

RESTORATION PLAN

A COASTAL EXAMPLE

Submitted to:

Forest Renewal BC

February 2000

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Forest Renewal BC
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by

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EXECUTIVE SUMMARY

Coastal Creek is a coastal watershed that supports two regionally significant species, coho and steelhead trout. Coastal Creek has, therefore, been designated a Key Watershed by the Ministry of Environment, Lands and Parks (MELP) and the Ministry of Forests (MoF). This Restoration Plan describes in detail the work plans for two high priority subbasins, Pacific Creek and Lower Coastal Creek, that are recommended for restoration.

Investment in Pacific and Lower Coastal Creeks, the priority subbasins of Coastal Creek, will provide long-term economic benefits that will be evident in improved watershed health and fish stocks. These improvements will be a result of instream and off-channel habitat restoration, re-establishment of historic fish access and hillslope drainage systems, riparian zone restoration, and reduced sediment transport to streams from roads and slopes. The smolt abundances of the target species, coho and steelhead, are expected to double after implementation of the restoration works. Reduced sediment transport to the critical habitat reaches will increase the long-term efficacy of instream treatments, improve egg incubation success for both target species, and contribute to greater smolt production. Restoration of road and hillslope drainage systems will improve the productivity of degraded forest sites, while riparian treatments will improve channel stability, provide a long-term large woody debris source, and increase the quality of wildlife habitat along river corridors.

We estimate a cost of approximately \$996,500 is required to implement the proposed Restoration Plan, which includes \$41,500 for the preparation of restoration prescriptions, \$900,000 for the implementation of restoration treatments, and \$55,000 for Routine Effectiveness Evaluations. Restoration activities in the two subbasins are anticipated to include 6.1 km of road deactivation, 17 km of riparian treatments, stabilization of 5 landslides, and salmonid rearing habitat improvements on 8.5 km of instream habitat and at 5 off-channel sites.

WRP expenditures will fall into two distinct phases, Major Works, and Evaluation and Maintenance. In the Major Works phase, restoration prescriptions and treatments on all high priority components will be implemented. This phase will be concluded when quality assurance sign-offs have been provided by qualified professionals on all high priority works identified in this Restoration Plan.

The second phase, Evaluation and Maintenance, will continue beyond the Major Works phase, and will encompass the implementation of Routine Effectiveness Evaluations on both subbasins, as well as maintenance and additional treatments. Additional treatments, if needed, will be described in an amendment to the Restoration Plan. The Evaluation and Maintenance phase will be concluded when a brief status report states that watershed health is acceptable and no maintenance or additional restoration treatments are required.

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1.0 INTRODUCTION

The Restoration Plan (RP) for Coastal Creek summarizes the assessment information that was used to prioritize and select subbasins where restoration work would proceed. The Plan describes in detail the work plans for two high priority subbasins, Pacific Creek and Lower Coastal Creek. For each high priority subbasin, the RP:

- identifies the critical limiting factors affecting fish;
- identifies the components targeted for restoration;
- describes the subbasin, component and site level restoration objectives;
- identifies the proposed restoration activities and sites;
- provides a schedule of works and budget estimate; and
- describes an evaluation plan.

2.0 RATIONALE FOR SELECTION AS KEY WATERSHED

The Coastal Creek Watershed supports many species of salmonids including: sockeye, pink, chum, coho, steelhead, cutthroat and Dolly Varden. Fish management values are considered high and there are active and ongoing stock assessment programs in the watershed. Coastal Creek is designated a Key Watershed by the Ministry of Environment, Lands and Parks (MELP), Ministry of Forests (MoF) and Department of Fisheries and Oceans (DFO). The chances of restoration success are rated high by MELP.

The target species for restoration in Coastal Creek are coho and steelhead. Because both species are regionally significant, the Coastal Creek Watershed has a 'very high' fisheries value ranking (38 out of a possible score of 40).

All of the subbasins in Coastal Creek, with the exception of West and Upper Coastal basins, had well over 20% of their watershed areas cut by 1988. Even though the hillslopes, roads and stream channels have been impacted as a result of logging, there are still significant areas of good quality habitat within the basin. It is believed that restoration activities can significantly improve conditions or prevent further damages that will benefit the target species. Coastal Creek is classified as a Category I Watershed.

3.0 DESCRIPTION OF WATERSHED

Coastal Creek is a 5th order coastal watershed with a drainage area of 88.1 km² (Figure 1). It drains the northern part of Moriarity Island to Segovik Inlet. Most of the watershed lies on the Segovik Plateau though its southwestern corner extends to the leeward side of the Porcupine Mountain Ranges where elevations reach a maximum of about 750 m. The Segovik Plateau is well-dissected with rounded hills separated by broad, low-gradient valleys. Maximum elevations on the Plateau in the watershed are about 450 m.

The subbasins of the Coastal watershed are coupled to the hillslopes in the headwater zone, but immediately below headwater slopes, are partially or completely decoupled across flood plains. Channel aggradation is common, and the greatest source of sediments is from landslides and debris flows. The majority of harvesting has been at low elevations (less than 300 m). The largest areas of unstable terrain are in the Lower Coastal, and West Coastal subbasins. There are 5.3 km of road on unstable terrain, with the greatest portion occurring in the Lower Coastal subbasin. The Lower Coastal basin has by far the greatest number of stream crossings, most of which are small streams that drain directly into the main Coastal Creek.

Degraded freshwater habitat is believed partly responsible for the decline in coho and steelhead escapements for Coastal Creek. For coho, escapement estimates are believed to be depressed from historical levels and now average 2,082 spawners per year (1983-92). From 1963-72, the average number of spawners was 8,850. Only about 4% of the reported steelhead sport fishing effort in the Region is now directed at Coastal Creek. Impacts from logging have degraded stream habitat in the mainstem and its tributaries, particularly affecting rearing habitats for both coho and steelhead. Timber harvest activities impacting fish habitat have related to: logging to the edge of the streambanks, logging and road construction on unstable terrain leading to slope failures and instream sedimentation, and poor stream crossings. Fish habitat impacts have included: loss of pool habitat, decrease in quality of spawning substrate, loss of LWD, and impediments to migration for both adult and juvenile fish. Because coho heavily use small tributaries, mainstem pool habitat and off-channel habitat, this species has received the greatest impact from harvesting.

4.0 PRIORITY SUBBASINS

Each of the four subbasins in Coastal Creek are eligible for Forest Renewal Funding. There are no private land or outstanding obligations on the part of the forest tenure holder.

The Overview (Stage 1) Assessments of Coastal Creek examined hillslope (roads, landslides, gullies), riparian, channel and fish habitat condition in each of the four subbasins (Overview Channel and Hillslope Assessment 1995; Overview FHAP 1995). Overview summaries of channel and hillslope conditions for the four subbasins are presented in Tables 1 to 4 and Figure 2. Three of the four basins were found to have significant impacts in one or more of the watershed component areas.

Pacific Subbasin is the highest priority for restoration. Compared to the other subbasins, Pacific has the highest quality of habitat for the target species and is presently the most populated with steelhead and coho juveniles. The level of disturbance for the watershed components is on average moderate, and it is believed that restoration will be cost-effective and result in significant improvements to limiting fish habitats (Tables 1 and 5). Also, restoration of potential and existing sediment sources will benefit the next priority basin, Lower Coastal, further downstream. There is a moderate to high risk of impact to fish habitat from the landslide, road, riparian, and channel disturbances in the subbasin. There is a high likelihood of benefits

from treatment of road, landslide, riparian and instream fish habitat components, and all four components are recommended for restoration (Table 6). It should be noted, however, that the benefits for riparian treatments would be evident after a conifer-dominated riparian area was established (i.e., 75-100 yrs).

Lower Coastal Subbasin is the second priority for restoration. Both target species, coho and steelhead, are heavily dependent on this subbasin for providing suitable rearing and spawning habitats. In particular, the second and third order tributaries to Reaches 2 and 3 are considered high priority rearing and spawning habitats for coho. Consequently, the 'risks to fish habitat' and 'likelihood of benefits to fish habitat' in Table 5 refer to both the tributaries and mainstem. This subbasin has moderate to high levels of existing disturbance for each watershed component (Tables 2 and 5). In particular, there is a high incidence of road, riparian and instream habitat disturbance with a high risk to fish habitat. The likelihood of restoration success benefitting coho and steelhead habitat is rated moderate to high for restoration of roads, instream habitat and riparian (long term) components in this subbasin. All three components are recommended for restoration (Table 6).

West Coastal Creek is not recommended for restoration at this time. Generally, there is a moderate risk of road failure affecting fish habitat in the upper part of Reach 12 (Tables 3 and 5). Even though the roads at risk can be treated successfully, the benefits to steelhead rearing habitat will only be moderate because the rearing habitat is a considerable distance downstream, and there are several low gradient sections well above the target species habitat where sediments would be deposited. Road restoration would benefit resident Dolly Varden primarily. Also, the landslides identified in the Stage 1 Assessment are a moderate risk to Dolly Varden habitat, but a low risk to steelhead habitat located further downstream. For most of the channel, only the left bank riparian has been logged, while the right bank riparian is old growth forest. Because LWD can continue to recruit from the right bank, the benefits from a riparian restoration treatment are considered low. Because the channel is moderately narrow and confined in anadromous Reaches 9 and 11, the impact of the channel condition on steelhead rearing habitat is considered low. Also, the benefits of instream restoration in this higher gradient, largely boulder cascade-pool habitat is considered low. The benefits of restoration to the targeted species habitats would be rated moderate for road restoration only in this subbasin. It is recommended that road restoration work in West Coastal Creek be considered a moderate priority (Table 6), and be undertaken after restoration activities in Pacific and Lower Coastal creeks.

The fourth subbasin, Upper Coastal Creek has received only minor amounts of logging, and has steelhead rearing habitat that is considered in good condition. The habitat is not considered at risk from hillslope, channel or riparian condition (Tables 4 and 5), and, consequently, no components are designated for restoration (Table 6).

5.0 RESTORATION PRIORITIES FOR SUBBASINS

Restoration of the two high priority subbasins will require the implementation of primary, secondary and tertiary watershed components to protect and restore critical limiting habitats for coho and steelhead. The restoration objectives for each of these watershed components in Pacific Creek and Lower Coastal Creek are described below. Restoration objectives for West Coastal Creek are not described as restoration work is not anticipated in this subbasin for a minimum of five years.

5.1 Pacific Creek Subbasin

5.1.1 Basin Condition

Channel and hillslope conditions for Pacific Subbasin are described in Table 1. This is a Type AB Watershed with the stream channel coupled to the hillslopes in the headwaters, but uncoupled further downstream. Road, channel, and gully conditions are fair while riparian and landslide conditions are poor (Erosion and Mass Wasting Assessment 1995, Riparian Assessment 1995, Overview Channel and Hillslope Assessment 1995). Fish habitat is also fair in the mainstem of Pacific Creek and in the tributary flowing into Pacific Creek near its mouth (Overview FHAP 1995, Level 1 FHAP 1995). There are numerous landslide failures in Reach 14 of Pacific Subbasin. Some of these are still supplying significant amounts of sediment to Pacific Creek.

5.1.2 Limiting Fish Habitat

The mainstem and tributary (Reach 15) of the Pacific Subbasin have an abundant supply and quality of spawning gravels (Level 1 FHAP 1995). The abundance of LWD in the mainstem and tributary is considered poor, and there is no future recruitment as the riparian has been logged extensively. Currently, the riparian is dominated by immature alder or is in the initial successional stage following logging. Deep pool habitat is considered fair, having been impacted by sediments generated primarily from landslides. Also, boulder and cobble habitats have been in-filled by sedimentation, reducing cover for steelhead parr in riffles. Summer and winter rearing habitats for both target species are considered to be limiting coho and steelhead production in Pacific Creek. A reduction in both boulder cover and water depths in pools will continue to occur unless hillslope sediment sources are stabilized.

5.1.3 Access Management

The Ministry of Forests has stipulated that two-wheel drive road access must be maintained from Reach 12 to upstream of Reach 14 because of ongoing silvicultural operations (Access Management Plan 1995). There is also a desire by the Ministry of Environment, Lands and Parks to limit the access of recreational hunters to elk habitat on the north side of Reach 14.

5.1.4 Restoration Objectives

There are three overall Subbasin Level Objectives for restoration in Pacific Creek. The objectives are:

- reduce sediment delivery from the hillslopes to the mainstem of Pacific Creek;
- restore a functional, conifer-dominated riparian forest; and
- restore rearing habitat in the tributary (Reach 15) and mainstem (Reaches 13 and 14).

The primary watershed components for restoration in the Pacific Subbasin are roads (Tables 5 and 6). There are 20 km of road in this subbasin of which 1.3 km are considered high priority for deactivation and 2 km are medium priority (Erosion and Mass-Wasting Assessment 1995, Access Management Plan 1995). The Component Level Objectives for road deactivation works in Pacific Subbasin are:

- restore hillslope drainage networks; and
- reduce the potential of landslides originating from roads.

Site Level Objectives for road deactivation works are:

- increase the number of crossings and cross-ditches; and
- stabilize existing and potential road failures that have direct linkages to fish-bearing streams.

The secondary watershed components for restoration in Pacific Subbasin are landslides and riparian. The 3.3 km of road recommended for deactivation have numerous road-related failures owing to inadequate drainage structures (Figure 2). These slide failures have direct linkages to fish habitat in Pacific Creek mainstem. The landslide component has a high risk to fish habitat and a high likelihood of benefit if restored. It is believed that several of the slides can be effectively treated to reduce persistent sediment inputs and reduce the risk to a low level. The Component Level Objective for landslides is:

- reduce the generation of sediments from existing landslides.
The Site Level Objective is:
- stabilize landslide tracks.

Recruitment of LWD to the tributary and mainstem channels is expected to be limited over the next 75-100 years. Riparian treatments should be initiated now in order to provide a LWD recruitment source, stabilize streambanks and channel morphometry in the long term. Riparian treatments are particularly important in Pacific Creek because LWD strongly influences channel morphology in streams with bankfull widths less than 25 m. The Component Level Objectives for riparian restoration are:

- increase potential for stream bank stability;
- establish optimum conifer density to provide an adequate size and number of LWD for future instream habitat; and
- accelerate conifer growth rate in the riparian reserve zone.

Site Level Objectives for riparian restoration are:

- increase soil cohesion on stream banks; and
- reduce growth competition to conifers from deciduous species.

The tertiary component for restoration is instream habitat. In addition to the anadromous portion of the mainstem, the next most important area for instream habitat restoration is the tributary (Reach 15) to Pacific Creek above the road crossing. Rearing habitat in this tributary has been directly impacted by debris torrenting and riparian logging. As discussed above, the rearing habitat is suffering from a lack of deep pools and LWD cover. High benefits to rearing habitat will result from the restoration of instream habitat. Component Level Objectives for the instream habitats are:

- increase residual pool depths; and
- increase cover in the tributary and mainstem.

Site Level Objectives for the instream habitats are:

- increase LWD frequency;
- increase percent of LWD cover in pools; and
- increase scour in existing pools.

For the other watershed components, i.e., gullies and channel, no restoration work is recommended. No gullies are at risk to targeted fish habitat. There is a moderate risk to fish habitat from the channel component as a consequence of bank erosion, and subsequent aggradation and channel overwidening. The impact would be evident in decreased residual pool depths, and sedimentation of spawning habitats. However, the likelihood of benefits to fish habitat from channel restoration are considered low because existing channel impacts relate primarily to sediments derived from landslides and road failures rather than the streambanks; and it is believed that the streambanks cannot be treated cost-effectively to have a significant fish habitat benefit.

5.2 Lower Coastal Subbasin

5.2.1 Basin Condition

Channel and hillslope conditions for Lower Coastal Subbasin are described in Table 2. This is a Type B-1 Watershed with the stream channel uncoupled from the hillslopes. The floodplain is heavily developed by logging roads. Road and riparian condition is poor while hillslope and mainstem channel condition is fair (Erosion and Mass Wasting Assessment 1995, Riparian Assessment 1995). Fish habitat is fair in the mainstem and in numerous second and third order tributaries to Lower Coastal Creek (Level 1 FHAP 1995).

5.2.2 Limiting Fish Habitat

The mainstem (Reaches 1-3) of the Lower Coastal Subbasin has an abundant supply and quality of spawning gravels for all species of salmon and trout (Level 1 FHAP 1995). There is a reasonable supply of large woody debris in the mainstem, but there is no future recruitment as the riparian has been heavily logged along Reach 3 in particular. Currently, the riparian is dominated by mature alder. There remains an abundance of deep pool habitat in the mainstem, but this is expected to diminish over time if sediment continues to be recruited to the mainstem area from upstream sources. Currently, there appears to be sufficient summer rearing habitat in the mainstem to support spring fry recruitment.

Summer rearing habitat for coho and steelhead is, however, limiting in the tributaries of Lower Coastal Subbasin. Deep pool habitat is considered fair, but cover as measured by LWD abundance is considered poor (Level 1 FHAP 1995).

Overwintering habitat is also limiting in Lower Coastal Subbasin. Historically, overwintering habitat for coho and steelhead in Lower Coastal Subbasin consisted primarily of second or third order tributaries which were rich in LWD and well shaded by mature conifers. These tributaries were logged over and are currently devoid of LWD, shallow, and sparsely shaded by mature alder. Additional overwintering habitat would have been provided by secondary side channels to the mainstem and backwater areas connected during winter and spring flows to the mainstem. These habitats have been degraded by larger than normal sediment inputs, and channel instability, which has reduced access to these off-channel habitats.

5.2.3 Access Management

Recreational steelhead anglers have requested that the mainline on the north side of Reaches 2 and 3 be maintained (Access Management Plan 1995). Ministry of Forests has stipulated that two-wheel drive road access must be maintained on four spur roads off the mainline on the north side of Reach 2 because of ongoing silvicultural operations.

5.2.4 Restoration Objectives

The Subbasin Level Objectives for Lower Coastal Creek are:

- reduce the incidence of road failures;

- restore natural drainage patterns and historic fish access;
- improve rearing habitat for coho and steelhead; and
- restore a functional, conifer-dominated riparian forest.

The primary watershed component for restoration in Lower Coastal Subbasin is roads (Table 6). There are over 43 km of road in this subbasin (Figure 3); 4.8 km are considered high priority for deactivation and 7.2 km are medium priority (Erosion and Mass-Wasting Assessment 1995, Access Management Plan 1995). Many of the roads have degraded stream crossings or inadequate drainage structures which are directly affecting fish habitat in this subbasin. The Component Level Objectives for road deactivation works in Lower Coastal Subbasin are:

- reduce the level of risk on roads at high risk of landsliding into the stream; and
- restore hillslope drainage networks.

Site Level Objectives for road deactivation works are:

- improve water conveyance and hydraulic design at existing road crossings;
- increase the number of crossings and cross-ditches; and
- deactivate high risk roads that are directly impacting targeted fish habitats.

The secondary watershed component for restoration in Lower Coastal Subbasin is instream habitat. Quality of and access to rearing habitats are the main concerns. The rearing habitats are located in tributaries and adjacent to the mainstem. They include backwaters, wetlands, and second or third order tributaries to the mainstem. Restoration of rearing habitats within the mainstem proper is envisaged in the future, although this would be scheduled after proposed works are completed and sediment inputs have stabilized at a low level for a minimum of five years.

Component Level Objectives for the instream habitats are:

- increase the number and viability of off-channel habitats;
- increase cover in tributaries, existing wetlands and backwaters; and
- increase fish access to tributaries and off-channel habitats.

Site Level Objectives for the instream habitats are:

- restore and create groundwater channels, wetlands and backwaters;
- increase LWD frequency, and percent of LWD cover in pools;
- increase scour in existing pools;
- improve hydraulic design at road crossings over fish-bearing streams; and
- restore the connectivity of the mainstem channel with adjacent wetlands and backwaters.

The tertiary watershed component for restoration in Lower Coastal Subbasin is riparian. Long-term stability of the tributaries and mainstem channels have been compromised by the removal of riparian vegetation from both streambanks. Re-establishment of a conifer dominated riparian forest will, in the long term, lead to improved bank stability, an appropriate width to depth ratio, and improved rearing habitats for coho and steelhead. The benefits of riparian restoration are considered high over the long term in the mainstem and tributaries because of increased bank stability, restored width to depth ratio, and a reduced frequency of channel avulsions. Also, LWD from the restored riparian area will strongly influence channel morphology (and fish habitat) in these streams where the average bankfull widths are less than 25 m. The Component Level Objectives for riparian restoration in Lower Coastal Subbasin are:

- increase potential for stream bank stability;
- establish optimum conifer density to provide an adequate size and number of LWD for future instream habitat; and
- accelerate conifer growth rate in the riparian reserve zone.

Site Level Objectives for riparian restoration are:

- increase soil cohesion on stream banks; and
- reduce growth competition to conifers from deciduous species.

For the other watershed components, i.e., landslides, gullies and channel, no restoration work is recommended. Landslides and gullies have a low risk to targeted fish habitat because most are located in Reach 1 and the lower part of Reach 2. Therefore, the sediments that would be generated from slides and gullies would have a low impact on the priority tributaries and off-channel habitats located primarily in Reaches 2 and 3. There is a moderate risk to fish habitat from the channel component as a consequence of bank erosion, and subsequent aggradation and channel overwidening. The impact would be evident in decreased residual pool depths, and sedimentation of spawning habitats. However, the likelihood of benefits to fish habitat are considered low because channel impacts relate primarily to the mainstem and not the tributaries where most of the priority habitats are located; and it is believed that the streambanks cannot be treated cost-effectively to have a significant fish habitat benefit.

6.0 IMPLEMENTATION PLAN

6.1 Pacific Creek

6.1.1 Work Site Priorities

Figure 3 shows the proposed sites, segments or reaches where prescriptions for each priority component are recommended. All medium and high priority locations will be prescribed, but restoration works will only be implemented at high priority locations at this time.

Activities anticipated for road restoration include: drainage control and road deactivation of roads at high risk of landsliding into fish-bearing streams. For the landslides which are persistently releasing sediments to the mainstem, landslide stabilization using bio-engineering techniques is recommended. High priority riparian treatments are paired with high priority instream fish habitat works in the adjacent channel. Similarly, medium and low priority riparian treatments are paired with adjacent instream fish habitat works that are considered medium or low priority, respectively. Instream works will include LWD structures that will increase cover in pools and increase pool depths hydraulically through scour.

It is anticipated that restoration work will involve:

- about 1.3 km of road deactivation;
- stabilization of 5 landslides (approx. area 1500 m²);
- riparian treatments on 5.0 km of streambanks; and
- instream habitat treatments on 2.5 km of stream.

6.1.2 Time Frame of Works

Prescription plans for the roads, landslides, riparian and instream habitat will be undertaken during the summer of 2000, and at the same time as plans are prepared for Lower Coastal Creek. This will allow for some field cost savings.

Restoration works will begin with road deactivation in 2001, starting on the south side of the mainstem. In order to access the landslides, stabilization of the slides will occur prior to road deactivation on the north side of Reach 14. If bio-engineering techniques are employed, landslide stabilization will occur during the willow dormancy period, typically late fall to early spring. It is anticipated that road deactivation will take one year and landslide stabilization one season.

Riparian treatments will be undertaken between late fall and early spring. They will begin in the high priority segments of Reaches 14 and 15 during the late fall of 2001. Riparian treatments of the medium and low priority segments are not recommended at this time.

Instream habitat restoration will be implemented after road deactivation and in high priority sections of Reaches 14 and 15. It is anticipated that habitat restoration will extend over two years. The work will be implemented sometime during mid-August. Special permits and approvals from Fisheries and Oceans and the Ministry of Environment, Lands and Parks will be required as technically, for the species present in Pacific Creek, the work window is closed throughout the summer (Chilibeck 1992).

6.1.3 Milestone and Restoration Completion Benchmarks

Restoration prescriptions, works scheduling and anticipated construction budget will be prepared and managed by the multi-year agreement (MYA) holder. Activity summary reports will be submitted each February to district and/or regional agency WRP specialists. The reports will summarize pending and completed restoration work, Effectiveness Evaluation findings, recommended maintenance, and detailed expenditure statements.

WRP expenditures in the Pacific Creek Subbasin will fall into two distinct phases, Major Works, and Evaluation and Maintenance. In the Major Works phase, restoration prescriptions and treatments on all high priority works will be implemented. This phase will be concluded when quality assurance sign-offs have been provided by qualified professionals on all high priority works identified in this Restoration Plan.

The second phase, Evaluation and Maintenance, will continue beyond the Major Works phase, and will encompass the implementation of Effectiveness Evaluations, as well as maintenance and additional treatments, if appropriate. The MYA holder will be responsible for the implementation of Effectiveness Evaluations, and maintenance on the treated high priority sites.

Five years after completion of all high priority works, a brief status report on watershed health will be provided by qualified professionals doing the Routine Evaluations. The report will provide an interdisciplinary evaluation on the state of recovery of the subbasin, and on the effectiveness of restoration treatments at meeting the stated restoration objectives. Specifically, this report will:

- summarize Routine Evaluation findings;
- describe the present status and extent of recovery of the watershed components (e.g., sediment sources; levels of risk on roads, landslides and gullies; hillslope, riparian, channel and habitat condition);
- describe the state of recovery of watershed processes;
- provide the rationale if further restoration work on recently identified high priority sites or on moderate priority sites is required; and
- identify the specific sites requiring maintenance or treatment.

If further restoration treatments are recommended, an amendment to the Restoration Plan would be prepared by the MYA holder that incorporates status report findings and recommendations. The amended RP would be submitted to the WRC for approval. A status report would again be prepared five years after completion of the recommended restoration treatments. The Evaluation and Maintenance phase will be concluded when the status report states that:

- Routine Effectiveness Evaluations of road, landslide, riparian, and fish habitat components indicate that restoration works are meeting or exceeding the restoration objectives;

- Levels of risk on roads, landslides, and gullies are acceptable;
- Comparison of fish habitat conditions after restoration to FHAP diagnostic quality values (Table 5 in Johnston and Slaney 1996) are within the fair and good levels (reach basis); and
- No maintenance or additional treatments are recommended.

6.1.4 Effectiveness Evaluation Plan

Routine Evaluations are recommended for Pacific Creek. The main objectives of the Routine Evaluations will be to:

- assess the present configuration and condition of restoration treatments (i.e., are the works still in place);
- through the assessment of a number of key variables, assess whether or not the treatments have been effective in addressing the restoration objectives (i.e., are the works functioning as intended); and
- determine if remedial work is needed.

Although further refinement will occur after prescriptions have been completed, the effectiveness evaluation questions anticipated for each watershed component are:

Roads

- 1) Has deactivation of roads at risk reduced the incidence of road related failures?
- 2) Has reconstruction of road crossings reduced the number of road failures caused by impeded drainage?

Landslides

- 1) Has bioengineering, using willow wattles on the landslide tracks, reduced the area of exposed mineral soils?
- 2) Has bioengineering reduced the frequency of reinitiated landslides?

Riparian

- 1) Has brushing alder permitted conifer growth to outpace competing brush species?

Instream Habitat

- 1) Have LWD structures increased residual pool depth?
- 2) Has the cover in pools used by coho and steelhead trout increased?

The variables that will be evaluated are:

- incidence of landslides from deactivated roads using rating categories;
- percent vegetative cover on rehabilitated landslides, and deactivated roads using ordinal rating categories;
- evaluation of present stability of rehabilitated landslides using rating categories;
- functional condition of water management structures (cross-ditches, fords, etc) using rating categories;
- growth of conifers vs brush species;
- residual pool depth;
- percent of cover in pools;
- presence/absence of coho and steelhead;
- instream structure stability and condition using rating categories.

The proposed sampling frequency and methodology are:

Roads: annual aerial review of all works to determine if post-deactivation road-related landslides have occurred; and if surface flow is still contained in intended channels. Sampling may be terminated when residual risk is deemed acceptable.

Landslides: annual aerial and/or ground review of landslides to determine stability and percent of vegetative cover. Sampling may be terminated when residual risk is deemed acceptable.

Riparian Areas: annual inspection to determine growth of conifers and brush species. Once stand reaches free to grow, inspection will be every five years.

Instream Habitat: walk through review of all installations after first and third year to determine habitat complexity and functional stability and condition, following Routine Monitoring Protocol (Koning et al. 1998); measure residual pool depths; presence/absence of coho and steelhead using Gee traps or through visual observation; sampling every five years thereafter or after a 1 in 10 year flood event.

All evaluation data, interim and final reports will be submitted annually to district and/or regional agency WRP specialists. This will provide an opportunity for adjustments to be made in the evaluation objectives, selection of variables or sampling methodologies.

We suggest that the evaluation on riparian areas also be considered for an Intensive Evaluation. Riparian treatments are still experimental and require further refinement before being applied on a broader basis. This would be a longer term study over a broader area (i.e.,

Pacific Creek and Lower Coastal Creek), and include more frequent sampling, permanent sample plots, and quantitative variables. A separate proposal will be submitted for this evaluation if the RP is approved.

6.1.5 Budget

Estimated costs for the preparation of restoration prescriptions, implementation of restoration works and Routine Effectiveness Evaluations are provided in Table 7. The budget estimate assumes that the consultant(s) develops prescription plans for roads and landslides concurrently; field visits for prescription plan development and effectiveness evaluations will be done concurrently, where feasible, on Pacific and Lower Coastal Creeks; and costs associated with effectiveness evaluations represent the total to complete the Routine Evaluations as specified.

6.2 Lower Coastal Creek

6.2.1 Work Site Priorities

Figure 4 shows the proposed sites, segments or reaches where prescriptions for each priority component are recommended. All medium and high priority locations will be prescribed, but restoration works will only be implemented at high priority locations at this time. Activities anticipated for road restoration include: drainage control and road deactivation of roads at high risk of landsliding into fish-bearing streams. At existing road crossings that are problems for fish migration, culvert crossings will be upgraded following an improved hydraulic design. Access will also be improved to wetlands and off-channel habitats by the re-establishment of historic connecting channels, backflooding of off-channels using low-head riffle structures, or using debris groins to direct a portion of the flow down an overflow channel. Investigations during the prescription phase will also identify opportunities for off-channel construction or restoration. Restoration works will also include LWD structures that will increase cover in mainstem and off-channel pools, and increase pool depths hydraulically through scour. High priority riparian treatments are paired with high priority instream and off-channel fish habitat works. Similarly, medium and low priority riparian treatments are paired with adjacent fish habitat works that are considered medium or low priority, respectively.

It is anticipated that restoration work will involve:

- about 4.8 km of road deactivation;
- instream habitat treatments on about 6 km of the mainstem and tributaries;
- off-stream construction and/or habitat treatments at 5 sites; and
- riparian treatments on 12 km of streambanks.

6.2.2 Time Frame of Works

Prescription plans for the roads, riparian and instream habitat will be undertaken in the summer of 2000, and at the same time as plans are prepared for Pacific Creek. This will allow for some field cost savings.

Restoration work on the roads will begin after road deactivation is completed in Pacific Creek. We anticipate beginning in 2002, starting on the north side of the mainstem. Upgrades to existing culvert crossings will be done concurrently with road deactivation. It is anticipated that road deactivation will take two years to complete.

Improving access to off-channel habitats will be implemented during August 2000. We believe this is a very high priority and this activity will not be compromised by having it precede the completion of road deactivation and landslide treatments in Pacific or Lower Coastal Creeks. However, the final scheduling of implementation will depend on further recommendations from the prescription specialists. Further off-channel and instream habitat work will be implemented after road deactivation. These works will be located adjacent to high priority riparian segments in Reaches 2, 3 and 4. It is anticipated that habitat restoration will extend over three years. The work will be implemented sometime during mid-August. Special permits and approvals from Fisheries and Oceans and the Ministry of Environment, Lands and Parks will be required as technically, for the species present in Lower Coastal Creek, the work window is closed throughout the summer (Chilibeck 1992).

Riparian treatments will be undertaken between the late fall and early spring. They will begin in the high priority mainstem segments of Reach 2 during the late fall of 2001, and the high priority tributary segments in 2002. Riparian treatments of the medium and low priority segments are not recommended at this time.

6.2.3 Milestone and Restoration Completion Benchmarks

Restoration prescriptions, works scheduling and anticipated construction budget will be prepared and managed by the MYA holder. Activity summary reports will be submitted each February to district and/or regional agency WRP specialists. The reports will summarize pending and completed restoration work; Effectiveness Evaluation findings; recommended maintenance; and detailed expenditure statements.

WRP expenditures in the Lower Coastal Creek Subbasin will fall into two distinct phases, Major Works, and Evaluation and Maintenance. In the Major Works phase, restoration prescriptions and treatments on all high priority works will be implemented. This phase will be concluded when quality assurance sign-offs have been provided by qualified professionals on all high priority works identified in this Restoration Plan.

The second phase, Evaluation and Maintenance, will continue beyond the Major Works phase, and will encompass the implementation of Effectiveness Evaluations, as well as maintenance and additional treatments, if appropriate. The MYA holder will be responsible for the implementation of Effectiveness Evaluations, and maintenance on the treated high priority sites.

Five years after completion of all high priority works, a brief status report on watershed health will be provided by qualified professionals doing the Routine Evaluations. The report will provide an interdisciplinary evaluation on the state of recovery of the subbasin, and on the effectiveness of restoration treatments at meeting the stated restoration objectives. Specifically, this report will:

- summarize Routine Evaluation findings;
- describe the present status and extent of recovery of the watershed components (e.g., sediment sources; levels of risk on roads, landslides and gullies; hillslope, riparian, channel and habitat condition);
- describe the state of recovery of watershed processes;
- provide the rationale if further restoration work on recently identified high priority sites or on moderate priority sites is required; and
- identify the specific sites requiring maintenance or treatment.

If further restoration treatments are recommended, an amendment to the Restoration Plan would be prepared by the MYA holder that incorporates status report findings and recommendations. The amended RP would be submitted to the WRC for approval. A status report would again be prepared five years after completion of the recommended restoration treatments. The Evaluation and Maintenance phase will be concluded when the status report states that:

- Routine Effectiveness Evaluations of road, riparian, and fish habitat components indicate that restoration works are meeting or exceeding the restoration objectives;
- Levels of risk on roads, landslides, and gullies are acceptable;
- Comparison of fish habitat conditions after restoration to FHAP diagnostic quality values (Table 5 in Johnston and Slaney 1996) are within the fair and good levels (reach basis); and
- No maintenance or additional treatments are recommended.

6.2.4 Effectiveness Evaluation Plan

Routine Evaluations are recommended for Lower Coastal Creek. The main objectives of the Routine Evaluations will be to:

- assess the present configuration and condition of restoration treatments (i.e., are the works still in place);

- through the assessment of a number of key variables, assess whether or not the treatments have been effective in addressing the restoration objectives (i.e., are the works functioning as intended); and
- determine if remedial work is needed.

Although further refinement will occur after prescriptions have been completed, the effectiveness evaluation questions anticipated for each watershed component are:

Roads

- 1) Has deactivation of roads at risk reduced the incidence of road related failures?
- 2) Has reconstruction of road crossings reduced the number of road failures caused by impeded drainage?

Instream Habitat

- 1) Have LWD structures increased residual pool depth?
- 2) Has the cover in pools used by coho and steelhead trout increased?
- 3) Has access to tributaries and off-channel habitats been improved?
- 4) Has the frequency of off-channel habitats increased?

Riparian

- 1) Has brushing alder permitted conifer growth to outpace competing brush species?

The variables that will be evaluated are:

- incidence of landslides from deactivated roads using rating categories;
- functional condition of water management structures (cross-ditches, fords, etc) using rating categories;
- functional effectiveness to convey design flow at reconstructed culvert crossings, using rating categories;
- growth of conifers vs brush species;
- residual pool depth;
- percent of cover in pools;
- presence/absence of coho and steelhead;
- instream structure stability and condition using rating categories.

The proposed sampling frequency and methodology are:

Roads: annual aerial review of all works to determine if post-deactivation road-related landslides have occurred; and if surface flow is still

contained in intended channels. Sampling may be terminated when residual risk is deemed acceptable.

<u>Instream Habitat:</u>	walk through review of all installations after first and third year to determine habitat complexity and functional stability and condition, following Routine Monitoring Protocol (Koning et al. 1998); measure residual pool depths; presence/absence of coho and steelhead using Gee traps or through visual observation; sampling every five years thereafter or after a 1 in 10 year flood event.
<u>Riparian Areas:</u>	annual inspection to determine growth of conifers and brush species. Once a stand reaches free-to-grow, inspection will be every five years.

All evaluation data, interim and final reports will be submitted annually to district and/or regional agency WRP specialists. This will provide an opportunity for adjustments to be made in the evaluation objectives, selection of variables or sampling methodologies.

We suggest that the evaluation on riparian areas also be considered for an Intensive Evaluation. Riparian treatments are still experimental and require further refinement before being applied on a broader basis. This would be a longer term study over a broader area (i.e., Pacific Creek and Lower Coastal Creek), and include more frequent sampling, permanent sample plots, and quantitative variables. A separate proposal will be submitted for this evaluation if the RP is approved.

6.2.5 Budget

Estimated costs for the preparation of restoration prescriptions, implementation of restoration works and Routine Effectiveness Evaluations are provided in Table 8. The budget estimate assumes that, where feasible, field visits for prescription plan development and effectiveness evaluations will be done concurrently on Pacific and Lower Coastal Creeks, and costs associated with effectiveness evaluations represent the total to complete the Routine Evaluation as specified.

7.0 RATIONALE FOR INVESTMENT

Investment in the Pacific and Lower Coastal subbasins will provide long-term economic benefits that will be evident in improved fish stocks and watershed health. These improvements will be a result of instream and off-channel habitat restoration, re-establishment of historic fish access and hillslope drainage systems, riparian zone restoration, and reduced sediment transport to streams from roads and slopes. Restoration of road and hillslope drainage systems will improve the productivity of degraded forest sites, while riparian treatments will improve channel stability, provide a long-term large woody debris source, and increase the quality of wildlife habitat along river corridors.

A total of \$996,500 is estimated to implement the proposed Restoration Plan, which includes \$41,500 for the preparation of restoration prescriptions, \$900,000 for the implementation of restoration treatments, and \$55,000 for Routine Effectiveness Evaluations. Restoration activities in the two subbasins are anticipated to include 6.1 km of road deactivation, 17 km of riparian treatments, stabilization of 5 landslides, and salmonid rearing habitat improvements on 8.5 km of instream habitat and at 5 off-channel sites.

The smolt abundances of the target species, coho and steelhead, are expected to double after implementation of the restoration works. This conservative estimate is based on published evaluations of restoration projects (Koning and Keeley 1997). For example, based on evaluations of habitat enhancement in the Keogh River (Ward and Slaney 1980), the expected increase in habitat capacity in Pacific and Lower Coastal Creeks as a result of instream rearing habitat complexing alone should increase existing annual smolt production by approximately 11,900 coho and 1060 steelhead smolts. Increases in habitat capacity due to off-channel improvements are also anticipated, but benefits would accrue to coho primarily (biostandard of 40 smolts/100 m²; Koning and Keeley 1997). Reduced sediment transport to the critical habitat reaches will further increase the long-term efficacy of instream treatments, improve egg incubation success for both target species, and contribute to greater smolt production.

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TABLES

Table 1. Channel and hillslope conditions for Pacific Creek.

Subbasin	Pacific Creek
Drainage Area (km²)	16.4
Tenure	100 % TFL
Area Logged (%)	40
Equivalent Clearcut Area (%)	15
Channel (lower reach)	
Type (CAP)	Riffle-pool
Width (m)	8-18
Gradient (%)	1-3
Watershed Type	Type AB. Stream channels are coupled to hillslopes but in the downstream portion, the stream channel is uncoupled from the hillslopes.
Channel Condition	Fair. The mainstem channel up to 550 m is moderately wide with a gravel/cobble substrate. The channel appears to be aggraded as a result of forestry-related landslides originating from roads. In addition, logging to the water's edge has de-stabilized the streambanks, increased bank erosion and resulted in channel overwidening. Bank stability is considered moderate. LWD occurs sparsely.
Riparian Condition	Poor. The mainstem and tributaries have been logged to the water's edge and are now primarily alder. LWD recruitment to the stream channel from the riparian zone is considered poor. Some mature spruce and hemlock are present.
Road Condition	Fair. 3.3 km out of a total of 20 km of road were rated as moderate to high risk of failure. Of this 3.3 km, 2 km were moderate risk and 1.3 km were high risk. Some of the high risk roads (0.18 km) were constructed on unstable terrain (Class IV or V). None of the road segments have been rehabilitated.
Hillslope Condition	Fair. Four landslides are still actively transporting sediment to the creek channel. No gullies were impacting the creek or at risk of failure. 31 % of the subbasin area has unstable terrain (Class IV or V), and 0.44 km ² of unstable terrain has been logged. No landslides or gullies have been rehabilitated.

Table 2. Channel and hillslope conditions for Lower Coastal Creek.

Subbasin	Lower Coastal Creek (mainstem)
Drainage Area (km²)	31.1
Tenure	100 % TFL
Area Logged (%)	60
Equivalent Clearcut Area (%)	20
Channel (lower reach)	
Type (CAP)	Riffle-pool
Width (m)	14.5-25
Gradient (%)	1-2
Watershed Type	Type B-1. In the downstream portion, the stream channel is uncoupled from the hillslopes. Floodplains are well developed.
Channel Condition	Fair. The mainstem channel appears to be aggraded as a result of forestry -related landslides. In addition, logging to the water's edge has de-stabilized the streambanks and increased bank erosion. Bank stability is considered moderate. Sediment wedges, LWD jams and bank scour were evident in the mainstem reaches.
Riparian Condition	Poor. The mainstem and tributaries have been logged to the water's edge and are now primarily alder. LWD recruitment to the stream channel from the riparian zone is considered poor. Some mature spruce and hemlock are present.
Road Condition	Poor. 12 km out of a total of 43 km of road were rated as having a moderate to high risk of failure. Of this 12 km, 7.2 km were moderate risk and 4.8 km were high risk. The high risk roads were constructed on unstable terrain (Class IV or V).
Hillslope Condition	Fair. Four landslides and three gullies located primarily in the lower Reaches of the mainstem are actively transporting small amounts of sediment to the mainstem. 34 % of the subbasin area has unstable terrain (Class IV or V), and 0.87 km ² of unstable terrain has been logged. No landslides or gullies have been rehabilitated.

Table 3. Channel and hillslope conditions for West Coastal Creek.

Subbasin	West Coastal Creek
Drainage Area (km²)	15.0
Tenure	100 % TFL
Area Logged (%)	15
Equivalent Clearcut Area (%)	8
Channel (lower reach)	
Type (CAP)	Riffle-pool
Width (m)	7.5-17
Gradient (%)	2
Watershed Type	Type AB. Stream channels are coupled to hillslopes but in the downstream portion, the stream channel is uncoupled from the hillslopes.
Channel Condition	Fair. The mainstem channel up to 405 m is moderately narrow and confined. A series of falls upstream of 405 m are barriers to fish migration. Little evidence of aggradation from hillslope mass wasting in channel. Bank stability is considered moderate. LWD occurs sparsely and typically in large debris jams.
Riparian Condition	Fair. The left bank of the mainstem has been logged while most of the right bank riparian is old growth forest. LWD recruitment to the stream channel from the riparian zone is still considered fair.
Road Condition	Fair. Over 4.3 km out of a total of 9.5 km of road were rated as moderate to high risk of failure. Of this 4.3 km, 3 km were moderate risk and 1.3 km were high risk. Some of the high risk roads (0.3 km) were constructed on unstable terrain (Class IV or V). None of the road segments have been rehabilitated.
Hillslope Condition	Fair. Four landslides located in the upper portion of Reach 12 are still actively transporting sediment to the mainstem. One gully is also transporting sediment to the upper mainstem. 34 % of the subbasin area has unstable terrain (Class IV or V), and 0.8 km ² of unstable terrain has been logged. No landslides or gullies have been rehabilitated.

Table 4. Channel and hillslope conditions for Upper Coastal Creek.

Subbasin	Upper Coastal Creek
Drainage Area (km²)	25.6
Tenure	100 % TFL
Area Logged (%)	3
Equivalent Clearcut Area (%)	2
Channel (lower reach)	
Type (CAP)	Riffle-pool
Width (m)	15-20
Gradient (%)	1
Watershed Type	Type AB. Stream channels are coupled to hillslopes but in the downstream portion, the stream channel is uncoupled from the hillslopes.
Channel Condition	Good. The mainstem channel up to 360 m is moderately narrow and confined. A 4 m falls upstream of 360 m is a barrier to anadromous fish migration. There is no evidence of excessive channel aggradation from hillslope mass wasting. Bank stability is considered good. LWD occurs frequently and is the dominant cover element.
Riparian Condition	Good. Only a short section of the mainstem riparian area along the right bank has been logged. LWD recruitment to the stream channel from the riparian zone is considered good.
Road Condition	No roads were constructed within the subbasin.
Hillslope Condition	Good. No landslides were impacting on the stream channel. Also, no gullies were impacting the channel or at risk of failure. 22 % of the subbasin area has unstable terrain (Class IV or V), but no unstable terrain has been logged. No landslides or gullies have been rehabilitated.

Table 5. Evaluation of the likelihood of restoration activities benefitting fish habitat for all subbasins in Coastal Creek watershed.

				Watershed Components					
Subwatershed Example	Target Species	Limiting Fish Habitat	Watershed Condition and Restoration Benefits	Landslides	Gullies	Roads	Riparian	Channel	Instream Fish Habitat
Pacific Creek	Coho/ Steelhead	Summer and winter rearing	Level of Existing or Potential Disturbance	High	Low	Moderate	High	Moderate	Moderate
			Impact or Risk to Fish Habitat	High	Low	High	High	Moderate	
			Likelihood of Benefits to Fish Habitat from Restoration of Component	High	Low	High	High (Long Term)	Low	High
Lower Coastal Creek	Coho/ Steelhead	Summer and winter rearing	Level of Existing or Potential Disturbance	Moderate	Moderate	High	High	Moderate	High
		Migration	Impact or Risk to Fish Habitat	Low	Low	High	High	Moderate	
			Likelihood of Benefits to Fish Habitat from Restoration of Component	Low	Low	High	High (Long Term)	Low	High
West Coastal Creek	Steelhead	Summer and winter rearing	Level of Existing or Potential Disturbance	Moderate	Low	High	Moderate	Moderate	Moderate
			Impact or Risk to Fish Habitat	Low	Low	Moderate	Moderate	Low	
			Likelihood of Benefits to Fish Habitat from Restoration of Component	Low	Low	Moderate	Low	Low	Low
Upper Coastal Creek	Steelhead	Summer and winter rearing	Level of Existing or Potential Disturbance	Low	Low	Low	Low	Low	Low
			Impact or Risk to Fish Habitat	Low	Low	Low	Low	Low	
			Likelihood of Benefits to Fish Habitat from Restoration of Component	Low	Low	Low	Low	Low	Low

Table 6. Prioritization of subbasins and components for restoration in Coastal Creek watershed.

Watershed	Subbasin	Priority	Likelihood of Restoration Success			Component for Restoration		
			Low	Moderate	High	Primary	Secondary	Tertiary
Coastal	Pacific	1			*	Roads	Landslides/ Riparian	Instream
	Lower Coastal	2			*	Roads	Instream	Riparian
	West Coastal	3		*		Roads		
	Upper Coastal	-	*			None		

Table 7. Cost estimate for restoration project in Pacific Creek.

Description		Estimated Cost
Prescription Plans		
1	Roads	\$2,500.00
2	Landslides	\$3,000.00
3	Riparian	\$4,000.00
4	Instream Habitat	\$4,000.00
Sub-total Prescription Plans		\$13,500.00
Restoration Works		
1	Roads	\$50,000.00
2	Landslides	\$25,000.00
3	Riparian	\$40,000.00
4	Instream Habitat	\$110,000.00
Sub-total Restoration Works		\$225,000.00
Effectiveness Evaluations		
1	Roads	\$5,000.00
2	Landslides	\$5,000.00
3	Riparian	\$10,000.00
4	Instream Habitat	\$10,000.00
Sub-total Effectiveness Evaluations		\$30,000.00
Total Cost		\$268,500.00

Note: Assume roads and landslide evaluations done together.

Table 8. Cost estimate for restoration project in Lower Coastal Creek.

Description		Estimated Cost
Prescription Plans		
1	Roads	\$10,000.00
2	Instream and Off-channel Habitat	\$10,000.00
3	Riparian	\$8,000.00
Sub-total Prescription Plans		\$28,000.00
Restoration Works		
1	Roads	\$220,000.00
2	Instream Habitat	\$360,000.00
3	Riparian	\$95,000.00
Sub-total Restoration Works		\$675,000.00
Effectiveness Evaluations		
1	Roads	\$5,000.00
2	Instream Habitat	\$10,000.00
3	Riparian	\$10,000.00
Sub-total Effectiveness Evaluations		\$25,000.00
Total Cost		\$728,000.00

FIGURES

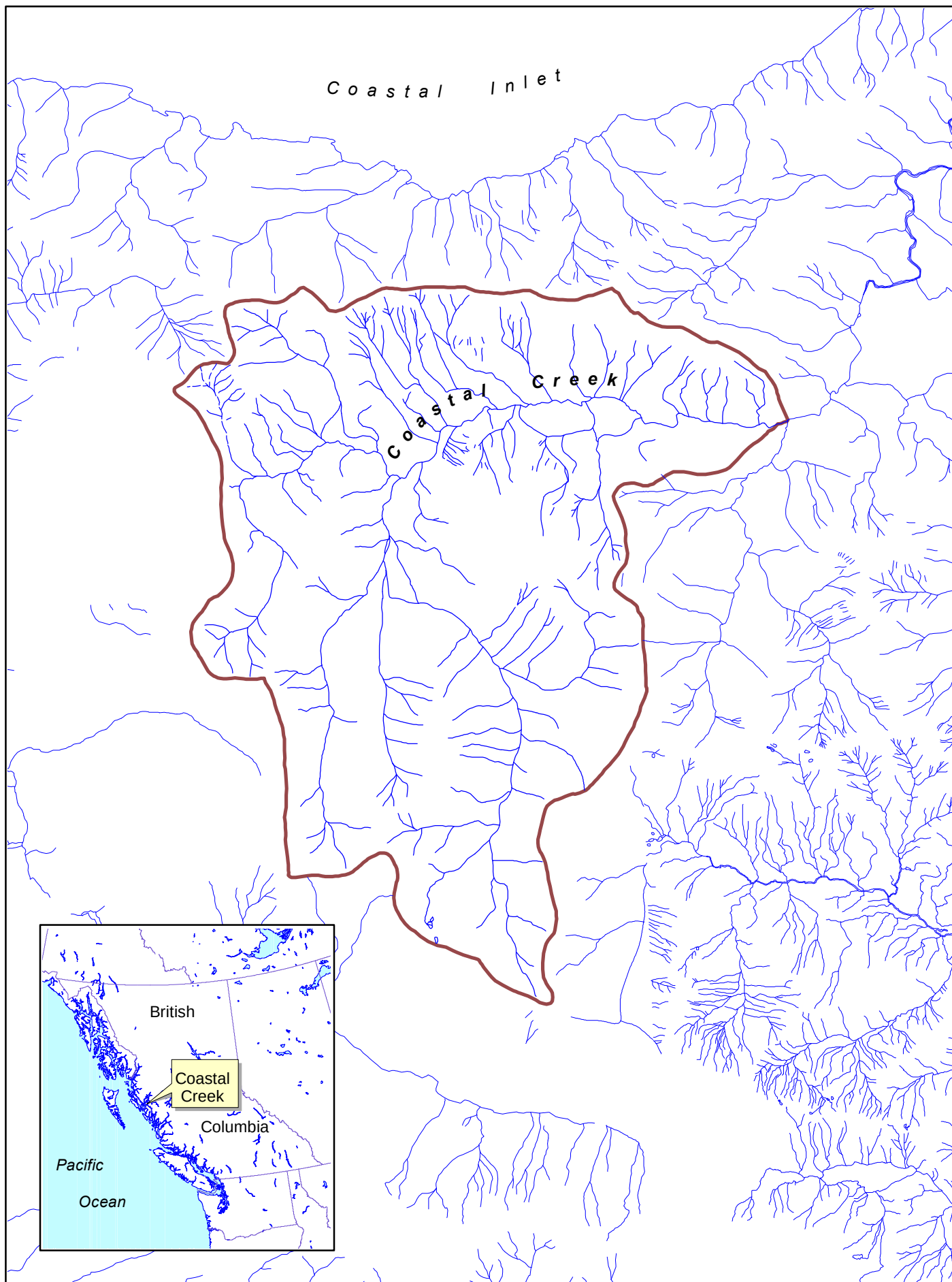
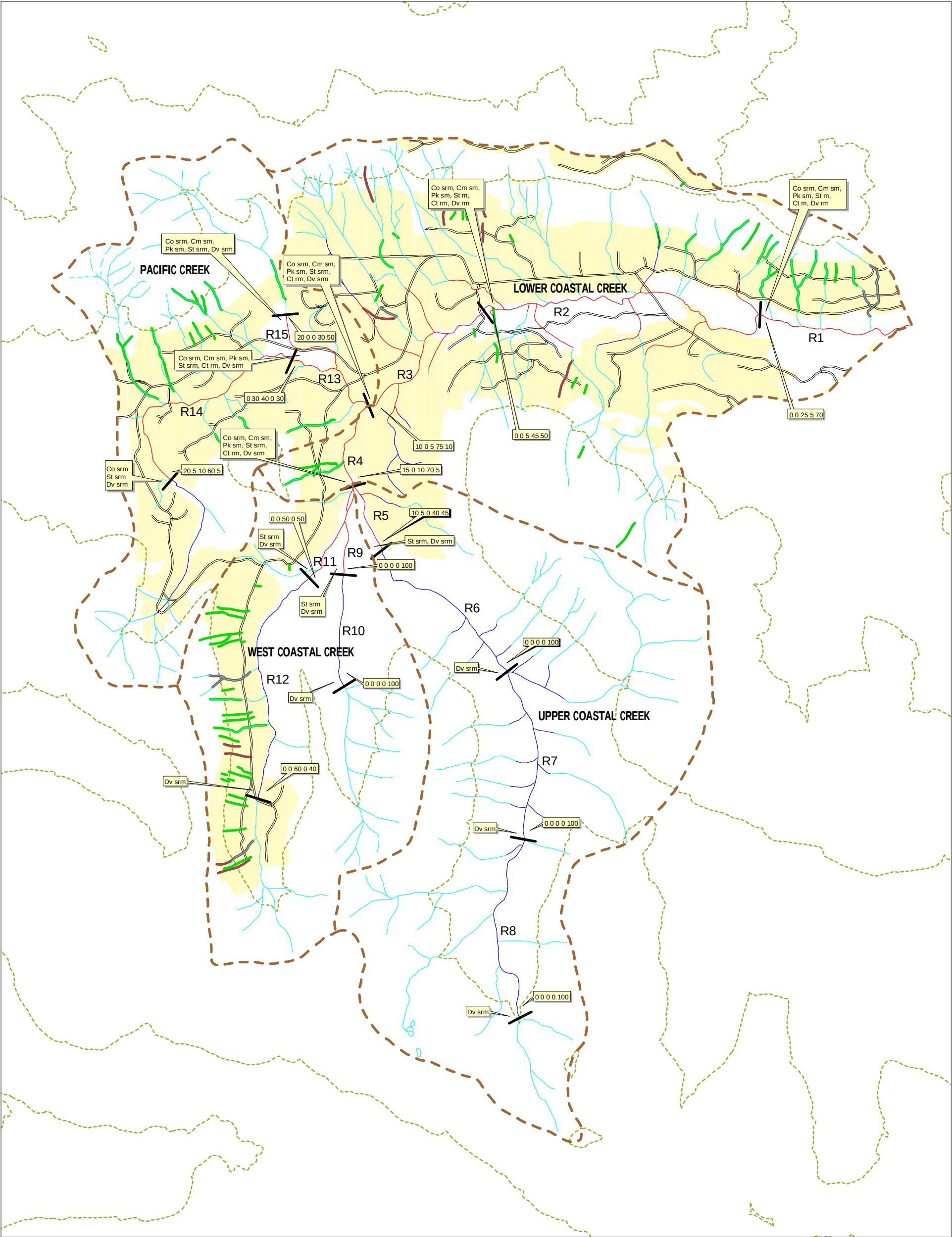


Figure 1. Index map of Coastal Creek watershed.



LEGEND

- Contour - 300 m
- Stream - anadromous
- Stream - resident
- Stream - unknown
- Roads
- Watershed Boundary
- R1 Reach Break
- Slide Failure
- Gully Failure
- Logged

Fish Distribution and Habitat Use
Species: Co Coho, Cm Chum, Pk Pink, St Steelhead, Ct Cutthroat, Dv Dolly Varden
Habitat: s spawning, r rearing, m migration

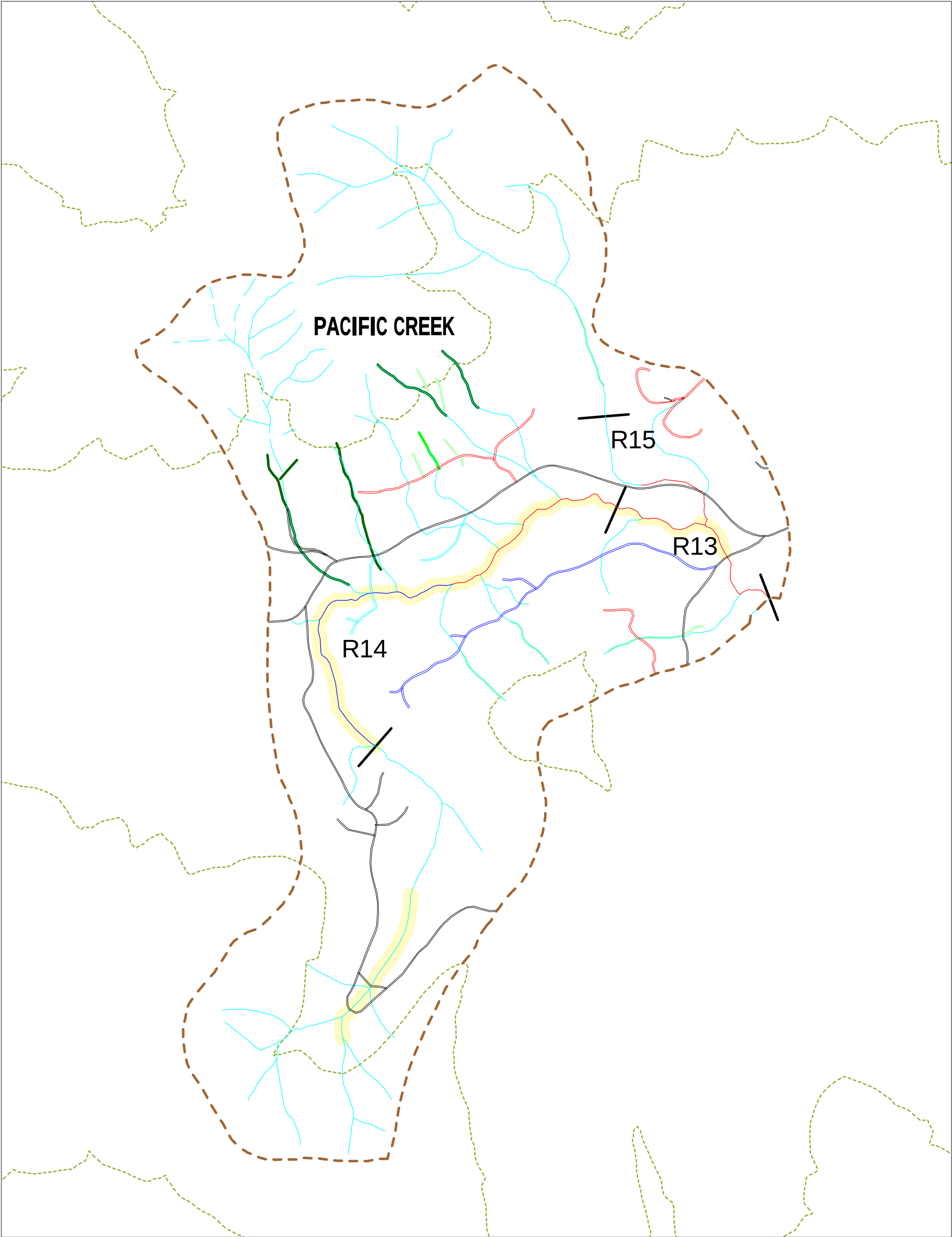
Riparian Vegetation Type (RVT) Classification
Percent Composition: RVT 1 2 3 4 5



1:50 000

0.6 0 0.6 1.2 Kilometers

Figure 2. Map of Coastal Creek showing subbasin condition from Overview/Stage 1 Assessments.



LEGEND

- Subbasin Boundary
- Reach Break
- Contour - 300 m
- Road
- Logged Riparian Zone

Priorities for Treatment

Instream - Riparian

- High
- Moderate
- Low

Roads

- High
- Moderate
- Low

Slides

- High
- Moderate
- Low

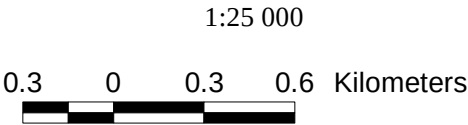


Figure 3. Map of Pacific Creek Subbasin showing priority sites for restoration.

