

# **Chapter Four**

## **Riparian Assessments**

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## 1.0 Introduction

This chapter presents results of riparian assessments, organized according to watersheds within buckets. Assessments were conducted of those openings assigned medium or high priority for remediation during the previous Overview assessment (G3 Consulting Ltd., 1998a). A summary of Overview findings and preliminary prescriptions has been provided, followed by Level 1 assessment results and refinement of preliminary prescriptions.

Recommendations for riparian remediation, based on Overview and Level 1 assessments, are summarized in Chapter 5.

## 2.0 Bucket 323

Bucket 323 consists of the watershed of Stikelan Creek, a first-order tributary of the Homathko River that enters near the south end of Tatlayoko Lake. Anthropogenic disturbances observed in this bucket were of limited extent. The Overview RA (G3 Consulting Ltd., 1998a) identified two openings in this bucket as being of potential riparian concern, both located along Cheshi Creek, a tributary of Stikelan Creek. Of these, Opening 1 was assigned medium priority for remediation and recommended for Level 1 assessment.

### 2.1 Cheshi Creek (Opening 1)

Opening 1 along Cheshi Creek was the riparian edge of an agricultural field, approximately 1,650 m in extent (Map 2).

#### 2.1.1 Overview RA Results

##### *General Characteristics*

Vegetation in Opening 1 appeared from air photos to be dominated by tall shrubs, most likely consisting of trembling aspen (*Populus tremuloides*) and willows (*Salix* spp.). Hybrid white spruce (*Picea glauca x engelmannii*) appeared scattered through the area. Soils here would be moist (Site Series IDFdk/08).

##### *Assessment Results*

The riparian leave-strip was very narrow (maximum width ~10 m). As Cheshi Creek was assigned a preliminary Stream Class S4, the BC Forest Practices Code (FPCBC) Riparian Management Area (RMA) would be 30 m in width (with no Riparian Reserve Zone [RRZ]). Riparian functions most subject to impairment would be stream shading, LWD inputs, SOD inputs, channel stability and in-stream fish habitat. Medium priority was assigned to rehabilitation at this location, given that, though vegetated, the narrow riparian zone was comparatively long.

### ***Preliminary Prescriptions***

Overview assessment suggested that Opening 1 may benefit from planting a nurse tree shelterwood. Candidate conifer species in this area would be hybrid white spruce, and, on slightly drier microsites, interior Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) and lodgepole pine (*Pinus contorta* var. *latifolia*). Such a treatment would address impaired riparian functions, especially by ensuring a long-term supply of LWD inputs, increasing shade, and providing deep root masses to increase bank stability. Existing deciduous shrubs could be augmented on the outside of the riparian leave-strip by planting live cuttings of species similar to ones present. This treatment would provide overhanging vegetation to improve fish habitat and SOD input.

### **2.1.2 Level 1 RA Results**

Cheshi Creek Opening 1 was assessed no further (as part of the Level 1 RA) as the landowner in this region preferred limited involvement in the process. It is suggested this area be included in Level 2 assessments should the landowner indicate an interest in implementing remediation measures as described above.

## **3.0 Bucket 327**

Bucket 327 comprises a portion of the Homathko River watershed, including all of Tatlayoko Lake. The upstream boundary of the bucket is formed by the watersheds of Charlie Creek (part of Bucket 327a) and Skinner Creek (Bucket 338), while the downstream boundary is formed by the watersheds of Ottarasko Creek (Bucket 329) and Nostetuko River (Bucket 316). Homathko River tributaries located within Bucket 327 include Lincoln Creek and Jamison Creek, the latter flowing into Tatlayoko Lake. For assessment purposes land areas at the downstream end of Bucket 327, south of the mouth of Stikelan Creek, were excluded from the study area (hatched area, Figure 2).

As Overview (Watershed Level) assessments did not identify areas of serious riparian concern in Bucket 327, Level 1 assessments were assigned low priority. Rehabilitation of riparian areas, for the purposes of increasing bank stability or potential LWD inputs, may be appropriate in conjunction with in-stream remediation.

## 4.0 Bucket 327a

Bucket 327a comprises the headwaters of the Homathko River, and several tributaries and lakes, including Charlie Creek, Cochin Creek and its tributary Chavez Creek, Quakie Creek, Cochin Lake, Lunch Lake and Whitesand Lake (Figure 2; Map 2). Bucket 327a has undergone the largest degree of anthropogenic alteration in the study area. Extensive areas have long been cleared for agricultural cropland or rangeland, while others have been clearcut or selectively logged more recently. Some large up-slope cutblocks were noted within this bucket, but had no associated riparian concerns, as buffer areas were sufficient. Several openings, located along Cochin Creek, Quakie Creek and the Homathko mainstem, were identified as being of riparian concern.

### 4.1 Homathko River (Opening 1)

Opening 1 along the Homathko River was an extensive cultivated area through which the river flowed, approximately 3,400 m in length (Map 2).

#### 4.1.1 Overview RA Results

##### *General Characteristics*

Opening 1, situated along Reaches 9, 10 and 11 of the Homathko River, is a stretch of valley bottom that supports various agricultural land uses, including rangeland and cropland. Effects of flooding (likely during the spring freshet) were noted to increase toward the upstream (northern) portion of the opening. An alluvial fan was present further upstream in Reach 14, where the river emerges from the valley wall onto the relatively flat valley. Artificial channels, likely used for flood control and irrigation, were observed throughout the opening and notably along the right (west) valley edge. Site Series (see Glossary) present along this opening would be highly variable, depending on microsite conditions.

##### *Assessment Results*

This opening was the most notable in the study area, given its unbroken extent of approximately 3.4 km. The full length of the opening was observed during aerial overview, and confirmed from air photos, to have little or no woody riparian vegetation in many locations. Regeneration of such vegetation may be inhibited in some locations by livestock grazing.

Impairment of riparian function along this portion of the Homathko River may have several notable consequences, given these reaches have been confirmed as habitat for rainbow trout, cutthroat trout, Dolly Varden and bull trout. Possible consequences could include:

- impaired structural heterogeneity of habitat due to little or no input of LWD;
- high water temperatures at low flow conditions resulting from a lack of stream shading;

- low inputs of allochthonous nutrients, particularly invertebrates that form food for fish and that may be exported downstream; and,
- low riparian buffering capacity for surface sediments or agricultural chemicals and livestock waste that may enter the river.

### ***Preliminary Prescriptions***

Overview assessment suggested that conditions similar to less disturbed areas downstream could be achieved in a cost-effective manner with little loss of agricultural land. A varied vegetation community would result from a combination of nurse tree shelterwoods and clustered tree planting on appropriate microsites.

Candidate species for nurse tree shelterwoods would include paper birch (*Betula papyrifera*) and trembling aspen (to provide inputs of small organic debris) and interior Douglas-fir and hybrid white spruce (to provide LWD in the long term). Hybrid white spruce and interior Douglas-fir would also be appropriate species for clustering, with spruce being planted in wetter depressional microsites and interior Douglas-fir on drier hummocks. Detailed assessments would confirm locations for these treatments and appropriate species composition and densities.

The Overview study (Watershed-Level RA) also suggested that native riparian shrubs be planted along portions of the riverbank to provide cover and forage material for wildlife, and improve habitat connectivity. Of particular benefit to moose and mule deer would be red-osier dogwood (*Cornus stolonifera*), a favoured browse species.

In-channel works, such as placement of LWD, may be undertaken to improve fish habitat conditions in the short-term. Such prescriptions are further elucidated in the Overview Fish Habitat Assessment (G3 Consulting Ltd., 1998).

## **4.1.2 Level 1 RA Results**

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### ***Assessment Description***

Level 1 circular plot surveys were conducted (according to methods described in Technical Circular 6; MELP and MOF, 1998) at three representative locations along Homathko River Opening 1 (Completed Field Form 2 sheets are provided in Appendix 4). In addition to survey plots, observations were made during fish habitat assessment of riparian condition throughout the opening.

Two sample plots were surveyed along Reach 10. Plot 1 was located immediately upstream of Reach Break 9/10. Plot 2 was located near the centre of Reach 10 (Map 2).

An additional plot was surveyed along Reach 11. Plot 3 was located at a point one-third the distance between Reach Break 11/12 and Reach Break 10/11, approximately 100 m downstream of a large cultivated area.

Table 4-1 summarizes plot locations.



<b>Table 4-1: Homathko River Opening 1, Plot Survey Locations</b>					
<b>Reach Number</b>	<b>Plot Number</b>	<b>UTM</b>	<b>Radius (m)</b>	<b>Side of Stream</b>	<b>Photos</b>
10	1	10.399729.5734639	3.99	right	4-1, 4-2, 4-3, 4-4
10	2	10.399706.5734584	3.99	right	4-5, 4-6
11	3	10.397963.5737406	3.99	right	4-7, 4-8

***Assessment Results***

**Reach 10, Plot 1**

- Photos 4-1, 4-2, 4-3, 4-4

Reach 10, Plot 1, was situated approximately 4 m from the right side of the Homathko River channel, alongside a hay field (Map 1). At this location, river channel morphology was characterized as a long homogeneous glide, with a bankfull width of approximately 6.5 m. Vegetation in Plot 1 was dominated by grasses (~90% cover). Willows formed a sparse shrub layer approximately 1.5 m tall. The plot also contained three regenerating lodgepole pine stems, two poles and one sapling. The generally silty soil, observed where exposed along the riverbank, had a surface H horizon, approximately 0.05 m deep, containing more organic matter than deeper, silty layers. A small amount of coarse woody debris (CWD) was present throughout the riparian area, likely deposited by floodwaters.

Riparian function at this location was assessed a low level for providing stream shading and potential LWD and SOD, and a moderate level for contributing to sediment filtering, channel stability and bank stability.

Disturbance indicators observed in the vicinity of the plot were livestock grazing and some beaver activity. On the left side of the river, opposite the plot, mature interior Douglas-fir and lodgepole pine grew within 10 m of the riverbank, and grazing of the understory was noted.

**Reach 10, Plot 2**

- Photos 4-5, 4-6

Plot 2 (Map 2) was also located along a long homogeneous glide of the Homathko River, with a bankfull width of approximately 6.5 m. On both sides, the river was flanked by wetlands estimated to be 10 m wide. Vegetation in this plot was dominated by grasses (~95% cover); tree and shrub layers were absent.

Exposed soil layers were available for examination. An H soil horizon approximately 0.05 m deep, consisting of organic matter and silt, overlaid a predominantly silty Ah horizon. These observations indicated the river transports silt to this area regularly, and that accumulation of organic matter is low.

Similar to Plot 1, a low capability rating was assigned to riparian functions of providing LWD, SOD and stream shading, while sediment filtering, channel stability and bank stability functions were rated moderate. Livestock grazing was the only disturbance indicator noted.

The portion of Homathko River Reach 10 upstream from Plot 2 (~1 km) flowed through wetland of similar character, where the riparian area contained no shrubs or trees. Discussions with the landowner confirmed that the original (pre-settlement) state of this portion of the valley was wetland, and that portions had been drained to increase agricultural capability.

### Reach 11, Plot 3

- Photos 4-7, 4-8

Plot 3 in Reach 11 (Map 2) was situated along a portion of the Homathko river characterized by alternating glides and pools, with a bankfull width of approximately 3.9 m. Riparian areas along both sides of the river at this location were forested. This area was selected for assessment as it may provide a natural “template” for remediation prescriptions for areas nearby.

Each vegetation stratum was comparatively well developed in this plot. A mature interior Douglas-fir tree, and one pole and one sapling were present, together with willows of a range of sizes that included six mature trees. Stocking density of interior Douglas-fir were extrapolated to be 600 stems per hectare (SPH). Willows dominated the shrub layer, while rushes, approximately 0.35 m in height, formed an estimated 50% of the herb layer. Mosses were also present.

Soil was observed where exposed along the riverbank. The Ah soil horizon, approximately 0.8 m deep, was of a silty/clay texture, while the underlying B horizon, approximately 0.5 m deep, was of a clay/silt texture. These soils were poor in organic matter, indicating a high level of flushing by river water.

The riparian area was rated low in its potential to provide LWD, moderate in functions of providing stream shading and channel stability, and high in providing SOD, surface sediment filtering and channel stability.

Disturbance indicators included livestock grazing and localized beaver activity. The treed riparian area, along the right side of the river, was approximately 15 m wide at this location, giving way to willow shrubs, then a hay field.

### ***Refinement of Prescriptions***

Viability of preliminary prescriptions presented above for Opening 1, based on the Overview assessment (G3 Consulting Ltd., 1998a), appears to have been confirmed by Level 1 plot assessments. A mosaic of nurse-tree shelterwoods, clustered tree planting and shrub augmentation would improve functioning along portions of the riparian area of Reaches 9, 10 and 11; however, it is recommended that no action be taken in the wetland area of Reach 10. Planting of conifers along Opening 1 would likely be best concentrated in areas where a riparian area exceeding 20 m were feasible, as there may be a concern that narrower strips of trees would not be wind firm.

It is suggested that discussions be held with landowners in the area to determine feasibility of riparian remediation and, if so, what constraints and opportunities exist relating to current and foreseen future land use. This information would

assist in determining specific sites for Level 2 riparian assessments and development of detailed prescriptions.

## **4.2 Cochin Creek (Opening 1)**

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Two riparian openings along Cochin Creek were identified during the Overview (Watershed-Level) Riparian Assessment (G3 Consulting Ltd., 1998a): Opening 1, downstream of Cochin Lake; and Opening 2, upstream of the lake (Map 2). Opening 1 was rated of medium priority for remediation, given riparian vegetation was observed to be sparse, but that the stream had been channelized, restricting available options. Opening 2 was rated of low priority, as a well-developed riparian buffer was present, and has not been further assessed.

### **4.2.1 Overview Results**

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#### ***General Characteristics***

Located along Reach 3 immediately downstream of Cochin Lake, Opening 1 was an area of agricultural land through which Cochin Creek flows (Map 2). The length of the opening was approximately 870 m. The Site Series on this comparatively moist site would be IDFdk4/08.

#### ***Assessment Results***

The entire portion of Cochin Creek flowing through Opening 1 has been channelized into a nearly straight canal. This action was likely a flow control measure for irrigation purposes. Riparian vegetation along this channel consists mainly of hay and grasses, with few woody shrubs present. The lack of stream shading through Opening 1 may produce elevated water temperatures potentially harmful to fish, particularly during low flows. Other impaired riparian functions along Opening 1, where Cochin Creek has been assigned a preliminary S4 Stream Class, are LWD and SOD inputs, channel stability and in-stream fish habitat.

#### ***Preliminary Prescriptions***

Given this section of Cochin Creek was channelized through agricultural land, it is unlikely that planting of conifers along the banks would be suitable, as LWD inputs could impair use of the canal for irrigation. A preferred option could include the planting of deciduous trees and shrubs along the stream banks. The FPCBC RMA width required for an S4 Stream is 30 m. This width applies to forest harvesting, and would be impractical along the channel banks. A minimum 10 m buffer is suggested wherever possible.

Such vegetation would provide SOD inputs, deep roots would improve channel stability, and overhanging branches would improve stream shading and fish habitat. Candidate species include paper birch, trembling aspen and shrubs commonly found in moist regions of the IDF zone, such as black gooseberry (*Ribes lacustre*), black twinberry (*Lonicera involucrata*), common snowberry (*Symphoricarpos albus*), Douglas maple (*Acer glabrum*) and red-osier dogwood. Several of these species can be regenerated from cuttings, at minimal expense.

## **4.2.2 Level 1 RA Results**

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### *Assessment Description*

- Photo 4-9

Quantitative vegetation plot assessments were not conducted in Opening 1, as they were impractical, given the narrow, untreed riparian area, and that the stream had been channelized. Landowner permission could not be obtained for digging a soil pit. Observations were made in conjunction with the assessment of fish habitat of this area.

### *Assessment Results*

Fish habitat assessments and discussions with local landowners indicated that potential fish habitat value in Cochin Creek Reach 3 was limited. Fish resident in Cochin Lake tend to migrate upstream rather than downstream, and Reach 3 is subject to low flow conditions.

Observations confirmed that riparian vegetation was restricted to shrubs and herbs, though, as Photo 4-9 demonstrates, riparian functions of stream shading, SOD inputs, surface filtering and bank stability have not been severely impaired.

### *Refinement of Prescriptions*

Preliminary prescriptions presented above, developed during Overview (Watershed-Level) Riparian Assessment, consisted of planting deciduous trees and augmenting shrubs along the stream banks to improve riparian functions, particularly stream shading and SOD inputs. This option appears viable, based on ground-truth surveys. Level 2 assessment is recommended in conjunction with assessment of suggested water control improvements (Chapter Three, Section 3.2.4). Specific sites, species and stocking densities could then be confirmed, pending landowner approval. As stated in the preliminary prescription, minimum 10 m buffer is recommended wherever possible, though no RMZ is required for S4 streams under FPCBC. Conifers have not been recommended, as LWD would likely be undesirable in an irrigation canal; potential for windthrow of isolated trees would also be of concern.

## **4.3 Quakie Creek (Opening 3)**

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Previous Overview (Watershed-Level) Riparian Assessments identified three openings along Quakie Creek (Map 2). Openings 1 and 2 were deemed of low priority for remediation, given the presence of treed riparian leave strips along the stream. Opening 3 was assigned medium priority, and examined during the Level 1 assessment.

### 4.3.1 Overview RA Results

#### *General Characteristics*

Opening 3 was a relatively recent clearcut (~4 to 7 years old) on private land, through which Quakie Creek flowed for a distance of approximately 300 m (Map 2). This site was located along Reach 3.

#### *Assessment Results*

The riparian area along this portion of Quakie Creek appeared on 1993 air photos to be totally unvegetated, likely having been cleared for agricultural purposes. There appeared to be a potential for an increased input of surface sediments to the stream, carried by surface water. Other riparian functions, such as stream shading, bank stability, and inputs of LWD and SOD, appeared to be severely impaired at this location.

#### *Preliminary Prescriptions*

It was recommended following the Overview study that the landowner consider planting riparian vegetation to control runoff of surface sediments, and to improve bank stability and other riparian functions. Candidate species would consist of native trees and shrubs found in adjacent areas. Given the preliminary S4 Stream Class assigned to Quakie Creek, the FPCBC RMA width would be 30 m, were this area Crown forest. The Overview assessment suggested a minimum riparian buffer of 10 m be planted if this area is being developed for agricultural purposes, and would eventually be fully vegetated.

### 4.3.2 Level 1 RA Results

#### *Assessment Description*

A Level 1 circular plot survey (Plot 1) was conducted along Quakie Creek Opening 3 (Map 2). The plot was situated approximately 2 m from the edge of the stream bank. In addition to survey plots, observations were made during fish habitat assessment of riparian condition throughout the opening. Table 4-2 summarizes the plot location.

Reach Number	Plot Number	UTM	Radius (m)	Side of Stream	Photos
3	1	10.394859.5741278	3.99	left	4-10, 4-11, 4-12

#### *Assessment Results*

- Photos 4-10, 4-11, 4-12

At the time of Level 1 assessments, Quakie Creek exhibited only subsurface flow adjacent to Opening 3. The channel along this portion of Reach 3 was aggrading, and the non-watered streambed substrate contained a high percentage of cobbles.

Immediately upstream of Opening 3, the stream channel was entrenched within heavily forested banks. The channel widened to approximately 18 m through Opening 3, apparently attributable to harvesting of the treed riparian area adjacent to the stream. Continuing bank erosion is evident in Photo 4-11. Streambed cobbles may have originated from a large scarp located upstream that may act as a periodic source of debris. Material has likely been deposited along Opening 3, as stream flow would slow along the less confined section. Cobble deposits observed throughout the riparian forest upstream provided evidence of high-energy freshet flows.

Vegetation noted in survey Plot 1 consisted only of grasses, providing approximately 75% cover. The surface soil (Ae horizon) was approximately 0.2 m deep and had a silty-sand texture. The C horizon below, approximately 3 m deep, had a silt-gravel texture, and an estimated 70% consisted of coarse fragments. Disturbance indicators included surface erosion, bank slope failure, and livestock grazing. All categories of riparian function were notably impaired.

### ***Refinement of Prescriptions***

The previous Overview (Watershed-Level) assessment of Quakie Creek Opening 3 (G3 Consulting Ltd., 1998a) tended to understate the degree of erosion and instability along the stream channel. During periods of high water flow, this site would be a considerable source of sediments that would enter the Homathko River downstream. It is unlikely that rehabilitation through replanting the riparian area would be effective unless accompanied by armouring (e.g., riprap) along the stream banks.

It is recommended that low priority be given to rehabilitating this site, given its remote location and limited linear extent. Established fish habitat value was limited, making the necessary level of planting and armouring not cost-effective. Though sedimentation would be notable, wetlands downstream likely serve as filters and may attenuate sedimentation of areas farther downstream (Map 2).

## **5.0 Bucket 332**

The headwaters of Mosley Creek, and several tributaries and lakes, define Bucket 332 (Figure 2). Mosley Creek is a third-order tributary of the Homathko River. Second-order tributaries that enter Mosley Creek in Bucket 332 include Butler Creek, Sapeye Creek and Valleau Creek. Lakes in Bucket 332 include Bluff Lake, Sapeye Lake, Little Sapeye Lake, and Horn Lake. The downstream boundary of Bucket 332 was located at the confluence of Mosley Creek and Razor Creek (Bucket 335).

### **5.1 Mosley Creek (Opening 2)**

A moderate amount of land had been cleared for agricultural use in Bucket 332, with other areas clearcut or selectively logged. One opening of riparian concern (Opening 2) was identified along the Mosley Creek mainstem in Bucket 332 (Opening 1 was located downstream in Bucket 332a).

#### **5.1.1 Overview RA Results**

##### *General Characteristics*

Opening 2, located on the right side of Mosley Creek along Reach 9, was an area cleared for agricultural land (Map 1). No tree regeneration was apparent from aerial overview. The main Site Series was determined to be IDFdk4/09, given the moist soils would be fairly rich at this recently cleared site.

##### *Assessment Results*

A portion of the riparian area along Opening 2 (approximately 100 m in length) appeared unvegetated during aerial overview. This condition could increase the potential for surficial sediments to enter Mosley Creek.

##### *Preliminary Prescriptions*

The previous Overview (G3 Consulting Ltd., 1998a) suggested that landowner(s) consider planting shrubs along the unvegetated portion of the riparian area to buffer potential sediment inputs to Mosley Creek. Candidate shrub species would consist of those found in adjacent areas. Shrubs commonly found in moist regions of the IDF zone include black gooseberry, black twinberry, common snowberry, Douglas maple and red-osier dogwood. It was suggested that several of these species could be regenerated from cuttings at minimal expense.

#### **5.1.2 Level 1 RA Results**

##### *Assessment Description*

Level 1 circular plot surveys were conducted at two locations along Mosley Creek. In addition to survey plots, observations were made during fish habitat assessment of riparian condition throughout the opening.

Plot 1 was situated approximately 10 m from the stream bank, an estimated 400 m upstream of Opening 2 in a forested riparian area adjacent to an agricultural field (Map 1). This location was chosen to provide a reference for Plot 2.

Plot 2 was situated within Opening 2, approximately 2 m from the stream bank along an outside bend in the channel (Map 1).

Table 4-3 summarizes plot locations.

<b>Table 4-3: Mosley Creek Opening 2, Plot Survey Locations</b>					
<b>Reach Number</b>	<b>Plot Number</b>	<b>UTM</b>	<b>Radius (m)</b>	<b>Side of Stream</b>	<b>Photos</b>
9	1	10.374528.5729451	3.99	right	4-13, 4-14
9	2	NA	3.99	right	4-15, 4-16

### ***Assessment Results***

#### Plot 1

- Photos 4-13, 4-14

A Riparian Assessment Field Form 2 for Plot 1 is provided in Appendix 4. Morphology of Mosley Creek channel, adjacent to Plot 1, was riffle-pool, with predominantly gravel bed material, high sinuosity, and undercut banks. Bankfull width was approximately 12.0 m.

Overstory vegetation observed within the plot consisted of trembling aspen (three mature and ten saplings) and interior Douglas-fir (seven saplings). Understory shrubs were dominated by willows approximately 3 m tall, providing an estimated 20% cover. The herb layer was dominated by grasses approximately 0.65 m tall, forming an estimated 70% cover.

Soils were of silty-sand texture until the B horizon, below approximately 0.18 m, 30% of which consisted of coarse fragments.

Livestock grazing was the only noted disturbance indicator in this location. This disturbance may reduce riparian functions of LWD provision, stream shading, surface sediment filtering, and channel and bank stability to moderate levels, while SOD input levels tended to remain high.

#### Plot 2

- Photos 4-15, 4-16

Channel morphology of Mosley Creek adjacent to Plot 2 was similar to that adjacent to Plot 1. Banks were undercut and eroding, and bankfull width was approximately 26.0 m (Form in Appendix 4).

Plot vegetation consisted of grasses, forming approximately 90% cover, and sparse willow shrubs forming only an estimated 1% cover.



The Ah soil horizon, approximately 0.46 m deep, had a silty-sand texture, while the B horizon, approximately 0.2 m deep was sandy. The C horizon was gravelly, consisting of an estimated 90% coarse fragments.

Disturbance indicators noted included livestock grazing and clearing of riparian vegetation for agricultural use, factors that may contribute to surface erosion. A lack of riparian trees and shrubs may have exacerbated bank erosion along the outside bend in the stream channel.

### ***Refinement of Prescriptions***

Preliminary prescriptions developed during Overview (Watershed-Level) Riparian Assessment (G3 Consulting Ltd., 1998a) consisted of planting shrubs commonly found in moist regions of the IDF zone (e.g., black gooseberry, black twinberry, common snowberry, Douglas maple and red-osier dogwood) along the approximately 100 m untreed portion of the riparian area to mitigate potential sediment input. The FPCBC RRZ width for an S2 stream is 30 m, and therefore the total area recommended for planting is 0.3 ha. To control the area of highest erosion along the outside channel bend, it may be more effective to live stake willows to establish a root mass quickly.

## **6.0 Bucket 332a**

Bucket 332a comprises the middle reaches of Mosley Creek and extends upstream from the watersheds of Scimitar Creek (Bucket 326) and Five Finger Creek (Bucket 331) to the boundary of Bucket 332 (Figure 2). Bucket 332a includes Mosley tributaries Quartz Creek and Hell Raving Creek, but excludes Twist Creek (Bucket 333). Lakes along the mainstem of Mosley Creek within Bucket 332a are Twist Lake and Middle Lake. The study area excluded the portion of Bucket 332a downstream of Twist Lake as no forest harvesting or agricultural activities had occurred there at the time of assessment (Figure 2).

Anthropogenic disturbances in the form of agriculture and selective logging, identified during Overview riparian assessment of Bucket 332a, were limited (G3 Consulting Ltd., 1998a). Cropland and rangeland use of portions of the Mosley Creek valley floor between Twist Lake and Middle Lake had degraded riparian vegetation. Opening 1, identified during the previous Overview (Watershed-Level) Riparian Assessment, was a sequence of agricultural fields located along Reach 3 of Mosley Creek, between Twist Lake and Middle Lake. As this area had been assigned low priority for remediation, it was not assessed at Level 1.

## **7.0 Bucket 336**

Bucket 336 comprises the watershed of Valleau Creek, a tributary of Mosley Creek and second-order tributary to the Homathko River, entering just downstream from Bluff Lake (Figure 2; Map 1). Valleau Creek flows through a gorge between Niut Mountain and Razorback Mountain.

### **7.1 Valleau Creek (Openings 1 & 2)**

Portions of the valley sides adjacent to Valleau Creek had been selectively logged or clearcut, and two clearcut openings were identified as being of potential riparian concern.

#### **7.1.1 Overview RA Results**

##### *General Characteristics*

Openings 1 and 2, along the left side of Valleau Creek Reach 3, were up-slope cutblocks adjacent to the steeply incised stream channel, and separated from each other by a small unharvested block (Map 1). Opening 1, approximately 560 m long, was clearcut in 1988. Opening 2, measuring approximately 1,610 m, was clearcut in 1991. Site Series on the riparian slope would range from IDFdk/01 to 08 as soil moisture increases downslope due to seepage.

##### *Assessment Results*

Openings 1 and 2 had been harvested to the top of the stream channel, leaving a steeply sloping riparian buffer (approximately 60 m wide). Riparian vegetation consisted of a mature forest dominated by interior Douglas-fir. Some windthrow of mature trees along the edge of the openings was observed during aerial reconnaissance. The Forest Cover Map designated these slopes as environmentally sensitive, due to unstable soils. Historic selective logging was evident on the opposite side of Valleau Creek.

##### *Preliminary Prescriptions*

During Overview assessments (G3 Consulting Ltd., 1998a) riparian buffers at these locations met or exceeded FPCBC requirements. The Overview report recommended that trees identified as subject to windthrow along the margin of the cutblocks be felled, and that the cutblock edges be feathered. This treatment was suggested to reduce potential soil destabilization by heaving root masses along the top of the slope. The Overview assigned a high priority to this work.

#### **7.1.2 Level 1 RA Results**

Though Valleau Creek Openings 1 and 2 were assigned a high priority for remediation, no further assessment was necessary. It is recommended that the windthrow hazard along the top of the gorge be addressed expeditiously, if not already addressed.

## **8.0 Bucket 338**

Bucket 338 comprises the watershed of Skinner Creek, a first-order tributary of the Homathko River. Apart from Reach 1 of Skinner Creek, which flows through a gorge, low gradient and poor drainage characterized Bucket 338. Large wetland areas melded into rangeland and hayfields, the main agricultural land uses in this watershed.

### **8.1 Skinner Creek (Openings 1 & 2)**

Skinner Creek Openings 1 and 2 were not assigned priority for remediation during previous Overview assessments (G3 Consulting Ltd., 1998a), as no action was deemed necessary. Level 1 Riparian Assessment was conducted concurrently with Level 1 FHA, to confirm this determination.

#### **8.1.1 Overview RA Results**

Opening 1, along Reach 6 of Skinner Creek, and Opening 2, along Reach 7, were locations where the stream flowed through areas of mixed agricultural use.

##### *General Characteristics*

Openings 1 and 2 were approximately 2,070 m and 1,940 m in extent, respectively (Map 2). Opening 2, further upstream from Opening 1, consisted mainly of rangeland and natural marsh. The Site Series in this area would be predominantly IDFdk4/09 on moist, relatively rich soils.

##### *Assessment Results*

Riparian tree and shrub vegetation were patchy along the stream banks in these openings; however, this condition likely reflected natural conditions and little riparian vegetation had been actively removed. Grazing livestock in some locations may have inhibited shrub growth. Openings were surrounded by well-forested areas extending to the edge of the wetlands.

##### *Preliminary Prescriptions*

The Overview report (G3 Consulting Ltd., 1998a) recommended no action be taken in these agricultural openings, as the areas resembled natural condition and shrub vegetation patchiness did not likely impair riparian function appreciably.

#### **8.1.2 Level 1 RA Results**

##### *Assessment Description*

One riparian plot was assessed in Opening 1, along Reach 6, adjacent to a hayfield (Appendix 4, Form 2). Observations were also made of riparian condition during fish habitat surveys. Plot location is summarized in Table 4-4.

<b>Table 4-4: Skinner Creek Opening 1, Plot Survey Locations</b>					
<b>Reach Number</b>	<b>Plot Number</b>	<b>UTM</b>	<b>Radius (m)</b>	<b>Side of Stream</b>	<b>Photos</b>
6	1	10.406785.5733130	3.99	left	R5-20,21,22,23

***Assessment Results***

- Photos 4-17, 4-18

Skinner Creek along Opening 1 was of low gradient (~0.05%) and sections of narrow, confined channel alternated with broader wetland areas. Bankfull width adjacent to Plot 1 was approximately 1.5 m.

No trees were present along this section of the stream. Plot vegetation consisted mainly of dense grasses, approximately 0.4 m tall, providing 100% cover. Willows up to 4 m tall were also noted; however, they represented only 5% cover in the shrub layer. Soils were observed from surface examination to have a high organic content; no exposed soil profile was available, and excavating a soil pit in the wetland was impractical.

Disturbance indicators included livestock grazing, localized beaver activity, flooding, and presence of three nearby culverts. Active haying operations were observed on both sides of the creek, although a 5 m to 10 m riparian buffer remained, characterized by long grasses.

Riparian functions of LWD and stream shade provision were rated at low levels, contribution to bank stability was rated moderate, and capability to filter surface sediments and provide channel stability were rated high.

***Refinement of Prescriptions***

Level 1 assessments confirmed original Overview suggestions that no action was necessary along this portion of Skinner Creek (G3 Consulting Ltd., 1998a). Observations of the riparian area, and discussions with the landowner, verified that the natural, pre-settlement, condition of this area had been wetland, and that riparian functions had not been impaired appreciably by adjacent agricultural land use.

## 9.0 Summary of Recommended Level 2 Assessments

Level 2 Riparian Assessment and development of planting prescriptions is recommended along portions of three study area streams. Locations, relative priority, and scope of work are summarized in Table 4-5. Field assessment forms summarizing Level 1 data are presented in Appendix 4.

<b>Table 4-5: Summary of Recommended Level 2 RAPP</b>						
<b>Stream</b>	<b>Opening</b>	<b>Reach</b>	<b>Recommended Action</b>	<b>Tenure</b>	<b>Approximate Areal Extent</b>	<b>Priority</b>
Homathko River	1	9, 10, 11	Level 2 RAPP to determine specifications of nurse-tree shelterwoods, clustered tree planting, shrub augmentation.	private	10.2 ha	High
Mosley Creek	2	9	Level 2 RAPP to determine specifications of deciduous shrub augmentation.	private	0.3 ha	High
Cochin Creek	1	3	Level 2 RAPP to determine specifications of deciduous tree and shrub augmentation.	private	0.9 ha	Low