

**Watershed Analysis
for Mendocino Redwood Company's Ownership
in the
Noyo River Watershed**

Introduction

This report presents the results of a watershed analysis performed by Mendocino Redwood Company (MRC) on their ownership in the Noyo River watershed. The MRC ownership in the Noyo River watershed is considered the Noyo watershed analysis unit (WAU). This section presents an overview of the watershed and the watershed analysis process followed by MRC. More specific information is found in the individual modules of this report.

Mendocino Redwood Company's Approach to Watershed Analysis

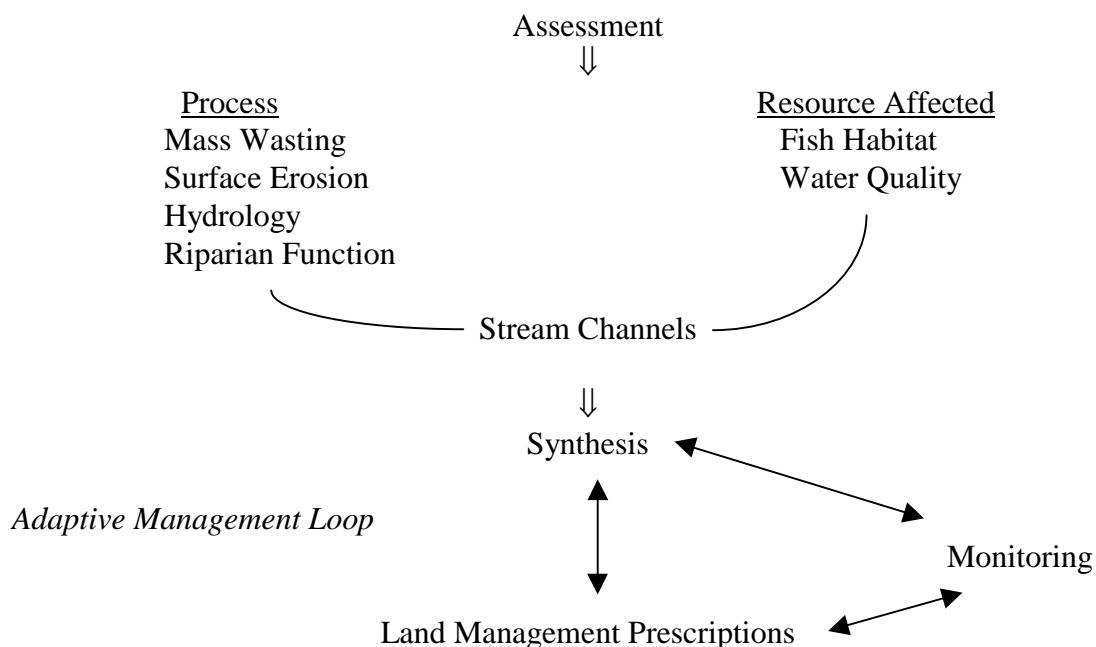
MRC is conducting watershed analysis on watersheds within its ownership in Northern California. The criteria for a watershed to be selected for intensive analysis are: 1) impaired waterbodies pursuant to the Clean Water Act Section 303(d), and 2) key fish populations and 3) forestry operation-related concerns.

The Noyo River is on the 303(d) list as sediment impaired and a total maximum daily load (TMDL) must be developed for sediment reduction in the river by the end of 2001. The Noyo River and its tributaries support populations of coho salmon and steelhead trout, two fisheries of concern in northern California. For this reason MRC conducted a watershed analysis to assist in their efforts to reduce non-point source pollution, evaluate current and past land management practices and establish a baseline for monitoring of watershed conditions over time. The watershed analysis will also be used to identify needs for site-specific management planning in the watershed to reduce impacts to aquatic resources and potentially to improve fish and stream habitat conditions.

The watershed analysis of the Noyo River WAU was conducted following modified guidelines from the Standard Methodology for Conducting Watershed Analysis (Version 3.0, Washington Forest Practices Board). Some variations of the methods in this manual were performed when it was determined that the methodology better served the purpose of this assessment. The watershed analysis process is not yet a regulatory requirement in the state of California. However, MRC is using this process to address cumulative effects from forest practices and provide baseline information of watershed conditions for aquatic habitat and water quality for their ownership.

MRC's approach to the Noyo River watershed analysis was to perform resource assessments of mass wasting, surface and fluvial erosion (roads/skid trails), hydrology, fish habitat, riparian condition and stream channel condition. Mass wasting, riparian condition and surface and fluvial erosion modules address the hillslope hazards. The physical processes and potential triggering mechanisms for each hillslope hazard are described in the module reports. The vulnerability of aquatic resources is addressed by the fish habitat and stream channel condition modules. The results of the resource assessments are synthesized and reported in a causal mechanism report (Figure 1). A causal mechanism report is produced for each hillslope hazard that has affected or has the potential to adversely affect aquatic resources. The causal mechanism report contains a description of the hillslope hazard and how land use activities trigger or route key input variables such as coarse sediment, fine sediment, wood and heat energy to sensitive resources. A prescription is developed to address the issues and processes identified in each causal mechanism report. Finally, monitoring is suggested to determine the efficacy of the prescriptions to protect sensitive aquatic resources. The monitoring will provide the feedback for MRC's adaptive management approach to resource conservation.

Figure 1. Watershed Analysis Overview



Assessment Overview

This watershed analysis was produced from a combination of field observations, performed during the summer of 1998, aerial photograph interpretation, and use of existing analysis on the Noyo WAU.

Existing data or analysis used in this watershed analysis included: Louisiana-Pacific's (L-P) Coastal Mendocino Sustained Yield Plan, old Fish and Game Reports on large woody debris removal, landslide mapping by John Coyle (John Coyle and Associates), and monitoring data collected by L-P. These information sources are cited in each module as they are used.

Aerial photograph interpretation was performed using available aerial photographs for the recent time period. The delineation of time periods for analysis was based on the available aerial photographs. The aerial photographs used are described below.

<u>Aerial Photo Year</u>	<u>Scale</u>	<u>Photo Source</u>
1978	1:15,840	Mendocino Redwood Co.
1996	1:12,000	Mendocino Redwood Co.

The synthesis of the field observations, aerial photo interpretation and existing analysis on the WAU constitutes the resource assessment modules in this report.

Noyo River Watershed Analysis Unit Overview

Physical Characteristics

General Location

The Noyo WAU is located in the California Coast Range drains into the Pacific Ocean in western Mendocino county, California. The outlet of the Noyo River is adjacent to the city of Fort Bragg.

The Noyo River watershed encompasses approximately a 106 mi² area. The MRC ownership is within 7 different planning watersheds in the Noyo watershed as delineated by the California Water Agency. MRC owns approximately 29 percent of the land in the Noyo River watershed (see Base Map, Noyo River Watershed Map and Table 1). The basin's elevations range from sea level to 3205 feet. Rainfall is seasonal in this region, with most of the rain (approximately 59-64 inches/year, Table 1) occurring between October and May.

Table 1. Selected Physical Characteristics by Planning Watershed for the Noyo River WAU (from L-P's Coastal Mendocino SYP, 1997).

Characteristics	McMullen Creek 11320010	Redwood Creek 11320011	Olds Creek 11320012	Hayworth Creek 11320013	Middle Fork Noyo 11320014	North Fork Noyo 11320015	Upper Noyo 11320021
Watershed Area (ac)	7066	3360	6963	7104	4563	6515	8429
MRC Owned Area (ac)	2017	1098	2336	4816	4176	4938	627
MRC Owned Area (%)	29%	33%	34%	68%	92%	76%	7%
Mean Annual Precipitation	59	60	60	64	61	60	52

Fisheries

Coho salmon (*Oncorhynchus kisutch*) are currently known to reside in the Noyo WAU. Other fish species known to reside in the WAU are steelhead (*Oncorhynchus mykiss*), sculpin (*Cotus sp.*), stickleback (*Gasterosteus aculeatus*), and Pacific lamprey (*Lamptera tridentata*). See Section F - Fish Habitat Assessment for distribution.

Geology

The Noyo WAU is chiefly characterized by the Coastal Belt of the Franciscan Complex, except its southeastern headwaters which are characterized by the Central Belt. The two lithologic units are separated by the east-dipping Two Rocks thrust fault. The wide, lower-gradient alluviated valleys are the major geologic feature of the Noyo WAU. The drainage pattern of the Noyo WAU reflects the strong structural and probably tectonic control.

Rocks of the Coastal Belt are highly sheared, and comprise structurally deformed massive, hard greywacke sandstone and shale interbedded with small amounts of limestone and pebble conglomerate. Strata are homoclinally folded, strike to the northwest, and dip moderately to steeply to the northeast except where they are disrupted near fault zones. The southern part of the Noyo WAU is traversed by the east-west-trending Noyo Anticline of Kramer, causing the bedrock dip to the South. Probably as a consequence of long-term tectonic forcing and climate change in the Holocene, the main valleys are 100-200 meters wide, and have alluviated floors with multiple terraces. The low gradient channels of Olds, Burbeck, McMullen, Redwood, North Fork Hayworth, and DeWarren Creeks; and Noyo (upstream of confluence with Redwood Creek) and Middle Fork North Fork Noyo Rivers are incised in these Holocene alluvial deposits. Because of entrenchment many of the first and second order tributaries drain on these terraces and form alluvial fans. In the downstream segments of the main stem Noyo River and North Fork Noyo River, the channels are incised into bedrock and are highly confined by strath terraces.

The headwaters of Olds Creek and main stem Noyo River are underlain by argillaceous melange of the Central Belt. Central Belt is a tectonic assemblage of

fragmented, sheared Eastern Belt rocks and Mesozoic metavolcanic rocks. Due to high erodibility of the sheared shale (melange), this area with gentle slopes is likely to be prone to deep seated landslides such as earth flows.

Soils within the Noyo WAU are of the inceptisol soil order.

Literature Cited

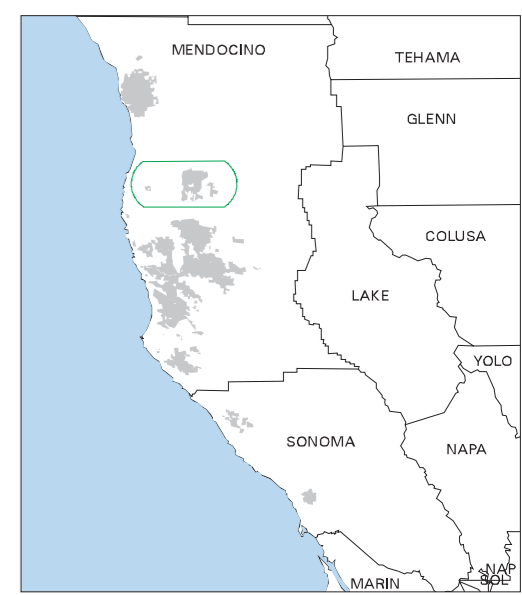
Louisiana-Pacific Corporation. 1997. Sustained Yield Plan for Coastal Mendocino.

Washington Forest Practice Board. 1995. Standard methodology for conducting watershed analysis. Version 3.0. WA-DNR Seattle, WA.

Noyo River Watershed Analysis Unit

Noyo River Watershed

- Streams
- Planning Watershed
- Ocean, Lake, Pond
- MRC Ownership



Pacific Ocean

Lower Noyo River
113.20040

Kass Creek
113.20037

Parlin Creek
113.20030

Brandon Gulch
113.20031

Upper Noyo River
113.20021

Duffy Gulch
113.20020

North Fork Noyo River
113.20015

Middle Fork Noyo River
113.20014

Olds Creek
113.20012




Redwood Creek
113.20011

Hayworth Creek
113.20013






McMullen Creek
113.20010

Noyo River Watershed Analysis Unit




Base Map

-  MRC Ownership
-  WWA Boundary
-  Planning Watershed Boundary



Transportation

-  Paved Road
-  Rocked Road
-  Native Road
-  Jeep Trail
-  Railroad

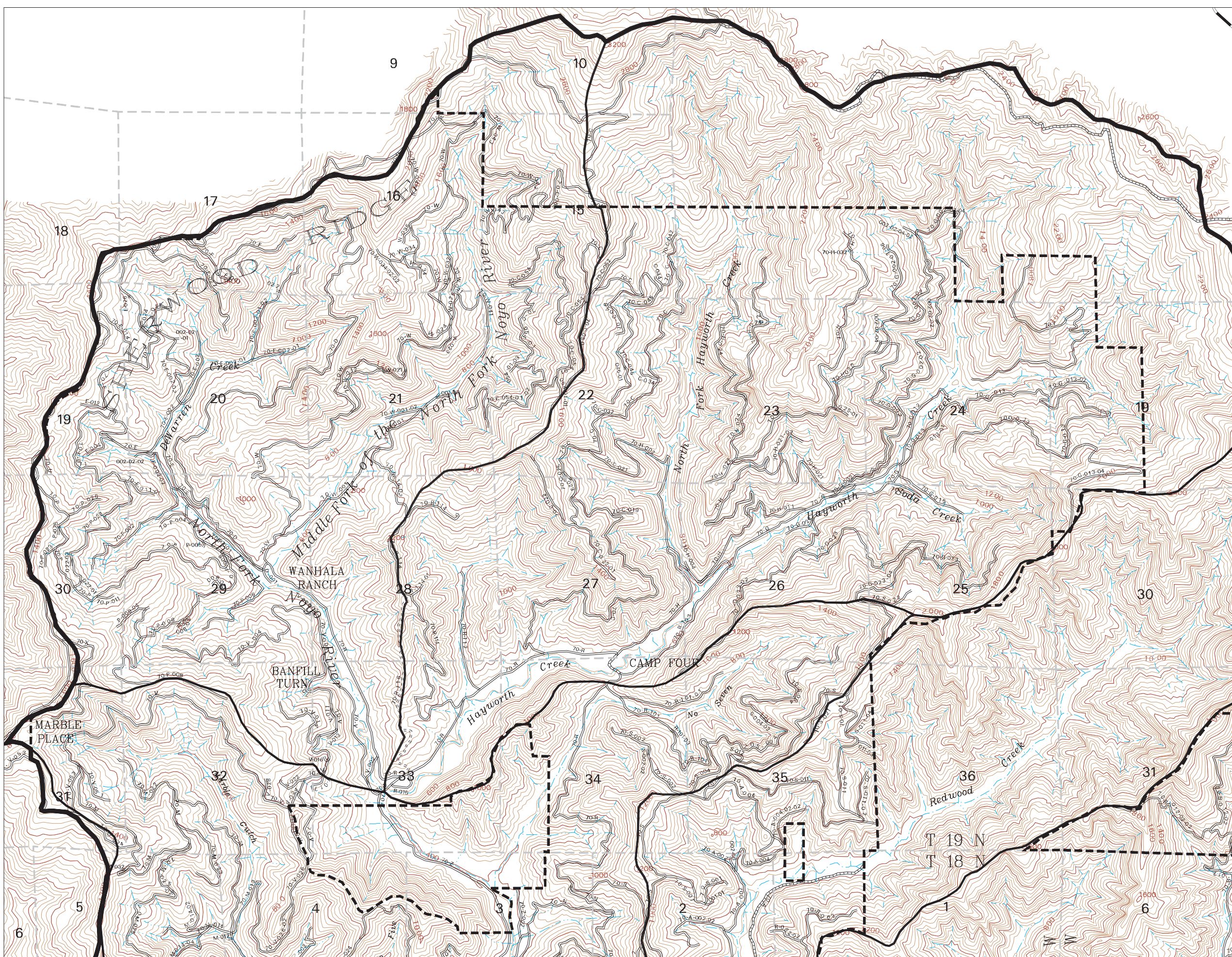
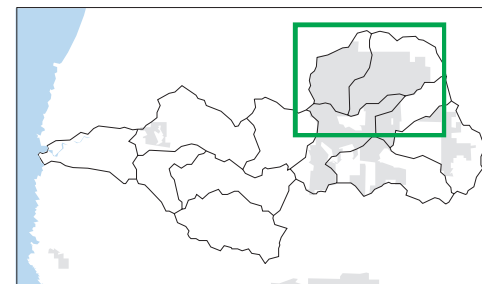
Flow Class

-  Class I
-  Class II
-  Class III

Topography




-  Index Contour (200' interval)
-  Regular Contour (40' interval)

Sheet 1








Noyo River Watershed Analysis Unit




Base Map

-  MRC Ownership
-  WWA boundary
-  Planning Watershed Boundary



Transportation

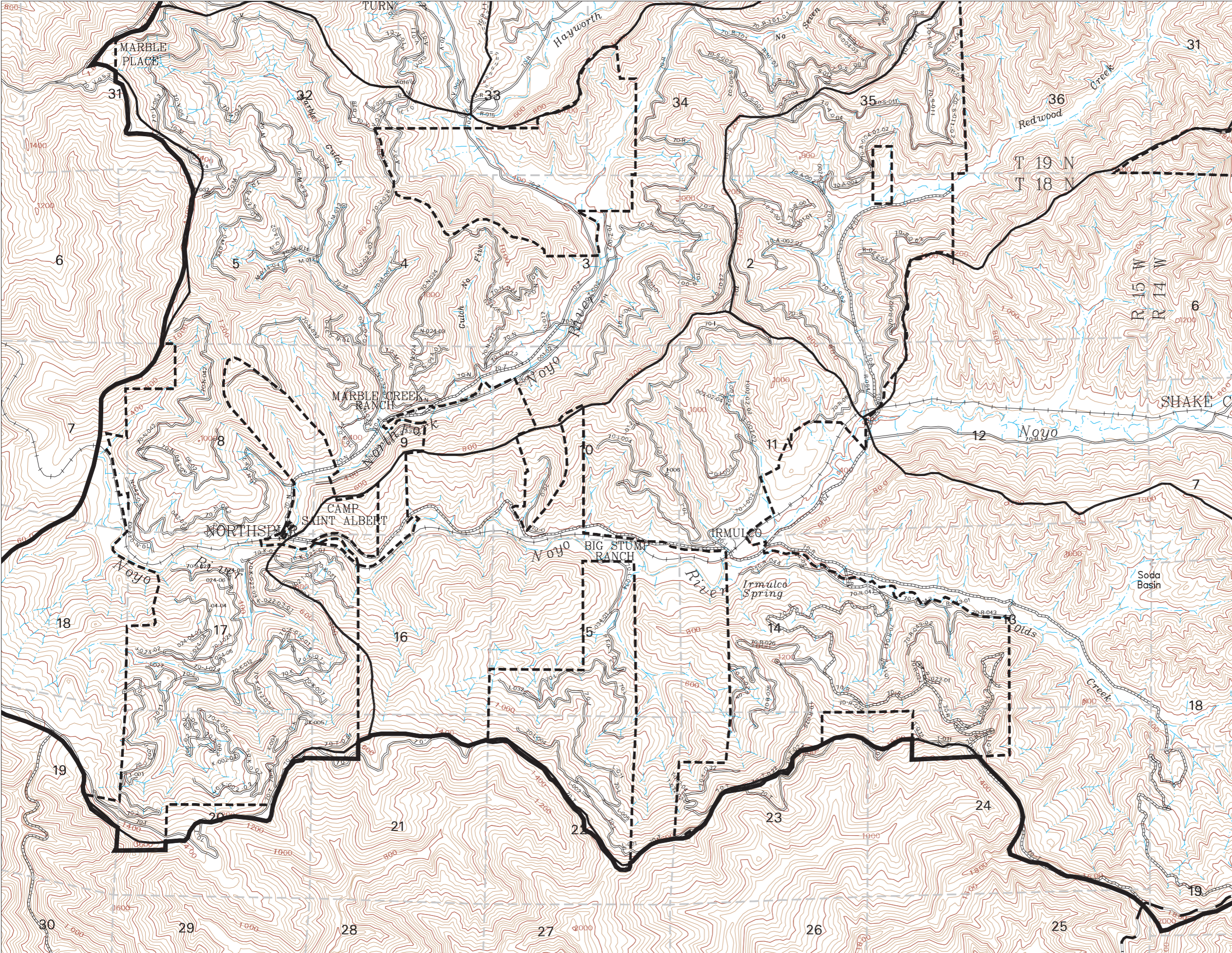
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-  Rocked Road
-  Native Road
-  Jeep Trail
-  Railroad

Flow Class

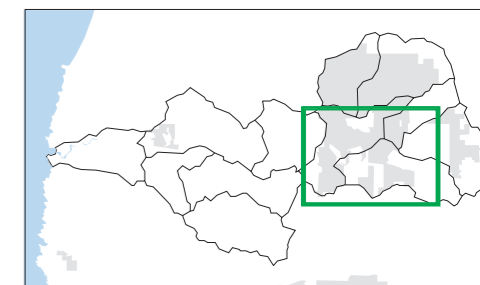
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Sheet 2








Noyo River Watershed Analysis Unit




Base Map

-  MRC Ownership
-  WWA boundary
-  Planning Watershed Boundary



Transportation

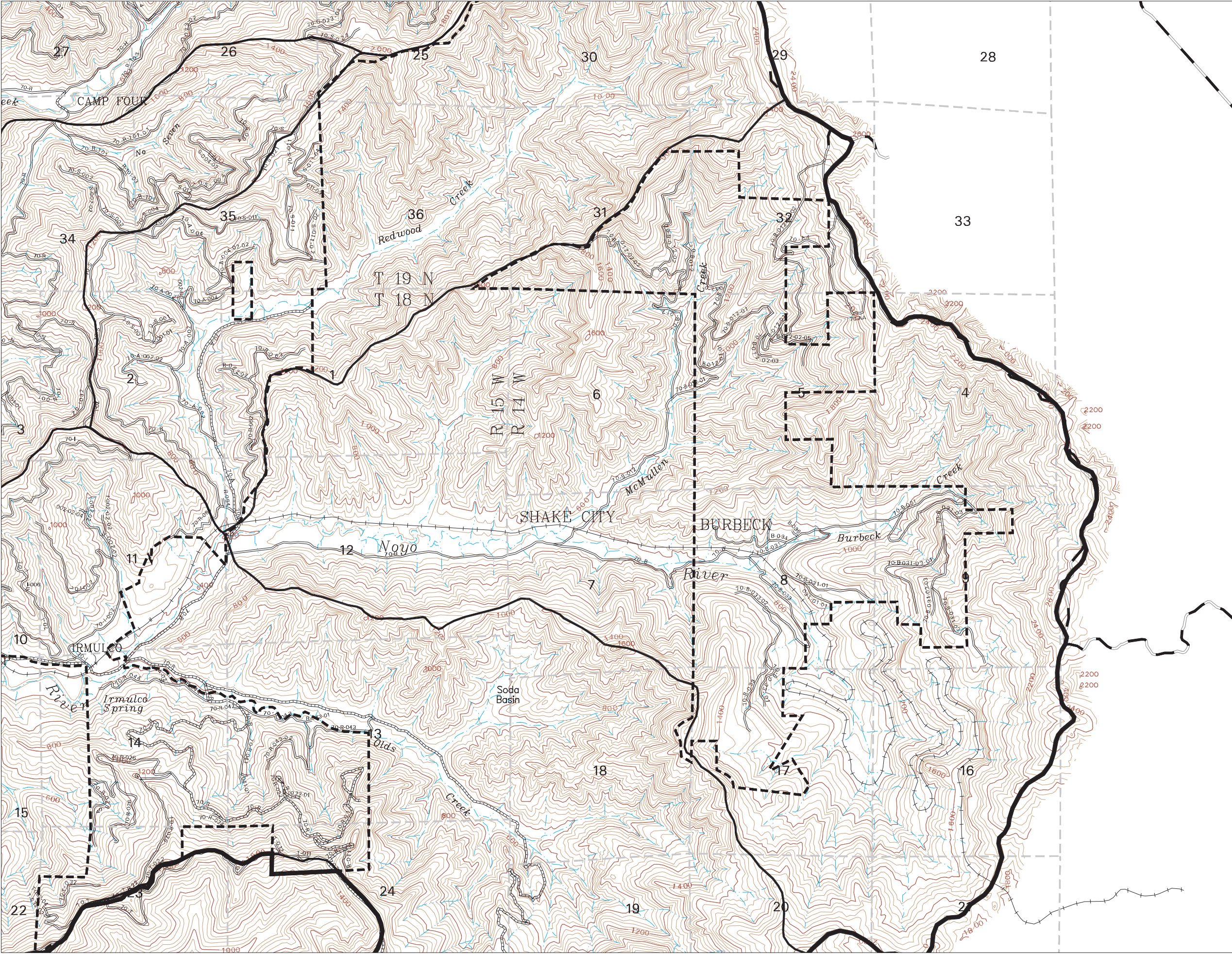
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Flow Class

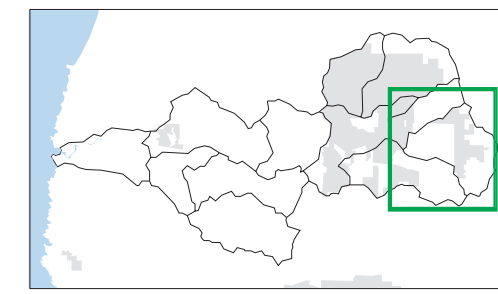
-  Class I
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-  Class III

Topography

-  Index Contour (200' interval)
-  Regular Contour (40' interval)






Sheet 3



Noyo River Watershed Analysis Unit




Base Map

-  MRC Ownership
-  WWA boundary
-  Planning Watershed Boundary



Transportation

-  Paved Road
-  Rocked Road
-  Native Road
-  Jeep Trail
-  Railroad

Flow Class

-  Class I
-  Class II
-  Class III

Topography

-  Index Contour (200' interval)
-  Regular Contour (40' interval)

Sheet 4

