno, Wisconsin
Laona RD, Nicolet NF
SENE, S17, T34N, R16E, Forest County, Wisconsin

Experimental Design: Randomized block, 10 blocks, 4-tree row plots, 39 families, 8 x 8 ft spacing, 2 border rows except for a single row on the north and west sides of replications 9 and 10.

Monumentation: Orange plastic stakes with metal tags mark all block corners. Many of the original wooden corner posts are also present.

Existing Fall Measurements:
Ht '73, '79
DBH

Survival: Very high, approaching 100%.

Growth: This plantation contains much between-plot variation in size. Within-plot variation is considerably less. Diameters range from 4 to 11 inches, averaging about 8 inches. Heights vary from 25 to 40 feet, with most trees about 30 feet. Live crown ratios are 50%.

Stem Form: These trees are straight with persistent lower limbs.

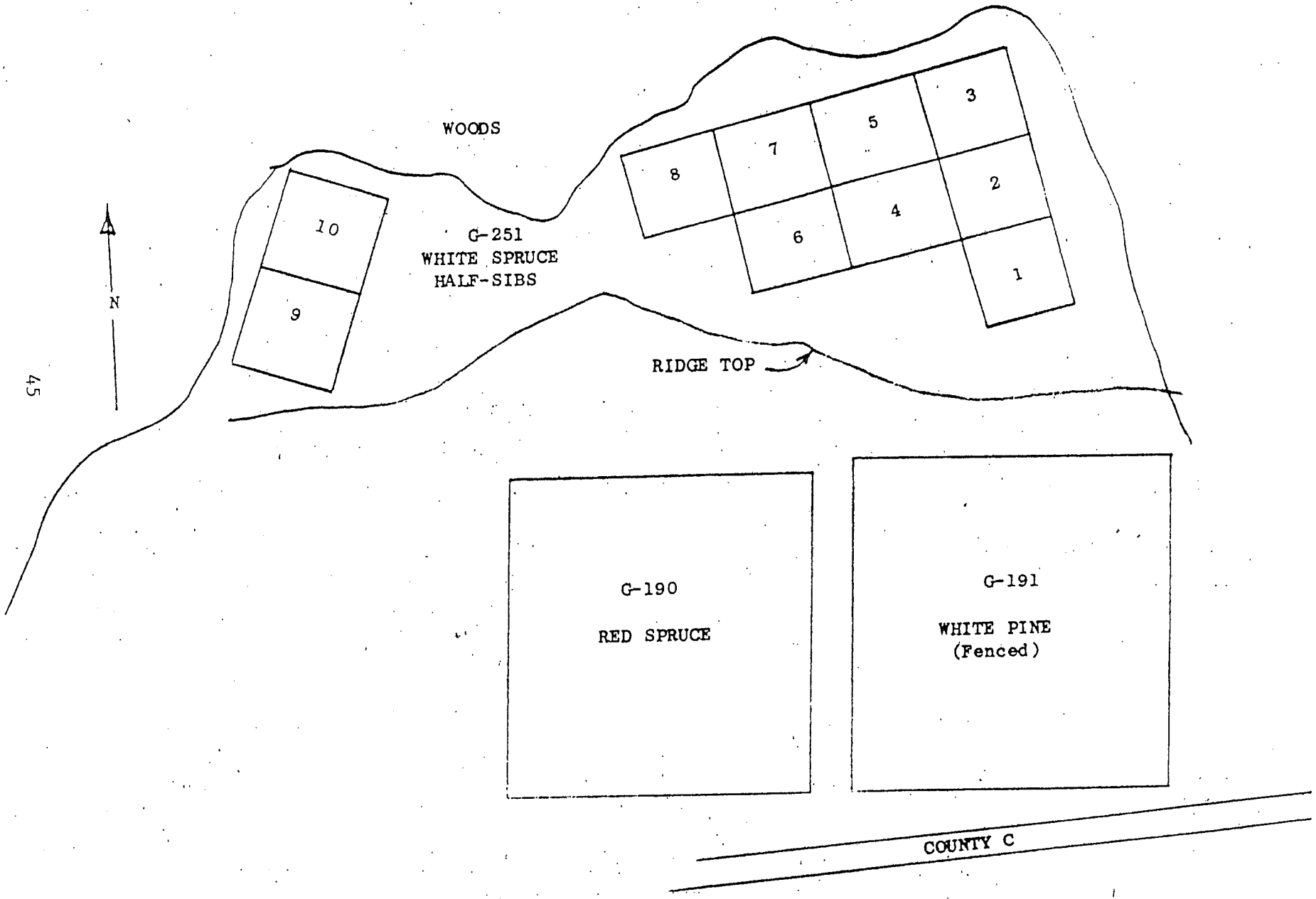
Damage: No insect or disease problems were apparent. These spruce seem quite vigorous.

Competing Vegetation: None. The only competition these spruce have are themselves.

Suggested Maintenance: This stand needs a good thinning.

Other Comments:

WABENO PLANTING
Nicolet National Forest
Sec.17, T34N, R16E
Forest Co., Wisconsin



G-251 White Spruce Half-Sibs
Wabeno, Planting
Fall, 1968

3			2			1		
689-2	683-1	2521	689-2	2526	3626	2524	683-4	683-6
2908	691-4	2520	689-3	2569	1888	2572	2521	1887
691-7	691-5	2523	683-6	683-4	2524	1890	1897	1889
1890	3626	683-4	2572	1889	691-4	2908	691-4	1886
691-1	2511	1887	691-5	690-8	1890	691-5	1892	2520
2526	2513	1889	2522	2525	1896	691-1	1885	2523
2569	1888	1898	683-1	2520	2908	2522	690-8	2551
1893	691-3	2571	1898	1895	2513	1893	689-3	2525
1896	2551	2524	1885	2566	1892	1895	1888	1896
1892	2566	1897	2571	2521	2551	2571	1898	689-2
683-6	2525	1886	1887	2523	1886	2569	683-1	2513
1895	689-3	1885	691-7	691-3	2511	2526	2566	3626
2572	2522	690-8	1897	691-1	1893	2511	691-3	691-7
1896	1885	1890	2566	683-1	2571			
2569	683-1	691-5	1895	1898	2521			
2908	2571	1898	1893	2525	689-3			
2566	1889	689-2	2522	2569	3626			
1886	2551	2522	1886	2572	690-8			
691-1	2511	690-8	691-1	2523	2908			
689-3	1892	683-4	1896	691-7	1897			
691-3	1897	683-6	2551	1892	2511			
1888	1887	2520	1887	1888	2520			
691-7	691-4	2526	1885	1889	689-2			
2572	1893	2524	2513	683-4	691-3			
2513	3626	2523	2524	691-5	683-6			
2521	1895	2525	2526	691-4	1890			
3626	1895	2908	689-3	1889	2524			
683-6	2521	2572	691-5	2520	1896			
2524	2569	691-5	683-1	691-1	2513			
2566	2526	1896	2572	2522	2526			
691-4	689-3	683-1	1885	1890	3626			
1887	2551	2511	683-6	2566	1888			
1886	691-3	691-7	1898	2569	1887			
689-2	1897	1885	2521	689-2	2908			
1893	2523	690-8	691-4	691-3	1886			
2525	2520	1898	691-7	2551	2525			
1889	691-1	683-4	1893	683-4	1892			
2522	2513	1888	690-8	2511	1895			
1890	2571	1892	1897	2571	2523			

5 4 7 6

N

Arrangement of White Spruce Half-Sibs
G-251
Wabeno Planting
Fall, 1968

8

2522	690-8	1890
2520	1888	691-3
1898	2571	2523
2511	689-3	1892
2524	1897	683-4
691-4	2526	683-1
3626	1886	2551
2521	2513	2569
2908	2572	1889
1896	1895	2525
1893	691-1	2566
691-5	689-2	683-6
1887	1885	691-7

N

10 9

691-7	1890	1893	2524	2525	1885
2520	689-2	691-1	1889	1895	2520
1885	2511	2521	2551	1897	1886
2908	691-4	1892	691-4	2569	1888
2513	2571	2524	691-5	3626	2572
2566	1898	2522	1896	683-1	2513
2569	1888	683-1	1890	690-8	691-7
691-3	2526	1889	2523	1898	1892
1886	3626	1897	2521	683-4	2526
2572	1895	691-5	683-6	691-3	2571
2525	1896	689-3	689-3	1893	691-1
683-4	2551	1887	2566	689-2	2522
690-8	2523	683-6	1887	2511	2908

39 Half-sib families, 10 replications
4 - Tree, N-S line plots, Tree 1 is southernmost in plot
8' x 8' Spacing
2 Border rows surround replication, exception 1 border on N-rep. 10, W-reps. 9 and 10.

GENETIC RESOURCE EVALUATION

Study No.: G-114 Species: Jack pine

Date Established: 5/6/54 Date Evaluated: 7/6/93

Title: Regional jack pine seed source study in the Lake States

Location: Argonne Experimental Forest near Hiles, Wisconsin
Eagle River RD, Nicolet NF
NENE, S21, T38N, R12E, Forest County, Wisconsin

Experimental Design: Randomized block, 4 blocks, 64-tree plots (8 x 8 trees square), 30 families, 5 x 5 ft spacing, 2 border rows.

Monumentation: White cedar posts originally marked all plot corners; a metal tag bearing the plot number was nailed to the southwest corner post of each plot. Most of these posts are still present, but are rotten and without tags. I placed orange plastic stakes at all block corners.

Existing Fall Measurements:
Ht '55, '58, '63, '73, '83
DBH '63, '73, '83

Survival: Overall survival is about 40%. The mortality has been more or less evenly distributed throughout the stand.

Growth: Diameters are somewhat variable from 6 to 11 inches, with most of the trees around 8 inches. Heights are fairly uniform at 55 to 60 feet. Live crown ratios are 20%.

Stem Form: Boles are free of limbs and generally straight.

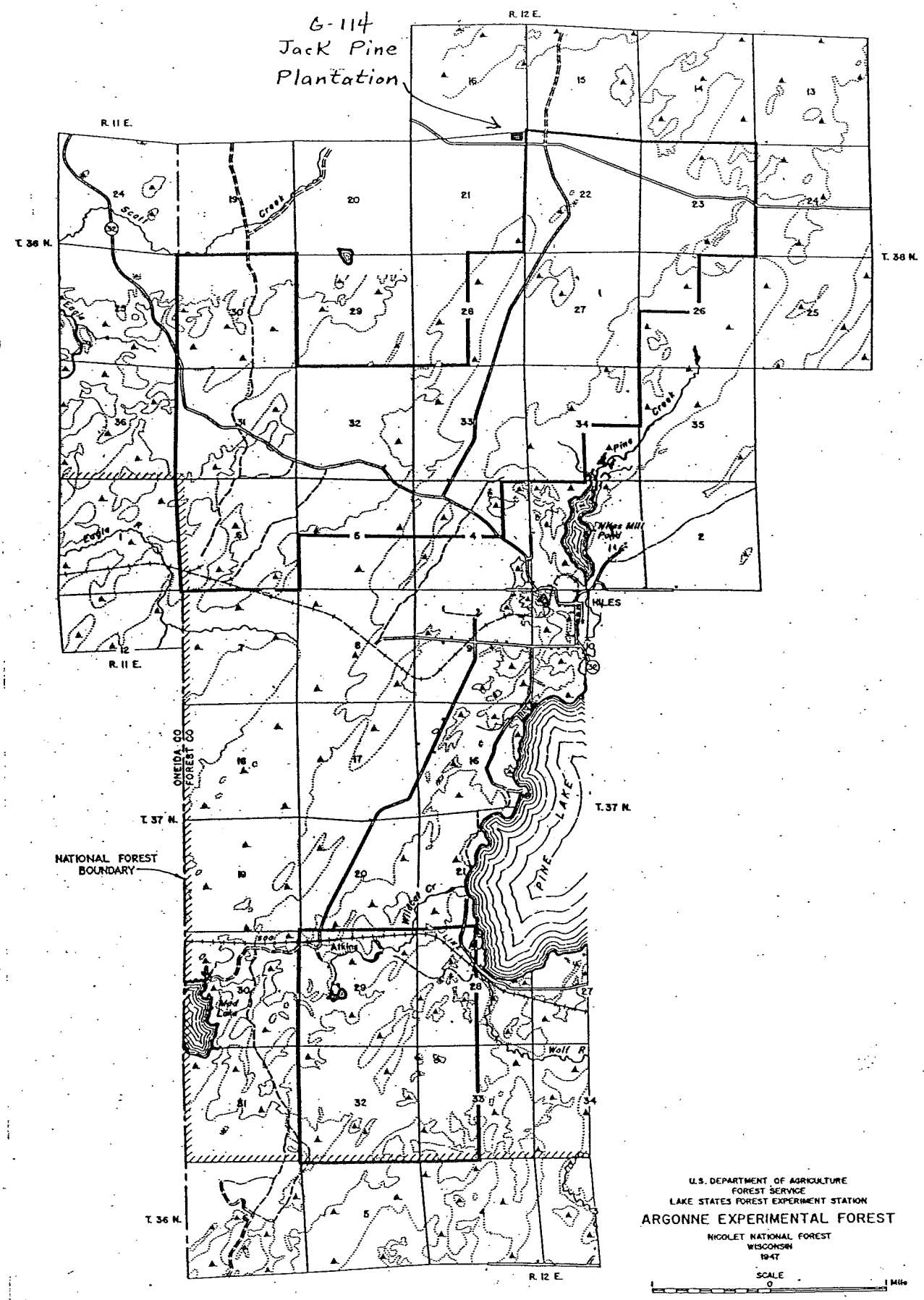
Damage: No rust or other diseases were noticed. The stand is in decent shape, having essentially thinned itself. Ideally, crown ratios should be higher, but for now these pines are doing OK.

Competing Vegetation: Sugar maple saplings 25 feet tall dominate the understory. Hazel, bracken fern, and *Lonicera* are also present.

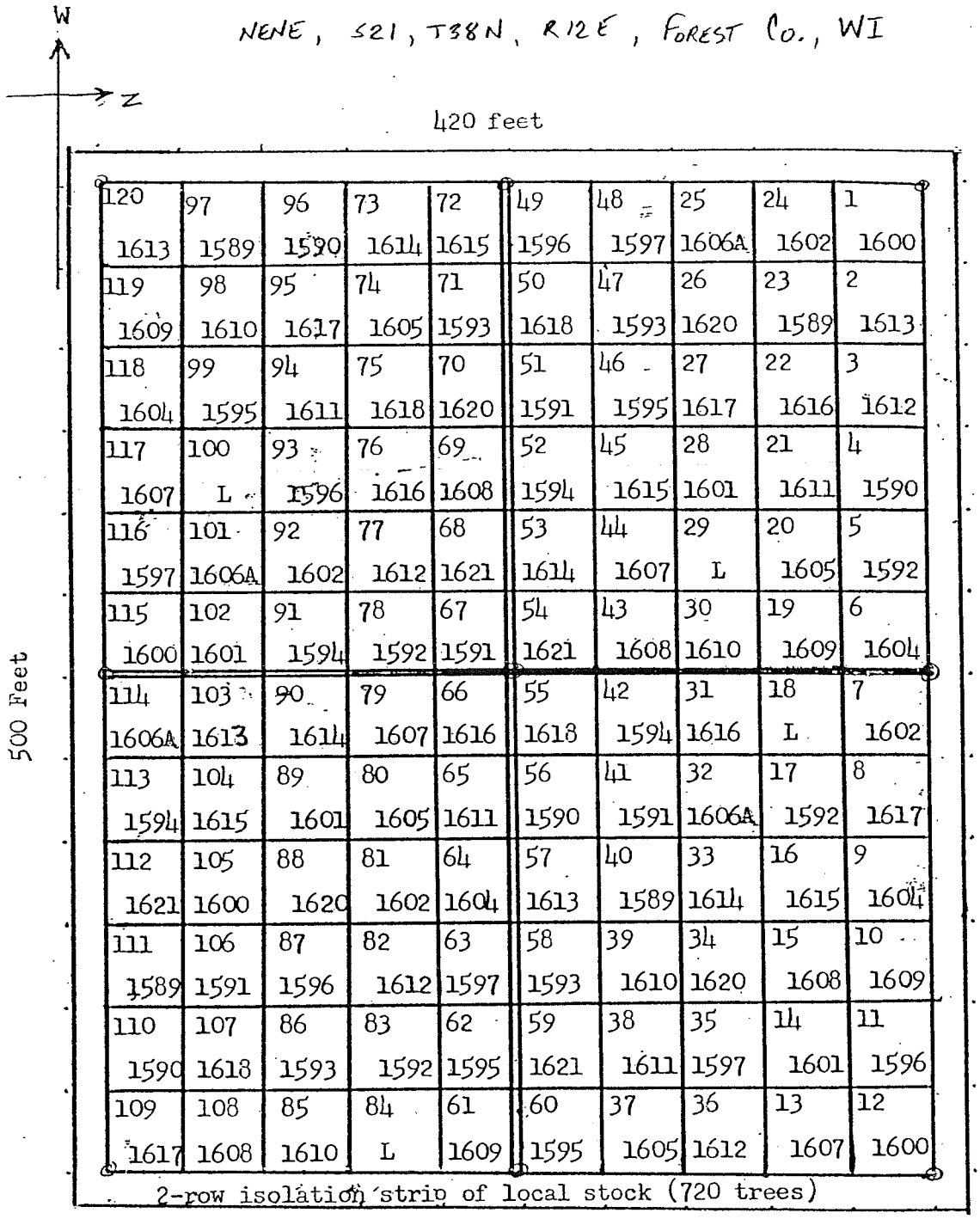
Suggested Maintenance: The stand needs a cleaning. The understory maples should come out, along with any dead pines not yet on the ground.

Other Comments: This planting is not actually within the Argonne Experimental Forest, but is adjacent to it in what is now the Headwaters Wilderness Area. I don't know whether or not this precludes management activities in the stand.

Access - from the junction of FR 2183 (Scott Lake Road) and FR 2184 (Experimental Road), proceed .3 mile west to a trail heading north. There is a signpost at this trailhead. The plantation lies immediately east of the trail and about 3/4 chain north of FR 2183.


G-114
Jack Pine
Plantation
R. 12 E.
R. 11 E.
T. 38 N.
T. 37 N.
T. 36 N.
HILES
ONEIDA CO
FOREST CO
NATIONAL FOREST
BOUNDARY
PINE LAKE
Scott Creek
Eagle
Pine
Creek
Wolf R
Mud Lake
Atkins
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LAKE STATES FOREST EXPERIMENT STATION
ARGONNE EXPERIMENTAL FOREST
NICOLET NATIONAL FOREST
WISCONSIN
1947
SCALE
0
1 Mile

G-114 JACK PINE SEED SOURCE STUDY
ARBONNE EXPERIMENTAL FOREST
NENE, S21, T38N, R12E, FOREST CO., WI



120 1613	97 1589	96 1590	73 1614	72 1615	49 1596	48 1597	25 1606A	24 1602	1 1600
119 1609	98 1610	95 1617	74 1605	71 1593	50 1618	47 1593	26 1620	23 1589	2 1613
118 1604	99 1595	94 1611	75 1618	70 1620	51 1591	46 1595	27 1617	22 1616	3 1612
117 1607	100 L	93 1596	76 1616	69 1608	52 1594	45 1615	28 1601	21 1611	4 1590
116 1597	101 1606A	92 1602	77 1612	68 1621	53 1614	44 1607	29 L	20 1605	5 1592
115 1600	102 1601	91 1594	78 1592	67 1591	54 1621	43 1608	30 1610	19 1609	6 1604
114 1606A	103 1613	90 1614	79 1607	66 1616	55 1618	42 1594	31 1616	18 L	7 1602
113 1594	104 1615	89 1601	80 1605	65 1611	56 1590	41 1591	32 1606A	17 1592	8 1617
112 1621	105 1600	88 1620	81 1602	64 1604	57 1613	40 1589	33 1614	16 1615	9 1604
111 1589	106 1591	87 1596	82 1612	63 1597	58 1593	39 1610	34 1620	15 1608	10 1609
110 1590	107 1618	86 1593	83 1592	62 1595	59 1621	38 1611	35 1597	14 1601	11 1596
109 1617	108 1608	85 1610	84 L	61 1609	60 1595	37 1605	36 1612	13 1607	12 1600

Fig. 1 - Plot arrangement for seed source test. (Upper number is plot number; lower one is collection number.)

GENETIC RESOURCE EVALUATION

Study No.: G-114 Species: Jack pine

Date Established: 5/20/54 Date Evaluated: 7/8/93

Title: Regional jack pine seed source study in the Lake States

Location: Chequamegon National Forest near Drummond, Wisconsin
Hayward RD, Chequamegon NF
NENW, S16, T45N, R8W, Bayfield County, Wisconsin

Experimental Design: Randomized block, 4 blocks, 64-tree plots (8 x 8 trees square), 30 families, 5 x 5 ft spacing, 2 border rows.

Monumentation: Cedar posts originally marked all plot corners, with a metal tag bearing the plot number nailed to the northeast corner post of each plot. These posts are in varying states of decay; about half are still standing but shaky. I placed orange plastic stakes at all block corners.

Existing Fall Measurements:
Ht '55, '58, '63, '73, '83, '87
DBH '63, '73, '83, '87

Survival: This stand has never been thinned and is currently at a stage of deterioration and break-up. Overall survival is about 30%. Mortality has been patchy, with nearly complete loss of some seed sources. There are many broken snags and down timber.

Growth: The largest trees are 10 inches in diameter by 60 feet in height with a 40% live crown ratio, but few are this size. The smallest are 6 inches by 45 feet with 10% live crown. Most are 6 to 8 inches in diameter by 50 to 55 feet in height with about a 20% crown ratio.

Stem Form: Boles are free of limbs and generally straight. 5 to 10% of the trees show signs of decay where gall rust has invaded the main stem.

Damage: About 25% of the surviving pines are infected with eastern gall rust. Many of the snags and down trees also show signs of having been infected with this disease. Eastern gall rust seems to be the major cause of mortality in the stand, working as a secondary agent on trees already subject to climatic and competitive stress.

Competing Vegetation: Black cherry saplings up to 20 feet tall are invading the stand. Hazel, bracken fern, and *Rubus* occupy the remainder of the understory.

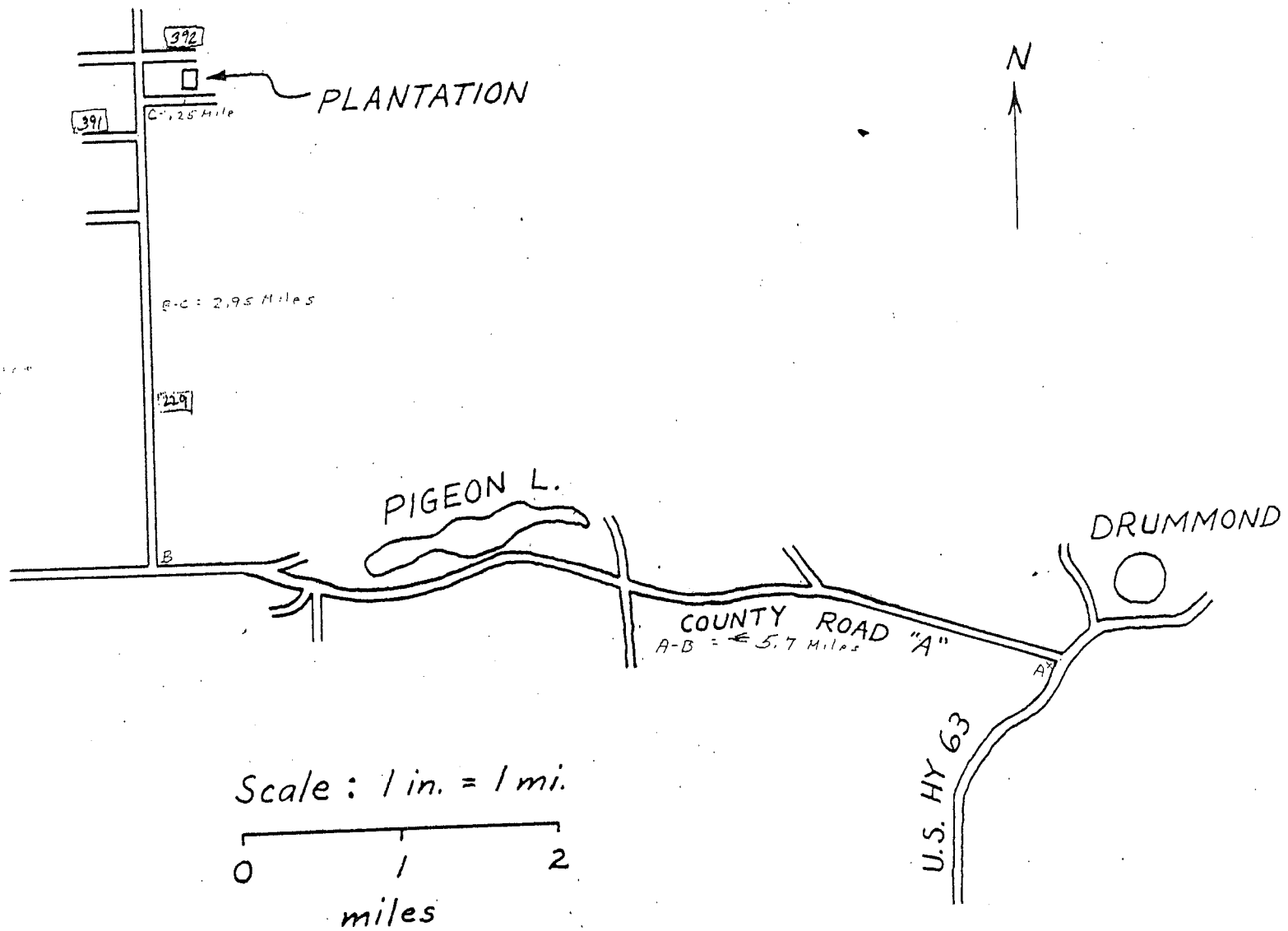
Suggested Maintenance: This stand is fading fast; I don't think much can be done to save it.

Other Comments: It would be interesting to examine the genetic differences in susceptibility to eastern gall rust.

The lane running east from FR 229 to this plantation, though no longer drivable, joins FR 229 halfway between the junctions of FR 391 and FR 392 with FR 229. The west edge of the plantation is a full quarter mile (20 chains) east of FR 229.

SKETCH MAP SHOWING LOCATION OF JACK PINE SEED SOURCE PLANTATION #9 IN BAYFIELD COUNTY, WISCONSIN

PLOT MONUMENTS ARE CAIRNS OF PLATS - NUMBERED A-1 A-2 etc.



G-114 Jack Pine
Bayfield Co, WI
NENW, S16, T45N, R8W

N

420 feet

500 feet

	1	2	3	4	5	6	7	8	9	10
A	1613	1589	1590	1614	1615	1596	1597	1606	1602	1600
B	1609	1610	1617	1605	1593	1618	1593	x 1620	1589	1613
C	1604	1595	1611	1618	x 1620	1591	1595	1617	1616	1612
D	1607	L	1596	1616	1605	1594	1615	1601	1611	1590
E	1597	1606	1602	1612	1621	1614	1607	L	1605	1592
F	1600	1601	1594	1592	1591	1621	1608	1610	1609	1604
G	1606	1613	1614	1607	1616	1618	1594	1616	L	1602
H	1594	1615	1601	1605	1611	1590	1591	1606	1592	1617
J	1621	1600	x 1620	1602	1604	1613	1589	1614	1615	1604
K	1589	1591	1596	1612	1597	1593	1610	1620	1608	1609
L	1590	1618	1593	1592	1595	1621	1611	1597	1601	1596
M	1617	1608	1610	L	1609	1595	1605	1612	1607	1600

2-row isolation strip of local stock (720 trees)

~~Example~~ Sample plot arrangement for complete seed source tests

GENETIC RESOURCE EVALUATION

Study No.: G-114 Species: Jack pine

Date Established: 5/20/54 Date Evaluated: 6/7/93

Title: Regional jack pine seed source study in the Lake States

Location: Ottawa National Forest near Watersmeet, Michigan
Watersmeet RD, Ottawa NF
SWSW, S27, T46N, R39W, Ontonagon County, Michigan

Experimental Design: Randomized block, 4 blocks, 64-tree plots (8 x 8 trees square), 30 families, 5 x 5 ft spacing, 2 border rows.

Monumentation: The remaining wooden stakes initially used to mark plot corners are rotten. I placed orange plastic stakes with metal tags at every other plot corner throughout the planting - every plot has a stake at one of its corners. Staked corners are marked on the planting map.

Existing Fall Measurements:
Ht '55, '58, '63, '73, '83, '87
DBH '63, '73, '83, '87

Survival: The eastern half of this plantation was thinned in 1978; about 30% of the planted trees remain. The westernmost N-S row of each plot was cut to allow access, and about half the trees came out in a selective thinning. The western two blocks were left unthinned as a control. Survival in the unthinned blocks is about 60%.

Along the western edge of the stand, 6 entire rows have been lost to a powerline right-of-way. This includes both border rows plus the westernmost 4 rows of all plots along the west side of the planting. (The western border rows were knowingly planted in the Hwy 45 right-of-way. The highway has since been relocated, but the powerline still follows the old right-of-way.)

Growth: Diameters vary from 6 to 11 inches. Heights are fairly uniform around 65 feet. Diameters show no obvious difference between the thinned and unthinned portions of the stand, with much variation present in both areas. However, live crown ratios are much better in the thinned area (30% vs. 15%), and I expect diameter growth will soon follow.

Stem Form: These are good looking jack pines with straight, clear boles.

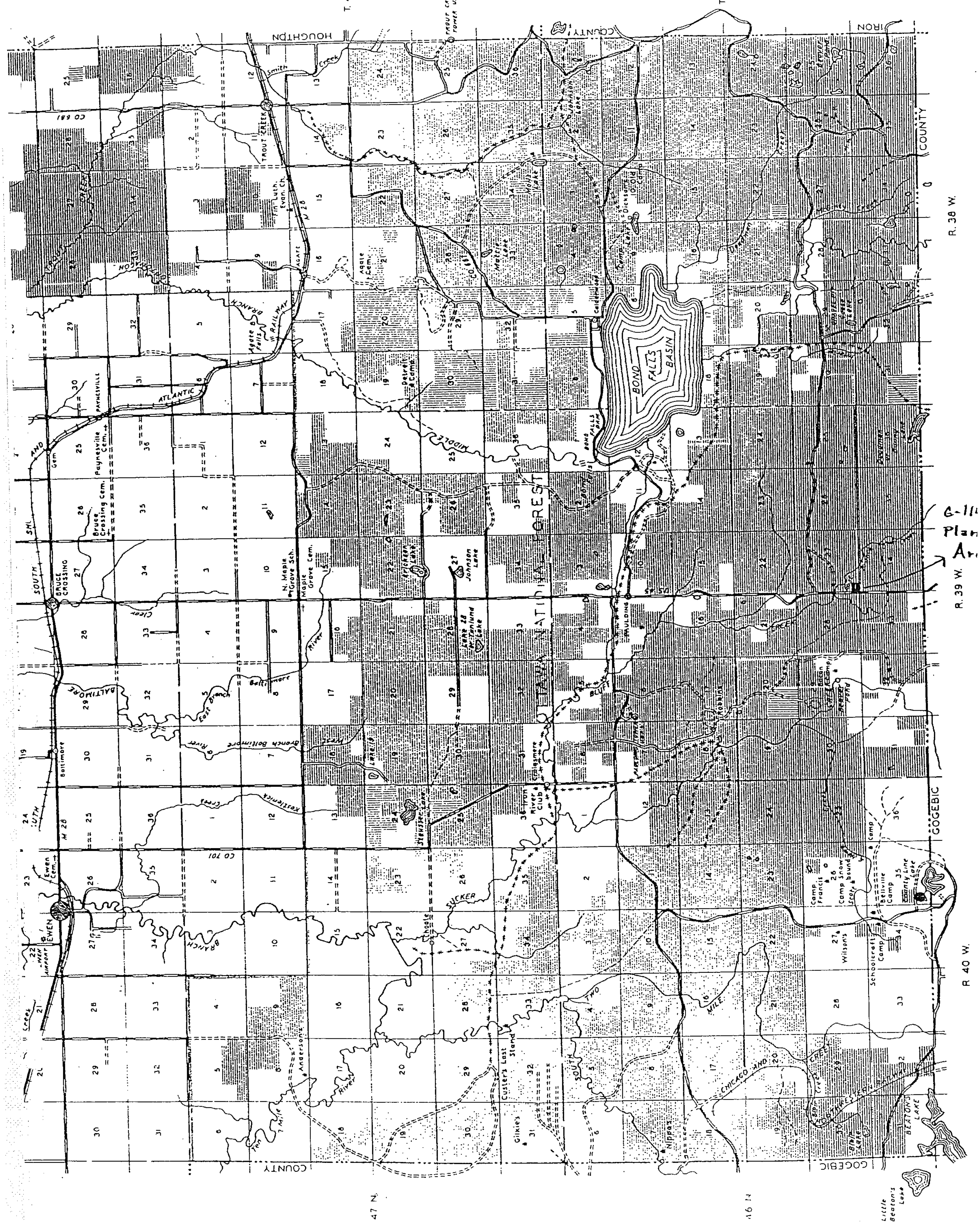
Damage: No pest or disease problems were noticed.

Competing Vegetation: Hazel brush and maple saplings form occasional thickets, more commonly in the unthinned half of the stand. Bracken fern is common throughout the planting.

Suggested Maintenance: None. Thinning the unthinned blocks would lead to windthrow and accelerated break-up of the stand, and would also destroy their value as controls.

Other Comments: A 3- to 5-year-old clearcut borders the stand on the south and east. Along the east edge of the stand, the markers did a fine job of leaving our trees; the outer border row is blue-lined. Along the south edge, however, about half of the border trees were taken and one plot tree was cut. Border rows along the north edge of the plantation seem to have died from natural causes. All of these incursions into the stand are indicated on the planting map.

This plantation is located directly across the road from the parking area for viewing the "Paulding Light."



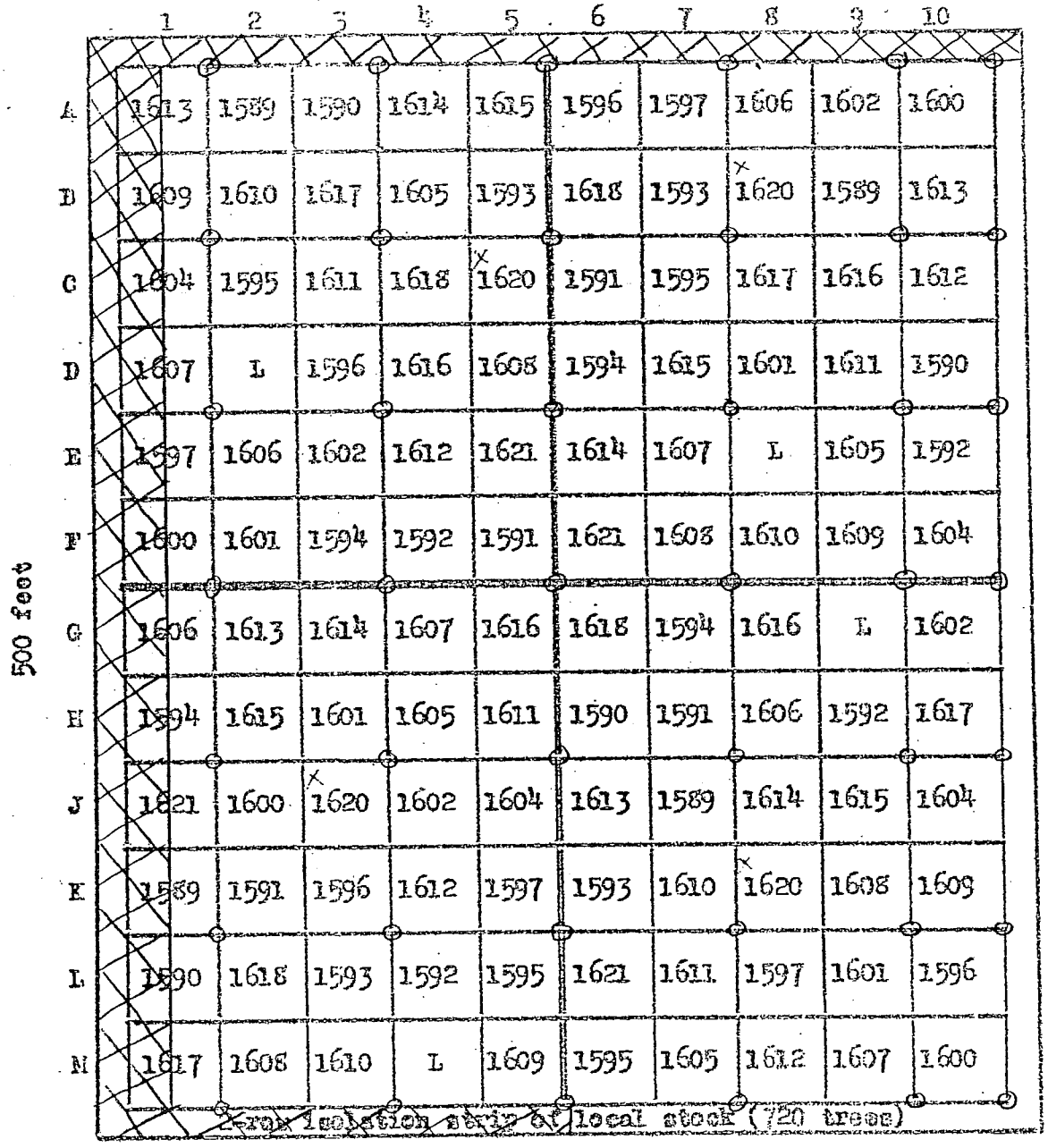
SOUTHEAST PART ONTONAG

STUDY No. G-114

FIGURE 2. Plot design and seed source randomization for the Ottawa National Forest Jack Pine Plantation.

SWSW, S27, T46N, R39W, ONTONAGON Co., MI

420 feet



~~Figure 2~~—Sample plot arrangement for complete seed source tests

HASHED AREA REPRESENTS MISSING TREES.

CORNER POSTS AT CIRCLED PLOT CORNERS.

GENETIC RESOURCE EVALUATION

Study No.: G-114 Species: Jack pine

Date Established: Spring, '54 Date Evaluated: 6/23/93

Title: Regional jack pine seed source study in the Lake States

Location: Chippewa National Forest near Cass Lake, Minnesota
Cass Lake RD, Chippewa NF
SWNW, S35, T146N, R30W, Beltrami County, Minnesota

Experimental Design: Randomized block, 4 blocks, 64-tree plots (8 x 8 trees square), 30 families, 5 x 5 ft spacing, 2 border rows.

Monumentation: Cedar posts were originally used to mark all plot corners, and about half of these are still in place. I placed orange plastic stakes with metal tags at all block corners.

Existing Fall Measurements:
Ht '55, '58, '63, '73, '83
DBH '63, '73, '83

Survival: 60%, but fading fast. This stand is breaking up. Mortality pockets, individual dead trees, broken snags, and down timber are common.

Growth: Diameters are fairly uniform at 6 inches, the best trees reaching 8 inches. Heights are 50 to 55 feet. Live crown ratios are only 10 to 20%.

Stem Form: Boles are straight and free of limbs, but 75% of the trees have cankers at 8 to 10 feet.

Damage: Dead and broken trees are common. Most of the survivors (75%) are infected with sweet-fern rust and have developed large bole cankers. Stem breakage and mortality will follow.

Competing Vegetation: The understory consists of blueberry, sweet-fern, and hazel. Aspen and black cherry seedlings are invading the larger openings.

Suggested Maintenance: Not much can be done for this stand.

Other Comments: This planting is easy to locate. A large landing was placed immediately north of these jack pines when the red pine stand to the east was thinned last year. The accompanying sketch shows the logging roads to follow to this landing.

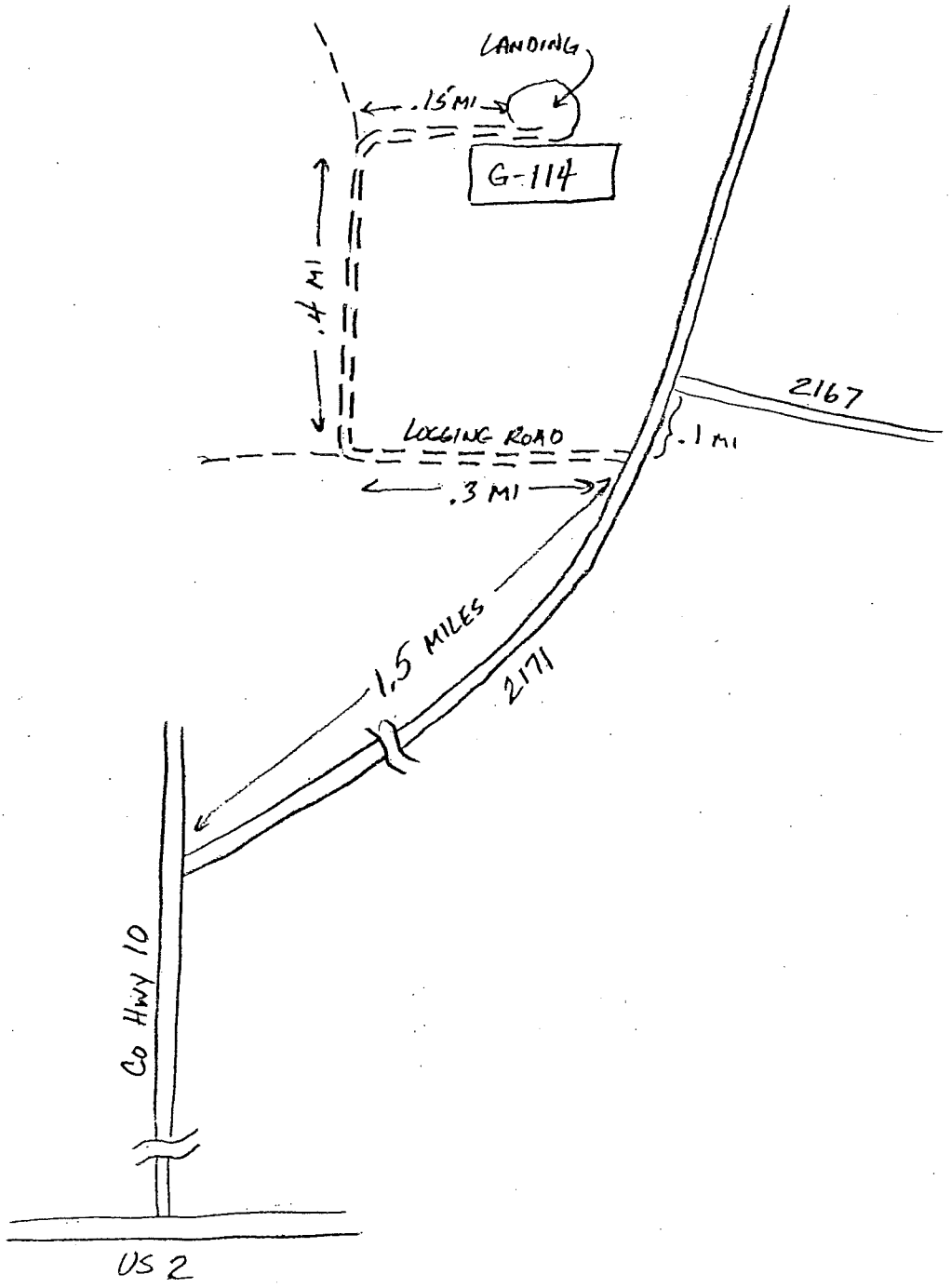
General Location - G-114 Jack Pine

Chippewa National Forest - SENW, S35, T146N, R30W

Beltrami Co., MN

N

(not to scale)



G-114 JACK PINE SEED SOURCE STUDY
CHIPPEWA NATIONAL FOREST
SENW, S35, T146 N, R30 W, BELTRAMI CO, MN

N

420 feet

500 feet

	1	2	3	4	5	6	7	8	9	10
A	1613	1589	1590	1614	1615	1596	1597	1606	1602	1600
B	1609	1610	1617	1605	1593	1618	1593	1620	1589	1613
C	1604	1595	1611	1618	1620	1591	1595	1617	1616	1612
D	1607	L	1596	1616	1605	1594	1615	1601	1611	1590
E	1597	1606	1602	1612	1621	1614	1607	L	1605	1592
F	1600	1601	1594	1592	1591	1621	1608	1610	1609	1604
G	1606	1613	1614	1607	1616	1618	1594	1616	L	1602
H	1594	1615	1601	1605	1611	1590	1591	1606	1592	1617
J	1621	1600	1620	1602	1604	1613	1589	1614	1615	1604
K	1589	1591	1596	1612	1597	1593	1610	1620	1608	1609
L	1590	1618	1593	1592	1595	1621	1611	1597	1601	1596
M	1617	1608	1610	L	1609	1595	1605	1612	1607	1600

2-row isolation strip of local stock (720 trees)

~~xxxxxxxx~~—Sample plot arrangement for complete seed source tests

GENETIC RESOURCE EVALUATION

Study No.: G-114 **Species:** Jack pine

Date Established: Spring, '54 **Date Evaluated:** 6/24/93

Title: Regional jack pine seed source study in the Lake States

Location: "Wanless Farm" planting near Isabella, Minnesota
Kawishiwi RD, Superior NF
E1/2NW, S29, T60N, R6W, Lake County, Minnesota

Experimental Design: Randomized block, 4 blocks, 64-tree plots (8 x 8 trees square), 30 families, 5 x 5 ft spacing, 2 border rows.

Monumentation: Most of the cedar posts initially used to mark plot corners are still standing. Additionally, orange plastic stakes with metal tags have been placed at all block corners.

Existing Fall Measurements:
Ht '55, '58, '63, '73, '83
DBH '63, '73, '83

Survival: The southern half of this plantation was thinned in 1978; about 35% of the planted trees remain. The northern E-W row of each plot was cut to allow access, and about half the trees came down in a selective thinning. Cut trees remain piled in small decks throughout the southern two blocks. The two northern blocks were left unthinned as a control. Survival in the unthinned blocks is about 85%.

Growth: In the two blocks which were thinned, diameters run 6 to 8 inches with an occasional ten-incher. Heights are right at 45 feet. Live crown ratios are about 30%.

In the control blocks, diameters are a bit smaller, averaging 6 inches, the best trees reaching 8 inches DBH. Heights again are 45 feet. Live crown ratios are only 10 to 20%.

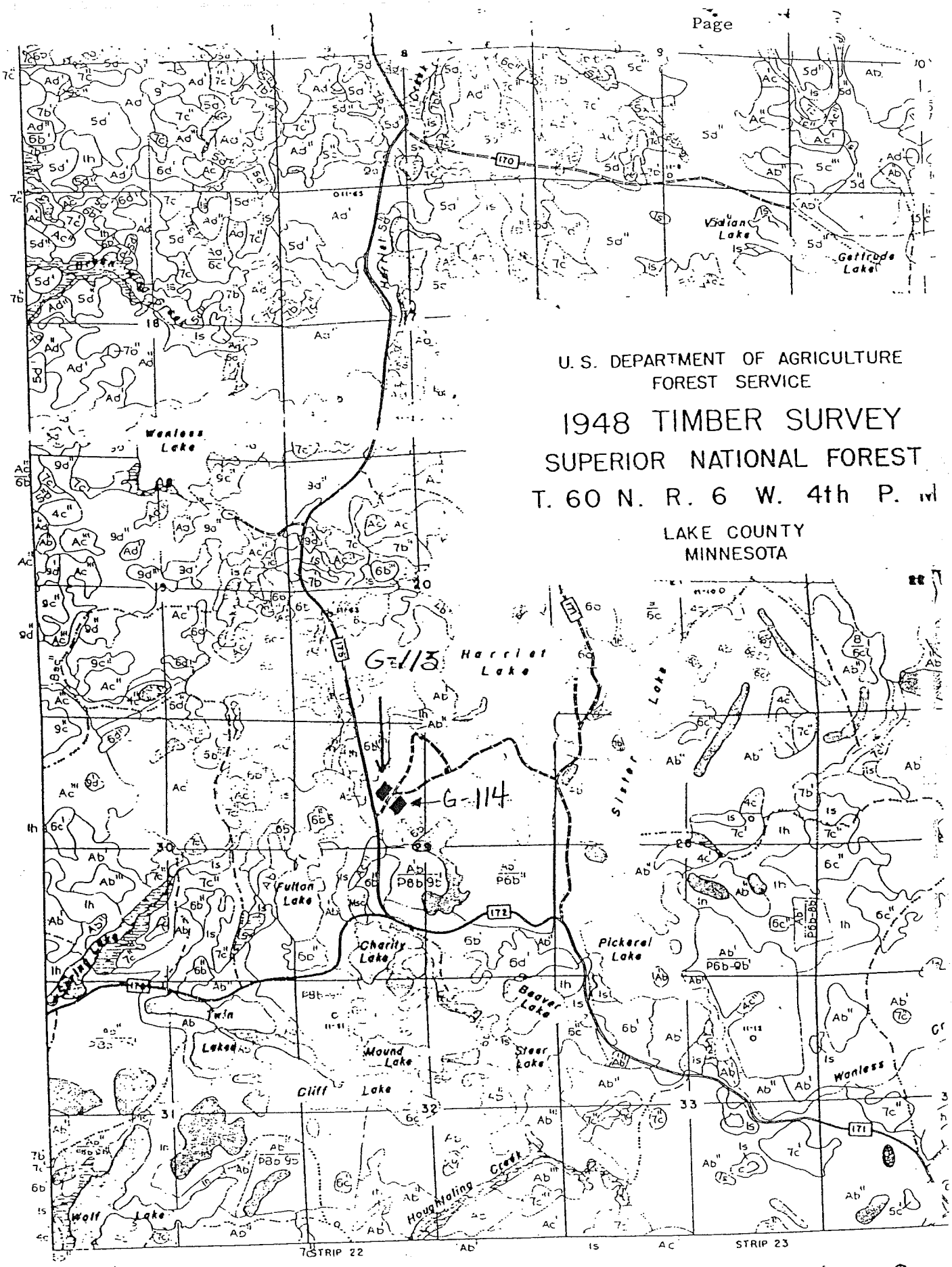
Stem Form: These are good looking jack pines, relatively straight with clean boles and no cankers.

Damage: No pests or diseases were apparent. The entire planting is in good shape, although vigor is declining in the unthinned portion.

Competing Vegetation: The understory of balsam fir. hazel, and juneberry gets pretty thick in the thinned half of the stand. Balsam fir thickets 15 feet tall are not uncommon. These species are present but only waist-high in the unthinned blocks.

Suggested Maintenance: The understory needs to be cleaned out in the southern (thinned) half of the planting. The northern half could benefit from a thinning, but may be more valuable as a control.

Other Comments: This planting is easy to locate. From County 7 take the spur toward Harriet Lake campground. In about 200 yards you will see the billboard identifying the Jack Pine Seed Source Study, immediately to the east of the road. (A G-113 white spruce plantation is west of the road.)



Location of NIF6-114 Plantation on Wanless Farm Section 29

G-114 JACK PINE
SUPERIOR NATIONAL FOREST
E½NW, S29, T60N, R6W,
LAKE CO, MN

N

420 feet

500 feet

	1	2	3	4	5	6	7	8	9	10
A	1613	1589	1590	1614	1615	1596	1597	1606	1602	1600
B	1609	1610	1617	1605	1593	1618	1593	x 1620	1589	1613
C	1604	1595	1611	1618	x 1620	1591	1595	1617	1616	1612
D	1607	L	1596	1616	1605	1594	1615	1601	1611	1590
E	1597	1606	1602	1612	1621	1614	1607	L	1605	1592
F	1600	1601	1594	1592	1591	1621	1608	1610	1609	1604
G	1606	1613	1614	1607	1616	1618	1594	1616	L	1602
H	1594	1615	1601	1605	1611	1590	1591	1606	1592	1617
J	1621	1600	x 1620	1602	1604	1613	1589	1614	1615	1604
K	1589	1591	1596	1612	1597	1593	1610	1620	1608	1609
L	1590	1618	1593	1592	1595	1621	1611	1597	1601	1596
M	1617	1608	1610	L	1609	1595	1605	1612	1607	1600

2-row isolation strip of local stock (720 trees)

xxxxxxxx—Sample plot arrangement for complete seed source tests

GENETIC RESOURCE EVALUATION

Study No.: G-223 Species: Jack pine

Date Established: 5/13/65 Date Evaluated: 6/3/93

Title: Nursery study of rangewide variation of jack pine

Location: State-owned land near Lake Tomahawk, Wisconsin
SWNW, S10, T38N, R7E, Oneida County, Wisconsin

Experimental Design: Randomized block, 12 blocks, 4-tree row plots, 90 families, 5 x 5 ft spacing.

Monumentation: Four-foot wooden posts were originally used to mark block corners. All but one of these are still present. Orange plastic stakes with metal tags have also been placed at all block corners.

Existing Fall Measurements:
Ht '65, '69, '72
DBH

Survival: Survival is high at 90% or better.

Growth: Diameters vary from 6 to 9 inches. Heights are uniform at 40 feet. Live crown ratios are 30 to 50%.

Stem Form: Boles are fairly straight for jack pine. Most trees have self-pruned to a height of 10 to 12 feet.

Damage: Crowns are healthy except for some minor tip dieback on lower limbs evident throughout the stand. No bole cankers were seen. This plantation is in good shape.

Competing Vegetation: White pine saplings up to 20 feet in height are encroaching in the southeast portion of the stand. Blocks I through V are affected. *Rubus* is abundant throughout the planting, occasionally attaining a height of 8 feet.

Suggested Maintenance: The stand needs a cleaning. The white pines should be removed, and the *Rubus* needs to be controlled to facilitate working in the stand.

Other Comments: This planting was established as an offshoot to the nursery study. After two growing seasons it became apparent that there would be ample seedlings available for an outplanting.

G-223

223

LAKE TOMAHAWK PLANTATION G-846 JACK PINE
T38N, R7E, Sec. 10 SE¼ SW¼ NW¼

2188	2206	2186	2182	2210	2202	2260	2186	2190	2175	2192	2209
2195	2240	2234	2232	2246	2222	2203	2232	2223	2185	2189	2201
2208	2184	2259	2198	2190	2212	2249	2211	2255	2237	2214	2202
2218	2214	2226	2200	2191	2224	2228	2224	2234	2250	2219	2252
2174	2175	2260	2261	2203	2217	2241	2188	2229	2182	2206	2257
2181	2244	2250	2177	2220	2197	2215	2248	2238	2247	2217	2210
2172	2225	2251	2241	2223	2247	2259	2258	2213	2239	2243	2261
2216	2219	2201 III	2228	2185	2183	2220	2225	2196 VI	2227	2253	2222
2178	2209	2192	2248	2243	2196	2251	2198	2245	2174	2171	2202
2202	2213	2231	2200	2199	2238	2205	2221	2207	2238	2199	2177
2258	2257	2237	2207	2239	2173	2178	2208	2204	2200	2176	2230
2189	2221	2193	2215	2171	2236	2236	2195	2179	2183	2193	2242
2245	2229	2256	2194	2176	2204	2212	2256	2194	2184	2172	2181
2227	2242	2179	2203	2254	2252	2226	2197	2246	2191	2254	2244
2249	2255	2211	2235	2230	2253	2233	2240	2231	2173	2210	2218
2184	2191	2232	2220	2181	2238	2229	2197	2204	2207	2236	2216
2236	2255	2245	2182	2242	2199	2174	2214	2241	2239	2196	2210
2224	2262	2215	2207	2223	2226	2233	2227	2195	2173	2253	2222
2249	2259	2257	2225	2253	2250	2211	2176	2256	2178	2212	2260
2229	2214	2205	2237	2221	2201	2234	2208	2203	2217	2189	2252
2241	2195	2247	2251	2261	2185	2257	2200	2194	2206	2255	2198
2228	2177	2188	2211	2194	2254	2199	2220	2242	2238	2185	2179
2230	2178	2198	2174	2183	2244	2171	2190	2192	2188	2202	2218
2217	2219	2212 II	2227	2213	2233	2235	2246	2181 V	2225	2177	2250
2175	2209	2235	2248	2258	2197	2231	2262	2258	2184	2175	2232
2203	2252	2218	2186	2172	2193	2219	2240	2209	2244	2248	2221
2171	2189	2256	2192	2206	2246	2237	2247	2245	2249	2251	2226
2210	2240	2231	2216	2176	2196	2183	2191	2213	2230	2193	2224
2234	2190	2200	2202	2173	2222	2259	2182	2261	2243	2186	2172
2204	2179	2208	2243	2260	2239	2254	2201	2215	2228	2223	2205
2191	2230	2172	2215	2231	2216	2206	2249	2216	2223	2225	2174
2228	2202	2222	2244	2201	2199	2198	2220	2254	2253	2242	2212
2232	2177	2253	2212	2181	2240	2175	2176	2256	2219	2211	2205
2197	2189	2209	2219	2204	2171	2196	2173	2224	2185	2250	2197
2235	2206	2186	2210	2225	2242	2182	2248	2262	2247	2237	2235
2173	2208	2220	2200	2203	2178	2244	2222	2246	2236	2234	2215
2217	2192	2237 I	2185	2221	2207	2257	2259	2212 IV	2209	2171	2189
2188	2190	2257	2245	2183	2250	2199	2230	2238	2240	2207	2203
2234	2256	2188	2206	2205	2195	2261	2241	2255	2231	2195	2200
2213	2241	2184	2196	2238	2226	2190	2182	2175	2221	2238	2227
2239	2253	2220	2243	2255	2179	2260	2251	2186	2226	2214	2204
2223	2246	2211	2248	2227	2193	2179	2201	2217	2181	2202	2228
2224	2175	2194	2176	2262	2213	2192	2183	2243	2245	2232	2210
2234	2214	2222	2251	2260	2233	2177	2208	2252	2193	2191	2183
2247	2182	2...	2248	2259	2251	2256	2172	2218	2194	2233	2229

N

2173	2204	2202	2249	2247	2176	2206	2247	2174	2215	2204	2233
2213	2211	2197	2230	2252	2253	2198	2250	2221	2179	2232	2234
2174	2200	2237	2262	2235	2257	2196	2261	2249	2251	2243	2255
2201	2246	2227	2222	2180	2179	2210	2230	2203	2197	2189	2223
2239	2175	2233	2248	2261	2245	2184	2173	2213	2226	2222	2227
2195	2218	2221	2254	2183	2208	2171	2201	2242	2240	2246	2193
2231	2177	2250	2229	2251	2178	2178	2237	2219	2208	2256	2205
2219	2215	2217	2228	2236	2185	2214	2220	2252	2191	2228	2253
2209	2205	2172	2260	2182	2214	2235	2229	2175	2245	2186	2207
2226	2171	2210 IX	2220	2191	2203	2225	2177	2185 XII	2109	2211	2216
2192	2184	2198	2196	2240	2259	2257	2209	2231	2172	2176	2239
2207	2181	2193	2199	2232	2216	2217	2181	2202	2195	2183	2212
2188	2235	2256	2223	2241	2243	2194	2241	2262	2188	2192	2182
2242	2224	2206	2244	2234	2238	2200	2236	2224	2238	2254	2244
2225	2188	2212	2256	2194	2190	2260	2259	2258	2248	2190	2218
2262	2171	2199	2183	2234	2197	2173	2232	2226	2193	2244	2254
2259	2245	2184	2178	2226	2257	2251	2247	(2175) (2196)	2184	2209	2262
2231	2220	2213	2232	2225	2236	2174	2216	2256	2212	2185	2252
2210	2260	2190	2194	2256	2186	2222	2260	2235	2237	2207	2261
2217	2250	2179	2201	2189	2219	2189	2220	2228	2230	2219	2250
2212	2192	2258	2237	2248	2175	2188	2186	2194 XI	2255	2249	2211
2202	2223	2200 VIII	2191	2246	2222	(2196)	2258	2240	2215	2225	2234
2224	2240	2173	2205	2235	2196	2241	2221	2243	2257	2182	2239
2253	2218	2193	2254	2209	2211	2240	2196	2205	2223	2192	2203
2261	2241	2247	2249	2158	2239	2178	2200	2176	2259	2213	2208
2252	2215	2223	2177	2208	2229	2242	2224	2218	2199	2191	2181
2233	2176	2255	2174	2182	2251	2227	2190	2231	2229	2233	2217
2221	2238	2244	2203	2195	2216	2236	2238	2253	2177	2246	2183
2172	2230	2190	2248	2206	2204	2172	2214	2202	2245	2206	2171
2242	2227	2207	2255	2181	2214	2197	2198	2204	2210	2201	2179
2186	2182	2178	2247	2262	2174	2172	2178	2188	2176	2212	2189
2209	2230	2217	2211	2229	2227	2200	2236	2251	2230	2245	2185
2257	2256	2178	2194	2235	2239	2257	2198	2243	2247	2207	2237
2192	2226	2188	2236	2233	2232	2214	2224	2199	2234	2246	2248
2260	2175	2208	2243	2172	2204	2259	2190	2209	2229	2182	2183
2184	2190	2214	2185	2181	2225	2178	2233	2231	2032	2202	2217
2176	2261	2251 VII	2205	2248	2241	2211	2235	2213 X	2222	2228	2226
2254	2215	2197	2224	2244	2203	2250	2242	2193	2220	2225	2203
2198	2256	2196	2202	2255	2200	2261	2249	2216	2194	2174	2258
2246	2250	2193	2206	2240	2191	2233	2205	2240	2201	2179	2195
2210	2259	2207	2245	2220	2213	2175	2206	2239	2262	2255	2186
2242	2212	2221	2177	2222	2179	2181	2191	2223	2177	2253	2219
2210	2185	2189	2234	2228	2237	2203	2204	2256	2241	2218	2260
2199	2183	2252	2216	2201	2253	2215	2252	2227	2254	2244	2221
2230	2223	2171	2249	2231	2219	2171	2184	2210	2197	2196	2192

N

GENETIC RESOURCE EVALUATION

Study No.: G-223 Species: Jack pine

Date Established: 5/17/66 Date Evaluated: 6/7/93

Title: Nursery study of rangewide variation of jack pine

Location: Ottawa National Forest near Watersmeet, Michigan
Watersmeet RD, Ottawa NF
SE1/4, S19, T45N, R29W, Gogebic County, Michigan

Experimental Design: Completely random planting of 371 seedlings from 59 seedlots, 4 x 4 ft spacing. Differences in resistance to *Scleroderris* canker were sought - planting site was known to be infected. In 1971, 50% of the trees were further innoculated with *Scleroderris*.

Monumentation: Most of the tags originally used to identify each tree are gone. I walked around the periphery of the planting and placed a tag on about every tenth tree. Tags are marked with the source number and are wired to a stob at breast height on the south side of the tree. Tagged trees are circled on the planting map.

Existing Fall Measurements:
Ht
DBH

Survival: About 70%. Many trees are dead and down. In spots the dead pines are jackstrawed into an impossible tangle.

Growth: This is essentially a dog-hair stand with a few wolf tree dominants. While the best trees reach 8 inches in diameter and 50 feet in height, most are only 4 inches in diameter, 35 to 40 feet tall, with very small crowns.

Stem Form: Most of these pines are straight, slender, without limbs, and without much volume either.

Damage: A 1973 inspection indicated that *Scleroderris* had never developed in the stand. I found no serious foliar or stem diseases. However, vigor is very low in the majority of trees due to suppression and stagnation.

Competing Vegetation: None.

Suggested Maintenance: A heavy thinning is needed if the stand is to be maintained.

Other Comments: Take FR 6110 to the sharp bend in Sec. 19; the planting is about 4 chains east on a gated logging road, immediately east of the G-169 white spruce planting.

G-223 Jack Pine Planting T45N, R39W, SE¼ Sec. 19

OTTAWA NATIONAL FOREST, ONTONAGON CO., MI

(2178)	2209	2249	2198	2200	2197	2192	(2191)	2185	2191	2181	2178	2189	2190	2188	2219	---
2223	2191	2192	2182	2249	2197	2191	2213	2248	2233	2201	2256	2190	U	2192	(2174)	2252
2199	2199	2174	2171	2236	2249	2194	2173	2258	2258	2191	2258	2190	2219	2252	2176	2211
2171	2177	2241	2174	2249	U	2195	2173	2227	U	2213	2243	2209	U	2173	2178	2225
2179	2172	2249	2203	2213	2213	2209	2188	2225	2241	2258	2213	2182	2171	2192	U	(2233)
2194	2203	2249	2194	2200	2200	2256	2252	2241	2223	2217	2249	2182	2171	2195	2236	2248
2207	2172	2173	2197	2215	2219	2250	2202	2172	2177	2261	2188	2241	2258	2198	2173	2204
2215	2203	2192	2175	2198	2217	2254	2171	2236	2172	2185	2217	2183	U	2203	2175	2241
2199	2188	2201	2193	2243	2188	2213	2202	2217	2225	2249	2223	U	2203	2202	2250	2209
2205	2172	2179	2172	2149	2174	2192	2200	2217	2172	2173	2185	2209	2174	2211	2211	2227
2171	2176	2186	2183	2209	2184	2197	2181	2225	2181	2213	2190	2225	2248	2211	2211	2256
(2179)	2186	2176	2172	2202	2183	2197	2173	2202	2256	2181	2215	2254	2176	2174	2193	2248
2171	2203	2185	2185	2255	2236	U	2254	2174	2192	2227	2248	2225	2194	2174	2201	2227
2179	2193	2233	2233	2190	2196	2243	2148	2182	2256	2256	2172	2184	2254	2209	2174	(2249)
2190	2203	2185	2219	2243	2241	2243	2197	2204	2261	2256	2196	U	2248	2248	2176	2209
2188	2205	2200	2248	2233	2243	2254	2172	2192	2261	2189	2178	2193	2243	2223	2176	2252
2171	2188	2254	2254	2243	2215	2250	U	2261	2243	2258	2192	2243	2176	2243	2250	2252
2178	2172	2196	2248	2193	2215	2186	2254	2261	2176	---	2213	2243	2236	2249	2248	2223
2184	U	---	U	2202	2215	2258	2182	---	---	---	---	(2185)	2256	2227	2248	2250
2198	2199	2182	U	2202	2255	2196	2173	---	---	---						
2203	U	2183	2177	2223	2209	2191	---	---	---	---						
2205	2199	2233	2203	2198	2217	2200	---	---	---	---						
2199	2199	2236	2198	2192	2174	U	2195	2185	2227	(2252)						
2233	(2219)	2198	2200	2179	2178	2195	2250	2195	2248	2256						
2200	2219	2204	2189	2181	2194	2188	(2191)	2192	2252	2241						

--- No tree

U No label

CIRCLED TREES TAGGED 6/7/93

GENETIC RESOURCE EVALUATION

Study No.: G-191 Species: Eastern white pine

Date Established: 5/10/62 Date Evaluated: 7/15/93

Title: Inter-regional provenance study of eastern white pine

Location: Hiawatha National Forest near Manistique, Michigan
Manistique RD, Hiawatha NF
NENE, S34, T42N, R17W, Schoolcraft County, Michigan

Experimental Design: Design II planting - Randomized block, 24 blocks, single-tree plots, 17 families, 14 x 14 ft spacing with filler trees (final spacing 7 x 7 ft), 2 border rows.

Monumentation: The original tags are nearly all missing. I placed a new metal tag on about every sixth tree around the perimeter of the planting; each tag is wired to a stob at breast height on the south side of the tree. Tagged trees are circled on the planting map.

Existing Fall Measurements:
Ht '62, '66, '76
DBH '76

Survival: Overall survival is 50 to 60%. Gaps in the rows and standing dead trees are fairly common.

Growth: These pines range in size from 6 inches in diameter by 35 feet in height to 12 inches by 45 feet. Most are about 8 inches by 35 feet. This is the only Design II white pine planting I've seen in which the filler rows haven't out-performed the test rows. (Filler rows are a local Rhinelander, WI source.)

Stem Form: These trees have not self-pruned as well as white pines usually do, making for difficult walking in spots. Some rows almost look like spruce rows.

Damage: White pine blister rust is evident on several trees, and is likely responsible for much of the mortality in the stand. Some trees have the forked top characteristic of old white pine weevil infestation, but not many trees are affected. Pine spittlebug infests about 80% of the border row trees, but does not appear to be doing any damage.

Competing Vegetation: None.

Suggested Maintenance: Thin.

Other Comments: The border rows are partially missing on the south side of the plantation.

Figure 5

Plantation Layout - Michigan
G-191 - Design II - White Pine
Manistique, Michigan - NENE, Sec. 34, T42N, R17W
School Craft County, Michigan

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
1638	1632	1656	1640	1637	(1651)	1635	1624	1670	1622	1639	(1634)	1650	1629	1633	1623	1636	A
(1623)	1670	1633	1639	1656	1650	1636	1634	1632	1624	1638	1635	1629	1651	1637	1640	(1622)	B
1634	1623	1636	1629	1650	1670	1651	1633	1640	1632	1639	1624	1656	1622	1637	1638	1635	C
1638	1624	1656	1634	1633	1623	1670	1639	1632	1637	1622	1651	1635	1629	1640	1650	1636	D
1656	1632	1635	1637	1651	1640	1638	1639	1622	1624	1670	1633	1629	1636	1650	1623	1634	E
(1650)	1623	1624	1622	1640	1651	1629	1637	1633	1635	1638	1634	1632	1636	1670	1656	(1639)	F
1636	1635	1640	1637	1638	1634	1656	1651	1622	1632	1670	1639	1633	1624	1623	1629	1650	G
1629	1670	1633	1639	1624	1656	1634	1623	1636	1650	1632	1635	1651	1638	1622	1637	1640	H
1650	1634	1629	1633	1636	1639	1624	1656	1632	1670	1622	1638	1635	1637	1651	1623	1640	I
1636	1640	1637	1651	1623	1650	1638	1635	1632	1624	1656	1639	1670	1622	1634	1633	1629	J
1[illegible]	1640	1637	1651	1638	1635	1632	1622	1656	1639	1670	1629	1633	1650	1623	1636	1634	K
(1651)	1637	1640	1635	1638	1624	1622	1632	1656	1634	1636	1623	1639	1670	1650	1633	(1629)	L
1638	1634	1656	1622	1636	1650	1633	1639	1629	1635	1632	1670	1623	1651	1624	1640	1637	M
1629	1633	1670	1636	1650	1634	1639	1623	1637	1656	1622	1624	1632	1635	1638	1640	1651	N
1637	1634	1623	1636	1622	1639	1624	1633	1670	1629	1650	1651	1656	1632	1638	1640	1635	O
1629	1632	1635	1622	1637	1651	1640	1633	1636	1639	1634	1624	1650	1623	1638	1656	1670	P
1640	1639	1629	1634	1623	1670	1624	1638	1650	1622	1651	1637	1632	1635	1656	1633	1636	Q
1640	1634	1624	1623	1656	1629	1636	1633	1650	1670	1638	1622	1637	1651	1635	1632	1639	R
(1639)	1624	1622	1636	1634	1670	1638	1629	1656	1650	1633	1651	1632	1635	1623	1637	(1640)	S
1650	1623	1637	1640	1638	1651	1622	1635	1624	1629	1636	1633	1656	1670	1639	1632	1624	T
1633	1670	1650	1634	1629	1636	1639	1624	1656	1632	1622	1637	1635	1651	1638	1640	1623	U
1640	1637	1651	1635	1638	1632	1622	1656	1650	1629	1633	1624	1634	1639	1670	1636	1623	V
1634	1623	1636	1650	1633	1670	1656	1639	1635	1640	1651	1629	1638	1622	1624	1637		W
(1640)	1651	1637	1636	1634	(1622)	1623	1638	1650	1635	1656	(1632)	1624	1639	1670	1629	(1633)	Y

T plants planted May 7, 1962 with 2-2 stock. Spacing 14' x 14' with filler trees.
Border and filler trees planted about May 10, 1962.
Border and filler trees of a local Rhinelander, Wisconsin seed source, 1953.
CIRCLED SOURCE NUMBERS ⇒ METAL TAG ON TREE.

GENETIC RESOURCE EVALUATION

Study No.: G-191 Species: Eastern white pine

Date Established: 5/9/62 Date Evaluated: 7/13/93

Title: Inter-regional provenance study of eastern white pine

Location: Newaygo Experimental Forest near Newaygo, Michigan
White Cloud RD, Manistee NF
NWNE, S2, T12N, R12W, Newaygo County, Michigan

Experimental Design: Design IV planting - Randomized block, 4 blocks, 81-tree plots (9 x 9 trees square), 16 families, 7 x 7 ft spacing, 2 border rows.

Monumentation: Block corners were originally marked with 8-foot cedar posts; all but two of these are still present. White pine 1 x 4" stakes initially marked the northeast corner of each plot; most of these persist except in the burned area.

Existing Fall Measurements:
Ht '62, '76
DBH

Survival: Half of this plantation was killed by fire two or three years ago. The fire was very hot and resulted in complete kill in the burned area. I've delineated the extent of the fire on the planting map - block IV is mostly gone, block III is half gone, and block II is a quarter gone.

In the unburned portion of the stand, survival is 90%.

Growth: Diameters in the unburned portion of the stand vary from 4 to 8 inches, and heights are 20 to 25 feet. Live crown ratios run about 60%. Border rows are a bit larger.

Stem Form: These trees haven't gotten tall enough yet to shed their lower branches. I noticed very little forking from white pine weevil.

Damage: As noted above, fire has destroyed half of this plantation. The unburned portion, however, seems to be quite healthy. I saw no white pine blister rust in the stand.

Competing Vegetation: None.

Suggested Maintenance: There is probably no value in maintaining the one block which escaped the fire. A thinning would be necessary if one did wish to do so.

Other Comments: A hiking trail transects the length of this planting, entering near the northwest corner and exiting at the southeast corner. Most trailside trees have been pruned, and many sport diamond trail markers. The trail served as an effective firebreak for much of its length and now follows the boundary between burned and unburned areas.

This plantation is bordered on the east by the "Newaygo Prairie Research Natural Area."

G-191 White Pine study

Newaygo Experimental Forest, Michigan

NWNE Sec. 2, T12N, R12W

(Hashed area = Newaygo Prairie RNA)

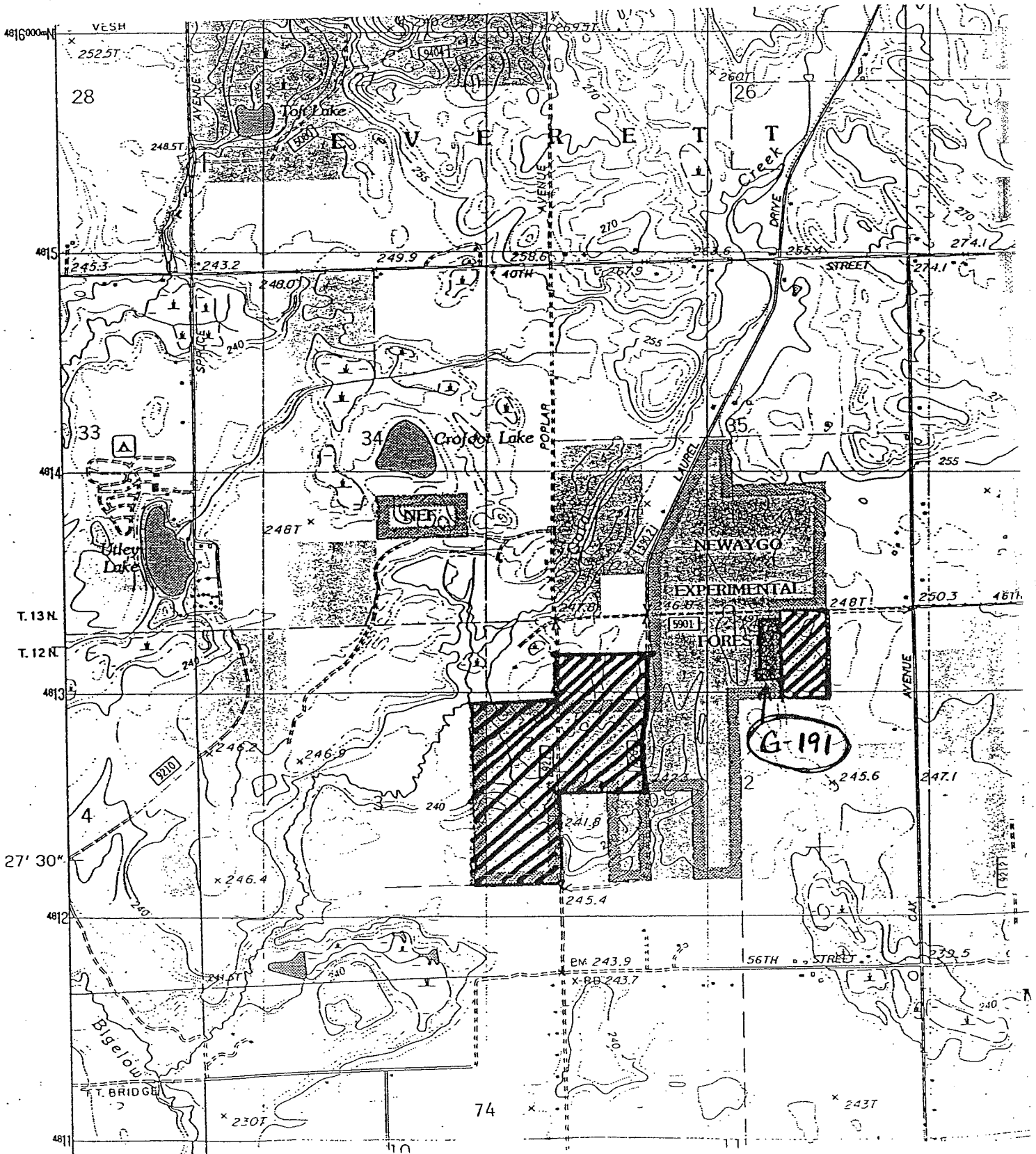
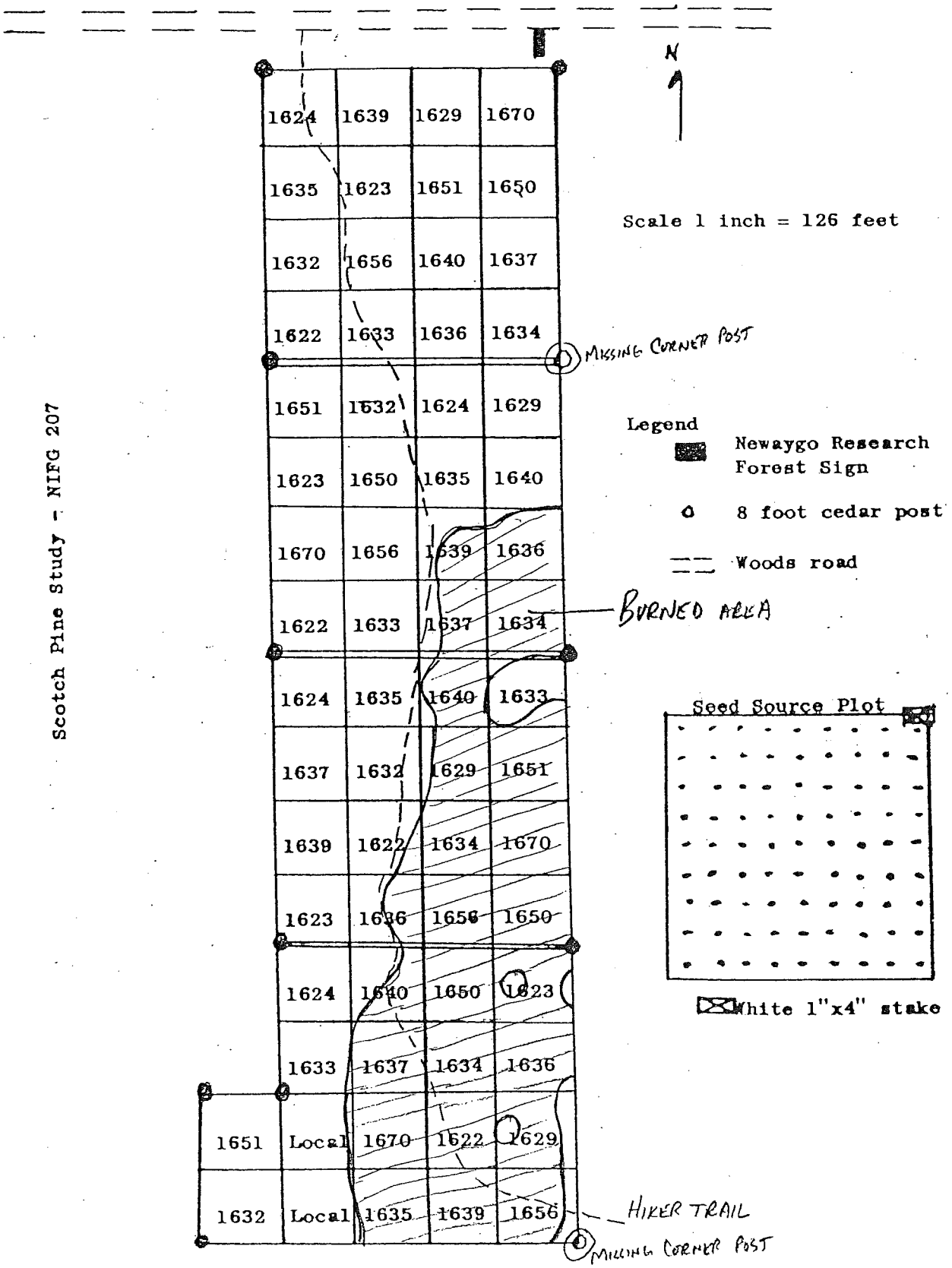


Figure 2.
Plantation Layout - Michigan

NIFG-191 Design IV White Pine

Newaygo Research Forest - NWNE, Sec. 2, T12N R12W



GENETIC RESOURCE EVALUATION

Study No.: G-191 Species: Eastern white pine

Date Established: 5/14/62 Date Evaluated: 6/18/93

Title: Inter-regional provenance study of eastern white pine

Location: Nicolet National Forest near Wabeno, Wisconsin
Laona RD, Nicolet NF
SENE, S17, T34N, R16E, Forest County, Wisconsin

Experimental Design: Design II planting - Randomized block, 24 blocks, single-tree plots, 18 families, 14 x 14 ft spacing with filler trees (final spacing 7 x 7 ft), 2 border rows.

Monumentation: I tagged about every sixth tree in every sixth row throughout the planting, depending on suitability. A metal tag with the source number was wired to a stob at breast height on the south side of the tree. Tagged trees are circled on the source map.

Existing Fall Measurements:
Ht '62, '66, '69, '76
DBH '76

Survival: Overall survival is 90%, but the filler rows have done better than the test rows. Survival of the plot trees is 75%.

Growth: Heights are fairly uniform at 35 feet. Diameters vary from 6 to 12 inches, with most of the trees 8 to 10 inches. Live crown ratio on most trees is about 40%.

Stem Form: Old damage from white pine weevil is common (forking, multiple leaders at 8 to 10 feet). At least half the trees are weevilled.

Damage: White pine blister rust is evident but uncommon in the stand. Perhaps 5% of the trees are infected. There is a grassy opening in the northern few rows of blocks L through P, which appears to be a frost pocket.

Competing Vegetation: None.

Suggested Maintenance: Thin the stand by removing the filler trees.

Other Comments:

G-251 WHITE SPRUCE HALF-SIBS
WABENO PLANTING
Nicolet National Forest
Sec.17, T34N, R16E
Forest Co., Wisconsin

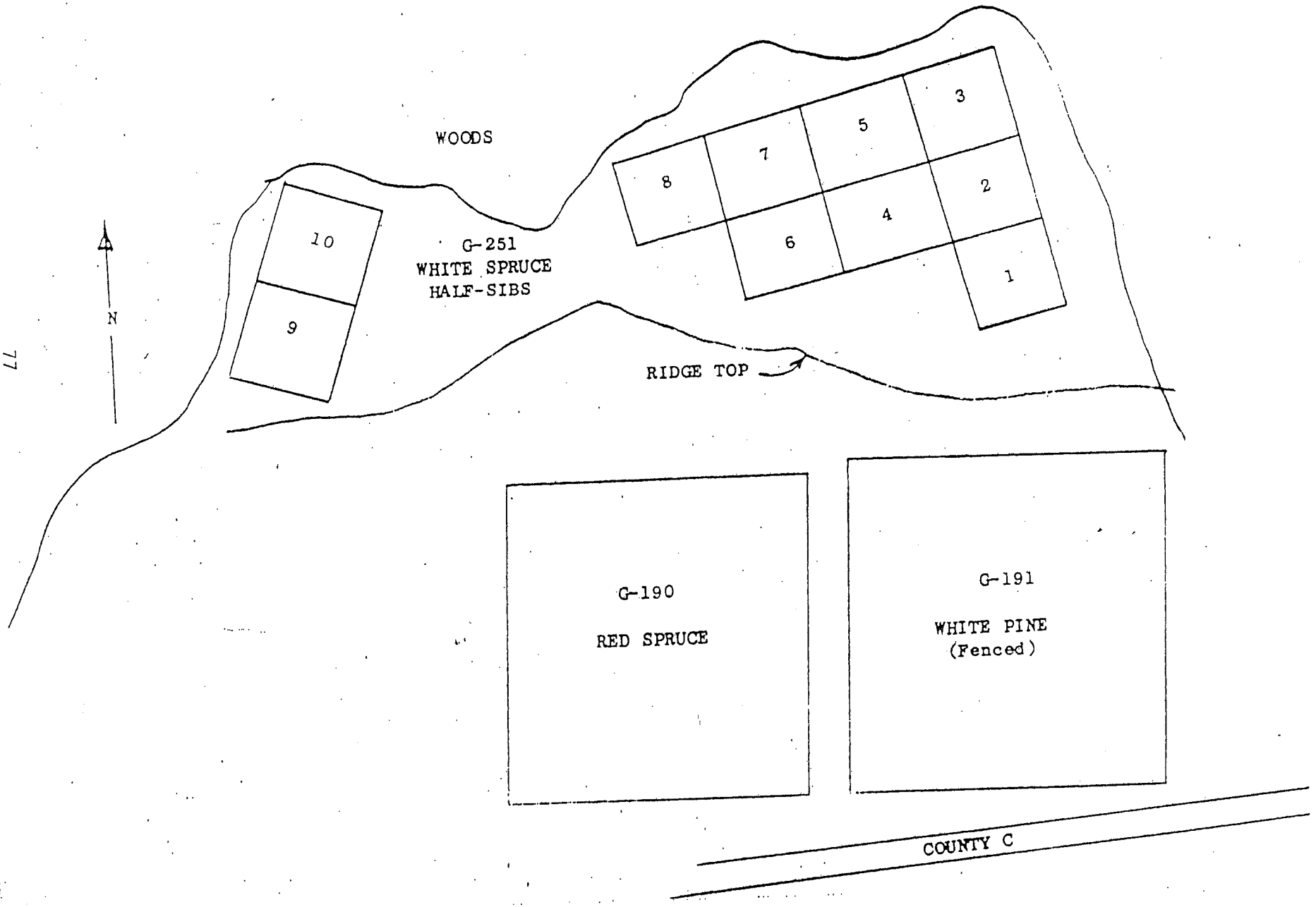


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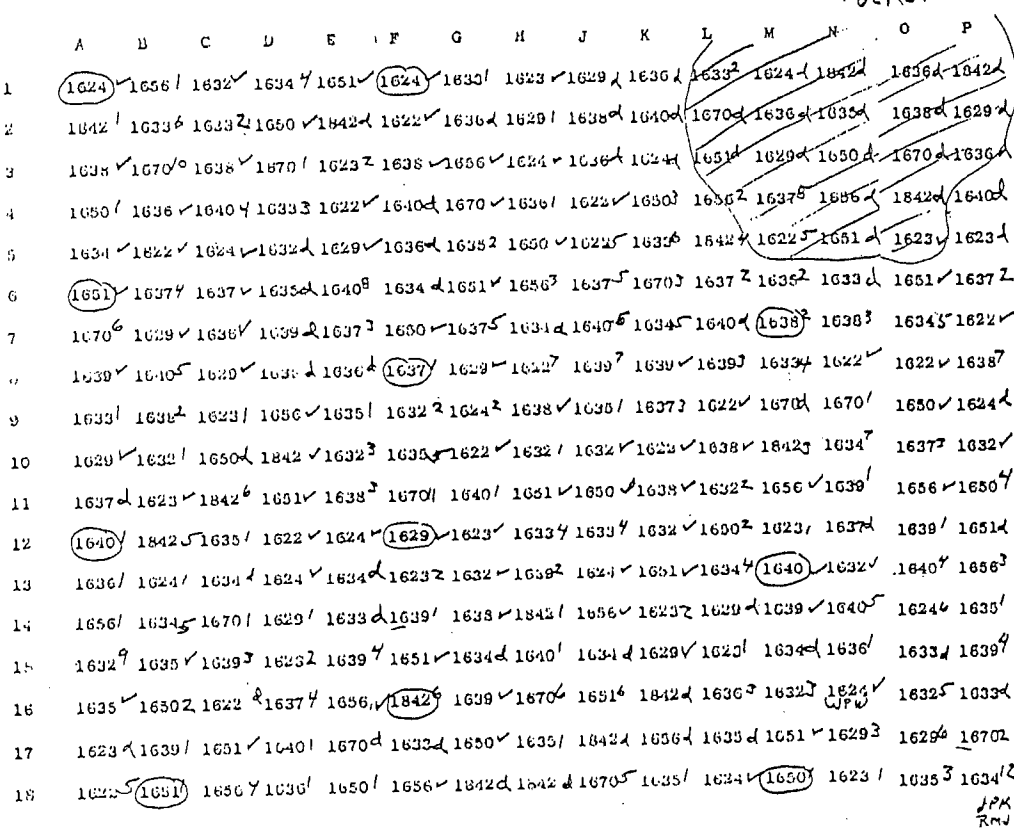
Figure 3

Plantation Layout - Wisconsin
G-191 - Design II - White Pine
Wabeno, Wisconsin - SENE, Sec. 17, T34N, R16E
Forest County, Wisconsin



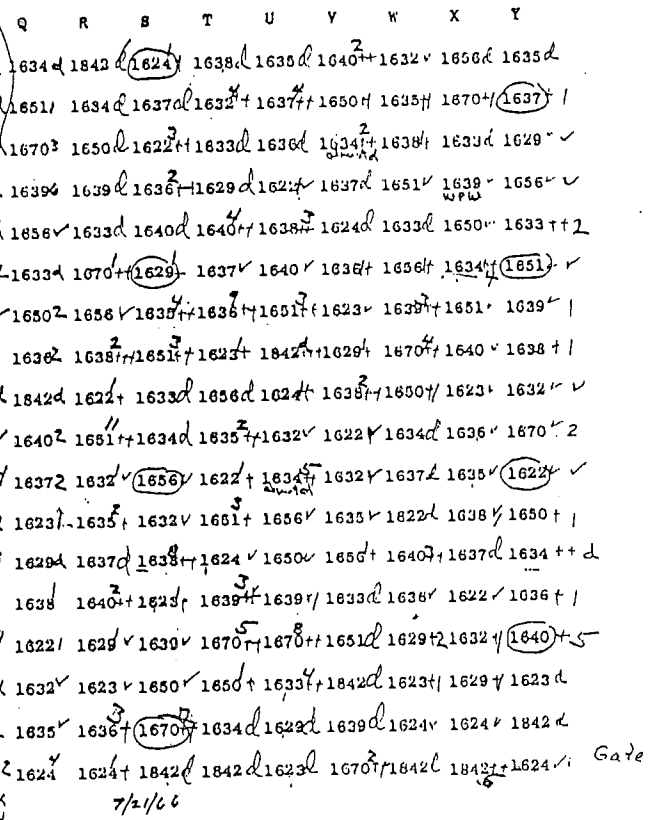
Planted May 14, 1962 with 2-2 stock. Spacing 14' x 14' with filler trees
Border and filler trees of a Rhinelander 1953 seed source.

CIRCLED SOURCE NO. ⇒ TAGGED TREE.

N

Figure 3 (Cont'd.)

Plantation Layout - Wisconsin
G-191 - Design II - White Pine
Wabeno, Wisconsin - SENE, Sec. 17, T34N, R16E
Forest County, Wisconsin



JPK
RMJ

7/21/66
d = dead
✓ = O.K.
3 = # branches removed
WPW = white pine blister rust

Gate

GENETIC RESOURCE EVALUATION

Study No.: G-191 Species: Eastern white pine

Date Established: 5/14/62 Date Evaluated: 6/22/93

Title: Inter-regional provenance study of eastern white pine

Location: Pike Bay Experimental Forest near Cass Lake, Minnesota
Compartment 154, Cass Lake RD, Chippewa NF
NWSE, S31, T145N, R30W, Cass County, Minnesota

Experimental Design: Design II planting - Randomized block, 24 blocks, single-tree plots, 17 families, 14 x 14 ft spacing with filler trees (final spacing 7 x 7 ft), 2 border rows.

Monumentation: The cedar posts used to mark the four corners of the plantation are rotten. I did <u>not</u> tag any trees because poor survival made it very difficult to ascertain seed sources.

Existing Fall Measurements:
Ht '62, '66, '74
DBH '74

Survival: Overall survival is 40 to 50%. Mortality has been patchy resulting in openings which have become quite brushy.

Growth: Growth of these trees has been variable both in diameter and height. While the best individuals have attained a diameter of 14 inches and a height of 50 feet, most are much smaller at about 4 to 6 inches DBH by 35 feet tall.

Stem Form: Most of the surviving trees have the forking and double top characteristic of old white pine weevil injury.

Damage: About 25% of the living trees are afflicted with white pine blister rust. Blister rust is no doubt responsible for much of the mortality in this stand.

Competing Vegetation: Hazel, mountain ash, and aspen are growing vigorously throughout the plantation and reach a height of 15 feet in the patches where pines have died.

Suggested Maintenance: Thinning and cleaning would <u>not</u> help this stand - the vigorous trees are too few and far between.

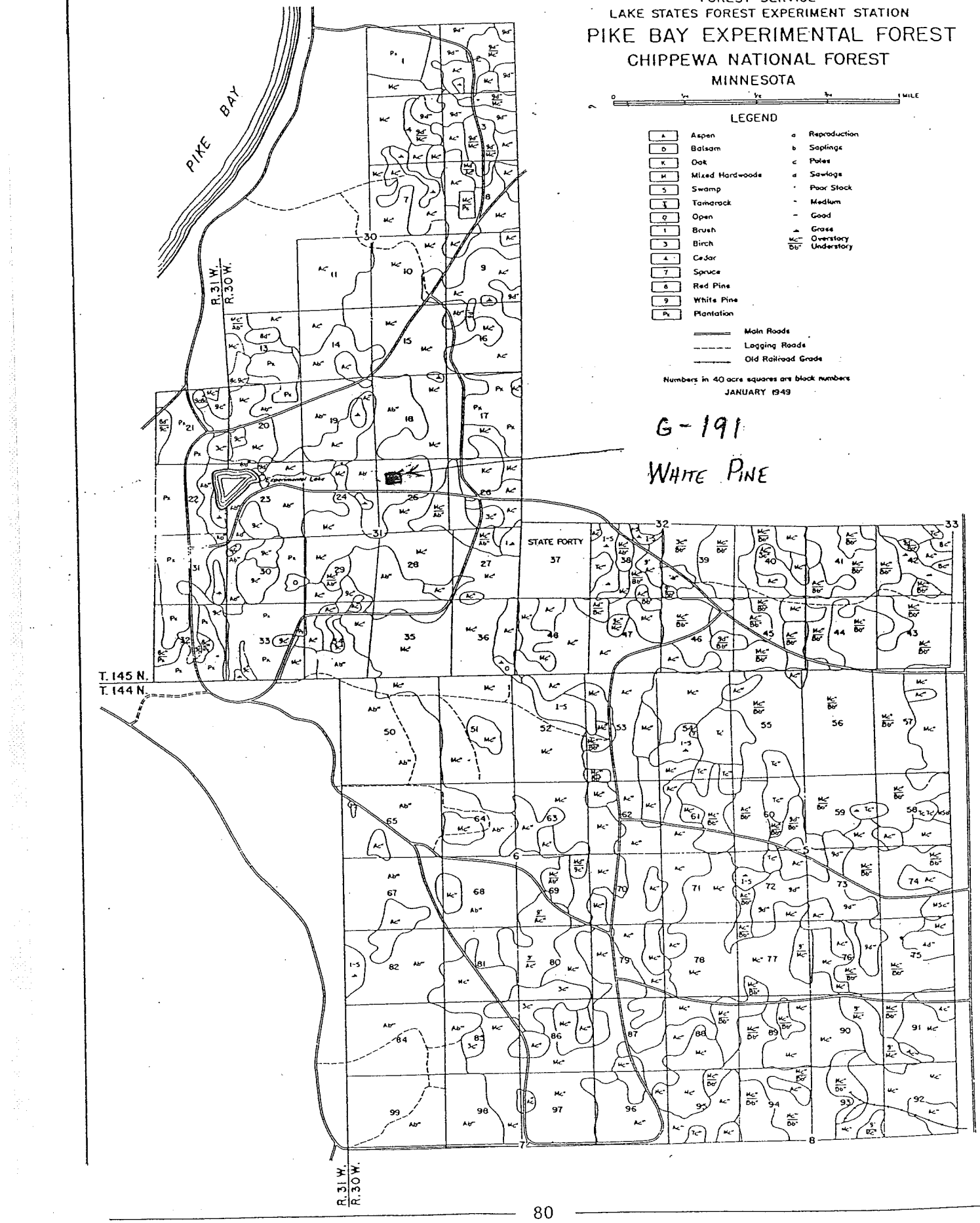
Other Comments: This planting was fenced when young, and the old posts along the south edge of the stand are easily seen from the road as you approach.

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LAKE STATES FOREST EXPERIMENT STATION

PIKE BAY EXPERIMENTAL FOREST

CHIPPEWA NATIONAL FOREST

MINNESOTA



LEGEND

A	Aspen	a	Reproduction
B	Balsam	b	Saplings
K	Oak	c	Poles
M	Mixed Hardwoods	d	Sawlogs
S	Swamp	·	Poor Stock
T	Tamarack	-	Medium
O	Open	–	Good
1	Brush	^	Grass
3	Birch	Mc/Bd	Overstory / Understory
4	Cedar		
7	Spruce		
8	Red Pine		
9	White Pine		
Pl	Plantation		

Main Roads
Logging Roads
Old Railroad Grade

Numbers in 40 acre squares are block numbers

JANUARY 1949

G-191

WHITE PINE

SCS-MILWAUKEE, WIS 1961

General Location, Pike Bay, MN Plantings

NWSE, S31, T145N, R30W

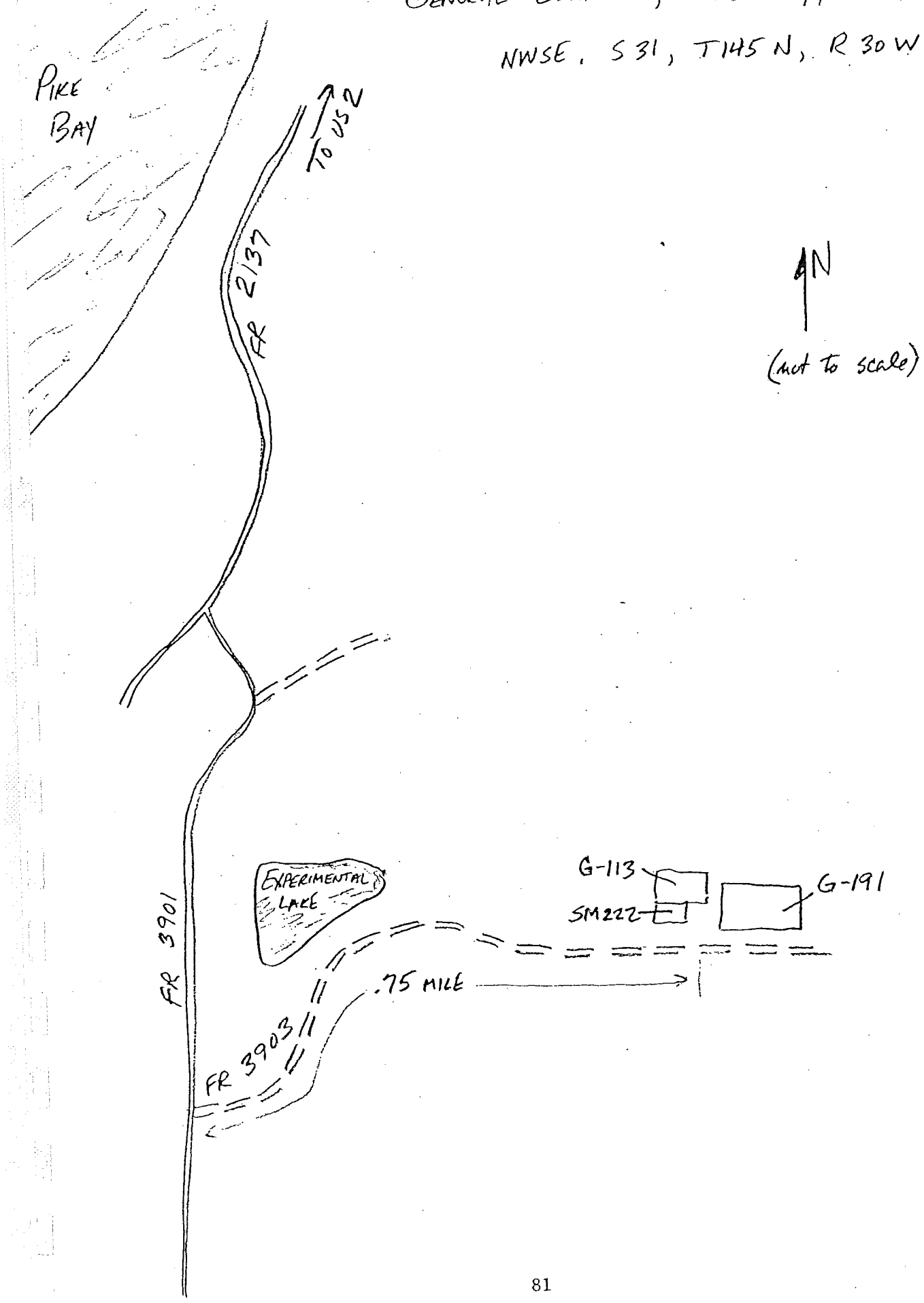


Figure 4

Plantation Layout - Minnesota
G-191 - Design II - White Pine
Pike Bay Experimental Forest - Sec. 31, T145N, R30W
Cass County, Minnesota → N

	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
A	1634	1624	1670	1640	1638	1635	1622	1632	1651	1633	1637	1656	1629	1623	1650	1639	1636
B	1656	1640	1637	1636	1670	1622	1651	1635	1632	1639	1624	1638	1650	1633	1634	1623	162
C	1639	1634	1650	1633	1656	1624	1670	1651	1638	1629	1636	1623	1640	1637	1632	1635	1622
D	1624	1639	1670	1640	1622	1637	1656	1638	1651	1632	1635	1636	1633	1623	1629	1634	165
E	1634	1629	1623	1636	1651	1635	1633	1622	1632	1638	1640	1624	1637	1656	1670	1639	165
F	1656	1623	1622	1636	1633	1629	1634	1624	1670	1639	1632	1637	1650	1638	1640	1635	1651
G	1632	1640	1636	1650	1633	1670	1639	1623	1624	1629	1634	1637	1635	1656	1622	1638	165
H	1622	1640	1624	1639	1633	1670	1637	1632	1656	1638	1635	1651	1634	1629	1650	1623	1636
J	1670	1636	1629	1623	1624	1650	1639	1656	1640	1638	1637	1633	1622	1634	1632	1635	165
K	1650	1640	1639	1633	1636	1629	1623	1634	1624	1637	1622	1635	1632	1638	1651	1670	165
L	1622	1636	1624	1640	1632	1637	1670	1639	1656	1633	1629	1650	1634	1635	1638	1651	1623
M	1638	1637	1635	1622	1670	1639	1656	1640	1651	1623	1624	1633	1650	1634	1629	1636	163
N	1651	1623	1637	1670	1624	1639	1636	1629	1634	1633	1635	1650	1640	1656	1622	1632	1638
O	1636	1638	1635	1640	1632	1637	1622	1639	1656	1670	1651	1624	1623	1629	1633	1634	165
P	1650	1624	1633	1634	1640	1637	1670	1632	1639	1656	1638	1622	1629	1636	1651	1635	162
Q	1670	1624	1637	1656	1640	1638	1622	1651	1635	1632	1650	1633	1639	1629	1623	1634	1636
R	1623	1636	1637	1670	1629	1634	1650	1651	1656	1624	1640	1632	1622	1635	1639	1633	163
S	1638	1640	1656	1639	1622	1637	1624	1670	1650	1632	1633	1651	1635	1623	1629	1634	1636
T	1637	1635	1622	1632	1638	1651	1640	1656	1670	1639	1624	1650	1633	1634	1629	1636	162
U	1640	1622	1638	1635	1632	1656	1637	1624	1650	1636	1670	1639	1629	1633	1634	1623	165
V	1623	1650	1624	1639	1656	1670	1637	1634	1632	1640	1638	1635	1651	1622	1636	1629	1633
W	1633	1623	1650	1624	1639	1670	1637	1636	1634	1629	1640	1622	1656	1638	1635	1651	163
X	1670	1638	1622	1640	1637	1635	1632	1651	1656	1636	1639	1634	1650	1633	1623	1624	1629
Y	1622	1624	1635	1651	1639	1636	1670	1656	1650	1637	1634	1623	1640	1633	1629	1632	163

.t plants planted May 9, 1962 with 2-2 stock. Spacing 14 x 14 feet with filler trees.
Filler trees and borders planted May 14, 1962.
Border and filler trees of an unspecified Northern Minnesota seed source.

GENETIC RESOURCE EVALUATION

Study No.: G-191 Species: Eastern white pine

Date Established: 5/11/62 Date Evaluated: 7/14/93

Title: Inter-regional provenance study of eastern white pine

Location: Pine River Experimental Forest near Cadillac, Michigan
Cadillac RD, Manistee NF
NWSW & SWSW, S10, T21N, R12W, Wexford County, Michigan

Experimental Design: Design II planting - Randomized block, 24 blocks, single-tree plots, 18 families, 14 x 14 ft spacing with filler trees (final spacing 7 x 7 ft), 2 border rows.

Monumentation: Cedar posts mark the four corners of the planting. I tagged about every sixth tree in every sixth row, depending on suitability. (Tagged trees are circled on the planting map.) Source number and row location, e.g. "1629 M12," are indicated on each tag, which is attached to a stob at breast height on the south side of the tree.

Existing Fall Measurements:
Ht '66, '76
DBH '76

Survival: This is the most promising of the white pine plantings I've visited. Overall survival is 80%, although the filler rows did better than the plot rows. Survival of plot trees is 65%.

Growth: Diameter and height are both quite variable in this stand. The smallest pines are 5 inches in diameter by 30 feet in height, the largest are 12 inches by 45 feet. All sizes in between are well represented. Crown ratios range from 30 to 50%.

Stem Form: These are good looking, straight-stemmed trees, with small lateral branches.

Damage: This entire stand seems healthy. I was looking for signs of the common pests of white pine, and could not find them. There is no evidence of either white pine blister rust or white pine weevil.

Competing Vegetation: The understory is clean except for occasional small seedlings of ash, ironwood, red oak, and red maple. These seedlings are less than two feet tall and are concentrated in the 3 or 4 rows nearest the edge of the stand.

Suggested Maintenance: None immediately needed.

Other Comments: There is an unusual bird nesting in the "T12" area which I believe may be a goshawk.

Study G-191 - Design II - White Pine
Pine River Research Forest - SWSW and NWSW Sec. 10, T21N, R12W
Wexford County, Michigan

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

1956 TIMBER SURVEY

MANISTEE NATIONAL FOREST
T. 21 N., R. 12 W. MICH. MER.
WEXFORD COUNTY
MICHIGAN

SCALE
0 ¼ ½ ¾ 1 MILE

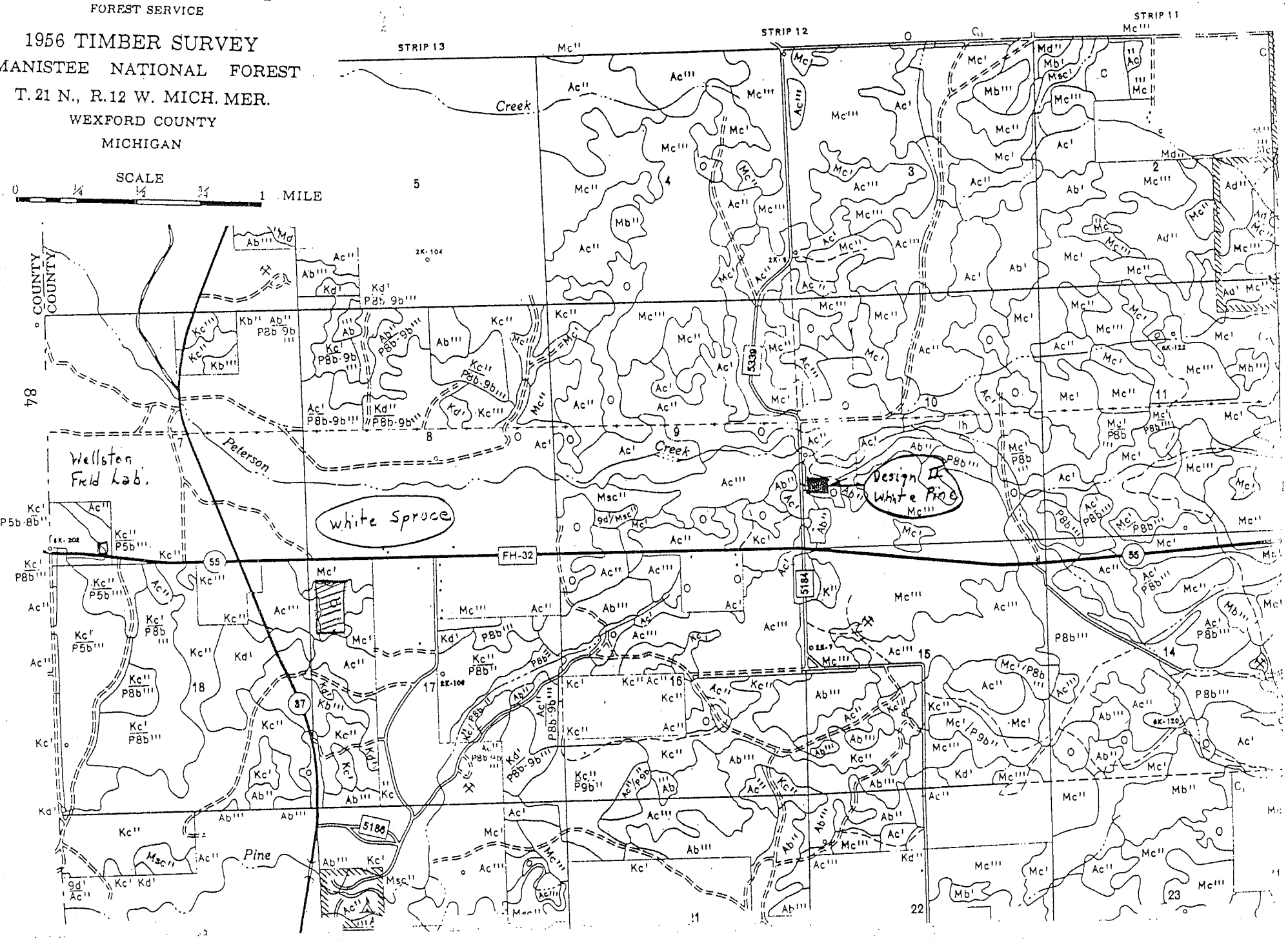


Figure 1

Plantation Layout - Michigan
G-191 - Design II - White Pine

Pine River Research Forest
SWSW and NWSW Sec. 10, T21N, R12W
Wexford County, Michigan

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1670	1632	1639	1651	(1651)	1636	1633	1650		1623	1649	1842	(1637)
2	(1632)	1638	1650	1629	1650	1650	1842	1624		1639	1634	1629	1842
3	1649	1842	1842	1656	1637	1639	1640	1624		1842	1622	1651	1638
4	1623	1636	1623	1634	1635	1629	1623	1629		1651	1842	1637	1632
5	1842	1635	1638	1623	1638	1634	1638	1634		1640	1637	1622	1639
6	1633	1629	1634	1650	1632	1633	(1634)	1656		1624	1632	1632	(1623)
7	(1639)	1637	1636	1637	1622	1656	1650	1632		1670	1638	1638	1670
8	1640	1650	1640	1636	1640	1670	1635	1640		1633	1650	1636	1636
	1656	1633	1650	1670	1629	1624	1637	1633		1634	1623	1656	1656
10	1638	1632	1651	1632	1633	1632	1651	1636		1656	1636	1634	1651
11	1622	1634	1637	1842	1624	1623	1629	1636		1650	1640	1639	1624
12	1637	(1640)	1670	1633	1636	(1842)	1622	1637		1629	1670	1623	(1629)
13	1636	1670	1622	1638	1634	1622	1639	1651		1637	1624	1670	1640
14	1635	1623	1633	1636	1623	1640	1656	1635		1635	1651	1635	1633
15	1651	1639	1629	1639	1639	1651	1624	1639		1638	1656	1650	1634
16	1634	1656	1632	1634	1842	1635	1638	1670		1622	1635	1640	1635
17	1624	1624	1636	1640	1670	1638	1632	1842		1636	1639	1633	1622
18	(1650)	1651	1634	1636	1656	(1637)	1670	1632		1634	1633	1624	(1650)

No Row lettered "I"

Planted May 10, 1962 with 2-0 stock. Spacing 14' x 14' with filler trees.
Border and filler trees of an unspecified Lower Michigan seed source.
CIRCLED SOURCE NUMBERS ⇒ TAGGED TREES.

Figure 1 (Cont'd.)

Plantation Layout - Michigan
G-191 - Design II - White Pine

Pine River Research Forest
SWSW and NWSW Sec. 10, T21N, R12W
Wexford County, Michigan

N ↑

	N	O	P	Q	R	S	T	U	V	W	X	Y
1	1842	1623	1638	1842	1634	1670	1842	1624	1670	1650	1633	(1632)
2	1623	1651	1636	1640	1624	1639	(1650)	1635	1639	1624	1650	1622
3	1639	1842	1632	1851	1651	1624	1636	1637	1623	1640	1634	1638
4	1636	1632	1623	1639	1650	1634	1635	1640	1842	1638	1639	1842
5	1634	1622	1842	1650	1633	1633	1636	1638	1629	1842	1656	1637
6	1670	1640	1634	1633	1670	1636	1632	1670	1624	1632	1636	(1651)
7	1624	1638	1633	1623	1656	(1629)	1622	1632	1651	1656	1651	1635
	1656	1650	1651	1624	1629	1656	1640	1622	1650	1670	1842	1640
9	1629	1635	1637	1632	1639	1650	1634	1638	1638	1636	1638	1650
10	1640	1636	1624	1670	1842	1640	1633	1651	1637	1634	1632	1633
11	1650	1634	1629	1636	1623	1623	1637	1650	1633	1637	1622	(1630)
12	1633	1633	1656	1634	1635	(1651)	1651	1633	1632	1622	1637	1656
13	1635	1637	1636	1629	1640	1635	1629	1623	1622	1623	1635	1634
14	1637	1656	1650	1636	1637	1622	1636	1656	1634	1639	1670	1624
15	1638	1624	1670	1637	1622	1637	1624	1634	1635	1651	1623	1629
16	1622	1639	1640	1656	1638	1632	1639	1629	1656	1633	1629	1670
17	1651	1670	1639	1638	1632	1638	1623	1842	1636	1635	1640	1639
18	1632	1629	1622	1632	1636	1842	(1670)	1639	1640	1629	1624	(1623)

GENETIC RESOURCE EVALUATION

Study No.: CG-361 Species: Eastern white pine

Date Established: Spring, '59 Date Evaluated: 11/21/93

Title: White pine provenance study

Location: Bald Rock Experimental Forest near London, Kentucky
London RD, Daniel Boone NF
Laurel County, Kentucky

Experimental Design: Design III planting - randomized block, 12 blocks, 4-tree row plots, 16 families, 7 x 14 ft spacing with fillers (7 x 7 overall).

Monumentation: None.

Existing Fall Measurements:
Ht '63, '66, '73, '76
DBH '73, '76

Survival: Overall survival is about 40%.

Growth: Diameter varies from 6 to 18 inches, and is evenly distributed across this range. Average diameter is 12 to 14 inches. Heights are fairly uniform at 80 feet. Live crown ratios are 25% of total tree height.

Stem Form: About 15% of the trees fork around 20 feet; I presume this is due to white pine weevil. Most of these pines have self-pruned to a height of 12 or 14 feet, although some retain branch stubs lower on the bole, and others are clear for 20 feet.

Damage: The old weevil injury affecting 15% of the trees is the only damage evident in the stand. No blister rust was found.

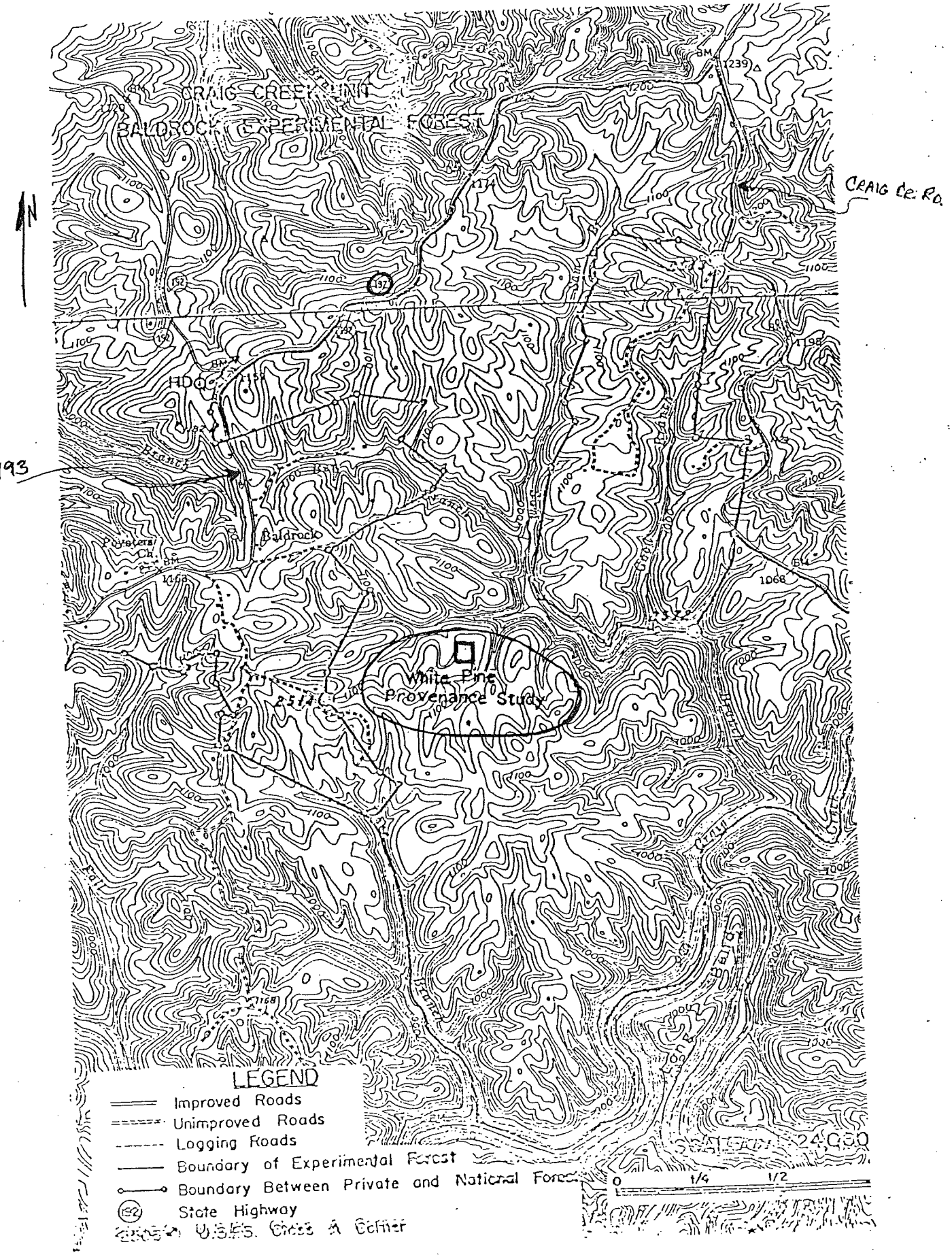
Competing Vegetation: None.

Suggested Maintenance: This stand could use a thinning.

Other Comments: A large reservoir has been created by the Army Corps of Engineers just southeast of this planting. The Bald Rock Experimental Forest is now the Laurel River Lake Recreation Area. Roads have been rearranged a bit since the location map was drawn - new FR 132B dead ends in a loop at the south edge of the planting.

Rows are 14 feet apart - if filler rows were planted, they have since been removed. (No planting map could be found.)

This seems to be a popular spot for campfires and beer.


CRAIG CREEK UNIT
BALDROCK EXPERIMENTAL FOREST
CRAIG CR. RD.
FR 1193
Baldrock
White Pine
Provenance Study
LEGEND
Improved Roads
Unimproved Roads
Logging Roads
Boundary of Experimental Forest
Boundary Between Private and National Forest
State Highway
0
1/4
1/2

GENETIC RESOURCE EVALUATION

Study No.: CG-361 Species: Eastern white pine

Date Established: 3/10/59 Date Evaluated: 1/16/94

Title: White pine provenance test

Location: Hoosier National Forest near Mt. Pleasant, Indiana
Tell City RD, Hoosier NF
NWSE, S11, T5S, R1W, Perry County, Indiana

Experimental Design: Design III planting - randomized block, 12 blocks, 4-tree row plots, 16 families, 7 x 14 ft spacing with fillers (final spacing 7 x 7 ft), 2 border rows.

Monumentation: The four-foot posts originally placed at the east and west ends of each row (inside the border rows) are nearly all present, but deteriorating. About a quarter of the rows contain wooden stakes every four trees; these mark the center of each 4-tree plot.

Existing Fall Measurements:
Ht '63, '64, '68, '73, '76
DBH '76

Survival: About 50% of these trees survive.

Growth: Heights are fairly uniform at 80 feet. Diameters vary from 6 to 19 inches, with most of the trees between 10 and 14 inches. However, 18-inch trees are not uncommon. Live crown ratios are 25 to 35% of total tree height.

Stem Form: Dead limbs persist on nearly all of these pines down to a height of 8 or 10 feet.

Damage: These trees are healthy. I found only one tree with white pine blister rust, and just a few with old weevil injury. Three large pines have recently died of unknown causes. I could not determine whether or not these three were blister rust victims.

Competing Vegetation: None.

Suggested Maintenance: This stand could use a thinning.

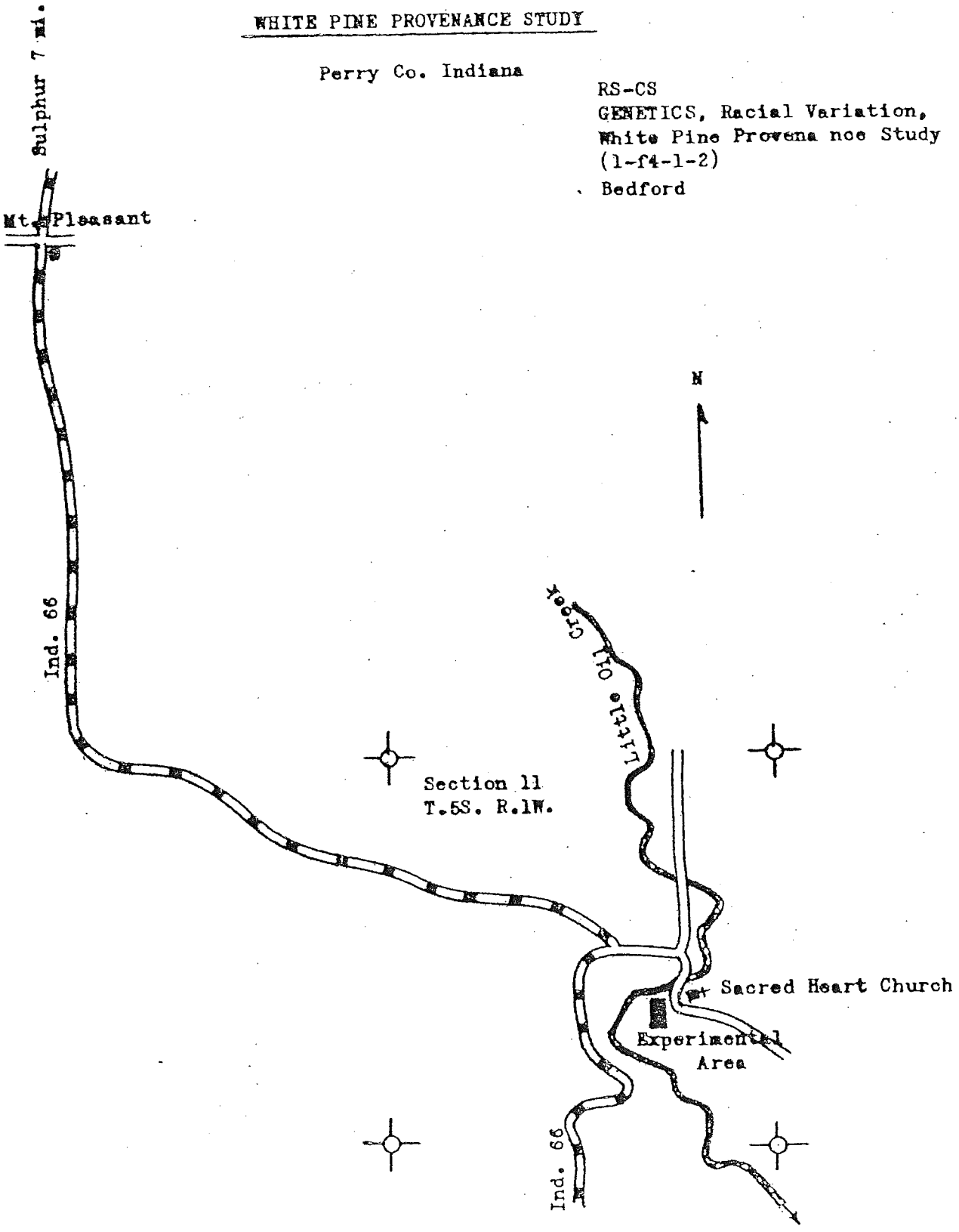
Other Comments:

EXPERIMENTAL AREA LOCATION

WHITE PINE PROVENANCE STUDY

Perry Co. Indiana

RS-CS
GENETICS, Racial Variation,
White Pine Provena noe Study
(1-f4-1-2)
Bedford



Scale 1:24000

Figure 1 89

FBC 2/59

GENETIC RESOURCE EVALUATION

Study No.: CG-361 **Species:** Eastern white pine

Date Established: 3/20/59 **Date Evaluated:** 3/4/94

Title: White pine provenance study

Location: Kaskaskia Experimental Forest, Karbers Ridge, Illinois
Elizabethtown RD, Shawnee NF
SENWNE, S21, T11S, R8E, Hardin County, Illinois

Experimental Design: Design III planting - Randomized block, 12 blocks, 4-tree row plots, 16 families, 7 x 14 ft spacing with fillers (7 x 7 overall), 6 border rows.

Monumentation: Wooden posts 4 inches in diameter mark the center of each 4-tree plot. 95% of these posts are present and solid. About 2/3 of these posts have an embossed tag nailed to the top identifying seed source and replication.

Existing Fall Measurements:

Ht	'64, '66, '68, '76, '78
DBH	'76, '78

Survival: 25% of the study trees remain (12% of total).

Growth: Diameter varies from 10 to 20 inches, with most of the trees between 14 and 16 inches. Height varies from 60 to 75 feet, with most of the trees around 70 feet. Live crown ratios are 40% of t.

Stem Form: These pines are uniformly straight, and nearly all are clear for 12 feet. They may even have been pruned long ago.

Damage: None. This is a good looking stand.

Competing Vegetation: Some dogwood, yellow-poplar, and sassafras saplings can be found in the understory, but they are not bothering these pines.

Suggested Maintenance: None needed.

Other Comments: This plantation was thinned 10 or 15 years ago. Filler rows were removed, and study trees were cut so as to leave the best tree of each 4-tree plot. All border rows remain. (Every tree in the plantation has a white line encircling it at breast height.)

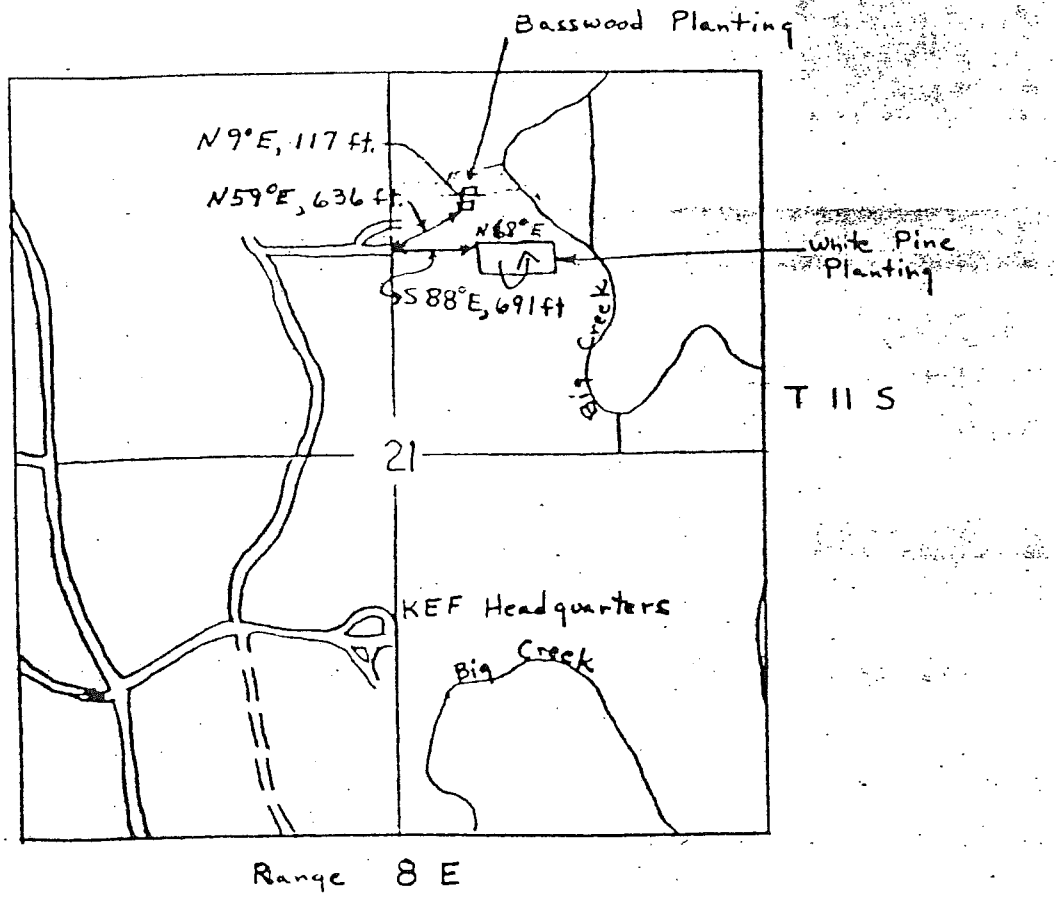


Figure 1. Location of White Pine Provenance Study and Basswood Planting

Figure 3. Diagram of plan for randomized plots and sources.
Carbondale Planting - Design III

Plot																
1	1/ Me*	NC	2/ Mich	Ont*	Tenn*	Va*	W.Va*	NY*	NS*	Que*	Iowa*	Minn*	Penn*	Ohio*	Wisc	Ga*
2	NS*	NY*	Ohio*	Me*	NC	Mich	W.VA	Va	Minn*	Ont*	Iowa*	Tenn*	Ga*	Que*	Penn	Wisc*
3	Ga*	Mich	Minn*	NY*	Iowa*	Me*	Ohio*	Tenn*	Wisc*	Ont*	Va	NS*	Que*	Penn	NC	W.Va
4	Minn	Penn	Va	Ga	Me*	W.Va	NC	Wisc*	NS*	Mich	Ohio	Iowa	Ont*	Que*	NY*	Tenn
5	NS	Va	Penn	NY	Me	Ont*	Iowa	Que	Tenn	W.Va	Ga	Wisc	Minn	Ohio	NC	Mich
6	Ga	Penn	Ont*	Minn	NY	Va	Tenn	Que	NC	Wisc	Mich	W.Va	NS	Me	Ohio	Iowa
7	Iowa	Mich	NC	Me	Que	Minn	Wisc	Ont	Va	NS	Ohio	Penn	Tenn	Ga	W.Va	NY
8	Mich	NC	Ga	Wisc	Penn	Minn	Ont	NS	Me	Iowa	Ohio	NY	Que	Tenn	W.Va	Va
9	Minn	NC	Penn	Ohio	NY	Me	Wisc	Va	NS	Mich	Ont	W.Va	Tenn	Que	Ga	Iowa
10	NC	Va	Ont	NY	Me	Ohio	Iowa	Ga	Tenn	Penn	W.Va	Que	NS	Mich	Wisc	Minn
11	Mich	W.Va	NS	NY	Iowa	Ohio	Ont	Que	Me	Penn	Minn	Tenn	Wisc	Va	NC	Ga
12	Tenn	Minn	Iowa	Ont	Penn	Wisc	Mich	W.Va	Me	Ga	NS	Va	Que	NC	Ohio	NY

Hedge

Slope

1/ All plots with "*" were planted with cull planting stock.
2/ Michigan source will not be planted in 1959.

GENETIC RESOURCE EVALUATION

Study No.: CG-361 Species: Eastern white pine

Date Established: 5/6/59 Date Evaluated: 3/9/94

Title: White pine provenance study

Location: Yellow River State Forest near McGregor, Iowa
NWSW & SENE, S6, T96N, R3W; and SESE, S35, T97N, R3W, Allamakee County, Iowa

Experimental Design: Design IV planting - randomized block, 4 blocks, 16 families, 81-tree plots (9 x 9 trees square), 7 x 7 ft spacing.

Monumentation: Original 2 x 2 posts, 4 feet high, mark about 5% of plot corners.

Existing Fall Measurements:
Ht '63, '64, '68, '74
DBH '74

Survival: Survival is about 40%, the mortality being evenly distributed throughout the stand.

Growth: Diameters vary considerably from 6 to 18 inches, with most of the trees between 10 and 14 inches. Heights range from 65 to 80 feet, the taller heights tending to be correlated with the larger diameters. Live crown ratios range from 10 to 35%.

Stem Form: Most of these pines have self-pruned to a height of 12 feet, and many (especially in Block 1) are clear for 25 feet or more. About 10% of these pines have the forked top characteristic of old weevil infestation; the forking generally occurs at 30 feet or higher.

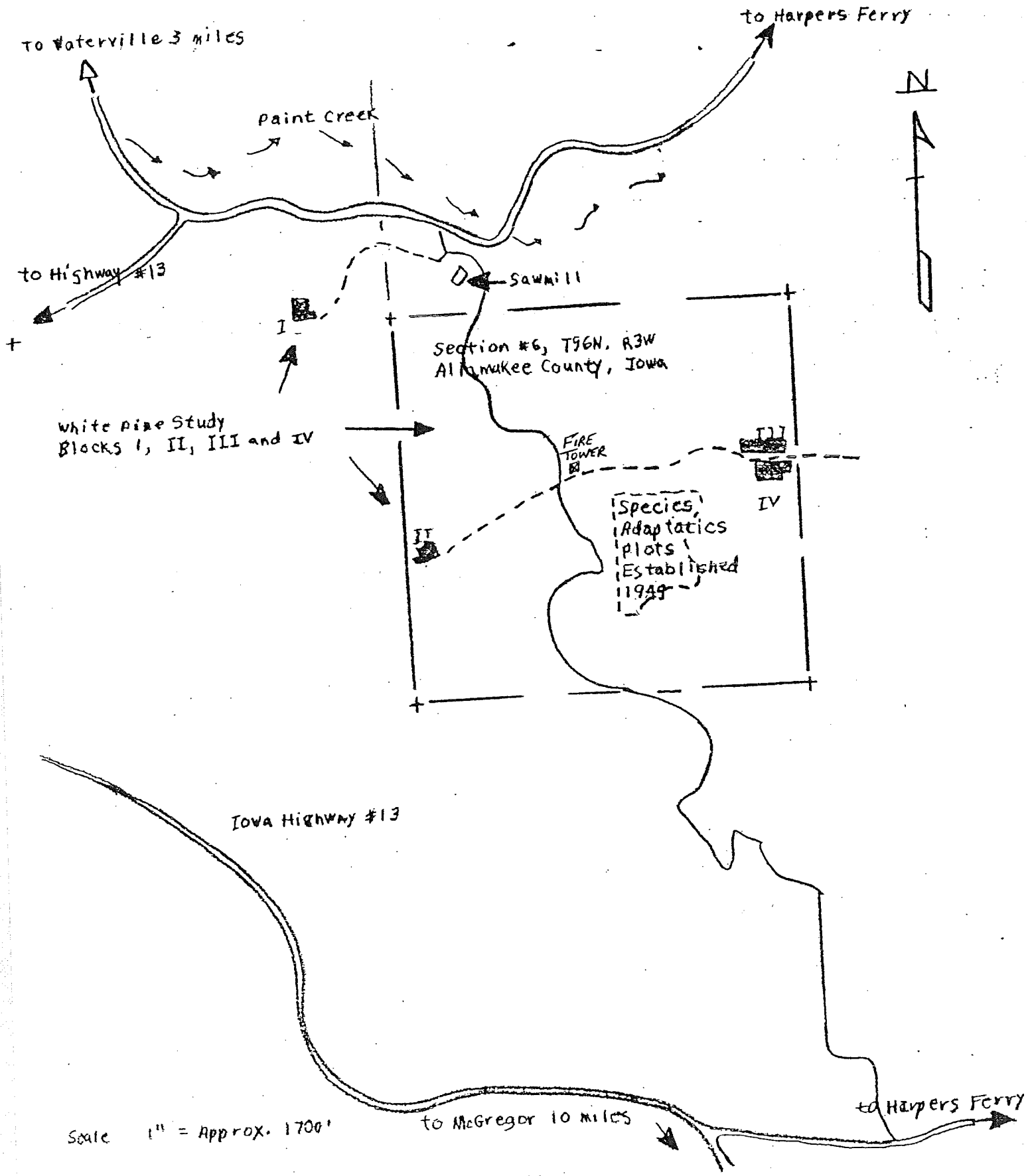
Damage: About 10% of the trees appear to have been attacked by white pine weevil many years ago. Another 5% are infected with white pine blister rust. There are many large dead trees throughout this plantation, some standing, some leaning, some down. Suppression alone would have taken these trees at a younger age - perhaps blister rust has been working here.

Competing Vegetation: None.

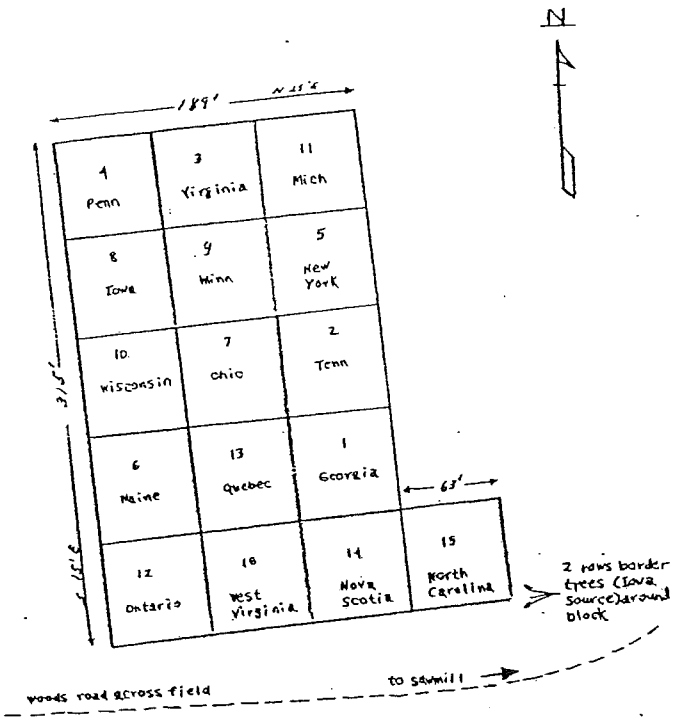
Suggested Maintenance: This stand needs to be thinned.

Other Comments: Planting blocks are widely separated along a ridgetop ski trail. The distance from Block 1 to Blocks 3 and 4 is about 1 1/2 miles. In winter months, bring your skis. Bob Honeywell at the Iowa DNR office can provide topo maps and directions.

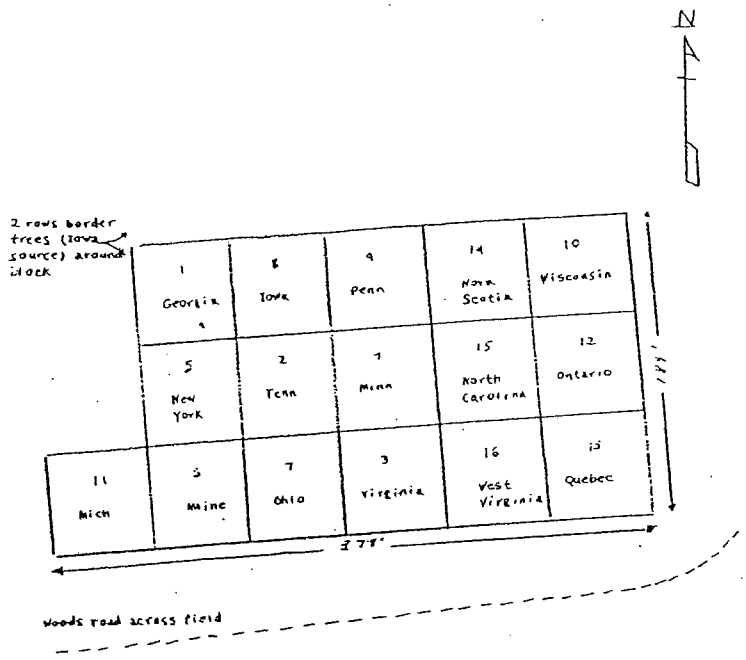
General location of White Pine Provenance
Plots at Yellow River State Forest
Near McGregor, Iowa
(Design IV)



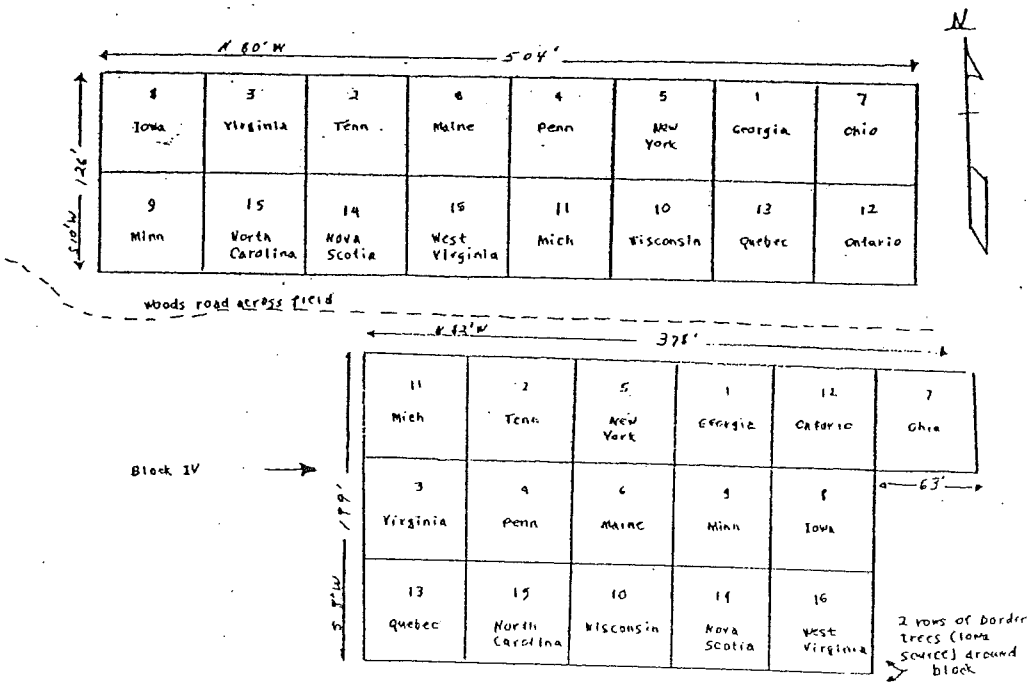
WHITE PINE PROVENANCE BLOCK I SHOWING SEED SOURCE PLOTS



WHITE PINE PROVENANCE BLOCK II SHOWING SEED SOURCE PLOTS



WHITE PINE PROVENANCE BLOCKS III AND IV SHOWING SEED SOURCE PLOTS



GENETIC RESOURCE EVALUATION

Study No.: 77-07 **Species:** Black walnut

Date Established: 4/13/77 **Date Evaluated:** 1/19/94

Title: The effects of genotype and nursery environment on the survival and growth of black walnut plantations

Location: Coulee Experimental Forest near LaCrosse, Wisconsin
SWNW & NWNE, S30, T16N, R5W, LaCrosse County, Wisconsin

Experimental Design: Randomized block, 5 blocks, 10-tree plots (split-plot design), 10 families, 10 x 10 ft spacing, 2 border rows. Blocks 1 & 2 straddle an east-facing draw; blocks 3, 4, & 5 planted 1/4 mile north on southwest-facing bench.

Monumentation: None. Blocks 3, 4, and 5 can be easily counted and marked - frozen ground prevented me from marking block corners. Blocks 1 & 2 are missing some rows along the southern edge making seed source identification difficult.

Existing Fall Measurements:
Ht '77, '80
DBH

Survival: Overall survival in blocks 1 & 2 is about 70%. Survival is very good in the center but a few rows seem to be missing along the southern edge of the two blocks. Survival is better in blocks 3, 4, & 5 at about 85%.

Growth: In blocks 1 & 2, diameters are evenly distributed from 1 to 5 inches, with heights ranging from 8 to 30 feet. Growth has been better in blocks 3, 4, & 5, with most trees 4 to 5 inches in diameter and 20 to 30 feet tall. The largest tree is 6 inches DBH and 35 feet tall. Live crown ratio for all blocks is 50 to 60%.

Stem Form: Most of these walnuts branch low, although a few are clean for ten feet. This trait seems to be correlated with seed source.

Damage: Basal cankers/cracks are present on about 75% of the larger trees in blocks 1 & 2. These do not have the annual callus growth characteristic of *Nectria*, and most are located on the south side of the bole.

This same injury is present in blocks 3, 4, & 5 on only about 10% of the trees.

Competing Vegetation: Sumac, *Rosa*, *Rubus*, and goldenrod are present throughout all blocks, reaching their heaviest concentrations along the north and south edges of blocks 1 & 2 where walnut survival has been poorest.

Suggested Maintenance: Blocks 1 & 2 need to have the understory cleaned up, while blocks 3, 4, & 5 need no treatment.

Other Comments:

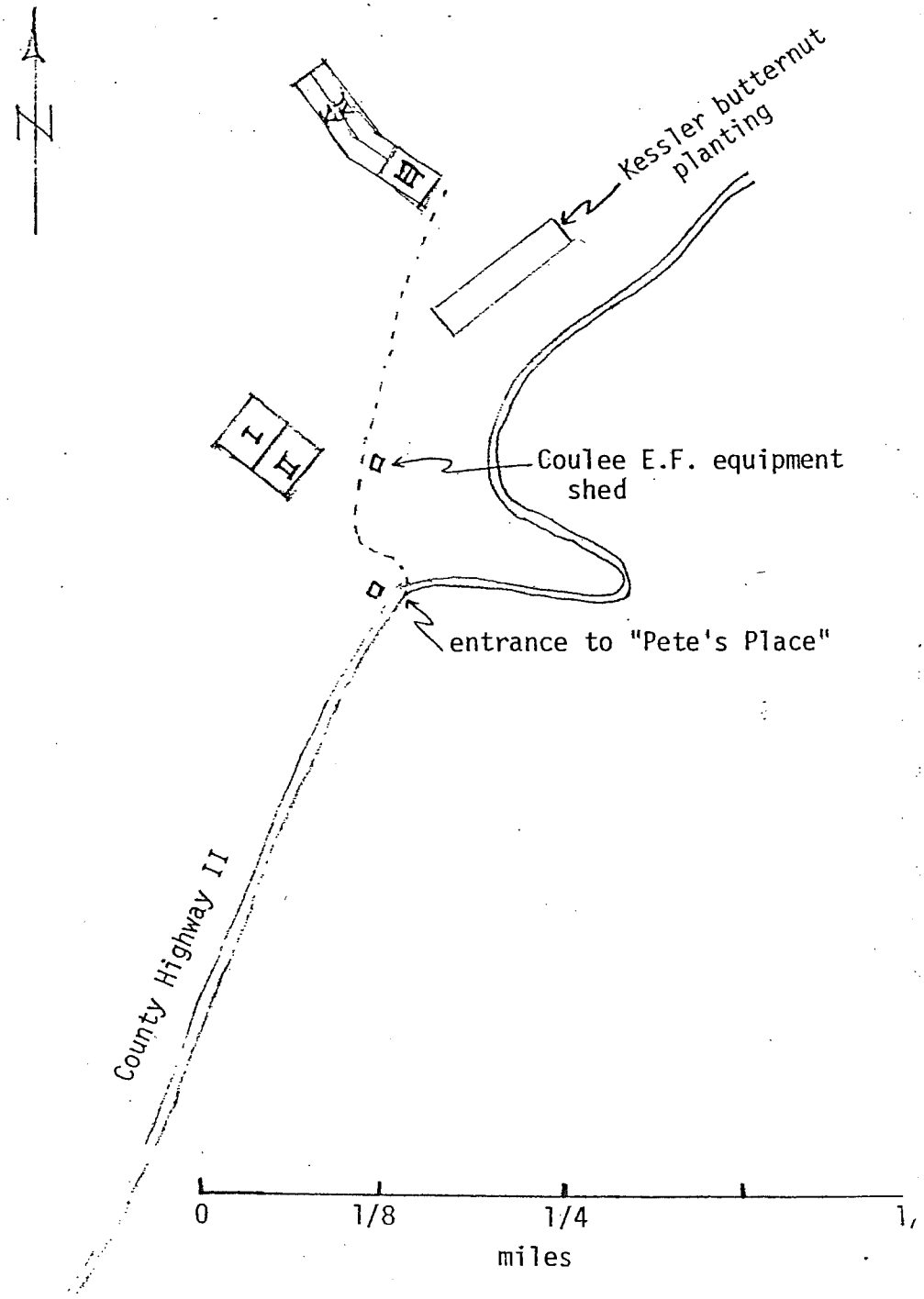


Figure 2.--Proximity map.

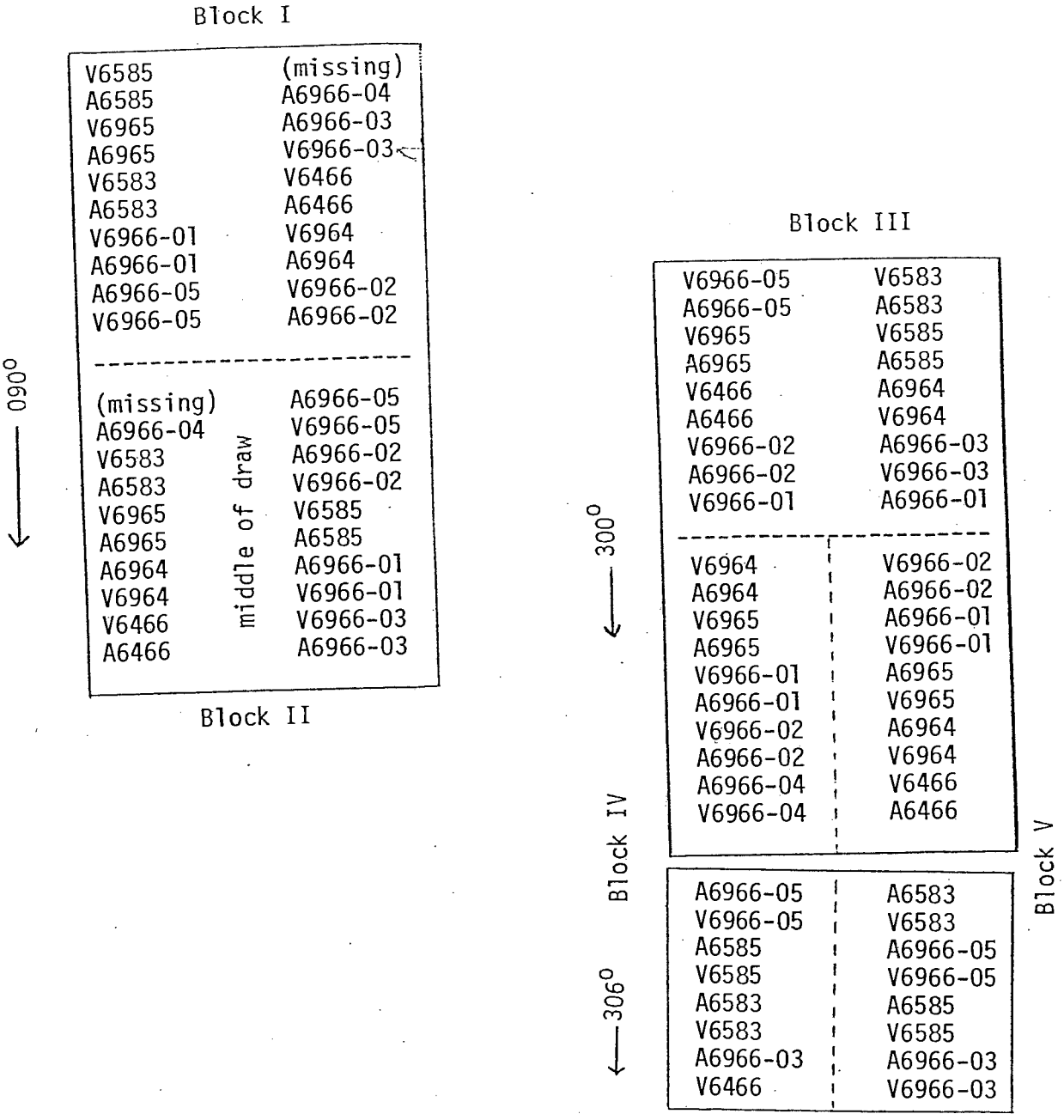


Figure 3.--Schematic layout of field plots.

GENETIC RESOURCE EVALUATION

Study No.: 77-07 Species: Black walnut

Date Established: 4/13/77 Date Evaluated: 1/17/94

Title: The effects of genotype and nursery environment on the survival and growth of black walnut plantations

Location: "Rock Springs Center" County Park, Decatur, Illinois
SWNW, S20, T16N, R2E, Macon County, Illinois

Experimental Design: Randomized block, 5 blocks, 10-tree plots (split plot design using 5-tree subplots), 10 families, 10 x 10 ft spacing, 2 border rows.

Monumentation: Original 2 x 2 wooden posts remain at the outside end of most plots. These posts do not have tags to indicate seed source number.

Existing Fall Measurements:

Ht	'77, '78, '80, '81
DBH	'80, '81

Survival: Generally, survival has been poor throughout most of the planting, and seems to vary among blocks. In block I, survival is 25%, Block II has 50% survival, and in Block V, survival is less than 10%. Blocks III and IV did considerably better, with approximately 80% of the trees surviving.

Growth: 70% of these trees are only 1 inch in diameter and 5 feet in height, or less. Another 20% are 2 inches DBH by 10 feet tall. The remaining 10% (located in Block IV) are about 3 inches DBH by 15 feet tall. The best specimen is 5 inches in diameter and 20 feet in height.

Stem Form: Most of these walnuts have a limby, open-grown form. The smaller ones are stunted and bushy due to repeated browsing by deer.

Damage: All but the largest of these trees have severe browse and rub damage. The small trees have a bushy form and have clearly been nipped back, year after year, by deer. The nipped twigs have the rough, torn end characteristic of deer browse, as opposed to other browsers. Mechanical cankers are common throughout the planting, likely caused by bucks in rut.

Competing Vegetation: Brome grass grows throughout the planting reaching a height of three feet. *Rosa* and *Rubus* are common. Occasional oaks (*Q. imbricaria* and *Q. rubra*) are much larger than the walnuts.

Suggested Maintenance: Most of this plantation is beyond help. However, Blocks III and IV could be salvaged with understory control.

Other Comments: Paul Marion is the District Conservation Forester in charge of the park. He has all the records concerning the planting, and he hopes further research will be done with these trees. The open area surrounding this plantation is managed with fire as a prairie habitat.

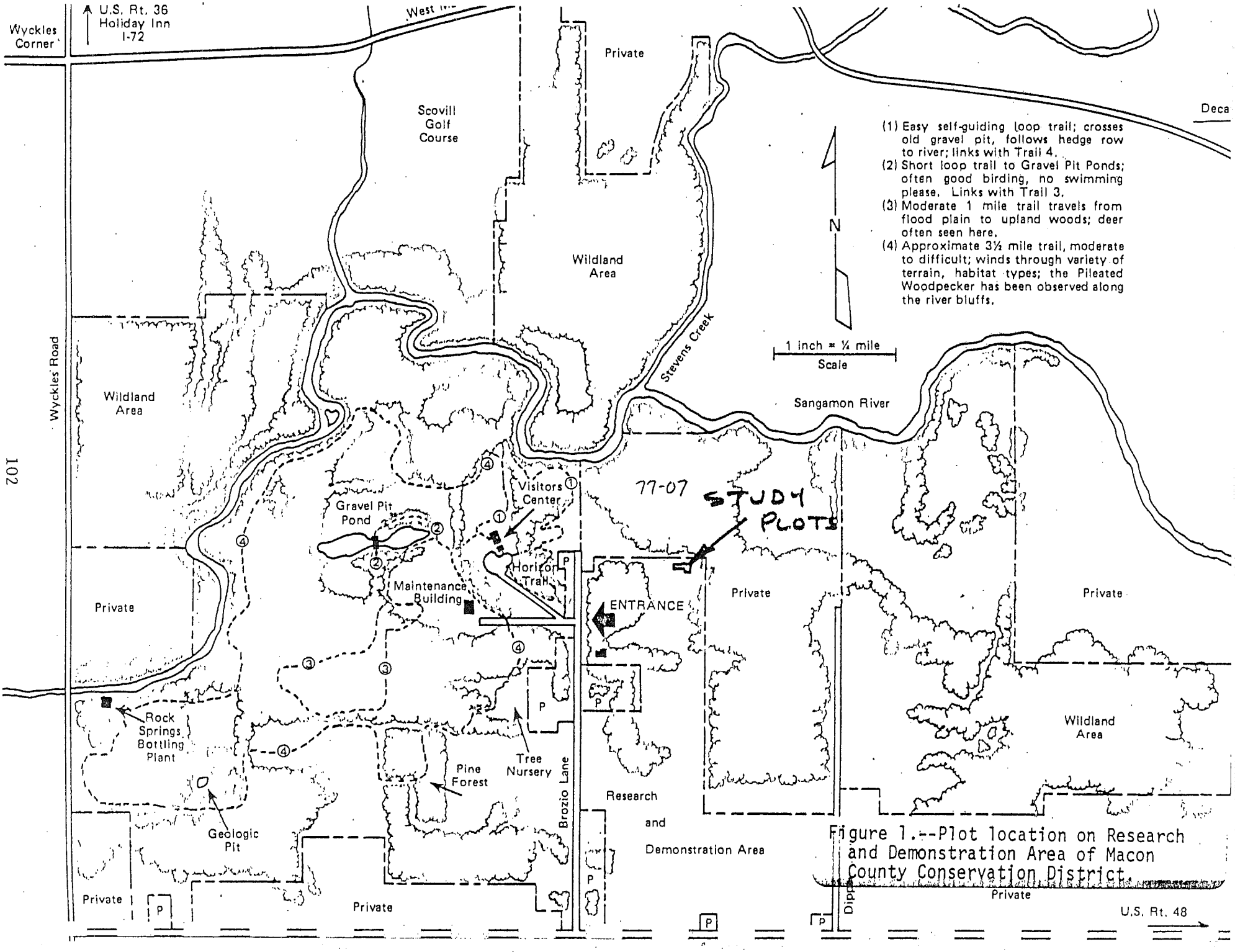


Figure 1.--Plot location on Research and Demonstration Area of Macon County Conservation District.

77-07
DECATUR, ILL

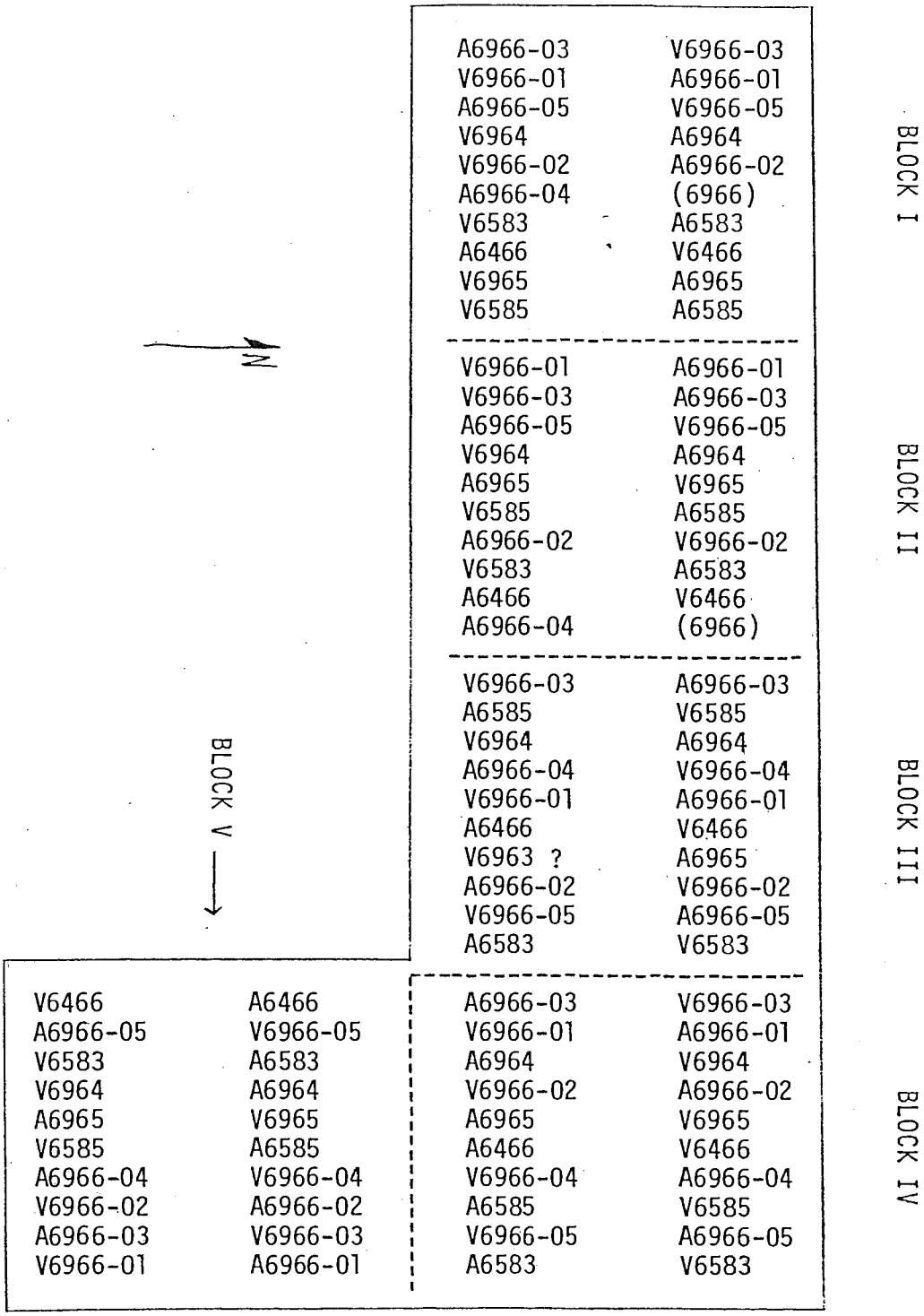


Figure 2.--Schematic layout of field plots.

GENETIC RESOURCE EVALUATION

Study No.: 77-07 Species: Black walnut

Date Established: 3/22/77 Date Evaluated: 11/22/93

Title: The effects of genotype and nursery environment on the survival and growth of black walnut plantations

Location: Standing Stone State Park near Livingston, Tennessee
Overton County, Tennessee

Experimental Design: Randomized block, 5 blocks, split-plot design with 5-tree subplots, 10 families, 10 x 10 ft spacing.

Monumentation: None.

Existing Fall Measurements:
Ht '78, '81
DBH '78, '81

Survival: This plantation no longer exists.

Growth:

Stem Form:

Damage:

Competing Vegetation:

Suggested Maintenance:

Other Comments: According to Carl Smith, a forestry technician at the park who helped plant these trees, they were hit hard by disease. Survival was so poor that the entire planting was subsequently cleared. The ridge road now ends in a 10-acre clearing where the plantation used to be.

Two other black walnut plantations are located nearby on the same ridge. Neither of these matches the layout or the marked location of the 77-07 planting. A sign indicates that these were planted in '76.

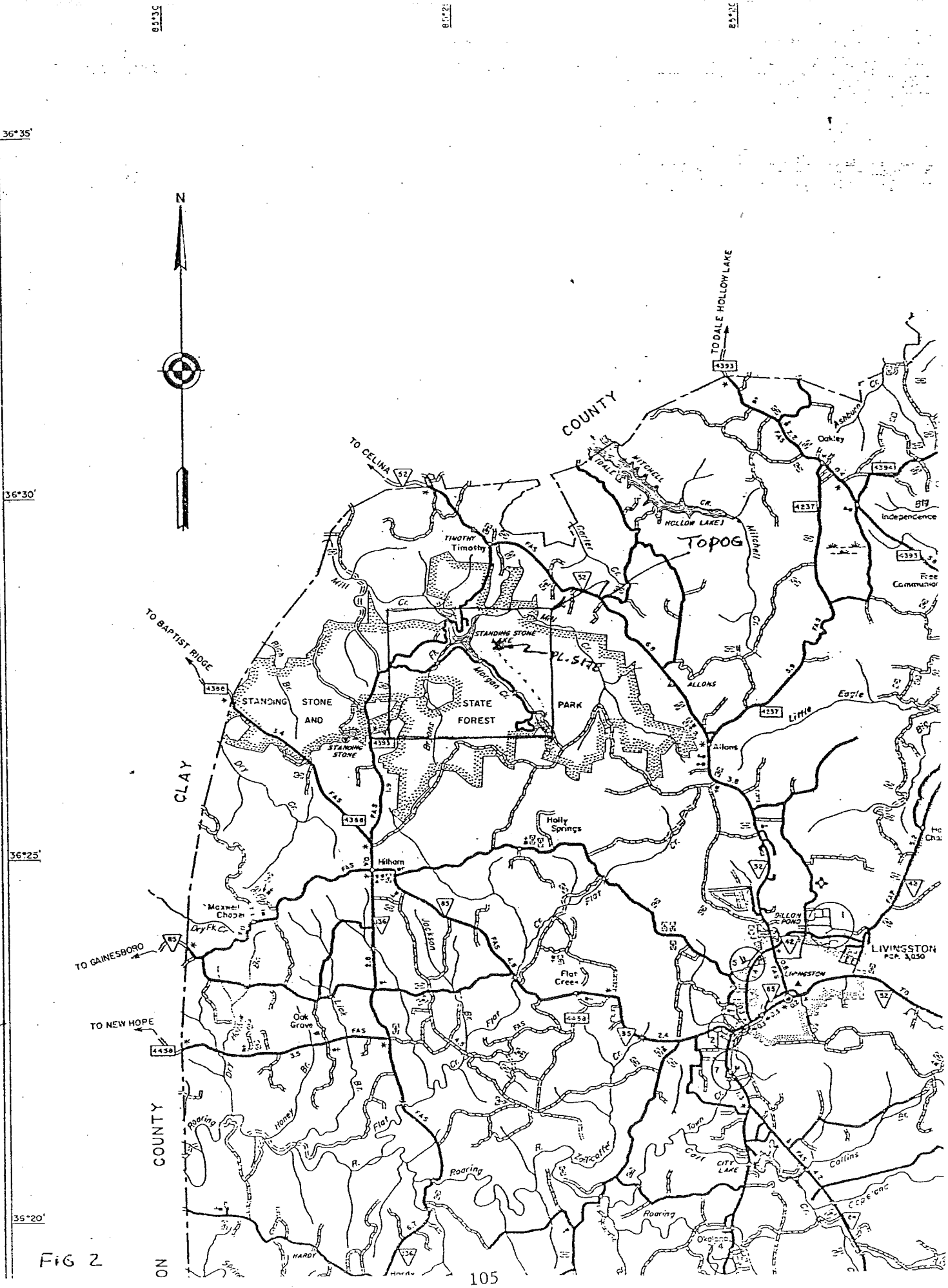
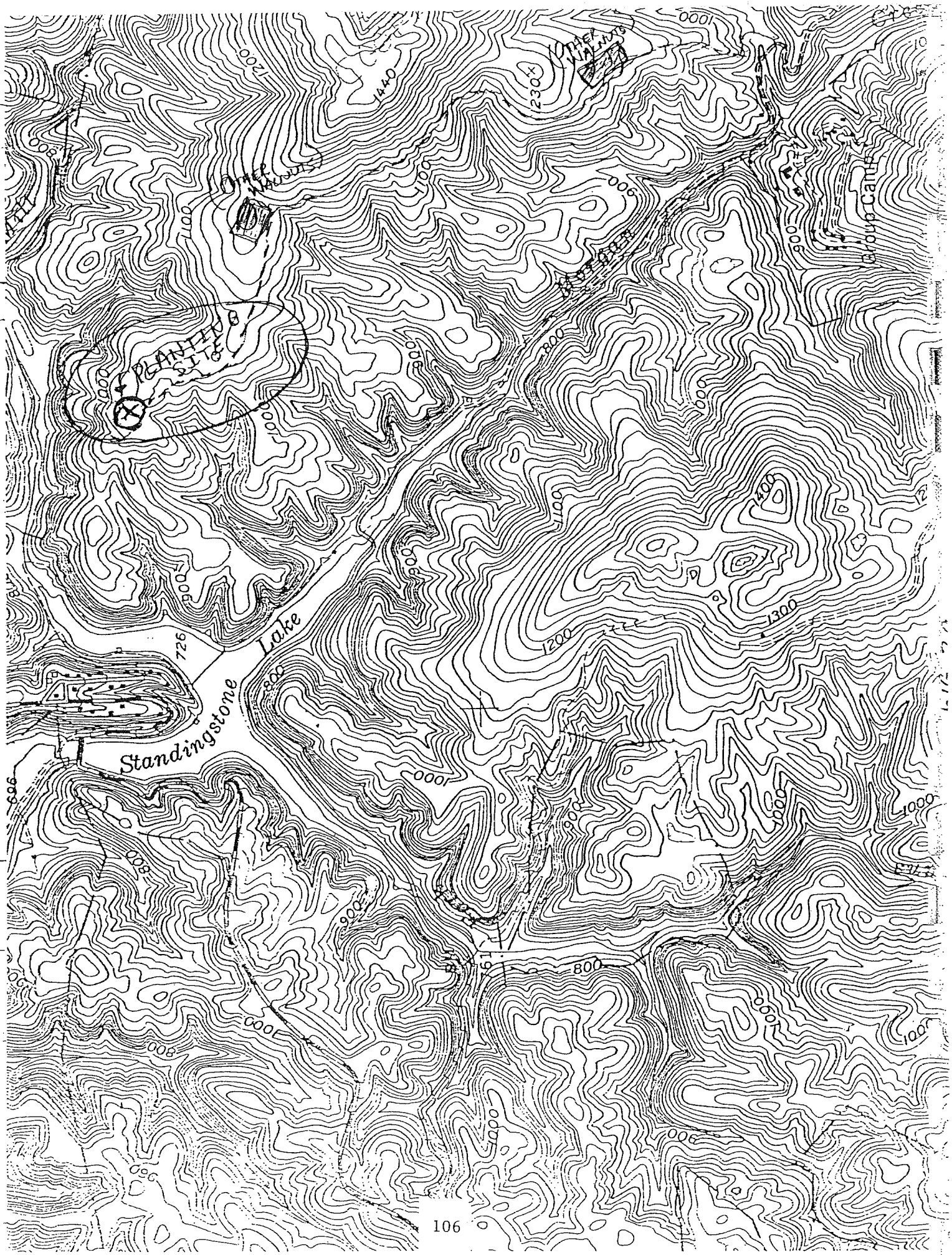

36°35'
36°30'
36°25'
36°20'
N
TO DALE HOLLOW LAKE
4393
COUNTY
TO CELINA
52
TIMOTHY
Timothy
MILL
CR.
HOLLOW LAKES
MITCHELL
CR.
Topog
Ashburn
Oakley
4394
4237
Big
Independence
Free
Communior
TO BAPTIST RIDGE
4396
STANDING
STONE
AND
STATE
FOREST
PARK
PL. STAT
STANDING STONE
Morgan Cr.
Allons
Eagle
Little
Big
CLAY
4398
4393
Holly
Springs
Hilham
Maxwell
Chapel
TO GAINESBORO
85
TO NEW HOPE
4438
Oak
Grove
Flat
Creek
DILLON
POND
LIVINGSTON
POP. 3,050
Roaring
Honey
Flat
R.
Town
Creek
CITY
LAKE
Collins
Cr.
Roaring
Oakland
HARDY
Hardy
COUNTY

FIG 2


PLANTED SITE
OTHER WALNUTS
OTHER WALNUTS
Standingstone
Lake
Bayou Camp
1440
1230+
1300
1200
1000
800
726

STANDING STONE STATE PARK

PLANTING DIAGRAM

PLANTED 3/22/77

N

BLOCKS

Field	And.	Val.
I	3	4
II	5	3
III	2	1
IV	4	2
V	1	5

I
- A 6965 V 6965
- V 6966-03 A 6966-03
- A 6964
- V 6583
- A 6966-05
- V - FILLER - A 6966-04
- V 6966-01
- A 6966-02
- A 6585
- V 6466

II
- V 6965
- V 6966-01
- V 6966-05
- A 6966-02
- A 6466
- V 6964
- V 6585
- A 6966-03
- A 6966-04 V FILLER
- V 6583

III
- V FILLER A 6966-04
- A 6466
- A 6966-02
- V 6585
- V 6964
- A 6966-05
- V 6965
- V 6583
- A 6966-01
- A 6966-03

IV
- V 6466
- V FILLER A 6966-04
- A 6585
- A 6966-05
- V 6966-01
- A 6965
- V 6964
- A 6585
- V 6966-03
- V 6966-02

V
- A 6966-01
- V 6966-03
- V 6966-05
- A 6585
- V 6964
- A 6583
- A 6965
- V 6966-02
- V 6466
- V FILLER A 6966-04

ROAD

FIG. 3

GENETIC RESOURCE EVALUATION

Study No.: 77-07 Species: Black walnut

Date Established: 3/17/77 Date Evaluated: 1/15/94

Title: The effects of genotype and nursery environment on the survival and growth of black walnut plantations

Location: Kimball Int. Corp. land near Trinity Springs, Indiana
SWNW, S28, T4N, R3W, Martin County, Indiana

Experimental Design: Randomized block, 5 blocks, 10-tree plots (split-plot design: 5-tree linear subplots), 10 families, 10 x 10 ft spacing, 2 border rows.

Monumentation: Wire pins with embossed metal tags mark about 20% of the plots. This is a confusing layout with an ambiguous map.

Existing Fall Measurements:
Ht '77, '78, '79, '81
DBH '81

Survival: Survival is about 70%.

Growth: Trees in the northern 2/3 of the planting are 1 to 3 inches in diameter and 8 to 16 feet tall. Trees in the southern 1/3 of the planting are larger, averaging 5 inches in diameter and 25 to 35 feet in height. The largest walnut is 7 inches DBH and 40 feet in height. Live crown ratios are 60% on the smaller trees and 40% on the larger ones.

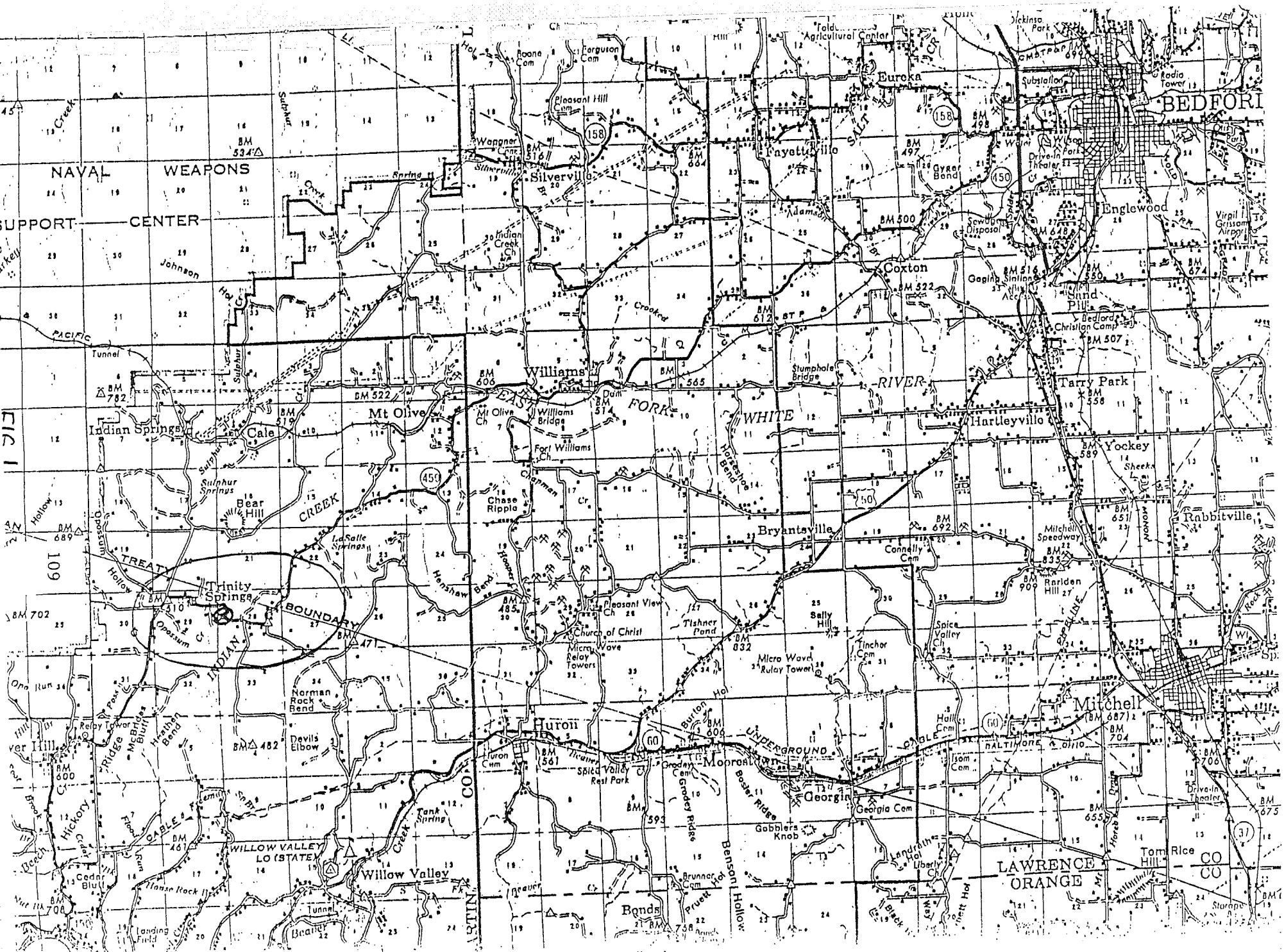
Stem Form: The southern blocks containing the larger trees were pruned to a height of 12 feet, and in some cases 16 feet, about 8 years ago. The northern blocks with the smaller trees have not been pruned and are bushy in form.

Damage: No pest or disease problems are evident.

Competing Vegetation: Perennials include *Rosa*, *Rubus*, and various vines. The vines are causing problems for a few of the smaller trees. Hackberry and boxelder saplings up to 5 inches in diameter are encroaching along the western side of the plantation.

Suggested Maintenance: Remove the competing vegetation.

Other Comments: Finding this plantation is confusing because Highway 450 has been relocated. The new bridge over Indian Creek is in the same location as the old one, but the highway has been moved a quarter of a mile to the north. There is a road that goes south from the east end of the bridge approach - this is the old highway and will lead one to the stand.


NAVAL WEAPONS
SUPPORT CENTER
Eureka
Fayetteville
Silverville
Englewood
Coxton
Williams
Mt Olive
Indian Springs
Cale
Bear Hill
Trinity Springs
Bryantsville
Hartleyville
Yockey
Tarry Park
Rabbitville
Mitchell
Huron
Willow Valley
Bonds
Georgia
Moorestown
LAWRENCE
ORANGE
CO
CO
EAST FORK WHITE RIVER
INDIAN CREEK
BOUNDARY
TREATY
CABLE
UNDERGROUND CABLE
Pacific Tunnel
Sulphur Springs
Norman Rock Bend
Devils Elbow
Hickory Ridge
McBride Bluff
Heathen Bend
Willow Valley Lo (State)
Tank Spring
Benson Hollow
Boster Ridge
Gabblers Knob
Georgia Cem
Church of Christ
Micro Wave Relay Towers
Micro Wave Relay Tower
Spice Valley Rest Park
Spice Valley Ch
Tishner Pond
Sally Hill
Tinchor Cem
Pleasant Hill Cem
Pleasant View Ch
Fort Williams Ch
Mt Olive Ch
Williams Bridge
Stumphole Bridge
Chase Riffle
Horseshoe Bend
Henshaw Bend
Hoover Bend
Chapman Cr
LaSalle Springs
Connelly Cem
Mitchell Speedway
Rariden Hill
Sand Pit
Bedford Christian Camp
Gaglin Simlton Acc
Sewage Disposal
Drive-in Theater
Radio Tower
Substation
Old Agricultural Center
Dickinson Park
Virgil I Grissom Airport
Tom Rice Hill
Storage
Landrath Hol Liberty Ch
Brunner Cem
Graden Cem
Graden Ridge
Huron Cem
Hall Cem
Isom Cem
Wagner Cem
Ferguson Cem
Boone Cem
Mt Olive Ch
Indian Creek Ch
Johnson
Adams
Gyger Bend
Crooked
Dam
Sheeks
Mohon
Opossum Hollow
Ono Run
Burton Hol
Pruett Hol
Black Hol
Hall Hol
Tank Spring
Treaver Cr
Landing Field
Tunnel
Beaver
Cedar Bluff
Hanse Rock
Ridge
Relay Tower
Pax
Ohio
Baltimore
Rock
Spr
Wh
BM 534
BM 516
BM 664
BM 498
BM 497
BM 500
BM 618
BM 516
BM 550
BM 674
BM 522
BM 612
BM 507
BM 606
BM 565
BM 514
BM 782
BM 519
BM 522
BM 556
BM 589
BM 651
BM 692
BM 833
BM 909
BM 687
BM 704
BM 706
BM 675
BM 655
BM 593
BM 758
BM 561
BM 606
BM 832
BM 485
BM 471
BM 482
BM 461
BM 600
BM 702
BM 689
BM 510
158
150
60
450
37
109

77-07

INDIANA

I

V III	6966-03	Andrews V
AND	6965	Vallonia
AND	6585	Vallonia
AND	6964	Vallonia
VAL	6966-02	Andrews
AND	6966-04	Vallonia
VAL	6966-01	Andrews
VAL	6466	Andrews
VAL	6583	Andrews
AND	6966-05	Vallonia

II

AND I	6964	Vallonia V
A	6966-01	Vallonia
V	6585	Andrews
V	6966-05	Andrews
V	6966-02	Andrews
A	6583	Vallonia
V	9966-04	Andrews
V	6965	Andrews
A	6466	Vallonia
V	6966-03	Andrews

III

A II	6964	Vallonia I
A	6966-05	Vallonia
A	6466	Vallonia
V	6585	Andrews
A	6966-03	Vallonia
V	6583	Andrews
A	6966-01	Vallonia
V	6965	Andrews
V	6966-02	Andrews
V	6966-04	Andrews

IV

V II	6966-01	Andrews IV
A	6583	Vallonia
V	6966-03	Andrews
A	6966-02	Vallonia
A	6966-05	Vallonia
A	6585	Vallonia
V	6466	Andrews
V	6965	Andrews
A	6964	Vallonia
V	6966-04	Andrews

V

A III	6966-01	Vallonia IV
A	6966-02	Vallonia
V	6966-03	Andrews
A	6583	Vallonia
A	6966-04	Vallonia
A	6965	Vallonia
V	6964	Andrews
V	6585	Andrews
A	6966-05	Vallonia
A	6466	Vallonia

Field	Andrews	Vallonia
I	5	3
II	1	5
III	2	1
IV	4	2
V	3	4

Planted March 16 & 17, 1977

Figure 2

GENETIC RESOURCE EVALUATION

Study No.: 82-03 Species: Black walnut

Date Established: 3/25/81 Date Evaluated: 1/13/94

Title: A comprehensive provenance-progeny test with comparison of nursery-grown and/or container-grown black walnut seedlings

Location: Camp Atterbury Military Reservation, Edinburg, Indiana
NENW, S30, T11N, R5E, Johnson County, Indiana

Experimental Design: Randomized block, 8 blocks, 4-tree row plots, 152 nursery-grown families, 202 container-grown families, 2 x 3 m spacing. (Odd-numbered blocks = nursery grown, even-numbered blocks = container grown.)

Monumentation: Original wire pins with largely illegible tags mark the southernmost tree of about 5% of the plots. No posts mark block corners. It's hard to know where you are in this large plantation.

Existing Fall Measurements:
Ht '81, '82, '83
DBH '81, '82, '83

Survival: Survival is 70%, and patchy.

Growth: These trees haven't done very well. The largest ones (in blocks VII and VIII) are only 2 inches in diameter and 10 feet tall. Most are only 1 inch DBH and 6 feet tall. Many are even smaller, 1/4 inch in diameter and 2 feet in height, and look like nursery stock.

Stem Form: Trees in blocks VII and VIII, while only 1 to 2 inches in diameter and 7 to 8 feet tall, were pruned during the winter of '92-'93.

Damage: No cankers are evident. I saw one buck rub, but no browse damage.

Competing Vegetation: A very heavy sod of brome grass is the probable cause of the poor performance shown by these trees. The grass is 3 feet high and very thick throughout the plantation.

Suggested Maintenance: Herbicide treatment is needed to control the heavy grass competition.

Other Comments:

Figure 1.--Location of Atterbury Farm site along Mauxferry road.

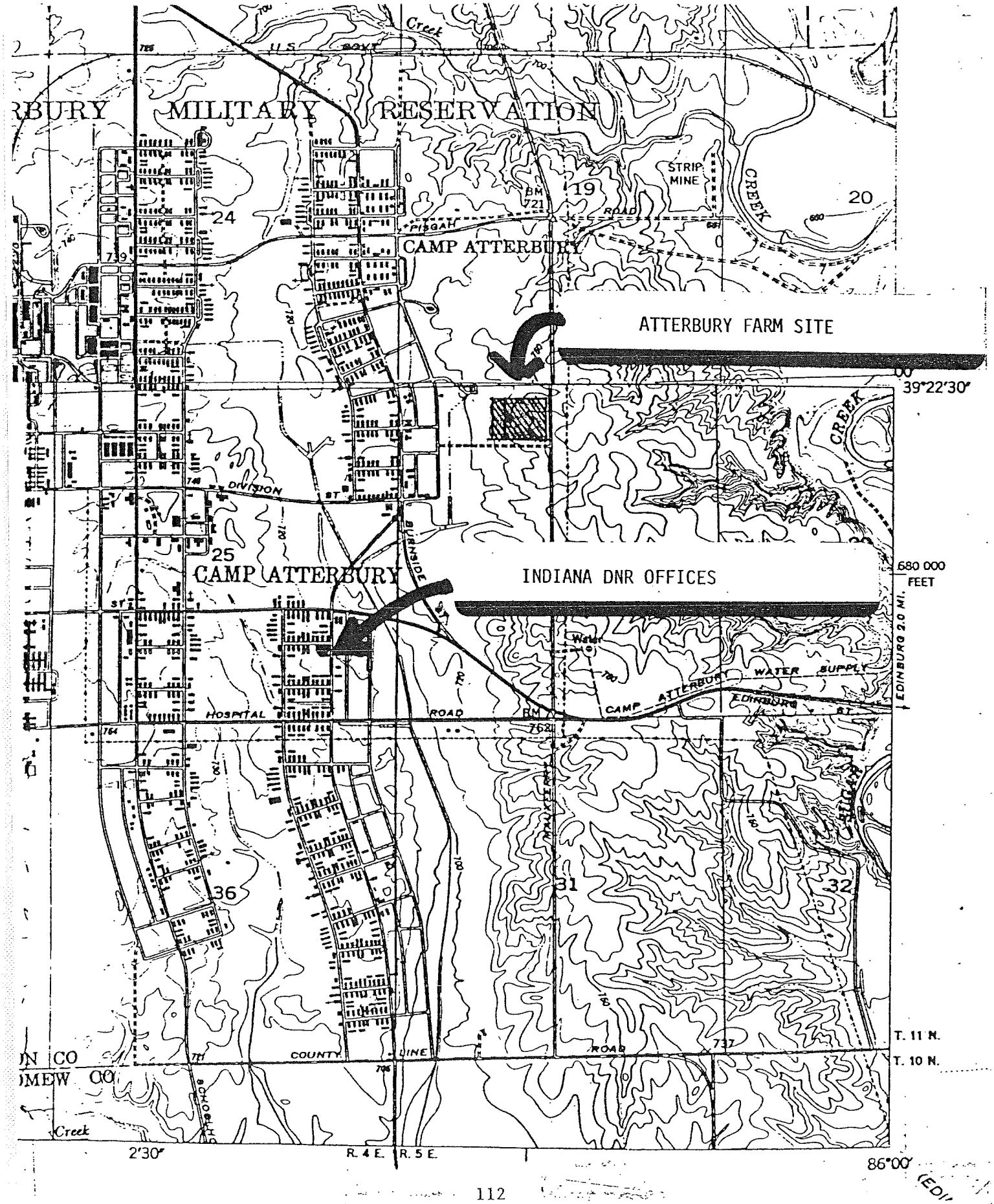
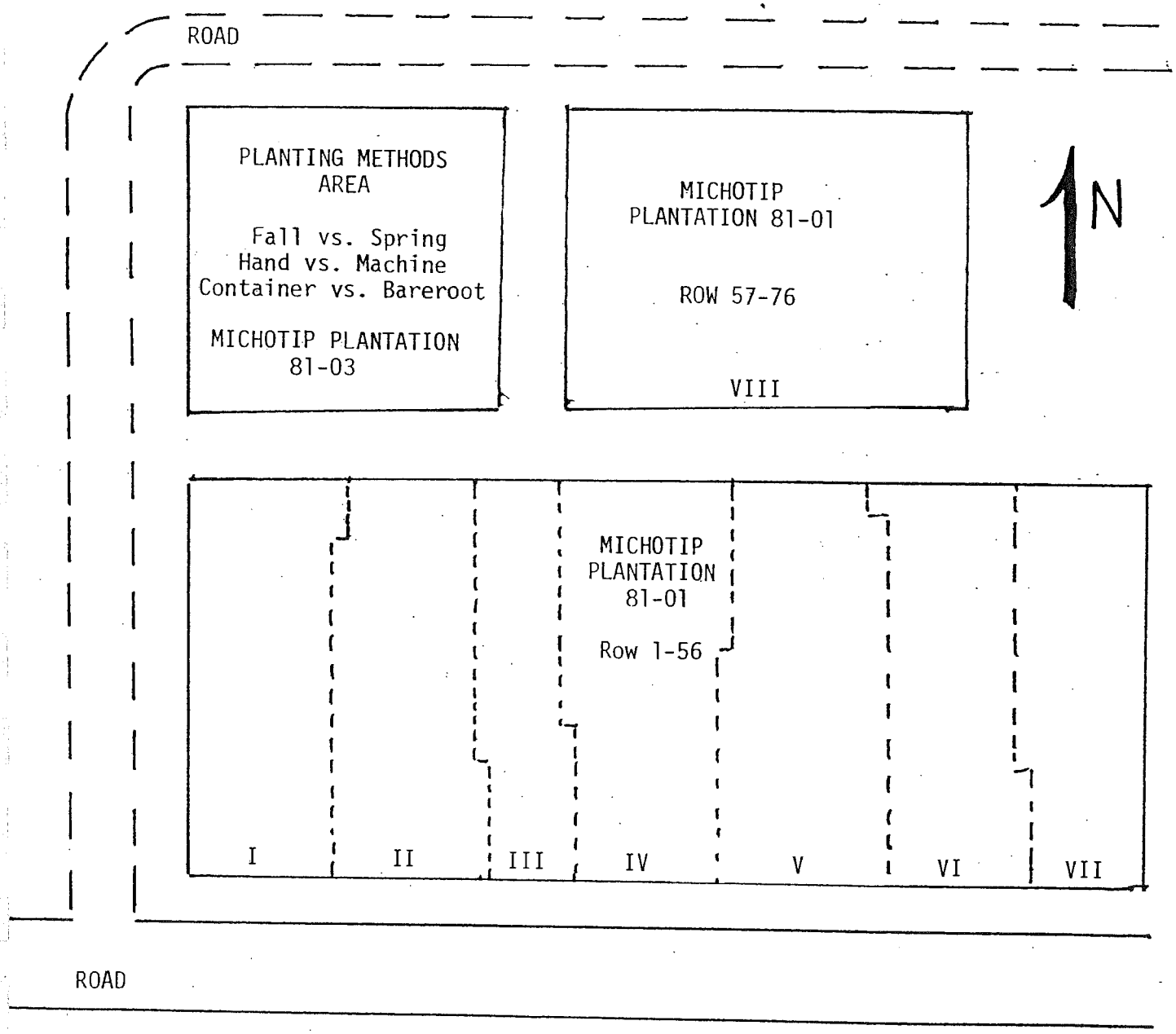
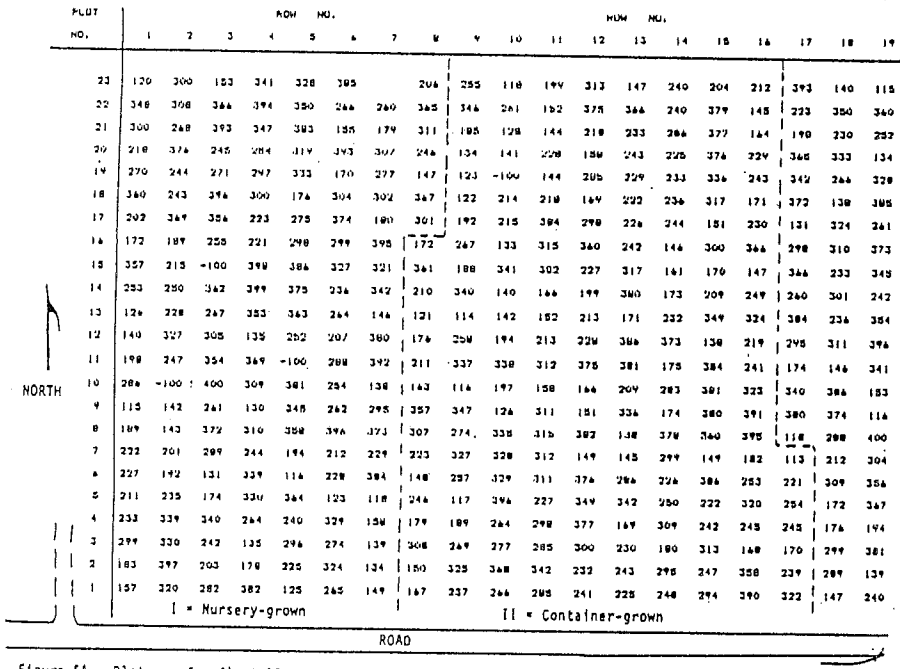


Figure 4.--Layout of MICHOTIP PLANTATION 81.01 and 81.03 for FS-NC-1151, 82-03 and 82-04, respectively, at the Atterbury Farm site.





PLOT NO.	ROW NO. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
23	120	300	153	341	328	385		206	255	118	199	313	147	240	204	212	393	140	115
22	348	308	364	394	350	246	260	365	346	261	152	375	366	240	379	145	223	350	340
21	300	248	393	347	383	135	179	311	185	128	144	219	233	284	377	164	190	230	252
20	218	376	245	284	319	393	307	246	134	141	228	188	243	225	376	229	366	333	134
19	270	244	271	297	333	170	277	147	123	-100	144	205	329	233	336	243	342	266	328
18	360	243	396	300	176	304	302	367	122	214	218	164	222	236	317	171	372	138	385
17	202	369	356	223	275	374	180	301	192	215	384	298	226	244	151	230	131	324	261
16	172	189	258	221	298	299	398	172	267	133	315	360	242	146	300	366	298	310	373
15	357	215	-100	398	386	327	321	361	188	341	302	227	317	161	170	147	346	233	345
14	253	250	362	399	375	236	342	210	340	140	166	199	380	173	209	249	260	301	242
13	126	328	267	353	363	264	146	121	114	142	152	213	171	232	349	324	384	236	384
12	140	327	305	135	252	207	380	176	258	194	213	329	386	373	138	219	295	311	396
11	198	247	354	369	-100	288	392	211	337	338	312	375	381	175	384	241	174	146	341
10	286	-100	400	309	381	284	136	143	116	197	158	166	209	283	381	323	340	386	183
9	115	142	261	130	348	262	295	357	347	126	311	181	336	174	380	391	380	374	116
8	189	143	372	310	358	396	373	307	274	338	315	382	138	378	360	395	118	288	400
7	232	201	289	244	194	212	229	225	327	328	312	149	145	299	149	182	113	212	304
6	227	192	131	339	116	228	384	148	297	329	311	376	286	226	386	253	221	309	356
5	211	235	174	330	364	123	118	246	117	396	227	349	342	250	222	320	254	172	367
4	233	339	340	264	240	329	158	179	189	264	298	377	169	309	242	245	245	176	194
3	299	330	242	135	296	274	139	308	249	277	285	300	230	180	313	168	170	299	381
2	183	397	203	178	225	324	134	150	325	348	342	232	243	295	247	358	239	289	139
1	157	320	282	382	125	265	149	167	237	266	285	241	225	248	294	390	322	147	240

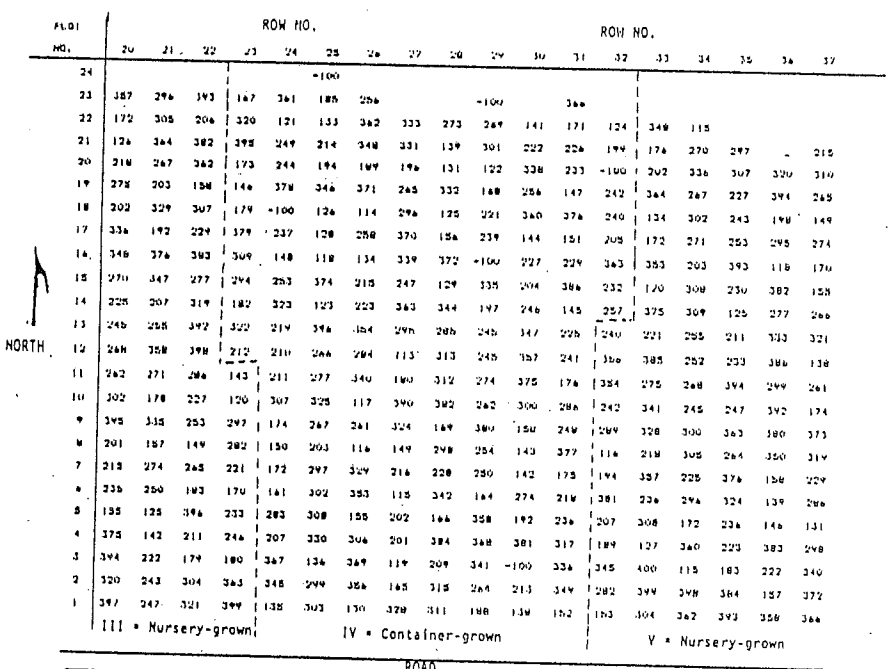
I = Nursery-grown

II = Container-grown

NORTH

ROAD

Figure 5A. Plot map for first 19 rows at Atterbury Farms.



PLOT NO.	ROW NO. 20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
24						-100												
23	387	296	393	167	361	185	256			-100		366						
22	172	305	206	320	121	133	362	333	273	269	141	171	124	349	115			
21	126	364	382	395	249	214	348	331	139	301	222	226	199	176	270	297	-	215
20	218	267	362	173	244	194	189	196	131	122	338	233	-100	202	336	307	320	310
19	278	203	158	146	378	346	371	265	332	168	256	147	242	364	267	227	394	265
18	202	329	307	179	-100	126	114	296	125	221	360	376	240	134	302	243	198	149
17	336	192	229	379	237	128	258	370	154	239	144	151	208	172	271	253	295	274
16	348	376	383	309	148	118	134	339	372	-100	227	229	363	353	203	393	118	170
15	370	347	277	294	253	374	215	247	129	335	204	386	232	120	308	230	382	158
14	225	207	319	182	323	123	223	363	344	197	246	145	257	375	309	125	277	266
13	245	255	392	320	219	396	364	298	285	245	347	225	240	221	255	211	333	321
12	268	358	398	212	210	266	284	113	313	245	157	241	386	385	252	253	386	138
11	262	271	286	143	211	277	340	180	312	274	375	176	384	275	268	394	299	261
10	302	178	227	120	307	325	117	390	382	262	300	286	242	341	245	247	342	174
9	345	335	253	297	174	267	241	324	169	380	150	249	299	328	300	363	380	373
8	201	157	149	282	150	203	116	149	298	254	143	377	116	218	305	264	350	317
7	213	274	265	221	172	297	329	216	228	250	142	175	194	357	225	376	156	229
6	235	250	183	170	161	302	353	115	342	164	274	219	381	236	296	324	139	286
5	135	125	396	233	283	308	155	302	166	358	192	236	207	308	172	236	146	131
4	375	142	211	246	207	330	306	201	384	368	381	317	189	127	360	223	383	298
3	394	222	179	180	367	136	369	119	209	341	-100	336	345	400	115	183	222	340
2	320	243	304	363	348	299	356	165	315	264	213	349	282	399	398	384	157	372
1	397	247	321	399	138	303	150	329	311	198	139	152	193	304	362	393	356	366

III = Nursery-grown

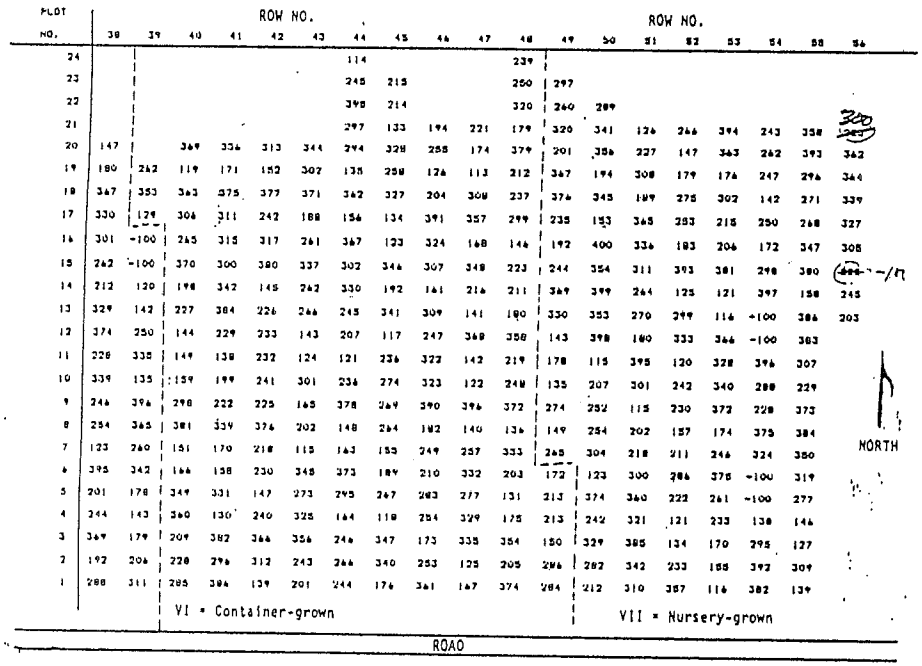
IV = Container-grown

V = Nursery-grown

NORTH

ROAD

Figure 5B. Plot map from Row #20 to Row #37 at Atterbury Farm.



PLOT NO.	ROW NO. 38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
24							114				239								
23							245	215			250	297							
22							395	214			320	260	289						
21							297	133	194	221	179	320	341	126	266	394	243	358	
20	147		369	336	313	344	294	328	288	174	379	201	356	227	147	363	262	393	362
19	180	262	119	171	152	302	135	258	126	113	212	367	194	308	179	176	247	296	344
18	367	353	363	375	377	371	362	327	204	309	237	376	345	189	275	302	142	271	339
17	330	129	306	311	242	188	156	134	391	357	299	235	153	365	283	215	250	268	327
16	301	-100	265	315	317	261	367	123	324	168	146	192	400	336	183	206	172	347	308
15	262	-100	370	300	380	337	302	346	307	348	223	244	354	311	393	381	298	380	344
14	212	120	198	342	145	262	330	192	161	216	211	369	399	264	125	121	397	158	245
13	329	142	227	384	226	266	245	341	309	141	180	330	353	270	399	116	-100	386	203
12	374	250	144	229	233	143	207	117	247	348	356	143	398	180	333	366	-100	383	
11	228	335	149	138	232	124	121	236	322	142	219	178	115	395	120	328	396	307	
10	339	135	159	199	241	301	236	274	323	122	248	135	207	301	242	340	288	229	
9	246	396	298	222	225	165	378	269	390	396	372	274	252	115	230	372	228	373	
8	254	365	381	339	376	202	148	264	182	140	136	149	254	202	157	174	375	384	
7	123	260	151	170	218	115	143	155	249	257	333	248	304	218	211	246	324	350	
6	395	342	166	138	230	348	373	189	210	332	203	172	123	300	286	376	-100	319	
5	201	178	349	331	147	273	295	267	283	277	131	213	374	340	222	261	-100	277	
4	244	143	360	130	240	325	144	118	254	329	175	213	242	321	121	233	138	146	
3	369	179	209	382	366	356	246	347	173	335	354	150	329	385	134	170	295	127	
2	192	206	228	296	312	243	266	340	253	125	205	296	282	342	233	188	392	309	
1	288	311	285	384	139	201	244	176	361	167	374	284	212	310	367	116	382	139	

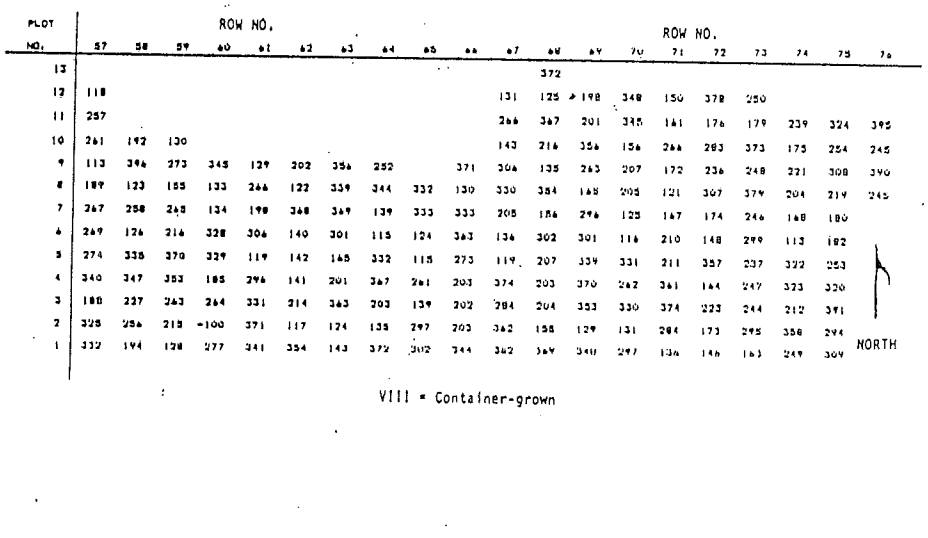
VI = Container-grown

VII = Nursery-grown

NORTH

ROAD

Figure 5C. Plot map from Row #38 to Row #56 at Atterbury Farm.



PLOT NO.	ROW NO. 57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
13												372								
12	118										131	125	198	348	150	378	250			
11	257										266	367	201	385	141	176	179	239	324	395
10	261	192	130								143	216	356	156	266	283	373	175	254	245
9	113	396	373	345	129	302	356	252		371	304	135	263	207	172	236	248	221	308	390
8	189	123	155	133	266	122	339	344	332	130	330	384	148	205	121	307	379	204	219	245
7	267	258	268	134	198	368	369	139	333	333	205	156	296	125	147	174	246	168	180	
6	269	126	216	328	306	140	301	115	124	363	136	302	301	116	210	148	299	113	182	
5	274	338	370	329	119	142	145	332	115	273	119	207	339	331	211	357	237	322	253	
4	340	347	353	185	296	141	201	367	261	203	374	203	370	262	361	144	247	323	320	
3	188	227	263	264	331	214	363	203	139	302	284	204	353	330	374	223	244	212	341	
2	325	256	215	-100	371	117	124	135	297	203	362	155	129	131	384	173	295	356	294	
1	332	194	128	277	341	354	143	372	302	344	362	369	340	297	134	146	163	249	309	

VIII = Container-grown

NORTH

Figure 5D. Plot map for Row #57 to Row #76 at Atterbury Farms.

GENETIC RESOURCE EVALUATION

Study No.: 82-03 Species: Black walnut

Date Established: 4/16/81 Date Evaluated: 1/12/94

Title: A comprehensive provenance-progeny test with comparison of nursery-grown and/or container-grown black walnut seedlings

Location: W. K. Kellogg Experimental Forest, Augusta, Michigan (Land is owned by Upjohn Pharmaceutical, managed by K.E.F.) SW1/4, S21, T1S, R9W, Kalamazoo County, Michigan

Experimental Design: 2 contiguous plantations. Nursery-grown seedlings: randomized block, 4 blocks, 4-tree row plots, 128 families, 2 x 3 m spacing. Container-grown seedlings: randomized block, 4 blocks, 4-tree row plots, 51 families, 2 x 3 m spacing.

Monumentation: None. Navigating within this plantation is easy nevertheless due to excellent survival and maintenance. Frozen ground prevented me from staking block corners.

Existing Fall Measurements:
Ht '84, '87
DBH

Survival: Survival is extremely high at 98% or more.

Growth: The largest tree in the plantation is 4 inches in diameter and 25 feet in height. The smallest is 1 inch by 7 feet. About half of the trees are 2 1/2 inches DBH and 15 to 20 feet tall, with 1/4 of them larger and 1/4 of them smaller. The east and west ends of the planting are on higher ground than the center; the lower ground tends to support taller trees. Crown ratios are 60 to 75%.

Stem Form: Most of these walnuts are not large enough yet for stem form to be evident. However, about 5% of the trees have broken limbs in the crown which may result in poor form in the future.

Damage: I found *Nectria* canker in the stand, but only on two trees. The stem breakage in the crowns of 5% of the trees did not appear to be a health threat in and of itself, but does of course provide an entryway for pathogens such as *Nectria*.

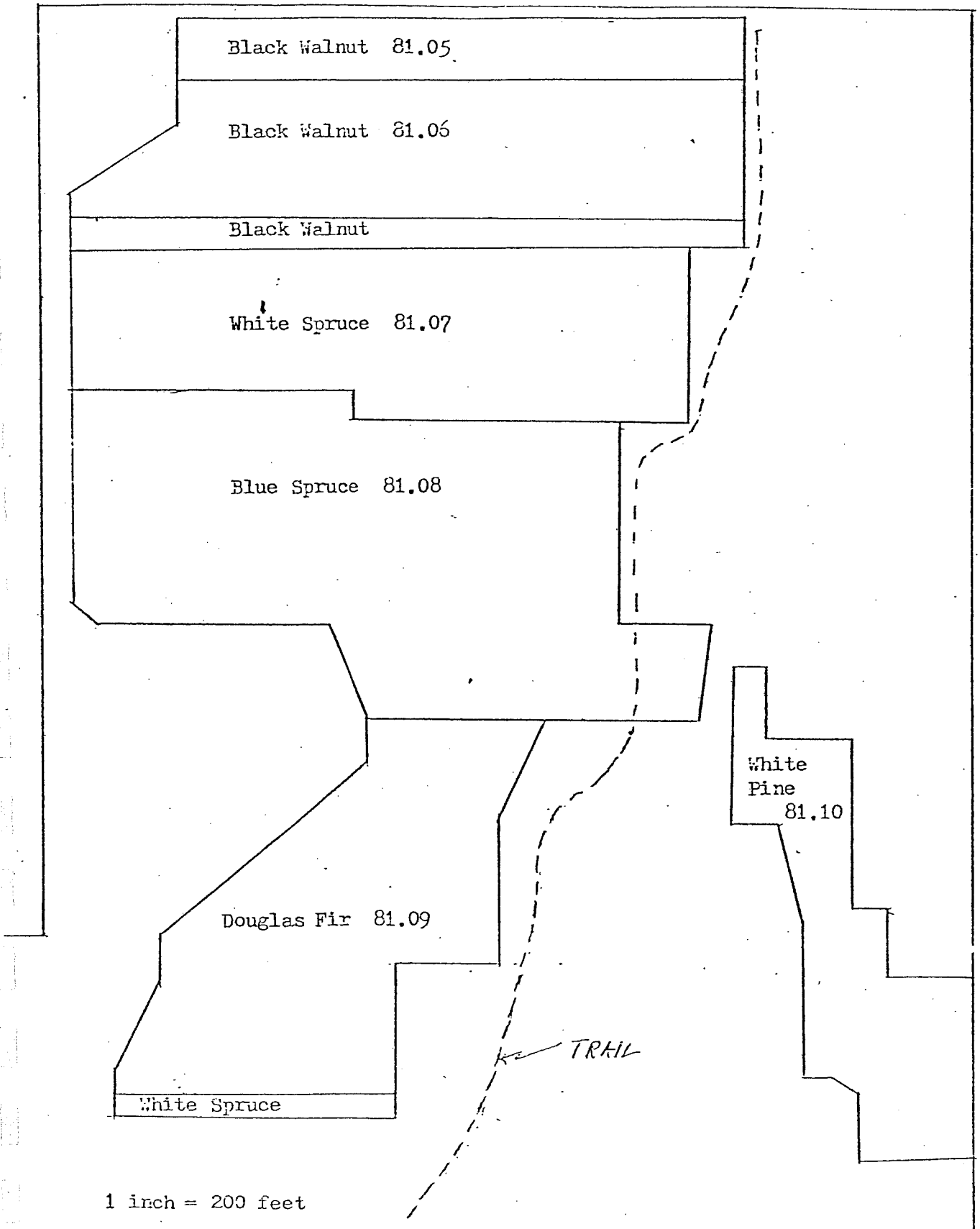
Competing Vegetation: Absolutely none. This plantation has received annual herbicide applications except for two years when it was mowed instead.

Suggested Maintenance: Maintain ongoing understory control.

Other Comments: This plantation is being maintained by Greg Kowalewski, Resident Forester, and his three full-time assistants. For information, measurement data, or assistance in locating the plantation, follow the road signs to the Kellogg Forest office roughly two miles north of Augusta.

TREE PLANTING - Spring 1981

FIGURE 1 : UPJOHN (Sherman) FARM A



1 inch = 200 feet

Walter Lemmien
10/11/81

MSFG-P-81.06 Juglans nigra (black walnut)

Half-sib progeny/provenance test, Upjohn Property, Kellogg Forest. Planted by Stine, Lemmien, et al on 4/16/81 with cultiplanter, 2 x 3 meter spacing. Randomized block design, 4-tree plots, 4* replications. Located at far northern slope of Upjohn Property, Augusta, MI. adjacent to plantation 80.05: Row 1, Col. 1 tree is 10 ft. south of Row 8, Col. 1 tree of 80.05 (T1S, R9W, Sec. 21). Note: Add 47,350,000 to all numbers on map for MSFG accession numb

Species code = 4735

ROW	COLUMN 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1-4	261	263	296	270	354	246	272	392	299	135	369	203	155	386	146	392	369	192	?	
5-8	210	203	206	180	?	301	192	262	?	275	263	225	294	212	348	268	218	143	359	
9-12	345	364	335	?	369	126	218	221	333	247	373	255	384	302	327	368	336	126	323	
13-16	229	225	250	134	339	328	340	225	219	?	319	113	211	324	133	305	339	275	214	
17-20	340	230	246	394	374	228	298	319	211	310	307	127	236	294	?	364	?	308	273	
21-24	392	223	309	381	248	206	305	131	210	335	354	131	233	115	116	211	147	189	269	
25-28	384	133	367	336	255	143	113	335	350	180	386	358	139	341	382	358	250	134	136	(VIII)
29-32	266	380	143	151	192	367	256	236	294	206	375	329	229	230	155	354	321	310	152	
33-36	174	219	218	342	363	311	121	127	235	321	?	210	298	282	278	229	367	?	242	
37-40	373	348	262	375	297	365	375	139	302	365	121	146	266	304	235	131	365	206	226	
41-44	256	278	236	307	328	309	174	363	233	143	262	138	133	299	248	263	335	262	226	
45-48	298	145	221	347	350	?	354	358	384	250	271	157	350	179	138	381	328	246	269	
49-52	131	299	125	272	211	308	268	247	145	336	201	172	365	301	333	236	295	342	?	
53-56	358	157	222	123	271	147	297	142	261	394	363	212	222	328	329	121	245	247	152	
57-60	366	243	333	275	294	134	386	255	157	308	345	153	278	228	153	345	113	142	136	
61-64	155	302	127	301	245	310	365	189	222	342	192	223	348	311	300	203	271	394	242	
65-68	368	153	189	365	295	394	282	203	304	126	296	219	116	147	125	311	386	123	214	(VII)
69-72	113	146	138	147	386	180	348	393	230	236	340	125	282	270	219	374	363	301	273	
73-76	236	327	172	330	350	336	345	125	300	151	261	302	382	134	384	347	309	179	323	
77-80	233	116	324	310	212	275	172	381	?	153	218	230	380	374	233	255	307	135	359	
81-84	121	300	235	321	142	123	243	347	?	146	295	333	115	246	243	296	221	180	323	
85-88	319	329	304	179	330	342	329	295	229	133	268	235	300	367	222	350	270	330	359	
89-92	139	341	115	228	270	250	263	271	?	116	392	248	341	339	365	319	256	359	273	
93-96	393	382	?	126	179	374	324	296	155	266	375	145	?	330	350	373	297	273	214	
97-100	305	365	247	308	339	321	115	138	350	341	366	243	393	309	145	393	236	214	136	
101-104	268	282	?	135	369	135	327	366	278	382	174	115	350	123	172	174	261	323	152	
105-108							373	307	245	380	245	327	236	189	380	225	375	136	269	(VI)
109-112		(I)*							248	368	364	?	368	221	266	298	127	152	242	
113-116								(II)*			256	151	381	304	151	228	210	269	?	
117-120											305	299	142	347	?	366	201	242	226	
121-124												(III)*			139	340	157	?	226	
															(IV)*			(V)		

source 397 71 Trees (Walnut)

Note: each number represents a 4-tree plot
Sources 236,350,365 occur twice in all reps
Sources 115,375 occur twice in rep III
Source 386 occurs twice in rep IV

There is a chance that 201 and 272 are the same source (either 201 or 272) These sources originally had nursery nos. of 54 and 154 (see original field map)

GENETIC RESOURCE EVALUATION

Study No.: CG-369 **Species:** Black walnut

Date Established: Spring, '63 **Date Evaluated:** 1/13/94

Title: Black walnut progeny study

Location: Salamonie River State Forest near Lagro, Indiana
S1/2NW, S2, T27N, R7E, Wabash County, Indiana

Experimental Design: Randomized block, 5 blocks, 4-tree row plots, 40 families.

Monumentation: Original wooden posts remain at half the block corners, but they are in poor condition. Orange plastic stakes with metal tags have been placed at all outside block corners. (The two interior corners are unmarked.)

Existing Fall Measurements:
Ht '66, '70, '71, '72, '80
DBH '80

Survival: 30 to 35% of the planted trees remain following thinning during the winter of '92-'93. Minnesota and Tennessee sources were removed due to poor performance; other trees were removed as needed to leave the best two trees in each plot.

Growth: Height and diameter are both rather variable. Diameters run from 4 to 9 inches and are evenly distributed across this range. Heights vary from 25 to 55 feet and are likewise evenly distributed. Live crown ratios are 30 to 40%.

Stem Form: Of the larger trees, most are straight and have at least 20 feet of clear bole to the first limb. A few trees fork low, but in general, form in this stand is very good.

Damage: A few of these walnuts have healed-over mower scars. No pathogen-caused cankers were found.

Competing Vegetation: Virtually none. This plantation has been mowed annually since 1977, and received simazine and glyphosate in the spring of '93 following the thinning. While between-tree understory control has been exemplary, the treatment stopped at the outermost row, allowing this outermost row on all sides of the planting to become overtopped by the adjacent tulip-poplar.

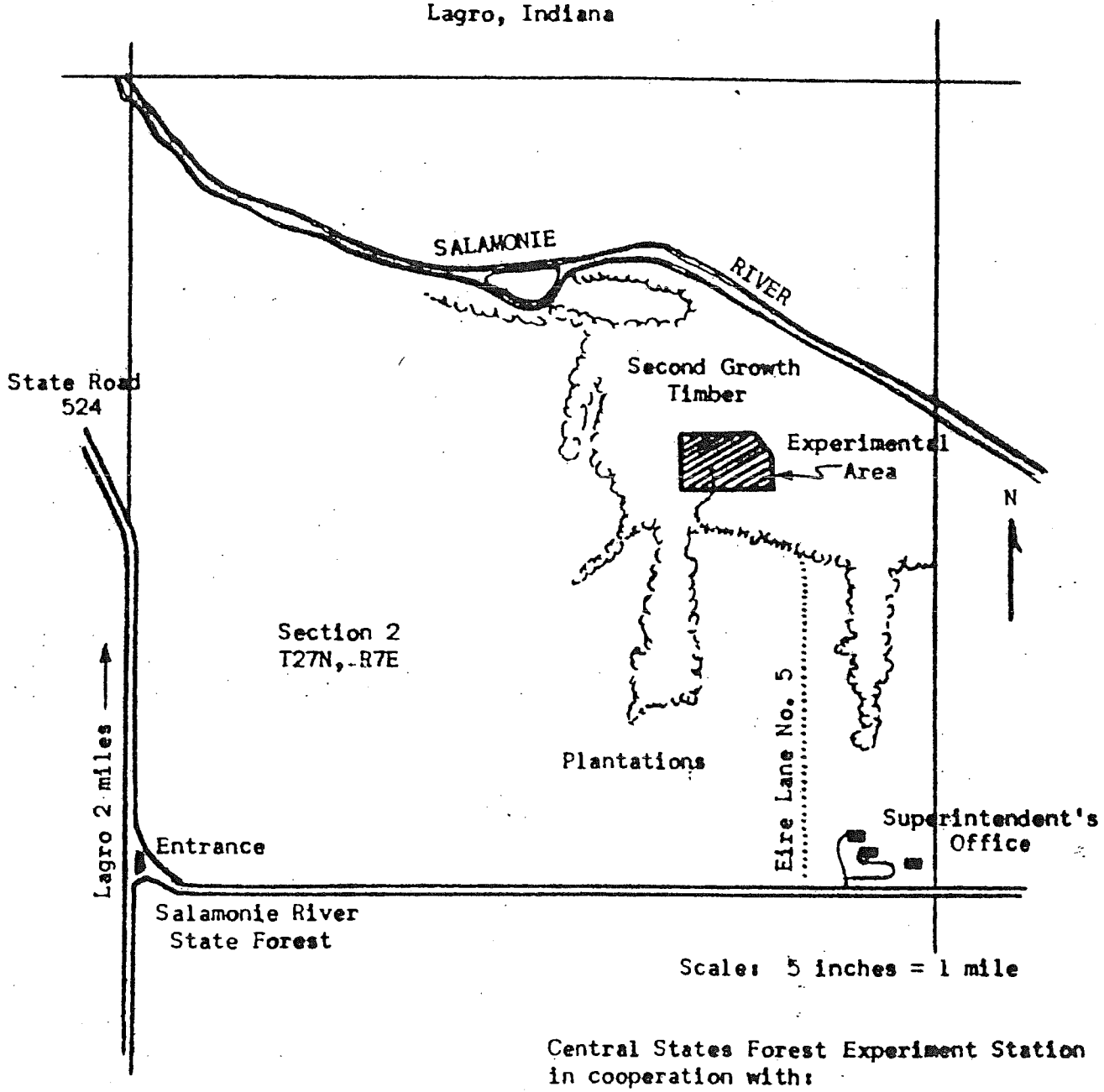
Suggested Maintenance: Maintain on-going understory control.

Other Comments: This plantation is being managed as a seed orchard. Contact Mark Coggeshall, Forest Geneticist with the Indiana DNR at the Vallonia Nursery, or John Pankop, Property Manager of the Salamonie River State Forest, for information.

EXPERIMENTAL AREA LOCATION

Black Walnut Progeny Study
FS 1-f4-1-15

SALAMONIE RIVER STATE FOREST
Lagro, Indiana



Scale: 5 inches = 1 mile

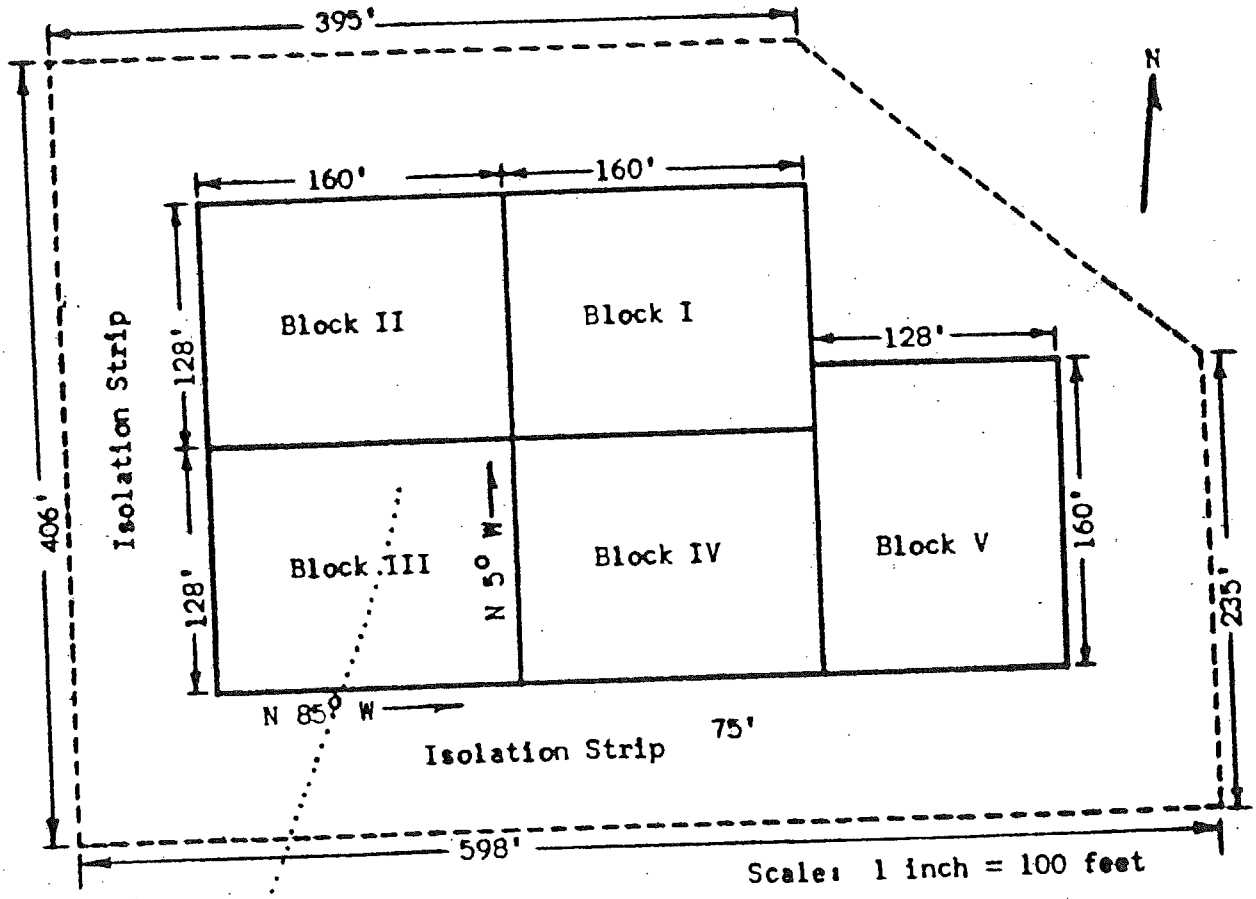
Central States Forest Experiment Station
in cooperation with:
Indiana State Division of Forestry
American Walnut Manufacturers Association

FBC 7/62

EXPERIMENTAL BLOCK LAYOUT

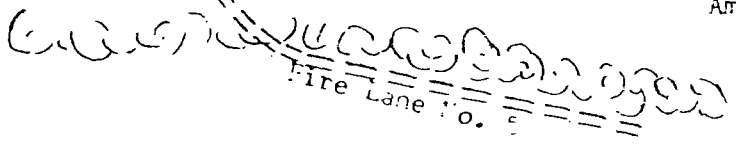
Black Walnut Progeny Study
FS 1-f4-1-15

SALAMONIE RIVER STATE FOREST
Lagro, Indiana



Second Growth Timber

Central States Forest Experiment Station
in cooperation with:
Indiana State Division of Forestry
American Walnut Manufacturers Association



Pine Plantation

FBC 7/62

GENETIC RESOURCE EVALUATION

Study No.: CG-414 Species: Black walnut

Date Established: 3/70 Date Evaluated: 3/5/94

Title: Selection of black walnut for drought resistance

Location: "Patton Tract" planting near Karbers Ridge, Illinois
Elizabethtown RD, Shawnee NF (upland site)
NWSE, S7, R9E, T11S, Hardin County, Illinois

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 42 families, 10 x 10 ft spacing, 1 border row, (paired bottomland & upland plantings).

Monumentation: Orange plastic stakes (no tags) mark the four corners of the planting.

Existing Fall Measurements:
Ht '70, '71, '73
DBH '70, '71, '73

Survival: Survival is quite poor at 15 to 20%.

Growth: The largest walnuts are 6 inches in diameter and 25 feet in height, but most are 3 to 4 inches DBH by 15 to 20 feet tall. Live crown ratio averages about 40% of total tree height.

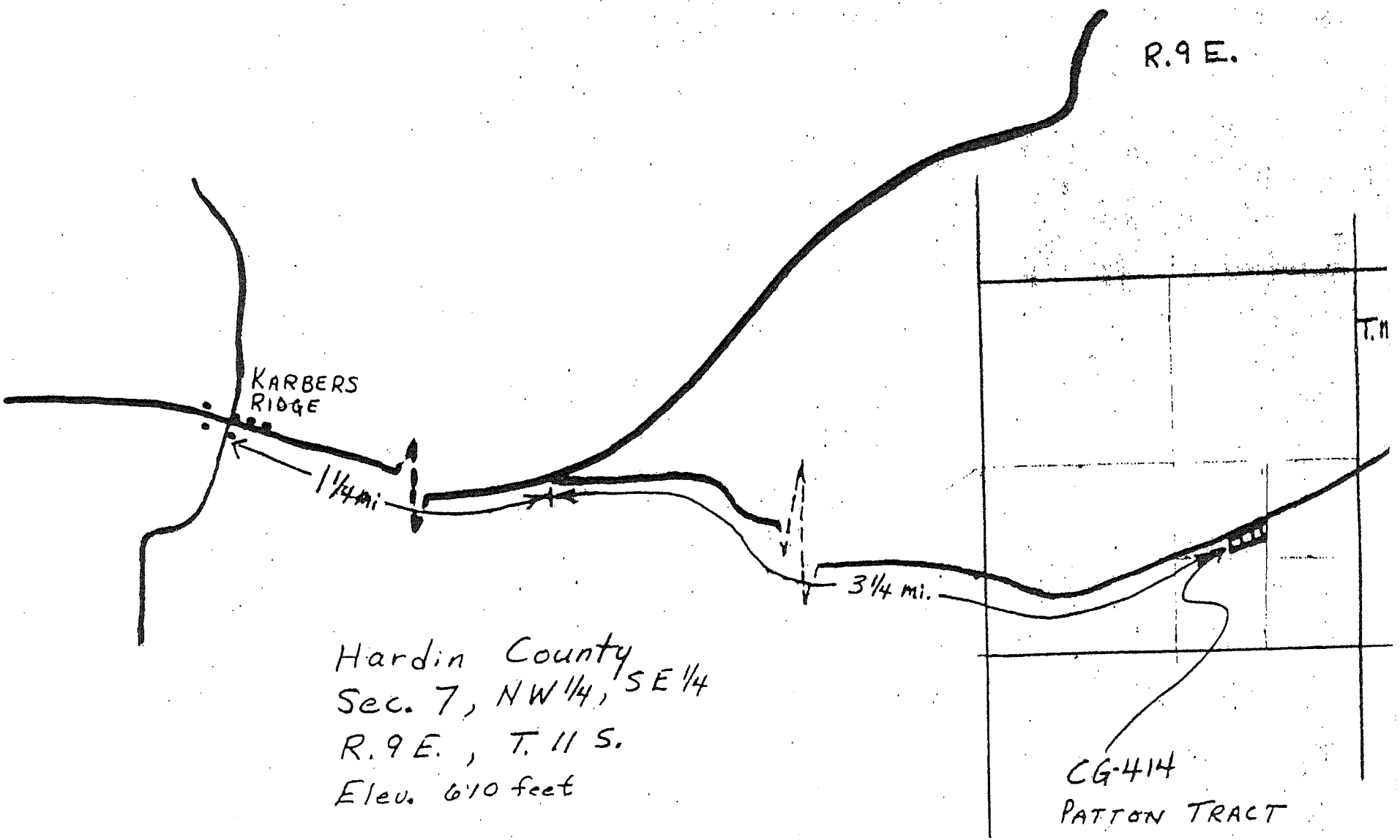
Stem Form: These walnuts have straight boles but most of them branch low due to short total height.

Damage: A few trees are heavy with grapevine. No other damage agents are working in the stand.

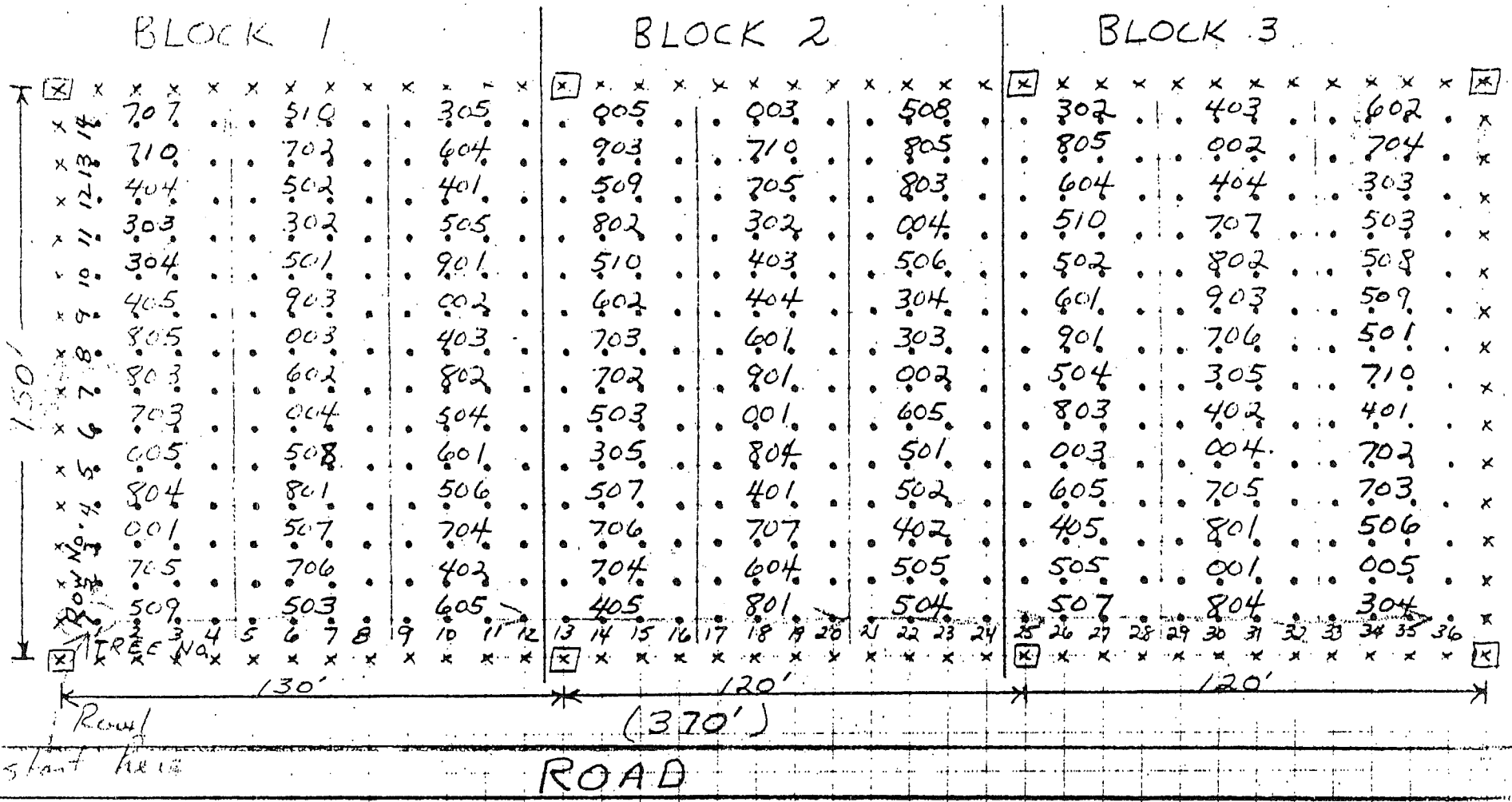
Competing Vegetation: Autumn olive (*Eleagnus umbellata*) was interplanted sometime after plantation establishment - clumps of autumn olive as large or larger than most of the walnuts form a dense jungle throughout the stand. Other woody invaders include sumac, ash, persimmon, sassafras, and honeylocust. *Rubus* and *Rosa*, and *Vitis*, are common shrubs.

Suggested Maintenance: Clean out the understory competition.

Other Comments: This planting is easy to overlook due to poor survival of the walnuts and heavy growth of autumn olive.


R.9 E.
T.11
KARBERS RIDGE
1¼ mi.
3¼ mi.
Hardin County
Sec. 7, NW¼, SE¼
R.9E., T.11 S.
Elev. 610 feet
CG-414
PATTON TRACT

74 FAMILIES ILL. 4p18mo



× BORDER TREES
• PLOT TREES
□ CORNER (BLOCK) STAKES

Location: Hardin County, Ill.
NW1/4, SE1/4, Sec 7
R.9E., T.11S.

N

CODE	STATE	COUNTY	LATITUDE (degrees N)	LONGITUDE (degrees W)
301 - 305	Kansas	Harvey	37.9	97.5
401 - 405	Kansas	Allen	37.9	95.5
501 - 510	Missouri	Hickory	37.9	93.1
601 - 605	Missouri	Crawford	37.9	91.3
701 - 710	Illinois	Union	37.6	89.4
801 - 805	Indiana	Perry	38.1	86.6
901 - 905	Kentucky	Fayette	37.9	84.5
001 - 005	Kentucky	Lawrence	38.2	82.7

GENETIC RESOURCE EVALUATION

Study No.: CG-414 Species: Black walnut

Date Established: 3/70 Date Evaluated: 3/4/94

Title: Selection of black walnut for drought resistance

Location: "Rendleman Tract" planting near Karbers Ridge, Illinois
Kaskaskia Experimental Forest (bottomland site)
Elizabethtown RD, Shawnee NF
SESE, S21, R8E, T11S, Hardin County, Illinois

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 37 families, 10 x 10 ft spacing, 1 border row, (paired bottomland & upland plantings).

Monumentation: Orange plastic stakes with metal tags mark all block corners.

Existing Fall Measurements:
Ht '70, '71, '73
DBH '73

Survival: Survival is 50% in blocks 1 and 2, 60% in block 3.

Growth: The largest tree in the plantation is 5 inches in diameter and 20 feet tall, but most are about 3 inches by 15 feet, and many are only 2 inches DBH and 8 feet tall. The tallest trees tend to occur at the north end of the planting. Live crown ratios run 40% of total tree height.

Stem Form: Many of these walnuts are too short for stem form to be apparent - live crowns begin at breast height. However, most of the taller ones at the north end of block 1 go 12 or 16 feet to the first limb.

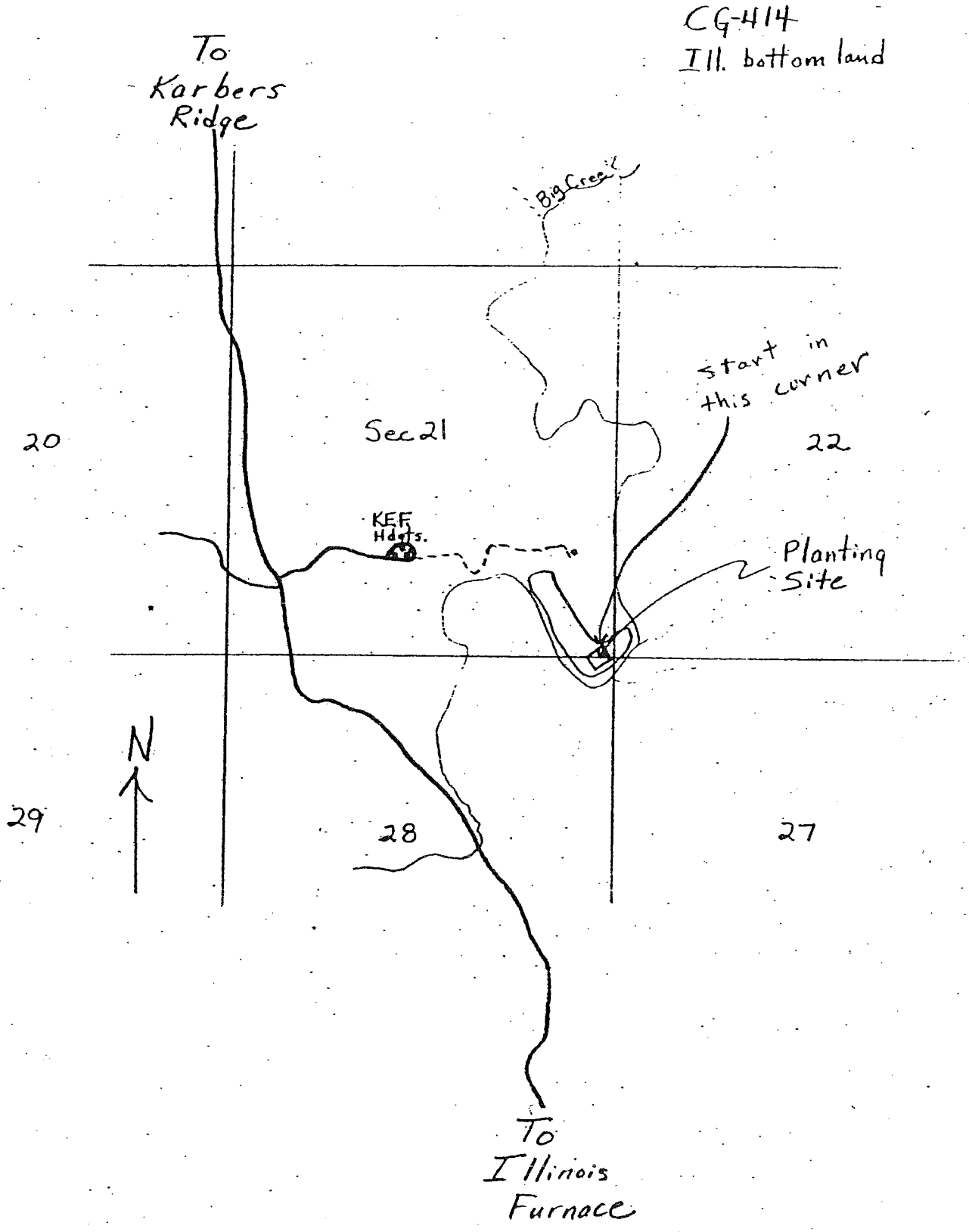
Damage: No insect or disease problems are evident.

Competing Vegetation: This stand is completely overgrown with various brambles and bushes. *Rubus, Rosa, Vitis,* sumac, hawthorn, and a large (15 ft) bamboo-like plant are all problematic. Taken together they are a major impediment to the health and vigor of these walnuts.

Suggested Maintenance: Clean out the competing vegetation.

Other Comments: This plantation is located 100 feet east of the south end of the CG-422 yellow-poplar planting. Several other walnut and ash plantations are located nearby.

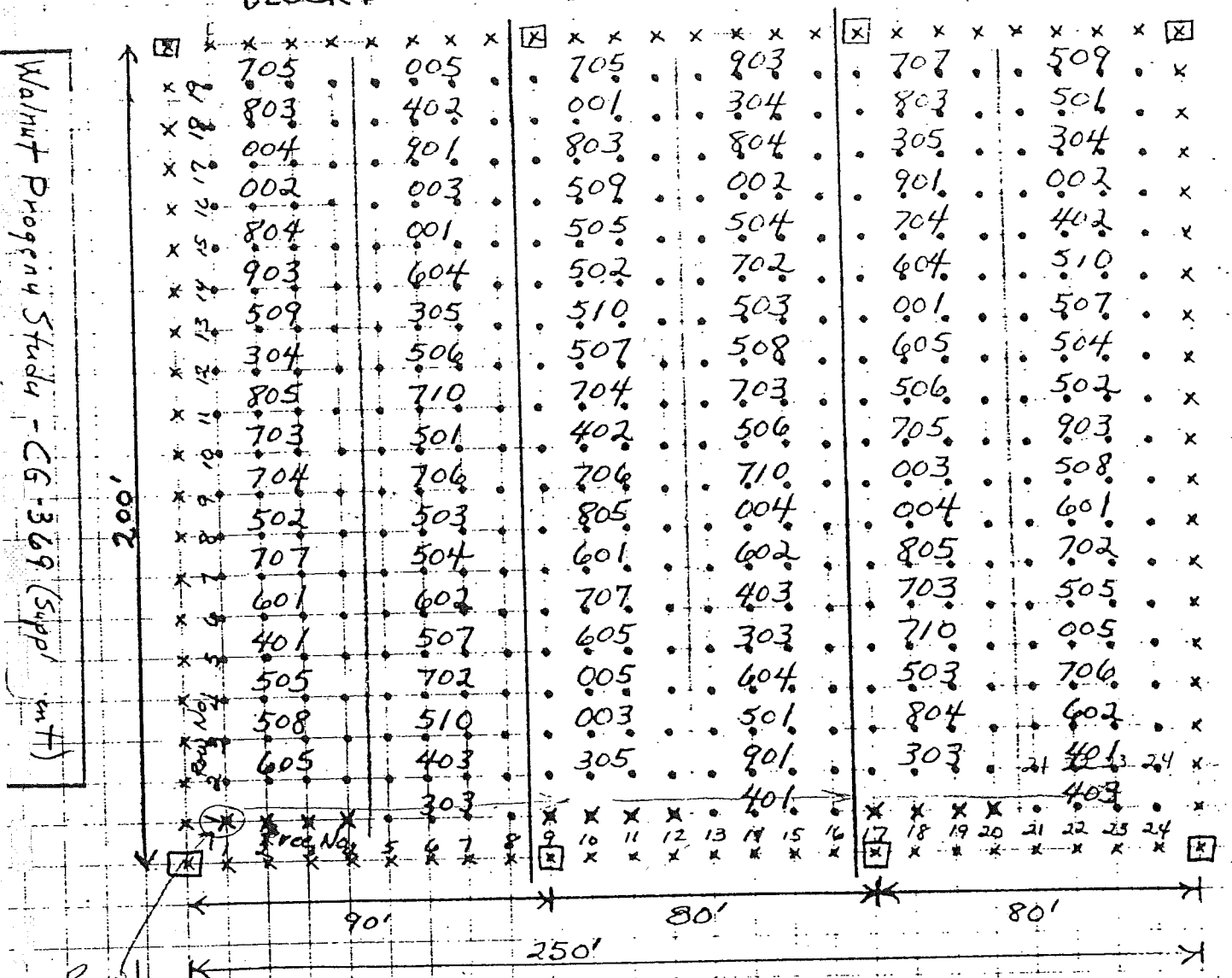
Diagram 3


CG-414
Ill. bottom land
To Karbers Ridge
Big Creek
start in this corner
20
Sec 21
22
KEF Hdqts.
Planting Site
N
29
28
27
To Illinois Furnace

RENDLEMAN TRACT (KEF)
37 FAMILIES

Ill. BOTTOMLAND

N



W/Mint Progress Study - CG-3269 (Sept. '71)

× BORDER TREES
• PLOT TREES
□ CORNER (BLOCK) STAKES

Location: Hardin Co., Ill.
SE¼, SE¼, Sec 21
R. 8E., T. 11S.

CODE	STATE	COUNTY	LATITUDE (degrees N)	LONGITUDE (degrees W)
301 - 305	Kansas	Harvey	37.9	97.5
401 - 405	Kansas	Allen	37.9	95.5
501 - 510	Missouri	Hickory	37.9	93.1
601 - 605	Missouri	Crawford	37.9	91.3
701 - 710	Illinois	[illegible]	37.6	89.4
801 - 805	Indiana	[illegible]	38.1	86.6
901 - 905	Kentucky	[illegible]	37.9	84.5
001 - 005	Kentucky	[illegible]	38.2	82.7

GENETIC RESOURCE EVALUATION

Study No.: CG-414 **Species:** Black walnut

Date Established: 3/70 **Date Evaluated:** 3/8/94

Title: Selection of black walnut for drought resistance

Location: Schell-Osage Wildlife Area near Schell City, Missouri
(Bottomland site)
NESW, S2, T37N, R29W, Vernon County, Missouri

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 27 families, 10 x 10 ft spacing, 1 border row (paired bottomland & upland plantings).

Monumentation: None. Three rows are missing from the south and/or north end, and no prior markings were found.

Existing Fall Measurements:
Ht
DBH

Survival: Overall survival is 35%. The southern block is largely missing, replaced by sumac.

Growth: Diameter varies from 2 to 7 inches. Height varies from 25 to 40 feet. Most trees are about 5 inches DBH by 30 to 35 feet tall. Live crown ratios are 50% of total tree height.

Stem Form: These walnuts are fairly straight although about 25% of them have large limbs below 10 feet.

Damage: Mechanical wounds from mowers or deer are evident on 5% of these trees.

Competing Vegetation: Sumac is heavy especially in the southwest end of the planting. The remainder of this planting has been occasionally mowed by the Missouri Department of Conservation.

Suggested Maintenance: Maintenance as a genetic test is not justified since the identification of seed sources is in question. However, the MDC may wish to prune these trees to increase value growth of this stand.

Other Comments: This plantation is located 100 yards north of the MDC headquarters/shop buildings.

GENETIC RESOURCE EVALUATION

Study No.: CG-414 Species: Black walnut

Date Established: 3/70 Date Evaluated: 3/8/94

Title: Selection of black walnut for drought resistance

Location: Schell-Osage Wildlife Area near Schell City, Missouri
(Upland site)
SENW, S3, T37N, R29W, Vernon County, Missouri

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 34 families, 10 x 10 ft spacing, 1 border row (paired bottomland & upland plantings).

Monumentation: None.

Existing Fall Measurements:
Ht
DBH

Survival: Only 15 trees remain of 494 planted.

Growth: Survivors are 4 to 6 inches in diameter and 20 feet in height.

Stem Form: These walnuts have poor form with large, low branches due to being open-grown.

Damage: None.

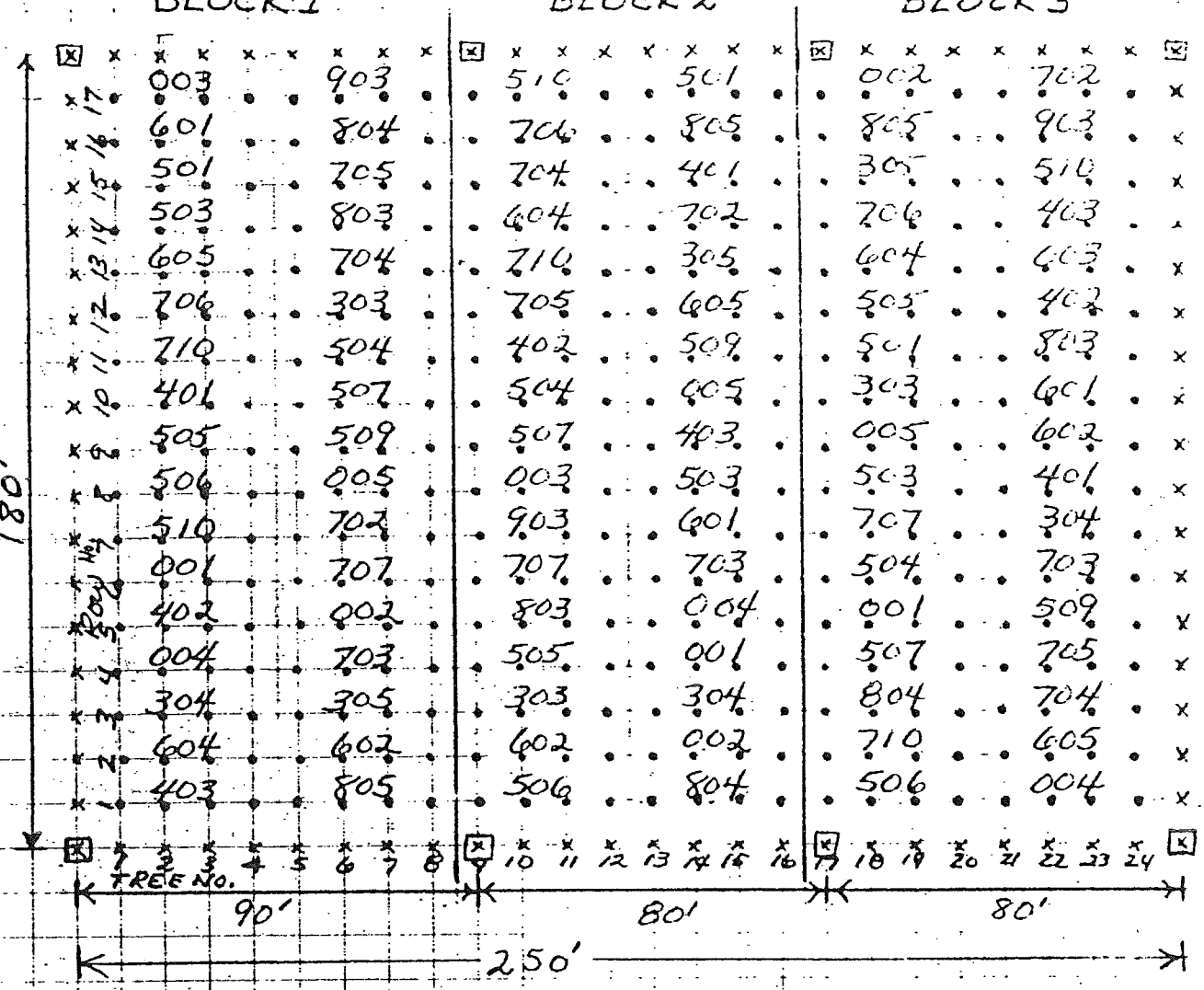
Competing Vegetation: Northern pin oaks larger than the walnuts grow among them. Understory species include honeylocust saplings, sumac, coralberry (*Symphoricarpos* sp.), and *Rubus*.

Suggested Maintenance: There is no point in any management activity here.

Other Comments: This planting is essentially a clump of trees in an open field. The area is managed as wildlife habitat with the emphasis on geese.

Diagram 6 SCHELL-OSAGE WILDLIFE AREA
34 FAMILIES

CG-414
Mo. Upland



× BORDER TREES
• PLOT TREES
□ CORNER (BLOCK) STAKES

N

Vernon County, Missouri
Location: SE¼, NW¼, Sec 3
T. 37 N., R. 29 W.

38.0° N 94.1° W
Elev. 800 ft.

CODE	STATE	COUNTY	LATITUDE (degrees N)	LONGITUDE (degrees W)
301 - 305	Kansas	Harvey	37.9	97.5
401 - 405	Kansas	Allen	37.9	95.5
501 - 510	Missouri	Hickory	37.9	93.1
601 - 605	Missouri	Crawford	37.9	91.3
701 - 710	Illinois	Union	37.6	89.4
801 - 805	Indiana	Perry	38.1	86.6
901 - 905	Kentucky	Fayette	37.9	84.5
001 - 005	Kentucky	Lawrence	38.2	82.7

GENETIC RESOURCE EVALUATION

Study No.: CG-425 **Species:** Black walnut

Date Established: 3/13/76 **Date Evaluated:** 11/18/93

Title: Black walnut progeny test/seed orchards for National Forests in the Eastern Region

Location: "Covered Bridge" planting near Marietta, Ohio
Compartment 210, Athens RD, Wayne NF
NWNW, S36, T2N, R7W, Washington County, Ohio

Experimental Design: Randomized block, 10 blocks, 4- and 5-tree row plots, 68 families, 6 x 12 ft spacing, 1 border row.

Monumentation: Original wire pins with embossed metal tags remain at the southernmost tree of 75% of plots. I placed 5 orange plastic stakes at the south end of the plantation, and another 5 at the north end. Metal tags on these stakes are marked with both location coordinates and seed source number.

Existing Fall Measurements:
Ht '80
DBH

Survival: Overall 80%. For the most part, survival is closer to 95%, but there is a pocket of missing trees in blocks 2 and 3.

Growth: Most diameters are right at 4 inches, with little variation. There are a few trees 3 inches and 5 inches. Heights are fairly uniform at 25 to 28 feet. Live crown ratios are 30%. Trees in blocks 1,2 & 3 are smaller; the problem seems to be excessive soil moisture. These smaller trees are 2 to 3 inches DBH and 15 to 20 feet tall, with 60% live crown.

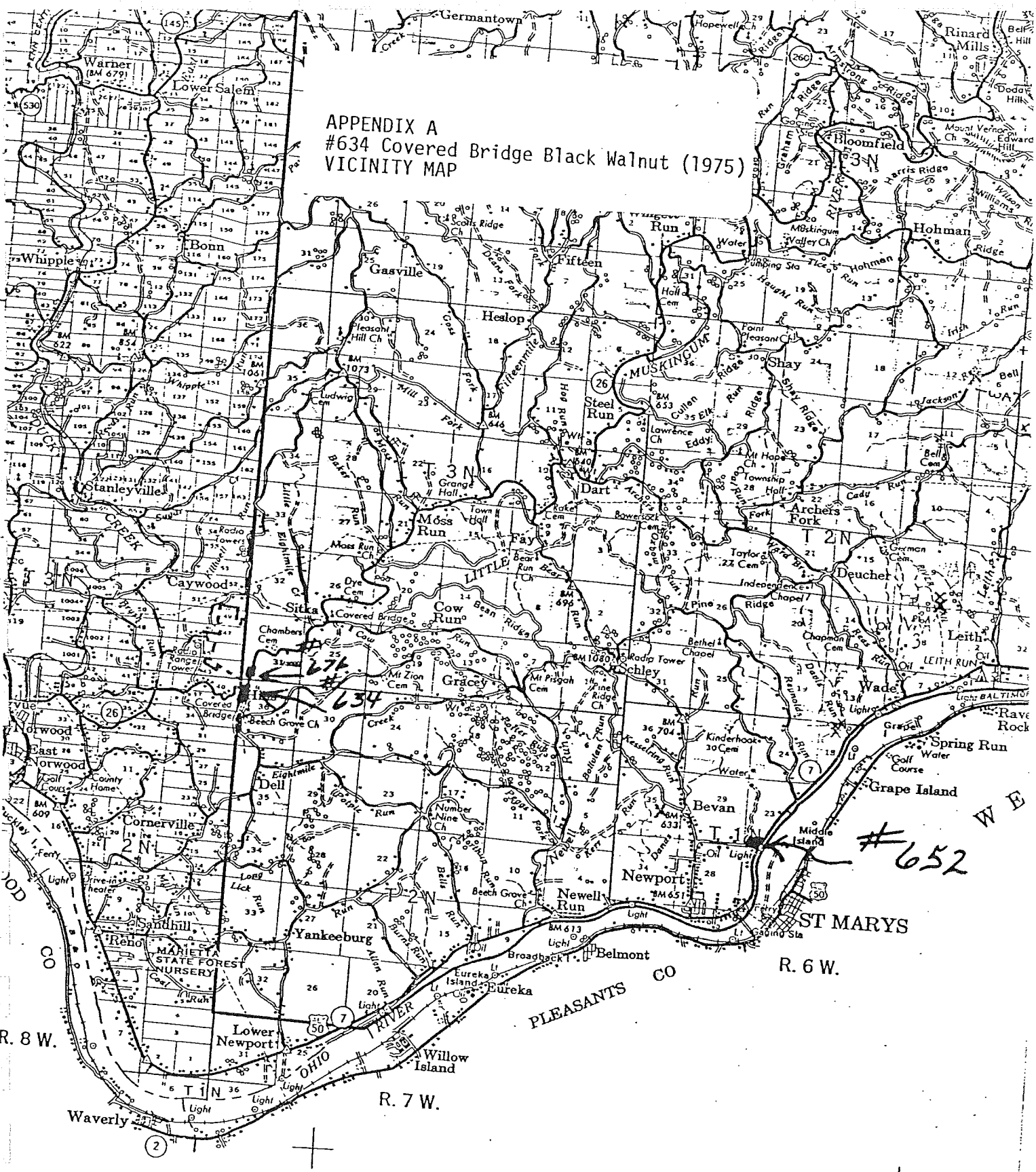
Stem Form: Most of these walnuts have done a good job of shedding dead lower branches. However, there is much variation in height to first live limb. Some trees have a 16-foot log or more, some a 12-foot, some 8, some less than 8. This appears to be related to seed source and could be improved by selection.

Damage: No damage was noticed outside of a few mower scars.

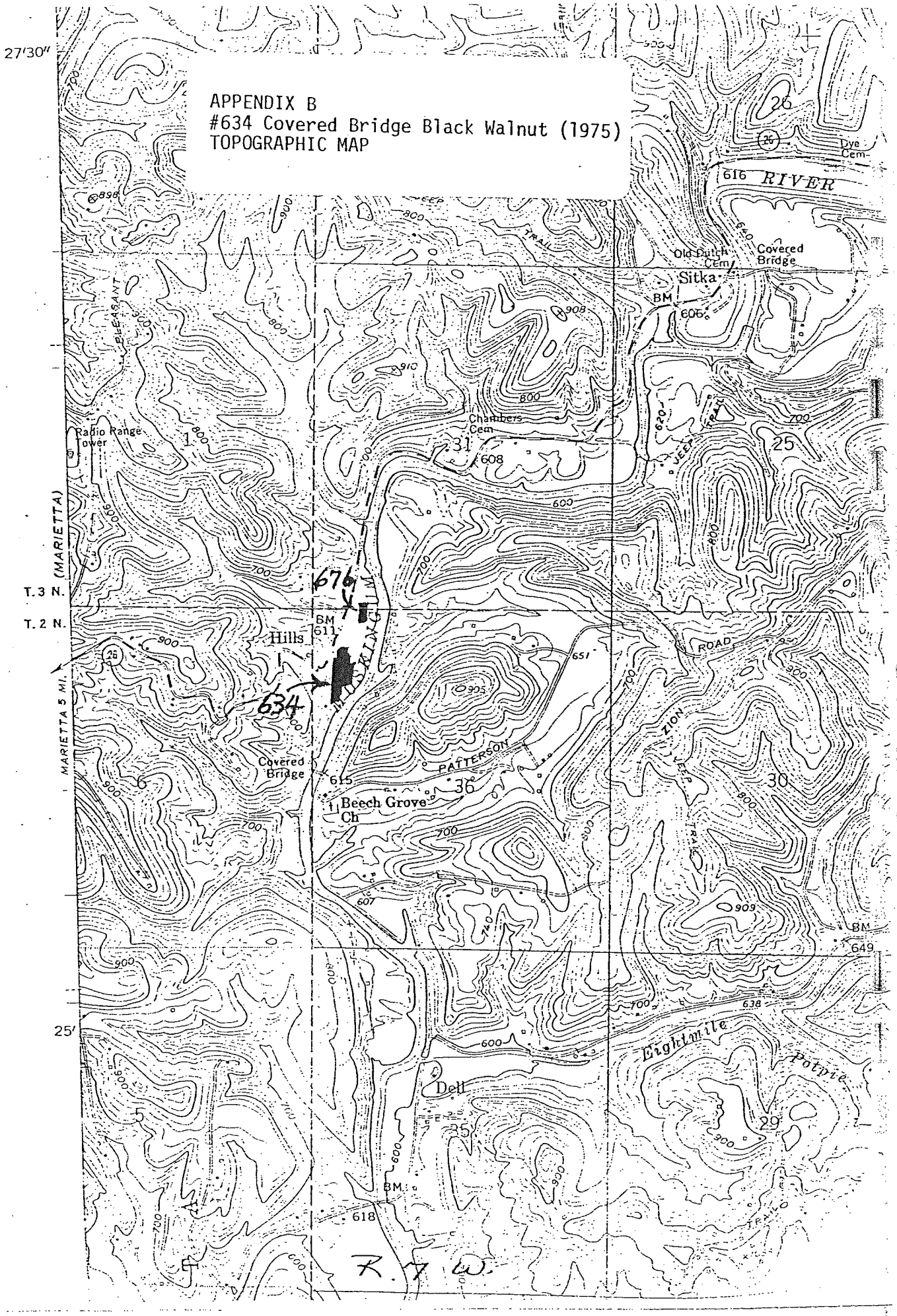
Competing Vegetation: There is no woody vegetation invading the stand, but shoulder-high perennials, primarily *Rubus*, *Rosa*, and goldenrod, form a dense briar patch and compete with the walnuts for moisture and nutrients. It's thick in here.

Suggested Maintenance: This plantation was mowed annually when young. Although crown closure has occurred, annual mowings should continue until the understory vegetation is controlled. No thinning is needed.

Other Comments: A hiking trail traverses this plantation from block 10 in the northeast to block 3 in the southwest. Impact on the stand has been minimal since the rows are 12 feet apart and the trail runs mostly north-south. The trail provides an easy route to quickly check the plantation in light of the dense, thorny understory.


APPENDIX A
#634 Covered Bridge Black Walnut (1975)
VICINITY MAP
#634
#652
Germantown
Warner
Lower Salem
Bonn
Whipple
Gasville
Fifteen Run
Heslop
Bloomfield
Rinard Mills
Hohman
Shay
Steel Run
Dart
Archers Fork
Deuchet
Leith
Wade
Spring Run
Grape Island
Middle Island
Bevan
Newport
Newell Run
ST MARYS
Stanleyville
Caywood
Moss Run
Fay
Sitka
Cow Run
Gracey
Schley
Torwood
East Torwood
Dell
Cornerville
Sandhill
Reno
Yankeeburg
MARIETTA STATE FOREST NURSERY
Eureka
Belmont
Lower Newport
Willow Island
Waverly
Grange Hall
Town Hall
Covered Bridge
Beech Grove Ch
Number Nine Ch
Golf Course
Drive-in theater
Ferry
Light
Oil
Gas
Sta
T 3 N
T 2 N
T 1 N
R. 8 W.
R. 7 W.
R. 6 W.
OHIO RIVER
PLEASANTS CO

APPENDIX B
#634 Covered Bridge Black Walnut (1975)
TOPOGRAPHIC MAP



GENETIC RESOURCE EVALUATION

Study No.: CG-425 Species: Black walnut

Date Established: 3/30/76 Date Evaluated: 11/19/93

Title: Black walnut progeny test/seed orchards for National Forests in the Eastern Region

Location: Fernow Experimental Forest near Parsons, West Virginia
Cheat RD, Monongahela NF
Tucker County, West Virginia

Experimental Design: Randomized block, 6 blocks, 5-tree plots, 34 families, 6 x 12 ft spacing. Blocks I - IV located on Hickman Flat, blocks V and VI located on McGowan Mtn Rd.

Monumentation: Brass tags wired to wooden dowels mark each plot; iron stakes mark block corners.

Existing Fall Measurements:
Ht '76, '77, '78, '79, '80, '90
DBH '90

Survival: 85% in blocks I, II, & V
70% in blocks III, IV, & VI

Growth: Diameters vary from 2 to 6 inches, with no size predominant. Heights vary from 15 to 30 feet, again with no typical or predominant size. Blocks I, II, & V tend toward the larger end of these ranges, while blocks III, IV, & VI tend to be smaller. Live crown ratios are 40%.

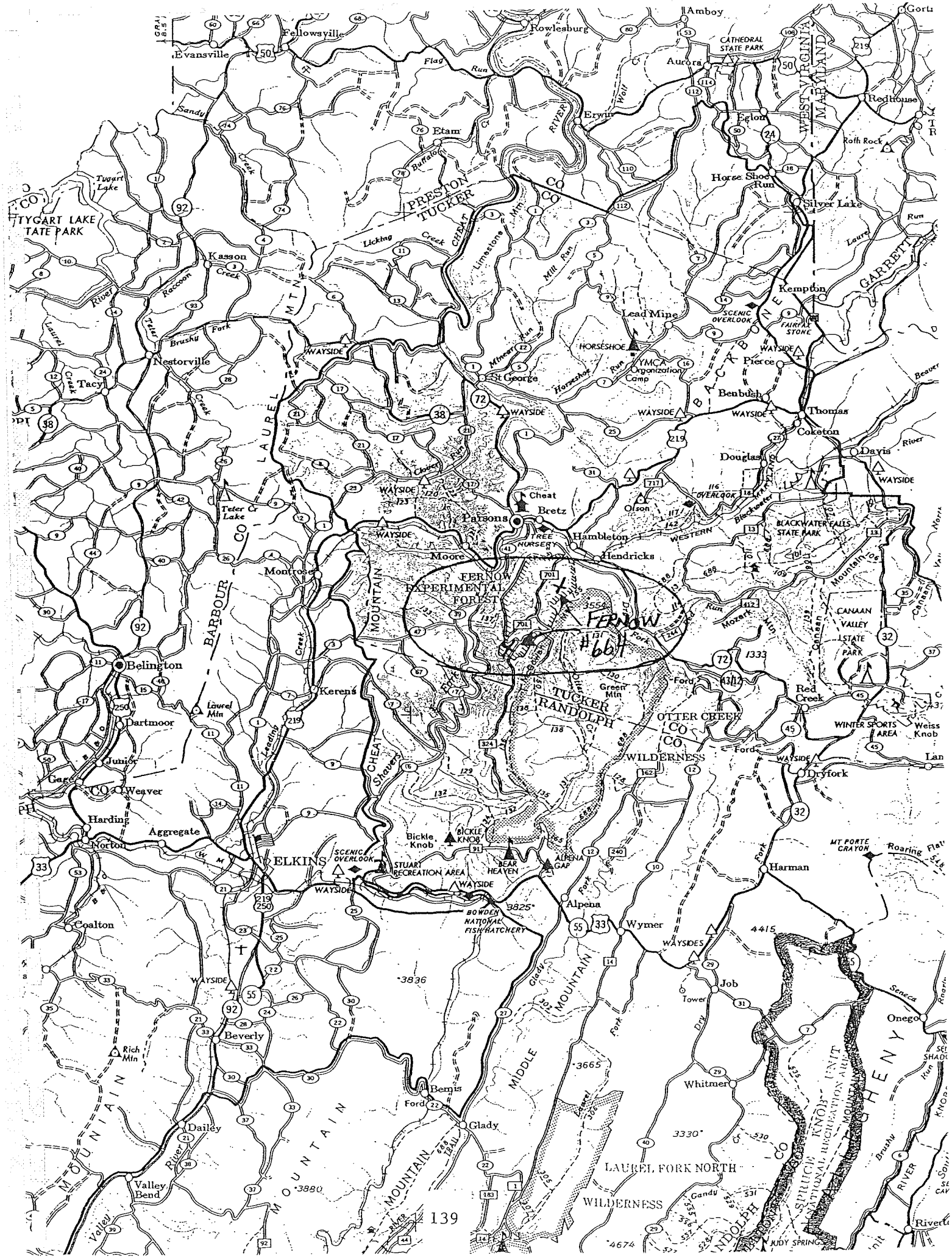
Stem Form: *Nectria* cankers occur on nearly all of these trees. These cankers are large and numerous resulting in boles essentially worthless for products.

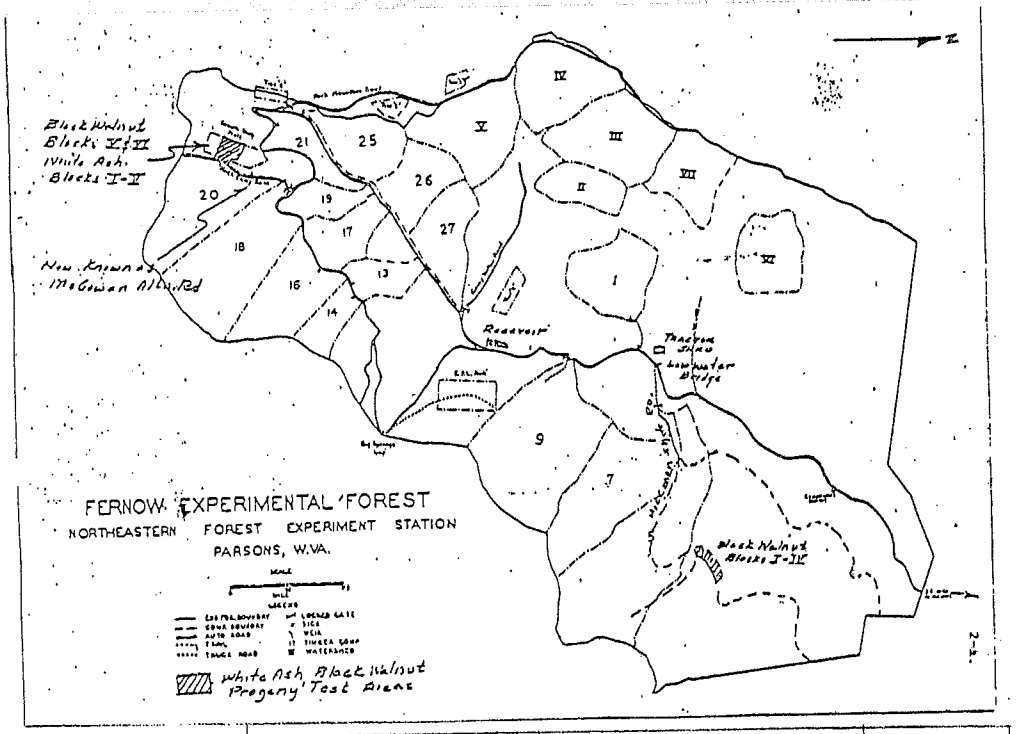
Damage: An extremely serious outbreak of *Nectria* canker affects this stand. I found no tree without at least one canker. Many are riddled with several. Three years ago when the stand was last measured, overall *Nectria* infection rate was 53%; the disease has progressed rapidly since then. Mortality will soon prevail as these cankers lead to stem breakage.

Competing Vegetation: None. This stand was cleaned in November of 1993 by an FS crew working out of the Timber and Watershed Lab in Parsons. Material removed consisted mainly of sugar maple and yellow-poplar saplings, *Rubus*, and Hercules'club.

Suggested Maintenance: None needed.

Other Comments: Tom Schuler, Timber and Watershed Lab, Parsons, West Virginia (NEFES) is taking care of this planting. He published 15-year results in April of 1993.


Amboy
Gorlu
Rowlesburg
Fellowsville
Evansville
Aurora
CATHEDRAL STATE PARK
WEST VIRGINIA
MARYLAND
Redhouse
Erwin
Eglon
Etam
Horse Shoe Run
Roth Rock
Silver Lake
TYGART LAKE STATE PARK
Tygart Lake
PRESTON
TUCKER
Kasson
Kempton
Lead Mine
SCENIC OVERLOOK
FAIRY STONE
GARRETT
Pierce
Nestorville
Tacy
St George
YMCA Organization Camp
HORSESHOE
WAYSIDE
Benbush
Thomas
Coketon
Davis
Douglas
LAUREL MTN
BACKBONE
Cheat
Bretz
Parsons
Olson
Hambleton
Hendricks
Moore
Montrose
TREE NURSERY
BLACKWATER FALLS STATE PARK
FERNOW EXPERIMENTAL FOREST
FERNOW #661
3554
CANAAN VALLEY STATE PARK
Belington
BARBOUR
Kerens
Laurel Mtn
Dartmoor
Junior
Weaver
Harding
Aggregate
Norton
Ford
Red Creek
TUCKER
RANDOLPH
OTTER CREEK
WILDERNESS
Green Mtn
WINTER SPORTS AREA
Weiss Knob
Dryfork
Bickle Knob
BICKLE KNOB
ELKINS
SCENIC OVERLOOK
STUART RECREATION AREA
BEAR HEAVEN
ALPENA GAP
Alpena
Harman
MT PORTE CRAYON
Roaring Flat
BOWDEN NATIONAL FISH HATCHERY
3825
Wymer
Coalton
Job
Tower
4415
Onego
Seneca
Beverly
Rich Mtn
3836
Glady
Bemis
Whitmer
3665
3330
Dailey
Valley Bend
Glady
LAUREL FORK NORTH
WILDERNESS
SPRUCE KNOB-SENECA ROCKS NATIONAL RECREATION AREA
MONONGAHELA
JUDY SPRINGS
4674
3880



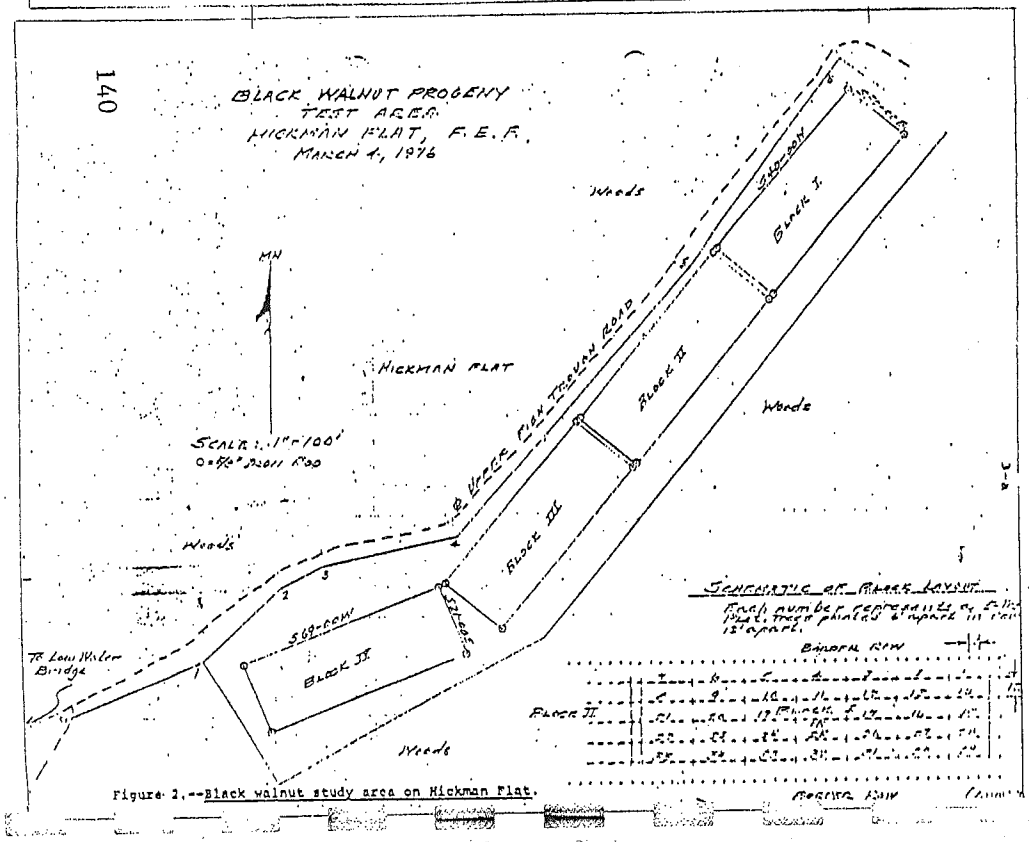


Figure 2.--Black walnut study area on Hickman Flat.

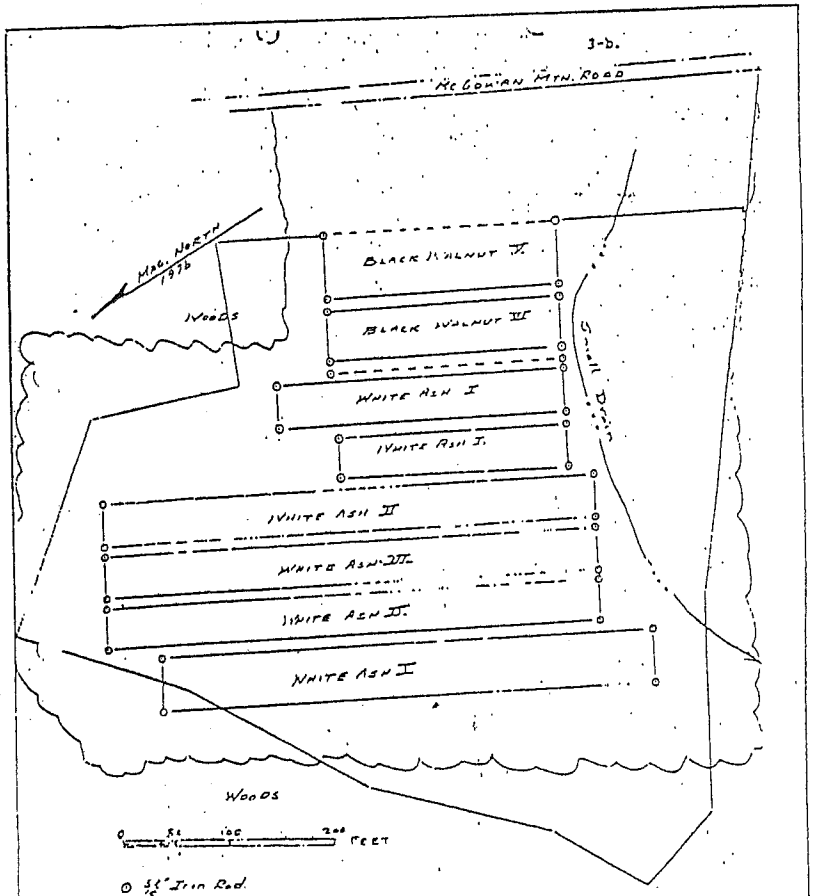


Figure 3.--Map showing location of black walnut blocks V and VI on McGowan Mountain Road

APPENDIX D

GENETIC RESOURCE EVALUATION

Study No.: CG-425 Species: Black walnut

Date Established: 4/20/76 Date Evaluated: 11/20/93

Title: Black walnut progeny test/seed orchards for National Forests in the Eastern Region

Location: "Fitzwater" planting near Marlinton, West Virginia
Compartment 11, Marlinton RD, Monongahela NF
Pocahontas County, West Virginia

Experimental Design: Randomized block, 4 blocks, 5-tree plots, 26 families, 6 x 12 ft spacing.

Monumentation: Original split-wood stakes persist at the N and S ends of 75% of the plots, and 75% of these stakes have brass tags attached. Blocks 7 & 8 are south of an old home site, while blocks 9 & 10 are north of the home site. Corners of each 2-block area are marked with orange plastic stakes.

Existing Fall Measurements:
Ht '76, '77, '78
DBH

Survival: About 50%.

Growth: In blocks 7, 9, & 10, diameters range from 2 to 6 inches, and heights range from 10 to 27 feet. Trees are more-or-less evenly distributed within these bounds. Live crown ratios are 40 to 50%.

In block 8, trees are smaller, most being about 2 inches DBH and 10 feet tall. Live crown ratios are 60%.

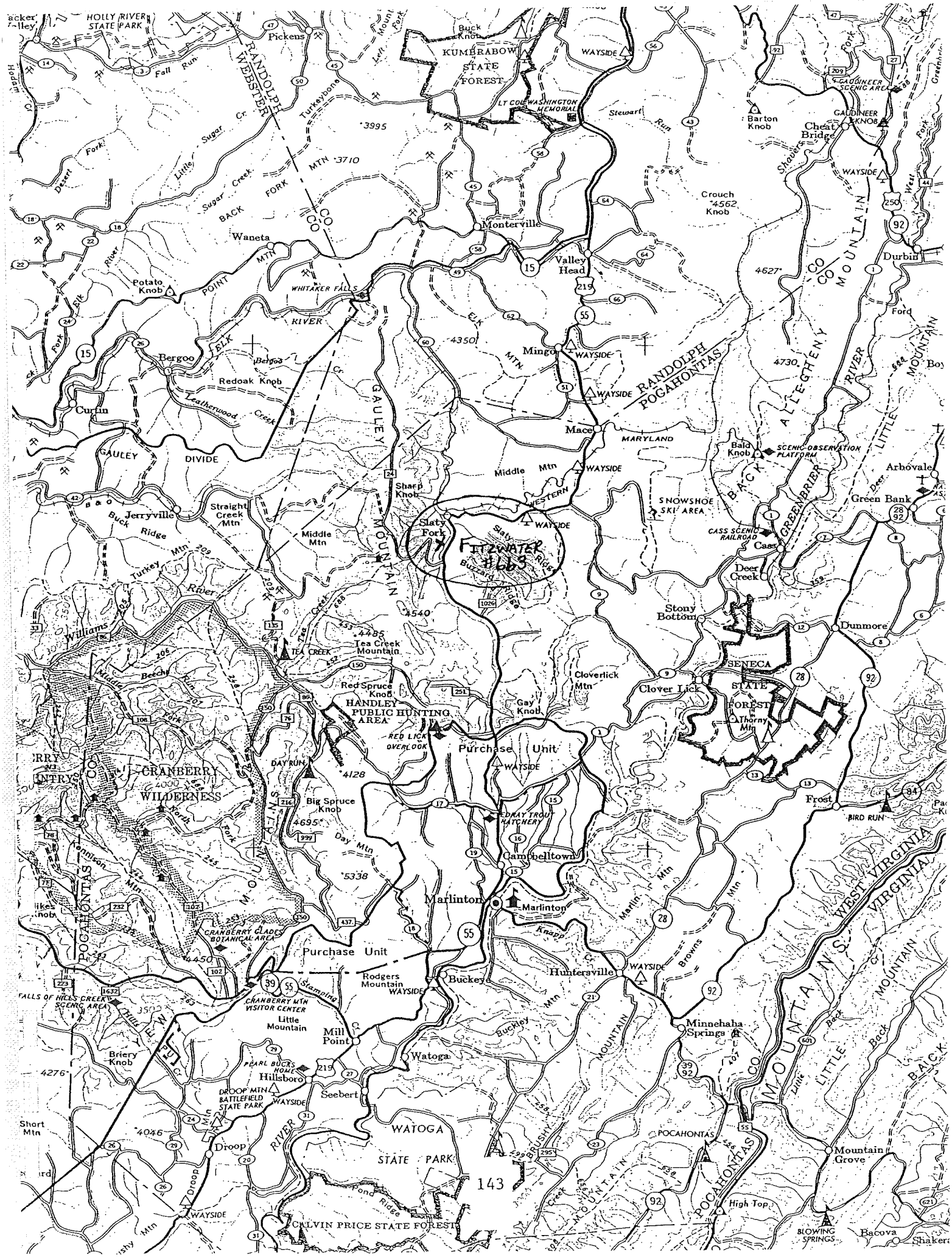
Stem Form: There is much variation in height to first limb. Many of the larger walnuts go 10 or 15 feet to a major limb, but many do not. Nearly all of these trees are infected with *Nectria* canker.

Damage: *Nectria* canker infects 100% of the trees in blocks 7, 9, & 10. Block 8 is about 90% infected.

Competing Vegetation: Goldenrod is thick in blocks 8 and 9. Autumn-olive has been interplanted in blocks 8 and 10. In block 8, the autumn-olives are as large as the walnuts. Woody invaders are not numerous, but some are much larger than the walnuts. These woody species include black locust, black cherry, and hawthorn.

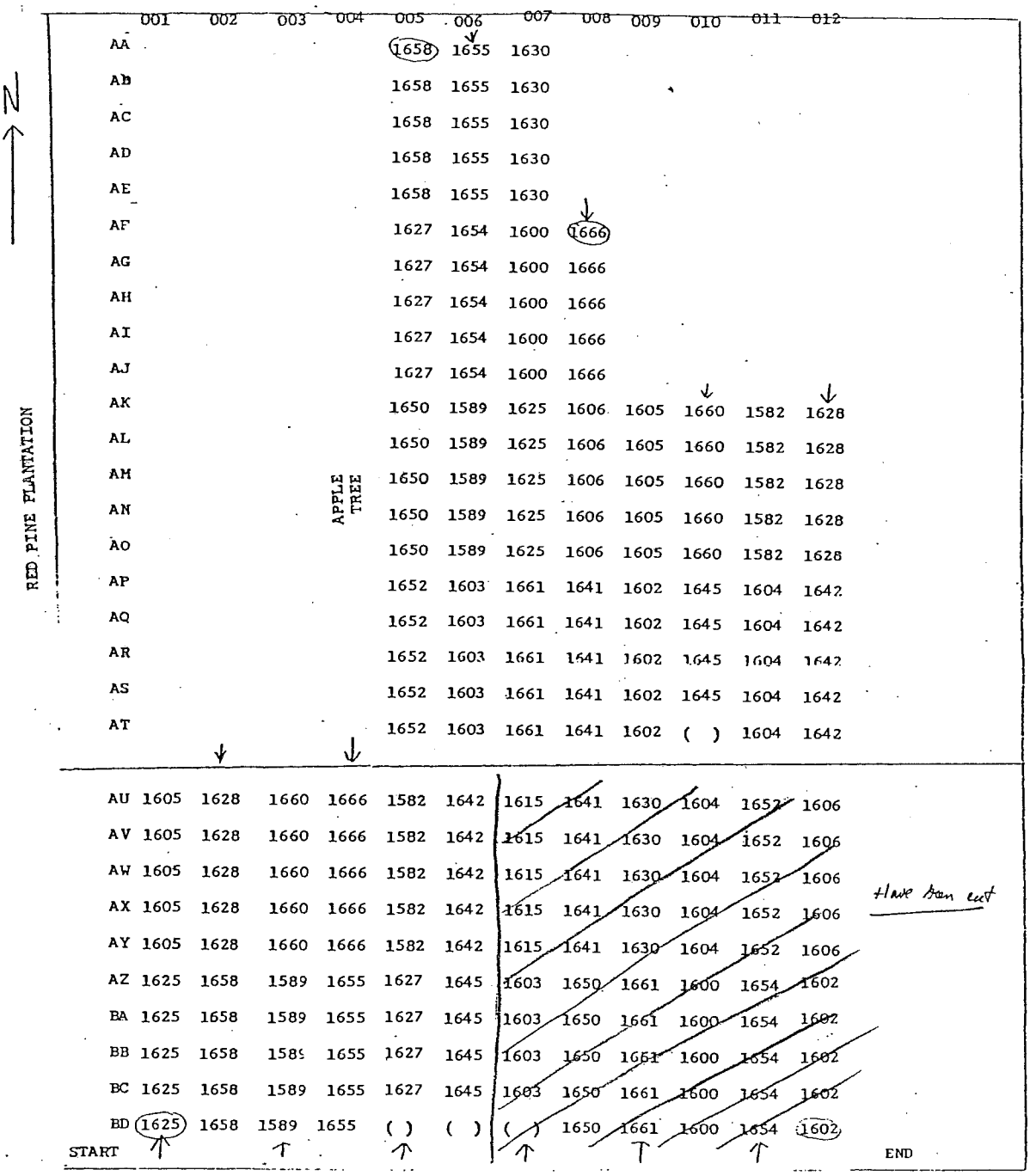
Suggested Maintenance: Clean out the understory vegetation.

Other Comments: Block 7 has been pruned. The eastern half of block 9 has been clearcut.


HOLLY RIVER STATE PARK
Pickens
RANDOLPH
WEBSTER
Buck Knob
KUMBRABOW STATE FOREST
LT COL WASHINGTON MEMORIAL
WAYSIDE
Barton Knob
GAUDINEER SCENIC AREA
GAUDINEER KNOB
Cheat Bridge
Shavers Fork
Stewart Run
Crouch 4562 Knob
Durbin
Fall Run
Turkeybone
Little Sugar Creek
Sugar Creek
BACK FORK MTN 3710
CO
Waneta
Monterville
Valley Head
Potato Knob
POINT MTN
WHITAKER FALLS
ELK RIVER
Bergoo
Redoak Knob
Leatherwood Creek
Curtin
GAULEY DIVIDE
Mingo
WAYSIDE
RANDOLPH
POCAHONTAS
4627
4730
BACK ALLEGHENY MOUNTAIN
RIVER
LITTLE
Ford
Mace
MARYLAND
Bald Knob
SCENIC OBSERVATION PLATFORM
Arbovale
Green Bank
GREENBRIER
Deer
SNOWSHOE SKI AREA
Middle Mtn
WESTERN
Sharp Knob
Jerryville
Straight Creek Mtn
Buck Ridge
Middle Mtn
GAULEY MOUNTAIN
Slaty Fork
Slaty Ridge
FITZWATER #683
Buzzard
CASS SCENIC RAILROAD
Cass
Deer Creek
Stony Bottom
Dunmore
Turkey Mtn
Turkey River
Williams
Tea Creek Mountain
4485
4540
Cloverlick Mtn
Clover Lick
SENECA STATE FOREST
Thorny Mtn
Red Spruce Knob
HANDLEY PUBLIC HUNTING AREA
RED LICK OVERLOOK
Gay Knob
Purchase Unit
WAYSIDE
DAY RUN
4128
Frost
BIRD RUN
CRANBERRY WILDERNESS
Big Spruce Knob
4695
EDRAY TROUT HATCHERY
Day Mtn
5338
Campbelltown
Marlinton
Marlin Mtn
Knapp
Browns
Huntersville
WEST VIRGINIA
MOUNTAINS
Tonnison Mtn
POCAHONTAS
CRANBERRY GLADES BOTANICAL AREA
4450
Purchase Unit
Rodgers Mountain
Buckeye
FALLS OF HILLS CREEK SCENIC AREA
CRANBERRY MTN VISITOR CENTER
Little Mountain
Mill Point
Watoga
Minnehaha Springs
Briery Knob
PEARL BUCK'S HOME
Hillsboro
Seebert
DROOP MTN BATTLEFIELD STATE PARK
Short Mtn
4046
Droop
WATOGA STATE PARK
Pond Ridge
CALVIN PRICE STATE FOREST
BRUSHY
POCAHONTAS
Mountain Grove
High Top
BLOWING SPRINGS
Bacova
Shaker
143

FITZWATER #663 BLACK WALNUT planted 4-20-76 NORTH OF HOUSE Note: South of House on separate sheet.
Monongahela NF 25+ families
Marlinton RD 4 blocks 5-tree plots Spacing 6' within rows 12' between rows

BLOCK 10



BLOCK 9

FITZWATER #663 BLACK WALNUT (SOUTH OF THE HOUSE)
Monongahela NF Planted 4-20-76 Spacing 6' within rows - 12' between rows
Harlinton RD 5-tree plots 27 families

Note: North of House on separate sheet.

BLOCK 8

		001	002	003	004	005	006	007	008	
	AA	(1652)	1615	1645	1605	(627)				
	AB	1652	1615	1645	1605	( )				
	AC	1652	1615	1645	1605	1627				
	AD	1652	1615	1645	1605	1627				
	AE	1652	1615	1645	1605	1627				
	AF	1600	1661	1628	1660	1658	1655			
	AG	1600	1661	1628	1660	1658	1655			
	AH	1600	1661	1628	1660	1658	1655			
	AI	1600	1661	1628	1660	1658	1655			
START	AJ	1600	1661	1628	1660	1658	1655			
	AK		1603	1606	1602	1642	1582			
	AL		1603	1606	1602	1642	1582			
	AM		1603	1606	1602	1642	1582			
	AN		1603	1606	1602	1642	1582			
	AO		1603	1606	1602		1582			
	AP		1641	1650	1604	1630	1589			
	AQ		1641	1650	1604	1630	1589			
	AR		1641	1650	1604	1630	1589			
	AS		1641	1650	1604	1630	1589			
	AT		1641	1650	1604	1630	1589			
	AU		1649	1654	1588	1625	1666			
	AV		1649	1654	1588	1625	1666			
	AW		1649	1654	1588	1625	1666			
	AX		1649	1654	1588	1625	1666			
	AY		1649	1654	1588	1625	1666			
	AZ				1588	1628	1661	1600		
	BA				1588	1628	1661	1600		
	BB				1588	1628	1661	1600		
	BC				1588	1628	1661	1600		
	BD				1588	1628	1661	1600		
	BE				1666	1627	1605	1660		
	BF				1666	1627	1605	1660		
	BG				1666	1527	1605	1660		
	BH				1666	1627	1605	1660		
	BI				1666	( )	1605	1660		
	BJ				1654	1642	1604	1625		
	BK				1654	1642	1604	1625		
	BL				1654	1642	1604	1625		
	BM				1654	1642	1604	1625		
	BN				1654	1642	1604	1625		
	BO				1606	1658	1630	1615		
	BP				1606	1658	1630	1615		
	BQ				1606	1658	1630	1615		
	BR				1606	1658	1630	1615		
	BS				1606	1658	1630	1615		
	BT				1589	1582	1603	( )		
	BU				1589	1582	1603	1602		
	BV				1589	1582	1603	1602		
	BW				1589	1582	1603	1602		
	BX				1589	1582	1603	1602		
	BY				1641	( )	1650	1652	1655	
	BZ				1641	1645	1650	1652	1655	
	CA				1641	1645	1650	1652	1655	
	CB				1641	1645	1650	1652	1655	
	CC				(1641)	1645	1650	1652	(1655)	END

BLOCK 7

GENETIC RESOURCE EVALUATION

Study No.: CG-425 **Species:** Black walnut

Date Established: 4/24/74 **Date Evaluated:** 1/16/94

Title: Black walnut progeny tests/seed orchards for National Forests in the Eastern Region

Location: "Stinking Fork" planting near West Fork, Indiana
Compartment #9, Tell City RD, Hoosier NF – 812-275-5987
SE1/4, S34, T3S, R1W, Crawford County, Indiana

Experimental Design: Randomized block, 4 blocks, 5-tree row plots, 51 families, 6 x 12 ft spacing, 1 border row.

Monumentation: Bamboo stakes with embossed metal tags mark the north and south ends of nearly every plot. Additionally, an orange plastic stake (with metal tag) has been placed at the tree nearest each of the four corners of the planting.

Existing Fall Measurements:
Ht '76, '79, '80
DBH

Survival: Overall survival is 80 to 85%. Survival is even better in the northern half of the plantation, but part of Block 8 in the southwestern corner of the stand has only 50% survival.

Growth: The best tree in the stand is 6 inches in diameter and 32 feet tall. Growth has been variable, and seems to follow a gradient from one end of the plantation to the other. In the northeastern third of the stand, trees are typically 4 to 5 inches in diameter and 25 to 30 feet in height. Trees in the central third of the stand are 2 to 3 inches in diameter and about 15 feet in height. In the southwestern third of the stand, trees are only 1 inch in diameter and 6 to 8 feet in height. (The northeastern corner of the site is closest to the creek, but is well-drained as the area drains to the southwest.) Live crown ratios throughout the planting are 40 to 50%.

Stem Form: Form is generally poor in this planting with most of the larger trees having a major branch or a fork at about 6 feet.

Damage: Three cankers were spotted in the stand - these did not appear to be *Nectria* cankers.

Kieth Woeste

Only had a few pieces of information

on the Walnut plantations around Stinking Fork.

1) Included is our compartment map and I have circled stand 17+18 and drew an arrow to the stands.

2) Two sheets contain old 1970 field information

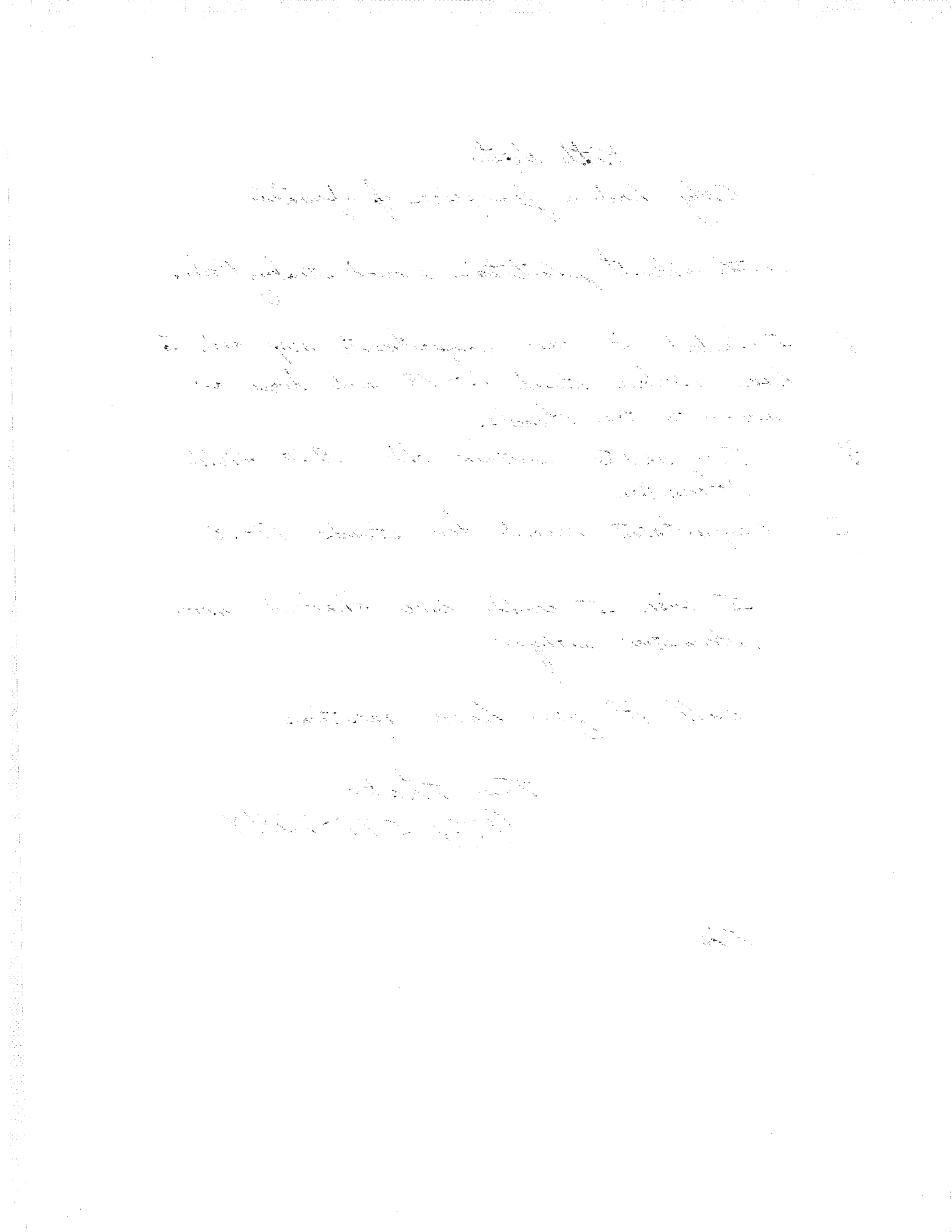
3 Compartment record for stands 17+18

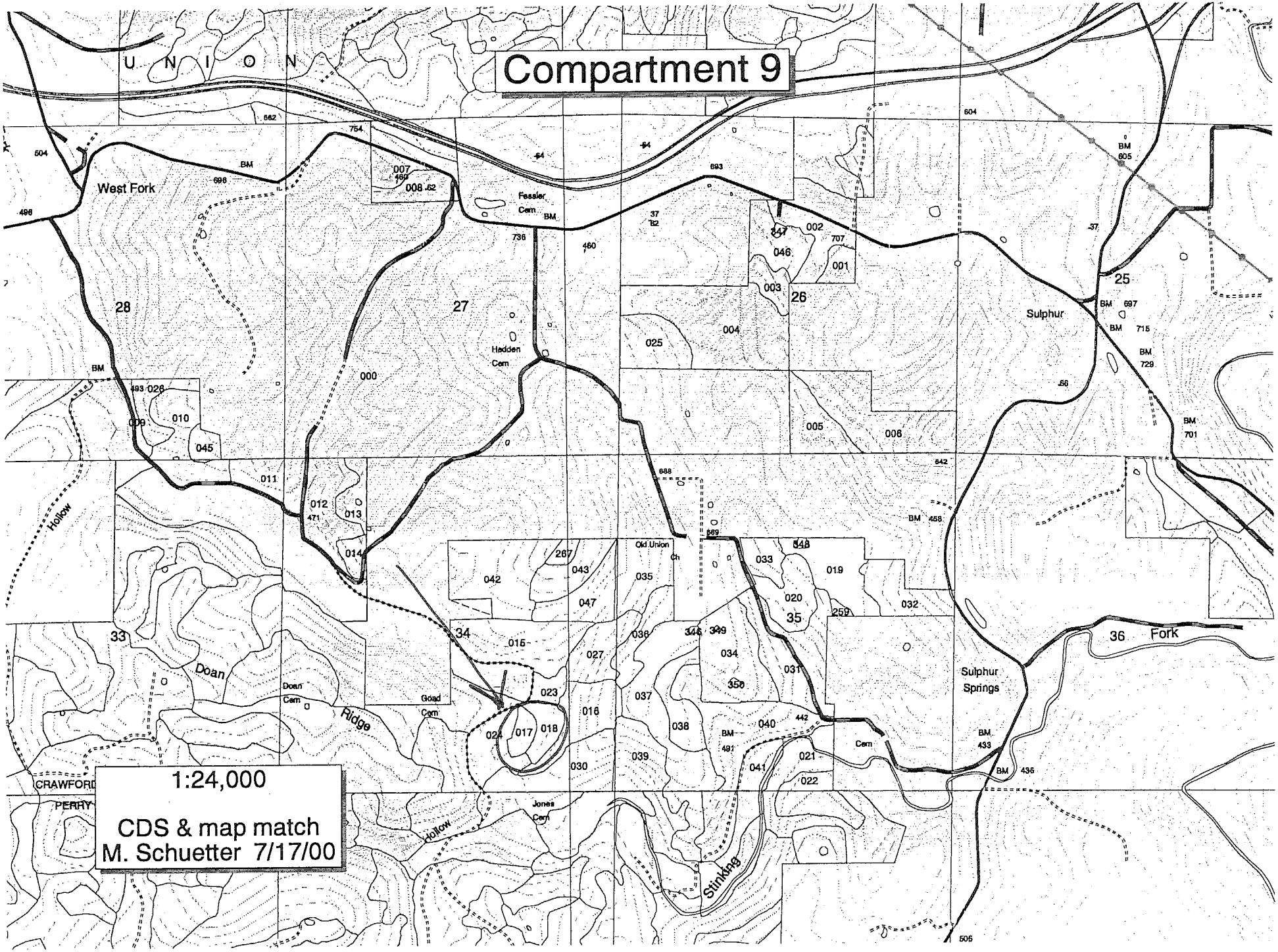
I wish I could have shared more information with you

call if you have questions

Tom Thake
(812) 547-9248

Fax



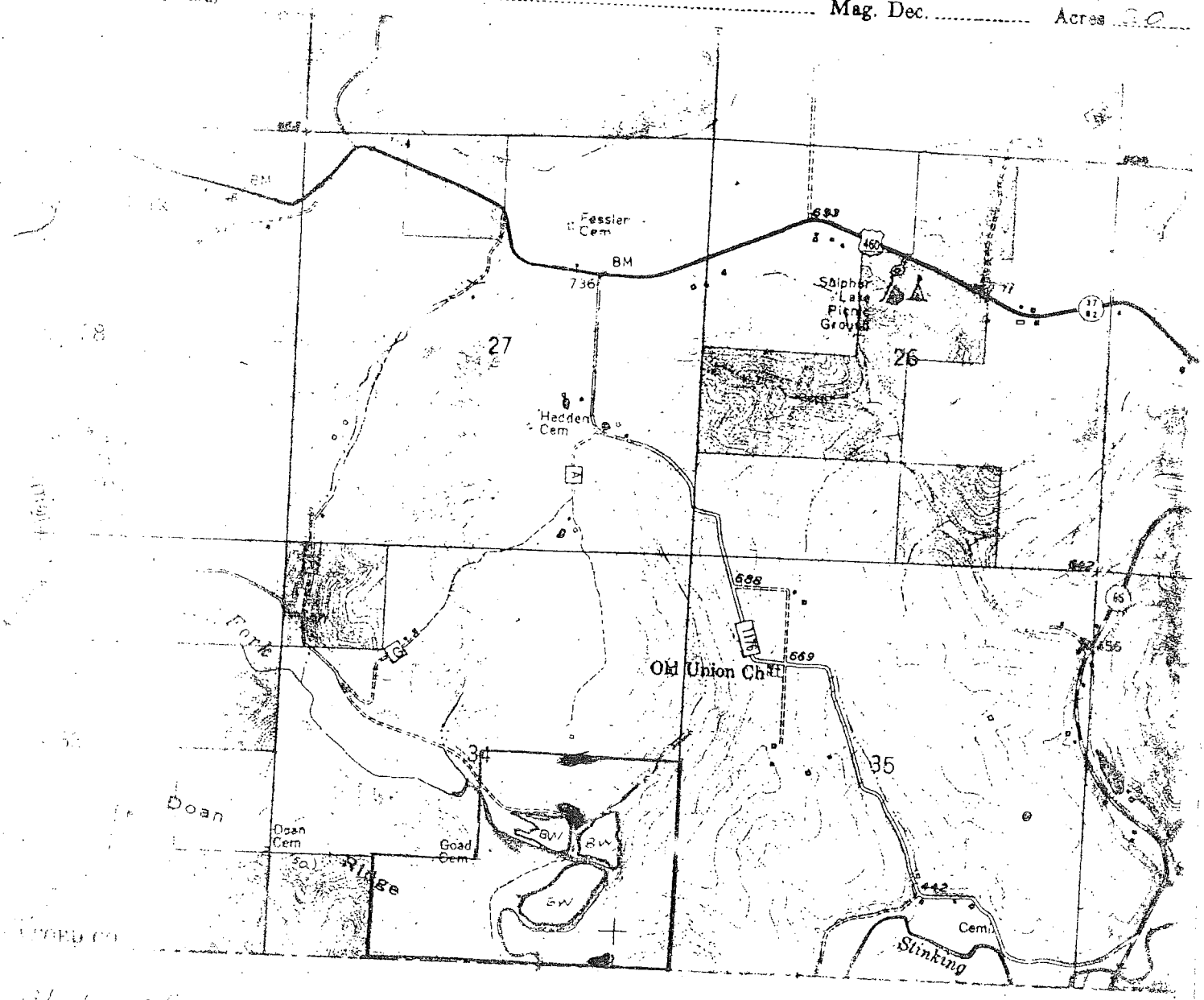

Compartment 9
U N I O N
West Fork
Fessler Cem
Hadden Cem
Sulphur
Old Union Ch
Doan
Doan Cem
Goad Cem
Ridge
Hollow
Jones Cem
Stinking
Sulphur Springs
Fork
CRAWFORD
PERRY
1:24,000
CDS & map match
M. Schuetter 7/17/00

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
FIELD MAP SHEET

Scale 2.64 inches = 1 mile

T. 35 R. 1W Sec. 34

Unit C-9 Mag. Dec. Acres 30



Black walnut 12.7 M planted Spring '70 Hand
site preparation (Rototilling) Fall '69
Spraying (Atrazine + Simazine) Spring '70

Life opening left at old homesite - Building line and Cl. Easement.
Any areas left unplanted for wildlife.

Drawn Date 7/30/70 Platted by F.T.K.

....., 19.....

R9-2470-2 (Rev. 9/12/67)

REGENERATION PRESCRIPTION
Prepare for each area to be regenerated by cultural methods (FSH 2472.1)

Date	National Forest
4/30/70	Hoosier
Type of Regeneration	**Ranger District**
P	Tell City

1. Description of Stand	Sec. 34 T. 55 R. 1W	Compartment No.	Stand No.	Stand Acres
		9	9	20

a. Present stocking: open

b. Soil: Excellent.

c. Topographic situation: Bottom

d. Biotic factors:

e. Site index: High

2. Prescription

Black walnut — 10' x 10' with Site Preparation

Site Preparation:

Rototill with Howard Rotovator on 10 ft rows (center to center). These rows are sprayed with a mixture of Atrazine + Simazine at a mixture of 5 lbs/Ac. Weed control and corrective pruning are carried out for 5 years after planting.

3. Special Coordination Instructions

Old home site should be left as n.v. area. as well as two brushy areas.

Economic Analysis

a. Planting or seeding

Species	Method	Spacing	No. Trees or # Seed Per Acre	Acres	Cost Per Acre	Total Cost
B.W.	Hand	10x10	436	20	15	300
Total						

b. Site Preparation

Method	Acres	Cost Per Acre	Total Cost
Roto-Till + Herbicide	20	30	600
Total			600

c. Seed and Planting Stock Requirements

Species	Planting Stock Type	M	Pounds of Seed	Cost Per M or Pound	Total Cost
B.W.	#1-0	12		20	240
Total					240

d. Animal & Disease Control

Excessive

Species	C/A	Cost

5. Cost Summary

Item	Cost P&M	Cost K-V
Seeding and Planting	300	
Site Preparation	600	
Seed and Planting Stock	240	
Animal & Disease Control	—	
	—	
TOTAL COST	$1140	

Prepared By:	Title	
Field Checked By:	Title	Date

Posted to R9-2470-9	Initials	Date

Region 09 Forest 12 District 04 Compartment 9

Std	Acres	Veg Typ	Surv Year	For Typ	Sz Dn	Tot BA	Cnd	Mgt Obj	Typ Obj	Site Spec	Site Indx	Yr Of Orign	LTA	Mgmt Area	M A Sub	VQO	LSC	ELT	DBH	Anm Hab	Soil Type	Op	EU	Opty Area	Slp Pct	OG
11																										
12	27		1995	54	9	110	5	1	54		66	1909		9.2			801		10					0406		
13	9		1995	44	6	100	5	1	44	837	70	1952		9.2			801		8					0406	12	
14	6		1995	32	3		5	1	32	129	75	1974		9.2			801		2					0406	18	
15	33		1995	52	9	90	5	1	52	837	62	1933		9.2			801		10					0406	34	
16	21		1995	54	9	100	4	6	54	837	58	1893		9.2			801		12			3		0406	35	
17	5		1995	78	2		5	1	78	837	70	1977		9.2			801							0406	2	
18	8		1995	78	2	48	5	1	78	837	78	1972		9.2			801		4					0406	3	
19	25		1995	3	2		5	1	3	129	80	1974		2.8			500		1					0406	5	
20	18		1995	54	9	100	4	6	54	837	71	1905		2.8			500		12			3		0406	22	

Remarks: POND #351 IS LOCATED IN STAND

Remarks:

Accomplishments:

FY	Actvty	Qual	WA	Quant
1979	35	0	1	23

Accomplishments:

FY	Actvty	Qual	WA	Quant
1979	35	0	1	12

Accomplishments:

FY	Actvty	Qual	WA	Quant
1979	35	0	1	16

Accomplishments:

FY	Actvty	Qual	WA	Quant
1979	35	0	1	46

Remarks:

Activity Inventory:

Actvty	Qual	WA	SchdFY	Quant
999	0	1		
999	0	2		
999	0	3		

Remarks:

Accomplishments:

FY	Actvty	Qual	WA	Quant
1979	35	0	1	17
1982	381	5	1	17
1986	511	0	1	8

Remarks: POND #348 IS LOCATED IN STAND

Remarks:

Activity Inventory:

Actvty	Qual	WA	SchdFY	Quant
999	0	1		
999	0	2		
999	0	3		

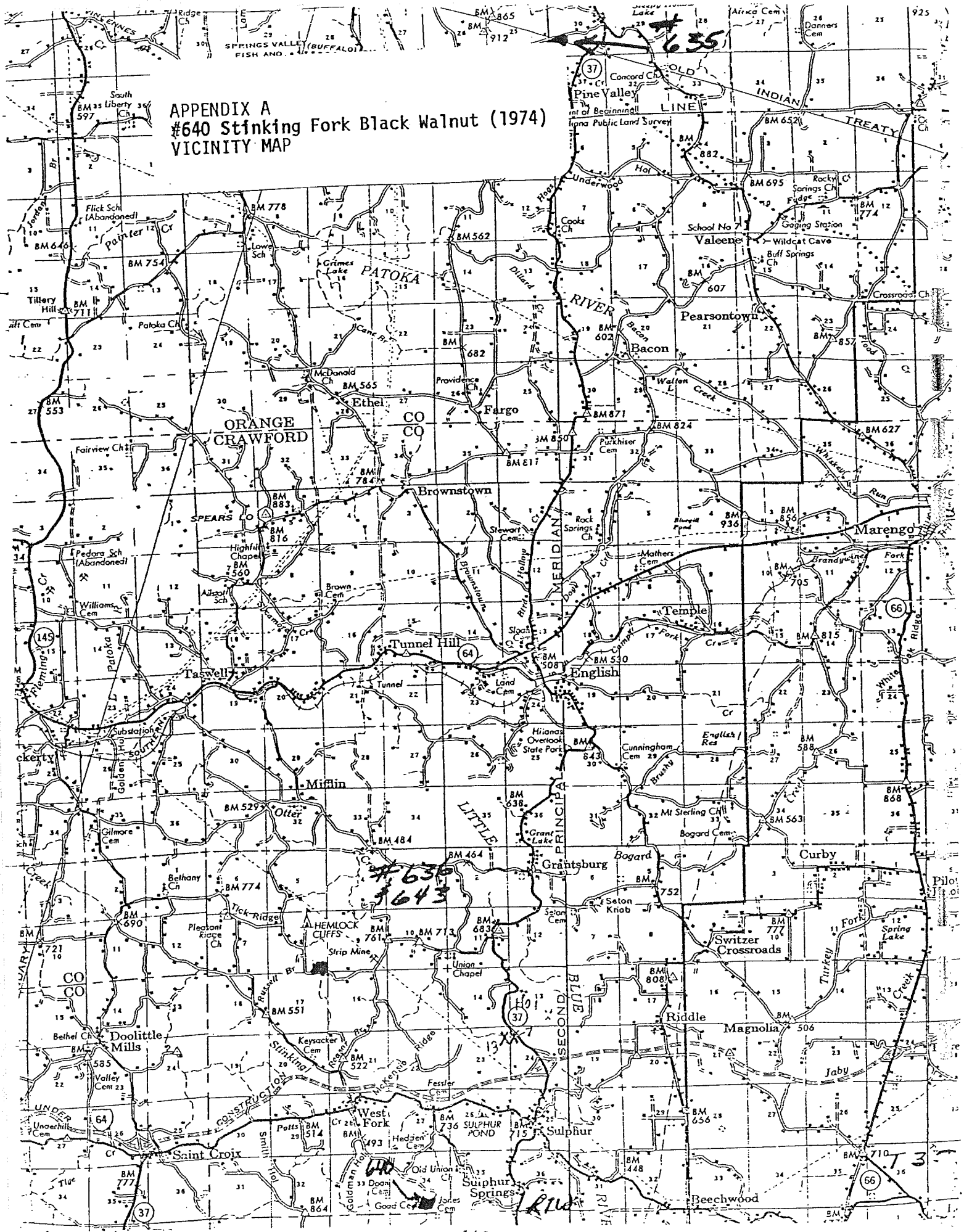
Competing Vegetation: In areas where the walnuts are shortest (along the western side and in the southwestern part of the planting) yellow-poplar saplings are successfully invading. These approach 20 feet in height and overtop the nearby slower-growing walnuts.

The entire plantation is underlain by a heavy growth of 4-foot-tall grass. I believe this is a brome. Leaves are about 3/4 inch wide, and seedheads contain 7 to 9 seeds in a flattened raceme-like construction. Grass growth has been best in areas where walnut growth has been poorest, and may be the cause of the poor walnut peformance.

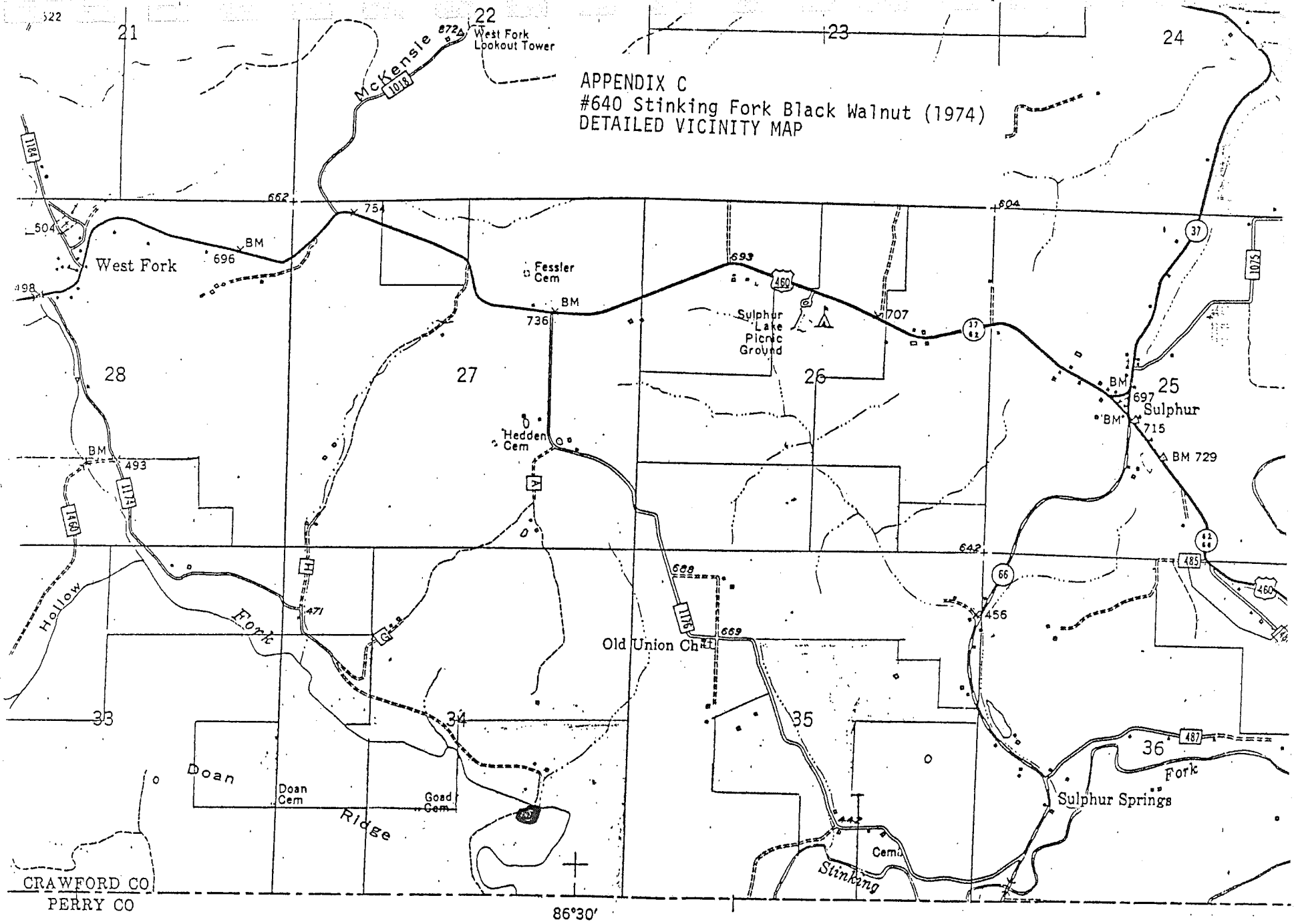
Suggested Maintenance: The competing yellow-poplar saplings need to be removed, and the heavy brome should be controlled. Pruning is necessary if these walnuts are to produce products.

Other Comments:

called Tom Thake 812-547-9248
District Ranger
USDA FS
248 15th St Tell City IN 47586-1902
812-547-9248


APPENDIX A
#640 Stinking Fork Black Walnut (1974)
VICINITY MAP
#635
#636
#643
#640
Pine Valley
Valeene
Pearsontown
Bacon
Fargo
Ethel
Brownstown
Marengo
Temple
English
Tunnel Hill
Taswell
Mifflin
Otter
Grantsburg
Bogard
Curby
Switzer Crossroads
Riddle
Magnolia
Doolittle Mills
Saint Croix
West Fork
Sulphur
Sulphur Springs
Beechwood
ORANGE
CRAWFORD
PATOKA
RIVER
PRINCIPAL MERIDIAN
SECOND
BLUE
LITTLE
INDIAN
TREATY
LINE
OLD
CONSTRUCTION
UNDER
Stinking
Fork
Creek
Ridge
Hemlock Cliffs
Strip Mine
Seton Knob
Mt Sterling Ch
Bogard Cem
Grant Lake
Hillanas Overlook State Park
Sulphur Pond
Union Chapel
Keysacker Cem
Hedden Cem
Old Union Ch
Good Cem
Jones Cem
Doom Cem
Valley Cem
Underhill Cem
Bethel Ch
Bethany Ch
Pleasant Ridge Ch
Gilmore Cem
Williams Cem
Brown Cem
Land Cem
Tunnel
Substation
Golden Gate
Southern
Pedora Sch (Abandoned)
Highfill Chapel
Wilson Sch
Flick Sch (Abandoned)
Lowe Sch
Grimes Lake
Tillery Hill
Patoka Ch
McDonald Ch
Providence Ch
Fairview Ch
Stewart Cem
Rock Springs Ch
Mathers Cem
Purkhiser Cem
Cooks Ch
Underwood
Rocky Springs Ch
Fudge
Gaging Station
Wildcat Cave
Buff Springs Ch
Crossroad Ch
Walton
Flood
Whiskey Run
Brandywine Fork
White Oak Ridge
Cunningham Cem
English Res
Spring Lake
Turkey Creek
Jaby
Africa Cem
Danners Cem
Concord Ch
Lake
Public Land Survey
Beginning
Hoop
Dillard
Bacon
Cane Br
Jordan Br
Painter Cr
Fleming Cr
Patoka
Tick Ridge
Russell Br
Keysacker Ridge
Hickenbottom Ridge
Smith Hol
Goldman Hol
Polts
Fessler Cem
Union Ch
Spears Cem
Highfill Chapel
Stewart Cem
Rock Springs Ch
Mathers Cem
Brandywine Fork
Temple
Tunnel Hill
Taswell
English
Mifflin
Otter
Grantsburg
Bogard
Curby
Switzer Crossroads
Riddle
Magnolia
Doolittle Mills
Saint Croix
West Fork
Sulphur
Sulphur Springs
Beechwood
Pearsontown
Bacon
Valeene
Pine Valley
Marengo
Brownstown
Ethel
Fargo
Tunnel Hill
Taswell
Mifflin
Otter
Grantsburg
Bogard
Curby
Switzer Crossroads
Riddle
Magnolia
Doolittle Mills
Saint Croix
West Fork
Sulphur
Sulphur Springs
Beechwood

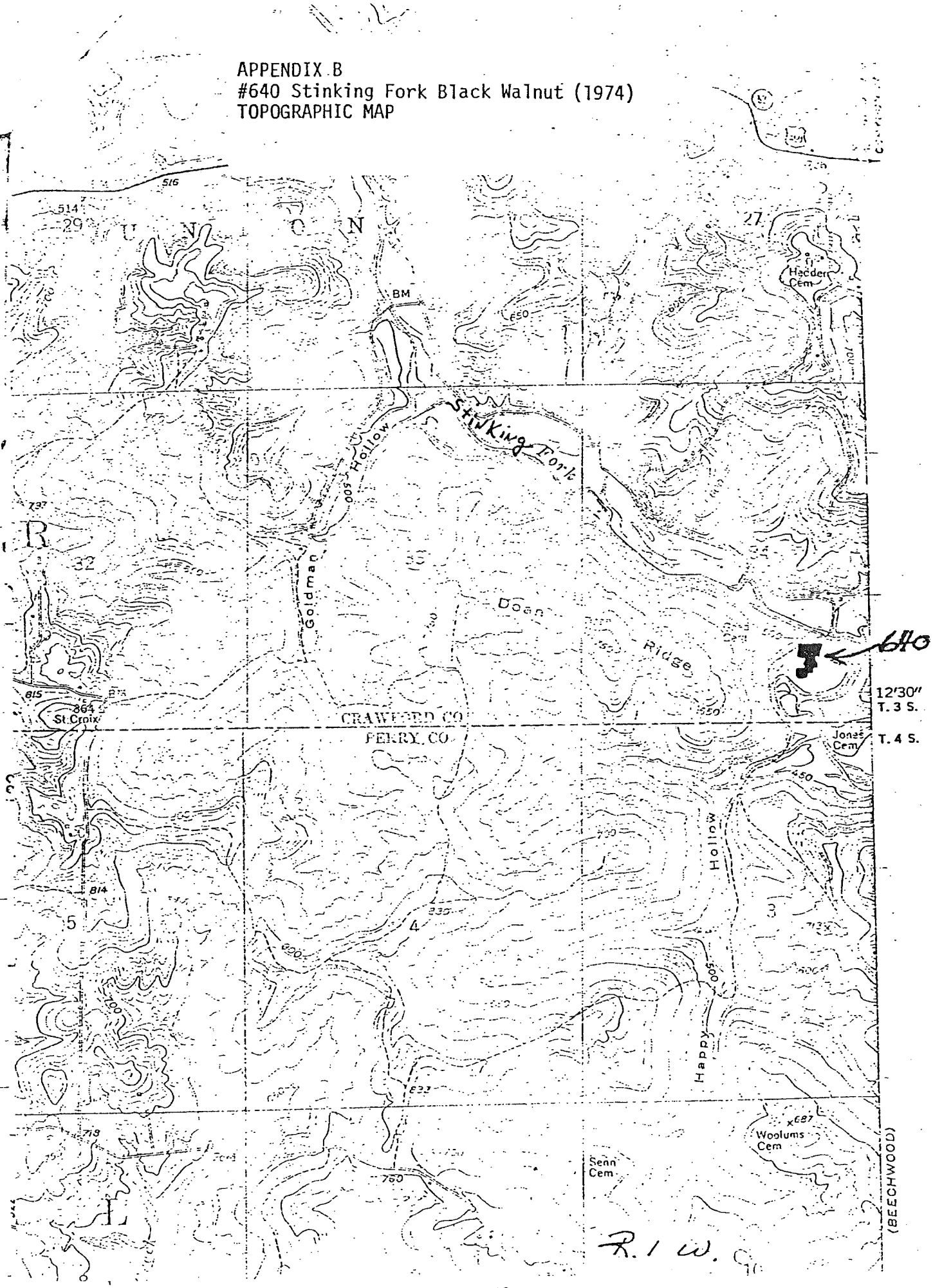
APPENDIX C
#640 Stinking Fork Black Walnut (1974)
DETAILED VICINITY MAP



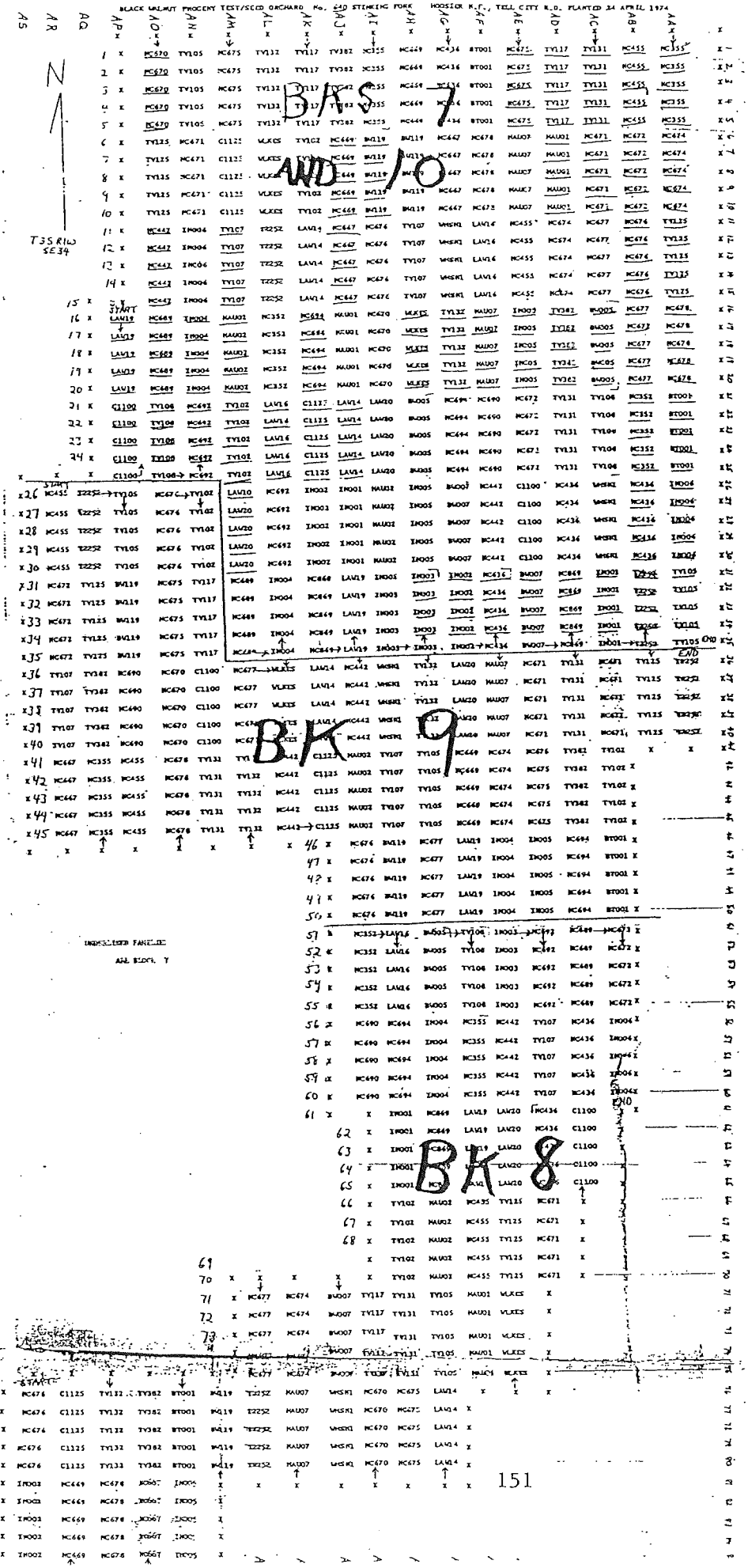
STINKING FORK
PLANTING

T. 3 S., R. 1 W.
HOOSIER NATIONAL FOR

APPENDIX B
#640 Stinking Fork Black Walnut (1974)
TOPOGRAPHIC MAP



REVISION 1 - Alpha Grid Coordinates Changed to fit Computer Program. 1/28/77 R.Hulek



GENETIC RESOURCE EVALUATION

Study No.: CG-425 **Species:** Black walnut

Date Established: 4/5/74 **Date Evaluated:** 1/15/94

Title: Black walnut progeny test/seed orchards for National Forests in the Eastern Region

Location: "Young's Creek" planting near Paoli, Indiana
Compartment #56, Tell City RD, Hoosier NF
NWSW, S30, T1N, R1E, Crawford County, Indiana

Experimental Design: Randomized block, 6 blocks, 5-tree row plots, 51 families, 6 x 12 ft spacing, 1 border row.

Monumentation: None. It is impossible to determine which trees are left.

Existing Fall Measurements:
Ht '76, '80
DBH

Survival: Only about 25% of these trees remain. Survival has been patchy, resulting in scattered groups of trees.

Growth: While the best trees are 6 inches in diameter and 32 feet tall, most are only 2 to 3 inches DBH and 15 to 25 feet tall.

Stem Form: Stem form is variable in these walnuts. Some are straight and have pruned themselves well, while others fork low at 6 or 7 feet.

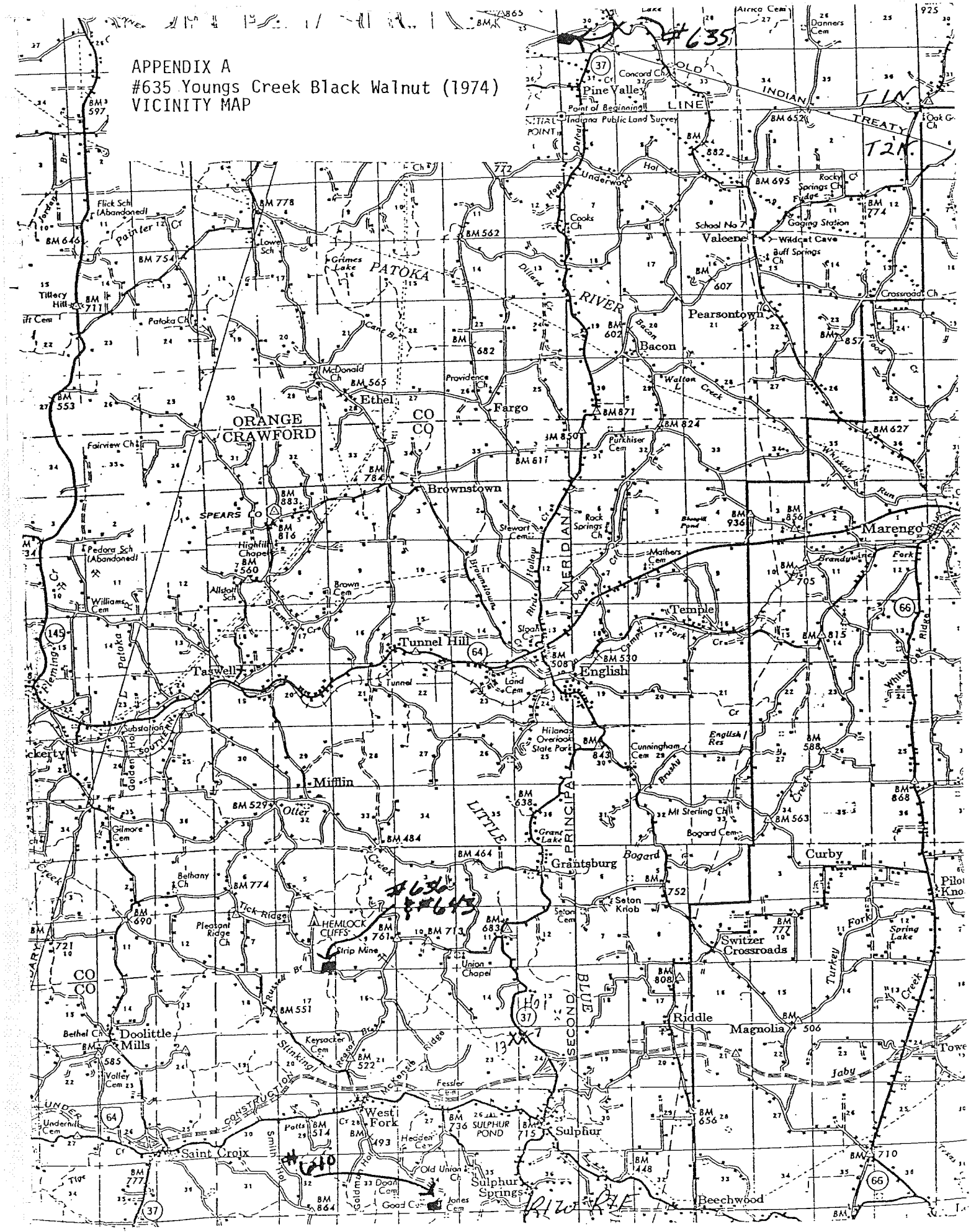
Damage: Heavy vine growth (*Vitis* and *Rhus*)is causing problems for some of the smaller walnuts. No cankers were seen.

Competing Vegetation: White pines 15 years old overtop nearly the entire plantation. These pines are all the same age and grow in rows - they appear to have been planted shortly after the walnuts. Also present are black cherry, yellow-poplar, and eastern red-cedar, the former two having outgrown the walnuts. Understory vegetation includes *Rosa* and *Rubus* as well as the vines already mentioned.

Suggested Maintenance: Low survival precludes management activities in this stand.

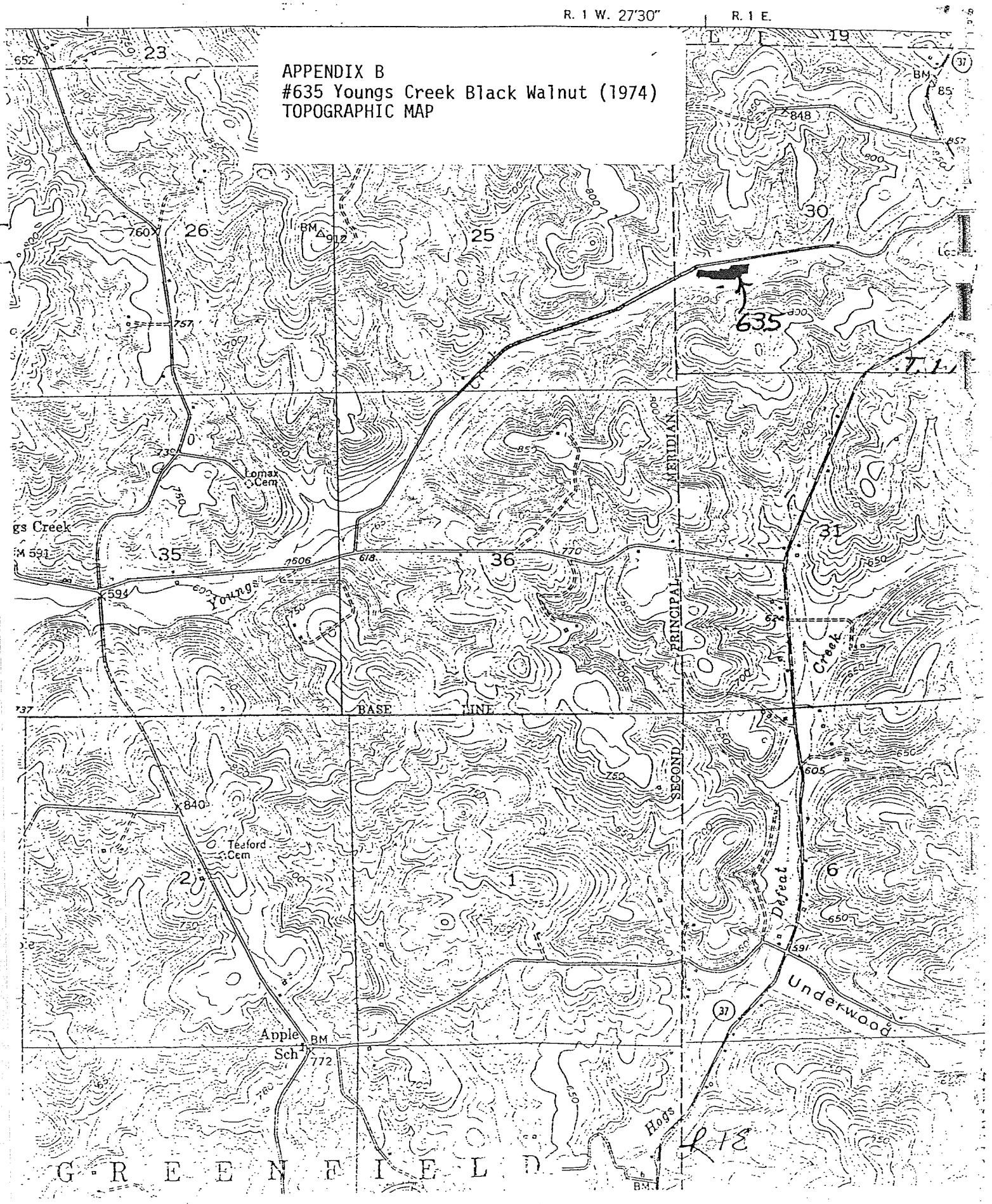
Other Comments: A bridle trail passes through this planting, and provides easy access.

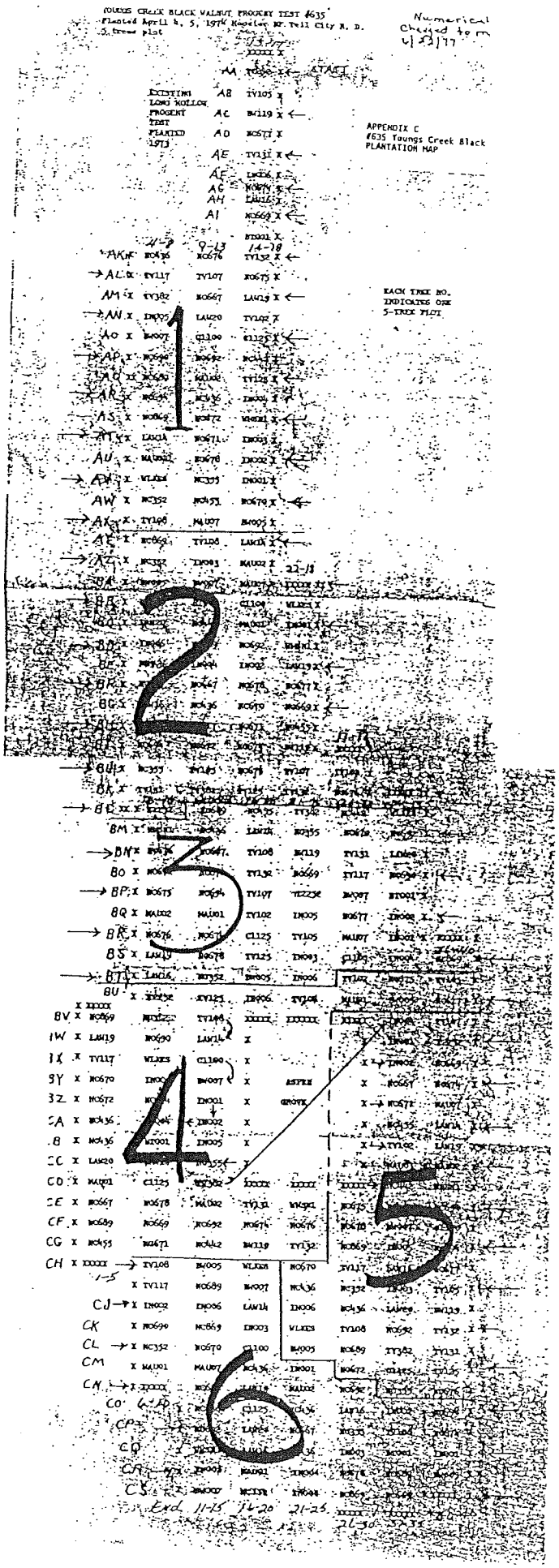
APPENDIX A
#635 Youngs Creek Black Walnut (1974)
VICINITY MAP



JNITED STATES
1ENT OF THE INTERIOR
)LOGICAL SURVEY

APPENDIX B
#635 Youngs Creek Black Walnut (1974)
TOPOGRAPHIC MAP




YOUNGS CREEK BLACK WALNUT PROGENY TEST #635
Planted April 4, 5, 1974 Hoerler Mt. Tell City R. D.
5-tree plot
Numerical
Checked to m
4/23/77
APPENDIX C
#635 Youngs Creek Black
PLANTATION MAP
EACH TREE NO.
INDICATES ONE
5-TREE PLOT
EXCEPTION
LONG HOLLOW
PROGENY
TEST
PLANTED
1973
START
END
1
2
3
4
5
6

GENETIC RESOURCE EVALUATION

Study No.: 78-07 Species: Yellow-poplar

Date Established: 5/10/78 Date Evaluated: 3/7/94

Title: Regional collection of yellow-poplar seed to estimate genotypic variation within and among stands

Location: Principia College property near Elsah, Illinois
S18, T6N, R11W, Jersey County, Illinois

Experimental Design: Randomized block, 8 blocks, 3-tree plots, 54 families, 10 x 10 ft spacing, 2 border rows.

Monumentation: Orange plastic stakes with metal tags mark all block corners.

Existing Fall Measurements:
Ht '79, '80, '82
DBH

Survival: Survival in this planting is about 60%. In addition, the border rows are largely gone, and each of the four corners of the stand has lost a few trees to a woods road which circumnavigates the plantation.

Growth: Much size variation is evident in the stand with the smallest tree 2 inches in diameter and 15 feet tall while the largest tree is 7 inches in diameter and 44 feet tall. Most trees are 3 to 5 inches DBH and about 30 feet tall. Live crown ratios are 50% of total tree height.

Stem Form: About 5% of these trees fork low, perhaps due to early death and later re-sprouting. The remainder are straight, and while most have live limbs low on the bole, these limbs are less than 1 inch in diameter and should prune off with time.

Damage: Mechanical wounds of various ages are apparent throughout the stand. These appear to be buck rubs.

Competing Vegetation: Understory vegetation is dominated by poison ivy, which grows as a free-standing plant as high as one's shoulders. This makes working in the stand understandably difficult, but as the plants are free-standing rather than vine-like, they do not seem to be bothering the yellow-poplars.

Five separate clumps of autumn olive grow here - if they were interplanted, they did not do well.

Suggested Maintenance: The stand needs a thinning.

Other Comments:

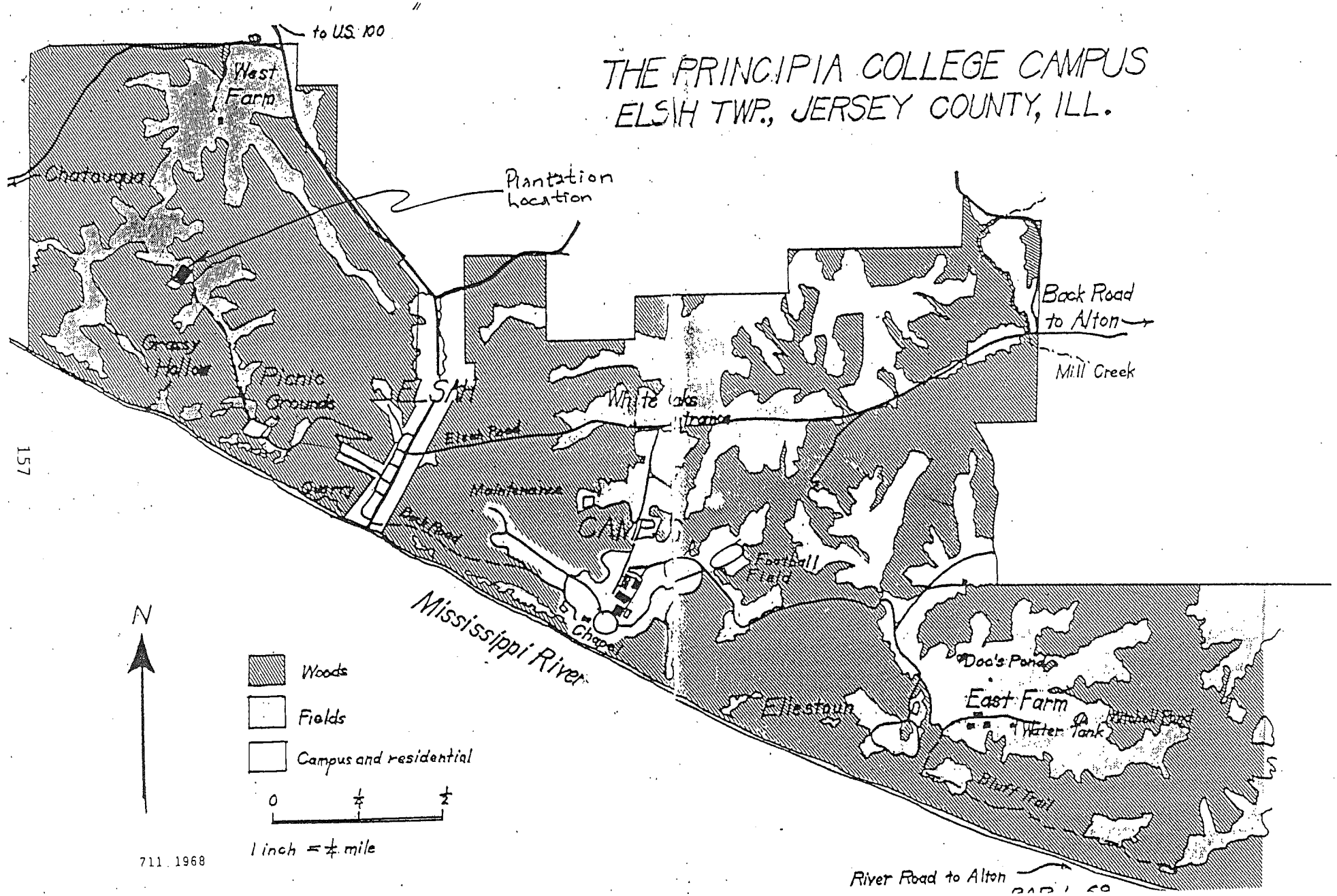

THE PRINCIPIA COLLEGE CAMPUS
ELSAH TWP., JERSEY COUNTY, ILL.
to US 100
West Farm
Chautauqua
Plantation Location
Back Road to Alton
Mill Creek
Grassy Hollow
Picnic Grounds
ELSAH
White Oaks Tramp
Elsah Road
Quarry
Maintenance
CAMPUS
Bluff Road
Football Field
Chapel
Mississippi River
Doc's Ponds
East Farm
Water Tank
Elliestown
Bluff Trail
River Road to Alton
N
Woods
Fields
Campus and residential
0
1 inch = ¼ mile
711 1968

Figure 2.

SOUTHERN ILLINOIS OUTPLANTING
PRINCIPIA COLLEGE, ELSAH, ILLINOIS
STUDY 1151, 78-07-REGIONAL COLLECTION
OF YELLOW POPLAR SEED TO ESTIMATE GENOTYPIC VARIATION...

BLOCK 8

1	2	3	4	5	6	7	8	9
14B-3	14-2	15-7	2A-4	14B-1	3A-1	11-5	11-2	14B-6
12-3	11-1	14-6	12-5	14-3	3A-5	3A-3	14B-5	15-9
13-4	3A-6	14B-2	14B-7	11-3	13-3	13-10	15-8	12-4
3A-2	1-10C	12-6	2A-7	2A-1	15-10	2A-2	1-10A	15-6
1-1	13-5	1-3	1-10D	3A-4	11-4	2A-6	12-1	13-2
11-6	13-6	14-7	12-2	2A-5	14-4	14-1	1-5	15-4

BLOCK 7

1	2	3	4	5	6	7	8	9
2A-1	13-10	11-3	12-6	11-2	1-5	15-4	12-5	14B-5
12-2	15-8	13-5	3A-2	3A-6	13-2	3A-3	14B-3	15-10
14-4	14-2	2A-4	2A-6	14-7	14B-7	1-10D	3A-1	14B-1
14-6	2A-5	12-1	1-10A	14-1	14B-2	12-4	13-6	14B-6
11-5	13-3	15-6	11-4	14-3	1-10C	13-4	2A-2	1-1
3A-5	11-6	3A-4	12-3	15-9	11-1	2A-7	1-3	15-7

N 26°E

BLOCK 6

1	2	3	4	5	6	7	8	9
15-9	3A-6	14-4	2A-1	14-3	14B-3	12-2	15-7	12-1
14B-1	11-4	11-1	14-1	1-3	13-5	14B-2	2A-2	1-10C
11-2	2A-7	13-10	12-6	1-10C	3A-4	11-3	15-6	13-4
13-3	14-7	12-5	15-8	3A-5	15-10	3A-2	2A-6	12-3
13-6	14-6	11-6	14-2	14B-5	14B-7	15-4	11-5	12-4
1-5	1-10A	1-1	2A-4	3A-1	13-2	3A-3	2A-5	14B-6

BLOCK 5

1	2	3	4	5	6	7	8	9
15-4	3A-5	1-5	14-2	11-5	13-2	13-10	1-10A	12-1
14B-2	11-3	13-4	2A-1	12-3	15-10	12-6	1-10D	15-7
14-7	3A-4	13-5	14-4	3A-2	12-5	1-1	11-4	12-4
15-9	14-1	11-6	14-6	3A-6	1-10C	14B-1	2A-2	14B-6
14B-7	15-8	3A-1	2A-4	2A-7	14B-5	11-2	15-6	14B-3
2A-6	14-3	13-3	3A-3	11-1	2A-5	1-3	12-2	13-6

BLOCK 4

1	2	3	4	5	6	7	8	9
15-9	12-2	14B-5	3A-1	14-7	14B-1	12-6	2A-2	14-2
2A-4	14B-6	14B-7	14-1	1-10A	11-2	13-2	3A-6	1-3
3A-3	13-5	12-3	14B-3	12-4	15-7	1-10C	11-6	2A-1
13-4	12-5	15-10	1-1	2A-5	1-10D	3A-5	3A-4	11-5
12-1	11-4	13-3	13-6	2A-7	13-10	11-3	2A-6	15-8
14-4	1-5	14B-2	15-6	14-3	3A-2	11-1	15-4	14-6

BLOCK 3

1	2	3	4	5	6	7	8	9
11-6	14B-2	3A-2	12-1	1-3	15-8	14-2	1-5	14B-1
1-10A	3A-6	15-6	2A-1	11-2	3A-1	1-10C	14B-3	12-4
1-10D	11-1	2A-6	14-4	2A-5	12-6	11-5	14-3	14B-5
13-2	13-5	3A-3	15-4	1-1	2A-4	2A-2	12-5	13-6
12-2	13-10	11-4	14-7	13-3	12-3	15-10	13-4	2A-7
14-1	14B-6	3A-5	14-6	15-7	3A-4	15-9	11-3	14B-7

BLOCK 2

1	2	3	4	5	6	7	8	9
12-3	14-7	15-10	12-2	3A-1	15-7	2A-7	11-1	12-6
1-1	2A-2	1-10A	15-4	14B-7	13-2	15-6	11-4	12-5
14-6	2A-5	2A-6	13-6	1-5	13-10	15-8	14-4	13-3
1-3	2A-4	1-10D	11-5	2A-1	14B-5	14-2	13-5	12-4
11-3	11-2	3A-2	3A-5	1-10C	12-1	3A-6	14B-1	14B-3
14-3	11-6	15-9	3A-3	3A-4	14B-6	13-4	14-1	14B-2

BLOCK 1

1	2	3	4	5	6	7	8	9
1-10A	13-10	14B-5	2A-1	2A-4	14B-3	11-6	3A-4	15-10
12-1	3A-3	13-3	15-8	3A-1	3A-2	3A-6	14B-6	11-2
14B-2	11-4	11-5	12-2	14-3	12-6	1-5	14-7	12-3
13-2	1-10D	12-5	13-5	15-9	12-4	1-1	2A-7	3A-5
2A-2	14-2	14B-1	14-6	14-4	15-4	11-3	11-1	14B-7
15-7	1-10C	1-3	2A-5	15-6	14-1	13-4	2A-6	13-6

GENETIC RESOURCE EVALUATION

Study No.: CG-422 **Species:** Yellow-poplar

Date Established: Spring, '74 **Date Evaluated:** 11/20/93

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Bishop Knob" planting near Richwood, West Virginia
Compartment 13, Gauley RD, Monongahela NF
Webster County, West Virginia

Experimental Design: Randomized block, 5 blocks, 4-tree plots, 20 families, 10 x 10 ft spacing.

Monumentation: A metal tag embossed with source number is wired to a stob at breast height on 80% of trees. Orange plastic stakes mark the four corners of the plantation.

Existing Fall Measurements:
Ht '74, '76, '78
DBH

Survival: 85%

Growth: The largest tree is 8 inches in diameter and 42 feet in height; the smallest is 2 inches in diameter and 20 feet in height. Most are 4 to 6 inches DBH and 25 to 35 feet tall, but much variation is evident. Live crown ratios are about 60%.

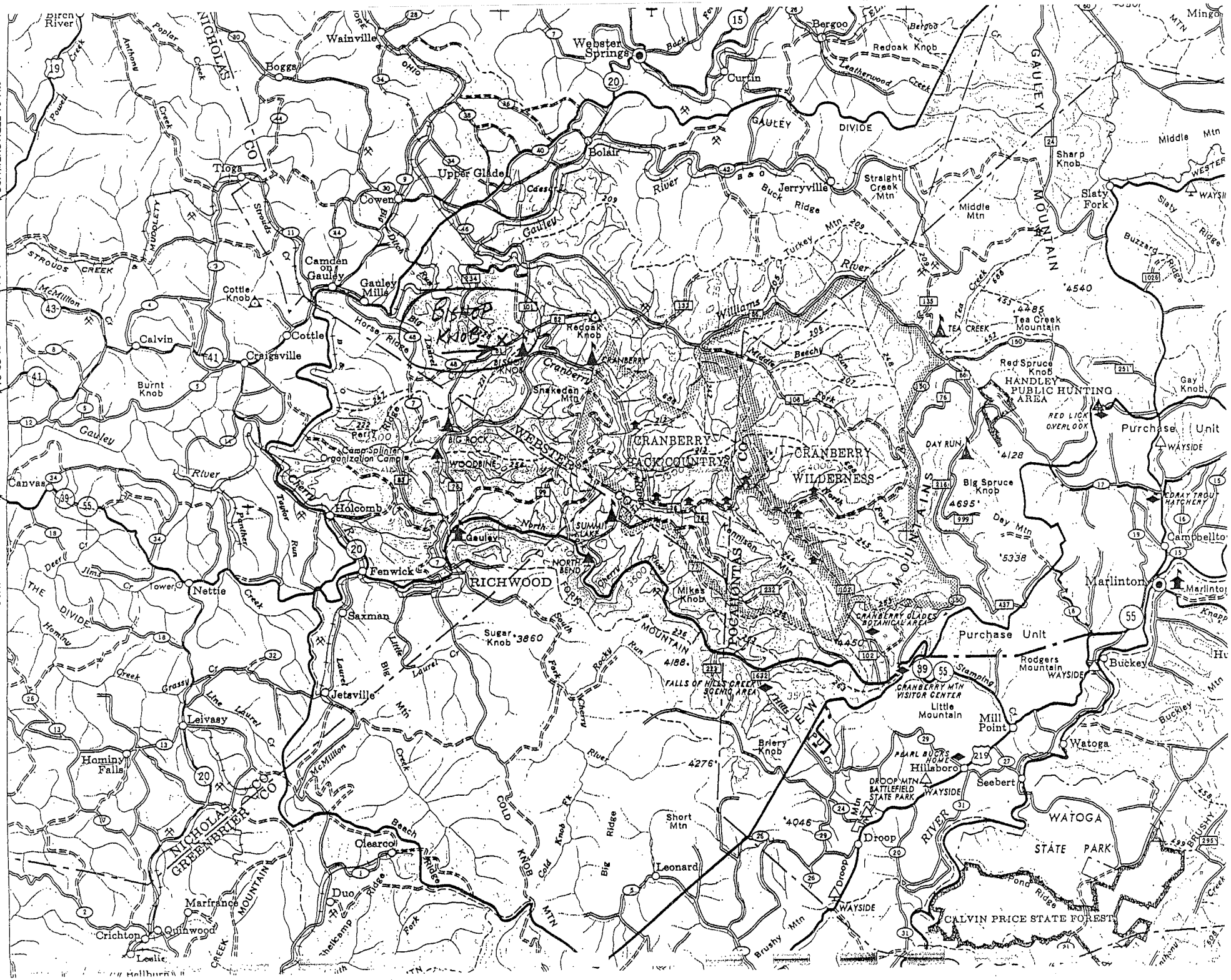
Stem Form: 70% are straight and clean, 10% are crooked, 10% fork low, and 10% are cankered.

Damage: *Nectria* cankers can be found on 10% of these trees. Infected trees appear to have healthy crowns, however.

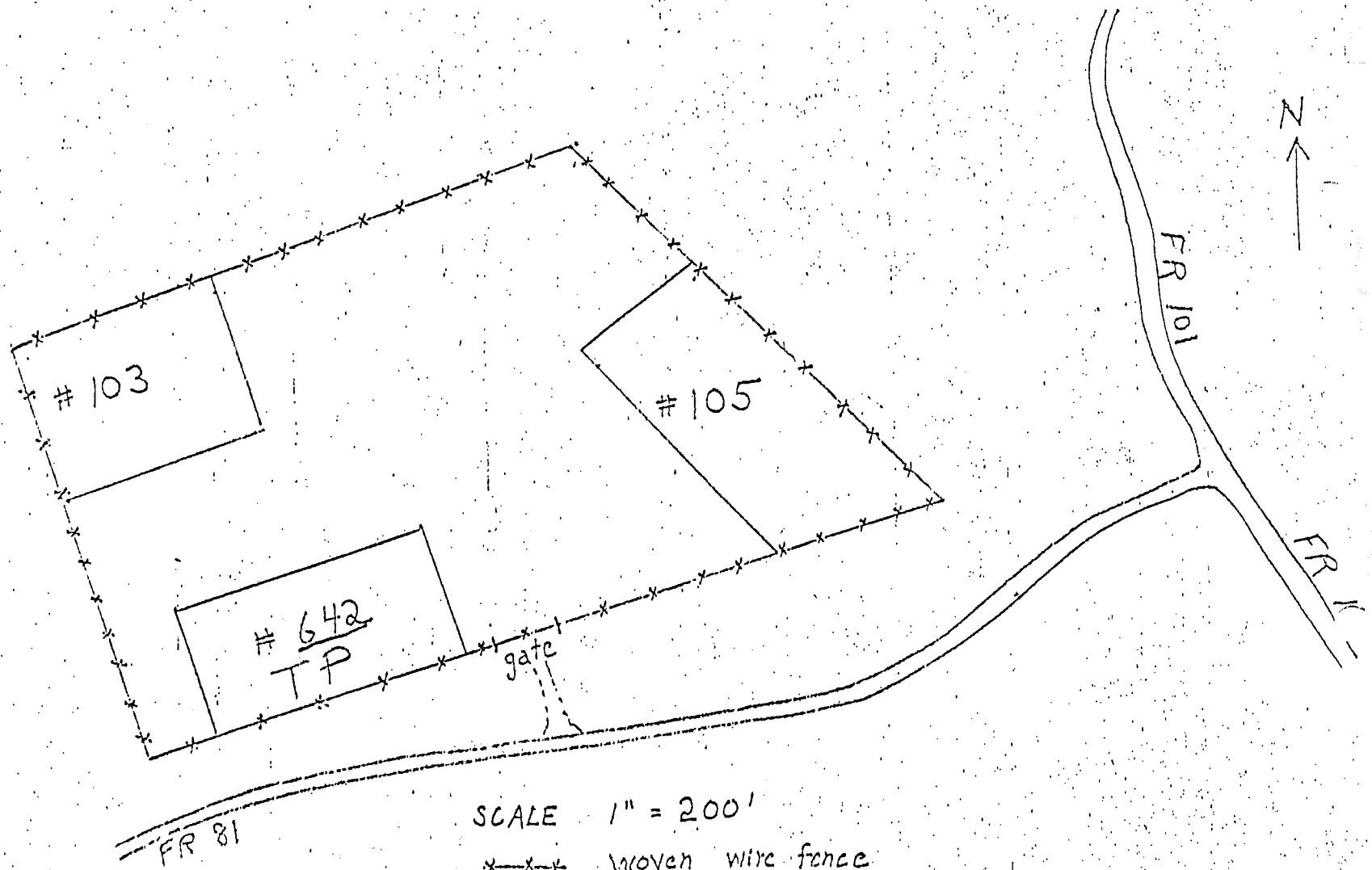
Competing Vegetation: None. This planting has been mowed regularly.

Suggested Maintenance: None needed. This stand is not ready for a thinning yet.

Other Comments: Go 5.9 miles N of Richwood on FR 76 to FR 81, then go 5.2 miles N on FR 81 to the plantation, which is fenced and signed, immediately north of the road.

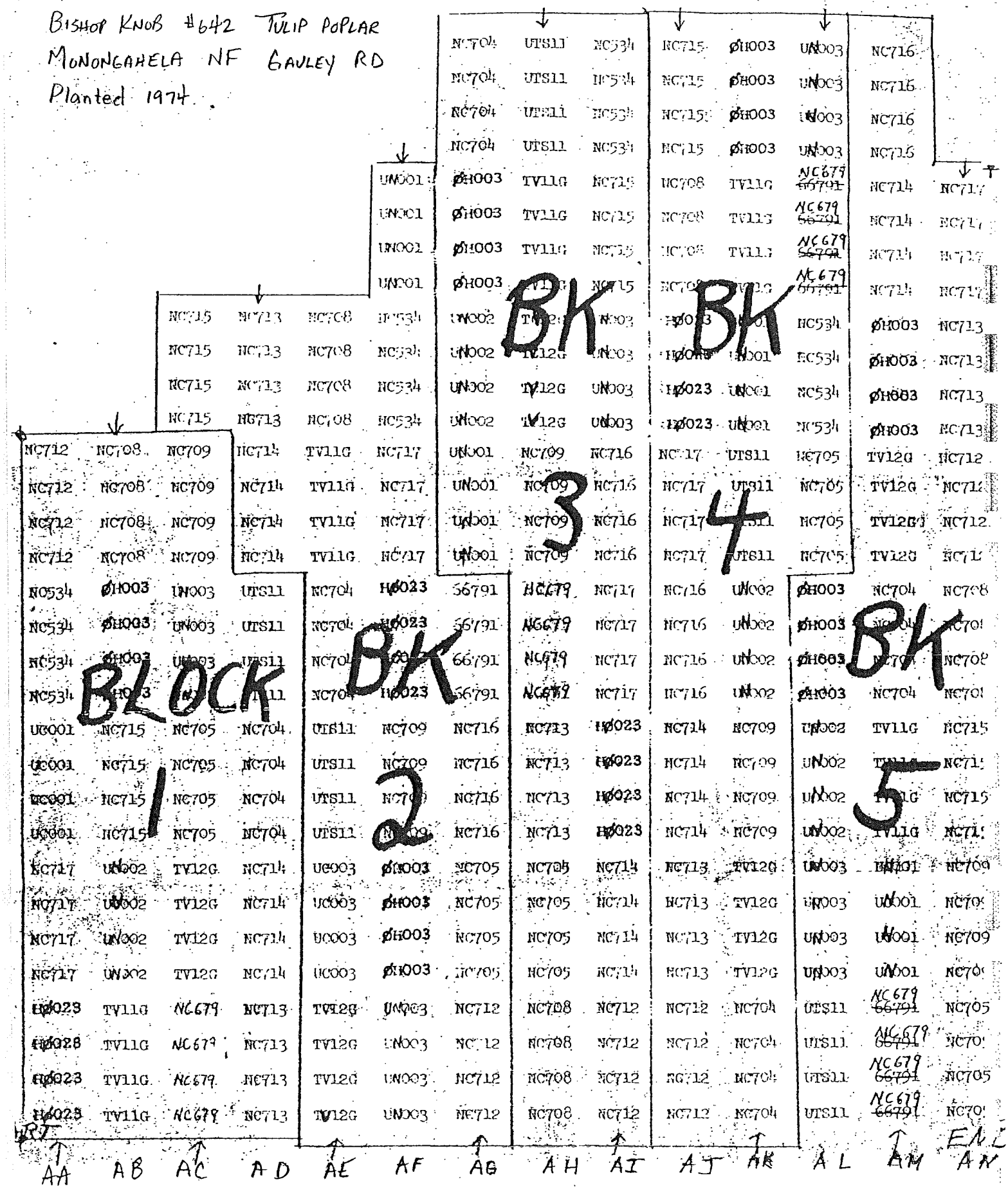

Birch River
Poplar Creek
Anthony Creek
Powell Creek
NICHOLAS CO
Wainville
Bogga
Webster Springs
Back Fk
Bergoo
Redoak Knob
Leatherwood Creek
Curtin
GAULEY DIVIDE
GAULEY MOUNTAIN
Middle Mtn
Sharp Knob
Slaty Fork
Slaty Ridge
Buzzard Ridge
Tioga
Muddlety Creek
Strouds Creek
Cowen
Big Birch
Upper Glade
Bolair
Jerryville
Straight Creek Mtn
Buck Ridge
Middle Mtn
Turkey Mtn
Gauley River
Williams River
Tea Creek
Tea Creek Mountain
Red Spruce Knob
HANDLEY PUBLIC HUNTING AREA
RED LICK OVERLOOK
Purchase Unit
WAYSIDE
Gay Knob
Camden on Gauley
Gauley Mills
Big Beaver Knob
Cottle Knob
Cottle
Calvin
Craigsville
Horse Ridge
Redoak Knob
Cranberry
Middle Beechy Run
Beechy Run
Burnt Knob
Shekeden Mtn
Perry Ridge
Camp Spilman Organization Camp
BIG ROCK
WOODBINE
WEBSTER CO
CRANBERRY BACK COUNTRY
CRANBERRY WILDERNESS
DAY RUN
Big Spruce Knob
4695'
Day Mtn
5338'
Canvas
Holcomb
Cherry River
Taylor Run
Gauley
North Fork
SUMMIT LAKE
NORTH BEND
Fenwick
RICHWOOD
Mikes Knob
POCAHONTAS CO
Tennison Mtn
MOUNTAIN
CRANBERRY GLADES BOTANICAL AREA
Marlinton
Campbellton
TROUT HATCHERY
Nettie
Tower
Jims Cr
Deer Cr
Hominy Creek
THE DIVIDE
Saxman
Sugar Knob 3860
South Fork Cherry River
Rocky Run
Little Laurel Cr
Big Laurel Cr
Jetsville
Laurel Mtn
Grassy Lime Cr
Leivasy
Hominy Falls
McMillion Creek
Purchase Unit
Rodgers Mountain
WAYSIDE
Buckeye
Stamping
FALLS OF HILLS CREEK SCENIC AREA
CRANBERRY MTN VISITOR CENTER
Little Mountain
Mill Point
Watoga
Briery Knob
4276'
Hills View Cr
PEARL BUCK'S HOME
Hillsboro
DROOP MTN BATTLEFIELD STATE PARK
Seebert
WATOGA STATE PARK
RIVER
Short Mtn
4046'
Droop
Droop Mtn
Clearco
Cold Knob Ridge
COLD KNOB MTN
Big Ridge
Leonard
Duo
Marfrance
Crichton
Quinwood
Leslie
NICHOLAS GREENBRIER CO
MOUNTAIN CREEK
Shelcamp Fork
Brushy Mtn
WAYSIDE
Pond Ridge
CALVIN PRICE STATE FOREST
SUMMERSVILLE 10 MI.
1 MI. TO US 19
2 MI. TO US 19
SUMMERSVILLE 2 MI.
160

Bishop Knob - Gauley RD Monongahela National Forest



APPENDIX-B

BISHOP KNOB #642 TULIP POPLAR
MONONGAHELA NF GAULEY RD
Planted 1974.



GENETIC RESOURCE EVALUATION

Study No.: CG-422 Species: Yellow-poplar

Date Established: 3/18/76 Date Evaluated: 11/18/93

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Covered Bridge" planting near Marietta, Ohio
Compartment 210, Athens RD, Wayne NF
SWSW, S31, T3N, R7W & NWNW, S36, T2N, R7W, Washington Co, Ohio

Experimental Design: Randomized block, 5 blocks, 4-tree row plots, 13 families, 10 x 10 ft spacing, 1 border row.

Monumentation: An unmarked wooden dowel is next to the northernmost tree of each plot. Orange plastic stakes with metal tags mark the four corners of the plantation.

Existing Fall Measurements:
Ht '76, '78, '82
DBH '82

Survival: 65%, patchy.

Growth: Diameters vary from 4 to 8 inches, with most trees 6 to 7 inches DBH. Heights vary from 25 to 50 feet, with 75% of the trees between 40 and 45 feet tall. Live crown ratios are 30%.

Stem Form: Most of these trees are straight, clean, typical yellow-poplar. About 20% are bent and crooked due to heavy vine growth. Another 10% have multiple stems and consequent poor form, probably due to early death and later re-sprouting.

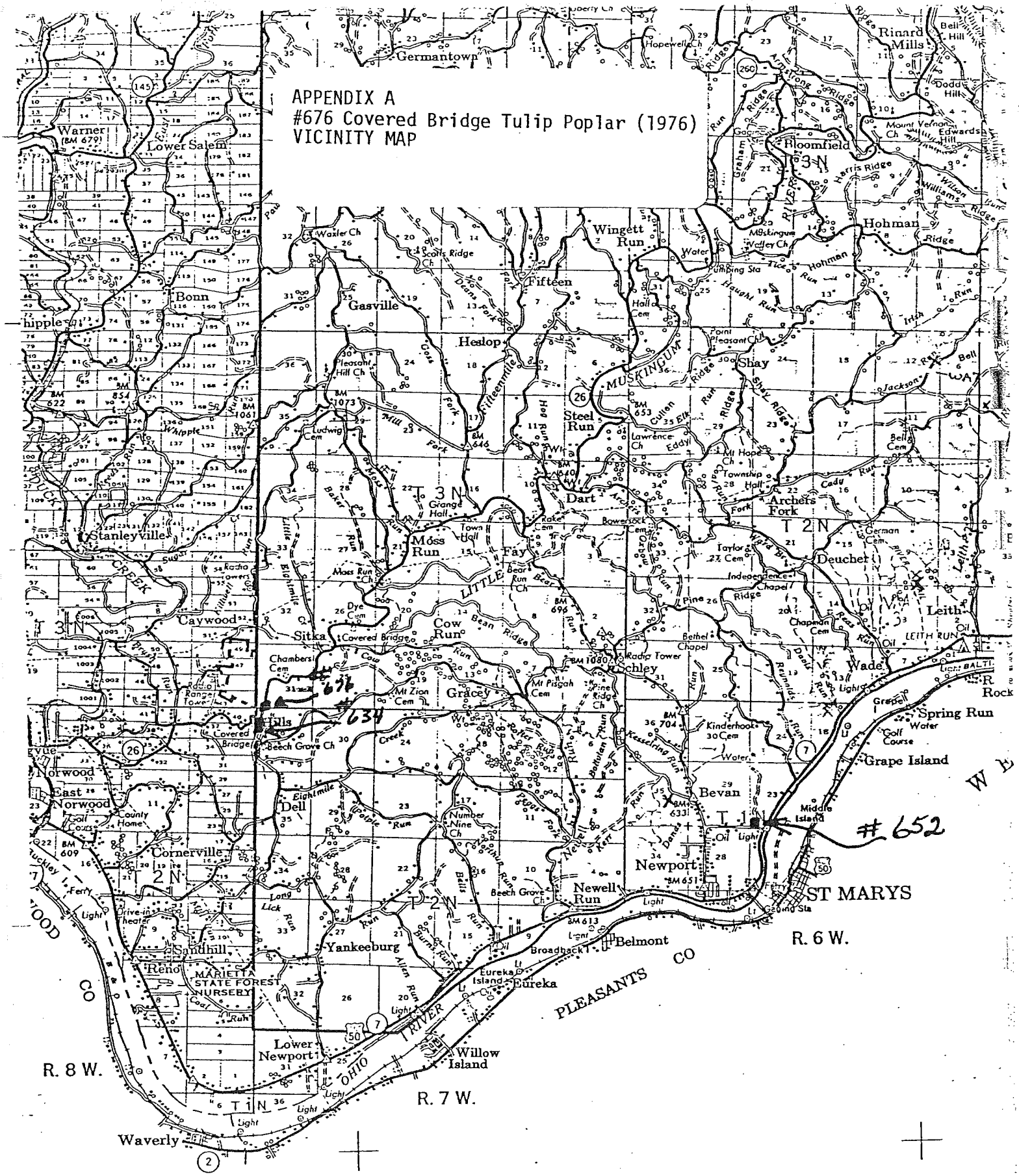
Damage: About 60% of the trees have serious grapevine (*Vitis* sp) troubles. Vine growth is very heavy resulting in poor form and decreased vigor. Many of the missing tulips were likely killed by vines. No other damage was evident.

Competing Vegetation: Occasional pole-size black cherry and boxelder have invaded the stand, but these are not numerous. Understory vegetation is sparse due to crown closure of the yellow-poplars, and consists of *Rubus*, *Rosa*, and goldenrod. The grapevines are the major competition.

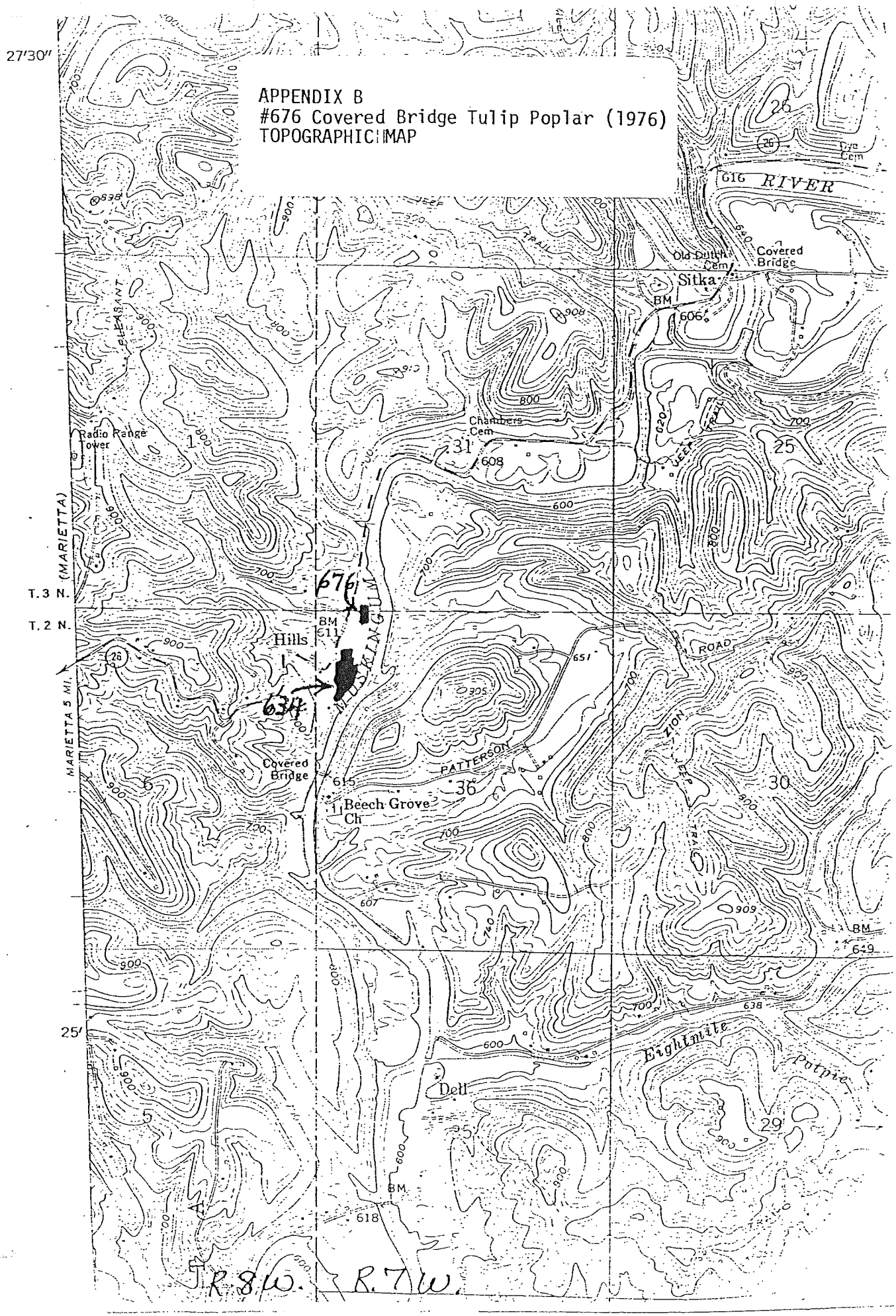
Suggested Maintenance: Kill the vines.

Other Comments: Access - park at the "Lane Farm" NF picnic area. Walk about 3 chains south along the hiking trail which follows the river. The plantation lies about 1 chain west of the trail, between the river and the road.

APPENDIX A
#676 Covered Bridge Tulip Poplar (1976)
VICINITY MAP



APPENDIX B
#676 Covered Bridge Tulip Poplar (1976)
TOPOGRAPHIC MAP



APPENDIX C
#676 Covered Bridge Tulip Poplar (1976)
PLANTATION MAP

RIVER

COVERED BRIDGE #676 TULIP POPLAR Evaluation Plantation WAYNE NF Athens RD Planted 3-18-76

	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	
AA	1750	1750	1750	1750	1757	1757	1757	1757	1753	1753	1753	1753	1775	1775	1775	1775	END
AB	1774	1774	1774	1774	1754	1754	1754	1754	1751	1751	1751	1751	1758	1758	1758	1758	← BLOCK-5
AC	1747	1747	1747	1747	1755	1755	1755	1755	1756	1756	1756	1756	1748	1748	1748	1748	
AD	1748	1748	1748	1748	1774	1774	1774	1774	1775	1775	1775	1775	1755	1755	1755	1755	←
AE	1757	1757	1757	1757	1752	1752	1752	1752	1756	1756	1756	1756	1751	1751	1751	1751	BLOCK-4
AF	1754	1754	1754	1754	1747	1747	1747	1747	1750	1750	1750	1750	1753	1753	1753	1753	←
AG	1748	1748	1748	1748	1774	1774	1774	1774	1775	1775	1775	1775	1751	1751	1751	1751	
AH	1757	1757	1757	1757	1750	1750	1750	1750	1753	1753	1753	1753	1754	1754	1754	1754	← BLOCK-3
AI	1756	1756	1756	1756	1755	1755	1755	1755	1747	1747	1747	1747	1752	1752	1752	1752	
AJ	1758	1758	1758	1758	1750	1750	1750	1750	1747	1747	1747	1747	1774	1774	1774	1774	←
AK	1756	1756	1756		1755	1755	1755	1755	1751	1751	1751	1751	1775	1775	1775	1775	BLOCK-2
AL	1748	1748	1748	1748	1757	1757	1757	1757	1753	1753	1753	1753	1754	1754	1754	1754	←
AM	1775	1775	1775	1775	1753	1753	1753	1753	1751	1751	1751	1751	1748	1748	1748	1748	
AN	1774	1774	1774	1774	1755	1755	1755	1755	1756	1756	1756	1756	1747	1747	1747	1747	← BLOCK-1
AO	1757	1757	1757	1757	1754	1754	1754	1754	1758	1758	1758	1758	1750	1750	1750	1750	

START

ROAD S 23° W

GENETIC RESOURCE EVALUATION

Study No.: CG-422

Species: Yellow-poplar

Date Established: 3/27/73

Date Evaluated: 1/15/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Hemlock Cliffs" planting near Grantsburg, Indiana
Compartment #2, Tell City RD, Hoosier NF
SESE, S8, T3S, R1W, Crawford County, Indiana

Experimental Design: Randomized block, 2 blocks, 4-tree row plots, 56 families, 10 x 10 ft spacing.

Monumentation: Wire pins mark the ends of about 70% of the plots, but only 1/4 of these pins are tagged. Plots in Block 4 run east to west, while in Block 5 they run north to south. Orange plastic stakes mark the four corners of the planting.

Existing Fall Measurements:
Ht '74, '77
DBH '78

Survival: Survival is 85%.

Growth: Height and diameter growth are both quite variable in this plantation, the variation occurring by family. Diameters range from 2 to 7 inches, no size being predominate. Heights range from 20 to 48 feet. Live crown ratios are 60 to 75%.

Stem Form: About 10% of these tulips are crooked due to having multiple stems. The remainder are straight and clean as is typical of yellow-poplar.

Damage: I found two cankers in this stand, but they appeared to be of mechanical rather than pathogenic origin.

Competing Vegetation: Multiflora rose is present but has not taken over. Eastern red-cedar and flowering dogwood saplings are abundant. A low grass covers the ground.

Suggested Maintenance: The understory should be controlled before it becomes a problem.

Other Comments:

GENETIC RESOURCE EVALUATION

Study No.: CG-422 Species: Yellow-poplar

Date Established: 4/5/74 Date Evaluated: 1/15/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Hemlock Cliffs" planting near Grantsburg, Indiana
Compartment #2, Tell City RD, Hoosier NF
SESE, S8, T3S, R1W, Crawford County, Indiana

Experimental Design: Randomized block, 2 blocks, 4-tree row plots, 30 families, 10 x 10 ft spacing, 1 border row.

Monumentation: Original wire pins with embossed metal tags remain at the north and south ends of approximately 75% of the plots. Orange plastic stakes mark the four corners of the plantation.

Existing Fall Measurements:
Ht '74, '76, '78
DBH '76

Survival: Survival is high at 90%.

Growth: Growth has been variable, and appears to be strongly correlated with seed source. Diameters run from 2 to 6 inches and are evenly distributed across this range. Heights vary from 20 to 42 feet, again being evenly distributed across this range. Live crown ratios are 60 to 75%.

Stem Form: All trees are straight. Some of the larger tulips are beginning to self-prune, but the lower limbs are still alive on many trees.

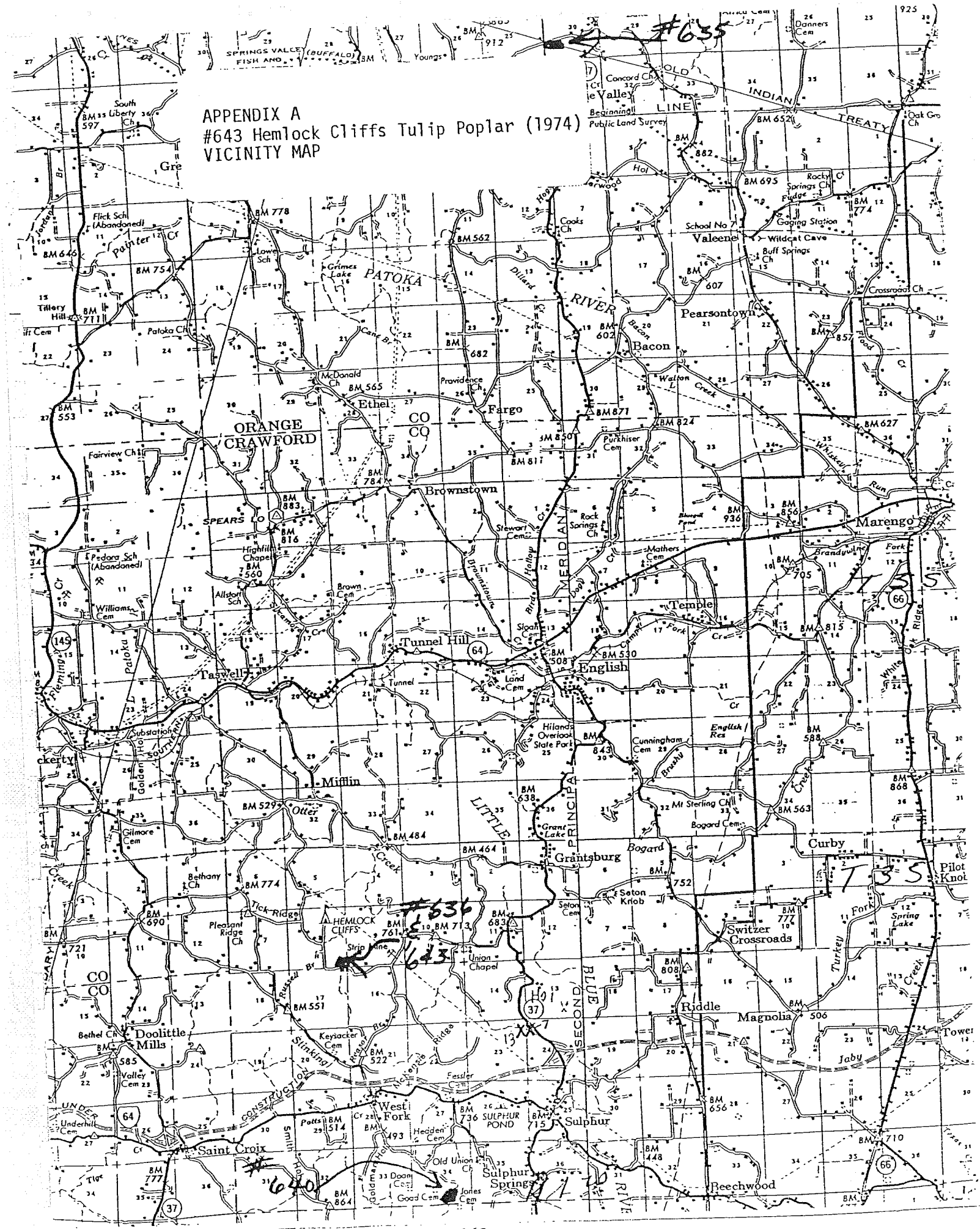
Damage: No pests or diseases were evident.

Competing Vegetation: Multiflora rose is present but has not taken over. Eastern red-cedar and flowering dogwood saplings are abundant. A low grass covers the ground.

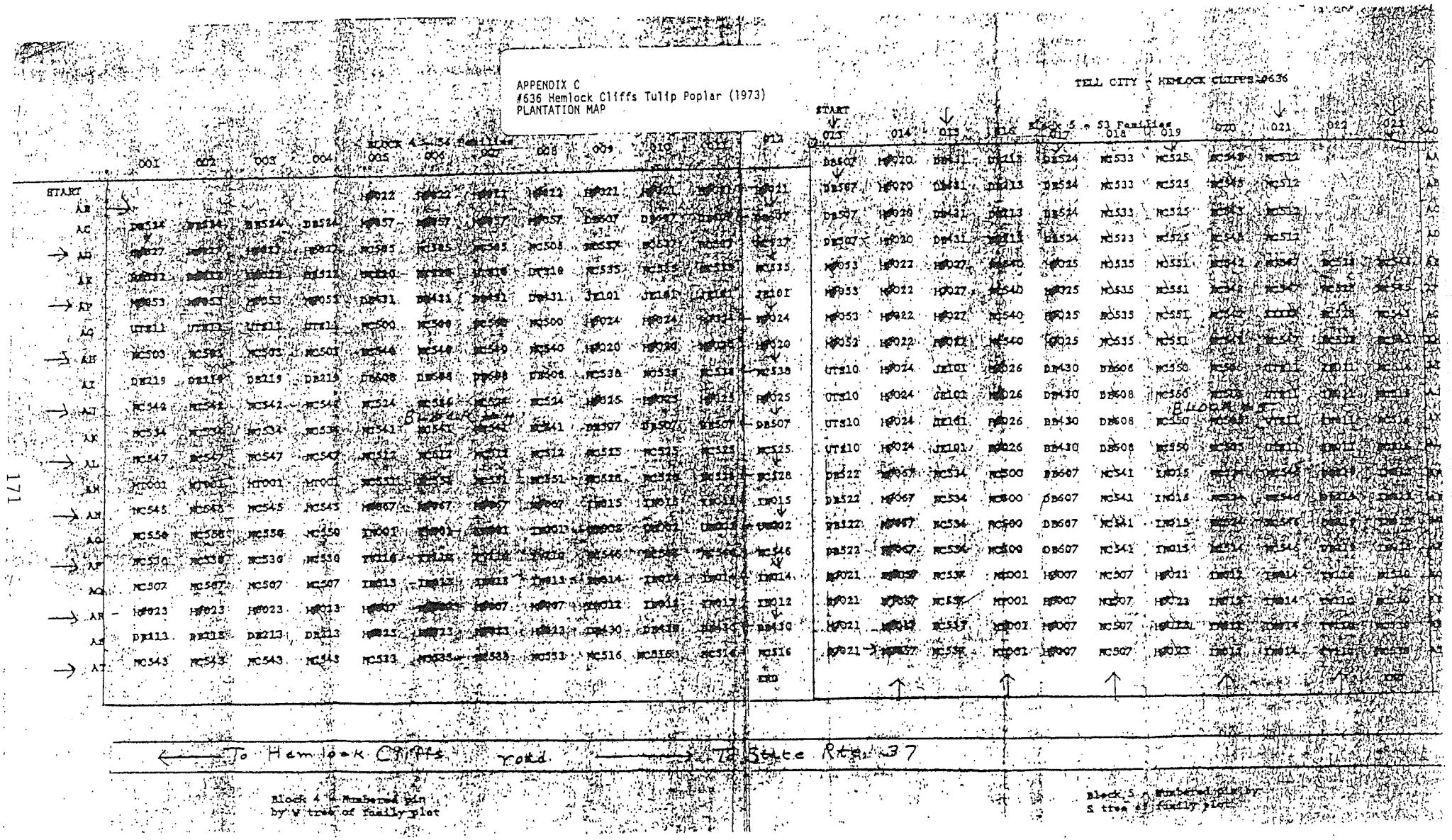
Suggested Maintenance: The understory should be controlled before it becomes a problem.

Other Comments:

APPENDIX A
#643 Hemlock Cliffs Tulip Poplar (1974)
VICINITY MAP




APPENDIX B
#643 Hemlock Cliffs Tulip Poplar (1974)
TOPOGRAPHIC MAP
FOREST
UNICOI
Tick Ridge
Otter
Creek
Russell Branch
Strip Mine
636
643
R. 1 W.
T. 33
BM
Cem
484
761
17
16


APPENDIX C
#636 Hemlock Cliffs Tulip Poplar (1973)
PLANTATION MAP
TELL CITY - HEMLOCK CLIFFS #636
Block 4 - 54 Families
Block 5 - 53 Families
START
END
To Hemlock Cliffs road
To State Rte. 37
Block 4 - Numbered pin by W tree of family plot
Block 5 - Numbered pin by S tree of family plot

HOOSIER NATIONAL FOREST, TELL CITY RD

HEMLOCK CLIFFS #643 TULIP POPLAR PLANTED 1974

	024	025	026	027	028	029	030	031	032	033	034	035	
E	NC705	UN003	NC516	NC696	NC707	NC700	NC714	NC704	NC516	NC712	NC706		
F	NC705	UN003	NC516	NC696	NC707	NC700	NC714	NC704	NC516	NC712	NC706		
	NC705	UN003	NC516	NC696	NC707	NC700	NC714	NC704	NC516	NC712	NC706		
H	NC705	UN003	NC516	NC696	NC707	NC700	NC714	NC704	NC516	NC712	NC706		
	NC679	NC704	NC698	NC717	ØH003	NC546	NC514	NC705	TV12G	NC709	UN002		
J	NC679	NC704	NC698	NC717	ØH003	NC546	NC514	NC705	TV12G	NC709	UN002		
	NC679	NC704	NC698	NC717	ØH003	NC546	NC514	NC705	TV12G	NC709	UN002		
	NC679	NC704	NC698	NC717	ØH003	NC546	NC514	NC705	TV12G	NC709	UN002		
	NC714	NC708	NC712	NC706	NC534	NC713	TV11G	NC717	ØH003	NC514	NC680		
	NC714	NC708	NC712	NC706	NC534	NC713	TV11G	NC717	ØH003	NC514	NC680		
	NC714	NC708	NC712	NC706	NC534	NC713	TV11G	NC717	ØH003	NC514	NC680		
	NC714	NC708	NC712	NC706	NC534	NC713	TV11G	NC717	ØH003	NC514	NC680		
	NC715	NC506	NC716	NC709	NC697	UN002	TV12G	NC506	NC715	NC698	NC552	NC546	
	NC715	NC506	NC716	NC709	NC697	UN002	TV12G	NC506	NC715	NC698	NC552	NC546	
	NC715	NC506	NC716	NC709	NC697	UN002	TV12G	NC506	NC715	NC698	NC552	NC546	
	NC715	NC506	NC716	NC709	NC697	UN002	TV12G	NC506	NC715	NC698	NC552	NC546	
	NC540	NC679	NC708	NC707	NC700	NC697	NC534	NC696	NC713	UN003	TV11G	NC716	
	NC540	NC679	NC708	NC707	NC700	NC697	NC534	NC696	NC713	UN003	TV11G	NC716	
	NC540	NC679	NC708	NC707	NC700	NC697	NC534	NC696	NC713	UN003	TV11G	NC716	
	NC540	NC679	NC708	NC707	NC700	NC697	NC534	NC696	NC713	UN003	TV11G	NC716	
ART	024	025	026	027	028	029	030	031	032	033	034	035	END

BLOCK #5

Block 4

BLOCK #4

Road

APPENDIX C
#643 Hemlock Cliffs Tulip Poplar (1974)
PLANTATION MAP

GENETIC RESOURCE EVALUATION

Study No.: CG-422 Species: Yellow-poplar

Date Established: 4/13/73 Date Evaluated: 3/6/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Hutchins Creek" planting near Alto Pass, Illinois
Compartment J54, Murphysboro RD, Shawnee NF
SESW, S1, & NENW, S12, T11S, R3W, Union County, Illinois

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 58 families, 10 x 10 ft spacing, 2 border rows on outside, 1 border row between progeny test and breeding arboretum.

Monumentation: Orange plastic stakes with metal tags mark all block corners.

Existing Fall Measurements:
Ht '73, '76, '77, '78
DBH '77, '78

Survival: 80%

Growth: Diameter varies from 4 to 8 inches, with half of the trees 6 to 7 inches, a quarter of them smaller, and a quarter larger. Height ranges from 50 to 65 feet. Live crown ratios are 25% of total tree height.

Stem Form: These tulips are typically straight and clean.

Damage: No cankers or diseases were evident in the stand beyond healed-over mower scars at the bases of some of the trees.

Competing Vegetation: The only undergrowth to speak of is *Rubus* which is fairly thick throughout the stand. Large grapevines hang from a few trees, but these are not common or troublesome.

Suggested Maintenance: This plantation should be thinned to leave the best individuals and stimulate seed production. The *Rubus* should be mowed and/or sprayed.

Other Comments: Hutchins Creek has eroded away several trees from block 3. Both border rows, 13 trees from the outer plot row, and 4 trees from the second plot row have fallen into the creek.

This planting, as well as the adjacent 1974 planting, is now in the Clear Springs Wilderness Area, which likely precludes management activites. One can drive to within 100 yards of the planting and park at the trailhead.

GENETIC RESOURCE EVALUATION

Study No.: CG-422 Species: Yellow-poplar

Date Established: 3/29/74 Date Evaluated: 3/6/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Hutchins Creek" planting near Altò Pass, Illinois
Compartment J54, Murphysboro RD, Shawnee NF
SESW, S1, & NENW, S12, T11S, R3W, Union County, Illinois

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 34 families, 10 x 10 ft spacing, 2 border rows on outside, 1 border row between progeny test and breeding arboretum.

Monumentation: Orange plastic stakes with metal tags mark all block corners.

Existing Fall Measurements:
Ht '76, '77, '78
DBH '77, '78

Survival: 80%

Growth: Diameter varies from 4 to 8 inches, with half of the trees 6 to 7 inches, a quarter of them smaller, and a quarter larger. Height ranges from 50 to 65 feet. Live crown ratios are 25% of total tree height.

Stem Form: Boles are straight and clean.

Damage: This is basically a healthy stand. Healed-over mower scars can be found at the bases of a few trees.

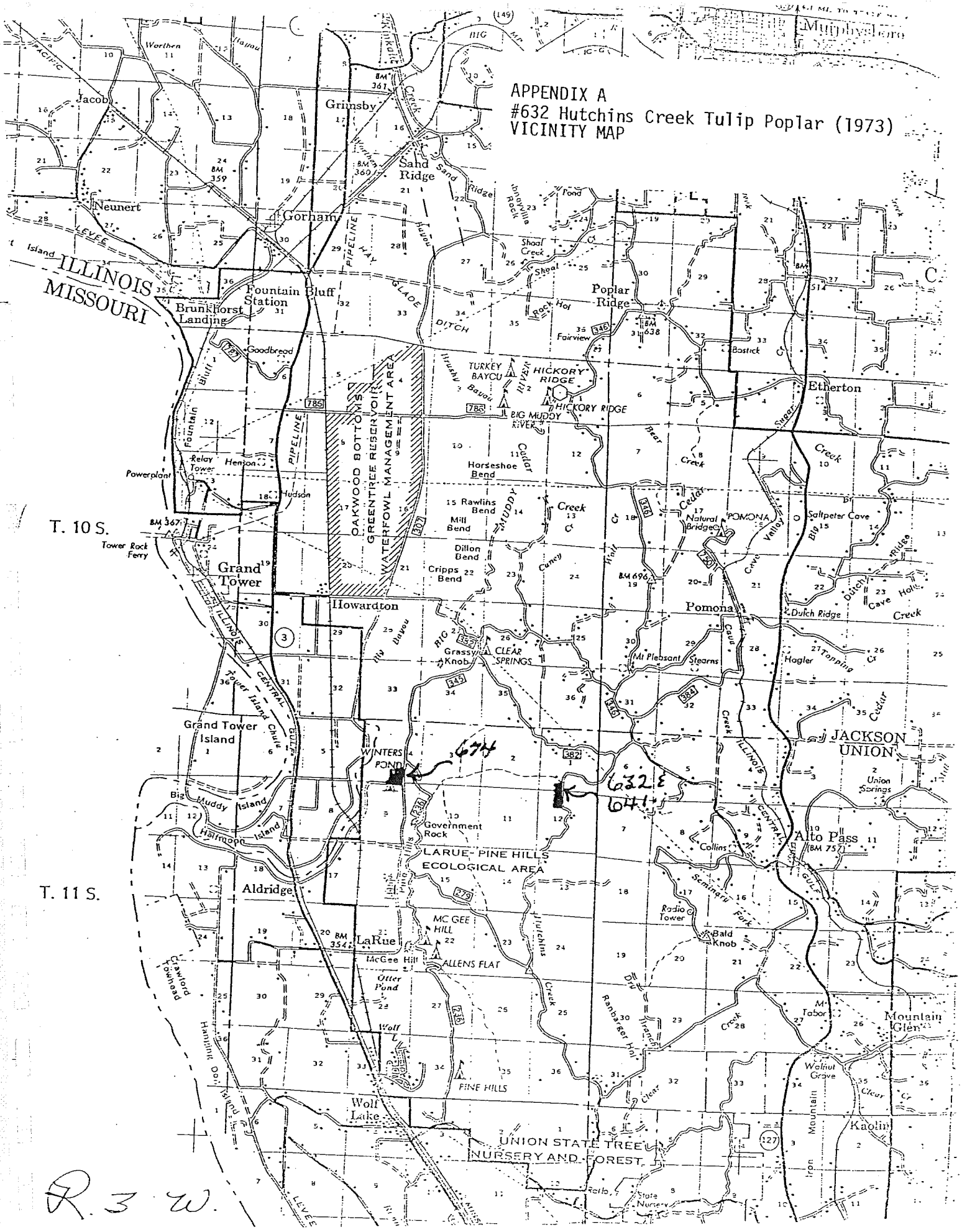
Competing Vegetation: The only undergrowth to speak of is *Rubus* which is fairly thick throughout the planting. Large grapevines hang in a few trees, but they are not common or troublesome.

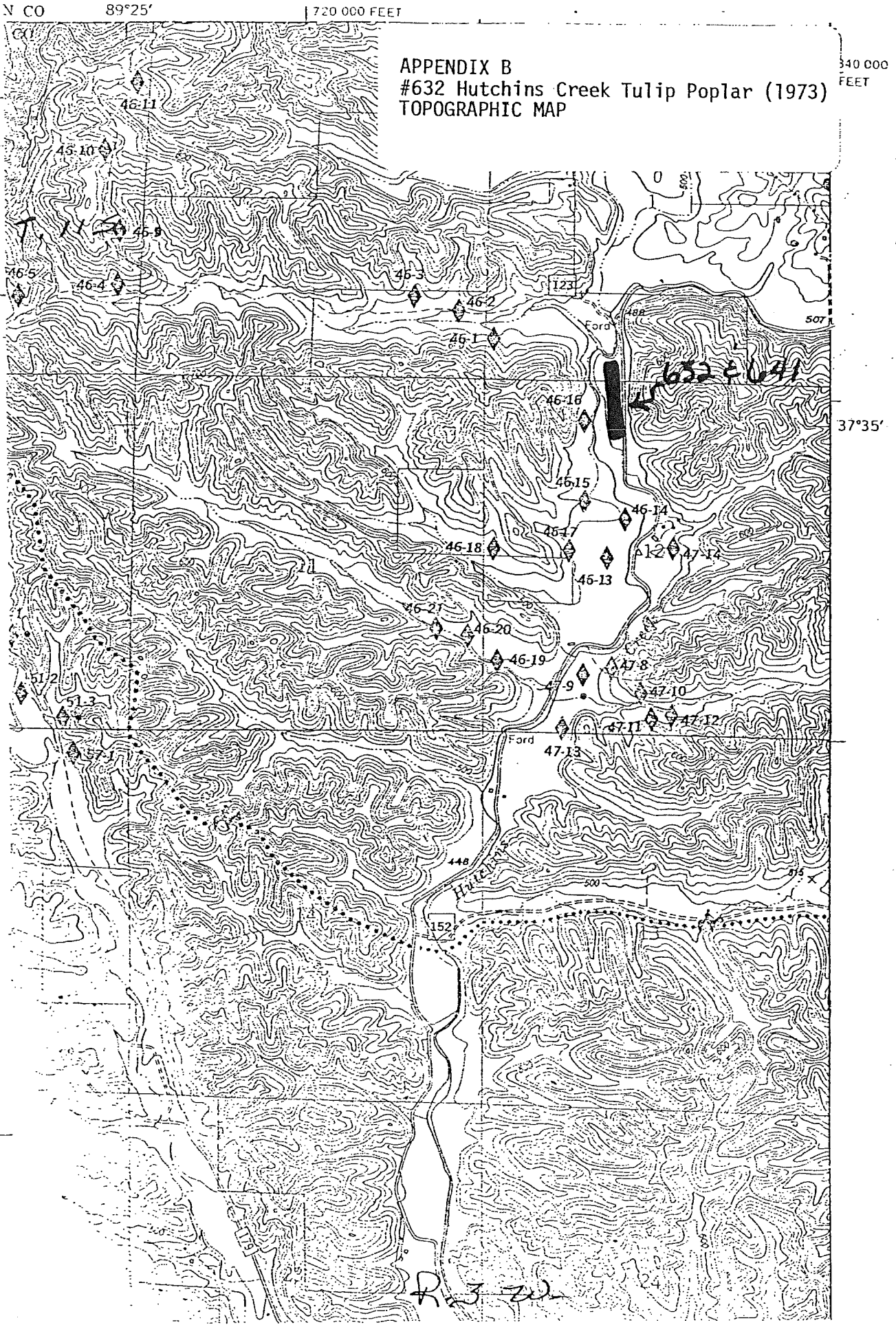
Suggested Maintenance: This stand should be thinned to leave the best trees and stimulate seed production. The *Rubus* should be mowed and/or sprayed.

Other Comments: This plantation is adjacent to the 1973 Hutchins Creek yellow-poplar outplanting, and all comments apply equally to either planting except for the erosion which affected only Block 3 of the 1973 planting.

Both stands are now in the Clear Springs Wilderness Area, which likely precludes management activites. One can drive to within 100 yards of them and park at the trailhead.

APPENDIX A
#632 Hutchins Creek Tulip Poplar (1973)
VICINITY MAP




APPENDIX B
#632 Hutchins Creek Tulip Poplar (1973)
TOPOGRAPHIC MAP
89°25'
720 000 FEET
340 000 FEET
37°35'
46-11
45-10
46-5
46-4
46-3
46-2
46-1
46-16
46-15
46-14
46-17
46-18
46-13
46-21
46-20
46-19
47-8
47-9
47-10
47-11
47-12
47-13
47-14
51-2
51-3
57-1
Ford
Hutchins Creek
632 & 641
T. 11 S.
R. 3 W.

CG-422
Revised April 1974

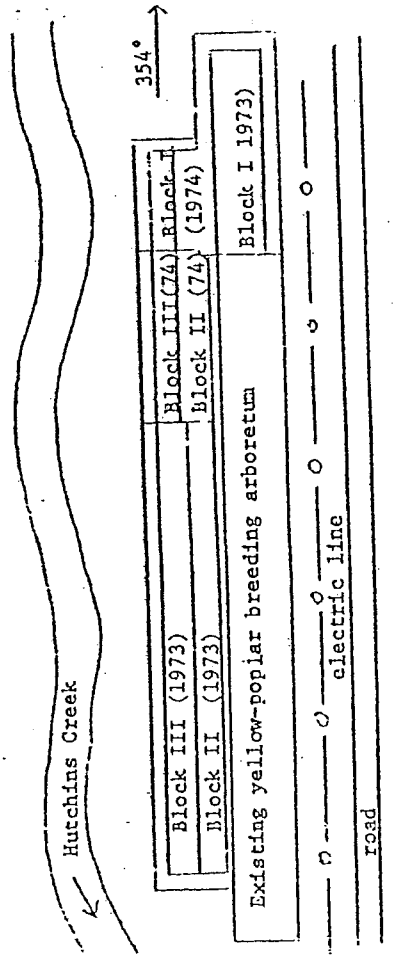
APPENDIX C
#632 Hutchins Creek Tulip Poplar (1973) 1/
LOCATION OF RELATED PLANTINGS & BREEDING ARBORETUM

Planted 12, 13 April 1973 by Alley and Hawker. Four-tree plots, oriented approximately E-W; 10- x 10-foot spacing; two border rows around outside one border row between progeny test and breeding arboretum. 1974 blocks planted 29 March by Funk, Alley, and Hawker.

Block III (1973)	Block II
6508	6509
I 2	6532
6520	6525
6550	6512
6530	TV 12G
6552	6552
6510	TV 11G
6532	6520
6507	6539
TV 12G	HO 25
6551	6524
6512	6518
CP 7B	HO 22
6524	6505
6518	6543
TV 11G	W 1
HO 7	6548
6525	6547
6513	JE 1101
W 1	6545
6509	6535
6547	6527
6543	6531
6521	6506
6553	I 2
6542	6534
6540	6515
6546	JE 1251
HO 22	6553
6545	6550
JE 1101	6551
6537	6500
6514	6537
6529	6504
6501	6501
6538	6514
6527	6542
HO 25	6521
6504	6507
UT 10	HO 57
6503	6530
DB 1431	6513
6526	6510
DB 1219	DB 1219
6516	6540
6506	6526
6515	6529
HO 57	6533
6548	6546
HO 53	HO 7
6531	6503
6509	UT 10
6535	6538
6505	HO 53
6534	DB 1431
6539	6508
JE 1251	6516

Hutchins Creek #632

WASHED OUT



CP 7B M6067

#632

Block I (1973)

6512	MO 53
6537	TV 12G
MO 7	JE 1251
6540	UT 10
6503	TV 11G
DB 1431	DB 1219
6524	6547
CP 7B	MO 57
W 1	6520
6532	6514
6504	6538
6508	6542
6505	6501
6539	6527
6546	6510
6521	I 2
6516	6543
MO 22	6545
6533	6525
6548	6534
6515	6550
6530	6507
6553	6518
6529	6526
6552	6551
MO 25	6513
6500	JE 1101
6531	6509
6535	6506

#641

Block I (1974)

6708	6506
6707	6706
6702	6709
6697	Union C
6679-1	6534
6514	6537
6716	6713
6552	No. 3
6710	Union B
6516	6507
TV 11G	6696
6700	6704
6698	6546
6705	6520
6715	6714
6523	6701
6712	6717

Block II (1974)

Union C	6523
6506	6715
6701	6679-1
6523	Union C
6697	6713
6546	6552
6704	6514
Union B	6537
6514	6506
6705	6534
6516	6507
6712	6520
6696	6712
6698	TV 11G
6702	6708
6710	Union B
6534	6704
6717	6707
No. 3	6709
6713	6705
6507	6696
6716	6701
6520	6700
6714	6702
6706	6697
6552	6546
6679-1	6717
6707	6716
TV 11G	6698
6709	6706
6537	6710
6700	6516
6715	6714
6708	No. 3

Block III (1974)

GENETIC RESOURCE EVALUATION

Study No.: CG-422 **Species:** Yellow-poplar

Date Established: 3/8/73 **Date Evaluated:** 3/4/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: Kaskaskia Experimental Forest, Karbers Ridge, Illinois
Elizabethtown RD, Shawnee NF
SESE, S21, T11S, R8E, Hardin County, Illinois

Experimental Design: Randomized block, 2 blocks, 4-tree row plots, 46 families, 8 x 12 ft spacing, 2 border rows (on N, W, & E sides).

Monumentation: Original wire pins with embossed tags can be found at the westernmost tree of 5% of the plots. Orange plastic stakes with metal tags mark the four corners of the planting.

Existing Fall Measurements:

Ht	'73, '74, '75, '76, '77, '78, '79
DBH	'77, '79

Survival: 70%

Growth: Diameter varies from 4 to 8 inches; about 60% of the trees are 6 to 7 inches, while 30% of the trees are 4 inches, and 10% are 8 inches. Height varies from 40 to 55 feet and is strongly correlated with diameter. Live crown ratios run 25 to 50% of tree height.

Stem Form: These trees are uniformly straight and clean, with only a very few being forked or sweepy.

Damage: None.

Competing Vegetation: Flowering dogwood, multiflora rose, and Indian paintbrush (*Rhamnus caroliniana*) grow in widely scattered clumps throughout the plantation.

Suggested Maintenance: Clean out the understory shrubs.

Other Comments: This planting is in good condition. On the south it adjoins with the 1974 CG-422 yellow-poplar planting. The road going east from the Kaskaskia Experimental Forest headquarters will bring you right to the plantation.

GENETIC RESOURCE EVALUATION

Study No.: CG-422 Species: Yellow-poplar

Date Established: 4/3/74 Date Evaluated: 3/4/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: Kaskaskia Experimental Forest, Karbers Ridge, Illinois
Elizabethtown RD, Shawnee NF
SESE, S21, T11S, R8E, Hardin County, Illinois

Experimental Design: Randomized block, 2 blocks, 4-tree row plots, 34 families, 8 x 12 ft spacing, 2 border rows (on E, W, & S sides).

Monumentation: Original wire pins with embossed tags can be found at the westernmost tree of 5% of the plots. Orange plastic stakes with metal tags mark the four corners of the planting.

Existing Fall Measurements:
Ht '79, '80
DBH '79, '80

Survival: 75%

Growth: Diameter varies from 4 to 10 inches. About 75% of the trees are 6 to 7 inches, with 20% at 4 inches, and 5% at 9 to 10 inches. Height varies from 40 to 55 feet. Live crown ratios run 25 to 60%, the fuller crowns being correlated with the larger diameters.

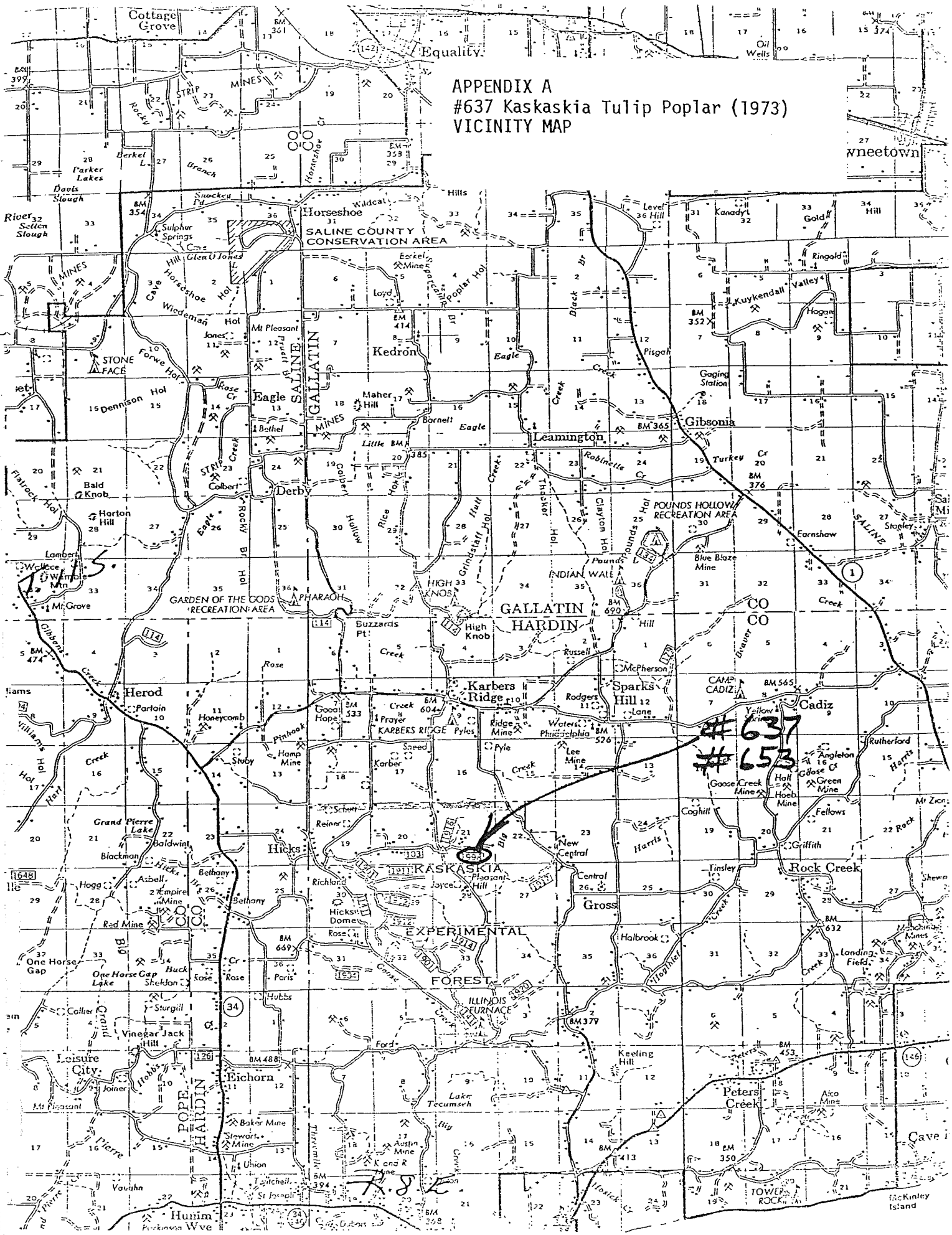
Stem Form: Form in this plantation is very good, with virtually no forked or excessively sweepy trees. Nearly all trees have self-pruned to a height of 10 feet or more; many of the smaller-crowned trees are clean for 20 to 30 feet.

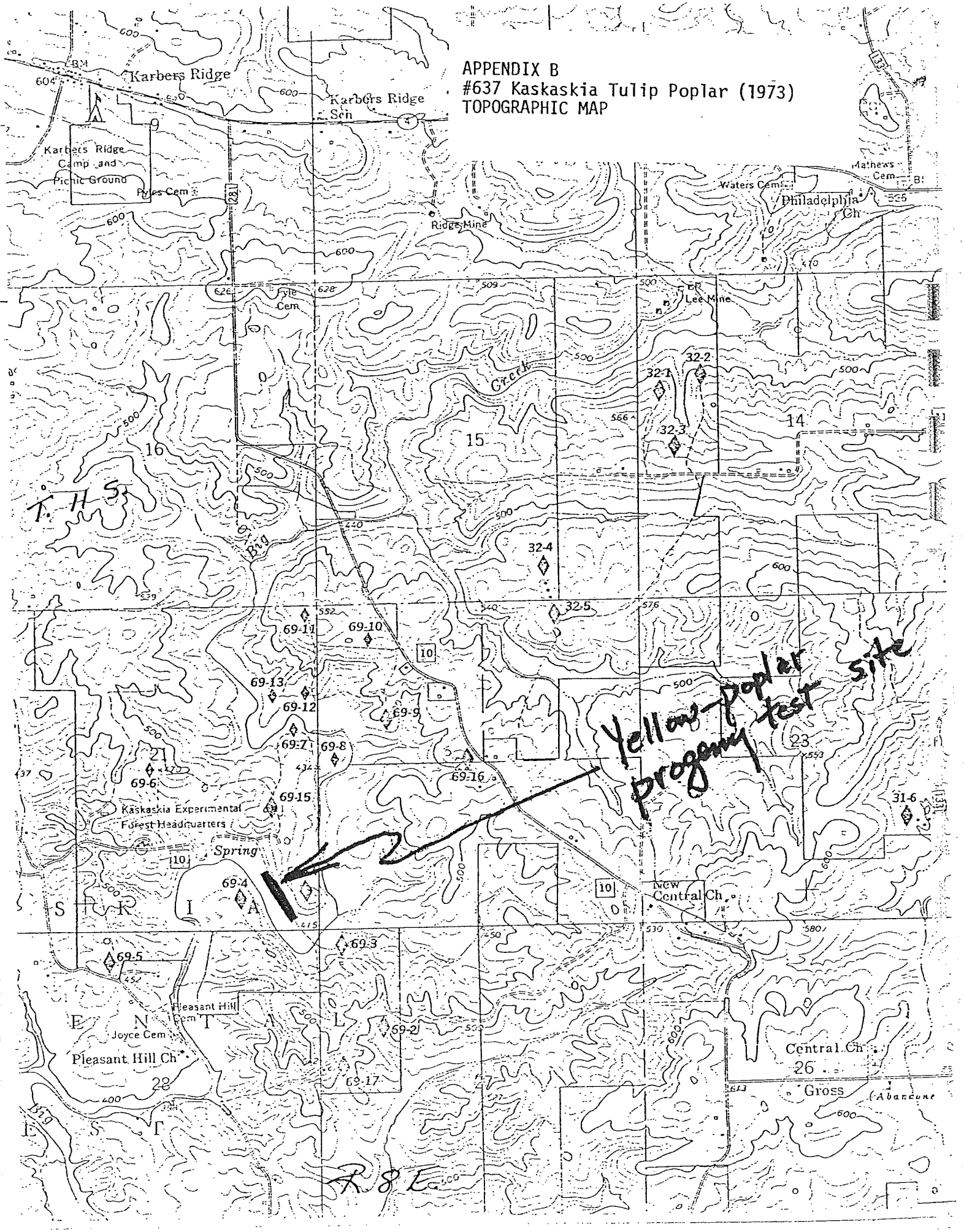
Damage: None.

Competing Vegetation: Flowering dogwood, multiflora rose, and Indian paintbrush (*Rhamnus caroliniana*) grow throughout the stand (more densely than in the adjacent 1973 planting).

Suggested Maintenance: Clean out the understory shrubs.

Other Comments: This plantation adjoins the 1973 CG-422 yellow-poplar planting to the north. It is easily reached by following the road east from the Kaskaskia Experimental Forest headquarters.


APPENDIX A
#637 Kaskaskia Tulip Poplar (1973)
VICINITY MAP
#637
#653
KASKASKIA
EXPERIMENTAL
FOREST
SALINE COUNTY
CONSERVATION AREA
GARDEN OF THE GODS
RECREATION AREA
POUNDS HOLLOW
RECREATION AREA
GALLATIN
HARDIN
SALINE
POPE
Cottage Grove
Equality
Horseshoe
Kedron
Eagle
Leamington
Gibsonia
Derby
Herod
Karbers Ridge
Sparks Hill
Cadiz
Hicks
Rock Creek
Gross
Eichorn
Leisure City
Peters Creek
Tower Rock
Wnneetown


APPENDIX B
#637 Kaskaskia Tulip Poplar (1973)
TOPOGRAPHIC MAP
Karbers Ridge
Karbers Ridge Sch
Karbers Ridge Camp and Picnic Ground
Pyles Cem
Ridge Mine
Waters Cem
Philadelphia Ch
Mathews Cem
Lee Mine
Pyle Cem
Green
Big
Yellow-Poplar Progeny test site
Kaskaskia Experimental Forest Headquarters
Spring
New Central Ch
Central Ch
Pleasant Hill Cem
Joyce Cem
Pleasant Hill Ch
Gross
Abandone
T. 4 S.
R. 8 E.
69-1
69-2
69-3
69-4
69-5
69-6
69-7
69-8
69-9
69-10
69-11
69-12
69-13
69-15
69-16
69-17
32-1
32-2
32-3
32-4
32-5
31-6

APPENDIX D
#637 Kaskaskia Tulip Poplar (1973)
PLANTATION MAP

	Block A				Block C			
AB	NC501	NC501	NC501	NC501	JR101	JR101	JR101	JR101
AC	JR101	JR101	JR101	JR101	NC505	NC505	NC505	NC505
AD	NC534	NC534	NC534	NC534	NC510	NC510	NC510	NC510
AE	NC507	NC507	NC507	NC507	NC553	NC553	NC553	NC553
AF	DB219	DB219	DB219	DB219	NC534	NC534	NC534	NC534
AG	NC535	NC535	NC535	NC535	NC535	NC535	NC535	NC535
AH	IN012	IN012	IN012	IN012	NC509	NC509	NC509	NC509
AI	NC506	NC506	NC506	NC506	HB007	HB007	HB007	HB007
AJ	TV11G	TV11G	TV11G	TV11G	NC512	NC512	NC512	NC512
AK	NC553	NC553	NC553	NC553	NC506	NC506	NC506	NC506
AL	NC537	NC537	NC537	NC537	TV12G	TV12G	TV12G	TV12G
AM	NC550	NC550	NC550	NC550	NC539	NC539	NC539	NC539
AN	NC504	NC504	NC504	NC504	NC525	NC525	NC525	NC525
AO	NC507	NC507	NC507	NC507	NC510	NC510	NC510	NC510
AP	NC538	NC538	NC538	NC538	NC503	NC503	NC503	NC503
AQ	NC530	NC530	NC530	NC530	DB219	DB219	DB219	DB219
AR	NC548	NC548	NC548	NC548	NC547	NC547	NC547	NC547
AS	NC500	NC500	NC500	NC500	NC507	NC507	NC507	NC507
AT	NC514	NC514	NC514	NC514	NC504	NC504	NC504	NC504
AU	NC503	NC503	NC503	NC503	NC538	NC538	NC538	NC538
AV	TV12G	TV12G	TV12G	TV12G	TV11G	TV11G	TV11G	TV11G
AW	NC539	NC539	NC539	NC539	NC545	NC545	NC545	NC545
AX	NC552	NC552	NC552	NC552	NC508	NC508	NC508	NC508
AY	NC505	NC505	NC505	NC505	NC548	NC548	NC548	NC548
AZ	NC520	NC520	NC520	NC520	NC527	NC527	NC527	NC527
BA	NC545	NC545	NC545	NC545	NC526	NC526	NC526	NC526
BB	NC547	NC547	NC547	NC547	IN012	IN012	IN012	IN012
BC	NC509	NC509	NC509	NC509	NC516	NC516	NC516	NC516
BD	NC531	NC531	NC531	NC531	NC520	NC520	NC520	NC520
BE	NC551	NC551	NC551	NC551	NC546	NC546	NC546	NC546
BF	NC546	NC546	NC546	NC546	NC515	NC515	NC515	NC515
BG	NC512	NC512	NC512	NC512	NC500	NC500	NC500	NC500
BH	NC508	NC508	NC508	NC508	NC551	NC551	NC551	NC551
BI	NC525	NC525	NC525	NC525	NC550	NC550	NC550	NC550
BJ	NC526	NC526	NC526	NC526	NC540	NC540	NC540	NC540
BK	NC517	NC517	NC517	NC517	NC517	NC517	NC517	NC517
BL	NC516	NC516	NC516	NC516	NC552	NC552	NC552	NC552
BM	NC527	NC527	NC527	NC527	NC524	NC524	NC524	NC524
BN	NC510	NC510	NC510	NC510	NC521	NC521	NC521	NC521
BO	NC532	NC532	NC532	NC532	NC514	NC514	NC514	NC514
BP	NC524	NC524	NC524	NC524	NC531	NC531	NC531	NC531
BQ	NC521	NC521	NC521	NC521	NC529	NC529	NC529	NC529
BR	NC529	NC529	NC529	NC529	NC532	NC532	NC532	NC532
BS	NC515	NC515	NC515	NC515	UCAVE	UCAVE	UCAVE	UCAVE

Upslope →

approx.

ROWS RUN NORTH & SOUTH
SPACING BETWEEN ROWS 12 ft.
SPACING WITHIN ROWS 6 ft.

END

183 1974 Yellow poplar E.P. #653 adjoin

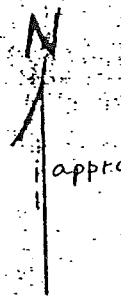
APPENDIX D
#653 Kaskaskia Tulip Poplar (1974)
PLANTATION MAP

YELLOW POPLAR PROGENY TEST KASKASKIA #653 SHAWNEE NATIONAL FOREST ELIZABETHTOWN RD
PLANTED 1974 KASKASKIA EXPERIMENTAL FOREST REDDLEMAN TRACT

Block 4 Block 5

	1	2	3	4	5	6	7	8
START								
→ BT	NC516	NC516	NC516	NC516	NC520	NC520	NC520	NC520
BU	NC537	NC537	NC537	NC537	NC715	NC715	NC715	NC715 ←
→ BV	NC506	NC506	NC506	NC506	TV110	TV110	TV110	TV110
BW	NC717	NC717	NC717	NC717	NC714	NC714	NC714	NC714 ←
→ BX	NC702	NC702	NC702	NC702	NC713	NC713	NC713	NC713
BY	NC520	NC520	NC520	NC520	NC507	NC507	NC507	NC507 ←
→ BZ	TV110	TV110	TV110	TV110	NC514	NC514	NC514	NC514
CA	NC707	NC707	NC707	NC707	ØH003	ØH003	ØH003	ØH003 ←
→ CB	NC700	NC700	NC700	NC700	NC716	NC216	NC716	NC716
CC	NC712	NC712	NC712	NC712	NC696	NC696	NC696	NC696 ←
→ CD	NC514	NC514	NC514	NC514	UC002	UC002	UC002	UC002
CE	UC002	UC002	UC002	UC002	NC710	NC710	NC710	NC710 ←
→ CF	NC701	NC701	NC701	NC701	NC506	NC506	NC506	NC506
CG	NC679	NC679	NC679	NC679	NC523	NC523	NC523	NC523 ←
→ CH	NC697	NC697	NC697	NC697	NC534	NC534	NC534	NC534
CI	NC534	NC534	NC534	NC534	NC717	NC717	NC717	NC717 ←
→ CJ	NC696	NC696	NC696	NC696	NC516	NC516	NC516	NC516
CK	UC003	UC003	UC003	UC003	NC712	NC712	NC712	NC712 ←
→ CL	NC704	NC704	NC704	NC704	NC704	NC704	NC704	NC704
CM	NC507	NC507	NC507	NC507	NC697	NC697	NC697	NC697 ←
→ CN	ØH003	ØH003	ØH003	ØH003	NC708	NC708	NC708	NC708
CO	NC710	NC710	NC710	NC710	NC698	NC698	NC698	NC698 ←
→ CP	NC552	NC552	NC552	NC552	NC706	NC706	NC706	NC706
CQ	NC546	NC546	NC546	NC546	NC701	NC701	NC701	NC701 ←
→ CR	NC714	NC714	NC714	NC714	NC702	NC702	NC702	NC702
CS	NC705	NC705	NC705	NC705	UC003	UC003	UC003	UC003 ←
→ CT	NC520	NC520	NC520	NC520	NC707	NC707	NC707	NC707
CU	NC706	NC706	NC706	NC706	NC700	NC700	NC700	NC700 ←
→ CV	NC708	NC708	NC708	NC708	NC679	NC679	NC679	NC679
CW	NC715	NC715	NC715	NC715	NC705	NC705	NC705	NC705 ←
→ CX	NC716	NC716	NC716	NC716	NC709	NC709	NC709	NC709
CY	NC698	NC698	NC698	NC698	NC546	NC546	NC546	NC546 ←
→ CZ	NC713	NC713	NC713	NC713	No. #	No. #	No. #	No. #
DA	NC709	NC709	NC709	NC709	No. #	No. #	No. #	No. # ←
→ DB	No. #	No. #	No. #	No. #				
DC	No. #	No. #	No. #	No. #	←			

END



GENETIC RESOURCE EVALUATION

Study No.: CG-422 **Species:** Yellow-poplar

Date Established: 4/3/74 **Date Evaluated:** 1/14/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Maumee" planting near Houston, Indiana
Compartment #40, Brownstown RD, Hoosier NF
SENE, S26 & NW1/4, S36, T7N, R2E, Jackson County, Indiana

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 30 families, 10 x 10 ft spacing. Blocks 1 & 2 on upland site in S26, Block 3 on bottomland site in S36.

Monumentation: Bamboo stakes with embossed metal tags mark both ends of most plots. Orange plastic stakes mark block corners.

Existing Fall Measurements:
Ht '74, '76, '78, '81
DBH '76

Survival: I could not locate Block 3; it seems to have been flooded out. Survival in Blocks 1 & 2 is 60 to 70% by family, that is, entire families are either present or absent.

Growth: Height and diameter are both quite variable in this plantation. The best tree is 7 inches DBH and 41 feet tall; the smallest is 1 inch by 7 feet. All sizes within these bounds are well-represented, the variation tending to occur by family.

Stem Form: These tulips are a bit limbier than most, but will probably prune themselves as they get larger.

Damage: Basal cankers are present on about 5% of these trees. These appeared to be mechanical rather than pathogen-caused.

Competing Vegetation: Sumac is the major competitor in this stand. At 15 feet in height, the abundant sumac is taller than many of the tulips.

Suggested Maintenance: Clean out the sumac.

Other Comments: Block 3, planted at the bottomland site in S36, could not be found. Another yellow-poplar plantation (Maumee '76) planted in the same vicinity was also missing. My guess is that Block 3 flooded out at an early age.

GENETIC RESOURCE EVALUATION

Study No.: CG-422 Species: Yellow-poplar

Date Established: 3/17/76 Date Evaluated: 1/14/94

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Maumee" planting near Houston, Indiana
Compartment #40, Brownstown RD, Hoosier NF
SW1/4, S25, T7N, R2E, Jackson County, Indiana

Experimental Design: Randomized block, 5 blocks, 4-tree row plots, 14 families, 10 x 10 ft spacing.

Monumentation: None.

Existing Fall Measurements:
Ht '76, '78, '81
DBH '76, '78

Survival: This plantation is gone.

Growth:

Stem Form:

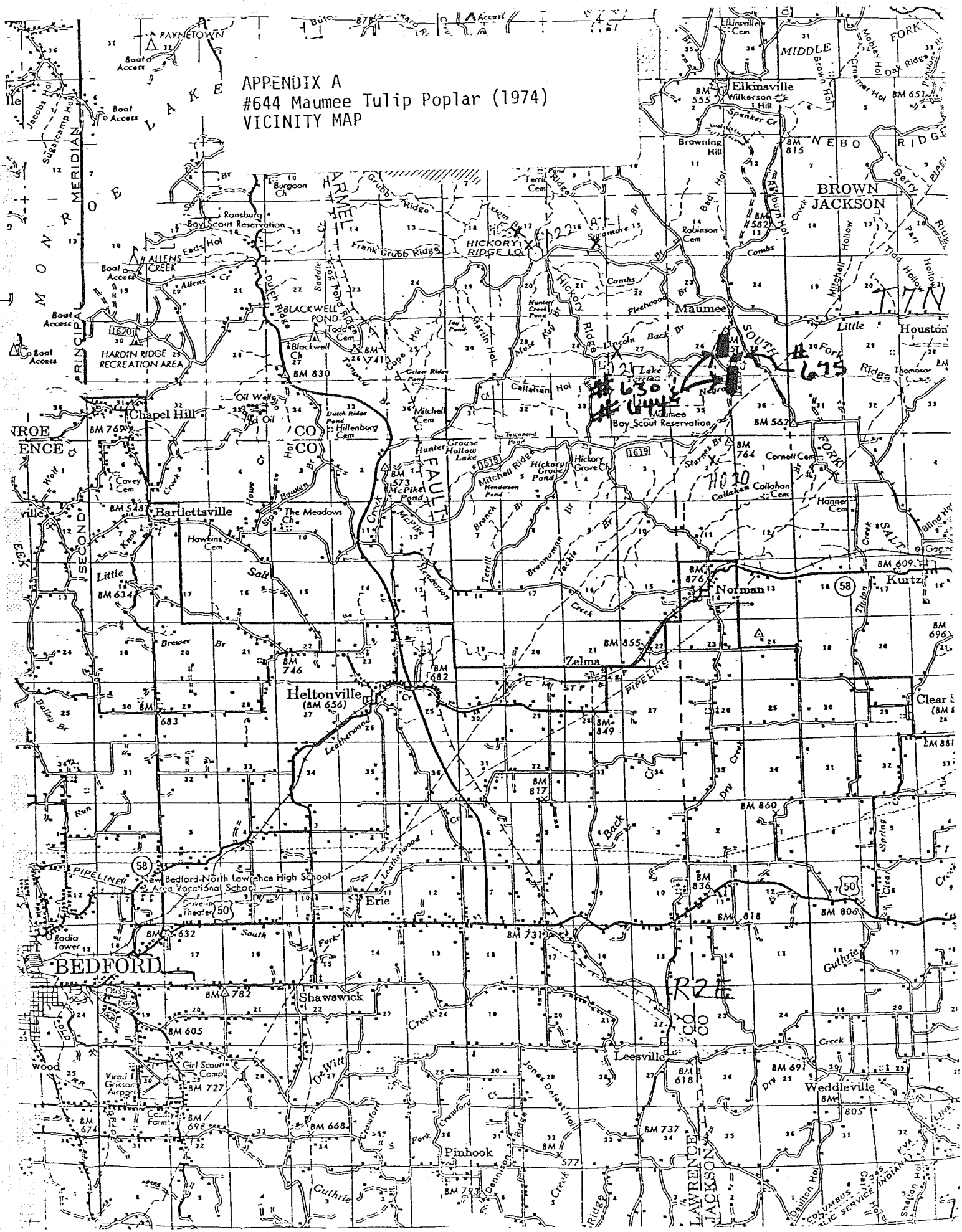
Damage:

Competing Vegetation:

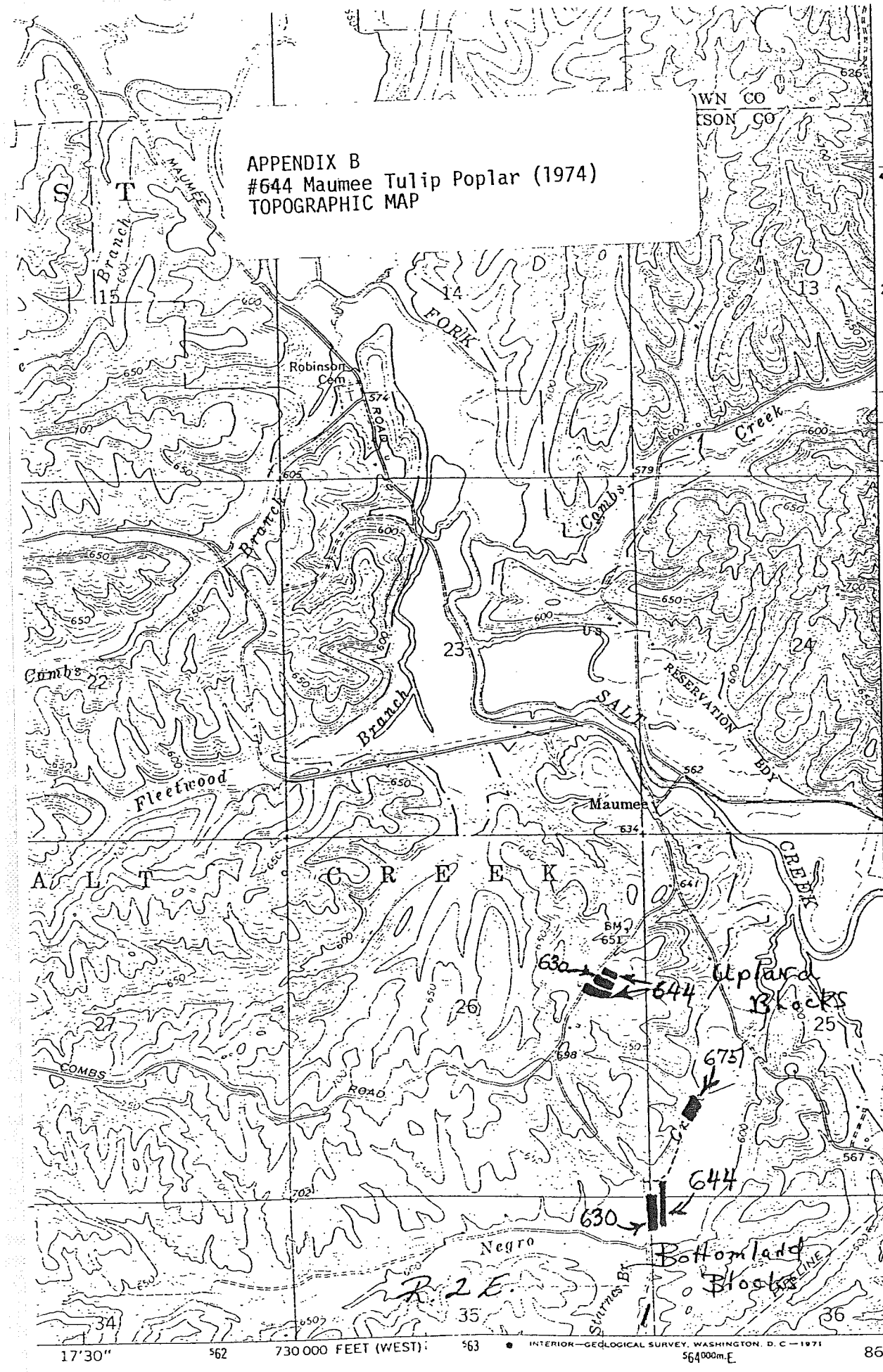
Suggested Maintenance:

Other Comments: I searched a quarter-mile north and south of the marked location. I found a plantation of sweetgum near the road, a stagnant walnut plantation just north of the sweetgums, but no plantations of any kind up the creek valley where this one was planted. There is an opening large enough to have accomodated the planting in about the right location - this opening is filled with heavy growth of tall grass, cattails, and marsh vegetation. These tulips must have been flooded out.

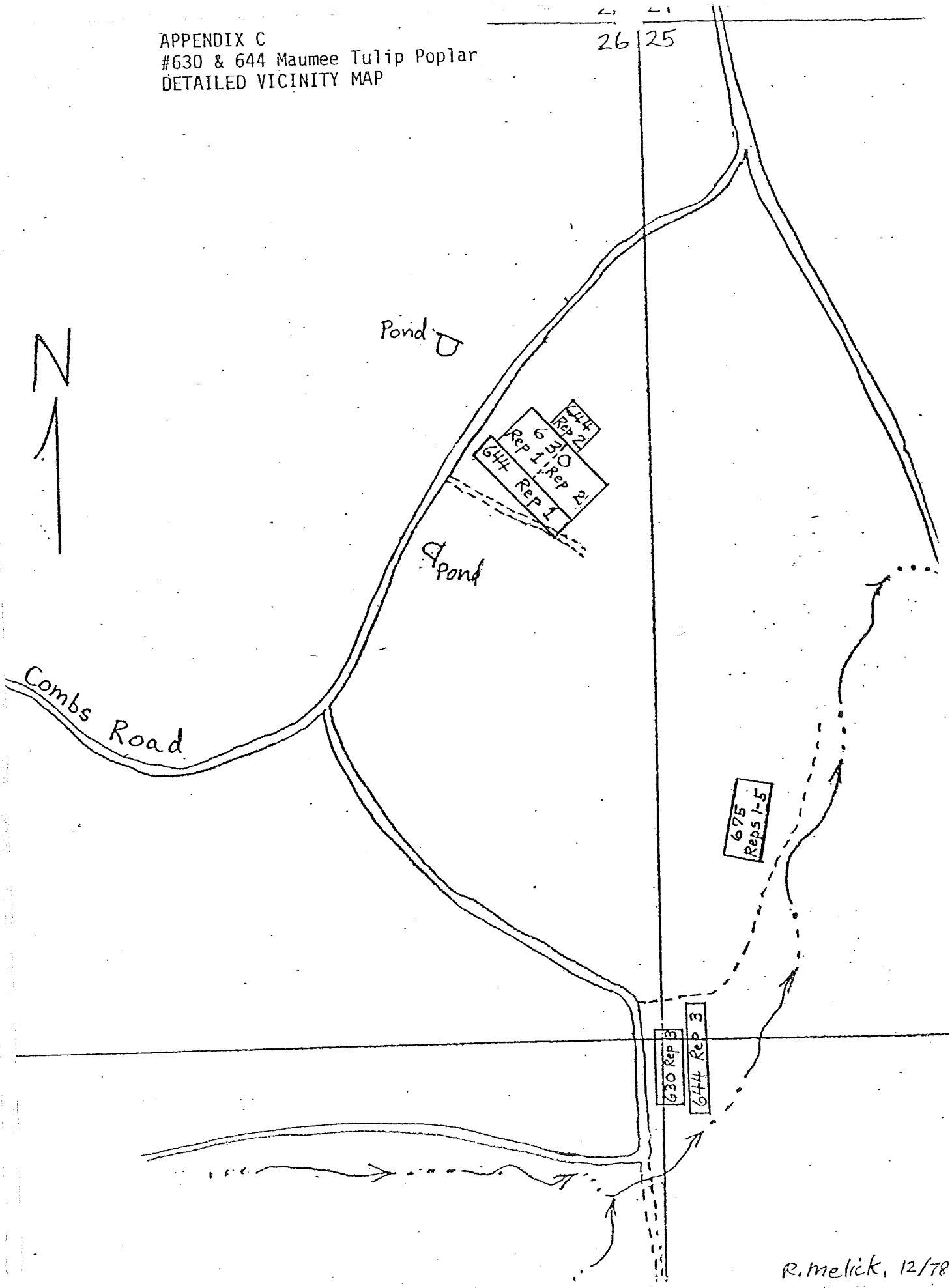
APPENDIX A
#644 Maumee Tulip Poplar (1974)
VICINITY MAP



APPENDIX B
#644 Maumee Tulip Poplar (1974)
TOPOGRAPHIC MAP



APPENDIX C
#630 & 644 Maumee Tulip Poplar
DETAILED VICINITY MAP



192

MAUMEE #675 TULIP POPLAR Evaluation Plantation Planted 3-17-76 Wayne-Hoosier NF Brownstown RD

	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	
AA	1751	1756	1747	1757	1751	1750	1758	1754	1753	1774	1755	1754	1753	1758	1755	1756	1774	1751	1774	1756	1754	END
AB	1751	1756	1747	1757	1751	1750	1758	1754	1753	1774	1755	1754	1753	1758	1755	1756	1774	1751	1774	1756	1754	
AC	1751	1756	1747	1757	1751	1750	1758	1754	1753	1774	1755	1754	1753	1758	1755	1756	1774	1751	1774	1756	1754	
AD	1751	1756	1747	1757	1751	1750	1758	1754	1753	1774	1755	1754	1753	1758	1755	1756	1774	1751	1774	1756	1754	
AE	1774	1750	1758	1753	1753	1756	1774	1748	1757	1748	[illegible]	1751	1756	1748	1754	1752	1775	1753	1758	1747	1748	
AF	1774	1750	1758	1753	1753	1756	1774	1748	1757	1748	1758	1751	1756	1748	1754	1752	1775	1753	1758	1747	1748	
AG	1774	1750	1758	1753	1753	1756	1774	1748	1757	1748	1758	1751	1756	1748	1754	1752	1775	1753	1758	1747	1748	
AH	1774	1750	1758	1753	1753	1756	1774	1748	1757	1748	1758	1751	1756	1748	1754	1752	1775	1753	1758	1747	1748	
AI	1748	1755	1752	1775	1754	1755	1775	1747	1759	1775	1757	1747	1750	1757	1750	1747	1751	1755	1775	1750	1757	
AJ	1748	1755	1752	1775	1754	1755	1775	1747	1759	1775	1757	1747	1750	1757	1750	1747	1751	1755	1775	1750	1757	
AK	1748	1755	1752	1775	1754	1755	1775	1747	1759	1775	1757	1747	1750	1757	1750	1747	1751	1755	1775	1750	1757	
AL	1748	1755	1752	1775	1754	1755	1775	1747	1759	1775	1757	1747	1750	1757	1750	1747	1751	1755	1775	1750	1757	

START

BLOCK-1

BLOCK-2

BLOCK-3

BLOCK-4

BLOCK 5

CREEK

N

GENETIC RESOURCE EVALUATION

Study No.: CG-422 **Species:** Yellow-poplar

Date Established: 3/74 **Date Evaluated:** 11/18/93

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Penn Central" planting near Newport, Ohio
Compartment 204, Athens RD, Wayne NF
SWSW, S23, T1N, R6W, Washington County, Ohio

Experimental Design: Randomized block, 3 blocks, 4-tree row plots, 25 families, 10 x 10 ft spacing, 1 border row.

Monumentation: Half of the original wire pins and embossed tags remain at the westernmost tree of each plot. I placed orange plastic stakes with metal tags at the four corners of the planting.

Existing Fall Measurements:
Ht '76
DBH

Survival: About 85%, the missing trees occurring at random.

Growth: Diameters vary from 4 to 12 inches. Most are 8 inches, with a few larger and many trees smaller. Heights are 60 feet plus or minus 5 feet. The largest tree is 12" DBH and 65 feet tall. Live crown ratios on all but the smallest trees are 25%. All trees seem healthy and vigorous except for the smallest ones which are being suppressed.

Stem Form: Boles are straight and clean, typical yellow-poplar. About 5% of the trees appear to have died when young and then re-sprouted, resulting in multiple-stem clumps.

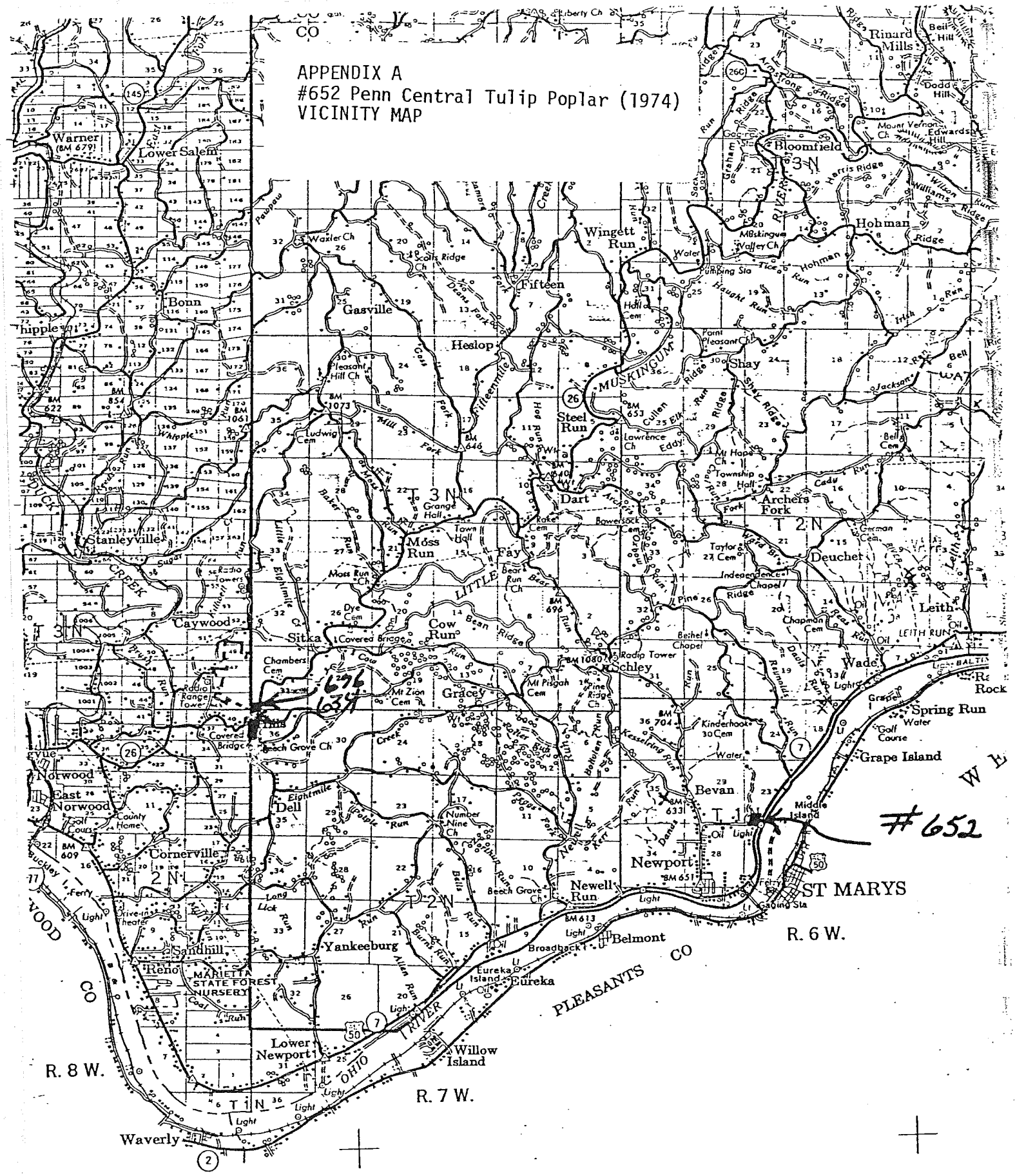
Damage: No damage was noticed other than suppression effects on the smaller trees.

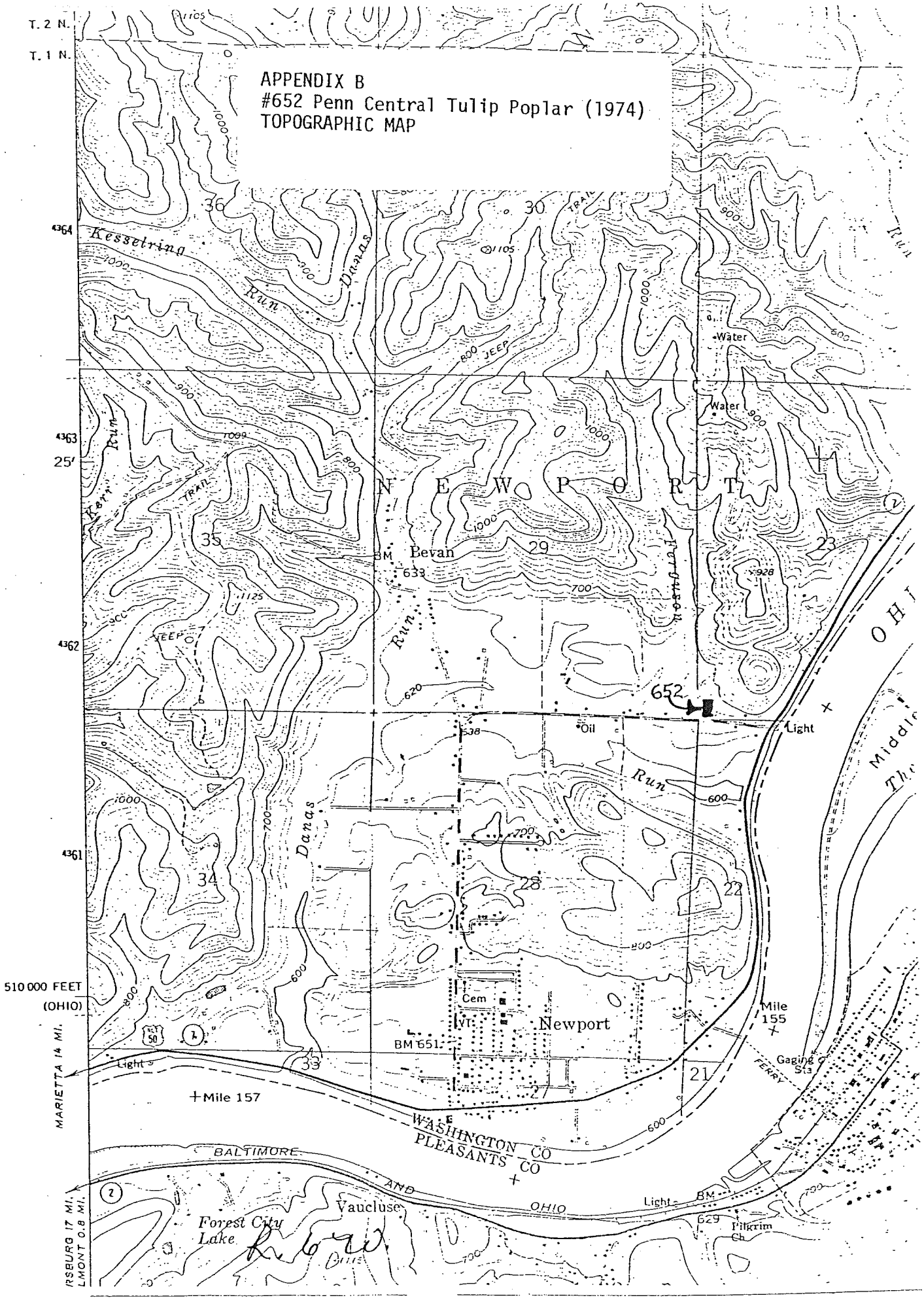
Competing Vegetation: The main understory component is multiflora rose, which forms large tangles throughout the stand. A few small boxelder and black cherry saplings can also be found.

Suggested Maintenance: Clean out the multiflora rose and thin from below.

Other Comments: This plantation is located just north of Co. Hwy 244 about 1/8 mile west of Hwy 7, bordered by a 2-track on the west and a powerline on the east. A dense stand of natural yellow-poplar lies north of the planting and west of the 2-track.

APPENDIX A
#652 Penn Central Tulip Poplar (1974)
VICINITY MAP




APPENDIX B
#652 Penn Central Tulip Poplar (1974)
TOPOGRAPHIC MAP
T. 2 N.
T. 1 N.
Kesselring Run
Danas Run
Water
Water
N E W P O R T
Bevan
BM 633
652
Oil
Light
Cem
Newport
BM 651
Mile 155
Gaging Sta
FERRY
Mile 157
WASHINGTON CO
PLEASANTS CO
BALTIMORE AND OHIO
Light
BM
Vaucluse
Forest City Lake
Pilgrim Ch
510 000 FEET
(OHIO)
MARIETTA 14 MI.
RSBURG 17 MI.
LMONT 0.8 MI.

APPENDIX C
#652 Penn Central Tulip Poplar (1974)
PLANTATION MAP

START

PLANTED SPRING 1974 — PENN CENTRAL TRACT — WAYNE NATIONAL FOREST — ATHENS RD — MUSKINGUM UNIT — TAN AR

	1	2	3	4	5	6	7	8	9	10	11	12
AA →	ØH023	ØH023	ØH023	ØH023	UN002	UN002	UN002	UN002	NC717	NC717	NC717	NC717
AB	NC715	NC715	NC715	NC715	NC714	NC714	NC714	NC714	TV11G	TV11G	TV11G	TV11G
AC →	NC713	NC713	NC713	NC713	NC716	NC716	NC716	NC716	NC709	NC709	NC709	NC709
AD	NC712	NC712	NC712	NC712	ØH003	ØH003	ØH003	ØH003	NC700	NC700	NC700	NC700
AE →	NC704	NC704	NC704	NC704	TV11G	TV11G	TV11G	TV11G	NC679	NC679	NC679	NC679
AF	NC697	NC697	NC697	NC697	NC705	NC705	NC705	NC705	NC686	NC686	NC686	NC686
AG →	UTS11	UTS11	UTS11	UTS11	UN003	UN003	UN003	UN003	NC708	NC708	NC708	NC708
AH	ØH003	ØH003	ØH003	ØH003	X	X	X	X	X	X	X	X
AI →	NC714	NC714	NC714	NC714	ØH023	ØH023	ØH023	ØH023	NC717	NC717	NC717	NC717
AJ	NC712	NC712	NC712	NC712	NC709	NC709	NC709	NC709	NC713	NC713	NC713	NC713
AK →	NC716	NC716	NC716	NC716	NC516	NC516	NC516	NC516	NC700	NC700	NC700	NC700
AL	NC715	NC715	NC715	NC715	NC704	NC704	NC704	NC704	NC708	NC708	NC708	NC708
AM →	UTS11	UTS11	UTS11	UTS11	TV11G	TV11G	TV11G	TV11G	UN003	UN003	UN003	UN003
AN	NC534	NC534	NC534	NC534	NC686	NC686	NC686	NC686	NC697	NC697	NC697	NC697
AO →	UN002	UN002	UN002	UN002	NC540	NC540	NC540	NC540	NC552	NC552	NC552	NC552
AP	NC679	NC679	NC679	NC679	NC705	NC705	NC705	NC705	TV12G	TV12G	TV12G	TV12G
AQ →	NC679	NC679	NC679	NC679	X	X	X	X	X	X	X	X
AR	NC708	NC708	NC708	NC708	NC697	NC697	NC697	NC697	NC700	NC700	NC700	NC700
AS →	NC540	NC540	NC540	NC540	NC552	NC552	NC552	NC552	UN003	UN003	UN003	UN003
AT	ØH023	ØH023	ØH023	ØH023	NC686	NC686	NC686	NC686	UTS11	UTS11	UTS11	UTS11
AU →	TV11G	TV11G	TV11G	TV11G	NC704	NC704	NC704	NC704	UN002	UN002	UN002	UN002
AV	NC709	NC709	NC709	NC709	NC516	NC516	NC516	NC516	ØH003	ØH003	ØH003	ØH003
AW →	TV12G	TV12G	TV12G	TV12G	NC712	NC712	NC712	NC712	NC717	NC717	NC717	NC717
AX	NC534	NC534	NC534	NC534	NC713	NC713	NC713	NC713	NC708	NC708	NC708	NC708
AY →	NC714	NC714	NC714	NC714	NC716	NC716	NC716	NC716	NC715	NC715	NC715	NC715

BLOCK #5

BLOCK #4

BLOCK #3

GENETIC RESOURCE EVALUATION

Study No.: CG-422 Species: Yellow-poplar

Date Established: 4/73 Date Evaluated: 11/20/93

Title: Developing yellow-poplar seed orchards for National Forests in the Eastern Region

Location: "Western Run" planting near Elkins, West Virginia
Cheat RD, Monongahela NF
Randolph County, West Virginia

Experimental Design: Randomized block, 5 blocks, 4-tree plots, 40 families, 10 x 10 ft spacing.

Monumentation: None.

Existing Fall Measurements:
Ht '75, '77
DBH

Survival: This plantation appears to have either failed or been destroyed; a 5-acre clearing is all that remains.

Growth:

Stem Form:

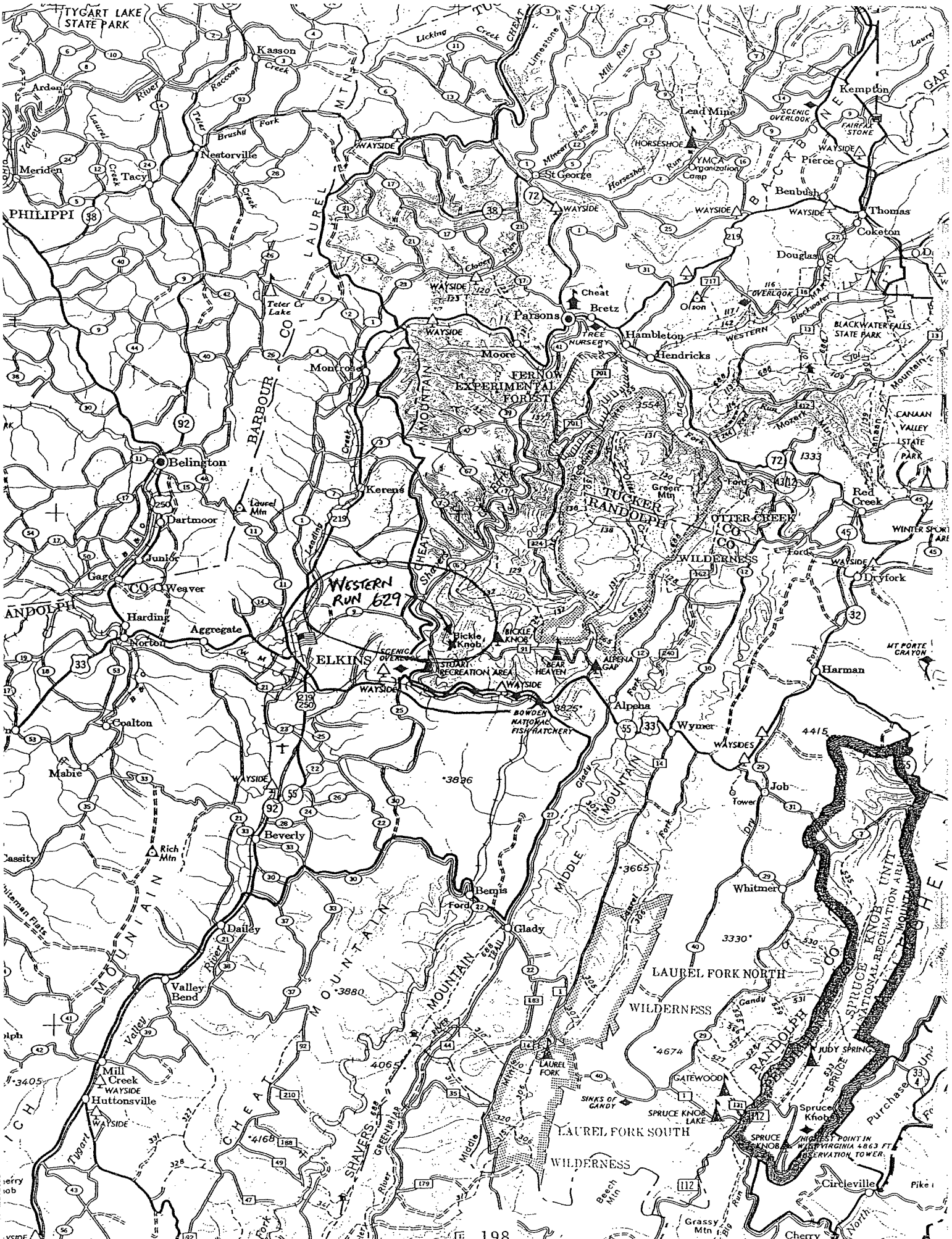
Damage:

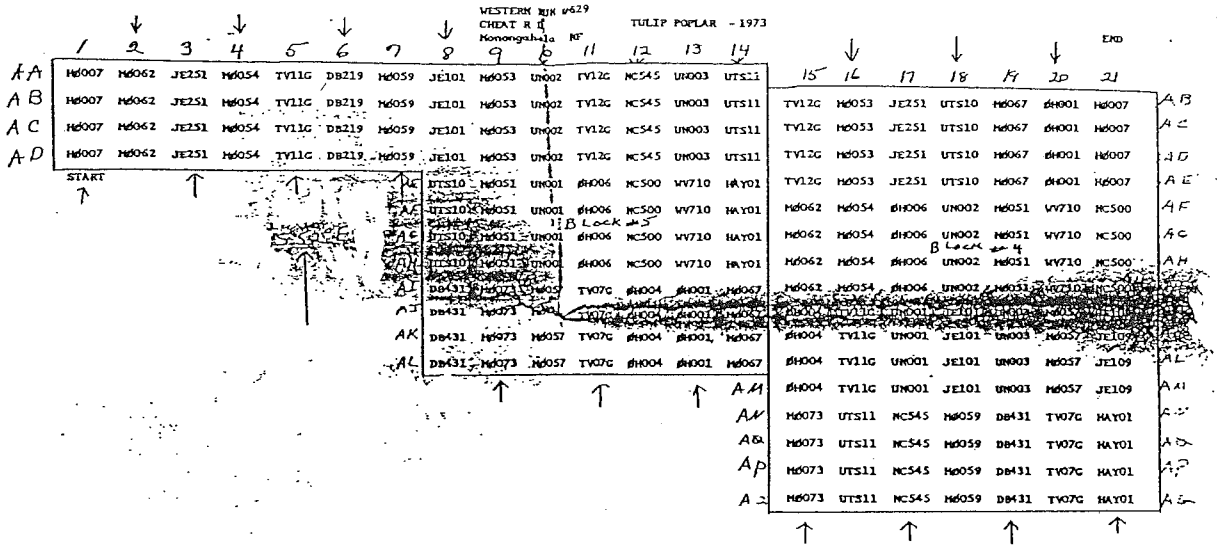
Competing Vegetation:

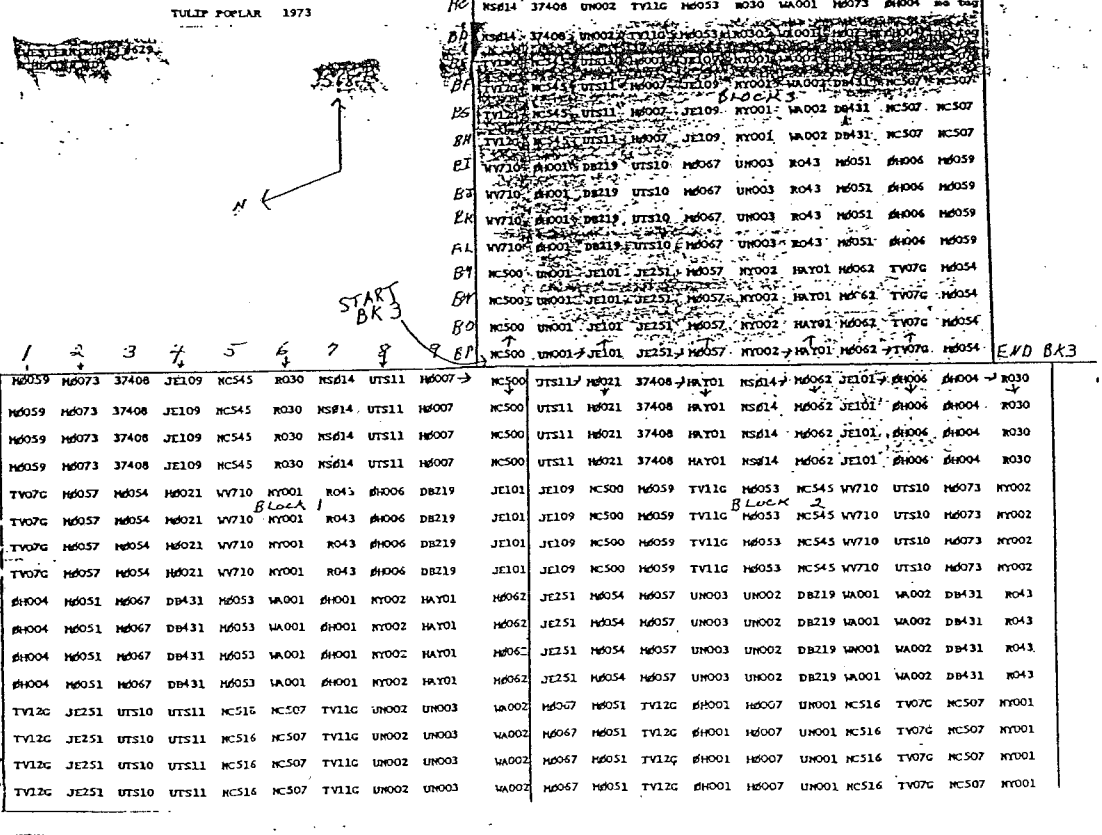
Suggested Maintenance:

Other Comments: The establishment report gives these directions to the plantation: Go 1 1/2 miles NE of US 33 on FR 91, then 1/2 mile N of FR 91 on a logging road.

There is a gated logging road, 91C, exactly 1 1/2 miles up FR 91 from old US 33 (US 33 has been re-routed). No other logging roads go north off FR 91 within a mile in either direction. Four tenths of a mile north on 91C (through mature sawtimber) is a cleared knob. I searched 1/2 mile further up this road, and the area surrounding this knob, without luck. The location marked on the forest map as being the plantation site is 100 to 200 yards SE of this clearing, on a slope entirely occupied by mature hardwoods.


TYGART LAKE STATE PARK
Kasson
Ardon
Meriden
Tacy
Nestorville
PHILIPPI
Licking Creek
Raccoon Creek
Teter Creek
Brushy Fork
Laurel Valley
Limestone Run
Mill Run
Mineral Run
Horseshoe Run
Lead Mine
HORSESHOE
YMCA Organization Camp
St George
SCENIC OVERLOOK
FAIRFAX STONE
Kempton
Pierce
Benbush
Thomas
Coketon
Douglas
Cheat Bretz
Parsons
TREE NURSERY
Olson
Hambleton
Hendricks
Moore
Monrose
FERNOW EXPERIMENTAL FOREST
Teter Lake
Clover Run
Blackwater
WESTERN
BLACKWATER FALLS STATE PARK
CANAAN VALLEY STATE PARK
Mozark Mtn
Green Mtn
Red Creek
Belington
Kerens
Dartmoor
Laurel Mtn
Junior
Gage
Weaver
Harding
Aggregate
Norton
Pickle Knob
ELKINS
SCENIC OVERLOOK
STUART RECREATION AREA
BEAR HEAVEN
ALPENA GAP
Alpena
Wymer
Harman
Dryfork
Ford
Coalton
Mabie
Beverly
Rich Mtn
Bemis
Glady
Dailey
Valley Bend
Mill Creek
Huttonsville
Tygart River
Shaver Fork
Leading Creek
Middle Fork
Gladys Fork
Laurel Fork
Job
Tower
Whitmer
Gandy
JUDY SPRING
GATEWOOD
SPRUCE KNOB LAKE
SINKS OF GANDY
LAUREL FORK NORTH WILDERNESS
LAUREL FORK SOUTH WILDERNESS
SPRUCE KNOB
HIGHEST POINT IN WEST VIRGINIA 4863 FT OBSERVATION TOWER
Spruce Knob
Circleville
Cherry Grove
Grassy Mtn
Beech Mtn
MT PORTE CRAYON
WINTER SPORTS AREA
WESTERN RUN 629
BOWDEN NATIONAL FISH HATCHERY
WAYSIDE
TUCKER
RANDOLPH
BARBOUR
CHEAT
LAUREL MOUNTAIN
BACK BONE MOUNTAIN
ALLEGHENY MOUNTAIN
MIDDLE MOUNTAIN
SHAVERS MOUNTAIN
GREENBRIER
OTTER CREEK WILDERNESS
SPRUCE KNOB-SENECA ROCKS NATIONAL RECREATION AREA
3825'
3836
3880
4065
4168
3405
3665
3330'
4674
4415


WESTERN BJK #629
CHEAT R
Monongahela NF
TULIP POPLAR - 1973
START
END
Block #5
Block #4


TULIP POPLAR 1973
START BK 3
END BK 3
Block 1
Block 2
Block 3
N

GENETIC RESOURCE EVALUATION

Study No.: 75-02 Species: English oak

Date Established: 3/5/76 Date Evaluated: 3/6/94

Title: *Quercus robur* progeny test

Location: Trail of Tears State Forest near Jonesboro, Illinois
SESE, S9, T12S, R2W, Union County, Illinois

Experimental Design: Randomized block, 5 blocks, 5-tree row plots, 72 families, 6 x 12 ft spacing, no border rows.

Monumentation: Orange plastic stakes with metal tags mark all block corners.

Existing Fall Measurements:
Ht '76, '77, '78, '79, '80
DBH

Survival: Survival is about 60%.

Growth: The largest tree in this plantation is 10 inches in diameter and 46 feet tall; the smallest is 1 inch in diameter and 12 feet tall. Diameters vary widely but most are between 3 and 9 inches. Most heights are between 25 and 45 feet. Live crown ratios run 50 to 70% of total tree height.

Northern red oak appears to have been interplanted throughout the stand, although I saw no mention of this in the establishment report. The English oaks occupy the low end of the size distribution described, while the red oaks are noticably larger in diameter and height.

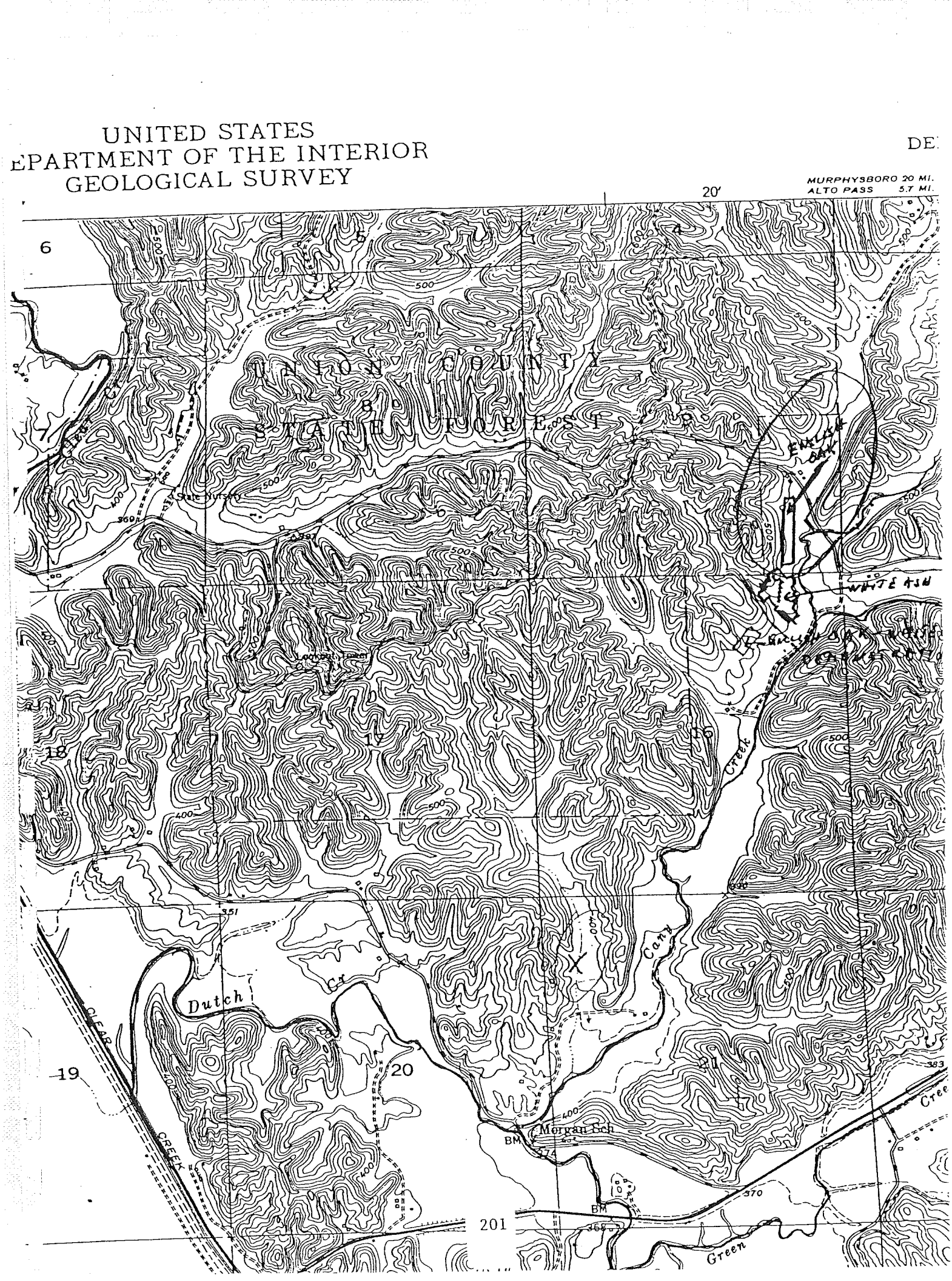
Stem Form: Nearly all of these trees have live limbs down to a height of 6 feet. In addition, the red oaks tend to fork low and show generally poor form.

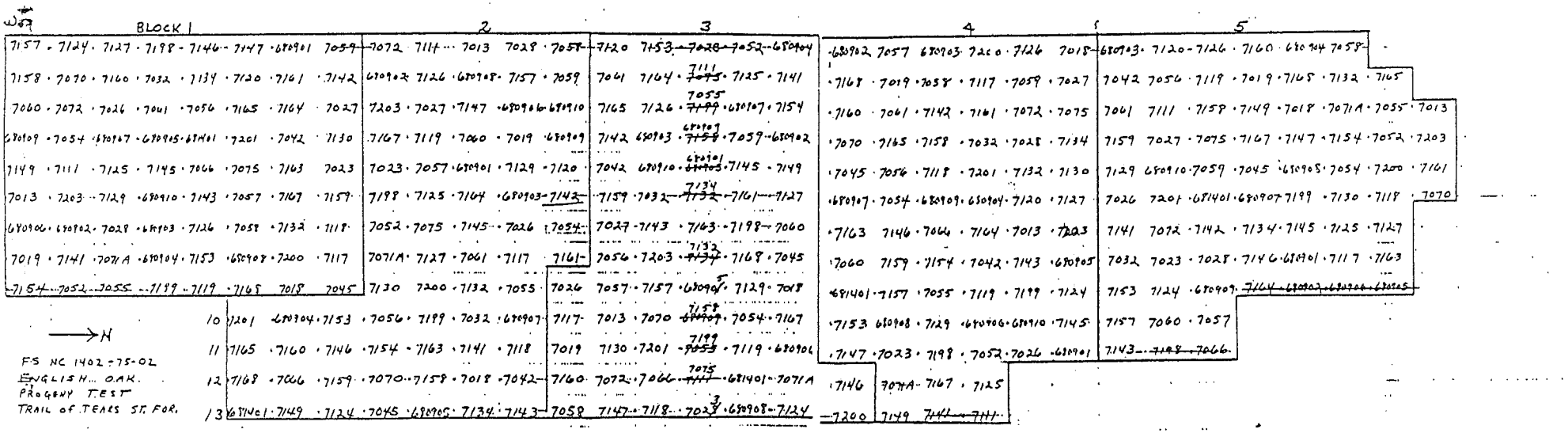
Damage: No damage was evident in the stand.

Competing Vegetation: None. This planting has received regular mowings throughout its life.

Suggested Maintenance: Maintain ongoing understory control.

Other Comments:


UNITED STATES
EPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
DE
MURPHYSBORO 20 MI.
ALTO PASS 5.7 MI.
20'
UNION COUNTY
STATE FOREST
Dutch
Morgan Sch
Creek
Green
201
19
20
21
18
17
16
6
7
4
5
8
BM
370
383
351


BLOCK 1
2
3
4
5
7157 · 7124 · 7127 · 7198 · 7146 · 7147 · 680901 · 7059
7158 · 7070 · 7160 · 7032 · 7134 · 7120 · 7161 · 7142
7060 · 7072 · 7026 · 7041 · 7056 · 7165 · 7164 · 7027
680909 · 7054 · 680907 · 680905 · 680901 · 7201 · 7042 · 7130
7149 · 7111 · 7125 · 7145 · 7066 · 7075 · 7163 · 7023
7013 · 7203 · 7129 · 680910 · 7143 · 7057 · 7167 · 7159
680906 · 680902 · 7028 · 680903 · 7126 · 7058 · 7132 · 7118
7019 · 7141 · 707A · 680904 · 7153 · 680908 · 7200 · 7117
7154 · 7052 · 7055 · 7199 · 7119 · 7165 · 7018 · 7045
7072 · 7114 · 7013 · 7028 · 7058
680902 · 7126 · 680908 · 7157 · 7059
7203 · 7027 · 7147 · 680906 · 680910
7167 · 7119 · 7060 · 7019 · 680909
7023 · 7057 · 680901 · 7129 · 7120
7198 · 7125 · 7164 · 680903 · 7143
7052 · 7075 · 7145 · 7026 · 7054
707A · 7127 · 7061 · 7117 · 7161
7130 · 7200 · 7132 · 7055 · 7026
7201 · 680904 · 7153 · 7056 · 7199 · 7032 · 680907 · 7117
7165 · 7160 · 7146 · 7154 · 7163 · 7141 · 7118 · 7019
7168 · 7006 · 7159 · 7070 · 7158 · 7018 · 7042 · 7160
680901 · 7149 · 7124 · 7045 · 680905 · 7134 · 7143 · 7058
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7165 · 7126 · 7055 · 7199 · 680907 · 7159
7142 · 680903 · 7158 · 7059 · 680902
7042 · 680910 · 680905 · 7145 · 7149
7159 · 7032 · 7134 · 7161 · 7127
7027 · 7143 · 7163 · 7198 · 7060
7056 · 7203 · 7132 · 7168 · 7045
7026 · 7037 · 7157 · 680906 · 7129 · 7018
7117 · 7013 · 7070 · 680909 · 7158 · 7054 · 7167
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7058 · 7147 · 7118 · 7023 · 680908 · 7124
680902 · 7057 · 680903 · 7200 · 7126 · 7018
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680907 · 7054 · 680909 · 680904 · 7200 · 7127
7163 · 7146 · 7066 · 7164 · 7013 · 7023
7060 · 7159 · 7154 · 7042 · 7143 · 680905
680901 · 7157 · 7055 · 7119 · 7199 · 7124
7153 · 680908 · 7129 · 680906 · 680910 · 7145
7147 · 7023 · 7198 · 7052 · 7026 · 680901
7146 · 707A · 7167 · 7125
7200 · 7149 · 7111 · 7114
680903 · 7120 · 7126 · 7160 · 680904 · 7058
7042 · 7056 · 7119 · 7019 · 7168 · 7132 · 7165
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7159 · 7027 · 7075 · 7167 · 7147 · 7154 · 7052 · 7203
7129 · 680910 · 7059 · 7045 · 680908 · 7054 · 7200 · 7161
7026 · 7201 · 680901 · 680907 · 7199 · 7130 · 7118 · 7070
7141 · 7072 · 7142 · 7134 · 7145 · 7125 · 7127
7032 · 7023 · 7028 · 7146 · 680901 · 7117 · 7163
7153 · 7124 · 680909 · 7164 · 680902 · 680906 · 680905
7157 · 7060 · 7057
7143 · 7199 · 7066
1 2 3 4 5 6 7 8 9 10 11 12 13
N
FS NC 1402-75-02
ENGLISH... OAK.
PROGENY TEST
TRAIL OF TEARS ST. FOR.

GENETIC RESOURCE EVALUATION

Study No.: CG-426 Species: Northern red oak

Date Established: 4/6/73 Date Evaluated: 3/5/94

Title: Genetic improvement of northern red oak

Location: "Winters Tract" planting near Elizabethtown, Illinois
Elizabethtown RD, Shawnee NF
S1/2NW, S12, T12S, R8E, Hardin County, Illinois

Experimental Design: Randomized block, 3 blocks, 2-tree plots, 26 families, 10 x 10 ft spacing, 2 border rows.

Monumentation: A solitary 4-foot wooden post marks the southeast corner of the planting.

Existing Fall Measurements:
Ht
DBH

Survival: About 20% of these trees survive.

Growth: Diameter varies from 4 to 8 inches and is evenly distributed within these bounds. Height ranges from 30 to 40 feet, with most of the trees 35 to 40 feet tall. Live crown ratios are 60%.

Stem Form: These oaks are straight but most have live limbs at a height of 8 feet or less.

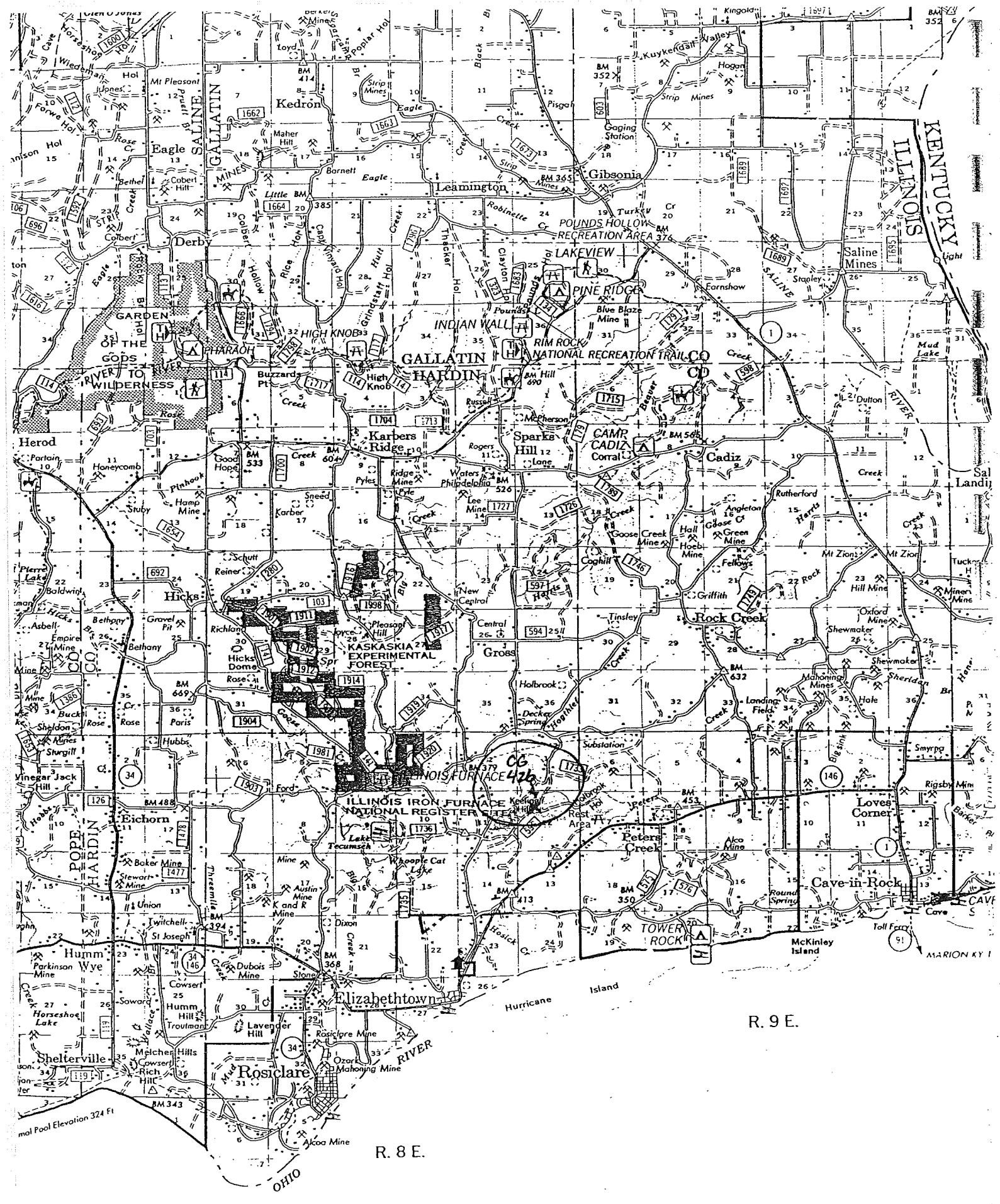
Damage: The surviving oaks seem healthy enough although vine growth is heavy in a few of them.

Competing Vegetation: White ash and black cherry saplings as large or larger than the oaks are common. Winged elm (*Ulmus alata*) is also common but remains small. Honeysuckle vines cover many trees in the area. A few autumn olive (*Eleagnus umbellata*) clumps can be found along the northern edge of the plantation.

Suggested Maintenance: Low survival and questionable identification of the seed sources present preclude maintenance of this plantation.

Other Comments: Autumn olive was interplanted 5 years after plantation establishment due to poor performance of the walnuts. Following 5 more years of poor growth, the study was closed.

Best access may be from the north down the woods road with a 4x4 vehicle. Coming in from the west, as I did, was a lengthy, albeit quite pleasant, hike.


KENTUCKY
ILLINOIS
GALLATIN
SALINE
HARDIN
POPE
Kedron
Eagle
Derby
Leamington
Gibsonia
Saline Mines
LAKEVIEW
PINE RIDGE
POUNDS HOLLOW RECREATION AREA
INDIAN WALL
RIM ROCK
NATIONAL RECREATION TRAIL
GARDEN OF THE GODS
RIVER TO RIVER WILDERNESS
PHARAOH
HIGH KNOB
GALLATIN HARDIN CO CD
CAMP CADIZ
Cadiz
Sparks Hill
Karbers Ridge
Herod
Hicks
Rock Creek
Gross
KASKASKIA EXPERIMENTAL FOREST
ILLINOIS IRON FURNACE
ILLINOIS IRON FURNACE NATIONAL REGISTER SITE
CG 426
Eichorn
Peters Creek
Loves Corner
Cave-in-Rock
TOWER ROCK
McKinley Island
Elizabethtown
Rosiclare
Shelterville
Humm
Lake Tecumseh
Whoopie Cat Lake
Hurricane Island
OHIO RIVER
MARION KY
R. 9 E.
R. 8 E.
T. 13 S.

GENETIC IMPROVEMENT OF NORTHERN RED OAK (T.V.A.)
Shawnee National Forest, Hardin Co., Illinois
S 1/2 NW 1/4 Sec. 12 T12S R8E (Winters tract)

Planted 6, 11 April 1973 by Rendleman, Spivey and Funk. Two-tree N-S plots; 10- x 10-foot spacing; two red oak border rows on all sides.

351° →
← Uphill

Block I		Block II		Block III	
1012	border	566	filler	~~border~~ 555	border
510	732	553	101	1913	2429
524	2423	2452	906	576	522
620	501	584	905	580	584
603	617	881	555	601	526
566	638	6662	627	896	631
2452	622	628	850	524	516
6662	540	513	897	501	579
2462	2418	571	895	571	568
576	505	519	876	707	591
637	718	883	894	2452	855
558	596	735	886	881	510
553	626	619	734	553	622
851	720	724	409	520	563
580	908	887	534	514	2418
623	2459	882	903	2472	2423
563	855	2422	203	894	638
721	605	878	597	587	586
2419	586	579	578	639	623
724	641	877	1012	558	541
639	520	884	2451	519	2419
571	2457	885	545	505	629
856	712	888	583	577	908
896	406	880	911	721	100
587	602	889	605	566	2427
579	583	586	577	635	708
907	734	913	601	895	720
898	913	576	707	570	712
600	631	635	2429	889	2457
519	884	541	721	906	573
601	500	100	907	534	406
635	902	530	732	597	735
883	556	2427	602	734	898
577	886	507	629	886	882
897	545	634	591	911	556
887	516	2411	708	907	640
541	877	2457	568	724	902
878	578	516	524	500	200
573	100	640	637	883	1012
910	703	514	570	6662	620
628	597	902	631	637	2459
2422	514	556	200	876	596
876	534	620	406	1164	856
888	885	712	500	628	540
911	894	2472	573	581	617
1164	526	2458	715	888	641
889	591	730	603	878	602
880	2429	581	567	887	910
200	629	914	520	877	732
850	522	515	2423	2462	718
567	2427	904	505	2458	851
507	881	527	2419	583	605
634	707	639	908	880	626
203	882	855	623	203	600
730	570	617	720	905	513
513	584	910	626	2411	619
619	515	718	641	101	530
627	904	563	596	904	2451
2472	101	580	851	850	914
555	2458	510	856	730	903
914	895	540	587	634	527
527	581	638	522	507	627
735	530	2418	526	897	578
568	2411	501	2459	545	567
905	903	600	896	885	884
906	2451	622	898	409	715
640	409	2462	558	2422	603