

Intermountain Forest Tree Nutrition Cooperative (IFTNC)

Klickitat Re-fertilization

Progress Report

Terry M. Shaw

James A. Moore

August 4, 1998

Summary

In the fall of 1990, the IFTNC established six fertilization study trials in the Klickitat area of south central Washington. Three IFTNC members were involved in the establishment of these study trails. Cooperative members include: Champion Timberlands, Longview Fibre and Washington Dept. of Natural Resources. The original fertilization trails were designed to study the effects of nitrogen (N) and potassium (K) fertilization on tree growth and survival. Tree fertilization response (basal area and cubic volume response over that of the controls) was monitored every two years and response results were summarized. Six-year results showed that periodic volume growth response for each two-year period since fertilization gradually decreased over time. However, significant responses were seen on individual sites by parent material types. Examination of the six-year results and re-evaluation of tree nutritional needs in this area prompted the cooperators to further investigate fertilization response in the Klickitat area with a re-fertilization of the existing 1990 installations.

Work Completed

In late April of 1998, the IFTNC re-fertilized the six 1990 Klickitat installations. Re-fertilization treatments included a N alone, N plus sulfur (S) and a mixed treatment consisting of N, S, boron (B) and copper (Cu). Height and diameter measurements were taken on all plot trees at the time of re-fertilization. The weather was warm (70's) and dry during fertilization. Soils were slightly moist to dry.

Time Table

Table 1.

YEAR	ACTIVITY
Spring/98	Re-fertilization and Tree Measurements
Fall/98	Foliage Collection/Chemical Analysis Foliar Response Analysis
Fall/99	2-Year Re-measurement (diameters only) Basal Area Response Analysis
Fall/01	4-Year Re-measurement (heights and diameters) Basal Area and Volume Response Analysis
Fall/03	6-Year Re-measurement (diameters only) Basal Area Response Analysis

Method and Design

The six study sites were established in October of 1990 and each site consists of six square 0.1 acre plots. The installations were located in predominately Douglas-fir species composition stands. The plots were grouped into three plots each, based on tree and site similarities and by treatment. Installation names, vegetation series, parent material types and ownership are shown in Table 2. Fertilization treatments for the original (F/1990) and the re-fertilization (S/1998) applications are listed in Table 3. Individual plot treatments are listed by installation and are in Appendix A. Nitrogen for the 1990 application was applied in the urea form and potassium in the murate of potash form. Nitrogen for the 1998 application was applied in the urea and ammonium sulfate form, sulfur in the ammonium sulfate and copper sulfate form, boron as boron FG and copper in the copper sulfate form.

Measurement of all live plot trees larger than 3 inches in diameter were tallied and are identified with tags or yellow paint. Diameters, total height and any incidence of damage or mortality is noted with probable cause at the time of measurement. Plots location maps are in Appendix B.

Table 2. Installation ownership and site characteristics for six Klickitat study sites I south central Washington.

Installation	Name	Ownership	Veg. Series	Rock Type (Basalt Flows)
307	Franz Creek	Champion	Grand fir	Wanapum
308	Harmon Spr.	Champion	Grand fir	Wanapum
309	B.Z. Corner	WA. DNR	Grand fir	Grand Ronde
310	Trout Lake	WA. DNR	W. Red Cedar	Landslide dep. Olivine basalt
311	Snowden	Longview Fibre	Grand fir	Wanapum
312	Appleton	Longview Fibre	Grand fir	Wanapum

Table 3. Six-plot treatment designs for the original (F/1990) and re-fertilization (S/1998) applications.

1990 Treatment (#s/ac.)	1998 Treatment (#s/ac.)
Control	Control
Control	200N
200N	200N + 100S
200N	200N + 100S + 10Cu + 5B
200N + 170K	200N + 100S
200N + 170K	200N + 100S + 10Cu + 5B

Appendix A

Klickitat Refertilization Project

Spring/1998

Treatments by Installation and Plot

INSTALLATION 307 (Franz Creek)

<u>Plot</u>	<u>Treatment (#s/ac.)</u>
1	200N + 100S
2	Control
3	200N + 100S
4	200N + 100S + 10Cu + 5B
5	200N + 100S + 10Cu + 5B
6	200N

Klickitat Refertilization Project

Spring/1998

Treatments by Installation and Plot

INSTALLATION 308 (Harmon Spr.)

<u>Plot</u>	<u>Treatment</u>
1	Control
2	200N + 100S
3	200N + 100S
4	200N + 100S + 10Cu + 5B
5	200N + 100S + 10Cu + 5B
6	200N

Klickitat Refertilization Project

Spring/1998

Treatments by Installation and Plot

INSTALLATION 309 (BZ Corner)

<u>Plot</u>	<u>Treatment</u>
1	200N + 100S
2	200N + 100S
3	200N
4	200N + 100S + 10Cu + 5B
5	Control
6	200N + 100S + 10Cu + 5B

Klickitat Refertilization Project

Spring/1998

Treatments by Installation and Plot

INSTALLATION 310 (Trout Lake)

<u>Plot</u>	<u>Treatment</u>
1	Control
2	200N + 100S
3	200N
4	200N + 100S + 10Cu + 5B
5	200N + 100S + 10Cu + 5B
6	200N + 100S

Klickitat Refertilization Project

Spring/1998

Treatments by Installation and Plot

INSTALLATION 311 (Snowden)

<u>Plot</u>	<u>Treatment</u>
1	200N + 100S
2	200N + 100S
3	200N
4	Control
5	200N + 100S + 10Cu + 5B
6	200N + 100S + 10Cu + 5B

Klickitat Refertilization Project

Spring/1998

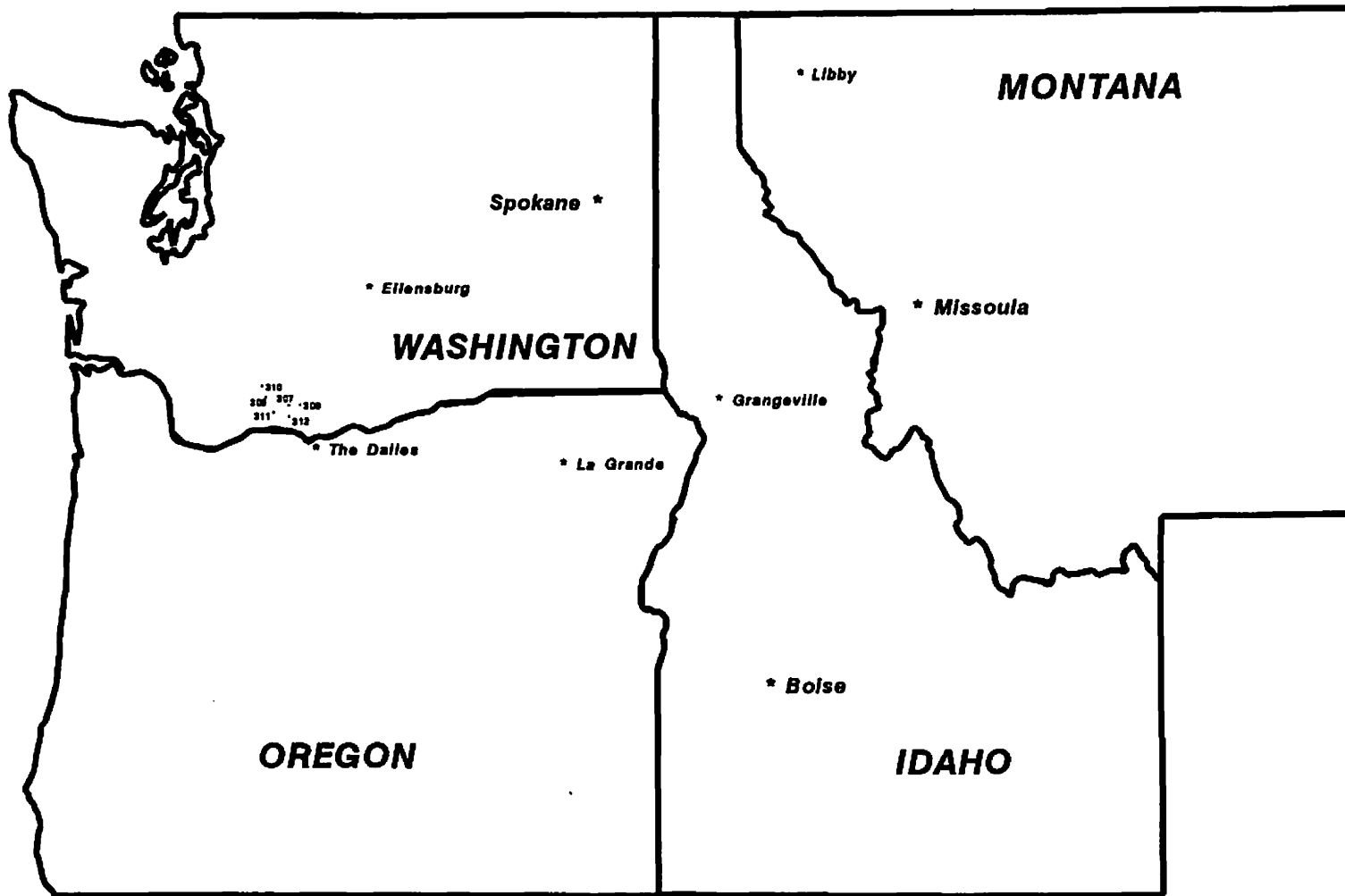
Treatments by Installation and Plot

INSTALLATION 312 (Appleton)

<u>Plot</u>	<u>Treatment</u>
1	200N + 100S
2	200N + 100S
3	200N
4	Control
5	200N + 100S + 10Cu + 5B
6	200N + 100S + 10Cu + 5B

Appendix B

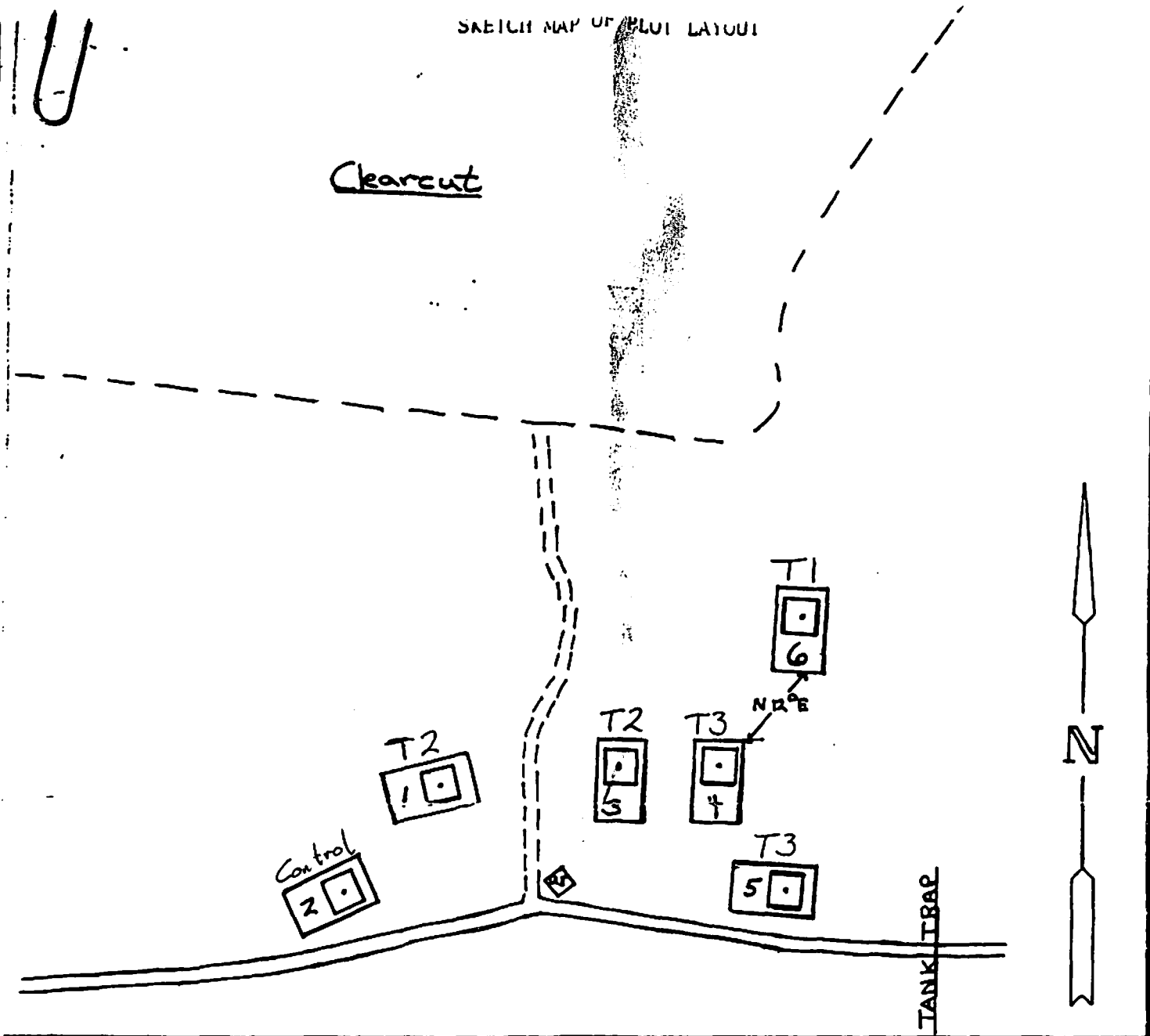
INTERMOUNTAIN FOREST TREE NUTRITION COOPERATIVE



DF Klickitat Study Site

11 U
SKETCH MAP OF PLOT LAYOUT

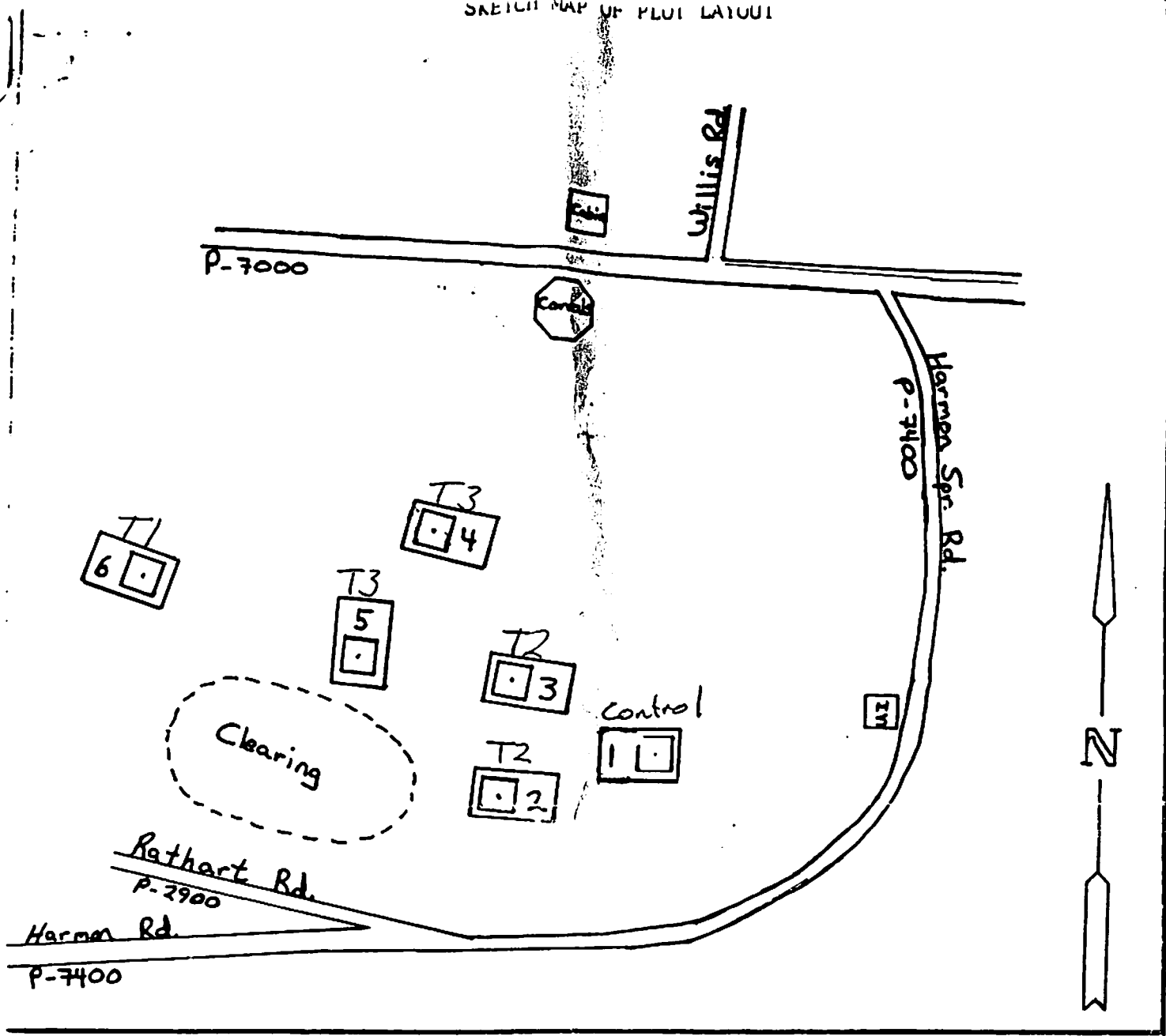
Clearcut



REMARKS Installation 307 Franz Creek N 1/2, SE 1/4, Sec. 11, T5N, R12E

Directions: From the Shade Tree Restaurant in Glenwood, WA go south on BZ-Glenwood Hwy for 4.7 mi. Turn left at BZ-Appleton corner onto Lakeside rd. Go 1.4 mi. and turn right on Fisher Hill rd. After 0.1 mi. turn right again and continue for 3.3 mi. Turn right across from cattle shoot onto gated dirt road. Follow road to where it is blocked with a hugh tank trap. Continue on foot approx. 0.15 mi. to plot area on right hand side of road.

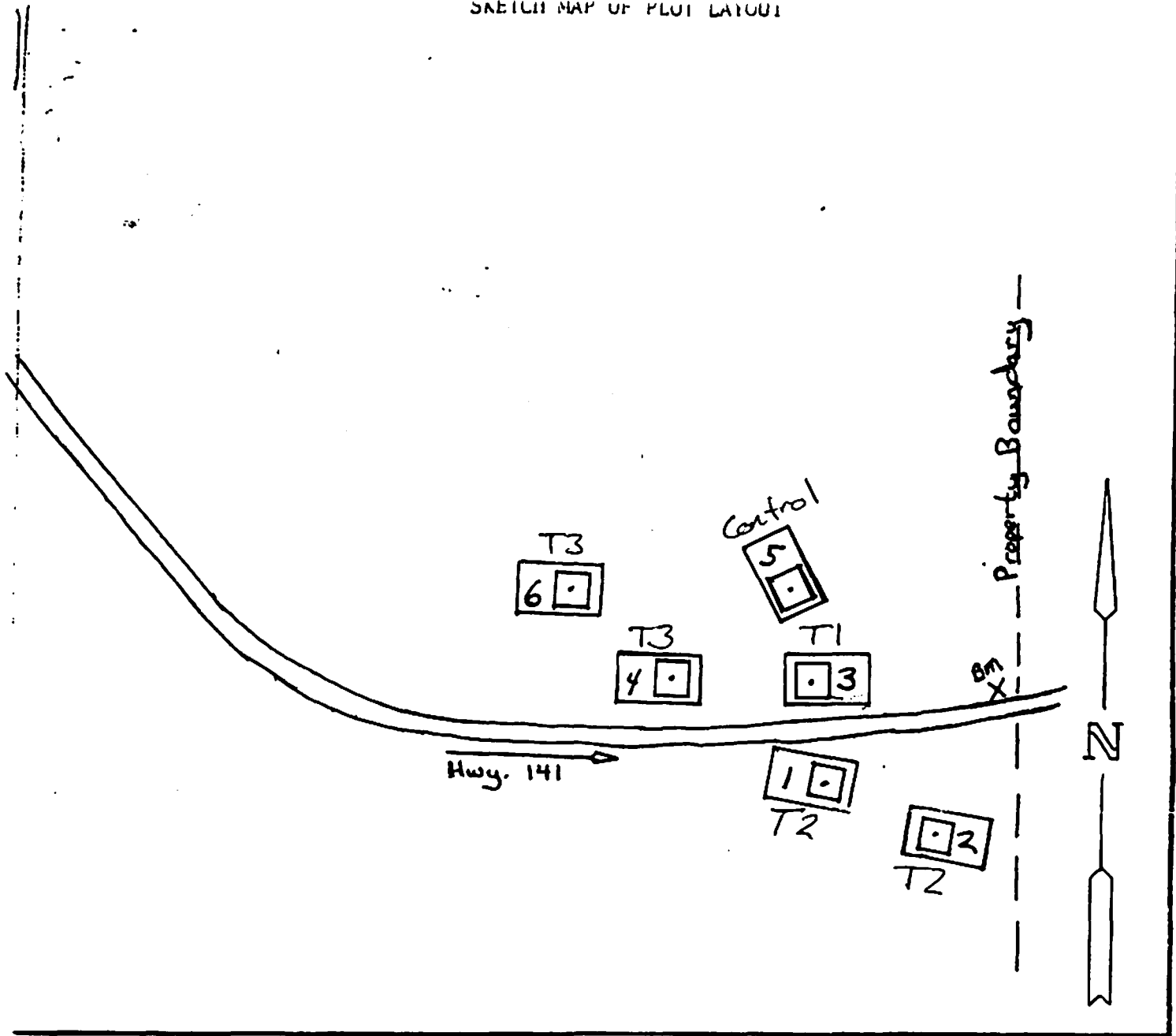
SKETCH MAP OF PLOT LAYOUT



REMARKS Installation 308 Harmon Springs NW corner, Sec. 20, T5N, R13E

Directions: From Shade Tree Restaurant in Glenwood, WA go south on BZ-Glenwood Hwy for 4.7 mi. Turn left at BZ-Appleton corner onto Lakeside road. Go 1.4 mi. and turn right on Fisher Hill road. After 0.1 mi. turn right again and continue for 3.5 mi. Turn left across cattle guard and continue for 3.4 mi. past riders cabin and Willis Canyon road. Turn right on road that reads water hole (Harmon Spr. rd.) Continue uphill for 0.2 mi. to plot area on right hand side of road.

SKETCH MAP OF PLOT LAYOUT

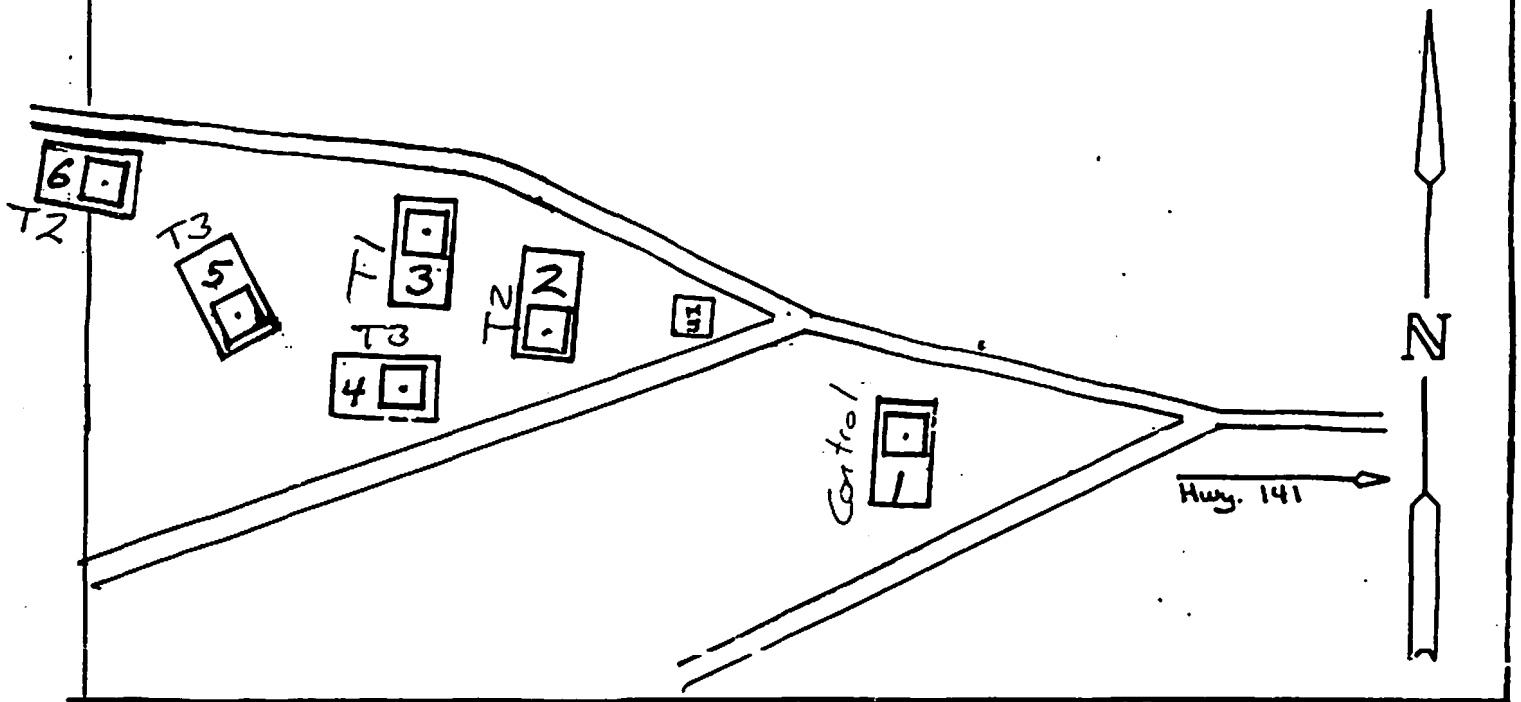


REMARKS Installation 309 BZ Corner, Sec. 34, T5N, R10E

Directions: From BZ Corner Marker go north on Hwy. 141 for 2.1 mi. Turn left on forest road and continue uphill for 0.7 mi. to plot area on both sides of road.

Comments: Plot 6 is only partially in the thinned area. Also, the 40' buffer in plot 6 has mature douglas-fir as part of the plot composition.

Sketch Plot Map



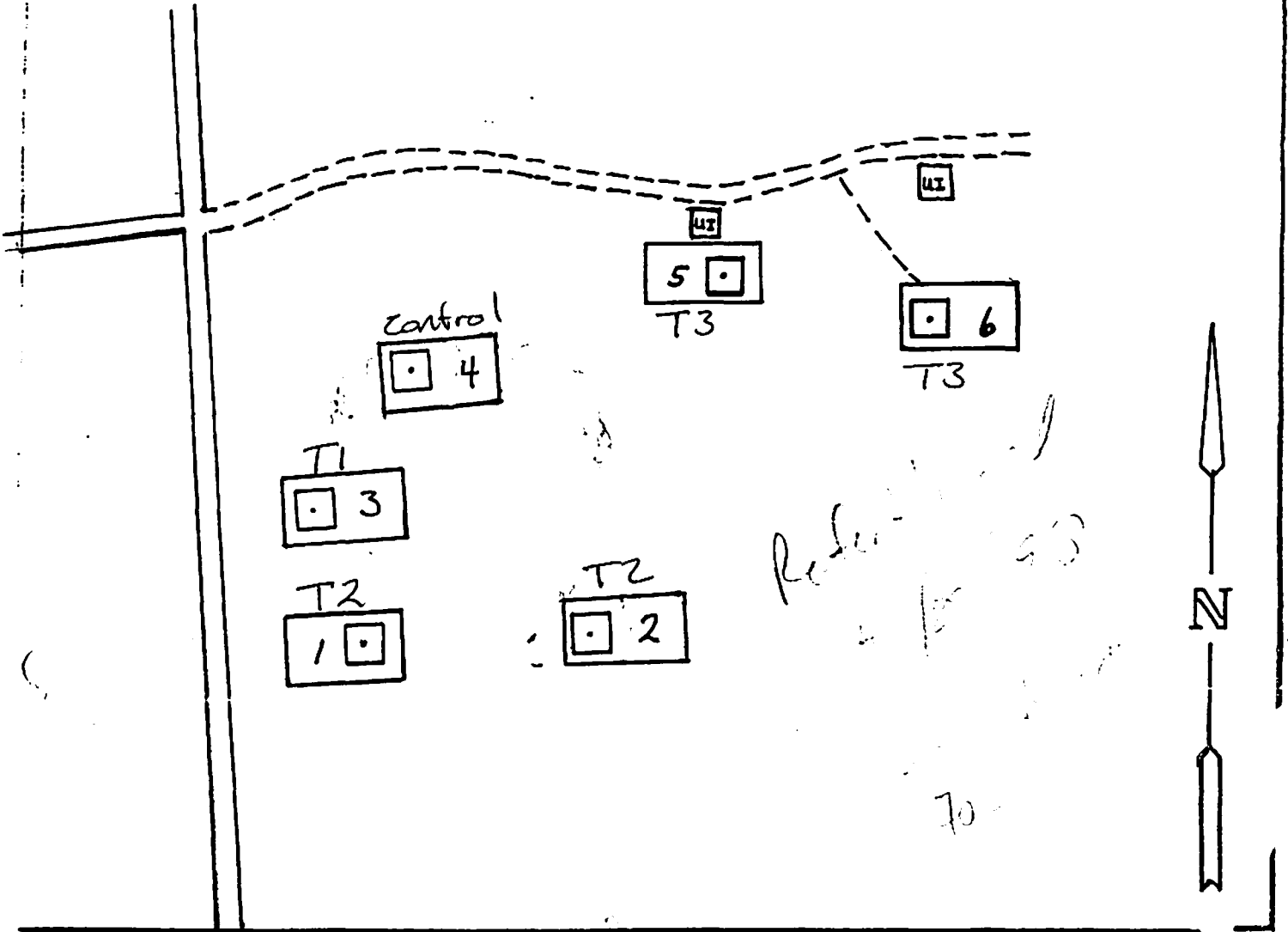
Intermountain Forest Tree Nutrition Coop
Installation Description

INSTALLATION: 310 NAME: Trout Lake LEGAL: T6N, R10E, Sec. 35

DIRECTIONS: From BZ Corner, WA start at grocery store and go north on Hwy. 141 for 8.5 mi. Turn left on road across from electrical station. Continue for 0.35 mi. to fork in road. Turn right at fork and proceed 0.1 mi. to a second fork and plot area (see map).

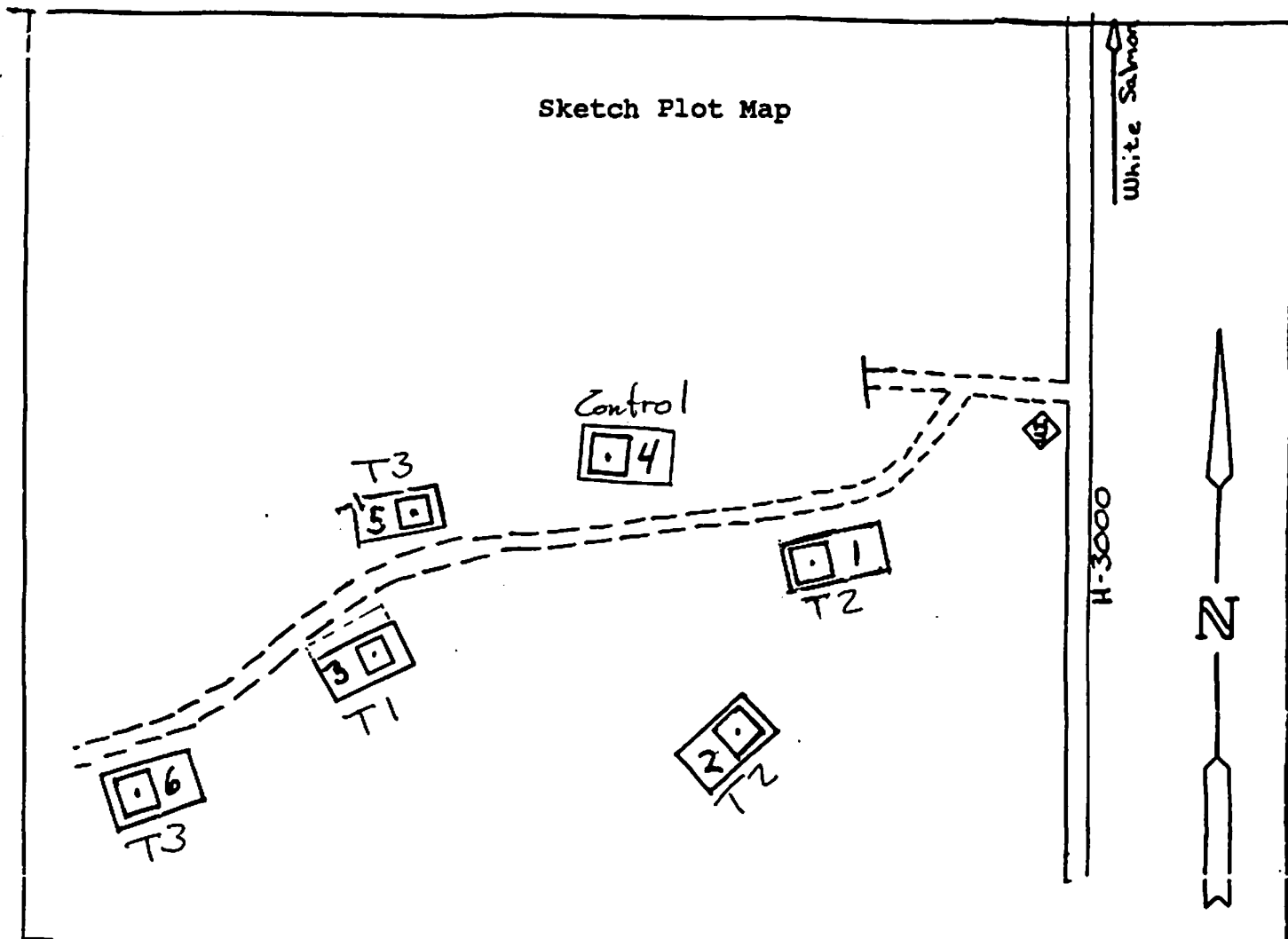
COMMENTS: Plot six boundaries were slightly moved, after establishment, to gain proper stocking. Consequently, the tree number sequence has been disrupted.

SKETCH MAP OF PLOT LAYOUT



REMARKS Installation: 311 Snowden, Sec. 8, T4N, R12E

Directions: In White Salmon, WA turn right (north) onto Main Street and continue for 0.85 mi. Turn right on Snowden road (H-1000) and continue for 15.8 mi. Note: Pavement ends after 12.5 mi. Turn left on H-1 dirt road and continue straight for 0.3 mi. Turn right and continue for 0.6 mi. to plot area on right side of road.



Intermountain Forest Tree Nutrition Coop
Installation Description

INSTALLATION: 312 NAME: Appleton LEGAL: T4N, R12E, Sec. 14

DIRECTIONS: In White Salmon, WA turn right (north) onto Main Street and continue for 0.85 mi. then turn right on Snowden road (H-1000) and continue for 20.5 mi. to T-intersection with H-3000 (ie. - approx. 8 mi. from end of pavement on the H-1000). Turn right onto the H-3000 and continue for 2.0 mi. then turn right onto indistinct forest road and continue for only 0.1 mi. then take left fork for 0.1 miles and plot area.

COMMENTS: Plot six was located on SDS Lumber Company Lands (Frank Baccus, Bingen, WA, 509-493-2155). In addition, the boundaries on plot six were slightly relocated, after establishment, to gain proper stocking. Consequently, the tree number sequence has been disrupted.