

STATE OF CALIFORNIA
DEPARTMENT OF FORESTRY

(FOR ADMINISTRATIVE USE ONLY)

(NO. 1-96NTMP-015 NAP

(DATE REC'D. JUN 26 1996 JUL 05 1996

(DATE FILED JUL 12 1996

(DATE APPR'VD. OCT 09 1996

NON-INDUSTRIAL TIMBER MANAGEMENT PLAN (NTMP)

I. Timberland Owner(s) Name: Pacific Union College *Am 15*
Address: 205 Highland Oaks
City: Angwin State: CA Zip: 94508 Phone: (707) 965-7150

*Randall & Lori Lee Dunn
P.O. Box 886
Angwin, CA 94508*

II. Timber Owner(s) Same

III. Registered Professional Forester Name: James W. Harvey
Address: Box 824 Registration Number: 2121
City: Lakeport State: CA Zip: 95453 Phone: (707) 263-0850

IV. Timber operations will be conducted within the Northern Forest District.

V. Location of the NTMP by legal description:
Base Meridian: Mount Diablo

The NTMP area consists of approximately 1351 acres in the La Jota land grant in Napa County (see NTMP Map). If Public Land survey descriptions were projected onto the area, the following approximate legal descriptions from the Mount Diablo Meridian would be used for the plan area.

	<u>Section</u>	<u>Township</u>	<u>Range</u>
Portions of	32,33, & 34	9N	5W
Portions of	3,4,5,6,7,8, &10	8N	5W

General Area Location: The NTMP area includes the forested portions of the Pacific Union College campus in and around Angwin, CA (see General Location Map). The plan area is generally south and west of Pope Valley and north and east of the Napa Valley approximately seven miles northeast of Saint Helena. This places the plan area on Howell Mountain, a broad flat ridge top that runs northwest to southeast.

Quad Maps: Saint Helena

Received CDF
REGION 1

JUL 05 1996

RESOURCE MANAGEMENT

AMENDMENTS TONTMP

	AM #1	AM #2	AM #3	AM #4	AM #5	AM #6	AM #7	AM #8	AM #9	AM #10
Date Received	5/31/00	8/6/01	7/26/02	7/30/03	6/24/04	10/13/04	8/22/07	9/6/13	9/16/13	
Date Processed		8/8/01	7/6/01	8/4/03	7/27/04	10/18/04	8/22/07	9/10/13	9/18/13	
Major/Minor	MINOR	MINOR	minor	minor	minor	minor	minor	Minor	minor	
Computer Entry (Your Initials)		(M)	(K)	ARM BR	R	N	gm	NTB	YJ	

The following information is submitted to assist the reviewer in finding compliance with CCR section 1090.5 Contents of NTMP.

Barkley's Section	Rules Book Section	Location in Report
1090.5(a)	1090.5(a)	Section I
1090.5(b)	1090.5(b)	Not Applicable
1090.5(c)	1090.5(c)	Section III
1090.5(d)	1090.5(d)	Section V
1090.5(e)	1090.5(e)	Section IV
1090.5(f)	1090.5(f)	Section VI, G and Section XVI
1090.5(g)	1090.5(g)	Section VI, A, B, C, D, E, F and Section XIV
1090.5(h)	1090.5(h)	Section VII
1090.5(i)	1090.5(i)	Section VIII
1090.5(j)	1090.5(j)	Section VII and Section VIII
1090.5(k)	1090.5(k)	Section IX and Appendix
1090.5(m)	1090.5(l)	Section XV
1090.5(n)	1090.5(m)	Section XV
1090.5(o)	1090.5(n)	Section X, Appendix, and Section XVI
1090.5(p)	1090.5(o)	Section XI, Appendix, and Section XVI
1090.5(q)	1090.5(p)	Section XII, Appendix, and Section XVI
1090.5(r)	1090.5(q)	Section XIII
1090.5(s)	1090.5(r)	Section VIII, B, 5 and Section XIV
1090.5(t)	1090.5(s)	Section VI and Section XIII
1090.5(u)	1090.5(t)	Section XIV
1090.5(v)	1090.5(u)	Section XVI
1090.5(w)	1090.5(v)	Appendix
1090.5(x)1	1090.5(w)1	page 6 and pages 14, 16, 18, 20, and 22
2	2	pages 14, 16, 18, 20, and 22
3	3	Not Applicable
4	4	page 38
5	5	Not Applicable
6	6	Not Applicable
7	7	page 34
8	8	Not Applicable
9	9	page 34
10	10	Not Applicable
11	11	Not Applicable
12	12	page 11
13	13	Not Applicable
14	14	page 36
1090.5(y)	1090.5(x)	Not Applicable

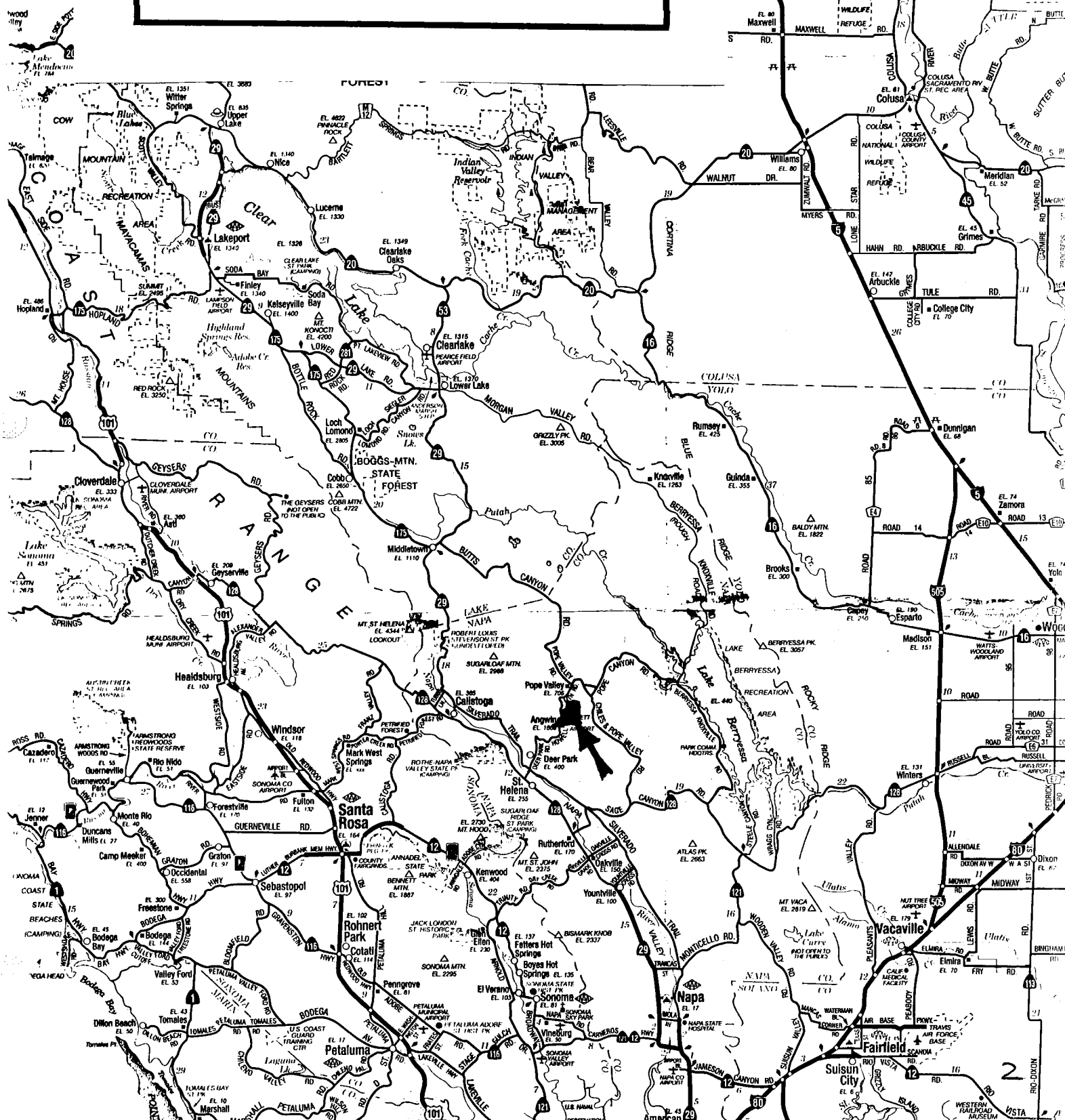
Received CDF
REGION 1

JUN 26 1996

RESOURCE MANAGEMENT

Barkley's Section	Rule Book Section	Location in Report
1090.5(z)	1090.5(y)	Not Applicable
1090.5(aa)	1090.5(z)	Not Applicable
1090.5(bb)	1090.5(aa)	Section XIII
1090.5(cc)	1090.5(bb)	Not Applicable
1090.5(dd)	1090.5(cc)	Not Applicable
1090.5(ee)	1090.5(dd)	Not Applicable
1090.5(ff)	1090.5(ee)	Not Applicable
1090.5(gg)	1090.5(ff)	Not Applicable
1090.5(hh)	1090.5(gg)	Not Applicable
1090.5(ii)	1090.5(hh)	Not Applicable
	1090.5(ii)	Not Applicable
	1090.5(jj)	Not Applicable
1090.5(jj)		Section XV

NTMP AREA



VI. DESCRIPTION OF THE PLAN AREA

The plan area is divided into five management units due to different management objectives for the various portions of the property (see Management Unit Map). For the sake of clarity and to avoid unnecessary duplication, characteristics that all the management units hold in common are discussed for the plan area as a whole. Those characteristics that are unique to the individual management units are discussed by management unit.

A. Stand Management History

The forests in the NTMP area have been managed for yields of forest products intermittently since the 1880's. In the late 1800's, George Yount operated a sawmill on the property. After the property was acquired by the Pacific Union College, the forested area was used to produce firewood and lumber for the College. Many of the original campus buildings were constructed of lumber harvested and milled on the site. After the College was operating (approximately 1915-1931), large quantities of wood were harvested to provide fuel for heating and running wood fired boilers for the College.

In 1931, a large wildfire burned from Pope Valley onto the property. This fire had substantial impacts to the majority of the forest and reportedly destroyed large quantities of stacked firewood waiting for transportation and use. Observation of stumps indicates that some salvage logging was done after the fire. In addition to the salvage work, the fire greatly influenced the current stand characteristics. Overall, the plan area is stocked at a level that is less than desirable. A significant portion of the plan area is dominated by sprouting hardwoods and brush which grew aggressively on the area following logging of conifers and the wildfire.

Salvage logging of isolated trees and removal of firewood continued until the early 1970's. A management plan prepared by George Johnson, RPF # 1786 advocated removal of regular amounts of hardwood for use as firewood. Some areas have had tanoak and madrone removed for this use. Removal of living hardwoods has resulted in increased growth and health of conifers in some areas of the property. Quantities varied from several hundred cords per year early in the program to approximately 50-100 cords now. The current firewood program barely removes the quantity of material generated by cleanup of hazard tree removal and the mortality that occurs adjacent to facilities and on roads.

Some small areas of planting and precommercial thinning have been accomplished. More areas exist where these activities could be implemented.

PACIFIC UNION COLLEGE
NTMP

SCALE
1"=2000'

N



T.9N.
T.8N.

Howell Mountain
Sch

Angwin

Martin
Spring

Bradley Road
Valley
Observatory

Newton
Observatory
Water
Tank

Pacific Union
College
BM 1666

Athletic Field

Sewage
Disposal

Sanjuelo
Mtn

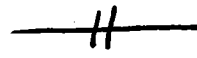
Four Corners
BM 1712

R.5W

PACIFIC UNION COLLEGE
NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

PLAN AREA MAP

PLANNING AREA
BOUNDARY



Recre
Flat

LAS POSADAS

Morris
Cem

Spring

B. Potential Pest or Protection Problems

1) Insects and Disease

The forest at Pacific Union College is free of epidemic levels of insects and diseases. Endemic levels of bark beetles occur in the ponderosa pine and small amounts of dwarf mistletoe exist. A small pocket of what appears to be black stain root rot occurs in the area south of Mill Valley.

2) Fire Protection

Enhancing fire protection is one of the primary objectives of the landowner. The area has been subjected to catastrophic wildfire events in the past, and the increase of residential and other public use has increased the probability of fire ignition. Fire suppression is greatly complicated by the urban interface situation that exists in and around the project area. In a large fire situation in this area, resources that could be used to halt the spread of a fire will likely be needed for structure protection, making control of fire perimeter more difficult.

The California Department of Forestry and Fire Protection is currently working cooperatively with the landowner to provide more defensible space around facilities and residential structures. A Vegetation Management Plan is currently being prepared so the landowner and the fire suppression agencies can work cooperatively to reduce wildland fire risk on the property. It is the intent of this plan to provide an opportunity to use forestry practices to contribute to increasing fire safety of the property and the campus facilities.

The activities and road sections of this report discuss planned items that will enhance fire protection. Thinning, harvesting, underburning, slash treatment, road improvement, and water developments are designed to reduce fire hazard and increase effectiveness and safety of fire control efforts.

C. Description of soils, slope, exposure, elevation

Soil information was gathered from on-site observations and from the Soil Conservation Service Soil Survey of Napa County (see Soil Map). The soils are generally derived from volcanic parent material and are grouped in mapping units that include slope characteristics.

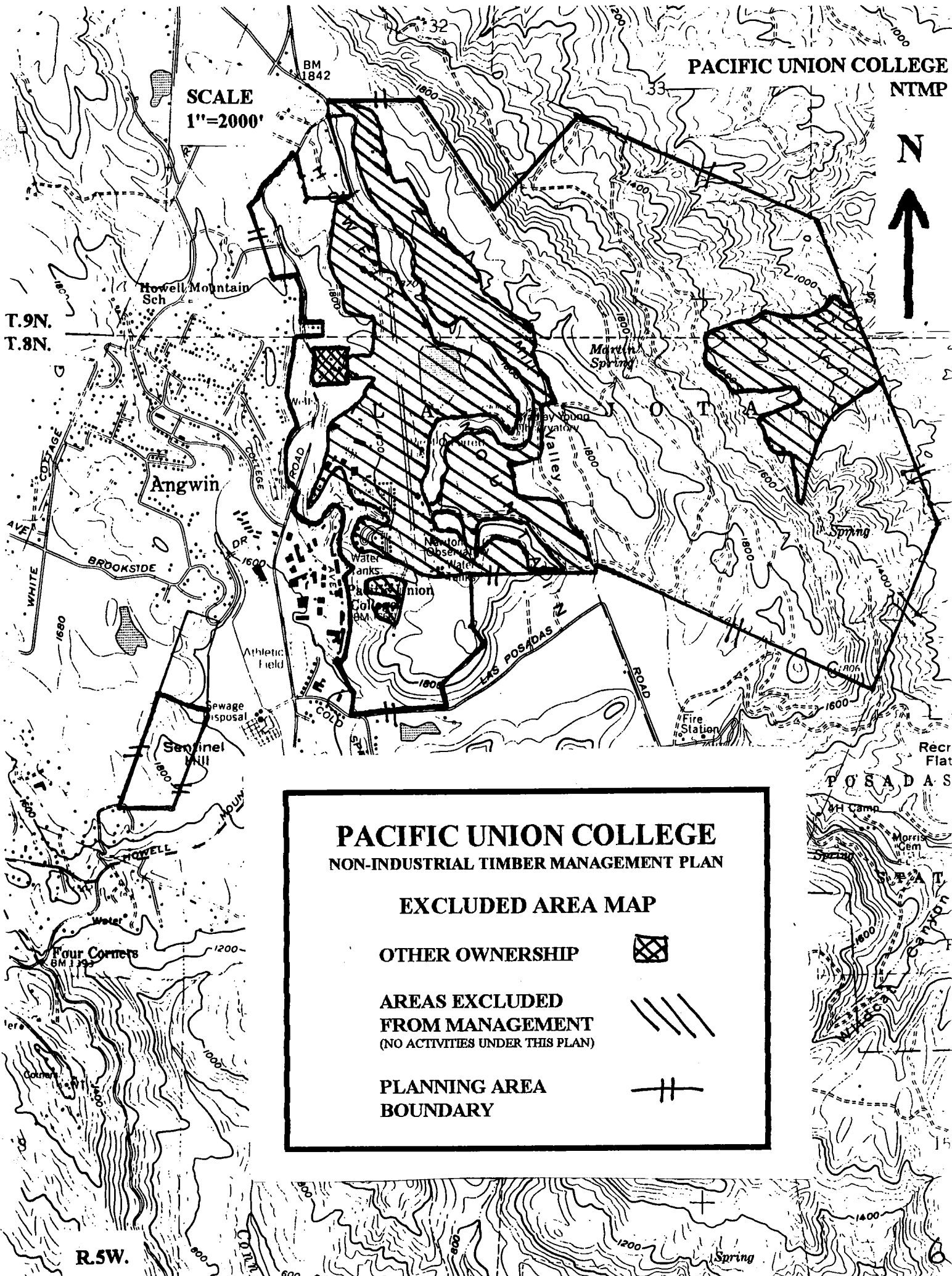
Slopes vary greatly over the plan area. Most of the area is less than 30% slope with aspects varying from flat to both northeast and southwest. Some short pitches of slopes up to 65% are found east of the main ridge that runs from Redwood Flat to the 4-H camp in Las Posadas Forest. The steep slopes are generally found in a band that runs along at approximately 1,550 feet elevation. Benches and flats exist adjacent to and within this band of steep slopes, providing access for ground-based skidding systems.

PACIFIC UNION COLLEGE NTMP

SCALE
1"=2000'



T.9N.
T.8N.



PACIFIC UNION COLLEGE NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

EXCLUDED AREA MAP

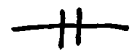
OTHER OWNERSHIP



AREAS EXCLUDED
FROM MANAGEMENT
(NO ACTIVITIES UNDER THIS PLAN)



PLANNING AREA
BOUNDARY



R.5W.

All exposures exist on the property. Howell Mountain is a broad, flat ridge that trends from the northwest to the southeast. Therefore, in addition to the flat slopes present on the ridgetops, most aspects are either southwest or northeast.

The property elevation ranges from below 800 feet to over 1,900 feet. In general elevations below 1,200 feet do not support commercial conifer growth in this arid region of California, so much of the lowest portion of the property was excluded from the NTMP.

D. Description of existing and proposed road system

The existing road system is a relic from previous harvest efforts. Currently many of the roads are utilized as mountain bike trails. In addition to old roads, new bike trails have been constructed and are in use throughout the property by hikers, mountain bikers, and horseback riders. The trail system is to remain in use and forestry activities will be planned to minimize impacts to these recreation uses of the area.

Roads in the area are generally well placed to serve the forested area of the property (see Road System Map). Some small sections of new construction will be undertaken at some time in the future, primarily to bypass steep sections of the existing road system. Some of this relocation will be specifically targeted at areas of the current road system that are contributing unnecessary sediment to watercourses. Relocation of these segments of the roads, combined with installation of drainage features to keep water from concentrating on road surfaces, will reduce erosion and sedimentation.

Perennial springs in the area north of Martin Springs will require improvement of current crossing structures at three sites to improve access and reduce road impacts on downstream values. Several areas in the existing road system need to be reconstructed to lower the road surface to create rolling dips at intermittent stream crossings to prevent water from running down the road surface. In general, much of the road system needs to be outsloped to encourage dispersal of surface runoff during storm events.

Improvement of the road system will allow better access for emergency traffic, particularly for fire protection. Current management of the lower part of the property (management unit 5) will be through long skids to avoid road construction until stocking levels can support permanent road development. Location of new road construction in management unit 5 will be evaluated, as needed, in amendments to this plan.

E. Description of Site Index and Potential

In his "Management Plan for Pacific Union College", May 15, 1985, George Johnson (RPF #1786) estimated that the property contained site class III through management units 1-4 and site classes III and V in management unit 5.

On-site measurements performed during the cruise for this management plan confirmed the site classifications of Johnson. Site index measurements in management units 1-4 ranged from 130-150, averaging 140 (100 year base). This is equal to a site class III (Dunning). Site index measurements for management unit 5 were more variable. Index measurements ranged from 140 to as low as 90. The majority of the area is site index 130 (site class III). Some small areas of class IV are shown on the site classification map. The majority of the area Johnson classed as V is excluded from the plan area as non-commercial. These site index estimates conform with site indices presented in the reference material on soil (see Appendix "I").

F. Description of Timberstand Characteristics

The current forest consists of a mixed Douglas-fir (71%), redwood (12%), ponderosa pine (17%) forest type with substantial amounts of tanoak, madrone, and black oak. Basal Areas of conifers average approximately 70 square feet per acre over the property with a range of 0 to 249 square feet. Hardwood stocking averages approximately 65 square feet with a range of 0 to 256 square feet. Total stocking ranges from 0 to over 450 square feet. Approximately 25% of the area is inadequately stocked with commercial conifers, primarily due to high levels of hardwoods. The following stand table and graph illustrate the size distribution and basal area distribution present on the property.

STAND TABLE

NUMBER OF TREES PER ACRE

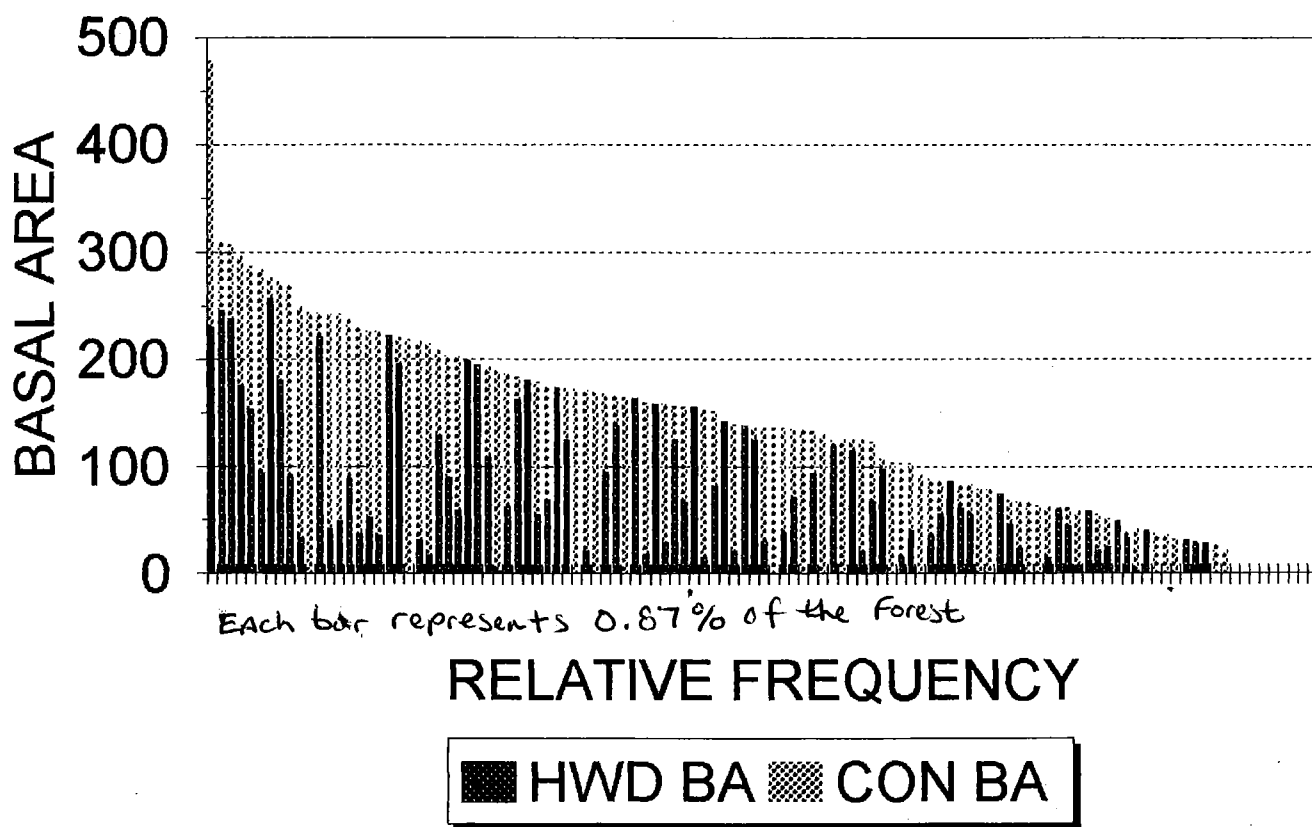
DBH	CONIF TOTAL	HARDWOOD TOTAL
<1	299	N/A
2	24.77	2.47
4	15.92	52.21
6	20.35	54.86
8	15.04	29.20
10	3.00	30.08
12	4.51	7.34
14	2.38	4.24
16	2.65	3.89
18	2.56	1.76
20	1.50	1.06
22	1.23	0.53
24	1.15	0.35
26	1.15	0.17
28	1.15	0.17
30	0.44	0.08
32	0.35	0
34	0.26	0.08
36	0.17	
38	0.08	
40	0.08	
42	0.17	
44	0.08	
46	0.08	

Current volume is estimated to be 8,263 board feet per acre for the property as a whole. Volumes were calculated from raw cruise data and use of a volume table from Boggs Mountain State Forest. This volume table was expected to fairly represent interior forests of this region. To confirm the volumes from this source, they were cross checked on a subsample of trees with volume tables in the California Forestry Handbook. The volumes used were found to be approximately 17% low (the actual volume of the property could be higher). No cull was deducted, therefore, the volume estimate is actually accounting for approximately 17% cull. This figure is quite reasonable for this type of stand in the interior coast ranges.

Growth was determined by calculating growth rate percent on a subsample of the trees in the cruise. Growth measurements taken during the inventory for this plan indicate a growth rate of approximately 2.3% on an average volume of 8,263 board feet per acre. This results in a current conifer growth rate of 168 board feet per acre per year. This rate is fairly similar to the rate estimated by Johnson of 2.5%. However, Johnson estimated the

CUMULATIVE BASAL AREA

By Species Group



PACIFIC UNION COLLEGE
NTMP

SCALE
1"=2000'



T.9N.
T.8N.

Howell Mountain
Sch

Angwin

BROOKSIDE

Athletic field

Sewage disposal

Sentinel Hill

HOWELL

Four Corners
BM 1792

R.5W.

BM
1842

32

33

1800

1870

1800

1800

1800

1800

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Martin Spring

Bradley Wood

Valley

Newton Observatory

Water Tanks

Pacific Union College

BM 1650

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Rec
Fla

LAS POSADAS

BM Camp

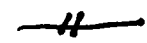
PACIFIC UNION COLLEGE
NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

SITE CLASS MAP

SITE CLASS

IV

PROJECT AREA



average volume to be only 2000 board feet per acre or a growth rate of approximately 50 board feet per acre per year. Yield tables (Schumacher, Douglas-fir) for this site indicate that a growth rate of approximately 340 board feet per acre per year is attainable. This level of productivity is estimated using a 100 year rotation and reductions for roads, trails and retaining approximately 35 square feet of hardwoods.

Ages of trees on the property are variable. Some older trees fall into the smaller size classes while many mid- and large-size class trees are relatively young. Trees in the 34"+ DBH class are generally 120+ years old. These trees are survivors of the wildfire that occurred in 1931. Trees in the 10-30" size class are generally about 60 years old reflecting the pulse of regeneration that established after the wildfire. Smaller trees vary widely with 10" trees anywhere from 40 to 60 years of age. Saplings in the 1-4" classes range from 10-25 years of age. Several isolated, residual old growth trees are found on the property including an old-growth redwood estimated to be 440 years old.

Conifer stocking levels varied between management units. Units 1,2,3, and 4 are similar, with basal area stocking averaging approximately 78 square feet per acre. management unit 5 averages only about 20 square feet per acre. Since only salvage and sanitation harvesting is planned in Unit 5 until stocking levels improve, this low basal area should not be inconsistent with the Forest Practice Rules.

G. Description of Land Uses Other Than Timber Production

The primary use of the property is for an educational institution. A portion of the property is developed into college classrooms, dormitories, chapel, shopping center and associated support facilities. A preschool, a secondary school and individual family dwellings also exist on the property. Much of the heavily developed area of the campus is not forested and is excluded from the NTMP area.

Some of the property is used for agricultural production. Grazing lands, hayfields and associated support buildings exist. These areas are generally excluded from the NTMP as the objective for these areas is not for forest production, and they are not forested currently.

An airport is operated on the property. This area is excluded from the NTMP area.

The forested area of the property is used for outdoor recreational activities including camping, mountain biking, hiking, horseback riding and educational field exercises. These activities will continue and are compatible with the activities planned under the NTMP.

VII. MANAGEMENT OBJECTIVES

General management objectives for all management units include:

Reduce fire hazard both adjacent to facilities and throughout the forest
Maintain pleasing, safe surroundings for college facilities and recreation uses
Continued periodic yields of forest products including sawtimber and fuelwood
Increased forest health measured by reduced need for salvage and hazard tree removal operations
Maintain or increase growth of high quality commercial forest trees
Reserve and protect individual character trees regardless of size
Manage forest to achieve an uneven-aged character
Maintain diverse habitat for wildlife species that currently inhabit the parcel

A. MANAGEMENT UNIT NUMBER 1

ESTIMATED ACREAGE: 150

LOCATION: Adjacent to Howell Mountain Road and adjacent to the developed portion of the campus.

PRIMARY OBJECTIVES:

- 1) Reduce the risk from hazard trees in areas of concentrated use, near roads, and near facilities.
- 2) Enhance the "protectability" of facilities from wildland fires.
- 3) Increase forest and individual tree health.

SECONDARY OBJECTIVES:

- 1) Maintain aesthetic values.
- 2) Provide periodic yields of forest products.

SILVICULTURAL SYSTEM: Uneven-aged management through individual tree selection.

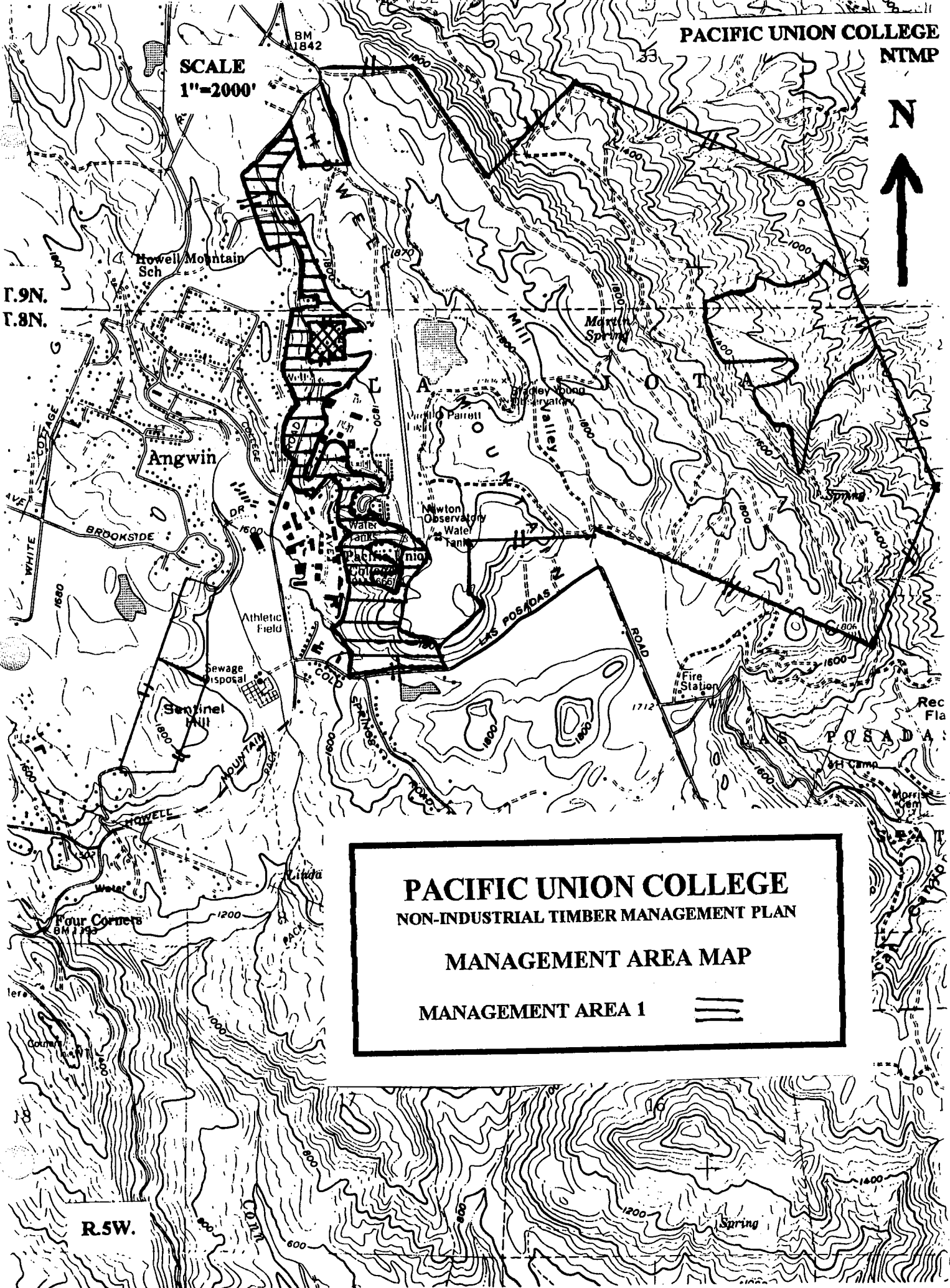
SUMMARY: Remove dead, dying and diseased trees as they occur to protect facilities and reduce potential for damage and injury. Thin trees so they have adequate growing space to keep individual trees healthy and so fire spread is not rapid. Reduce fuel ladder effects by thinning understory trees and disposing of slash.

SCALE
1"=2000'

N



T.9N.
T.8N.



PACIFIC UNION COLLEGE
NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

MANAGEMENT AREA MAP

MANAGEMENT AREA 1



R.5W.

B. MANAGEMENT UNIT NUMBER 2

ESTIMATED ACREAGE: 21

LOCATION: Spotted owl roosting areas. Adjacent to Redwood Flat and south of Inspiration Point.

PRIMARY OBJECTIVES:

- 1) Maintain and enhance spotted owl roosting and nesting habitat characteristics.
- 2) Enhance the resiliency of these areas to withstand disturbance events such as fires and windstorms.

SECONDARY OBJECTIVES:

- 1) Maintain aesthetic quality.
- 2) Maintain and increase forest and individual tree health.

SILVICULTURAL SYSTEM: Uneven-aged management achieved through application of individual tree selection.

SUMMARY: Any logging done in these areas will be aimed toward increasing the suitability of the area for spotted owl nesting or to help make the area more stable in the event of fires, windstorms, etc. The objective will be to create a forest dominated by large trees with sufficient layering of forest levels to promote spotted owl use.

PACIFIC UNION COLLEGE

NTM

SCALE
1"=2000'

N



T.9N.
T.8N.

Howell Mountain
Sch

Angwin

BROOKSIDE

Sentinel
Hill

Four Corners
BM 1395

R.5W.

PACIFIC UNION COLLEGE
NON-INDUSTRIAL TIMBER MANAGEMENT PLAN
MANAGEMENT AREA MAP
MANAGEMENT AREA 2

||||

C. MANAGEMENT UNIT NUMBER 3

ESTIMATED ACREAGE: 10

LOCATION: The area immediately adjacent to the Redwood Flat and Inspiration Point.

PRIMARY OBJECTIVES:

- 1) Maintain aesthetic quality.
- 2) Enhance the "protectability" of the areas from fire.

SECONDARY OBJECTIVES:

- 1) Produce periodic yields of forest products.
- 2) Increase forest health.

SILVICULTURAL SYSTEM: Uneven-aged management through application of individual tree selection.

SUMMARY: Manage these areas to keep aesthetic values high. Keep the areas similar in appearance to what they are now. Allow large trees to dominate the areas, but keep them healthy through thinning overstocked areas and removing diseased trees. Assure that regeneration occurs so that replacement trees are available when needed. Management activities will be visible, but subordinate to the natural landscape.

SCALE
1"=2000'



T.9N.
T.8N.

WHITE COTTAGE AVE
BROOKSIDE DR
ANGWIN

Howell Mountain Sch

Angwin

Athletic Field

Sewage Disposal

Sentinel Hill

HOWELL

Linda Falls

Four Corners

R.5W.

BM 1842

Newton Observatory

Water Tanks

Pacific Union College

Martin Spring

Barley Road

Valley

Fire Station

Rec Fla

POSADA

PACIFIC UNION COLLEGE NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

MANAGEMENT AREA MAP

MANAGEMENT AREA 3



D. MANAGEMENT UNIT NUMBER 4

ESTIMATED ACREAGE: 915

LOCATION: The forested area outside management units 1, 2, and 3 and generally above the low site areas that occur as the property drops off toward Pope and Chiles Valleys. This management unit includes the stringers and patches of forest between the airport and Mill Valley as well as the forested portion of Sentinel Hill.

PRIMARY OBJECTIVES:

- 1) Maintain and increase the growth of high quality commercial forest trees.
- 2) Increase forest health.
- 3) Develop a forest structure that is less susceptible to damage from fire.

SECONDARY OBJECTIVES:

- 1) Produce periodic yields of forest products.
- 2) Maintain a pleasing, safe setting for outdoor recreational uses of the area.

SILVICULTURAL SYSTEM: Uneven-aged management through application of group selection.

SUMMARY: Develop a forest that contains many ages of healthy trees in small groups. Group size will vary depending on the species of trees that occur on the individual site. Ponderosa pine requires a larger opening size for successful regeneration (0.5 to 1.0 acre) while Douglas-fir and redwood will regenerate successfully in smaller (0.25 to 0.5 acre) openings.

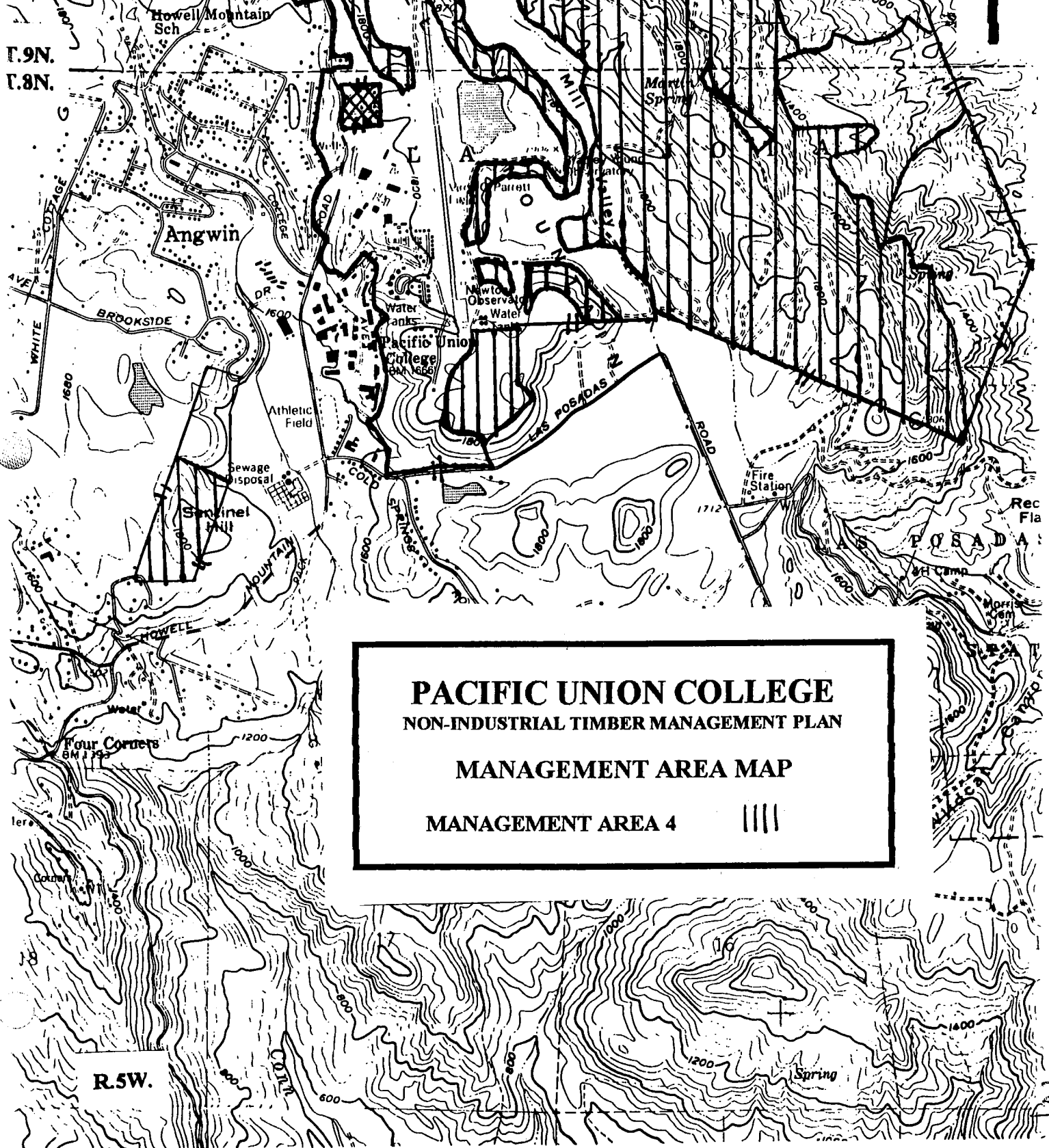
Use of the group selection method will allow us to treat slash, encourage a mixture of tree species and reduce competition from hardwoods.

This means logging will occur on the area regularly (perhaps annually). Logging will remove small groups of trees that probably total somewhere between 0.5 and 1.0% of the area annually. Between the groups some thinning and sanitation will occur.

SCALE
1"=2000'



T.9N.
T.8N.



PACIFIC UNION COLLEGE
NON-INDUSTRIAL TIMBER MANAGEMENT PLAN
MANAGEMENT AREA MAP
MANAGEMENT AREA 4 ||||

E. MANAGEMENT UNIT NUMBER 5

ESTIMATED ACREAGE: 255

LOCATION: The extreme eastern end of the property. This management unit lies at the interface between the oak-woodland and the forested ridge areas.

PRIMARY OBJECTIVES:

- 1) Increase stocking of conifers.
- 2) Develop a forest structure that is less susceptible to damage from wildfire.

SECONDARY OBJECTIVES:

- 1) Increase forest health.
- 2) Improve the road system to provide access for management, fire protection, and recreation uses.

SILVICULTURAL SYSTEM: Uneven-aged management through the application of group selection. Only dead, dying and diseased trees should be removed until the area recovers to meet minimum stocking standards specified in the Forest Practice Rules.

SUMMARY: This area is still recovering from excessive logging and the 1931 fire. The area is capable of supporting a forest as long as it is protected from wildfire. Only the few dead, dying and diseased trees that occur will be removed from this area until enough trees exist for the area to be managed for forest values.

This area is less productive than management unit 4 due to shallower soils and because it is at a lower elevation with hotter temperatures. However, as portions of this management unit develop into forest, they will be treated in a manner similar to management unit 4.

Balancing Growth and Harvest

The intent of the College is to retain a forest environment similar to what exists now in terms of habitat and visual quality. It is also important to the College, and to society at large, that activities are planned on a sustainable basis. To this end, growth and harvest levels are established in a very conservative way using existing growth as a basis.

A 100 year cutting cycle is used for group selection management. This will assure that the forest on the property continues to look similar to the forest now present. Higher yields could be obtained using a cutting cycle of approximately 50-60 years which is near culmination of mean annual increment. Using this more intensive approach, however, will not allow development and retention of large trees on the property. Growth and harvest will be balanced each decade, even though annual levels will fluctuate in response to market conditions and landowner desires.

PACIFIC UNION COLLEGE
NTMP

SCALE
1"=2000'

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T.8N.

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WHITE

AVENUE

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Howell Mountain Sch

Angwin

Geninel Hill

Four Corners

R.5W.

BM 1842

Howell Mountain Sch

Water Tanks

Howell

Four Corners

R.5W.

Valley

Newton Observatory

Las Posadas

Howell

Four Corners

R.5W.

R.5W.

Martin Spring

Bradley Road

Valley

Newton Observatory

Las Posadas

Howell

Four Corners

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Martin Spring

Bradley Road

Valley

Newton Observatory

Las Posadas

Howell

Four Corners

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PACIFIC UNION COLLEGE
NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

MANAGEMENT AREA MAP

MANAGEMENT AREA 5



VIII. DESCRIPTION OF PROPOSED ACTIVITIES

A. PROJECTED FREQUENCY OF HARVEST

Uneven aged management regimes, by design, result in frequent, light harvest activities spread throughout the forest. Every acre of the plan area needs to be reviewed for harvest each decade with the appropriate amount removed so that stocking levels do not become high enough to adversely affect forest health. This approach results in a lessening of the visual impact of harvest and a retention of forest attributes at a generally higher level rather than heavy harvest followed by long periods with no activities. Salvage is an annual or biannual event in part due to development activities and the stress that is placed on the trees by human activities. Endemic levels of insect activity as well as windstorms continue to occur causing an ongoing need for salvage activities.

Regeneration harvests and stocking control activities will occur throughout the property every decade with salvage operations occurring as needed. The RPF will keep records of the accumulated harvest to assure that salvage plus regeneration and stocking control harvest does not exceed sustainable levels. It is important that flexibility be maintained with regard to harvest scheduling to maximize value from harvest operations. Some years may pass without any harvest and some years will accrue harvest activities that exceed their pro rata share, but harvest and growth will be balanced each decade.

PROJECTED HARVEST

Management Unit 1

Growth and harvest will balance each decade in this management unit. Expected growth of 168 bf/ac/yr will result in increased stocking of approximately 250 MBF for the unit over each decade. The majority of this will be removed through salvage, hazard tree removal and some thinning to increase individual tree health. Harvest in this unit should be stable for at least 3 decades before increasing. Some hardwood removal will occur to encourage regeneration of conifers.

Projected annual harvest= 20 MBF for this unit.

Management Unit 2

Growth will outpace harvest in this unit, so growth and harvest will not be balanced during the first 2-3 decades of the plan. It is desirable to increase stocking, particularly of large conifers in this unit. Some thinnings and removal of hardwood will occur. Estimated annual growth of 168 bf/ac/yr will result in accrual of approximately 35 MBF per decade for this unit.

Projected annual harvest= 1 MBF for this unit in the first decade.
2 MBF for the second decade.
2 MBF for the third decade.

Management Unit 3

Growth and harvest will balance each decade for this unit. Current growth of 168 bf/ac/yr will result in accrual of approximately 16 MBF each of the first three decades. Increasing inventory is a desirable situation in the portion of this unit near Redwood Flat. Some hardwood removal will occur in this area to encourage regeneration. At the end of three decades growth is expected to increase and harvest will have to be increased to maintain forest health.

Projected annual harvest= 1 MBF for this unit in the first decade.
1 MBF in the second decade.
2 MBF in the third decade.

Management Unit 4

Growth and harvest will be balanced each decade in this unit, however, it is expected that thinning harvests will not keep up with growth for the first and probably second decades. This is desirable to increase inventory. As long as salvage operations can keep up with mortality, the increase in volume inventory should not cause problems and will increase growth for the forest as a whole. Expected growth rate of 168 bf/ac/yr will result in accrual of approximately 1,500 MBF for the unit during the first decade. Regeneration harvest will be regulated by group area and will not exceed 1% per year to achieve a 100 year cutting cycle. For the first decade, regeneration groups will be selected primarily from plant aggregations where basal areas are below 50 square feet and seedling stocking is heavy. Approximately 30% of the regeneration groups will be selected from areas that have no commercial conifers. This strategy will improve stocking and increase growth over time. It is expected that regeneration groups will exceed 75 square feet of basal area after 18-20 years. Regeneration harvest will result in yields of approximately 300 MBF for the first decade and increase thereafter as regeneration is begun in stands with heavier stocking. It is estimated that approximately 44% of the area currently needs thinning to improve stand health. Thinning and salvage will produce yields of near 220 MBF for the first

decade. Regenerating unstocked areas early in the plan life will allow increases in harvest levels as the plan progresses. The second decade of the plan should allow harvest of at least 750 MBF and in the third decade, harvest should be approximately 1250 MBF. These figures compare with a current growth rate of approximately 1,500 MBF per decade.

Hardwood removal in and near the groups selected for regeneration will be harvested. Reinventory should substantiate an increase in growth and harvest levels after the first three decades to ensure that high stocking does not adversely effect forest health.

Projected annual harvest= 52 MBF for this unit for the first decade
75 MBF for the second decade
125 MBF for the third decade

Management Unit 5

Growth and harvest are not expected to balance in this management unit for at least three decades. Growth of 168 bf/ac/yr will probably occur in mainly submerchantable trees for this period. Accrued inventory will probably be near 360 MBF for the decade. Expected harvest of salvage should not exceed 215 MBF for each decade. After the third decade of this plan, group selection for regeneration should be needed. This will accrue an additional harvest of near 200 MBF per decade. Hardwoods may be removed for stand improvement.

Projected annual harvest= 15 MBF for this unit in the first decade.
20 MBF in the second decade.
22 MBF in the third decade.

SUMMARY OF PROJECTED HARVEST Per year for first decade of plan implementation

Management Unit 1	20 MBF
Management Unit 2	1 MBF
Management Unit 3	1 MBF
Management Unit 4	52 MBF
Management Unit 5	<u>15 MBF</u>
Total	89 MBF

These values should be viewed as the maximum annual volume that will be harvested during the first decade. Projections beyond 30 years will be made after the first monitoring inventory is completed. Growth rates in the future should exceed current growth. Based on expected stocking increases and management of hardwood density, growth should exceed 200 bf/ac annually compared with the current 168 bf/ac. Once the forest is regulated, growth should be near 300 bf/ac annually.

Maximum sustained productivity will be achieved using option c of 14 CCR 933.11.

B. SILVICULTURAL PRESCRIPTIONS FOR HARVESTING

1. Salvage and Hazard Tree Removal

Salvage harvest is the harvest of trees that are dead or dying. This mortality may be caused by insect or disease activity, suppression by adjacent trees, wind or snow breakage, or other damaging agent. Trees are removed as individuals or small groups that replicate the scope of the causal agents. Total volume removal from salvage operations is estimated for each management unit in the previous section of this report. Not all mortality volume will be captured with salvage operations, but most will be discovered and harvested. Based on historical patterns, it is estimated that salvage will occur during seven of each ten years. Removal of hazard trees as they become evident will add to this schedule, so it is expected that some harvest will occur each year.

Harvest tree selection for dying and diseased trees will follow the definitions specified in 14 CCR 895.1. Selection of these trees will not require an RPF except as specified in the above referenced section of the Forest Practice Rules. Hazard trees will be identified by either a registered arborist, an RPF or the landowner.

2. Stocking Adjustment and Regeneration Harvest

Harvest of live trees for stocking control will vary depending on the management unit from which harvesting occurs. In uneven aged management, regeneration must be initiated with each cutting cycle to assure sustainable harvests. With Individual tree selection, uniformly distributed populations of seedlings should be the result of each harvest. In Group selection, small groups of seedlings should result from each group harvested.

In management units 1, 2, and 3, individual tree selection will be the system used for management. This will result in harvest of trees from many size classes to work toward developing the desired stand structures.

Group Selection will be practiced in management units 4 and 5. Some small (less than 1 acre) groups may be necessary to perpetuate ponderosa pine in the stand. It is the intent of the landowner to harvest on a nearly annual basis rather than a single heavy harvest every ten years. It is also desirable to increase the inventory, particularly in management unit 5. Because of this desire, the maximum sustainable volumes identified as available for harvest will not be available for harvest in this unit as inventories build.

The College wishes to have a relatively constant stream of income to support programs. It is probable, though, that harvesting will be undesirable in perhaps 2 years out of each decade due to poor market conditions. Harvest activities that are deferred during a year due to poor market conditions or other reasons may occur in subsequent years and not be outside the scope of this plan.

The RPF will oversee the designation of trees for harvest so that the stand structure develops toward the desired stand outlined in the description of objectives. All trees will be

marked before cutting with a mark both above and below stump height. Individual tree selection harvest of trees to achieve uneven-aged management does not lend itself to simple descriptions of trees classes to cut and to leave. Generally trees will be harvested to allow the best trees to remain on the site and grow while spacing them so that crowns from like size trees have adequate space. This has some elements of even-aged harvesting techniques from commercial thinning, sanitation/cleaning, and overstory removal. Designation of trees for harvest will require consideration of the concepts of each of these harvest methods plus insect and disease ramifications and the need to provide for regeneration.

Groups selected for regeneration will include areas dominated by hardwoods and areas with brush or knobcone in approximately their proportionate share of the property. This will assure that these areas are regenerated and do not continue to be unproductive.

Post harvest stocking levels will be as follows: Individual tree selection-75 square feet of group A species (all areas site class III), Thinning between groups in group selection areas-75 square feet of group A species(for site class III areas) or 50 square feet of basal area (for site class IV areas), if sanitation between groups in group selection areas will result in basal areas below 75 square feet (50 square feet for site class IV areas), the area will be included in a group for regeneration.

3. Hardwood Harvest

The current high level of hardwood stocking (tanoak, madrone, black oak and live oak) is a result of past harvesting followed by wildfire. The sprouting hardwoods were favored in this environment and have increased their presence to approximately half the basal area of the property. It is not desirable to eliminate hardwoods from the forest environment. They make a large contribution to diversity, forest health and wildlife habitat. However, levels of hardwood stocking that are excessively high can reduce diversity, suppress growth of other plant species and diminish the value of a forest for many uses.

Our objective is to gradually reduce the presence of hardwoods to a level that more closely represents their historic level in the stand. The goal for the first cutting cycle (100 years) is to reduce the hardwood stocking from the current level of 65 square feet per acre to approximately 35 square feet per acre. Use of hardwoods will be for fuelwood, pulp, and sawlogs, if the market develops. Most hardwood harvest will be in conjunction with group selection harvests where hardwoods and conifers will be harvested at the same time. Some individual tree harvest will need to be accomplished in management units 1,2, and 3 to improve health and vigor of desired trees and to move the stand composition toward the desired species mix. Proposed harvest schedule for hardwoods follows.

Management Unit	Annual Hardwood Harvest
1	No Regulated Harvest
2	No Regulated Harvest
3	2 Cords
4	200 Cords
5	15 Cords

The harvest of hardwoods outlined here is in addition to removal and use of any dead hardwoods or portions of hardwood trees that break off or blow down. Trees selected for removal will generally be selected from trees less than 26 inches in diameter. Large hardwood trees with cavities will not be felled. This will leave larger and more valuable wildlife habitat trees on the site. Hardwoods are expected to be used for chips (during

periods when market conditions support this), sawlogs (if the market develops) or for the college's ongoing firewood program.

4) Precommercial Thinning

Approximately one third of the plan area is overstocked with young conifers. These areas could be thinned to reduce insect and disease buildups, to reduce slash concentrations from dead trees and to increase growth of the most desirable trees. Thinning should emphasize retention of a mixed species stand to avoid catastrophic disease and insect problems. Spacing should be at least 14 feet between trees (exceptions may be made adjacent to openings) and should not exceed 20 feet. Average spacing should be 14-16 feet between leave trees. Slash from trees removed during thinning may be used for fuelwood or other products whenever practical to reduce fuel buildups. Areas needing thinning are small and scattered widely throughout the property. It is estimated that 20-40 acres will need this treatment during each of the first two decades of the plan. The amount may drop off in subsequent decades.

5. Site Preparation and Regeneration

Uneven-aged management requires that regeneration occur each harvest entry. This will be accomplished by a combination of natural and artificial regeneration within the plan area. Regeneration appears adequate in disturbed areas where hardwoods are controlled. Much of the area has seedlings that need to be protected. It is expected that adequate regeneration will continue to occur in future entries. The RPF is concerned that the genetics of the regeneration be representative of the best trees on the site rather than trees that may not represent the best genotypes. The strategy of leaving character trees and group selection will assure that the superior genotypes are represented in the future stand. Areas over 150 feet in diameter where existing seedlings do not occur, should be used for slash disposal piling areas. Piling and burning these areas will not only assist in reducing fuel loading, but will provide a seed bed that will encourage natural seeding.

Site preparation will not be required to meet stocking requirements. Some slash treatment will occur that will result in de facto site preparation. The majority of the planned slash treatment will be accomplished through the use of tractor piling by the LTO or by the landowner. Tractor piling will primarily occur within harvested groups, so residual trees will be protected. Some slash treatment may occur in areas throughout the NTMP area to meet fuel management and visual quality objectives. Slash treatment work will be accomplished as soon as practical after logging. Piles will be burned to aid in protecting the area from wildfire. Unstocked groups will be inspected by the RPF for two spring seasons following piling. If natural regeneration has not occurred the areas will be planted at a rate of 300 trees per acre (12X12 foot spacing) by the owner. Species mix of planted species should approximate the conifers removed from each group. Hardwoods will regenerate adequately from stump sprouts.

It is estimated that 10% of the plan area currently is unstocked and is occupied by brush (manzanita). The landowner wishes to stock these areas with conifers. Where they can be

included in groups selected for regeneration, they will be treated as a part of logging activities. Where they cannot be included with logging treatment, they will be piled (utilizable material will be removed for fuelwood) and planted with a mixture of desirable species (PP and DF). Areas needing this treatment are scattered and the biggest is approximately 2 acres.

6. Fuel Modification

The land use patterns of the area have changed over the years adding emphasis to developing and maintaining a program of fire protection. Currently a Vegetation Management Plan (VMP) is being prepared to allow cooperative work by fire suppression agencies and by the landowner to reduce risks associated with the interface of wildlands and college development. Rural residences have increased in number around the property increasing the risk of a fire start and complicating suppression activities when a fire occurs.

The primary means of protecting the area and developments from destruction by wildfire is through reducing the intensity of a potential fire by implementing various fuel management activities. This will require two different types of activities. Vegetation around and adjacent to facilities will need to be manipulated by hand (both as a part of this NTMP and under the VMP) to reduce density and reduce fuel ladders so defensible space is provided. Most of this work will be within 150 feet of structures and will occur in management unit 1.

Another key component in accomplishing fuel objectives is underburning for fuel reduction. Fire intensities will need to be carefully regulated to reduce the damage and to assure regeneration is protected. This can be accomplished by using a backing fire and burning when conditions result in a 1-2 foot flame height. CDF burn managers will need to use the BEHAVE or similar predictive model to prescribe burning conditions that achieve these parameters. Areas where regeneration is needed to achieve stocking standards will either be excluded from burn projects (by constructing a scratch line) or the seedlings will be protected by tractor piling prior to seedling establishment or physically protecting needed seedlings during the burns. Burning rotation will vary depending on current fuel loading and management objectives. Most of the area may be burned only once per decade. High priority for treatment is the area in and adjacent to the spotted owl management units (management unit 2) for protection of habitat.

7. Vegetation Management

Control of competing vegetation will be an important consideration in increasing yields from the property. Sprouting hardwoods will aggressively occupy sites where their growth is not retarded. Measures to assist in maintaining the desired balance of species should include, piling slash on stumps during slash disposal, uprooting small hardwood trees during slash piling operations, and assuring that hardwoods are cut along with conifers in groups. Herbicide use either broadcast or as a stump treatment may be effective in controlling unwanted hardwoods. If the landowner desires to undertake this practice a

recommendation from a licensed pest control advisor may assist in designing the most effective treatment.

8. Inventory and Monitoring

Yields and growth projections are based on current inventory information. To assure that projections are accurate over time, monitoring and periodic reinventory is necessary. If the landowners desire to increase harvest levels to reflect increased growth that will occur in the future, an inventory of timber volumes will be required. This RPF recommends a follow-up inventory in approximately 2006 to validate inventory projections and growth rates.

9. Pruning

Pruning will be necessary to reduce ladder fuels (primarily in management unit 1) and to increase sight distance along roads and trails. Pruning should attempt to minimize damage to tree stems and should emphasize cuts flush with the bark so rapid healing can occur.

IX. DESCRIPTION OF CULTURAL AND HISTORICAL RESOURCES

A complete survey of the cultural and historical resources of the plan area was conducted and is described in a confidential appendix. Six sites were recorded as a result of this survey. Two of the sites were prehistoric, two contained both historic and prehistoric material and two were historic only. Scattered lithic material was found throughout the property evidence of use by American Indian groups prior to Anglo-European settlement.

Only one of the prehistoric sites has survived with little disturbance. With the exception of use of the existing road, all activities will be excluded from this site to maintain the integrity of cultural resources. The historic sites qualify as sites since they are over 50 years old, but they do not include any attributes that would make them significant. They will not be protected during operations. One Prehistoric site has been extensively used for agricultural activities and disturbed by discing and ditch construction. This site will not be protected during timber operations. The two sites that contain both historic and prehistoric materials will be protected from unnecessary disturbance during timber operations. Existing roads and skid trails will be used for skidding, directional falling will be used to reduce soil disturbance in site areas. Rubber tired skidders with integral arches will skid loads with one end suspension to reduce surface disturbance and trees will be directionally felled to assist in concentrating disturbance and activities outside the sites.

1. For the Redwood Flat and Martin Spring sites, the RFP shall flag the site boundaries just prior to the start of operations in the vicinity of these sites.
2. For the Redwood Flat and Martin Spring sites, trees selected for harvest shall be directionally felled away from the site center and towards existing skid trails or roads except where that practice would increase risk of damage to features.
3. For the Redwood Flat and Martin Spring sites, no heavy equipment shall operate within the boundaries of the sites with the exception of a rubber tired skidder restricted to operating on the existing roads and trails.
4. For sites #1, #2, and CA-NAP-541, no operations shall be permitted within the site boundaries.
5. For all sites, no slash piling or burning within the boundaries of the sites
6. For all sites, no collecting of cultural materials by project personnel.
7. For all Sites, just prior to operations, the RPF shall show the site locations to the LTO on the ground and explain restrictions to operations on and around each site.

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X. INFORMATION ON THREATENED AND ENDANGERED PLANTS AND ANIMALS

Pre field research for evaluating effects and protection measures needed for plant and animal populations consisted of consulting with knowledgeable persons from the Pacific Union College, consulting with Steve Sayers, manager of the adjacent Las Posadas State Forest, reviewing California Native Plant Society (CNPS) records for Napa County, and obtaining the results of a Natural Diversity Database run for this area. This revealed some very useful information. Bruce Wallis of PUC had maintained a sighting record for avian species that covered several years (included in Appendix). The RPF is fortunate to have such complete records to use in evaluating effects and planning for habitat requirements. The CNPS records were helpful in determining plants which might occur on the property and habitat that would support those plants.

In April of 1996, a reconnaissance was performed to evaluate whether sensitive plants existed on the proposed NTMP area. The survey consisted of visiting known sites nearby to assure that plants were in a state that would allow identification followed by a search of similar habitats in the NTMP area. The RPF was assisted in this search by Joe Colezio of the Napa County CNPS, David Isle, and Steve Sayers, RPF. Many of the areas where plants listed on the CNPS 1B list (most sensitive) are found are on habitat types that either are not present on the plan area (ie serpentine) or in habitats that will not be affected by planned operations (ie vernal pools). None of the plants identified by the CNPS as within the Saint Helena Quad were found. The RPF will continue to look for the most sensitive plants as operations proceed and if any are found, protection measures will be initiated. For a complete list of plants considered in this area, see Appendix material.

A pair of spotted owls have historically used the property for roosting, although no nesting has been recorded. The pair were located and observed on several occasions. The areas used by them for day roosting have been identified, and special management units to assure maintenance of roosting habitat have been established in this plan (see management unit 2 objectives). Ted Wooster of the California Department of Fish and Game visited the site and approved protection measures (see Northern Spotted Owl Consultation Worksheet). Activities in management units 2, 3, 4, and 5 that occur within the breeding season for Northern spotted owls (March 1-July 31) will require the following measures:

- 1) Protocol surveys in areas of NSO habitat
- 2) Current year status of all known NSO sites and new sites must be determined.
- 3) Reconsultation must be completed if nesting NSO's are found outside management area 2.
- 4) If NSO's are found nesting in management area 2, no operations shall occur within 500 feet of nesting spotted owls.

No other animal species of concern were noted in the area, and the habitat will not be altered to make it unsuited for any animal species of concern.

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XI. DESCRIPTION OF POTENTIAL EFFECTS ON WATER QUALITY AND QUANTITY

As shown on the Stream Class Map, several watercourses and lakes requiring protection under the Forest Practice Rules exist on the plan area. Four segments of class II watercourse exist on the property. Three unnamed segments occur near Redwood Flat and below Martin Springs while Conn Creek flows adjacent to the plan area below Angwin. The water near Redwood Flat, both at the flat itself and at the unnamed spring south of the flat, is perennial and supports aquatic life. Below the spring areas, however, the flows become seasonal and do not support aquatic life nor riparian vegetation. Protection specified in the Rules will be observed and should prove adequate. This protection includes the general protection specified in CCR 936.3 and 936.4 as well as specific protection in CCR 936.5. Specifically, 1) WLPZ boundaries will be flagged by the RPF prior to submission of notice of operations for operations in the area of any of these WLPZs; 2) all harvest trees will be marked (including a stump mark) by an RPF prior to submission of the notice of operations, and 3) No more than 50% of the canopy cover nor more than 75% of the overstory conifers will be removed. WLPZ width will be 50 feet at Redwood Flat and the unnamed spring south of the Flat, and 75 feet on Conn Creek and the creek below Martin Spring. Crossings will be reconstructed and used where existing roads cross these watercourses. It is unlikely that any significant amounts of soil will be bared in WLPZs. If amounts of soil disturbance occur that exceed threshold listed in 14 CCR 936.7, 943.2(m) or 943.5(f)(4), slash will be deposited in the disturbed area (above the high water line of the streamcourse) in such a way that it covers at least 50% of the soil surface.

Several class III watercourses are shown on the Stream Class Map. These will require protection specified in the Forest Practice Rules. The general protection provided in CCR 936.3 and 936.4 will be adequate to protect the beneficial uses of the water. An Equipment Exclusion Zone (EEZ) of 25 feet will be established on all class III watercourses as allowed in CCR 936.5. Watercourse protection zones will not generally be flagged for class III watercourses, but all harvest trees will be marked by an RPF and the RPF will flag any locations where tree removal might impinge on EEZs prior to submission of the notice of operations. Removal will be planned to assure that 50% of understory vegetation is retained as specified in CCR 935.5. Existing road crossings will be used and will be dipped out after use to assure that water stays in the streamcourses. Any soil deposited in class III watercourses due to any activities under this plan will be removed or stabilized prior to October 15 in the year it is created. This will in some cases improve drainage and prevent unnecessary erosion that is occurring from road surfaces. A tractor crossing will be necessary on the class III stream that flows off Sentinel Hill into the class IV watercourse adjacent to the sewage treatment fields. This crossing is at the site of an old streamcourse crossing and can be used with a small amount of dipping out. Any deposited material can be removed easily. A great deal of disturbance has occurred in this area and it is unlikely that use of this crossing will adversely effect current conditions.

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Several class IV watercourses and lakes appear on the Stream Class Map. Except for one case, these are well away from proposed activities. Some road use on existing roads will occur near these facilities. Near the same location mentioned in the discussion of class III watercourses, a crossing will be required on a class IV watercourse. This watercourse has been constructed to divert runoff away from sewage disposal areas. Constructing and reinstalling this ditch will not adversely effect water quality. No protection is planned for class IV watercourses.

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XII. DESCRIPTION OF SOILS, EROSION HAZARD, AND CONTROL METHODS.

The majority of the soils found in the NTMP area are suitable for producing commercial forests both in terms of species and densities. Based on field review and research in the Soil Survey of Napa County (SCS, 1978), the following soil mapping units are present on the NTMP area: Aiken loam, 2 to 15 percent slopes (100); Aiken loam, 15 to 30 percent slopes (101); Aiken loam, 30 to 50 percent slopes (102); Boomer loam, 2 to 15 percent slopes (107); Boomer gravelly loam, 30 to 50 percent slopes (109); and Forward gravelly loam, 30 to 75 percent slopes (140).

The following non-forest soils mapping units are found on the property: Bale clay loam, 2 to 5 percent slopes (105); Perkins gravelly loam, 5 to 9 percent slopes (169); and Pleasanton loam, 2 to 5 percent slopes (171). Very little of these soil mapping units is included in the NTMP area (see Exclusion Area Map). The Lodo-Maymen-Felton association, 30 to 75 percent slopes (mapping unit 157) area is not easy to generalize about. The Felton soil series is capable of producing commercial forests with site index of approximately 140. The other two soil series are only suitable for producing watershed cover and wildlife habitat. Complete descriptions of these mapping units and individual soil series are included in this report in Appendix.

On-site erosion hazard ratings are generally low. (see Appendix for forms). These ratings reflect the actual conditions on the property and the proposed treatment. Combining these factors, all on-site ratings were "low". Soil characteristics did not indicate a predisposition to erodibility. Detachability was not high anywhere in the NTMP area. Data from the Soil Survey of Napa County indicated the following erosion potentials for bare soil:

Mapping Unit	Erosion Hazard Adjective
100	Slight
101	Moderate
102	Moderate
107	Slight
109	Moderate
140	High
157	High

The ratings are very dependant on slope. Higher slope classes carry a higher erosion hazard rating, even if the soil characteristics do not indicate a propensity for erosion. Uneven-aged management will assure that bare soil areas are small and adequately buffered by well vegetated areas. These conditions will best be represented by the low ratings that are presented in the site specific information. Use of standards higher than those required for "low" ratings will provide extra protection above minimum levels required in the Forest Practice Rules.

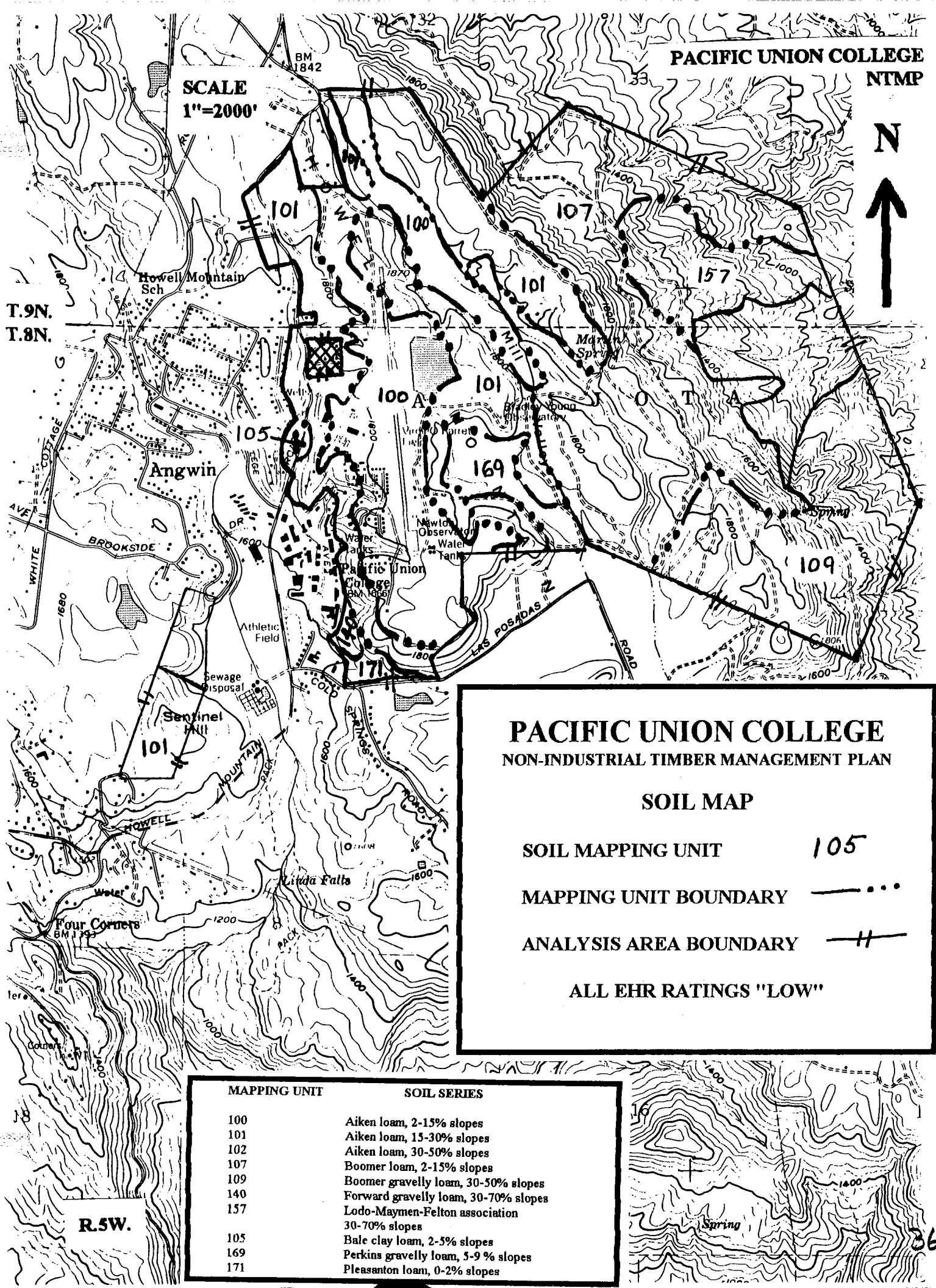
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NTMP

SCALE
1"=2000'



PACIFIC UNION COLLEGE NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

SOIL MAP

SOIL MAPPING UNIT 105

MAPPING UNIT BOUNDARY — ...

ANALYSIS AREA BOUNDARY — + +

ALL EHR RATINGS "LOW"

MAPPING UNIT	SOIL SERIES
100	Aiken loam, 2-15% slopes
101	Aiken loam, 15-30% slopes
102	Aiken loam, 30-50% slopes
107	Boomer loam, 2-15% slopes
109	Boomer gravelly loam, 30-50% slopes
140	Forward gravelly loam, 30-70% slopes
157	Lodo-Maymen-Felton association 30-70% slopes
105	Bale clay loam, 2-5% slopes
169	Perkins gravelly loam, 5-9% slopes
171	Pleasanton loam, 0-2% slopes

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XIII. DESCRIPTION OF PROPOSED YARDING METHODS

All yarding throughout the plan area will be with tractor. Some small areas where slopes are between 50 and 65 % occur in the NTMP area. None of these areas lead directly into class I or II streamcourses nor do any of the areas have erosion hazards of high or extreme. Yarding in areas with slopes over 60 % will be through lining logs to skid trails on benches and to roads. The existing road system contains some landings. Several new landings will be needed to accommodate planned logging activities. Landing locations are available on flats and benches adjacent to existing and new road locations. All are outside WLPZs. None of the proposed landings will exceed 1/4 acre in size nor will any occur on slopes over 50%.

Since no areas are designated for cable operations, no tractor operations will occur in areas designated for cable logging nor will any new landings exceed the maximum size specified in the Forest Practice Rules.

Approximately 0.2 mile of new road construction will occur as a part of the first decade harvesting activities (see Transportation System Map). All proposed road routes are flagged on the ground. These roads will occur in two segments as shown on the road system map. New road segments occur on gentle terrain with no side slopes over 50%.

Road construction will occur during periods of the year when adverse effects will be minimized (not during the winter period). Existing roads were reviewed by the RPF for crossing upgrade needs. One 12" culvert will be installed at Redwood Flat, one 18" culvert will be installed at Martin Spring and one rock lined dip will be constructed at the spring between these two points. No current unacceptable effects are occurring, but access will be facilitated and water quality protection will be assured by installation of these facilities. Several places where roads cross intermittent streamcourses currently do not have adequate dips to assure that water does not run down the road surface. These locations will need to be dipped out to provide positive control of surface water flows in the winter.

An extensive mountain bike trail system currently exists on the property. It is the desire of the landowner to maintain this system and to minimize disruption of this use due to logging. To facilitate this, skid trail patterns will be laid out to avoid bike path locations where possible. Bike paths have evolved to use existing roads. To minimize conflicts, roads will not be widened except where absolutely necessary. Timber operations will not occur when college-sponsored, organized bike events are scheduled. Operations will be signed and portions of the trail system closed as needed to assure safe recreational use.

No winter period operations (November 15-April 1) will occur unless the conditions specified in CCR 934.7 (c) (1&2) are met. Specifically tractor operations will only occur in dry rainless periods when soils are not saturated and erosion control structures will be in place when a "chance" of rain is predicted and no operations will occur within WLPZs.

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Existing roads will be waterbarred or dipped in a way that assures that water will not collect on the surface of roads and be diverted from natural downhill flows. Where road surface characteristics are appropriate, outsloped road design will be developed. If surface characteristics do not provide adequate drainage, waterbars or dips will be installed at the spacing specified for moderate erosion hazard where cross slopes are less than 40% and at the spacing specified for high erosion hazard where cross slopes exceed 40%.

Spacing of erosion control structures for skid trails will conform to the spacing specified in the Forest Practice rules for moderate erosion hazard.

Some problem areas exist on the road system that require an accelerated effort to correct. A map of maintenance timing is included in this report as page 38a. Problem areas within these segments will be corrected during the proposed season regardless of whether logging operations occur in these areas or not.

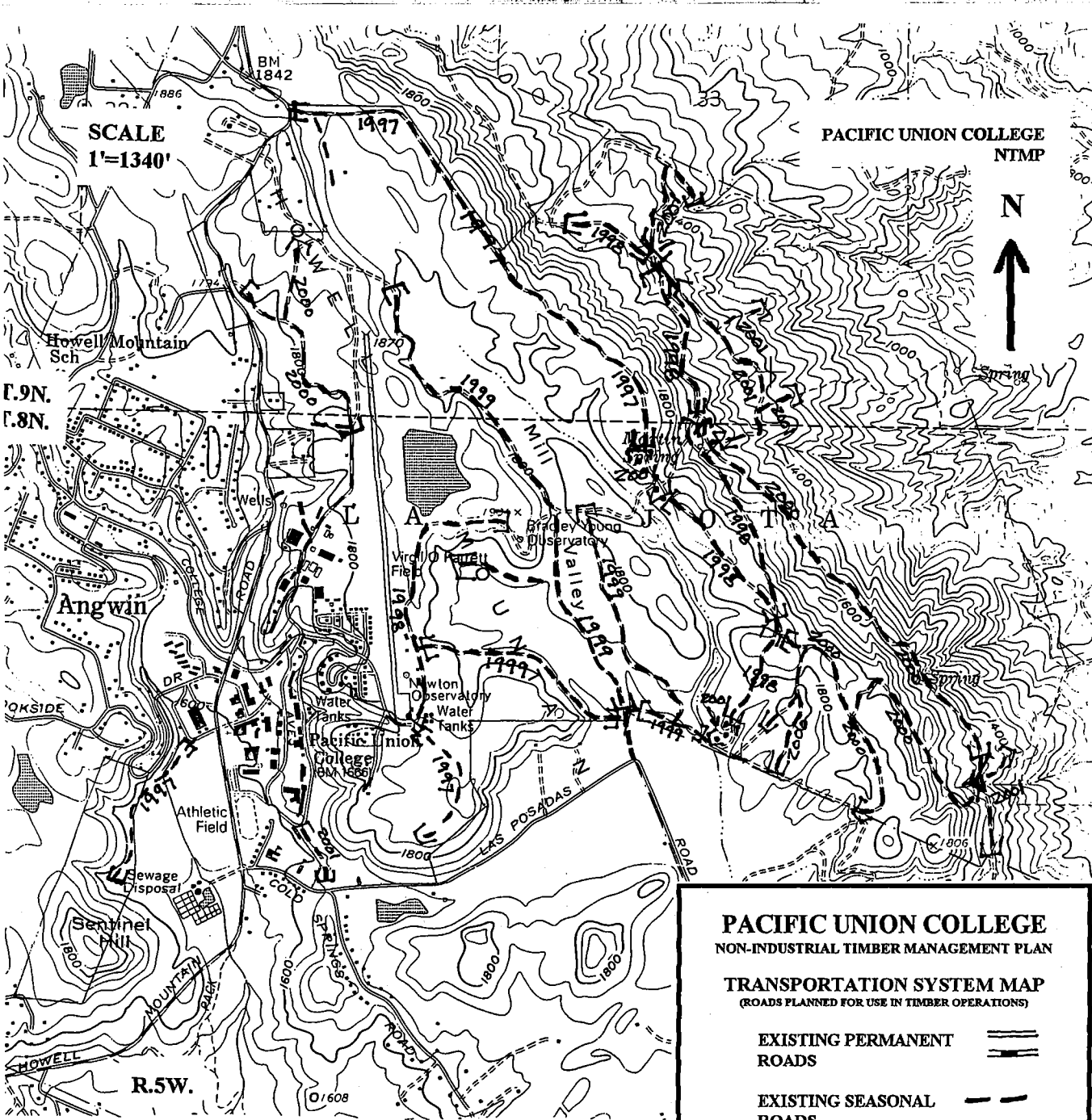
Two segments of existing road will be bypassed and not used for operations after new construction occurs. The segment near Las Posadas will be treated by stabilizing the road surface with slash except for a single track mountain bike trail on a location within the road surface that is stable. Both road segments will be blocked with cull logs designed to restrict use by four wheel vehicles, but still allow access by mountain bikes.

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PACIFIC UNION COLLEGE NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

TRANSPORTATION SYSTEM MAP (ROADS PLANNED FOR USE IN TIMBER OPERATIONS)

EXISTING PERMANENT
ROADS



EXISTING SEASONAL
ROADS



PLANNED SEASONAL
ROADS



ALL YARDING BY TRACTOR OR
RUBBER-TIRED SKIDDER

XIV. DESCRIPTION OF SLASH TREATMENT FOR SITE PREPARATION, FIRE PROTECTION, AND PEST PROTECTION CONSIDERATIONS

1. SLASH TREATMENT AND FIRE PROTECTION

Minimum standards of the Forest Practice Rules will be met or exceeded in this plan. Section 937.2 of the Rules requires treatment along permanent roads, private roads open to the public, and adjacent to structures. These standards will be followed with the following additions. Slash adjacent to any structure, regardless of whether it is designed for human habitation or not, will be treated as specified in 937.2(c). Where slopes, economics, and timing of treatment permit, group selection areas will be piled for burning. Since this is in excess of the requirements of the rules, application of this process will be completely at the discretion of the landowner and the RPF.

Enhancing fire protection of the property is important to the landowner. Slash treatment above requirements in the Forest Practice Rules will be focused in areas that will enhance fire protection and will complement the VMP activities occurring in cooperation with the CDF.

2. PEST MANAGEMENT CONSIDERATIONS

Black Stain Root Rot

Black stain root rot is an insect vectored root rotting fungus. It is characterized by black stains running with the annual rings for portions of the circumference of infected tree boles. Stain is only found near the root collar. Once infected the fungus spreads by root to root transmission between trees. Infections are usually fatal to infected trees as the fungus progressively clogs and destroys conductive tissue in the roots. Although it can infect either ponderosa pine or Douglas-fir, on a particular site this fungus tends to be species specific. The infection center found in this NTMP area is in Douglas-fir, so maintaining a healthy, mixed species stand is important to mitigating effects of this disease over the long term.

Dwarf Mistletoe

Dwarf mistletoe was noted in ponderosa pine only. This pest is species specific and will not transfer from the yellow pine host to other commercial species. Therefore, the primary consideration for managing this will be to prevent (as much as practical) the spread from older trees to young trees of the same species. This can be accomplished by : removing affected ponderosa pine that overtops uninfected young ponderosa pine that is needed to meet desired stocking and size distribution numbers, precommercial thinning to remove infected young ponderosa pine (this can include pruning where this practice can remove infected portions of the tree) where no infected overstory exists, favoring other commercial species in young stands where infected ponderosa pine overstory exists and it is not

desirable to remove it at the time of harvest due to needs for size class distribution or tree health and vigor.

Bark Beetles

Endemic populations of bark beetles (Dendroctonus spp. and Ips spp.) exist in this forest type. These pests are species specific and will only affect ponderosa and sugar pine. Populations generally will not build up in slash under 4" in diameter. Preventative measures that will reduce the potential for significant damage from these pests include: log and thin ponderosa pine so that slash over 4" diameter is not produced between February 1 and July 15, do not pile pine slash over 4" diameter until it has had a chance to dry, salvage trees promptly if insect brood is within the tree, and maintain stand densities that promote individual tree health and vigor.

XV. OTHER REQUIRED INFORMATION

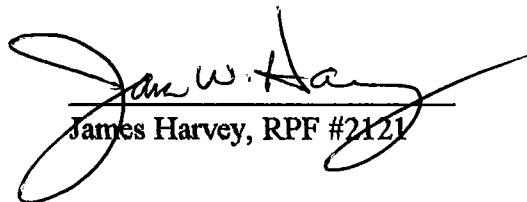
As a part of preparing this plan the RPF visited and became familiar with the plan area. This included personally conducting portions of the timber inventory, site determination, road location, and archaeological reconnaissance.

No land use conversions will occur as a result of this plan. The intent is to manage the area for production of forest values in perpetuity.

No interim management activities have or will occur that might result in rule compliance questions.

A management plan was prepared for this property in 1985 by George Johnson, RPF #1786. This plan, titled "Management Plan for the Pacific Union College" will continue to be in effect for use in reforestation, thinning and other stand management activities covered by cooperative funds.

I certify that the information developed by me and presented in this Non-Industrial Timber Management Plan is correct and accurate.

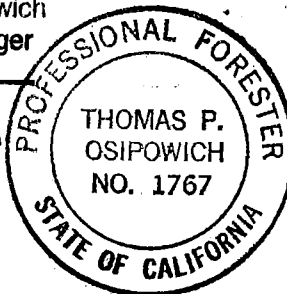

James Harvey, RPF #2121

This NTMP conforms to the rules
and the regulations of the Board of
Forestry and the Forest Practice Act.

By: Thomas P. Osipowich

Title: Resource Manager

Date: 



Pacific
Union
College

June 18, 1996

Director
California Department of Forestry
and Fire Protection

I have reviewed the Non-Industrial Timber Management Plan prepared by James Harvey for Pacific Union College. This plan is designed to meet our management objectives, and I agree to follow the management direction provided in the plan. I understand that we may cancel the plan at any time, but that cancellation requires written notification to the California Department of Forestry and Fire Protection and to the Registered Professional Forester of record.

The College will retain the services of a Registered Professional Forester for those services that require a professional, and will use the services of a Licensed Timber Operator for activities that require a LTO. James Harvey, RPF #2121, is designated as the RPF for managing the college property unless I notify him and the California Department of Forestry and Fire Protection in writing of a change. Bill DeWaal, LTO #A348, is designated as the Licensed Timber Operator for harvesting activities on the college property unless I notify the Registered Professional Forester of record and the California Department of Forestry and Fire Protection in writing of a change.

Consent is hereby given to the Director of Forestry, his agents, and employees to enter the plan area to inspect timber operations for compliance with the Forest Practice Act and forest practice rules.

Very sincerely,



T. N. Hopmann
Vice President for Financial Administration

Received CDF
REGION 1

JUN 26 1996

RESOURCE MANAGEMENT

Angwin, CA 94508-9797

Financial Administration
707-965-6699 • Vice President
707-965-6231 • Campus Business Manager
707-965-6232 • Administrative Manager
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XVI. DESCRIPTION OF CUMULATIVE EFFECTS OF PROPOSED OPERATIONS

Introduction

The NTMP proposes to manage approximately 1351 acres of mixed conifer forest on a sustained-yield basis through uneven aged management. The following information is provided to support the RPF's assertion that the activities proposed in the NTMP will not result in significant cumulative impacts on the various resources in and adjacent to the project area. Two summaries follow that provide data on cumulative effects of past THPs and the summary on the Cumulative Effects Assessment.

The California Department of Forestry and Fire Protection THP atlas in Region I headquarters at Santa Rosa was reviewed on June 21, 1996 for past harvesting that might contribute to cumulative effects within the assessment area. All previous timber operations in the assessment area have been conversions to vineyards. The current proposed NTMP is the only timber operation within the analysis area that proposes to manage for forest values over the long term. Below is a list summarizing the past and present THPs within the watershed assessment area.

THP Number	Acres In AA	Silvicultural System	Harvest Method
84-141	80	Conversion	Tractor
85-276	80	Conversion	Tractor
95-165	10	Conversion	Tractor
95-367	80	Conversion	Tractor

**STATE OF CALIFORNIA
BOARD OF FORESTRY
CUMULATIVE IMPACTS ASSESSMENT**

(1) Do the assessment areas of resources that may be affected by the proposed project contain any past, present, or reasonably foreseeable probable future projects?

Yes X. No .

If the answer is yes, identify the projects and effected resource subjects. See above THP list.

(2) Are there any continuing, significant adverse impacts from past land use activities that may add to the impacts of the proposed project?

Yes . No X.

If the answer is yes, identify the activities and the affected resource subjects.

(3) Will the proposed project, as presented, in combination with past, present, or reasonably foreseeable probable future projects identified in (1) or (2) above, have a reasonable potential to cause or add to significant cumulative impacts in any of the following resource subjects?

	<u>Yes after mitigation (a)</u>	<u>No after mitigation (b)</u>	<u>No Reasonably potential significant effects (c)</u>
1. Watershed	<u> </u>	<u> </u>	<u>X</u>
2. Soil Productivity	<u> </u>	<u> </u>	<u>X</u>
3. Biological	<u> </u>	<u> </u>	<u>X</u>
4. Recreation	<u> </u>	<u> </u>	<u>X</u>
5. Visual	<u> </u>	<u> </u>	<u>X</u>
6. Traffic	<u> </u>	<u> </u>	<u>X</u>
7. Other	<u> </u>	<u> </u>	<u> </u>

If a column (a) is checked in (3) above describe why the expected impacts cannot be feasibly mitigated or avoided and what mitigation measures or alternatives were considered to reach this determination. If column (b) is checked in (3) above describe what mitigation measures have been selected which will substantially reduce or avoid reasonably potential cumulative impacts except for those mitigation measures or alternatives mandated by application of the rules of the Board of Forestry.

I. CUMULATIVE WATERSHED EFFECTS ASSESSMENT

A. Beneficial Uses

Water is used on site for agricultural irrigation and off site for various uses. No responses were received regarding domestic water uses in response to the legal notice and mailing. Water flows off site only during winter and spring periods of precipitation. Water flows off the project site in Martin and Conn Creeks into Lake Hennessy and in Maxwell Creek into Lake Berryessa.

B. Watershed Assessment Area

The project area drains into three higher order drainages described below. The northeastern portion (approximately 40% of the area) drains into the Maxwell Creek watershed through several unnamed intermittent tributaries. One of these tributaries is a Class II while the others are Class III watercourses. The central portion (approximately 40%) drains into the Moore Creek watershed directly into Moore Creek. The south and western portions (approximately 20%) drain into Conn Creek which flows between portions of the project area. These drainages were used to define the assessment area for watershed impacts (see attached map). This assessment area contains approximately 7600 acres. The boundaries of this assessment area were established to account for any changes generated by the project on stream flow rates and sedimentation. It is expected that the flat areas in Pope Valley and Angwin will effectively buffer downstream locations below them from any measurable changes. It is difficult to determine where the downstream boundary of the assessment area should be in Moore Creek. Moore Creek is an extremely low gradient streamcourse through the project area and the adjacent Las Posadas State Forest. It seemed appropriate to limit the assessment area at the east edge of the recreation flat in Las Posadas. It is doubtful that watershed effects generated by the small changes proposed in this plan will go further than that point.

The portion of the project area within the Maxwell Creek watershed has several streamcourses (shown on the Stream Class Map). Maxwell Creek appears to be a Class III streamcourse within the assessment area. Adequate WLPZ protection and the light proposed harvesting will assure that no measurable changes in stream flows occur. Sedimentation changes also should be minimal due to the filtering of WLPZs and the positive effects of improved road maintenance. The proposed action will not, either individually or in combination with other projects, cause significant cumulative impacts in this watershed.

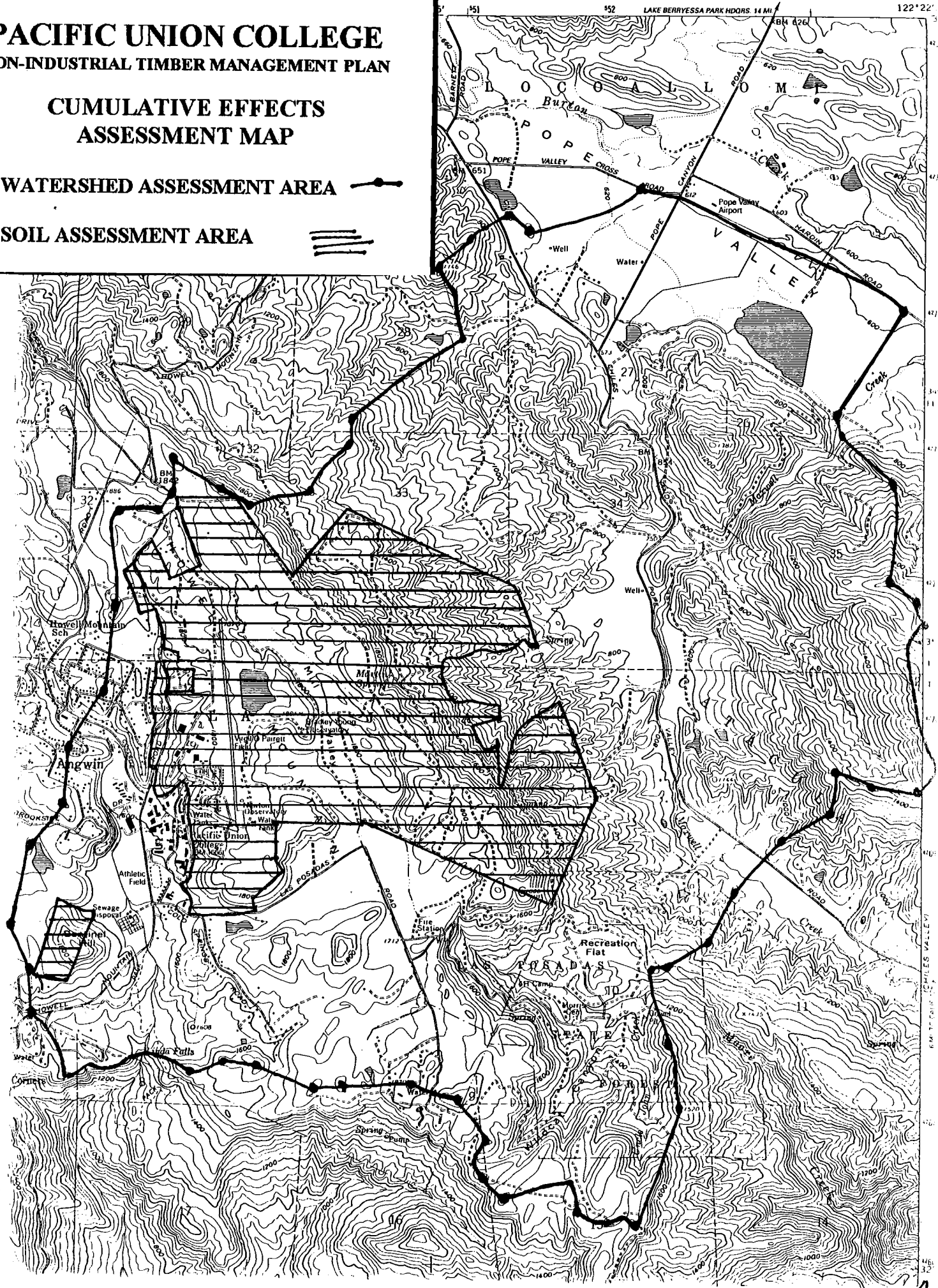
PACIFIC UNION COLLEGE

NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

CUMULATIVE EFFECTS ASSESSMENT MAP

WATERSHED ASSESSMENT AREA

SOIL ASSESSMENT AREA



The portion of the project area within the Moore Creek watershed has no defined tributary streamcourses (shown on the Stream Class Map). Two Class IV water features (ponds) exist. Moore Creek appears to be a Class III streamcourse within the assessment area. Most of the area of Moore Creek within the land ownership of the project area is used for agriculture. Adequate WLPZ protection within the area managed for forest values and the light proposed harvesting will assure that no measurable changes in stream flows occur. Sedimentation changes also should be minimal due to the filtering of WLPZs and the flat stream gradient. The positive effects of improved road maintenance should result in lowering sedimentation in the future. The proposed action will not, either individually or in combination with other projects, cause significant cumulative impacts in this watershed.

The portion of the project area within the Conn Creek watershed has some tributary streamcourses (shown on the Stream Class Map). Conn Creek appears to be a Class II streamcourse within the assessment area. Adequate WLPZ protection and the light proposed harvesting will assure that no measurable changes in stream flows occur. Sedimentation changes also should be minimal due to the filtering of WLPZs. The proposed action will not, either individually or in combination with other projects, cause significant cumulative impacts in this watershed.

Several constructed agricultural water features lie within the assessment area. No change in the quantity nor quality of water resources available to these ponds will result from the project activities. The ponds within the NTMP boundaries provide some habitat, but do not appear to provide vernal pool habitat components.

C. Current Stream Channel Conditions

1. All stream courses within the project area are in excellent shape with no current downcutting or bank deterioration. Moore and Maxwell Creeks, as well as their tributaries, appear to be in excellent condition within the assessment area. No excessive downcutting was observed. Small amounts of sediment deposition were noted, but this was attributed to the excessive water generated by the storm events in 1994. Conn Creek appears to have downcut through the Angwin area, but the channel bottom appears stable now, and it is impossible to determine when the initial downcutting occurred. No bank cutting or bank wasting was noted on Conn Creek as a result of the 1994 weather events. No problems associated with scouring, embedding gravels, aggrading or pool filling were noted. No debris jams were noted. Course woody debris amounts in the channel seemed insufficient to provide structure, probably a result of past agricultural, commercial and residential development adjacent to the channel up stream from the project area.

2. The RPF is not aware of any downstream conditions inside or outside the assessment area that would indicate deterioration of stream channel conditions nor any conditions that would reduce the above mentioned beneficial uses. The RPF observed downstream conditions during moderate to heavy storm events.

D. Past Projects

Based on the RPF review for this assessment and knowledge of watershed conditions on and off the proposed project area, past projects within the assessment area have not resulted in any of the following impacts.

1. Increased sediment inputs that embedded gravels, filled pools, or caused channel aggradation within any portion of the stream system.
2. Increased downcutting or bank erosion as a result of increased flows, sediment transport, or other channel modifications.
3. Increased water temperatures due to canopy removal along stream channels.
4. Placing chemicals or unstable organic debris into the stream system.
5. Removed large organic debris resulting in loss of pool habitat.

E. Potential On Site Effects

Based on current conditions and the RPF's knowledge of the impacts of similar past projects, below is listed the potential of the proposed project as described, and mitigated, to produce the following individual effects.

1. Increased stream or lake sediment from:	Potential
a. Channel or bank erosion	low
b. Streamside or inner gorge mass wasting	low
c. Debris flows or torrents from sideslopes	low
d. Debris flows from debris jams.	low
e. Side slope mass wasting that causes material to enter upstream water courses	low
f. Sheet, gully, or rill erosion that could enter the stream system via the transportation system	low
g. Sheet, gully or rill erosion that could enter the stream system from harvested or site prepared areas.	low
2. Openings along stream channels that could cause increased stream temperatures.	low
3. Increased amounts of small organic debris in streams or lakes.	low
4. Movement of roadway chemicals, fuels, pesticides, or nutrients released by burning into streams or lakes.	low
5. Increased peak flows as a result of vegetation removal or rerouting of runoff.	low
6. Inputs of large organic debris into streams or lakes.	low
7. Extraction of large organic debris from streams.	low
8. Loss of future large organic debris as a result of harvesting.	low

F. Impacts Evaluation

The proposed project as presented and combined with past and reasonably foreseeable future projects as identified in sections C through E does not have a reasonable potential to cause nor add to significant cumulative impacts to water resources. There are no reasonably potential significant effects to water resources due to the current good conditions of the watercourses combined with gentle terrain and planned vegetation retention. All Part E evaluations are rated "low."

II. CUMULATIVE SOIL PRODUCTIVITY IMPACTS ASSESSMENT

1. Soil Productivity Assessment Area

The soil productivity assessment area is the NTMP boundary. No offsite effects will occur and equipment and disturbance will be confined to the plan area.

2. Effects Assessment

The proposed project activities will not combine with past and future activities to cause significant soil productivity impacts. Soil resource information was obtained from the Soil Survey of Napa County, California prepared by the Soil Conservation Service. Applicable excerpts are available in the appendix of this plan. All soils proposed for forest management activities are rated as productive soils by the soil survey report. Continuous forest cover combined with standard practices will assure that no reasonably potential significant impacts will occur in terms of surface soil loss. Operations should occur when soil moisture is well below field capacity to assure that compaction does not occur. This will be addressed by limiting winter operations, as discussed in the plan, to dry periods should operations be contemplated during the winter period.

Growing space loss will be minimized with planned reforestation efforts and through care in conserving existing natural seedlings and saplings. Careful skid trail location will conserve advanced regeneration and conserve organic matter as well as soil surface cover. Operations will not result in significant effects on the site fertility and productivity. Nitrogen is the most critical element in retention of site productivity. Removal of logs leaves the vast majority of the site nitrogen reserve on the site in the form of leaves, litter, limbs and roots.

Soil Impacts Summary

Will the project, as presented, alone or in combination with the impacts of past and future projects have a reasonable potential to cause or add to significant, cumulative soil productivity impacts as a result of:

	Yes, after <u>mitigation</u>	No, after <u>mitigation</u>	No reasonably potential significant <u>impacts</u>
1. Organic matter loss			X
2. Surface soil loss			X
3. Growing space loss			X
4. Compaction		X*	

* Mitigation through following winter operations restrictions.

III CUMULATIVE BIOLOGICAL RESOURCE IMPACTS ASSESSMENT

A. Biological Resource Inventory

1. A pair of northern spotted owls use part of the project area (DF&G territory NP029). Data base searches indicate that two other pairs live on the areas near, but outside the assessment area (DF&G territories NP002 and NP 014). Peregrine falcon, golden eagle and pileated woodpeckers have been recorded using the project area and the assessment area (see appendix). No red legged frogs were observed in the project area, and habitat appeared marginal for foraging and inadequate for breeding although some habitat may occur within the assessment area.

According to CNPS records, four plant species of concern are noted that occur within the assessment area. These are:

<u>plant species</u>	<u>habitat</u>
<u>Astragalus clarianus</u>	dry, rocky meadows
<u>Ranunculus lobbi</u>	vernal pools
<u>Perideria gairdneri</u>	low wet areas
<u>Ceanothus divergens</u>	brushy ridgetops

A reconnaissance was performed during the spring of 1996 and none of these plants were located on the project area. None of these plant species are associated with mixed conifer forests. A list of possible plant species that were evaluated is included in the appendix. No list 1b, 2, or 3 plants were located on the project area. Several list 4 plants were located (see appendix). One old-growth redwood tree was located during plan preparation. It (and any others located during operations) will be preserved and only harvested in case of hazard or mortality salvage. Management will attempt to enhance its health and vigor.

2. No other wildlife nor fisheries resource concerns are known or suspected to occur within the assessment area .

3. Biological Assessment Area

The assessment area is shown on the attached map. An analysis distance of .7 miles was specified for spotted owl habitat by Ted Wooster of the CA Department of Fish and Game. A distance of .7 miles around the project area is also appropriate for other mobile creatures such as deer, mountain lions and pileated woodpeckers. Effects on smaller, less mobile creatures such as red legged frogs could be assessed in a much smaller area, but for the sake of consistency, the biological assessment area is the same for all species. The project area contains a variety of habitat types that are found in adjacent areas, so that animals using the project area will also use the adjacent areas so assessment of habitat on the project area should reflect cumulative impacts for adjacent areas. A reasonable array of habitat types occur within the assessment area including meadow and riparian as well as various forest types and seral stages. The assessment area contains 12,320 acres. Results of consultation of spotted owl effects is documented on the Spotted Owl Consultation worksheet in the appendix to this report.

4. All current uses by biological resources will be maintained throughout the plan period. Little change in habitat conditions is anticipated, overall. Some increase in crown closure will occur that will perhaps increase use by closed canopy forest species such as spotted owls.

B. Habitat Condition*

<u>Habitat Components</u>	<u>Pre-Project</u>		<u>Post-Project</u>
	<u>On-Site</u>	<u>Off-Site</u>	<u>On-Site</u>
Presence of snags/den/ nest trees	Low	Low	Slight reduction in some Management Areas
Amount of downed large woody debris	Low	Low	No Change
Presence of multi-storied canopy	High	Medium	No Change
Road density	Low	Medium	No Change
Presence of hardwoods	High	High	Reduced by 50%
Presence of late seral forest characteristics	None	None	No Change
Continuity of late seral stage forests	None	Low	No Change

*Categories and ratings use information provided in CDF "Guidelines for Assessment of Cumulative Impacts" dated October 27, 1992.

C. Presence of Significant Wildlife Areas

<u>key habitat component</u>	<u>within assessment area</u>	
	<u>on-site</u>	<u>off-site</u>
deer fawning areas	yes	yes
deer migration corridors	no	no
deer winter range	yes	yes
deer summer range	no	no
wetlands	no	no
riparian areas	yes	yes
vernal pools	constructed	yes

The proposed project activities will not significantly effect the use of these features by wildlife.

D. Other Projects

No other projects exist nor are planned currently by the plan submitter that will affect the biological environment of the assessment area. Conversion of forest habitat to other uses, particularly agricultural production, has been occurring in the analysis area (see the list of past timber harvest activities at the front of this section). These conversions place added importance on developing and approving land management plans that maintain forest habitats over time.

E. Interactions

The following factors were considered in determining what the potential is for significant cumulative effects on the biological resources of the assessment area:

- The biological resources of the assessment area (part A and C).
- Current habitat conditions and expected changes (part B)
- The effects of past and future projects (part D)

The potential for developing significant cumulative effects on the biological resources of the assessment area as a result of the project combined with past projects is low. The potential of these effects occurring combining past, proposed, and reasonable foreseeable future projects is also low. In fact, the proposed project will maintain biological resources and buffer suburban and agricultural reduction of habitat.

F. Impacts Evaluation

Based on the information gathered by the RPF, the contents of the Management Plan, the forest practice rules, information from the review of other plans, and the evaluation presented above in sections A through E the project, as proposed, is not likely to produce significant adverse cumulative effects on the biological resources within the assessment area.

This is based in large part on the fact that proposed management will continue long term trends and little change will occur in vegetation and habitat components. Specifically large trees will be retained in patches, hardwoods will be retained at high levels, and overall forest habitat will change little over time. There are no reasonably potential significant effects as a result of implementing the proposed project.

IV. CUMULATIVE RECREATION RESOURCES IMPACTS ASSESSMENT

A. Recreation Resources Inventory

The recreation assessment area is the NTMP area plus 300 feet. This area is suggested in California Department of Forestry and fire Protection Guidelines for assessment of Cumulative Impacts, October 27, 1992 as adequate for assessing cumulative impacts for the recreation resource. In addition to residential recreation by landowners and adjacent residents, large numbers of recreationists use the project area. Primary uses include: mountain bike riding-including two organized events, jogging, hiking, horseback riding, and the outdoor activities associated with these such as birdwatching and picnicking. Camping activities are allowed at redwood flat by organized groups.

B. Change in Recreational Resources

Timber operations will be scheduled and planned to minimize disruption of ongoing recreational uses of the area. Some closures for safety will be required. Warning signs will be posted as needed and logging activities will be scheduled so no harvesting activities will occur on Saturdays nor on days when heavy recreational use is scheduled (such as bike events). The existing and proposed road system will not allow high speed hauling, so safety problems generated by log hauling and recreation uses will be minimized. Skidding and falling operations and road improvement will be laid out to assure-as much as possible-that existing trails are not rendered unusable. Skid trails will open up old trails that are brushed over and unusable by bikes which may, in fact, increase trail mileage.

C. Impacts Evaluation

The proposed project individually and in combination with past and foreseeable future activities will have no reasonably potential significant effects to the recreational uses of the area. While some temporary impacts will occur during the actual harvest, no cumulative, significant, nor lasting impacts will occur.

V. CUMULATIVE VISUAL RESOURCE IMPACTS ASSESSMENT

A. Visual Resource Inventory

The area within 3 miles of the NTMP area was reviewed to identify areas where significant numbers of people might view planned activities. This 3 mile distance defines the visual assessment area. This area is suggested in California Department of Forestry and fire Protection Guidelines for assessment of Cumulative Impacts, October 27, 1992 as adequate for assessing cumulative impacts for the visual resource. Near-view visual effects will generally be limited to within 300 feet of the NTMP boundary. Middle to far-view effects will be most evident from the areas around Sentinel Hill and Pope and Chiles Valleys. No Special Treatment Areas have been designated by the Board of Forestry in or near the plan area. The far-view areas are approximately 1.5 miles from the project area. Viewers in this area will view the area from stationary locations near residences and on the county road through the valley. It is anticipated that neither of these locations will accrue noticeable adverse effects. Viewer inferior positions combined with light harvesting will render activities barely noticeable from middle to far views. Viewers in the near-view areas will view the area from stationary locations near residences. Many local residents and alumni of the college feel that the visual quality in the Angwin area is an important background for local activities.

B. Change in Visual Resource

Light harvest levels proposed in this plan will entirely mitigate middle and far view visual affects. The continuous forest cover and the inferior viewer position will assure that no soil exposure will be evident to viewers and slash and debris will be too far away to see. Near-view observers will notice slash debris and stumps. They will also notice a change in the forest if they have carefully observed the forest before and after harvest. Slash cleanup as required around residences and public use roads will mitigate this for residences within 200 feet of the property boundary. Recreation users will notice activities as roads and trails are used in the project area.

C. Other Projects

Thinning, lot clearing and vineyard conversion have all resulted in changes in the visual environment in the assessment area during the past decade. These activities will continue to change the character of the area in the future.

D. Impacts Evaluation

The proposed project will not individually nor in combination with past and future activities cause significant cumulative impacts to the visual resource. In fact, the long term commitment of the project area to uneven aged management and forest values will contribute to the stabilization of the visual quality in and adjacent to the visual assessment area.

VI. CUMULATIVE VEHICULAR TRAFFIC IMPACTS ASSESSMENT

A. Traffic Resource Inventory

The traffic assessment area will be Las Posadas Road and Cold Springs Road to Howell Mountain Road; Howell Mountain Road to Silverado Trail and Pope Valley Road; and Silverado Trail and Pope Valley Roads to Highway 29. These areas are chosen as the traffic assessment area because they are the roads that will be used in operations. Pope Valley Road and Silverado Trail both receive heavy use by all types of traffic, and the additional traffic generated by this operation will not be noticeable, much less significant. The same is true of Howell Mountain Road between the project area and Silverado Trail. Howell Mountain Road between the project area and Pope Valley is narrow with tight radius curves. Truck traffic will need to use this road with extreme caution to provide for safety.

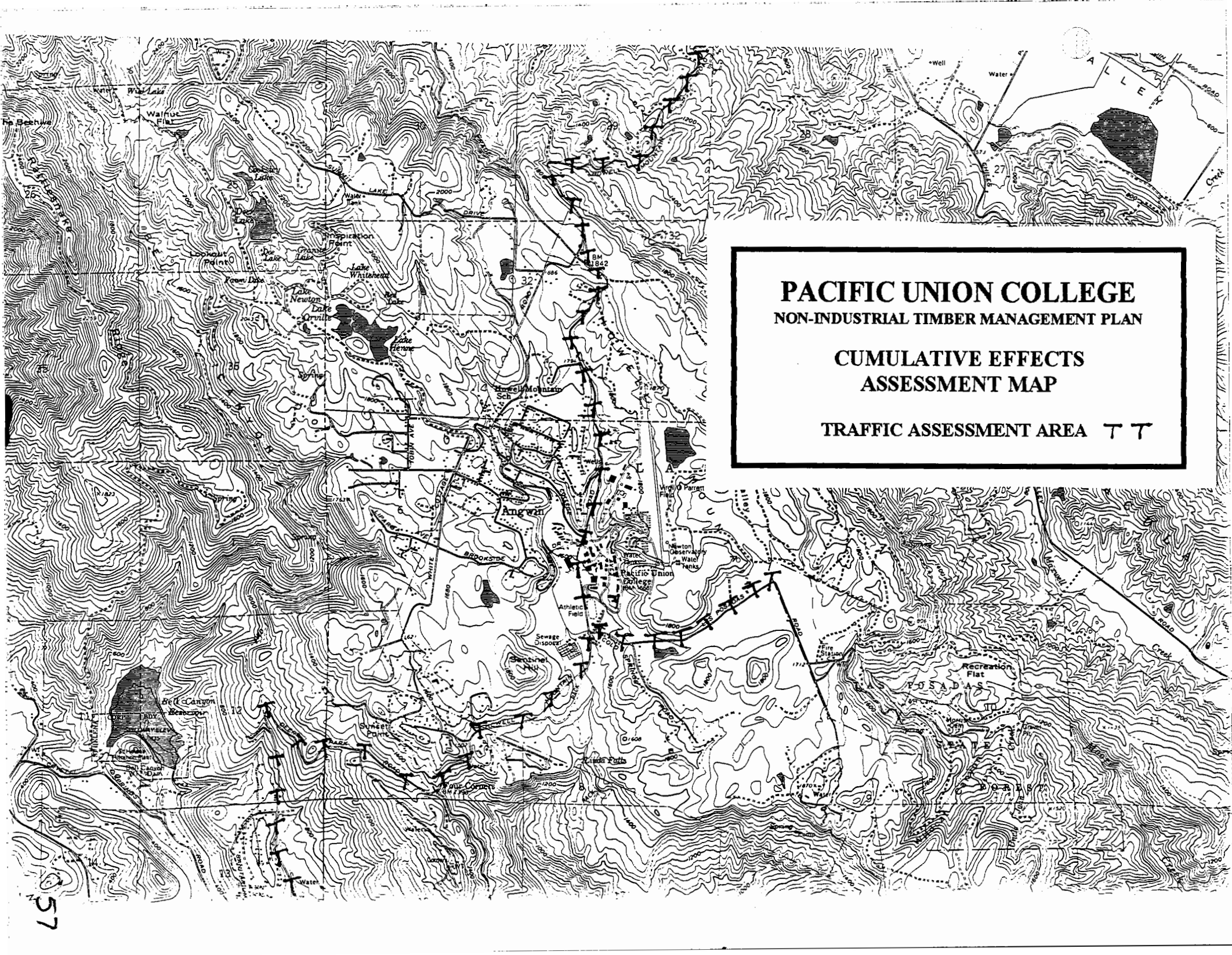
Las Posadas-Cold Creek Roads, Howell Mountain Road through Angwin and the local roads through the college all have adequate width and visibility for safe operation if posted speed limits and normal driver caution is observed. Operations on this plan will be low production and will be limited to a very low number of log truck trips daily (a maximum of 2). During each decade of the plan between 150 and 250 log truck loads will be hauled from the property. Between 15 and 25 log truck loads per year spread between the several routes will not significantly affect traffic on any of the possible haul routes.

B. Other Projects

No other projects are known that will combine with this project to produce additive effects.

C. Impacts Evaluation

The project will not combine with past nor any foreseeable future projects to produce reasonably potential significant effects.



PACIFIC UNION COLLEGE
NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

**CUMULATIVE EFFECTS
ASSESSMENT MAP**

TRAFFIC ASSESSMENT AREA T T

INFORMATION SOURCES FOR CUMULATIVE IMPACTS ASSESSMENT

Personal communications with the following individuals:

**Steve Sayers-Forest Manager, Las Posadas State Forest
(707) 928-5484**

**Ted Wooster-Biologist, CA Department of Fish and Game
Region 3 Hqtrs., Yountville, (707) 944-5524**

**Lynn Compas-THP Researcher, Northwest Information Center
S.S.U., Rohnert Park, (707) 664-2494**

**Mark Gary-Archaeologist, California Department of Forestry
and Fire Protection, Santa Rosa, (707) 576-2959**

**Joe Callizo-CNPS Record Steward for Napa County
(707) 965-2225**

David Isle-Botonist, Stonyford, CA (916) 934-3316

Mike Ramsey-PCB (916) 934-3316

**Bruce Wallis-Pacific Union College and amateur birder
(707) 965-9304**

**Charlie Brown-Resource Manager, Pacific Union College
(707) 965-6668**

The following documents were used in assessing cumulative impacts:

**Natural Diversity Database Output for Pacific Union College VMP
Draft VMP Pacific Union College
Cumulative Effects Assessment-Hershey THP (conversion)
CNPS plant status information (both Napa County records and statewide list)
THP atlas-Region I Headquarters, CDF
Various U.S.F.S. publications on the Visual Resource Management System**

APPENDIX A

SPECIES OF CONCERN

SPOTTED OWL CONSULTATION

Plan Name Pacific Union College NTMP

Date Referral Received by DFG: 6/26/95 Date RPF Notified: _____ Alternative used: _____
Date Referral Received by CDF: _____ USGS Quad Name ST. HELENA, CALIF.
(Date Referral Received by Designated Biologist: 6/26/95 fill in) (X)7.5" ()15"

California Department of Fish and Game
Northern Spotted Owl Consultation Checklist

95 JUN 29 AM 9:07
RECEIVED
FISH AND GAME
CALIFORNIA

A1 Plan Submitter James Harvey
Consultation Information Submitter Mike Ramsey
Watershed/Tributaries Moore Cr. and Conn Cr. to Napa River, Maxwell Cr. to Lake Berryessa.

Township	Range	Sections	County
<u>9N</u>	<u>5W</u>	<u>32, 33, 34</u>	<u>Napa</u>
<u>8N</u>	<u>5W</u>	<u>3, 4, 5, 6, 7, 8, 9, 10</u>	<u>Napa</u>

Plan Acres/Silviculture (approx. acres) Management area 1, 150 acres; Management area 2, 21 acres; Management area 3, 10 acres; Uneven-aged management/single tree selection. Management area 4, 915 acres; Management area 5, 255 acres; Uneven-aged management/group selection. Prescribed fire may be used in all management areas.

A2 Document Review

	Submitted	Needed	Explanation
Plan Description	<u>X</u>		
Planimetric/Topographic Map	<u>X</u>		
Habitat Map (acres/location)	<u>X</u>		On/Off Site
Aerial Photos (if available)	Source: <u>WAC</u>	Series/Date: <u>1992 # 8-67</u>	
NSO Location Map (1.3 Miles)	<u>X</u>		Nest/Roost
Database (CDF Printout)	<u>X</u>		Date/Results <u>12/11/95</u>

(DFG Territory #) NP002, NP014, NP028, NP029
(submit database printout with referral request and consultation checklist)
Survey Data X Results 6/10/95 visual on 1 um at night. 6/11/95 umf found during day, male took 3 mice dropping and ignoring the third mouse. The pair was also found at the same roost sight on 6/15/95. The male was also found at this roost site on 10/8/95. The pair was found at a different roost site (historical) on 6/26/95.

A3 Field Review

Review Participants Ted Wooster, Mike Ramsey, James Harvey

Adequate Review Route ()no (X)yes Date 6/26/95 Explain _____

Accurate Maps ()no (X)yes Explain _____

Accurate Habitat Mapping ()no (X)yes Explain _____

Adequate Surveys ()no (X)yes Explain Although surveys were not completed to USFWS protocol, the owls present on the property were located. Based on the observations recorded, and behavior of the owls, it was determined that the pair was not nesting. Potential owl habitat within and adjacent to all Management areas, except populated developed areas were surveyed.

Habitat Characteristics Larger and older conifers are predominately found adjacent to developed areas associated with the college campus, management area 1. Management area 2, which is the two spotted owl roosting locations, and management areas 3 and 4 have similar habitat characteristics. These include predominately single story canopies, even-aged conifers approximately 80 -120 years old about 100 feet tall with tan oak being the predominate hardwood. Canopy closure varies between 20-100% Tree species include redwoods, Douglas fir, ponderosa pine, tan oak, black oak, and madrone.

Plan Name Pacific Union College NTMP

Project Evaluation

- B1 NSO's detected within 1.3 miles of operations area? ()no (X)yes Date last detected 10/8/95
 NSO's present now? ()unknown (X)yes: (X)onsite ()500' ()1000' ()0.7mi ()1.3mi
 Will NSO habitat retention standards be met post harvest? ()no (X)yes Describe post-harvest
 habitat characteristics to support NSO's: Management area 1 will continue to provide
approximately 50% roosting and 50% foraging habitat. Management area 2 will maintain
current roosting and foraging habitat and increase nesting habitat to 100%. Management area 3
will ultimately provide 100% nesting and roosting habitat and 100% foraging habitat.
Management area 4 will continue to provide 40 % roosting/nesting habitat and 100% foraging
habitat. Management area 5 will provide 40% nesting and roosting habitat and 100% foraging
habitat. Note acreages for foraging habitat include acreages that also contribute to nesting
and roosting habitat.

Estimated Habitat Retention Acres by Management Area (MA) (pre/post NTMP implementation):

	MA 1		MA 2		MA 3		MA 4		MA 5	
Nest	75	/ 75	5	/ 21	4	/ 10	366	/ 366	26	/ 102
Roost	75	/ 75	21	/ 21	4	/ 10	366	/ 366	26	/ 102
Forage	75	/ 75	21	/ 21	10	/ 10	915	/ 915	255	/ 255
Non-Habitat		/		/		/		/		/

- B2 Is this consultation for more than one (1) THP (NTMP)? (X)no ()yes
 List all known NSO consultations within 1.3 mi of this survey area None known.

- B3 Will the proposed plan significantly disrupt, impair or modify (if yes or unk, explain in B4)
- | | no | n/a | unk | yes |
|---|----------|-----|-----|-----|
| a. Local movement (onsite or within 0.5mi of NSO) | <u>X</u> | | | |
| b. Dispersal opportunity (within 1 mi of NSO) | <u>X</u> | | | |
| c. Prey base (within 0.5 mi of NSO) | <u>X</u> | | | |
| d. Foraging Habitat | <u>X</u> | | | |
| e. Roosting Structure | <u>X</u> | | | |
| f. Roosting Behavior | <u>X</u> | | | |
| g. Nesting Structure | <u>X</u> | | | |
| h. Nesting behavior | <u>X</u> | | | |
| i. Other (predation, exposure, etc.) | <u>X</u> | | | |

- B4 Comments (evaluate the adequacy of information provided, compliance with accepted guidelines, and features specific to survey area) Management areas 2, 3, 4, and 5 will be resurveyed when
operations are planned to occur during the breeding season (March 1 through July 31).
Owl habitat outside the property was not analyzed due to the size of the property and the
proposed management under the NTMP. There are over 1300 acres on this property which meets
or exceeds foraging habitat; however, foraging habitat within the management areas totals 1276
acres. The adjacent Las Posadas State Forest will also provide at least foraging habitat. Nesting
and roosting habitat will be increased and better protected ensuring longevity of habitat with the
implementation of the proposed management

Name of preparer for parts A & B, if different from designated biologist: Mike Ramsey

Plan Name Pacific Union College NTMP

Consultation Determination

Pursuant to the Protocol for Surveying Proposed Management Activities that may impact Northern Spotted Owls, endorsed and revised by the U.S. Fish and Wildlife Service (USFWS) on March 17, 1992, subsequent revisions to the protocol issued by the USFWS, and other scientific information available to me, I have verified in the field information submitted and have concluded that:

- C1 The information provided is sufficient to complete my evaluation.
- C2 The surveys provided to me ~~do not~~ ^{do} conform to the protocol issued and revised by the USFWS.
- C3 The information provided to me and the field review of the plan and surrounding area lead me to conclude that: own
- C3-1. The plan area is suitable northern spotted owl habitat;
- C3-2. The project area and surrounding habitat has been adequately evaluated for the presence of northern spotted owls;
- C3-3. The potential that undetected northern spotted owls or northern spotted owl territories exist in or near the plan is not likely; and
- C3-4. The potential for this plan to result in the "unauthorized incidental take" of a northern spotted owl is not likely. Thw

A determination that the potential for unauthorized incidental take has been minimized (C-3, above) remains valid until the start of the breeding season in the year 1996. For operations to be conducted in management areas 2,3,4 and 5 during the breeding season (March 1-July 31) after this date 1) protocol surveys must be completed in areas of suitable NSO habitat; 2) the current year status of all known NSO sites and new sites must be determined; 3) reconsultation must be completed if nesting NSO's are found outside of management area 2; 4) if NSO's are found nesting in management area 2, no operations shall occur within 500 feet of nesting spotted owls. All survey results must be provided to the DFG/CDF upon request. For this consultation determination to be valid, all measures stipulated must be adopted as enforceable conditions of the NTMP.

This consultation checklist applies to a plan that (initial applicable findings):

TWN

- C4(not)—Does not need to be revised to minimize unauthorized incidental take.
- C5()—Has been revised to minimize unauthorized incidental take, as described in the attached comments.
- C6()—Requires revisions in order to minimize unauthorized incidental take, as described in the attached comments.
- C7()—For which the consultation checklist cannot be completed until additional information is submitted (Sections 919.10(C), 939.10(C)). The additional information is described in the attached comments.

Signature

mw

Mike Ramsey
Private Consulting Biologist

Print Name

Mike Ramsey

Attached to the worksheet are 19 additional pages.

Date Completed 1/24/96

Based on the information provided, I am in agreement with the conclusions reached by the Private Consulting Biologist.

Signature

Theodore W Wooster
Designated Biologist

Print Name

Theodore W Wooster

Form Distribution: (☒) DB (☒) DFG HQ (☒) CDF (☒) RPF (☒) PCB

Susanna Lange

NORTHERN SPOTTED OWL DATABASE
Recorded Observation Information Request
(one plan only per each request)

TO: California Department of Forestry & Fire Protection
P.O. Box 670
Santa Rosa, CA 95401

Attn: Forest Practice

REQUESTER:

Name: James Harvey
Address: Box 824
Lakeport, CA 95453

Phone: (707) 263 0850

LOCATION:

Plan Name: Pacific Union College NTMP

County (s) NAPA

Legal Description of Plan Area

Tnshp	Rng	Sctn(s)
<u>9N</u>	<u>5W</u>	<u>32, 33, 34</u>
<u>8N</u>	<u>5W</u>	<u>See Attached Map 3, 4, 5, 6, 7, 8, 9, 10</u>
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

Legal Description of Sections within 1.5 miles of Plan Area 2, 3, 4, 5,

Tnshp	Rng	Sctn(s)
<u>8N</u>	<u>5W</u>	<u>6 ; 7 ; 8 ; 17 ; 18 ; 9, 10, 11, 14, 15, 11</u>
<u>9N</u>	<u>5W</u>	<u>19 ; 20 ; 21 ; 26 ; 27 ; 28, 29, 30, 31, 32, 33, 34</u>
<u> </u>	<u> </u>	<u> </u>
<u>7N</u>	<u>6W</u>	<u>1 ; 12 ; 13 ;</u>
<u>9N</u>	<u>6W</u>	<u>25 ; 36 ;</u>

+ The following land grants: LA Jota, Las Posadas, Catacula, La Coaton

Map: Attached is a map showing the location of potential operations taken from the USGS 7.5 minute topographic quadrangles Srt. Helena.

SIGNATURE: James W. Harvey

RPF # 2121

CDF Use Only

DATE RECEIVED:

DATE RESPONSE MAILED: 12-11-95
REQUEST ID NUMBER: 944

INSORQST.4M

NOTICE

**DUE TO BUGS IN THE DATA BASE,
REPORT FORM 2 MAY INCLUDE ERRORS
IN THE LOCATION OF ACTIVITY CENTERS.**

**UNTIL FURTHER NOTICE,
PLEASE USE REPORT FORM 3
TO ID ACTIVITY CENTER LOCATIONS**

California Department of Fish and Game
California Department of Forestry and Fire Protection

NORTHERN SPOTTED OWL DATABASE MANAGEMENT SYSTEM

APRIL 10, 1995 DATA

REPORT #1

REPORT OF AREAS SEARCHED

COUNTY áááááá	TOWNSHIP áááááááá	RANGE ááááá	SECTION áááááááá	TERRITORY áááááááááá
NP	8N	5W	2	** NO OWLS KNOWN **
NP	8N	5W	3	** NO OWLS KNOWN **
NP	8N	5W	4	** NO OWLS KNOWN **
NP	8N	5W	5	** NO OWLS KNOWN **
NP	8N	5W	6	** NO OWLS KNOWN **
NP	8N	5W	7	** NO OWLS KNOWN **
NP	8N	5W	8	** NO OWLS KNOWN **
NP	8N	5W	9	** NO OWLS KNOWN **
NP	8N	5W	10	NP028
NP	8N	5W	11	** NO OWLS KNOWN **
NP	8N	5W	14	** NO OWLS KNOWN **
NP	8N	5W	15	** NO OWLS KNOWN **
NP	8N	5W	16	** NO OWLS KNOWN **
NP	8N	5W	17	NP014
NP	8N	5W	18	NP014
NP	8N	6W	1	** NO OWLS KNOWN **
NP	8N	6W	12	** NO OWLS KNOWN **
NP	8N	6W	13	** NO OWLS KNOWN **
NP	9N	5W	19	** NO OWLS KNOWN **
NP	9N	5W	20	** NO OWLS KNOWN **
NP	9N	5W	21	** NO OWLS KNOWN **
NP	9N	5W	26	** NO OWLS KNOWN **
NP	9N	5W	27	** NO OWLS KNOWN **
NP	9N	5W	28	** NO OWLS KNOWN **
NP	9N	5W	29	** NO OWLS KNOWN **
NP	9N	5W	30	NP002
NP	9N	5W	31	** NO OWLS KNOWN **
NP	9N	5W	32	NP029
NP	9N	5W	33	** NO OWLS KNOWN **
NP	9N	5W	34	** NO OWLS KNOWN **
NP	9N	5W	35	** NO OWLS KNOWN **
NP	9N	6W	25	** NO OWLS KNOWN **
NP	9N	6W	36	** NO OWLS KNOWN **

NOTE: THREE SEPERATE REPORTS ARE GENERATED IF NORTHERN SPOTTED OWL RECORDS ARE KNOWN FROM THE REQUESTED AREA. THE SECOND AND THIRD REPORTS WILL NOT PRINT IF OBSERVATIONS RECORDS ARE NOT FOUND.

NOTE

Northern Spotted Owl information has been submitted with Non-Industrial Timber Management Plan **1-96NTMP-015 NAP.** Under direction of the U.S. Fish & Wildlife Service (USFWS) and Department of Fish & Game (DFG), the California Department of Forestry and Fire Protection (CDF) can not disclose site-specific information and thus has edited site-specific information from the general version of this THP and placed it in a confidential file at the CDF Region I headquarters, 135 Ridgway Avenue, Santa Rosa, CA 95401. The information edited from the general version of the plan has been sent to the following locations for review:

- ☒ DFG - Region 3 (Dick Moore @ SNU)
- ☐ DFG - Region 1 - Eureka
- ☐ CDF Field Unit - Fortuna
- ☐ CDF Field Unit - Ukiah
- ☒ CDF Field Unit - Santa Rosa Region Office
- ☒ Other **REVIEWING FORESTER, CDF REGION OFFICE**

Site-specific information may be released by DFG of the USFWS on a need-to-know basis. In this instance, contact:

Gordon Gould
Department of Fish & Game
Wildlife Management Division
Nongame Bird and Mammal Section
1416 Ninth Street
Sacramento, CA 95814

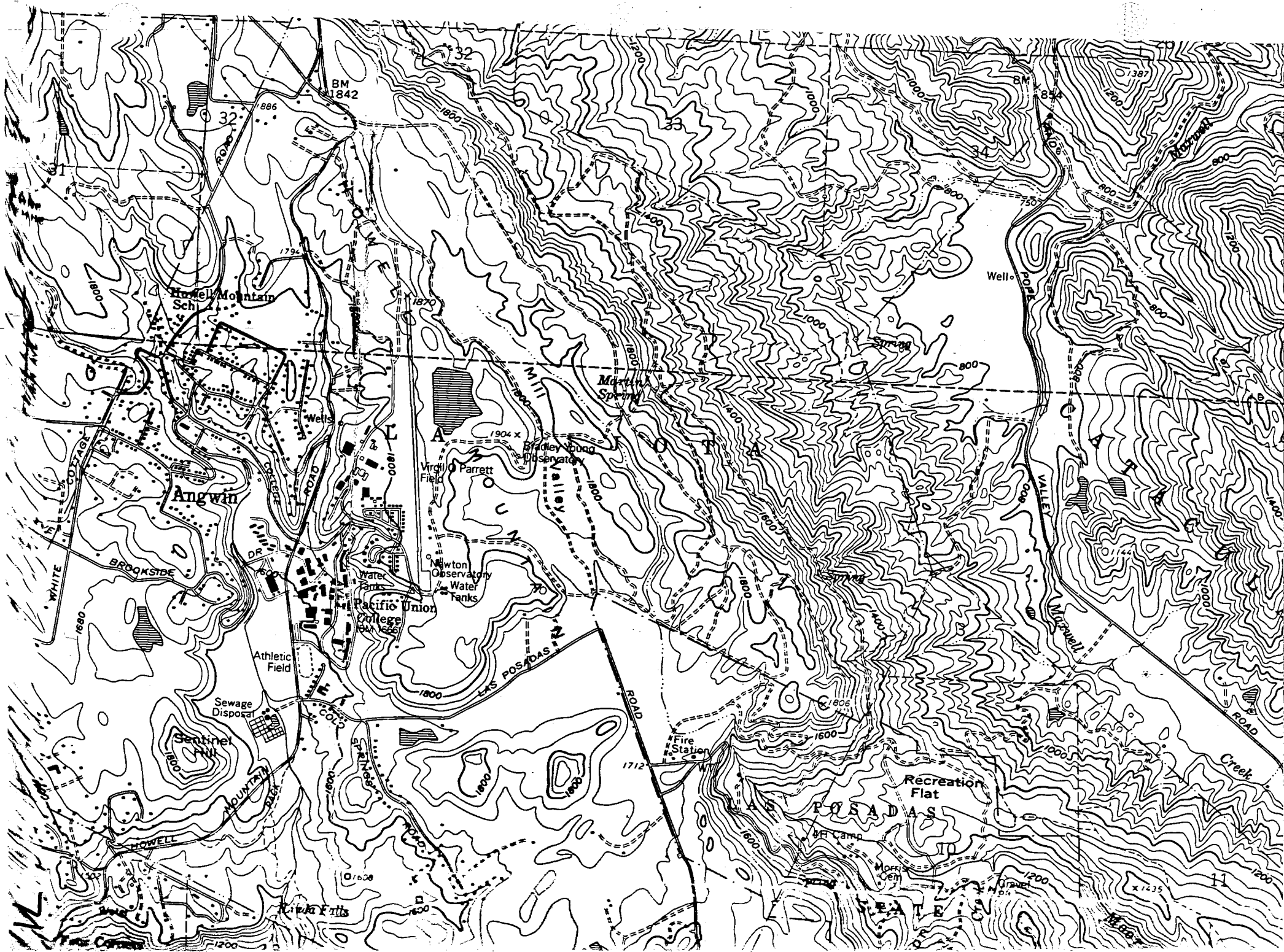
or:

US Fish & Wildlife Service
2800 Cottage Way, Room E-1823
Sacramento, CA 95825



↑ N

ⓂⓂⓂ = Nesting / Roosting
Habitat





PLANT SURVEYS

The following plants were identified as occurring on the Saint Helena Quadrangle. Reconnaissance of habitat for these plants was completed and no plants of these species was found.

Astragalus clarianus

Ranunculus lobbi

Perideria gairdneri

Ceanothus divergens

The following are list 1b plants that may have habitat on the property. While looking for the plants known to occur near the plan area, a search was performed for these plants as well.

Lupinus sericatus

Monardella villosa ssp. globosa

Sidalcea hickmanii ssp. viridis

Sidalcea oragana ssp. hydrophylla

While conducting the reconnaissance for the plants above, the following plants were noted to have potential habitat on the property.

The following list 2 plant:

Limnanthes floccosa ssp. floccosa

The following list 3 plants:

Erigeron bioletti

Erigeron luteolum var. caninum

The following list 4 plants:

Antirrhinum virga

Calandrina brewerii

Ceanothus purpureus

Cordylanthus tenuis ssp brunneus

Lilium rubescens

Lomatium repostum--Found Near Mill Valley.

Madia nutans--found near Mill Valley.

Micropus amphibolus

Monadella viridis--Found Near Mill Valley.

Pityopus californicus

Ribes victoris

Trichostema rubisepalum

The following species were noted as possibly in the area, but no habitat exists on the property for them due to serpentine habitat selectivity by the plants.

Hesperolinon divergens

Cryptantha clevelandii var. *dissita*

Erigeron angustatus

Madia hallii

Vernal pool and chaparral habitat occur on the property, but are generally excluded from the NTMP area. No activities nor effects are expected to occur in these habitat types.

<u>Genus</u>	<u>Species</u>	<u>Sub spp or var</u>	<u>List</u>	<u>Habitat</u>
<i>Astragalus</i>	<i>clarianus</i>		1b	dry meadows
<i>Ceanothus</i>	<i>divergens</i>		1b	brushy ridgetops
<i>Madia</i>	<i>nutans</i>		4	open rocky areas
<i>Lupinus</i>	<i>sericatus</i>		1b	disturbed areas
<i>Sidalcea</i>	<i>hickmanii</i>	<i>viridis</i>	1b	vernal pools
<i>Sidalcia</i>	<i>oragana</i>	<i>hydrophylla</i>	1b	vernal pools
<i>Limnanthes</i>	<i>floccosa</i>	<i>floccosa</i>	2	vernal pools
<i>Ranunculus</i>	<i>lobbi</i>		4	vernal pools
<i>Calandrina</i>	<i>brewerii</i>		4	fire annual
<i>Antirrhinum</i>	<i>virga</i>		4	chaparral
<i>Ceanothus</i>	<i>purpureus</i>		4	chaparral
<i>Micropus</i>	<i>amphibolus</i>		4	chaparral
<i>Ribes</i>	<i>victoris</i>		4	chaparral
<i>Cordylanthus</i>	<i>tenuis</i>	<i>brunneus</i>	4	generally serp
<i>Pityopus</i>	<i>californicus</i>		4	dense conifers
<i>Perideria</i>	<i>gairdneri</i>		1b	
<i>Monardella</i>	<i>villosa</i>	<i>globosa</i>	1b	
<i>Erigeron</i>	<i>bioletti</i>		3	
<i>Erigonum</i>	<i>luteolum</i>	<i>caninum</i>	3	
<i>Lilium</i>	<i>rubescens</i>		4	
<i>Lomatium</i>	<i>repostum</i>		4	
<i>Monadella</i>	<i>viridis</i>		4	
<i>Trichostema</i>	<i>rubisepalum</i>		4	

AVIAN SPECIES

BIRDS

of

PACIFIC UNION COLLEGE

Revised: January 29, 1996

The following is a preliminary list of 184 species of birds that have been seen on Pacific Union College property. This list is arranged according to the 6th edition of the A.O.U. Checklist, 1983.

PODICIPEDIFORMES

Podicipedidae

Pied-billed Grebe YV
Horned Grebe WV
Eared Grebe WV
Clark's Grebe R

Common Goldeneye R
Barrow's Goldeneye A
Rufflehead WP
Common Merganser FM
Ruddy Duck WR

PELECANIFORMES

Phalacrocoracidae

Double-crested Cormorant YV

FALCONIFORMES

Cathartidae

Turkey Vulture YR

CICONIIFORMES

Ardeidae

Great Blue Heron YR
Great Egret YR
Cattle Egret A
Green-backed Heron R

Accipitridae

Black-shouldered Kite YV*
Northern Harrier RM
Sharp-shinned Hawk SR
Cooper's Hawk YR**
Red-shouldered Hawk YR*
Red-tailed Hawk YR
Golden Eagle R

ANSERIFORMES

Anatidae

Tundra Swan R
Greater White-fronted Goose R
Snow Goose R
Canada Goose R
Wood Duck YR
Green-winged Teal WR
Mallard YR*
Northern Pintail WV
Cinnamon Teal R
Northern Shoveler WR
Gadwall R
Eurasian Wigeon WV
American Wigeon WR
Canvasback R
Ring-necked Duck WV
Greater Scaup A
Lesser Scaup R

Falconidae

American Kestrel YR**
Merlin WV
Peregrine Falcon YV

CALLIFORMES

Meleagridinae

(Meleagrididae)
Wild Turkey YV*

Odontophorinae

California Quail YR*
Mountain Quail R

GRUIFORMES

Rallidae

Wigeon R
American Coot YV

CHARADRIIFORMES

Lesser Golden Plover (Pulva) A
Semipalmated Plover A
Killdeer YR*

Recurvirostridae

Big Horned Grebe (A)
American Avocet (?) A

Scolopacidae

Greater Yellowlegs WV
Lesser Yellowlegs FM
Spotted Sandpiper FM
Western Sandpiper FM
Least Sandpiper WV
Baird's Sandpiper FM
Pectoral Sandpiper FM
Long-billed Dowitcher FM
Common Snipe WR
Wilson's Phalarope FM
Red-necked Phalarope FM
Red Phalarope A

Laridae

Bonaparte's Gull WV
Caspian Tern A

COLUMBIFORMESColumbidae

Rock Dove YR*
Band-tailed Pigeon YV
Mourning Dove YR**

STRIGIFORMESTytonidae

Common Barn Owl YR**

Strigidae

Western Screech Owl YR**
Great Horned Owl YR**
Northern Pygmy Owl YR**
Spotted Owl YR**

APODIFORMESApodidae

Vaux's Swift A
White-throated Swift A

Trochilidae

Costa's Hummingbird A
Calliope Hummingbird A
Rufous Hummingbird SM
Allen's Hummingbird SR*

Alcedinidae

Belted Kingfisher YR**

PICIFORMESPicidae

Acorn Woodpecker YR*
Red-breasted Sapsucker WR
Williamson's Sapsucker A
Nuttall's Woodpecker YR**
Downy Woodpecker YR**
Hairy Woodpecker YR*
Northern Flicker YR**
Pileated Woodpecker YR**

PASSERIFORMESTyrannidae

Olive-sided Flycatcher SR
Western Wood-Pewee SR*
Willow Flycatcher FM
Gray Flycatcher A
Pacific Slope Flycatcher SR*
Black Phoebe YR*
Say's Phoebe YV
Ash-throated Flycatcher SR**
Western Kingbird SR**

Hirundinidae

Purple Martin R*
Tree Swallow SR*
Violet-green Swallow SR**
Northern Rough-winged Swallow SR*
Cliff Swallow SR*
Barn Swallow SR*

Corvidae

Steller's Jay YR*
Scrub Jay YR*
Clark's Nutcracker A
American Crow YR*
Common Raven YR**

Paridae

Mountain Chickadee A
Chestnut-backed Chickadee YR*
Plain Titmouse YR*

Aegithalidae

Bushtit YR**

Sittidae

Red-breasted Nuthatch R
White-breasted Nuthatch YR**
Pygmy Nuthatch YR*

Certhiidae

Brown Creeper YR*

Troglodytidae

Bewick's Wren YR**
House Wren SR**
Winter Wren WR

Cinclidae

American Dipper R

Muscicapidae

(Sylviinae)

Golden-crowned Kinglet WV
Ruby-crowned Kinglet WR

(Turdinae)

Western Bluebird YR*
Townsend's Solitaire A
Swainson's Thrush R
Hermit Thrush YR**
American Robin YR*
Varied Thrush WR

(Timalinae)

Wrentit YR**

Mimidae

Northern Mockingbird YR**
California Thrasher YR**

Motacillidae

American Pipit WR

Bombycillidae

Bohemian Waxwing A

Cedar Waxwing YV

Ptilogonatidae

Phainopepla A

Sturnidae

European Starling YR*

Vireonidae

Solitary Vireo SR**
Hutton's Vireo SR**
Warbling Vireo SR*

Emberizidae

(Parulinae)

Orange-crowned Warbler SR*
Nashville Warbler A
Yellow Warbler FM
Yellow-rumped Warbler WR
Black-throated Gray W. YR*
Townsend's Warbler WV
Hermit Warbler WV
MacGillivray's Warbler FM
Common Yellowthroat WV
Wilson's Warbler SR**
Yellow-breasted Chat R

(Thraupinae)

Western Tanager SR**

(Cardinalinae)

Black-headed Grosbeak SR*
Lazuli Bunting R

(Emberizinae)

Rufous-sided Towhee YR*
California Towhee YR*
American Tree Sparrow A
Chipping Sparrow R
Lark Sparrow YV
Savannah Sparrow YR**
Fox Sparrow WR
Song Sparrow YR**
Lincoln's Sparrow FM
White-throated Sparrow WR
Golden-crowned Sparrow WR
White-crowned Sparrow WR
Harris' Sparrow A
Dark-eyed Junco YR*

(Icterinae)

Red-winged Blackbird YR*
Tricolored Blackbird WV
Western Meadowlark YR**
Brewer's Blackbird YR*
Brown-headed Cowbird YR
Northern Oriole SR*
Evening Grosbeak R

Fringillidae

(Carduelinae)

Purple Finch YR
House Finch YR*
Red Crossbill R
Pine Siskin WV
Lesser Goldfinch YR**
Lawrence's Goldfinch R
American Goldfinch WV

Passeridae

House Sparrow YR

CODES:

YR - Year round resident
SR - Summer resident
WR - Winter resident
YV - Year round visitant
WV - Winter visitant
SM - Spring migrant
FM - Fall migrant
RM - Rare migrant
R - Rare
A - Accidental

* - Current or Previous Nesters
** - Suspected but unconfirmed
Nesters

DEFINITIONS:

A "Resident" indicates a bird species that is readily observed on college property in its preferred habitat.

A "Visitant" indicates a bird species that is within its normal range-but is observed only occasionally on college property.

A "Migrant" is a bird species that it is usually observed only during migration.

"Rare" indicates an unusual siting of a bird species.

"Accidental" indicates a bird species that strayed out of its normal range and will most likely not be seen again on college property.

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APPENDIX B

HERITAGE RESOURCES

(CONFIDENTIAL)

NOTE

Information concerning archeological sites has been removed from this Non-Industrial Timber Management Plan (NTMP), 1-96NTMP-015 NAP, in accordance with the policy of The Office of Historic Preservation as adopted by the State Historical Resources Commission under the authority of Public Resources Code 5020.4.

Copies of the information have been sent to the following locations to facilitate review of the project:

1. CDF field unit - Santa Rosa Region Office

The original copy of this material is maintained in a confidential file at CDF Region I Headquarters, 135 Ridgeway Avenue, Santa Rosa, CA 95401.

APPENDIX C

SOIL RESOURCES

ESTIMATED SURFACE SOIL EROSION HAZARD
RM-87 (4/84)

STATE OF CALIFORNIA
BOARD OF FORESTRY

I. SOIL FACTORS				FACTOR RATING BY AREA					
				100	101	102			
A. SOIL TEXTURE	Fine	Medium	Coarse	A	B	C			
1. DETACHABILITY	Low	Moderate	High	15	15	15			
Rating	1-9	10-18	19-30						
2. PERMEABILITY	Slow	Moderate	Rapid	2	2	2			
Rating	5-4	3-2	1						
B. DEPTH TO RESTRICTIVE LAYER OR BEDROCK									
	Shallow	Moderate	Deep	7	7	7			
	1"-19"	20"-39"	40"-60" (+)						
Rating	15-9	8-4	3-1						
C. PERCENT SURFACE COARSE FRAGMENTS GREATER THAN 2 MM IN SIZE INCLUDING ROCKS OR STONES									
	Low	Moderate	High	6	6	6			
	(-) 10-39%	40-70%	71-100%						
Rating	10-6	5-3	2-1						
				SUBTOTAL					
					30	30			
II. SLOPE FACTOR									
Slope	5-15%	16-30%	31-40%	41-50%	51-70%	71-80% (+)	2	5	8
Rating	1-3	4-6	7-10	11-15	16-25	26-35			
III. PROTECTIVE VEGETATIVE COVER REMAINING AFTER DISTURBANCE									
	Low	Moderate	High	2	2	2			
	0-40%	41-80%	81-100%						
Rating	15-8%	7-4	3-1						
IV. TWO-YEAR, ONE-HOUR RAINFALL INTENSITY (Hundredths Inch)									
	Low	Moderate	High	Extreme	8	8	8		
	(-) 30-39	40-59	60-69	70-80 (+)					
Rating	1-3	4-7	8-11	12-15					
				TOTAL SUM OF FACTORS					
					42	45	48		
EROSION HAZARD RATING									
	<50	50-65	66-75	>75	L	L	L		
	LOW (L)	MODERATE (M)	HIGH (H)	EXTREME (E)					
	THE DETERMINATION IS								

7540-130-043

129

ESTIMATED SURFACE SOIL EROSION HAZARD
RM-87 (4/84)

STATE OF CALIFORNIA
BOARD OF FORESTRY

I. SOIL FACTORS				FACTOR RATING BY AREA		
A. SOIL TEXTURE	Fine	Medium	Coarse	A	B	C
1. DETACHABILITY	Low	Moderate	High	15	15	16
Rating	1-9	10-18	19-30			
2. PERMEABILITY	Slow	Moderate	Rapid	2	2	2
Rating	5-4	3-2	1			

B. DEPTH TO RESTRICTIVE LAYER OR BEDROCK

	Shallow	Moderate	Deep			
	1"-19"	20"-39"	40"-60" (+)	5	5	5
Rating	15-9	8-4	3-1			

C. PERCENT SURFACE COARSE FRAGMENTS GREATER THAN 2 MM IN SIZE
INCLUDING ROCKS OR STONES

	Low	Moderate	High	FACTOR RATING BY AREA		
	(-) 10-39%	40-70%	71-100%	4	3	3
Rating	10-6	5-3	2-1	A	B	C
SUBTOTAL				26	25	26

II. SLOPE FACTOR

Slope	5-15%	16-30%	31-40%	41-50%	51-70%	71-80% (+)	2	10	10
Rating	1-3	4-6	7-10	11-15	16-25	26-35			

III. PROTECTIVE VEGETATIVE COVER REMAINING AFTER DISTURBANCE

	Low	Moderate	High			
	0-40%	41-80%	81-100%	2	2	2
Rating	15-8%	7-4	3-1			

IV. TWO-YEAR, ONE-HOUR RAINFALL INTENSITY (Hundredths Inch)

	Low	Moderate	High	Extreme	8	8	8
	(-) 30-39	40-59	60-69	70-80 (+)			
Rating	1-3	4-7	8-11	12-15			

TOTAL SUM OF FACTORS 38 45 46

EROSION HAZARD RATING

<50	50-65	66-75	>75	L	L	L
LOW (L)	MODERATE (M)	HIGH (H)	EXTREME (E)			
THE DETERMINATION IS						

7540-130-043

130

ESTIMATED SURFACE SOIL EROSION HAZARD

RM-87 (4/84)

STATE OF CALIFORNIA
BOARD OF FORESTRY

SOIL FACTORS				FACTOR RATING BY AREA		
A. SOIL TEXTURE	Fine	Medium	Coarse	A	B	C
1. DETACHABILITY	Low	Moderate	High	12		
Rating	1-9	10-18	19-30			
2. PERMEABILITY	Slow	Moderate	Rapid	2		
Rating	5-4	3-2	1			

B. DEPTH TO RESTRICTIVE LAYER OR BEDROCK

	Shallow	Moderate	Deep	7		
	1"-19"	20"-39"	40"-60" (+)			
Rating	15-9	8-4	3-1			

C. PERCENT SURFACE COARSE FRAGMENTS GREATER THAN 2 MM IN SIZE INCLUDING ROCKS OR STONES

Rating	Low	Moderate	High	5			FACTOR RATING BY AREA		
	(-) 10-39%	40-70%	71-100%				A	B	C
	10-6	5-3	2-1						
SUBTOTAL							26		

II. SLOPE FACTOR

Slope	5-15%	16-30%	31-40%	41-50%	51-70%	71-80% (+)	10		
Rating	1-3	4-6	7-10	11-15	16-25	26-35			

III. PROTECTIVE VEGETATIVE COVER REMAINING AFTER DISTURBANCE

	Low	Moderate	High	2		
	0-40%	41-80%	81-100%			
Rating	15-8%	7-4	3-1			

IV. TWO-YEAR, ONE-HOUR RAINFALL INTENSITY (Hundredths Inch)

	Low	Moderate	High	Extreme	8		
	(-) 30-39	40-59	60-69	70-80 (+)			
Rating	1-3	4-7	8-11	12-15			
TOTAL SUM OF FACTORS							

EROSION HAZARD RATING

	<div><div><50</div><div>LOW (L)</div></div>	<div><div>50-65</div><div>MODERATE (M)</div></div>	<div><div>66-75</div><div>HIGH (H)</div></div>	<div><div>>75</div><div>EXTREME (E)</div></div>	46		13
	THE DETERMINATION IS <div>0</div>						

The following data are excerpts from the publication Soil Survey of Napa County, 1978 published by the Soil Conservation Service (now the Natural Resource Conservation Service).

Aiken series

The Aiken series consists of well drained soils on uplands. Slope is 2 to 50 percent. Elevation is 300 to 2,500 feet. These soils formed in material weathered from basic volcanic rock. The natural vegetation consists of ponderosa pine, oaks, redwoods in moist draws, annual grasses, and brush in small areas that had been cleared. The mean annual precipitation is 30 to 50 inches, and the mean annual temperature is 54° to 56° F. Summers are warm and dry, and winters moist and cool. The frost-free season is 200 to 250 days.

In a representative profile the surface layer is reddish brown, medium acid and slightly acid loam 8 inches thick. The subsoil is medium acid, reddish brown clay loam and medium acid, yellowish red clay 36 inches thick. Hard basic igneous rock is at a depth of 44 inches.

Permeability is moderately slow. The effective rooting depth is 40 to 60 inches or more. Available water capacity is 6.5 to 11 inches.

Aiken soils are mainly used for timber. A few areas that are gently sloping have been cleared and are used for vineyards and orchards.

Representative profile of Aiken loam, 2 to 15 percent slopes, 400 feet southwest from the southwest corner of the fence line of the air strip at Pacific Union College, SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 5, T. 8 N., R. 5 W.:

A11—0 to 2 inches, reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; moderate fine and medium granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine common medium roots; few fine interstitial pores; medium acid (pH 6.0); clear smooth boundary.

A12—2 to 8 inches, reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium and few coarse roots; few fine common medium tubular pores; slightly acid (pH 6.2); abrupt wavy boundary.

B21t—8 to 14 inches, reddish brown (5YR 5/4) clay loam, dark reddish brown (5YR 3/4) moist; weak coarse angular blocky structure; very hard, friable, sticky and plastic; few fine and medium and many coarse roots; many very fine and fine tubular and interstitial pores; few thin clay films on peds and lining pores; medium acid (pH 6.0); clear wavy boundary.

B22t—14 to 20 inches, yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; weak coarse angular blocky structure; very hard, firm, very sticky and plastic; many medium and common coarse roots; many very fine and fine tubular and interstitial pores; few thin clay films on peds and lining pores; medium acid (pH 6.0); gradual wavy boundary.

B23t—20 to 27 inches, yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; massive; very hard, firm, very sticky and plastic; few fine and medium roots; common very fine and fine tubular and interstitial pores; common thin clay films on peds and lining pores; medium acid (pH 6.0); diffuse wavy boundary.

B31t—27 to 35 inches, yellowish red (5YR 5/8) clay, yellowish red (5YR 4/8) moist; massive; very hard, firm, very sticky and plastic; few fine and medium roots; common very fine and fine tubular and interstitial pores; common thin clay films on peds and lining pores; medium acid (pH 6.0); diffuse wavy boundary.

B32t—35 to 44 inches, yellowish red (5YR 5/8) clay, yellowish red (5YR 4/8) moist; massive; hard, firm, very sticky and plastic; common very fine and fine tubular and interstitial pores; common thin clay films on peds and lining pores; medium acid (pH 6.0); abrupt irregular boundary.

R—44 inches, basic igneous bedrock.

The A horizon is dark reddish brown and reddish brown (5YR 3/3, 3/4, and 4/4) loam or clay loam. In some pedons it is gravelly and cobbly and is 15 to 30 percent fragments, by volume. Structure is fine and medium granular to weak and fine or medium subangular blocky.

The Bt horizon is strong brown, reddish brown, and yellowish red (7.5YR 5/6 and 4/6 and 5YR 4/4, 5/4, 5/6, 5/8, 7/6, and 6/6). Structure is weak, coarse, subangular blocky or angular blocky, or the soil is massive. Reaction is medium acid or strongly acid. Depth to hard igneous bedrock ranges from 40 to 60 inches.

The Aiken soils in Napa County are shallower to bedrock and are less acid than is defined in the range for the series. These differences, however, do not greatly alter the use and behavior of the soils.

100—Aiken loam, 2 to 15 percent slopes. This gently sloping to strongly sloping soil is mainly on foot slopes on uplands, but in places in the Los Posadas area it is on wide, mesalike areas. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Boomer, Forward, Kidd, and Sobrante soils. Also included were small areas of soils, along White Cottage Road, that formed in material weathered from serpentine, areas of soils that have stones on the surface, and areas of soils that are more than 60 inches deep to bedrock.

Runoff is medium, and the hazard of erosion is slight.

This soil is mainly used for timber and watershed. Small areas that are gently sloping are used for vineyards and orchards. Capability unit IIIe-1(5).

101—Aiken loam, 15 to 30 percent slopes. This moderately steep soil is on side slopes on uplands.

Included with this soil in mapping were small areas of Boomer, Felton, Forward, Kidd, and Sobrante soils, areas of soils that have stones on the surface, and areas of soils that are more than 60 inches deep to bedrock.

Runoff is medium, and the hazard of erosion is moderate.

This soil is used for timber, recreation, wildlife habitat, and watershed. Capability unit IVe-1(5).

102—Aiken loam, 30 to 50 percent slopes. This steep soil is on uplands.

Included with this soil in mapping were small areas of Boomer, Felton, Forward, Kidd, and Sobrante soils, areas of soils that have stones on the surface, and areas of soils that are similar to this Aiken soil but that are less than 40 inches deep to bedrock.

Runoff is rapid, and the hazard of erosion is moderate.

This soil is used for timber, recreation, wildlife habitat, and watershed. Capability unit VIe-1(5).

Boomer series

The Boomer series consists of well drained soils on uplands. Slope is 2 to 50 percent. Elevation is 500 to 2,500 feet. These soils formed in material weathered from mixed igneous rocks. The plant cover is Douglas-fir, ponderosa pine, black oak, manzanita, poison-oak, and madrone. The mean annual precipitation is 30 to 50 inches, and the mean annual temperature is 53° to 56° F. Summers are warm and dry, and winters are cool and moist. The frost-free season is 210 to 250 days.

In a representative profile a 2-inch-thick layer of duff and litter is on the surface. The mineral surface layer is brown, medium acid loam 4 inches thick. The subsoil is brown and yellowish red, slightly acid and medium acid clay loam 30 inches thick. The substratum is pink, slightly acid clay loam 10 inches thick. Very pale brown weathered andesite is at a depth of 44 inches.

Permeability is moderately slow. The effective rooting depth is 40 to 60 inches or more. Available water capacity is 6 to 10 inches.

Boomer soils are used mostly for timber. Some small areas are used for wildlife habitat and recreation.

Representative profile of Boomer loam, 2 to 15 percent slopes, 4,800 feet east of intersection of Howell Mountain Road and Los Posados Road and 90 feet south of Los Posados Road, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 4, T. 8 N., R. 5 W.:

O1—2 inches to 0; duff and litter.

A1—0 to 4 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; common very fine tubular and interstitial pores; medium acid (pH 6.0); gradual smooth boundary.

B1t—4 to 11 inches; brown (7.5YR 5/4) clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few coarse, common medium, and many very fine and fine tubular and interstitial pores; few thin clay films on peds and lining pores; medium acid (pH 6.0); gradual smooth boundary.

B21t—11 to 22 inches; yellowish red (5YR 5/6) clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few coarse and many very fine and fine roots; common very fine and fine tubular and interstitial pores; common thin clay films on peds and lining pores; slightly acid (pH 6.3); clear wavy boundary.

B22t—22 to 34 inches; yellowish red (5YR 5/6) and light brown (7.5YR 6/4) clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; few thin clay films on peds and in pores; slightly acid (pH 6.2); clear wavy boundary.

C1—34 to 44 inches; pink (7.5YR 7/4) clay loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, sticky and slightly plastic; few coarse, very fine, and fine roots; common very fine and fine tubular and interstitial pores; few thin clay films in pores; slightly acid (pH 6.2); gradual irregular boundary.

Cr2—44 to 56 inches, very pale brown (10YR 7/4) weathered andesite.

The A1 horizon is brown (7.5YR 5/4 and 4/4) loam or gravelly loam. It is medium acid or slightly acid. In some pedons the A1 horizon is 15 to 20 percent pebbles 2 to 5 millimeters in diameter. It is less than 15 percent pebbles in pedons on foot slopes and plateaus.

The Bt horizon is brown or yellowish red (7.5YR 5/4, 4/4, and 5YR 5/6) clay loam or gravelly clay loam. In some pedons the Bt horizon is 15 to 20 percent pebbles 2 to 5 millimeters in diameter.

The C horizon is pale brown, very pale brown, or pink (10YR 7/3, 7/4, and 6/3 and 7.5YR 8/4 and 7/4). Depth to the Cr horizon is 40 to 60 inches.

Boomer soils in Napa County are less red than is defined in the range for the series. This difference, however, does not alter the use and management of the soils.

107—Boomer loam, 2 to 15 percent slopes. This gently sloping to strongly sloping soil is on foot slopes and plateaus on uplands. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Aiken, Forward, and Kidd soils.

Runoff is medium. The hazard of erosion is slight.

This soil is used for timber, recreation, and watershed. Capability unit IIIe-1 (5).

108—Boomer gravelly loam, 15 to 30 percent slopes. This moderately steep soil is on side slopes on uplands. It has a profile similar to the one described as representative of the series, but the profile is 15 to 20 percent pebbles 2 to 5 millimeters in diameter.

Included with this soil in mapping were small areas of Aiken, Forward, and Kidd soils. Also included were areas of soils that have stones on the surface and areas of Rock outcrop.

Runoff is rapid. The hazard of erosion is moderate.

This soil is used mostly for timber and watershed. Capability unit IVe-1 (5).

109—Boomer gravelly loam, 30 to 50 percent slopes. This steep soil is on uplands. It has a profile similar to the one described as representative of the series, but the profile is 15 to 20 percent pebbles 2 to 5 millimeters in diameter.

Included with this soil in mapping were small areas of Aiken, Forward, and Kidd soils. Also included were areas of soils that have stones on the surface and areas of Rock outcrop.

Runoff is rapid. The hazard of erosion is moderate.

This soil is used mostly for timber, wildlife habitat, and watershed. Capability unit VIe-1 (5).

Lodo series

The Lodo series consists of somewhat excessively drained soils on uplands. Slope is 30 to 75 percent. Elevation is 400 to 2,500 feet. These soils formed in material weathered from sandstone and shale. The vegetation is chamise, manzanita, and scrub oak and small trees in protected areas. The mean annual precipitation is 30 to 40 inches, and the mean annual temperature is 60° to 62° F. Summers are hot and dry, and winters are cool and moist. The frost-free season is 220 to 260 days.

In a representative profile the surface layer is brown, neutral loam 4 inches thick. The subsoil is brown, neutral heavy loam 3 inches thick. Fractured sandstone is at a depth of 7 inches.

Permeability is moderate. The effective rooting depth is 6 to 20 inches, but in most areas it is 6 to 12 inches. The available water capacity is 1 to 3.5 inches.

Lodo soils are mainly used for wildlife habitat and watershed. A few areas are used for range.

Representative profile of Lodo loam, in an area of Lodo-Maymen-Felton association, 30 to 75 percent slopes, 600 feet east on Oakville Grade Road from intersection with Dry Creek Road and 300 feet north of Oakville Grade Road, NW $\frac{1}{4}$ SE $\frac{1}{4}$, R. 5 W., T. 7 N.:

A1—0 to 4 inches, brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak, very fine and medium granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine and medium tubular and interstitial pores; neutral (pH 6.7); clear wavy boundary.

B2—4 to 7 inches, brown (7.5YR 5/4) loam, dark brown (7.5YR 3/2) moist; weak medium granular and weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine and medium tubular and interstitial pores; neutral (pH 6.7); clear wavy boundary.

R—7 inches, fractured fine grained sandstone.

The A1 horizon is mainly grayish brown or brown (10YR 4/3 and 5/2 and 2.5Y 5/2) loam or clay loam, but it is shaly loam or shaly clay loam in some profiles. Reaction is slightly acid or neutral.

The B2 horizon is mainly brown or yellowish brown (10YR 5/3, 5/4 and 7.5YR 5/4) loam or clay loam, but it is shaly loam or shaly clay loam in some profiles. Reaction is slightly acid or neutral. Depth to fractured, fine grained sandstone and shale is 6 to 20 inches.

The soil is mapped only in association with Maymen, Millsholm, and Felton soils.

157—Lodo-Maymen-Felton association, 30 to 75 percent slopes. This association consists of steep and very steep soils on hills mainly in the Dry Creek-Oakville Grade area in the central part of Napa County. The Lodo soils in this association are in convex areas on south-facing slopes of 50 to 75 percent, and they are covered by brush and grass. The Maymen soils are on north-facing slopes of 30 to 50 percent, and they are covered by dense brush. The Felton soils are on north- and east-facing slopes that border Dry Creek and that are in moist draws; they are mainly covered by conifers, but some of the areas have a deciduous cover of chamise, forbs, and grasses.

This association is mainly 60 percent Lodo soils, 20 percent Maymen soils, and 20 percent Felton soils. In areas near Greeg Mountain and west of Pope Valley, the association is 45 percent Lodo soils, 25 percent Maymen soils, 20 percent Felton soils, and 10 percent Millsholm soils and soils that are similar to Lodo soils but that are more than 10 inches deep to bedrock.

Runoff is rapid to very rapid. The hazard of erosion is high to very high. It is higher in the Lodo soils than in the other soils of this association.

These soils are used for timber, range, watershed, and wildlife habitat. Capability unit VIIe-1 (15); Lodo and Maymen parts in Shallow Coarse Loamy range site, Felton part not assigned to a range site.

Forward series

The Forward series consists of well drained soils on uplands. Slope is 2 to 75 percent. Elevation is 400 to 3,500 feet. These soils formed in material weathered from rhyolite. The plant cover is Douglas-fir, madrone, scrub oak, pepper, and bay trees. The mean annual precipitation is 30 to 50 inches, and the mean annual temperature is 54° to 56° F. Summers are warm and dry, and winters are cool and moist. The frost-free season is 200 to 230 days.

In a representative profile the surface layer is light gray, slightly acid gravelly loam 4 inches thick. The subsoil is light gray, medium acid and strongly acid loam 22 inches thick. The substratum is light gray, strongly acid gravelly loam that overlies weathered rhyolitic tuff at a depth of 35 inches.

Permeability is moderately rapid. The effective rooting depth is 20 to 40 inches. Available water capacity is 2 to 4.5 inches.

Forward soils are used for watershed, wildlife habitat, and limited timber production.

Representative profile of Forward gravelly loam, 30 to 75 percent slopes, 30 feet north of southeast corner of parking lot facing southernmost building on Pacific Union College campus and 30 feet east, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 8 N., R. 5 W.:

- O1—2 inches to 0, duff and litter; slightly acid.
- A1—0 to 4 inches, light gray (10YR 6/1) gravelly loam, very dark grayish brown (10YR 3/2) moist; strong fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, medium, and coarse roots; many very fine and fine interstitial pores; 20 percent gravel; slightly acid (pH 6.5); diffuse wavy boundary.
- B1—4 to 10 inches, light gray (10YR 7/2) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure that parts to weak fine granular; soft, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; few medium and common very fine and fine tubular pores; 10 percent gravel; medium acid (pH 6.0); diffuse wavy boundary.
- B21—10 to 17 inches, light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure that parts to weak fine granular; soft, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few medium and common very fine and fine tubular pores; 10 percent gravel; medium acid (pH 5.8); gradual wavy boundary.
- B22—17 to 26 inches, light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak medium subangular and weak fine granular structure; soft friable, slightly sticky and slightly plastic; few very fine and fine, common medium, and many coarse roots; few medium and common very fine and fine tubular pores; 10 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.
- C1—26 to 35 inches, light gray (10YR 7/2) gravelly loam, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine and common medium roots; many very fine and fine tubular pores; 25 percent gravel; strongly acid (pH 5.5); gradual wavy boundary.
- C2r—35 to 49 inches, light gray (10YR 7/1) weathered rhyolitic tuff, very pale brown (10YR 7/3) moist.

The A horizon is light gray, light brownish gray, or pale brown (10YR 6/1, 6/2, and 6/3) gravelly loam or loam. It is 10 to 20 percent gravel. Reaction is slightly acid or medium acid.

The B horizon is light gray or light brownish gray (10YR 7/2, 6/2) gravelly loam or loam. It is 10 to 20 percent gravel. Reaction is medium acid or strongly acid.

The C horizon is very pale brown or light gray (10YR 7/1, 7/2, 7/3, and 8/3) gravelly loam or loam. It is 10 to 30 percent gravel. Reaction is medium acid or strongly acid. Depth to weathered rhyolitic tuff is 20 to 40 inches.

138—Forward gravelly loam, 2 to 9 percent slopes. This gently sloping to moderately sloping soil is on side slopes on uplands.

Included with this soil in mapping were small areas of Aiken, Boomer, Kidd, and Sobrante soils. Also included were areas of soils that are similar to this Forward soil but that have a clay loam subsoil and that are less than 20 inches deep to bedrock.

Runoff is medium. The hazard of erosion is slight. This soil is used for limited timber production, vineyards and orchards, wildlife habitat, and watershed. Capability unit IIIe-1 (5).

139—Forward gravelly loam, 9 to 30 percent slopes. This strongly sloping to moderately steep soil is on side slopes on uplands.

Included with this soil in mapping were small areas of Aiken, Boomer, Kidd, and Sobrante soils. Also included were areas of soils that are similar to this Forward soil but that have a clay loam subsoil and that are less than 20 inches deep to bedrock.

Runoff is medium. The hazard of erosion is slight to moderate.

This soil is used for limited timber production, wildlife habitat, and watershed. Capability unit IVe-1 (5).

140—Forward gravelly loam, 30 to 75 percent slopes. This steep and very steep soil is on uplands. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Aiken, Boomer, Kidd, and Sobrante soils. Also included were areas of soils that are similar to this Forward soil but that have a clay loam subsoil and areas of clayey, less sloping soils.

Runoff is very rapid. The hazard of erosion is high to very high.

This soil is used for timber, recreation, wildlife habitat, and watershed. Capability unit VIIe-1 (5).

141—Forward-Kidd complex, 50 to 75 percent slopes. This complex consists of very steep soils on uplands. These soils are so intermingled that it was not practical to separate them at the scale used in mapping. Commonly, the Forward soils are on toe slopes and the Kidd soils on side slopes.

This complex is about 60 percent Forward soils, about 20 percent Kidd soils, and about 20 percent Aiken, Boomer, and Sobrante soils and areas of rock outcrop.

Runoff is rapid and the hazard of erosion is high in the less sloping areas. Runoff is very rapid and the hazard of erosion is very high in the more sloping areas.

The soils in this complex are used for limited timber production, wildlife habitat, and watershed. Capability unit VIIe-1 (5).

Perkins series

The Perkins series consists of well drained soils on terraces. Slope is 2 to 9 percent. Elevation is 150 to 1,500 feet. These soils formed from alluvium derived from igneous rock. The vegetation consists of oak-grass in natural state and orchards and vineyards where the soils are cultivated. The mean annual precipitation is 30 to 40 inches, and the mean annual temperature is 59° to 62° F. Summers are hot and dry, and winters are cool and moist. The frost-free season is 220 to 260 days.

In a representative profile the surface layer is brown, slightly acid gravelly loam 19 inches thick. The subsoil is reddish brown, slightly acid gravelly clay loam 38 inches thick. The substratum is brown slightly acid gravelly loam to a depth of 60 inches.

Permeability is slow. The effective rooting depth is 50 to 60 inches. Available water capacity is 7.5 to 8.5 inches.

Perkins soils are used for vineyards and orchards where the soils are cultivated, and they are used for grazing areas that have an oak-grass cover.

Representative profile of Perkins gravelly loam, 5 to 9 percent slopes, about 4,600 feet south on Silverado Trail from Yountville Cross Road and 50 feet west of Silverado Trail, T. 7 N., R. 4 W. (nonsectionalized):

A11—0 to 7 inches, brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) moist; moderate medium granular and subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular and vesicular pores; 20 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

A12—7 to 19 inches, brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) moist; moderate medium granular and subangular blocky structure; slightly hard, friable, non-sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular and vesicular pores; few thin discontinuous clay films on peds; 25 percent gravel; slightly acid (pH 6.5); gradual smooth boundary.

B1t—19 to 29 inches, reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure that parts to moderate fine and medium granular; slightly hard, friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine tubular and vesicular pores; common thin discontinuous clay films on peds, lining pores, and as bridges; 20 percent gravel; slightly acid (pH 6.5); gradual smooth boundary.

B21t—29 to 44 inches, reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure that parts to moderate fine and medium granular; hard, friable, slightly sticky and slightly plastic; very few coarse and many fine and very fine roots; few fine tubular and many vesicular pores; common thin continuous clay films on peds, lining

pores, and as bridges; 20 percent gravel; slightly acid (pH 6.5); gradual smooth boundary.

B22t—44 to 57 inches, reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure that parts to moderate fine and medium granular; hard, friable, slightly sticky and slightly plastic; few coarse and common very fine and fine roots; few fine tubular and many vesicular pores; common thin discontinuous clay films on peds, lining pores, and as bridges; 20 percent gravel; slightly acid (pH 6.5); diffuse wavy boundary.

C—57 to 60 inches, brown (7.5YR 5/4) gravelly loam, reddish brown (5YR 3/4) moist, moderate medium subangular blocky structure that parts to weak fine and medium granular; hard, friable, slightly sticky and slightly plastic; few coarse and common very fine and fine roots; few fine tubular and many vesicular pores; common thin discontinuous clay films on peds, lining pores, and as bridges; many shale and mixed volcanic fragments; 30 percent gravel; slightly acid (pH 6.5).

The A horizon is brown or reddish brown (7.5YR 5/4 and 5YR 5/4, 4/4) gravelly loam. It is 15 to 35 percent gravel.

The Bt horizon is reddish brown (5YR 5/4, 5/3, and 4/4) gravelly loam or gravelly clay loam. It is 15 to 20 percent gravel.

The C horizon is brown and reddish brown (7.5YR 5/4 and 5YR 5/4, 4/4) gravelly loam. It is 15 to 40 percent gravel. In some pedons, the C horizon is partly indurated or cemented. Depth to weathered mixed alluvium ranges from 50 to 60 inches.

The Perkins soils in Napa County do not have the massive A horizon that is in the range defined for the series. This difference, however, does not alter the use and behavior of the soils.

168—Perkins gravelly loam, 2 to 5 percent slopes. This gently sloping soil is on old terraces and alluvial plains.

Included with this soil in mapping were small areas of Bale, Coombs, and Haire soils.

Runoff is slow. The hazard of erosion is slight.

This soil is used for vineyards and orchards and for hay where the soil is not cultivated. Capability unit Iie-3 (14).

169—Perkins gravelly loam, 5 to 9 percent slopes. This moderately sloping soil is on old terraces. It has the profile described as representative for the series.

Included with this soil in mapping were small areas of Bale and Haire soils. Also included were small areas of very gravelly soils.

Runoff is medium. The hazard of erosion is slight.

This soil is mainly used for vineyards and orchards. Areas of this soil that are adjacent to other soils that are in pasture are used for grazing. Capability unit Iie-3 (14).

TABLE 3.—Woodland management and productivity

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Important trees	Site index	
Aiken: 100, 101.....	3o	Slight.....	Slight.....	Slight.....	Severe.....	Douglas-fir..... Ponderosa pine..... Redwood.....	140 148	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine
102.....	3r	Moderate.....	Slight.....	Slight.....	Severe.....	Douglas-fir..... Ponderosa pine..... Redwood.....	140 148	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine
Boomer: 107, 108.....	3o	Slight.....	Slight.....	Slight.....	Severe.....	Ponderosa pine..... Douglas-fir.....	130 130	Ponderosa pine, Monterey pine, Coulter pine, Douglas-fir.
109.....	3r	Moderate.....	Slight.....	Slight.....	Severe.....	Ponderosa pine..... Douglas-fir.....	130 130	Ponderosa pine, Monterey pine
¹ 110: Boomer part.....	3o	Slight.....	Slight.....	Slight.....	Severe.....	Ponderosa pine..... Douglas-fir.....	130 130	Ponderosa pine, Monterey pine, Coulter pine, Douglas-fir.
Forward part.....	3o	Slight.....	Slight.....	Slight.....	Severe.....	Douglas-fir..... Ponderosa pine..... Redwood.....	140	Ponderosa pine, Douglas-fir, Monterey pine, Coulter pine.
Felta part. ¹ 111: Boomer part.....	3r	Moderate.....	Slight.....	Slight.....	Severe.....	Ponderosa pine..... Douglas-fir.....	130 130	Ponderosa pine, Monterey pine, Coulter pine, Douglas-fir.
Forward part.....	4r	Severe.....	Slight.....	Slight.....	Severe.....	Douglas-fir..... Ponderosa pine..... Redwood.....	110	Ponderosa pine, Douglas-fir, Monterey pine, Coulter pine.
Felta part. Felton: 135.....	3o	Slight.....	Slight.....	Slight.....	Severe.....	Douglas-fir.....	140	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
136.....	3r	Moderate.....	Slight.....	Slight.....	Severe.....	Douglas-fir.....	140	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
137.....	3r	Severe.....	Moderate.....	Slight.....	Severe.....	Douglas-fir.....	140	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
Forward: 138, 139.....	4o	Slight.....	Slight.....	Slight.....	Severe.....	Douglas-fir..... Ponderosa pine..... Redwood.....	110 120	Ponderosa pine, Douglas-fir, Monterey pine, Coulter pine.
140.....	4r	Severe.....	Slight.....	Slight.....	Severe.....	Douglas-fir..... Ponderosa pine..... Redwood.....	110 120	Ponderosa pine, Douglas-fir, Monterey pine, Coulter pine.
¹ 141: Forward part.....	4r	Severe.....	Slight.....	Slight.....	Severe.....	Douglas-fir..... Ponderosa pine..... Redwood.....	110 120	Ponderosa pine, Douglas-fir, Monterey pine, Coulter pine.
Kidd part.								
Lodo: ¹ 157: Lodo part.....						Live oak..... Digger pine.....		
Maymen part. Felton part.....	3r	Severe.....	Moderate.....	Slight.....	Severe.....	Douglas-fir.....	140	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
Maymen: ¹ 163: Maymen part. Millsholm part. Lodo part.....						Live oak..... Digger pine.....		

¹ This mapping unit is made up of two or more kinds of soil. See mapping unit description for the composition and behavior of

In table 3 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The *potential productivity* of merchantable or important trees on a soil is expressed as a *site index*. This index is the average height in feet that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

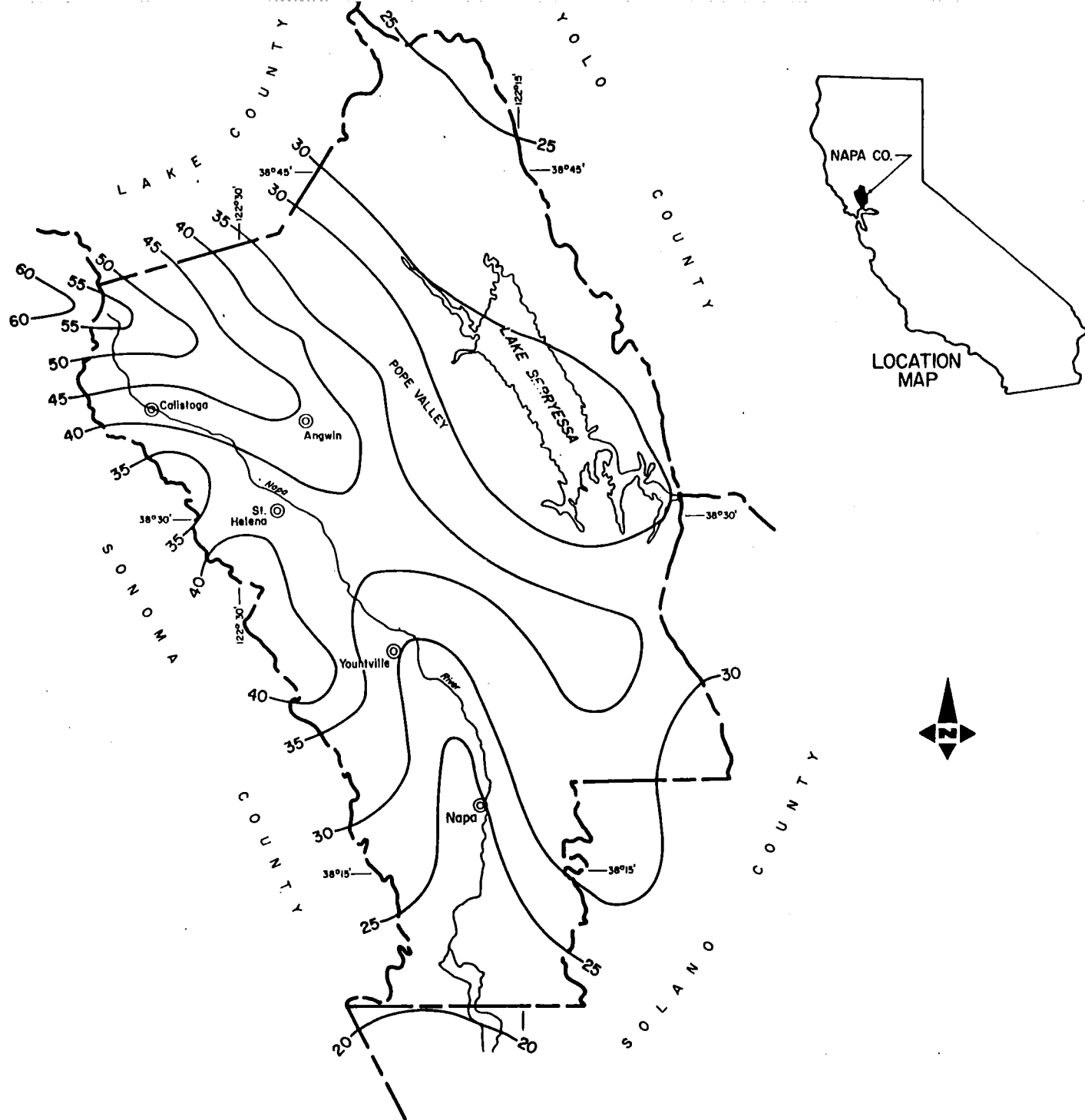


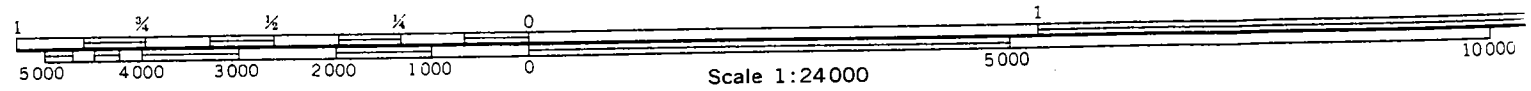
Figure 1.—Average annual precipitation in Napa County.

TABLE 15.—Temperature and precipitation data
[Data from Angwin]

Month	Temperature					Average precipitation
	Highest	Average maximum	Average	Average minimum	Lowest	
	°F	°F	°F	°F	°F	In
January.....	75	50.7	44.0	37.2	19	9.25
February.....	76	55.0	47.0	39.0	20	6.62
March.....	79	57.4	47.9	38.4	23	4.82
April.....	86	64.5	53.0	41.5	25	2.90
May.....	94	71.9	58.6	45.3	27	0.87
June.....	106	80.0	65.1	50.2	33	0.37
July.....	105	88.1	71.1	54.1	37	0.02
August.....	101	86.7	69.9	53.1	39	0.13
September.....	108	81.7	66.8	51.9	35	0.30
October.....	98	71.8	60.5	49.1	30	2.46
November.....	86	59.5	51.4	43.2	26	4.70
December.....	75	52.7	45.8	38.8	23	8.27
Year.....						140 40.74



(Joins sheet 20)



NAPA COUNTY, CALIFORNIA — SHEET NUMBER 20

R. 6 W. | R. 5 W.



Appendix D

Domestic Water Notification

AFFIDAVIT OF PUBLICATION

JAMES HARVEY

REGISTERED PROFESSIONAL FORESTER

P.O. BOX 824

LAKEPORT, CA. 95453

263-0850

STATE OF CALIFORNIA

County of Napa

I am a citizen of the United States and a resident of the County foresaid; I am over the age of eighteen years, and not a part to or interested in the above-entitled matter. I am the principal clerk of the printer of The Napa Register, a newspaper of general circulation, printed and published daily in the City of Napa, County of Napa, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Napa, State of California, under the date of November 16, 1951, Case Number 12752, that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

APRIL 22

all in the year 19 96

I certify (or declare) under penalty that the foregoing is true and correct.

Dated at . . . NAPA COUNTY . . .

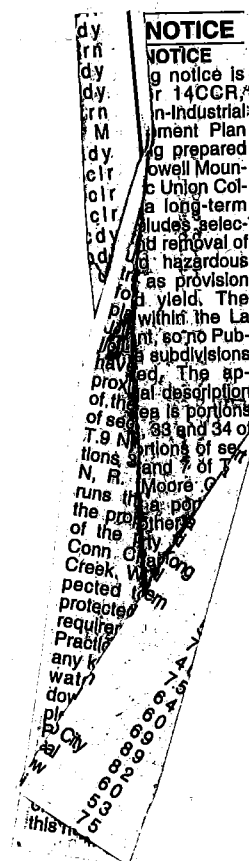
California, this 22 day of APRIL 1996

Nancy Casas
Signature

Affidavit of Publication of

No. _____

LEGAL NOTICE



A copy of the attached letter was mailed to William and Barbara White on May 25, 1996. They are the only property owners within 1000' downstream of operations on a class II watercourse.

James Harvey

Box 824
Lakeport, CA 95453
May 25, 1996

Dear Landowner:

I am currently involved in preparing a long-term forest management plan near your property. This particular type of plan is called a Non-Industrial Timber Management Plan (NTMP). It will map a strategy to improve forest health, reduce hazard tree occurrence and reduce fire hazards on land near or adjacent to your property.

One of the most frequent questions people ask when timber operations are planned near their property is "What will it look like?." The NTMP is a plan for managing a forest over a long period of time, rather than a quick, heavy harvest emphasizing short-term economic returns. As such, the strategy planned in the NTMP will include sustained yield and uneven-aged management. Single tree and group selection will be practiced adjacent to your property, so individual trees will grow and individual trees and small groups of trees will be removed, but the forest environment as a whole will change little over time. A strategy of light harvesting requires more frequent activities, but substantially reduces visual impacts.

As a part of preparing the NTMP, I need to request information about use of water from surface sources for properties less than 1000' downstream. I am certain that the protection measures in the plan and the requirements of the Forest Practice Rules will adequately protect water quality. Even though this is the case, please notify me if you have surface water uses on your property. Attached is a copy of the legal notice published in the Napa Valley Register, for your information.

Later in the year, and into the future, if you notice trees adjacent to your property that appear to be hazards, appear unhealthy, or seem to present fire hazards, please notify me. I will be working with management of the property as a whole, so I will not be as familiar with the land around your property as you are.

Sincerely,

James W. Harvey
Registered Professional Forester

018-123-005 065-001 373 541.41

UNGERMANN RALPH K M/M

27240 NATOMA RD
LOS ALTOS HILLS CA 94022-4306

018-123-006 065-001 32 20.00

HAHN KURT P AND ELLEN I

BOX 36
ANGWIN CA 94508-0036

025-010-006 077-001 37 445.99

WHITE WILLIAM M AND BARBARA E TR

4647 CHILES-POPE VALLEY RD
ST HELENA CA 94574-9654

025-010-007 077-006 33 240.00

NAPA COUNTY LAND TRUST

1040 MAIN ST #208
NAPA CA 94559-2641

025-030-019 077-006 30 60.00

LAMPLEY J BRAD UM/M ETAL
X JBL REAL ESTATE
539 BRYANT ST
SAN FRANCISCO CA 94107

025-030-020 077-006 30 50.00

LAMPLEY J BRAD UM/M ETAL
X JBL REAL ESTATE
539 BRYANT ST
SAN FRANCISCO CA 94107

025-030-021 077-006 32 73.00

LAMPLEY J BRAD S/M
X JBL REAL ESTATE
539 BRYANT ST
SAN FRANCISCO CA 94107

APPENDIX E

INSTRUCTIONS TO
LTO

SUMMARY OF INSTRUCTIONS TO LTO

NOTE: This section is prepared to aid the LTO in completion of the Pacific Union College NTMP. It is assumed that the LTO will exercise due diligence in following the Forest Practice Rules and Logging Safety orders in all activities under this plan. If a provision of this NTMP is proposed that is different than the standard rules, specific instructions are included.

SILVICULTURE

a. All trees to be harvested will be marked by an RPF except that trees which qualify as dead dying and diseased under the Rules may be harvested without designation by an RPF. All activities will be performed under an approved Notice of Timber Operations. The LTO will be given a copy of the Notice before commencement of operations.

b. Trees marked for harvest will include hardwoods. Hardwoods will be processed and slash treated the same as commercial conifers. Where damage to residual stands is not a concern, hardwoods may be uprooted or pushed over in lieu of falling to aid in vegetation control.

PESTS

When harvesting in portions of the Plan area that include Ponderosa Pine, care will be taken by the LTO to spread slash in openings to aid drying and discourage insect populations. Piling of pine slash during the period December 1-July 31 will occur in such a way to allow slash drying before piling.

HARVESTING PRACTICES

a. All yarding operations will be carried out with either a rubber-tired skidder or crawler tractor.

b. Water barring standards will meet or exceed those specified for low erosion hazard rating considering the slope where waterbars are being installed. If questions arise, installation of extra waterbars is encouraged.

c. At times during operations, the LTO may be required to directionally fall trees, rig and pull trees and take other precautions to avoid damage to facilities and to protect resources including WLPZs and residual stocking.

d. Some slopes exceeding 50% exist in the NTMP area. No tractor operations on these slopes is permitted except on benches and flats where slopes are less than 50%. Endlining and directional falling will be used to reach trees on slopes that exceed 50% without breaks.

e. Slash will be deposited on bare areas so that at least 50% of the bare area is covered in the following situations:

- 1) If operations expose a patch of bare soil of more than 800 square feet within the WLPZ of a class II watercourse.
- 2) If more than 20 feet of sidecast are deposited so that it has access to a WLPZ from either landing or road construction or maintenance.

f. Waterbars shall be constructed using the spacing guide in the rules for erosion hazard rating (EHR) of moderate.

WINTER OPERATIONS

Winter operations may be allowed in the NTMP area. These operations must adhere to the requirements of the Forest Practice Rules 14 CCR 934.7(c). Specifically, tractor work (including yarding, construction and slash disposal) may only occur during dry, rainless periods where soils are not saturated. Waterbars will be constructed daily when a chance of rain (>30%) exists and at any break in operations longer than overnight. No operations will occur in WLPZs except those required for public safety. All water breaks and rolling dips must be installed by October 15 or as prescribed above.

RECEIVED

SEP 30 1996

COAST AREA OFFICE
RESOURCE MANAGEMENT

149 (9/27)

ROADS AND LANDINGS

- a. New road locations are flagged on the ground. No construction will occur except on those locations.
- b. Reconstruction and maintenance of existing roads will include removal of berms and outslping roads with waterbars at appropriate intervals.
- c. No landings will exceed 1/4 acre in size. All landing locations will be identified on the ground by the RPF or his designee.
- d. Watercourse crossings will be reconstructed to assure drainage off the road surface. Rehabilitation after use will include removal of material deposited in watercourses and dipping the road surface to assure that no water flows down the road surface.
- e. Erosion control structures (waterbars or dips) shall be constructed using the spacing requirements for moderate EHR where cross slopes average less than 40% and EHR of high where cross slopes exceed 40%.

WATERCOURSE AND LAKE PROTECTION ZONE (WLPZ) AND DOMESTIC WATER SUPPLY PROTECTION MEASURES

- a. Several watercourses requiring protection are located in the NTMP area. These have either a WLPZ or EEZ. No equipment will be allowed to operate in these zones except at established crossings. If additional crossings are needed for operations, the NTMP must be amended and the crossing approved by the RPF.
- b. Directional falling will be required in the vicinity of streamcourses to avoid damage to riparian vegetation and to limit cleanup requirements. Activities will assure retention of 50% of the overstory canopy in WLPZs for Class II streamcourses and retention of 50% of the understory in the WLPZs and EEZs.

HAZARD REDUCTION

- a. Several roads and improvements exist in the NTMP area which require slash treatment adjacent to them. All buildings will receive the treatment specified in 14 CCR 937.2. Specifically all slash within 100 feet of the structure will be removed or piled for burning. All slash between 100 and 200 feet of any building will be lopped and scattered. All slash within 100 feet of permanent roads open to the public for vehicular use will be removed or piled for burning.
- b. Piling and burning is to be used for hazard reduction. It is the responsibility of the landowner to complete the disposal operations or arrange for the LTO to accomplish this as part of the logging contract.

BIOLOGICAL AND CULTURAL RESOURCES

- a. A pair of resident Northern Spotted Owls resides on the property. Operations are restricted during the period between March 1 and July 31 in all areas except Management Unit #1. Operations in the restricted areas can occur during this period only if surveys indicate that no nesting is occurring or if required for public health and safety.
- b. Unmerchantable snags should not be felled except for safety of operations and public health and safety.
- c. An archaeological survey been made of the areas to be harvested and several features requiring protection were found. The RPF will specify protection measures during preparation of Notice of Timber Operations for each area.

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SEP 30 1996

COAST AREA OFFICE
RESOURCE MANAGEMENT

150 (9/27)

To: Theodore Wooster, Environmental Specialist Date: 7/30/96
California Department of Fish and Game
P. O. Box 47
Yountville, CA 94599
FAX 707-944-5563

RECEIVED

JUL 30 1996

COAST AREA OFFICE
RESOURCE MANAGEMENT

Extension of No-Take Certification for Northern Spotted Owl

On 6/26/95, you signed a No-Take Certification for
northern spotted owl for THP 1-96NTMP015NAP plan name _____
Pacific Union College NTMP, County napa.

Since then, we have surveyed for NSO's on the following dates:
7/21/96, 3/22/96, and 6/23/96 7/24/96

Results of this calling are as follows: NSOs remain
in set areas (NP 29)

Detailed survey sheets are attached as appendices.

Name JAMES HARVEY
Company RPF
FAX (707) 2630850

Attachments

I have reviewed the NSO survey data for 1996 and find that it is
sufficient to insure continuation of the No-Take determination
until March 1, 1997.

*I also visited site
on 6/23/96 & located
NSO. ✓ WW*

Theodore Wooster
Theodore Wooster

Date 7/14/96

4 PAGES OF SURVEY SHEETS SUBMITTED WITH EXTENSION ON 7/30/96

NOTE

Northern Spotted Owl information has been submitted with Non-Industrial Timber Management Plan **1-96NTMP-015 NAP**. Under direction of the U.S. Fish & Wildlife Service (USFWS) and Department of Fish & Game (DFG), the California Department of Forestry and Fire Protection (CDF) can not disclose site-specific information and thus has edited site-specific information from the general version of this THP and placed it in a confidential file at the CDF Region I headquarters, 135 Ridgway Avenue, Santa Rosa, CA 95401. The information edited from the general version of the plan has been sent to the following locations for review:

- ☒ DFG - Region 3 (Dick Moore @ SNU)
- ☐ DFG - Region 1 - Eureka
- ☐ CDF Field Unit - Fortuna
- ☐ CDF Field Unit - Ukiah
- ☒ CDF Field Unit - Santa Rosa Region Office
- ☒ Other **REVIEWING FORESTER, CDF REGION OFFICE**

Site-specific information may be released by DFG of the USFWS on a need-to-know basis. In this instance, contact:

Gordon Gould
Department of Fish & Game
Wildlife Management Division
Nongame Bird and Mammal Section
1416 Ninth Street
Sacramento, CA 95814

or:

US Fish & Wildlife Service
2800 Cottage Way, Room E-1823
Sacramento, CA 95825

RECEIVED

SEP 30 1996

COAST AREA OFFICE
RESOURCE MANAGEMENT

Box 824
Lakeport, CA
September 27, 1996

Review Team

Re: 1-96NTMP-015 NAP

The following explanations and attached material is submitted in response to recommendations resulting from the PHI of July 24, 1996 and follow-up visit of August 29, 1996.

Recommendation 1. Timber marking will be completed prior to submission of individual "Notices of Operation" to allow Department inspection.

The RPF recognizes the Department's responsibility and concern for the impact that individual marking decisions may have on resource protection, particularly in the vicinity of watercourses. The RPF agrees to follow this approach with two exceptions. 1) Hazard trees, trees profoundly damaged by operations and salvage trees that meet the definitions that would qualify them for removal under an exemption will be marked and removed as they are found and as specified in the plan with no additional notice to the Department. 2) Within the scope of an outstanding and active Notice of Operations, additional trees may be marked and the RPF agrees to provide the Department with 3 days notice prior to logging.

The RPF understands that the provisions above in no way will affect the approval timing specified in CCR 1090.6.

Recommendation 2 and Recommendation 4. Erosion control structure spacing on skid trails shall be based on "Moderate" EHR rather than "Low" and road erosion control structure spacing shall be based on either "Moderate or High" EHR depending on side slope.

The RPF agrees to incorporate this recommendation into the plan (see substitute pages 35, 37, 37a, 149 and 150 attached) although he believes that the standard spacing provided in the rules will be adequate. This is based on the current condition of the road and trail system that has existed for years with no erosion control structures. Installation of structures to the standards called for in the rules will significantly enhance resource protection over the existing condition.

It is anticipated that decreased spacing will have an adverse effect on the existing and future recreation uses of the area. If this adverse effect proves significant and if wider erosion control structure spacing appears to be capable of providing resource protection, the RPF will submit a plan amendment to reduce the spacing.

PART OF PLAN

Recommendation 3. Prepare a plan to correct existing surface erosion problems on the road system within a five year period.

Attached is a map of proposed road maintenance areas (page 38a) and a discussion of the requirements (page 37a).

Recommendation 5. Use a rock lined dip instead of a culvert at the crossing between Martin Spring and Redwood Flat and install an 18" culvert rather than a 12" culvert at Martin Spring.

A substitute page 37 is attached. Since no adverse effects are occurring at any of these crossings, they are not included in the timing specified in recommendation 5.

Recommendation 6 and Recommendation 7. Cover the road surface of the road segment of abandoned road near Las Posadas with slash and block the ends of abandon road segments with cull logs.

See page 37a (attached). The road surfaces of the abandoned road will be stabilized with slash except that a single track mountain bike trail will be maintained on a location within the road surface that is stable and will not increase erosion. Cull log blockage will be designed to restrict use by four wheel vehicles, but still allow access by mountain bikes.

Recommendation 8. Flag WLPZs and mark trees for removal prior to submission of "Notice of Operations".

See revised page 33.

Recommendation 9. Prior to commencement of operations under this NTMP the RPF shall conduct annual surveys to obtain a "no take" certification from the DFG.

Specific enforceable measures are identified in the PUC consultation and included in the plan as page 63. These measures were proposed by Mike Ramsey, Consulting Biologist and agreed to by Ted Wooster of the DFG and the RPF. These measures are attached on a revised page 32.

Recommendation 10. Proposed mitigation measures received from the U.S. Fish and Wildlife Service for CA red-legged frog (CARLF) will be incorporated into the NTMP.

The RPF and CDF inspector visited the site with the FWLS biologists. No CARLFs were observed and habitat was judged marginal at best. According to most accepted authorities, the NTMP area is outside the current range of the CARLF. Bull frogs were found on the site. Based on these factors and personal review, Mike Ramsey recommended several temporary mitigation measures that, based on his professional assessment, will provide adequate protection until protocol surveys can be conducted. These measures have been sent to the Department.

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It would be an extremely rare occurrence to find a CARLF within the NTMP area. To withhold approval of the plan based on CARLF is unreasonable. The RPF recommends approval of the plan as it stands with implementation of the measures proposed by Mike Ramsey for the first year of the plan or until a protocol survey can be conducted. If the FWLS later proposes different standards, it is the responsibility of the landowner, RPF and LTO to contact the FWLS and integrate the new measures into the plan.

Recommendation 11. Include the seven mitigation measures proposed by Mark Gary into the plan.

The following recommendations from Mark Gary are included in the NTMP:

1. For the Redwood Flat and Martin Spring sites, the RPF shall flag the site boundaries just prior to the start of operations in the vicinity of these sites.
2. For the Redwood Flat and Martin Spring sites, trees selected for harvest shall be directionally felled away from the site center and towards existing skid trails or roads except where that practice would increase risk of damage to features.
3. For the Redwood Flat and Martin Spring sites, no heavy equipment shall operate within the boundaries of the sites with the exception of a rubber tired skidder restricted to operating on the existing roads and trails.
4. For sites #1, #2, and CA-NAP-541, no operations shall be permitted within the site boundaries.
5. For all sites, no slash piling or burning within the boundaries of the sites
6. For all sites, no collecting of cultural materials by project personnel.
7. For all Sites, just prior to operations, the RPF shall show the site locations to the LTO on the ground and explain restrictions to operations on and around each site.

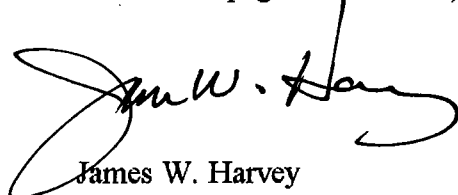
See revised page 31.

Recommendation 12. Revise the instructions to the LTO to provide for RPF identification of landing locations.

See revised page 150 (attached).

Recommendation 13. Correct the reference on page 37 to reflect the appropriate CCR section for in lieu measures.

See revised page 37 (attached).


James W. Harvey
RPF #2121

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RP, DFG, WQ
10-8-96
mc

**AGREEMENT TO ADDITIONAL RECOMMENDATIONS
FOR
NTMP 1-96NTMP-015 NAP**

I agree that the mitigation measures concerning the California red-legged frog contained in the letter from the United States Fish and Wildlife Service dated October 2, 1996, shall be incorporated into the above referenced NTMP. By incorporating these measures into the referenced NTMP, the specific mitigation measures shall become enforceable elements of the NTMP.

James W. Harvey
(RPF Signature)
James W. HARVEY
(Printed Name)

#2121
(License #)

10/6/96
(Date)

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

California State Office
3310 El Camino Avenue, Suite 120
Sacramento, California 95821

IN REPLY REFER TO:

October 2, 1996

Richard A. Wilson
Director
California Department of Forestry and Fire Protection
P.O. Box 944246
Sacramento, California 94244-2460

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Fax copy rec'd 10-3-96
NOV 12 1996

COAST AREA OFFICE
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Subject: Review of the Pacific Union College Non-Industrial Timber Management Plan (1-96-NTMP-015-NAP) Located in Napa County, California for Potential Taking of the California Red-legged Frog

Dear Mr. Wilson:

Pursuant to your August 1, 1996, request, the U.S. Fish and Wildlife Service (Service) recently formed a team of biologists to review pending timber harvest plans (THPs), non-industrial timber management plans (NTMPs) and plan amendments that are currently awaiting California Department of Forestry and Fire Protection (CDF) approval but may potentially contain suitable habitat for the federally threatened California red-legged frog (*Rana aurora draytonii*). The purpose of these reviews is to provide CDF with technical assistance in designing and implementing the proposed plans in a manner that is not likely to result in take of the California red-legged frog. Take of federally listed species is prohibited under section 9 and regulations under section 4(d) of the Endangered Species Act of 1973, as amended (Act). During the review process, the Service's team visited the plan sites in coordination with CDF biologists and foresters and compiled information on the biology and habitat of the California red-legged frog. The process also involved visiting many sites known to be California red-legged frog habitat and discussing the species with scientists and local experts. The Service has completed its case-by-case review of the pending THPs, NTMPs, and amendments provided by CDF and presents its findings herein.

The following is a summary of the aspects of the California red-legged frog's ecology that were considered by the review team in making its assessments of and recommendations for the plans. The California red-legged frog can utilize a variety of habitats during each stage of its life history. All life history stages may be found in and around breeding sites, which are known to include coastal lagoons, marshes, springs, and still water portions of streams, as well as artificial impoundments ranging from stock ponds filled with emergent vegetation to other water holding structures devoid of vegetation.

Most California red-legged frogs can be expected to occur in or near water year-round. However, at any time of year they can be found at localities remote from breeding sites in association with streams or springs or any structure on the landscape that offers cool, moist resting or sheltering habitats (e.g. under boards or in small mammal burrows). California red-legged frogs may move away from the water for several reasons. They may leave the water when conditions at aquatic sites become adverse. In addition, post-metamorphic juveniles, sub-adults, and adult California red-legged frogs may

PART OF PLAN

make movements to and from breeding sites. These breeding-associated movements typically occur during periods of mild, wet weather, particularly in the fall and spring. These movements may occur in or along stream channels or across upland habitat types and involve a diverse array of riparian and upland habitats. During hot, dry weather, if the California red-legged frog leaves the water, movements are typically confined to moist riparian vegetation.

Habitat quality for California red-legged frogs varies temporally and spatially. For example, within a single year water quality at a breeding site can deteriorate. Whole reaches of streams holding juvenile frogs can dry up. A wet, mild spring may facilitate long-distance overland dispersal by large numbers of sub-adult frogs, allowing them to colonize new breeding sites. Populations appear to persist where a mosaic of habitat elements exists, embedded within a matrix of dispersal habitat where local extinctions are counterbalanced by recolonizations of new or unoccupied areas of suitable habitat.

Because the California red-legged frog exhibits the above traits, a level of uncertainty exists in assessing the potential for take of the species as a result of timber harvest activities. However, the following landscape features and on-the-ground observations can aid in evaluating the likelihood that timber harvest may result in take of California red-legged frogs: (1) proximity of breeding sites to the plan area; (2) observations of larvae or frogs of any age class on the project site; and (3) the existence of habitat elements that temporarily attract and hold California red-legged frogs moving to and from breeding sites.

In general, take of California red-legged frogs due to implementation of timber harvest plans may occur in the following forms: killing or injuring of individual frogs during logging operations in uplands; killing or injuring individual frogs or harm through the destruction and degradation of the riparian plant community; and killing or injuring of embryos or larvae or harm through the destruction and degradation of the aquatic ecosystem onsite or downstream of the plan area due to sedimentation:

Upland Habitats: Away from watercourses or ponds, timber operations are more likely to kill, injure, or harm individual frogs during the wet season, when frogs make overland movements, than during the summer months. During the period from the first rains of fall until conditions become dry in the spring, individual frogs can be found in upland locations, often several hundred meters from streams or ponds. Such frogs are secretive during the day, taking refuge in moist niches such as leaf litter, holes, crevices, and surface objects. These quiescent individuals may be vulnerable to ground disturbing activities including road and landing construction, heavy equipment operations, and felling and yarding activities.

Riparian Habitats: The California red-legged frog forages nocturnally and seeks cover on land in moist riparian habitats close to streams or other bodies of water. The riparian plant community is likely to include ferns, horsetails, sedges and shrubs. Although these foraging excursions typically take place at night, individual frogs occasionally may spend the day resting in moist niches on land at any time of the year. Day or night, most frogs are expected to be within a few hops of water, but longer distance movements become more likely during periods of wet mild weather. Frogs in riparian habitats are vulnerable to being killed or injured by timber harvest operations within the riparian plant community. Loss of, or damage to, the riparian plant community may

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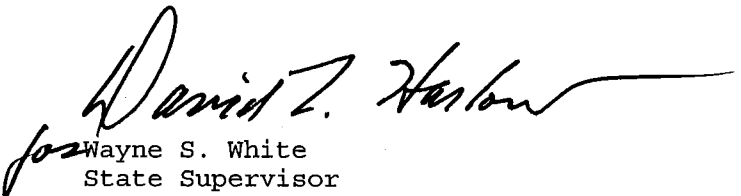
represent a loss of important foraging habitat and cover that provides shelter from desiccation and predation.

Aquatic Habitats: California red-legged frogs utilize pool habitats for breeding and refuge from predation. Sedimentation that results in any change to the hydrology of the stream and thus the aquatic environment can negatively influence habitat quality and the way frogs use the habitat. Sediments in streams can kill embryos and kill and/or slow the growth of larvae. Harm to adult frogs may occur through filling of pool habitats resulting in the loss of cover from predators and the loss of breeding sites.

Enclosed are the Service's assessment and recommendations for the Pacific Union College Non-Industrial Timber Management Plan (1-96-NTMP-015-NAP). The review team visited the site of this THP on August 29, 1996. Provided that the enclosed recommendations are implemented, the Service believes that this plan is not likely to result in the take of the California red-legged frog. Please note that this letter does not constitute authorization for incidental take. If circumstances arise indicating that implementation of this THP may result in take, operations should be suspended and the Service should be contacted immediately. The Act defines "take" as to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding or sheltering. An exception to the Federal prohibition against take of a listed species may be authorized by the Service through an incidental take permit issued pursuant to section 10(a)(1)(B) of the Act. To qualify for the permit, the project proponent would need to submit an application to the Service together with a habitat conservation plan (HCP) that describes, among other things, how the impacts of the proposed taking of federally listed species would be minimized and mitigated and how the plan would be funded. A complete description of the requirements for an HCP can be found at 50 CFR 17.32.

We appreciate your concern for protecting the California red-legged frog and CDF's cooperation during the review process. If you have questions regarding the Service's review of this timber harvest plan, please contact Dr. Steve Morey or my staff at (916) 979-2129.

Sincerely,


David Z. Harlow
Wayne S. White
State Supervisor

Enclosure

cc: FWS, Sacramento Field Office, Sacramento, CA
FWS, Ventura Field Office, Ventura, CA
CDFG, Sacramento, CA

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**Assessment and Recommendations for the Pacific Union College
Non-Industrial Timber Management Plan
(1-96-NTMP-015-NAP) Located in Napa County, California
for Potential Taking of the California Red-legged Frog (*Rana aurora draytonii*)**

The Service believes that take of California red-legged frogs may occur in the following forms: killing or injuring of individual frogs during logging operations in uplands; killing or injuring individual frogs or harm through the destruction and/or degradation of the riparian plant community; and killing or injuring of embryos or larvae or harm through the destruction and/or degradation of the aquatic ecosystem onsite or downstream of the plan area due to sedimentation. Based on the review team's evaluation of the Pacific Union College Non-Industrial Timber Management Plan (1-96-NTMP-015-NAP), the following assessment and subsequent recommendations are provided for your assistance. The following assessment and recommendations were based on the aspects of California red-legged frog ecology that were presented in the cover letter to this enclosure.

No California red-legged frogs were observed during pre-harvest inspections or during the site visit by the Service's review team on August 29, 1996. Based on the site visit, the Service has determined that it is unlikely that California red-legged frogs breed within the plan area. The nearest perennial streams are $\frac{1}{2}$ to $\frac{1}{3}$ mile away, on California State Forest property. The Service is not aware of any breeding localities within one mile of the Pacific Union College NTMP. However, because the California red-legged frog is known to make extensive overland movements during periods of wet mild weather, individuals may occur within the plan area during fall, winter, and spring. A moderate amount of riparian vegetation was associated with the springs, seeps, and intermittent streams in the NTMP area. These features could provide habitat for frogs moving through the plan area during fall, winter or spring. The proposed roads and crossings within the WLPZ, and the wide range of erosion potential of the site, suggest at least a moderate potential for mobilization of sediments into the stream courses. Based on the team's knowledge of California red-legged frog ecology and the habitat within and adjacent to the plan area, the Service has the following recommendations to assist in designing and implementing the proposed plan in a manner that is not likely to result in take of the California red-legged frog:

1. Operations in uplands that are likely to result in the take of individual California red-legged frogs through direct killing and/or injuring should be avoided. For purposes of this assessment, "uplands" are defined as all areas within the THP area that are outside riparian habitat. Measures to reduce the potential for take of California red-legged frogs in upland habitats include the following:

- Plan off-road driving and ground disturbing activities by heavy equipment--including road construction, skid trail construction, and construction of landings--to occur prior to the first frontal system that results in at least $\frac{1}{4}$ " precipitation after October 1 (the first significant fall rain) or after April 15.
- After the first significant fall rain, tree falling and skidding, hauling, and loading of logs should occur during daylight hours only.

2. Operations in riparian habitats that are likely to result in the take of individual California red-legged frogs through direct killing and injuring as well as harm through destruction and/or degradation of riparian habitat should be avoided. For purposes of this assessment, "riparian habitat" is defined as those areas within the THP area that are composed of a riparian vegetation community. Measures to reduce the potential for take of California red-

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legged frogs in riparian habitats should be applied year-round as appropriate and include the following:

- After the first significant fall rain until April 15, avoid felling trees within riparian habitat.
- Locate roads, landings, skid trails, and crossings outside riparian habitat, and avoid the disturbance of all other associated wet areas.
- Route heavy equipment operations outside riparian habitat.
- Operate heavy equipment outside and away from springs, seeps, bogs and any wet areas.
- During harvest operations, fell trees out of or away from riparian habitat.
- Locate yarding and skidding routes outside riparian habitat.
- Outside the WLPZ, fall trees away from springs, seeps, bogs, or other wet areas.

3. Erosion that is likely to result in the take of individual California red-legged frogs, their embryos or larvae through direct killing and injuring as well as harm through destruction and/or degradation of the aquatic habitat should be avoided. Measures to reduce the potential for take of California red-legged frogs, their embryos or larvae in aquatic habitats should be applied year-round and include the following:

- Implement erosion control measures as necessary to prevent sediment movement into aquatic habitat.
- Use road rocking within the WLPZ.
- Mulch and/or slash pack tractor roads, cable roads, and skid trails in the WLPZ.
- Mulch and/or slash pack all areas of exposed mineral soil, regardless of size, that may contribute to sediment movement into aquatic habitat.
- Establish road maintenance programs that provide permanent protection from sediment movement into aquatic habitat.

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NOTE

Northern Spotted Owl information has been submitted with Non-Industrial Timber Management Plan **1-96NTMP-015 NAP**. Under direction of the U.S. Fish & Wildlife Service (USFWS) and Department of Fish & Game (DFG), the California Department of Forestry and Fire Protection (CDF) can not disclose site-specific information and thus has edited site-specific information from the general version of this THP and placed it in a confidential file at the CDF Region I headquarters, 135 Ridgway Avenue, Santa Rosa, CA 95401. The information edited from the general version of the plan has been sent to the following locations for review:

- [X] DFG - Region 3 (Dick Moore @ SNU)
- [] DFG - Region 1 - Eureka
- [] CDF Field Unit - Fortuna
- [] CDF Field Unit - Ukiah
- [X] CDF Field Unit - Santa Rosa Region Office
- [X] Other **REVIEWING FORESTER, CDF REGION OFFICE**

Site-specific information may be released by DFG of the USFWS on a need-to-know basis. In this instance, contact:

Gordon Gould
Department of Fish & Game
Wildlife Management Division
Nongame Bird and Mammal Section
1416 Ninth Street
Sacramento, CA 95814

or:

US Fish & Wildlife Service
2800 Cottage Way, Room E-1823
Sacramento, CA 95825

California Department of Fish and Game
California Department of Forestry and Fire Protection

NORTHERN SPOTTED OWL DATABASE MANAGEMENT SYSTEM

APRIL 10, 1995 DATA

REPORT #2

REPORT OF TERRITORIES FOUND

LOCALE	TWN	RNG	SECT	1/4	1/16	1/64	OWNER TYPE	OWNER	YEAR	TERR.	NEST/YNG KNOWN
áááááááááááááááááá	ááá	ááá	áááá	ááá	áááá	áááá	ááááá	ááááá	áááááááááá	ááááááááá	
TERRITORY: NP002 INK GRADE	9N	5W	30	NE	SE		PVT		94	- P	94 - 93
TERRITORY: NP014 CONN CR	8N	5W	17	C			PVT		94	- P	-
TERRITORY: NP028 MOORE CR	8N	5W	10	W	W	C	PVTI	LPC	92	- P	92 - 92
TERRITORY: NP029 HOWELL MTN	9N	5W	32	E			PVT		93	- S	-

NOTE: FOR AN EXPLANATION OF THE DATA COLUMNS, USE A "DATABASE REPORT EXPLANTATION SHEET" DATED AFTER JANUARY 1, 1994.

California Department of Fish and Game
California Department of Forestry and Fire Protection

NORTHERN SPOTTED OWL DATABASE MANAGEMENT SYSTEM

APRIL 10, 1995 DATA

REPORT #3

REPORT OF SIGHTINGS REPORTED FOR TERRITORIES FOUND

TWN	RNG	SECT	1/4	1/16	1/64	DATE SEEN	OBSERVER	NO. OF OWLS	AGE- SEX	PAIR	NO. OF YNG.	NEST
ááá	ááá	áááá	ááá	áááá	áááá	áááááááá	áááááááááááááááá	áááá	áááá	áááá	áááá	áááá
TERRITORY: NP002												
9N	5W	30				01/01/60	TILLAY	1	UU		0	
9N	5W	30				01/01/80	TILLAY	1	UU		0	
9N	5W	30				11/26/89	WOOSTER	0			0	
9N	5W	29				03/10/90	WOOSTER+	0			0	
9N	5W	30	SE	NE		02/09/92	WOOSTER	2	UMF		0	
9N	5W	30	SE	NE	NW	03/11/92	WOOSTER+	2	UMF		0	
9N	5W	30	SE			04/04/92	WOOSTER	2	UMF	Y	0	
9N	5W	30	SE	NE		05/10/92	WOOSTER	2	UMF	Y	0	
9N	5W	30	SE	NE		06/26/92	WOOSTER+	2	UMF	Y	0	
9N	5W	30				08/26/92	WOOSTER	0			0	
9N	5W	30				03/07/93	LEON via WOOSTE	2	UMF		0	
9N	5W	30	NE	SE		04/04/93	WOOSTER	2	UMF	Y	0	
9N	5W	30				05/16/93	WOOSTER+	1	UF		0	
9N	5W	30	NE	SE		06/10/93	WOOSTER	2	UMF	Y	1	
9N	5W	30				11/07/93	WOOSTER	0			0	
9N	5W	30	NE	SE		04/01/94	WOOSTER	2	UMF	Y	0	
9N	5W	30	NE	SE		04/02/94	WOOSTER	2	UMF	Y	0	
9N	5W	30				05/30/94	WOOSTER	2	UMF	Y	0	
TERRITORY: NP014												
8N	5W	17	NW	SE	SE	11/26/89	WOOSTER	1	UM		0	
8N	5W	18				01/01/90	WOOSTER+	0			0	
8N	5W	17	C			03/10/90	WOOSTER+GRUMMER	2	UMF	Y	0	
8N	5W	17				11/16/90	WOOSTER	0			0	
8N	5W	14				12/04/90	WOOSTER	0			0	
8N	5W	18	NE	SE	E	12/06/90	WOOSTER	1	UF		0	
8N	5W	17	NE	SE		01/01/92	WOOSTER+	1	UF		0	
8N	5W	18	E			11/07/93	WOOSTER	0			0	
8N	5W	18	NW	NE		01/02/94	WOOSTER+	1	UF		0	
TERRITORY: NP028												
8N	5W	10				03/10/90	WOOSTER+	0			0	
8N	5W	10	W	W	C	02/09/92	WOOSTER	2	UMF		0	
8N	5W	10	W	W	C	03/01/92	WOOSTER+	1	UU		0	

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California Department of Fish and Game
California Department of Forestry and Fire Protection

NORTHERN SPOTTED OWL DATABASE MANAGEMENT SYSTEM

APRIL 10, 1995 DATA

REPORT #3

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TWN	RNG	SECT	1/4	1/16	1/64	DATE SEEN	OBSERVER	NO. OF OWLS	AGE- SEX	PAIR	NO. OF YNG.	NEST
ááá	ááá	áááá	ááá	áááá	áááá	áááááááá	áááááááááááááááá	áááá	áááá	áááá	áááá	áááá
8N	5W	10	W	W	C	03/11/92	WOOSTER+	2	UMF		0	
8N	5W	10	W	W	C	04/08/92	MUNN	2	UMF	Y	0	
8N	5W	10	W	W	C	05/10/92	WOOSTER	1	UM		0	
6N	5W	10				06/24/92	WOOSTER	2	UMF	Y	1	
6N	5W	10	W			07/26/92	WOOSTER+	0			0	
8N	5W	10				08/26/92	WOOSTER	0			0	
6N	5W	10				04/04/93	WOOSTER	0			0	
6N	5W	10				05/16/93	WOOSTER+	0			0	
6N	5W	10				04/01/94	WOOSTER	0			0	
TERRITORY: NP029												
9N	5W	32	E			01/01/93	WOOSTER+	1	UU		0	
9N	5W	32	E			05/16/93	WOOSTER+	0			0	

NOTE: FOR AN EXPLANATION OF THE DATA COLUMNS, USE A "DATABASE REPORT EXPLANATION SHEET" DATED AFTER JANUARY 1, 1994.

7/31/96

4 PAGES OF SURVEY SHEETS SUBMITTED WITH EXTENSION ON 7/30/96

NOTE

Northern Spotted Owl information has been submitted with Non-Industrial Timber Management Plan **1-96NTMP-015 NAP**. Under direction of the U.S. Fish & Wildlife Service (USFWS) and Department of Fish & Game (DFG), the California Department of Forestry and Fire Protection (CDF) can not disclose site-specific information and thus has edited site-specific information from the general version of this THP and placed it in a confidential file at the CDF Region I headquarters, 135 Ridgway Avenue, Santa Rosa, CA 95401. The information edited from the general version of the plan has been sent to the following locations for review:

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US Fish & Wildlife Service
2800 Cottage Way, Room E-1823
Sacramento, CA 95825

COAST AREA OFFICE
RESOURCE MANAGEMENT

7½ min _____
15 min _____

page ____ of ____

DFG TERRITORY NO.

PUC

COUNTY NAPA

DATE & START 6/23/96 T-_____ R-_____ SECS.

OBSERVERS J. HARVEY, T. WOOSTER, L. HARVEY

START TIME (2400 clock): 1 END TIME: 1 TOTAL TIME: 1
 WEATHER (circle one): clear cloudy mist/fog light/rain heavy/rain snow WIND (circle one): calm breeze moderate

[illegible]

RECEIVED

nc740-3-

Habitat types or conditions:

JUL 30 1996

COAST AREA OFFICE
RESOURCE MANAGEMENT

COAST AREA OFFICE
RESOURCE MANAGEMENT

CALIFORNIA DEPARTMENT OF FISH AND GAME
SPOTTED OWL FIELD SURVEY

page ____ of

DFG TERRITORY NO.

GENERAL LOCATION

PUC

COUNTY NAPA

DATE @ START 7/29/96 T- R- SECS.

OBSERVERS M. Ramsey - J. Harvey

START TIME (2400 clock): 2120 END TIME: 2300 TOTAL TIME:

WEATHER (circle one): clear cloudy mist/fog light/rain heavy/rain snow WIND (circle one): calm breeze moderate

[illegible]

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NY 740-3-

Habitat types or conditions:

JUL 30 1996

COAST AREA OFFICE
RESOURCE MANAGEMENT