ROAD ASSESSMENT AND RESTORATION PLANNING IN THE CAMP CREEK AND SLATE CREEK WATERSHEDS OF THE KLAMATH RIVER BASIN

FINAL REPORT

September 2000

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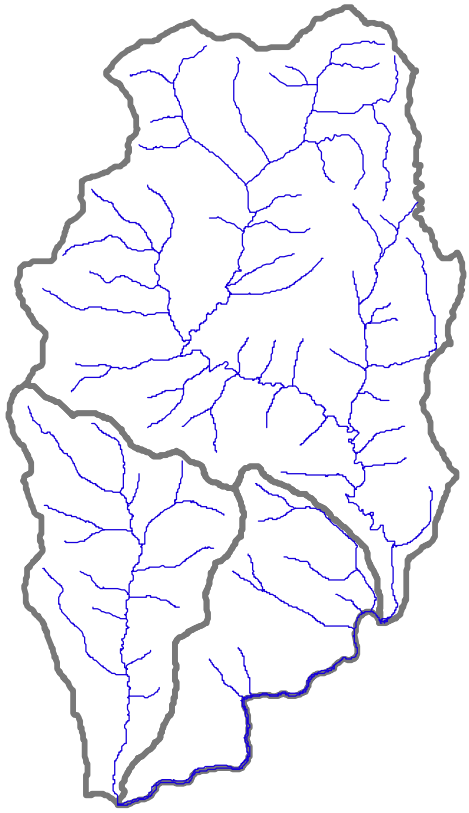

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Background

Camp and Slate Creeks are adjacent tributaries to the Klamath River. Located 12 miles upstream from the confluence with the Trinity River, they are part of the Lower-Middle Klamath River Basin. Camp Creek watershed has an area of 26,994 acres and Slate Creek watershed covers 8,768 acres. Camp and Slate Creeks surround two smaller watersheds, Crawford and Ullathorne, and share a common road system. These two smaller watersheds have an estimated combined area of 5,500 acres. Together, these four watersheds, referred to in this report as the Camp-Slate watersheds, encompass much of the north side drainages in the Lower-Middle Klamath Basin (Figure 1). Approximately 95.5% of the land in the Camp-Slate watersheds is located within and managed by the Orleans Ranger District of Six Rivers National Forest, with 1600 acres privately owned.

The Klamath Basin Assessment has identified the Lower-Middle Klamath Basin as containing some of the best spawning and rearing habitat for anadromous salmonids. Both Camp and Slate Creeks support fall-run chinook salmon, coho salmon, and steelhead trout. Combined, these creeks contain approximately thirteen river miles of anadromous fish habitat. Additionally, Camp Creek has been designated as a "key watershed" by Six Rivers National Forest due to its important role in the recovery of at-risk fish stocks within the Klamath basin.

In the summer of 1999 funding was secured through the California Department of Fish and Game Senate Bill 271 to develop a plan to reduce the delivery of sediment from Forest Service roads to streams within the Camp-Slate watersheds. Tyler Ledwith administered the grant and Michael Love was retained as a sub-contractor.

This summary report describes the road assessment and inventory process and presents an action-plan for preventing future erosion from Forest Service roads within the project area.

Road Inventory

Identification of Non-System Roads

The first phase of the project involved identifying non-system roads from aerial photographs. Currently there exists a GIS layer of Forest roads that consists of all system roads. Additionally, the roads layer contains many, but not all, non-system roads. To identify roads not shown on the GIS layer, the 1990 air photo set (1:16,000 scale) was used. A non-system road was defined as any road not part of the Forest transportation system. Non-system roads can include “temp” roads, abandoned roads, and jeep trails. Most are not maintained, increasing their associated erosion hazard.

Using the Forest Service roads layer and the identified non-systems roads, a project map of the road system was constructed and served as the base map for showing locations of sites with potential future erosion and sediment delivery to streams.

Field Inventory Procedure

From July to September 1999, 250 miles of road (226 miles of system roads and 24 miles of non-system roads) in Camp and Slate Creek watersheds and adjacent frontage drainages were inventoried to identify and assess road-related sediment sources. The inventory focused on collecting information at road-stream crossings, cross drains (ditch relief culverts), and erosional features. The information collected was used to identify active and potential sources of sediment delivery from roads to streams. The location of each feature was recorded with a Global Positioning System (GPS) unit. The attributes of each feature were recorded onto the appropriate field form and then entered into the GPS unit as an attached table (Appendix I). The location and attributes were then converted to an ARC/INFO coverage, which is located in the Six Rivers National Forest computer database at *fs/fsfiles/ref/library/gis/sixrivers/stream_xing*. To ensure accuracy, the hard copies of the completed data forms were used to check the entered data and have subsequently been provided to the Watershed/Hydrology department at the Supervisors Office, Six Rivers National Forest.

Inventory Assessment

Road-Scale

A road-scale approach was used to prioritize roads for treatment based on their sediment delivery potential to the stream network. To aid in developing the erosion reduction action-plan for roads in the Camp-Slate watershed, a matrix was created to rate roads based on their overall need for treatment.

Summary statistics were calculated for each road and placed into the following categories:

1) Proximity of stream crossings to anadromous fish habitat;
2) Risk of stream crossing diversions;
3) Risk of road surface erosion at stream crossings;
4) Adequacy of road drainage between stream crossings, and;
5) Number of sites ranked high for treatment or needing maintenance.

Factors in each category were given weighted scores based on importance. The sum of the weighted scores for each road combined with professional judgment was used to develop the final ranking of roads for treatment. The road-ranking matrix along with the criteria used to score each factor is presented in Appendix II.

Stream Crossings

Analysis of stream crossings was conducted to determine the relative risk each crossing poses to the stream network based on its sediment delivery potential. Stream crossings were ranked for treatment using methodologies outlined in the *Methods for Inventory and Environmental Risk Assessment of Road Drainage Crossings* (Flanagan *et. al*, 1998); *Assessment and Implementation Techniques for Controlling Road-Related Sediment Sources*, (Hagans and Weaver, 1997), and

the Klamath National Forest (personnel comm.). The crossings were analyzed by examining site-specific data organized into four categories:

1) *Culvert Hazard* – the likelihood of culvert capacity being exceeded, referred to as culvert failure;
2) *Fill Hazard* – the likelihood of the stream crossing fill failing;
3) *Consequences* – the erosion effects of culvert failure, and;
4) *Impacts* – the effects of culvert failure on downstream resources.

Factors in each category were given scores that were then weighted based on importance. The sum of the weighted scores gives the Environmental Risk Score (Appendix II). Using the Environmental Risk Score and professional judgment, stream crossing sites were then identified as high, medium, and low priority sites. The volume of potential sediment delivery to streams ("sediment saved") was estimated for all high and medium priority stream crossings. The measured fill volume was used as an estimate of sediment delivery. Stream crossing sites in need of maintenance were also identified and mapped in the field.

Cross Drains

The assessment of cross drain sites was based on the delivery potential to streams and failure potential. Cross drains were considered a "high priority" when the: outlet gully connected to a stream, inlet was plugged or crushed, pipe was damaged by rust, road bed was saturated, excess ravel in ditch, or ditch not routing water properly. Information on contributing ditch and potential diversion distance was collected and used in the analysis of road segments.
Cross drains in need of maintenance were also identified and mapped in the field.

Erosional Features

Erosional features were examined in the field to assess the type of failure (i.e., slump, slide, gully), the location (i.e., cutslope, road bed, fillslope), the volume of the feature, and the potential future yield to the stream network (Appendix I). Only features associated with roads and greater than 20 cubic yards or gullies greater than 20 feet in length were included in the database. Features were given a rating of high, medium and low, based on the potential for future sediment yield to the stream network, proximity to an anadromous fish bearing stream, activity of the feature, and potential risk to the road network.

Results

Watershed Scale

Most roads within the Camp-Slate watershed are positioned near ridgelines and on stable geology. A majority of the inventoried road system was determined to pose little risk to the stream network, with only minor evidence of past sediment delivery to streams.

The areas with the highest erosion potential were found at stream crossings. The most common problem at stream crossings was the potential for stream diversions (Table 1). Since most stream crossings will eventually fail, it is imperative to eliminate diversion potential at all existing crossings as a principal component of any erosion prevention plan within the watershed.

The road system, although relatively stable, suffers from a lack of routine maintenance. Many of the spur and feeder roads are brushy and difficult to access by vehicle. Additionally, nearly 40% of the stream crossings are in need of routine maintenance. With poor access to many of these sites, they are likely to continue being unmaintained and may eventually fail, delivering sediment into adjacent streams.

Table 1. Site classification and future sediment yield from all inventoried road-related sites in the Camp-Slate Creek watersheds.

Site Type	Total number of sites	Number of sites to treat	Number of sites with fill problems	Future yield to streams (cy) [1]	Number of sites that need maintenance	Number of sites currently diverting	Number of sites with diversion potential
Stream Crossings	204	172[2]	31	107,320	80	4	145
Cross Drains	232	27[3]	7	N/A	69	N/A	222
Erosional Features	42	21[4]	30	3,058	N/A	N/A	N/A
Totals	478	220	68	110,378	149	4	367

[1] At stream crossings with diversion potential, future erosion is difficult to predict. A minimum estimate of the stream crossing fill volume was used as a predicted value for this table.
[2] Stream crossings ranked high or medium priority. Sites that need maintenance may be included in this value.
[3] Does not include cross drain sites that need maintenance.
[4] Erosional features ranked high and medium priority are included in this value.

Road Scale

Often it is most cost-effective to treat sites using a road-by-road approach. Individual roads were ranked based on treatment immediacy using the scoring system outlined in the Analysis section and Appendix II. Only roads containing one or more stream crossings, cross drains, or erosional features were examined.

Sixty roads were identified as having features and were ranked, for a total length of 144 miles. Roads needing extensive improvement or decommissioning because of future potential sediment delivery were ranked highest and are listed in Table 2. The remaining roads were identified as either low or medium priority for treatment. A summary of each road along with its assigned treatment immediacy can be found in the Road Log (Appendix IV).

The top seven roads were further divided into two treatment categories: roads needing extensive upgrade and roads recommended for decommissioning. Arterial roads 12N12, 12N20 and 11N05 have relatively high traffic loads, and both have road segments situated adjacent to anadromous stream reaches. Identified in the road assessment as both chronic contributors of sediment to nearby streams and containing a large number of sites with diversion potential, these

three roads would benefit greatly from drainage upgrades. Treatment of these roads would result in potential "sediment savings" of 26,331 cubic yards.

Table 2 – Top road treatment priorities for the Camp-Slate Creek watersheds based on density and severity of sites, risk of diversions, and overall adequacy of road drainage.

Road Number	Length (miles)	Road-Risk Score (max = 66)	No. of high immediacy stream xings	No. of maint. sites	Volume "Saved" (cy)	Overall Road Condition
12N12	23.82	60	12	27	12,847	22 of 29 stream crossings have diversion pot, 28% of the road is connected to streams at crossings, and road contains the most high-immediacy treatment and maintenance sites.
11N38	1.66	30	4	4	1,351	4 high immediacy sites, saturated fills, an active diversion, and 2 erosional features. Unmaintained road (walk-in).
12N38	1.03	23	1	2	180	Long continuous ditch, steep grade, 22% of road connected to streams, gullies on roadbed, active diversions, and intermittent stream in ditch.
12N01.1	0.3	10	0	1	400	Fill is actively failing along the first 0.3 miles of road. Beyond, the road is decommissioned. Close proximity to Camp Creek.
11N46	3.45	33	5	6	3,625	5 high immediacy sites, flow through fill, road crosses 7 perennial streams, long contributing ditches and potential diversion lengths.
12N20	6.22	46	2	16	10,654	33% of road connected to streams, 1 overtopped crossing, 1 site with major flow through fill, 14 of 20 stream crossings w/ diversion potential.
11N05	10.76	51	5	6	2,830	2 previously failed sites, undersized culvert on tributary close to lower Slate Creek. Large erosional feature, all 11 stream crossings have diversion potential.
15N01	17.11	52	3	12	64,747	2 undersized culverts on large perennial streams, cross-drain with large gully to 12N38, 32 of 35 stream crossings w/diversion pot. (paved road).
11N44	1.79	37	2	4	3,683	2 crossings overtopped with one actively diverting, 8 of 8 stream crossings w/ diversion potential, 33% of road connected to streams.
12N01	1.93	35	1	2	291	2 of 4 stream crossings w/ diversion potential, 1 undersized culvert near lower Camp Creek. 2 connected X-drains with long contributing ditch.
10N15A	0.41	23	2	2	565	1 crossing overtopped, 1 plugged inlet. Unmaintained road (walk-in) with 30% of road length connected to streams at crossings
12N19	2.72	23	1	4	1,193	Overtopped perennial stream crossing, 5 of 5 crossings with diversion potential, all crossings undersized. Road close to large perennial stream.
12N36	3.81	21	1	4	1,229	Fill failing at 1 crossing, 4 crossings with partially plugged inlets, and 8 of 9 crossings have diversion potential, with an average diversion length of 300 ft.
12N18	2.05	21	1	4	1,777	Plugged crossing with diversion, slide through road connected to stream, 4 of 5 crossings with diversion potential.
11N48	2.86	18	1	1	587	Inlet plugged with long diversion. Large erosional feature with potential to deliver 350 cy to stream.

Roads 12N38 and 11N46 were identified as needing substantial upgrading of the drainage system. 12N38 is a midslope road possessing a steep unbroken grade for over a mile, ending at a perennial stream. The road was identified as containing numerous failed sites and erosional features requiring treatment. Also a midslope road, 11N46 contains saturated fills while crossing numerous perennial streams, including forks of Ullathorne Creek. Treating these two road would result in sediment savings of 3,805 cubic yards.

Two roads are recommended for decommissioning. Inventory of 11N38 found it to contain an active diversion and saturated fills, with one observed and several impending fill failures with direct delivery to adjacent stream channels. The non-system road, 12N01.1 is an abandoned road upslope of lower Camp Creek. Although the road was decommissioned, the first 0.5 miles requires further treatment. Built on steep, unstable terrain, failing road fill continues to initiate debris slides caught by 12N01 immediately below, with the potential for sediment delivery to Camp Creek. Both roads are neither maintained nor accessible by vehicles. Treating these two roads would result in potential "sediment savings" of 1,751 cubic yards. Due to the difficulty of predicting the size of future catastrophic hillslope failures initiated by these roads, the actual amount of sediment delivered may be substantially greater.

Stream Crossings

A total of 204 stream crossings were inventoried in the Camp-Slate watersheds giving a stream crossing density of 0.8 crossings per mile of road (Figure 2). The low density of stream crossings is attributable to the high proportion of roads on or near ridgelines where streams are fewer.

All of the stream crossings in the watershed were fitted with corrugated metal culverts. No bridges or other alternative crossing types were inventoried. Additionally, there were no crossings on anadromous stream reaches. Stream crossing sites were identified as high, medium, or low priority based on the risk of failure and potential to delivery sediment to streams. Fifty-two sites (25%) were identified as high, 120 (59%) as medium, and 32 (16%) low priority. Problems and treatments have been listed for each high and medium priority stream crossing to prevent an estimated 107,320 yds^3 of sediment from entering the stream network (Table 1 and Appendix III). Treatment options for these sites include preventing diversion, installing larger culverts or end-sections, reconstructing the crossing fill, or decommissioning entire road segments.

All of the crossings were assessed for hydraulic capacity at a headwater to diameter ratio of 1.0. Of the 204 crossings, 134 (66%) of the culverts were identified as being sized for less than the 25-year storm event; 150 (74%) were sized for less than the 50-year storm event; and 165 (81%) were sized for less than the 100-year storm event. Standard and Guidelines for Road Management outlined in the Northwest Forest Plan specify that "stream crossings determined to pose a substantial risk to riparian condition will be improved, to accommodate at least the 100-year flood, including associated bedload and debris." Sites with culverts undersized for the 100-year flood and at risk of direct sediment delivery to anadromous fish habitat were identified as high priority.

Within the Camp-Slate Creek watersheds, 4 sites were identified as currently diverting and 145 having the potential to divert if the stream flow overtopped the crossing fill. (Table 1). Erosion from diversion has been identified as a major source of sediment input into streams. At the watershed scale, potential diversions can be corrected cost-effectively through the installation of diversion dips at stream crossings. Sites with diversion potential can be found in the Road Log (Appendix IV) and in the main database under the heading, "Diverted."

The risk of stream crossing failure can be reduced through routine maintenance. Within the project area 80 sites were identified as benefiting from some form of maintenance (Appendix III). These include sites with plugged or crushed culverts and other problems that can be fixed by hand or a small backhoe. Stream crossing maintenance sites were ranked based on a Maintenance Risk Score. This score accounts for the hazard, consequence, and impacts of the site failing. The list in Appendix III is sorted by road number and mile post to facilitate maintenance planning and implementation.

The maintenance list overlaps with sites identified as high and medium priority in Table 1 and Appendix III to provide options in the timing of maintenance and treatment for these sites. Treating the maintenance needs of high priority sites will reduce the risk of failure and sediment delivery in the short term, while planning, design, and funding decisions for treatment are underway.

Cross Drains

A total of 232 cross drains were inventoried in the project area (Figure 3). Of these 27 (12%) were identified as needing immediate treatment (Appendix III). The most common problem at these pipes was direct delivery of sediment to the stream network through surface flow paths (i.e., rills and gullies). These flow paths can be chronic contributors of fine sediment from the road surface and inboard ditches. The main cause of these flow paths is long sections of uncontrolled flow along the road surface and inboard ditch. In these situations, the most effective treatment is the installation of additional drainage features to reduce the volume of contributing water.

Cross drains in need of maintenance were identified in the field. These included 69 (30%) sites where routine maintenance techniques would be sufficient to treat the problem (Appendix III). The most common problem encountered was sediment plugging of the culvert, which accounted for over 50% of these sites. Other maintenance problems encountered included buried outlets, filled contributing ditches, and broken drop inlet covers. Thirty-eight of these sites need immediate treatment, including all sites with sediment plugging. Sites that plug can divert water either onto the road surface or hillslope causing erosion, or into downroad cross drains or stream crossings possibly causing these sites to fail. Routine maintenance of these sites is a cost-effective way of storm proofing the road system within the watersheds, reducing potential delivery of sediment to the stream network.

Erosional Features

A total of 42 road-related erosional features were field identified in the Camp-Slate watersheds (Figure 4). Types of erosional features included: 19 fillslope failures, 13 cutslope failures, 7 roadbed gullies, and 3 roadbed failures. Of these, 30 (71%) sites were identified as having the potential to deliver an estimated 3,058 cubic yards of sediment into the stream network.

Erosional features were given a rating of high, medium and low priority for treatment, based on the potential for future sediment yield to the stream network, proximity to anadromous fish habitat, activity of the feature, and potential for damage to the road system. Of the 42 features, 11 (26%) sites were considered high priority, 10 (24%) sites medium priority, and 21 (50%) sites low priority (Appendix III). It is recommended that all sites with potential future delivery be treated.

Treatments for erosional features are site specific and should reflect the future use of the road. Cutslope failures and roadbed gullies are usually chronic sediment sources that can be effectively treated through disconnecting the sediment source from the stream network. Material from cutslope failures is often stored on the road prism. This sediment enters inboard ditches and is transported by runoff to cross drains or stream crossings. Rolling dips, cross drains, and waterbars that direct water and sediment away from streams are cost-effective methods for disconnecting sediment sources from the stream network.

Larger mass wasting features associated with fillslope (and hillslope) failures are more difficult to treat. Unstable road segments or fillslopes may have to be excavated and stabilized to keep material from failing and entering the stream network. Some buttressing, revegetation and upslope drainage control may be necessary to prevent further sedimentation and stabilize the erosional feature.

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Personal Communications

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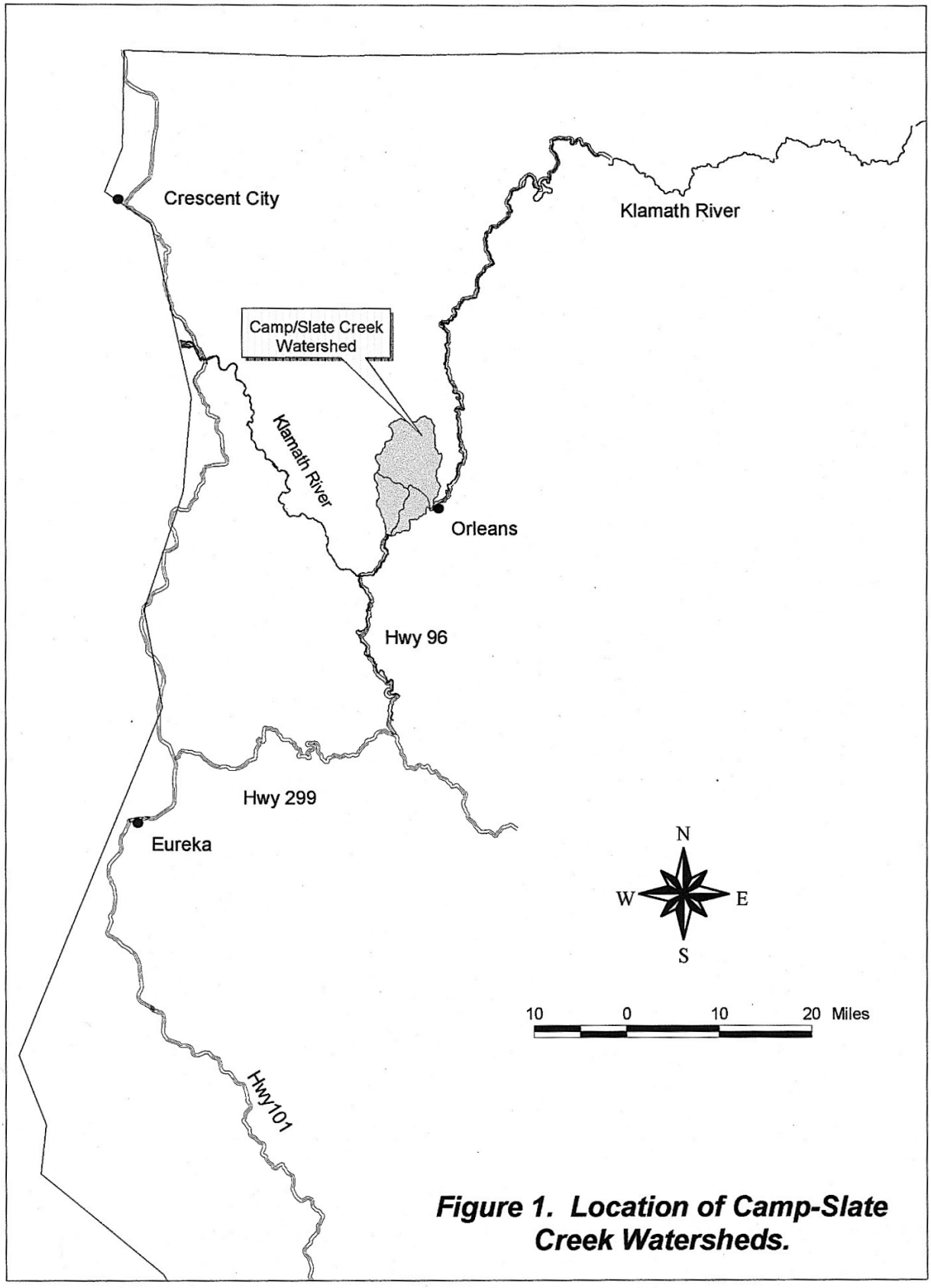

Figure 1. Location of Camp-Slate Creek Watersheds.

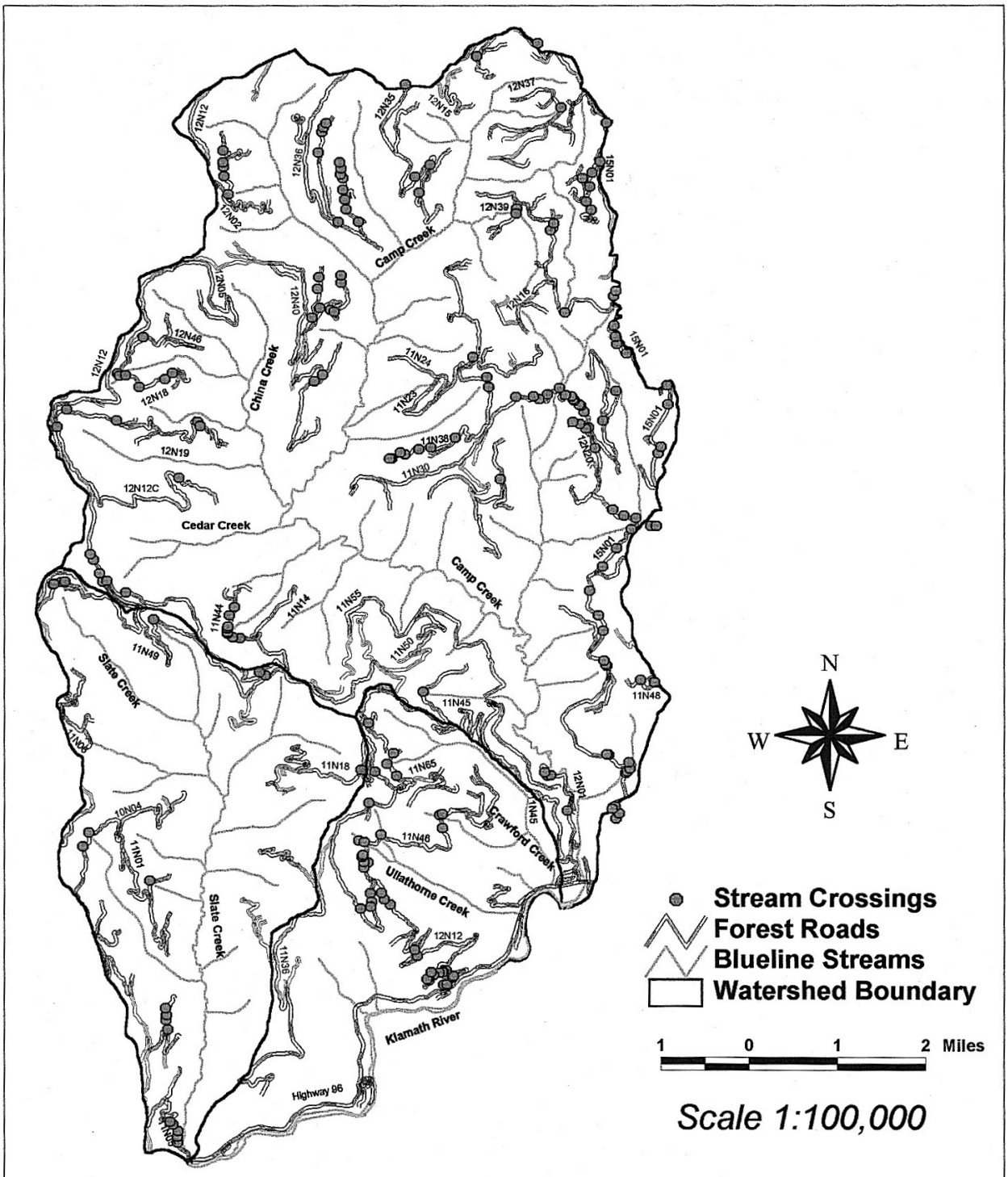

Figure 2. Location of Stream Crossings in the Camp-Slate Creek Watersheds.

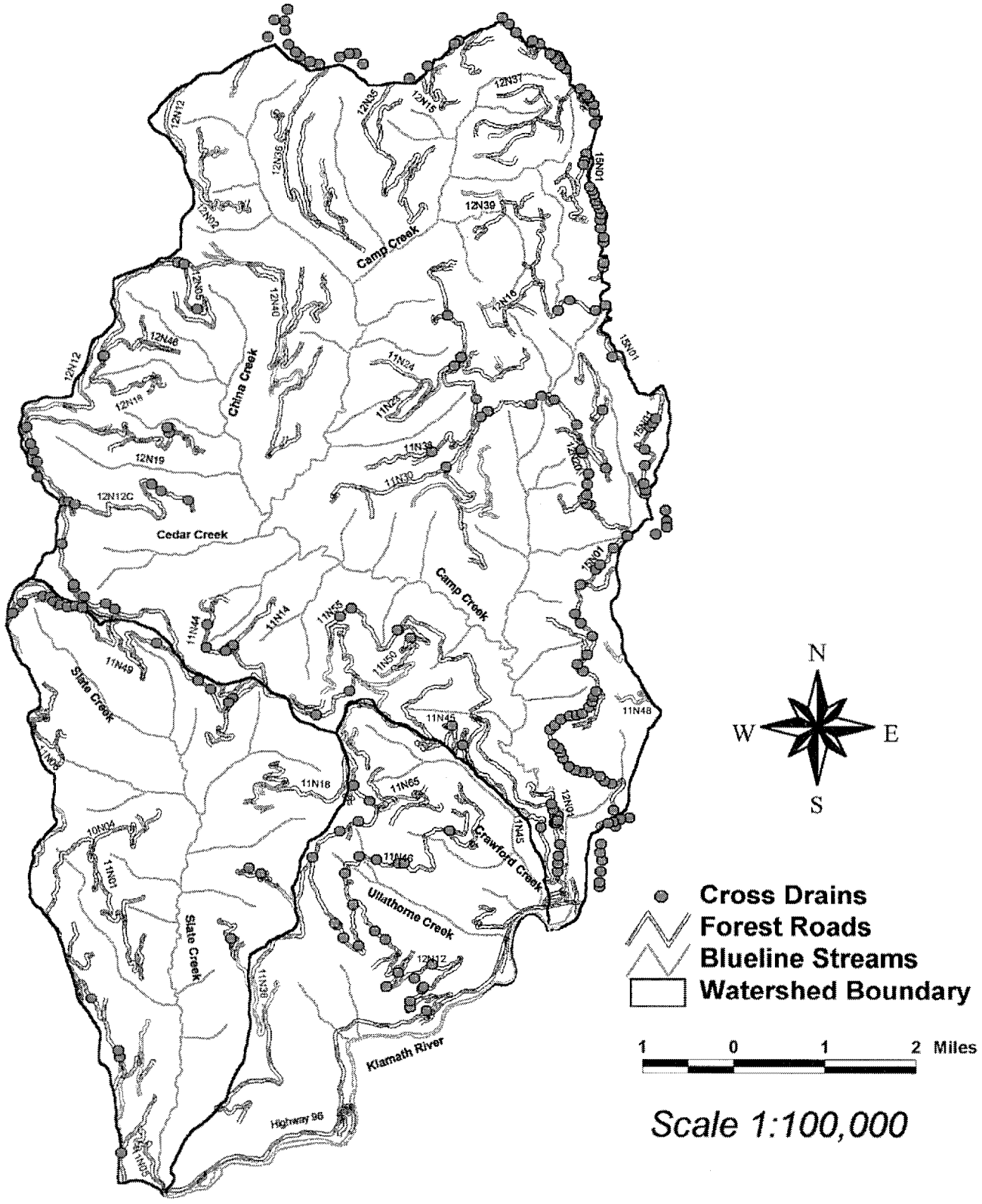

Figure 3. Location of Cross Drains in the Camp-Slate Creek Watersheds.

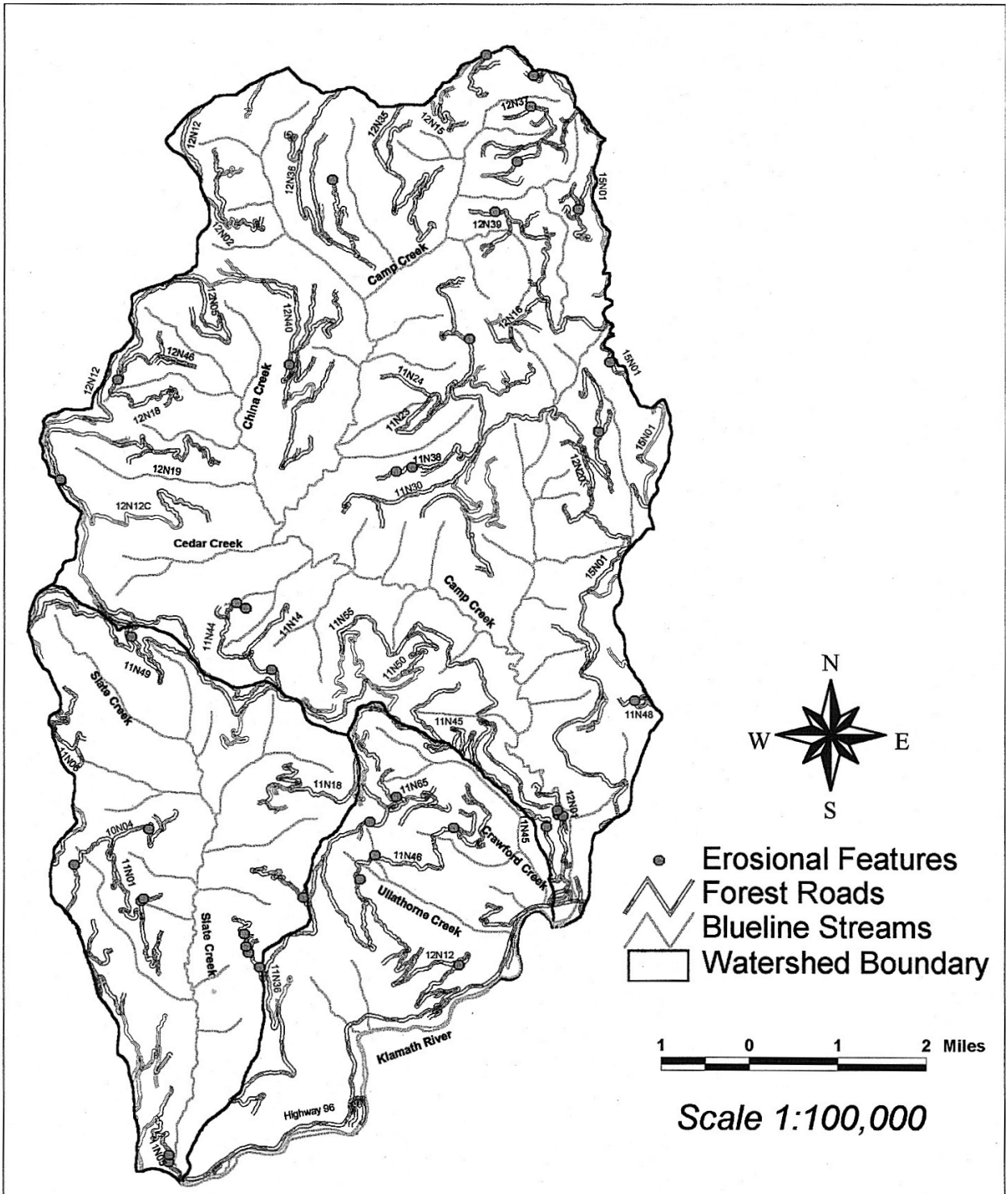

Figure 4. Location of Erosional Features in the Camp-Slate Creek Watersheds.

Appendix I

Field Data Forms

Stream Xing Data Sheet

Observers:

Date							
GPS Position							
UTC Time*							
No. of Points							

Road #							
Mile Post							
Xing Type							
CMP Slope							
Stream Type							
Inlet Type							
Diameter							
Ch Slope Ab							
In Fill Slope							
In Fill Length							
Flood Width							
Channel W 1							
Channel W 2							
Channel W 3							
Basin Width							
Overtop?							

Road Width							
Draw Width							
CMP Length							
Out F Slope							
Out F. Length							
Ch Slope B							
Rustline							

Outlet Type							
Trash Rack?							
Debris Upstr.							
L to 1st Xdrain							
L Inbd Ditch							
R to 1st Xdrain							
R Inbd Ditch							
Diverted?							
Diverts to							
Pot. Length							
Rec. Feature							

Mile Post							
Inlet Plugged							
Inlet crushed							
Flow Under?							
Condition							
Priority							

Explain Priority (Why?)							
Comments							

X-Drains Data Sheet

Observer:

Date							
GPS Position							
UTC Time*							
No. of Points							

Road #							
Mile Post							
Diameter							
Contrib. Ditch Length							
Connected ?							
Wet Veg?							
Pot. Diversion Length							
CMP Cond. (good/main/failed)							
Ditch Cond. (good/main)							
Comments							
Why							

Erosional Features

Observer:

Date							
GPS Position							
UTC Time*							
No. of Points							

Road #							
Mile Post							
Feature							
Location							
Condition							
Volume of Feature (cy)							
Volume Excavated (cy)							
Volume Left (cy)							
Delivy Pot of Volume left (%)							
Spring (y/n)							
Wet Veg (y/n)							
Priority (H/M/L)							
Why							

Appendix II

Environmental Risk Assessment Criteria

Environmental Risk Assessment Criteria for the Camp-Slate Creek Watersheds

Roads

[*RRS*] ROAD RISK SCORE

Each road containing at least one inventoried site (a stream crossing, cross drain, or erosional feature) within the Camp-Slate watershed was given an overall score, referred to as the Road Risk Score. This score is a measure of the risk the road poses to downstream resources. It is based on eleven road summary statistics from five different categories:

(1) downstream fisheries values,
(2) consequences of diversion,
(3) road drainage and surface erosion at stream crossings,
(4) drainage at cross drains, and
(5) density of high risk and maintenance sites.

The Road Risk Score is then computed using an equation with the form:

$$[RRS] = \Sigma(k_i * F_i)$$

where k_i is the weighting coefficient associated with the road summary statistic, F_i. The Road Risk Score has a maximum possible value of 66.

The Road Risk Score is used, along with professional judgment in the field, to rank roads for treatment.

Road Summary Statistics incorporated into the Road Risk Score:

Number of crossings on streams draining directly to an anadromous reach.
(Weighting Coefficient, $k_i = 3$)

0	none
1	1 crossings
2	2– 5 crossings
3	>5 crossings

Number of stream crossings with diversion potential. (Weighting Coefficient, $k_i = 3$)

0	none
1	1 – 2
2	3 – 8
3	> 8

Average diversion length for all crossings with diversion.
(Weighting Coefficient, $k_i = 2$)

0	none
1	1 ft - 250 ft
2	250 ft – 1000 ft
3	> 1000 ft

Percent of road length draining to stream crossings. (Weighting Coefficient, $k_i = 2$)

0	none
1	< 5%
2	5% - 20%
3	> 20%

Average ditch length to break-in-grade. (Weighting Coefficient, $k_i = 1$)

0	none
1	< 200 ft
2	< 1000 ft
3	>= 1000 ft

Number of cross-drains connected to streams. (Weighting Coefficient, $k_i = 2$)

0	none
1	1
2	2
3	>2

Average contributing ditch length to cross-drains. (Weighting Coefficient, $k_i = 1$)

0	< 100 ft
1	<250 ft
2	< 500 ft
3	>= 500 ft

Potential future sediment yield to streams at road-related erosion features.
(Weighting Coefficient, $k_i = 2$)

0	none
1	< 100 cy
2	< 500 cy
3	>= 500 cy

Number of stream crossings ranked high for treatment on the road.
(Weighting Coefficient, $k_i = 3$)

0	none
1	1
2	2 - 3
3	> 3

Number of stream crossings requiring maintenance (sites ranked high for treatment and also needing maintenance were included).
(Weighting Coefficient, $k_i = 1$)

0	none
1	1
2	2 - 3
3	> 3

Number of cross-drains requiring maintenance. (Weighting Coefficient, $k_i = 2$)

0	none
1	1
2	2 - 5
3	> 5

Environmental Risk Assessment Criteria for the Camp-Slate Creek Watersheds

Stream Crossings

[*ERS*] ENVIRONMENTAL RISK SCORE

Each stream crossing within the project area was given an overall score, referred to as the Environmental Risk Score. This score is the sum of four indexes: Culvert Hazard [*CH*], Fill Hazard [*FH*], Consequence [*C*], and Impact [*IP*].

$[ERS] = [CH + FH + C + IP]$

Each index measures a specific element of the overall risk posed to downstream resources by steam crossings. The Environmental Risk Score has a maximum possible value of 100.

The Environmental Risk score is used, along with professional judgment in the field, to identify stream crossing sites needing treatment and to rank them for treatment based on their overall risk to downstream resources.

[*CH*] - CULVERT HAZARD

Culvert Hazard is an index used to evaluate the likelihood of a culvert failing as a result of:

(1) its current condition,
(2) its capacity to transport watershed products (water, woody debris, and sediment), and
(3) the potential for overtopping of the inlet (HW/D=1).

Each stream-crossing site is given a Culvert Hazard score using the following equation:

$[CH] = (2*T + 2*w + 1*s + 1*cp1 + 1*cp2 + 2*rl + 1*dus + 3*ip + 3*ic + 6*c)/1.63$

where each variable is multiplied by a weighting coefficient ranging between one and six, and the entire term is divided by 1.63 to give the Culvert Hazard index a maximum possible score of 36 out of 100.

Variables incorporated into the Culvert Hazard index:

[*T*] an expression of hydraulic capacity.

[lower *T* values have greater hazard]
3 *T* = < 25 years
2 *T* = 25 - 100 years
1 *T* = > 100 years
0 no pipe or no definable drainage area

[*w*] an expression of woody debris capacity = culvert diameter / upstream channel width.

[lower values have greater hazard].
3 *w* = < 0.5
2 *w* = 0.5 - 1.0
1 *w* = > 1.0
0 no pipe or no definable channel

[*s*] a measure of the ability of a pipe to transport sediment = slope of pipe / slope of channel.

[lower values have greater hazard]
3 *s* = < 0.3
2 *s* = 0.3 - 0.6
1 *s* = > 0.6
0 no pipe

[*cp1*] collection potential – contributing ditch length to first cross drain structure; assumes cross drain is functioning.

3 *cp1* > 500 feet
2 *cp1* = 200 - 500 feet
1 *cp1* < 200 feet
0 no collection potential

[*cp2*] collection potential - contributing ditch length to road grade reversal or other feature that breaks collection potential; assumes that cross drains will plug during storm event (worst-case scenario).

3 *cp2* > 1,000 feet
2 *cp2* = 250 - 1,000 feet
1 *cp2* < 250 feet
0 no collection potential

[*rl*] rustline - an expression of active channel flow verses pipe capacity = height of rustline / culvert diameter.

[higher values have greater hazard]
3 *rl* = 0.5 - 1.0
2 *rl* = 0.25 - 0.5
1 *rl* < 0.25
0 no rustline in pipe

[*dus*] debris upslope - presence of woody debris upslope that could potentially plug a culvert.

1 pluggable woody debris upslope
0 no pluggable woody debris upslope

[*ip*] inlet plugged - percent of the culvert inlet plugged by sediment or woody debris (reduced capacity).

3 *ip* = > 75%
2 *ip* = 50%
1 *ip* = 25%
0 culvert not plugged

[*ic*] inlet crushed - percent of the culvert inlet crushed (reduced capacity).

3 *ic* = > 75%
2 *ic* = 50%
1 *ic* = 25%
0 culvert not crushed

[*c*] condition - current condition of the culvert

3 stream flow has overtopped culvert (HW/D=>1)
2 culvert needs maintenance
0 culvert in good condition

[*FH*] - FILL HAZARD

Fill Hazard is an index used to assess the potential for a stream-crossing fill prism to fail by mass movement. Each stream-crossing site is given a Fill Hazard rating using the following equation:

$[FH] = [6*fuc + 12*sr + 6*rff]/1.63$

where each of the three variables is multiplied by a weighting coefficient of either six or twelve, and the entire term is divided by 1.63 to give the Culvert Hazard index a maximum possible score of 22 out of 100.

Variables incorporated into the Fill Hazard index:

[*fuc*] flow under CMP - presence of stream flow under a culvert and piping through the fill.

2 major stream flow under the culvert and through the fill
1 minor stream flow under the culvert and through the fill
0 no flow through the fill

[*sr*] saturated road fill - whether the road fill at the site is partially of fully saturated during the dry season.

1 saturated road fill
0 no water on road fill

[rff] road fill failing - whether the road fill has signs of mass movement

2 high volume slumps, slides or tension cracks on roadbed or fillslope
1 low volume rills, gullies, or tension cracks on roadbed or fillslope
0 no mass movement

[*C*] - CONSEQUENCE

Consequence is an index used to gage the physical effects of a future stream crossing failure. Each stream-crossing site is given a Consequence rating using the following equation:

$[C] = [2*fv + 4*div + 3*dd + 3*gm]/1.63$

where each variable is multiplied by a weighting coefficient between two and four, based on its perceived importance. The entire term is divided by 1.63 to give the Culvert Hazard index a maximum possible score of 22 out of 100.

Variables incorporated into the Consequence index:

[*fv*] fill volume – volume of sediment at risk of entering a stream if crossing fails (The potential volume delivered to a stream due to a diversion was assumed to be equal to the fill volume – likely to be an underestimate).

3 > 1,000 cubic yards (cy)
2 250 - 1,000 cy
1 < 250 cy
0 no fill volume

[*div*] diversion

3 has diverted in the past
2 potential to divert
0 no

[*dd*] diversion distance

3 > 1,000 feet
2 300 - 1,000 feet
1 < 150 feet
0 no potential diversion

[*gm*] geomorphic character of site drainage basin

3 abundant unstable geomorphic terrenes
2 abundant dormant slides, inner gorge, steep slopes
1 low relief, with limited dormant slides
0 stable geomorphic terrenes

[*IP*] - IMPACT

The Impact index measures the value of downstream resources that may be effected by failure of the stream crossing. Each stream-crossing site is given an Impact rating using the following equation:

$[IP] = [2*ws + 4*fb + 2*fa + 2*bl]/1.63$

where each variable is multiplied by a weighting coefficient of either two or four, based on its perceived importance. The entire term is divided by 1.63 to give the Culvert Hazard index a maximum possible score of 20 out of 100.

Variables incorporated into the Impact index:

[*ws*] water supply sources at risk – downstream potable surface water sources.

3 municipal source
2 > 5 domestic sources or campground
1 any potable source (< 5 domestic)
0 none

[*fb*] fish-bearing or perennial stream at site (&/or other "sensitive" aquatic species)

3 stream flows directly into anadromous fish habitat
2 residential fish at site
1 non fish-bearing perennial stream at site
0 no perennial stream at site

[*fa*] downstream facilities at risk

3 non-road facilities at direct risk* (e.g., buildings, campgrounds, trailheads)
2 more than one road crossings downstream
1 single road crossing downstream
0 none (or bridge only)

* "direct risk" means facility is:
(1) directly downslope,
(2) within the same or next higher order stream,
(3) less than one mile downstream, and
(4) located on floodplain (<= 100 year).

[*bl*] Proximity to blue line streams - streams shown on base layer (typically represents larger perennial streams).

3 site crosses blue line stream
2 < 200 feet from blue line stream
1 200 - 500 feet from blue line stream
0 > 500 feet from blue line stream

Appendix III

Results

Table III-1. **High Priority Stream Crossings.** Comments and recommendations for top priority stream crossing sites in the Camp-Slate Creek watersheds. Sorted by priority. Road numbers with a decimal place (e.g., 12N01.1) indicate a non-system road.

Road Number and Mile Post	Stream Type	Sediment 'Saved' (cy)	Existing Condition	Recommended Treatment
11N38-1.72	Spring	42	Culvert undersized. Stream overtopped culvert. Saturated roadbed. Actively diverting down road. Walk in access only.	Pull crossing. Decommission road.
11N44-1.20	Intermittent	233	Culvert undersized. Stream overtopped culvert. Inlet plugged. Fill failing. Actively diverting.	Re-size/replace culvert or clear inlet. Install diversion dip.
12N02-0.83	Ephemeral	113	Culvert undersized. Stream overtopped culvert. Active diversion causing gully.	Re-size/replace culvert. Install diversion dip.
12N36A-1.18	Spring	102	Culvert undersized. Stream overtopped culvert. Saturated roadbed. Fill failing. Actively diverting down road.	Re-size/replace culvert. Install diversion dip.
11N05-0.24	Intermittent	278	Stream overtopped culvert. Active slide upslope. Potential diversion. Fish bearing site.	Stabilize slide. Re-size/replace culvert. Stabilize slide. Install diversion dip.
11N05-0.30	Intermittent	234	Culvert undersized. Stream overtopped culvert. Debris flow up channel. Potential diversion. Fish bearing site.	Examine upstream slide for stabilization. Re-size/replace culvert. Install diversion dip.
11N46-0.10	Perennial	662	Culvert undersized. Stream overtopped culvert. Flow thru fill. Potential diversion. Pond below site.	Re-size/replace culvert. Install diversion dip.
11N44-1.04	Intermittent	807	Culvert undersized. Stream overtopped culvert. Inlet plugged. Potential diversion.	Re-size/replace culvert. Clear inlet. Install diversion dip.
11N05-10.20	Ephemeral	201	Culvert undersized. Stream overtopped culvert. Potential diversion. Evidence of past failure by cutslope ravel. Spring near site.	Re-size/replace culvert. Install diversion dip.
12N18-0.90	Intermittent	349	Culvert undersized. Stream overtopped culvert. Inlet plugged. Potential diversion. Water running down road.	Re-size/replace culvert or clear inlet. Install diversion dip.
12N19-0.83	Perennial	87	Culvert undersized. Stream overtopped culvert. Inlet plugged. Potential diversion.	Re-size/replace culvert or clear inlet. Install diversion dip.
11N49-0.65	Intermittent	149	Culvert undersized. Stream overtopped culvert. Flow thru fill.	Re-size/replace culvert.
10N15A-0.22	Intermittent	85	Culvert undersized. Stream overtopped culvert. Inlet plugged. High consequence of failure. Walk in access only.	Re-size/replace, remove or clear culvert.

Table III-1. **High Priority Stream Crossings** (continued)

Road Number and Mile Post	Stream Type	Sediment 'Saved' (cy)	Existing Condition	Recommended Treatment
12N20-4.00	Perennial	854	Stream overtopped culvert. Evidence of high flows.	Re-size/replace culvert.
12N39B-0.15	Perennial	370	Culvert undersized. Stream overtopped culvert.	Re-size/replace culvert.
12N40B-1.8	Ephemeral	165	Culvert undersized. Inlet plugged. Flow thru fill. 1/3 of fill beginning to slump.	Re-size/replace culvert or clear inlet.
10N15A-0.10	unknown	325	Culvert undersized. Inlet plugged. Saturated roadfill. Walk in access only.	Re-size/replace, remove culvert or clear inlet.
15N01-2.38	Perennial	1,693	Culvert undersized. Inlet plugged. Potential diversion. Delivery to Delivery to fish bearing stream.	Re-size/replace culvert or clear inlet. Install diversion dip.
11N48-2.70	Perennial	196	Culvert undersized. Inlet plugged. Potential diversion. Long diversion length.	Re-size/replace culvert or clear inlet. Install diversion dip.
12N40H-0.04	Intermittent	528	Culvert undersized. Inlet plugged. Evidence of high flow.	Re-size/replace culvert or clear inlet. Install diversion dip.
11N38-1.35	Spring	192	Culvert undersized. Major flow thru fill. Saturated roadbed. Fill failing. Walk in access only.	Pull crossing. Decommission road.
12N12-0.70	Spring	206	Major flow thru fill. Culvert rusted thru. Potential diversion.	Re-size/replace culvert. Install diversion dip.
11N46-2.06	Spring	42	Culvert undersized. Major flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.
12N20-1.28	Spring	107	Culvert undersized. Major flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.
12N12-4.68	Perennial	544	Culvert undersized. Major flow thru fill. Culvert rusted thru.	Re-size/replace culvert.
12N12-0.72	Intermittent	431	Culvert undersized. Flow thru fill. Delivery to Delivery to fish bearing stream.	Re-size/replace culvert.
12N12-15.39	Intermittent	1,466	Culvert undersized. Flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.
12N12-4.74	Perennial	3	Culvert undersized. Flow thru fill. Culvert highly rusted. Potential diversion.	Re-size/replace culvert. Install diversion dip.

Table III-1. **High Priority Stream Crossings** (continued)

Road Number and Mile Post	Stream Type	Sediment 'Saved' (cy)	Existing Condition	Recommended Treatment
11N46-0.25	Perennial	348	Culvert undersized. Flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.
12N38A/12N49-0.05	Spring	58	Culvert undersized. Flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.
12N12-15.63	Ephemeral	18	Culvert undersized. Flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.
11N46-0.21	Spring	190	Culvert undersized. Flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.
12N12-3.25	Perennial	88	Culvert undersized. Flow thru fill.	Re-size/replace culvert.
11N46-1.82	Perennial	638	Culvert undersized. Flow thru fill.	Re-size/replace culvert.
12N40B-1.00	Intermittent	297	Culvert undersized. Flow thru fill.	Re-size/replace culvert.
12N12-5.50	Spring	158	Culvert undersized. Flow thru fill.	Re-size/replace culvert.
11N18-0.38	Spring	179	Culvert undersized. Saturated roadbed. Fill failing. Water ponding. Potential diversion.	Re-size/replace culvert. Install diversion dip.
11N38-0.80	Ephemeral	103	Culvert undersized. Saturated roadbed. Gullies on road. Potential diversion. Walk in access only.	Pull crossing. Decommission road.
11N38-1.45	Perennial	128	Culvert undersized. Saturated roadbed. Potential diversion to unstable slope. Walk in access only.	Pull crossing. Decommission road.
12N20-4.65	Ephemeral	86	Culvert undersized. Slump thru fill. Downspout unattached.	Re-size/replace culvert.
11N05-0.49	Intermittent	67	Culvert undersized. Fill failing. Gullies in stream channel. Potential diversion. Fish bearing site.	Re-size/replace culvert. Install diversion dip.
12N36-3.72	Spring	444	Fill failing. Potential diversion.	Re-size/replace culvert. Install diversion dip.
15N01-11.50	Ephemeral	4,225	Fill at risk from headcut erosion. Large gully at outlet flows 300 ft. to 12N38-0.15.	Re-size/replace culvert or armor fill slope.
11N05-0.38	Intermittent	240	Culvert undersized. Potential diversion. Delivery to Delivery to fish bearing stream.	Re-size/replace culvert. Install diversion dip.
12N01-1.00	Intermittent	248	Culvert undersized. Potential diversion. Delivery to fish bearing stream.	Re-size/replace culvert. Install diversion dip.
12N12-0.09	Perennial	131	Culvert undersized. Potential diversion. Delivery to fish bearing stream.	Re-size/replace culvert. Install diversion dip.

Table III-1. **High Priority Stream Crossings** (continued)

Road Number and Mile Post	Stream Type	Sediment 'Saved' (cy)	Existing Condition	Recommended Treatment
12N12-0.65	Perennial	71	Culvert undersized. Potential diversion. Delivery to fish bearing stream.	Re-size/replace culvert. Install diversion dip.
15N01-2.05	Perennial	9,216	Culvert undersized. Potential diversion. Delivery to fish bearing stream.	Re-size/replace culvert. Install diversion dip.
10N04-0.73	Intermittent	23	Culvert undersized. Potential diversion. Stream flows down skid trail above site.	Re-size/replace culvert. Install diversion dip/waterbar on skid trail.
12N38-0.50	Ephemeral	92	Culvert undersized. Potential diversion. Large gullies upstream start from x-drain 15N01-11.19	Re-size/replace culvert. Install diversion dip. Add additional drainage structures near cross drain above site.
12N12-5.32	Spring	92	Culvert undersized. Culvert highly rusted. Potential diversion.	Re-size/replace culvert. Install diversion dip.
12N12-0.68	Perennial	234	Culvert undersized. Inlet plugged. High flow. Potential diversion.	Re-size/replace culvert. Install diversion dip.

Table III-2. **Stream Crossing Maintenance.** Stream crossing maintenance sites for Camp-Slate Creek watersheds sorted by road number. Road numbers with a decimal place (e.g., 12N01.1) indicate a non-system road.

Road Number	Maintenance Risk Score (max = 78)	Existing Condition
10N15A-0.10	16	Inlet 75% plugged. Walk in access only.
10N15A-0.22	23	Inlet 100% plugged. Walk in access only.
11N05-0.24	49	High plugging potential. Large gully at outlet. Fish bearing site.
11N05-0.30	47	Drop inlet needs cover. Fish bearing site.
11N05-10.18	22	Inlet 25% plugged.
11N05-10.20	11	Past failures by cutslope ravel.
11N05-11.30	31	Inlet 25% plugged. Crushed culvert.
11N38-0.80	31	Inlet 25% plugged. Gullies on road. Walk in access only.
11N38-1.25	28	Inlet 25% plugged.
11N38-1.35	22	Flow saturating fillslope. Walk in access only.
11N38-1.72	8	Crushed culvert. Walk in access only.
11N44-1.04	38	Inlet 100% plugged. Trash rack plugged.
11N44-1.20	44	Inlet 100% plugged. Gully on fillslope.
11N46-0.10	41	Inlet 25% plugged. Crushed culvert.
11N46-2.06	43	Outlet 50% buried.
11N48-2.70	30	Inlet 75% plugged.
11N49-0.65	38	Trash rack and ditch.
11N65A-0.31	26	Inlet 25% plugged.
11N65A-0.38	21	Inlet 25% plugged. Vegetation blocking inlet.
12N02-0.56	17	Inlet 75% plugged. Downspout separated from outlet.
12N02-0.83	38	Inlet plugged. Inlet basin filled.
12N02-0.92	22	Inlet 25% plugged. Outlet 50% plugged.
12N02-1.00	22	Inlet 25% plugged.
12N02-1.20	17	Inlet 75% plugged.
12N12-0.04	34	Outlet 100% buried. Fish bearing site.
12N12-0.18	37	Inlet 25% plugged and crushed. Outlet 25% buried.
12N12-0.65	40	Outlet 100% buried. Fish bearing site.
12N12-0.68	43	Inlet 25% plugged. Crushed culvert. Fish bearing site.
12N12-0.70	34	Culvert rusted thru at inlet and outlet. Fish bearing site.
12N12-1.02	18	Inlet 25% Plugged.
12N12-1.21	18	50% rusted. Drains spring.
12N12-16.00	30	Inlet 25% plugged. Large woody debris in inlet basin.
12N12-2.12	18	Inlet 25% Plugged.
12N12-2.99	24	Side of drop inlet 50% plugged. Ditch needs maintenance.
12N12-4.49	18	Outlet crushed. Pipe rusted. Drains spring.
12N12-4.68	14	Inlet rusted. Spring draining into ditch near crossing.
12N12-4.74	32	Crushed culvert.
12N12-5.32	25	50% of inlet rusted thru.
12N12-5.42	28	Crushed culvert.
12N12-5.50	11	Crushed culvert.
12N12-8.69	11	Inlet 25% plugged.

Table III-2. **Stream Crossing Maintenance** (continued)

12N18-0.90	44	Inlet 75% plugged. Water running down road.
12N18-0.92	36	Inlet 25% plugged.
12N18-1.66	24	Inlet 25% plugged. Vegetation blocking inlet.
12N18-1.78	24	Inlet 25% plugged. Vegetation blocking inlet.
12N19-0.18	33	Crushed culvert.
12N19-0.83	41	Inlet 100% plugged. Inboard ditch filled.
12N19-2.34	24	Inlet 25% plugged.
12N19-2.41	22	Inlet 25% plugged. Vegetation blocking inlet.
12N19-2.42	31	Inlet 25% plugged. Crushed culvert.
12N20-0.20	34	Inlet 25% plugged.
12N20-0.39	27	Outlet 80% plugged.
12N20-1.28	28	Inlet 25% plugged. Outlet buried.
12N20-2.12	13	Inlet 25% plugged.
12N20-4.00	23	Inlet 25% plugged.
12N20-4.65	8	Slump thru road. Downspout unattached.
12N20D-0.49	31	Crushed culvert.
12N35-2.00	17	Inlet 25% plugged. Crushed culvert.
12N35A-0.10	25	Inlet 50% plugged. Walk in access only.
12N36-2.30	31	Inlet 25% plugged.
12N36-3.09	22	Inlet 25% plugged.
12N36-3.20	28	Inlet 25% plugged. Crushed culvert.
12N36-3.65	28	Inlet 50% plugged. Outlet buried.
12N36A-1.05	25	Inlet 25% plugged.
12N38-0.50	34	Inlet 50% plugged. Crushed culvert.
12N38A/12N49-0.05	22	Inlet 25% plugged. Spring flow in ditch.
12N39-0.75	14	Inlet 50% plugged.
12N39-0.89	14	Inlet 50% plugged.
12N39B-0.10	23	Outlet plugged. Gully on road.
12N40-3.30	11	Inlet 25% plugged.
12N40-3.90	17	Inlet 100% plugged.
12N40-4.20	8	Inlet basin full. Water on road. Outlet 25% plugged.
12N40B-1.8	17	Plugged drop inlet culvert. 30% of road failing.
12N40G-0.81	8	Outlet 25% plugged.
12N40H-0.04	19	Inlet 100% plugged. Outlet 75% buried.
12N46-0.39	28	Inlet 75% plugged.
15N01-1.95	50	Inlet 25% plugged. Crushed culvert. Fish bearing site.
15N01-2.05	59	Inlet 50% plugged. Fish bearing site.
15N01-2.38	50	Inlet 75% plugged. Fish bearing site.
15N01-5.55	12	Inlet covered with debris.
15N01-6.33	27	Outlet buried.
15N01-6.41	29	Outlet buried.
15N01-7.55	35	Crushed culvert.
15N01-9.44	35	Inlet 50% plugged.
15N05-15.03	38	Inlet 50% plugged.

Table III-3. **Cross Drain High Priority.** Top priority cross drain sites in the Camp-Slate Creek watersheds sorted by road number. Road numbers with a decimal place (e.g., 12N01.1) indicate a non-system road.

Road Number and Mile Post	Culvert Diameter (inches)	Existing Conditions
11N05-10.50	18	Hydrologically connected.
11N44-1.27	18	Hydrologically connected.
11N46-0.30	18	Hydrologically connected. Ditch needs maintenance.
11N46-1.14	18	Fill saturated.
11N47.1-0.50	12	Inlet crushed. Outlet buried. Culvert rusted thru. Ditch needs maintenance.
11N49-0.23	12	Fill saturated. Ditch needs maintenance.
11N55-1.02	18	Hydrologically connected. Fill saturated. Ditch needs maintenance.
12N01-1.31	18	Hydrologically connected. Ditch needs maintenance.
12N01-1.41	18	Hydrologically connected.
12N12-1.19	18	Hydrologically connected. Inlet 25% Plugged. 50% rusted.
12N12-11.63	18	Culvert rusted thru. Ditch needs maintenance.
12N12-15.52	18	Hydrologically connected. Inlet 25% crushed.
12N12-15.76	18	Hydrologically connected.
12N12-17.89	18	Fill saturated. Inlet 25% plugged. Inlet 75% crushed. Outlet buried.
12N12-24.56	18	Hydrologically connected. Inlet 50% plugged. Highly rusted.
12N12-3.29	18	Hydrologically connected. Inlet 50% plugged. Outlet 75% Plugged
12N12-6.30	24	Hydrologically connected. Drains spring. Inlet rusted.
12N12C-2.27	24	Hydrologically connected.
12N20-0.65	18	Slump at site. Fill saturated.
12N20-2.11	18	Hydrologically connected.
12N20-3.80	18	Hydrologically connected. Inlet 50% plugged.
12N20-4.70	18	Fill saturated. Ditch needs maintenance.
12N38-0.19	24	Uproad stream in ditch/gullies connected to 15N01 - 11.50
12N46-0.11	24	Hydrologically connected. Drop inlet overgrown.
15N01-0.00	18	Hydrologically connected. Drains slump.
15N01-11.19	18	Gully at outlet runs 2000 ft. to 12N38. Ditch needs maintenance.
15N01-11.90	18	Hydrologically connected.

Table III-4. **Cross Drain Maintenance.** Cross drain sites in need of maintenance in the Camp-Slate Creek watersheds. Sorted by road number. Road numbers with a decimal place (e.g., 12N01.1) indicate a non-system road.

Road Number and Mile Post	Culvert Diameter (inches)	Existing Conditions
11N14-0.23	18	Inlet is 100% plugged. Ditch needs maintenance.
11N30-0.49	18	Inlet covered by debris. Ditch needs maintenance.
11N36A-0.85	18	36 inch downspout drains spring. Ditch needs maintenance. Road blocked 0.1 miles above.
11N36B-0.40	18	Ditch needs maintenance. Walk in access only.
11N44-0.71	18	Inlet 50% plugged.
11N45-0.83	18	Inlet partially plugged.
11N45-2.39	18	Ditch needs maintenance.
11N46-0.68	18	Inlet is 25% plugged. Ditch needs maintenance.
11N46-0.92	18	Ditch needs maintenance.
11N46-1.22	18	Inlet 50% plugged. Ditch needs maintenance.
11N46-2.37	18	Inlet is 25% plugged. Ditch needs maintenance.
11N55-1.10	18	Inlet 50% plugged.
12N01.080	24	Ditch needs maintenance. Diverts to another cross drain.
12N01.1-.10	18	Ditch needs maintenance.
12N01.1-.25	24	Abandoned road above 12N01. Culvert needs to be removed. Ditch needs maintenance.
12N01-0.50	18	Ditch needs maintenance.
12N01-0.60	24	36 inch drop inlet. Ditch needs maintenance.
12N01-0.65	24	Ditch needs maintenance.
12N01-1.10	24	36 inch drop inlet. Ditch needs maintenance.
12N01-1.14	18	36 inch drop inlet. Ditch needs maintenance.
12N01-1.20	18	Ditch needs maintenance.
12N05-0.33	18	Inlet is 100% plugged. Ditch needs maintenance.
12N05-0.42	18	Inlet is 100% plugged. Ditch needs maintenance.
12N12-1.02	18	Inlet 25% Plugged.
12N12-1.21	18	50% rusted. Drains spring.
12N12-11.13	18	36 inch drop inlet crushed and separated.
12N12-12.74	18	Inlet 100% plugged. Barely visible. Ditch needs maintenance.
12N12-12.85	24	36 inch drop inlet covered by brush and debris. Outlet not visible. Ditch needs maintenance.
12N12-13.23	24	36 inch drop inlet. Ditch needs maintenance.
12N12-15.16	18	Inlet 50% plugged.
12N12-16.80	18	Outlet is 90% plugged.
12N12-17.60	18	Outlet is 95% plugged.
12N12-2.12	18	Inlet 25% Plugged.
12N12-2.99	24	Side of drop inlet 50% plugged. Ditch needs maintenance.
12N12-24.86	18	Outlet 50% plugged. 36 inch drop inlet.
12N12-4.49	18	Outlet crushed. Pipe rusted. Drains spring.
12N12-5.70	18	Inlet and outlet 50% plugged. Does not drain inboard ditch.
12N12-6.16	18	Outlet is 75% plugged and crushed. Culvert rusted.
12N12-6.34	18	Inlet partially crushed. 36 inch drop inlet.

Table II I-4. **Cross Drain Maintenance** (continued)

12N12-7.24	18	Ditch needs maintenance.
12N12-8.72	18	36 inch drop inlet. Outlet not visible due to vegetation. Could be downspout or buried.
12N12C-0.12	18	Outlet is plugged. Ditch needs maintenance.
12N12C-0.42	18	Outlet is 50% crushed. Ditch needs maintenance.
12N12C-2.41	18	Ditch needs maintenance.
12N16-0.03	18	Outlet is 75% plugged. May need to remover some fill on fillslope.
12N16-0.06	24	Ditch needs maintenance. Ditch not catching flow.
12N19-2.24	18	Inlet plugged. Ditch needs maintenance.
12N19-2.28	18	Ditch needs maintenance.
12N20-0.92	18	Trash rack needs cleaning. Ditch needs maintenance.
12N20-2.40	18	Inlet plugged.
12N20-3.05	18	Inlet 50% plugged.
12N20-3.15	18	Outlet is 100% plugged.
12N20-3.25	18	Inlet 50% plugged.
12N20-5.18	18	Outlet is 90% plugged. 36 inch drop inlet. Cover rotted.
12N46-0.10	18	Inlet 100% plugged. Currently has flow from seep.
15N01-1.15	18	Inlet is 100% buried. Cutslope slump covering half of drop inlet. Ditch needs maintenance.
15N01-10.30	18	Outlet 100% plugged.
15N01-10.95	18	Drop inlet is 100% plugged.
15N01-11.10	18	Inlet is 75% plugged.
15N01-11.13	18	Inlet is 50% plugged with cutslope ravel.
15N01-12.20	18	Ditch needs maintenance. Ditch full of ravel.
15N01-12.62	18	Inlet 50% plugged. Drop inlet.
15N01-12.78	24	Ditch needs maintenance. Ditch full of ravel.
15N01-13.08	18	Outlet is 75% plugged.
15N01-16.00	18	Drop inlet cover needs replacing.
15N01-16.20	18	Drop inlet cover needs replacing.
15N01-4.73	18	Outlet is 75% plugged.
15N01-5.98	18	Inlet 50% plugged.
15N01-8.12	18	Inlet is 25% plugged.

Table III-5. **Erosional Features.** Road-related erosional features in the Camp-Slate Creek watersheds. Sorted by priority. Road numbers with a decimal place (e.g., 12N01.1) indicates a non-system road.

Road Number Milepost	Erosion Type	Location of Feature	Present Condition	Volume of Feature	Priority	Future Sediment Yield to Streams (cy)	Existing Conditions
11N05-0.24	debris slide	cutslope	active	3,150	High	800	Future failure of cutslope will cause diversion and have direct delivery into Slate creek.
11N44-0.27	debris slide	fillslope	active	2,250	High	345	Over steep fillslope ravel.
11N48-2.73	slump	cutslope	recovering	350	High	280	Large volume near stream.
11N38-1.35	debris slide	fillslope	active	378	High	198	Saturated road fill. Logs rotting in fill. Walk-in access only.
10N11-0.21	slump	fillslope	active	250	High	168	Tension crack in roadbed. Feature adjacent to stream crossing 10N11-0.20.
10N11-0.16	slump	fillslope	active	200	High	140	Tension cracks in roadbed. Stream directly below.
12N18-0.71	debris slide	cutslope	active	400	High	100	Sediment deposited into intermittent stream. Slide continues thru road.
12N36-3.72	debris slide	fillslope	active	60	High	20	Direct delivery but little volume remaining.
12N01-1.32	debris slide	cutslope	active	150	High	15	Debris slide originates from non-system road 12N01.1. Close proximity to Camp Creek.
11N05-0.31	debris slide	cutslope	active	50	High	8	May plug stream crossing 11N05-0.30 and cause long diversion.
12N01-1.21	gully	cutslope	active	168	High	0	Caused by cross drain on non-system road 12N01.1. Close proximity to Camp Creek.
11N65A-0.13	debris slide	fillslope	active	700	Medium	150	High in watershed. Delivery to ephemeral stream.
12N12-8.08	debris slide	cutslope	active	31	Medium	5	Rocky area with active rock slides.
12N20J-0.10	gully	roadbed	active	100	Medium	100	600 feet in length.
11N44-1.82.	slump	fillslope	active	500	Medium	100	Walk-in access only.
11N46-0.74	debris slide	fillslope	active	500	Medium	50	Close to spring. Sediment stored on hillslope.
15N01-9.31	gully	fillslope	active	50	Medium	50	Uproad inboard ditch drains onto fillslope. Old silt fences at site not working.
11N49-2.20	gully	roadbed	active	16	Medium	8	Gully runs along road for 400 ft.
12N12-1.68	debris slide	cutslope	active	31	Medium	0	Chronic cutslope failure.
11N36A-0.13	gully	roadbed	active	120	Medium	3	Bad gullies along first 0.3 miles of road. Recommend installation of waterbars.

Table III-5. **Erosional Features** (continued)

10N04-0.55	gully	roadbed	active	1	Medium	1	Delivers to channel.
11N36B-0.40	slump	fillslope	active	2,700	Low	265	No nearby perennial streams.
12N37E-0.65.	slump	fillslope	active	1,000	Low	50	6 inch tension cracks. Part of small landing far above creek.
15N01F-0.17	slump	fillslope	active	800	Low	35	Large bench below.
11N36B-0.35	slump	fillslope	Unknown	350	Low	18	
11N44-1.70	slump	fillslope	active	300	Low	15	Tension cracks on road and fill. Walk-in access only.
11N36B-0.30	slump	fillslope	Unknown	250	Low	13	
11N36B-0.20	slump	fillslope	active	160	Low	8	No nearby perennial streams.
11N45-0.83	debris slide	cutslope	active	60	Low	5	
11N46-0.05	debris slide	cutslope	active	50	Low	5	Sediment stored on road.
12N38B\ 12N38-0.05	gully	roadbed	active	6	Low	3	Settling basin catching half of sediment. On map as 12N38, signed on ground as 12N38B.
10N04-2.00	gully	roadbed	active	3	Low	0	Map shows stream below. Not sure its connected.
11N38-1.46	debris slide	fillslope	recovering	60	Low	0	May have been caused by old diversion or failed cutslope.
11N47.1-0.70	debris slide	roadbed	active	100	Low	0	Material deposited on road 12N12.
11N47.1-0.72	debris slide	roadbed	active	425	Low	0	Material deposited on road 12N12 and hillslope.
12N01.1-0.35	debris slide	cutslope	active	20	Low	0	
12N37-1.27	debris slide	fillslope	active	800	Low	0	Most material has failed. Remaining fillslope has been pulled. End of drivable road.
12N39-1.75	debris slide	fillslope	active	280	Low	0	
12N40-2.43	debris slide	cutslope	active	650	Low	0	No delivery to stream. Slide transects road.
11N46.1-0.05	gully	roadbed	active	240	Low	0	Sediment settles on flat area.
12N20-5.10	slump	roadbed	active	240	Low	0	Little potential of delivery.
12N23-0.01	slump	fillslope	active	1,500	Low	0	Large cracks but no vertical displacement. Feature continues down road.

Appendix IV

Road Log

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
10N04		**2.93**	**1**	**2**	**0.1%**	**Medium**	**159**
Mile Post			Existing Condition		Recommended Treatment		
0.55	Stream Xing	ephem	Gully flows into stream below crossing. Four large gullies close to crossing. Potential diversion.		Improve road drainage upslope of crossing. Install diversion dip.	**Medium**	131
0.55	Erosion					**Medium**	5
0.73	Stream Xing	intrmt	Culvert undersized. Potential diversion. Stream flows down skid trail above site.		Re-size/replace culvert. Install diversion dip/waterbar on skid trail.	**High**	23
2.00	Erosion					**Low**	0

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
10N11		**0.53**	**2**	**0**	**3.2%**	**Low**	**308**
Mile Post			Existing Condition		Recommended Treatment		
0.16	Erosion		Tension cracks - stream directly below.			**High**	140
0.20	Stream Xing	ephem				**Low**	
0.21	Erosion		Tension crack. Feature on opposite side of draw from stream crossing. Stream directly below.			**High**	168

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
10N15		**1.12**	**0**	**1**	**0.8%**	**Low**	**112**
Mile Post			Existing Condition		Recommended Treatment		
0.65	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	112

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
10N15A		**0.41**	**2**	**1**	**29.7%**	**High**	**565**
Mile Post			Existing Condition		Recommended Treatment		
0.10	Stream Xing	ephem	Culvert undersized. Inlet plugged. Saturated roadfill. Walk in access only.		Re-size/replace, remove culvert or clear inlet.	**High**	325
0.16	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	155
0.22	Stream Xing	intrmt	Culvert undersized. Stream overtopped culvert. Inlet plugged. High consequence of failure. Walk in access only.		Re-size/replace, remove or clear culvert.	**High**	85

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N05		**10.76**	**8**	**11**	**6.7%**	**High**	**2,830**
Mile Post			Existing Condition		Recommended Treatment		
0.24	Stream Xing	ephem	Stream overtopped culvert. Active slide upslope. Potential diversion. Flows directly to anadromous reach.		Stabilize slide. Re-size/replace culvert. Stabilize slide. Install diversion dip.	**High**	278
0.24	Erosion		Future failure of cutslope will cause diversion and have direct delivery to Slate Creek.			**High**	800
0.30	Stream Xing	intrmt	Culvert undersized. Stream overtopped culvert. Debris flow up channel. Potential diversion. Flows directly to anadromous reach.		Examine upstream slide for stabilization. Re-size/replace culvert. Install diversion dip.	**High**	234
0.31	Erosion		May plug CMP and cause long diversion.			**High**	20
0.38	Stream Xing	intrmt	Culvert undersized. Potential diversion. Flows directly to anadromous reach.		Re-size/replace culvert. Install diversion dip.	**High**	240
0.49	Stream Xing	intrmt	Culvert undersized. Fill failing. Gullies in stream channel. Potential diversion. Flows directly to anadromous reach.		Re-size/replace culvert. Install diversion dip.	**High**	67
0.51	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	154
1.65	X-Drain						
3.05	X-Drain						
3.12	X-Drain						
4.00	X-Drain						
9.95	X-Drain						
10.10	X-Drain						
10.18	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	163
10.20	Stream Xing	ephem	Culvert undersized. Stream overtopped culvert. Potential diversion. Evidence of past failure by cutslope ravel. Spring near site.		Re-size/replace culvert. Install diversion dip.	**High**	201
10.30	Stream Xing	ephem	Long contributing ditch. Potential diversion.		Disconnect ditch from stream. Install diversion dip.	**Medium**	144
10.35	Stream Xing	ephem	Long contributing ditch. Potential diversion.		Disconnect ditch from stream. Install diversion dip.	**Medium**	175
10.42	X-Drain						
10.50	X-Drain		Hydrologically connected		Disconnect from stream.	**High**	
10.55	X-Drain						
10.68	X-Drain						
10.76	X-Drain						
10.88	X-Drain						
10.95	X-Drain						
11.18	Stream Xing	ephem	Long contributing ditch. Potential diversion.		Disconnect ditch from stream. Install diversion dip.	**Medium**	104

Table IV-1. Camp-Slate Creek watersheds road log.

11.26	X-Drain					
11.30	Stream Xing	spr	Long contributing ditch. Potential diversion.	Disconnect ditch from stream. Install diversion dip.	**Medium**	249

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N14	**1.08**	**0**	**0**	**0.0%**	**Low**	**0**

Mile Post		Existing Condition	Recommended Treatment		
0.15	X-Drain				
0.23	X-Drain	Inlet buried.		**Maintenance**	

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Road High Immediacy	Total Sediment 'Saved' (cy)
11N18	**2.00**	**1**	**1**	**0.5%**	**Medium**	**179**

Mile Post			Existing Condition	Recommended Treatment		
0.38	Stream Xing	spr	Culvert undersized. Saturated roadbed. Fill failing. Water ponding. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**High**	179

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N30	**2.12**	**0**	**0**	**0.0%**	**Low**	**0**

Mile Post		Existing Condition	Recommended Treatment		
0.49	X-Drain	Debris covering inlet.		**Maintenance**	

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N31A	**1.11**	**0**	**1**	**0.3%**	**Low**	**14**

Mile Post			Existing Condition	Recommended Treatment		
0.25	Stream Xing	per	2 seeps exist along road that are not properly drained. Surface erosion present. Culvert undersized. Potential diversion	Improve drainage. Re-size/replace culvert. Install diversion dip.	**Medium**	14

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N36A		**1.33**	**0**	**0**	**0.0%**	**Medium**	**3**
Mile Post			Existing Condition		Recommended Treatment		
0.13	Erosion					**Medium**	3
0.85	X-Drain					**Maintenance**	
1.25	X-Drain						

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N36B		**1.19**	**0**	**0**	**0.0%**	**Low**	**303**
Mile Post			Existing Condition		Recommended Treatment		
0.20	Erosion					**Low**	8
0.30	Erosion					**Low**	13
0.35	Erosion					**Low**	18
0.40	Erosion		No stream nearby.			**Low**	265
0.40	X-Drain		Walk-in only			**Maintenance**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N38		**1.66**	**5**	**6**	**12.7%**	**High**	**1,351**
Mile Post			Existing Condition		Recommended Treatment		
0.80	Stream Xing	ephem	Culvert undersized. Saturated roadbed. Gullies on road. Potential diversion. Walk in access only.		Pull crossing. Decommission road.	**High**	103
1.00	X-Drain						
1.25	Stream Xing	spr	Potential diversion.		Install diversion dip.	**Medium**	106
1.35	Stream Xing	spr	Culvert undersized. Major flow thru fill. Saturated		Pull crossing. Decommission road.	**High**	192
1.35	Erosion		Fill and roadbed saturated. Logs rotting in fill. Walk-in			**High**	198
1.45	Stream Xing	per	Culvert undersized. Saturated roadbed. Potential diversion to unstable slope. Walk in access only.		Pull crossing. Decommission road.	**High**	128
1.46	Erosion					**Low**	
1.60	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	514
1.70	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	67
1.72	Stream Xing	spr	Culvert undersized. Stream overtopped culvert. Saturated roadbed. Actively diverting down road. Walk-in only.		Pull crossing. Decommission road.	**High**	42

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N44		**1.79**	**4**	**8**	**22.7%**	**High**	**3,683**
Mile Post			Existing Condition		Recommended Treatment		
0.27	Erosion		Oversteepened fill slope.			**High**	345
0.71	X-Drain		Inlet 50% plugged at perennial seep.			**Maintenance**	
0.81	Stream Xing	per	Undersized (high rustline) with diversion potential and long contributing ditch.		Re-size/replace culvert. Install diversion dip.	**Medium**	1,408
0.93	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	257
0.97	X-Drain						
1.02	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	110
1.04	Stream Xing	per	Culvert undersized. Stream overtopped culvert. Inlet plugged. Potential diversion.		Re-size/replace culvert. Clear inlet. Install diversion dip.	**High**	807
1.07	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	154
1.09	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	46
1.20	Stream Xing	intrmt	Culvert undersized. Stream overtopped culvert. Inlet plugged. Fill failing. Actively diverting.		Re-size/replace culvert or clear inlet. Install diversion dip.	**High**	233
1.27	X-Drain		Hydrologically connected. Stream crossing at MP-1.2 diverted to here.		Disconnect from stream	**High**	
1.33	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	208
1.70	Erosion					**Low**	15
1.82	Erosion					**Medium**	100

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N45		**5.29**	**0**	**0**	**0.0%**	**Low**	**3**
Mile Post			Existing Condition		Recommended Treatment		
0.83	Erosion					**Low**	3
0.83	X-Drain		Inlet maintenance			**Maintenance**	
2.39	X-Drain		Ditch Maintenance			**Maintenance**	
3.20	X-Drain						

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N45A		**1.17**	**0**	**0**	**0.0%**	**Low**	**47**
Mile Post			Existing Condition		Recommended Treatment		
0.50	Stream Xing	intrmt	2 channels at crossing, one eroding road. Culvert undersized.		Resize/replace culvert. Protect road prism from erosion	**Medium**	47

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N46		**3.45**	**7**	**7**	**10.0%**	**High**	**3,625**
Mile Post			Existing Condition		Recommended Treatment		
0.05	Erosion					**Low**	3
0.10	Stream Xing	per	Culvert undersized. Stream overtopped culvert. Flow thru fill. Potential diversion. Pond below site.		Re-size/replace culvert. Install diversion dip.	**High**	662
0.15	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	196
0.21	Stream Xing	spr	Culvert undersized. Flow thru fill. Potential diversion.		Re-size/replace culvert. Install diversion dip.	**High**	190
0.25	Stream Xing	per	Culvert undersized. Flow thru fill. Potential diversion.		Re-size/replace culvert. Install diversion dip.	**High**	348
0.30	X-Drain		Hydrologically connected.		Disconnect from stream.	**High**	
0.42	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	369
0.43	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	1,128
0.68	X-Drain		Inlet 50% plugged			**Maintenance**	
0.71	Stream Xing	per				**Low**	
0.74	Erosion					**Medium**	50
0.92	X-Drain		Ditch Maintenance			**Maintenance**	
1.14	X-Drain		Drains spring along road. Fill saturated.			**High**	
1.22	X-Drain		Inlet partially buried.			**Maintenance**	
1.82	Stream Xing	per	Culvert undersized. Flow thru fill.		Re-size/replace culvert.	**High**	638
2.00	Stream Xing	per				**Low**	
2.06	Stream Xing	spr	Culvert undersized. Major flow thru fill. Potential diversion.		Re-size/replace culvert. Install diversion dip.	**High**	42
2.37	X-Drain		Inlet is 25% plugged.			**Maintenance**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N46.1		**0.15**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
0.05	Erosion					**Low**	
0.10	Stream Xing	per				**Low**	

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N47.1			**1**	**0**	**0.0%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
0.50	X-Drain		Culvert rusted through. Inlet crushed and outlet buried.			**High**	
0.70	Erosion					**Low**	
0.72	Erosion					**Low**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N48		**2.86**	**2**	**2**	**0.7%**	**High**	**587**
Mile Post			Existing Condition		Recommended Treatment		
2.49	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	111
2.70	Stream Xing	per	Culvert undersized. Inlet plugged. Potential diversion. Long diversion length.		Re-size/replace culvert or clear inlet. Install diversion dip.	**High**	196
2.73	Erosion		Large volume remaining. Near Stream.			**High**	280

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N49		**2.79**	**2**	**0**	**0.3%**	**Medium**	**149**
Mile Post			Existing Condition		Recommended Treatment		
0.23	X-Drain		Seep saturating road fill. Fixed by cleaning ditch.			**High**	
0.65	Stream Xing	intrmt	Culvert undersized. Stream overtopped culvert. Flow thru fill.		Re-size/replace culvert.	**High**	149
2.20	Erosion					**Medium**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N50		**2.64**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
1.70	X-Drain						
2.41	X-Drain						
2.42	X-Drain						

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N55		**1.93**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
1.02	X-Drain		Hydrologically connected. High priority. Seep.		Disconnect from stream.	**High**	
1.10	X-Drain		Pipe 50% plugged			**Maintenance**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N59A		**0.35**	**0**	**0**	**0.8%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
0.10	Stream Xing	ephem				**Low**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
11N65A		**0.67**	**0**	**1**	**1.7%**	**Medium**	**212**
Mile Post			Existing Condition		Recommended Treatment		
0.13	Erosion					**Medium**	150
0.23	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	62
0.31	Stream Xing	intrmt				**Low**	
0.38	Stream Xing	ephem				**Low**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N01		**1.93**	**5**	**2**	**10.8%**	**High**	**291**
Mile Post			Existing Condition		Recommended Treatment		
0.50	X-Drain		Ditch Maintenance			**Maintenance**	
0.60	X-Drain					**Maintenance**	
0.65	X-Drain		Ditch Maintenance			**Maintenance**	
1.00	Stream Xing	per	Culvert undersized. Potential diversion. Flows directly to anadromous reach.		Re-size/replace culvert. Install diversion dip.	**High**	248
1.10	X-Drain					**Maintenance**	
1.14	X-Drain		Ditch needs maintenance.			**Maintenance**	
1.20	X-Drain		Ditch Maintenance			**Maintenance**	
1.21	Erosion		Caused by cross-drain on above abandoned road. Close proximity to Camp Creek.			**High**	
1.31	X-Drain		Hydrologically Connected		Disconnect from stream.	**High**	

Table IV-1. Camp-Slate Creek watersheds road log.

1.32	Erosion		Caused by abandoned road upslope. Close proximity to Camp Creek.		**High**	15
1.41	X-Drain		Hydrologically connected.	Disconnect ditch from stream.	**High**	
1.74	Stream Xing	intrmt	Potential diversion.	Install diversion dip.	**Medium**	29
1.76	Stream Xing	intrmt			**Low**	
1.82	Stream Xing	per			**Low**	
0.80	X-Drain		Diverts to another cross-drain.		**Maintenance**	

Road Number	**Length (mi)**	**No. of High Immediacy Sites**	**Xings with Diversion Potential**	**Percent of Road Connected to Streams**	**Treatment Immediacy**	**Total Sediment 'Saved' (cy)**
12N01.1	**0.20**	**0**	**0**	**0.0%**	**High**	**20**
Mile Post		Existing Condition		Recommended Treatment		
0.10	X-Drain	Ditch Maintenance			**Maintenance**	
0.25	X-Drain	Abandoned road.			**Maintenance**	
0.35	Erosion				**Medium**	20

Road Number	**Length (mi)**	**No. of High Immediacy Sites**	**Xings with Diversion Potential**	**Percent of Road Connected to Streams**	**Treatment Immediacy**	**Total Sediment 'Saved' (cy)**
12N02	**1.47**	**1**	**3**	**0.7%**	**Medium**	**274**
Mile Post		Existing Condition		Recommended Treatment		
0.56	Stream Xing	intrmt	Inlet 75% plugged and downspout separated from outlet.	Unplug and fix downspout.	**Medium**	26
0.83	Stream Xing	ephem	Culvert undersized. Stream overtopped culvert. Active diversion causing gully.	Re-size/replace culvert. Install diversion dip.	**High**	113
0.92	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	42
1.00	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	65
1.20	Stream Xing	ephem	Inlet plugged	Unplug inlet.	**Medium**	28

Road Number	**Length (mi)**	**No. of High Immediacy Sites**	**Xings with Diversion Potential**	**Percent of Road Connected to Streams**	**Treatment Immediacy**	**Total Sediment 'Saved' (cy)**
12N05	**2.29**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post		Existing Condition		Recommended Treatment		
0.33	X-Drain	Inlet 100% plugged			**Maintenance**	
0.42	X-Drain	Inlet 100% plugged			**Maintenance**	
1.02	X-Drain					

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N12		**23.82**	**27**	**22**	**41.4%**	**High**	**12,847**
Mile Post			Existing Condition		Recommended Treatment		
0.02	X-Drain						
0.04	Stream Xing	intrmt	Outlet buried. Culvert undersized. Potential diversion		Re-size/replace culvert. Install diversion dip.	**Medium**	154
0.09	Stream Xing	per	Culvert undersized. Potential diversion. Flows directly to anadromous reach.		Re-size/replace culvert. Install diversion dip.	**High**	131
0.18	Stream Xing	per	Inlet plugged 25%. Potential diversion		Unplug inlet. Install diversion dip.	**Medium**	38
0.19	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	84
0.65	Stream Xing	per	Culvert undersized. Potential diversion. Flows directly to anadromous reach.		Re-size/replace culvert. Install diversion dip.	**High**	71
0.68	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	234
0.69	Stream Xing	spr	Potential diversion.		Install diversion dip.	**Medium**	123
0.70	Stream Xing	spr	Major flow thru fill. Culvert rusted thru. Potential diversion.		Re-size/replace culvert. Install diversion dip.	**High**	206
0.72	Stream Xing	intrmt	Culvert undersized. Flow thru fill. Flows directly to anadromous reach.		Re-size/replace culvert.	**High**	431
0.82	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	909
0.93	X-Drain						
0.99	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	573
1.02	X-Drain		Hydrologically connected. Inlet 25% plugged with sediment. Outlet partially plugged.			**Maintenance**	
1.05	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	691
1.19	X-Drain		Inlet 25% plugged and crushed.		Disconnect ditch from stream.	**High**	
1.21	X-Drain		Drains active spring 35 feet up the ditch.			**Maintenance**	
1.68	Erosion		Caused by lack of culvert above. Water on upper road is draining concentrating and draining on slope.			**High**	91
2.12	X-Drain		Hydrologically connected. Inlet 25% filled with sediment and debris.			**Maintenance**	
2.51	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	245
2.99	X-Drain		Hydrologically connected. Inlet 50% plugged with sediment.			**Maintenance**	
3.12	X-Drain						
3.25	Stream Xing	per	Culvert undersized. Flow thru fill.		Re-size/replace culvert.	**High**	88
3.29	X-Drain		Hydrologically connected. Inlet 50% plugged. Outlet 75% plugged.		Disconnect ditch from stream.	**High**	
4.36	X-Drain						
4.49	X-Drain		Hydrologically connected. Outlet crushed and highly rusted.			**Maintenance**	

Table IV-1. Camp-Slate Creek watersheds road log.

4.55	Stream Xing	intrmt	Potential diversion.	Install diversion dip.	**Medium**	1,230
4.68	Stream Xing	per	Culvert undersized. Major flow thru fill. Culvert rusted	Re-size/replace culvert.	**High**	544
4.74	Stream Xing	per	Culvert undersized. Flow thru fill. Culvert highly rusted. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**High**	3
5.23	X-Drain					
5.32	Stream Xing	spr	Culvert undersized. Culvert highly rusted. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**High**	92
5.42	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	132
5.50	Stream Xing	spr	Culvert undersized. Flow thru fill.	Re-size/replace culvert.	**High**	158
5.70	X-Drain		Inlet 50% plugged.		**Maintenance**	
6.16	X-Drain		Outlet 75% crushed.		**Maintenance**	
6.24	Stream Xing	ephem			**Low**	
6.30	X-Drain		Hydrologically connected. Drains active spring in ditch 5 feet up road. Inlet rusted through.		**High**	
6.34	X-Drain		Inlet partially crushed.		**Maintenance**	
7.24	X-Drain		Ditch Maintenance.		**Maintenance**	
7.64	X-Drain					
7.89	Stream Xing	ephem			**Low**	
8.08	Erosion				**Medium**	5
8.08	X-Drain					
8.49	X-Drain					
8.69	Stream Xing	ephem			**Low**	
8.72	X-Drain		Outlet plugged or under debris.		**Maintenance**	
11.13	X-Drain		Drop inlet crushed and separated.		**Maintenance**	
11.63	X-Drain		Pipe rusted through.		**High**	
12.64	Stream Xing	intrmt	Potential diversion.	Install diversion dip.	**Medium**	327
12.74	X-Drain		Inlet buried.		**Maintenance**	
12.85	X-Drain		Inlet hidden by brush and debris.		**Maintenance**	
13.23	X-Drain				**Maintenance**	
13.36	X-Drain					
15.16	X-Drain		Inlet 50% plugged by brush and sediment.		**Maintenance**	
15.29	X-Drain					
15.39	Stream Xing	intrmt	Culvert undersized. Flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**High**	1,466
15.52	X-Drain		Hydrologically connected. Inlet 25% plugged.	Disconnect ditch from stream.	**High**	
15.63	Stream Xing	ephem	Culvert undersized. Flow thru fill. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**High**	18
15.76	X-Drain		Hydrologically connected.	Disconnect ditch from stream.	**High**	
16.00	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	809
16.09	Stream Xing	intrmt	Potential diversion.	Install diversion dip.	**Medium**	3,493
16.32	X-Drain					
16.80	X-Drain		Outlet 90% plugged.		**Maintenance**	
17.38	X-Drain					

Table IV-1. Camp-Slate Creek watersheds road log.

17.50	X-Drain					
17.60	X-Drain		Outlet 95% plugged.		**Maintenance**	
17.71	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	591
17.89	X-Drain		Ponding at inlet. 75% crushed and plugged. May have flow under. Outlet buried.		**High**	
24.56	X-Drain		Hydrologically connected. Inlet 50% plugged. Highly rusted.	Disconnect ditch from stream.	**High**	
24.86	X-Drain		Outlet blocked 50% by sediment.		**Maintenance**	

Road Number	**Length (mi)**	**No. of High Immediacy Sites**	**Xings with Diversion Potential**	**Percent of Road Connected to Streams**	**Treatment Immediacy**	**Total Sediment 'Saved' (cy)**
12N12C	**2.91**	**1**	**0**	**1.4%**	**Medium**	**0**

Mile Post			Existing Condition	Recommended Treatment		
0.12	X-Drain		Outlet plugged.		**Maintenance**	
0.42	X-Drain		Outlet 50% crushed.		**Maintenance**	
2.27	X-Drain		Hydrologically connected. Beginning of stream.	Disconnect ditch from stream.	**High**	
2.29	Stream Xing	spr			**Low**	
2.41	X-Drain		Ditch Maintenance.		**Maintenance**	
2.73	X-Drain					

Road Number	**Length (mi)**	**No. of High Immediacy Sites**	**Xings with Diversion Potential**	**Percent of Road Connected to Streams**	**Treatment Immediacy**	**Total Sediment 'Saved' (cy)**
12N12E	**0.87**	**0**	**0**	**0.9%**	**Low**	**0**

Mile Post			Existing Condition	Recommended Treatment		
0.44	Stream Xing	spr			**Low**	

Road Number	**Length (mi)**	**No. of High Immediacy Sites**	**Xings with Diversion Potential**	**Percent of Road Connected to Streams**	**Treatment Immediacy**	**Total Sediment 'Saved' (cy)**
12N16	**1.89**	**0**	**0**	**9.2%**	**Medium**	**0**

Mile Post			Existing Condition	Recommended Treatment		
0.03	X-Drain		Outlet 75% plugged.		**Maintenance**	
0.06	X-Drain		Ditch not catching flow.		**Maintenance**	
0.20	X-Drain					
0.71	X-Drain					
0.78	Stream Xing	ephem			**Low**	

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N18		**2.05**	**2**	**5**	**1.5%**	**High**	**1,777**
Mile Post			Existing Condition		Recommended Treatment		
0.71	Erosion		Slide continues through road. Looks connected to intermittent stream.			**High**	100
0.90	Stream Xing	intrmt	Culvert undersized. Stream overtopped culvert. Inlet plugged. Potential diversion. Water running down road.		Re-size/replace culvert or clear inlet. Install diversion dip.	**High**	349
0.92	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	614
1.02	Stream Xing	intrmt				**Low**	
1.24	Stream Xing	spr	Potential diversion.		Install diversion dip.	**Medium**	160
1.66	Stream Xing	ephem	25% plugged by sediment. Potential diversion.		Unplug inlet. Install diversion dip.	**Medium**	286
1.78	Stream Xing	ephem	Inlet 25% plugged. Culvert undersized. Potential diversion		Re-size/replace culvert. Install diversion dip.	**Medium**	267

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N19		**2.72**	**1**	**5**	**5.7%**	**High**	**1,193**
Mile Post			Existing Condition		Recommended Treatment		
0.18	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	436
0.83	Stream Xing	per	Culvert undersized. Stream overtopped culvert. Inlet plugged. Potential diversion.		Re-size/replace culvert or clear inlet. Install diversion dip.	**High**	87
2.24	X-Drain		Inlet plugged with woody debris.			**Maintenance**	
2.28	X-Drain		Ditch Maintenance			**Maintenance**	
2.34	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	427
2.41	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	117
2.42	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	125

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N20		**6.22**	**7**	**14**	**33.8%**	**High**	**10,654**
Mile Post			Existing Condition		Recommended Treatment		
0.01	X-Drain						
0.09	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	458
0.20	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	576
0.39	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	554
0.60	X-Drain						
0.65	X-Drain		Large slump.			**High**	
0.73	X-Drain						

Table IV-1. Camp-Slate Creek watersheds road log.

0.80	X-Drain					
0.92	X-Drain		Trash rack needs cleaning		**Maintenance**	
1.05	X-Drain					
1.28	Stream Xing	spr	Culvert undersized. Culvert highly rusted. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**High**	107
1.30	X-Drain					
1.35	X-Drain					
1.54	Stream Xing	intrmt			**Low**	
1.67	X-Drain					
1.85	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	41
1.90	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	376
1.91	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	265
1.95	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	45
2.00	Stream Xing	spr	Potential diversion.	Install diversion dip.	**Medium**	114
2.02	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	146
2.11	X-Drain		Hydrologically connected	Disconnect ditch from stream.	**High**	
2.12	Stream Xing	ephem			**Low**	
2.30	Stream Xing	per	Long contributing ditch to large stream	Disconnect ditch from stream.	**Medium**	4,338
2.40	X-Drain		15 feet to Browns Creek. Partially plugged.		**Maintenance**	
2.49	Stream Xing	per	Potential diversion.	Install diversion dip.	**Medium**	791
2.59	X-Drain					
2.65	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	65
2.74	Stream Xing	spr	Potential diversion.	Install diversion dip.	**Medium**	1,634
2.95	Stream Xing	spr	Potential diversion.	Install diversion dip.	**Medium**	206
3.05	X-Drain		Inlet 50% plugged.		**Maintenance**	
3.15	X-Drain		Outlet buried.		**Maintenance**	
3.25	X-Drain		Inlet 50% plugged.		**Maintenance**	
3.80	X-Drain		Hydrologically connected. Inlet 50% plugged.	Disconnect ditch from stream.	**High**	
3.89	Stream Xing	ephem			**Low**	
4.00	Stream Xing	per	Culvert undersized. Culvert highly rusted. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**High**	854
4.60	X-Drain					
4.65	Stream Xing	ephem	Culvert undersized. Slump thru fill. Downspout unattached.	Re-size/replace culvert.	**High**	86
4.70	X-Drain		Fill saturated		**High**	
5.10	Erosion				**Low**	
5.18	X-Drain		Inlet 90% plugged		**Maintenance**	

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N20D		**0.90**	**0**	**2**	**7.1%**	**Medium**	**56**
Mile Post			Existing Condition		Recommended Treatment		
0.49	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	25
0.70	X-Drain						
0.90	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	31

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N20E		**0.33**		**2**	**60.3%**	**Medium**	**112**
Mile Post			Existing Condition		Recommended Treatment		
0.05	Stream Xing	intrmt	Undersized culvert. Potential diversion.		Re-size/replace culvert. Install diversion dip.	**Medium**	22
0.14	Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	30
0.22	Stream Xing	per	Long contributing ditch.		Disconnect ditch from stream.	**Medium**	60

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N20G		**0.67**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
0.55	X-Drain						

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N20J		**1.28**	**0**	**0**	**0.0%**	**Low**	**100**
Mile Post			Existing Condition		Recommended Treatment		
0.10	Erosion					**Medium**	100

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N23		**0.61**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
0.01	Erosion					**Low**	

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N23A		**0.53**	**0**	**1**	**0.0%**	**Low**	**155**
Mile Post			Existing Condition		Recommended Treatment		
0.05	Stream Xing	ephem	Gullies on roadbed. Potential Diversion		Improve road drainage. Install diversion dip.	**Medium**	155

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N35		**2.95**	**0**	**1**	**0.4%**	**Low**	**73**
Mile Post			Existing Condition		Recommended Treatment		
1.57	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	73
2.00	Stream Xing	ephem				**Low**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N35A		**1.03**	**0**	**1**	**0.0%**	**Low**	**75**
Mile Post			Existing Condition		Recommended Treatment		
0.10	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	75

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N36		**3.81**	**2**	**8**	**0.1%**	**High**	**1,229**
Mile Post			Existing Condition		Recommended Treatment		
2.30	Stream Xing	ephem	Gully leading from roadbed down filslope at outlet. Potential Diversion.		Improve road drainage upslope of crossing. Install diversion dip.	**Medium**	142
2.87	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	74
3.09	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	123
3.20	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	57
3.36	Stream Xing	ephem				**Low**	
3.50	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	54
3.58	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	226
3.65	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	90
3.72	Stream Xing	spr	Fill failing. Potential diversion.		Re-size/replace culvert. Install diversion dip.	**High**	444
3.72	Erosion					**High**	20

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N36A		**1.32**	**1**	**4**	**3.1%**	**Medium**	**461**
Mile Post			Existing Condition		Recommended Treatment		
0.80	Stream Xing	spr	Potential diversion.		Install diversion dip.	**Medium**	161
1.05	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	123
1.10	Stream Xing	ephem	Road surface rutted and wet. Potential diversion.		Improve drainage. Install diversion dip.	**Medium**	74
1.18	Stream Xing	spr	Culvert undersized. Stream overtopped culvert. Saturated roadbed. Fill failing. Actively diverting down road.		Re-size/replace culvert. Install diversion dip.	**High**	102

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N37		**1.74**	**0**	**0**	**0.3%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
0.89	Stream Xing	ephem				**Low**	
1.27	Erosion					**Low**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N37E		**0.87**	**0**	**0**	**0.0%**	**Low**	**50**
Mile Post			Existing Condition		Recommended Treatment		
0.65	Erosion		6" tension cracks. Portion of landing far from stream.			**Low**	50

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N38		**1.03**	**2**	**2**	**22.4%**	**High**	**180**
Mile Post			Existing Condition		Recommended Treatment		
0.01	X-Drain						
0.19	X-Drain		Uproad stream in ditch. Gullies connected to stream at stream crossing.			**High**	
0.23	X-Drain						
0.30	Stream Xing	ephem	Long contributing ditch. Potential diversion.		Disconnect ditch from stream. Install diversion dip.	**Medium**	88

Table IV-1. Camp-Slate Creek watersheds road log.

0.50	Stream Xing	ephem	Culvert undersized. Potential diversion. Large gullies upstream start from x-drain 15N01-11.19	Re-size/replace culvert. Install diversion dip. Add additional drainage structures near cross drain above site.	**High**	92

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N38A/12N49	**0.65**	**1**	**1**	**24.1%**	**Medium**	**58**
Mile Post		Existing Condition		Recommended Treatment		
0.05 Stream Xing	spr	Culvert undersized. Flow thru fill. Potential diversion.		Re-size/replace culvert. Install diversion dip.	**High**	58
0.15 Stream Xing	intrmt				**Low**	

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N38B\12N38	**0.14**	**0**	**1**	**5.5%**	**Medium**	**63**
Mile Post		Existing Condition		Recommended Treatment		
0.05 Erosion					**Low**	3
0.10 Stream Xing	per	Potential diversion.		Install diversion dip.	**Medium**	60

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N39	**2.08**	**0**	**0**	**0.0%**	**Medium**	**0**
Mile Post		Existing Condition		Recommended Treatment		
0.75 Stream Xing	ephem	Inlet plugged with fillslope material. No evidence of flow in swale.			**Low**	
0.89 Stream Xing	ephem				**Low**	
1.75 Erosion					**Low**	

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N39B	**0.60**	**1**	**1**	**15.4%**	**Medium**	**390**
Mile Post		Existing Condition		Recommended Treatment		
0.10 Stream Xing	ephem	Gully on road leading to Camp tributary. Potential diversion.		Improve road drainage upslope of crossing. Install diversion dip.	**Medium**	19
0.15 Stream Xing	per	Culvert undersized. Stream overtopped culvert.		Re-size/replace culvert.	**High**	370

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N40		**3.88**	**0**	**0**	**0.0%**	**Low**	**258**
Mile Post			Existing Condition		Recommended Treatment		
2.43	Erosion					**Low**	
3.30	Stream Xing	ephem				**Low**	
3.90	Stream Xing	ephem	Inlet plugged		Unplug inlet.	**Medium**	157
4.20	Stream Xing	spr	Inlet basin full. Water bypassing inlet causing large gully. Culvert undersized.		Clear out inlet basin. Re-size/replace culvert.	**Medium**	101

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N40B		**1.50**	**2**	**0**	**2.0%**	**Medium**	**462**
Mile Post			Existing Condition		Recommended Treatment		
0.35	Stream Xing	ephem				**Low**	
0.85	Stream Xing	intrmt				**Low**	
1.00	Stream Xing	intrmt	Culvert undersized. Culvert highly rusted.		Re-size/replace culvert.	**High**	297
1.70	Stream Xing	intrmt				**Low**	
1.80	Stream Xing	ephem	Culvert undersized. Inlet plugged. Flow thru fill. 1/3 of fill beginning to slump.		Re-size/replace culvert or clear inlet.	**High**	165

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N40G		**1.23**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post			Existing Condition		Recommended Treatment		
0.81	Stream Xing	ephem				**Low**	

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N40H		**1.50**	**1**	**0**	**1.6%**	**Medium**	**528**
Mile Post			Existing Condition		Recommended Treatment		
0.04	Stream Xing	intrmt	Culvert undersized. Inlet plugged. Evidence of high flow.		Re-size/replace culvert or clear inlet. Install diversion dip.	**High**	528

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
12N46		**1.45**	**1**	**1**	**0.4%**	**Medium**	**104**
Mile Post			Existing Condition		Recommended Treatment		
0.10	X-Drain		Flow from seep. Inlet buried.			**Maintenance**	
0.11	X-Drain		Hydrologically connected. Draining seep. Inlet covered in willows.		Disconnect ditch form stream.	**High**	
0.39	Stream Xing	ephem	Inlet 75% plugged, small diversion potential		Unplug outlet. Install diversion dip.	**Medium**	104

Road Number		Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
15N01		**17.11**	**6**	**32**	**25.1%**	**High**	**64,747**
Mile Post			Existing Condition		Recommended Treatment		
0.00	X-Drain		Hydrologically connected. Drains slump.		Disconnect ditch from stream.	**High**	
0.06	X-Drain						
0.18	X-Drain						
0.29	X-Drain						
0.38	X-Drain						
0.48	X-Drain						
0.55	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	579
0.61	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	1,271
0.70	X-Drain						
0.98	X-Drain						
1.08	X-Drain						
1.15	X-Drain		Cutslope slump covers drop inlet.			**Maintenance**	
1.23	X-Drain						
1.29	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	345
1.31	Stream Xing	intrmt	Potential diversion.		Install diversion dip.	**Medium**	1,460
1.65	X-Drain						
1.89	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	395
1.90	Stream Xing	ephem	Potential diversion.		Install diversion dip.	**Medium**	383
1.95	Stream Xing	spr	Potential diversion.		Install diversion dip.	**Medium**	513
2.05	Stream Xing	per	Culvert undersized. Potential diversion. Flows directly to anadromous reach.		Re-size/replace culvert. Install diversion dip.	**High**	9,216
2.13	X-Drain						
2.24	X-Drain						
2.33	X-Drain						
2.38	Stream Xing	per	Culvert undersized. Inlet plugged. Potential diversion. Flows directly to anadromous reach.		Re-size/replace culvert or clear inlet. Install diversion dip.	**High**	1,693
2.41	Stream Xing	spr	Potential diversion.		Install diversion dip.	**Medium**	525
2.49	X-Drain						

Table IV-1. Camp-Slate Creek watersheds road log.

2.57	X-Drain					
2.63	X-Drain					
2.69	X-Drain					
2.80	X-Drain					
2.89	X-Drain					
2.95	X-Drain					
3.03	X-Drain					
3.20	X-Drain					
3.30	X-Drain					
3.38	X-Drain					
3.49	X-Drain					
3.55	X-Drain					
3.62	X-Drain					
3.71	X-Drain					
3.80	X-Drain					
3.85	X-Drain					
3.91	X-Drain					
4.03	Stream Xing	intrmt	Undersized culvert. Potential diversion.	Re-size/replace culvert. Install diversion dip.	**Medium**	235
4.09	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	276
4.12	Stream Xing	intrmt	Potential diversion.	Install diversion dip.	**Medium**	979
4.25	X-Drain					
4.37	X-Drain					
4.53	X-Drain					
4.66	Stream Xing	per	Potential diversion.	Install diversion dip.	**Medium**	386
4.73	X-Drain		Inlet 75% plugged.		**Maintenance**	
4.85	Stream Xing	intrmt	Potential diversion.	Install diversion dip.	**Medium**	933
4.95	X-Drain					
5.05	X-Drain					
5.18	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	357
5.42	X-Drain					
5.55	Stream Xing	ephem	Inlet covered with debris.		**Low**	
5.69	X-Drain					
5.73	X-Drain					
5.83	Stream Xing	ephem			**Low**	
5.98	X-Drain		Inlet 50% plugged.		**Maintenance**	
6.10	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	1,760
6.33	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	499
6.41	Stream Xing	intrmt	Potential diversion.	Install diversion dip.	**Medium**	9,232
6.51	X-Drain					
6.71	X-Drain					
6.75	X-Drain					
6.89	X-Drain					

Table IV-1. Camp-Slate Creek watersheds road log.

7.09	X-Drain					
7.19	X-Drain					
7.27	X-Drain					
7.50	X-Drain					
7.55	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	1,171
7.70	Stream Xing	per	Potential diversion.	Install diversion dip.	**Medium**	7,333
7.73	X-Drain					
8.05	X-Drain					
8.08	X-Drain					
8.12	X-Drain		25% plugged with ravel.		**Maintenance**	
8.24	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	121
8.48	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	2,379
9.14	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	1,617
9.20	X-Drain					
9.31	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	3,244
9.31	Erosion				**Medium**	
9.44	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	1,112
9.52	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	2,022
9.88	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	2,906
9.95	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	907
10.25	X-Drain					
10.30	X-Drain		Outlet buried.		**Maintenance**	
10.55	X-Drain					
10.59	X-Drain					
10.70	X-Drain					
10.80	X-Drain					
10.85	X-Drain					
10.91	X-Drain					
10.95	X-Drain		Drop inlet filled with wood and sediment.		**Maintenance**	
11.03	X-Drain					
11.10	X-Drain		Inlet 75% plugged.		**Maintenance**	
11.13	X-Drain		Inlet 50% plugged with cutslope .		**Maintenance**	
11.19	X-Drain		Gully forming at outlet runs 200 feet to 12N38 to previously failed culvert. Gully volume of 70 cy.	Disconnect ditch.	**High**	70
11.50	Stream Xing	ephem	Fill at risk from headcut erosion. Large gully at outlet flows 300 ft. to 12N38-0.15.	Re-size/replace culvert or armor fill slope.	**High**	4,225
11.90	X-Drain		Suspect large gully at outlet connected to Hines Creek.	Disconnect ditch from stream.	**High**	
11.95	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	883
12.03	X-Drain					
12.10	X-Drain					
12.20	X-Drain		Ravel falling into ditch.		**Maintenance**	

Table IV-1. Camp-Slate Creek watersheds road log.

12.23	X-Drain					
12.35	X-Drain					
12.62	X-Drain		Inlet 50% plugged		**Maintenance**	
12.70	X-Drain					
12.78	X-Drain		Ditch full of ravel.		**Maintenance**	
12.85	X-Drain					
13.00	X-Drain					
13.08	X-Drain		Inlet 75% plugged with ravel.		**Maintenance**	
13.18	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	2,971
13.30	X-Drain					
13.41	X-Drain					
13.52	X-Drain					
14.09	X-Drain					
14.13	X-Drain					
14.55	X-Drain					
14.79	X-Drain					
15.03	Stream Xing	ephem	Potential diversion.	Install diversion dip.	**Medium**	2,748
15.36	X-Drain					
15.50	X-Drain					
15.60	X-Drain					
15.70	X-Drain					
16.00	X-Drain		Inlet cover needs replacement.		**Maintenance**	
16.09	X-Drain					
16.20	X-Drain		Inlet cover needs replacement.		**Maintenance**	
16.24	X-Drain					
16.36	X-Drain					
16.58	X-Drain					
16.69	X-Drain					
16.80	X-Drain					

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
15N01.2	**??**	**0**	**0**	**0.0%**	**Low**	**0**
Mile Post		Existing Condition		Recommended Treatment		
0.01	X-Drain					

Table IV-1. Camp-Slate Creek watersheds road log.

Road Number	Length (mi)	No. of High Immediacy Sites	Xings with Diversion Potential	Percent of Road Connected to Streams	Treatment Immediacy	Total Sediment 'Saved' (cy)
15N01F	**0.34**	**0**	**0**	**0.0%**	**Low**	**35**
Mile Post		Existing Condition		Recommended Treatment		
0.17 Erosion					**Low**	35