SECTION H

CAUSAL MECHANISM AND PRESCRIPTIONS

INTRODUCTION

The following Causal Mechanism Reports and Prescriptions were specifically prepared for use in the Albion Watershed Analysis Unit (WAU). These prescriptions are updates to the prescriptions developed in 2001 and supercede those prescriptions. The prescriptions were updated to reflect new company policies and additional information generated in this update.

These prescriptions are meant to help address issues to aid in the stewardship of aquatic resources of the Mendocino Redwood Company ownership in the Albion 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 current policies or regulations.

The land management prescriptions presented here are the protections that Mendocino Redwood Company will pursue to provide protection of aquatic resources. In addition to these prescriptions Mendocino Redwood Company will build and maintain all of its roads at high design standards such as presented in the Handbook for Forest and Ranch Roads (Weaver and Hagans, 1994).

The causal mechanism reports present the situations where watershed conditions have a likelihood of affecting a vulnerable resource. By addressing each of these situations with an appropriate prescription the situations that could impact sensitive resources will either be removed or their impact significantly lessened. This is to attempt to provide protection to watershed values from receiving significant or cumulative impacts from future management actions.

Monitoring will be conducted in the Albion WAU to ensure that these prescriptions are providing necessary protection to aquatic resources (see Section I, Albion WAU Monitoring Plan). This monitoring is part of an adaptive management approach that tests the hypothesized protections the prescriptions are developed to meet. If it is found that the prescriptions are not providing the appropriate protections, then they will be updated and improved.

CAUSAL MECHANISMS AND PRESCRIPTION REPORTS

Each Causal Mechanism Report and Prescription has specific headings to provide background on the watershed situation and prescription. The following is the description of these headings.

Resource Sensitive Area: the area or topic encompassed by the prescription.

Input Variable and Process: this briefly states what is the source variable or input to a vulnerable resource.

Situation Sentence: presents the situation that will be addressed by the prescription.

Prescriptions: specific land management actions or recommendation for the proposed causal mechanism.

Causal Mechanism Report and Prescription #1

Resource Sensitive Area: Terrain Unit (TU) 1

Input Variable and Process: Coarse and fine sediment from mass wasting

Situation Sentence:
Small shallow seated landslides are common within the over-steepened slopes or inner gorge topography. The immediate proximity of watercourses to these landslides provides direct delivery of fine and coarse sediment. The sediments delivered to the river channels are necessary to provide channel substrate needed for fish spawning and rearing habitat. However, if erosion is increased from management disturbances, then sediments delivered to the river channels could be deleterious to fish habitat. Changes to fish habitat from high sediment levels can be created by pool filling, increased channel scour, fine sediments smothering spawning gravels and loss of river channel complexity.

Prescriptions:
The general location of terrain 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 TU 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.

TU 1 Road construction:
- No new road or landing construction unless field reviewed and approved by a California Registered Geologist.

TU 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 TU 1 should be considered for abandonment if no longer needed.

TU 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.

TU 1 Skid Trail Construction or Reconstruction:
- No new tractor trail construction unless field reviewed and approved by a California Registered Geologist.

TU 1 Timber Harvest:
- TU 1 will receive no harvest on inner gorge slopes unless approved by a California Registered Geologist.
- On steep streamside slopes within TU 1 timber harvest must retain a minimum of 50% canopy[1] dispersed evenly across the slopes above AMZ.

[1] Only trees greater than 30 feet in height count towards canopy measurement.

Causal Mechanism Report and Prescription #2

Resource Sensitive Area: Terrain Unit (TU) 2

Input Variable and Process: Coarse and fine sediment from mass wasting.

Situation Sentence:
Shallow seated and deep seated landslides are frequently initiated on the streamside slopes or inner gorge of TU 2. The immediate proximity of watercourses to these landslides provides direct delivery of fine and coarse sediment. The sediments delivered to the river channels are necessary to provide channel substrate needed for fish spawning and rearing habitat. However, if landslide frequency is increased from management disturbances, then sediments delivered to the river channels could be deleterious to fish habitat. Changes to fish habitat from high sediment levels can be created by pool filling, increased channel scour, fine sediments smothering spawning gravels and loss of river channel complexity.

Prescriptions:
The general location of terrain 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 TU 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.

TU 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.

TU 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 TU 2 should be considered for abandonment if no longer needed.

TU 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.

TU 2 Skid Trail Construction or Reconstruction:

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

TU 2 Timber Harvest:

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

[2] Only trees greater than 30 feet in height count towards canopy measurement.

Causal Mechanism Report and Prescription #3

Resource Sensitive Area: Terrain Unit (TU) 3

Input Variable and Process: Coarse and fine sediment from mass wasting

Situation Sentence:
Steep and/or convergent slopes of TU 3 can have shallow seated landslides associated with them. These landslides can travel moderate distances across hill slopes to reach streams where sediment delivery and sometimes debris torrents or flows occur. When sediment delivery occurs with these landslides, sediments will travel down the watercourses and are delivered to river and stream channels. If the frequency and amount of shallow seated landslides are increased from management actions in TU 3 this can contribute to poor instream habitat, downstream aggradation or high stream turbidity.

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

TU 3 Road construction:
- No new road construction across TU 3 unless field reviewed and approved by a California Registered Geologist unless it is the best road alternative[3].

TU 3 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 TU 3 should be considered for abandonment if no longer needed.

TU 3 Tractor Yarding:
- Equipment limited to existing roads or stable trails[4].

TU 3 Skid Trail Construction or Reconstruction:
- No new tractor trail construction or reconstruction unless field reviewed and approved by a California Registered Geologist.

TU 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.

[3] Best road alternative – the placement has a lower potential for sediment production and greater cost effectiveness.
[4] 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.

Causal Mechanism Report and Prescription #4

Resource Sensitive Area: Rockslides

Input Variable(s): Coarse and fine sediment from mass wasting.

Situation Sentence:
Rockslides are deep-seated landslides within the Hollow Tree WAU. These features can be active, dormant or have sections of the landslide active with other sections of the landslide dormant. Increases in sub-surface water from loss of evapo-transpiration or concentrated water from road drainage can activate or accelerate movement and sediment delivery from these features. The increased sediment delivery could contribute to adverse fish habitat by pool filling, increased channel scour, fine sediments smothering spawning gravel and loss of stream channel complexity.

Prescriptions:
The general location of rockslides is mapped in Map A-1 but final determination of the rockslide existence and/or activity will be determined from 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.

Causal Mechanism Report and Prescription #5

Resource Sensitive Area: High and Moderate Erosion Hazard Roads

Input Variable(s): Coarse and fine sediment from surface and point source erosion.

Situation Sentence:
The erosion hazard ratings suggest the likelihood and amount of future sediment delivery to be delivered from a road. The high erosion hazard roads would be considered the greatest risk, with the moderate erosion hazard roads next.

These roads can have areas of long un-drained road lengths, unstable fill or are directly adjacent to watercourses. These roads can create surface or point source erosion contributing both fine and coarse sediment deliveries to watercourses. If the frequency and amount of erosion is increased from management actions this can contribute to poor rearing habitat, high turbidity or decreased spawning habitat quality.

Prescriptions:

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.

Causal Mechanism Report and Prescription #6

Resource Sensitive Area: High and moderate treatment immediacy sites for roads in the Hollow Tree WAU.

Input Variable(s): Sedimentation from surface and point source erosion.

Situation Sentence:
Individual culverts, bridges, landings and road erosion sites were identified that had a high likelihood of near-term sediment delivery. If the frequency and amount of erosion is increased from management actions this can contribute to poor rearing habitat, or degradation of spawning habitat quality.

Prescriptions:

The 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.

Causal Mechanism Report and Prescription #7

Resource Sensitive Area: Riparian Areas

Input Variable(s): Large woody debris recruitment

Situation Sentence*:*
Large woody debris (LWD) is an important component of stream habitat. Large woody debris provides sediment storage in channels, creates areas of scour for pool creation, provides cover for fish habitat and adds channel roughness for habitat complexity. Historic forest management practices did not require watercourse protection measures like current California Forest Practice Rules mandate. Historic removal of LWD from the Hollow Tree WAU has created a deficiency of LWD available for fish habitat and stream channel diversity. Historic harvesting practices have removed many of the large conifer trees which provide the current and future large woody debris recruitment needed in these areas.

This watershed analysis has presented, by stream segment, the instream LWD demand based on riparian stand recruitment potential and instream LWD conditions. The majority of streams in the Hollow Tree WAU have a high LWD demand, suggesting lack of LWD and short term LWD recruitment potential

Prescriptions:

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.

Areas of the mainstem Albion River and the South Fork Albion River should be the highest priority for LWD in the Albion WAU.

Causal Mechanism Report and Prescription #8

Resource Sensitive Area: Canopy closure over Class I and II watercourses

Input Variable(s): Canopy closure and stream temperature

Situation Sentence:
Stream temperatures in the Albion WAU range are generally within the preferred range for rearing salmonids. The range of stream temperatures in the Albion WAU reflects a range of environmental conditions. If high water temperatures occur it can be deleterious and even fatal to many fish and aquatic species and warrant concern. Therefore, promoting appropriate stream canopy cover is important. Areas that are unnaturally low in canopy should be targeted for restoration and concern given to management activities that do not promote increased canopy.

Prescriptions:

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.

Causal Mechanism Report and Prescription #9

Resource Sensitive Area: Channel Migration Zones
lower Railroad Gulch
(stream segments 4 partial and 5)
lower Duck Pond Gulch
(stream segment 14 partial)
mid-section of South Fork Albion River
(stream Segments 78 and 79 partial)
See Stream Channel Condition (Map E-2)

Input Variable and Process: Large woody debris recruitment

Situation Sentence*:*
These stream channel segments are characterized as channel migration zones. During high water flows the stream can occupy one or many abandoned channels across the width of the valley floor. This variation in stream placement across the valley floor in any given year requires stream habitat structure to be available at all locations along the valley floor. The primary mechanism to ensure that fish habitat structure is present wherever the channel may migrate or meander is through adequate LWD across the valley floor.

Prescriptions:
These channel migration zones will receive a special width Aquatic Management Zone (AMZ) with the following specifications to encourage LWD recruitment to the migrating and alternating stream channels:

The AMZ width will be defined by break in slope of the valley floor. Across the valley floor the AMZ will have a canopy closure of at least 85% throughout the AMZ. Only "no harvest" or "late seral" emphasis silvicultural prescriptions will be applied to the AMZ across the valley floor. From the break in slope away from the valley floor the AMZ will be expanded up the hillslope the width defined by slope class by the California Forest Practice Rules for Class I water and lake protection zones (WLPZ). This additional width will retain canopy and vegetation as defined by the California Forest Practice Rules for Class I water and lake protection zones.

All LWD in the AMZ will be retained with the exception of removal due to road construction or moved for stream enhancement or riparian restoration purposes. Where LWD is deficient LWD material should be recruited during timber harvest.

Literature Cited

Weaver, W. and D. Hagans. 1994. Handbook for forest and ranch roads, a guide to planning , designing, constructing, reconstructing, maintaining and closing wildland roads. Prepared for: The Mendocino Resource Conservation District, Ukiah, CA.