

## Noyo River Watershed Analysis

### EXECUTIVE SUMMARY

The Noyo River is located in the California Coast Range and 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 mi<sup>2</sup> area. The Mendocino Redwood Co., LLC (MRC) ownership represents approximately 29 percent of the land in the Noyo River watershed (see Base Map, Noyo River Watershed Map and Table 1, Introduction) and is spread across 7 different planning watersheds as delineated by the California Department of Water Resources.

This report presents the results of a watershed analysis performed by MRC on their ownership in the Noyo River watershed; the Noyo watershed analysis unit (WAU). The watershed analysis of the Noyo WAU was conducted following modified guidelines from the Standard Methodology for Conducting Watershed Analysis (Version 4.0, Washington Forest Practices Board). 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. The results of the resource assessments are synthesized and land management prescriptions are developed to address the issues and processes identified in the watershed analysis. Finally, monitoring is suggested to determine the efficacy of the prescriptions to protect sensitive aquatic resources.

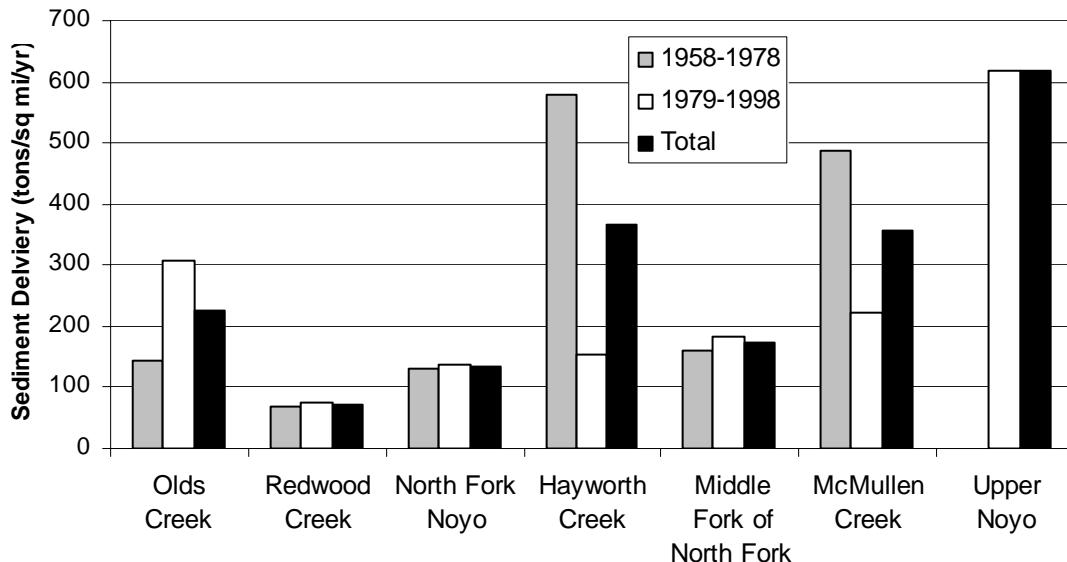
### Results

#### *Mass Wasting*

A total of 305 shallow-seated landslides (debris slides, torrents or flows) were identified and characterized in the Noyo WAU for the time period of 1958-1998. A total of 157 deep-seated landslides (rock slides or earth flows) were mapped in the Noyo WAU (see Table A-1 and Map A-1, Mass Wasting Assessment module). Total sediment input is estimated, from shallow-seated landslides and small streamside mass wasting, at 290,433 tons or 453 tons/sq. mile/yr. for the past forty years in the Noyo WAU (1958-1998).

The highest sediment input from mass wasting occurs in the Hayworth Creek, Upper Noyo and McMullen Creek planning watersheds (Figure ES-1). The higher sediment delivery appears to be due to a combination of extensive tractor yarding and intense forest management prior to forest practice rules, and a few very large landslides that contributed a high amount of the sediment in those planning watersheds. In contrast, Redwood Creek Planning Watershed has an extremely low mass wasting input. The low input for Redwood Creek, on Mendocino Redwood Company property may be attributable to a low number of mapped landslides (15), and a wide strath terrace bounding Redwood Creek. Most landslides in this planning watershed deposit sediment to this terrace and not to a watercourse.

**Figure ES-1.** Total Mass Wasting Sediment Input (tons/sq. mi./yr.) from Landslides and Small Streamside Mass Wasting for MRC Ownership Shown by Planning Watershed and Time Period.



The Noyo WAU was partitioned into five terrain stability units (TSU) representing areas of similar geomorphology, landslide processes, and sediment delivery potential (see Map A-2, Mass Wasting module). TSU 1 is inner gorges and steep streamside slopes along low gradient watercourses. TSU 2 is inner gorges and steep streamside slopes along moderate to high gradient watercourses. TSU 3 is steep convergent topography. TSU 4 is moderate gradient and divergent topography. TSU 5 is low relief topography.

TSU 3 represented the greatest mass wasting sediment delivery for any one TSU, providing 51% of the sediment delivered from 1958-1998. Streamside mass wasting (combining TSU 1 and 2) yields 40% of the total sediment input. Streamside mass wasting and TSU 3 sediment delivery are highest in the Noyo WAU. Management activities in these areas will need special attention and evaluation.

#### ***Surface and Fluvial Erosion (Roads/Skid Trails)***

Overall the Noyo WAU is estimated to have 105 tons/mi<sup>2</sup>/yr of sediment from road associated surface and fluvial erosion. The highest levels of total road associated sediment delivery (tons/yr.) is from the Middle Fork North Fork Noyo, Hayworth Creek and North Fork Noyo Planning Watersheds. These are also the planning watersheds with greatest amount of MRC ownership. When the road associated sediment delivery is normalized by area (tons/sq. mi./yr.) all the planning watersheds are relatively close in their estimated road sediment delivery rates for the Noyo WAU (Table ES-1).

**Table ES-1.** Road Contributing Length (for sediment delivery), Road Length, Road Density and Sediment Delivery by Planning Watershed in the Noyo WAU.

Planning Watershed	Road Contributing Area (ac)	Road Length (miles)	Road Density (mi/sq mi)	Road Sed. Del. (tons/yr)	Road Sed. Rate (tons/sq mi/yr)
McMullen Creek	1.7	21.5	6.8	168	53
Hayworth Creek	6.6	47.0	6.2	722	96
Middle Fork North Fork Noyo	7.9	49.1	7.5	898	138
North Fork Noyo	8.0	62.5	8.1	867	112
Olds Creek	4.9	27.2	7.4	487	133
Redwood Creek	1.8	13.2	7.7	150	87
Upper Noyo River	0.7	14.4	14.7	105	108
<b>Noyo WAU Total</b>	<b>18.9</b>	<b>250.0</b>	<b>8.0</b>	<b>3293</b>	<b>105</b>

Road density is currently averaging 8 miles of road to every square mile of land MRC owns. This density is high and needs to be a source of improvement.

High and moderate treatment immediacy controllable erosion and diversion potential sites were identified along the roads in the Noyo WAU. The Noyo WAU currently has 43 high treatment immediacy sites, 123 moderate immediacy sites and 157 sites with a diversion potential. These sites will be a priority for improvement of the road network in the Noyo WAU. The road number, site number for each individual site is shown on Map B-1 and in Appendix B of this report.

The road network is classified into High, Moderate and Low surface erosion hazard. The roads with the high hazard are the highest priorities for improvements, monitoring or maintenance. The moderate hazard roads are a medium priority for improvements, monitoring or maintenance. The low hazard roads are not much of a concern for erosion.

Past skid trail erosion was found to be high in the Noyo WAU from aerial photograph interpretation. Hayworth Creek has the highest skid trail surface erosion inputs over time. This is mainly due to a high amount of tractor yarding done in the late 1960's and early 1970's. Future skid trail sediment delivery rates will be lower than current or past rates because current Forest Practice Rules and MRC policies require cable yarding on steep ground. Much of the skid trail erosion in the WAU came from skid trail use on steep terrain before the current Forest Practice Rule restrictions. Furthermore, skid trail operation next to or directly in watercourses is restricted.

### ***Riparian Function***

The riparian function assessment is divided into two groups: 1) the potential of the riparian stand to recruit large woody debris (LWD) to the stream channel along with the level of concern about current LWD conditions in the stream, and 2) a canopy closure and stream temperature assessment.

LWD was determined to be sparse in the mainstem channel segments of the Noyo WAU; the Noyo River, North Fork Noyo River, and Hayworth Creek. LWD was

determined to be mainly sparse with some areas of abundant LWD in the channel segments of Redwood Creek, Olds Creek, Middle Fork of the North Fork Noyo River, Burbeck Creek, and Marble Gulch (see Table D-5, Riparian Function module). The smaller tributaries of the Noyo WAU vary from having sparse to abundant LWD in their channel segments. There is a need for more large woody debris in many of the channel segments of the Noyo River tributaries. Currently in the Noyo WAU most of the streams are in the high and moderate in-stream LWD demand classification (see Map D-1, Riparian Function module). The increased in-stream LWD demand in the Noyo WAU are primarily from low levels of LWD in the stream channels compounded by many riparian stands with moderate to low LWD recruitment potential.

Canopy closure over watercourses varies throughout the Noyo WAU. The canopy closure map (see Map D-2, Riparian Function module) shows a high proportion of Class I streams with a high streamside shade classification (58% of Class I watercourses) (70-100% cover). However, some of the Noyo WAU Class I streams have moderate streamside shade classification (40-70% cover) and low streamside shade classification (0-40% cover), 28% and 14% of Class I watercourses respectively. The varied stream canopy closure and proximity of the ownership away from the ocean is evident in the stream temperatures of the Noyo WAU. The maximum daily stream temperatures from 1991-1999 for the Noyo WAU vary from 17.8 to 24.7 °C (see Table D-9, Riparian Function module). Typically these maximum stream temperature levels only occur for a few days during July and August (see Appendix D of this module), when high daytime air temperatures exists. The highest stream temperatures observed were at sites in Hayworth Creek and North Fork Noyo in the early 1990's. In both cases these highest observed stream temperatures have lowered through time. The general trend for all the stream temperature observations in the Noyo WAU is a decreasing trend, with some areas showing no change.

For Coho salmon the maximum weekly average temperature (MWAT) has been reported to be between 17 and 18 °C . The maximum weekly average temperatures (MWAT) for 1996 and 1999 in the Noyo WAU (see Table D-10, Riparian Function module) are right at this critical temperature threshold for all stations except Marble Gulch. Extra care must be taken to ensure that adequate shade along streams is provided and recruited in the Noyo WAU to protect from warming stream temperatures.

### ***Stream Channel Condition***

Baseline information on the stream channels of the Noyo WAU was collected and reported (see Table E-1, Stream Channel Condition module). Individual channel segments were categorized into geomorphic units using the baseline stream channel information, topography the channel segments are found in, position in the drainage network, and gradient/confinement classes. Six geomorphic units were established to represent the range of channel conditions and sensitivities to input factors of coarse and fine sediment and LWD (Table ES-2) (see Map E-2, Stream Channel Condition module).

**Table ES-2.** Stream Geomorphic Units and Sensitivities for the Noyo WAU.

Stream Geomorphic Unit	Approximate Location(s)	Channel Sensitivity		
		Coarse Sediment	Fine Sediment	LWD
I. Highly Entrenched Depositional River Segments Confined by Strath Terraces.	Mainstem Noyo, lower section North Fork Noyo, lower section Hayworth Creek.	Moderate	Moderate	Moderate
II. Moderately Entrenched Depositional Channels in Strath Terraces and V-shaped Canyons.	Olds Creek, Marble Gulch, Hayworth Creek, North Fork Hayworth Creek.	Moderate	Moderate	High
III. Slightly Entrenched Depositional Channels in Strath Terraces and U-shaped Canyons.	Redwood Creek, Middle Fork North Fork, upper section of North Fork Noyo.	High	Moderate	High
IV. Moderate Gradient Transport Channels of V-shaped Canyons.	Middle to upper segments of tributary streams with slope gradients of 2-8%.	High	Moderate	Moderate
V. Response and Transport Streams of U-shaped Canyons.	Small/isolated tributaries near Irmulco, Gulch No. Five.	Low	Low	Low
VI. High Gradient Transport Segments of V-shaped Canyons.	Typically Class III, with some Class II watercourses with slope gradients of 8-20%.	Low	Low	Moderate

### ***Fish Habitat Assessment***

Anadromous salmonids inhabiting the Noyo River WAU are coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*O. mykiss*). Other non-salmonid species within the Noyo River WAU include the three spine stickleback (*Gasterosteus aculeatus*), sculpin (*Cottus spp.*), and Pacific lamprey (*Lamptera tridentata*). Both steelhead and coho salmon are present in the mainstem and major tributaries, while steelhead but not coho are found inhabiting smaller, high gradient tributaries. Coho salmon are found in the highest densities in Redwood Creek. (see Map F-1 for fish distribution and Map F-2 for potential spawning, rearing, and overwintering habitat, Fish Habitat Assessment module).

Fish habitat quality for the three main life stages; spawning, rearing, and overwintering habitat were evaluated for salmonids (see Table F-3, Fish Habitat Assessment module). Generally habitat conditions for all three life stages are rated as fair. A few areas have poor habitat quality and a few areas have good habitat quality.

Fifty percent of the units surveyed within the Noyo WAU were deficient in LWD and only twenty-five percent had optimal LWD. LWD provides cover for fish, increases shelter complexity and scours the channel aiding in pool formation and depth. Between 1959 and 1964 the California Department of Fish and Game removed LWD accumulations by burning in channel and cutting material then placing it above the floodplain. Approximately 4,662,000 board feet were removed from the Noyo River during this time period. The removal of LWD appears to have degraded the rearing and overwintering habitat. Spawning gravels were potentially lost in high water events when LWD otherwise could have stored these gravels.

### **Sediment Input Summary**

The average estimated sediment input for the past forty years for the Noyo WAU is 470 tons/square mile/year. The inputs in the Noyo WAU over the last 40 years have come from hillslope mass wasting (42%) and road mass wasting, surface and fluvial erosion (48%) and to a lesser extent skid trail erosion (10%) (Figure G-1). The breakdown of total sediment input is presented by planning watershed for the Noyo WAU (Table G-1 and Figure G-2). The greatest amount of sediment inputs is estimated to be from the Hayworth Creek planning watershed.

Road associated erosion is the dominant sediment contributing process in the Noyo WAU. The road associated mass wasting, surface and fluvial erosion combined accounts for 48% of the estimated sediment inputs in the Noyo WAU. Mass wasting from roads and hillslopes combined accounts for 66% of the sediment inputs in the Noyo WAU. Future forest practices must give the potential of mass wasting and road erosion careful attention in the Noyo WAU to attempt and reduce this sediment input over time.

**Table ES-3.** Estimated Sediment Inputs by Process for Planning Watersheds of the Noyo WAU, Averaged over the Last Forty Years (1958-1998).

Planning Watershed	Road Surface & Fluvial Erosion (tons/mi <sup>2</sup> /yr )	Hillslope Mass Wasting (tons/mi <sup>2</sup> /yr )	Road Mass Wasting (tons/mi <sup>2</sup> /yr )	Skid Trails (tons/mi <sup>2</sup> /yr )	Total (tons/mi <sup>2</sup> /yr )
McMullen Creek	53	257	100	38	448
Redwood Creek	87	44	29	23	183
North Fork Noyo	112	104	31	60	307
Olds Creek	133	123	103	11	370
Middle Fork North Fork	138	165	7	63	373
Hayworth Creek	96	347	19	115	577
Upper Noyo*	108	185	432	n/a	725

\*- only estimated for past 20 years

***Land Management Prescriptions***

The following land management prescriptions were prepared for use in the Noyo WAU. The prescriptions are designed to provide protection of the aquatic resources that have the highest vulnerability of water quality and aquatic habitat impacts, as identified in this watershed analysis. The prescriptions are in addition to Mendocino Redwood Company policies (MRC, 2000) and the current California Forest Practice rules.

***Mass Wasting Prescriptions:******Terrain Stability Unit 1***

The general location of terrain stability units are mapped in Map A-1 but final determination of the unit existence and boundaries will be determined from field observations.

Where there is inner gorge within TSU 1 protections will extend from the edge of the watercourse transition line up to the break in slope of the inner gorge and 25 feet of additional slope distance after the break in slope of the inner gorge.

**TSU 1 Road construction:**

- No new road or landing construction unless field reviewed and approved by a California Registered Geologist.

**TSU 1 Existing Roads:**

- Roads or landings shall be maintained at the design standards that lower risk of mass wasting sediment delivery. Existing roads and landings within TSU 1 should be considered for abandonment if no longer needed.

**TSU 1 Tractor Yarding:**

- Equipment exclusion zones on inner gorge slopes.
- Equipment exclusion zones on steep streamside slopes (non-inner gorge) except for existing roads or where alternative yarding method creates potential for greater sediment delivery.

**TSU 1 Skid Trail Construction or Reconstruction:**

- No new tractor trail construction unless field reviewed and approved by a California Registered Geologist.

**TSU 1 Timber Harvest:**

- TSU 1 will receive no harvest on inner gorge slopes unless approved by a California Registered Geologist.
- On steep streamside slopes within TSU 1 timber harvest must retain a minimum of 50% canopy<sup>1</sup> dispersed evenly across the slopes above AMZ.

***Terrain Stability Unit 2***

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<sup>1</sup> Only trees greater than 30 feet in height count towards canopy measurement.

The general location of terrain stability units are mapped in Map A-1 but final determination of the unit existence and boundaries will be determined from field observations.

Where there is inner gorge within TSU 2 protections will extend from the edge of the watercourse transition line up to the break in slope of the inner gorge and 25 feet of additional slope distance after the break in slope of the inner gorge.

TSU 2 Road construction:

- If inner gorge topography, no new road or landing construction unless field reviewed and approved by a California Registered Geologist. If steep streamside slope topography, road construction shall be minimized. If road construction must occur, the road must utilize the highest design standards to lower risk of mass wasting sediment delivery.

TSU 2 Existing Roads:

- Roads or landings shall be maintained at the design standards that lower risk of mass wasting sediment delivery. Existing roads and landings within TSU 2 should be considered for abandonment if no longer needed.

TSU 2 Tractor Yarding:

- Equipment exclusion zones on inner gorge slopes. Equipment exclusion zones on steep streamside slopes gorge slopes except for existing roads or where alternative yarding method creates potential for greater sediment delivery.

TSU 2 Skid Trail Construction or Reconstruction:

- No new tractor trail construction unless field reviewed and approved by a California Registered Geologist.

TSU 2 Timber Harvest:

- TSU 2 will receive no harvest on inner gorge slopes unless approved by a California Registered Geologist.
- On steep streamside slopes within TSU 2 timber harvest must retain a minimum of 50% canopy<sup>2</sup> dispersed evenly across the slopes above AMZ.

*Terrain Stability Unit 3*

The general location of terrain stability units are mapped in Map A-1 but final determination of the unit existence and boundaries will be determined from field observations.

TSU 3 Road construction:

- No new road construction across TSU 3 unless field reviewed and approved by a California Registered Geologist unless it is the best road alternative<sup>3</sup>.

TSU 3 Existing Roads:

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<sup>2</sup> Only trees greater than 30 feet in height count towards canopy measurement.

<sup>3</sup> Best road alternative – the placement has a lower potential for sediment production and greater cost effectiveness.

- Roads or landings shall be maintained at the design standards that lower risk of mass wasting sediment delivery. Existing roads and landings within TSU 3 should be considered for abandonment if no longer needed.

TSU 3 Tractor Yarding:

- Equipment limited to existing roads or stable trails<sup>4</sup>.

TSU 3 Skid Trail Construction or Reconstruction:

- No new tractor trail construction or reconstruction unless field reviewed and approved by a California Registered Geologist.

TSU 3 Timber Harvest:

Retain 50% canopy (see footnote 1, page H-2) with trees dispersed evenly across slope. Tree retention shall be emphasized in the axis of headwall swales. Deviations from this default must be field reviewed and approved by a California Registered Geologist.

*Rockslides*

The general location of rockslides is mapped in Map A-1 but final determination of the existence and/or activity will be determined by field observations.

No harvest or new road construction will occur on active portions of rockslides with a risk for sediment delivery unless approved by a California Registered Geologist.

Road Prescriptions

*River Road (R Line)*

The long un-drained road tread approaches to watercourse crossings on this road section will be treated with one or a combination of several of these options:

- 1) Ditch relief culverts can be installed to drain water and sediments concentrated in inside ditches. The ditch relief culverts would be placed such that the majority of long un-drained tread approaches to watercourse crossings of the road would be relieved prior to the watercourse crossing. The discharges of water and sediment from the ditch relief culverts would drain on to the adjacent hillslope such that no additional erosion would occur.
- 2) Rocked rolling dips or rolling dips can be installed in the road prism. The rolling dips would be placed such that the majority of long un-drained tread approaches to watercourse crossings of the road would be relieved prior to the watercourse crossing. The discharges of water and sediment from the rolling dips would drain on to the adjacent hillslope such that no additional erosion would occur.
- 3) Long tread approaches to watercourse crossings can have the road prism reshaped such that the tread is outsloped toward its outside edge. This out-sloped

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<sup>4</sup> Stable trail – skid trail that has >85% of trail's tread intact, fill cracks or settling can have occurred provided the trail is still 85% intact and can have corrective action such that the trail presents little risk of future sediment delivery after use. Cut bank slumps can occur on stable trails, however, the slump cannot be removed if it buttresses failure of upslope soils.

road would be done so that it allows continuous drainage of the road surface away from the watercourse crossings.

Treatment of native surface segments:

- The segment of the River road from the bridge crossing at the Noyo River, adjacent to the confluence with Redwood Creek, to Camp Four area will be a high priority for receiving a rock surface.
- The segment of the River road from the Hunter's Camp, adjacent to the confluence of Hayworth Creek and North Fork Noyo, to the intersection with the W road by the Middle Fork of the North Fork Noyo will be a medium priority for receiving a rock surface.
- The segment of the River road from the Camp Four to the Hunter's Camp will be a low priority for receiving a rock surface.

The entire River road should receive a high level of attention, maintenance and monitoring.

#### *High and Moderate Road Surface Erosion Hazard Rating Roads*

The roads with a high erosion hazard rating should be given special attention for maintenance or erosion control. These roads should be considered high priority roads for rock surface, improved and increased road drainage relief, design upgrades or decommissioning.

The moderate erosion hazard roads should be given similar attention, but not as high a priority as the high erosion hazard roads.

#### *Roads with High Treatment Immediacy Sites and High or Moderate Sediment Delivery Potential in the Noyo WAU.*

These high treatment immediacy controllable erosion sites will be the highest priority for erosion control, upgrade or modifications to existing design. These sites will be scheduled for repair based on operational considerations of harvest scheduling, proximity and availability of equipment, magnitude of the problem, and accessibility to the site.

#### *Roads with Moderate Treatment Immediacy Sites and High or Moderate Sediment Delivery Potential in the Noyo WAU.*

These moderate treatment immediacy controllable erosion sites will be the next highest priority (relative to the high treatment immediacy sites) for erosion control, upgrade or modifications to existing design. These sites will be scheduled for repair based on operational considerations of harvest scheduling, proximity and availability of equipment, magnitude of the problem, and accessibility to the site. It is very likely that moderate treatment immediacy sites will be addressed when in close proximity to high treatment immediacy sites.

#### *Diversion Potential Sites along Roads in the Noyo WAU.*

These diversion potential sites will be a high priority for correction. These sites will be scheduled for repair based on operational considerations of harvest scheduling, proximity

and availability of equipment, magnitude of the problem, and accessibility to the site. It is very likely that these sites will be addressed when in close proximity to high treatment immediacy sites.

*Aquatic Management Zone (AMZ) (also known as WLPZ) Roads in the Noyo WAU.*

Road surface and prism treatment and road management:

- Seasonal roads (gets used annually) in the AMZ will have the surface of new road construction or re-opened existing roads armored with, at a minimum, a 6 inch rock layer.
- Temporary roads (roads only used periodically, every few years or decades) in AMZ will have maintenance free road drainage prior to the winter period and the surface stabilized with grass seed, mulch or other cover product.

*Riparian Prescriptions*

*Large woody debris recruitment*

The company policies for streamside stand retention are considered to be appropriate at this time for LWD recruitment. Monitoring of LWD recruitment will be done to determine if this is correct.

In the interim MRC will promote attempts to place LWD in stream channels to provide habitat structure. The stream locations with high instream LWD demand should be considered the highest priority for LWD placement. The moderate instream LWD demand segments would be next.

*Low and Moderate Canopy Closure Areas*

The company policies for promoting streamside canopy and riparian management are considered to be appropriate at this time to improve stream canopy. Monitoring of stream temperatures and canopy will be conducted to determine if this is correct.

Areas with low canopy in the Noyo WAU will have the following considerations:

- Restoration harvest within the AMZ will not remove trees providing effective shade.
- Stream temperatures will be monitored to determine if temperatures fluctuate over time.
- Tree planting should be considered in streamside areas with low tree density of future canopy potential for shading a watercourse.

***Monitoring***

Aquatic resources monitoring will be conducted in the Noyo WAU.

Monitoring Plan Goals:

- Test the efficacy of the Noyo WAU prescriptions to address impacts to aquatic resources from timber harvest and related forest management activities.
- To assess long term channel conditions. Are current and future forest management practices inhibiting, neutralizing or promoting stream channel conditions for aquatic habitat?

The monitoring matrix (Table ES-4) outlines the hillslope and in-stream monitoring MRC will be conducting in the Noyo WAU.

Table ES-4. Monitoring Matrix for Mendocino Redwood Company Lands Including the Noyo Watershed Analysis Unit.

<b>Monitoring Objectives</b>	<b>Reasoning, Comments</b>	<b>Technique</b>
1. Determine effectiveness of measures to reduce management created mass wasting.	Management created mass wasting is significant contributor of sediment delivery.	Evaluation of mass wasting following a large storm event or after approximately 20 years.
2. Determine effectiveness of erosion control practices on high and moderate surface erosion hazard roads and landings.	Roads provide sediment delivery in the Noyo WAU.	Watercourse crossings, landings, and road lengths for erosion evaluation.
3. Determine in-stream large woody debris amounts over time.	Large woody debris is needed for stream channel and aquatic habitat improvement in the Noyo WAU.	Stream LWD inventories and mapping of LWD designation areas in select stream reaches and long term channel monitoring sites.
4. Determine if stream temperatures are staying within properly functioning range for salmonids.	Stream temperature can be a limiting factor for salmonid growth and survival.	Stream temperature probes and assessment conducted in strategic locations.
5. Determine if fine sediment in stream channels is creating effects deleterious to salmonid reproduction.	Many forest practices can produce high fine sediment amounts. Need to ensure fine sediments are not impacting salmonid reproduction.	Permeability measurements on select stream reaches (bulk gravel samples if necessary).
6. Determine long-term channel morphology changes from coarse sediments.	Channel morphology can be altered from sediment increases, possibly affecting aquatic habitat.	Thalweg profiles and cross section surveys on select stream reaches.
7. Determine presence and absence of fish species in Class I watercourses.	Management practices and resource protections can affect distribution of aquatic organisms.	Electro-fishing and snorkeling observations at select locations to determine species composition and presence.