Section B
SURFACE AND POINT SOURCE EROSION (ROADS/SKID TRAILS)

INTRODUCTION

The surface and point source erosion module examines the past and present soil erosion from roads and skid trails of the Mendocino Redwood Company (MRC) ownership in the Rockport Coastal Streams watershed, the Rockport Coastal Streams watershed analysis unit (WAU). This module also provides a hazard assessment of the potential for future surface and point source erosion from roads in the Rockport Coastal Streams WAU. The potential erosion assessment is to assist in development of mitigation measures and actions to minimize future soil erosion from the road network. The road data that is the basis for most of this analysis was collected by MRC during a road inventory of the Rockport Coastal Streams WAU. The erosion estimates utilize a combination of field observations and the use of the surface erosion model presented in the Standard Methodology for Conducting Watershed Analysis (Version 4.0, Washington Forest Practices).

Surface erosion is defined as the removal of soil particles from the surface of the soil. Processes such as rill erosion, sheetwash, biogenic transport (animal burrows, treefall, etc.) and ravel are considered surface erosion. Gullies, road crossing wash-outs, and large erosion features created by erosion from overland flow of water are considered point source erosion. In contrast, the largest discrete erosion events, landslides, are considered mass wasting.

This report examines road and skid trail associated surface and point source erosion delivering sediment into watercourses. Excessive levels of fine sediments from surface and point source erosion can get trapped in porous streambed gravels; and can increase water turbidity and suspended sediment concentrations. Excessive coarse sediments from point source erosion can adversely affect stream channel morphology. These can reduce the survival of salmonids in their redds or affect habitat needs and physiological characteristics of rearing salmonids. Excessive surface and point source erosion when delivered to a watercourse can also affect other downstream uses such as water supplies, agricultural diversions and recreation users. It is important that best management practices be utilized in forest management operations to minimize the impacts of surface and point source erosion.

SURFACE AND POINT SOURCE EROSION FROM ROADS

Methods

Road Inventory

A road inventory of the roads with the Rockport Coastal Streams WAU was completed in 2006. The road inventory consisted of traveling all roads with a Global Positioning System (GPS) unit and identifying, mapping and inventorying all major features of the road network. Some of the

features that are inventoried include watercourse-crossings and crossing structures (culverts, bridges, etc.), landings, erosion features and controllable erosion amounts (as defined below). Information relating to erosion and sediment delivery from the road inventory is analyzed in this report. Dimensions of the road network such as length, width and sediment contributing road lengths are also summarized. The road inventory collects information on the entire road infrastructure. This road infrastructure information allows for better management and tracking of the road network.

Estimating controllable erosion

Future or potential point source erosion (gully or road fill wash-outs, not sheetwash) observations were also collected during the road inventory. This potential future erosion is called controllable erosion[a], a term developed by the North Coast Regional Water Quality Control Board for Total Maximum Daily Load (TMDL) purposes. Typically, controllable erosion is a measure of the fill material from a road that could erode if a road feature is left un-maintained or fails in the next 40 years. The controllable erosion amount is the volume of soil that can be controlled with high design standards for a road feature (i.e. watercourse crossing, side-cast fill, etc.).

The controllable erosion sites are further designated by the potential for sediment delivery and the immediacy of treatment for the site. Both the sediment delivery potential and the treatment immediacy are ranked low, moderate, or high. The ranking of each controllable erosion site by these variables provides a hazard or risk assessment of the controllable erosion. This allows prioritization of road improvements and erosion control work based on potential point source erosion hazard.

Another important variable of potential future point source erosion from a road is the likelihood of diversion of water down the road prism. This diversion potential, as it is called, was evaluated for every watercourse crossing of every road in the Rockport Coastal Streams WAU. A site has a diversion potential if when the watercourse crossing plugged, dammed or failed water could be diverted out of the "natural" watercourse channel and down the road prism. Water diverted out of its "natural" channel would erode the road prism creating potentially high sediment delivery. Sites with a diversion potential can be engineered such that the diversion of water down a road prism does not occur if the watercourse crossing plugged, dammed, or failed.

A prioritization of potential point source erosion sites for the Rockport Coastal Streams WAU is presented (Appendix B). This prioritization is based on amount of controllable erosion of the site, the treatment immediacy, and a high diversion potential.

Culvert size analysis

Proper culvert sizing is another important characteristic for consideration of road erosion potential. Culverts that do not have the capacity to pass debris, water and sediment in high flow events can plug creating road prism failures with high sediment inputs. MRC currently designs all new culvert installations to pass the 100 year flood to ensure enough capacity in the pipe to

[a] Three important points qualify the definition of controllable erosion:

- Human action created the condition.
- Human action can reasonably control the condition.
- Estimated potential for sediment delivery, within 40 years, is greater than 10 $yd^{3.}$

pass water, debris and sediment in high flows. To determine if culvert sizing is appropriate for existing culverts the area behind each culvert inventoried was determined from topography data in the MRC Geographic Information System (GIS). The regression equation for the North Coast region (Waananen and Crippen, 1977) is used to predict the 50 and 100 year peak flow. A culvert sizing nomograph is used to determine the appropriate size for 50 and 100 year peak flow magnitudes and the predicted size are compared to the existing culvert sizing to determine if the culvert is large enough.

The culvert sizing analysis must be interpreted carefully as it was often difficult to tell what area of watershed drained to a culvert from a map based analysis. This culvert sizing analysis is only meant to be "first cut" at determining if a culvert is properly sized. From this analysis a field visit to the site will determine if indeed the appropriate watershed drainage area was used and the culvert is indeed under-sized. The results from the culvert sizing analysis are presented in Appendix B.

Road surface erosion modeling

Surface erosion (sheetwash and minor rills) from roads was not directly estimated in the field. The contributing length or extent of road that delivers erosion to a watercourse is measured in the field then used for surface erosion calculations. The contributing length of a road is the length of road prism that drains water and associated eroded soil into a watercourse. Thus it defines the length of surface erosion of any particular site on the road. The model used to calculate surface erosion from roads is based on the Standard Methodology for Conducting Watershed Analysis (Version 4.0, Washington Forest Practices Board) and is described below. Modifications to the standard methodology are also indicated below.

Surface erosion from the road surface is influenced by the amount of road traffic (high use mainline, moderate use, active secondary, etc.), the type of road surface material, precipitation, width and size of road (the more surface area to erode, the more erosion), proximity to the watercourse, and vegetative cover (Reid, 1981). The Standard Methodology for Conducting Watershed Analysis (Version 4.0, Washington Forest Practices Board) provides relationships based on these factors to estimate the amount of surface erosion from different road types and conditions.

Field observations from the road inventory determined the length of the road delivering sediment to a watercourse (contributing length) from individual features of the road (culverts and crossings), the road width, the road surface material and the type of road (seasonal or temporary) to aid in the surface erosion calculations.

The road inventory lacked contributing road length for road segments adjacent to a watercourse but not associated with a culvert or crossing. Using an analysis from GIS, the amount of road within 50 feet, 50-100 feet and 100-200 feet of a watercourse was determined for all road segments not associated with a culvert or crossing. It was assumed that within 50 feet, 100 percent of erosion from the road delivers sediment to a watercourse. At 50-100 feet 35 percent and at 100-200 feet 10 percent of erosion from the road was assumed to deliver sediment to a watercourse. These assumptions were based on sediment delivery ratios used in a road erosion model called SEDMOD.

The following model parameters were used to calculate surface erosion from roads in the Rockport Coastal Streams WAU. All of the observed roads were assumed to be older than two years and a base erosion rate of 60 tons/acre/year was applied to seasonal, temporary and

permanent roads. A base erosion rate of 6 tons/acre/year was applied to decommissioned and historic road types since those road types are no longer used for normal operations and typically have competent surfaces.

This base erosion rate was altered (multiplied) by the unitless factors of traffic on the road, cut- and fill-slope vegetation cover, road surface type, road slope, annual precipitation, and road type in an attempt to model the actual sediment volume contributed by a given road segment. The road tread width was determined in the field during the road inventory and is assumed to be 40% of the road prism. The cut- and fill-slopes are assumed to encompass 60% of the road prism; their dimensions for the surface erosion model were determined by multiplying the tread width by 1.5.

Road cut- and fill-slopes usually had approximately 50% vegetative cover, giving a cover factor of 0.37. The majority of hauling on roads occurs during drier times of the year (i.e. late spring, summer and early fall). Therefore the lowest annual precipitation category is used (<47 in. precipitation annually). Precipitation impacts the road surface by eroding off unconsolidated material. A road tread factor was assigned to each type of road surface (rocked, native, paved or decommissioned). All road tread types were categorized within this annual precipitation category described above. A road with at least a 6 inch rock surface is given a tread factor of 0.2, a native surface road has a factor of 1 and paved roads were assigned a road tread factor of 0.03. MRC chose a road tread factor of 0.03 also for decommissioned roads since these are assumed to achieve competent surfaces within a relative short time period after decommissioning. MRC assigned a road tread factor of 1 for road segments where the road surface type was undetermined.

Road segments with a slope of 15% or greater were assigned a slope factor of 2.5 and all other segments (including undetermined) were assigned a slope factor of 0.2.

Road widths were determined in the road inventory and undetermined widths were assigned a standard width of 18 feet.

There were 3 traffic factors used in surface erosion modeling:

1) *Mainline roads with moderate traffic* have a factor of 2; these roads are used for log haul traffic 2-3 times each decade.
2) *Seasonal (and undetermined) roads* have a traffic factor of 1.2; these are tributary roads which receive moderate log haul traffic 1-2 years each decade and light traffic the remainder of the time.
3) *Temporary roads* receive a traffic factor of 0.61; these roads receive moderate log haul traffic 1-2 times per every 1-2 decades with little to no use in between.
4) *Decommissioned and Historic roads* have a traffic factor of 0.001; these roads do not receive any log haul traffic but are occasionally traveled on with all-terrain vehicles. We assumed that most erosion from these road types would have little do with traffic and more to do with exposed cut and fill slopes.

The result of the surface erosion modeling (including the near stream surface erosion) is normalized by road length and presented as tons/mile/year of sediment delivery (see Appendix B for erosion estimates of each road in the Rockport Coastal Streams WAU). For relative sediment contributions from each planning watershed for road-associated sediment input evaluation, the tons/year calculations for all roads was totaled by planning watershed and normalized by

dividing by the MRC ownership, in square miles, for the planning watershed. The result is a tons/square mile of MRC ownership/year estimate of road surface and point source erosion.

Erosion Hazard Rating

Finally, with this information each road in the Rockport Coastal Streams WAU is assigned an erosion hazard class. The erosion hazard class is used to classify the road features (culverts, crossings and road segments) in the Rockport Coastal Streams WAU by their current and potential erosion hazard. The erosion hazard class was determined by the amount of erosion a feature produced and the likelihood for that erosion to be delivered to a watercourse. High levels of traffic, road surface, proximity to the stream, and high modeled surface erosion all were considered when ranking roads for their erosion hazard.

Road segments with deliverable sediment to crossings and culverts were classified into high, moderate, and low categories based on the natural breaks in the sediment delivery data (for example, the top third were categorized as high erosion hazard). Road segments not draining to a culvert a crossing were categorized similarly, with the following exceptions: segments within 50 feet of a watercourse were categorized only as high and moderate and segments within 200 feet were categorized only as moderate and low.

Results and Discussion – Roads

Erosion Hazard Rating

The road erosion hazard rating for each road in the Rockport Coastal Streams WAU is presented on Maps B-1(a) and B-2(b) in Appendix B of this report. The categorizing of road segments into hazard classes is intended to identify current problem areas, consider reconstruction and prioritize maintenance. Hazard ratings for road segments are normalized by the segment length. The following are the definitions for each erosion hazard class.

High Erosion Hazard Class - These features have the highest amount of recent deliverable surface erosion to watercourses and a high potential for future deliverable erosion. Often features in this class are close to watercourses creating a high sediment delivery potential. Erosion is typically due to long contributing road lengths or road with native surfaces near watercourses: a result of too few waterbars and/or rolling dips or lack of rock surface. Erosion may also be a product of problem areas such as watercourse crossing wash-outs, poor road drainage, plugged road watercourse crossings, water diverted down the road surface, culverts not fitted with downspouts, etc. Active roads in this class should get the highest priority for maintenance or improvements.

Moderate Erosion Hazard Class - These features have moderate amounts of recent deliverable surface erosion to watercourses and potential for future deliverable erosion. Erosion problems on roads in this class can usually be handled with good road maintenance. Erosion is typically from problem areas such as poor road drainage, water diverted down the road surface, culverts not fitted with downspouts, and an occasional plugged culvert or watercourse crossing wash-out. Active roads in this class should be a priority for maintenance.

Low Erosion Hazard Class - These features have low amounts of recent deliverable surface erosion to watercourses and low potential for future deliverable erosion. These roads can be active, abandoned or closed. Active roads in this class do not need to be a priority for maintenance.

Road features from the road inventory

The mapped roads and road features (culverts, crossings, and landings) are presented in map B-2 for the Rockport Coastal Streams WAU. The associated treatment immediacy of the road feature is also shown on these maps. Potential controllable (point source) erosion sites were identified and prioritized in the Rockport Coastal Streams WAU. In the Rockport Coastal Streams WAU 73 controllable erosion sites have high treatment immediacy and 14 controllable erosion sites have moderate treatment immediacy. In addition to these controllable erosion sites 66 culverts or crossings in the Rockport Coastal Streams WAU have a diversion potential. These diversion potential sites need to be considered a high priority for road improvement as they can represent a significant potential point source erosion hazard. The site identification, treatment immediacy and amount of controllable erosion estimated are found in Appendix B of this report.

Culvert size analysis

The culvert size analysis has determined that, out of a total of 177 watercourse culverts, approximately 69% are potentially too small to pass the 50 year flood flow and 70% for the 100-year flow. The analysis of culvert sizing is only an estimate based on culvert location from the MRC road inventory and area draining to the culvert based on MRC GIS topographic data. All culverts were analyzed with a headwall-to-pipe diameter ratio of 0.75 and a mean annual precipitation of 55 inches (or a 100-year rainfall intensity of 3.1 inches per hour with a runoff coefficient of 0.4). A field review will be required at each site to validate the culvert size analysis results and determine if the culvert is indeed under-sized. However, the identification of these culverts as under-sized provides information to address potential road problems in Rockport Coastal Streams WAU. These culverts identified as potentially too small need to be a high priority for upgrade if after field review the culverts are determined to be under-sized. The culvert sizing results are found in Appendix B of this report.

Table B-1. Culvert size analysis for the Rockport Coastal Streams WAU.

Planning Watershed	Percentage of culverts NOT passing 100-yr flow requirements	Percentage of culverts NOT passing 50-yr flow requirements
Hardy Creek	60%	60%
Juan Creek	73%	73%
Howard Creek	83%	74%

Road density

It was determined that there are 129 miles of truck roads in the Rockport Coastal Streams WAU (skid trails not included). This represented an average road density of 7 miles of road per square mile of property owned by MRC. Table B-2 breaks shows the road lengths and densities for the Rockport Coastal Streams WAU.

Table B-2. Road Lengths and Density by Planning Watershed for the Rockport Coastal Streams WAU.

Planning Watershed	Watershed area (mi^2)	MRC owned (mi^2)	Road Length (miles)	Contributing* Road Length (miles)	Road Density** (mi/mi^2)
Hardy Creek	5.7	4.7	41	12.4	8.8
Juan Creek	7.7	7.3	54.9	17.2	7.5
Howard Creek	5.5	3.7	34.5	6.5	9.0

**Contributing road length is defined as the amount of road potentially draining to a watercourse that could lead to a deliverable amount of surface erosion. It is determined during the road inventory.*
***Road density is calculated by dividing the road length by the amount of MRC-owned land within each planning watershed.*

Road densities are something that should be managed for in the Rockport Coastal Streams WAU. Not all roads can be abandoned, but by converting many of these roads to a temporary status or putting them to bed after use, the amount of road that can contribute erosion at any given time is reduced.

Surface and point source erosion

The surface and point source erosion estimates by planning watershed are presented in Table B-3. The breakdown of estimated erosion, road lengths and hazard rating by individual roads is in Appendix B of this report. Road segments within 50 feet of watercourses are assumed to deliver 100% of their estimated sediment yield. At 50-100 feet, segments are assumed to deliver 35% of their estimated sediment yield and 10% for segments within 100-200 feet of watercourses. No delivery was assumed for segments beyond 200 feet from a watercourse. Of the 129 total miles of road within the Rockport Coastal Streams WAU, 12.4 miles within Hardy Creek, 17.2 miles within Juan Creek, and 6.5 miles within Howard Creek were estimated to be deliverable sources of sediment to watercourses within the watershed, equating to roughly 28% of the total. Roads in the MRC ownership in the Rockport Coastal Streams WAU are estimated to generate, on average, 176 $tons/mi^2/yr$ of sediment from road-associated surface and point source erosion. This rate of erosion from roads within the Rockport Coastal Streams WAU is relatively moderate in comparison with other typical erosion rates on MRC land.

Table B-3 Road Associated Surface and Point Source Erosion Estimates for the Rockport Coastal Streams WAU.

Planning Watershed	MRC owned (mi^2)	Surface Erosion (tons/sq mi/yr)	Point Source Erosion (tons/sq mi/yr)	Total (surface + point source) (tons/sq mi/yr)
Hardy Creek	4.7	17	120	137
Juan Creek	7.3	16	284	300
Howard Creek	3.7	6	93	99
Rockport Coastal Streams WAU	***15.7***	***14***$^+$	***168***$^+$	***392***$^+$

$^+$*Area-weighted average*

Controllable erosion

The future potential for point source erosion was evaluated in the Rockport Coastal Streams WAU. This potential erosion or controllable erosion was identified during the road inventory during 2008. A total of 20,709 cubic yards of controllable erosion was identified in the Rockport Coastal Streams WAU (Table B-4).

Table B-4. Controllable Erosion Volume Estimates by Road Feature and Treatment Immediacy for the Rockport Coastal Streams WAU.

	Controllable Erosion by Treatment Immediacy (yd^3)			
Road Feature	**High**	**Moderate**	**Low**	**None**
Culverts	4,685	2,190	7,385	0
Crossings	0	1,745	360	2
Landings	0	300	385	0
Erosion Sites	0	0	117	0
Road slides	3,000	200	340	0
Total	***7,685***	***4,435***	***8,587***	***2***

The majority of controllable erosion (by volume) is at culverts and road slides. There are a total of 606 controllable erosion sites within the Rockport Coastal Streams WAU (Table B-5). Appendix B contains more details for each feature.

Table B-5. Number of features by Treatment Immediacy for the Rockport Coastal Streams WAU.

Road Feature	High	Moderate	Low	None
Culverts	72	7	94	13
Crossings	0	4	47	60
Landings	0	2	8	263
Erosion Sites	0	0	5	0
Road slides	1	1	19	10
Total	***73***	***14***	***173***	***346***

Fish passage barriers in the Rockport Coastal Streams WAU

There are no identified barriers to fish passage in the Rockport Coastal Streams WAU.

Road Associated Erosion Control Measures for the Rockport Coastal Streams WAU 1998-2008

Since Mendocino Redwood Company's ownership in the Rockport Coastal Streams WAU (starting in 1998), MRC has conducted erosion control and road upgrade work to address and improve road erosion sites. The initial road inventory survey of Rockport Coastal Streams WAU was conducted in 2008. On-going erosion control work has improved sedimentation conditions in Rockport Coastal Streams WAU since MRC has taken ownership of the property, but credit for treating controllable erosion sites cannot be taken since the road inventory was just completed. Map B-3 displays erosion control work completed since 1998 and Table B-6 lists recent road work completed.

Table B-6. Treated Erosion by Area for the Rockport Coastal Streams WAU.

Year	THP or Project	Brief Work Description	Treated Erosion (yd^3)
1998	SF Hardy	Slide removal, rocked dips, fill removal	250
1998	Juan Creek	Slide removal, rocked dips, fill removal	800
2000	Alviso, Rock Ck	Slide removal, rocked dips, culvert removal	1,200
2000	Juan, Lynch	Slide removal and rocked dips	220
2004	Hardy	Rocked dips, culvert removal	175
2006	Hardy	Removed culverts, road upgrades	625
2008	Juan, Hardy	Road decommission, fire restoration	550

Summary of Treated Erosion since 1998 in the Rockport Coastal Streams WAU

Treated Erosion Total for Rockport Coastal Streams WAU 1998 = 1,050 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 1999 = 0 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2000 =1,420 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2001 =0 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2002 =0 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2003 =0 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2004 = 175 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2005 = 0 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2006 =625 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2007 =0 cubic yards
Treated Erosion Total for Rockport Coastal Streams WAU 2008 =550 cubic yards

Treated Erosion Total for Rockport Coastal Streams WAU 1998-2008 = 3,820 cubic yards

SURFACE AND POINT SOURCE EROSION FROM SKID TRAILS

Methods

Sediment delivery from surface and point source erosion from skid trails was determined from aerial photograph interpretation and sediment delivery estimates developed in previous MRC watershed analyses (MRC, 1998 and MRC, 2000). Aerial photographs were analyzed from the

1952, 1965, 1978, 1990, 2000, 2010 photo years. MRC owned photographs from 2010, 2000 1990, and 1978. Photocopies on file at the Mendocino County Resource Conservation District in Ukiah for the 1965 and 1952 series were used to analyze older skid trail activity, but without the aid of a stereoscope. The aerial photographs were used to identify skid trail activity for each decade from 1940 to the end of the 1990s.

The aerial photograph interpretation for skid trail activity consisted of determining the area harvested with ground based yarding by skid trail density (high, moderate, low) for each photo year. High-density skid trail activity is defined as having greater than 100 watercourse crossings per square mile. Moderate-density skid trail activity is defined as having between 50-100 watercourse crossings per square mile. Light skid trail density has less than 50 watercourse crossings per square mile or trails with significant re-vegetation observed in the aerial photograph.

The amount of sediment delivery from the various densities of skid trail activity was estimated from sediment delivery rates during previous watershed analyses by MRC (MRC, 1998 and MRC, 2000). A combination of surface erosion modeling and field observations of point source erosion from skid trails, from previous watershed analysis, was used to develop the skid trail estimates. High skid trail density is estimated to contribute 600 tons/square mile/year of sediment. Moderate skid trail density is estimated to contribute 400 tons/square mile/year of sediment, while low skid trail density contributing 100 tons/square mile/year. Results from the South Fork Caspar Creek in the early 1970's suggested that high density tractor logging, with practices used at that time, generated approximately 600 tons/square mile/year (Rice et. al., 1979).

For each photo year the area in each skid trail density category was multiplied by the sediment delivery rate for that density. The estimate was then divided by the MRC ownership in each Calwater planning watershed to provide a sediment rate (tons/square mile/year) for each planning watershed. The estimated rate was then assumed to represent the decade previous to the photo year observed (i.e. 1978 photos represent activity in the 1970s), but an average value of the previous and subsequent decades (1965 and 1978 photo sets) was used for the 1960s.

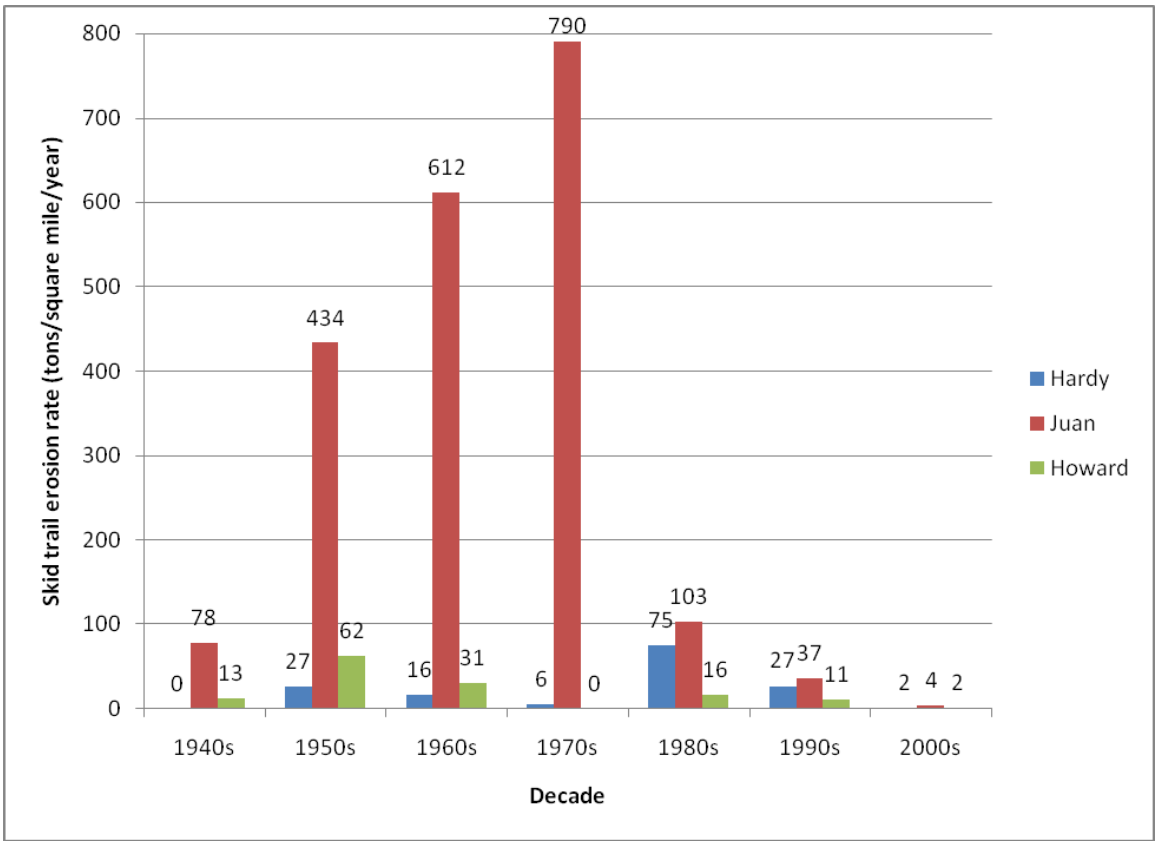
Results and Discussion - Skid Trail Erosion

The results by time period for the skid trail sediment delivery estimates are summarized in Chart B-1. The estimates should be considered a minimum sediment delivery for skid trails constructed and used in the decade. Undoubtedly some, if not many, sediment delivering skid trails were vegetated enough to be overlooked during the inventory. In particular are those trails constructed or used greater than five years prior to aerial photograph reconnaissance. Two aerial photographs below depict impacts due to skid trail harvesting. The first (Photo 1) shows the intensive harvesting of the Juan Creek drainage from the 1970s. The second (Photo 2) indicates a decrease in skid trail activity and a reforestation of intensively-harvested areas (red square in Photo 1 is the area shown in Photo 2).

Photo 1: 1978 aerial photograph of southern Hardy Creek and northern Juan Creek

Photo 2: 2010 aerial photograph of Juan Creek

Chart B-1. Skid Trail Sediment Delivery Rates for Rockport Coastal Streams WAU, 1940s-1990s.



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APPENDIX B
Surface and Point Source Erosion Module

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Crossing	41HB0000000x15	41-HB	none	0	yes
Crossing	41HB0000000x16	41-HB	low	5	no
Crossing	41HB0000000x17	41-HB	low	5	no
Crossing	41HB0000000x18	41-HB	low	5	no
Crossing	41HB0190000x1	41-HB-019	none	0	yes
Crossing	47HC0000000x13	47-HC	low	20	no
Crossing	47HC0000000x19	47-HC	low	40	no
Crossing	47HC0000000x26	47-HC	none	0	yes
Crossing	47HC0000000x30	47-HC	none	0	yes
Crossing	47HC0000000x33	47-HC	low	10	no
Crossing	47HC0000000x38	47-HC	none	0	yes
Crossing	47HC0000000x43	47-HC	none	0	yes
Crossing	47HC0000000x44	47-HC	none	0	yes
Crossing	47HC0000000x66	47-HC	none	0	yes
Crossing	47HC0000000x75	47-HC	none	0	yes
Crossing	47HC0000000x79	47-HC	none	0	yes
Crossing	47HC0000000x83	47-HC	none	0	yes
Crossing	47HC0000000x84	47-HC	none	0	yes
Crossing	47HC0090000x6	47-HC-009	low	20	no
Crossing	47HC0090000x8	47-HC-009	low	10	no
Crossing	47HC0320000x2	47-HC-032	none	0	yes
Crossing	47HC0320000x3	47-HC-032	none	0	yes
Crossing	47HC0320400x3	47-HC-032-04	none	0	yes
Crossing	47HR0000000x15	47-HR	none	0	yes
Crossing	47HR0000000x16	47-HR	none	0	yes
Crossing	47HR0000000x19	47-HR	none	0	yes
Crossing	47HR0000000x24	47-HR	low	10	no
Crossing	47HR0270000x3	47-HR-027	low	10	no
Crossing	47HR0280100x3	47-HR-028-01	low	80	no
Crossing	47JN0000000x52	47-JN	low	20	no
Crossing	47JN0000000x60	47-JN	none	0	yes
Crossing	47JN0000000x61	47-JN	none	0	yes
Crossing	47JN0030000x2	47-JN-003	none	0	yes
Crossing	47JN0030000x24	47-JN-003	low	10	no
Crossing	47JN0030000x6	47-JN-003	low	20	no
Crossing	47JN0120000x5	47-JN-012	low	10	no
Crossing	47JN0370000x14	47-JN-037	none	0	yes
Crossing	47JN0370000x16	47-JN-037	low	0	no
Crossing	47JN0370000x17	47-JN-037	none	0	yes
Crossing	47JN0370000x6	47-JN-037	none	0	yes
Crossing	47JN0370000x7	47-JN-037	low	60	no
Crossing	47JN0370000x8	47-JN-037	none	0	yes
Crossing	47JN0371000x2	47-JN-037-10	low	20	no
Crossing	47LJ0130000Jx1	47-LJ-013	moderate	10	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Crossing	47LJ0130000Jx16	47-LJ-013	moderate	100	no
Crossing	47MJ0000000x4	47-MJ	none	0	yes
Crossing	47MJ0000000x48	47-MJ	low	20	no
Crossing	47MJ0000000x52	47-MJ	none	0	yes
Crossing	47MJ0000000x60	47-MJ	none	0	yes
Crossing	47MJ0000000x69	47-MJ	low	20	no
Crossing	47MJ0000000x70	47-MJ	low	10	no
Crossing	47MJ0430000x1	47-MJ-043	low	20	no
Crossing	47MJ0650000x11	47-MJ-065	moderate	100	no
Crossing	47MJ0650000x25	47-MJ-065	low	150	no
Crossing	47MJ0650000x34	47-MJ-065	moderate	150	no
Crossing	47MJ0650000x42	47-MJ-065	low	5	no
Crossing	47MJ0650000x43	47-MJ-065	low	5	no
Crossing	47MJ0650000x8	47-MJ-065	low	20	no
Crossing	47MJ0820000X1	47-MJ-082	none	0	yes
Crossing	47MJ0820000X10	47-MJ-082	none	0	yes
Crossing	47MJ0820000X11	47-MJ-082	none	0	yes
Crossing	47MJ0820000x12	47-MJ-082	none	0	yes
Crossing	47MJ0820000X13	47-MJ-082	none	0	yes
Crossing	47MJ0820000X14	47-MJ-082	none	0	yes
Crossing	47MJ0820000X15	47-MJ-082	none	0	yes
Crossing	47MJ0820000x16	47-MJ-082	none	0	yes
Crossing	47MJ0820000x17	47-MJ-082	none	0	yes
Crossing	47MJ0820000X18	47-MJ-082	low	0	no
Crossing	47MJ0820000x19	47-MJ-082	low	20	no
Crossing	47MJ0820000X2	47-MJ-082	none	0	yes
Crossing	47MJ0820000x22	47-MJ-082	low	60	no
Crossing	47MJ0820000x23	47-MJ-082	low	150	no
Crossing	47MJ0820000x24	47-MJ-082	low	500	no
Crossing	47MJ0820000X25	47-MJ-082	low	10	no
Crossing	47MJ0820000X26	47-MJ-082	low	200	no
Crossing	47MJ0820000x29	47-MJ-082	low	10	no
Crossing	47MJ0820000X3	47-MJ-082	none	0	yes
Crossing	47MJ0820000X30	47-MJ-082	low	20	no
Crossing	47MJ0820000X4	47-MJ-082	none	0	yes
Crossing	47MJ0820000x5	47-MJ-082	none	0	yes
Crossing	47MJ0820000x6	47-MJ-082	none	0	yes
Crossing	47MJ0820000x7	47-MJ-082	none	0	yes
Crossing	47MJ0820000X8	47-MJ-082	none	0	yes
Crossing	47MJ0820000x9	47-MJ-082	none	0	yes
Crossing	47MJ0821100x1	47-MJ-082-11	none	0	yes
Crossing	47TC0000000x32	47-TC	none	0	yes
Crossing	47TC0241601x2	47-TC-024-16-01	low	5	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Crossing	47TC0241601x4	47-TC-024-16-01	low	5	no
Crossing	47UH0000000x19	47-UH	none	0	yes
Crossing	47UH0000000x47	47-UH	none	0	yes
Crossing	47UH0000000x55	47-UH	none	0	yes
Crossing	47UH0000000x56	47-UH	none	0	yes
Crossing	47UH0000000x61	47-UH	low	10	no
Crossing	47UH0010700X12	47-UH-001-07	low	20	no
Crossing	47UH0010700X13	47-UH-001-07	low	30	no
Crossing	47UH0010700X15	47-UH-001-07	none	0	yes
Crossing	47UH0010700X21	47-UH-001-07	low	20	no
Crossing	47UH0060300x1	47-UH-006-03	low	20	no
Crossing	47UH0060300x2	47-UH-006-03	low	10	no
Crossing	47UH0120502x3	47-UH-012-05-02	low	20	no
Crossing	47UH0120505Jx1	47-UH-012-05-05	none	0	yes
Crossing	47UH0120505Jx2	47-UH-012-05-05	none	0	yes
Crossing	47UH0120505Jx3	47-UH-012-05-05	none	0	yes
Crossing	47UH0120505Jx4	47-UH-012-05-05	none	0	yes
Crossing	47UH0440000x5	47-UH-044	low	10	no
Crossing	47UH0520000x1	47-UH-052	none	0	yes
Crossing	47UH0520000x2	47-UH-052	low	10	no
Crossing	47UH0520000x3	47-UH-052	none	0	yes
Crossing	47UH0520000x4	47-UH-052	low	10	no
Crossing	47UH0540000x1	47-UH-054	none	0	yes
Crossing	47UH0560000x2	47-UH-056	none	0	yes
Culvert	45MJ0820000c4	45-MJ-082	none	0	yes
Culvert	47CH8280000c1	47-CH-828	low	50	no
Culvert	47CH8300000Jc1	47-CH-830	high	20	no
Culvert	47CH8300000Jc2	47-CH-830	none	0	yes
Culvert	47CH8300000Jc3	47-CH-830	low	60	no
Culvert	47CH8300000Jc4	47-CH-830	high	20	no
Culvert	47CH8300500c1	47-CH-830-05	high	30	no
Culvert	47CH8300500c2	47-CH-830-05	low	60	no
Culvert	47HC00000000c40	47-HC	low	20	no
Culvert	47HC0000000c1	47-HC	high	60	no
Culvert	47HC0000000c11	47-HC	high	40	no
Culvert	47HC0000000c12	47-HC	moderate	30	no
Culvert	47HC0000000c13	47-HC	low	110	no
Culvert	47HC0000000c2	47-HC	low	30	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Culvert	47HC0000000c21	47-HC	low	50	no
Culvert	47HC0000000c22	47-HC	low	60	no
Culvert	47HC0000000c23	47-HC	none	0	yes
Culvert	47HC0000000c24	47-HC	low	60	no
Culvert	47HC0000000c26	47-HC	moderate	90	no
Culvert	47HC0000000c29	47-HC	high	160	no
Culvert	47HC0000000c32	47-HC	low	30	no
Culvert	47HC0000000c33	47-HC	low	200	no
Culvert	47HC0000000c35	47-HC	low	80	no
Culvert	47HC0000000c36	47-HC	high	200	no
Culvert	47HC0000000c38	47-HC	high	120	no
Culvert	47HC0000000c4	47-HC	low	50	no
Culvert	47HC0000000c42	47-HC	low	30	no
Culvert	47HC0000000c50	47-HC	low	80	no
Culvert	47HC0000000c52	47-HC	low	300	no
Culvert	47HC0000000c69	47-HC	none	0	yes
Culvert	47HC0000000c70	47-HC	high	40	no
Culvert	47HC0000000c73	47-HC	low	150	no
Culvert	47HC0000000c74	47-HC	low	90	no
Culvert	47HC0000000c76	47-HC	low	110	no
Culvert	47HC0000000c77	47-HC	high	100	no
Culvert	47HC0090000c8	47-HC-009	low	60	no
Culvert	47HC0170000Jc4	47-HC-017	high	70	no
Culvert	47HC0170000Jc5	47-HC-017	high	80	no
Culvert	47HC0170000Jc6	47-HC-017	high	80	no
Culvert	47HC0170000Jc7	47-HC-017	high	120	no
Culvert	47HC0790000c13	47-HC-079	low	300	no
Culvert	47HC0790000c7	47-HC-079	low	200	no
Culvert	47JN0000000c4	47-JN	low	20	no
Culvert	47JN0000000c49	47-JN	low	90	no
Culvert	47JN0000000c53	47-JN	high	40	no
Culvert	47JN0000000c56	47-JN	low	40	no
Culvert	47JN0000000c6	47-JN	none	0	yes
Culvert	47JN0030000c29	47-JN-003	low	40	no
Culvert	47JN0030000c3	47-JN-003	low	30	no
Culvert	47JN0030000c30	47-JN-003	high	30	no
Culvert	47JN0030000c34	47-JN-003	high	30	no
Culvert	47JN0030000c35	47-JN-003	high	100	no
Culvert	47JN0030000c7	47-JN-003	high	40	no
Culvert	47JN0030000c8	47-JN-003	high	40	no
Culvert	47JN0030000c9	47-JN-003	high	60	no
Culvert	47LJ0000000c6	47-LJ	high	50	no
Culvert	47LJ0000000c7	47-LJ	high	20	no
Culvert	47LJ0000000c74	47-LJ	high	70	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Culvert	47LJ0000000c9	47-LJ	low	480	no
Culvert	47LJ0050000c1	47-LJ-005	high	40	no
Culvert	47LJ0050000c1	47-LJ-005	high	60	no
Culvert	47LJ0050000c2	47-LJ-005	low	70	no
Culvert	47LJ0130000c10	47-LJ-013	low	200	no
Culvert	47LJ0130000c12	47-LJ-013	high	20	no
Culvert	47LJ0130000c13	47-LJ-013	low	30	no
Culvert	47LJ0130000c14	47-LJ-013	high	20	no
Culvert	47LJ0130000c16	47-LJ-013	high	260	no
Culvert	47LJ0130000c20	47-LJ-013	low	20	no
Culvert	47LJ0130000c21	47-LJ-013	high	30	no
Culvert	47LJ0130000c22	47-LJ-013	high	60	no
Culvert	47LJ0130000c23	47-LJ-013	low	30	no
Culvert	47LJ0130000c24	47-LJ-013	low	100	no
Culvert	47LJ0130000c27	47-LJ-013	low	60	no
Culvert	47LJ0130000c28	47-LJ-013	high	50	no
Culvert	47LJ0130000c29	47-LJ-013	low	50	no
Culvert	47LJ0130000c30	47-LJ-013	high	100	no
Culvert	47LJ0130000c31	47-LJ-013	low	40	no
Culvert	47LJ0130000c4	47-LJ-013	high	20	no
Culvert	47LJ0130000c5	47-LJ-013	low	20	no
Culvert	47LJ0130000c6	47-LJ-013	low	30	no
Culvert	47LJ0130000c7	47-LJ-013	low	30	no
Culvert	47LJ0130000c8	47-LJ-013	low	30	no
Culvert	47LJ0550000c1	47-LJ-055	low	60	no
Culvert	47LJ0550000c4	47-LJ-055	low	40	no
Culvert	47LJ0760000c11	47-LJ-076	low	50	no
Culvert	47LJ0760000c3	47-LJ-076	low	50	no
Culvert	47LJ0760000c6	47-LJ-076	low	50	no
Culvert	47LR0130000c2	47-LR-013	high	30	no
Culvert	47LR0130000c3	47-LR-013	high	50	no
Culvert	47LR0130000c4	47-LR-013	none	0	yes
Culvert	47MJ0000000c13	47-MJ	low	70	no
Culvert	47MJ0000000c17	47-MJ	none	0	yes
Culvert	47MJ0000000c18	47-MJ	high	200	no
Culvert	47MJ0000000c21	47-MJ	high	40	no
Culvert	47MJ0000000c23	47-MJ	high	40	no
Culvert	47MJ0000000c24	47-MJ	low	60	no
Culvert	47MJ0000000c25	47-MJ	low	60	no
Culvert	47MJ0000000c28	47-MJ	high	40	no
Culvert	47MJ0000000c30	47-MJ	low	60	no
Culvert	47MJ0000000c34	47-MJ	moderate	110	no
Culvert	47MJ0000000c36	47-MJ	high	60	no
Culvert	47MJ0000000c37	47-MJ	low	70	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Culvert	47MJ0000000c38	47-MJ	low	70	no
Culvert	47MJ0000000c4	47-MJ	high	20	no
Culvert	47MJ0000000c43	47-MJ	low	30	no
Culvert	47MJ0000000c47	47-MJ	low	60	no
Culvert	47MJ0000000c53	47-MJ	high	10	no
Culvert	47MJ0000000c55	47-MJ	high	80	no
Culvert	47MJ0000000c57	47-MJ	moderate	400	no
Culvert	47MJ0000000c58	47-MJ	low	30	no
Culvert	47MJ0000000c59	47-MJ	high	200	no
Culvert	47MJ0000000c60	47-MJ	low	40	no
Culvert	47MJ0000000c61	47-MJ	low	20	no
Culvert	47MJ0000000c63	47-MJ	low	30	no
Culvert	47MJ0000000c67	47-MJ	low	30	no
Culvert	47MJ0000000c69	47-MJ	high	40	no
Culvert	47MJ0000000c70	47-MJ	high	20	no
Culvert	47MJ0000000c71	47-MJ	low	30	no
Culvert	47MJ0000000c72	47-MJ	low	30	no
Culvert	47MJ0000000c80	47-MJ	none	0	yes
Culvert	47MJ0430000c1	47-MJ-043	high	20	no
Culvert	47MJ0650000c10	47-MJ-065	low	40	no
Culvert	47MJ0650000c15	47-MJ-065	moderate	1000	no
Culvert	47MJ0650000c17	47-MJ-065	moderate	500	no
Culvert	47MJ0650000c18	47-MJ-065	low	30	no
Culvert	47MJ0650000c19	47-MJ-065	low	200	no
Culvert	47MJ0650000c20	47-MJ-065	low	200	no
Culvert	47MJ0650000c21	47-MJ-065	high	100	no
Culvert	47MJ0650000c24	47-MJ-065	high	200	no
Culvert	47MJ0650000c25	47-MJ-065	high	20	no
Culvert	47MJ0650000c26	47-MJ-065	high	80	no
Culvert	47MJ0650000c27	47-MJ-065	high	10	no
Culvert	47MJ0650000c28	47-MJ-065	high	70	no
Culvert	47MJ0650000c29	47-MJ-065	low	200	no
Culvert	47MJ0650000c3	47-MJ-065	low	60	no
Culvert	47MJ0650000c4	47-MJ-065	low	140	no
Culvert	47MJ0650000c9	47-MJ-065	low	40	no
Culvert	47MJ0820000c13	47-MJ-082	high	10	no
Culvert	47MJ0820000c3	47-MJ-082	none	0	yes
Culvert	47TC0000000c1	47-TC	high	5	no
Culvert	47TC0000000c2	47-TC	high	8	no
Culvert	47TC0000000c27	47-TC	low	10	no
Culvert	47TC0000000c34	47-TC	low	10	no
Culvert	47TC0000000c5	47-TC	high	10	no
Culvert	47TC0000000c6	47-TC	high	12	no
Culvert	47TC0000000c7	47-TC	high	10	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Culvert	47TC0120400Jc1	47-TC-012-04	high	30	no
Culvert	47TC0240000c23	47-TC-024	moderate	60	no
Culvert	47TC0240000c24	47-TC-024	high	60	no
Culvert	47TC024000c1	47-TC-024	high	60	no
Culvert	47TC024000c10	47-TC-024	low	90	no
Culvert	47TC024000c11	47-TC-024	low	185	no
Culvert	47TC024000c12	47-TC-024	high	330	no
Culvert	47TC024000c3	47-TC-024	high	20	no
Culvert	47TC024000c4	47-TC-024	low	50	no
Culvert	47TC024000c5	47-TC-024	low	30	no
Culvert	47TC024000c6	47-TC-024	low	40	no
Culvert	47TC024000c7	47-TC-024	high	40	no
Culvert	47TC024000c8	47-TC-024	high	30	no
Culvert	47TC024000c9	47-TC-024	high	200	no
Culvert	47TC0241601c3	47-TC-024-16-01	high	100	no
Culvert	47TC0241601c4	47-TC-024-16-01	low	10	no
Culvert	47TC0241601c5	47-TC-024-16-01	low	10	no
Culvert	47UH0000000c10	47-UH	low	110	no
Culvert	47UH0000000c11	47-UH	low	0	yes
Culvert	47UH0000000c15	47-UH	high	50	no
Culvert	47UH0000000c17	47-UH	low	100	no
Culvert	47UH0000000c18	47-UH	low	40	no
Culvert	47UH0000000c19	47-UH	low	60	no
Culvert	47UH0000000c21	47-UH	none	0	yes
Culvert	47UH0000000c25	47-UH	low	200	no
Culvert	47UH0000000c29	47-UH	none	0	yes
Culvert	47UH0000000c3	47-UH	low	80	no
Culvert	47UH0000000c33	47-UH	low	150	no
Culvert	47UH0000000c34	47-UH	low	150	no
Culvert	47UH0000000c35	47-UH	high	50	no
Culvert	47UH0000000c36	47-UH	high	50	no
Culvert	47UH0000000c37	47-UH	none	0	yes
Culvert	47UH0000000c38	47-UH	low	50	no
Culvert	47UH0000000c39	47-UH	low	50	no
Culvert	47UH0000000c7	47-UH	low	130	no
Culvert	47UH0000000c8	47-UH	low	150	no
Culvert	47UH0000000c9	47-UH	low	160	no
Culvert	47UH001007c18	47-UH-001-07	low	50	no
Culvert	47UH0010700c17	47-UH-001-07	low	30	no
Culvert	47UH0440000c8	47-UH-044	none	0	yes
Erosion site	41HB0190000e1	41-HB-019	low	5	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Erosion site	47MJ0000000e32	47-MJ	low	20	no
Erosion site	47TC0241601e5	47-TC-024-16-01	low	80	no
Erosion site	47TC0350101e1	47-TC-035-01-01	low	2	no
Erosion site	47TC0350102e1	47-TC-035-01-02	low	10	no
Landing	41BW0000000l32	41-BW	low	5	no
Landing	41BW0320000l4	41-BW-032	none	0	yes
Landing	41BW0320000l8	41-BW-032	none	0	yes
Landing	47CH0800400l3	47-CH-080-04	none	0	yes
Landing	47CH8280000l1	47-CH-828	none	0	yes
Landing	47CH8280000l2	47-CH-828	none	0	yes
Landing	47CH8280000l5	47-CH-828	none	0	yes
Landing	47CH8280700l1	47-CH-828-07	none	0	yes
Landing	47CH8300000l9	47-CH-830	none	0	yes
Landing	47-CH-830-0700l1	47-CH-830-07	none	0	yes
Landing	47HC0000000l28	47-HC	none	0	yes
Landing	47HC0000000l36	47-HC	none	0	yes
Landing	47HC0000000l55	47-HC	none	0	yes
Landing	47HC0000000l59	47-HC	none	0	yes
Landing	47HC0000000l63	47-HC	none	0	yes
Landing	47HC0000000l71	47-HC	none	0	yes
Landing	47HC0000000l9	47-HC	none	0	yes
Landing	47HC0100000l1	47-HC-010	none	0	yes
Landing	47HC0170000l4	47-HC-017	none	0	yes
Landing	47HC0170000l5	47-HC-017	none	0	yes
Landing	47HC0170000l6	47-HC-017	none	0	yes
Landing	47-HC-017-0900l1	47-HC-017-09	none	0	yes
Landing	47HC0320000l13	47-HC-032	none	0	yes
Landing	47HC0320000l6	47-HC-032	none	0	yes
Landing	47HC0320400l6	47-HC-032-04	none	0	yes
Landing	47HC0590000l3	47-HC-059	none	0	yes
Landing	47HC0590000l6	47-HC-059	none	0	yes
Landing	47HC0590100l1	47-HC-059-01	none	0	yes
Landing	47HC0590200l1	47-HC-059-02	none	0	yes
Landing	47HC0590300l2	47-HC-059-03	none	0	yes
Landing	47HC0590400l1	47-HC-059-04	none	0	yes
Landing	47HC0590700l2	47-HC-059-07	none	0	yes
Landing	47HC0590700l3	47-HC-059-07	none	0	yes
Landing	47HC0590700l7	47-HC-059-07	none	0	yes
Landing	47HC0790000l11	47-HC-079	none	0	yes
Landing	47HC0790000l13	47-HC-079	none	0	yes
Landing	47HC0790000l14	47-HC-079	low	0	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Landing	47HC0790000l16	47-HC-079	low	200	no
Landing	47HC0790000l18	47-HC-079	moderate	200	no
Landing	47HC0790000l2	47-HC-079	none	0	yes
Landing	47HC0790000l3	47-HC-079	none	0	yes
Landing	47HC0790000l4	47-HC-079	none	0	yes
Landing	47HC0790000l6	47-HC-079	none	0	yes
Landing	47HC0790000l7	47-HC-079	none	0	yes
Landing	47-HC-079-0800l1	47-HC-079-08	low	100	no
Landing	47HR0180000l1	47-HR-018	none	0	yes
Landing	47HR02700l10	47-HR-027	none	0	yes
Landing	47HR02700l13	47-HR-027	none	0	yes
Landing	47HR0270800l2	47-HR-027-08	none	0	yes
Landing	47HR0280000l1	47-HR-028	none	0	yes
Landing	47HR0280000l3	47-HR-028	none	0	yes
Landing	47HR0280000l4	47-HR-028	none	0	yes
Landing	47HR0280000l6	47-HR-028	none	0	yes
Landing	47HR0280000l7	47-HR-028	none	0	yes
Landing	47HR0280100l1	47-HR-028-01	none	0	yes
Landing	47HR0280100l2	47-HR-028-01	none	0	yes
Landing	47HR0280100l3	47-HR-028-01	none	0	yes
Landing	47HR0280100l4	47-HR-028-01	none	0	yes
Landing	47HR0280500l1	47-HR-028-05	none	0	yes
Landing	47JN000000l14	47-JN	none	0	yes
Landing	47JN000000l27	47-JN	none	0	yes
Landing	47JN000000l29	47-JN	none	0	yes
Landing	47JN000000l30	47-JN	none	0	yes
Landing	47JN000000l35	47-JN	none	0	yes
Landing	47JN000000l45	47-JN	none	0	yes
Landing	47JN000000l47	47-JN	none	0	yes
Landing	47JN000000l50	47-JN	none	0	yes
Landing	47JN000000l57	47-JN	none	0	yes
Landing	47JN000000l59	47-JN	none	0	yes
Landing	47JN0030000l10	47-JN-003	none	0	yes
Landing	47JN0030000l13	47-JN-003	none	0	yes
Landing	47JN0030000l15	47-JN-003	none	0	yes
Landing	47JN0030000l17	47-JN-003	none	0	yes
Landing	47JN0030000l23	47-JN-003	low	30	no
Landing	47JN0030000l45	47-JN-003	none	0	yes
Landing	47JN0030000l47	47-JN-003	none	0	yes
Landing	47JN0030000l48	47-JN-003	none	0	yes
Landing	47JN0030000l49	47-JN-003	none	0	yes
Landing	47JN0030000l9	47-JN-003	none	0	yes
Landing	47JN0120000l3	47-JN-012	none	0	yes
Landing	47JN0120000l5	47-JN-012	none	0	yes

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Landing	47JN0370000l9	47-JN-037	none	0	yes
Landing	47JN0371000l2	47-JN-037-10	low	0	no
Landing	47JN0371001l1	47-JN-037-10-01	none	0	yes
Landing	47JN0371001l2	47-JN-037-10-01	none	0	yes
Landing	47JN0460000l1	47-JN-046	none	0	yes
Landing	47JN0460000l2	47-JN-046	none	0	yes
Landing	47LJ0000000l10	47-LJ	none	0	yes
Landing	47LJ0000000l41	47-LJ	none	0	yes
Landing	47LJ0000000l47	47-LJ	none	0	yes
Landing	47LJ0000000l49	47-LJ	none	0	yes
Landing	47LJ0000000l58	47-LJ	none	0	yes
Landing	47LJ0000000l64	47-LJ	none	0	yes
Landing	47LJ0000000l66	47-LJ	none	0	yes
Landing	47LJ0000000l75	47-LJ	none	0	yes
Landing	47LJ0050000l1	47-LJ-005	none	0	yes
Landing	47LJ0050000l3	47-LJ-005	none	0	yes
Landing	47LJ0130000l11	47-LJ-013	none	0	yes
Landing	47LJ0130000l14	47-LJ-013	none	0	yes
Landing	47LJ0130000l18	47-LJ-013	none	0	yes
Landing	47LJ0130000l20	47-LJ-013	none	0	yes
Landing	47LJ0130000l27	47-LJ-013	none	0	yes
Landing	47LJ0130000l29	47-LJ-013	none	0	yes
Landing	47LJ0130000l31	47-LJ-013	none	0	yes
Landing	47LJ013000l4	47-LJ-013	none	0	yes
Landing	47LJ013000l7	47-LJ-013	none	0	yes
Landing	47LJ013000l9	47-LJ-013	none	0	yes
Landing	47-LJ-013-0700l1	47-LJ-013-07	none	0	yes
Landing	47LJ0210000l14	47-LJ-021	none	0	yes
Landing	47LJ021000l8	47-LJ-021	none	0	yes
Landing	47LJ0220000l12	47-LJ-022	none	0	yes
Landing	47LJ022000l4	47-LJ-022	none	0	yes
Landing	47LJ022000l8	47-LJ-022	none	0	yes
Landing	47LJ0220300l2	47-LJ-022-03	none	0	yes
Landing	47LJ0220300l5	47-LJ-022-03	none	0	yes
Landing	47LJ0220300l9	47-LJ-022-03	none	0	yes
Landing	47LJ0440000l1	47-LJ-044	none	0	yes
Landing	47LJ0480000l1	47-LJ-048	none	0	yes
Landing	47LJ0480000l5	47-LJ-048	none	0	yes
Landing	47LJ0480000l7	47-LJ-048	none	0	yes
Landing	47LJ0480000l8	47-LJ-048	none	0	yes
Landing	47LJ0550000l2	47-LJ-055	none	0	yes
Landing	47LJ0550000l3	47-LJ-055	none	0	yes

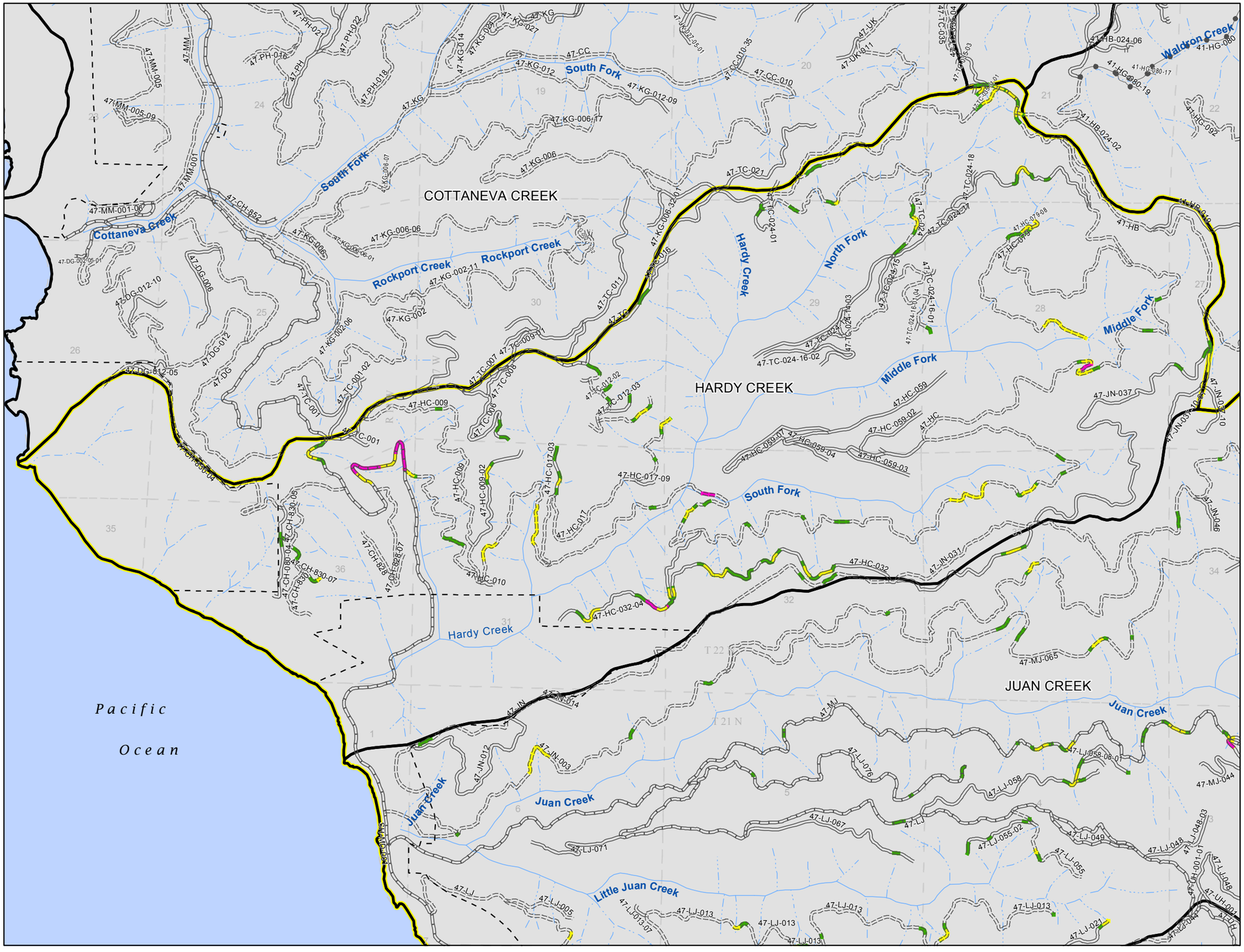
Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Landing	47LJ0550000l4	47-LJ-055	none	0	yes
Landing	47LJ0550200l3	47-LJ-055-02	none	0	yes
Landing	47LJ0670000l5	47-LJ-067	none	0	yes
Landing	47LJ0670000l7	47-LJ-067	none	0	yes
Landing	47LJ0710000l1	47-LJ-071	none	0	yes
Landing	47LJ0710000l2	47-LJ-071	none	0	yes
Landing	47LJ0710000l3	47-LJ-071	none	0	yes
Landing	47LJ0710000l4	47-LJ-071	none	0	yes
Landing	47LJ0710000l5	47-LJ-071	none	0	yes
Landing	47LJ0760000l7	47-LJ-076	none	0	yes
Landing	47LR0000000l10	47-LR	none	0	yes
Landing	47LR0000000l11	47-LR	none	0	yes
Landing	47LR0000000l3	47-LR	none	0	yes
Landing	47LR0000000l30	47-LR	none	0	yes
Landing	47LR0000000l6	47-LR	none	0	yes
Landing	47LR0000000l9	47-LR	none	0	yes
Landing	47LR0020000l1	47-LR-002	none	0	yes
Landing	47LR0070000l1	47-LR-007	none	0	yes
Landing	47LR0130000l4	47-LR-013	none	0	yes
Landing	47MJ0000000l	47-MJ	none	0	yes
Landing	47MJ0000000l12	47-MJ	none	0	yes
Landing	47MJ0000000l14	47-MJ	none	0	yes
Landing	47MJ0000000l20	47-MJ	none	0	yes
Landing	47MJ0000000l22	47-MJ	none	0	yes
Landing	47MJ0000000l26	47-MJ	none	0	yes
Landing	47MJ0000000l27	47-MJ	none	0	yes
Landing	47MJ0000000l29	47-MJ	none	0	yes
Landing	47MJ0000000l34	47-MJ	none	0	yes
Landing	47MJ0000000l35	47-MJ	none	0	yes
Landing	47MJ0000000l39	47-MJ	none	0	yes
Landing	47MJ0000000l42	47-MJ	none	0	yes
Landing	47MJ0000000l44	47-MJ	none	0	yes
Landing	47MJ0000000l51	47-MJ	none	0	yes
Landing	47MJ0000000l58	47-MJ	none	0	yes
Landing	47MJ0000000l65	47-MJ	none	0	yes
Landing	47MJ0000000l74	47-MJ	none	0	yes
Landing	47MJ0440000l1	47-MJ-044	none	0	yes
Landing	47MJ0650000l13	47-MJ-065	none	0	yes
Landing	47MJ0650000l20	47-MJ-065	none	0	yes
Landing	47MJ0650000l21	47-MJ-065	none	0	yes
Landing	47MJ0650000l22	47-MJ-065	none	0	yes
Landing	47MJ0650000l23	47-MJ-065	low	1	no
Landing	47MJ0650000l25	47-MJ-065	moderate	100	no
Landing	47MJ0650000l26	47-MJ-065	none	0	yes

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Landing	47MJ0650000l27	47-MJ-065	none	0	yes
Landing	47MJ0650000l28	47-MJ-065	none	0	yes
Landing	47MJ0650000l29	47-MJ-065	low	50	no
Landing	47MJ0650000l33	47-MJ-065	none	0	yes
Landing	47MJ0650000l38	47-MJ-065	none	0	yes
Landing	47MJ0650000l6	47-MJ-065	none	0	yes
Landing	47MJ0650000l9	47-MJ-065	none	0	yes
Landing	47MJ0652300l4	47-MJ-065-23	none	0	yes
Landing	47MJ0652400l1	47-MJ-065-24	none	0	yes
Landing	47MJ0820000L10	47-MJ-082	none	0	yes
Landing	47MJ0820000L11	47-MJ-082	none	0	yes
Landing	47MJ0820000L19	47-MJ-082	none	0	yes
Landing	47MJ0820000L21	47-MJ-082	none	0	yes
Landing	47MJ0820000L26	47-MJ-082	none	0	yes
Landing	47MJ0820000L4	47-MJ-082	none	0	yes
Landing	47MJ0820000L6	47-MJ-082	none	0	yes
Landing	47MJ0820000L7	47-MJ-082	none	0	yes
Landing	47MJ0820400l3	47-MJ-082-04	none	0	yes
Landing	47MJ0820400l4	47-MJ-082-04	none	0	yes
Landing	47MJ0820401l1	47-MJ-082-04-01	none	0	yes
Landing	47MJ0821000l1	47-MJ-082-10	none	0	yes
Landing	47-MJ08211001L	47-MJ-082-11	none	0	yes
Landing	47-MJ0821100L2	47-MJ-082-11	none	0	yes
Landing	47TC0000000l16	47-TC	none	0	yes
Landing	47TC0000000l18	47-TC	none	0	yes
Landing	47TC0000000l2	47-TC	none	0	yes
Landing	47TC0000000l23	47-TC	none	0	yes
Landing	47TC0000000l24	47-TC	none	0	yes
Landing	47TC0000000l3	47-TC	none	0	yes
Landing	47TC0000000l32	47-TC	none	0	yes
Landing	47TC0000000l33	47-TC	none	0	yes
Landing	47TC0000000l4	47-TC	none	0	yes
Landing	47TC0000000l7	47-TC	none	0	yes
Landing	47TC0060000l3	47-TC-006	none	0	yes
Landing	47TC0060000l6	47-TC-006	none	0	yes
Landing	47TC0120000l4	47-TC-012	none	0	yes
Landing	47TC0120200l1	47-TC-012-02	none	0	yes
Landing	47TC0120300l1	47-TC-012-03	none	0	yes
Landing	47TC0120400l2	47-TC-012-04	none	0	yes
Landing	47TC0240000l18	47-TC-024	none	0	yes
Landing	47TC0240000l2	47-TC-024	none	0	yes
Landing	47TC0240000l22	47-TC-024	none	0	yes
Landing	47TC0240000l4	47-TC-024	none	0	yes

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Landing	47TC0240100l1	47-TC-024-01	none	0	yes
Landing	47TC0240100l2	47-TC-024-01	none	0	yes
Landing	47TC0241500l2	47-TC-024-15	none	0	yes
Landing	47TC0241600l1	47-TC-024-16	none	0	yes
Landing	47TC0241600l2	47-TC-024-16	none	0	yes
Landing	47TC0241600l4	47-TC-024-16	none	0	yes
Landing	47TC0241600l7	47-TC-024-16	none	0	yes
Landing	47TC0241600l8	47-TC-024-16	none	0	yes
Landing	47TC0241600l9	47-TC-024-16	none	0	yes
Landing	47TC024160103l1	47-TC-024-16-01-03	none	0	yes
Landing	47TC024160103l2	47-TC-024-16-01-03	none	0	yes
Landing	47TC024160104l1	47-TC-024-16-01-04	none	0	yes
Landing	47TC024160104l2	47-TC-024-16-01-04	none	0	yes
Landing	47TC024160105l1	47-TC-024-16-01-05	none	0	yes
Landing	47TC0241601l3	47-TC-024-16-01	none	0	yes
Landing	47TC0241601l4	47-TC-024-16-01	none	0	yes
Landing	47TC0241601l5	47-TC-024-16-01	none	0	yes
Landing	47TC0241601l6	47-TC-024-16-01	none	0	yes
Landing	47TC0241602l1	47-TC-024-16-02	none	0	yes
Landing	47TC0241602l2	47-TC-024-16-02	none	0	yes
Landing	47TC0241700l1	47-TC-024-17	none	0	yes
Landing	47TC0241800l1	47-TC-024-18	none	0	yes
Landing	47TC0350100l1	47-TC-035-01	none	0	yes
Landing	47UH0000000l18	47-UH	none	0	yes
Landing	47UH0000000l53	47-UH	none	0	yes
Landing	47UH0000000l58	47-UH	none	0	yes
Landing	47UH000000l44	47-UH	none	0	yes
Landing	47UH0010000l5	47-UH-001	none	0	yes
Landing	47UH0010700l1	47-UH-001-07	none	0	yes
Landing	47UH0010713l2	47-UH-001-07-13	none	0	yes
Landing	47UH0010716l2	47-UH-001-07-16	none	0	yes

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Landing	47UH0011100l4	47-UH-001-11	none	0	yes
Landing	47UH0060000l10	47-UH-006	none	0	yes
Landing	47UH0060000l12	47-UH-006	none	0	yes
Landing	47UH0060000l2	47-UH-006	none	0	yes
Landing	47UH0060000l5	47-UH-006	none	0	yes
Landing	47UH0060200l1	47-UH-006-02	none	0	yes
Landing	47UH0060300l2	47-UH-006-03	none	0	yes
Landing	47UH0120000l11	47-UH-012	none	0	yes
Landing	47UH0120000l13	47-UH-012	none	0	yes
Landing	47UH0120000l15	47-UH-012	none	0	yes
Landing	47UH0120000l16	47-UH-012	none	0	yes
Landing	47UH0120000l17	47-UH-012	none	0	yes
Landing	47UH0120200l1	47-UH-012-02	none	0	yes
Landing	47UH0120500l7	47-UH-012-05	none	0	yes
Landing	47UH0120500l8	47-UH-012-05	none	0	yes
Landing	47UH0120502l2	47-UH-012-05-02	none	0	yes
Landing	47UH0120502l4	47-UH-012-05-02	none	0	yes
Landing	47UH0120505l1	47-UH-012-05-05	none	0	yes
Landing	47UH0120505l2	47-UH-012-05-05	none	0	yes
Landing	47UH0120505l4	47-UH-012-05-05	none	0	yes
Landing	47UH0121000l1	47-UH-012-10	none	0	yes
Landing	47UH0130000l4	47-UH-013	none	0	yes
Landing	47UH0130400l1	47-UH-013-04	none	0	yes
Landing	47UH0320000l1	47-UH-032	none	0	yes
Landing	47UH044000l4	47-UH-044	none	0	yes
Landing	47UH044000l9	47-UH-044	none	0	yes
Landing	47UH0520000l4	47-UH-052	none	0	yes
Landing	47UH0520000l5	47-UH-052	none	0	yes
Landing	47UH0540000l1	47-UH-054	none	0	yes
Landing	47UH0560000l3	47-UH-056	none	0	yes
Landing	47UH0560200l1	47-UH-056-02	none	0	yes
Landing	47UK0000000l1	47-UK	none	0	yes
Road slide	47HC0000000r13	47-HC	high	3000	no
Road slide	47HC0000000r70	47-HC	low	0	no
Road slide	47HC0090200r1	47-HC-009-02	none	0	yes
Road slide	47HC0590300r2	47-HC-059-03	low	60	no
Road slide	47HC0790000r9	47-HC-079	none	0	yes
Road slide	47JN0030000r16	47-JN-003	none	0	yes
Road slide	47JN0030000r7	47-JN-003	low	10	no

Feature	Site ID	Road Number	Treatment Immediacy	Controllable Volume (yd3)	CONTROLLED
Road slide	47JN0120000r1	47-JN-012	moderate	200	no
Road slide	47JN0120000r4	47-JN-012	low	20	no
Road slide	47JN0120000r7	47-JN-012	low	0	no
Road slide	47LJ0550000r1	47-LJ-055	low	0	no
Road slide	47LJ0580000r3	47-LJ-058	low	20	no
Road slide	47LR0130000r3	47-LR-013	low	0	no
Road slide	47MJ0000000r59	47-M7	low	100	no
Road slide	47MJ0000000r61	47-M7	low	10	no
Road slide	47MJ0000000r63	47-M7	low	10	no
Road slide	47MJ0650000r12	47MJ0650000	none	0	yes
Road slide	47MJ0650000r13	47MJ0650000	none	0	yes
Road slide	47MJ0650000r26	47MJ0650000	none	0	yes
Road slide	47MJ0650000r27	47MJ0650000	none	0	yes
Road slide	47MJ0650000r28	47MJ0650000	none	0	yes
Road slide	47MJ0650000r29	47MJ0650000	none	0	yes
Road slide	47MJ0650000r31	47MJ0650000	low	0	no
Road slide	47MJ0650000r35	47MJ0650000	low	50	no
Road slide	47MJ0820000r10	47-MJ-082	low	0	yes
Road slide	47MJ0820000r19	47-MJ-082	low	0	no
Road slide	47TC0240000r23	47-TC-024	low	40	no
Road slide	47TC0241600r6	47-TC-024-16	none	0	yes
Road slide	47UH0000000r18	47-UH	low	0	no
Road slide	47UH0000000r28	47-UH	low	20	no
Road slide	47UH0120000r11	47-UH-012	low	0	no



Rockport Coastal Streams
-Hardy Creek Planning Watershed-
Watershed Analysis
Unit

Map B-1(a)
Erosion Hazard Rating Classifications

This map presents an erosion hazard rating and road classification for MRC roads. High erosion hazard road segments have the highest amount of recent deliverable surface erosion to watercourses and a high potential for future deliverable erosion in comparison to moderate and low erosion hazard rated segments. This information is estimated using road inventory data and should be used to aid in prioritizing road segments for repairs such as road outsloping,increasing waterbreak spacing, or adding rolling dips. Roads currently classified as seasonal roads should be converted to temporary roads,where feasible, to increase the number of self-maintaing watercourse crossings within the watershed.

Erosion Hazard Rating

- Low
- Moderate
- High

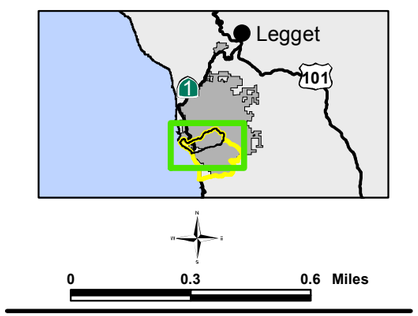
Road Classification

- Permanent
- Seasonal
- Temporary
- Undetermined
- Decommissioned
- Historic

- MRC Ownership
- Planning Watershed Boundary
- Elk Creek Watershed Analysis Unit Boundary

Flow Class

- Class I
- Class II
- Class III



March 2011

Rockport Coastal Streams
-Juan Creek Planning Watershed-
Watershed Analysis
Unit

Map B-1(b)
Erosion Hazard Rating Classifications

This map presents an erosion hazard rating and road classification for MRC roads. High erosion hazard road segments have the highest amount of recent deliverable surface erosion to watercourses and a high potential for future deliverable erosion in comparison to moderate and low erosion hazard rated segments. This information is estimated using road inventory data and should be used to aid in prioritizing road segments for repairs such as road outsloping,increasing waterbreak spacing, or adding rolling dips. Roads currently classified as seasonal roads should be converted to temporary roads,where feasible, to increase the number of self-maintaing watercourse crossings within the watershed.

Erosion Hazard Rating

- Low
- Moderate
- High

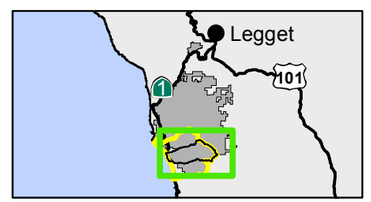
Road Classification

- Permanent
- Seasonal
- Temporary
- Undetermined
- Decommissioned
- Historic

- MRC Ownership
- Planning Watershed Boundary
- Elk Creek Watershed Analysis Unit Boundary

Flow Class

- Class I
- Class II
- Class III



March 2011

Rockport Coastal Streams
-Howard Creek Planning Watershed-
Watershed Analysis
Unit

Map B-1(c)
Erosion Hazard Rating Classifications

This map presents an erosion hazard rating and road classification for MRC roads. High erosion hazard road segments have the highest amount of recent deliverable surface erosion to watercourses and a high potential for future deliverable erosion in comparison to moderate and low erosion hazard rated segments. This information is estimated using road inventory data and should be used to aid in prioritizing road segments for repairs such as road outsloping,increasing waterbreak spacing, or adding rolling dips. Roads currently classified as seasonal roads should be converted to temporary roads,where feasible, to increase the number of self-maintaing watercourse crossings within the watershed.

Erosion Hazard Rating

- Low
- Moderate
- High

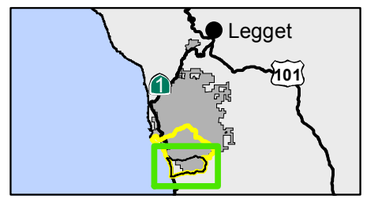
Road Classification

- Permanent
- Seasonal
- Temporary
- Undetermined
- Decommissioned
- Historic

- MRC Ownership
- Planning Watershed Boundary
- Elk Creek Watershed Analysis Unit Boundary

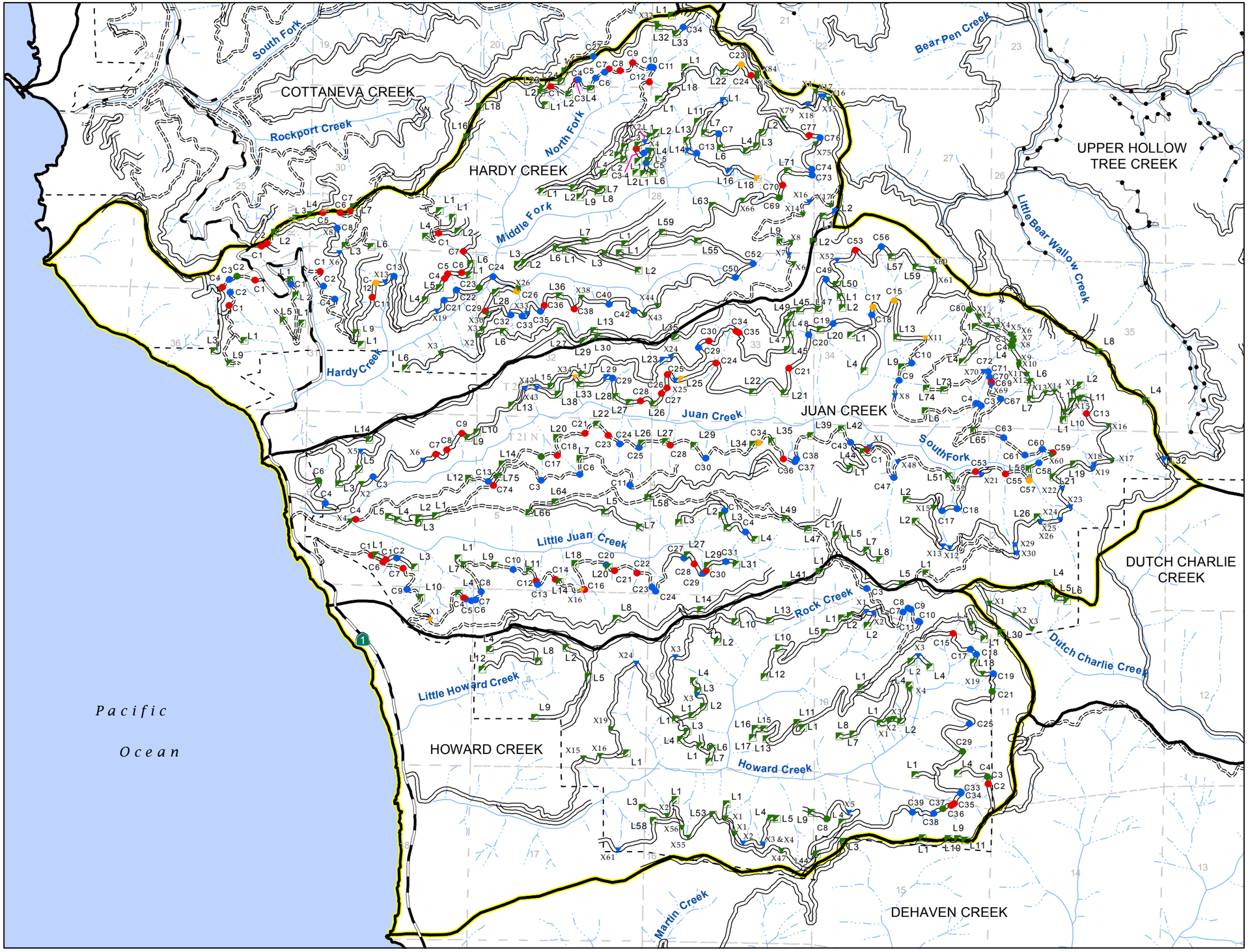
Flow Class

- Class I
- Class II
- Class III



0 0.25 0.5 Miles

March 2011



Rockport Coastal Streams Watershed Analysis Unit

Map B-2
Road Feature Treatment Immediacy

This map presents select results from MRC's road inventory. The entire road network and road features were mapped using geographic positioning system (GPS) from 2006. For each feature with the potential to create erosion (culverts, landings, crossings) the treatment immediacy for the feature was assigned. The treatment immediacy represents the level of concern for either upgrading or maintenance to the feature.

Treatment Immediacy

Culverts	Crossings	Landings
high	high	high
moderate	moderate	moderate
low	low	low
none	none	none

L = Landing; C = Culvert; X = Crossing

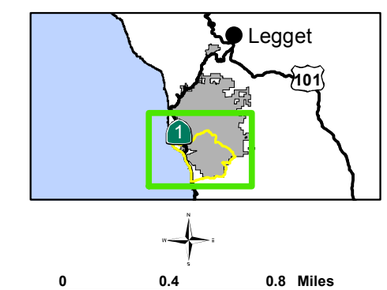
Road Surface

- Paved Road
- Rocked Road
- Native Road
- Jeep Trail
- Undetermined
- Decommissioned
- Historic

- MRC Ownership
- Planning Watershed Boundary
- Elk Creek Watershed Analysis Unit Boundary

Flow Class

- Class I
- Class II
- Class III



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