EXECUTIVE SUMMARY

Watershed Analysis for Mendocino Redwood Company's Ownership in the Northern Russian River Watershed

This report presents the results of a watershed analysis performed by Mendocino Redwood Company (MRC) on their ownership[a] in the Northern Russian River watershed. The MRC ownership in the Northern Russian River watershed is considered the Northern Russian River watershed analysis unit (WAU), which consists of portions of Jack Smith Creek, Mill Creek and Lower and Upper Ackerman Creeks including Alder Creek. This section presents a brief overview of results from the watershed analysis performed by MRC. More specific information is found in the individual modules of this report.

The Northern Russian River WAU and its tributaries support populations of steelhead trout, fisheries of concern in Northern California. The Russian River has been listed as an impaired watershed by the State Water Quality Control Board for sediment under Section 303(d) of the Clean Water Act. MRC conducted a watershed analysis to assist in 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 and restoration in the watershed to reduce impacts to aquatic resources and potentially to improve fish and aquatic habitat conditions.

MRC's approach to the Northern Russian River watershed analysis was to perform resource assessments of mass wasting, surface and point source erosion (roads/skid trails), hydrology, fish habitat, amphibian distribution, riparian condition and stream channel condition. Mass wasting, riparian condition and surface and point source erosion modules address the hillslope hazards. The fish habitat, amphibian distribution, and stream channel condition modules address the vulnerability of aquatic resources. 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. The monitoring will provide the feedback for MRC's adaptive management approach to resource conservation.

[a] It must be emphasized that only the Mendocino Redwood Company ownership is analyzed.

RESULTS

Mass Wasting

A total of 91 shallow-seated landslides (debris slides, torrents, or flows) were identified and characterized in the Northern Russian River WAU. A total of 35 deep-seated landslides (rockslides and earthflows) were mapped in the Northern Russian River WAU. The majority of the landslides observed in the Northern Russian River WAU are debris slides and earth flows. Of the 91 shallow-seated landslides in the Northern Russian River WAU, 40 are determined to be road associated (includes roads, skid trails, or landings). This is approximately 44% of the total number of shallow-seated landslides. Only two debris torrents were observed in the entire Northern Russian River WAU. This is approximately 2% of the total shallow landslides. Also, only two debris flows were observed, accounting for approximately 2% of the total shallow-seated landslides. Eighty-seven percent of the shallow landslides inventoried were initiated on slopes greater than 60% gradient, with the exception of 12 landslides with gradients in the 40% and 50% range.

A total of 49,005 tons of mass wasting sediment delivery was estimated for the time period 1972-2000 in the Northern Russian River WAU. This equates to 191 tons/mi^2/yr. Of the total estimated amount, 17,384 tons (35% of total) occurred from 1972-1981, 10,507 tons (21% of total) occurred from 1982-1987, and 21,114 tons (43% of total) was estimated to occur in the 1988-2000 time period. Road associated mass wasting was found to contribute 32,191 tons (125 tons/sq mi/yr.) of sediment over the 29 years analyzed (1972-2000). This represents approximately 66% of the total mass wasting inputs for the Northern Russian River WAU for 1972-2000.

The landscape was partitioned into seven Terrain Stability Units (TSU) representing general areas of similar geomorphology, landslide processes, and sediment delivery potential for shallow-seated landslides. The Terrain Stability Unit with the highest sediment delivery is TSU 1 is estimated to deliver 22,005 tons of sediment, or 45% of the total mass wasting inputs, over the last twenty-nine years.

Surface and Point Erosion (Roads/Skid Trails)

It was determined that there are 62 miles of truck roads in the Northern Russian River WAU (skid trails not included), which includes portions of the Masonite Road. The total watershed area is roughly nine square miles, so the Northern Russian WAU has an average road density of roughly seven miles of road per square mile of MRC owned land. Approximately 16 miles of road contributes surface erosion to watercourses (defined as contributing road length). This represents approximately 25% of the total road length in the Northern Russian River WAU.

Roads in the Northern Russian River WAU are estimated to generate, on average, 412 tons/mi^2/yr of sediment from road-associated surface and point source erosion (Table ES-1).

Table ES-1.Road Associated Surface and Point Source Erosion Estimates by Planning Watershed for the Northern Russian River WAU.

Planning Watershed	MRC Owned (sq mi)	Surface Erosion (tons/sq mi/yr)	Point Source Erosion (tons/sq mi/yr)	Total (surface +point source) (tons/sq mi/yr)
Jack Smith Creek	2.5	222	56	278
Lower Ackerman Creek	0.6	350	360	710
Mill Creek	0.3	321	32	352
Upper Ackerman Creek	5.5	253	193	446
Northern Russian River WAU Total	***8.9*** [b]	***253*** [c]	***159*** [c]	***412*** [c]

The future potential for point source erosion was evaluated in the Northern Russian River WAU. This potential erosion or controllable erosion was identified during the road inventory during 2000-2003 then adjusted by road erosion control work performed in 1998-2003. A total of 343,400 cubic yards of controllable erosion (Table ES-2) is currently estimated to be associated with the road network in the Northern Russian River WAU. Approximately 290,000 cubic yards of this controllable erosion is associated with the Masonite Road in Ackerman Creek. Since 1998, when the company was formed, approximately 44,000 cubic yards of erosion from the road network has been controlled. This represents an improvement of greater than 10% of the total controllable erosion within the last 5 years. Further improvements will continue to occur.

Table ES-2. Controllable Erosion by Treatment Immediacy for the Northern Russian River WAU.

Road Feature	Controllable Erosion by Treatment Immediacy (yd^3)			
	High	Moderate	Low	Undetermined
Culverts	120000	54000	73000	0
Crossings	400	2900	15500	200
Landings	4200	2600	1400	0
Erosion Features	7600	1700	3400	0
Road slides	7000	38000	11500	0
Total	***139200***	***99200***	***104800***	***200***

The Northern Russian River WAU was evaluated for skid trail sediment delivery from the 1960s to 2000. There was little ground-based yarding observed in the aerial photographs during this time period. This low level of skid trail construction and use is estimated to contribute only low levels of sediment delivery.

Hydrology

Using the peak flow record from 1940-2001, the flood of record was in 1955 (45,000 cfs) and was calculated to be over a 50 year event for the Russian River near Hopland. The second highest peak flow occurred in the 1965 water year, specifically December 1964. The third highest peak flow occurred in 1974. The high occurrence of these extreme storms suggests that the Northern Russian River WAU has been subjected to stressful hydrologic conditions, possibly creating a greater incidence of landslides, road failures or surface erosion.

b Sum of property ownership within the Northern Russian River WAU

c Weighted average by ownership

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.
Our analysis showed a need for large woody debris in most of the channel segments of the Northern Russian River WAU due to low instream LWD and low riparian recruitment potentials. None of the Ackerman Creek channels met the key piece LWD target. One of the segments in Jack Smith Creek exceeded the target while the other one had no key pieces at all. The majority of the stream segments in the Northern Russian River WAU had a high LWD demand. Currently the stream segments in Upper Ackerman Creek have a deficient LWD quality rating (<50% of watercourses have low or moderate LWD demand, and little functional or key LWD), while Jack Smith is marginal. No data was collected for the Mill Creek planning watershed.

Canopy closure over watercourses is generally low in the Northern Russian River WAU. Ackerman Creek has good canopy in the very lower and very upper sections. The area in between, however, has canopy closure in the 0-40% cover range. Lower Alder Creek is also very poor with increasing canopy in the upper sections. Because of the wide stream reaches and oak woodland dominated riparian areas this is probably expected. Jack Smith Creek has more generally good canopy closure levels (70-90%).

Stream temperatures in the Northern Russian River WAU are not within levels preferred by salmonids. Instantaneous maximum temperatures recorded at all sites typically exceeded the maximum lethal ranges for steelhead trout and coho salmon. Coho salmon are not currently utilizing the watershed. Ackerman Creek sites have especially high temperatures. Moderate canopy ratings and poor temperature conditions result in marginal stream shade quality ratings for the planning watersheds within the Northern Russian River WAU.

It should be noted that a majority of the riparian areas of the mainstem of Ackerman Creek are dominated by oak woodlands possibly due to historic land uses and current grazing practices. Causes and prescriptions for deficient riparian function in these areas could therefore be given alternative consideration to those currently used for conifer-dominated areas.

Stream Channel Condition

Baseline information on the stream channels of the Northern Russian River WAU was collected and reported (see Stream Channel Condition module). Individual channel segments were categorized into geomorphic units using morphology, sediment size, position in the drainage network, and gradient/confinement classes. Four stream 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-3).

Long term channel monitoring observations have been collected on two monitoring segments (Upper and Lower Ackerman Creek) in the Northern Russian River WAU in 2000, 2001 and 2002. Longitudinal profile data indicated that the standard deviation around the calculated residual depth increased in Upper Ackerman Creek and decreased in Lower Ackerman Creek for the years surveyed. The observed decrease in Lower Ackerman Creek was most likely due to the removal of a culvert along the Masonite Road and the stream channel attempting to achieve its historic grade prior to the culvert.

Table ES-3. Stream Geomorphic Units and Sensitivities for the Northern Russian River WAU.

Stream Geomorphic Unit	Channel Sensitivity to		
	Coarse Sediment	Fine Sediment	LWD
Geomorphic Unit I. Confined Low Gradient Channels.	Moderate	Moderate	High
Geomorphic Unit II. Low Gradient Confined to Moderately Confined Transport Channels.	Moderate	Moderate	High
Geomorphic Unit III. Moderate Gradient Confined Transport Channels	Moderate	Moderate	Moderate
Geomorphic Unit IV. High Gradient Transport Channels.	Low	Low	Low

Fish Habitat Assessment

The anadromous fish species inhabiting the Northern Russian River WAU is steelhead trout (*Oncorhynchus mykiss)*. Coho salmon (*Oncorhynchus kisutch*) do not currently reside in the Northern Russian River WAU. Other species include three-spine stickleback *(Gasterosteus aculeatus)*, California roach *(Lavinia symmetricus)* and Sacramento Sucker (*Catostomus occidentalis).*

Habitat typing data indicated that spawning habitat was generally fair throughout most of the Northern Russian River WAU. However, permeability data indicated gravels with low permeability. Reduction of erosion rates should increase the quality of spawning gravel in the Northern Russian River WAU. Throughout most of the Northern Russian River WAU, summer rearing and over-wintering habitat were rated as poor to fair mainly due to low pool depths. Land management activities that promote woody debris recruitment and sediment reduction should directly increase the quality of rearing habitat in the Northern Russian River WAU.

Amphibian Distribution

Amphibian species surveys were conducted in Upper Ackerman Creek in 2003. The amphibious 'Species of Special Concern' (as designated by the State of California) detected within the Northern Russian River WAU were foothill yellow-legged frogs, western toad and northwestern pond turtle.

Synthesis

Since 1998 MRC has controlled 11% of the total controllable erosion within the Northern Russian River WAU (including the Masonite Road). Excluding the Masonite Road, MRC has controlled approximately 45% of the total controllable erosion within the Northern Russian River WAU. Road surface associated controllable erosion, the majority of which is associated with the Masonite Road, is a top priority for management within the Northern Russian River WAU. Land management strategies to enhance the riparian conditions along the mainstem of Ackerman Creek will be needed to address the high stream temperatures, lack of canopy closure, and LWD deficiency within the channel.

Causal Mechanisms and Land Management Prescriptions

Causal mechanisms and prescriptions were prepared specifically for use in the Northern Russian River WAU. These prescriptions are meant to help address issues to aid in the stewardship of aquatic resources of the Mendocino Redwood Company ownership in the Northern Russian River WAU. The prescriptions are meant to be used in addition to the current California Forest Practice Rules and company policies. At the time of the publication of this watershed analysis, MRC's forest management policies are governed by interim guidelines prior to the issuance of a Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP). Once the HCP/NCCP is approved, the conservation strategies set forth in these documents will become the company policies. A prescription is only presented if it deviates from or adds clarification to these policies. Table ES-4 is a summary of the causal mechanisms and prescriptions. Please refer to the causal mechanisms and prescriptions module for details.

Table ES-4. Causal Mechanisms and Prescriptions for the Northern Russian River WAU

Causal Mechanisms a) Resource Sensitive Area b) Input Variable(s)	Prescriptions				
	Road construction	Existing Roads	Tractor Yarding	Skid Trail Construction or Reconstruction	Timber Harvest
a) TSU 1 b) Coarse and fine sediment from mass wasting	No new road or landing construction unless field reviewed by CA Reg. Geologist	Minimize risks of mass wasting; abandon when possible	Equipment exclusion zones on inner gorge and certain steep streamside slopes	No new tractor trail construction unless field reviewed by CA Reg. Geologist	No harvest unless approved by CA Reg. Geologist plus canopy requirements for steep streamside slopes
a) TSU 2 b) Coarse and fine sediment from mass wasting	For inner gorge, same as TSU 1	Same as TSU 1	Same as TSU 1	Same as TSU 1	Same as TSU 1
a) TSU 3 b) Coarse and fine sediment from mass wasting	Same as TSU 1 unless it is the best road alternative	Same as TSU 1	Equipment limited to existing roads or stable trails	Same as TSU 1	Retain 50% canopy cover with even dispersion; deviations must be reviewed by CA Reg. Geologist
a) Rockslides b) Coarse and fine sediment from mass wasting	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.				
a) High and Moderate Erosion Hazard Roads b) Coarse and fine sediment from mass wasting	Roads with a high erosion hazard rating should be given special attention for maintenance or erosion control; moderate erosion hazard roads receive a lower priority.				

Table ES-4. (continued) Causal Mechanisms and Prescriptions for the Northern Russian River WAU

Causal Mechanisms a) Resource Sensitive Area b) Input Variable(s)	Prescriptions
a) High and moderate treatment immediacy features b) Sedimentation from surface and point source erosion	Schedules for repair are based on operational considerations of harvest scheduling, proximity and availability of equipment, magnitude of the problem, and accessibility to the site. The moderate treatment immediacy sites will typically be addressed when in close proximity to high treatment immediacy sites.
a) Masonite Road b) Coarse and Fine Sediment	Follow the guidance and erosion control timeline in the Masonite Road Management Plan, developed in 2004 by Mendocino Redwood Company for the North Coast Regional Water Quality Control Board.
a) Riparian Areas b) LWD 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. Placement of LWD structures to increase habitat will be promoted.
a) Canopy closure over Class I and II watercourses b) Canopy closure and stream temperature	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.

Monitoring Plan and Goals

A monitoring report will be produced each year that monitoring is conducted in the Northern Russian River WAU. The report will cover the monitoring and analysis that has occurred up to that year; if no monitoring is conducted in a given year than no report will be produced. Table ES-5 summarizes some of the monitoring to be conducted in the Northern Russian River WAU over time. Goals of the monitoring plan are as follows:

- Test the efficacy of the Northern Russian River 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?

Table ES-5. Monitoring Matrix for Mendocino Redwood Company Lands Including the Northern Russian River River Watershed Analysis Unit.

Monitoring Objectives	**Reasoning, Comments**	**Technique**
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 Northern Russian River WAU.	Evaluation of 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 Northern Russian River 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.

Mill Creek
114.33011

Jack Smith Creek
114.33020

Upper Ackerman
114.31014

Lower Ackerman
114.31015

Northern Russian River Watershed Analysis Unit

Northern Russian River WAU Overview

Major Streams

Planning Watershed

Northern Russian River Watershed Analysis Unit Boundary

Ocean, Lake, Pond

MRC Ownership

0 1 2 3 Miles

November 2004

Copyright © 2004 Mendocino Redwood Company, LLC