# SECTION H
# SYNTHESIS

## INTRODUCTION

The synthesis module presents a compilation of results with an attempt to summarize the most significant hillslope hazards and aquatic resource conditions for improvement. The information compiled will be a summary of sediment inputs, presentation of aquatic habitat condition ratings (on target, marginal, deficient), and any water quality information available. The synthesis module presented here differs from the protocols presented in the Washington state watershed analysis manual (Version 4.0, Washington Forest Practices).

### Sediment Inputs

The purpose of this summary is to demonstrate the relative amount of different sediment sources, indicate priorities for erosion control, and assist with interpretation of stream channel conditions in relation to sediment deposition and transport. A sediment budget provides quantification of sediment inputs, transport, and storage in a watershed (Reid and Dunne, 1996). In this case we are not doing a true sediment budget, only an estimation of the sediment inputs. Care must be used when interpreting these estimated values; by no means can the estimates be considered absolute. Rather, the sediment input estimates are best interpreted for relative comparisons between processes and planning watersheds.

This section combines and summarizes the sediment input results from the Mass Wasting and Surface and Point Source Erosion modules of the watershed analysis. Sediment input for the Rockport Coastal Streams WAU is estimated from hillslope mass wasting, road associated mass wasting, road surface and point source erosion, and skid trail erosion. The sediment inputs are shown as an average rate for past conditions (1943-2004).

The average estimated sediment input for the time period 1943-2004 for the Rockport Coastal Streams WAU is 1,024 tons/square mile/year. The inputs in the Rockport Coastal Streams WAU over this time frame have come from mass wasting (24%) and surface and point source erosion (17%) and skid trail erosion (59%). The breakdown of total sediment input is presented by planning watershed for the Rockport Coastal Streams WAU (Table H-1 and Figure H-1).

Historic skid trail erosion is the largest contributor to sediment delivery in the Rockport Coastal Streams WAU. By adding the contribution of road surface, point source, skid trails and road-associated mass wasting sediment delivery, roads represented 35% of the sediment inputs in the Rockport Coastal Streams WAU.

Roughly 20,709 cubic yards of controllable erosion is currently associated with the road network in Rockport Coastal Streams. Since 1998, when the company was formed, approximately 3,820 cubic yards of erosion from the road network has been treated. A majority of this erosion control work, however, was completed prior to the road inventory in Rockport Coastal Streams, so credit for treating controllable erosion cannot be taken at this time.

Figure H-1. Estimated Percentage of Sediment Inputs by Source for the Rockport Coastal Streams WAU, 1943-2004.

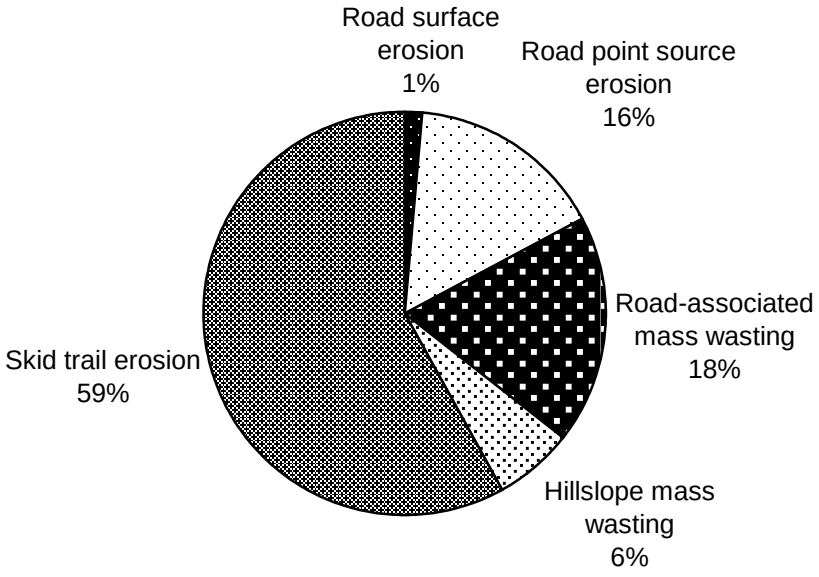


Table H-1. Estimated Sediment Inputs by Input Type the Rockport Coastal Streams WAU 1938-2004.

| *Planning Watershed* | *Road Surface Erosion (tons/mi$^2$/yr)* | *Road Point Source Erosion (tons/mi$^2$/yr)* | *Road Associated Mass Wasting (tons/mi$^2$/yr)* | *Hillslope Mass Wasting (tons/mi$^2$/yr)* | *Skid Trail Erosion (tons/mi$^2$/yr)* | *Total (tons/mi$^2$/yr)* |
|---|---|---|---|---|---|---|
| Hardy Creek | 17 | 120 | 64 | 115 | 153 | 469 |
| Juan Creek | 16 | 284 | 583 | 72 | 2058 | 3013 |
| Howard Creek | 6 | 93 | 67 | 33 | 136 | 335 |
| ***Rockport Coastal WAU**** | ***13*** | ***162*** | ***188*** | ***66*** | ***595*** | ***1024*** |

* - *Area-weighted averages*

## HABITAT QUALITY RATINGS

The habitat quality ratings for LWD, stream temperature, stream shade, stream gravel permeability, and fine sediment are presented here. Some of the ratings were previously presented in this watershed analysis.

### LWD Quality Ratings (as reported in Section D, Riparian Function)

Table H-2 shows the instream LWD quality rating for the planning watersheds of the Rockport Coastal Streams WAU. This quality rating will provide a tool to monitor the quality of the LWD in major streams over time. Currently all three planning watersheds have a deficient LWD quality rating.

Table H-2. In-stream LWD Quality Ratings for the Rockport Coastal Streams WAU.

| Calwater Planning Watershed | Percent of segments† with low or moderate demand | Percent of segments† meeting at least half of the key piece target | In-stream LWD Quality Rating* |
|---|---|---|---|
| Hardy Creek | 0% | 25% | Deficient |
| Juan Creek | 17% | 33% | Deficient |
| Howard Creek | 29% | 43% | Deficient |

† – normalized by segment lengths

* – includes debris jams

### Stream Temperature and Shade Quality Ratings (as reported in Section D, Riparian Function)

MRC uses two sequential sets of criteria to determine if a watershed has "on-target" effective shade and temperature quality. The first is based on most recent three year average maximum weekly average temperature (MWAT), the second on canopy cover. The Upper Rockport Coastal Streams planning watershed has marginal stream shade and temperature conditions whereas Lower Rockport Coastal Streams is rated as on-target as indicated by the stream shade ratings (Table H-3). It is anticipated that these ratings will improve over time with policies promoting stream shade.

Table H-3. Stream Shade and Temperature Quality Ratings for Streams in the Rockport Coastal Streams WAU.

| Planning watershed | Number of segments surveyed | % segments with MWAT < 15 deg C and/or average canopy greater than target | % segments with >70% average canopy | Stream Shade Quality Rating |
|---|---|---|---|---|
| Hardy Creek | 8 | 100% | 100% | ON TARGET |
| Juan Creek | 18 | 100% | 100% | ON TARGET |
| Howard Creek | 8 | 100% | 100% | ON TARGET |

### Stream Gravel Quality

Stream gravel quality has been monitored in one long term stream monitoring segment in the Rockport Coastal Streams WAU (stream segment RJ02 in Juan Creek). Permeability samples were collected in the summer of 2006. The permeability quality ratings are defined below in Table H-4.

| Permeability Ratings | |
|---|---|
| ON TARGET (OT) | >10,000 cm/hr permeability = >55% survival index. |
| MARGINAL (M) | >2000 cm/hr permeability = >30% survival index. |
| DEFICIENT (D) | <2000 cm/hr permeability = <30% survival index. |

Table H-4. Stream Gravel Quality Ratings for Permeability and Fine Sediment for Rockport Coastal Streams WAU Long Term Monitoring Segment, 2006.

| Segment ID | Stream Name | Geometric Mean Permeability for Segment (cm/hr) | Standard Error Permeability (cm/hr) | Range of Permeability Observations (cm/hr) | Permeability Survival Index (Taggart/ McCuddin) |
|---|---|---|---|---|---|
| RJ02 | Juan Creek | 4,840 | 1,453 | 1,470 - 30,119 | 44% |

Table H-5. V-star data for Rockport Coastal Streams WAU Long Term Monitoring Segments, 2006.

| Pool number | V* |
|---|---|
| 1 | 0.22 |
| 2 | 0.35 |
| 3 | 0.21 |
| 4 | 0.23 |
| 5 | 0.21 |
| 6 | 0.13 |
| 7 | 0.48 |
| 8 | 0.40 |
| **High** | **0.48** |
| **Low** | **0.13** |
| **Mean** | **0.26** |
| **Variance** | **0.0033** |
| **Standard Error** | **0.057** |

The mean of the V-star observations (Table E-5) indicate that this long term monitoring segment exhibits fine sediment deposition characteristic of regional index streams with little to no prior disturbance, as observed in the study by Knopp 1993. The index streams observed by Knopp 1993 indicated mean V-star values ranging from 0.17 to 0.28 whereas the moderately to highly disturbed watersheds resulted in mean values of 0.37 to 0.42.

**Aquatic Habitat and Water Quality Summary**

The habitat quality ratings and sediment input summaries show that large woody debris recruitment, canopy, and road associated sediment have the greatest need for improvement. Currently MRC has made good improvements in its efforts to controlling road sediment, but information on the amount of controllable erosion that has been treated cannot be determined since the road inventory was finished in 2006.

**LITERATURE CITED**

Knopp, C. 1993. Testing Indices of Cold Water Fish Habitat. Final Report for Development of Techniques for Measuring Beneficial Use Protection and Inclusion into the North Coast Region's Basin Plan by Amendment of the.....Activities, September 18, 1990. North Coast Regional Water Quality Control Board in cooperation with California Department of Forestry. 57 pp.

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Reid, L. and T. Dunne. 1996. Rapid evaluation of sediment budgets. Catena Verlag GMBH. Reiskirchen, Germany.

USEPA. 1999. Noyo River Total Maximum Daily Load for sediment. Region IX, San Francisco.