SECTION V

SWANTON PACIFIC RANCH NTMP

ADDITIONAL INFORMATION

BIG CREEK

"Growing Redwoods for the Future"

I herby certify that noticing per 14 CCR 926.3 (Santa Cruz County) has been carried out for the proposed Non-Industrial Timber Management Plan. The neighbors listed on the following page were notified via mail on 11/27/07. The notice was published in the Santa Cruz Sentinel on 11/30/2007. Proof of publication is attached. Notices and maps were hung along Swanton Road on 11/27/07.

Sincerely,

Nadia Hamey
RPF #2788
Big Creek Lumber

Big Creek Timber Company
3564 Highway 1
Davenport, CA 95017

Coast Dairies & Land Co
116 New Montgomery Street
San Francisco, CA 94105

Smith Roberta Katherine Trustee
PO Box 174
Davenport, CA 95017

McCrary Frank Trustee Et Al
310 Swanton Road
Davenport, CA 95017

Lone Star Cement Corp
5180 Golden Foothill Pkwy, Suite 200
El Dorado Hills, CA 95762-9347

MPK Farms Llc
264 Village Blvd. #201
Incline Village, NV 89451

McCrary Homer T & Emma W
310 Swanton Road
Davenport, CA 95017

Corral Michael F & Valerie Ann Leveroni
230 Swanton Road
Davenport, CA 95017

La Mar Frances S Trustee
881 Palo Verde Ave
Long Beach, CA 90815

Neal Coonerty, Supervisor
County of Santa Cruz
701 Ocean Street
Santa Cruz, CA 95060

Pacific Elementary School
50 Ocean Street
Davenport, CA 95017

McCrary Frank & Barbara E Trustees
640 Swanton View Rd
Davenport, CA 95017

Calif Polytechnic State Univ Foundation
Foundation Admin Office, Bldg 15
San Luis Obispo, CA 93407

McCrary Kenneth A & Jeanine C Trustees
316 Swanton Road
Davenport, CA 95017

Ashley Susan & Peter Trustees Et Al
1450 California St
Berkeley, CA 94703

Deutsch Richard Allan
& Valerie Wolf Trustees
651 Swanton View Road
Davenport, CA 95017

Todd Jay P & Kay Rodenberg
906 Swanton View Road
Davenport, CA 95017

Weaver Claudia & Michael W/H
338 Swanton Road
Davenport, CA 95017

Strayer Richard G Trustee Et Al
16151 Wood Acres Rd
Los Gatos, CA 95030

McCrary Frank & Barbara
640 Swanton View Rd
Davenport, CA 95017

Rinde Dennis E & Ellen M Trustees
206 Swanton View Rd
Davenport, CA 95017

McCrary Frank Trustee
640 Swanton Road
Davenport, CA 95017

McCrary Michael G/Kenneth A;Chambers
316 Swanton Rd
Davenport, CA 95017

Filice John G & Janice F
625 Highland Ave
Santa Cruz, CA 95060

NOTICE OF INTENT TO HARVEST TIMBER / DOMESTIC WATER SUPPLY INQUIRY

A Non-Industrial Timber Management Plan (NTMP) that may be of interest to you **WILL SOON BE SUBMITTED** to the California Department of Forestry & Fire Protection. The Department will be reviewing the proposed timber operation for compliance with various laws and rules. This review requires the addressing of any concerns you may have with what is being proposed. **THIS NOTICE WITH MAP IS BEING PROVIDED PRIOR TO SUBMISSION OF THE NTMP SO THAT THE SUBMITTER MAY BE ADVISED OF SURFACE DOMESTIC WATER SUPPLIES TAKEN FROM THE WATERCOURSES WITHIN THE THP OR WITHIN 1000 FEET DOWNSTREAM OF THE PROPOSED HARVEST. Please send such information to the forester listed at the bottom of the page within 10 days of the postmarked date of the notice of inquiry.** The following briefly describes the proposed timber operation and where and how to get more information.

The review times given to the Department to review the proposed timber operation are variable in length, but limited. To ensure the Department receives your comments please read the following:

The earliest possible date the Department may approve the plan or amendment is: January 26, 2008 .

NOTE: THIS DATE IS PROBABLY NOT THE ACTUAL APPROVAL DATE AND CLOSE OF PUBLIC COMMENT. Normally, a much longer period of time is available for preparation of comments. Please check with the Department, prior to the above listed date, to determine the actual date that the public comment period closes.

The plan or amendment will be submitted to the Department on or after: December 12, 2007 . **Reference NTMP # 1-07NTMP-020 SCR**

Questions about the proposed timber operation or laws and rules governing timber operations should be directed to:

California Department of Forestry & Fire Protection
Forest Practice Program
135 Ridgeway Avenue
Santa Rosa, CA 95401
(707) 576-2959

California Department of Forestry and Fire Protection
San Mateo/Santa Cruz Ranger Unit
6059 Highway 9 (P.O. Drawer F-2)
Felton, CA 95018
(831) 335-6740

SantaRosaPublicComment@fire.ca.gov

The public may review the plan or amendment at the above Department office or purchase a copy of the plan or amendment. The cost to obtain a copy is 10 cents for each page, $2.50 minimum per request. (To be completed by the Department upon receipt. The cost to obtain a copy of the plan or amendment is:_____.)

Information about the plan or amendment follows:

1. Timberland Owners where the timber operation is to occur: Cal Poly Corporation, Steve Spafford, Susan Spafford England, Stuart Spafford

2. Registered Professional Forester who prepared the plan or amendment: Nadia Hamey, RPF # 2788
   3564 Highway 1, Davenport CA 95017, (831) 457-6383

3. Name of individuals who submitted the plan or amendment: Cal Poly Corporation, Steve Spafford, Susan Spafford England, Stuart Spafford

4. Location of the proposed timber operation (county, legal description, approximate direction & approximate distance of the timber operation from the nearest community or well-known landmark): The proposed timber operation is located in Santa Cruz County, CA, approximately 3 miles north of the town of Davenport via Highway 1 and Swanton Road. Legal Description: Portion of Sections 8, 9, 16, 17 and Rancho Agua Puerca y Las Trancas, T10S - R3W (MDB&M), on the Davenport 7.5' Quadrangle.

5. The name of and distance from the nearest perennial stream and major watercourse flowing through or downstream from the timber operation: Little Creek, Winter Creek and the headwaters of Berry Creek flow through the NTMP area. Archibald Creek is adjacent to and downstream of the NTMP area.

6. Acres proposed to be harvested: Approximately 701 Acres

7. The regeneration methods and/or intermediate treatments to be used: Selection per 14 CCR 913.8 (a) & Selection/alternative per 14 CCR 913.8 (b).

8. Is there a known overhead power line, except lines from transformers to service panels, within the plan area? Yes X No ___

9. The approximate property lines have been flagged for review where truck roads, tractor roads, or harvest areas are within 100 feet of the property line.
10. Helicopter Operations will occur once every fifteen to twenty years for approximately 2-3 weeks.

A map is attached to help in locating where the proposed timber operation is to occur. Once the department has received the plan it will be reviewed to determine whether it can be filed. If the department files the plan, you will be notified by mail of the NTMP number and the filing date of the plan. You will be notified in a separate mailing of any public hearing. You should check with the department for the date of the Review Team Meeting. If you would like to contact the Registered Professional Forester who prepared the plan, please don't hesitate to call the Big Creek Forestry Office at (831) 457-6383.

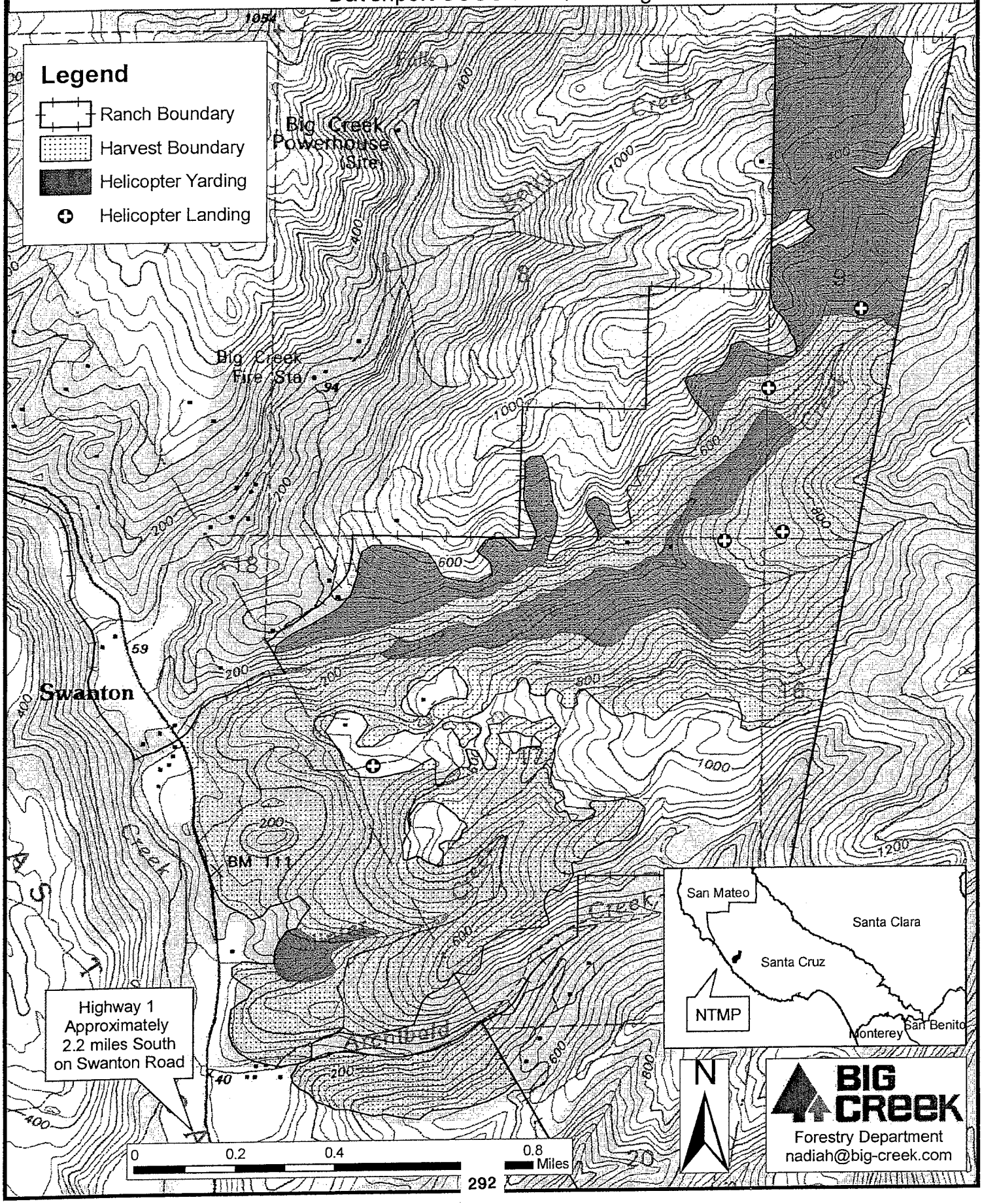
FOR DEPARTMENT USE ONLY

TIMBER HARVESTING PLAN NO. _____ DATE OF RECEIPT _____

SWANTON PACIFIC RANCH NTMP - PROJECT LOCATION MAP

Portion of Sections 8,9,16,17 and Rancho Agua Puerca y Las Trancas, T10S - R3W, MDB&M

Davenport USGS 7.5' Quadrangle



DEPARTMENT OF FORESTRY AND FIRE PROTECTION
6059 Highway 9 – P.O. Drawer F-2
Felton, CA 95018
(831) 335-6740

FACT SHEET ON TIMBER HARVEST REGULATION IN THE SANTA CRUZ MOUNTAINS

The enclosed Notice of Intent/Domestic Water Supply Inquiry ("Notice") is to inform you that either a Timber Harvesting Plan (THP) or a Nonindustrial Timber Management Plan (NTMP) is being prepared by a licensed forester for a private landowner whose property is near your property. **Although the forester has not yet submitted the THP/NTMP to the California Department of Forestry and Fire Protection (CDF) for review, this FACT SHEET will clarify both how and when you can obtain information about the proposed timber operation and how you may participate in the review process once the plan has been accepted for filing by CDF.**

The forester is required to mail a copy of the enclosed Notice to owners of property within 300 feet of the property where timber harvesting is proposed, to the owners of property adjoining private roads proposed to be used for trucking logs, and to other owners within 1000 feet downstream of the harvest boundary ***prior to the THP/NTMP being submitted to CDF***. If helicopter operations are proposed in Santa Cruz County, the forester must notify additional people. **If after receiving this Notice you want more information about the THP/NTMP, you should wait approximately 15 calendar days to allow time for the THP/NTMP to arrive at the CDF Region Office and copies to be sent to CDF Felton before calling CDF. Prior to this time, CDF will *not* have any information about the THP/NTMP. You should contact the private forester as soon as possible if there are concerns which you believe should be *included* in the THP/NTMP.**

California's forest practice regulations, comprised of more than 1,000 regulations, are the most stringent and comprehensive to be found anywhere in the nation. They govern all aspects of the commercial harvest of forest products including the licensing of timber operators, preparation of timber harvesting plans, cutting intensity, harvest practices, road construction, erosion control, stream and watershed protection, hazard reduction, and fire protection. In addition, special local rules address such things as hours of work, traffic safety, and erosion control maintenance. Regulations for our area prohibit clear cutting. Only selective harvesting is permitted allowing just a portion of the standing timber to be cut.

The state's forest practice regulations are enforced by CDF. Enforcement includes the interdisciplinary environmental review by local (including water districts), state and federal agencies of all written harvest plans and inspection of both active and completed harvest operations to ensure compliance with the regulations. All harvest plans are prepared by a Registered Professional Forester (RPF), licensed to practice in the state, who also is responsible for on-the-ground supervision of harvest activities.

There are several ways you may learn more about this THP/NTMP and participate in its evaluation:

1. **Approximately 15 days from the date of the enclosed Notice, you may wish to confirm the availability of the THP/NTMP by calling the CDF Felton office at (831) 335-6740.** Once CDF has received the THP/NTMP, you may obtain information, review the THP, or purchase a copy of it by writing CDF (P.O. Drawer F-2; Felton, CA 95018) or calling (831) 335-6740.

2. During the minimum 45 day review period, CDF may hold a public hearing on the harvest plan. **If a hearing is scheduled, you will be notified of the time and place in a separate mailing within a few weeks.** The purpose of the hearing is to give you an opportunity to provide any information, especially site-specific factors, you believe CDF should consider when evaluating the proposed plan. Examples include the location of water lines, uptakes, and landslides; local traffic patterns, etc. No decision regarding the THP/NTMP is made at this public hearing. CDF's responsibility is to document the concerns that are presented.

3. **If you are unable to attend a scheduled public hearing, please send us your comments in writing. *Written comments receive the same consideration as testimony received at the public hearing.*** Written comments should be addressed to Leslie Markham at 135 Ridgway Avenue; Santa Rosa, CA 95401, where the official THP/NTMP documents are maintained, or sent via email to SantaRosaPublicComment@fire.ca.gov. The Santa Rosa office sends a copy of all public correspondence to the Felton office so that it can be considered during the review of the THP/NTMP.

4. Review of the THP/NTMP is carried out by CDF and representatives from the Department of Fish and Game, Regional Water Quality Control Board, California Geological Survey, local water districts, and County Planning Department. The review includes a field inspection of the proposed operation (called the Preharvest Inspection) and Preharvest Inspection Reports which discuss the THP/NTMP's provisions and make recommendations, where necessary, to ensure that the THP/NTMP conforms to the rules. These reports are discussed at the Review Team Meeting (chaired by CDF) at which time "Review Team Recommendations" are developed. These final recommendations, along with all CDF and other agency documents, and any public correspondence received at the Felton office, are submitted to CDF's regional office in Santa Rosa, where the Director's representative makes the final decision on the THP/NTMP. You may review (at the CDF Felton office) or purchase a copy of the Preharvest Inspection Report, Review Team Recommendations, or any other document associated with the review of the THP/NTMP. Please call the CDF Felton office to confirm availability and cost.

If you have questions, please contact the RPF who will be submitting the THP/NTMP or contact a CDF forester at the Felton office (831) 335-6740.

Sincerely,

John Ferreira, Chief
CDF San Mateo & Santa Cruz Unit

By: Richard Sampson
Division Chief-Resource Management
RPF #2422

Proof of Publication

(2015.5 C.C.P)

Public Notice

STATE OF CALIFORNIA

SS

COUNT OF SANTA CRUZ

I, THE UNDERSIGNED, DECLARE:

That I am over the age of eighteen and not interested in the herein-referenced matter; that I am now, and at all times embraced in the publication herein mentioned was, a principal employee of the printer of the Santa Cruz Sentinel, a daily newspaper printed, published and circulated in the said county and adjudged a, newspaper of general circulation by the Superior Court of California in and for the County of Santa Cruz, under Proceeding No. 25794; that the a advertisement (of which the annexed is a true printed copy) was published in the above-named newspaper on the following dates, to wit:

NOVEMBER 29, 2007

I DECLARE under the penalty of perjury that, the foregoing is true and correct to the best of my knowledge.

This 3RD day of DECEMBER 2007, at Santa Cruz California.

LYNETTE G. JAQUEZ

NOTICE OF INTENT TO HARVEST TIMBER\DOMESTIC WATER SUPPLY INQUIRY

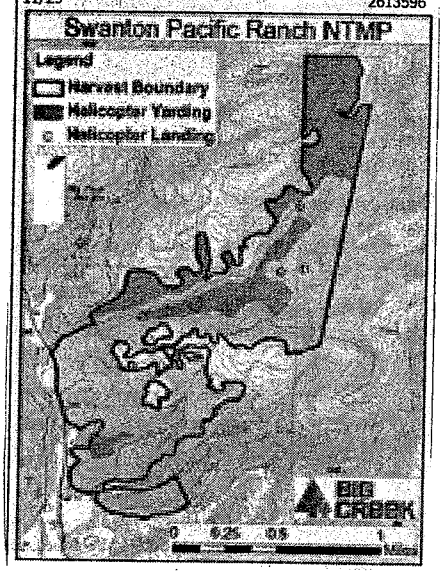
A Non-Industrial Timber Management Plan (NTMP) will soon be submitted to the California Department of Forestry & Fire Protection for Swanton Pacific Ranch. This notice with map is being provided prior to submission of the NTMP so that the NTMP submitters may be advised of surface domestic water use from the watercourses within the NTMP area or within 1,000 feet downstream of the NTMP boundary. Please send such information to the forester listed below within 10 days of the publication of this inquiry. The earliest possible date the Department may approve the plan is: January 26, 2008. The plan will be submitted to the Department on or after: December 12, 2007. Questions or concerns regarding this specific NTMP or laws and rules governing timber operations should be directed to the CDF Regional Office listed below, so that public input may be incorporated into an Official Response Document, reference NTMP #1-07NTMP-020 SCR.

California Department of Forestry & Fire Protection
Forest Practice Program - Regional Office
135 Ridgway Avenue
Santa Rosa, CA 95401
(707) 576-2959
SantaRosaPublicComment@fire.ca.gov

California Department of Forestry and Fire Protection
San Mateo/Santa Cruz Ranger Unit
6059 Highway 9 (P.O. Drawer F-2)
Felton, CA 95018
(831) 335-6740

Once the plan has been received by the Department, the public may review the plan at the above Department offices or purchase a copy of the plan upon payment of the applicable charge. The Timberland Owners and Plan Submitters are Cal Poly Corporation, Steve Spafford, Susan Spafford England, and Stuart Spafford. The Registered Professional Forester who prepared the NTMP is Big Creek Lumber Company Forester Nadia Hamey, RPF #2788; 3564 Highway 1, Davenport, CA 95017; phone: (831) 457-6383. The proposed timber operation is located in Santa Cruz County, approximately 3 miles north of the town of Davenport via Highway 1 and Swanton Road. Legal description: Portion of Sections 8,9,16,17 and Ranch Agua Puerca y Las Trancas T10S - R3W (MDB&M) on the Davenport 7.5' Quadrangle. Little Creek, Winter Creek and the headwaters of Berry Creek flow through the project area. Archibald Creek is adjacent to and downstream of the project area. Approximately 701 acres are proposed to be harvested. The regeneration methods to be used are Selection per 14 CCR 913.8 (a) and Selection/alternative per 14 CCR 913.8(b). Helicopter Operations will occur once every fifteen to twenty years for approximately 2-3 weeks. There are known overhead electric power lines within the plan area. The approximate property lines have been flagged for review where truck roads, tractor roads, or harvest areas are within 100 feet of the property line. If you would like to contact the Registered Professional Forester who prepared the plan, please call the Big Creek Forestry Office at (831) 457-6383.

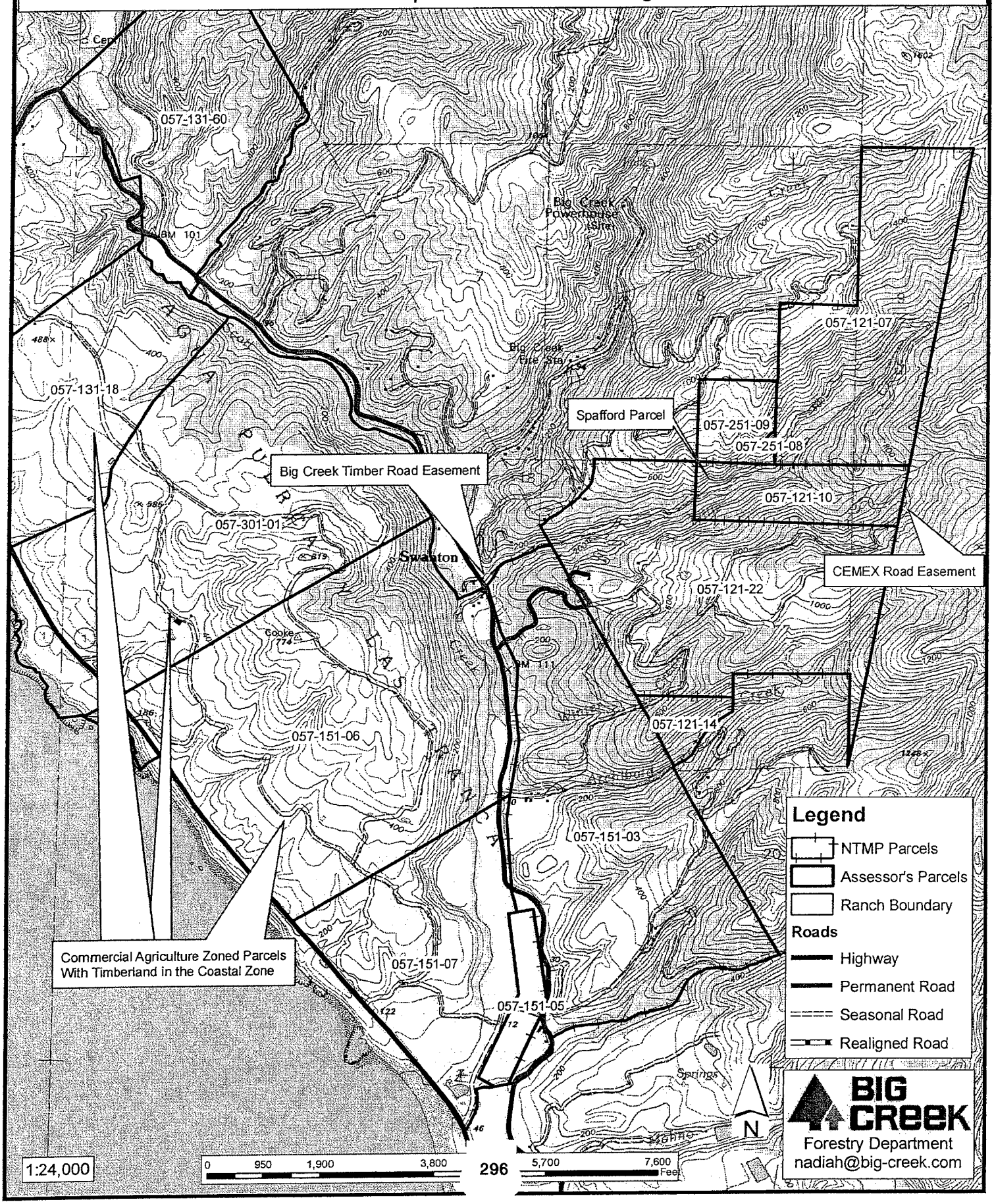
11/29 2613596



Swanton Pacific Ranch NTMP - Parcel Ownership Map

T10S R3W, Portions of Sections 8,9,16,17,20 and Rancho Agua Puerca y Las Trancas, MDB&M

Davenport USGS 7.5' Quadrangle



BIG CREEK

Forestry Department

nadiah@big-creek.com

1512 OR 598

JAN 17 1963

Return to
Big Creek Timber Co.
Davenport
California

84300-A S. C.

340 20
1512 PAGE 598
OFFICIAL RECORDS OF SANTA CRUZ COUNTY, CALIF.
DEC 19 4 05 PM '62
SANTA CRUZ LAND TITLE CO.

For value received JOSEPH PFYFFER and KATHERINE PFYFFER, his wife
ERNEST GAISER and NELLA GAISER, his wife

GRANT to BIG CREEK TIMBER COMPANY, a partnership

all that real property situate in the

County of Santa Cruz, State of California, described as follows:

A RIGHT OF WAY 20 feet in width over an existing road leading from the lands of Grantee herein to the Old Coast Road and running over the lands conveyed to Joseph Pfyffer, et al by Deed recorded in Volume 1391, Page 579, Official Records of Santa Cruz County and over that triangular parcel of land conveyed by Big Creek Timber Company, a partnership to Joseph Pfyffer by Deed concurrently recorded with this Grant Deed.

The center line of said Right of Way being approximately the center line of that 50 foot strip of land conveyed to J. Downey Harvey by Deed recorded in Volume 215 of Deeds, at Page 83, Santa Cruz County Records.

Above Right of Way being appurtenant to the remaining lands conveyed to Big Creek Timber Company, by Deed recorded in Volume 1222, Page 486, Official Records of Santa Cruz County.

Said Right of Way to have a triangular entrance on each side thereof with additional width of 15 feet on each side of the Northeasterly line of the Old Coast Road and extending Northerly 15 feet along the sides of said 20 foot Right of Way.

Joseph Pfyffer
Katherine Pfyffer
Ernest Gaiser
x Nella Gaiser

Dated December 7, 1962

STATE OF CALIFORNIA
County of Santa Cruz } ss.

On Dec. 12, 1962 before me, the undersigned a Notary Public in and for said County and State, personally appeared Joseph Pfyffer, Katherine Pfyffer, Ernest Gaiser, & Nella Gaiser known to me to be the person s whose name s subscribed to the within instrument, and acknowledged to me that they executed the same.

My commission expires

Appl. No.

Donald J. Mungai
Notary Public

DONALD J. MUNGAI
NOTARY PUBLIC STATE OF CALIFORNIA
PRINCIPAL OFFICE SANTA CRUZ COUNTY
MY COMMISSION EXPIRES MARCH 6, 1965

1512 PAGE 599

34021

1512 PAGE 599

SANTA CRUZ LAND TITLE CO

AUG 19 4 05 PM '82

Return to
Mr. Joseph Pfyffer
201 Mission Street
Santa Cruz, California

84300-A S. C.

For value received BIG CREEK TIMBER COMPANY, a partnership

GRANTS to JOSEPH PFYFFER and KATHERINE PFYFFER, his wife, as Joint Tenants, as to an undivided 1/2 interest; and ERNEST GAISER and NELLA GAISER, his wife, as Joint Tenants, as to an undivided 1/2 interest all that real property situate in the

County of Santa Cruz, State of California, described as follows:

BEING a part of lands conveyed to Woodrow Wilson Wert, et ux by Deed recorded in Volume 779 of Official Records at Page 315, Santa Cruz County Records, and more particularly bounded and described as follows, to-wit:

BEGINNING at the most Northern corner of lands conveyed to Joseph Pfyffer, et al, by Deed dated May 1, 1961 and recorded May 4, 1961 in Volume 1391 of Official Records at Page 579, Santa Cruz County Records; thence from said point of beginning, South 69° 02' East 115.95 feet to a 1/2 inch iron pipe; thence Southeasterly 80 feet, a little more or less, to the middle of Little Creek at the Eastern corner of said lands conveyed to Pfyffer, et al; thence Northwesterly, along the Northeastern boundary of said last mentioned lands 195 feet, a little more or less, to the place of beginning.

EXCEPTING THEREFROM so much of the hereinabove described property as may lie within the boundaries of that certain 50 foot strip of land conveyed by Deed from J. Downey Harvey, et al as Trustees for Scotts Creek Railway Company and J. Downey Harvey to San Vicente Lumber Company, a corporation, dated April 3, 1911, recorded May 9, 1911 in Volume 230, of Deeds, at Page 370, Santa Cruz County Records and by Deed dated December 1, 1909, recorded May 9, 1911 in Volume 230 of Deeds, at Page 353, Santa Cruz County Records.

SURVEYED AND COMPILED November, 1962 by Bowman and Williams, Registered Civil Engineers, Job No. 14253.

BIG CREEK TIMBER COMPANY

By Homer T. McCrary

By Frank McCrary, Jr.

Frank McCrary

Dated December 7, 1962

STATE OF CALIFORNIA)
) ss.
COUNTY OF SANTA CRUZ)

On December 12, 1962 before me, the undersigned, a Notary Public in and for said County of Santa Cruz personally appeared HOMER T. McCRARY, FRANK McCRARY, Jr. and FRANK McCRARY known to me to be partners of BIG CREEK TIMBER COMPANY, a partnership, and known to me to be the partners of the partnership that executed the within instrument and acknowledged that said partnership executed the same.

DAVID H. MORTON
NOTARY PUBLIC
In and for the County of Santa Cruz, State of California

David H. Morton
Notary Public in and for the County of Santa Cruz, State of California

Corporation Grant Deed

THE SANTA CLARA COUNTY COUNCIL BOY SCOUTS OF AMERICA, a corporation, which acquired title as The Santa Clara Council Boy Scouts of America,

a corporation, party of the first part, does hereby Grant to ALBERT B. SMITH, a single man, as to an undivided 1/2 interest, and DAVID KENNETH ROBISON and RUTH ROBISON, husband and wife, as joint tenants, as to an undivided 1/2 interest,

parties of the second part, all that real property situate in the County of Santa ~~Clara~~ Cruz, State of California, described as follows:

1st: The East half of the Southeast quarter of Section 8; the Northwest quarter of the Northwest quarter and lots No.1,2,3 and 4, of Section 9; the North half of the Northeast quarter of Section 17; Lot No. 1 Section 16 all in Township 10 South Range 3 West, M.D.B.& M.

2nd: Commencing at a point 476 feet North of the Southeast corner of the Southwest quarter of the Southeast quarter of Section 8, Township 10, South Range 3 West, M.D.M. which corner is about forty feet north of the line of the Scotts Creek Railway as now constructed; thence South 58° West 50.84 feet; thence South 40° West 85.05 feet; thence South 24° West 92.97 feet; thence North at right angle 100 feet; thence North 24° East 107.03 feet; thence North 40° East 114.95 feet; thence North 58° East 129.16 feet; thence South 117.92 feet to the point of beginning; containing .66 acres more or less.

ALSO including the right of way for all road purposes now held by G.M.Locatelli and wife which is used and is necessary for the use and enjoyment of the lands above described and which right of way is over a strip of land particularly described as follows:

FIRST: A strip of land 50 feet in width being 25 feet on either side of the center line which center line is described as follows:

Beginning at a point on the Westerly boundary of the property formerly belonging to the heirs of the Estates of John Staub and Anna Staub deceased, where the same is intersected by the center line of the tract formerly of the Scotts Creek Railway Company, as located and constructed which point bears North 31° 26' West 57 feet from a corner on said boundary line common to the properties, formerly of said Staub heirs, A. Gianone and the Shore Line Investment Company; thence North 88° 14' East 21.3 feet; thence on a circular curve to the left having a radius of 458.6 feet 241.2 feet; thence North 58° 05' East 46.3 feet; thence on a circular curve to the right, having a radius of 239.2 feet 134.4 feet; thence North 89° 55' East 44.00 feet; thence on a circular curve to the left having a radius of 239.2 feet 85.1 feet; thence North 69° 29' East 154.7 feet; thence on a circular curve to the right having a radius of 239.2 feet 47.6 feet; thence North 80° 54' East 86.7 feet; thence on a circular curve to the left having a radius of 239.2 feet 97.1 feet; thence North 57° 36' East 198.1 feet; thence on a circular curve to the right having a radius of 239.2 feet 113.1 feet; thence North 84° 45'

on a circular curve to the right having a radius of 239.2 feet 163.8 fee thence South 79° 24' East 73.00 feet; thence on a circular curve to the left having a radius of 239.2 feet 198.9 feet; thence North 52° 52' East 232.0 feet; thence on a circular curve to the right having a radius of 239.2 feet; 101.5 feet; thence North 77° 14' East 97.1 feet to a point on the Easterly boundary line of said property formerly belonging to the heirs of the Estates of John Staub and Anna Staub, deceased, 539.00 feet South from a corner on said Easterly boundary line common to the property formerly of said Staub heirs, Timothy Hopkins and the Santa Cruz Power Company and containing 3.31 Acres, more or less.

SECOND: A strip of land 50 feet in width through the property formerly of A.Gianone bounded on the East by the property formerly of the Staub Estate; on the South by property formerly of Shore Line Investment Company, said strip being bounded by the Easterly and Southern boundaries of said property formerly of A. Gianone and by lines drawn parallel to and 25.00 feet on either side of a center line together with such additional width as may be required for the slopes of excavations and embankments. Said center line above mentioned is described as follows:

Commencing at a point on the Easterly boundary of the property formerly of A.Gianone 57 feet thereon Northerly from the corner common to properties formerly of Staub Estate, A. Gianone and Shore Line Investment Company; thence South 88° 14' West 88.1 feet; thence on a circular curve to the left with a radius of 239.17 feet, 134.2 feet; thence South 56°04' West 63.1 feet; thence on a circular curve to the right with a radius of 239.17 feet 95.3 feet; thence South 78°53' West 50.5 feet; thence on a circular curve to the left with a radius of 239.17 feet 78.4 feet; thence South 60°04' West 147.2 feet; thence on a circular curve to the right with a radius of 239.17 feet 82.6 feet; thence South 79° 53' West 98.9 feet; thence on a circular curve to the left with a radius of 239.17 feet 158.3 feet; thence South 39°30' West 532.00 feet to a point on the boundary line common to the properties of A.Gianone and Shore Line Investment Company 108 feet more or less Westerly from the County Road containing 1.75 Acres, excepting therefrom that portion thereof lying Westerly from the center line of said County Road.

In Witness Whereof, said party of the first part, by its _____ President and Vice President ~~Secretary~~ thereunto duly authorized, has caused its corporate name to be hereunto subscribed and its corporate seal to be hereto affixed, this 30th day of December, 1943.

THE SANTA CLARA COUNTY COUNCIL BOY SCOUTS OF AMERICA, a corporation.

By _____ PRESIDENT

By _____ ~~SECRETARY~~ Vice President

paid out of the residue and not out of the assets to be distributed under Section 4.2.

Section 4.2. Within a reasonable time after Trustor's death, the Trustee shall make the following distributions free of death tax:

(a) To LOIS I. SPAFFORD and F. E. SPAFFORD, in equal shares, or all to the survivor of them, the property known as Little Creek (Santa Cruz County Assessor's Parcel No. 057-121-10), subject to any easements of record, and $300,000 in municipal bonds (valued at the date of Trustor's death). If neither survive Trustor, then to the then living issue of LOIS SPAFFORD, by right of representation, it being Trustor's intent (but not a requirement) that the Spafford family use the property and supplemental gift to enable them to maintain it for their recreational enjoyment, subject to the interests described in paragraph (b) next following.

have forestry use right - E. Hong

(b) To CALIFORNIA POLYTECHNIC STATE UNIVERSITY FOUNDATION (1) the property known as Swanton Pacific Ranch (Santa Cruz County Assessor's Parcel Nos. 057-121-06, 057-121-07, 057-121-08, 057-121-09, 057-121-14, 057-121-22, 05-151-01, 057-151-03, 057-151-05, 057-151-06, 057-151-07, 057-131-13, and 057-131-60; (2) the property known as Valencia Creek (Santa Cruz County Assessor's Parcel Nos. 105-021-08, 105-221-01, 105-221-03, 105-231-02, and 107-061-01); and (3) the following interests in Assessor's Parcel No. 057-121-10 (Little Creek Property):

500± ac near Apts 5 million Bd ft Res Lumber ready to

1. the exclusive right to take timber from the land on a commercial basis, and as an auxiliary to that right, the nonexclusive right to manage the forest on the land for the purpose of improving and protecting the commercial timber yield; and

2. the nonexclusive right to use the land and to allow it to be used for State University forestry and natural resources management instruction, experimentation, and research.

PLANNING DEPARTMENT

GOVERNMENTAL CENTER

COUNTY OF SANTA CRUZ

701 OCEAN STREET · SANTA CRUZ, CALIFORNIA 95060
FAX (831) 454-2131 TDD (831) 454-2123

DEVELOPMENT PERMIT APPLICATION

PHONE: (831) 454-2130
PRINT DATE: 10/29/2007
APPLICATION DATE: 10/29/2007

APPLICATION NO.: **07-0658**

PARCEL NO.	SITUS ADDRESS
057-251-08	NOT AVAILABLE
057-251-09	NOT AVAILABLE

PROJECT DESCRIPTION:
Proposal to rezone two parcels from the ResidentialAgriculture (RA) Zone District to the Timber Production (TP) ZoneDistrict. Requires a Rezoning. Property located at about 680 feetSouth of Berry Creek Road (no road access) at about 1500 feetSouth East of the intersection of Berry Creek Road and Big Creek Road.

DIRECTIONS TO PROPERTY: TAKE HWY 1 NORTH TO SWANTON ROAD. TURN RIGHT. TURN RIGHT ON BIG CREEK ROAD AND THEN RIGHT ON BERRY CREEK. PROPERTY LIES SOUTH OF BERRY CREEK ROAD AND EAST OF BIG CREEK ROAD BUT IS NOT ACESSIBLE BY ROAD.

OWNER: CALIFORNIA POLYTECHNIC STATE UNIV FOUNDATION FOUNDATION ADMIN OFF BLD 15 SAN LUIS OBISPO CA 94307
SEND HEARING NOTICE AND STAFF REPORT TO OWNER

APPLICANT: JOSEPH CARTER 318 AVALON ST SANTA CRUZ CA 95060
BUS. PHONE: (831)359-5989
SEND HEARING NOTICE AND STAFF REPORT TO APPLICANT

STATEMENT OF INTEREST IN PROPERTY: FORESTER/APPLICANT

APPLICATION FEES: **RECEIPT: 00108446** **DATE PAID: 10/29/2007**

COB NOE ADMINISTRATIVE FEE	50.00	
APPLICATION INTAKE A	131.00	
ENVIRONMENTAL EXEMPTION	145.00	
ENVIRONMENTAL EXEMPTION	-145.00	
REZONING TO TPZ	1500.00	#15031
RECORDS MANAGEMENT FEE	15.00	
*** TOTAL ***	1696.00	***

PARCEL CHARACTERISTICS FOR: 05725108
ZONE DISTRICT(S): RESIDENTIAL AGRICULTURE
GENERAL PLAN LAND USE DESIGNATION(S): MOUNTAIN RESIDENTIAL
PLANNING AREA: NORTH COAST
COASTAL ZONE: WITHIN COASTAL ZONE
GENERAL PLAN RESOURCES & CONSTRAINTS: C-FIRE
GENERAL PLAN RESOURCES & CONSTRAINTS: BIOTIC
ASSESSOR LAND USE CODE: PRIVATE COLLEGE
DISTRICT SUPERVISOR: Neal Coonerty Third District

 COPY - APPLICANT

PARCEL SIZE: 30492 SQUARE FEET (ASSESSOR)

IF A MINIMUM PARCEL SIZE IS REQUIRED TO MEET COUNTY STANDARDS, YOU MAY NEED TO OBTAIN A SURVEY TO DEMONSTRATE THAT YOU HAVE SUFFICIENT LAND AREA.

ACTUAL CONDITIONS ON THIS PROPERTY MAY NOT COINCIDE WITH THE MAPPED RESOURCE/CONSTRAINT INFORMATION, WHICH IS SOMEWHAT GENERALIZED. THE APPLICATION OF SPECIFIC RESOURCE AND CONSTRAINT POLICIES IS DEPENDENT ON THE ACTUAL CONDITIONS ON THE PROPERTY AND IN THE AREA OF DEVELOPMENT.

PARCEL CHARACTERISTICS FOR: 05725109
ZONE DISTRICT(S): RESIDENTIAL AGRICULTURE
GENERAL PLAN LAND USE DESIGNATION(S): MOUNTAIN RESIDENTIAL
PLANNING AREA: NORTH COAST
COASTAL ZONE: WITHIN COASTAL ZONE
GENERAL PLAN RESOURCES & CONSTRAINTS: C-FIRE
GENERAL PLAN RESOURCES & CONSTRAINTS: ARCRES
GENERAL PLAN RESOURCES & CONSTRAINTS: BIOTIC
ASSESSOR LAND USE CODE: PRIVATE COLLEGE
DISTRICT SUPERVISOR: Neal Coonerty Third District
PARCEL SIZE: 39.3 ACRES (ASSESSOR)

IF A MINIMUM PARCEL SIZE IS REQUIRED TO MEET COUNTY STANDARDS, YOU MAY NEED TO OBTAIN A SURVEY TO DEMONSTRATE THAT YOU HAVE SUFFICIENT LAND AREA.

ACTUAL CONDITIONS ON THIS PROPERTY MAY NOT COINCIDE WITH THE MAPPED RESOURCE/CONSTRAINT INFORMATION, WHICH IS SOMEWHAT GENERALIZED. THE APPLICATION OF SPECIFIC RESOURCE AND CONSTRAINT POLICIES IS DEPENDENT ON THE ACTUAL CONDITIONS ON THE PROPERTY AND IN THE AREA OF DEVELOPMENT.

YOU WILL RECEIVE A LETTER OR LETTERS WITH THE RESULTS OF YOUR TECHNICAL REVIEW(S).

APPLICATION TAKEN BY
LEZANNE JEFFS, PLANNING DEPARTMENT
SUBMITTED AT 701 OCEAN STREET

NOTICE TO DEVELOPMENT PERMIT APPLICANT:

You will be notified within five (5) working days of the name and phone number of your project planner.

If your project is found to be extraordinarily complex, reviews normally charged a fixed development permit or technical review fee may be charged on an actual cost basis. This determination may be made either at application acceptance or during application review. Authority for these charges is found in the Planning Department Fee Schedule.

Your application fees are not refundable, except as specified in the Planning Department Fee Schedule.

If you have begun an activity or work requiring county review or approval without first obtaining a permit, you will be charged fees equal to the cost of investigation and resolution of the violation. Authority for these charges is found in Chapter 1.12 of the Santa Cruz County Code.

You need to advise residents of property that Planning Department staff may be visiting the site. Site should be clearly marked/staked for staff inspection. Incomplete directions or marking will delay review of the project.

COPY

Job No. 15031
Application No. 07-0658
Assessor's Parcel No. 057-251-08&09

CONTRACT FOR PROCESSING OF PROJECTS AT COST

THIS AGREEMENT is entered into this 29th day of October 20 07, by and between Joseph Culver, hereinafter referred to as Applicant, and the County of Santa Cruz planning Department, hereinafter referred to as Department.

RECITALS

WHEREAS Applicant has filed with the Department an application for Timber rezoning (hereinafter referred to as "Project"), and;

WHEREAS the scope of said project requires processing as follows: review of relevant policies and issues; analysis of the application thereof to Applicant's proposal; preparation of recommendations thereon; presentation before the Planning Commission and Board of Supervisors; and issuance of findings, decisions, and permits if approved, and;

WHEREAS County resolution requires that the Applicant bear the actual cost of all work necessary for the processing of said Project as set forth in this Agreement.

AGREEMENT

NOW, THEREFORE, the parties hereto mutually agree as set forth the following. Upon execution of this Agreement, pursuant to applicable statutes and ordinances, the Department shall initiate all necessary action for processing of said Project

1. Estimated Cost
It is estimated that processing of this Project will require 10 hours of Planning Department staff time. The estimated cost of such work necessary for the processing of said Project is $ 1,500.00 exclusive of costs for building permits, service and capital improvement fees and code enforcement costs which are to be paid separately. This is an estimate only and may change due to variations in the application, scope of review or other now unforeseen reasons. In any event, Applicant shall be liable for reimbursement of all Department costs incurred if these estimated times and amounts are exceeded. Similarly, if the above estimate exceeds the actual costs incurred by the Department to process the Project the remainder will be refunded to Applicant.

2. Payment for Costs
Applicant shall pay a deposit in the amount of $ 1,500.00 concurrent with filing of the application for such Project. Thereafter Department shall mail to the Applicant at the address given below, a monthly statement of actual costs incurred by Department in the processing of said Project (through completion as determined by the Planning Director) based on staff, contract, material and indirect costs. The deposit will be used to offset the cost of processing said application. When the deposit is 75% exhausted, a review will be made by Department staff to determine if a further deposit amount is needed and will so notify Applicant. **Department will suspend work on any application if there are no funds on deposit to cover the costs of the work and Applicant will be deemed to waive any processing deadlines under the California Permit Reform Act of 1981 codified under Government Code Section 15374 et seq.** In the event that any additional amounts that may be required are not paid by Applicant within 90 days of the first mailing of the notice for additional deposit the Department shall initiate abandonment proceedings under the provision of County Code Section 18.10.430 (a). Should costs not exceed the amount of the deposit, Department shall refund Applicant the remaining balance of the deposit after all Department charges due are paid.

3. Termination of Agreement
Either the Department or Applicant may terminate this Agreement by presentation of written notice to the other party hereto at least ten regular County working days prior to the effective date of said termination. Such termination shall constitute withdrawal of said Project application and shall cause Department to cease all work on said application. In the event of termination, Department shall be entitled to payment for all costs incurred by it prior to and including the effective date of termination. Department shall, in accordance with County procedures, refund Applicant for any portion of deposit paid by Applicant which is in excess of such costs.

4. Amendment of Agreement
No amendment to the terms of this agreement shall be valid unless in writing and signed by all parties hereto.

IN WITNESS WHEREOF, the Department and the Applicant have executed this Agreement effective the date first above written.

TOM BURNS, PLANNING DIRECTOR

By Lezanne Jeffs Date 10/29/07

Name: Lezanne Jeffs

Title: Planner III

APPLICANT

By Joseph Culver Date 10/29/07

Print Name: Joseph Culver Date 10/29/07

Title: Forester

APPROVED AS TO FORM:

By Christopher Cheleden
County Counsel

Lead Planner Porcila Perez

Phone 454-5321

Bill to: Cal Poly Corporation
Building 15
San Luis Obispo, CA 93407
Tel (805) 756-1131

Distribution: Original - Accounting; Copy - Project File; Copy - Applicant

At Cost Contract Form.doc rev 2/04

LICENSE AGREEMENT

This Agreement, made as of the 6th day of February 2008, between RMC Pacific Materials, Inc., ("Licensor") and ~~Swanton Pacific Ranch~~ Cal Poly Corporation ("Licensee").

1. Grant of License. Licensor, in consideration of the covenants and conditions hereinafter stated on the part of Licensee to be kept and performed, hereby grants to Licensee the right and license utilize Licensor's property located at Davenport, CA and further described on the attached Exhibit A; Located in Santa Cruz County (the "Property") for the limited purpose of loading logs from an existing landing and hauling timber across an existing access road from April 15, 2011 until April 15, 2012. All activities will be limited to only that area required for the above-described purpose.

2. Private License. The License shall be a private one, and Licensee shall not permit it to be used except by the Licensee without Licensor's prior written approval.

3. Use of License. Licensee shall use the Licensed Premises solely for the purpose described above and for no other purpose.

4. Term and Termination.

A. The Term of this Agreement shall commence on the date shown above and terminate upon completion of the project.

B. Upon failure of Licensee to perform or comply with any material term, covenant, clause, or condition herein contained, Licensor shall give Licensee written notice of the failure, specifying with particularity the necessary corrective action. If Licensee does not correct the failure to Licensor's reasonable satisfaction within one (1) day of its receipt of such notice, or have commenced corrective action within such one (1) day for those matters which can not be reasonably completed within one (1) day, Licensor may give Licensee written notice of the termination of this Agreement, specifying a termination date at least one (1) day thereafter.

5. Assignment. The permission and license hereby afforded shall be the personal privilege of Licensee, and no assignment thereof shall be made, other than as herein provided, without the prior written consent of Licensor, which shall not be unreasonably withheld.

6. Risk, Liability and Indemnity.

A. Licensee expressly assumes all risk of loss, damage, personal injury or death as may result from its use of the Licensed Premises.

B. Licensee, as further consideration for the grant of this License, assumes all liability for, and releases and agrees to defend, indemnify, and save Licensor harmless from and against:

(i) all claims, loss of or damage to any property, now situated or which may later be placed on the Licensed Premises, and the loss of or interference with any use or services thereof; and

(ii) all claims, loss and damage on account of injury to or death of any and all persons on or using the Licensed Premises.

7. Insurance. At all times during the Term of this Agreement, Licensee shall carry the following types of insurance in at least the limits (which may be a combination of primary and excess coverage) specified below:

COVERAGES	LIMITS OF LIABILITY
Worker's Compensation	Statutory
Employer's Liability	$1,000,000
Comprehensive General Liability (Including bodily injury, property damage, completed operations, contractual liability and explosion, collapse & underground)	$1,000,000 per occurrence

In addition, Licensee agrees to arrange for the endorsements for the above-referenced insurance coverage, copies of which shall be provided, that provide for inclusion of Licensor, its directors, officers, agents and employees as additional insureds as respects this License. In addition, Licensee agrees that the insurance referenced above is primary insurance and that neither the Licensor nor its insurers be called upon to contribute to a loss.

8. Compliance with Laws. Licensee shall comply with all applicable local, county, state or federal laws, codes or ordinances of any description, including, but not limited to: zoning, building, engineering, sanitation, health or environmental laws. Licensee shall promptly remedy any breach of any law caused by its use of the Licensed Premises, and shall assume all cost and expense and responsibility in connection therewith, without any liability whatsoever on the part of Licensor and Licensee hereby agrees to indemnify, protect and save harmless Licensor therefrom.

9. General Provisions.

A. No Waiver. Waiver of any provision of this License, in whole of in part, in any one instance shall not constitute a waiver of any other provision, or a waiver of the same provision, in any other instance; but each provision shall continue in full force and effect with respect to any other then existing or subsequent breach.

B. Notice. Any notice to be given in connection with this License shall be given in writing to the respective party at the address specified below, or at such other address as that party may specify by notice, by (i) delivery in hand or by postage prepaid, United States first class mail, (ii) overnight courier service, (iii) telegram, or (iv) facsimile. Notice so sent shall be effective upon receipt, or upon attempted delivery, if such notice is not accepted by the recipient.

If to Licensee:
Cal Poly Corporation
Building 15, 1 Grand Avenue
San Luis Obispo, CA 93407
Fax: (805) 756-1402

If to Licensor:
RMC Pacific Materials
840 Gessner, Suite 1400
Houston, TX 77024
Attn: Real Estate Department
Fax: (713) 722-5833

C. Applicable Law. This License shall be governed by and construed in accordance with the laws of the State of California. If any provision of this Agreement is found to be illegal or unenforceable, said provision shall be so construed, if reasonably possible, to be a valid and enforceable provision. If any provision cannot be reasonably construed in a manner that renders it valid and enforceable, then, in that event, the remaining portion of this License shall be enforced as though the invalid and unenforceable provision were not a part of the Agreement.

D. No Estate Created. This License shall not be construed as creating or vesting in Licensee any estate in the Licensed Premises but only the limited right of possession under the License hereinabove described and shall not be recorded with any Registry of Deeds or in any other public recording office.

E. Authority to Sign. The Licensee represents and warrants to Licensor that the individual signing on behalf of Licensee has the full authority to bind Licensee to the obligations set forth herein.

IN WITNESS WHEREOF, the said parties hereto have caused this License Agreement to be duly executed and delivered as of the day and year first above written.

WITNESS:

LICENSOR:
RMC Pacific Materials

By: _____
Name: EDMOND L. PRIMS
Title: DIRECTOR - REAL ESTATE

WITNESS:

LICENSEE:
Cal Poly Corporation

By: _____
Name: Starr Lee
Title: Legal Counsel

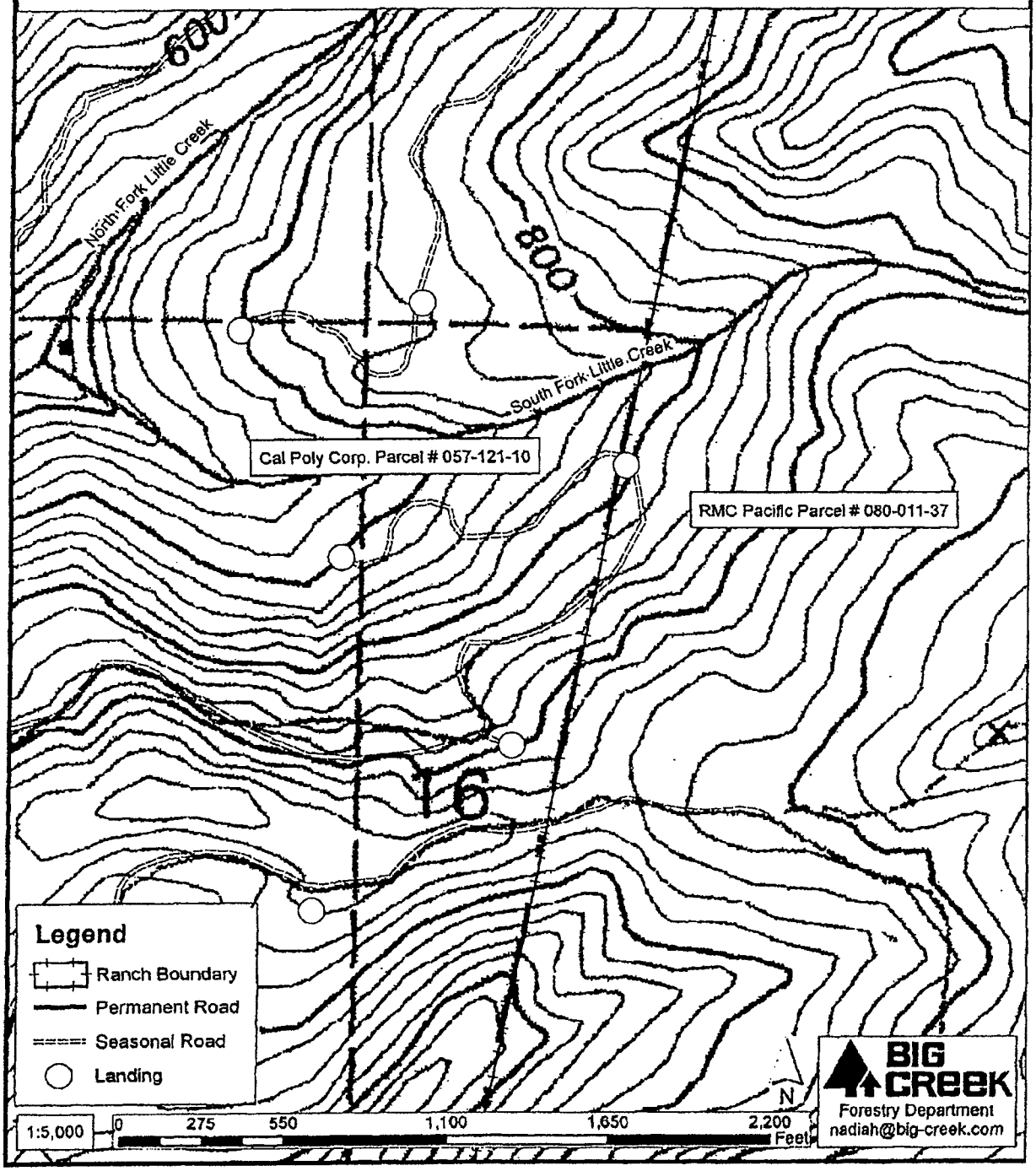
RECEIVED
APR 15 2008
COAST AREA OFFICE
RESOURCE MANAGEMENT

PART OF PLAN

Cal Poly Corporation / RMC Pacific Materials Inc.
Road License Agreement - Exhibit A

SL

T10S R3W, Portion of Projected Section 16 and Rancho San Vicente, MDB&M
Davenport USGS 7.5' Quadrangle



RECEIVED

APR 15 2008 PART OF PLAN

COAST AREA OFFICE
RESOURCE MANAGEMENT

304.4 REVISED

BIG CREEK

"Growing Redwoods for the Future"

October 28, 2007

Cal Poly Corporation
Attn: Dale Texter
Building 15, 1 Grand Avenue
San Luis Obispo, CA 93407

Re: Notice of Responsibilities for Timberland Owner and Plan Submitter with regards to the Swanton Pacific Ranch NTMP

Dear Mr. Texter:

As the Registered Professional Forester (RPF) preparing a Non-Industrial Timber Management Plan (NTMP) for your properties in Santa Cruz County, California I am required to notify you of your responsibilities as Timberland Owner and Plan Submitter for the proposed harvest.

Your responsibilities as Timberland Owner include compliance with the requirements of the California Forest Practice Act and compliance with the California Forest Practice Rules regarding site preparation, stocking, and maintenance of roads, landings, and erosion control facilities. I recommend that you obtain a copy of the 2007 California Forest Practice Rules by contacting the California Department of Forestry and Fire Protection or online at http://www.fire.ca.gov/rsrc-gt_content/downloads/2007FPRulebook_wDiagrams.pdf#page2.

Your responsibilities as Plan Submitter include retaining an RPF to conduct all matters which require an RPF. I have attached a copy of the portion of the Forest Practice Rules describing these responsibilities.

If you have any questions regarding your responsibilities, or any other matters pertaining to the proposed NTMP, Please contact me at (831) 457-6383.

Sincerely,

Nadia Hamey
RPF #2788

Enc. 14 CCR 1090.9 (Plan Submitter Responsibilities)
Cc: Dr. Brian Dietterick, Swanton Pacific Ranch Director

1090.9 Plan Submitter Responsibility

The plan submitter, or successor in interest, shall:

(a) Ensure that an RPF conducts any activities which require an RPF.

(b) Provide the RPF preparing the plan or amendments with complete and correct information regarding pertinent legal rights to, interests in, and responsibilities for land, timber, and access as these affect the planning and conduct of timber operations.

(c) Sign the NTMP certifying knowledge of the plan contents and the requirements of this section.

(d) Within five (5) working days of change in RPF responsibilities for NTMP implementation or substitution of another RPF, file with the Director a notice which states the RPF's name and registration number, address, and subsequent responsibilities for any RPF required field work, amendment preparation, or operation supervision. Corporations need not file notification because the RPF of record on each document is the responsible person.

(e) Provide a copy of the approved NTMP and Notice of Timber Operations to the LTO.

(f) Notify the Director prior to commencement of site preparation operations. Receipt of a burning permit is sufficient notice.

(g) Provide the RPF preparing the Notice and LTO each a copy of the current NTMP and subsequent amendments.

REGISTERED PROFESSIONAL FORESTER (RPF) RESPONSIBILITY ACKNOWLEDGEMENT

(As per Section 1035.1 Title 14, CCR)

RPF Certified to Provide Professional Advice:

Name: **Nadia Hamey**

Street Address/PO Box: **3564 Highway 1** City: **Davenport** Zip Code: **95017**

Telephone Number: **(831) 457-6383** RPF Number: **2788**

Name: **Steve R. Auten**

Street Address/PO Box: **125 Swanton Road** City: **Davenport** Zip Code: **95017**

Telephone Number: **(831) 458-5413** RPF Number: **2734**

Name: **Douglas Piirto**

Street Address/PO Box: **Cal Poly NRM Department, 11-217, 1 Grand Ave.** City: **San Luis Obispo** Zip Code: **93407-0259**

Telephone Number: **(805) 756-2968** RPF Number: **2179**

Name: **Walter R. Mark**

Street Address/PO Box: **Cal Poly NRM Department, 11-217, 1 Grand Ave.** City: **San Luis Obispo** Zip Code: **93407-0259**

Telephone Number: **(805) 756-5028** RPF Number: **1250**

As of January 1, 2001, I have read and understand my responsibility as RPF, as described under 14 CCR 1035.1(a-g). I agree to fulfill my responsibilities as an RPF as they pertain to this plan.

[**X**] Yes [ ] No I have been retained as the RPF, available to provide professional advice to the licensed timber operator and timberland owner upon request throughout the active timber operations regarding: (1) the plan, (2) the forest practice rules, (3) and other associated regulations pertaining to timber operations.

RPF Signature: Nadia Hamey

RPF Signature: Steve R. Auten

RPF Signature: Douglas D. Piirto

RPF Signature: Walter R. Mark

Swanton Pacific Ranch Nonindustrial Timber Management Plan 2007

Cal Poly Corporation ("Corporation"), a nonprofit corporation that benefits California Polytechnic State University, owns Swanton Pacific Ranch, which is located in portions of Sections 8, 9, 16, 17 and portions of Rancho Agua Puerca y las Trancas, Township 10 South, Range 3 West. The Ranch is roughly 3202 acres, and was bequested to Cal Poly Corporation by Al Smith. Cal Poly Corporation is submitting a Nonindustrial Timber Management Plan ("NTMP") for portions of the ranch to the California Department of Forestry and Fire Protection. The NTMP will include the harvest of timber in parcel 057-121-10, an 80 acre in-holding owned by other heirs of Al Smith (Steve Spafford, Susan Spafford England, and Stuart Spafford (together known as "Landowners")). This parcel is located next to Swanton Pacific Ranch and is located near the confluence of the North and South Forks of Little Creek; Cal Poly Corporation holds timber rights to parcel 057-121-10.

The Department of Forestry is requiring that the Landowners execute the NTMP and other documents as plan submitter and timberland owner in order for Cal Poly Corporation to realize its timber rights on parcel 057-121-10. Therefore, the Cal Poly Corporation assumes all responsibilities, including costs for filing and permits, as plan submitter and as the timberland owner for all timberlands included in the NTMP as required by the state of California per Title 14 California Code of Regulations Chapter 4, 4.5, and 10 ("California Forest Practice Rules"), and assumes legal responsibility as plan submitter and timberland owner for parcel 057-121-10. Cal Poly Corporation will comply with all applicable state laws and regulations regarding the NTMP, including but not limited to, the Forest Practices Act, the Forest Practice Rules, and the Porter-Cologne Water Quality Control Act.

Cal Poly Corporation shall defend, indemnify, hold harmless and protect Steve Spafford, Susan Spafford England and Stuart Spafford (together known as the "Landowners") from and against any and all costs, damages, expenses, liabilities, losses (including without limitation to costs and fees of litigation of every nature) arising out of or in connection with Cal Poly Corporation's compliance with the NTMP as approved by the state, or failure to comply with any of its obligations contained in this agreement, except such loss or damage which was caused by the negligence or willful misconduct of any of the Landowners.

In consideration of this agreement, the Landowners each agree to support Cal Poly Corporation's submission of the NTMP and the application for waiver for waste discharge requirements, and any other documents required for the successful and timely application and completion of the NTMP process, by providing reasonable and expeditious review and execution of the necessary documents as plan submitter and timberland owner.

Starr Lee
Legal Counsel
Cal Poly Corporation

12-10-07
Date

Concur:

David Wehner
Dean
College of Agriculture, Food, and Environmental Sciences
California Polytechnic State University

12/7/07
Date

Concur:

Dr. Brian Dietterick
Swanton Pacific Ranch Manager

12/11/07
Date

Steve Spafford, Landowner

12/11/07
Date

Susan Spafford England, Landowner

12/11/07
Date

Stuart Spafford, Landowner

12/11/07
Date

Relevant sections of Title 14 California Code of Regulations related to Plan Submitter Responsibilities

THP-Timber Harvest Plan
RPF-Registered Professional Forester
LTO-Licensed Timber Operator
Plan Submitter- includes Timberland Owner and timber rights owner
NTMP-Nonindustrial Timber Management Plan

For a Timber Harvest Plan

§1035.1 Registered Professional Forester Responsibility

(a) Upon submission of a THP, the RPF who prepares and signs a plan is responsible for the accuracy and completeness of its contents.

(1) The RPF preparing the plan shall state in the THP the work which will be performed by the RPF plan preparer (beyond preparation of the THP and attending the pre-harvest inspection if requested by the Director), and any additional work requiring an RPF which the plan preparer does not intend to perform. This may include, but is not limited to, field work in identifying watercourse and lake protection zones or special treatment areas, marking trees, or other activities. The RPF is only responsible for the activities set forth in the plan when employed for that purpose, or required by the rules of the Board. The RPF shall state whether or not he or she has been retained to provide professional advice throughout the timber operations.

(2) *The RPF preparing the plan shall in writing, inform the plan submitter(s) of their responsibility pursuant to Section 1035 of this Article, and the timberland owner(s) of their responsibility for compliance with the requirements of the Act and where applicable, Board rules regarding site preparation, stocking, and maintenance of roads, landings, and erosion control facilities.*

§1035 Plan Submitter Responsibility

The plan submitter, or successor in interest, shall:

(a) *Ensure that an RPF conducts any activities which require an RPF.*

(b) *Provide the RPF preparing the plan or amendments with complete and correct information regarding pertinent legal rights to, interests in, and responsibilities for land, timber, and access as these affect the planning and conduct of timber operations.*

(c) *Sign the THP certifying knowledge of the plan contents and the requirements of this section.*

(d) (1) *Retain an RPF who is available to provide professional advice to the LTO and timberland owner upon request throughout the active timber operations regarding:*

A) *the plan,*

B) *the Forest Practice Rules, and*

C) *other associated regulations pertaining to timber operations,*

(2) *The plan submitter may waive the requirement to retain an RPF to provide professional advice to the LTO and timberland owner under the following conditions:*

A) *the plan submitter provides authorization to the timberland owner to provide advice to the LTO on a continuing basis throughout the active timber operations provided that the timberland owner is a natural person who personally performs the services of a professional forester and such services are personally performed on lands owned by the timberland owner;*

B) *the timberland owner agrees to be present on the logging area at a sufficient frequency to know the progress of operations and advise the LTO, but not less than once during the life of the plan; and*

C) *the plan submitter agrees to provide a copy of the portions of the approved THP and any approved operational amendments to the timberland owner containing the General Information, Plan of Operations, THP Map, Yarding System Map, Erosion Hazard Rating Map and any other information deemed by the timberland owner to be necessary for providing advice to the LTO regarding timber operations.*

(3) *All agreements and authorizations required under 14 CCR § 1035(d)(2) shall be documented and provided in writing to the Director to be included in the plan.*

(e) Within five working days of change in RPF responsibilities for THP implementation or substitution of another RPF, file with the Director a notice which states the RPF's name and registration number, address, and subsequent responsibilities for any RPF required fieldwork, amendment preparation, or operation supervision. Corporations need not file notification because the RPF of record on each document is the responsible person.
(f) Provide a copy of the portions of the approved THP and any approved operational amendments to the LTO containing the General Information, Plan of Operations, THP Map, Yarding System Map, Erosion Hazard Rating Map and any other information deemed by the RPF to be necessary for timber operations .
(g) Notify the Director prior to commencement of site preparation operations. Receipt of a burning permit is sufficient notice.
(h) Disclose to the LTO, prior to the start of operations, through an on-the-ground meeting, the location and protection measures for any archaeological or historical sites requiring protection if the RPF has submitted written notification to the plan submitter that the plan submitter needs to provide the LTO with this information.

For a Nonindustrial Timber Management Plan

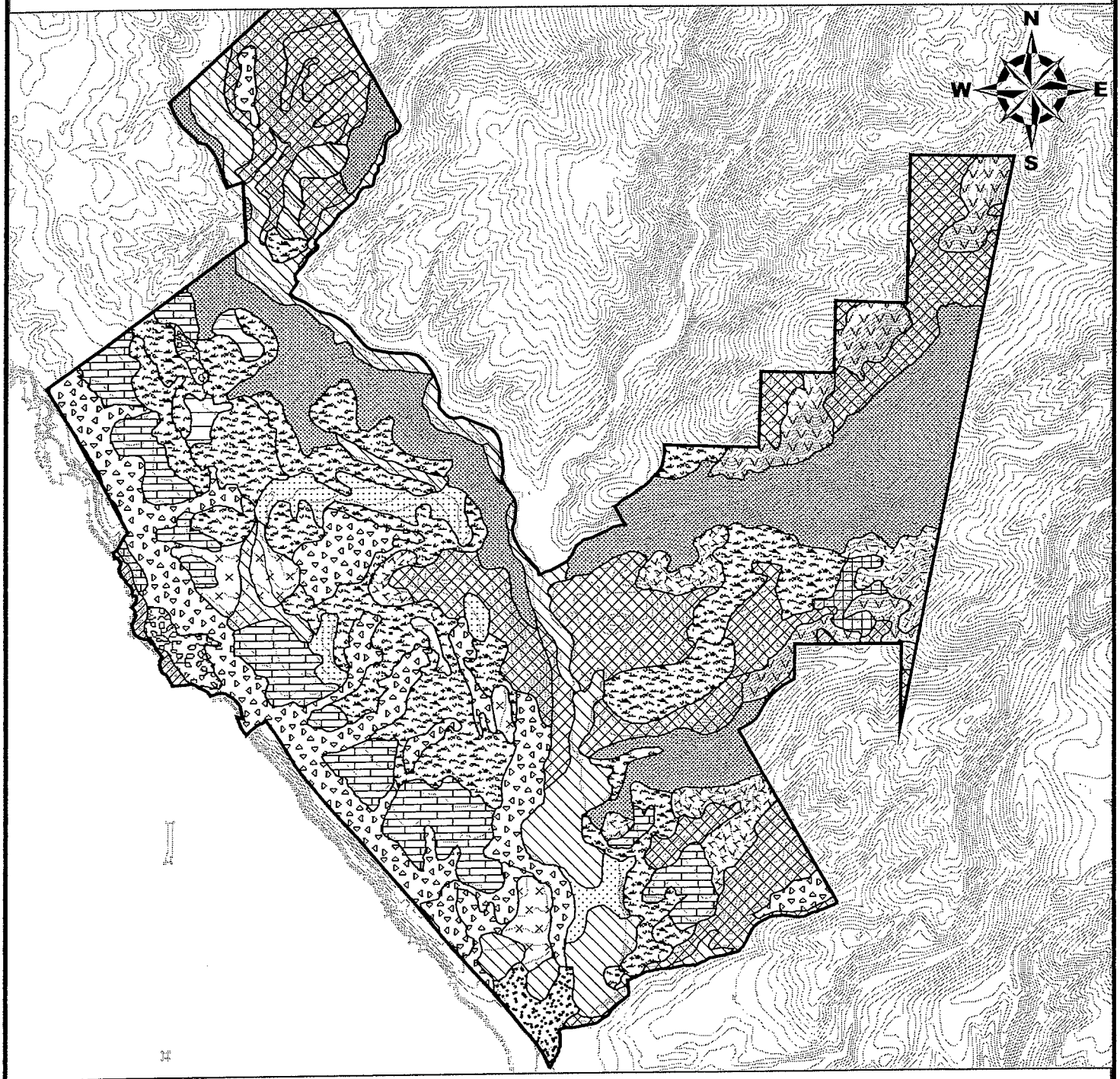
§1090.9 Plan Submitter Responsibility

The plan submitter, or successor in interest, shall:

(a) Ensure that an RPF conducts any activities which require an RPF.
(b) Provide the RPF preparing the plan or amendments with complete and correct information regarding pertinent legal rights to, interests in, and responsibilities for land, timber, and access as these affect the planning and conduct of timber operations.
(c) Sign the NTMP certifying knowledge of the plan contents and the requirements of this section.
(d) Within five (5) working days of change in RPF responsibilities for NTMP implementation or substitution of another RPF, file with the Director a notice which states the RPF's name and registration number, address, and subsequent responsibilities for any RPF required field work, amendment preparation, or operation supervision. Corporations need not file notification because the RPF of record on each document is the responsible person.
(e) Provide a copy of the approved NTMP and Notice of Timber Operations to the LTO.
(f) Notify the Director prior to commencement of site preparation operations. Receipt of a burning permit is sufficient notice.
(g) Provide the RPF preparing the Notice and LTO each a copy of the current NTMP and subsequent amendments.

Swanton Pacific Ranch NTMP - Soils Map

T10S R3W, Portions of Sections 8,9,16,17,20
and Rancho Agua Puerca y Las Trancas, MDBM



Legend

- Swanton Boundary
- 40 foot Contours

Soil Names

- Aptos loam, warm
- Aquents/flooded
- Beaches
- Ben Lomond-Catelli-Sur Complex
- Bonnydoon loam
- Bonnydoon-Rock Outcrop Complex
- Elder sandy loam
- Elkhorn sandy loam
- Lompico-Felton Complex
- Los Osos loam
- Maymen stony loam
- Maymen-Rock Outcrop Complex
- Pfeiffer gravelly sandy loam
- Santa Lucia shaly clay loam
- Soquel loam
- Tierra-Watsonville Complex
- Watsonville loam
- Watsonville loam, thick surface

1:30,000

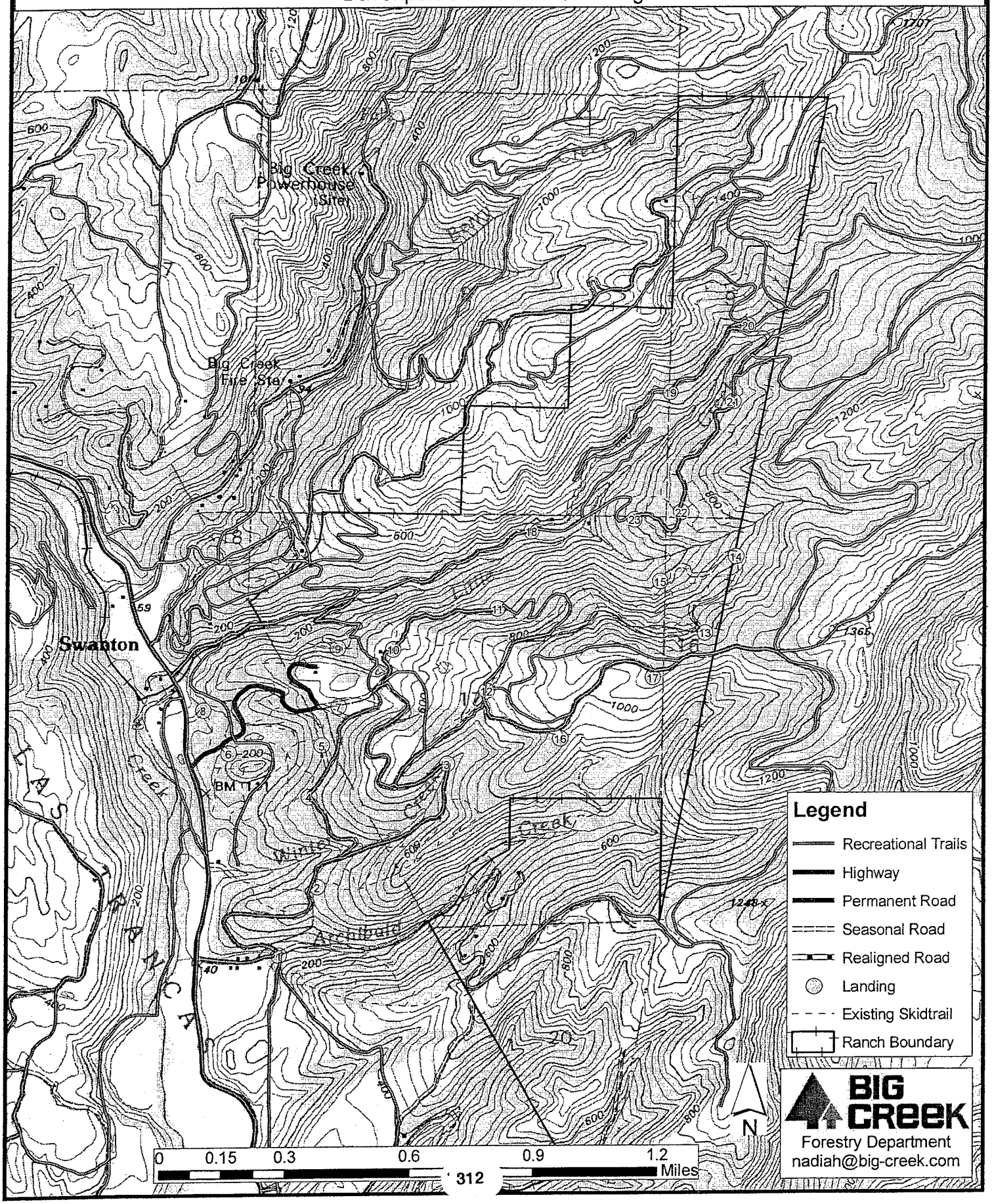
0 1,250 2,500 5,000 7,500 10,000 Feet

BIG CREEK
Forestry Department
nadiah@big-creek.com

Swanton Pacific Ranch NTMP - Recreational Trails Map

T10S R3W, Portions of Sections 8,9,16,17,20 and Rancho Agua Puerca y Las Trancas, MDB&M

Davenport USGS 7.5' Quadrangle



BIG CREEK
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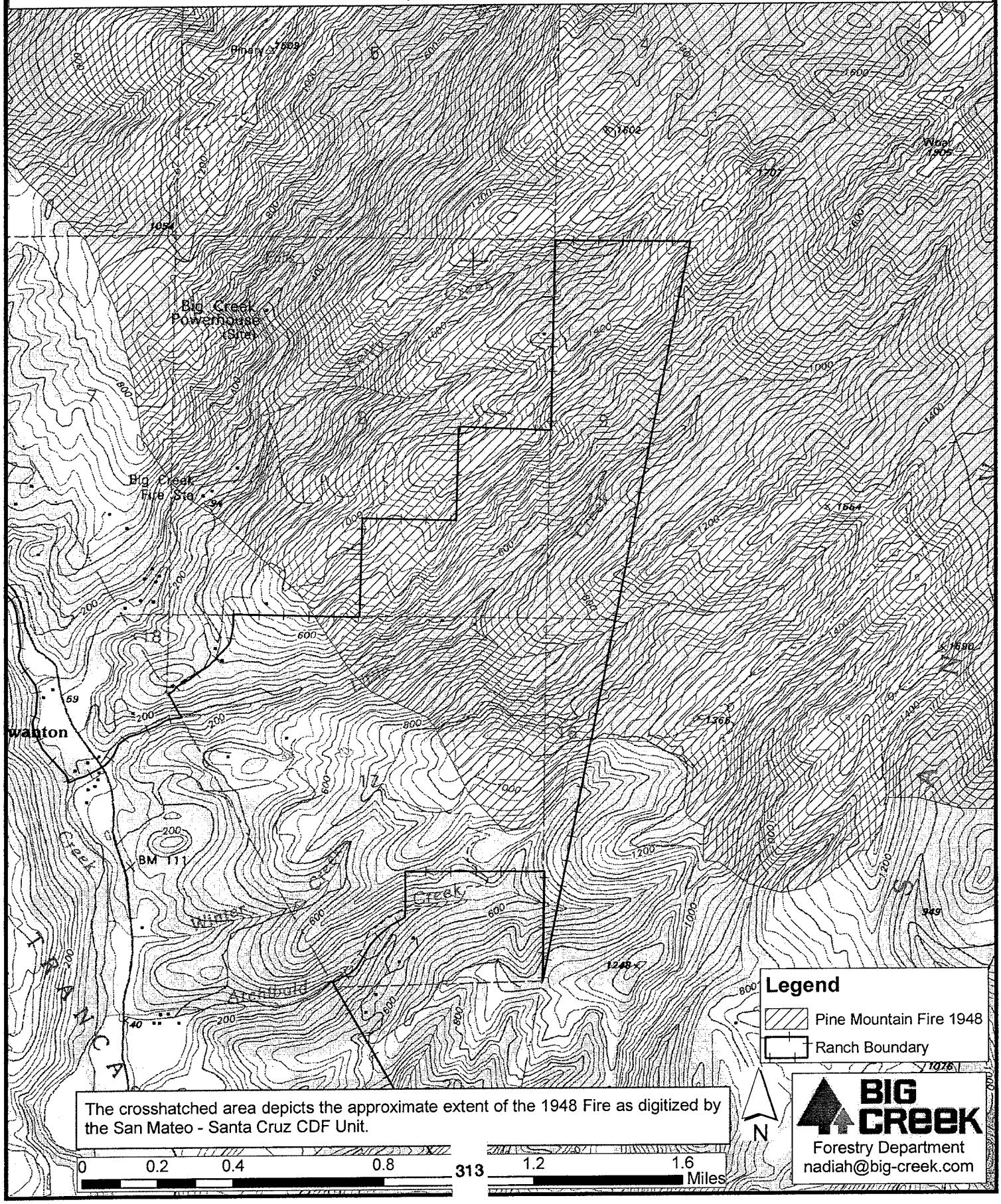
1948 Fire in the Vicinity of Swanton Pacific Ranch

T10S R3W, Portions of Sections 8,9,16,17,20 and Rancho Agua Puerca y Las Trancas, MDB&M

Davenport USGS 7.5' Quadrangle



The crosshatched area depicts the approximate extent of the 1948 Fire as digitized by the San Mateo - Santa Cruz CDF Unit.

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ESTIMATED SURFACE SOIL EROSION HAZARD
Swanton Pacific Ranch NTMP

STATE OF CALIFORNIA
BOARD OF FORESTRY

I. SOIL FACTORS				FACTOR RATING BY AREA			SOIL TYPES
A. SOIL TEXTURE	Fine	Medium	Coarse	A	B	C	**A= 113 Ben Lomond-Catelli Sur complex 30-75% slope** **B= 117 Bonnydoon loam 30-50% slope** **C= 167 Santa Lucia shaly clay loam 5-30% slope**
1. DETACHABILITY	Low	Moderate	High	**25**	**17**	**10**	
Rating	1-9	10-18	19-30				
2. PERMEABILITY	Slow	Moderate	Rapid	**1**	**3**	**3**	
Rating	5-4	3-2	1				

B. DEPTH TO RESTRICTIVE LAYER OR BEDROCK

	Shallow	Moderate	Deep			
	1"-19"	20"-39"	40"-60"	**4**	**13**	**8**
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%	**5**	**9**	**4**			
Rating	10-6	5-3	2-1				A	B	C
						SUBTOTAL⇒	**35**	**42**	**25**

II. SLOPE FACTOR

Slope	5-15%	16-30%	31-40%	41-50%	51-70%	71-80%(+)	**18**	**12**	**5**
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%	**3**	**3**	**3**
Rating	15-8	7-4	3-1			

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

	Low	Moderate	High	Extreme			
	(-) 30-39	40-59	60-69	70-80(+)	**15**	**15**	**15**
Rating	1-3	4-7	8-11	12-15			
				TOTAL SUM OF FACTORS⇒	**71**	**72**	**48**

EROSION HAZARD RATING

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

ESTIMATED SURFACE SOIL EROSION HAZARD
Swanton Pacific Ranch NTMP

STATE OF CALIFORNIA
BOARD OF FORESTRY

I. SOIL FACTORS				FACTOR RATING BY AREA			SOIL TYPES
A. SOIL TEXTURE	Fine	Medium	Coarse	A	B	C	**A= 168 Santa Lucia shaly clay loam 30-50% slope** **B= 169 Santa Lucia shaly clay loam 50-75% slope** **C= 174 Tierra Watsonville complex 15-30% slope**
1. DETACHABILITY Rating	Low	Moderate	High	**10**	**10**	**20**	
	1-9	10-18	19-30				
2. PERMEABILITY Rating	Slow	Moderate	Rapid	**3**	**3**	**5**	
	5-4	3-2	1				

B. DEPTH TO RESTRICTIVE LAYER OR BEDROCK

	Shallow	Moderate	Deep			
	1"-19"	20"-39"	40"-60"	**8**	**8**	**12**
Rating	15-9	8-4	3-1			

D. 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**	**4**	**5**			
Rating	10-6	5-3	2-1				A	B	C
						SUBTOTAL⇒	**25**	**25**	**42**

II. SLOPE FACTOR

	5-15%	16-30%	31-40%	41-50%	51-70%	71-80%(+)	**15**	**23**	**6**
Slope 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%	**3**	**3**	**3**
Rating	15-8	7-4	3-1			

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

	Low	Moderate	High	Extreme			
	(-) 30-39	40-59	60-69	70-80(+)	**15**	**15**	**15**
Rating	1-3	4-7	8-11	12-15			
				TOTAL SUM OF FACTORS⇒	**58**	**66**	**66**

EROSION HAZARD RATING

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

ESTIMATED SURFACE SOIL EROSION HAZARD

Swanton Pacific Ranch NTMP

STATE OF CALIFORNIA
BOARD OF FORESTRY

I. SOIL FACTORS				FACTOR RATING BY AREA			SOIL TYPES
A. SOIL TEXTURE	Fine	Medium	Coarse	A	B	C	**A= 175 Tierra Watsonville complex 30-50% slope** **B= 151 Maymen Stony loam 30-75%** **C= 153 Maymen-Rock Outcrop complex 50-75%**
1. DETACHABILITY Rating	Low	Moderate	High	**20**	**24**	**24**	
	1-9	10-18	19-30				
2. PERMEABILITY Rating	Slow	Moderate	Rapid	**5**	**2**	**2**	
	5-4	3-2	1				

B. DEPTH TO RESTRICTIVE LAYER OR BEDROCK

	Shallow	Moderate	Deep			
	1"-19"	20"-39"	40"-60"	**12**	**11**	**11**
Rating	15-9	8-4	3-1			

E. 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%	**5**	**2**	**2**			
Rating	10-6	5-3	2-1				A	B	C
						SUBTOTAL⇒	**42**	**39**	**39**

II. SLOPE FACTOR

Slope	5-15%	16-30%	31-40%	41-50%	51-70%	71-80%(+)	**15**	**18**	**18**
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%	**3**	**3**	**3**
Rating	15-8	7-4	3-1			

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

	Low	Moderate	High	Extreme			
	(-) 30-39	40-59	60-69	70-80(+)	**15**	**15**	**15**
Rating	1-3	4-7	8-11	12-15			
				TOTAL SUM OF FACTORS⇒	**75**	**75**	**75**

EROSION HAZARD RATING

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

MOLINO CREEK

LOCATION: T10S, R5W, Secs. 17, 18, 20, 21

Santa Cruz County

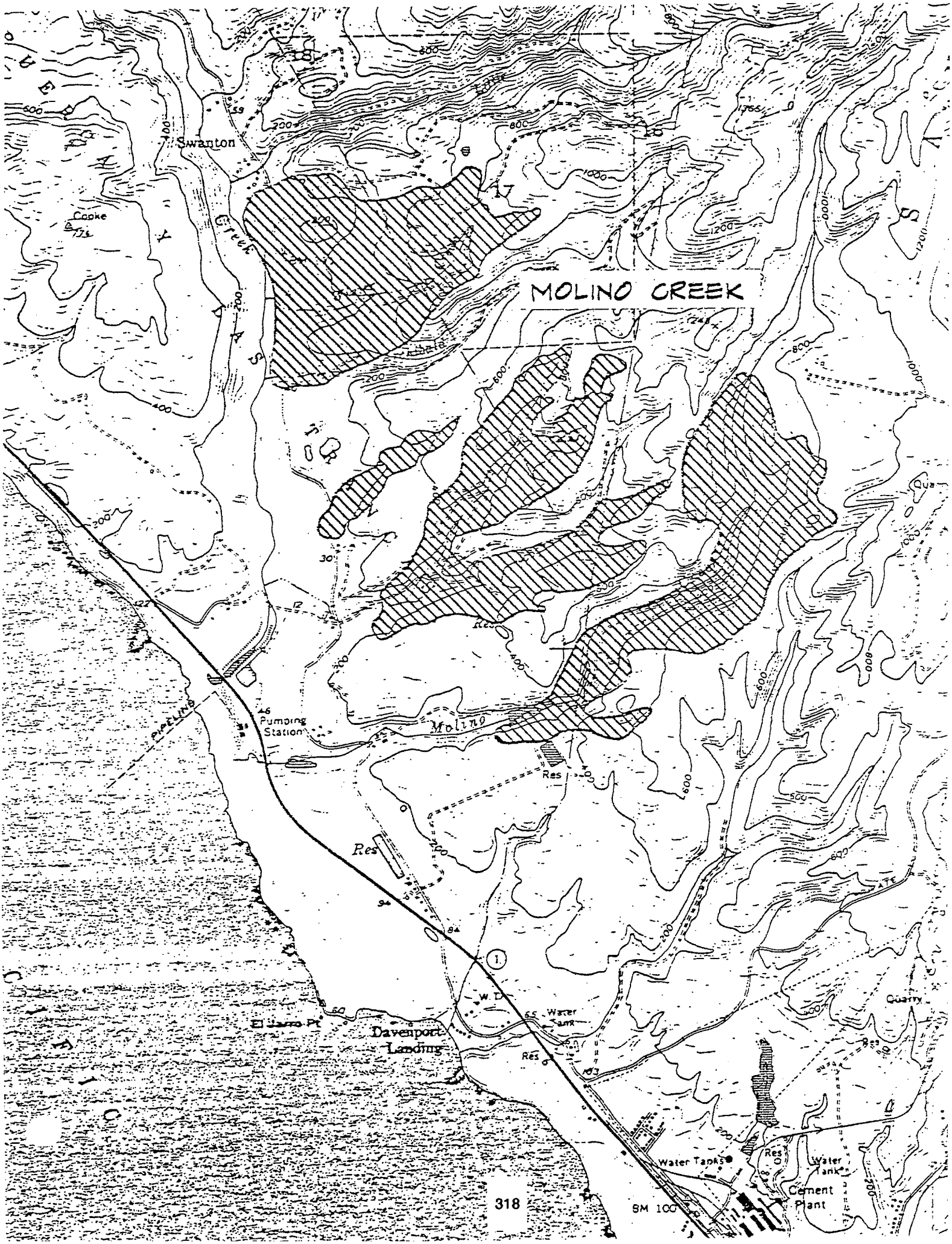
ACREAGE: Not yet computed

OWNERSHIP: Private

CRITERIA: A, B

DESCRIPTION: East of State Highway 1 and across from a very popular beach, finger-like gulches reach from the relatively flat agricultural lands adjacent to the road eastward to the first coastal ridge. These gulches are filled with dense conifer groves consisting mainly of Redwood and Douglas fir trees. This impressive contrast of sandy beach and ocean on one side and rising timberland on the other can be seen by travelers from both directions on the highway and by beachgoers.

OBJECTIVES: The visual character of the wooded groves should be maintained for the continued enjoyment of highway travelers and beach users. Although the existing species composition is well suited to the site, other possibilities that would offer an equally impressive view could be introduced.

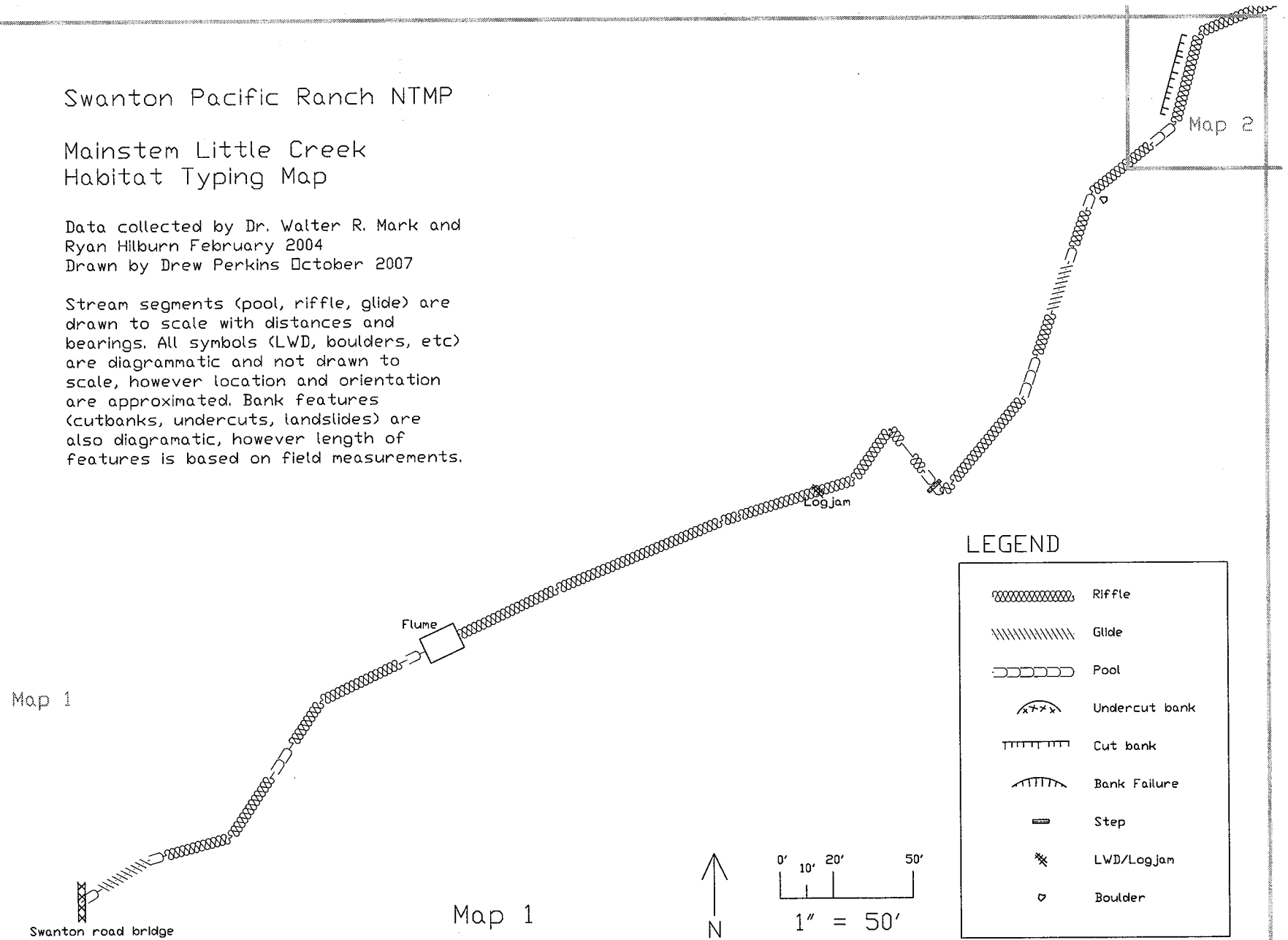

MOLINO CREEK
Swanton
Cooke
Creek
Pumping Station
Pipeline
Molino
Res
Res
Res
Res
Res
Water Tank
Water Tanks
Water Tank
Cement Plant
Quarry
Davenport Landing
El Jarro Pt
W. D.
BM 100
318

Swanton Pacific Ranch NTMP

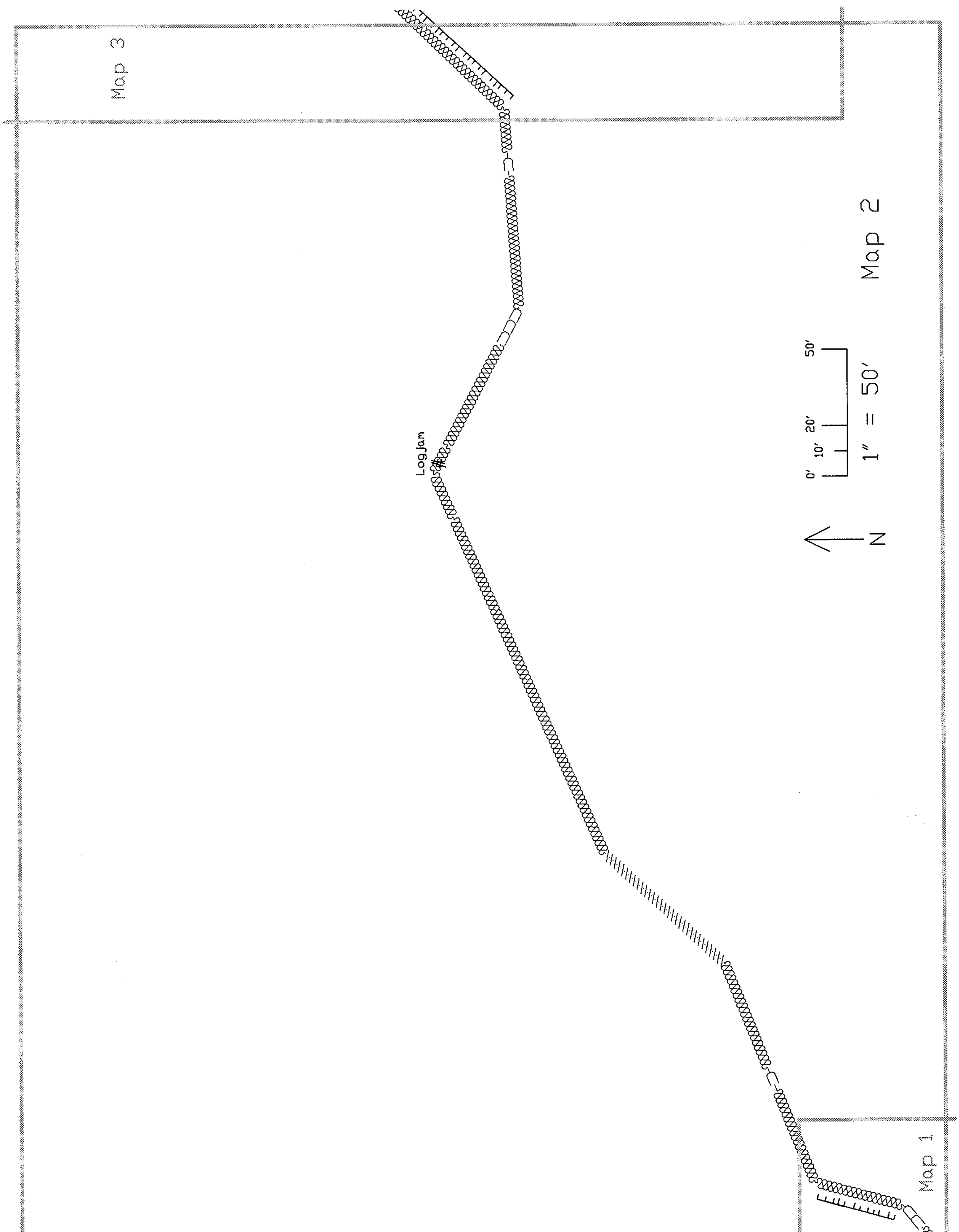
Mainstem Little Creek Habitat Typing Map

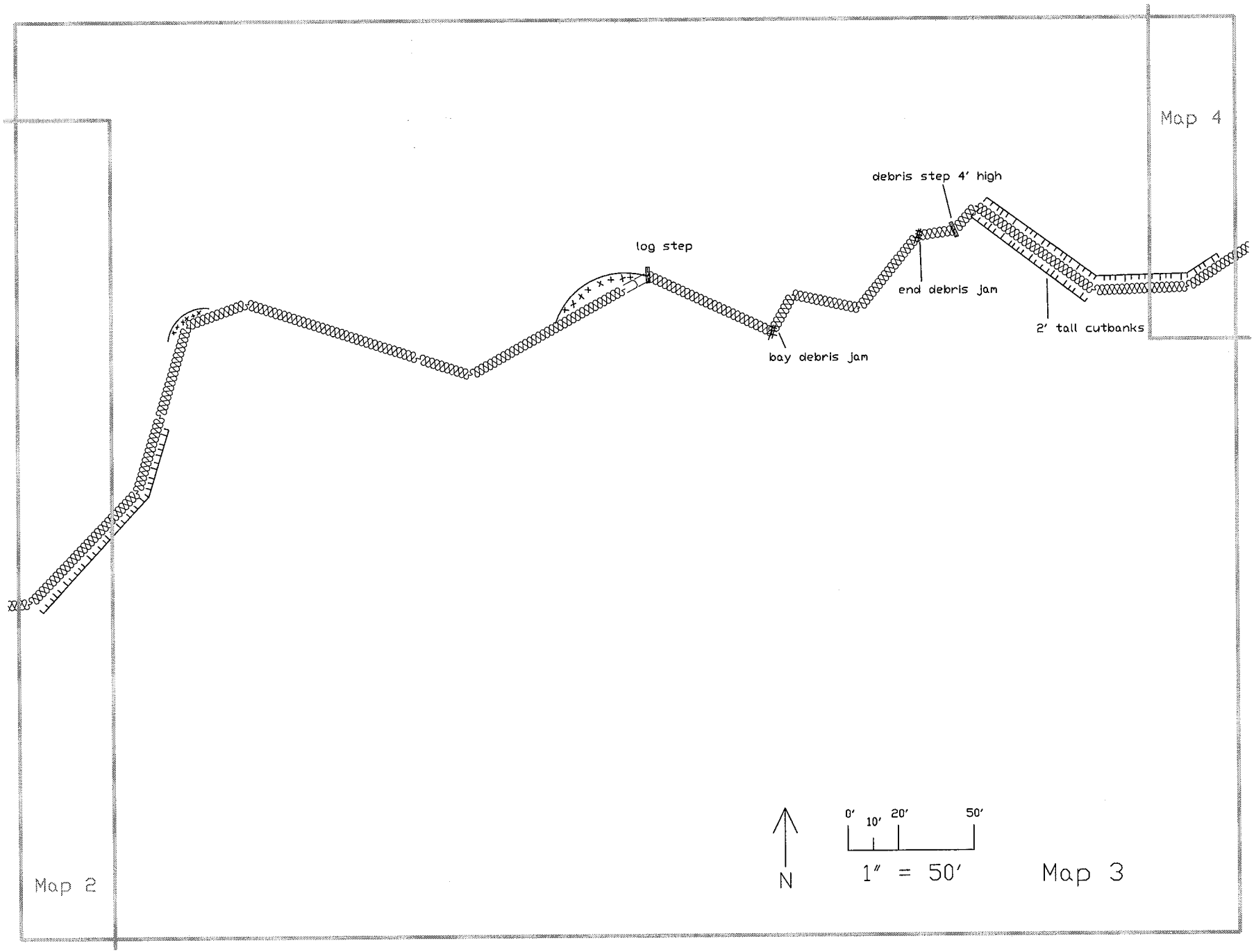
Data collected by Dr. Walter R. Mark and Ryan Hilburn February 2004
Drawn by Drew Perkins October 2007

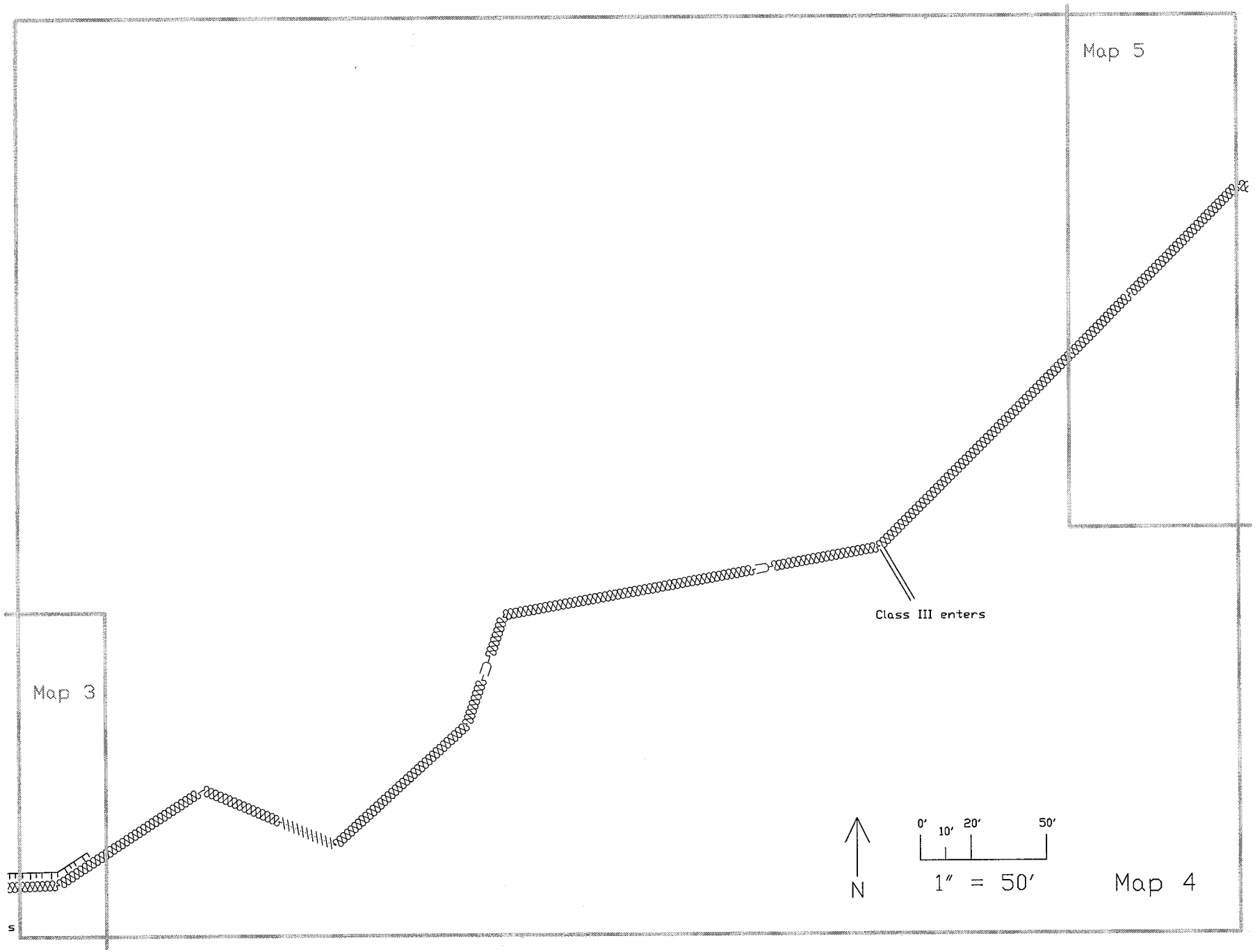
Stream segments (pool, riffle, glide) are drawn to scale with distances and bearings. All symbols (LWD, boulders, etc) are diagrammatic and not drawn to scale, however location and orientation are approximated. Bank features (cutbanks, undercuts, landslides) are also diagramatic, however length of features is based on field measurements.

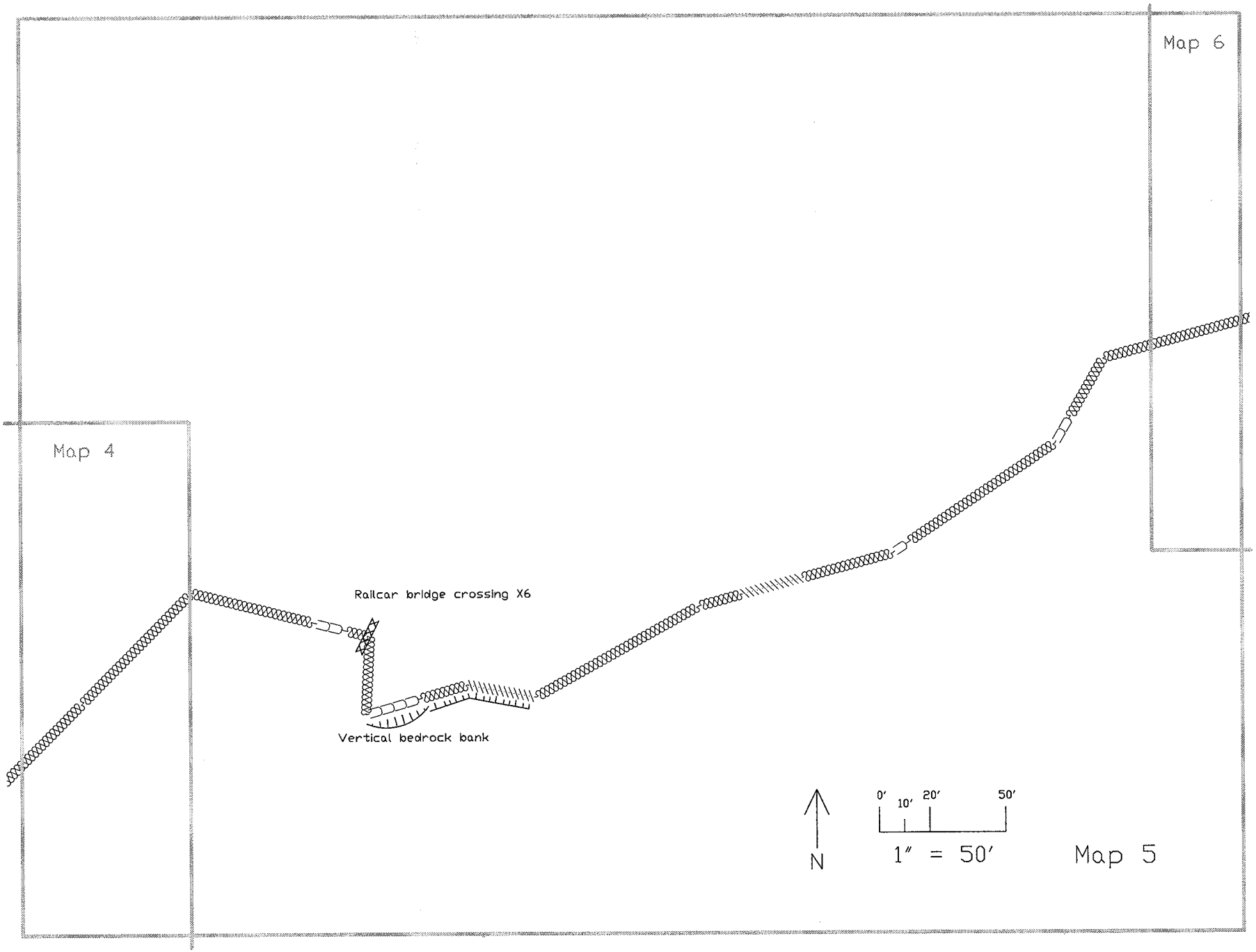


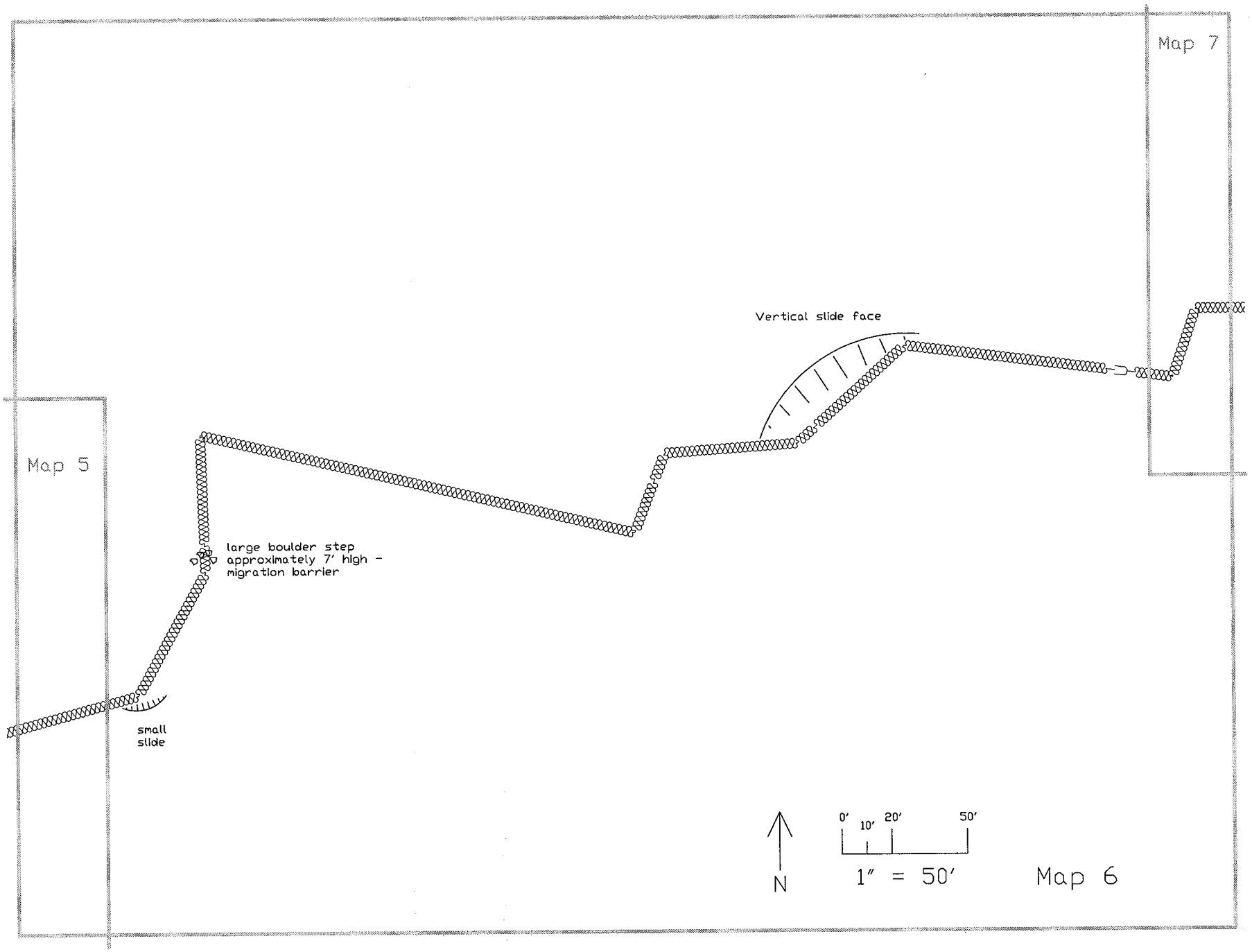
Map 1

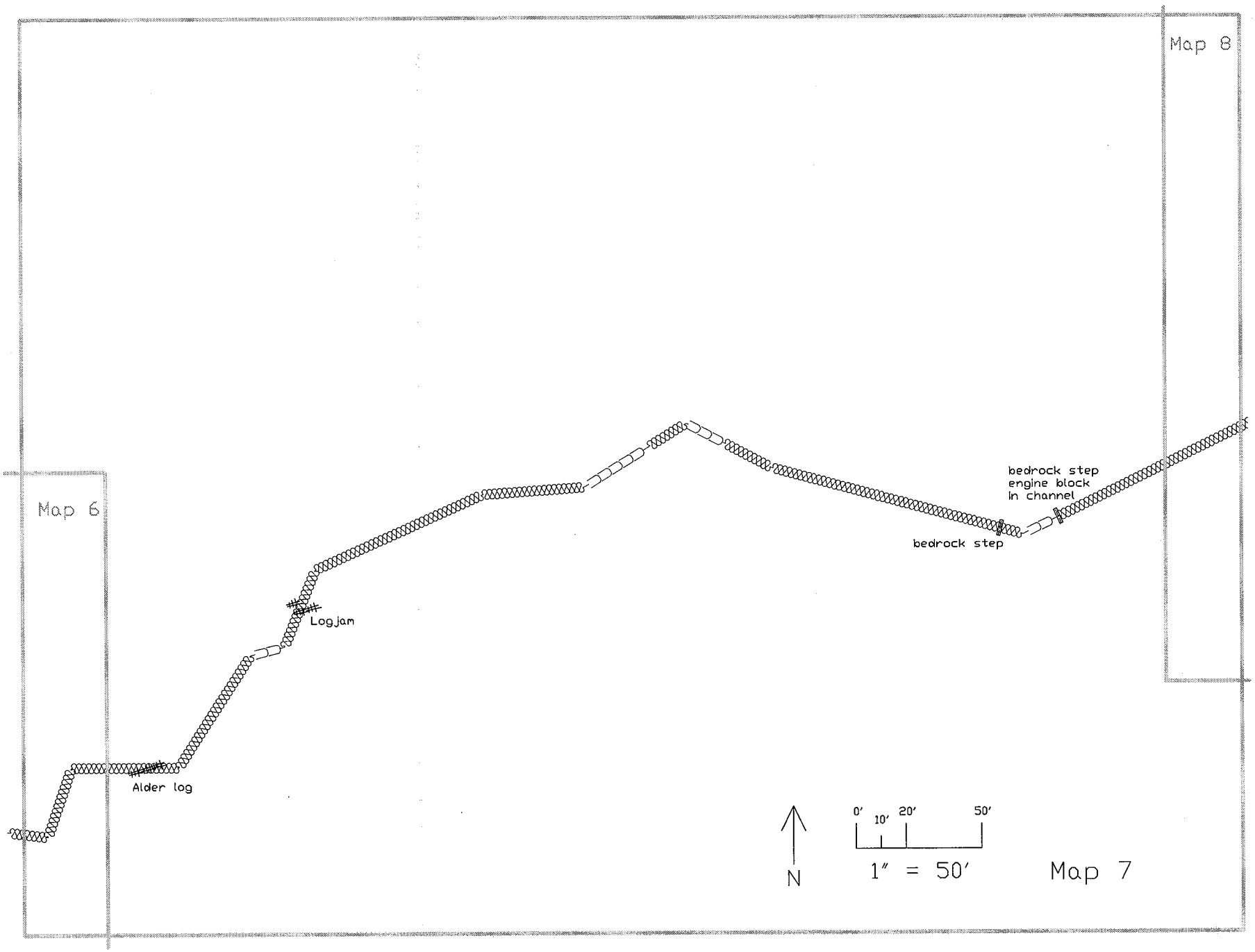

Map 3
Map 2
Map 1
LogJam
0'
10'
20'
50'
1" = 50'
N

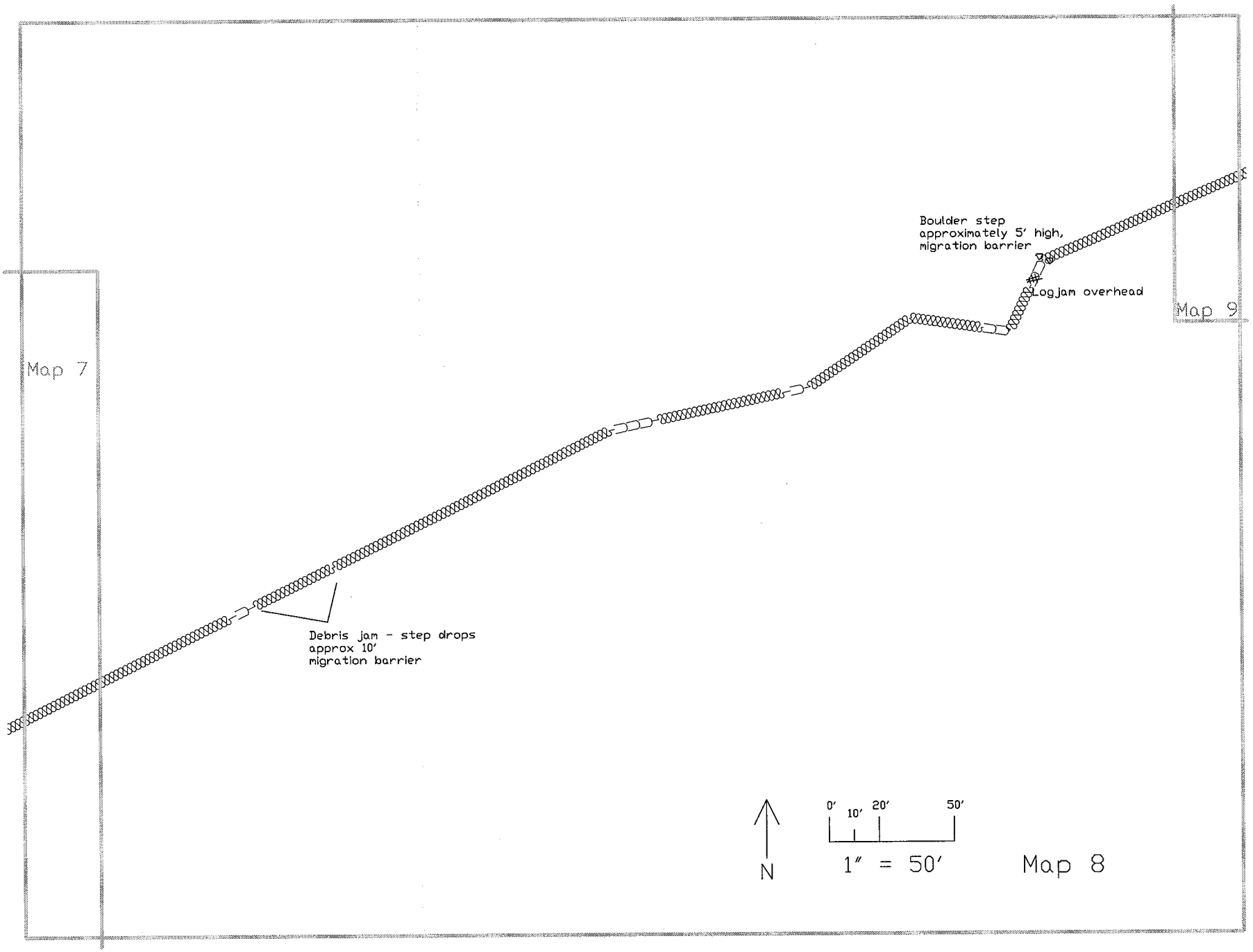

Map 4
debris step 4' high
log step
end debris jam
2' tall cutbanks
bay debris jam
Map 2
N
0'
10'
20'
50'
1" = 50'
Map 3

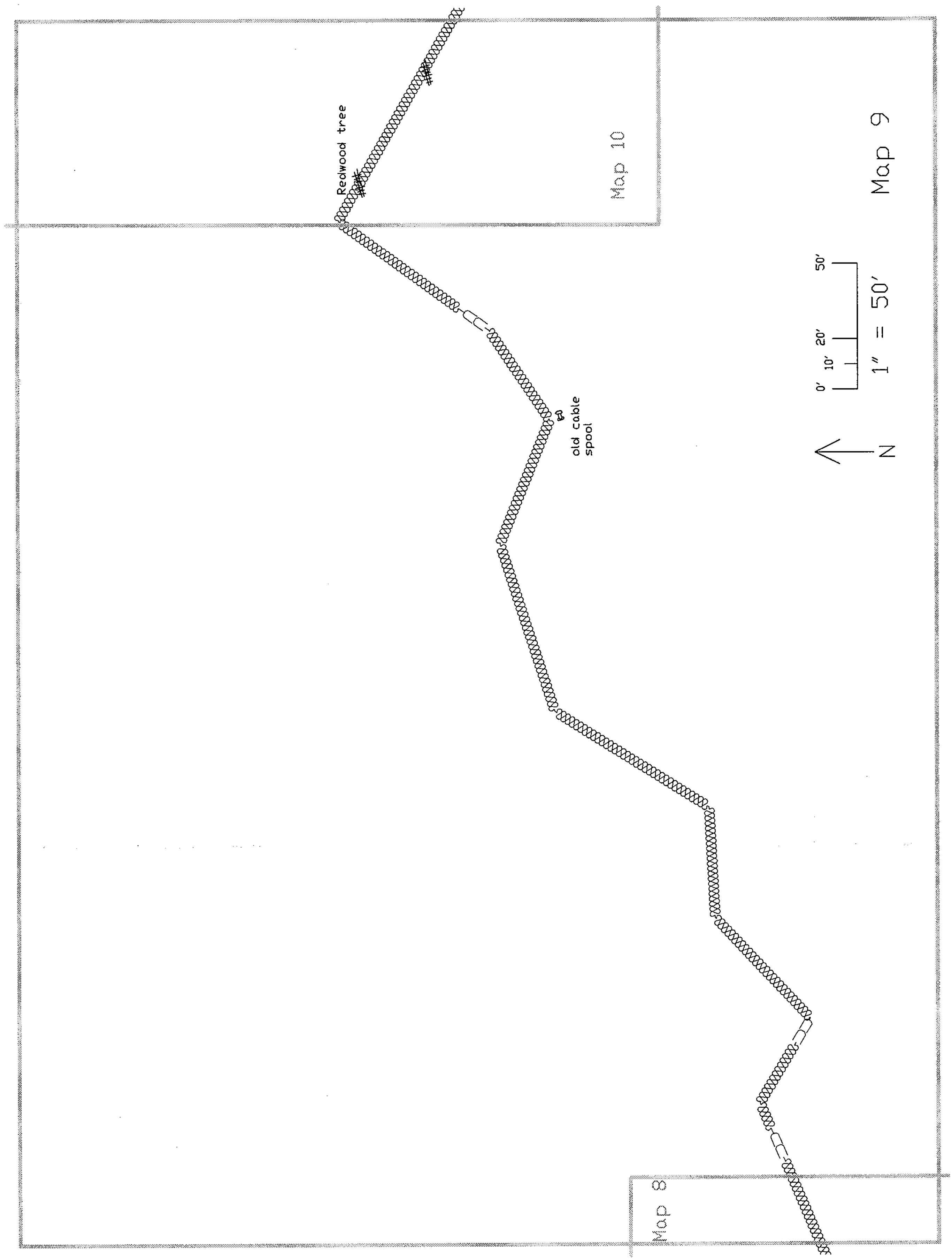

Map 5
Class III enters
Map 3
N
0'
10'
20'
50'
1" = 50'
Map 4

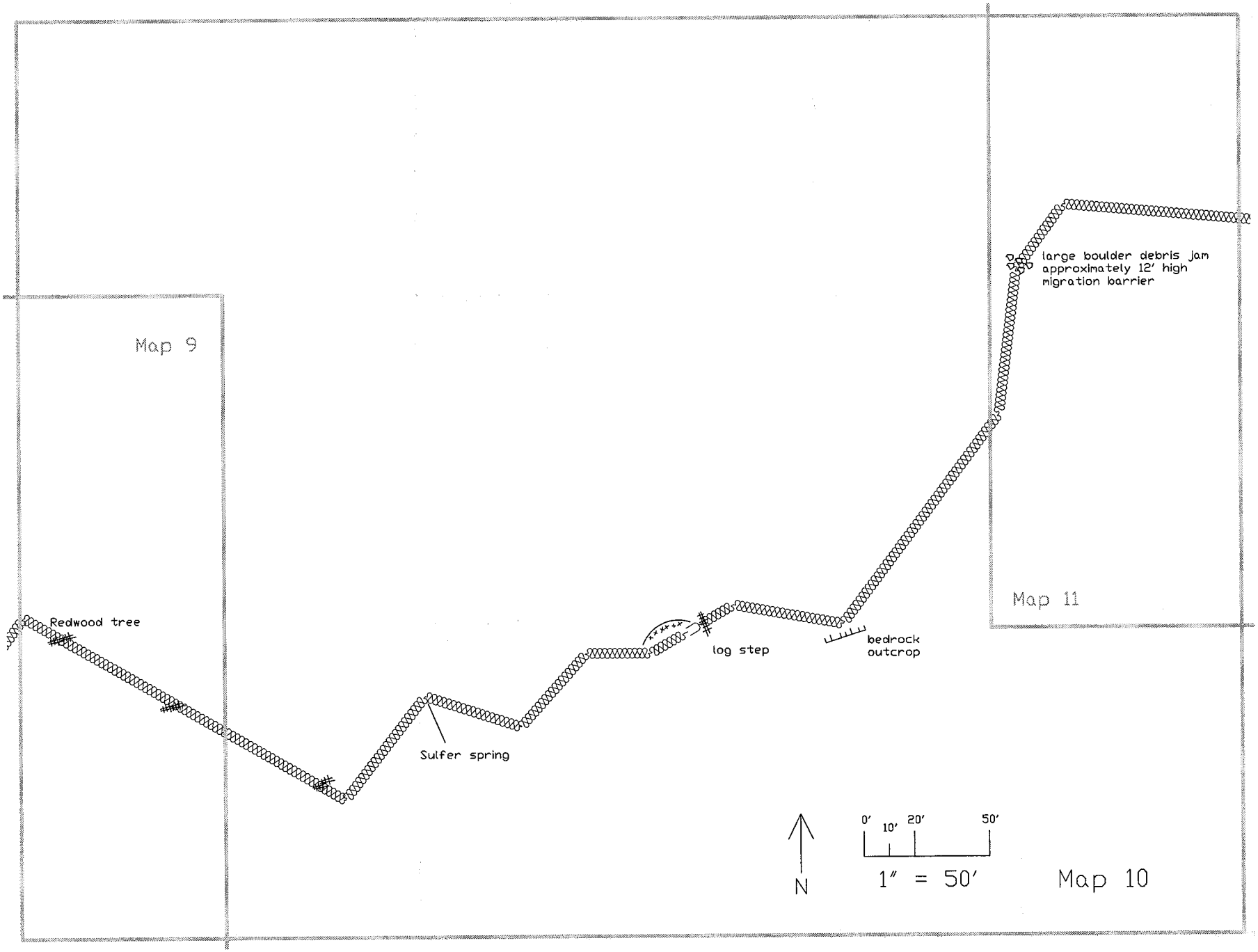

Map 6
Map 4
Railcar bridge crossing X6
Vertical bedrock bank
N
0'
10'
20'
50'
1" = 50'
Map 5

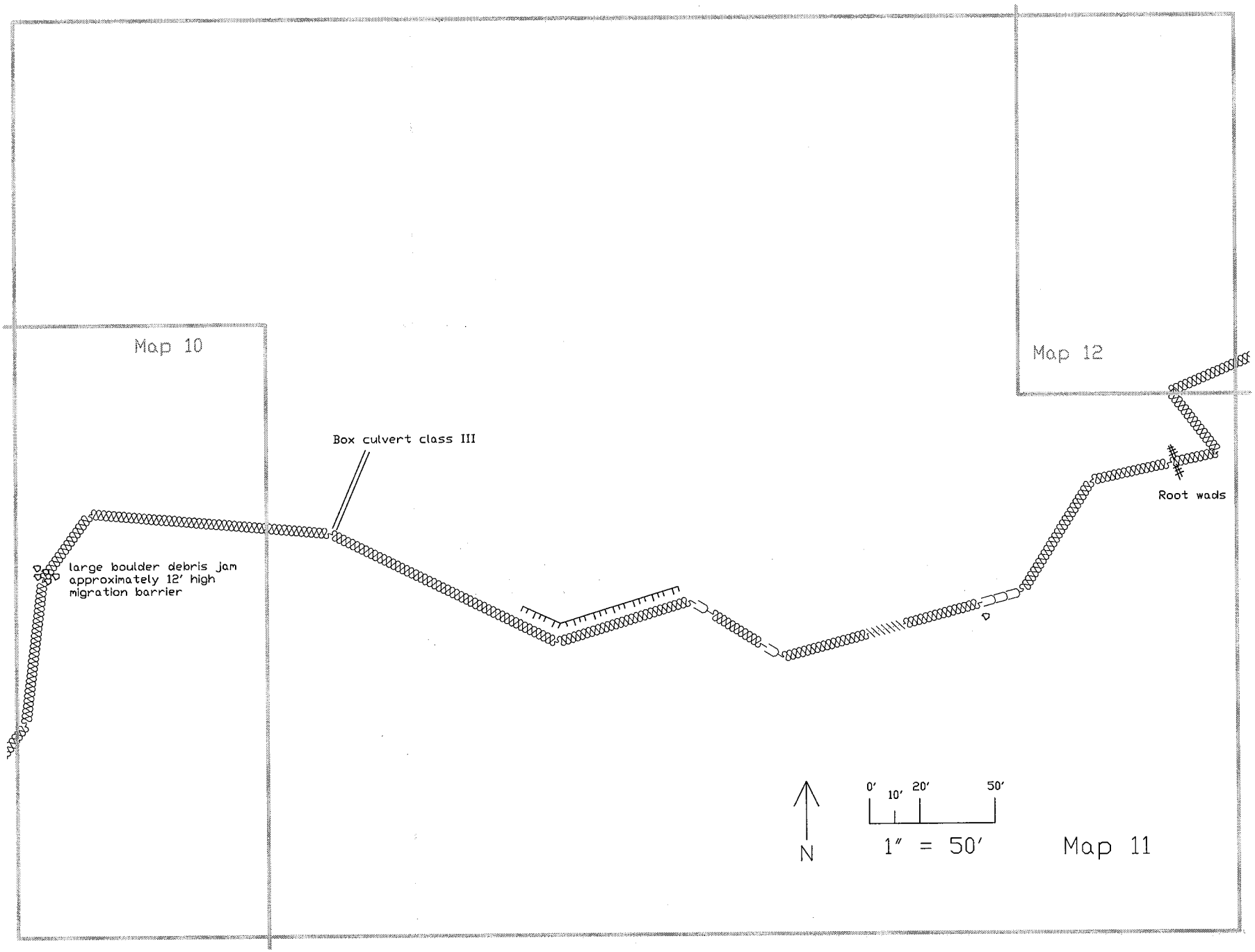

Map 7
Map 5
Vertical slide face
large boulder step
approximately 7' high -
migration barrier
small
slide
N
0'
10'
20'
50'
1" = 50'
Map 6

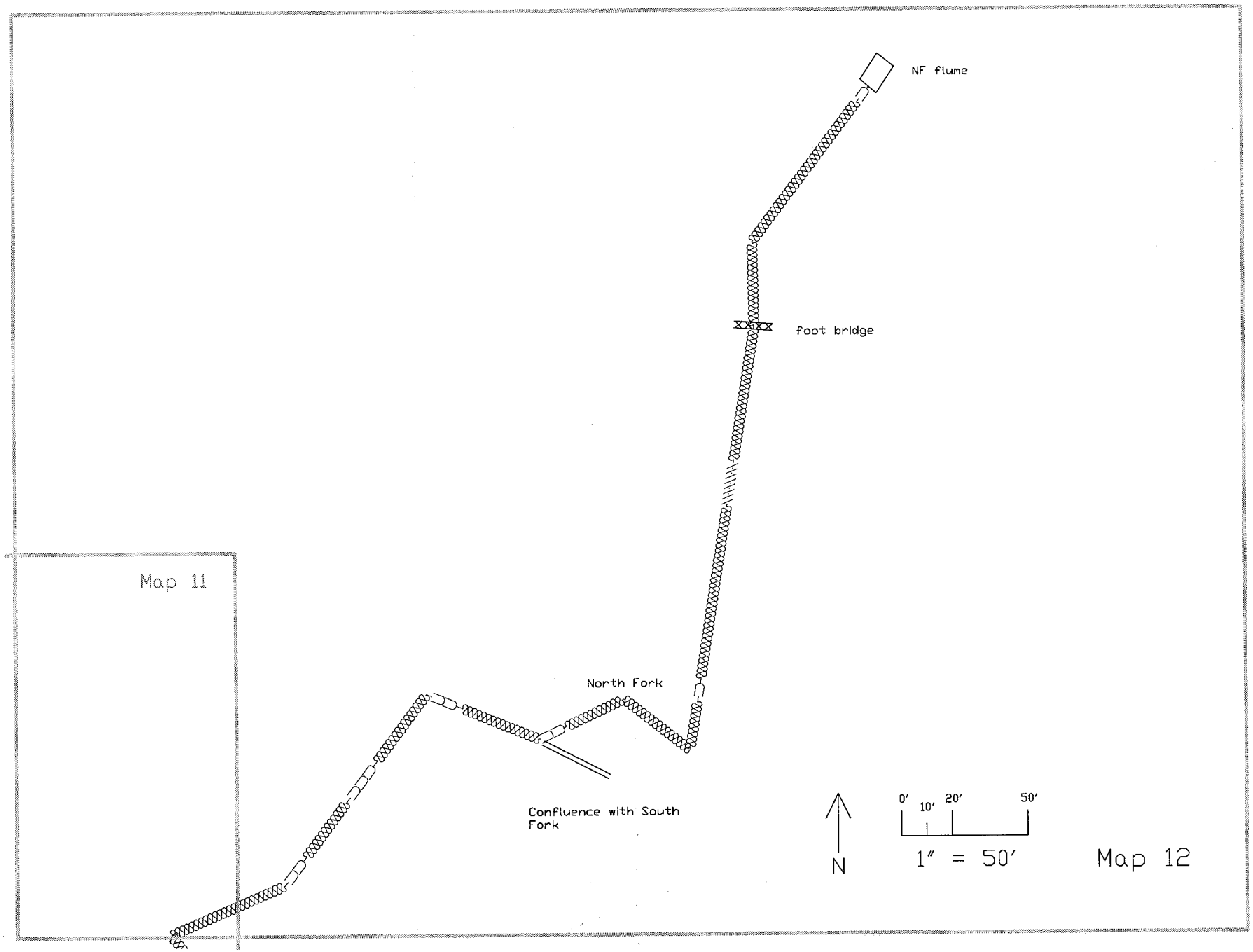

Map 8
Map 6
bedrock step
engine block
in channel
bedrock step
Logjam
Alder log
N
0'
10'
20'
50'
1" = 50'
Map 7


Map 7
Map 9
Boulder step
approximately 5' high,
migration barrier
Logjam overhead
Debris jam - step drops
approx 10'
migration barrier
N
0'
10'
20'
50'
1" = 50'
Map 8


Redwood tree
Map 10
Map 9
old cable spool
0' 10' 20' 50'
1" = 50'
N
Map 8


Map 9
Redwood tree
Sulfer spring
log step
bedrock outcrop
large boulder debris jam approximately 12' high migration barrier
Map 11
N
0' 10' 20' 50'
1" = 50'
Map 10


Map 10
Map 12
Box culvert class III
Root wads
large boulder debris jam
approximately 12' high
migration barrier
N
0'
10'
20'
50'
1" = 50'
Map 11

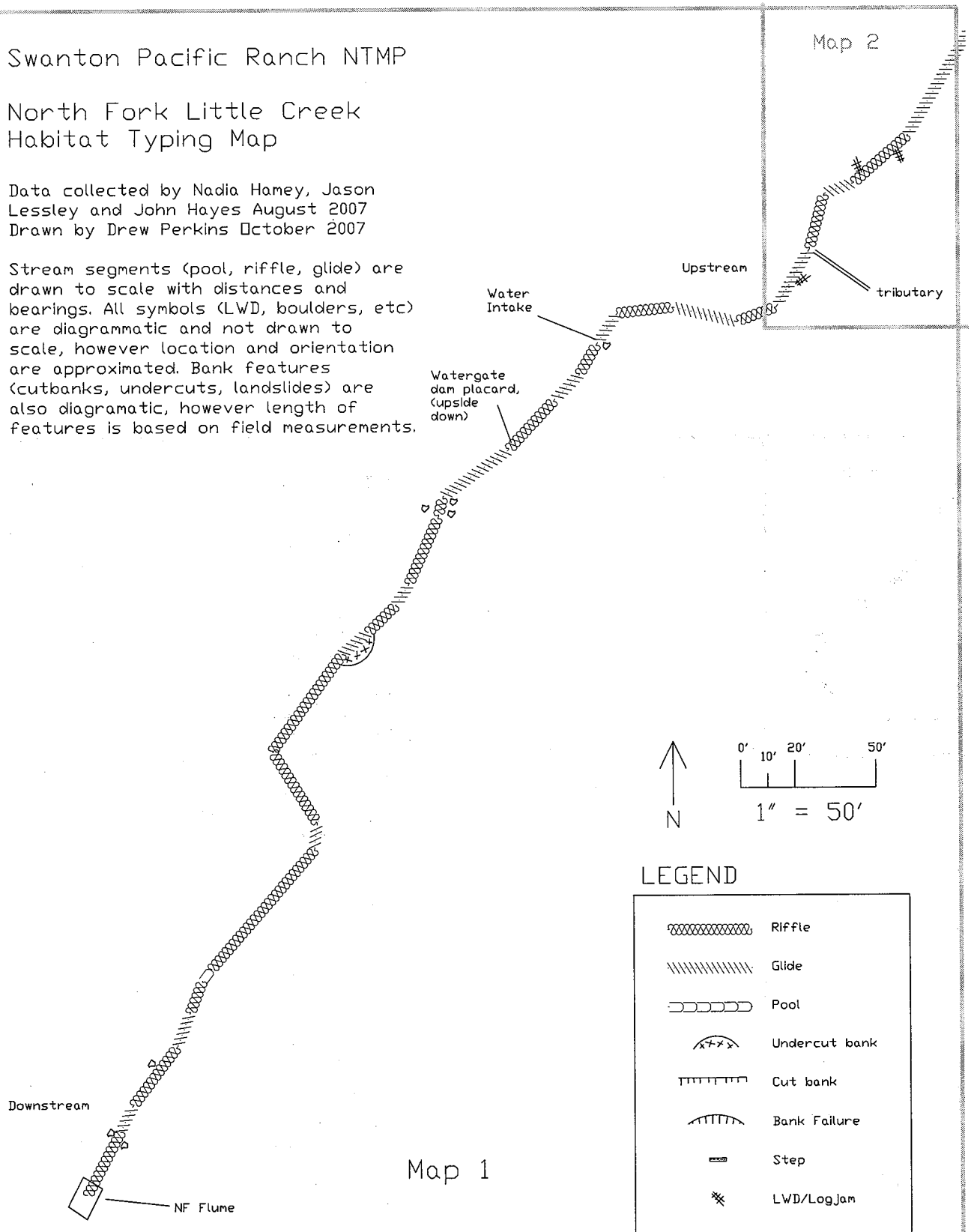

NF flume
foot bridge
North Fork
Confluence with South Fork
Map 11
N
0'
10'
20'
50'
1" = 50'
Map 12

Swanton Pacific Ranch NTMP

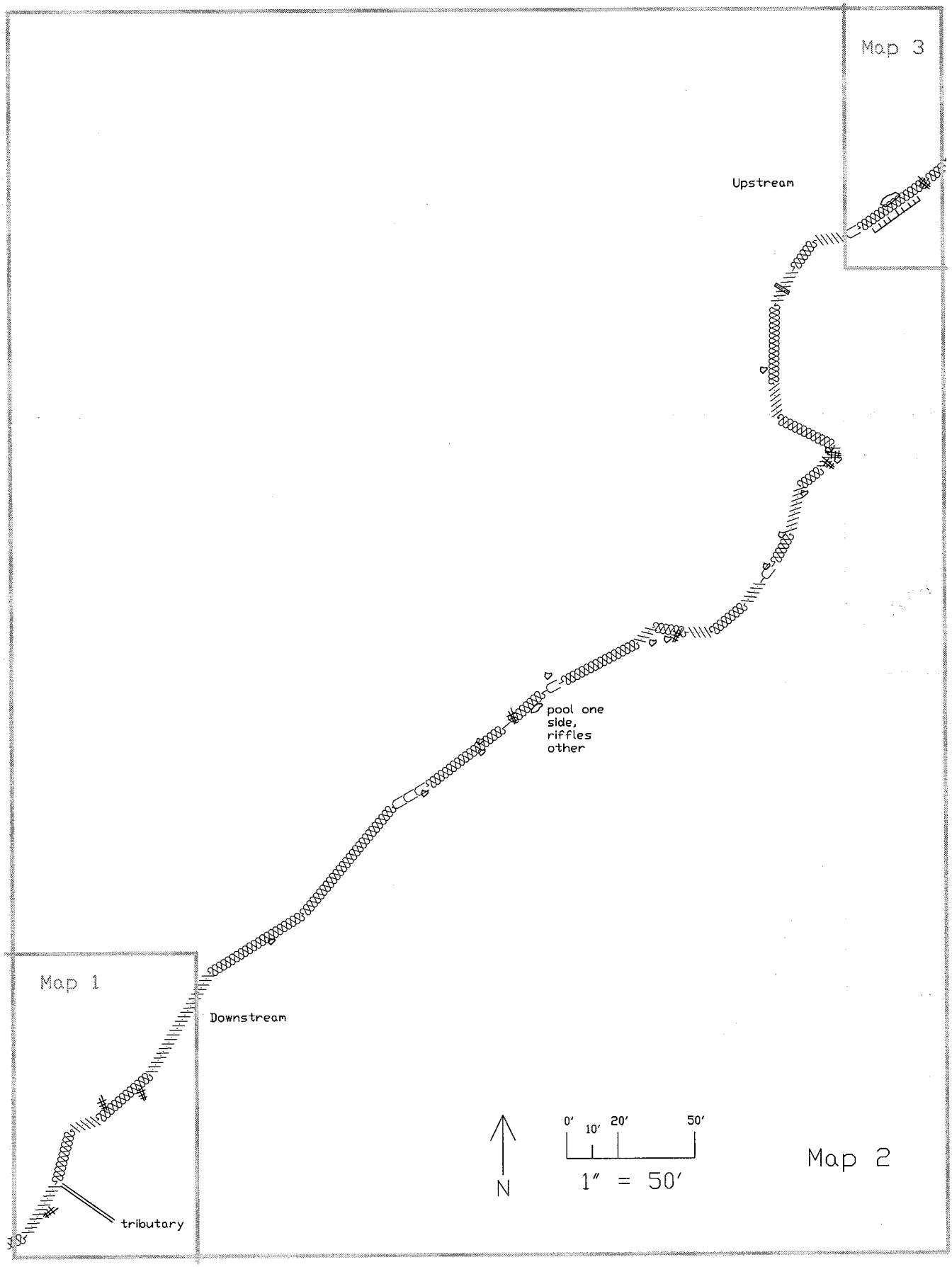
North Fork Little Creek Habitat Typing Map

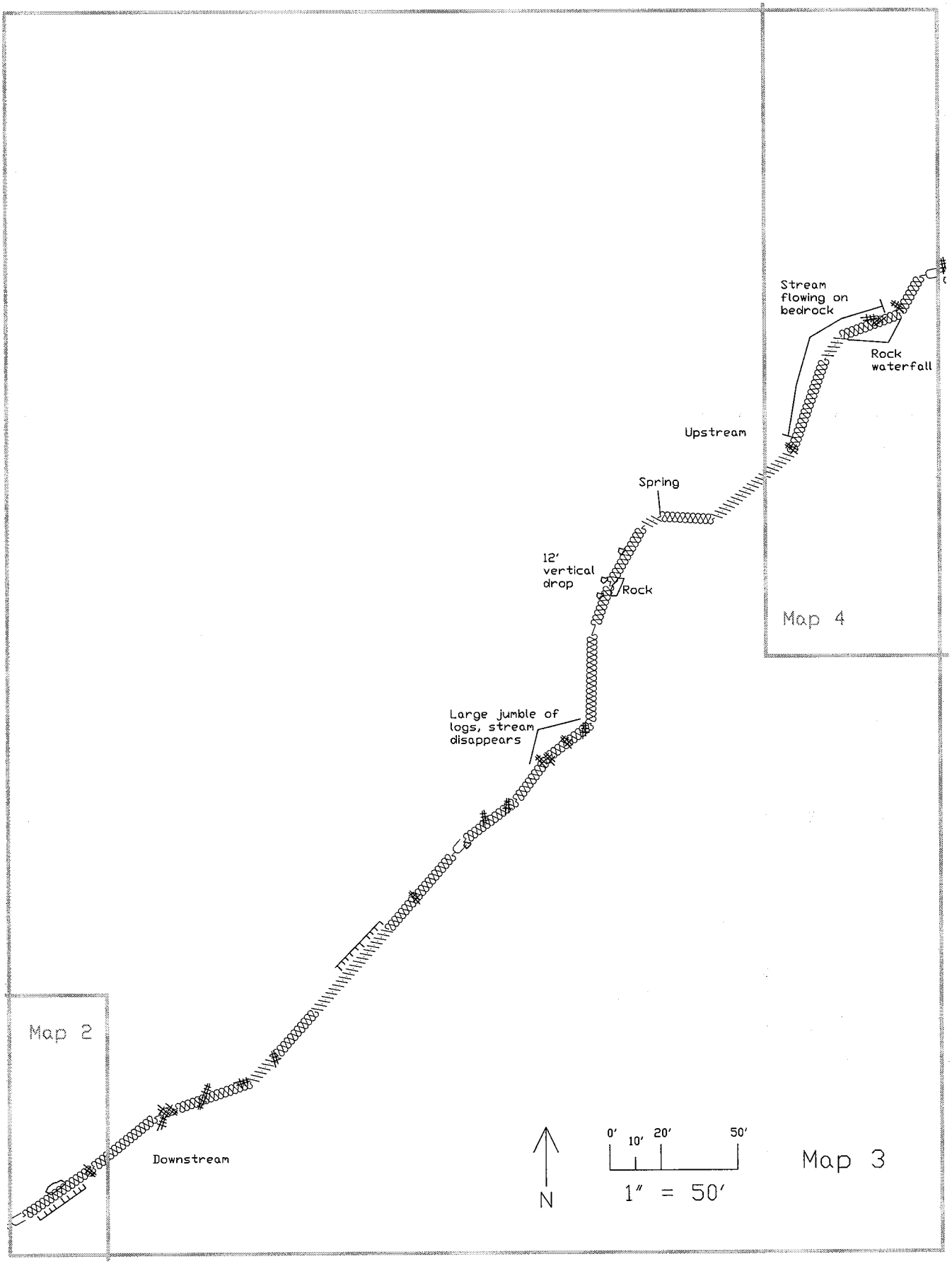
Data collected by Nadia Hamey, Jason Lessley and John Hayes August 2007
Drawn by Drew Perkins October 2007

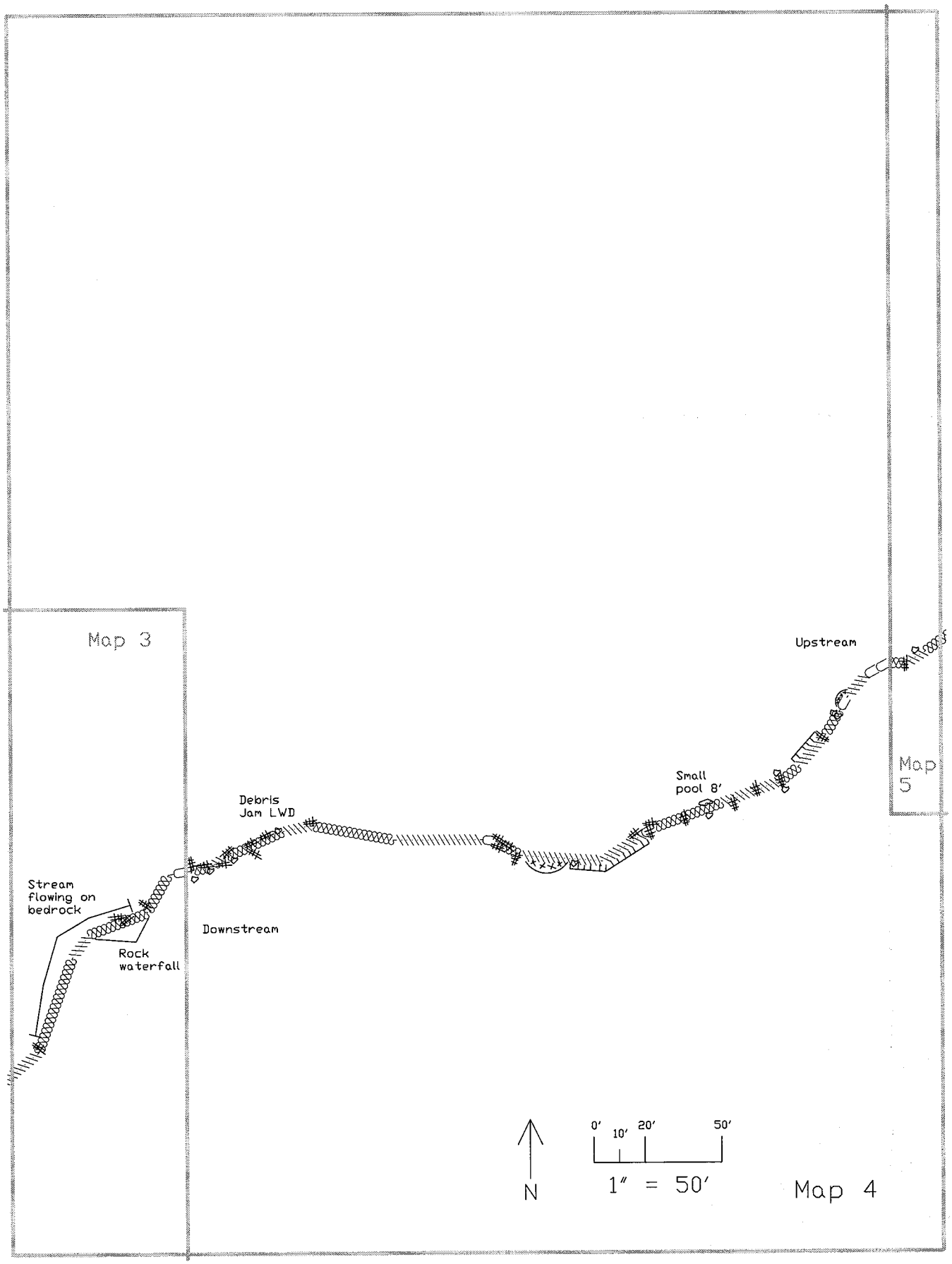
Stream segments (pool, riffle, glide) are drawn to scale with distances and bearings. All symbols (LWD, boulders, etc) are diagrammatic and not drawn to scale, however location and orientation are approximated. Bank features (cutbanks, undercuts, landslides) are also diagramatic, however length of features is based on field measurements.

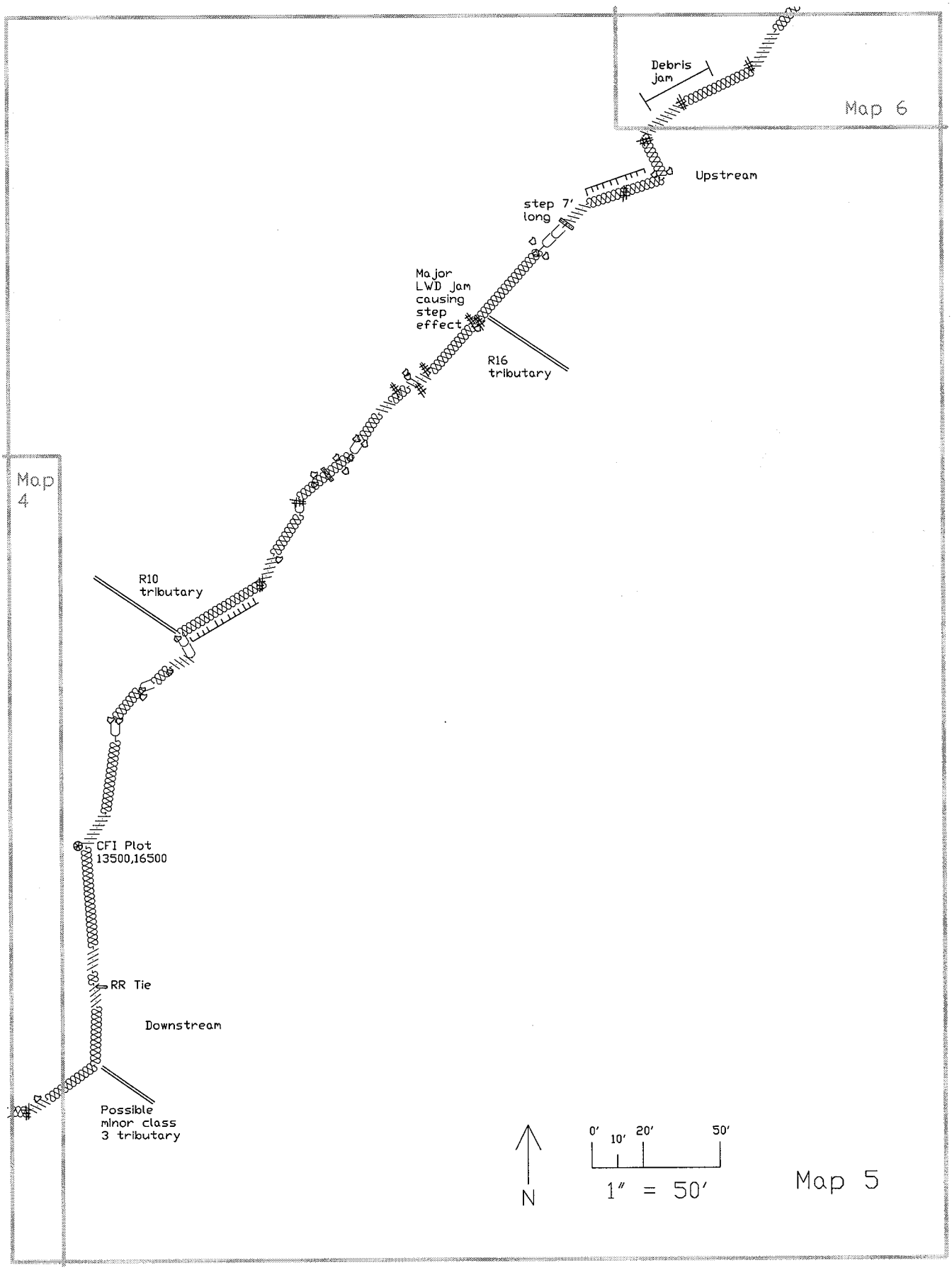


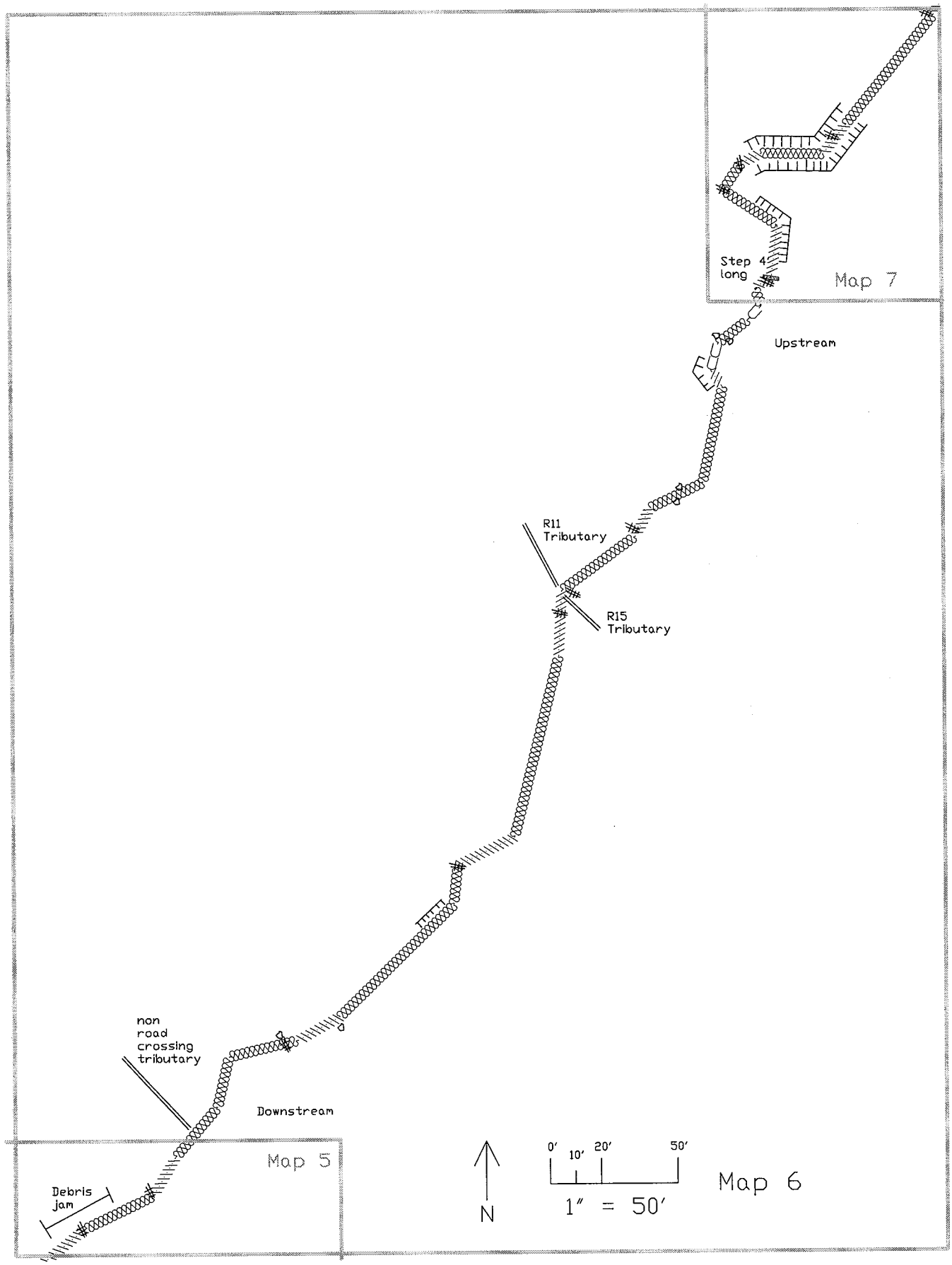
See mainstem map for North Fork Little Creek below flume

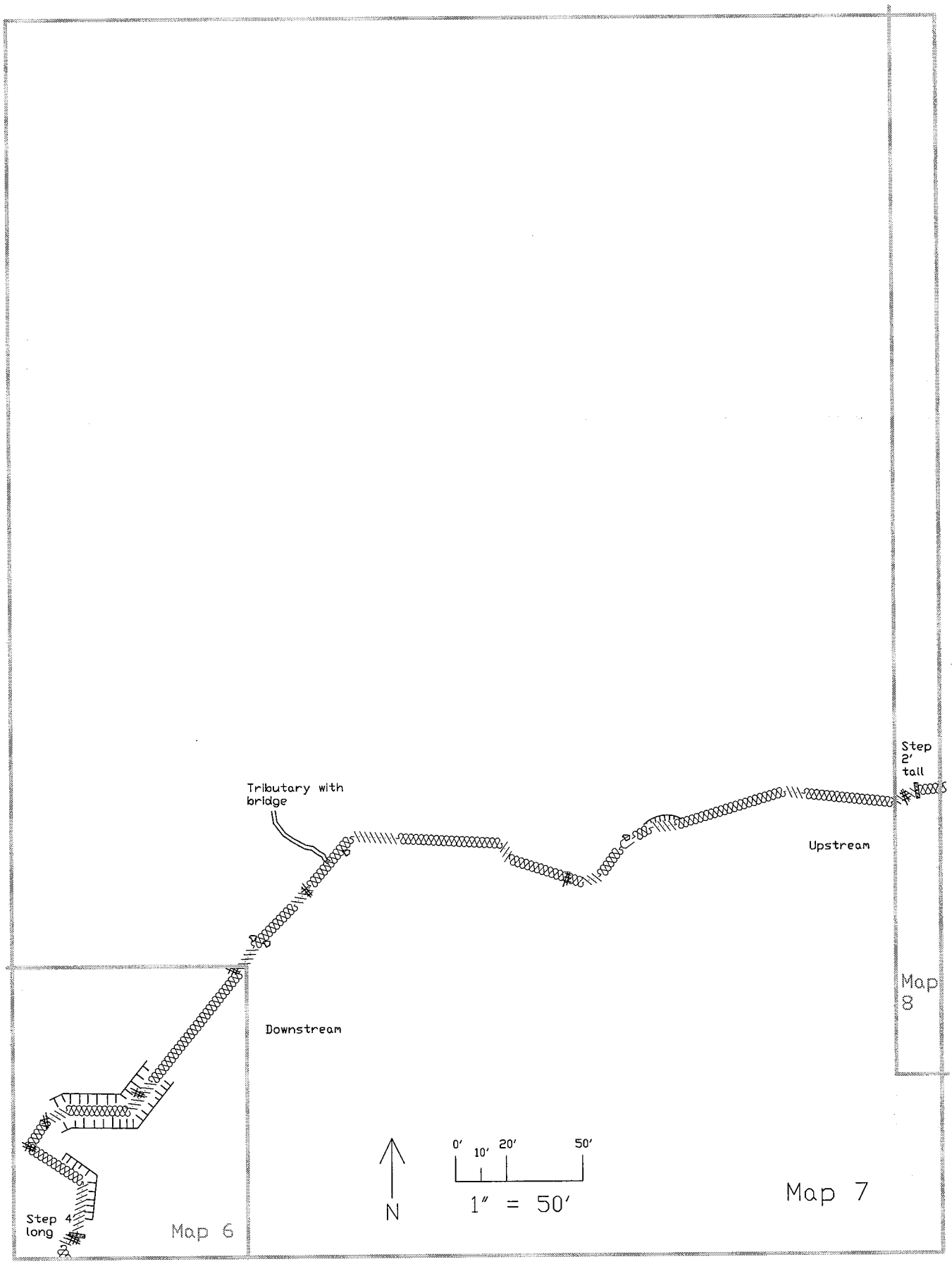

Map 3
Upstream
pool one
side,
riffles
other
Map 1
Downstream
tributary
N
0'
10'
20'
50'
1" = 50'
Map 2

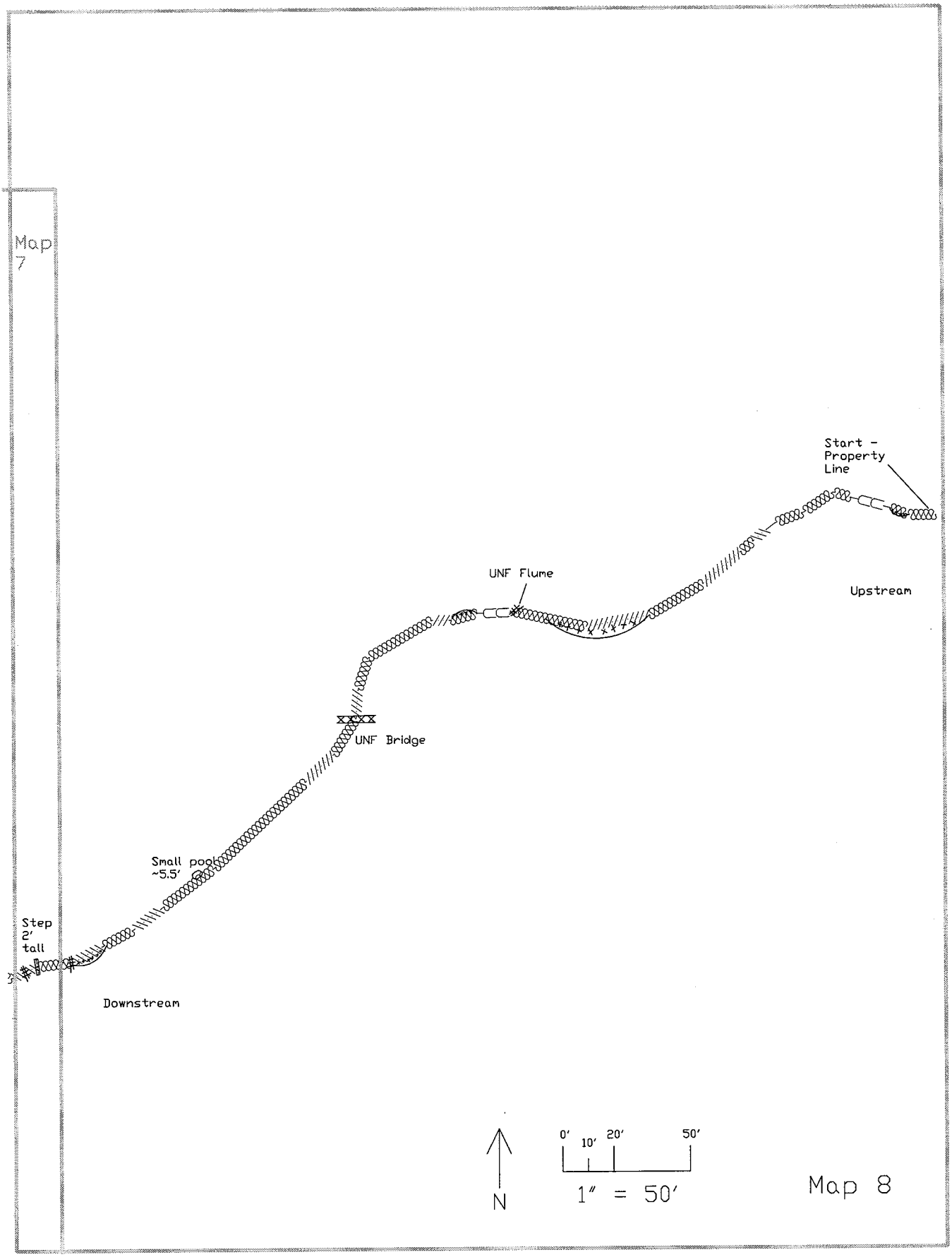

Stream flowing on bedrock
Rock waterfall
Upstream
Spring
12' vertical drop
Rock
Map 4
Large jumble of logs, stream disappears
Map 2
Downstream
N
0'
10'
20'
50'
1" = 50'
Map 3


Map 3
Upstream
Map 5
Small pool 8'
Debris Jam LWD
Stream flowing on bedrock
Downstream
Rock waterfall
0'
10'
20'
50'
N
1" = 50'
Map 4

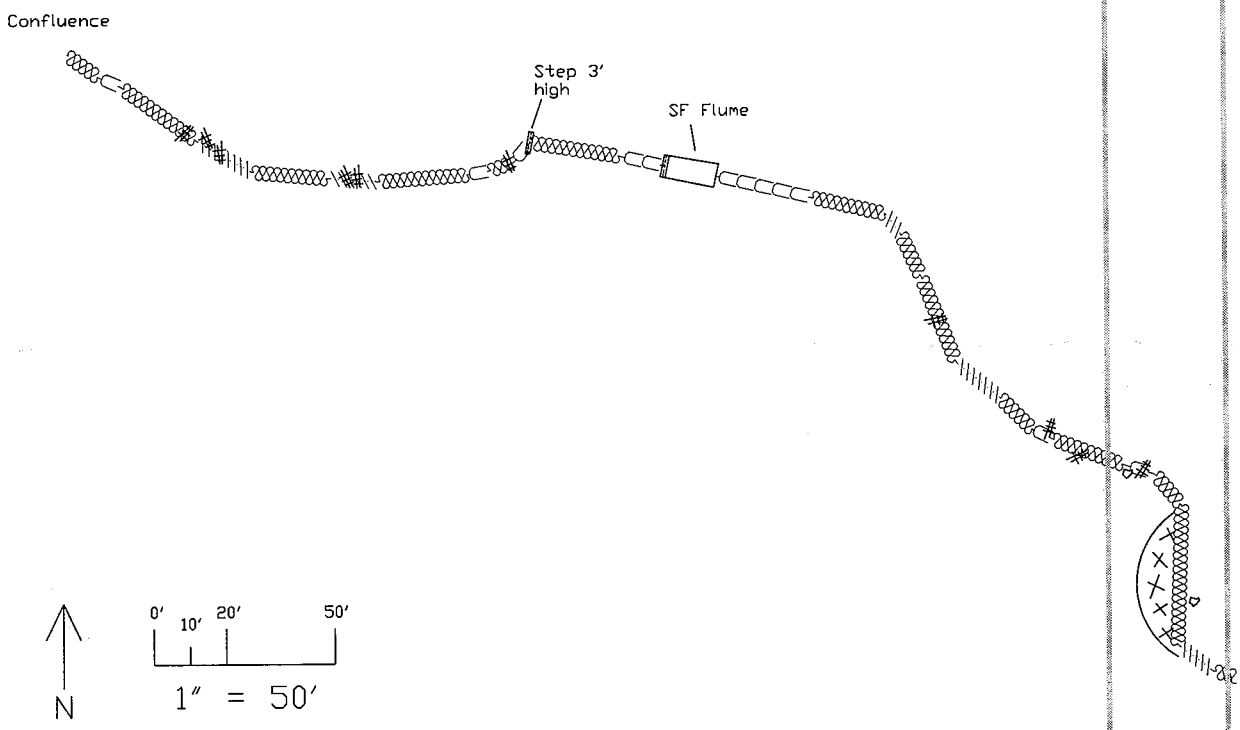

Debris jam
Map 6
Upstream
step 7' long
Major LWD jam causing step effect
R16 tributary
Map 4
R10 tributary
CFI Plot 13500,16500
RR Tie
Downstream
Possible minor class 3 tributary
N
0' 10' 20' 50'
1" = 50'
Map 5


Step 4
long
Map 7
Upstream
R11
Tributary
R15
Tributary
non
road
crossing
tributary
Downstream
Map 5
Debris
jam
N
0'
10'
20'
50'
1" = 50'
Map 6

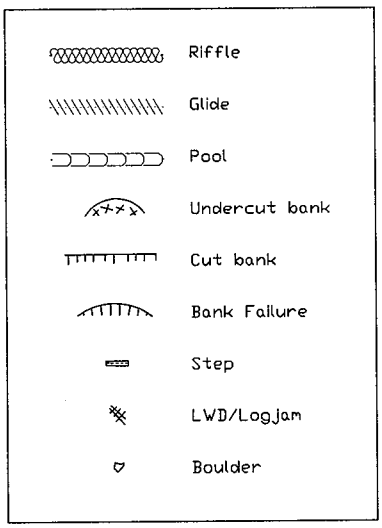

Step
2'
tall
Tributary with
bridge
Upstream
Map
8
Downstream
0'
10'
20'
50'
N
1" = 50'
Map 7
Step 4
long
Map 6


Map 7
Start - Property Line
UNF Flume
Upstream
UNF Bridge
Small pool ~5.5'
Step 2' tall
Downstream
N
0'
10'
20'
50'
1" = 50'
Map 8

Map 2



LEGEND



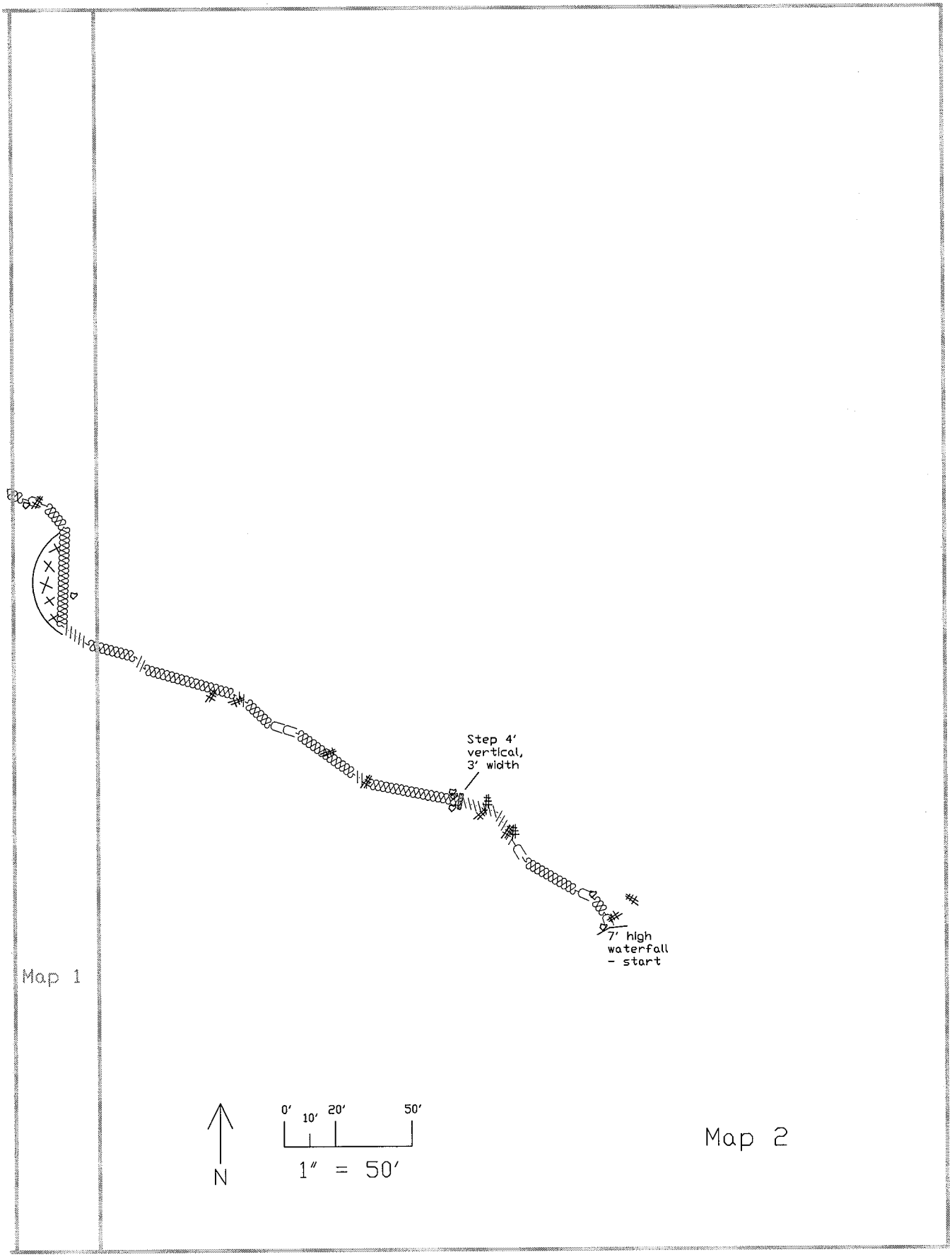
Map 1

Swanton Pacific Ranch NTMP

South Fork Little Creek Habitat Typing Map

Data collected by Nadia Hamey, Jason Lessley and John Hayes August 2007
Drawn by Drew Perkins October 2007

Stream segments (pool, riffle, glide) are drawn to scale with distances and bearings. All symbols (LWD, boulders, etc) are diagrammatic and not drawn to scale, however location and orientation are approximated. Bank features (cutbanks, undercuts, landslides) are also diagramatic, however length of features is based on field measurements.


Step 4'
vertical,
3' width
7' high
waterfall
- start
Map 1
N
0'
10'
20'
50'
1" = 50'
Map 2

TIMOTHY C. BEST, CEG
ENGINEERING GEOLOGY AND HYDROLOGY

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(831) 425-5832 ■ Fax: (831) 425-5830 ■ e-mail: timbest@pacbell.net

March 1, 2004

Mr. Ryan Hilburn
Swanton Pacific Ranch
125 Swanton Road
Davenport, CA 95017

Job: SPR-LITTLE-331

SUBJECT: ENGINEERING GEOLOGIC REVIEW OF BRIDGE CROSSING X6: LOWER LITTLE CREEK THP

INTRODUCTION

As requested, on January 28, 2004, I made a site visit to review erosion and stability concerns at a partially washed out bridge crossing on Little Creek, a narrow steep walled tributary to Scott Creek. The southwest abutment to the bridge was reportedly undercut in 1998 by high stream flows causing the bridge to partially drop in to the channel. The purpose of this field review was to evaluate the geologic feasibility of reconstructing the bridge and to provide appropriate mitigative and erosion control measures.

GEOLOGIC CONDITIONS

The subject bridge site is located on Little Creek, a narrow, steep gradient perennial stream. The area is characterized by steep mountainous terrain that is fairly typical for the region. Little Creek is deeply incised into the landscape with steep (60% to 75+%) inner gorge slopes descending directly to the stream's edge. Regionally the terrain is consistent with shallow and deep-seated landslide processes (Cooper Clark and Associates, 1974). The area is vegetated with advanced second growth redwood, Douglas-fir and a scattered understory of hardwood and brush.

The subject site is underlain by Tertiary age Santa Cruz Mudstone described as medium to thick bedded siliceous mudstone and sandy siltstone that dips moderately (22 degrees) to the south west (Clark, 1981). Bedrock that is exposed in the steep channel bank and road cuts is consistent with this description. Where fresh, the bedrock is competent and able to form steep cuts. Thin alluvial terrace deposits are found intermittently along both sides of the steep walled stream. These deposits are variable and consist mainly of silt, sand, cobles and few boulders.

The subject site is located in a seismically active area of California. The active San Gregorio Fault is located , which is considered capable of generating a Moment Magnitude 7.3 earthquake with a 400-

year return interval (Petersen et al., 1996), is located about 2.5 miles west and off shore. The active San Andreas Fault is located 14 miles to the northeast and is capable of generating a Maximum Moment Magnitude 7.1 to 7.9 earthquake with a recurrence interval of 220 years (Petersen et al., 1996). This fault last ruptured in 1906. Peak ground acceleration with a 10% probability of exceedance in 50 years is reported to be 0.45g (USGS, 1996). High ground accelerations associated with fault rupture along either of these two fault systems is likely a contributing factor if not dominant for movement on many of the deep-seated landslides found in the area.

The regional landslide map by Cooper Clark and Associates (1974) identifies a questionable large-scale deep-seated landslide underlying the southwest side of the hillside at the bridge crossing. I was unable to confirm or negate the existence of this landslide. I did not observe any evidence of recent or active movement at the crossing and Ryan Hilburn (cal Poly) did not report any evidence of upslope slide movement, such as fresh scarps, leaning trees or open ground cracks. The potential risk from deep-seated instability at the bridge is probably low.

OBSERVATIONS

The existing bridge is a 54-foot long, 12 foot wide old railroad flat car that crosses Little Creek obliquely. At this site, Little Creek is a narrow, cobble and boulder bedded stream draining a roughly 1100 acre watershed. The active channel is 16 feet wide a naturally confined between the steep valley walls. Both bridge abutments appear to have been founded on remnants of old fluvial terrace deposits about 14 feet above channel bottom.

Photo 1: Looking upstream

At the crossing, the stream makes a slight bend to the right resulting in a steep channel bank along the outside edge of the bend. Upstream of the crossing relatively competent bedrock is exposed in the near vertical channel banks. However, at the crossing, the channel bank is comprised of old fluvial terraces deposits that are much more prone to erosion. During the 1998 El Nino storms, the southwest (left bank) abutment was undercut causing this end of the ridge to drop down.

Presently the channel too wide to reinstall the existing 54 long bridge without reconstructing the bridge abutment in the active stream channel, a costly endeavor. Therefore the best alternative will be to replace the 54 long bridge with a longer 75 long bridge that can adequately span the channel without encroaching into the stream. The bottom of the proposed bridge should be located a minimum of 10 feet above the channel, which based on field observations, should be well outside the 100-year flood elevation.

Both abutments are inherently at risk of being undermined by stream bank erosion during a large storm event. This is especially true if a log jam forms in the channel and diverts streamflow into the

banks. The use of a long span bridge will minimize the potential that future erosion will comprise the bridge footings. However, if additional protection is necessary then it should be possible to minimize the amount of erosion by armoring the channel banks with large diameter wood or riprap.

RECOMMENDATIONS

1. Replace the existing bridge with a 75 long rail car as shown on Figure 1.
2. The left bank abutment should be located a minimum of 15 back from the abrupt edge of the stream channel to minimize the potential of it being undercut.
3. Bridge shall utilize suitable footings. It is my understanding that Cal Polly has traditionally used buried wood logs for the bridge footings. Logs are generally adequate for temporary bridges but may suitable for a permanent crossing because they tend to rot out in time. For a permanent crossing a more permanent footing such as reinforced concrete blocks or piers is preferred. The RPF and/or landowner shall provide final design criteria of the bridge footings
4. For an added level of protection against future channel bank erosion that could undermine the bridge footing in time, the channel banks can be armored with rock rip rap or wood logs. Rock rip-rap will provide the greatest level of protection but is the most costly and will have the greatest environmental impact. Alternatively large logs can be placed and anchored against the channel bank. The decision to amour the channel bank is left up to the landowner and depended upon the level of long-term stability that is desired. Typical design criteria for rock rip rap and wood log channel bank protection is found in Appendix A.

Please give me a call if you have any further questions.

Sincerely,

Timothy C. Best
Certified Engineering Geologist #1682

REGISTERED GEOLOGIST
TIMOTHY C. BEST
No. 1682
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

REFERENCES

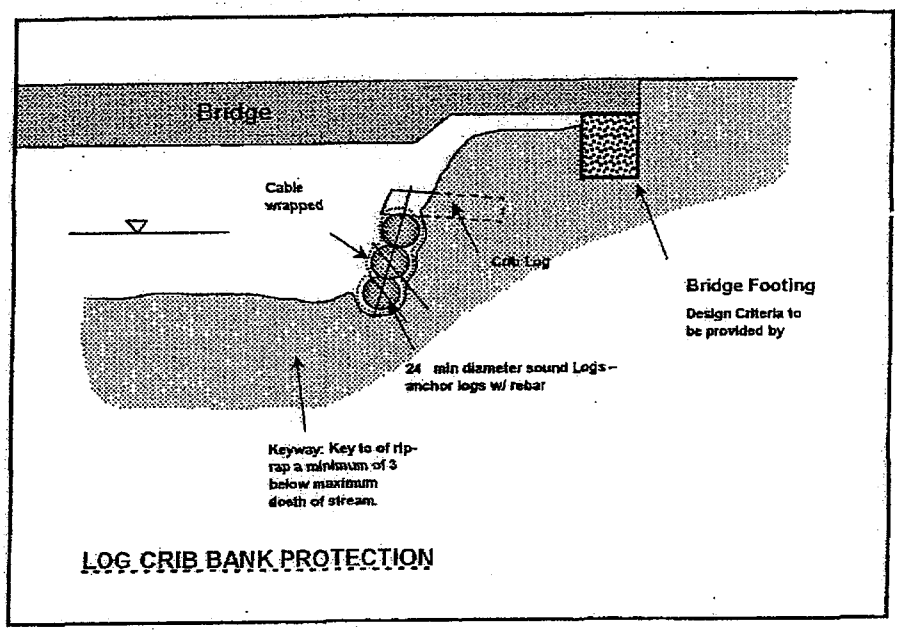
Clark, J.C., 1981, Stratigraphy, Paleontology, and Geology of the Central Santa Cruz Mountains, California Coast Range: USGS Professional Paper 1168, p. 51.

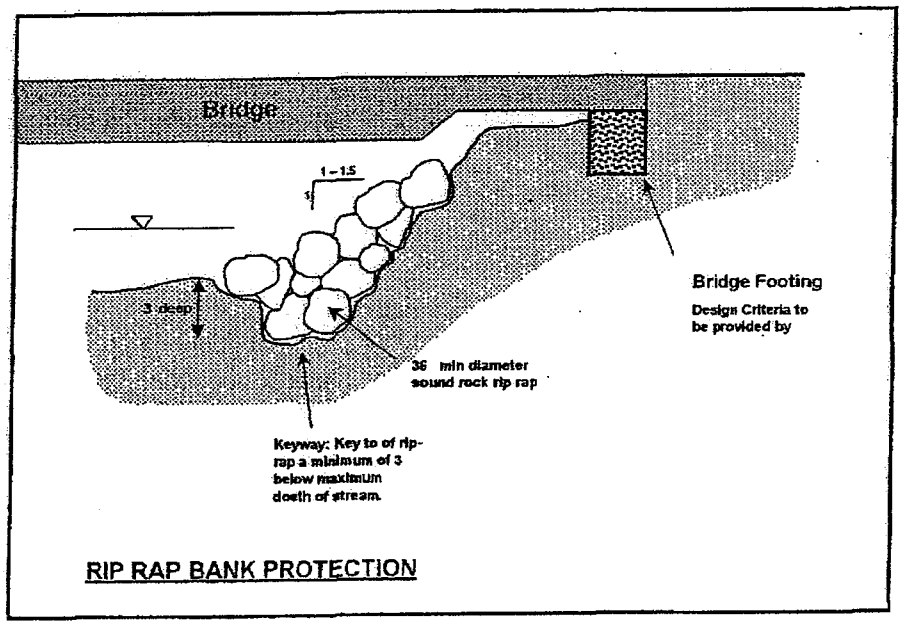
Cooper Clark and Associates, 1974, Preliminary Map of Landslide Deposits in Santa Cruz County, California, Santa Cruz County Planning Department, County Building, 701 Ocean Street, Santa Cruz, California 95060.

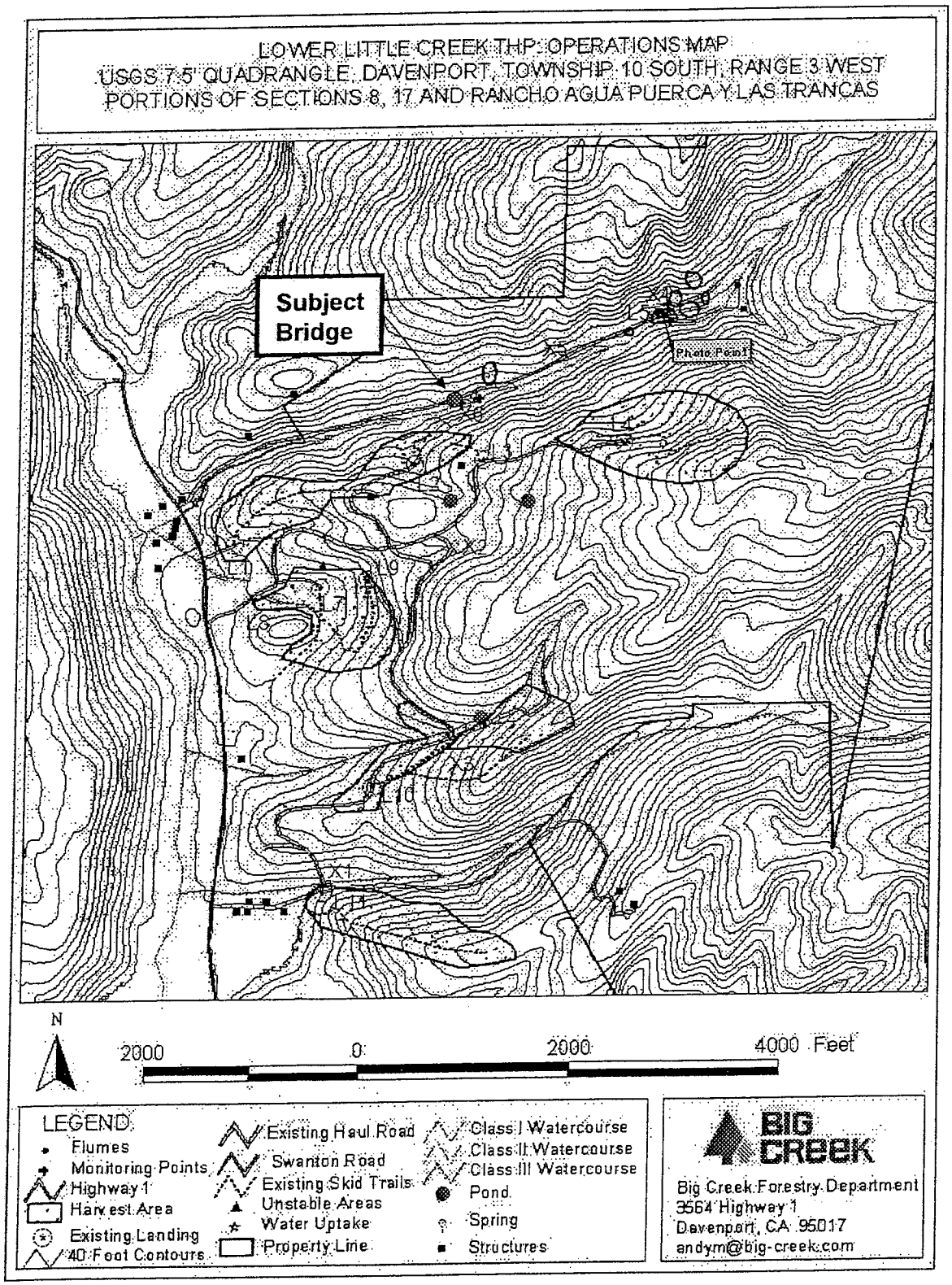
Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic Seismic Hazard Assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open File Report 96-08; U.S. Geological Survey, Open File Report 96-706, p. 31.

USGS, 1996, USGS National Seismic Mapping Project, Web site http://geohazards.cr.usgs.gov/eq/html/germap.html.

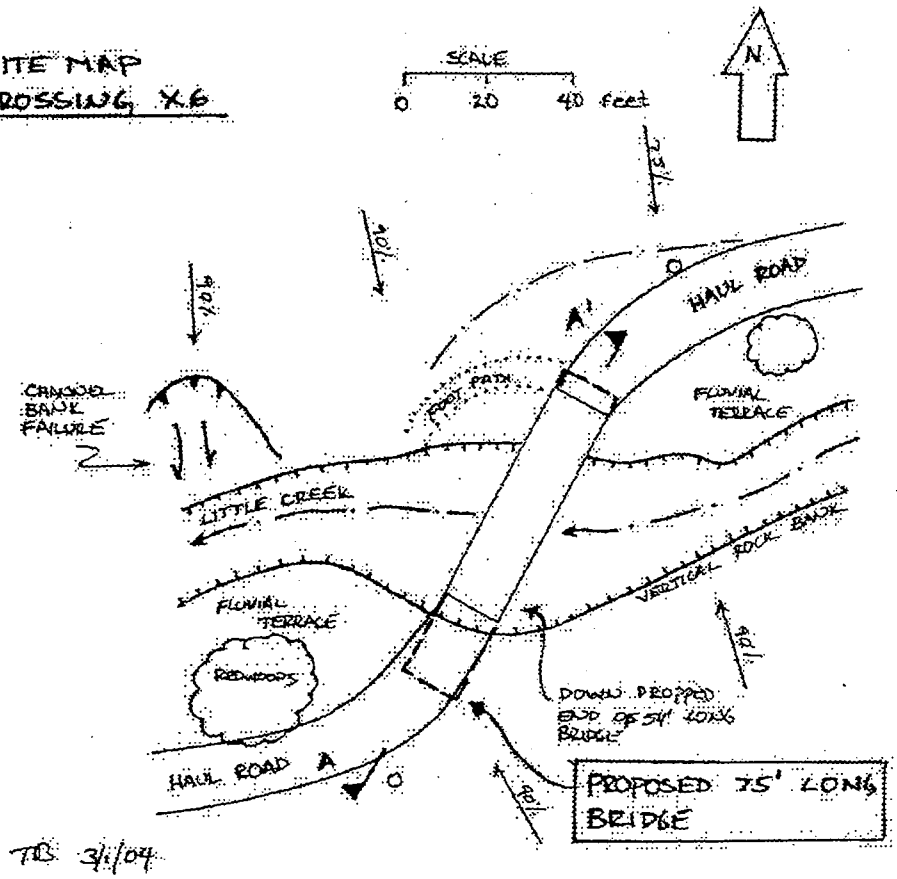
Schematic Bridge abutments and bank protection



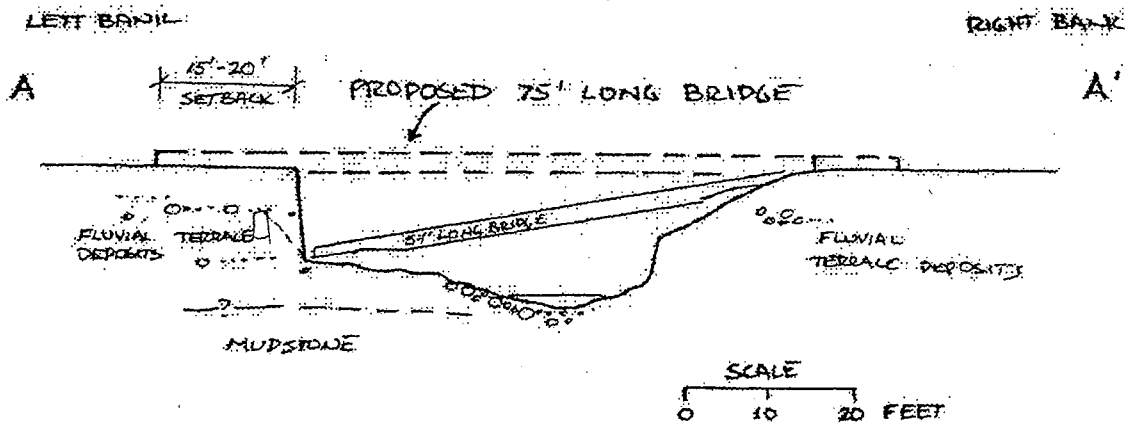




THP map from Swanton Pacific Ranch



CROSS-SECTION



For Department Use Only					
Notification Number:		Date Received		Date Completed	
Fee Enclosed?	☐ Yes $_____		☐ No_____		
Action Taken/Notes					

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

All fields must be completed unless otherwise indicated.
(See enclosures for instructions.)

Notification Type	
☑ Timber Harvesting Plan (No._____)	☐ Water Application (No._____)
☐ Commercial Gravel Extraction (No._____)	☐ Other

Application Information			
	Name	Address	Telephone/FAX
Applicant:	Big Creek Lumber Company	3564 Highway 1 Davenport, CA 95017	Business: (831) 457-6387 Fax:(831) 425-2872
Operator:	Big Creek Lumber Company	3564 Highway 1 Davenport, CA 95017	Business: (831) 457-6387 Fax: (831) 425-2872
Contractor: (if known)	Unknown		Business: Fax:
Contact Person: (if not applicant)	Big Creek Lumber Company ATTN: Steve Auten	3564 Highway 1 Davenport, CA 95017	Business: (831) 457-6387 Fax: (831) 425-2872
Property Owner:	California Polytechnic State University Foundation	Foundation Administration Building 15, San Luis Obispo, CA 93407	Business: (805) 756-1402 Fax:

Project Location				
Location Description:	Approximately 3 miles north of Davenport, CA			
County		Assessor's Parcel Number		
Santa Cruz County		057-121-07/10/14/22, 057-251-09, 057-151-03		
USGS Map	Township	Range	Section	Latitude/Longitude
Davenport, California	10 S	3 W	8,17,18,20	37*03' / 122*13'
Name of River, Stream, or Lake:	Little Creek			
Tributary To?	Scotts Creek			

NO[illegible]ICATION OF LAKE OR STREAMBED ALTE[illegible]TION
(Continued)

Name of Applicant: California Polytechnic State Univ. Found.

Project Description							
Project Name:	Lower Little Creek THP						
Start Date:	05/01/04	**Completion Date:**	05/01/07	**Project Cost:**	$ 5-500K	**Number of Stream Encroachments: (Timber Harvesting Plans Only)**	1

Describe project below: (Attach separate pages if necessary)

See attached addendum.

☑ Continued on separate page (s)

Attachments/Enclosures		
Attach or enclose the required documents listed below and check the corresponding boxes.		
☑ Project Description	☑ Map showing project location, including distances and/or directions from nearest city or town	☑ Construction plans and drawings pertaining to the project
Completed CEQA documents:	☐ Notice of Exemption ☐ Negative Declaration ☐ Mitigated Negative Declaration ☐ Draft or Final Environmental Impact Report ☐ Notice of Determination	
Copies of applicable local, State, or federal permits, agreements, or other authorizations:	☐ Local. Describe:	
	☐ State. Describe: THP review in progress. CCRWQCB review in progress.	
	☐ Federal. Describe:	

I hereby certify that all information contained in this notification is true and correct and that I am authorized to sign this document. I understand that in the event this information is found to be untrue or incorrect, I may be subject to civil or criminal prosecution and the Department may consider this notification to be incomplete and/or cancel any Lake or Streambed Alteration Agreement issued pursuant to this notification. I understand that this notification is valid only for the project described herein and that I may be subject to civil or criminal prosecution for undertaking a project that differs from the one described herein, unless I have notified the Department of that project in accordance with Fish and Game Code Section 1602.

I understand that a Department representative may need to inspect the property where the project described herein will take place before issuing a Lake or Streambed Alteration Agreement pursuant to this notification. In the event the Department determines that a site inspection is necessary, I hereby authorize the Department to enter the property where the project described herein will take place to inspect the property at any reasonable time and certify that I am authorized to grant the Department permission to access the property.

☑ I request the Department to first contact me at (insert telephone number) (831) 457-6387 to schedule a date and time to enter the property where the project described herein will take place and understand that this may delay the Department's evaluation of the project described herein.

Steve R. Autrey
Operator or Operator's Representative

3/12/04
Date

Form FG2023

(Effective January 12, 2004)

Lake and Streambed Alteration Program
Project Questionnaire

Complete the following questionnaire and submit it with your notification package. Please attach or enclose any addional information or documents that support or relate to your response.

	Yes	Maybe/ Uncertain	No	Please explain if you responded "yes" or "maybe/uncertain"
1. Will the project or activity involve work on the bank of a river, stream, or lake?	✓			
2. If you answered "yes" to #1, will the project or activity involve any of the following:				
a. Removal of any vegetation?		✓		Insignificant removal of some vegetation may occur around the crossing.
b. Excavation of the bank?			✓	
c. Placement of piers?			✓	
d. Placement of bank protection or stabilization structures or materials (e.g., gabions, rip-rap, concrete slurry/sacks)?			✓	
3. Will the project or activity take place in, adjacent to, or near a river that has been designated as "wild and scenic" under state or federal law?			✓	
4. Will the project or activity involve work in the bed or channel of a river, stream, or lake?			✓	
5. Will the project or activity involve the placement of any permanent or temporary structure in a river, stream, or lake?			✓	

	Yes	Maybe/ Uncertain	No	Please explain if you responded "yes" or "maybe/uncertain"
6. Will the project involve the use of material from a streambed?			✓	
7. Will the project or activity result in the disposal or deposition of debris, waste, or other material in a river, stream, or lake?			✓	
a. If you answered "yes" to #7, describe the material that will be disposed of or deposited in the river stream, or, lake:				
8. Will any type of equipment be used in a river, stream, or lake?			✓	
a. If you answered "yes" to #8, describe the type of equipment that will be used:				
9. Does the project or activity area flood or periodically become inundated with water?	✓			See attachment.
10. Will water need to be diverted from a river, stream, or lake for the project or activity?			✓	
11. If you answered "yes" to #10, please answer the following:				
a. Will this be a temporary diversion?				
b. Will water quality be affected by the deposition of silt, an increase in water temperature, a change in the pH level, or in some other way?				
c. Will the water be diverted by means of a dam, reservoir, or other water impoundment structure?				
12. Will the project or activity be done pursuant to a water right application or permit?			✓	
13. a. Has a wildlife assessment or study been completed for the area where or near where the project or activity will take place? (If "yes", attach or enclose a copy of the assessment or study.)	✓			See Timber Harvesting Plan.

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	Yes	Maybe/ Uncertain	No	Please explain if you responded "yes" or "maybe/uncertain"
14. Will the project or activity affect fish, amphibians, insects, or other aquatic resources?			✓	
15. Will the project or activity affect terrestrial wildlife?			✓	
16. Are any endangered or rare plant species thought or known to occur in the area where the proposed project or activity will take place?			✓	
17. Are any endangered or threatened fish, bird, or animal species thought or known to occur in the area where the proposed project or activity will take place?	✓			Steelhead, and possibly coho salmon, are thought to occur in Little Creek in the area of the bridge placement.
18. Have you contacted any other local, State, or federal agency regarding the project or activity?	✓			
a. If you answered "yes" to #18, please list the names of the agencies you have contacted:	California Department of Forestry and Fire Protection (CDF), Central Coast Regional Water Quality Control Board (CCRWQCB), Native American Historical Commission.			
19. Have you applied for or obtained any permit, agreement, or other authorization for your project or activity from any government agency?	✓			
a. If you answered "yes" to #19, please list the names or describe the permit, agreement, or authorization you have applied for or obtained:	Timber Harvesting Plan under review by CDF, Waiver of Waste Discharge Requirements applied for from CCRWQCB.			
20. Have any environmental documents pertaining to your project or activity been prepared?	✓			
a. If you answered "yes" to #20, please list the environmental documents that have been prepared:	Timber Harvesting Plan			

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I hereby certify that all information contained in this form is true and correct and that I am authorized to sign this document. I understand that in the event this information is found to be untrue or incorrect, I may be subject to civil or criminal prosecution and the Department may consider my notification to be incomplete and/or cancel any Lake or Streambed Alteration Agreement issued pursuant to my notification.

Steve R. Austin
Operator or Operator's Representative

3/12/04
Date

Botanical Assessment

Swanton Pacific Ranch

Non-Industrial Timber Management Plan

Dr. Grey Hayes
Watsonville, California

June, 2007

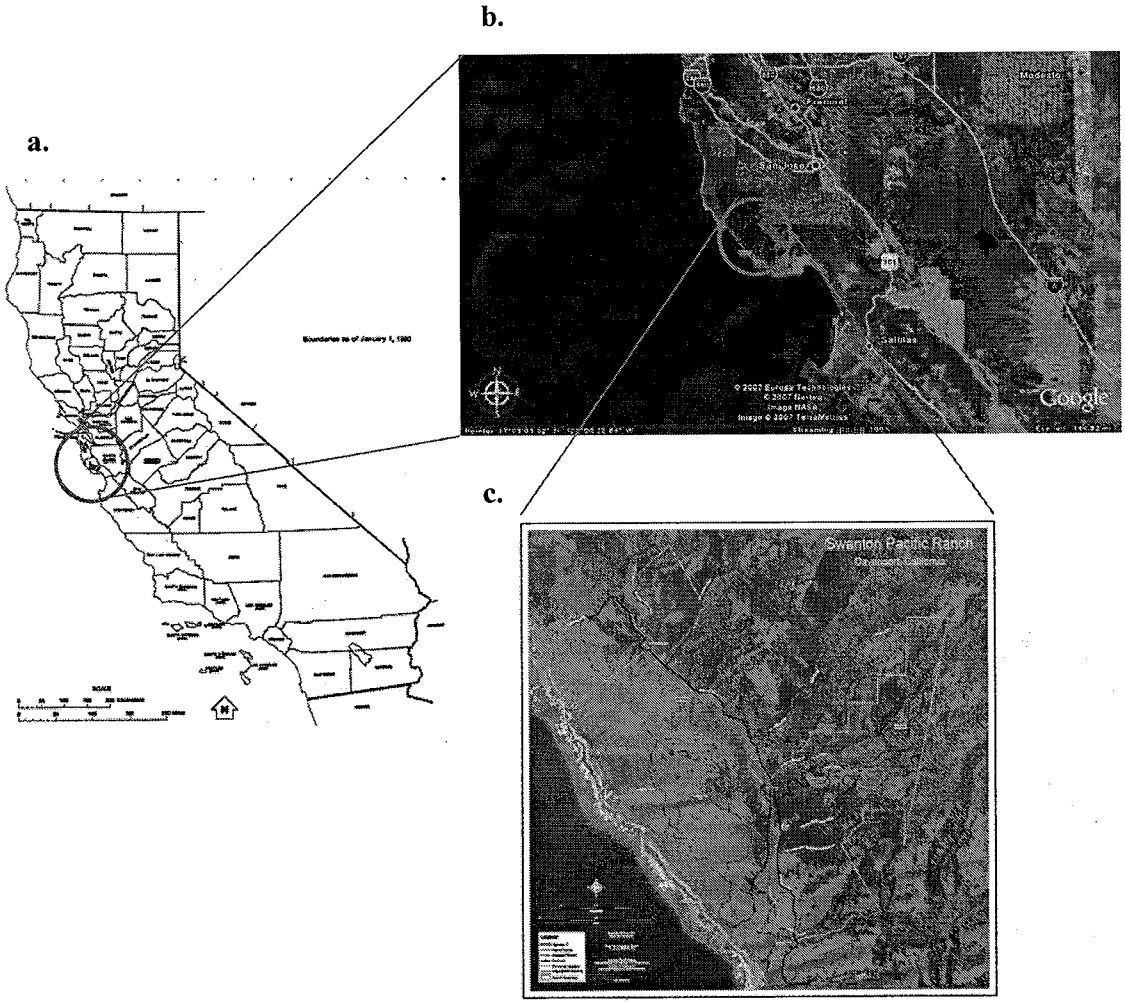
Prepared for:

California Polytechnic University
Swanton Pacific Ranch

Introduction

The following is a botanical assessment of the proposed "Non-Industrial Timber Management Plan" (NTMP) at the California Polytechnic Institute's Swanton Pacific Ranch (Swanton Pacific Ranch) in northern Santa Cruz County (Figure 1). The assessment was performed by the author of the report, a scientist familiar with the botanical resources and land management practice alternatives within the region. It is intended as part of a larger environmental review process associated with the proposed timber activities. The assessment included field reconnaissance, document review, reference to scientific literature, and interviews with ranch and timber managers. The area proposed for the NTMP includes sensitive plant species and vegetation communities; impacts to these can be minimized through careful planning. In this document, I review the methods and results of the assessment and make recommendations about ways of mitigating any negative impacts of proposed activities on botanical resources.

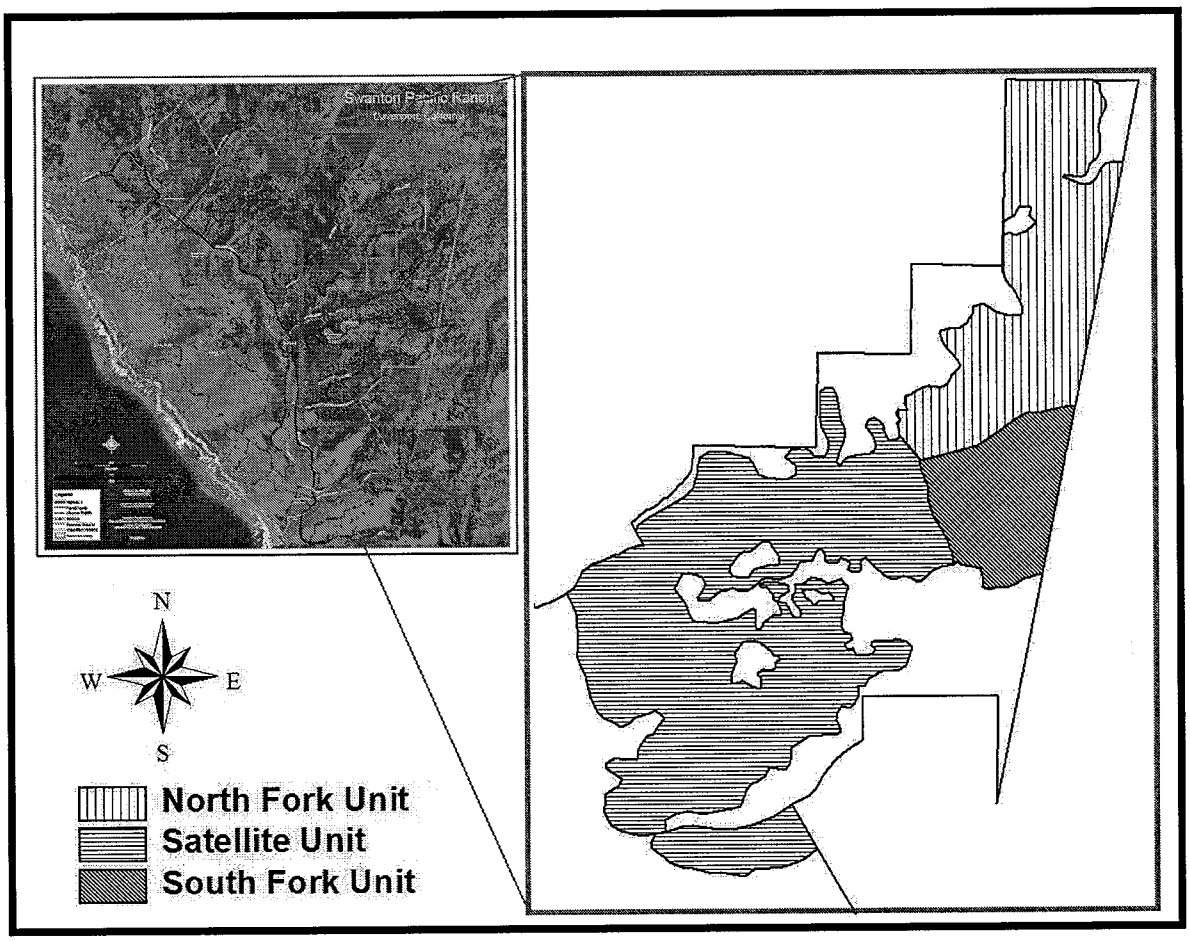
Figure 1: Vicinity of project: a) central, coastal California; b) northern Santa Cruz County; c) Swanton Pacific Ranch (light gray boundary).



Methods

The botanical assessment included several activities. I referred to existing site-specific data including maps, aerial photographs, CNDDB records, the Santa Cruz County General Plan (Santa Cruz County 1994), and previous reports. I also reviewed the scientific literature on timber harvest impacts on botanical resources, although not much information pertinent to the Santa Cruz Region or selective harvesting was available. In 2006 and 2007, I surveyed areas mapped within the boundary of the proposed NTMP (Figure 2). Dates were chosen to allow the survey to capture a wide range of plant phenology, including times when potential sensitive plant species would be identifiable. I particularly focused surveys along roads, skid trails, and landings, where the majority of potential impacts would take place. I also collected vegetation composition data at a number of locations to build on previous baseline vegetation composition analyses. I recorded survey transects, vegetation composition data collection points, and some areas of botanical resource concerns within the boundaries of the three proposed units of the NTMP (Figure 2).

Figure 2: Botanical survey areas – 3 harvest units within the NTMP



Sensitive Plant Species

Based on my experience, lists compiled by local expert Jim West and the California Native Plant Society (Morgan and Santa Cruz Flora Committee 2005), and queries to the California Natural Diversity Database, I developed a list of sensitive species which occur within 5 miles of the NTMP (Table 1[1]). I used this list to better target survey locations and timing. There are 39 sensitive plant species known from this region; 20 of these grow in habitats similar to those found within the NTMP area, and so have potential to occur there.

Table 1: Sensitive plant species known to occur within 5 miles of the NTMP Area

Scientific name	Common name	Status	Potential Habitat?
Agrostis aristiglumis	Awned bentgrass	SC County	Y
Agrostis blasdalei	Blasdale's bent grass	CNPS 1B.2	N
Amsinckia lunaris	Bent-flowered fiddleneck	CNPS 1B.2	Y
Anomobryum julaceum	slender silver-moss	CNPS 2.2	Y
Arabis blepharophylla	Coast rock cress	CNPS 4	Y
Arctostaphylos andersonii	Santa Cruz Manzanita	FC; CNPS 1B	Y
Arctostaphylos glutinosa	Schreiber's manzanita	CNPS 1B.2	Y
Arctostaphylos pajaroensis	Pajaro manzanita	CNPS 1B.1	N
Arctostaphylos silvicola	Bonny Doon manzanita	FC; CNPS 1B.2	N
Calyptridium parryi var. hesseae	Santa Cruz Mountains pussypaws	SC County	N
Chorizanthe pungens var. *hartwegiana*	Ben Lomond spineflower	FE; CNPS 1B.1	N
Cirsium andrewsii	Franciscan thistle	CNPS 1B.2	N
Collinsia multicolor	San Francisco Collinsia	CNPS 1B.2	Y
Cupressus abramsiana	Santa Cruz cypress	SE; FE; CNPS 1B.2	N
Elymus californicus	California bottlebrush grass	SC County	Y

[1] Listing status is Federal (F) or State (S), Endangered (E) or Species of Concern (C). California Native Plant Society (CNPS)[1] listing status also included. County municipal status ("SC County") is also noted.[1]

Table 1: Sensitive plant species known to occur within 5 miles of the NTMP Area			
Scientific name	**Common name**	**Status**	**Potential Habitat?**
Eriogonum nudum decurrens	Zayante buckwheat	SC County	N
Erysimum ammophilum	coast wallflower	CNPS 1B.2	N
Erysimum teretifolium	Santa Cruz wallflower	SE; FE; CNPS 1B.1	N
Festuca elmeri	Elmer's fescue	-not listed-	Y
Gnaphalium zayatense (pro sp)	Zayante everlasting	SC County	N
Hesperevax sparsiflora var. brevifolia	short-leaved evax	CNPS 2.2	N
Horkelia cuneata sericea	Kellogg's Horkelia	CNPS 1B.1	N
Lilium rubescens	Redwood lily	SC County	Y
Malacothamnus arcuatus	Arcuate bushmallow	SC County	Y
Microseris paludosa	Marsh Microseris	CNPS 1B.2	Y
Pedicularis dudleyi	Dudley's lousewort	CNPS 1B.1	Y
Penstemon rattanii var. *kleei*	Santa Cruz Mountains beardtongue	CNPS 1B.2	Y
Pentachaeta bellidiflora	White-rayed Pentachaeta	SE; FE; CNPS 1B.1	N
Perideridia gairdneri ssp. gairdneri	Gairdner's yampah	CNPS 4	N
Pinus radiata	Monterey pine	CNPS 1B.1	Y
Piperia michaelii	Michael's rein orchid	CNPS 4	N
Plagiobothrys chorisianus var. chorisianus	Artist's popcornflower	CNPS 1B.2	N
Plagiobothrys diffusus	San Francisco popcornflower	SE; CNPS 1B.1	N
Ribes divaricatum var. pubiflorum	Straggly gooseberry	SC County	Y
Silene verecunda ssp. *verecunda*	Santa Cruz campion	CNPS 1B.2	Y
Sanicula hoffmannii	Hoffmann's sannicle	SC County	Y

Table 1: Sensitive plant species known to occur within 5 miles of the NTMP Area			
Scientific name	**Common name**	**Status**	**Potential Habitat?**
Stebbinsoseris decipiens	Santa Cruz Microseris	CNPS 1B.2	Y
Micropus amphibolus	Mt Diablo cottonweed	SC County	N
Trifolium buckwestiorum	Santa Cruz clover	CNPS 1B.1	Y

Based upon prior surveys, my knowledge of the site, and habitats identified in aerial imagery and maps of prior vegetation surveys, I targeted my surveys in areas with potential habitat for each of the sensitive species. Surveys were focused in various seasons to detect the range of plants with varying phenologies (Table 2). Survey methodology included walking all haul roads, skid trails and landings as well as harvest areas. I compiled a list of any vascular plant species encountered. I also confirmed or modified mapped vegetation community polygons using a baseline vegetation polygon map provided by the Swanton Pacific Ranch, and recorded plant community composition for various stands within those polygons. These data will be submitted separately from this report to Swanton Pacific Ranch and the California Department of Fish and Game's Biogeographic Data Branch.

Table 2: Survey dates, locations, and survey effort.		
Date	**Location**	**Hours**
August 23, 2005	NW area of North Fork Unit	8
November 12, 2005	West of Scotts Creek	8
February 6, 2006	South Fork Unit	8
April 7, 2006	North of Little Creek; South Fork Unit	8
May 28, 2006	Satellite unit: south of Archibald Creek	8
July 8, 2006	South of Little Creek	8
October 7, 2006	Western portion of south Winter Creek stand	8
February 15, 2007	West of Scotts Creek	2
April 25, 2007	South of Winter Creek; Haul road southwest of Staub House.	2
May 4, 2007	Old Schoolhouse Road, between Little Creek and Winter Creek; Little Creek haul road	8

Sensitive Vegetation Community Types

The author focused on any vegetation associations listed of regional and global concern. The California Department of Fish and Game list of habitats of concern was reviewed as was the CNDDB and the County of Santa Cruz's 1994 General Plan (Table 3).

Table 3: List of potential sensitive habitat types within the NTMP area.

Community name	**Status**
Bald hills prairie	G2. S2.1
Coastal brackish marsh	G2 S2.1
Coastal terrace prairie	G2 S2.2
Knobcone pine forest	G4 S4
Maritime coast range ponderosa pine forest	G1 S1.1
Monterey pine forest	G1 S1.1
Native riparian forests, including: Central coast live oak riparian forest Central coast arroyo willow riparian forest Central coast riparian scrub Red alder riparian forest	 G3 S3.2 G2 S2.1 G3 S3.2 G3 S3.2
Northern coastal salt marsh	G3 S3.2
North central coast drainage Sacramento Sucker/Roach river	G? S?
North central coast Short-Run Coho Stream	G? S?
Northern interior cypress forest (Santa Cruz Cypress woodland)	G1
Northern maritime chaparral	G1 S1.1
Old growth and primary forests of all types including: Mature and old-growth Coastal Redwood stands[2] Alluvial redwood forest Upland redwood forest	 E G2 S2.2 G4 S2.3
Shreve oak forest	-not listed-
Upland Douglas fir forest	G4 S3.1

[2] Here defined as trees with large diameter branches and other canopy structure characteristics that support epiphytes, marbled murrelet, and other unusual and rare phenomena. Also considered will be "goose pen" trees: those with large hollowed out trunks that support a number of special species values.

Results

Botanical Inventory

I found 170 vascular plant species in the NTMP area (Appendix 1). Twenty-four of these species are non-native species and 146 of these are native species, indigenous to the area. Based on the number of hours of effort and the plant diversity of the area, this list probably represents 90% of the plant species within the boundaries of the NTMP.

I recorded data for seven vegetation polygons. These will be deposited with Swanton Pacific Ranch and the DFG in addition to data for 15 other polygons recorded from my other recent surveys in the NTMP area. These data add to the growing vegetation database from the Santa Cruz Mountains and can help future projects better assess cumulative impacts to botanical resources.

Sensitive Plant Species

I encountered 2 of the 20 potential sensitive plant species within the NTMP during the surveys: Monterey pine (*Pinus radiata)* and Elmer's fescue (*Festuca elmeri*).

The Swanton area is home to one of two Elmer's fescue populations in Santa Cruz County; the other may have been recently extinguished at UC Santa Cruz. Elmer's fescue is a species of local significance, which does not have any listing status. However, there may be as few as 20 populations of this species remaining in the wild. Most other previously documented populations are from areas now affected by urbanization (G. Hayes, unpublished research). This species is widespread in grasslands on Swanton Pacific Ranch and on roadsides and landings in the NTMP area. It shall not be negatively affected by operations and is in fact favored by practices. Populations in proximity to the NTMP area shall be monitored during periodic visits by botanists to the Ranch. A permanent plot with current species presence is selected in each management unit. If populations are observed to diminish, adaptive management shall commence.

Outside of the NTMP area on Swanton Pacific Ranch, native Monterey pine (*Pinus radiata*), is present in contiguous stands. However, only three known specimens of native Monterey pine trees are located in the NTMP area, approximately 50 feet south of Little Creek, just above Swanton Road, around a small parking area, according to Dr. Walter Mark. This plant species is considered by the California Department of Fish and Game as meeting the requirements for listing as endangered in the State of California. Stands of this species at the Swanton Pacific Ranch form a portion of one of the few remaining populations of the species. Naturally occurring Monterey pine stands are threatened by development and pitch canker (*Fusarium subglutinans* f. sp. *pini*), a fungal disease. Although not carrying the significance of whole stands, the few native Monterey pine trees on the outskirts of the NTMP area should be retained. Several other areas within the NTMP are supposed to have been planted with non-native Monterey pine. The latter are not of conservation concern and are addressed in the discussion section, below.

Sensitive vegetation communities

I noted the presence of 5 different sensitive plant associations within the various units of the NTMP area: northern maritime chaparral, old growth redwood (*Sequoia sempervirens*), upland redwood forest, riparian, and coastal prairie. In addition, I note redwood understory wetland assemblages and a single mature tanoak (*Lithocarpus densiflorus*) stand, which I describe below. Locations of sensitive plant communities are illustrated in Appendix 2; the communities are described in the following section.

Northern Maritime Chaparral

One area of northern maritime chaparral is found on the boundary of the NTMP, on a ridge to the south of Winter Creek. Refer to Appendix 2, 'Satellite Unit Botanical Comment 2). The stand is dominated by the burl-forming brittle leaf manzanita (*Arctostaphylos crustacea* ssp. *crinita*). Other species in the stand include chamise (*Adenostoma fasciculata*), coast live oak (*Quercus agrifolia*), and madrone (*Arbutus menziesii*). Recently disturbed areas along a ridgeline road have grown up with deer brush (*Lotus scoparius*). A single blue gum eucalyptus (*Eucalyptus globulus*) is included within the stand. Douglas firs (*Pseudotsuga menziesii*) and redwoods are encroaching into the stand, as well. Similar stands of maritime chaparral extend on the western slope of the Santa Cruz Mountains from just south of Half Moon Bay to Chittenden Gap, covering a few thousand acres. As with this stand, most stands have not been subjected to fire in recent history and are thereby nearly closed canopy with high levels of fuels and many manzanitas are dying as they are overtopped by encroaching trees.

Old Growth Redwood

The NTMP area includes a stand of old growth redwood near the headwaters of Berry Creek, the General Smith Grove. This stand is in the northwest corner of the NTMP. The grove contains many old growth redwood trees as well as mature tan oaks and Douglas firs. The forest canopy is dense (~80%), with 30% cover of each of the aforementioned tree species. There are many small tanoaks in the forest understory. Large, Douglas fir trees, heavily infected with *Phellinus pini,* were removed from the grove in the early 1990's. There is one other very small stand of old growth redwood trees, near the Al Smith House. But, this stand is too small to support a vegetation association influenced by the old growth trees.

Upland Redwood Forest

Many stands of upland redwood forest dominate much of the NTMP. These areas were clear cut in the early 1900's and have had several harvests since that time. Common associated tree species include Douglas fir, tanoak, buckeye (*Aesculus californicus*), coast live oak, shreve oak (*Quercus parvula* ssp. *shrevii*) and California bay laurel (*Umbellularia californica*). Common understory species include redwood sorrel (*Oxalis oregona*) California lilac (*Ceanothus thyrsiflorus*), poison oak (*Toxicodendron diversilobum*), and blackberry (*Rubus ursinus*). These stands are the focus of harvest activities in the NTMP.

Native Riparian Forest
A well developed riparian forest occurs along Little Creek. Red alder (*Alnus rubra*) is the dominant component of this community, which also include willows (*Salix* species), California bay laurel, coast redwood, buckeye, and box elder (*Acer negundo*). Common understory species include coffeeberry (*Rhamnus californica*), blackberry, and stinging nettle.

Coastal Prairie
Several areas of coastal prairie are found along haul roads; any grassland areas affected by NTMP activities should be considered coastal prairie.

Other Vegetation Communities

Shreve oak woodland
Shreve oak stands are patchily distributed on moist slopes, from 100 – 2000' elevation, west of the coast range crest from Marin to Monterey Counties. The species is similar taxonomically to interior live oak, and although its taxonomic status is currently being reviewed, most scientists currently suggest stands receive conservation attention for two reasons. First, the species is threatened by sudden oak death (*Phytophthora ramorum*). Second, much of the distribution of stands occurs in proximity to areas of high development pressure.

Shreve oak is a common component of many of the vegetation communities throughout the NTMP. However, the species is the definitive element of stands below the Al Smith House within and adjacent to the aforementioned Monterey Pine grove, (Appendix 2, 'Satellite Unit Botanical Comment 1'). Common associated tree species include coast redwood, Douglas fir, and tan oak. Monterey pine is a minor element as is buckeye. Common understory species include sword fern, bracken fern, and nightshade (*Solanum douglasii*).

Wetlands and seeps
Two areas of wetlands with springs and seeps are in the vicinity of areas proposed for infrastructure in the NTMP. Characteristic species in these areas include elk clover (*Aralia californica*), giant chain fern (*Woodwardia fimbriata*), and (*Carex bolanderi*). These seep communities indicate prolonged if not year-long wetland conditions; these communities are widespread but occupy a small fraction of the landscape. They are linear features, and originate from mostly discrete springs (Appendix 2, 'North Fork Unit Botanical Comment 2').

Mature tanoak stand
Although tanoak is a common species in the region, more mature stands and individual trees are rare due to the harvest of the species for the creation of tannic acid in the early 1900's. An unusual mature stand is in the North Fork Unit, on the north side of Little Creek, surrounding one of the aforementioned wetland areas, (Appendix 2, 'North Fork Unit Botanical Comment 1'). There is little understory and tanoaks form the majority of the canopy of this small (<5 acre) area.

Discussion

Overview

In order to preface my discussion of potential NTMP impacts to plant species and communities, I present here a short review of the scientific literature. I cite scientific literature on direct and indirect impacts to plant species and vegetation communities. It should be noted that there is very little literature addressing forestry impacts in redwood ecosystems, let alone the southern extent in the Santa Cruz Mountains, and only a small amount more discussing botanical impacts of forestry from anywhere, although not pertaining directly to single-tree selection harvesting as practiced in the Southern Subdistrict under the California Forest Practice Rules. Most literature addresses wildlife impacts.

Literature Review – Direct Impacts to Plant Species

Direct impacts of forestry practices to plant species include plant removal or above/below ground tissue damage. Creation of harvest infrastructure (roads, skid trails, landings) is the most apparent cause of direct impacts of botanical resources. Infrastructure can sometimes occupy a surprising percentage of the land within managed forests (Buckley et al. 2003). Plants adjacent to logging roads and skid trails are often damaged during operations (Jackson et al. 2002). Direct impacts also occur in harvest areas, where trees are felled and dragged, slash is piled, or gaps in the canopy expose understory plants to new levels of high light intensity. Direct impacts are of concern if they cumulatively or individually affect species at the population-level, or if there are impacts to protected or sensitive species. Loss of some herb species has been noted following logging in some systems potentially due to combinations of direct and indirect impacts (Meier et al. 1995). And, depending on the scale of impacts, some of the longer lived, dispersal limited, and slower to establish understory herbs (e.g. *Trillium ovatum*) associated with redwood forests may take a very long time to recover after the direct impacts of forestry (Kahmen and Jules 2005).

Literature Review – Indirect Impacts to Plant Species

Indirect impacts to plant species from logging may include edaphic changes (light, soil moisture, temperature) and changed animal abundance (herbivores, pollinators, seed dispersing agents). As I discovered nothing published on the indirect impacts to plants by changed animal abundance, I focus on edaphic effects.

With fire-adapted ecosystems such as redwood forests, edaphic changes would naturally have occurred cyclically after fire events, and so one would expect natural adaptation of many of the plant species to varying edaphic conditions. Indeed, in the Swanton region, as with most western forests, the majority of understory plant species may not be dependent on the narrow edaphic conditions of specific seral stages of forest development. Plant species appear to persist – albeit with varying abundances – throughout the cline from young to more mature stands (Halpern and Spies 1995). A few

plant species (mainly bryophytes) may be truly old-growth dependent (Norris 1985), but these would have been lost at the onset of logging, early in the 1900's in the project area.

Harvest techniques such as those proposed in the NTMP may reduce potential indirect impacts by maintaining structural characteristics upon which some more sensitive plant species may depend (Deans et al. 2003). On the other hand, even the creation of minor canopy gaps from proposed activities may result in the short term loss of summer water input from fog drip, reducing soil moisture and potentially impacting certain species in the redwood understory (Ahlstrom 1968, Azevedo and Morgan 1974, Dawson 1998). While possibly more important to conifers, (Ingraham and Matthews 1995) impacts to fog precipitation have yet to be analyzed with regard to species specific to the coast redwood vegetation association.

Increases in light levels may affect some plants positively, negatively, or not at all (Pearcy and Pfitsch 1991). Forestry practitioners working in redwood systems often aim for sufficiently increased light levels to improve regeneration of new redwood stems (Hunter 1995). Here again, sudden changes in light levels within redwood communities are a disturbance with which associated species must have evolved. Light levels change when canopies are opened through natural events such as slope failure and tree fall (Hunter and Parker 1993). Moreover, light gaps may maintain botanical species diversity on the local scale (Sugihara 1994).

Literature Review – Vegetation Community Impacts

Any significant amount of tree removal inevitably alters plant community composition. Clines of forest community composition change in response to varying levels of tree harvest have been noted in many studies (Halpern and Spies 1995, Deans et al. 2003). Because of their sensitivity to changes in temperature and hydrology, wetland communities may be particularly sensitive to the effects of logging, with increased light levels concomitant with increased sedge populations (Batzer et al. 2000).

Presettlement redwood communities, for instance, may have had much larger hardwood and shrub components (Bonnicksen and Stone 1982). The redwood community itself may be threatened by extinction (Namkoong and Roberds 1974), though logging may in some ways promote the long-term regeneration and health of redwoods (Florence 1965). Logging is sometimes seen as a way of fuels reduction. Redwood communities undoubtedly evolved with fire, with effects extending into recent history of the Swanton Pacific Ranch stands (Greenlee 1990).

Skid trails and haul roads have been noted to create soil compaction, changed soil moisture levels, higher light levels, and bare mineral soil; these effects could result in changes in vegetation composition, including higher cover of invasive exotic species (Buckley et al. 2003). Logging roads are often cited as the greatest indirect impact on biotic systems, mainly due to their long term contribution to changes in hydrology and concomitant sediment contribution (Steensen and Spreiter 1992). But, there can be more direct impacts to native plant communities. Equipment along skid trails and logging roads can vector introduced species and disease (Jules et al. 2002). Also, roads and skid

trails work in a variety of ways that favor the establishment and spread of invasive species (Parendes and Jones 2000). Procedures are in place to wash equipment prior to entering the NTMP area in order to reduce introduction of invasive species to the NTMP area. Although it was beyond the scope of this botanical assessment to quantify the percent cover of the total NTMP area comprised of skid trails, haul roads, and landings, other studies suggest up to a quarter of managed stands can be comprised of these types of forest infrastructure (Jackson et al. 2002, Buckley et al. 2003). Due to the proposed aerial skyline cable and helicopter yarding, the NTMP ground-based infrastructure is likely less than the 25% suggested in these studies. Even so, creation and maintenance of this infrastructure undoubtedly has altered and will continue to alter the vegetation communities of the NTMP.

A little-addressed issue is the potential impact of logging on the recruitment of woody debris to the forest floor or into streams. Downed woody debris on the forest floor may contribute to microsites important to plant establishment and growth. In addition, the recruitment of woody debris into watercourses plays an important role to many biota and biotic communities both in stream and in the alluvial and flood planes adjacent to streams. With regard to the latter, separating the effects of logging vs. environmental factors (slope stability, wind, etc) has confounded studies thus far (Benda et al. 2002). Some suggest that large woody debris volumes are substantially less in forestry areas vs. natural systems (McGee et al. 1999, Franklin et al. 2002). However, in the proposed NMTP, the selection silviculture will maintain large woody debris (LWD) recruitment by retaining all snags, downed wood, and a majority of stems of all sizes for future creation of LWD.

Most California plant communities are thought to be fire adapted. Indeed, scientists have shown that fire is an important factor in influencing the composition of forests in coastal California (Hunter et al. 1999). Logging may mimic fire in some respects (increasing light to forest floor, exposing mineral soil along roads/landings), and in some forest types has been shown to maintain similar species diversity (Reich et al. 2001). The suppression of fire along with logging may also convert some forests from once heterogenous landscapes with variable habitat types into more homogenous conifer-dominated systems (Gallant et al. 2003). We do not yet understand where California's coastal forests lie on this continuum. But, there is data that suggest that younger, second growth redwood stands may be more susceptible to fire mortality than old growth (Namkoong and Roberds 1974). Also, because of increased non-native plant invasions, ecosystems may be becoming more fire prone (D'Antonio and Vitousek 1992). And so, there is tension in the scientific community about whether catastrophic fire may become too frequent (Stylinski and Allen 1999, Odion and Claudia Tyler 2002), or if we must work to maintain fire in ecosystems to maintain biodiversity (Van Dyke and Holl 2001). However, most people involved in managing forest ecosystems recognize that we cannot re-introduce fires under present-day forest conditions without first conducting extensive mechanical site preparation or employing large numbers of people to work fire lines around prescribed fires at great risk and expense.

The NTMP area was burned immediately following falling of the old growth trees at the turn of the century to enable easier log skidding. A large conflagration subsequently burned a portion of the Ranch in 1948. Since that time, region-wide fire suppression has been the norm, and the lack of fire has undoubtedly had an effect on the botanical species distribution and composition. The mechanical vegetation modification proposed under the NTMP is a surrogate for fire in some respects. Reducing the vertical and horizontal continuity of fuels will decrease the intensity of a catastrophic crown fire.

Cumulatively, the suppression of natural fires and the difficulty to execute prescribed burns in State Responsibility Areas causes a problem for the continued health of fire-dependent plant communities. This NTMP area is a very small piece of the puzzle. Taking into account continued urbanization and associated risks, we cannot expect a let-it burn fire policy to take hold. We can; however, treat areas with a variety of treatments (some of which may have fire surrogate elements), and observe how fire reacts to our management when it does happen.

Suggested Management for Sensitive Species

Elmer's fescue
The author suggests that Elmer's fescue should be periodically monitored in relation to the NTMP (Mitigation Measure EF1, Table 3). In general, the standards associated with normal forest practices are sufficient to address concerns with these species. It is highly probable that typical timber harvest activities are compatible with the conservation and recovery of this species. However, periodic monitoring can help to inform this supposition. Three plots are established for this purpose, one in each management unit.

Monterey pine
Three known specimens of native Monterey pine are located in the NTMP area. These trees are not proposed for harvest and are shown on the Botanical Conservation Map. Measures to treat slash from non-native pine removals to mitigate the spread of pitch canker are included in Section II of the NTMP.

Suggested Management for Sensitive Vegetation Communities

Old growth redwood
The old growth redwood forest community is the highest level concern for the conservation of botanical resources in the NTMP. Specific issues to address include the loss of old growth stand characteristics, including loss of individual trees and the continued recruitment of coarse woody debris (Mitigation Measures OG1-OG3 and ALL4, Table 3). Soil compaction issues should also be addressed (Mitigation Measure OG4, Table 3). General concerns listed for all systems also pertain, including fire and invasive species (see following sections).

To avoid impacts to the individual trees of General Smith Grove, the boundaries of this stand are clearly delineated on the Botanical Conservation Map and mitigations are described in Section II, Item 14, under Old Growth. These stands shall have harvesting

in them; however, none of the residual trees shall be harvested or negatively impacted during operations. Thinning from below to reduce competition and to remove ladder fuels is permitted. The LTO shall strive to avoid negative impacts to the roots of old trees by keeping equipment away from the drip line. Tractors may approach old growth trees only on designated skid trails.

Volume of coarse woody debris is one of the variables that contrasts old growth and late successional redwood forests with those areas with ongoing forestry operations (Goodburn and Lorimer 1998). Coarse woody debris may be important for ecological processes in many regards, and it has been shown to be important in maintaining understory plant species diversity (He and Barclay 2000). And so, I recommend that within the designated stand, large woody debris greater than 24" shall not be removed. Ongoing recruitment of coarse woody debris shall be provided by retaining all snags, old growth treesm, and a majority of stems of all sizes through selection silviculture.(Mitigation Measure ALL4, Table 3).

Northern maritime chaparral

Prior timber harvest activities in this area included maintaining and/or opening/improving a skid trail on the ridge at the top of a stand of northern maritime chaparral (Appendix 2: Satellite Unit Botanical Comment 2). To address future impacts, I repeat suggestions I made for prior harvest activities (Mitigation Measures MC1-MC3, Table 3). These suggestions include management and control of invasive exotic species and management controls on forest succession. I also acknowledge the negative affect that fire exclusion has had and because of the importance of fire to this ecosystem, I encourage the Ranch to consider regenerations methods such as prescribed fire or mechanical disturbance to simulate fire. I recommend the Ranch prepare a Fire Mangement Plan outside of the NTMP process, as resources become available. Resulting adaptive management strategies may be proposed as future amendments to the NTMP, if need be, (see 'fire' section, below and Mitigation Measure ALL2, Table 3).

Wetlands and seeps

The two more extensive and species rich wetland/seep areas in the NTMP (Appendix 2: 'North Fork Unit Botanical Concern 1 & 2) may be an artifact of increased light levels from previous tree harvesting (Batzer et al. 2000). Temporary wetlands have been historically overlooked as a conservation target in forested ecosystems, but represent many conservation values (Williams 2005). I suggest that the ongoing timber operations may benefit the wetland plant communities by providing increased levels of light, but that impacts to soil should be avoided to the extent feasible, as to avoid changes in hydrology that could impact these and surrounding plant communities (Mitigation Measure WL1, Table 3). Measures to minimize negative impacts to these wet areas are described in Section II, under Mitigation Point MP31 (Hygric plants).

Riparian

The author suggests two areas of concern for riparian communities from a botanical perspective (Mitigation Measures RI1, Table 3). First, this habitat has the most possibility of being impacted by exotic invasive species. Second, the addition of coarse

woody debris may be important to the long term health and plant diversity of the riparian plant community. Forest managers ensure an ongoing natural level of recruitment of large woody debris, by implementing Watercourse and Lake Protection Zones with high canopy retention requirements along watercourses in the plan area. The canopy is especially extensive within the Little Creek riparian system where retention provides for at lest 85% canopy cover within 75 feet of the watercourse and 65% canopy cover from 75 to150 feet from the watercourse (Mitigation Measure ALL4, Table 3).

Shreve oak stands

Ecological succession and disease (e.g., sudden oak death) are the two major concerns for Shreve oak stands (Mitigation Measures SO1-SO4, Table 3). Succession is influenced by suppression of fire, and timber activities due to change of fire fuel structure, planting of coniferous trees for production, and direct damage to the understory. It is difficult to assess and mitigate the effects of the impacts to Shreve oak stands by ecological succession solely within the confines of the NTMP; the meta-populations of Shreve oak as a whole extend onto many parcels and has not been addressed with a population-wide management plant. However, NTMP activities can include measures to address succession, albeit on a small portion of the population. These include: 1) selective harvest that targets larger statured conifers that shade Shreve oak stands, and; 2) refraining from any planting of taller-statured coniferous species that could shade these stands. Mitigation measures to limit impacts from operations and improve growing conditions are included in Section II, Item 32.

Because the spread of sudden oak death is also a concern, I have reviewed the measures proposed to control the spread of this and any other forest pathogen and find them suitable. See Section II, Item 15 and the section below labeled 'disease' and in Mitigation Measure ALL1, Table 3.

Upland redwood forest

The focus of the NTMP is predominantly upon the upland redwood forest community. Because of the economic importance of the timber from this community, timber harvest practices generally address the botanical concerns for conservation of this forest type. However, some concerns remain for the gradual loss of some, albeit not sensitive, plant species that are important elements of the redwood understory (see literature review, above). These may be impacted by infrequent soil disturbance from tree felling and skidding. In order to address this botanical conservation concern, sizeable harvest areas have been designated for cable and helicopter yarding where the absence of ground based operations will leave the understory less impacted by forestry activities. Operators puts forth great effort to minimize canopy damage and ground disturbance as discussed in numerous areas in the NTMP. In the Class II WLPZ, an in-lieu practice is proposed to allow fallers to fall trees in existing canopy gaps, thereby saving riparian canopy. The standard practice of falling groups of trees to the lead of the infrastructure e.g. skid trails and cable corridors also spares residual vegetation. Under these various conditions, research could be undertaken in the future to compare understory composition through time. (Mitigation Measure RF1, Table 3).

Coastal prairie

Potential impacts to coastal prairie include loss of native plants through trampling, introduction and spread of exotic invasive species, and changed hydrology. The loss of plants along roads is difficult to mitigate because few plants are adapted to such heavy traffic. However, the corridor along road cuts is often where the species diversity is highest due to increased light levels. Using such roads in the dry season after plants have entered dormancy will help. I recommend against seeding any areas within the grassland; where seeding is necessary I recommend using only non-native, non-invasive species such as field barley. Finally, coastal prairies retain their integrity only insofar as the complex hydrology is maintained. Small changes in drainage patterns can affect the ability for the persistence of native species or for the establishment and spread of invasive species. Drainage structures should to the extent feasible be carefully planned to maintain natural flow patterns in prairie areas. See Table 3, Mitigation Measures CP1-4.

Mature tanoak stand

Potential impacts to the single stand of mature tanoaks I identified (Appendix 2: 'North Fork Unit Botanical Comment 1) include damage to trees, soil compaction, and disease introduction (Mitigation Measures TN1, TN2, and ALL3). Mitigations to minimize potential impacts are included in Section II, Item 32, Mitigation Point 32. Timber operators shall avoid activities which could directly impact trees, to the extent feasible. Operations shall be restricted to designated skid trails within the grove, and shall traverse the grove with equipmentin the driest possible portion of the year. Required mitigations for addressing sudden oak death and other diseases are included in Section II, Item 15. Further discussion is included below in the 'disease' section.

General Suggestions

Monterey pine plantations

Local managers suggest that several areas were planted as timber plantations with unknown genetic stock of Monterey pines. This is problematic because of the proximity of these plantations to the native Monterey pine stands, suggesting the potential for drift of inappropriate genetic material. Although this potential has been extant for some time now, it will remain ongoing until the plantations are controlled. Complete control of planted Monterey pines is an expensive and time consuming operation, which portends little economic return from any harvested resources at this time. However, I recommend that such removal of non-indigenous Monterey pine take place whenever feasible within the bounds of NTMP activities (Mitigation Measure MPP1, Table 3). Gradual removal is planned as plantation pines are harvested using either single-tree or group selection silviculture and the areas are inter-planted with native conifer stock.

Invasive species

Invasive species impacts may be exacerbated by logging activities. These impacts should be mitigated as much as possible as part of the NTMP. Priority should be given to the current problem species: jubata grass (*Cortaderia jubata*), periwinkle (*Vinca major*), and French broom (*Genista monspessulana*). Other priority species include cape ivy (*Delairea odorata*), sticky eupatorium (*Ageratina millefolium*) and any other species listed on the highest priority list by the California Invasive Plant Council. The Ranch is

currently controlling the most pervasive species, jubata grass and eucalyptus, by removing each population as soon as possible following identification. Roads are kept open by mowing, which keeps invasive species growing along their length in check. As resources are available, the Ranch will implement an invasive inventory and control program, which may rely on hand weeding and judicious application of herbicides, prescribed by a licensed Pest Control Advisor.(Mitigation Measure INV1, Table 3).

Disease

Forest pathogens are increasingly a concern to the conservation of botanical resources. A plant pathologist was consulted to inform best management practices proposed in this NTMP to assure long term forest health to the extent feasible. These include measures to sanitize equipment before it enters harvest areas, see Section II, Item 15. (Mitigation Measure ALL3, Table 3).

Genetic contamination

Seeds and other propagules are sometimes used in forestry as erosion control or to improve timber stands. Scientists have numerous concerns about the introduction of non-indigenous genetic material, including outbreeding depression (McKay et al. 2005). And so, I recommend a policy of limiting site introduction of new plants to those which have been collected within the appropriate seed zone (Mitigation Measure ALL1: Table 3). Section II, Item 18 specifies that erosion control species be limited to Non-invasive cereal grains. Section II, Item 14 specifies that seedlings to be planted shall be redwood and Douglas-fir with origins in the local seed zone.

Fire

Fire is an evolutionary disturbance regime that plays an indisputable role in the maintenance of species and community diversity in the ecosystems within the NTMP. A fire management plan is outside of the scope of the NTMP; however, I recommend that the Ranch create a fire management plan, as resources become available, (Mitigation Measure FF1, Table 3). Mitigations could be amended to the NTMP as appropriate. As mentioned previously, logging cannot entirely mimic the effects of fire (Gallant et al. 2003), but may affect the potential for or impacts of naturally occurring fire. Continued fire suppression for many years may increase fuel loads to unnatural levels, endangering sensitive systems such as the old growth redwood forest. A change in the natural fire regime is a by-product of the modern fire-suppression era. Implementing prescribed burns is a very risky and expensive undertaking that would also likely require pre-fuels treatments. A future fire management plan should include analysis of the potential for the use of prescribed fire and/or mechanical treatments that mimic fire. . The silvicultural treatments proposed in the NTMP are designed to reduce the horizontal continuity of fuels. The potential cumulative effects of NTMP operations in the context of historic and current fire suppression are discussed in Section IV.

Table 3: Suggested management measures for mitigation of botanical impacts		
Botanical Resource	**Potential Impact**	**Mitigation Measure**
Monterey pine	Damage to few individual Monterey pine trees	**MP1:** Clearly mark any trees pre-harvest, educate and oversee fellers and equipment operators to avoid impacts within the drip line of trees (Refer to Section II, Item 32)
Elmer's fescue	Uncertain impacts; probably favored by activities.	**EF1:** Periodically monitor Elmer's fescue in several locations within the NTMP (Refer to Section II, Item 32, Elmer's fescue). Submit NDDB forms detailing this monitoring at least every decade
Old growth redwood forest	Loss of trees	**OG1:** Delineate stands of old growth trees and specify retention of all old growth trees (Refer to Section II, Item 14c, and Map of Potentially Suitable Marbled Murrelet Habitat in Section V).
Old growth redwood forest	Loss of trees	**OG2:** Clearly delineate boundaries and educate all personnel (Refer to Section II, Item 14c and Map of Potentially Suitable Marbled Murrelet Habitat in Section V)
Old growth redwood forest	Lack of recruitment of coarse woody debris	**OG3:** Manage for ongoing recruitment of natural levels of coarse woody debris (Refer to Section II, Item 14c, Old Growth)

Table 3: Suggested management measures for mitigation of botanical impacts		
Botanical Resource	**Potential Impact**	**Mitigation Measure**
Old growth redwood forest	Soil compaction	**OG3:** Use best management practices to avoid soil compaction in the drip line of any canopy of old growth trees (Refer to Section II, Item 14c, Old Growth)
Northern maritime chaparral	Invasive exotic species introduction/spread	**MC1:** Follow up post harvest to control invasive species such as broom, eucalyptus, and jubata grass (Refer to Section II, Item 32, Invasives)
Northern maritime chaparral	Invasive exotic species introduction/spread	**MC2:** Remove single blue gum in center of stand (Refer to Section II, Item 32, Northern Maritime Chaparral)
Northern maritime chaparral	Slow degradation of stand via competition with trees	**MC3:** Whenever feasible, remove trees growing in maritime chaparral polygon (Refer to Section II, Item 32, Northern Maritime Chaparral)
Wetlands and seeps	Damage to soil hydrology	**WL1:** Clearly mark any seep areas prior to harvest, educate and oversee fellers and equipment operators to avoid soil impacts to the extent possible (Refer to Section II, Item 26 and Item 32, Mitigation Point MP31, Hygric Plants)
Riparian	Lack of recruitment of coarse woody debris	**RI1:** Manage for ongoing recruitment of natural levels of coarse woody debris (Refer to Section II, Item 26)

Table 3: Suggested management measures for mitigation of botanical impacts		
Botanical Resource	**Potential Impact**	**Mitigation Measure**
Shreve oak stands	Slow degradation of groves via competition with taller coniferous trees	**SO1:** Delineate stands for conservation. Control conifer encroachment to achieve eventual elimination of coniferous trees within several 5-acre + blocks. (Refer to Section II, Item 32)
Shreve oak stands	Slow degradation of groves via competition with taller coniferous trees	**SO2:** Do not plant taller statured trees within areas designated to conserve the Shreve oak community (Refer to Section II, Item 32)
Shreve oak stands	Degradation of groves due to damage to oaks, including through hardwood control techniques commonly associated with forestry.	**SO3:** Management measures shall ensure continued health of Shreve oaks within areas designated to conserve the Shreve oak community (Refer to Section II, Item 32)
Upland redwood forest	Loss of understory species	**RF1:** Establish cable and helicopter yarding areas (i.e. less impacted understory areas) to inform future management
Coastal prairie	Invasive exotic species introduction	**CP1:** Limit road seeding to areas with the highest erosion potential (Refer to Section II, Item 18, Erosion Control Specifications and Guidelines for Coastal Prairie Roads)
Coastal prairie	Invasive exotic species introduction	**CP2:** Seed only with non-invasive non-native species (Refer to Section II, Item 18, Erosion Control Specifications and Guidelines for Coastal Prairie Roads)

Table 3: Suggested management measures for mitigation of botanical impacts		
Botanical Resource	**Potential Impact**	**Mitigation Measure**
Coastal prairie	Changed hydrology	**CP3:** Maintain natural hydrological features by careful planning and installation of drainage structures (Refer to Section II, Item 18, Erosion Control Specifications and Guidelines for Coastal Prairie Roads)
Coastal prairie	Loss of native plants	**CP4:** Mow roads and limit NTMP road use in prairie areas to dormant season as much as possible (Refer to Section II, Item 18, Erosion Control Specifications and Guidelines for Coastal Prairie Roads)
Mature tanoak stand	Damage to trees	**TN1:** Clearly mark any trees pre-harvest, educate and oversee fellers and equipment operators to avoid trees. (Refer to Section II, Item 32, Mitigation Point MP32)
Mature tanoak stand	Soil compaction	**TN2:** Avoid stand when soils are moist. (Refer to Section II, Item 32, Mitigation Point MP32)
Monterey pine plantations	Genetic contamination of local species gene pools	**MPP1:** Remove, whenever feasible, non-indigenous stock of Monterey pine (Refer to Section II, Item 32)
All systems	Genetic contamination of local species gene pools	**ALL1:** Introduction of any native plant stock shall be limited to that which has been collected within the local seed zone (Refer to Section II, Item 14g)

Table 3: Suggested management measures for mitigation of botanical impacts		
Botanical Resource	**Potential Impact**	**Mitigation Measure**
All systems	Changes in natural fire regime	**ALL2:** Review potential for prescribed fire and/or mechanical disturbance to maintain fire-dependent communities and species as resources become available. (Future Ranch Task)
All systems	Disease, including spread of sudden oak death	**ALL3:** Assure equipment used in area is carefully sanitized before entering NTMP (Refer to Section II, Item 15)
All systems	Loss of coarse woody debris inputs	**ALL4:** Provide for comparison areas for recruitment of coarse woody debris (Refer to Section II, Item 26, retention guidelines for WLPZ)
Invasive exotic species	Spread of invasive species into adjoining landscape, competition with native species	**INV1:** Continue to remove jubata and eucalyptus, mow roadways and implement an inventory, and control program for invasive species, as resource become available.
Fire	Change in natural fire regime; impacts from uncontrolled fire into fire-suppressed areas.	**FF1:** Fire suppression has changed the natural fire regime. NTMP impacts and mitigations in this context are discussed in Section IV.

Appendix 1: Vascular Plants of the NTMP Area

Family	Scientific name	Common name	Introduced species = *
Aceraceae	*Acer macrophyllum*	big leaf maple	
Anacardiaceae	*Toxicodendron diversilobum*	poison oak	
Apiaceae	*Apiastrum apiifolium*	mock parsley	
Apiaceae	*Conium maculatum*	poison hemlock	*
Apiaceae	*Osmorhiza chilensis*	sweet cicely	
Apiaceae	*Sanicula crassicaulis*	gambel weed	
Apiaceae	*Sanicula hoffmannii*	Hoffman's sannicle	
Apiaceae	*Sanicula pro sp. gianonei*	West's sannicle	
Apiaceae	*Torilis arvensis*	hedge parsley	*
Apocynaceae	*Vinca major*	periwinkle	*
Araliaceae	*Aralia californica*	elk clover	
Asteraceae	*Achillea millefolium*	yarrow	
Asteraceae	*Adenocaulon bicolor*	trail plant	
Asteraceae	*Agoseris grandiflora*	mountain dandelion	
Asteraceae	*Artemisia douglasii*	mugwort	
Asteraceae	*Aster chilense*	common aster	
Asteraceae	*Aster radulinus*	woodland aster	
Asteraceae	*Baccharis pilularis*	coyote brush	
Asteraceae	*Cardamine oligosperma*	popweed	
Asteraceae	*Cirsium brevistylum*	Indian thistle	
Asteraceae	*Cirsium vulgare*	bull thistle	*
Asteraceae	*Erechtites arguta*	fireweed	*
Asteraceae	*Gnaphalium californicum*	California cudweed	
Asteraceae	*Gnaphalium purpureum*	purple cudweed	
Asteraceae	*Gnaphalium ramosissimum*	pink everlasting	
Asteraceae	*Hieracium albiflorum*	hawkweed	
Asteraceae	*Hypochaeris radicata*	rough cat's ears	*
Asteraceae	*Madia gracilis*	cherry syrup tarplant	
Asteraceae	*Madia madioides*	woodland tarplant	
Asteraceae	*Petasites frigidus var. palmatus*	coltsfoot	
Asteraceae	*Soliva sessilis*	Soliva	*
Asteraceae	*Sonchus olereaceus*	sow thistle	*
Asteraceae	*Taraxacum officinale*	dandelion	*
Betulaceae	*Alnus rubra*	red alder	
Betulaceae	*Corylus californica*	hazelnut	
Blechnaceae	*Woodwardia fimbriata*	giant chain fern	
Boraginaceae	*Cryptantha clevelandii*	Cleveland's popcornflower	
Boraginaceae	*Cynoglossum grande*	hound's tongue	
Boraginaceae	*Myosotis latifolia*	forget-me-not	*
Brassicaceae	*Cardamine californica*	milk maids	
Campanulaceae	*Campanula prenanthoides*	California harebell	
Caprifoliaceae	*Lonicera hispidula var. vacillans*	hairy honeysuckle	

Appendix 1: Vascular Plants of the NTMP Area

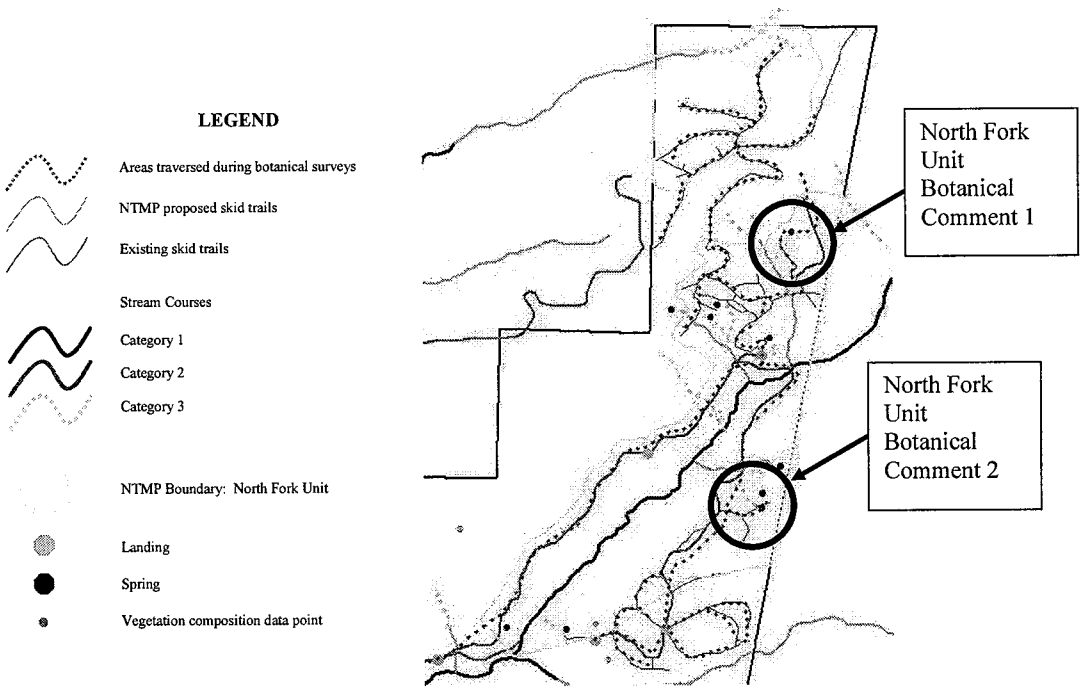
Family	Scientific name	Common name	Introduced species = *
Caprifoliaceae	*Symphoricarpos albus var. laevigatus*	snowberry	
Caryophyllaceae	*Cerastium glomeratum*	mouse-eared chickweed	*
Caryophyllaceae	*Stellaria media*	chickweed	*
Celastraceae	*Euonymus occidentalis var. occidentalis*	western burning bush	
Cistaceae	*Helianthemum scoparium*	rush rose	
Cornaceae	*Cornus sericea*	dogwood	
Cucurbitaceae	*Marah fabaceus*	people root	
Cyperaceae	*Carex bolanderi*	Bolander's sedge	
Cyperaceae	*Carex sp.*	sedge	
Cyperaceae	*Cyperus eragrostis*	nut sedge	
Cyperaceae	*Scirpus microcarpus*	pannicled bulrush	
Dennstaedtiaceae	*Pteridium aquilinum puberulum*	bracken fern	
Dryopteridaceae	*Athyrium filix-femina var. cyclosorum*	lady fern	
Dryopteridaceae	*Dryopteris arguta*	wood fern	
Dryopteridaceae	*Polystichum munitum*	shield fern	
Equisetaceae	*Equisetum telmateia ssp. Braunii*	horsetail	
Ericaceae	*Arbutus menziesii*	madrone	
Ericaceae	*Arctostaphylos crustacea ssp. crinita*	brittle-leaf manzanita	
Ericaceae	*Vaccinium ovatum*	huckleberry	
Fabaceae	*Lathyrus vestitus*	wild pea	
Fabaceae	*Lithocarpus densiflora*	tanbark oak	
Fabaceae	*Lotus micranthus*	small flowered lotus	
Fabaceae	*Lotus scoparius*	deer weed	
Fabaceae	*Quercus parvula shrevei*	Shreve oak	
Fabaceae	*Rupertia physodes*	Indian tea	
Fabaceae	*Trifolium angustifolium*	narrow leaved clover	*
Fabaceae	*Trifolium bifidum*	bifid clover	
Fabaceae	*Trifolium subterraneum*	sub clover	*
Fabaceae	*Vicia gigantea*	giant vetch	
Fagaceae	*Quercus agrifolia*	coast live oak	
Geraniaceae	*Geranium molle*	cranes bill	*
Grossulariaceae	*Ribes menziesii*	Menzies' gooseberry	
Hippocastanaceae	*Aesculus californica*	buckeye	
Hydrophyllaceae	*Eriodictyon californicum*	yerba santa	
Hydrophyllaceae	*Nemophila parviflora*	small flowered baby blue eyes	
Iridaceae	*Iris douglasii*	Douglas' iris	
Juncaceae	*Juncus effusus*	western rush	
Juncaceae	*Juncus patens*	common rush	
Juncaceae	*Luzula multiflora*	wood rush	
Lamiaceae	*Satureja douglasii*	yerba buena	
Lamiaceae	*Scutellaria tuberosa*	skullcap	
Lamiaceae	*Stachys bullata*	hedge nettle	
Lauraceae	*Umbellularia californica*	California bay	

Appendix 1: Vascular Plants of the NTMP Area

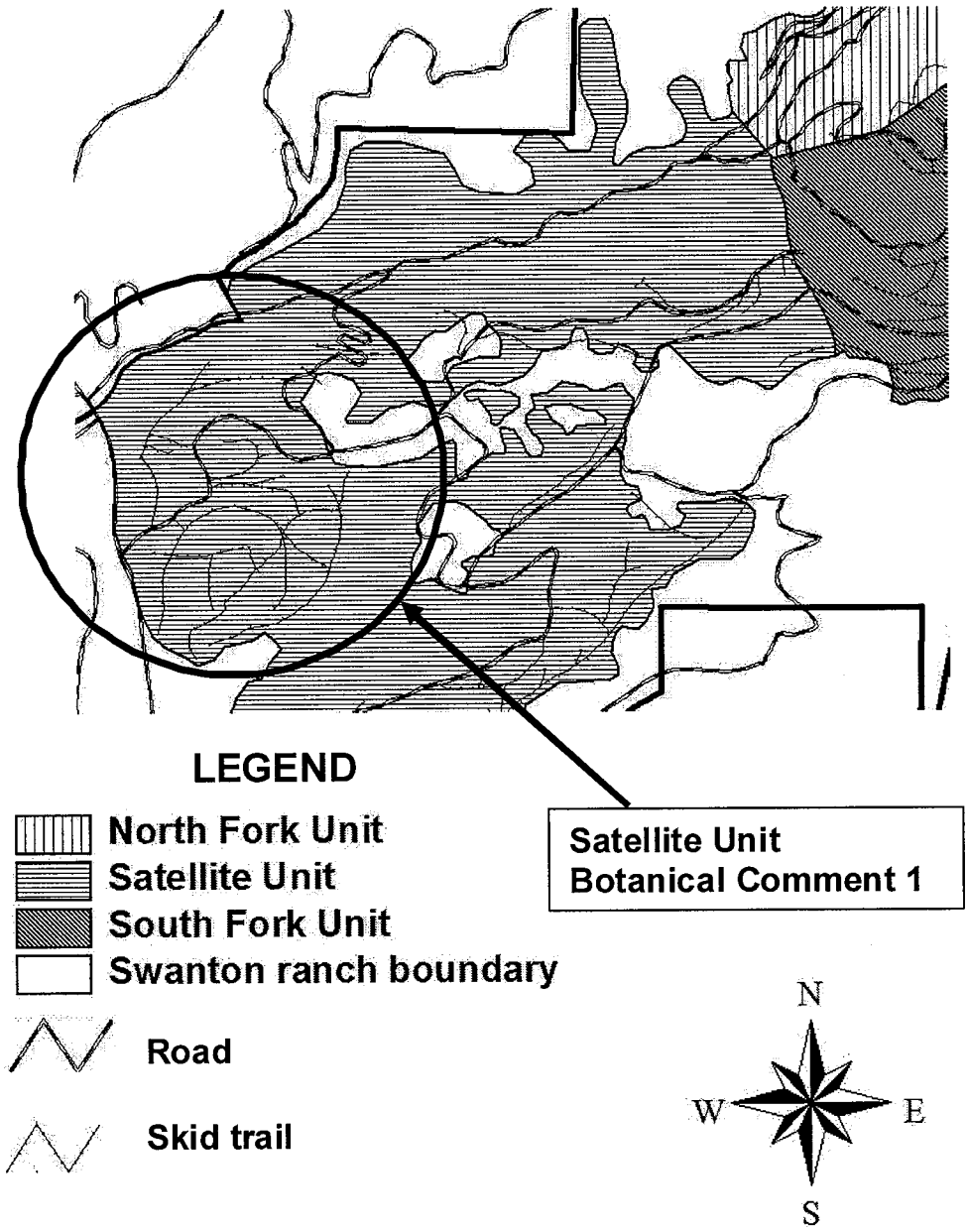
Family	Scientific name	Common name	Introduced species = *
Lemnaceae	*Lemna sp.*	duckweed	
Liliaceae	*Chlorogalum pomeridianum pomeridianum*	soap root	
Liliaceae	*Dichelostemma congesta*	blue dichs	
Liliaceae	*Disporum hookeri*	fairy bells	
Liliaceae	*Fritillaria affinis var. affinis*	checker lily	
Liliaceae	*Scoliopus bigelovii*	slink pod	
Liliaceae	*Smilacina racemosa*	fat false Solomon's seal	
Liliaceae	*Smilacina stellata*	slim false Solomon's seal	
Liliaceae	*Trillium chloropetalum*	wake robin	
Liliaceae	*Trillium ovatum*	trillium	
Liliaceae	*Zigadenus fremontii major*	Fremont star lily	
Myricaceae	*Myrica californica*	wax myrtle	
Onagraceae	*Epilobium ciliatum*	willow herb	
Oxalidaceae	*Oxalis oregana*	redwood sorrel	
Oxalidaceae	*Oxalis pes caprae*	Bermuda buttercup	*
Pinaceae	*Pinus radiata*	Monterey pine	
Pinaceae	*Pseudotsuga menziesii*	Douglas fir	
Plantaginaceae	*Plantago lanceolata*	plantain	
Poaceae	*Agrostis pallens*	leafy bent grass	
Poaceae	*Bromus carinatus*	California brome grass	
Poaceae	*Bromus vulgaris*	common brome	
Poaceae	*Calamagrostis rubescens*	red reed grass	
Poaceae	*Cortedaria jubata*	jubata grass	*
Poaceae	*Cynosurus echinatus*	dogtail	*
Poaceae	*Danthonia californicus*	California oatgrass	
Poaceae	*Deschampsia elongata*	elongate hairgrass	
Poaceae	*Elymus glaucus*	blue wild rye	
Poaceae	*Festuca elmeri*	Elmer's fescue	
Poaceae	*Festuca occidentalis*	western fescue	
Poaceae	*Festuca subuliflora*	crinkle awn fescue	
Poaceae	*Hierochloë occidentale*	vanilla grass	
Poaceae	*Lolium perenne*	perennial ryegrass	*
Poaceae	*Melica subulata*	melic grass	
Poaceae	*Melica torreyana*	Torrey's melic	
Poaceae	*Nassella pulchra*	purple needlegrass	
Poaceae	*Panicum aff. Agrostioides*	panic grass	*
Polemoniaceae	*Collomia heterophylla*	Collomia	
Polemoniaceae	*Navarretia sp*	skunkweed	
Polygonaceae	*Rumex acetosella*	sheep sorrel	*
Polygonaceae	*Rumex conglomeratus*	dock	*
Polygonaceae	*Rumex crispus*	curly dock	*
Polypodiaceae	*Polypodium calirhiza*	licorice fern	
Portulacaceae	*Claytonia perfoliata*	miner's lettuce	

Appendix 1: Vascular Plants of the NTMP Area			
Family	**Scientific name**	**Common name**	**Introduced species = ***
Portulacaceae	*Claytonia sibirica*	candy flower	
Primulaceae	*Anagallis arvensis*	scarlet pimpernel	*
Primulaceae	*Trientalis latifolia*	starflower	
Pteridaceae	*Adiantum jordanii*	Jordan's fern	
Pteridaceae	*Pellaea andromedifolia*	coffee fern	
Pteridaceae	*Pentagramma triangularis*	gold backed fern	
Ranunculaceae	*Actaea rubra*	baneberry	
Ranunculaceae	*Anemone oregana*	woodland anemone	
Ranunculaceae	*Clematis lasiantha*	virgin's bower	
Ranunculaceae	*Dicentra formosa*	Dutch man's britches	
Ranunculaceae	*Ranunculus californicus*	buttercup	
Ranunculaceae	*Ranunculus hebecarpus*	pubescent-fruited buttercup	
Rhamnaceae	*Ceanothus thyrsiflorus*	blue blossom	
Rhamnaceae	*Rhamnus tomentella ssp. tomentella*	hairy-leaved coffeeberry	
Rosaceae	*Adenostoma fasciculatum*	chamise	
Rosaceae	*Fragaria californica*	woodland strawberry	
Rosaceae	*Heteromeles arbutifolia*	toyon	
Rosaceae	*Holodiscus discolor*	ocean spray	
Rosaceae	*Oemleria cerasiformis*	bearberry	
Rosaceae	*Rosa gymnocarpa*	woodland rose	
Rosaceae	*Rubus leucodermis*	black-cap raspberry	
Rosaceae	*Rubus parviflorum*	thimbleberry	
Rosaceae	*Rubus ursinus*	blackberry	
Rosaceae	*Sambucus racemosa*	elderberry	
Rubiaceae	*Galium aparine*	goose grass	
Rubiaceae	*Galium californicum*	California bedstraw	
Rubiaceae	*Galium porrigens*	climbing bedstraw	
Rubiaceae	*Galium triflorum*	three leaved bedstraw	
Salicaceae	*Salix sp.*	willow	
Saxifragaceae	*Heuchera micrantha*	cream cups	
Saxifragaceae	*Lithophragma sp.*	woodland star	
Scrophulariaceae	*Mimulus aurantiacus*	sticky monkeyflower	
Scrophulariaceae	*Mimulus moschatus*	musk monkeyflower	
Scrophulariaceae	*Scrophularia californica ssp. californica*	bee plant	
Solanaceae	*Solanum douglasii*	Douglas' nightshade	
Solanaceae	*Solanum umbelliferum*	witch's hat	
Taxaceae	*Torreya californica*	California nutmeg	
Taxodiaceae	*Sequoia sempervirens*	redwood	
Urticaceae	*Hesperocnide tenella*	dwarf nettle	
Urticaceae	*Urtica californica*	California nettle	
Verbenaceae	*Verbena lasiostachys var. lasiostachys*	California verbena	
Violaceae	*Viola sempervirens*	redwood violet	

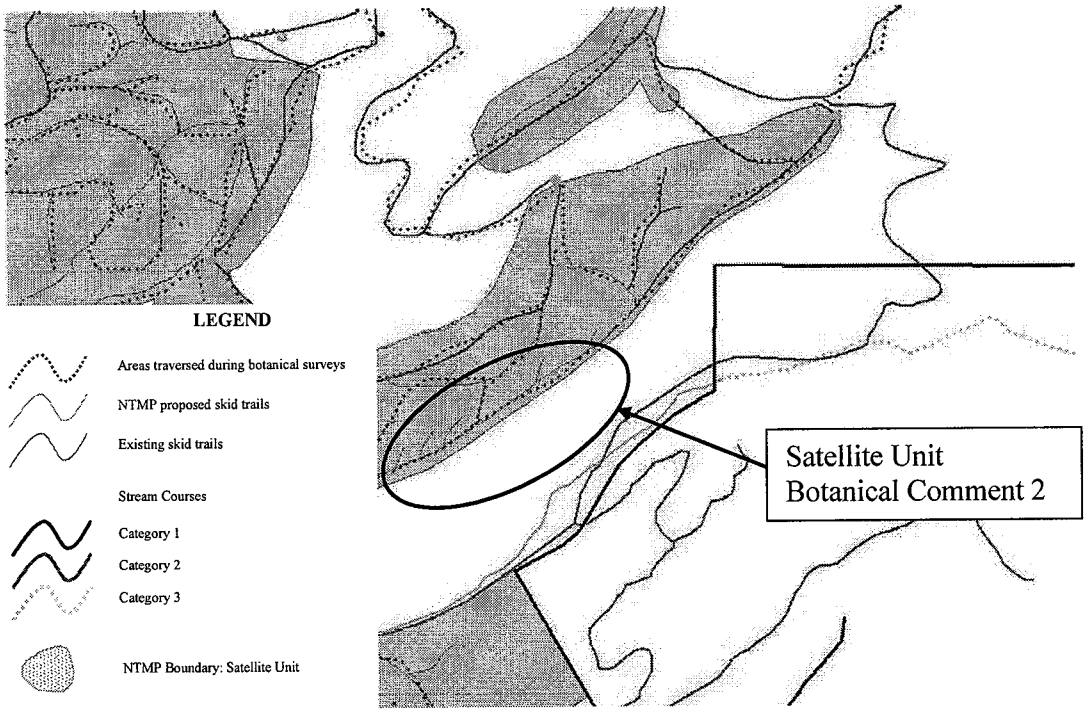
Appendix 2: Areas of botanical concern



Appendix 2: Areas of botanical concern



Appendix 2: Areas of botanical concern



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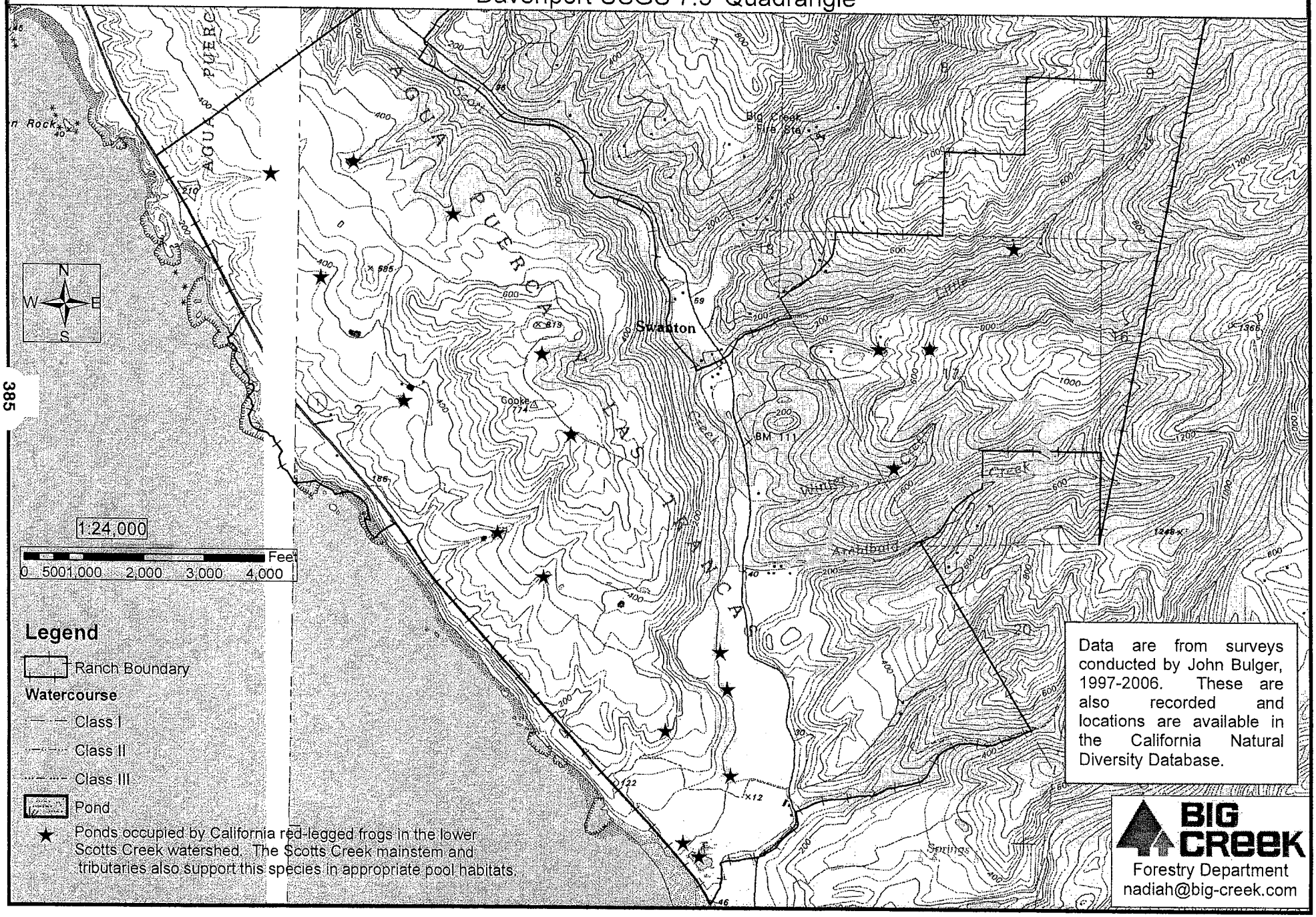
Swanton Pacific Ranch NTMP - California Red-Legged Frog Distribution

T10S R3W, Portions of Sections 8,9,16,17,20 and Rancho Agua Puerca y Las Trancas, MDBM

Davenport USGS 7.5' Quadrangle



Data are from surveys conducted by John Bulger, 1997-2006. These are also recorded and locations are available in the California Natural Diversity Database.

BIG CREEK
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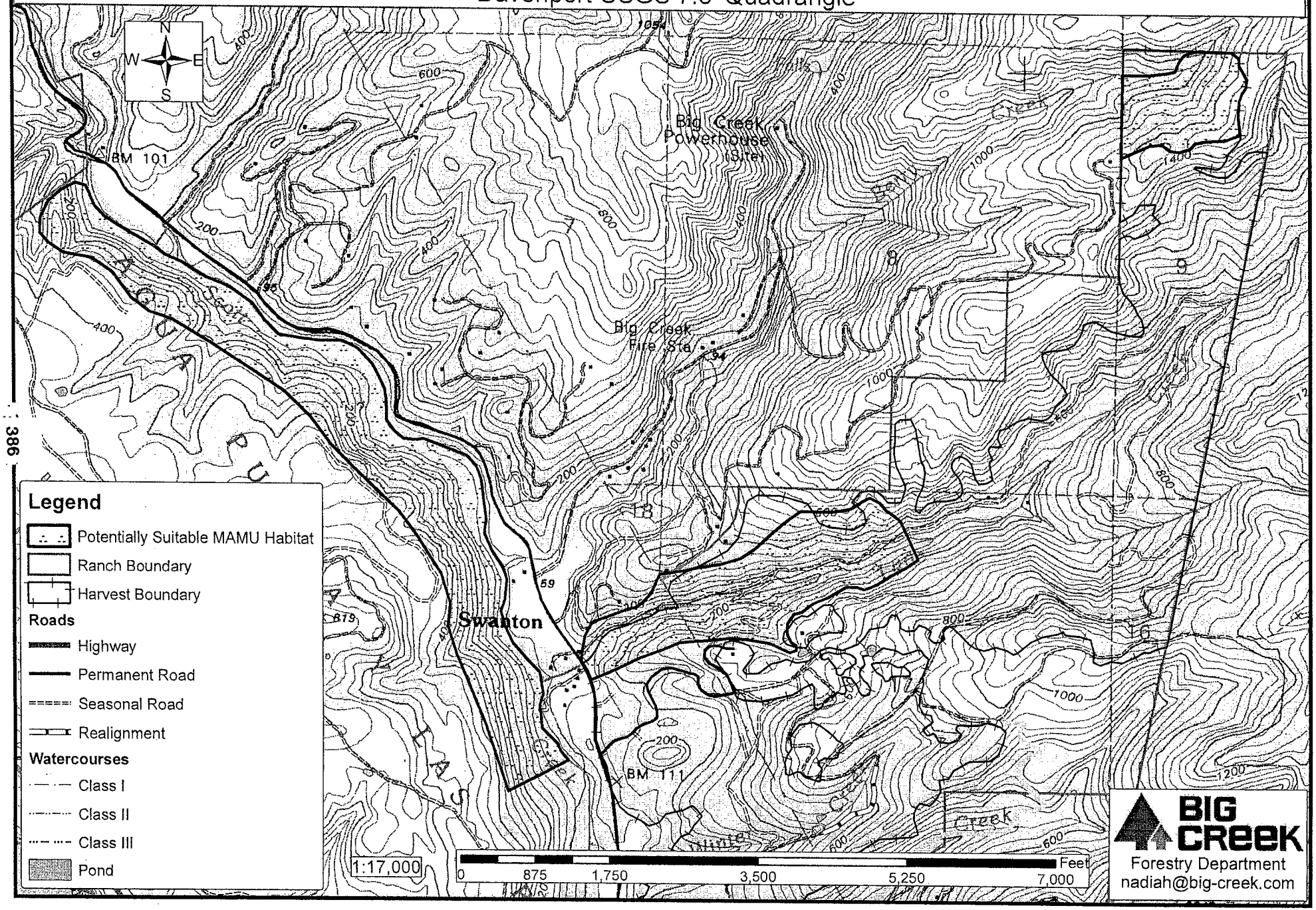
Swanton Pacific Ranch NTMP - Potentially Suitable Marbled Murrelet Habitat

T10S R3W, Portions of Sections 8,9,16,17,20 and Rancho Agua Puerca y Las Trancas, MDBM

Davenport USGS 7.5' Quadrangle



Legend

- Potentially Suitable MAMU Habitat
- Ranch Boundary
- Harvest Boundary

Roads

- Highway
- Permanent Road
- Seasonal Road
- Realignment

Watercourses

- Class I
- Class II
- Class III
- Pond

BIG CREEK
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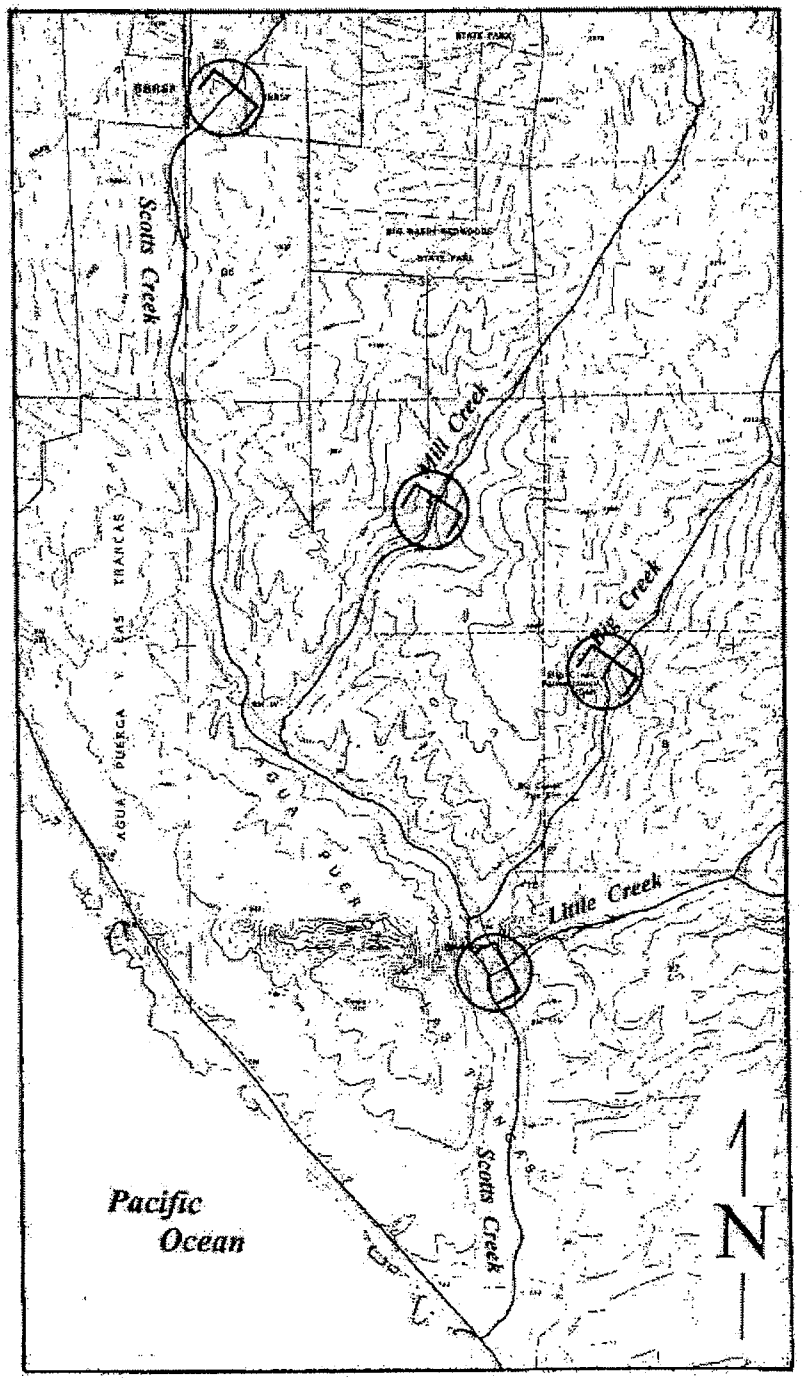
NATURAL BARRIERS TO ANADROMOUS FISH



Map 1. Natural barriers to upstream migration of coho salmon and steelhead in Scotts Creek and its principal tributaries, Little Creek, Big Creek, and Mill Creek. The barrier shown on Little Creek is for coho salmon only.
Scale: 1 inch = 0.75 mile

Source: Snider, B., K.A.F. Urquhart, and D. Marston. 1995. The relationship between instream flow and coho salmon and steelhead habitat availability in Scott Creek, Santa Cruz County, California. Unpublished report. CDFG Environmental Services Division, Stream Flow and Habitat Evaluation Program. 48 pp.

State of California – The Resources Agency ARNOLD SCHWARZENEGGER, Governor
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March 29, 2007

Ms. Nadia Hamey
Registered Professional Forester
Big Creek Lumber Company.
3564 Highway 1
Davenport, CA 95017

Dear Ms. Hamey:

Subject: Marbled Murrelet Pre-Consultation for the Cal Poly Swanton Pacific Ranch Non-Industrial Timber Management Plan, Scott Creek and Little Creek Watersheds, Santa Cruz County

This letter responds to your request for a marbled murrelet (*Brachyramphus marmoratus*) pre-consultation for the above-referenced Non-Industrial Timber Management Plan (NTMP). The Department of Fish and Game (DFG) has reviewed marbled murrelet consultation information submitted by you dated February 26, 2007. DFG has also reviewed murrelet survey reports by Wildlife Consultant John Bulger dated August 28, 2001 and August 2003. At issue is the validity of 2000 to 2003 marbled murrelet surveys conducted in a portion of the NTMP area for a proposed harvest entry in 2008. The marbled murrelet is listed as State endangered pursuant to Fish and Game Code 2050 *et seq.*, Federally threatened pursuant to Title 16, United States Code 1531 *et seq.*, and is a sensitive species as defined by Title 14, California Code of Regulations (14 CCR) Section 895.1. Marbled murrelet consultations for THPs are required pursuant to 14 CCR § 919.11 where there is evidence of an active marbled murrelet nest site in or adjacent to the project site, or where the project has the potential to impact the marbled murrelet.

The proposed NTMP area (i.e., North Fork Harvest Area) and three patches of potential marbled murrelet habitat are located along Scott Creek, and Little Creek and Berry Creek, tributaries to Scott Creek, Santa Cruz County (T10S, R3W, Sections 8, 9, 16, 17, 20 and Rancho Agua Puerca y Las Trancas; MDB&M; Davenport 7.5' USGS quad map) (see attachment).

DFG representative Stacy Martinelli accompanied Mr. Bulger on a site inspection of the Lower Scott Creek Stand on February 26, 2001, and on a site inspection of the Little Creek Stand and General Smith Stand on June 12, 2002. Based on forest stand and conifer tree characteristics observed during the inspections, DFG determined that these forest patches are potential marbled murrelet habitat areas.

Mr. Bulger conducted protocol-level surveys for marbled murrelets in the Lower Scott Creek Stand in 2000 and 2001 and in the Little Creek Stand and General Smith Stand in 2002 and 2003. No marbled murrelets were detected in the Lower Scott Creek Stand. Two auditory detections of marbled murrelets were recorded from the General Smith Stand in 2002;

however, no detections of murrelets were made in 2003. No marbled murrelets were detected in the Little Creek Stand.

In the pre-consultation request, a proposed harvest entry in the NTMP's North Fork Harvest Area is planned in 2008, approximately five years after the last marbled murrelet surveys were performed in the area. DFG is not aware of any new information regarding marbled murrelets (e.g., presence, occupancy, potential habitat) in the vicinity of the North Fork Harvest Area. As such, the planned timber harvest in the North Fork Harvest Area scheduled for 2008 will not require additional marbled murrelet surveys. However, after 2008, marbled murrelet surveys will likely be necessary prior to future entries in the NTMP area if timber harvesting activities will occur within 0.25-mile of the three potential habitat areas during the murrelet breeding season. Please contact DFG for additional consultation on marbled murrelet at that time.

The pre-consultation request (see enclosure) includes measures to protect marbled murrelets and their potential habitat. The proposed seasonal operation buffers (i.e., harassment avoidance buffers) appear consistent with the noise harassment guidelines developed by the U. S. Fish and Wildlife Service[1] for marbled murrelet. DFG concurs with the proposed protection measures. In addition to these, DFG recommends that the mitigation measures specify that no-vegetation modification will occur within the potential marbled murrelet habitat areas. Also, DFG recommends that the NTMP specify that the planned timber harvesting operational buffer surrounding the potential habitat areas will be in effect only during the marbled murrelet breeding season, which is March 24 to September 15. Any new information regarding marbled murrelet occurrence near the planned harvest area, modification to the proposed mitigation measures or changes to the location and boundary lines of the planned harvest area will require further consultation with DFG. Finally, DFG recommends that the marbled murrelet mitigation measures outlined above and in the attachment be included in Section II of the NTMP prior to its submittal.

If you have questions or comments, please contact Stacy Martinelli, Environmental Scientist, at (707) 544-1799; or Rick Macedo, Senior Environmental Scientist, at (707) 928-4369.

Sincerely,

Cindy Catalano

Charles Armor
Acting Regional Manager
Bay Delta Region

Enclosure

[1] Long, Michael. Transmittal of Guidance: Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California. Memo from the U. S. Fish and Wildlife Service. July 31, 2006.

BIG CREEK
"Growing Redwoods for the Future"

February 26, 2007

California Department of Fish and Game
Attn: Stacy Martinelli
PO Box 2825
Santa Rosa, CA 95405

Re: Swanton Pacific Ranch NTMP Marbled Murrelet Consultation

Dear Stacy,

I am in the process of preparing an NTMP for Cal Poly Swanton Pacific Ranch, with an entry planned in the North Fork of Little Creek in 2008. The haul road for the North Fork harvest area crosses the Little Creek stand of potentially suitable marbled murrelet habitat, which was last surveyed in 2003. The surveys were conducted by wildlife biologist John Bulger and no detections were recorded as a result of those surveys. I am asking for the 2003 surveys to remain valid for 5 years, through 2008, to allow the next harvest to proceed without the need to resurvey. If you deem that the recent surveys will suffice, I would like to include a letter as an appendix to the NTMP to that effect.

I have attached a map showing the NTMP area proposed for harvest in 2008 and the stands of potentially suitable nesting habitat where surveys were conducted. Potentially suitable nesting habitat for murrelets is present at three locations within the NTMP Area (General Smith, Little Creek, and Lower Scotts Creek stands). All three potentially suitable habitat areas have been harvested at least once previously, and murrelet habitat elements are present within these stands as widely scattered individual trees. All three potentially suitable murrelet habitat areas were recently (2000-2003) surveyed in accordance with protocol standards developed by the Pacific Seabird Group and California Department of Fish and Game and found not to be occupied. Protocol-level murrelet surveys have also been conducted on adjacent forest lands owned by Big Creek Lumber Company. This includes nearly all of the Scotts Creek drainage upstream from the NTMP area for a distance of 2.5 miles, as well as the lower portions of the Big Creek drainage. Based on the results of these field studies, the nearest timber stand known to be occupied by murrelets is located approximately one mile north of the northern boundary of the NTMP area in T9S, R4W, Section 36. Murrelets have been observed flying over the Big Creek drainage, but there have been no observations indicative of site occupancy.

The following mitigations are proposed in the NTMP for future entries to avoid take of marbled murrelets: All potentially suitable marbled murrelet nesting habitat within the NTMP area shall be surveyed in accordance with the most recent protocols issued by PSG and CDFG. The results shall be submitted to CDFG prior to commencing harvest operations in or immediately adjacent to the three stands identified as potentially suitable nesting habitat. The surveys shall be completed within three years of the onset of operations or, with CDFG consultation, surveys may remain valid for up to five years. The survey requirement shall apply to all harvest entries for the lifetime of the NTMP. In the absence of such surveys, the three potentially suitable habitat areas shall be protected by means of 300 ft. no-cut buffer zones and 0.25 mile operational restriction buffers during the murrelet nesting season.

If you have any questions or need more info, please don't hesitate to contact me. Thank you for your consultation on this matter.

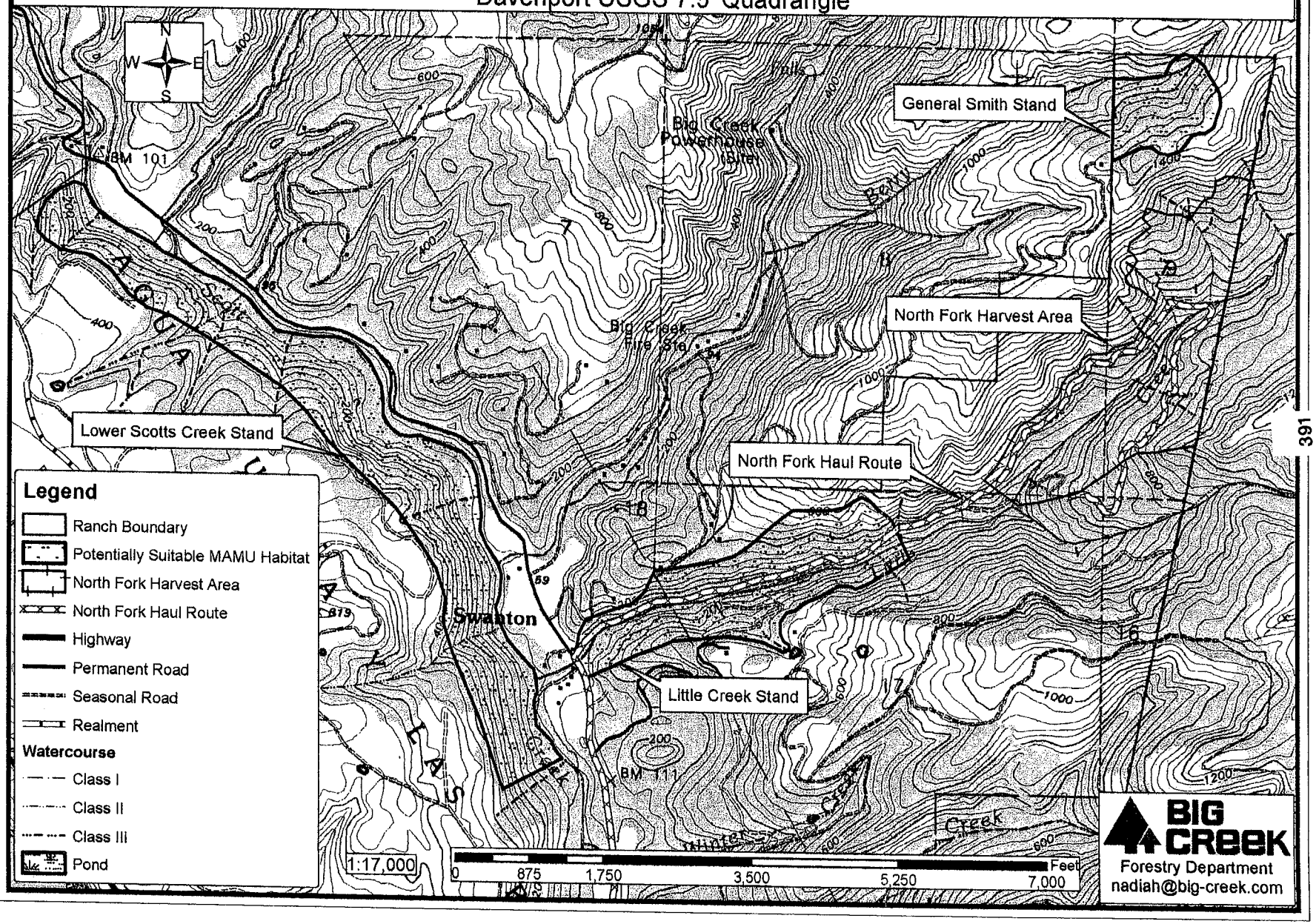
Sincerely,

Nadia Hamey
Registered Professional Forester #2788

Swanton Pacific Ranch NTMP - Potentially Suitable Marbled Murrelet Habitat

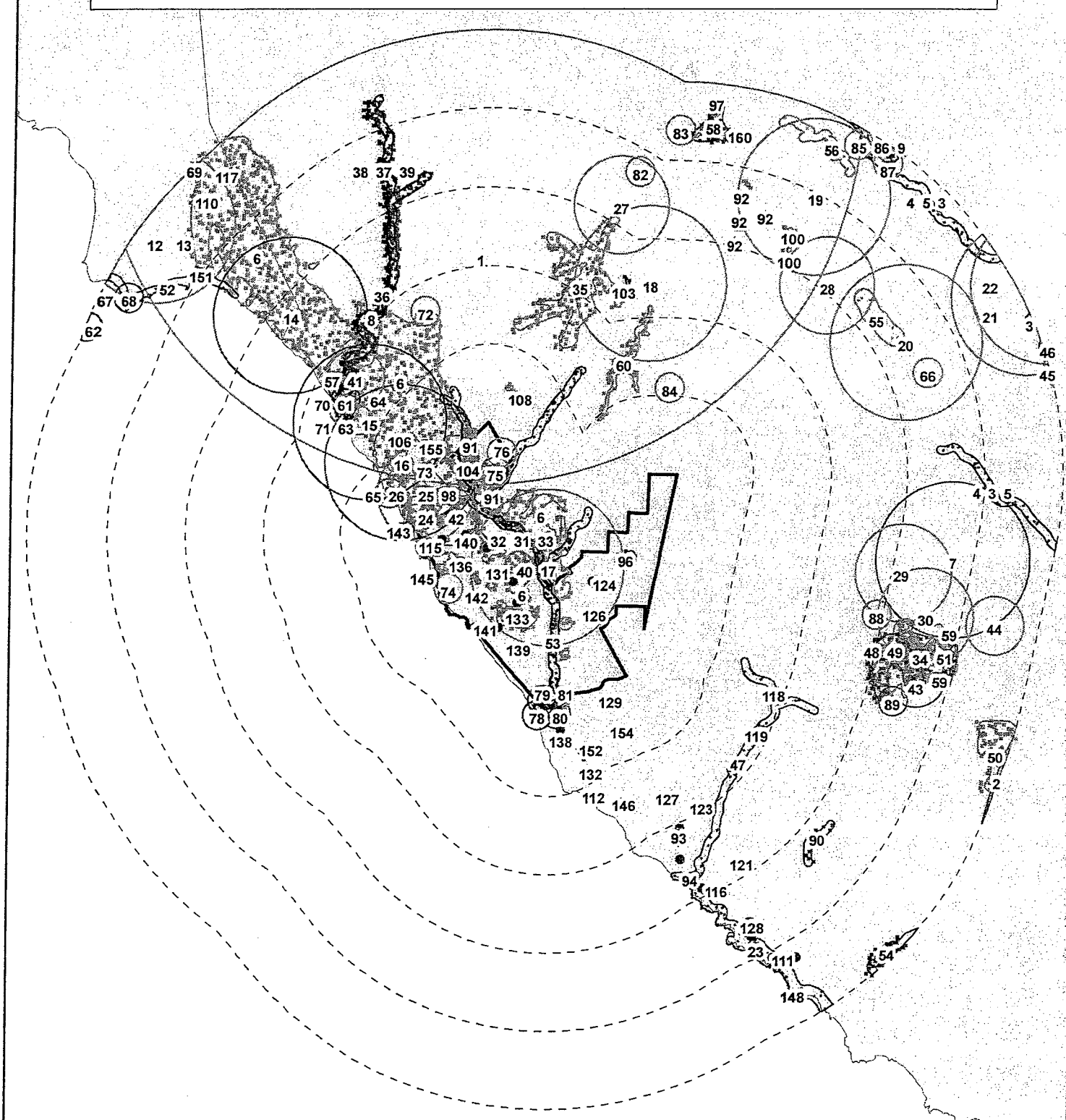
T10S R3W, Portions of Sections 8,9,16,17,20 and Rancho Agua Puerca y Las Trancas, MDBM

Davenport USGS 7.5' Quadrangle



391

SWANTON PACIFIC RANCH NTMP
CNDDB OCCURANCES WITHIN 5 MILES



Legend

1 Mile Buffer

Ranch Boundary

Refer to the following page for species names relating to each occurence number.

0 1 2 4 6 8 Miles

N W E S

BIG CREEK

Forestry Department
nadiah@big-creek.com

Swanton Pacific Ranch NTMP
CNDDB Occurrences Within 5 Miles of the Project Area

Occurance #	Scientific Name
1	Anomobryum julaceum
2	Trimerotropis infantilis
3	Oncorhynchus mykiss irideus
4	Oncorhynchus kisutch
5	North Central Coast Drainage Sacramento Sucker/Roach River
6	Pinus radiata
7	Dipodomys venustus venustus
8	Rana aurora draytonii
9	Cupressus abramsiana
10	Northern Interior Cypress Forest
11	Erysimum teretifolium
12	Erysimum ammophilu m
13	Cirsium andrewsii
14	Monterey Pine Forest
15	Danaus plexippus
16	Monterey Pine Forest
17	Trifolium buckwestiorum
18	Stebbinsoseris decipiens
19	Penstemon rattanii var. kleei
20	Cupressus abramsiana
21	Chorizanthe pungens var. hartwegiana
22	Pentachaeta bellidiflora
23	Cypseloides niger
24	Microseris paludosa
25	Trifolium buckwestiorum
26	Agrostis blasdalei
27	Penstemon rattanii var. kleei
28	Arctostaphylos pajaroensis
29	Erysimum teretifolium
30	Arctostaphylos pajaroensis
31	Oncorhynchus kisutch
32	North Central Coast Short-Run Coho Stream
33	Oncorhynchus mykiss irideus
34	Arctostaphylos silvicola
35	Arctostaphylos glutinosa
36	Oncorhynchus mykiss irideus
37	Oncorhynchus kisutch
38	Emys (=Clemmys) marmorata
39	North Central Coast Short-Run Coho Stream
40	Rana aurora draytonii

Occurance #	Scientific Name
41	Collinsia multicolor
42	Plagiobothrys chorisianus var. chorisianus
43	Northern Maritime Chaparral
44	Penstemon rattanii var. kleei
45	Chorizanthe pungens var. hartwegiana
46	Arctostaphylos andersonii
47	Oncorhynch us mykiss irideus
48	Cupressus abramsiana
49	Northern Interior Cypress Forest
50	Cupressus abramsiana
51	Maritime Coast Range Ponderosa Pine Forest
52	Charadrius alexandrinus nivosus
53	Eucyclogobius newberryi
54	Oncorhynchus mykiss irideus
55	Arctostaphylos andersonii
56	Arctostaphylos andersonii
57	Eucyclogobius newberryi
58	Northern Interior Cypress Forest
59	Chorizanthe pungens var. hartwegiana
60	Arctostaphylos glutinosa
61	Laterallus jamaicensis coturniculus
62	Eumetopias jubatus
63	Silene verecunda ssp. verecunda
64	Stebbinsoseris decipiens
65	Mielichhoferia elongata
66	Arctostaphy los andersonii
67	Cypseloides niger
68	Riparia riparia
69	Danaus plexippus
70	Charadrius alexandrinus nivosus
71	Rosa pinetorum
72	Arctostaphylos glutinosa
73	Horkelia cuneata ssp. sericea
74	Agrostis blasdalei
75	Trifolium buckwestior um
76	Arctostaphylos glutinosa
77	Coastal Brackish Marsh
78	Charadrius alexandrinu s nivosus
79	Northern Coastal Salt Marsh
80	Agelaius tricolor
81	Geothlypistrichas sinuosa
82	Arctostaphylos glutinosa
83	Pentachaeta bellidiflora

Occurance #	Scientific Name
84	Arctostaphylos glutinosa
85	Chorizanthe pungens var. hartwegiana
86	Hesperevax sparsiflora var. brevifolia
87	Chorizanthe pungens var. hartwegiana
88	Arctostaphyos andersonii
89	Maritime Coast Range Ponderosa Pine Forest
90	Rana aurora draytonii
91	Stebbinsoseris decipiens
92	Arctostaphylos andersonii
93	Rana aurora draytonii
94	Rana aurora draytonii
95	Oncorhynchus kisutch
96	Rana aurora draytonii
97	Cupressus abramsiana
98	Plagiobothrys diffusus
99	Cicindelahirticollis gravida
100	Arctostaphylos andersonii
101	Collinsia multicolor
102	Stebbinsoseris decipiens
103	Rana aurora draytonii
104	Amsinckia lunaris
105	Stebbinsoseris decipiens
106	Sileneverecunda ssp. verecunda
107	Collinsia multicolor
108	Stebbinsoseris decipiens
109	Amsinckia lunaris
110	Rana aurora draytonii
111	Rana aurora draytonii
112	Rana aurora draytonii
113	Stebbinsoseris decipiens
114	Stebbinsoseris decipiens
115	Stebbinsoseris decipiens
116	Rana aurora draytonii
117	Rana aurora draytonii
118	Rana aurora draytonii
119	Rana aurora draytonii
120	Rana aurora draytonii
121	Rana aurora draytonii
122	Rana aurora draytonii
123	Rana aurora draytonii
124	Rana aurora draytonii
125	Rana aurora draytonii
126	Rana aurora draytonii

Occurance #	Scientific Name
127	Rana aurora draytonii
128	Rana aurora draytonii
129	Rana aurora draytonii
130	Rana aurora draytonii
131	Rana aurora draytonii
132	Rana aurora draytonii
133	Rana aurora draytonii
134	Amsinckia lunaris
135	Collinsia multicolor
136	Rana aurora draytonii
137	Rana aurora draytonii
138	Rana aurora draytonii
139	Rana aurora draytonii
140	Rana aurora draytonii
141	Rana aurora draytonii
142	Rana aurora draytonii
143	Cypseloides niger
144	Cypseloides niger
145	Cypseloides niger
146	Danaus plexippus
147	Danaus plexippus
148	Cypseloides niger
149	Erysimum teretifolium
150	Silene verecunda ssp. verecunda
151	Rana aurora draytonii
152	Rana aurora draytonii
153	Collinsia multicolor
154	Rana aurora draytonii
155	Rana aurora draytonii
156	Agelaius tricolor
157	Collinsia multicolor
158	Cupressus abramsiana
159	Plagiobothr ys chorisianus var. chorisianus
160	Cupressus abramsiana
161	Silene verecunda ssp. verecunda

CNPS Inventory of Rare and Endangered Plants

Status: Plant Press Manager window with 50 items - Wed, Apr. 25, 2007 07:31 c

Reformat list as: Standard List - with Plant Press controls

ECOLOGICAL REPORT

scientific	family	life form	blooming	communities	elevation	CNPS
Agrostis blasdalei	Poaceae	perennial rhizomatous herb	May-Jul	•Coastal bluff scrub (CBScr) •Coastal dunes (CoDns) •Coastal prairie (CoPrr)	5 - 150 meters	List 1B.2
Amsinckia lunaris	Boraginaceae	annual herb	Mar-Jun	•Coastal bluff scrub (CBScr) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)	3 - 500 meters	List 1B.2
Anomobryum julaceum	Bryaceae	moss	•Broadleafed upland forest (BUFrs) •Lower montane coniferous forest (LCFrs) •North Coast coniferous forest (NCFrs)/damp rock and soil on outcrops, usually on roadcuts	100 - 1000 meters	List 2.2	
Arctostaphylos andersonii	Ericaceae	perennial evergreen shrub	Nov-Apr	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •North Coast coniferous forest (NCFrs)/openings, edges	60 - 730 meters	List 1B.2
Arctostaphylos glutinosa	Ericaceae	perennial evergreen shrub	(Nov-Apr) Months in parentheses are uncommon.	•Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl)/diatomaceous shale	170 - 685 meters	List 1B.2
Arctostaphylos pajaroensis	Ericaceae	perennial evergreen shrub	Dec-Mar	•Chaparral (Chprl)(sandy)	30 - 760 meters	List 1B.1

Arctostaphylos regismontana	Ericaceae	perennial evergreen shrub	Jan-Apr	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •North Coast coniferous forest (NCFrs)/granitic or sandstone	305 - 730 meters	List 1B.2
Arctostaphylos silvicola	Ericaceae	perennial evergreen shrub	Feb-Mar	•Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl) •Lower montane coniferous forest (LCFrs)/inland marine sands	120 - 600 meters	List 1B.2
Arenaria paludicola	Caryophyllaceae	perennial stoloniferous herb	May-Aug	•Bogs and fens (BgFns) •Marshes and swamps (MshSw) (freshwater)/sandy, openings	3 - 170 meters	List 1B.1
Astragalus pycnostachyus var. pycnostachyus	Fabaceae	perennial herb	Apr-Oct	•Coastal dunes (CoDns) (mesic) •Coastal scrub (CoScr) •Marshes and swamps (MshSw)(coastal salt, streamsides)	0 - 30 meters	List 1B.2
Calyptridium parryi var. hesseae	Portulacaceae	annual herb	May-Jul	•Chaparral (Chprl) •Cismontane woodland (CmWld)	305 - 1115 meters	List 3
Campanula californica	Campanulaceae	perennial rhizomatous herb	Jun-Oct	•Bogs and fens (BgFns) •Closed-cone coniferous forest (CCFrs) •Coastal prairie (CoPrr) •Meadows and seeps (Medws) •Marshes and swamps (MshSw)(freshwater) •North Coast coniferous forest (NCFrs)/mesic	1 - 405 meters	List 1B.2
Carex comosa	Cyperaceae	perennial rhizomatous herb	May-Sep	•Coastal prairie (CoPrr) •Marshes and swamps (MshSw)(lake margins) •Valley and foothill grassland (VFGrs)	0 - 625 meters	List 2.1
				•Coastal prairie (CoPrr)		

<u>Carex</u> <u>saliniformis</u>	Cyperaceae	perennial rhizomatous herb	Jun(Jul) Months in parentheses are uncommon.	•Coastal scrub (CoScr) •Meadows and seeps (Medws) •Marshes and swamps (MshSw)(coastal salt)/mesic	3 - 230 meters	List 1B.2
<u>Chorizanthe</u> <u>pungens</u> var. <u>hartwegiana</u>	Polygonaceae	annual herb	Apr-Jul	•Lower montane coniferous forest (LCFrs)(maritime ponderosa pine sandhills)	90 - 610 meters	List 1B.1
<u>Chorizanthe</u> <u>robusta</u> var. <u>hartwegii</u>	Polygonaceae	annual herb	Apr-Jul	•Meadows and seeps (Medws)(sandy) •Valley and foothill grassland (VFGrs) (mudstone and Purisima outcrops)	230 - 245 meters	List 1B.1
<u>Chorizanthe</u> <u>robusta</u> var. <u>robusta</u>	Polygonaceae	annual herb	Apr-Sep	•Chaparral (Chprl) (maritime) •Cismontane woodland (CmWld)(openings) •Coastal dunes (CoDns) •Coastal scrub (CoScr)/sandy or gravelly	3 - 300 meters	List 1B.1
<u>Cirsium</u> <u>andrewsii</u>	Asteraceae	perennial herb	Mar-Jul	•Broadleafed upland forest (BUFrs) •Coastal bluff scrub (CBScr) •Coastal prairie (CoPrr) •Coastal scrub (CoScr)/mesic, sometimes serpentinite	0 - 150 meters	List 1B.2
<u>Collinsia</u> <u>multicolor</u>	Scrophulariaceae	annual herb	Mar-May	•Closed-cone coniferous forest (CCFrs) •Coastal scrub (CoScr)/sometimes serpentinite	30 - 250 meters	List 1B.2
<u>Corethrogyne</u> <u>leucophylla</u>	Asteraceae	perennial herb	May-Dec	•Closed-cone coniferous forest (CCFrs) •Coastal dunes (CoDns)	3 - 60 meters	List 3.2
<u>Cupressus</u> <u>abramsiana</u>	Cupressaceae	perennial evergreen tree	•Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl) •Lower montane coniferous	280 - 800 meters	List 1B.2	

			forest (LCFrs)/sandstone or granitic		
Dacryophyllum falcifolium	Hypnaceae		•North Coast coniferous forest (NCFrs)/carbonate	50 - 275 meters	List 1B.3
Didymodon norrisii	Pottiaceae	moss	•Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs)/intermittently mesic, rock	600 - 1700 meters	List 2.2
Eriogonum nudum var. decurrens	Polygonaceae	perennial herb	Jun-Oct	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs)(maritime ponderosa pine sandhills)/sandy	50 - 800 meters	List 1B.1
Erysimum ammophilum	Brassicaceae	perennial herb	Feb-Jun	•Chaparral (Chprl) (maritime) •Coastal dunes (CoDns) •Coastal scrub (CoScr)/sandy, openings	0 - 60 meters	List 1B.2
Erysimum teretifolium	Brassicaceae	perennial herb	Mar-Jul	•Chaparral (Chprl) •Lower montane coniferous forest (LCFrs)/inland marine sands	120 - 610 meters	List 1B.1
Grindelia hirsutula var. maritima	Asteraceae	perennial herb	Jun-Sep	•Coastal bluff scrub (CBScr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/sandy or serpentinite	15 - 400 meters	List 1B.2
Hesperevax sparsiflora var. brevifolia	Asteraceae	annual herb	Mar-Jun	•Coastal bluff scrub (CBScr)(sandy) •Coastal dunes (CoDns)	0 - 215 meters	List 2.2
Hoita strobilina	Fabaceae	perennial herb	May-Jul(Aug-Oct) Months in parentheses are uncommon.	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Riparian woodland (RpWld)/usually serpentinite, mesic	30 - 860 meters	List 1B.1
				•Coastal prairie (CoPrr) •Coastal scrub (CoScr)		

				grassland (VFGrs)/rocky		
Microseris paludosa	Asteraceae	perennial herb	Apr-Jun(Jul) Months in parentheses are uncommon.	•Closed-cone coniferous forest (CCFrs) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)	5 - 300 meters	List 1B.2
Mielichhoferia elongata	Bryaceae	moss	•Cismontane woodland (CmWld)(metamorphic, rock, usually vernally mesic)	500 - 1300 meters	List 2.2	
Monardella villosa ssp. globosa	Lamiaceae	perennial rhizomatous herb	Jun-Jul(Aug) Months in parentheses are uncommon.	•Broadleafed upland forest (BUFrs)(openings) •Chaparral (Chprl) (openings) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)	100 - 915 meters	List 1B.2
Pedicularis dudleyi	Scrophulariaceae	perennial herb	Apr-Jun	•Chaparral (Chprl) (maritime) •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFrs) •Valley and foothill grassland (VFGrs)	60 - 900 meters	List 1B.2
Penstemon rattanii var. kleei	Scrophulariaceae	perennial herb	May-Jun	•Chaparral (Chprl) •Lower montane coniferous forest (LCFrs) •North Coast coniferous forest (NCFrs)	400 - 1100 meters	List 1B.2
Pentachaeta bellidiflora	Asteraceae	annual herb	Mar-May	•Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)(often serpentinite)	35 - 620 meters	List 1B.1
Pinus radiata	Pinaceae	perennial evergreen tree	•Closed-cone coniferous forest (CCFrs) •Cismontane woodland	25 - 185 meters	List 1B.1	

				(CmWld)		
Plagiobothrys chorisianus var. chorisianus	Boraginaceae	annual herb	Mar-Jun	•Chaparral (Chprl) •Coastal prairie (CoPrr) •Coastal scrub (CoScr)/mesic	15 - 160 meters	List 1B.2
Plagiobothrys diffusus	Boraginaceae	annual herb	Mar-Jun	•Coastal prairie (CoPrr) •Valley and foothill grassland (VFGrs)	60 - 360 meters	List 1B.1
Polygala subspinosa	Polygalaceae	perennial herb	May-Aug	•Great Basin scrub (GBScr) •Pinyon and juniper woodland (PJWld)/gravelly, rocky	1330 - 1705 meters	List 2.2
Polygonum hickmanii	Polygonaceae	annual herb	May-Aug	•Valley and foothill grassland (VFGrs) (mudstone and sandstone)	210 - 250 meters	List 1B.1
Rosa pinetorum	Rosaceae	perennial shrub	May-Jul	•Closed-cone coniferous forest (CCFrs)	2 - 300 meters	List 1B.2
Silene verecunda ssp. verecunda	Caryophyllaceae	perennial herb	Mar-Jun(Aug) Months in parentheses are uncommon.	•Coastal bluff scrub (CBScr) •Chaparral (Chprl) •Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/sandy	30 - 645 meters	List 1B.2

CALIFORNIA WILDLIFE HABITAT RELATIONSHIPS SYSTEM
Supported by
CALIFORNIA INTERAGENCY WILDLIFE TASK GROUP
and maintained by the
CALIFORNIA DEPARTMENT OF FISH AND GAME
Database Version: 8.0

SPECIES SUMMARY REPORT

I=Introduced
N=Native
1=Federal Endangered
2=Federal Threatened
3=California Endangered
4=California Threatened
5=California Fully Protected
6=California Protected
7=California Species of Special Concern
8=Federally-Proposed Endangered
9=Federally-Proposed Threatened Candidate
10=Federal Candidate
11=BLM Sensitive
12=USFS Sensitive
13=CDF Sensitive
14=Harvest

Note: Any given status code for a species may apply to the full species or to only one or more of its subspecies.

ID	SPECIES NAME	STATUS
A001	CALIFORNIA TIGER SALAMANDER	6 7 10
A003	LONG-TOED SALAMANDER	1 3 5 6
A007	CALIFORNIA NEWT	7
A012	ENSATINA	7 11 12
A040	RED-LEGGED FROG	2 6 7 12
A043	FOOTHILL YELLOW-LEGGED FROG	6 7 12
R004	WESTERN POND TURTLE	6 7 11 12
R029	COAST HORNED LIZARD	6 7 11 12
R036	WESTERN SKINK	7 11
R043	CALIFORNIA LEGLESS LIZARD	6 7 10 12
R046	RUBBER BOA	4 6 12
R053	STRIPED RACER	2 4 6
R059	CALIFORNIA MOUNTAIN KINGSNAKE	6 7 12
R061	COMMON GARTER SNAKE	1 3 5 6 7
B043	BROWN PELICAN	1 3 5
B044	DOUBLE-CRESTED CORMORANT	7
B051	GREAT BLUE HERON	13
B052	GREAT EGRET	13
B096	HARLEQUIN DUCK	7 11 14
B110	OSPREY	7 13
B111	WHITE-TAILED KITE	5
B113	BALD EAGLE	2 3 5 13
B114	NORTHERN HARRIER	7
B115	SHARP-SHINNED HAWK	7
B116	COOPER'S HAWK	7
B124	FERRUGINOUS HAWK	7 11
B126	GOLDEN EAGLE	5 7 11 13
B128	MERLIN	7
B129	PEREGRINE FALCON	3 5 13
B131	PRAIRIE FALCON	7
B144	CLAPPER RAIL	1 3 4 5
B173	LONG-BILLED CURLEW	7
B648	BAIRD'S SANDPIPER	7
B215	CALIFORNIA GULL	7
B240	MARBLED MURRELET	2 3 13
B247	RHINOCEROS AUKLET	7
B248	TUFTED PUFFIN	7
B269	BURROWING OWL	7 11
B272	LONG-EARED OWL	7
B273	SHORT-EARED OWL	7
B279	BLACK SWIFT	7
B281	VAUX'S SWIFT	7
B307	NORTHERN FLICKER	3
B315	WILLOW FLYCATCHER	1 3 12
B410	LOGGERHEAD SHRIKE	1 7

CALIFORNIA WILDLIFE HABITAT RELATIONSHIPS SYSTEM
Supported by
CALIFORNIA INTERAGENCY WILDLIFE TASK GROUP
and maintained by the
CALIFORNIA DEPARTMENT OF FISH AND GAME
Database Version: 8.0

SPECIES SUMMARY REPORT

I=Introduced	3=California Endangered	7=California Species of Special Concern	11=BLM Sensitive
N=Native	4=California Threatened	8=Federally-Proposed Endangered	12=USFS Sensitive
1=Federal Endangered	5=California Fully Protected	9=Federally-Proposed Threatened Candidate	13=CDF Sensitive
2=Federal Threatened	6=California Protected	10=Federal Candidate	14=Harvest

Note: Any given status code for a species may apply to the full species or to only one or more of its subspecies.

ID	SPECIES NAME	STATUS
B348	WESTERN SCRUB-JAY	7
B337	HORNED LARK	7
B338	PURPLE MARTIN	7
B342	BANK SWALLOW	4
B398	CALIFORNIA THRASHER	2
B430	YELLOW WARBLER	7
B461	COMMON YELLOWTHROAT	7
B467	YELLOW-BREASTED CHAT	7
B483	SPOTTED TOWHEE	7
B484	CALIFORNIA TOWHEE	2 3
B487	RUFOUS-CROWNED SPARROW	7
B497	SAGE SPARROW	2 7
B499	SAVANNAH SPARROW	3 7
B505	SONG SPARROW	7
B512	DARK-EYED JUNCO	7
B520	TRICOLORED BLACKBIRD	7 11
M003	VAGRANT SHREW	7
M006	ORNATE SHREW	7 8
M018	BROAD-FOOTED MOLE	7
M037	TOWNSEND'S BIG-EARED BAT	7 11 12
M038	PALLID BAT	7 11 12
M042	WESTERN MASTIFF BAT	7 11
M045	BRUSH RABBIT	1 3 14
M051	BLACK-TAILED JACKRABBIT	7 14
M095	CALIFORNIA POCKET MOUSE	7
M104	HEERMANN'S KANGAROO RAT	1 3 5
M117	DEER MOUSE	7
M127	DUSKY-FOOTED WOODRAT	1 7
M134	CALIFORNIA VOLE	1 3 7
M147	RED FOX	4 12 14
M170	CALIFORNIA SEA-LION	6
M171	HARBOR SEAL	6
M152	RINGTAIL	5
M163	NORTHERN RIVER OTTER	7 11
M161	WESTERN SPOTTED SKUNK	7 14
M165	MOUNTAIN LION	7

Total Number of Species: 81

THREATENED, ENDANGERED OR ANIMALS OF SPECIAL CONCERN IN SANTA CRUZ COUNTY
Updated 3/1/94

SPECIES	STATE/FEDERAL LISTING	SPECIES OF SPECIAL CONCERN
SPIDERS AND RELATIVES		
Dollof Cave Spider	C2	
Santa Cruz Teleman Spider	C2	
Empire Cave Pseudoscorpion	C2	
GASTROPODS		
California Brackish Water Snail	C2	
INSECTS		
Barbate (Mt. Herman) June Beetle	C2	
Opler's Longhorn Moth	2R	
Monarch Butterfly (wintering sites)	†	
FISHES		
Coho (Silver Salmon)		
Tidewater Goby	C2	Yes
AMPHIBIANS AND REPTILES		
Santa Cruz Long-toed Salamander	SE/FE	
California Red-legged Frog	C2	Yes
Western Pond Turtle		Yes
San Francisco Garter Snake	SE/FE	
Horned Lizard		Yes
BIRDS		
Bank Swallow	ST	
Black-crowned Night Heron		Yes
Black-shinned Hawk		Yes
Black Swift		Yes
Brown Pelican	SE/FE	
Burrowing Owl		Yes
California Least Tern	SE/FE	
Cooper's Hawk		Yes
Double Crested Cormorant		Yes
Golden Eagle		Yes
Ferruginous Hawk		Yes
Marbled Murrelet	SCT/FPT	
Merlin		Yes
Osprey		Yes
Peregrine Falcon	SE/FE	
Purple Martin		Yes
Sharp-shinned Hawk		Yes
Spotted Owl		Yes
Tricolored Blackbird	C2	Yes
Western Snowy Plover	FT	Yes
Western Yellow Billed Cuckoo	SE	
Willow Flycatcher	SCE	
Yellow Breasted Chat		Yes
Yellow Warbler		Yes
MAMMALS		
American Badger		Yes
Monterey Ornate Shrew	C2	Yes
Northern (Steller) Sea Lion	FT	
Santa Cruz Harvest Mouse	C2	Yes
Souther Sea Otter	FT	

KEY

STATE

SE State listed Endangered
ST State listed Threatened
SCE State candidate Endagered
SCT State candidate Threatened

FEDERAL

FE Federally listed Endangered
FT Federally listed Threatened
FPE Federally proposed Endagered
FPT Federally proposed Threatened

C1 Sufficient data to support Federal listing
C2 Listing May be warranted, but data insufficient to support Federal listing.
1R Recommended for C1 status by U.S. Fish and Wildlife Service (USFWS)
2R Recommended for C2 status by USFWS

† Species fall into one or more categories:

- Biologically rare, very restricted in distrib-ution or declining throughout their range.
- Species closely associated with a habi-tat that is rapidly declining in California.
- California population(s) are threatened with extirpation.

CALIFORNIA STATE PLANT SPECIES OF CONCERN FOUND IN SANTA CRUZ COUNTY - RARE AND/OR ENDANGERED
Updated 3/1/94

	Scientific Name	Common Name	State/ Federal Status	Location	Threat
	Agrostis agristiglumis	Awned bentgrass	C1	Small colony on bluff near Greyhound Rock	
	Agrostis blasdalei	Blasdale's bentgrass	C2	Few colonies in coastal grasslands, mostly Swanton/Greyhound Rock areas.	Threatened in part by agricultural conversion
	Amsinckia lunaris	Bent-flowered fiddleneck		Small colonies on slopes in Swanton area	No immediate threat?
	Arabis blepharophylia	Coast rock cress	C3c	One colony near Eagle Rock, purchased by Sempervirons Fund.	No immediate threat.
	Arctostaphylos glutinosa	Schreiber's manzanita	C2	Chalk ridges NE of Swanton, most of habitat owned by Lockheed.	Up to 1/3 population removed for fire suppression. Possible long-term threat from fire suppression.
	Arctostaphylos hookeri ssp. Hookeri	Hooker's manzanita		Maritime chaparral in San Andreas/Calabasas area.	Threatened by residential development and competing exotics, especially Eucalyptus
X?	**Arctostaphylos pajaroensis**	Pajaro manzanita		Collected in same area as A. hookeri, probably always rare in Santa Cruz Co.	Threats same as A. hookeri if not already extirpated in Santa Cruz County
E	**Arctostaphylos silvicola**	Silver leaved manzanita	CE/C2	Zayante sandhills and Bonny Doon	Residential Development and sand quarrying. Large population in Bonny Doon protected.
X	**Arenaria paludicola**	Marsh sandwort	CE/C1	Only colony at Camp Evers marsh in Scotts Valley habitat destroyed for golf course and trailer park.	Habitat destroyed.
	Calyptridlum parryl var. hesseae	Santa Cruz Mtns pussypaws		Rare, few locations in sandy chaparral north of Watsonville, reported in Ben Lomond Mtn and Zayante sandhills.	More information needed on occurrences and threats
X	**Campanula californica**	Swamp harebell	C2	Only colony at Camp Evers marsh in Scotts Valley habitat destroyed for golf course and trailer park.	Habitat destroyed.
	Campanula exigua	Chaparral harebell		Two small colonies in Zayante sandhills.	No immediate threat?
	Castilleja latifola	Monterey Indian paintbrush		Coastal dunes at Sunset Beach State Park and Pajaro Dunes.	Most of population removed by residential development. Threatened by invasive exotics European beachgrass and Iceplant.
	Ceanothus rigidus	Monterey ceanothus	C2	Few plants in maritime chaparral in Calabasas area.	Threatened by residential development, competing exotics and fire suppression.
	Chlorizanthe pungens var. hartwegiana	Ben Lomond Spineflower	FE	Zayante sandhills and Bonny Doon	Mining
	Chorizanthe pungens var. pungens	Monterey Spineflower	C1	Sunset Beach and probably a few other sandy areas in south County but no recent collections.	More information needed on occurrences.
	Chorizanthe robusta var. robusta	Robust spineflower	FE	Found in a few sandy places in midcounty and Sunset Beach areas.	No immediate threat?
E	**Chorizanthe robusta var. hartwegli**	Hartweg's spineflower	C1	Restricted to a few flower fields in Scotts Valley	Threatened by proposed housing and gold course development.

KEY
E = Endemic to Santa Cruz County
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† = Presumed extict

STATE/ FEDERAL STATUS:
CE = State listed as Endangered
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C1 = Sufficient data to support federal listing
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CALIFORNIA STATE PLANT SPECIES OF CONCERN FOUND IN SANTA CRUZ COUNTY - RARE AND/OR ENDANGERED
Updated 3/1/94

	Scientific Name	Common Name	State/ Federal Status	Location	Threat
	Collinsia franciscana	San Francisco collinsia		A fee colonies on slopes in Greyhound Rock and Swanton areas.	No immediate threat.
	Cupressus abramsiana	Santa Cruz cypress	CE/FE	Isolated groves in chaparral at Bonny Doon, Eagle Rock, Bracken Brae and above Smith Grade.	Some loss due to residential and vineyard development. Two colonies are publically owned.
X?	Cypripedium fasciculatum	Clustered lady's slipper	C3c	Formerly reported near Glenwood and Boulder Creek. No recent records.	Presumed extirpated in Santa Cruz County, possibly due to collecting.
	Elymus californicus	California bottlebrush grass	C3c	Isolated colonies in openings in woodlands in Swanton area and a few mid county areas.	Most colonies not threatened at this time.
E	Erigonum nudum decurrens	Zayante buckwheat		Zayante sandhills and a few sandy areas in south county.	Reduced by mining and residential development, but common in remaining habitat.
	Erysimum ammophilum	Coast wallflower	C2	Secondary coastal dunes at Sunset Beach and south to Monterey Co.	Threatened by iceplant.
	Elrysimum franciscanum	San Francisco wallflower	C2	Few small colonies on sandy bluffs in Greyhound Rock area; population is at the southern limit of its range.	Threatened by competition from iceplant.
E	Erysimum teretifollum	Santa Cruz wallflower	CE/C1	Zayante sandhills and a small colony in Bonny Doon	Significantly reduced by quarrying. 2-3 populations protected, but largest population threatened by quarrying.
X?	Fritillaria agrestis	Stinkbells	C3c	Reported between Santa Cruz and Soquel, no recent records.	Probably lost long ago to agricultural and urban development
	Grindella latifolia latifollia	Coastal gumplant		Common in saltmarsh at Pajaro estuary and other places along the coast.	More common than originally considered; may be candidate for delisting.
E	Gnaphallum zayateense	Zayante everlasting		Zayante sandhills	Probably much reduced by quarrying
	Holocarpha macradenia	Santa Cruz tarplant	CE/C1	A few colonies remaining in Watsonville area, Soquel/Live Oak area and at Graham Hill Rd.	Possibly all are currently or potentially threatened by various developments.
	Horkella cuneata ssp sericea	Wedge leaved horkelia	C2	Coastal grasslands in Greyhound Rock area and at Graham Hill Rd.	Possibly much reduced by quarrying
	Horkella marinensis	Pt. Reyes horkelia	C2	Native grasslands along Empire Grade	No immediate threat?
X?	Lilliun rubescens	Redwood lily		Reported to occur south to Santa Cruz County. No recent records.	
	Lomatium parvifollum	Small leaved lomatium		A few found in maritime chaparral NW of Watsonville	Still extant? Possible threat from residential development.
	Malacothamnus arcuatus	Arcuate bushmallow		Few in chaparral near Big Basin	No immediate threats?
	Microseris decipiens	Santa Cruz microseris	C2	Few colonies in Greyhound Rock/Swanton area.	No immediate threats?

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CALIFORNIA STATE PLANT SPECIES OF CONCERN FOUND IN SANTA CRUZ COUNTY - RARE AND/OR ENDANGERED
Updated 3/1/94

	Scientific Name	Common Name	State/ Federal Status	Location	Threat
E?	Mimulus rattanii ssp decurtatus	Santa Cruz County monkeyflower		Chaparral borders in Zayante sandhills	Probably reduced by mining and residential development.
	Monardella undulata var undulata	Curly leaved coyote mint		Zayante sandhills	Much reduced by mining and residential development.
X?	Pedicularis dudleyi	Dudley's lousewort	CR/C3c	Reported from redwood forest at San Lorenzo River and Aptos, but no recent records.	
	Penstemon rattanii ssp kleei	Santa Cruz Mountains beardtongue		Few small populations in Nisene Marks State Park and Ben Lomond Mountain.	No immediate threats?
	Pentachaeta bellidiflora	White rayed pentachaeta	CC/C2	Big Basin Quadrangle	
	Perideridia gairdneri ssp gairdneri	Gairdner's yampeh	C2	Colonies on native terrace grasslands, mostly midcounty area, some in Swanton area	Much reduced by agriculture and urban development; remaining colonies threatened
	Pinus radiata	Monterey pine		Only native groves in Swanton area.	Possible threats due to disease and genetic pollution by artificially planted hybrids
	Piperia elongata ssp michaelii	Michael's rein orchid		Few colonies along north coast.	Some reduction due to trampling, otherwise numbers mysteriously decreasing
	Plagiobothrys chorisianus var chorisianus	Chorist's popcornflower		Scattered colonies in wet places, north coast grasslands, etc.	
†	Plagiobothrys diffusus	San Francisco popcornflower	CE/C2	Presumed extinct, since rediscovered in grassland near Swanton and other places near Santa Cruz and Scotts Valley	Most colonies threatened by housing development.
	Quercus lobata	Valley oak		Best grove near corner of Zayante and Quail Hollow Rds, small groves and individual trees scattered throughout San Lorenzo Valley and other areas.	Future of grove in uncertain
X?	Ranunculus lobbii	Lobb's aquatic buttercup		Reportedly found in ponds and marshes south to central Santa Cruz County. No recent records.	
	Ribes divaricatum var publiforum	Straggly goosberry		Fairly common in moist, brushy areas	No significant threats
	Sanicula hoffmannii	Hoffmann's sanicle	C3c	Several colonies in Last Chance Rd area	No immediate threats?
	Silene verecunda ssp verecunda	San Francisco champion	C2	Mudstone outcrops in Greyhound Rock area.	No immediate threats?
	Stylocline amphibola	Mt Diablo cottonweed		Scattered colonies on mudstone outcrops mostly in Greyhound Rock area, some in Scotts Valley area.	Scotts Valley colonies threatened by housing and golf course development.
	Trifolium grayi	West's clover		Colonies at isolated grasslands at Scotts Valley and a few other inland areas.	Threatened by housing and golf course development.

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October 25, 2007

Mr. Steve Auten
Swanton Pacific Ranch
125 Swanton Road
Davenport, CA 95017

Job: SPR-NTMP-429

SUBJECT: FOCUSED ENGINEERING GEOLOGIC REVIEW OF A PORTION OF A PROPOSED NON-INDUSTRIAL TIMBER MANAGEMENT PLAN

NTMP:	**SWANTON PACIFIC RANCH NTMP**
PROPERTY:	Swanton Pacific Ranch
QUAD:	Davenport
T&R:	T10S, R3W, SEC 8, 9, 16, 17 & 20, and SAN VINCENTE (ESCARRILLA) and AGUA PUERCA Y LAS TRANCAS land grants
WATERSHED:	Archibald Creek, Little Creek, and Scott Creek

1.0 INTRODUCTION

This report summarizes the results of my focused Engineering Geologic Review of the above referenced Non-Industrial Timber Management Plan (NTMP). The proposed 701± acre NTMP is located on moderate to steep gradient slopes within the Archibald Creek, Little Creek and Scott Creek drainages. Several large-scale deep-seated forested translational landslides and shallow debris flows underlie portions of the NTMP area. The 8± mile network of existing seasonal roads, permanent roads, and landings are in reasonably good condition, although several segments are in need of upgrades or repair areas that have recently been damaged or to improve long-term stability.

This assessment has been conducted at the request of the Registered Professional Forester (RPF) who observed characteristics of unstable areas (14CCR895.1) within the proposed plan area. The purpose of this investigation was to qualitatively evaluate the potential impact of the proposed road improvements may have on slope stability and erosion. This investigation focuses on those sites specifically outlined in this report where geologic oversight was requested. Recommendations provided to the RPF are intended to minimize the risk of accelerated sediment delivery to watercourses from landsliding associated with the proposed harvest. The chief geologic concern is increased erosion and sediment delivery to watercourses, which could threaten water quality and adversely affect listed species or their habitats.

1.1 SCOPE OF SERVICES

The specific scope of services was as follows:

- Review of pertinent published and unpublished geologic reports relevant to the NTMP
- Geomorphic interpretation of six sets of stereo aerial photographs (taken in 1946, 1956, 1975, 1982, 1989 and 2003)
- Geomorphic interpretation of LIDAR coverage for the plan area
- Geologic field review of specific road points outlined in this report
- Discussions with Nadia Hamey (RPF, Big Creek Lumber), Bob Reynolds (Operations Forester, Big Creek Lumber), Steve Auten (Resource Manager, RPF, Swanton Pacific Ranch), DR. Brian Dietterick (Director, Professional Hydrologist, Swanton Pacific Ranch), Tom Spittler (Engineering Geologist, CGS) and Michael Huyette (Engineering Geologist, CGS)
- Preparation of this report

2.0 PROJECT DESCRIPTION

The NTMP proposes 701 acres of light single-tree selection and group selection harvesting on Swanton Pacific Ranch. The predominant harvesting method will be single tree selection, removing approximately one third of the trees over twelve inches at breast height. The interval between harvest entries will be approximately 20 years. Group selection will focus on hardwood dominated portions of the property with small pockets of Douglas-fir in order to re-establish the conifer component in these areas. Once the groups are planted with conifers following operations, single tree selection will be reinstated to perpetuate the conifer growth and move these areas toward an uneven aged structure over time. The overall harvest will retain approximately 50-65% of the canopy throughout the harvest area, immediately following operations. The NTMP will incorporate ground based, skyline and helicopter yarding. Please refer to the NTMP for a more complete discussion of stands and silviculture prescriptions.

The NTMP will utilize about 8± miles of existing seasonal and permanent roads. While most of the road network is in reasonably good conditions, several segments are in need of upgrades.

3.0 GEOMORPHIC SETTING

The NTMP area is characterized by moderate to steep mountainous terrain within the Archibald Creek, Little Creek and Scott Creek drainages. Rapid tectonic uplifting and down-cutting by stream erosion and landsliding has created canyons with local steep streamside slopes. The area is fairly typical for the region with slope gradients ranging between 10% along ridge tops and midslope benches, to 70% and greater along local streamside slopes and other isolated areas. Elevations within the NTMP area range from 60 feet along Scott Creek to 1260 feet in the upper portion of NF Little Creek.

The NTMP area is drained by several small and short swales and ephemeral stream channels, many of which have hosted shallow landslides. Archibald and Little Creeks are deeply incised into the landscape with local steep streamside slopes. A well defined slope break marking the upper end of an "inner gorge" is generally not well defined. Scott Creek occupies an agraded (drowned) river mouth formed by the most recent (Holocene) rise in sea level.

The geomorphology of the hillsides are locally irregular and benchy, consistent with local large-scale deep-seated translational landsliding. Several of these landslides have experienced small scale incipient movement in recent years. Shallow landsliding is also common within the area occurring most frequently along the steep streamside slopes of the larger watercourses.

3.1.1 Past Landuse

Much of the Little Creek watershed was logged by the San Vicente Lumber Company between 1906 and 1922. Several miles of railroad grade, including a trestle across the North Fork of Little Creek provided access to the upper part of the Little Creek watershed area. The logging technique at that time was clear-cut and burn, leaving the ground relatively un-vegetated. Harvesting occurred in the lower portion of Little Creek and throughout the satellite stands in the 1950s and 1960s. This harvest focused on removal of bigger trees and removed a good portion of the Douglas-fir to supply a nearby box factory. Subsequent single-tree selection harvests have occurred in the South Fork of Little Creek in 1989-90, in the North Fork of Little Creek in 1993-94, and in the lower Little Creek and the satellite stands in 2004-05. In the last ten years, 360 acres in the watershed have been selectively harvested.

3.1.2 Current Timber Stand

The RPF reports the existing stand to be predominantly a mixed forest of second growth redwood and Douglas-fir of varying degrees of stocking, with tan oak hardwood overstory and understory that dominates some areas. Generally, aggregations of Douglas-fir occur in areas of past soil disturbance, with redwood occurring throughout the units resulting from past harvesting and stump sprouting. In some areas of the plan tan oak has increased in site occupancy. Refer to the NTMP for a complete discussion of the stands and vegetation descriptions.

4.0 GEOLOGIC SETTING

The NTMP area is situated on the western flank of the Coast Range Physiographic Province of Northwest California, a series of coastal mountain chains paralleling the pronounced northwest-southeast structural grain of northwest California. The Santa Cruz Mountains are mostly underlain by an elongate wedge of granitic and metamorphic basement rock, known collectively as the Salinian Block. These rocks are separated from contrasting basement rock types to the northeast by the San Andreas fault and to the southwest by the Sur-Nacimiento-San Gregorio fault system. Overlying the granitic basement rocks is a sequence of dominantly marine sedimentary rocks of Paleocene to Pliocene age and non-marine sediments of Pliocene to Pleistocene age.

Most of the Ranch is underlain by Tertiary Santa Cruz Mudstone, which is described as a medium to thick bedded, laminated siliceous mudstone, grading locally to a sandy siltstone (Brabb, 1989; Clark, 1981). On the property, Santa Cruz Mudstone consists of rock that is highly fractured hard, brittle, porcelainaeous shale and mudstone with firm to soft non-siliceous mudstone, siltstone and sandstone. Bedrossian (1989) reports that the Santa Cruz Mudstone may extend into the area mapped as quartz diorite. Bedding within the Santa Cruz Mudstone is mapped as striking northwest and dipping 3 and 24 degrees to the southwest. An adverse dip slope condition does not exist on the property.

The northeast corner of the Ranch is underlain by Tertiary Santa Margarita Sandstone and Paleozoic to Mesozoic quartz diorite and schist. The Santa Margarita Sandstone is described as very fine - to

very coarse- grained arkosic sandstone (Clark, 1981).

A veneer of colluvium derived from the underlying bedrock appears to range between 1 to 4 feet in thickness across the property, with an abrupt downward change from colluvium to weathered bedrock noted in several locations. Soils on the property are mapped as a combination of loams and sandy loams belonging to the Lompico- Felton complex (U.S. Department of Agriculture, 1980). The RPF reports the Erosion Hazard Rating (EHR) as Moderate to High, which is consistent with field observations. Please refer to the THP for a more complete discussion of soils and associated Erosion Hazard Ratings.

Quaternary-age alluvium underlies Scotts Creek and some of its larger tributaries. These deposits consist mainly of unconsolidated sand, silt and gravel.

4.1 SEISMICITY

The subject property is located within a highly seismically-active region of California. A broad system of inter-related northwest-southeast trending strike-slip faults represents a segment of the boundary between the Pacific and North American crustal plates. For approximately the past 15 million years (mid-Miocene) the Pacific plate has been slipping northwestward with respect to the North American plate (Atwater, 1970; Graham and Dickinson, 1978). The majority of movement has been taken up by the San Andreas Fault itself; however, there are other faults within this broad system that have also experienced movement at one time or another. The regional faults of significance include the San Andreas and San Gregorio faults.

The main trace of the active San Andreas Fault is located about 13 miles northeast of the property. San Andreas Fault system can be divided into segments with earthquakes of different magnitudes and recurrence intervals (WGONCEP, 1996). The great 1906 earthquake, the predominant historic seismic event of the San Andreas fault system in northern California, ruptured all currently locked segments of the fault (from near the Mendocino triple junction to San Juan Bautista. The 1906 rupture overlaps the independent subsegments (Peninsula Segment and Santa Cruz Mountains Segment). Current research into prehistoric events along the northern San Andreas Fault indicates that a similar great event probably occurred most recently in the 17th century (Schwartz et al., 1986).

The San Francisco Peninsula segment is the closest segment of the fault to the site. This segment of the San Andreas fault has been assigned a slip rate that results in a Mw 7.3 earthquake with a recurrence interval of 400 years (WGONCEP, 1996). The 1906 Segment of the fault has been assigned a slip rate that results in a larger Mw 7.9 earthquake with a recurrence interval of 210 years. The active San Gregorio Fault is mapped less than 3 miles west and offshore of the plan. The San Gregorio fault has been assigned a slip rate that results in a Mw 7.3 earthquake with a recurrence interval of 400 years (WGONCEP, 1996). High ground accelerations associated with fault rupture along either of these two fault systems is likely a contributing factor if not dominant for movement on many of the deep-seated landslides found in the area (Keefer, 1999).

Seismic shaking at the property will be intense during the next major earthquake along one of the local fault systems. Ground motion maps have been created by the California Seismic Hazards Mapping Act as a by-product of the delineation of Seismic Hazards Zones by the Department of Conservation (Cao et al., 2003; CGS, 2002; Petersen et al., 1996). These maps show an estimate of

the likelihood of earthquake ground motions, based on a probabilistic seismic hazard analysis. Ground motions shown on the maps are expressed as maximum horizontal accelerations (MHA) having a 10-percent probability of being exceeded in a 50-year period (corresponding to a 475-year return period) in keeping with the UBC-level of hazard. Mean Peak Ground Acceleration (PGA) on firm rock at the subject site with a 10% probability of exceedance in 50 years is reported to be 0.74g (CGS, 2002; USGS, 2003). Such an earthquake will cause additional movement on some of the larger slides in the watershed.

5.0 LANDSLIDING

The Quaternary history of the Santa Cruz Mountains includes abundant evidence for landslide related processes as an important factor shaping the evolution of the modern landscape. Numerous shallow and deep-seated landslides are common throughout the region and are one of the dominant processes shaping the present day landscape.

Landslides on and adjacent to the NTMP area were mapped from the historic set of aerial photographs, LIDAR data, and from the published landslide maps (Cooper Clark and Associates, 1974). These landslides are presented in Figure 1. Because I did not make a formal field reconnaissance of the plan area to confirm air photo and LIDAR interpretations, the landslide map presented in Figure 1 should be considered approximate.

Bedrossian (1989) reports numerous landslides and landslides scarps are present near the contact of the Santa Cruz Mudstone and quartz diorite. My interoperation of landsliding from air photos and LIDAR could not confirm this observation.

Landslides are a natural and on going process and will likely continue to occur as a result of adverse storm or seismic events regardless of current or proposed landuse activities. Historical accounts and geologic studies of the San Andreas earthquake of 1906 and the Loma Prieta earthquake of 1989 indicate that there is a strong correlation between major earthquakes and the resulting landslides, earth flows and ground cracking in this region. The occurrence of landsliding is also strongly controlled by the amount of seasonal rainfall the area receives, particularly during wetter than average rainfall years dominated by El Niño climatic events.

5.1 DEEP-SEATED LANDSLIDING

Characteristic of the area, the subject site is underlain by several forested, large-scale deep-seated rotational/translational landslides (Figure 1). The slides are characterized by a relatively cohesive slide mass with a failure plane that extending well into bedrock (Crunden and Varnes, 1996). These slides are identified in the aerial photographs, LIDAR imagery and on the ground surface by a series of broad arcuate scarps and mid-slope benches on what is otherwise moderate to steeply sloping terrain. The landslide commonly consists of several smaller slide blocks that coalesce together to form the larger landslide complex. Lateral scarps between the individual landslide blocks are often poorly defined, in part due to the low rate and/or infrequent movement of the slide mass.

The slides appear to toe out at the base of the hillside. With the exception of an old failure along Scott Creek, lobate toes with a well-defined zone of accumulation are typically not apparent. The overall depths of failures are unknown, but I expect it varies and is on the order of 75 feet, or more.

My mapping and interpretation of landslides differs somewhat from that presented by Cooper Clark and Associates (1974). The differences are likely due to a higher quality of imagery and availability of LIDAR used in this assessment. The landslide boundaries mapped on Figure 1, however, should be viewed as approximate since field confirmation was not undertaken in most areas.

These deep-seated landslides exhibit varying degrees of activity. Most of the slides are likely old and dormant and do not show signs of recent activity, such as open ground cracks, fresh scarps, or leaning trees. Existing roads that cross the slides do not show signs of distress. However, portions of 80± acre slide **G1** do show signs of historic small-scale incipient slide movement based on the presence discrete scarps and cracks. Most of this movement is located towards the valley bottom. In addition, topographically sharp features, benched topography and disturbed drainages suggest that discreet portions of many of the slides have been episodically active for the past several thousand years or longer.

THP proposes tractor operations on these landslides where slopes are less than 60%. Proposed tractor operations are unlikely to have a significant impact on deep-seated stability since the mass balance and hydrology of the slides will not be substantially altered.

5.2 SHALLOW SEATED LANDSLIDES

Shallow-seated landslides include debris slides, debris flows, channel bank failures and road fill failures and are characterized by rapid, shallow (generally less than 10 feet thick) downslope movement of surficial soil, colluvium, and weathered bedrock. Recent failures commonly leave bare scars. Most natural shallow slides are located on steep slopes and are triggered by elevated porewater pressures resulting from high intensity and/or long duration rainfall or from being undercut by stream bank erosion.

A review of the historic set of aerial photographs reveal a high incidence of shallow landslides occurred as a result of the destructive 1955 storms. The vast majority of these failures occurred along the steep stream banks of the larger watercourses. A very large debris flow initiated in the upper reaches of NF Little Creek (off the subject property) with debris extending several thousand feet down stream to the mouth of Little Creek. This slide probably was a contributing factor in many of the other stream bank failures that occurred along the runout path.

Extensive research on landslides throughout the Scotts Creek Watershed was undertaken for the Scotts Creek Watershed Council in 2000 with the assistance of funding from the Scotts Creek Watershed Council and from the California Department of Fish and Game (SCWC, 2000). This report identified 125 – 150 slides in the Little Creek watershed during the 1997-1998 storms, although little landslide material reportedly reached stream channels. Most of these slides were not visible in my review of the aerial photographs, probably because of their small size and heavy tree cover. The SCWC report concluded that most of the small landslides were not caused by roads, which in many other watersheds is the leading cause for failure.

My brief reconnaissance of some of the roads revealed few current problems with shallow landslide processes. Recent fill slope failures were observed at **MP 7** and **MP 29** and are proposed to be repaired by moving the road into the bank. A few of the stream crossings (e.g. **R7** and **R8**) are at risk of plugging in the event of upslope debris flows. At **R7** the crossing is proposed to be removed

and a short bridge installed. Elsewhere critical dips will be installed with the intent to prevent stream diversions in the event the culvert plugs with slide debris.

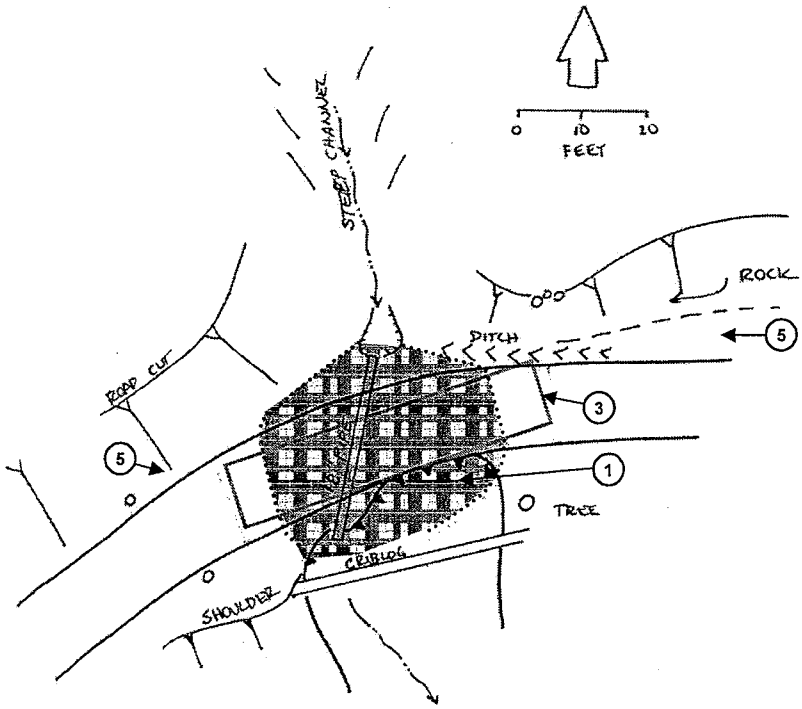
Archibald and Little Creeks are deeply incised into the landscape with local steep streamside slopes. A well defined slope break marking the upper end of an "inner gorge" is generally not well defined. As previously mentioned, shallow landslide processes appear to be concentrated along these slopes, the majority of which are attributed to the toe of the slope being undercut by stream bank erosion.The proposed light selection harvest associated with this NTMP in concert with standard WLPZ protection appears adequate to minimize potential changes in root strength and evapotranspiration that could potentially increase the risk of slope displacements.

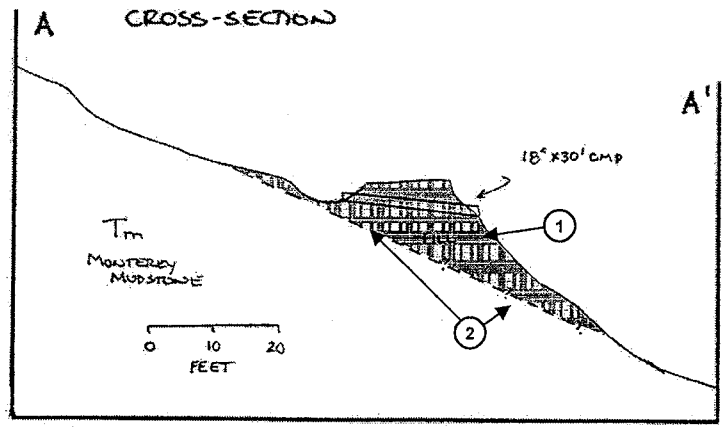
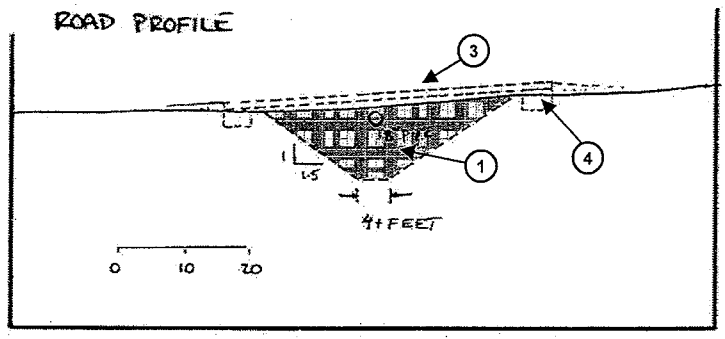
6.0 SITE OBSERVATIONS AND RECOMMENDATIONS

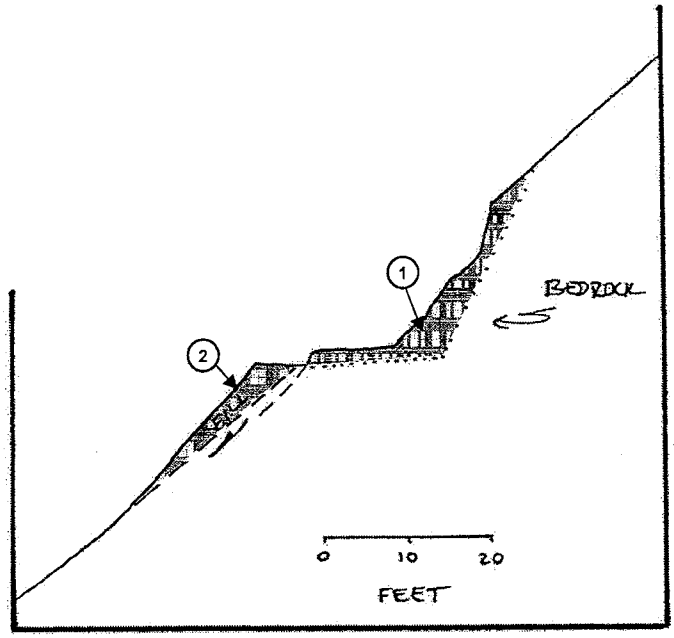
The following recommendations shall be incorporated into the NTMP.

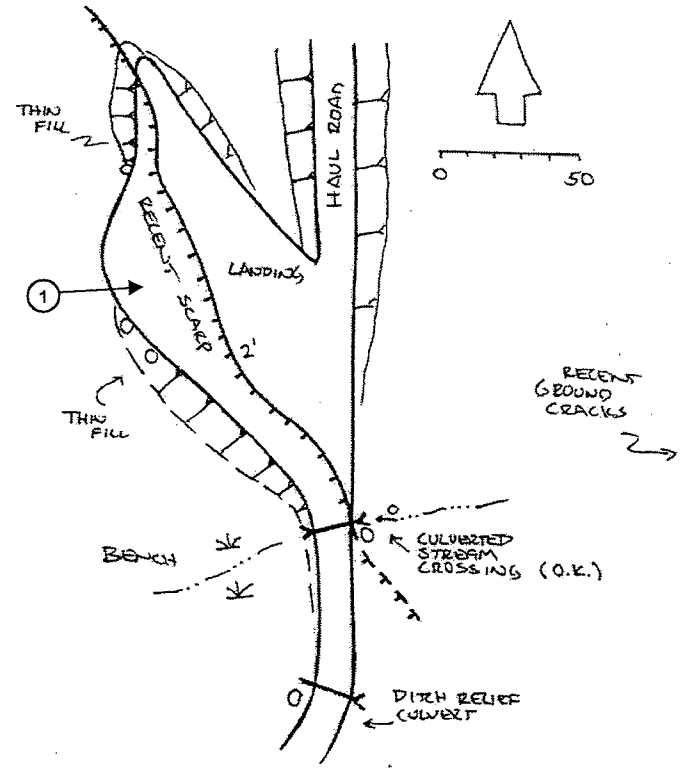
6.1 SPECIFIC RECOMMENDATIONS

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R7	Stream Crossing	**DESCRIPTION** This is an 18 inch by 30 foot long plastic pipe located at a narrow and steep gradient Class II watercourse. The outer edge of the crossing has repeatedly failed narrowing the road to about 10 feet. The THP proposes to reconstruct the crossing for the proposed harvest. The Class II watercourse drains a roughly 30 acre basin. The active channel is about 30 inch wide and 16 inches deep with thin alluvial/colluvial mantle. Channel morphology suggests past debris flow activity extending down the channel and through the crossing, but it is unknown if this has occurred in historic times. Road cut exposes relatively competent sandstone bedrock at a shallow depth. The road contours across 75+% sideslopes following an old rail road grade. The old road/railroad grade was probably constructed at a 24± foot width on balanced cut and fill with the outer edge partially supported by a 24 inch diameter 40 foot long crib log. The original Humboldt crossing is reportedly still in place but is not functioning. This crossing failed at some unknown date and was subsequently reconstructed at a much narrower 12 to 14 foot width. The outer edge of the road is reportedly supported on stacked rock. The 18 inch diameter curvet was installed in 1998, as an emergency repair following crossing failure associated with a 1998 El Nino event. This pipe is undersized and was installed with the outlet misaligned to the native channel. The misalignment was probably done to avoid having to disturb and reconstruct the stacked rock wall where the road was narrowest. The pipe was placed high with the outlet shot gunned out the side of the crossing fill, which has resulted in some outlet erosion. I Because the road is too narrow for logging operations and because the culvert is undersized and misaligned, the crossing will need to be reconstructed. The principal geotechnical concerns are slopes stability of the residual fill and cut, crossing capacity, and upslope debris flows that may extend through the channel. The best alternative to widen the road is to cut into the bank slightly on a full bench. For the most part this would require removing old slough that has accumulated on the inboard road edge. Competent nature of the mudstone bedrock exposed in the cut to either side of the crossing suggests that the cuts will be reasonably stable. Two alternatives exist to reconstructing the crossing. The first alternative would be to remove the old culvert and install a new 48 inch diameter pipe at grade and aligned with the natural channel. The 48 inch pipe would carry the expected 100 year flow but would be at risk for plugging from an upslope debris flow. The second alternative would be to remove the crossing and install a short (~50 foot long bridge). The bridge option would provide a higher level of stability against upslope debris flows, although it would not be entirely immune. The landowner proposes to implement the second alternative.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R7 Cont		**RECOMMENDATION** • Widen the road into the bank about 4 to 6 feet on a full bench. Soils may be endhauled or feathered out along the inboard edge. • Remove crossing and associated fill. The excavated crossing shall have a minimum 6 feet wide channel bottom with uniform channel grade. Banks shall be laid back to 1.5:1 (65%) slope or gentler, unless otherwise directed onsite by the project engineering geologist or designee. o About 100 to 150 cy of material will need to be excavated and endhauled to a stable location on slopes less than 30%. • Install cross-vein structures in the channel to help stabilize the channel banks and direct flow to the center of the channel. o Cross-drain structures shall be designed by Dr. Brian Dietterick, Professional hydrologist who will also oversee their installation • Install a minimum 50 foot long bridge o Bridge shall utilize suitable footings. It is my understanding that Cal Polly has traditionally used buried wood logs for the bridge footings. Logs are generally adequate for temporary bridges but are not suitable for a permanent crossings because they tend to rot out in time. For this crossing a more permanent footing such as reinforced concrete blocks or piers is preferred. The RPF and/or landowner shall provide final bridge footing design criteria to the project geotechnical consultant prior to bridge implementation. • Conform to DFG 1600 agreement • Mulch exposed soils per Section II, Item 18 of the NTMP • The project engineering geologist or designee shall supervise work
R7 Cont		 (1) Remove crossing and associated fill. The excavated crossing shall have a minimum 6 feet wide channel bottom with uniform channel grade. Banks shall be laid back to 1.5:1 (65%) slope or gentler, unless otherwise directed onsite by the project engineering geologist or designee. (3) Install a minimum 50 foot long bridge (5) Cut into bank to gain extra road width. Drain road prior to bridge.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R7 Cont		  (1) Remove crossing and associated fill. The excavated crossing shall have a minimum 6 feet wide channel bottom with uniform channel grade. Banks shall be laid back to 1.5:1 (65%) slope or gentler, unless otherwise directed onsite by the project engineering geologist or designee. (2) Install cross-vein structures per recommendations of Cal Poly hydrologist (3) Install a minimum 50 foot long bridge (4) Bridge shall utilize suitable footings

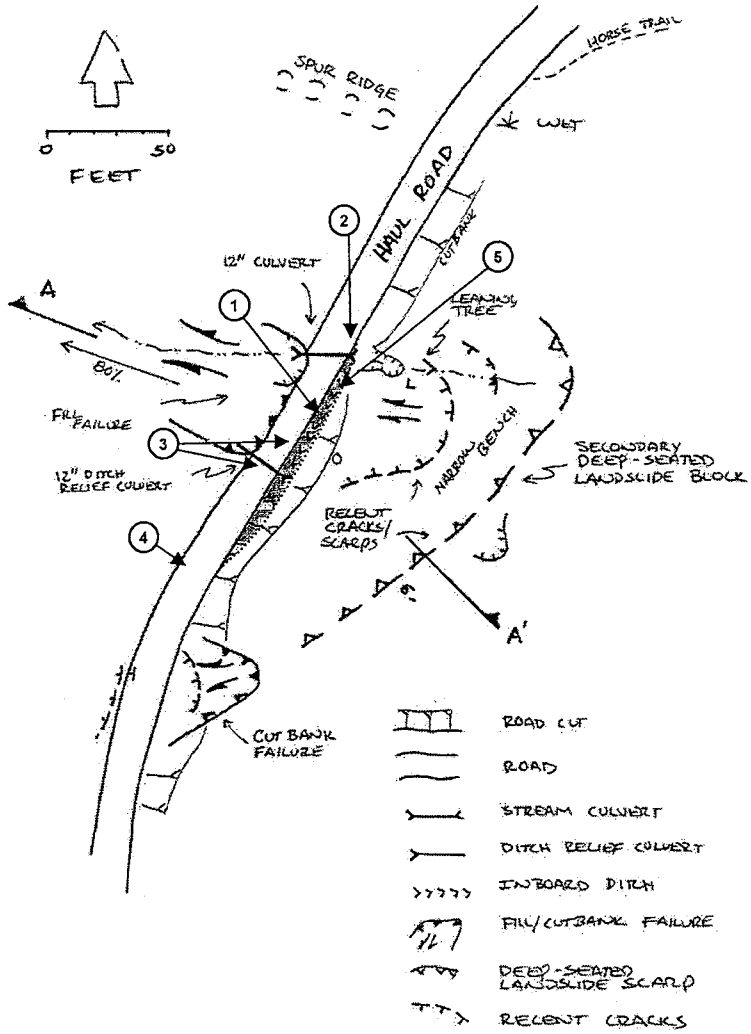
MP	FEATURE	DESCRIPTION AND RECOMMENDATION
MP 7	Fill slope failure	**DESCRIPTION** 45 feet of the outside edge of road fill has cracked and down dropped about 18 inches with cracks extending about 8 feet into the road prism. The failure occurred on an upslope road constructed many years ago on a partial bench across 85% sideslopes on a section of road constructed many years ago. Cuts are able to stand at a steep angle. During wet weather in November 2006 several large tanoaks on the downslope road edge started to lean progressively away from the road, a crack appeared and fill material settled. The oak trees were immediately cut to reduce weighting on the outer edge of the road and the slide appeared to have temporarily stabilized. A small ditch was hand-dug around the scarp to prevent road runoff from discharging onto it. Failure is attributed to saturation of thick fill sidecasted onto steep slopes. Torque exhibited by the oaks may have been a contributing factor. The cracked and down dropped fill material is potentially unstable and could fail in a large storm event. This material should be removed. The road can be reopened at a 16 foot width by cutting into the bank on full bench and endhauling spoils to a stable location. **RECOMMENDATION** • The road shall be widened to a 16 foot width by cutting into the bank. The road surface may also be lowered approximately 2 feet to minimize bank cutting • On the outer edge of the road, the cracked fill shall be pulled back to a more stable configuration • Spoils will likely need to be endhauled to a stable location on slopes less than 30%, as directed by the RPF. Some of the fill may be feathered out along the inboard edge of the road to give the road an outsloped pitch. No spoils shall be sidecast.  (1) Widen the road to maximum 16 foot width by cutting into the bank on a full bench and/or by lowering the road surface. (2) Pull back cracked fill along the outer edge of the road

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
MP 16	Cracked ground	**DESCRIPTION** About 180 feet of a landing has cracked and down dropped about 2 feet. The site is located on a natural bench within nominal fill. Ground cracks were first observed in November 2006 and appear to be associated with incipient movement of deep-seated landslide **G1**. Cracks are not associated with failure of the road fill. **RECOMMENDATION** • Regrade over the scarps and drain the landing by outsloping  (1) Regrade over the scarps and drain the landing by outsloping

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
MP 29 R15	Cutbank and fill slope instability	**DESCRIPTION** **Site Conditions** A roughly 150 foot long segment of seasonal haul road has been narrowed to a 10 foot width by both cut and fill slope instability. The road was built in a geologic sensitive area across 60% to 80% slopes below a narrow midslope bench. This midslope bench represents a secondary slide block of an active portion of deep-seated landslide **G1**. Underlying bedrock is weathered granite. The road was constructed in 1989 at a 14 to 16 foot width. Construction resulted in a 18 foot high cut that stands at a 1:1 to 1.25:1 slope. The cut has experienced past shallow sloughing depositing debris at the base and narrowing the road slightly. The upper portion of the cut is presently vegetated with small Douglass-fir. The outer edge of road was apparently constructed on 3 to 4 feet of sidecast fill on steep slopes. About 50+ feet of linear distance of the road fill has failed with relatively little residual fill material left. On the north side of the road segment is a small Class II seep fed watercourse (Crossing **R15**). A 14 inch diameter metal culvert was installed when the road was constructed in 1989. Subsequently, when the culvert inlet plugged, a snorkel drain was added to the inlet and an additional 12 inch diameter plastic culvert installed on top. There are no downspouts. There is a large redwood root wad in the cutbank above the culvert inlet. The root wad has since slid or rotated downslope slightly toward the culvert at crossing **R15** and partially obstructs the seep-fed Class II watercourse, causing water to pipe below the root wad and seep out of the cutbank and onto the road. This causes the road to be seasonally wet. South of **R15** the road is insloped and drained to a ditch relief culvert. High groundwater conditions exist nearing the immediate vicinity of crossing **R15** with standing water observed in a hand auger hole drilled adjacent to the crossing. The wet area is very localized and south of crossing groundwater was not encountered in two other shallow hand auger holes drilled along the inboard edge of the road. Geotechnical issues associated with this road are cutbank stability, fill slopes stability, stability of the larger landslide **G1**, and erosion at the outlet of the Class III watercourse. The following is a discussion of these issues. Please refer to figure below. **Deep-seated landslide:** Portions of slide **G1** in the vicinity of this road segment have experienced recent incipient slide movement. About 100 feet above the road along the back edge of a narrow bench is a series recent discontinuous scarps with about 2 to 4 of vertical displacement that are associated with incipient movement on a secondary landslide block to deep-seated landslide **G1**. This conclusion is supported by location of the scarp along the back edge of a pre existing bench, slide morphology and adjacent instability to the north. It is possible that the road cut has undercut the slope causing a relatively large block to down drop. There is however little field evidence to indicate that the toe of the slide block has moved onto the road way. A subsurface investigation (trenching or down-hole borings) would be required to determine if the upslope block toes out above or below the road. Cracks do not appear to cross the road and outside of cut and fillslope instability the road has not yet been directly damaged by slide activity. The large landslide complex at **G1** is marginally stable with a high probability for future movement under adverse seismic or climatic events. Future movement will likely result in additional ground cracks similar to what is observed and could result in additional damage to the road. Reconstructing the road across the slide is unlikely to impact deep-seated stability since the mass balance and hydrology of the large landslide will not be substantially altered. **Cutbank stability:** Road construction resulted in an 18 foot high cut that stands at a 1:1 to 1.25:1 slope. Potions of the cut have sloughed onto the roadway requiring the material to be periodically graded off. A small amount of extra road width could be obtained by cutting into the bank less than 2 feet on a full bench. For larger cuts (>2 feet into the bank) the cutbank will need to be laid back to minimize the risk of causing a cutbank failure by oversteepening the cut. It should be recognized that future cutbank instability should be expected which could periodically block the road requiring debris to be excavated and endhauled offsite. Future road failures would most likely be localized and be retained on the road with out sediment input to stream.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
MP 29 cont		**Fillslope stability:** The outer edge of the road was apparently constructed on 3 to 4 feet of sidecast fill. About 50+ feet of the road fill has failed with relatively little residual fill material left. Age of the failure is unknown. Failure is attributed to saturation of thick fill sidecasted onto steep slopes. A significant contributing factor may have been water discharged from the small Class II watercourse at **R15** and from the 12 inch ditch relief culvert to the south. Both of these culverts were placed high in the fill and do not have adequate downspouts. Most of the fill at risk for failure has already failed with the risk of a future large fill failure being relatively low. Adding downspouts to culverts will minimize the risk that runoff from culverts will saturate the residual fill and native soils leading to renewed slide activity. **Road drainage:** The 14 inch plugged CMP and the new 12 inch plastic pipe at **R15** will need to be replaced with a new 30 inch culvert with downspout. The root wad at the culvert inlet will need to be removed and the bank stabilized with rock armor. Cal Poly would like to install cross vien structures on the upstream channel. **Treatment Alternatives** The existing road is located in a geologic sensitive area. Its location on an active portion of a deep-seated landslide (**G1**) places it at inherent risk for instability. Future deep-seated movement could result in damage to the road network requiring the road to be repaired, reconstructed or rerouted. The probability and the amount of future road damage cannot be quantified at this time. It is not possible to stabilize the large landslide within the economic constraints of the NTMP and therefore any road reconstruction/repair at this site will need to be designed and constructed to accommodate future landslide movement. The goal is to upgrade the road for use in the NTMP in a manner that, although it may be partially or wholly damaged by future slide movement, it will not increase the instability of the slide nor result in a significant increase in sediment to a watercourse. Presently the road is too narrow for use in logging operations. Three alternatives were considered to upgrade the road past this site: 1) reroute the road, 2) build the outboard edge of road out on a retaining wall and 3) cut into the bank. **Alternative 1: Reroute Road** - It may be possible to reroute the road upslope along the back edge of the midslope bench. The road will still be rerouted across the active slide but would avoid having to cross it where slopes are steep. The disadvantage of this alternative is that over 500 feet of new road would be required. Some of the new road would be required to cross steep slopes but generally in an area that appears to be slightly more stable. A steep (> 18%) adverse grade would be required to the south which may preclude this as a viable alternative. **Alternative 2: Build road out on retaining wall** -In theory, the road can be widened by shoring up the outer road edge on a 10 to 15 foot high retaining wall. Because of the deep-seated instability that exists at this site, future slide movement could damage or destroy this wall. As a result the retaining wall option is not viable within the economic constraints of the project. **Alternative 3: Widen road into the bank** - The road can be widened to a 14 foot width by cutting into the bank on a full bench and endhauling spoils (~ 500 cy). The cut would be laid back to a 1.25:1 (80%) slope which is slightly gentler than what exists now. A concern is whether this alternative would increase the risk of landsliding. As demonstrated on the cross-section below, cutting into the bank should not significantly alter the mass balance of the hillside contributing to an increased risk of deep-seated landsliding. Shallow slumping of the cut would continue to occur. The road would be insloped and adequately drained. Downspouts would need to be added to the two culverts and discharged in a reasonable and controlled manner away form the road. This is considered the best alternative since it provides reasonable access, albeit temporary and does not significantly increase the risk for instability. If the landowner decides to proceed with this alternative they should be aware that the alternative does not increase the level of hillslope stability over what exists now. Future instability will occur regardless of landuse and such instability could damage or destroy the road. Ongoing maintenance of the road will be required.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
MP 29 cont		**RECOMMENDATION** • Grading o Widen the road by cutting into the bank a maximum of 2 feet and endhaul spoils - For minimal cuts that are less than 2 feet into the bank, the cut will not need to be laid back thus maintaining the small established Douglas fir trees at the top of the cut. o Backfill in the inboard ditch and inlet to the southern ditch relief culvert o At the conclusion of operations - Project engineering geologist shall inspect the cut. - Replace the toe of the slope with compacted earth if directed by the geologist or designee - Regrade the road to have an inslope pitch - Clean culvert inlets • Stream crossing o Replace the existing culvert at R15 with a new 30 inch diameter pipe - Install the pipe at grade - Install 30 foot long downspout and energy dissipater o Remove redwood stump such that the crossing inlet basin can be restored o Construct a 15 to 20 foot long catch basin at culvert inlet o Line inlet basin and banks with rock rip rap - Rock shall extend 5 feet up the channel bank in the area where the seep is located as directed - Rock shall be inclined no steeper than 1.25:1 (H:V) - Use 12 to 18 inch diameter rock placed 1½ layers deep o Conform to DFG 1600 agreement • Road drainage o Replace southern ditch relief culvert if necessary - Add downspout and energy dissipater o Maintain inslope pitch to road o Upgrade 200 feet of road drainage to the south by installing rolling dips at 75 foot spacings or ditch relief culverts at 100 foot spacings • Other o Mulch exposed soils with straw or slash per Item 18 o Project geotechnical consultant or representative should oversee the work and advise the contractor Optional treatments that could occur in conjunction with the above mitigations, depending on conditions: • Extra road width o Widen the road up to 5 feet by cutting to the bank on a full bench and endhaul material to a stable location. o Lay the slope back to 1.25:1 (80%). • Drainage o Install a 3-4 foot deep curtain drain on the inside road edge, see the typical design specifications • Cross-vein structures o Install cross-vein structures in the channel to help stabilize the channel banks and direct flow to the center of the channel. o Cross-drain structures shall be designed by Dr. Brian Dietterick, Professional hydrologist who will also oversee their installation

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
MP 29 cont		

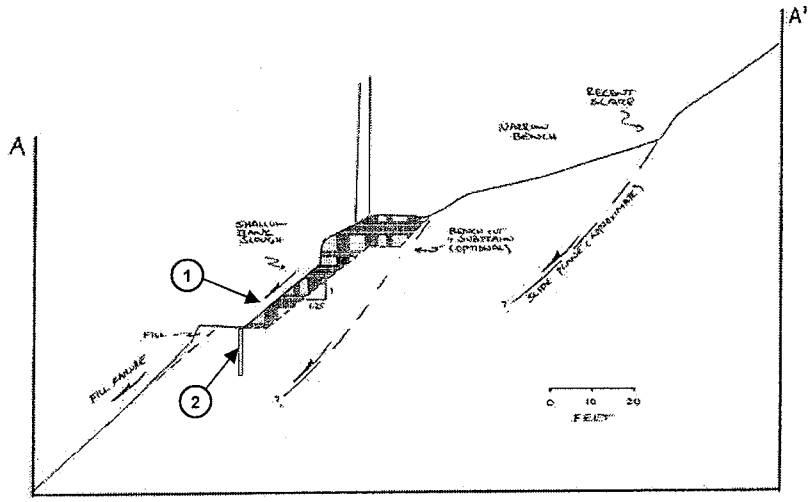
(1)
- Widen road by cutting into the bank a maximum of 2 feet. Backfill inboard ditch and endhaul excess spoils.
  - o At the conclusion of operations replace the toe of the slope with compacted earth as directed
- Optional:
  - o For additional width, widen the road into bank up to 5 feet (max) and endhaul spoils
  - o Lay cut back to a 1.25:1 (H:V) slope
  - o For cuts greater than 20 feet, incorporate a 6-foot wide intermediate bench

(2)
- Replace the existing culvert with a new 30 inch diameter pipe. Add 30± foot long downspout.
- Remove redwood stump and construct a 15 to 20 foot long catch basin at culvert inlet
- Line inlet basin and banks with rock rip rap
- Optional:
  - o Install cross-vein structures in the channel to help stabilize the channel banks and direct flow to the center of the channel per Cal Poly Hydrologist

(3)
- Inslope road
- Replace southern ditch relief culvert if necessary. Add downspout.

(4)
- Upgrade 200 feet of road drainage to the south by installing rolling dips at 75 foot spacings or ditch relief culverts at 100 foot spacings

(5)
- Optional: Install a 3-4 foot deep curtain drain on the inside road edge

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
MP 29 cont		 (1) • Widen road by cutting into the bank a maximum of 2 feet. Backfill inboard ditch and endhaul excess spoils. o At the conclusion of operations replace the toe of the slope with compacted earth as directed • Optional: o For additional width, widen the road into bank up to 5 feet (max) and endhaul spoils o Lay cut back to a 1.25:1 (H:V) slope • For cuts greater than 20 feet, incorporate a 6-foot wide intermediate bench (2) • Optional: Install a 3-4 foot deep curtain drain on the inside road edge

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
G1	Deep-seated landslide	**DESCRIPTION** Slide **G1** is an 80+ acre deep-seated translational landslide complex located on moderate to steep slopes on the east side of Little Creek. The slide complex is over 4000 feet wide, 1400 feet long and estimated to be greater than 75 feet deep toeing out in Little Creek. The failure plane extends well below the colluvial layer and into the underlying bedrock. The slide exhibits locally hummocky topography with small nested mid-slope benches, and locally shallow and somewhat poorly defined drainages. The slide consist of several smaller secondary slide blocks that exhibit differential rates of movement and coalesce together to form a larger landslide complex. Toe slopes along Little Creek tend to be somewhat steep. The toe is steep because Little Creek appears to be steadily removing the toe of the landslide. The slide complex exhibits varying degrees of activity. Portions of the slide complex are dormant with a low rate of slide movement (characterized as Dormant–Young per (Keaton and DeGraff, 1996)), whereas other portions of the slide, mainly along the toe slopes, show clear signs of recent small-scale incipient movement based on the presence of localized discontinuous scarps, local leaning trees and offset road/skid trail prisms. Slide movement has offset a portion of the road at **MP 16** and contributed to cut and fill slope instability at **MP 29**. Slide movement is mainly a natural and on going process and will likely continue to occur as a result of adverse storm or seismic events regardless of current or proposed landuse activities. Catastrophic failure is unlikely although displacement could contribute to shallow debris flows along the steeper toe slopes. Future movement will likely result in small-scale ground cracking similar to what is currently observed. Catastrophic failure is very unlikely, although movement could trigger debris flows of the steep slopes. Overall, the rate of deep-seated slide movement under static (non-earthquake) conditions is relatively low. The NTMP proposes 27± acres of light selection on this slide and to continue to use the existing road network. It is unlikely that the proposed harvest will have any measurable impact on deep-seated stability and associated sediment delivery to the stream network for several reasons. First, the harvest will employ single tree selection retaining a substantial component of the total stand. Any changes in hydrologic balance due to reduced evapotranspiration will be minor. Second, the proposed selection harvest is not expected to have a measurable impact on root strength, particularly in redwood and hardwood which dominate the site and which resprout vigorously after cutting. Moreover, any reduction in root strength will have negligible impact on a deep-seated landslide where the depth of failure extends well below the zone of root penetration. Third, there is no empirical evidence in the professional literature or from my own reconnaissance of harvest plans in the Santa Cruz area to indicate that a partial harvest under selection silviculture (or equivalent) has significantly increased the risk of deep-seated slide movement. Future movement could result in additional damage to the road network requiring the road to be repaired, reconstructed or rerouted. The road can be used for immediate use by upgrading the road at **MP 16** and **29**. If additional displacement occurs then additional geologic/geotechnical review is necessary to develop appropriated road upgrades. **RECOMMENDATIONS** • Harvesting on slides shall incorporate single tree selection maintaining a minimum of 50% of the existing stand greater than 12-inch dbh except those incidentally damaged during harvest operations. Existing silviculture prescriptions conform to this recommendation. • If the landowner desires to conduct hardwood treatment, no more than 50% of the total stems shall be harvested at one time • Road upgrades shall be made at **MP 16** and **29** as outlined in this report. If additional displacement occurs then additional geologic/geotechnical review is necessary to develop appropriated road upgrades.

6.2 GENERAL RECOMMENDATIONS

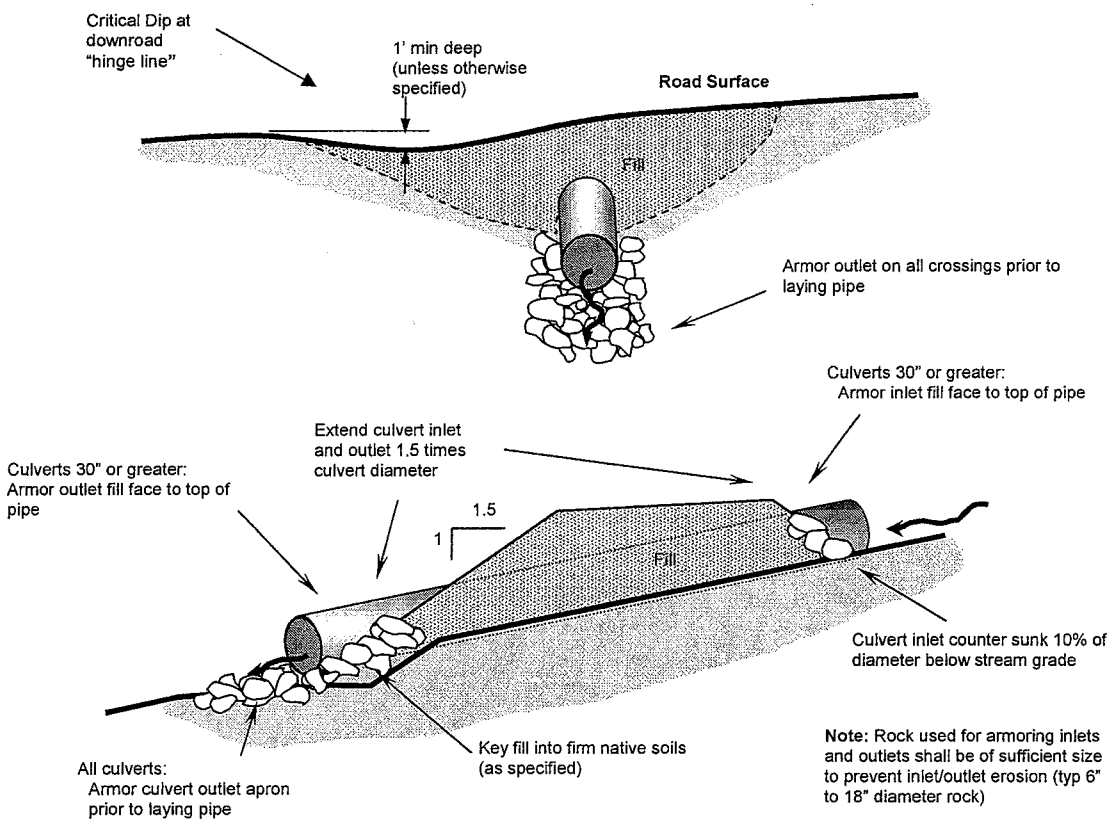
Spoil Placement
Placement of spoil shall be limited to slopes less than 30%, and shall not be placed in any swale, draw or watercourse. Spoils shall be placed in a stable configuration, less than 10' deep with a fill face inclined no steeper than 65% (2:1). Spoil shall be properly drained by out sloping or crowning. Appropriate erosion control methods shall be implemented, such as track walking, slash packing and seeding the fill face. Slash can also be placed at the base of the fill to filter out any eroded sediment.

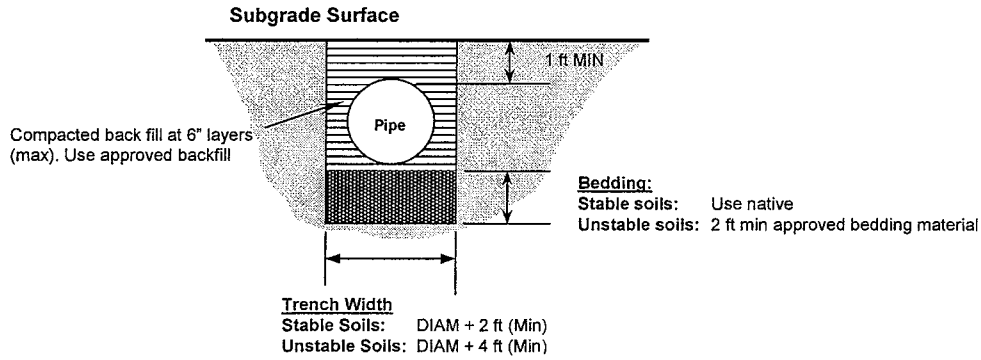
Road Drainage
Unless otherwise specified, roads and skid trails shall be drained per standard Forest Practice Rules. On roads with grades less than 10% the road may be drained by out sloping and rolling dips. On road grades greater than 10% out sloping and rolling dips can be ineffective and therefore large water bars may need to be installed.

General
If any unexpected variations in soil conditions, or any unanticipated geologic conditions are encountered during construction, or if the proposed project will differ from that discussed or illustrated in this report, we require that we be notified so supplemental recommendations can be given.

The RPF and/or LTO shall consult with the engineering geologist if additional clarifications on road construction are necessary or if the plan differs from what is described in this report.

If I am not accorded the privilege of making the recommended clarifications we can assume no responsibility for misinterpretation of our recommendations

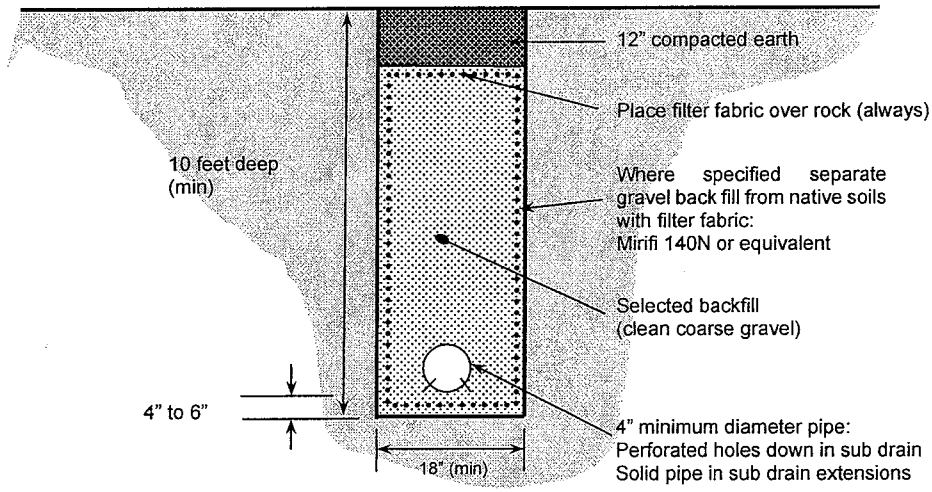




Notes:

- The culvert bed shall be clean and free of large woody debris and large rocks
- Unsuitable foundation material (highly plastic material – "blue goo") shall be excavated below the invert elevation of the culvert to an approximate depth of 2 feet and a width of at least the culvert diameter plus 4 feet.
- Unsuitable material shall be replaced with selected granular foundation material and compacted to obtain a uniform foundation.
- Select mineral soil shall be used for culvert backfill. The back fill shall be free of lumps, chunks, highly plastic material, and organic materiel
- No rocks greater than 3" in any dimension placed closer than 1 foot to the culvert
- Back fill shall be compacted to a degree greater than the surrounding soils. Soil moisture shall be adequate to achieve suitable compaction.

	PERMANENT WATERCOURSE CROSSING STANDARD PLAN	Standard Detail R1
		Date: June 27, 2007



NOTES

- Excavate 18" wide trench as specified. Trench should have positive gradient to discharge point.
- Where specified, line trench with approved filter fabric (Mirifi 140N or equivalent).
- Place perforated pipe 4" to 6" from bottom of trench. Soild pipe should extend from trench to discharge point.
- Back fill trench with clean coarse gravel to within 12" of grade.
- Place fabric over top of gravel back fill.
- Cap with 12" of compacted earth.
- Discharge in a reasonable and controlled manner.

TIMOTHY C. BEST, CEG *ENGINEERING GEOLOGY AND HYDROLOGY* *1002 Columbia Street, Santa Cruz, CA 95060* *(831) 425-5832 (831) 425 5830 fax.*	**PERFORATED SUBDRAIN STANDARD PLAN**	Standard Detail R2 Date: June 27, 2007

7.0 REFERENCES

Air Photos

1946: Flight CDF, Frames 5-1-91 to 93. Black and white, 1:10,000 nominal scale; on file at UCSC Map Library.

1956: Flight CJA, Frames 4R-177 to 179; 4R-165 and 166. Black and white, 1:10,000 nominal scale; on file at UCSC Map Library

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1982: Flight USGS JSC, Frames 3-3 and 4, 4-4 and 5. Black and white, 1:20,000 nominal scale; on file at UCSC Map Library

1989: Flight DAVENPORT, Frames 3-5 and 6. Black and white, 1:24,000, nominal scale; on file at UCSC Map Library

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Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic Seismic Hazard Assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open File Report 96-08; U.S. Geological Survey, Open File Report 96-706, p. 31.

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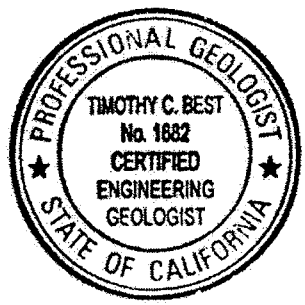
INVESTIGATIVE LIMITATIONS

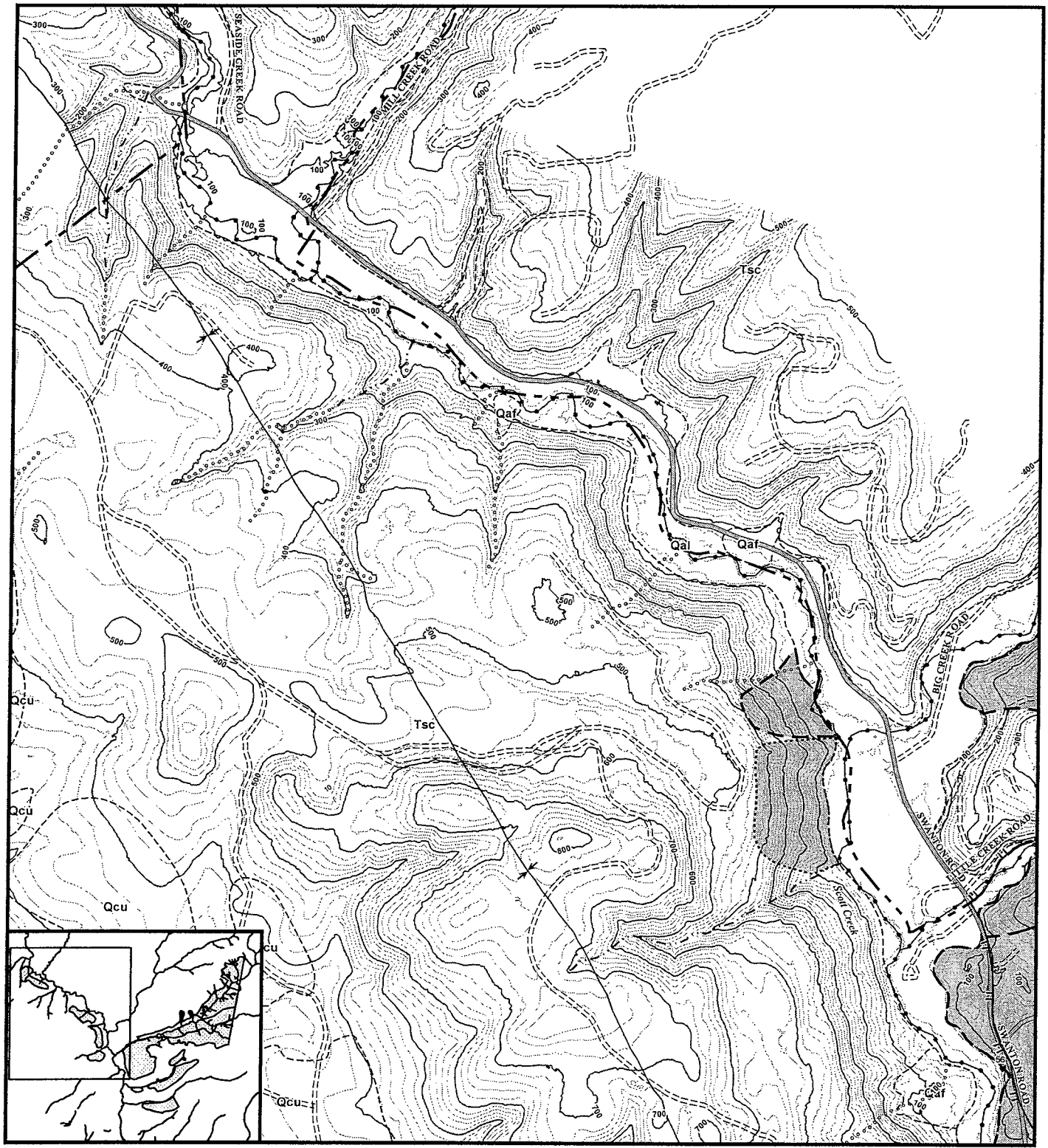
1. The purpose of this study was to conduct a limited field and air photo investigation to evaluate several road points associated with the proposed non-industrial timber harvest plan. This study is focused on *reducing* the potential impact of the proposed THP on slope instability with sediment delivery to fish bearing streams.
2. My services consist of professional opinions and recommendations made in accordance with generally accepted engineering geology principles and practices as they apply to forestry. No warranty, expressed or implied, including any implied warranty of merchantability or fitness for the purpose is made or intended in connection with our services or by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings.
3. The interpretations and conclusions presented in this report are based on a study of inherently limited scope. Observations were qualitative and limited to surface expressions and limited natural and artificial exposures of subsurface materials at and adjacent to the harvest area. Subsurface sampling and slope stability modeling are beyond the scope of this investigation. Interpretations of problematic hillslopes are typically based on the nature and distribution of existing landslide features. For this reason, the conclusions should be considered limited in extent.
4. Recommendations outlined in this report are based on qualitative observations and are designed to minimize the level of potential risk associated with the identified geologic hazards. Any "engineered" structure identified or recommended in this report should be reviewed by a licensed civil or geotechnical engineer as deemed necessary by the landowner. The conclusions and recommendations noted in this report are based on probability and do not imply the site will not possibly be subjected to rainfall, ground failure or seismic shaking so intense that structures or roads will be severely damaged or destroyed.
5. This written report comprises all my professional opinions, conclusions and recommendations. This report supersedes any previous oral or written communications concerning my opinions, conclusions and recommendations.
6. This report is issued with the understanding that it is the duty and responsibility of the client, or his or her representative or agent, to ensure that the recommendations contained herein are fully implemented.
7. The findings of this report are valid as of the present date. However, changes in the conditions of a property or landform can occur with the passage of time, whether due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or partially, by changes outside my control. Therefore, the conclusions and recommendations contained in this report cannot be considered valid beyond a period of two years from the date of this report without review by a representative of this firm.

I would like to thank you for this opportunity to assist you in your land use planning. If you have any questions or desire additional clarification, please don't hesitate to contact me.

Sincerely,

Timothy C. Best
Engineering Geologist #1682





EARTH MATERIALS

- **Qaf:** Alluvial fan deposits
- **Qal:** Alluivum
- **Qcu:** Marine terrace deposits
- **Tsc:** Santa Cruz Mudstone
- **Tsm:** Santa Margarita Sandstone
- **sch:** Schist
- **gd:** Quartz-diorite

SYMBOLS

- Geologic Contact dashed where approximate
- Strike and dip of bedding
- Syncline axis

N

0 250 500 750 Feet

1:12,000

Deep-seated landslide
recent activity (solid)
dormant (dashed)
uncertain (dotted)

Shallow landslides
- Hillslope Failure
- Road/Skid Fill Failur
- Cutbank Failure
- Channel Bank Failure
- Large Failure (typ. >750 cy)

Approximate slide volume
(Estimated from air photos)

Size Code
- < 100 cy
- 100 - 250 cy
- 250 - 500 cy
- 500 - 2000 cy
- > 2000 cy

87 Air Photo year

Roads
- Higway
- Paved
- Permanent/ Seasonal

Watercourse
- Class 1
- Class 2
- Class 3

G1 Reference Point

Harvest Unit and Boundary

Property Boundary

Geology modifed from Brabb (1989)
Landslides mapped from air photos and LIDAR imagery

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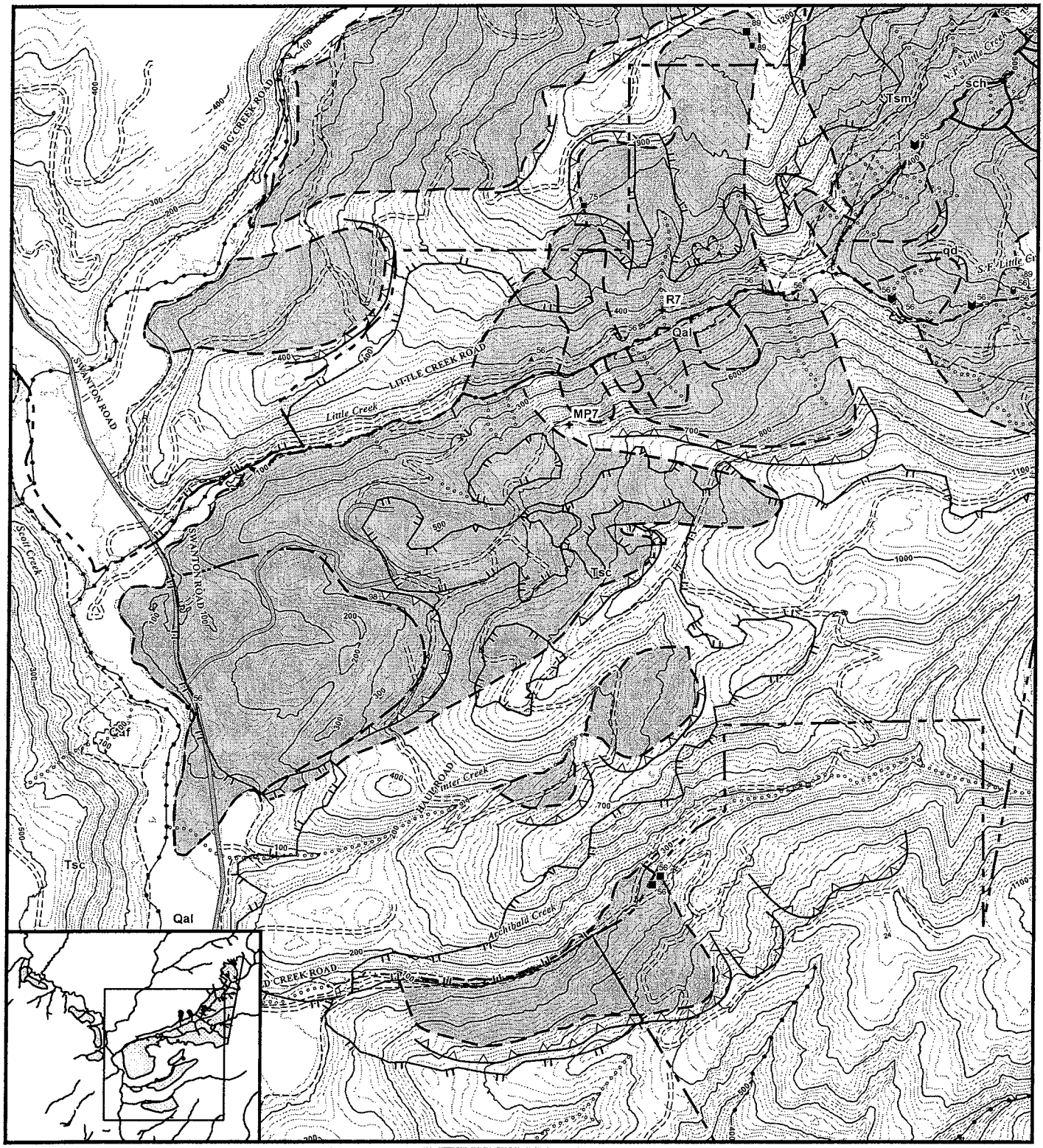
GEOLOGIC AND LANDSLIDE MAP
SWANTON PACIFIC NTMP

FIGURE 1A
Job: SPR-NTMP-429
Date 10/26/2007



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- Class 3

G1 Reference Point

Harvest Unit and Boundary

Property Boundary

Geology modifed from Brabb (1989)
Landslides mapped from air photos and LIDAR imagery

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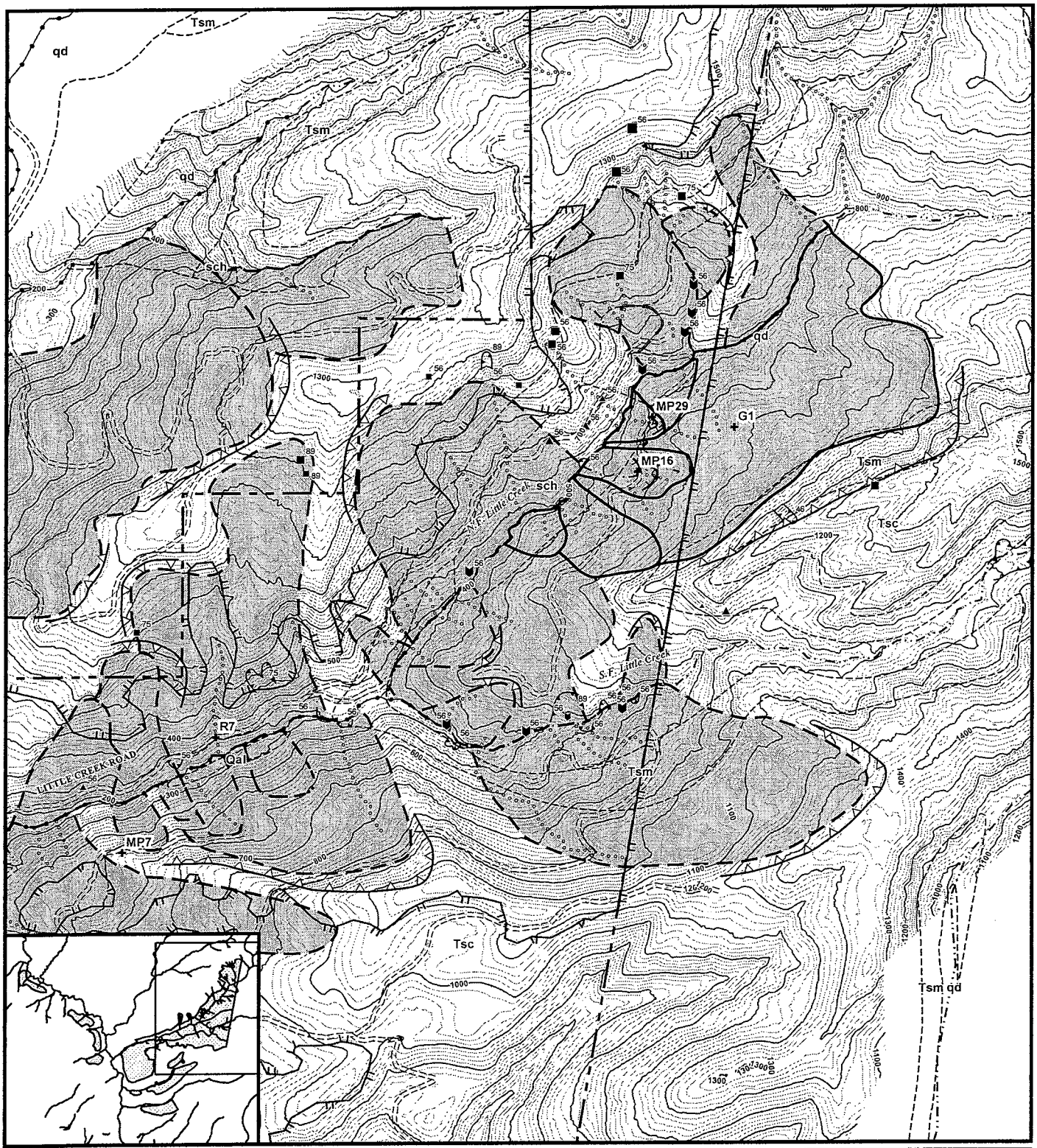
GEOLOGIC AND LANDSLIDE MAP
SWANTON PACIFIC NTMP

FIGURE 1B
Job: SPR-NTMP-429
Date 10/26/2007



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SYMBOLS

- Geologic Contact — dashed where approximate
- Strike and dip of bedding
- Syncline axis

N

0 250 500 750 Feet

1:12,000

Deep-seated landslide
recent activity (solid)
dormant (dashed)
uncertain (dotted)

Shallow landslides
- Hillslope Failure
- Road/Skid Fill Failur
- Cutbank Failure
- Channel Bank Failure
- Large Failure (typ. >750 cy)

Approximate slide volume
(Estimated from air photos)

Size Code
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- 100 - 250 cy
- 250 - 500 cy
- 500 - 2000 cy
- > 2000 cy

87 Air Photo year

Roads
- Higway
- Paved
- Permanent/ Seasonal

Watercourse
- Class 1
- Class 2
- Class 3

G1 + Reference Point

Harvest Unit and Boundary

Property Boundary

Geology modifed from Brabb (1989)
Landslides mapped from air photos and LIDAR imagery

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GEOLOGIC AND LANDSLIDE MAP
SWANTON PACIFIC NTMP

FIGURE 1C
Job: SPR-NTMP-429
Date 10/26/2007

TIMOTHY C. BEST, CEG
ENGINEERING GEOLOGY AND HYDROLOGY

1002 Columbia Street, Santa Cruz, CA 95060
(831) 425-5832 • Fax: (831) 425-5830 • e-mail: timbest@coastgeo.com

March 19, 2008

Mr. Steve Auten
Swanton Pacific Ranch
125 Swanton Road
Davenport, CA 95017

Job: SPR-NTMP-429

SUBJECT: ADDENDUM LETTER 1:
REVISIONS TO R7 AND REVIEW OF RECENT CRIB WALL FAILURE ON THE LITTLE CREEK ROAD, SWANTON PACIFIC RANCH NTMP (NTMP 1-07NTMP-020 SCR)

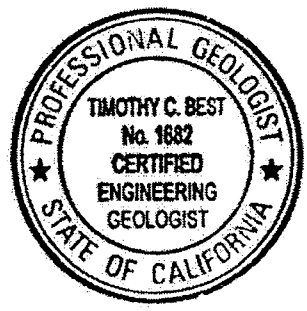
Dear Mr. Auten:

This letter responds to concerns raised by CDF, CGS, and CDF&G during the January 28, 2008 Pre Harvest Inspection. Specifically, this letter provides additional information pertaining to the proposed bridge abutments at stream crossing **R7** and reconstruction of the failed crib wall at **R9**.

Please give me a call if you have any questions.

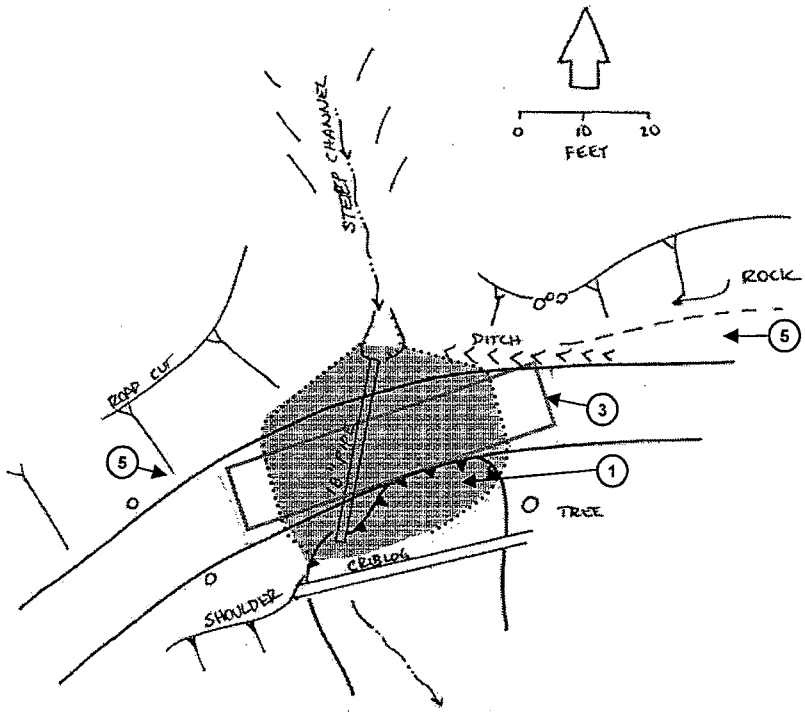
Sincerely,

Timothy C. Best
Engineering Geologist # 1682

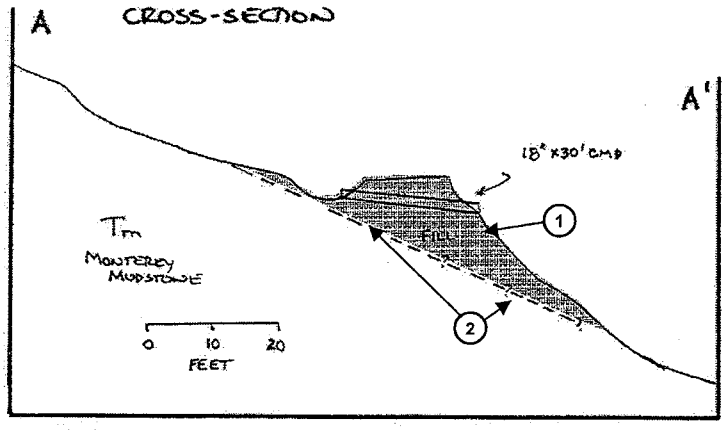
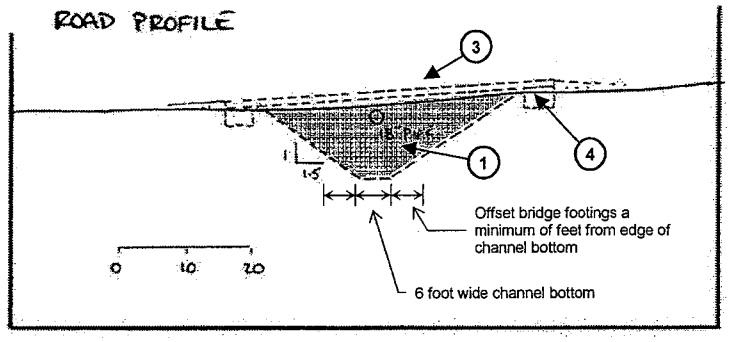


MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R7	Stream Crossing	**DESCRIPTION** This is an 18 inch by 30 foot long plastic pipe located at a narrow and steep gradient Class II watercourse. The outer edge of the crossing has repeatedly failed narrowing the road to about 10 feet. The THP proposes to reconstruct the crossing for the proposed harvest. The Class II watercourse drains a roughly 30 acre basin. The active channel is about 30 inch wide and 16 inches deep with thin alluvial/colluvial mantle. Channel morphology suggests past debris flow activity extending down the channel and through the crossing, but it is unknown if this has occurred in historic times. Road cut exposes relatively competent sandstone bedrock at a shallow depth. The road contours across 75+% sideslopes following an old rail road grade. The old road/railroad grade was probably constructed at a 24± foot width on balanced cut and fill with the outer edge partially supported by a 24 inch diameter 40 foot long crib log. The original Humboldt crossing is reportedly still in place but is not functioning. This crossing failed at some unknown date and was subsequently reconstructed at a much narrower 12 to 14 foot width. The outer edge of the road is reportedly supported on stacked rock. The 18 inch diameter curvet was installed in 1998, as an emergency repair following crossing failure associated with a 1998 El Nino event. This pipe is undersized and was installed with the outlet misaligned to the native channel. The misalignment was probably done to avoid having to disturb and reconstruct the stacked rock wall where the road was narrowest. The pipe was placed high with the outlet shot gunned out the side of the crossing fill, which has resulted in some outlet erosion. Because the road is too narrow for logging operations and because the culvert is undersized and misaligned, the crossing will need to be reconstructed. The principal geotechnical concerns are slopes stability of the residual fill and cut, crossing capacity, and upslope debris flows that may extend through the channel. The best alternative to widen the road is to cut into the bank slightly on a full bench. For the most part this would require removing old slough that has accumulated on the inboard road edge. Competent nature of the mudstone bedrock exposed in the cut to either side of the crossing suggests that the cuts will be reasonably stable. Two alternatives exist to reconstructing the crossing. The first alternative would be to remove the old culvert and install a new 48 inch diameter pipe at grade and aligned with the natural channel. The 48 inch pipe would carry the expected 100 year flow but would be at risk for plugging from an upslope debris flow. The second alternative would be to remove the crossing and install a relatively short bridge. The bridge option would provide a higher level of stability against upslope debris flows, although it would not be entirely immune. The landowner proposes to implement the second alternative.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R7 Cont		**RECOMMENDATION** • Widen the road into the bank about 4 to 6 feet on a full bench. Soils may be endhauled or feathered out along the inboard edge. • Remove crossing and associated fill. The excavated crossing shall have a minimum 6 foot wide channel bottom with uniform channel grade. Banks shall be laid back to 1.5:1 (65%) slope or gentler, unless otherwise directed onsite by the project engineering geologist or designee. Steeper channel banks up to a 1:1 slope may occur if competent native earth materials are encountered. o About 100 to 150 cy of material will need to be excavated and endhauled to a stable location on slopes less than 30%. • Install cross-vein structures in the channel to help stabilize the channel banks and direct flow to the center of the channel. o Cross-drain structures shall be designed by Dr. Brian Dietterick, Professional hydrologist who will also oversee their installation • Install a bridge that is long enough to span between its abutments. o Bridge shall utilize suitable footings. - Footings shall be offset a minimum of 5 feet from the edge of the channel bottom. Final location and depth of footings to be determined in the field by the project geotechnical consultant at the time of operations. - It is my understanding that Cal Polly has traditionally used buried wood logs for the bridge footings. Logs are generally adequate for temporary bridges but are not suitable for permanent crossings because they tend to rot out in time. For this crossing a more permanent footing such as reinforced concrete blocks or piers is preferred. The RPF and/or landowner shall provide final bridge footing design criteria to the project geotechnical consultant prior to bridge installation. • Conform to DFG 1600 agreement • Mulch exposed soils per Section II, Item 18 of the NTMP • The project engineering geologist or designee shall supervise work

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R7 Cont		

1. Remove crossing and associated fill. The excavated crossing shall have a minimum 6 feet wide channel bottom with uniform channel grade. Banks shall be laid back to 1.5:1 (65%) slope or native grade, unless otherwise directed onsite by the project engineering geologist or designee. Steeper channel banks up to a 1:1 slope may occur if competent native earth materials are encountered.
3. Install a bridge that is long enough to span between its abutments
5. Cut into bank to gain extra road width. Drain road prior to bridge.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R7 Cont		  (1) Remove crossing and associated fill. The excavated crossing shall have a minimum 6 feet wide channel bottom with uniform channel grade. Banks shall be laid back to 1.5:1 (65%) slope or gentler, unless otherwise directed onsite by the project engineering geologist or designee. (2) Install cross-vein structures per recommendations of Cal Poly hydrologist (3) Install a bridge that is long enough to span between its abutments. (4) Bridge shall utilize suitable footings. Footings to be offset a minimum of 5 feet from the channel bottom. Final location and depth of footings to be determined in the field by the project geotechnical consultant at the time of operations.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
R9		**DESCRIPTION** During the 2007-08 winter the upper portion of a 45 foot long log crib wall supporting Little Creek Road failed, narrowing the road to less than 16 feet. less than 5 cy of material failed with debris retained a short distance downslope without sediment delivery to a watercourse. During the PHI concern was raised by the reviewing agency about the stability of the residual fill and CGS Engineering Geologist Tom Spittler recommended that a detailed engineering geologic review of the site be prepared and submitted to CDF prior to second review. The following outlines the geotechnical conditions and conceptual design for the Little Creek Road crib wall repair. The overall objective is to reconstruct the logging road past the failure for future logging operations and as economically as possible while minimizing offsite impacts. **Site Conditions:** The road was constructed in 1989 across a steep (75% to 80%) swale at a 17 to 20 foot width supported by a 5 to 6 foot high log crib wall. The wall consisted of two 24± inch diameter stacked redwoods logs retained on either end behind two small groups of redwoods. A 2 to 3 foot deep inside ditch draining to a 12 inch culvert was installed along the back edge of the road to intercept shallow groundwater. This culvert discharges water to the south and outside of the swale. The road grade is between 12% and 17% with a strong outslope pitch past the swale. Over the past 18 years the two logs have slowly decayed contributing to the 2007-08 failure. A switchback of the old railroad grade is located about 100 feet upslope but does not impact the road. A spring servicing a domestic water intake is found about 100 feet downslope within the swale. Further down the swale a cabin is located. **Geologic Conditions:** The site is located along the mapped contact between the overlying Santa Cruz Mudstone and underlying Santa Margarita Sandstone. The contact was not directly observed. Most bedrock outcrops along the road exposed sandy siltstone which appears to be part of the Santa Cruz Mudstone. Bedrock is mantled by colluvial soils and old landslide debris comprised mainly of loose organic rich silty sand with abundant sandstone and siltstone clasts of varying sizes. Depth of colluvium is variable, ranging between 2 to greater than 5 feet. An attempt was made at two hand auger borings to evaluate subsurface conditions. Both of these borings were shallow with refusal on gravelly soils at a maximum depth of 2 feet. Soils in the borings were mainly organic rich topsoil and the results were not particularly useful in the analysis. **Landsliding:** A shallow debris flow landslide scar is located about 50 feet upslope of the road within the axis of the swale. The morphology of the slide suggests it may be relatively recent (1982?) but predating the construction of Little Creek Road in 1989. The failure is probably naturally occurring within the steep gradient swale, where soils and subsurface groundwater tend to concentrate. Old slide debris resides in the axis of the swale downslope of the road. The morphology of the swale is consistent with infrequent shallow landslide activity. Future shallow slope instability should be expected in response to adverse climatic or seismic events, which could periodically block the road requiring debris to be excavated and endhauled offsite. The site is also located along the southern margin of a 40+ acre deep-seated landslide complex which appears to extend down the axis of the swale. The potential for future deep-seated slide activity was not evaluated, but no signs of recent or active deep-seated slide activity were observed in the immediate area. If the slide were to move it could damage or destroy the road. Reconstructing the road across the slide, however, is unlikely to adversely impact deep-seated stability since the mass balance and hydrology of the large landslide will not be substantially altered. **Groundwater:** The site is located within an area that appears to have perennial high groundwater. The ground is locally wet and the sound of subsurface water can be heard year round flowing within the swale axis at shallow depth below the ground. The bulk of flow is below the depth of the inside road ditch, which primarily captures cutbank seeps. About 100 feet downslope of the road and within the swale is a spring servicing a domestic water intake. Runoff from the inside ditch is conveyed to a ditch relief culvert and discharged to the south of the swale and away from the area of the water intake.

MP	FEATURE	DESCRIPTION AND RECOMMENDATION
		Groundwater flow is dependent upon the topography, earth materials, and geologic structure. Subsurface flow and pore pressures are controlled by the permeability of the material. Zones of low permeability, such as clay or cemented bedrock impede groundwater flow, either perching groundwater on top or confining it below. In competent bedrock most of the subsurface runoff is along joints and fractures with little interstitial flow. Within the colluvium and weathered bedrock, most of the subsurface flow is interstitial, flowing between individual particles. Permeability contrasts between the colluvium, weathered bedrock, and competent bedrock, force shallow subsurface flow to be concentrated along the axis of the bedrock depression (hollow). At present there is insufficient information to determine the origin and flow pattern of groundwater. The sound of flowing water along either fractured bedrock or within a soil pipe eroded in the colluvium is easily heard. The high groundwater flow may be due to permeability contrasts between the different earth materials, or due to dilation along the lateral margin of the deep-seated landside. Regardless, groundwater flow appears to be significant and occurring at a shallow depth. **Treatment Alternatives** The primary factors to be considered in the design and construction of the roadway are the presence of potential weak soils, steep slopes, past landsliding, high groundwater and the downslope water intake. The existing road is located on steep slopes with locally weak earth materials, high groundwater conditions, and evidence of past instability. Natural shallow and deep-seated landsliding has occurred and should be expected to occur in the future under adverse climatic or seismic conditions. Future slide movement could impact the road requiring repair or reconstruction. Excavating into the hillside could intercept the zone of high groundwater, which could alter the local groundwater regimen and complicate construction. To control subsurface flow a subdrain system will be required. Collecting water and discharging outside of the swale or downslope of the water intake could impact the amount of water available at the intake. If water is discharged in the swale and above the intake then materials used in the subdrain should conform to drinking water standards. Based on information gathered to date, it is not economically feasible to reconstruct the road in such a manner that eliminates all geologic risk. Therefore, a goal is to upgrade the road for use in the NTMP in a manner that, although it may be impacted by future slide movement, it will not increase the instability of the slide, result in a significant increase in sediment to a watercourse, or significantly impact the downstream water intake. Presently the outside edge of the road is potentially unstable and the road is too narrow for long term use. Several alternatives were considered to upgrade the road past this site for both short and long term use: 1. Maintain existing narrow roadway for short term use 2. Bridge road across failure 3. Build road out on retaining wall or rock buttress 4. Widen road cut into bank. Based on available information, maintaining the narrow roadway provides the most economical short term solution for road access. Over time, however, continued erosion may further undercut the road requiring a more "permanent" solution to be employed. For longer term stability the bridge option is judged to provide the necessary access at a reasonable cost while minimizing offsite impacts and maintenance. Building the road out on a rock buttress is also feasible but uncertainties in subsurface soil strength and groundwater conditions may complicate construction and result in possible impacts to the downstream water intake. Widening the road by cutting into the bank is not recommended.

Short Term
Alternative 1: Maintain narrow road
In the short term it should be feasible to maintain a 12 foot road width by temporarily infilling the inside road ditch to gain extra room and then reestablishing the ditch at the conclusion of operations. The road may need to be widened a couple of feet into the comparatively stable bank north of the swale and outside of an area of significant geologic concern. Residual perched fill that had been retained by the crib wall will be pulled back to a 1:1 or gentler slope.

Increased stability may be achieved by installing a subdrain (French drain) along the back edge of the road, however, it is uncertain how deep the drain can be installed or how effective it may be at stabilizing the residual material. Within the swale it is possible that the drain would intercept the zone of high groundwater flow which could complicate drain installation. As previously mentioned, discharging flow outside of the swale or downslope the water intake could impact the quantity of water available at the intake. If water is discharged in the swale and above the intake then materials used in the subdrain should conform to drinking water standards.

This alternative is the most cost effective for a short term solution. The main disadvantage with this alternative is that it does not provide long term stability and the resultant 1:1 fill slopes may still be unstable.

Long Term
Alternative 2: Bridge the site
For longer term stability the road can be reconstructed at a 14 foot width by supporting the outer 8 feet of the road on a 62 foot long rail car bridge and the inside 6 feet on native earth. The bridge would be founded along its inside edge on native earth with the bridge abutments founded into firm native soils behind the two clumps of redwood, which should provide adequate lateral support. Both approaches would need to be regraded to lower the road grade and the road may need to be widened a couple of feet into the comparatively stable bank north of the swale. Unstable fill material would be removed and the inboard ditch maintained. The existing ditch relief culvert would be relocated south of the bridge abutment and discharged outside of the main swale.

The advantage of this alternative is that it provides the necessary access while at the same time minimizing the amount of grading and resulting impact to the slope and groundwater regime. Based on available data the bridge option provides the greatest level of success since it spans and avoids the problem area.

The disadvantage is that the bridge would need to be installed at a 12+% grade, which is steeper than optimum. Stability of the bridge abutments cannot be fully evaluated until footings are excavated, which may encounter thick roots behind the two redwood clumps. Placing the inside edge of the bridge on or near the ground surface could accelerate rust and corrosion of the bridge thus necessitating periodic inspections, although proposed use of gravel mat to rest the bridge on would increase drainage and reduce corrosion potential. The risk of upslope shallow landsliding will not be mitigated (nor is it mitigated by any of the options). A future upslope landslide could deposit material on the bridge possibly damaging it and causing it to need repair or replacement. Similarly, the risk of a downslope landslide will not be mitigated, unless a subdrain is installed. It is unlikely that a downslope failure would undermine the bridge footings, nonetheless annual inspections of the ground below the bridge should be made to determine if a winter failure has occurred.

Alternative 3: Reconstruct road on rock buttress
The road can be widened to a 14 foot width by reconstructing the outside edge of the road on a rock buttress (or mechanically stabilized earth (MSE) wall) and draining the slope with a series of subdrains. The inside road ditch would be temporarily infilled and reestablished at the conclusion of operations.

The near surface underlying soils below the road appear to be old slide debris of uncertain depth. Based on the limited surface exposures these soils are relatively weak and are probably not suitable to support the foundation of a retaining wall or rock buttress. The rock buttress/retaining wall would need to be founded at depth into firm native soils. At present there is little subsurface information on soil or groundwater conditions to determine how deep the foundation will ultimately need to go. An attempt was made to hand auger through the debris but too many rocky clasts were encounter to yield meaningful results. Additional subsurface exploration will be required to determine the depth of embedment.

The buttress footing would likely encounter the zone of high groundwater. Intercepting the zone of high groundwater flow could impact construction and the downstream water intake. To control groundwater a back drain should be installed at the base of the keyway and sloped to drain to a controlled discharge point. As previously mentioned, discharging flow outside of the swale or below the water intake could impact the quantity of water available at the intake. If water is discharged in the swale and upslope of the intake then materials used in the subdrain should conform to drinking water standards.

Based on available information, constructing the rock buttress would involve removing 120+ cy of loose residual fill and replacing it with a similar quantity of rock rip rap. The keyway should be a minimum of 8 feet wide and extend a minimum of 3 feet below the loose slide debris. Rock should consist of 24 inch to 36 inch diameter angular rip rap and should be brought up to grade at a 1:1 slope.

The advantage of this alternative is that it provides the necessary access and may improve local stability through the installation of a series of subdrains. The disadvantage is that extensive excavation would be required to develop a suitable foundation and to install the structure. The buttress footing would likely encounter the zone of high groundwater which could impact construction and the downstream water intake. A rock buttress would need to be brought up to grade at a 1:1 slope, which is somewhat steeper than optimum and could necessitate periodic maintenance to repair portions of the structure that have settled. A mechanically stabilized earth (MSE) wall could be near vertical but the costs of this structure would probably be cost prohibitive. Additional work would be required to further evaluate the feasibility of a MSE wall.

If the buttress option is pursued, additional subsurface work should be undertaken either prior to construction or when the buttress footings are being excavated, to more accurately determine the limits and depth of the structure.

Alternative 4: Widen the road into the bank and support the cut with a retaining wall
It may be possible to widen the road into the bank and support the cut with a soldier pier retaining wall, however this option would be expensive and not cost effective at present. Cutting into the bank to gain extra road width without supporting the cut would lead to hillslope failure and is not recommended.

RECOMMENDATIONS
The following table outlines the minimum work needed to upgrade the road. Additional work may be required over time.

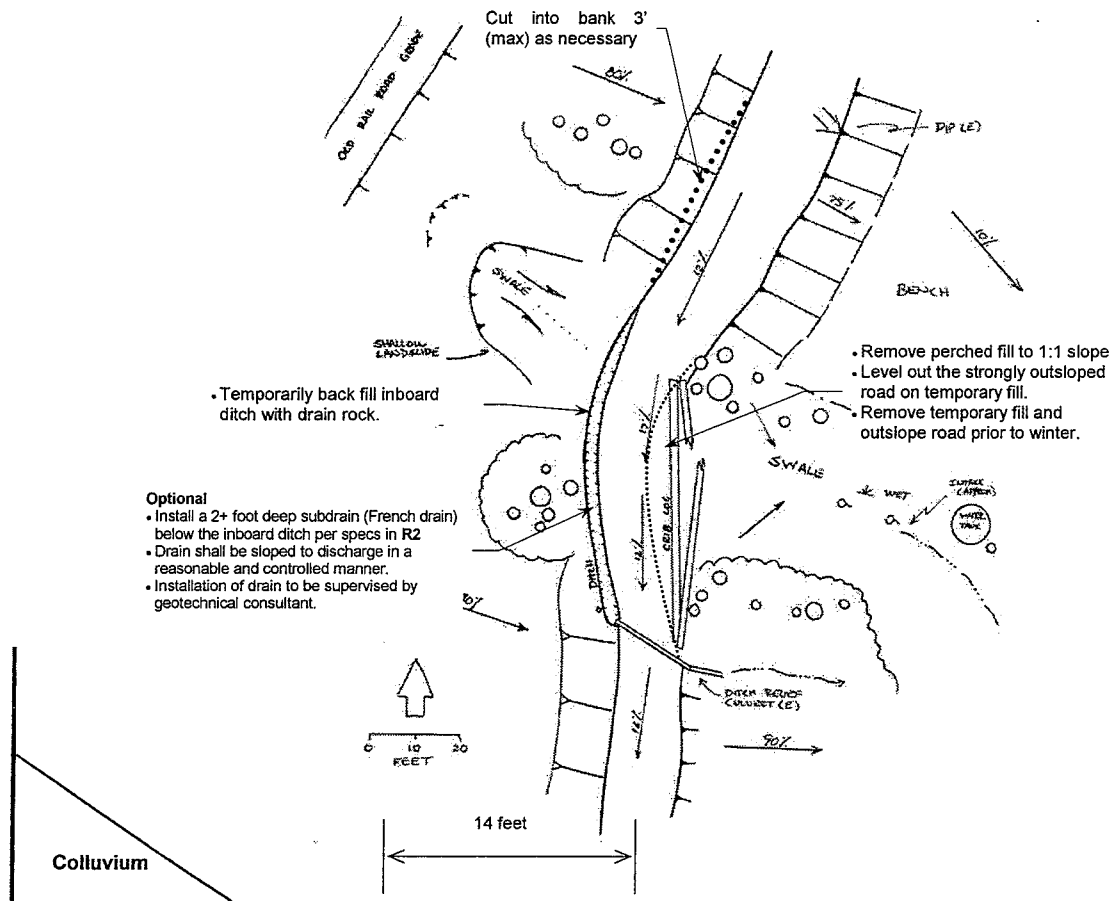
Short Term
Alternative 1: Maintain narrow road
- Remove crib log and pull back residual fill material to a 1:1 slope
- Temporarily backfill the inside ditch with drain rock
- Level out the strongly outsloped road on temporary fill
- About 50 feet north of the swale the road can be widened a maximum of 3 feet into the comparatively stable bank if extra road width is required for trucks to make the turn through the swale.
- Maintain existing rolling dip located about 75 feet to the north

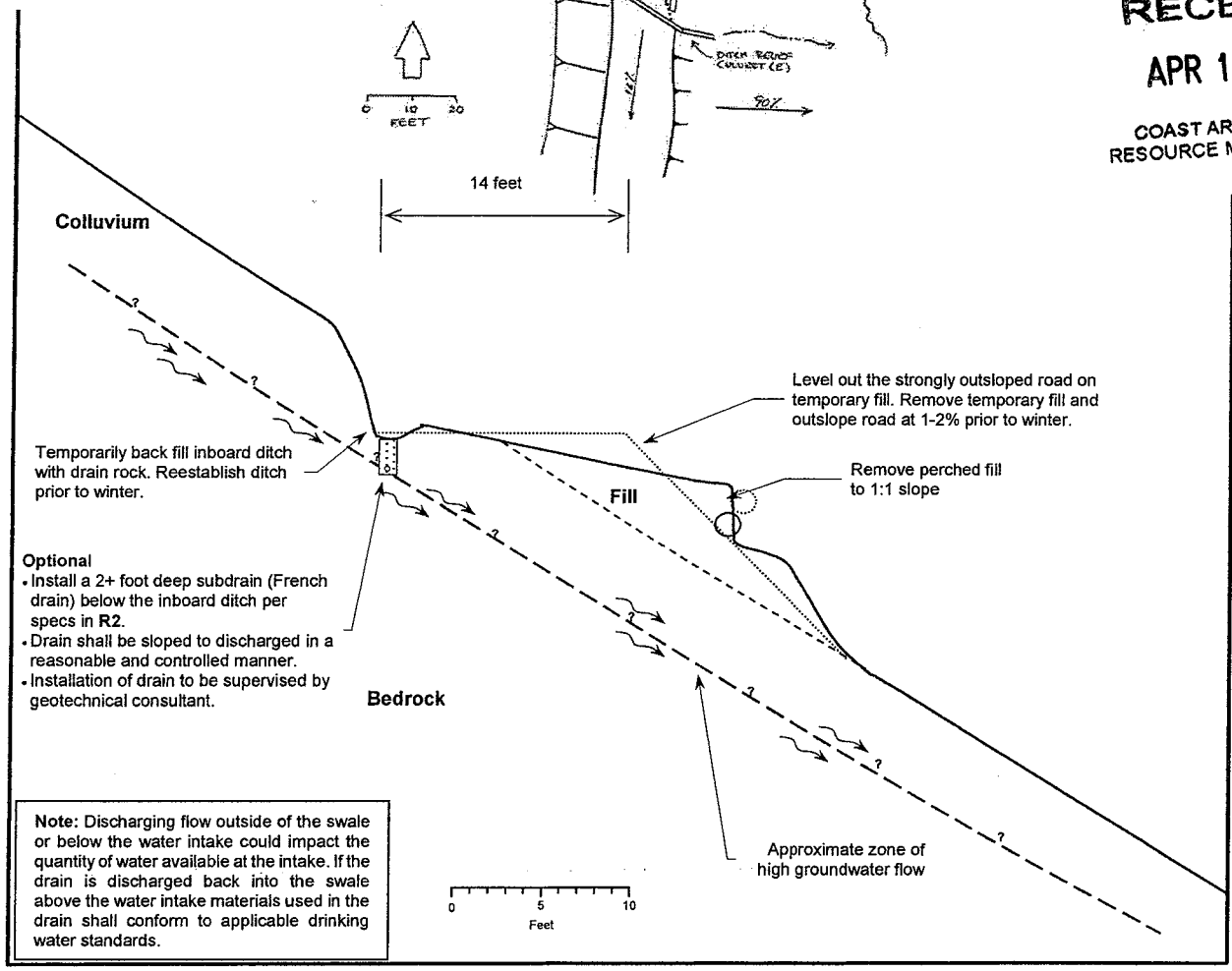
Optional:
- Install a 2+ foot deep subdrain (French drain) below the inboard ditch
  - See **R2** for typical drain specifications
  - Drain shall be sloped to discharge in a reasonable and controlled manner to an area within the swale and above the water intake unless otherwise specified by the project geotechnical consultant at the time of construction. If discharged upslope of the water intake then materials used in drain construction shall conform to drinking water standards.
  - To allow for periodic cleaning, a cleanout shall be installed at the head of the subdrain
  - Drain installation to be supervised by geotechnical consultant

Long Term
Alternative 2: Bridge the site
- Remove crib log and pull back residual fill material to a 1.5:1 slope
- Install permanent 62 foot long railcar bridge
  - Bridge abutments to be keyed into firm native soils behind the two redwood clumps located at either side of the swale
  - Bridge abutments may consist of reinforced concrete blocks or piers. The RPF and/or landowner shall provide final bridge footing design criteria to the project geotechnical consultant prior to bridge installation.
  - The existing 12" diameter ditch relief culvert may need to be relocated to accommodate the bridge footing. Culvert shall discharge outside of the swale leading to the domestic water intake.

		o Inside edge of the bridge to be founded on native earth or on a gravel mat • Temporarily backfill the inside ditch with drain rock as judged necessary. Reestablish ditch at the conclusion of operations and prior to the winter season. • About 50 feet north of the swale the road can be widened a maximum of 3 feet into the comparatively stable bank if extra road width is required for trucks to make the turn through the swale. • Maintain existing rolling dip located about 75 feet to the north • Geotechnical consultant to supervise excavation of bridge abutments Optional: • Install a 2+ foot deep subdrain (French drain) below the inboard ditch as described in Alternative 1 **Alternative 3: Reconstruct road on rock buttress** The following are conceptual recommendations • Rock buttress to be keyed a minimum of 3 feet into firm native soils o The keyway shall be a minimum of 8 feet wide and inclined into the hillside 5% o The back cut shall be inclined no steeper than a 0.75:1 slope. The final inclination of the temporary cut is the responsibility of the contractor based on safety considerations. o About 120± cy of material will need to be excavated. Some of this material may be incorporated into the inside edge of the road above and below the site, the remainder will need to be endhauled to an approve stable location on slopes less than 30% o **Note: Excavation of the keyway may encounter the zone of high groundwater flow complicating excavation and buttress construction.** • A backdrain shall be installed at the back and base of the keyway o The backdrain shall consist of a 4-inch diameter, perforated SDR35 pipe (or equivalent) surrounded on all sides by at least 4-inches of ½ to ¾ inch drain rock wrapped in filter fabric (Mirafi 180NC or equivalent). o Approved Class 2 permeable material may be used in lieu of drain rock wrapped in fabric o The backdrain shall be sloped to drain to a controlled discharge point a minimum of 30 feet downslope. Water shall be discharged in a manner as to minimize the impact to the water intake. o To allow for periodic cleaning, a cleanout shall be installed at the head of the backdrain, at every bend greater than 45 degrees, and at 150 foot intervals o Materials used in the drain shall be compatible with drinking water standards. o **Note: Discharging groundwater flow outside of the swale or downslope the water intake could impact the quantity of water available at the intake.** • The rock buttress shall consist of 24 inch to 36 inch diameter sound angular rock and brought up to grade at a 1:1 slope and capped with a minimum of 18" of compacted soil. Separate soil from rock with woven geotextile fabric (Mirifi 500X or equivalent). • Temporarily backfill the inside ditch with drain rock as judged necessary. Reestablish ditch at the conclusion of operations and prior to the winter season. • About 50 feet north of the swale the road can be widened a maximum of 3 feet into the comparatively stable bank if extra road width is required for trucks to make the turn through the swale. • Maintain existing rolling dip located about 75 feet to the north • Geotechnical consultant to supervise excavation of the rock buttress

ALTERNATIVE 1: MAINTAIN NARROW ROAD





Note: Discharging flow outside of the swale or below the water intake could impact the quantity of water available at the intake. If the drain is discharged back into the swale above the water intake materials used in the drain shall conform to applicable drinking water standards.

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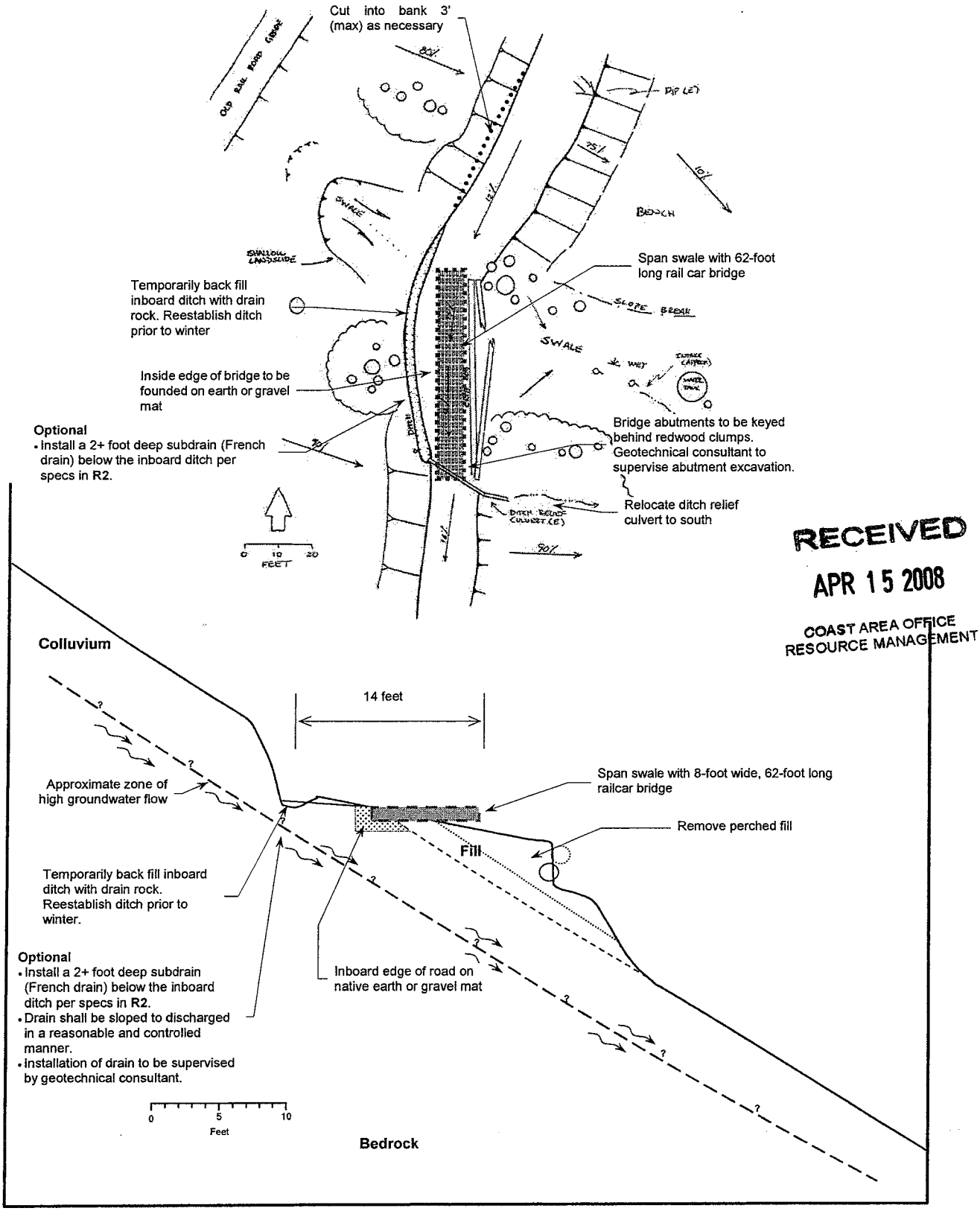
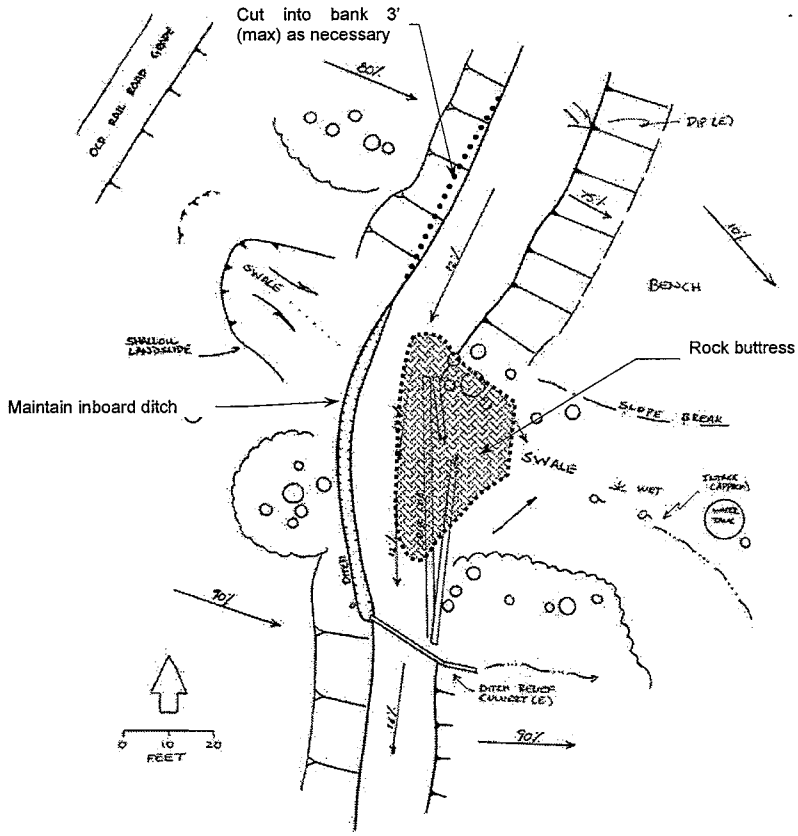
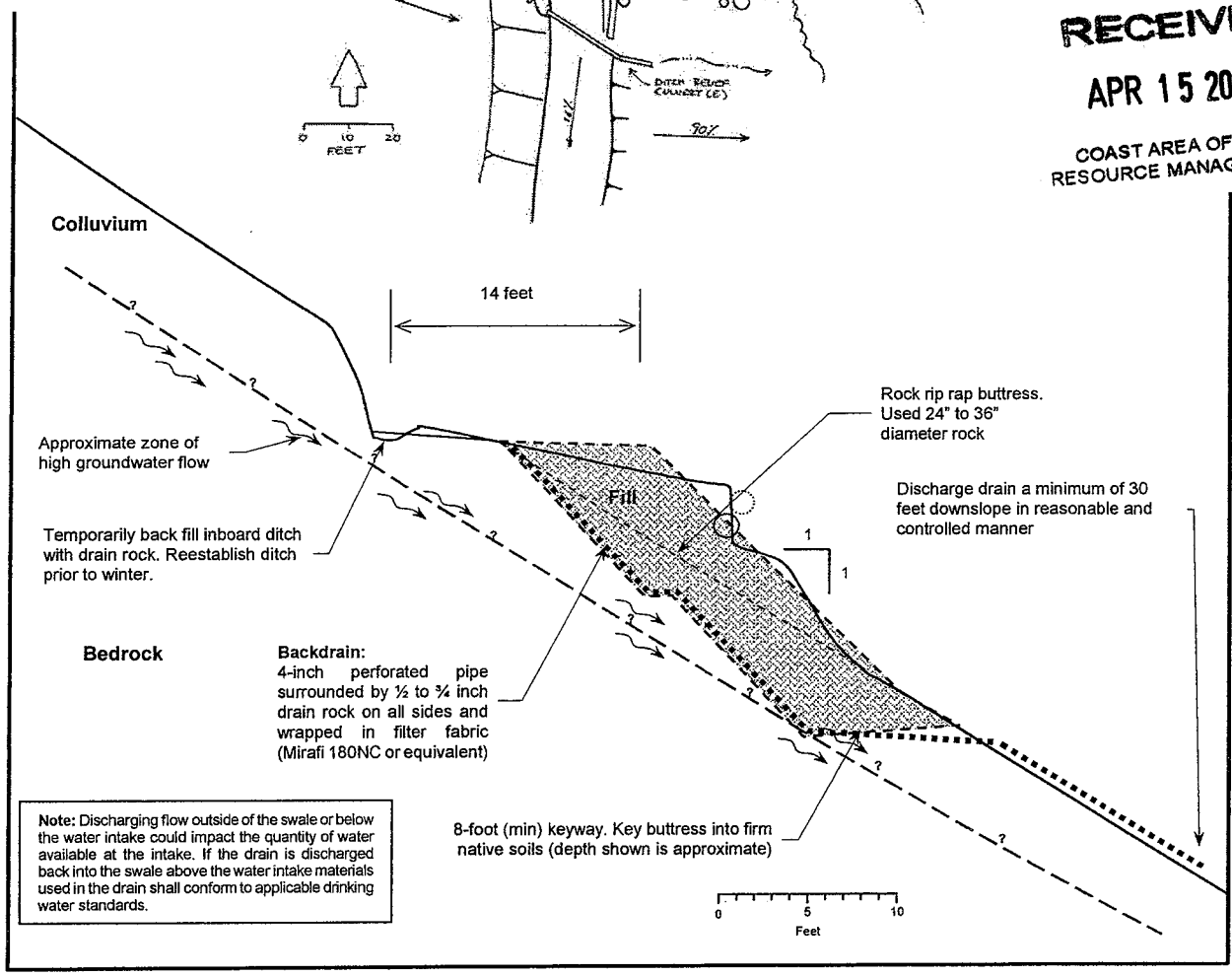
ALTERNATIVE 2: BRIDGE



ALTERNATIVE 3: ROCK BUTTRESS





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