COOPERS GREEN PARK

ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT

Prepared for:

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Statement of Limitations

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Executive Summary

This report provides a summary of environmental conditions at Coopers Green Park, Halfmoon Bay, Sunshine Coast Regional District (SCRD). The report has been prepared for the SCRD's Parks Department as support for a management planning process that is currently underway for the park.

The objectives of the study were to identify the prevailing biophysical conditions in the park, conduct a riparian assessment under the terms of the provincial Riparian Areas Regulation (RAR), and conduct a preliminary evaluation of the environmental impacts of potential future developments within the park that have been considered by the SCRD.

The field work for the study was undertaken on September 24th and 25th, 2014, and consisted of a reconnaissance-level traverse of the entire park, from the foreshore in the west to the upland forest in the east. The reconnaissance was preceded and followed by reviews of background information provided by the SCRD and obtained from other sources, including online research and personal interviews.

Results

The study's findings regarding ecosystem types, species and ecosystems at risk, invasive species, environmentally sensitive areas, riparian areas, and evaluation of potential park development options, are summarized as follows:

- 1. The park was found to contain the following five ecosystem types:
 - marine intertidal beach and bedrock;
 - seasonal estuarine wetland;
 - inland forest (mostly mature second-growth coniferous, and a small area of young deciduous forest);
 - seasonal freshwater stream; and
 - developed areas.
- 2. The online search for species and ecosystems at risk revealed:
 - no plant species at risk;
 - 13 animal species that may occur in the study area and are considered at risk, of which four are on the Red list and nine are on the Blue list, as shown in Table 6 (p.10); and
 - 10 ecosystems, including one in the beach, seven in the estuarine area and two in the forest, as shown in Table 7 (p.11).

No critical habitat for at-risk species was confirmed to occur in the park. It is noted, however, that an anecdotal report was received second- hand on the possible presence of a Great Blue Heron nest in the park; it was not possible to confirm this report. Also, additional investigation is needed to confirm whether the park contains critical habitat for any of the identified at-risk species or significant areas of any of the identified ecosystems at risk.

- 3. Five species of invasive plants were recorded. Based on the field observations, none of these appear to be present in large numbers.
- 4. Four key environmentally sensitive areas were identified in the park:
 - the Pond and its riparian zone;
 - the Lagoon and its riparian zone;
 - the marine foreshore area (beach); and
 - Kitchin Creek and its riparian corridor.
- 5. The freshwater riparian assessment, using the RAR's Simple Assessment method, yielded the following findings:
 - the RAR applies to Kitchin Creek upstream from its point of discharge to the Lagoon; the Lagoon and Pond are considered estuarine or intertidal habitats, which are not addressed by the RAR and, instead, are to be addressed through the policies and guidelines of the SCRD and Fisheries and Oceans Canada;
 - the streamside protection and enhancement area (SPEA) for Kitchin Creek is a 30 m wide zone on either side of the stream, measured from the top of the bank;
 - the development setback or riparian buffer along the Lagoon and Pond areas would be 7.5 m wide measured inland from the high water level, in accordance with SCRD policy.

It was also concluded that additional investigation of fish habitat values in Kitchin Creek is warranted, as no fish were observed in the creek (which was dry) during the field investigation. The study results did not confirm the presence of fish in Kitchin Creek, and the seasonal absence of flow suggests that the sensitivity of the stream with respect to fish may be low. The SPEA width or the applicability of the RAR may change if the stream is confirmed to not support fish under the RAR.

- 6. The following potential development considerations were evaluated at a preliminary level as part of this assessment:
 - Clean-up of human-made debris from within the Pond;
 - Cleanup of buried garbage that may be present within the Lagoon;
 - Modifications to the Pond, particularly its outlet, to create a deeper water body;
 - Repairs to the Pond outlet to prevent entry of logs and other large floating debris;
 - Replacement of the log culvert that connects the Pond and the Lagoon under Redrooffs Road;
 - Installation of one or more additional buildings within the park;
 - Construction of a trail within the park east of Redrooffs Road, possibly connecting to the existing trail network in the community of Halfmoon Bay.

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1. INTRODUCTION

1.1. Project Understanding

Coopers Green Park in Halfmoon Bay is 3.54 hectares of developed and natural park owned and operated by the Sunshine Coast Regional District (SCRD). The park is located approximately 1.6 km south of Highway 101 along the west end of Redrooffs Road. The civic address for the park is 5500 Fisherman Road. The park supports a variety of uses including a boat launch, diving, beach access, open space for picnics, a community hall and viewing areas. There are two water features within the park: one is a tidal pond with fresh water flowing through it, the second is a tidally influenced lagoon fed by Kitchin Creek. Kitchin Creek tends to dry up for during the summer months. An overview is shown in Figure 1.

During the early 1900's a resort located on the site used to dump garbage in the lagoon. The garbage has since been covered by a layer of silt and organic material but there are still indications of the previous dumping activity. Although the west side of the park has been developed for many years consideration must be given to the fact that artifacts of significance may be present on the site. The Sechelt Band is completing a Preliminary Field Reconnaissance of the site that may be made available if completed within the time of this environmental assessment.

The SCRD is preparing a Park Management Plan for Coopers Green Park. An environmental assessment of the park will form part of the management plan. The SCRD has retained Whitehead Environmental Consultants Ltd. to complete the required environmental assessment. The results of the assessment are presented in this report.

1.2. Objectives

The purpose of the environmental assessment is to form the basis for a management plan for Coopers Green Park. The specific objectives of the assessment are to:

- 1. complete an Ecosystem Summary Report including identification of environmentally sensitive areas;
- 2. complete a Riparian Assessment; and
- 3. evaluate the environmental implications of potential future development concepts.

2. METHODS

2.1. Ecosystem Summary

The ecosystem summary was completed by reviewing topographic mapping and aerial ortho-photography provided by the SCRD and then undertaking a reconnaissance-level biophysical survey of the entire park on September 24th and 25th, 2014, lasting approximately eight hours. During the reconnaissance, observations were made of the topography and soils; drainage and watercourses; ecosystems, flora and fauna; and current and past human impacts. Plant and animal identification was taken to the genus or species level wherever possible.

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Figure 1. General Layout of Coopers Green Park in Halfmoon Bay, Sunshine Coast Regional District.

2.2. Riparian Assessment

The riparian assessment was completed by following the methodology outlined in the province's Riparian Areas Regulation (RAR) and its Implementation Guidebook (Government of B.C., 2006, 2014). The Riparian Areas Regulation (RAR) applies only in relation to proposed development beside a freshwater body, and does not apply to marine and estuarine shorelines. As stated in the RAR Methods: "The boundary between freshwater habitats and estuarine habitats is considered the upstream extent of tidal influence." (Government of B.C., 2014). Accordingly, the riparian assessment presented in this report applies only to Kitchin Creek upstream of its confluence with the Lagoon.

Development is defined very broadly under the RAR, as follows:

"development means any of the following associated with or resulting from the local government regulation or approval of residential, commercial or industrial activities or ancillary activities to the extent that they are subject to local government powers under Part 26 of the Local Government Act:

- a. removal, alteration, disruption of destruction of vegetation;
- b. disturbance of soils;
- c. construction or erection of buildings and structures;
- d. creation of nonstructural impervious or semi-impervious surfaces
- e. flood protection works;
- f. construction of roads, trails, docks, wharves and bridges;
- g. provision and maintenance of sewer and water services
- h. development of drainage systems;
- *i. development of utility corridors;*
- j. subdivision as defined in section 872 of the Local Government Act;"
- (Government of B.C. 2014)

Two options are stipulated under the RAR as methods for the determination of the riparian protection zone: Simple or Detailed assessment. The Simple Assessment was selected for this study. Our decision to apply the Simple Assessment Method was based on the knowledge that the present study was undertaken as a high-level aid to planning future management of the park, and no specific development proposals have yet been identified along Kitchin Creek.¹

The Simple Assessment is based on the answers to the following three questions, around which our work plan was focused:

- 1. What is the width and status of the existing and potential streamside vegetation?
- 2. Is the stream currently or potentially fish-bearing? Or is it tributary to a fish-bearing stream?
- 3. For a few, limited situations, is the stream flow permanent or non-permanent?² (This question applies only to non-fish-bearing streams with existing or potential vegetation greater than 30 m in width).

To address potential development concepts for areas beside the non-freshwater areas of the park, the SCRD's internal riparian protection policy, as well as Fisheries and Oceans Canada's guidelines, were considered.

¹ The Detailed Assessment Method is typically used in situations where there is a need for determination of the SPEA width based on site-specific assessment of the ecological features, functions and conditions of the stream and riparian area.

² Assessment methods definition: "permanent stream "means a stream that typically contains continuous surface waters or flows for periods more than 6 months in duration."

2.3. Future Development Considerations

Areas within the park that may be sensitive to potential future development, or which may be amenable to remediation or restoration were also identified during the ecosystem assessment. To this end, a concept plan showing alternative future building sites, and a number of background reports, provided by the SCRD, were reviewed with regard to the findings of the biophysical survey.

3. ECOSYSTEM SUMMARY

3.1. Climate, Geology and Soils

3.1.1. Climate

The climate of the Sunshine Coast in general can be described as coastal maritime, with mild wet winters and warm dry summers. Most of the precipitation (70%) falls between October 1 and March 31 every year. The main climate characteristics of the Project area are summarized in Table 1 using climate normal data for Merry Island Light Station at the entrance to Halfmoon Bay (Environment Canada, 2012). Monthly weather data is provided in Appendix 1.

(Enviro	nment Canada, 2014)	
	Characteristic	Merry Island
		(Halfmoon Bay) ^a
	Station Elevation (m)	6.1
	January average temperature (°C)	5.4
	July average temperature	21.4
	Extreme minimum temperature (°C)	-11.7 (28-Dec-1968)
	Extreme maximum temperature (°C)	32.2 (18 Aug-1973)
	Days per year with minimum temperatures less than 0°C	13.5
	Days per year with maximum temperatures greater than 20°C	60.1
	Total precipitation per year (mm)	1028.8
	Total rainfall per year (mm)	1006.0
	Total snowfall per year (mm)	23
	Days per year of rain	168
	Days per year of snow	5.9
	Total hours of bright sunshine	1893.6

Table 1. Weather characteristics of the Halfmoon Bay area (1981 – 2010)

a – Merry Island is located approximately 4.2 km south-southwest of Coopers Green Park.

Land and resource managers now routinely consider the anticipated effects of climate change as an important environmental aspect for planning purposes. An extensive literature review on the potential impacts of climate change on biodiversity in B.C. concludes that the following effects can be expected over time (Gayton, 2008):

- average annual temperatures warming by 1 to 4°C by 2100;
- Northern B.C. warming the fastest, followed by the Interior and Coastal B.C.;
- winter temperatures warming faster than summer temperatures;
- average annual precipitation increasing up to 20 percent by 2100;

- winter precipitation continuing to increase, and a greater proportion of winter precipitation falling as rain;
- declining summer stream flows; ; and
- reduced summer soil moisture in some regions.

3.1.2. Surficial Geology and Soils

The surficial geology of the Sunshine Coast is based on Coastal Plutonic Complex rock (Coast Range granites) that was exposed after the retreat of the glaciers 10,000 to 15,000 years ago. Upland soils vary throughout the region, and are mainly comprised of Podzols and Gleysols (Luttmerding 1980, 1981), and the shoreline is dominated by sand and gravel.

The foreshore area does not contain soil. Rather, it comprises a sand and gravel beach with one major outcrop of smooth bedrock. The beach faces southwest and is evidently exposed to considerable wave action at times. The upper end of the beach contains a well-defined drift-log zone, while down-gradient from the log zone, the surficial materials are relatively uniformly distributed.

The Sunshine Coast Agricultural Area Plan Background Report (Lawseth & Smith, 2013) provides the following descriptions: "Podzols are found in forested areas on sandy glacio-fluvial deposits with high levels of annual precipitation; typically they occur under coniferous, mixed, and deciduous forest vegetation, but may also occur under shrub and grass vegetation (AAFC, 1998). ... Gleysols are poorly drained soils, which develop under wetlands or poorly-drained forest vegetation. Their colour and mottling indicate prolonged periods of intermittent or continuous saturation with water from either a high groundwater table or temporary accumulation of water above a relatively impermeable layer, or both (AAFC, 1998)."

The available soil mapping for the Sunshine Coast reaches the southern edge of the Halfmoon Bay area; however, the coverage does not extend as far north as Coopers Green Park. Based the descriptions contained in Lawseth & Smith (2013) and Luttmerding (1981) and our field observations, the soil types likely to occur in the study area are listed in Table 2.

Soil type	Description	Location where the soil type
(map code)		likely occurs in Study Area ^a
Bose	Moderately to very stony gravelly marine or	East of Redrooffs Rd in Kitchin Creek
(BO)	glaciofluvial deposits overlying moderately coarse-	watershed (likely)
	textured glacial till (moderately to well-drained	
	gravelly sandy loam or gravelly loamy sand).	
Capilano	Coarse-textured, stony, glaciofluvial and deltaic	West of Redrooffs Rd (likely) and
(CP)	deposits (well to rapidly drained gravelly sandy loam).	within the Lagoon area
Cannell	Moderately coarse colluvium and glacial till (well to	East of Redrooffs Rd in Kitchin Creek
(CE)	rapidly drained sandy loam or gravelly sandy loam).	watershed (likely)
Eunice	Coniferous organic material overlying bedrock (well to	In and around bedrock-dominated
(EU)	rapidly drained organic forest litter over bedrock).	areas on either side of Redrooffs Road,
		esp. east of the upper lagoon
Rocky	Exposed bedrock or areas with less than 10 cm of	In and around bedrock dominated
outcrop (RO)	mineral or organic soil on the rock surface.	areas on either side of Redrooffs Road

 Table 2. Soil types likely to occur in Coopers Green Park.

a - Additional assessment is required to confirm the types and distribution of soils in Coopers Green Park.

3.2. Drainage and Watercourses

The park contains a single freshwater stream, known locally as Kitchin Creek. This stream flows into an estuarine wetland comprised of two basins, one on either side of Redrooffs Road: an upper tidal pond, known as the Lagoon, on the east side of Redrooffs Road, and a lower tidal pond, known as the Pond, between the latter and Fisherman's Road (Figure 1). The stream goes dry for extended periods during the summer. The wetlands are also intermittently dry, depending on tide levels and stream flows, with the greatest degree of drying occurring in the summer when there is no flow in Kitchin Creek.

There is no record of a Kitchin Creek in the various provincial databases such as iMapBC, Water Licences Query, and Fisheries Information Summary System (FISS) databases that were examined during this assessment (Government of B.C., 2014a, 2014b, 2014c). Alternative names for Kitchin Creek were not found during the review of available background information.

Kitchin Creek is a small, seasonal watercourse that drains an undetermined area of the uplands above Halfmoon Bay, from an elevation of approximately 160 down to sea level. The stream's total mapped length is approximately 1160 m, of which 215 m are within the park. The catchment area or watershed was not measured; however, SCRD habitat mapping shows no wetlands or other significant water bodies in the headwaters (SCRD 2014).

The Lagoon is approximately 120 m long, between 4 and 27 m wide, and has a surface area of approximately 2120 m^2 . It is fed either by freshwater from Kitchin Creek at the south end or by tidally driven brackish or salt water from the north end through the log culvert under Redrooffs Road.

The Pond is approximately 73 m long, 5 to 12 m wide and approximately 545 m² in extent. It is fed either by the outflow from the Lagoon or by seawater that enters through the 1.22 m (4 ft) diameter cement pipe culvert under Fisherman's Road whenever the tide is above 3.9 m (13 feet). Both of these waterbodies are shallow, with maximum water depths of approximately 1 m at the highest tides, and are dry during low tides in the summer when there is no flow in Kitchin Creek. The salinity of the water in these basins can range from fresh though brackish to saltwater depending on the amount of flow in Kitchin Creek, the extent of the high tide above the 3.9 m threshold level at the Pond outlet, and the degree of mixing. For example, during the reconnaissance on September 23^{rd} 2014, salt water was present to the uppermost end of the Lagoon.

3.3. Ecosystems and Vegetation

3.3.1. Ecosystems

The Halfmoon Bay area lies within the moist maritime subzone of the Coastal Douglas-fir biogeoclimatic zone (CDFmm) (Green and Klinka 1994, MFLNRO 2014). Within the park itself, the following types of ecosystems were observed (Figure 2, p. 14):

- Marine foreshore and its contiguous back-shore, most of which is dominated by a mixed sand and gravel beach (Photo 1) with a moderate slope of approximately 13%. There is also a bedrock outcrop (Photo 2) and rock riprap armour (Photo 3) or cement wall (Photo 4) along the top of bank.
- Estuarine wetlands, comprised of the Pond between Fisherman's Road and Redrooffs Road (Photo 5), and the Lagoon (Photo 6) between the latter road and the mouth of Kitchin Creek. Viewed from an ecological perspective, the Pond and Lagoon are inland extensions of the

intertidal zone, subjected as well to the seasonal influence of freshwater inputs from Kitchin Creek. Sediment accumulation and periodic or intermittent dryness in these estuarine basins are a natural condition.

- Inland forest, consisting mainly of a mature second-growth coniferous forest (Photos 7, 8, 9), which also includes rocky outcrops (Photos 10, 11) and the seasonal freshwater ecosystem of Kitchin Creek and its riparian corridor (Photos 12, 13, 14) as well as a smaller area of younger deciduous forest at the south (upper) end of the park (Photo 15).
- Developed lands that comprise most of the actively used portion of the park west of Redrooffs Road, and include landscaped areas, buildings and other built infrastructure, abandoned and inuse, and the roadside areas (Photos 16, 17, 18, 19).

Each of these ecosystems has its own assemblage of plant and animal species. A partial list of the plant species identified in the park is summarized in Table 3 (page 20). Similarly, a partial list of animal species observed during the assessment or previously reported is summarized in Table 4 (page 22).

3.3.2. Plant communities

The beach ecosystem is submerged daily by the tides and contains no well-established plant communities. The only plants observed during the reconnaissance were incidental or fragments of intertidal marine algae: greenstrap (*Enteromorpha* sp.) that tends to be associated with freshwater seepage onto the shore, and rockweed (*Fucus* sp.) that commonly grows on rocky substrates, such as the small island in front of the park.

The back-shore lies immediately above the beach, between the high tide level and the paved surface of Fisherman's Road and the top of bank to the south. Where it has not been developed with constructed hard surfaces, the back-shore supports a vegetation community that is tolerant of high salinity from the adjacent foreshore. The predominant species here include dune grass (*Elymus mollis*), beach pea Beach pea (*Lathyrus japonicas*), Nootka rose (*Rosa nootkana*), Arbutus (*Arbutus menziesii*) and occasionally shore pine (*Pinus contorta contorta*).

The estuarine wetland vegetation exhibits a gradation from more salt tolerant species such as saltwort (also known as pickleweed) (*Salicornia virginica*) and gumweed (*Grindelia integrifolia*) in the saltmarsh around the Pond, to the freshwater wetland species, slough sedge (*Carex obnupta*) and hardhack (*Spiraea douglasii*), around the Lagoon.

The inland forest is located almost entirely on the east side of Redrooffs Road, with a small stand at the north end of the park next to Fisherman's Road. The plant communities here consist primarily of relatively closed-canopy, mature second growth coniferous stands dominated by Douglas-fir (*Pseudostuga menziesii*) and lesser amounts of western redcedar (*Thuja plicata*) and scattered bigleaf maple (*Acer macrophyllum*), with a variably dense understorey dominated by swordfern (*Polystichum munitum*), salal (*Gaultheria shallon*), Oregon grape (*Mahonia nervosa*) and a variety of mosses. The very east end of the park is dominated by a younger deciduous forest dominated by red alder (*Alnus rubra*) with lesser amounts of bigleaf maple, and a understorey dominated by dense salmonberry (*Rubus spectabilis*) and scattered swordfern.

Vegetation in the developed areas includes a mix of native and introduced species. The dominant trees are Douglas-fir with lesser amounts of western redcedar, bigleaf maple, red alder and arbutus, while the ground cover is mostly grasses with scattered areas of tall or low shrubs (e.g., hardhack, Pacific crabapple

(*Malus fusca*), and snowberry (*Symphoricarpus albus*) and others, concentrated particularly in the riparian zone on the south side of the Pond and along both sides of Redrooffs Road. Numerous introduced species, including shrubs, forbs and probably grasses are also present (although no effort was dedicated to their identification).

3.4. Fish and Wildlife

3.4.1. Fish

Coopers Green Park contains habitat used by marine, estuarine and freshwater fish. No fish were observed in any of these habitats during the field reconnaissance.

The beach or foreshore zone is considered the most important fish habitat in the park because it likely provides critical spawning habitat for forage fish such as surf smelt (*Hypomesus pretiosus*) and Pacific sand lance (*Ammodytes hexapterus*) (Ramona de Graaf, personal communication). Forage fish -which are an important link in the food web of salmon, whales and seabirds- spawn year-round in the upper intertidal zone of sand-gravel beaches. The beach also provides important feeding habitat for juvenile salmonids, seabirds, and other shoreline species that feed in shallow water during higher tides, as well as for a diversity of invertebrates including clams, snails, and arthropods and others that inhabit the substrate.

There is no information on fish presence in the estuarine habitats in the Pond and the Lagoon. The accessibility and use of these habitats by fish is strongly constrained by several factors: the high elevation of the culvert invert at the Pond outlet; the intermittent dryness of the Lagoon (and to a lesser extent the Pond) during low tides in the summer, and the absence of freshwater inputs from the creek for prolonged periods during the summer. However, it is anticipated that juvenile salmonids and sculpins (*Cottus* sp. and *Leptocottus* sp.) for example, that are adapted to varying salinities, may enter the Pond and Lagoon during high tides (>13 ft/3.96 m) and, depending on freshwater inputs from the creek, may remain in these basins for varying lengths of time. Based on the present findings, the fish habitat values of the Pond and Lagoon can be considered low, with no critical fish habitat being present. However, it is recognized that the wetlands and creek are a source of organic matter to the marine food web. Additional investigation of fish presence and ecology in the Pond and Lagoon is recommended.

Regarding freshwater fish, the Sunshine Coast Habitat Atlas describes fish presence in Kitchin Creek as "unknown" (Community Mapping Network (CMN), 2014). However, an unconfirmed report of salmon fry being observed at the mouth of Kitchin Creek several years ago was provided (Jim Wilson, Fisheries Technician, personal communication). Whether these fry originated from spawning activity at the mouth of Kitchin Creek or elsewhere is unknown. In general, it would appear that the freshwater fish habitat values in the park are also low.

3.4.2. Wildlife

The predominant wildlife of Coopers Green Park are undoubtedly the birds, owing to the presence of both terrestrial and marine species and abundant edge habitat. Wildlife species observed during the present study or reported in the park and vicinity are listed in Table 4. A second-hand anecdotal report of a Great Blue Heron nest in the north end of the park was received during the study; however, it was not possible to establish contact with the original observer or to confirm the presence of a Great Blue Heron nesting tree within or near the park, although an individual heron was observed flying above the Lagoon.

It is important to note that a full inventory of the wildlife species diversity in the park requires a level of effort that is beyond the scope of the present reconnaissance-level survey.

3.5. Invasive Species

A preliminary survey of invasive species was completed in August 2012 (Goodwin 2012). The invasives noted in 2012 and during the present assessment in 2014 are listed in Table 5. In general, no areas in which noxious invasive plants were overtaking the natural ecosystems were noted, with the notable exception of English ivy in the forest on the east side of Redrooffs Road (Photo 20). Several other non-native (introduced) species were also observed, mainly in the developed area of the park (Table 3). However, none of these were present in sufficient numbers or densities to be considered invasive.

Species	Scientific Name	Aug. 2012	Sep. 2014	Notes					
Scotch broom	Cytisus scoparius	х	х	Individual plants observed around the Pond. Not wide spread.					
Knotweed	Polygonum sp.	Х		One patch reported "near the bridge" in 2012. Not observed in 2014.					
English ivy	Hedera sp.	Х	х	Wide-spread in the park, in open and forested areas.					
Himalaya blackberry	Rubus discolor		х	Noted particularly on the east side of Redrooffs Road beside the Lagoon; also present elsewhere.					
Daphne or spurge laurel	Daphne laureola		х	Observed in formerly developed land at the north end of the Lagoon. Not recorded in 2012.					

 Table 5. Invasive species observed in Coopers Green Park, 2012 and 2014

3.6. Species and Ecosystems at Risk

A search of the provincial government's online database was conducted to identify terrestrial plant and animal species and ecosystems that are considered to be "at risk" within the Sunshine Coast Regional District. The search criteria for species included species that are on the provincial Red and Blue lists³, as well as those that are listed as Endangered, Threatened or of Special Concern by the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC). (Marine wildlife species were excluded from the search results.) The search criteria for ecosystems included estuarine, terrestrial beach, terrestrial forest, and wetland-mineral ecosystem groups are on the provincial Red and Blue lists.

The species search revealed no plant species of and 13 animal species that may occur in the study area and are considered at risk (B.C. Conservation Data Centre (CDC), 2014). Of these, four are on the Red list and nine are on the Blue list, as shown in Table 6 (p.10).

The ecosystems search revealed a total of 10 ecosystems, including one in the beach, seven in the estuarine area and two in the forest, that may occur in the study area and are considered at risk, all of

⁵ **Red**: Includes Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. **Blue:** Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened. (CDC 2014)

which are on the Red list (CDC, 2014) (Table 7). Of these, the "dune wildrye-beach pea" ecosystem was confirmed to occur within the drift log zone at the uppermost end of the beach.

Additional detailed investigation during the growing season is needed to confirm whether or not the other listed ecosystems are present, to what extent, and whether they are at risk within the park.

Table 6. Animal species considered at risk in the Sunshine Coast Regional District that do or may occur in Coopers Green Park (adapted from CDC 2014)

English Name	glish Name Scientific Name BC COSEWIC		Comments	
	(Synonym)	LIST	(Listing Date)	
Northern Goshawk,	Accipiter gentilis	Red	Threatened	Less likely due to preference for continuous
laingi subspecies	laingi		(Apr 2013)	lorest rather than edge habitat.
Western Toad	Anaxyrus boreas	Blue	Special Concern	Probably no breeding habitat available in
	(Bufo boreas)		(Nov 2012)	park wetlands, due to salinity.
Great Blue Heron,	Ardea herodias	Blue	Special Concern	Known to occur in Coopers Green Park; do
fannini subspecies	fannini		(Mar 2008)	the Pond and Lagoon provide feeding habitat?
Marbled Murrelet	Brachyramphus	Blue	Threatened	Possibly observable in Halfmoon Bay from
	marmoratus		(May 2012)	beach.
Painted Turtle - Pacific	Chrysemys picta	Red	Endangered	Known to occur in Trout Lake. Probably no
Coast Population	pop. 1		(Apr 2006)	breeding habitat available in park wetlands, due to salinity.
Olive-sided Flycatcher	Contopus cooperi	Blue	Threatened	Probably present in summer.
			(Nov 2007)	
Monarch butterfly	Danaus plexippus	Blue	Special Concern	Possibly in SCRD; larvae's preferred food
			(Apr 2010)	plants are milkweeds (Asclepias spp.)
Western Branded	Hesperia colorado	Red	Endangered	Unlikely. Historically associated with
Skipper butterfly,	oregonia		(Nov 2013)	meadows, sand-dunes and Garry Oak and
<i>oregonia</i> subsp.				from the Sunshine Coast and Lower
				Mainland.
Barn Swallow	Hirundo rustica	Blue	Threatened	Probably present in summer
			(May 2011)	
Western Screech-Owl,	Megascops (Otus)	Blue	Threatened	Possibly present in the upland coniferous
kennicottii subspecies	kennicottii kennicottii		(May 2012)	forest
Threaded Vertigo snail	Nearctula sp. 1	Red	Special Concern	Preferred habitat is deciduous forest litter
	(Nearctula rowellii)		(Apr 2010)	
Band-tailed Pigeon	Patagioenas fasciata	Blue	Special Concern	Probably present in late summer and fall,
	(Columba fasciata)		(Nov 2008)	teeding on berries
Northern Red-legged	Rana aurora	Blue	Special Concern	Probably no breeding habitat available in
Frog			(Nov 2004)	park, due to salinity

Table 7. Ecosystems considered at risk in the Coastal Douglas-fir Biogeoclimatic Zone of the Sunshine Coast Regional District that do or may occur in Coopers Green Park (adapted from CDC 2014)

ECOSYSTEM / Scientific Name	English Name	Ecosystem Group	BC List	Notes - 2014
BEACH		•		
Elymus mollis ssp. mollis - Lathyrus japonicus	dune wildrye - beach pea	Beach Beachland (Bb)	Red	Observed
ESTUARINE		•		
Carex lyngbyei - Herbaceous Vegetation	Lyngby's sedge - Herbaceous Vegetation	Estuary Marsh (Em)	Red	Possibly at N end of Lagoon
Deschampsia cespitosa ssp. beringensis - Hordeum brachyantherum	tufted hairgrass - meadow barley	Estuary Meadow (Ed)	Red	Possibly around Pond
Deschampsia cespitosa ssp. beringensis - Symphyotrichum subspicatum	tufted hairgrass - Douglas' aster	Estuary Meadow (Ed)	Red	Possibly around Pond
Distichlis spicata var. spicata - Herbaceous Vegetation	seashore saltgrass - Herbaceous Vegetation	Estuary Marsh (Em)	Red	Possibly around Pond
Juncus arcticus - Plantago macrocarpa	arctic rush - Alaska plantain	Estuary Meadow (Ed)	Red	Possibly around Pond
Ruppia maritima - Herbaceous Vegetation	beaked ditch-grass - Herbaceous Vegetation	Estuary Marsh (Em)	Red	Possibly around Pond and Lagoon
Salicornia pacifica - Glaux maritima	American glasswort - sea-milkwort	Estuary Marsh (Em)	Red	Salicornia present; Glaux not observed
FOREST				
Thuja plicata / Oemleria cerasiformis	western redcedar / Indian-plum	Coniferous - moist/wet	Red	Possibly in remnant forest on west side of park
Thuja plicata - Pseudotsuga menziesii / Eurhynchium oreganum	western redcedar - Douglas-fir / Oregon beaked-moss	Coniferous - moist/wet	Red	Possibly forest on east side of Redrooffs Rd

3.7. Summary of Environmentally Sensitive Areas (ESAs)

The following areas, presented in descending order of priority, are of the park are considered environmentally sensitive because of their importance for biodiversity and the relative abundance of the habitat type in the area (Table 7, p.11):

- Pond and its riparian zone.
- Lagoon and its riparian zone.
- Beach area (intertidal and back-shore zones).
- Kitchin Creek and its riparian corridor.

In addition, any tree containing the (active or inactive) nest of a heron or raptor, which may be identified in future, should also be designated an ESA and the provincial protection guidelines followed.

Environmentally Sensitive Area	Unique and regionally uncommon species	Regionally uncommon ecosystem	Sensitive to disturbance from human activity	Provides critical habitat to key species	Protected under Fisheries Act & Fish Protection Act
Pond and its riparian zone (saltmarsh)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Lagoon and its riparian zone	\checkmark	\checkmark	\checkmark		\checkmark
Beach (marine foreshore)				\checkmark	\checkmark
Kitchin Creek and its riparian corridor					√*

 Table 8. Summary of Environmentally Sensitive Areas in Coopers Green Park.

* additional investigation of fish habitat values in Kitchin Creek is warranted, as the results of the present study have not confirmed the presence of fish in Kitchin Creek, and the seasonal absence of flow in the channel suggests that the sensitivity of the stream with respect to fish may be low.

4. RIPARIAN ASSESSMENT

4.1. Freshwater Ecosystems

The results of the Riparian Assessment of Kitchin Creek are summarized in Table 8 and Figure 2, based on the RAR Simple Assessment method. The competed RAR report is provided in Appendix 2 (this report has not been submitted to the RAR Notification System).

The answers to the three questions underlying the Simple Assessment were:

- (1) the width of the existing or potential vegetation beside Kitchin Creek is \geq 30 m;
- (2) the stream is reported to be fish-bearing, at least seasonally; and
- (3) the stream is permanent as it has flow for more than 6 months a year.

Based on these findings, the width of the Streamside Protection and Enhancement Area (SPEA) established for Kitchin Creek is 30 m, measured from the top of the stream bank. Existing developments within the SPEA are "grandfathered" and allowed to remain and be maintained as long as their footprint does not increase.

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This finding means that any proposed future development (per the definition of "development" under the RAR) should be sited outside of the 30 m-wide boundary on either side of Kitchin Creek. Alternatively, a Detailed Assessment should be conducted and the SPEA resulting from that method should be applied, and/or any unavoidable riparian habitat losses can be offset through the implementation of a habitat compensation plan.

Given that the proponent for such a development would be a local government and the land in question is zoned as a park, it is recommended that, in the event that development within the SPEA were to be considered necessary, the SCRD contact the RAR authorities in Victoria for further guidance.

 Table 8. Determination of the Streamside Protection and Enhancement Area (SPEA) of Kitchin Creek, Coopers Green Park, under the Simple Assessment method of the Riparian Areas Regulation. (adapted from Government of BC, 2014)

Vegetation Category	Existing or potential streamside vegetation	Streamside Protection and Enhancement Area Width*				
	conditions	Fish bearing	Non-Fish Bear	ing		
		rish bearing	Permanent	Non Permanent		
1	Continuous areas ≥30 m or discontinuous but occasionally > 30 m to 50 m	30 m	30 m	Minimum 15 m Maximum 30m		
2	Narrow but continuous areas = 15 m or discontinuous but occasionally > 15 m to 30 m	Minimum 15 Maximum 30	15 m			
3	Very narrow but continuous areas up to 5 m or discontinuous but occasionally > 5 m to 15 m	15 m	Minimum 5m Maximum 15 m			

* The SPEA is measured from the top of bank or top of ravine bank.

It is noted that the RAR does not apply to creek crossings, which are addressed instead under Section 9 of the Water Act. (See <u>http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/</u>)

4.2. Marine and Estuarine Ecosystems

The SCRD's own riparian protection policy stipulates a minimum riparian protection zone width of 7.5 m from salt water (Trevor Fawcett, pers. comm.). This width is interpreted by SCRD staff to apply within Coopers Green Park along the marine shoreline and along the shores of the Pond to the inlet of the Lagoon (Figure 2).

The zone along the marine back-shore is already developed, as it is almost entirely occupied either by the paved surface and verges of Fisherman's Road or by other developed or landscaped areas of the park. The SCRD's option here is to plan any future development in a manner that meets the 7.5 m no-disturbance setback from the high tide level, or to justify and approve any variance to that policy. The SCRD, as the owner of the land, also has the option to increase the riparian protection zone along the Pond and Lagoon, to match the SPEA along Kitchin Creek or to an intermediate width, depending on any site-specific development plans that may be brought forward in the future.

Department of Fisheries and Oceans (DFO) guidelines with respect to projects near water are currently based on a self-assessment, completed online, through which a proponent can identify the types project activities and criteria for determining where a review by DFO is required. The guidance is available at the following website: <u>http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html</u>

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5. FUTURE DEVELOPMENT CONSIDERATIONS

A number of potential improvements or future development concepts have been identified for Coopers Green Park (Williams, 2007; Byzyna, 2009, 2010; Anon. 2010). The following were evaluated at a preliminary level as part of this assessment:

- Clean-up of human-made debris from within the Pond;
- Cleanup of buried garbage that may be present within the Lagoon;
- Modifications to the Pond, particularly its outlet, to create a deeper water body;
- Repairs to the Pond outlet to prevent entry of logs and other large floating debris;
- Replacement of the log culvert that connects the Pond and the Lagoon under Redrooffs Road;
- Installation of one or more additional buildings within the park;
- Construction of a trail within the park east of Redrooffs Road, possibly connecting to the existing trail network in the community of Halfmoon Bay.

Our comments regarding the environmental implications of each of these are provided below.

5.1. Clean-up of human-made debris in the Pond

Human-made debris within the Pond is comprised almost entirely of blocks or pieces of cement that appear to have been the foundation footings of former buildings at the site. The well-aged cement is not an environmental liability (i.e., there are no adverse impacts in water quality), in our opinion; however, the blocks considered an aesthetic problem.

Removal of this debris is best undertaken during a low tide in summer when there is no flow in Kitchin Creek, in order to facilitate access. Although these blocks are submerged, the water depth at low tide during the summer is shallow enough that they are readily accessible on foot (although hip waders or equivalent may be desirable). The smaller pieces can likely be lifted by hand, by one or two persons and loaded into a wheel barrow. Larger pieces can readily be removed by a machine, such as a rubber-tired back-hoe equipped with a thumbed bucket, and loaded into a nearby small truck for off-site disposal.

A rubber-tired machine is preferable to a tracked excavator in order to minimize the disturbance to vegetation and soils along the access routes to the removal sites. The overall environmental impact of such an operation would be negligible as long as the work is done carefully.

5.2. Clean-up of buried garbage that may be present within the Lagoon

Remnants of garbage were found in several places around the Lagoon (Figure 2). All but one were close to the entrance to the trail that borders the south edge of the park. One deposit at the south end of the Lagoon was partially in the water and consisted of older waste (Photo 21) that might conceivably contain artifacts of historical interest. All the other deposits were on land well away from the water and, with one possible exception on the northeast side, appeared to be much more recent, judging by the presence of plastics and aluminum foil (Photo 22). In general, all of the garbage deposits observed were small (less than 1 m³) and did not appear to be the source of any significant environmental impacts. However, the more recent deposits, in particular, do present an aesthetic impact, and shards of broken glass in any of the deposits may present a safety hazard.

Removal of the one deposit within the Lagoon is not recommended, in our view, because the small amount of material does not warrant the disturbance to the bank and adjacent aquatic habitat. However, the more recent material in the upland deposits can be readily removed by hand for proper disposal off site.

5.3. Repairs to the Pond outlet to prevent entry of logs

Logs and other large floating debris commonly enter the Pond through the culvert under Fisherman's Road and get trapped within the Pond or Lagoon. An iron grate over the culvert outlet has become damaged over time and is no longer effective. The damage has been caused, apparently, by logs moved by wave action at high tides and, possibly as well, by logs drifting out of the Pond during periods of high stream flow and ebbing tide. Although the logs are considered unsightly, their environmental impact in the Pond and Lagoon is negligible, in our view. In addition, preventing their entry or removing those that are already in the Pond or Lagoon also has no significant impact.

Replacing and up-grading the grate presents no significant risk to the marine or estuarine environments, provided that the work is planned and executed carefully. Ideally, the new grate would be appropriately engineered to withstand the anticipated forces. Since the timing of any cement work will need to be timed to prevent any contact between raw cement and flowing freshwater or saltwater, the work should be scheduled to take place during a low-low tide in late summer when there is no flow in the creek.

5.4. Improvements to the Pond and Lagoon

There is considerable interest in "improving" the Pond and the Lagoon to enhance the visual aesthetics, recreational use potential and, ostensibly, environmental aspects. Based on the available information (Williams, 2007; Byzyna, 2009, 2010; Anon. 2010), the perception that improvement is needed arises, at least in part, because these basins go dry for prolonged periods during the summer, the season when recreational use of the park is highest. The sediment deposits, in the Lagoon in particular, contain abundant organic matter and nutrients that support high biological productivity in the warm and shallow water above, leading to the growth of mats of floating filamentous estuarine algae that become stranded during low tide; the decomposition of the organic matter in the sediment and stranded algal mats and can cause unpleasant odours that detract from park users' enjoyment of the site.

A number of approaches to achieve the desired improvements have been identified. These are examined further below from an environmental viewpoint (cost implications are not addressed).

5.4.1. Removal of logs from the Pond and Lagoon

Removal of tidally delivered logs from Pond and Lagoon is considered to have low ecological risk, provided the work is carried out carefully. Floating logs can be towed, during a sufficiently high tide, to a suitable location for removal from the water, cutting (bucking) into shorter lengths if necessary, and transport off-site for disposal or re-use.

Sunken logs are best left in place in most cases, except where their removal is needed in order to facilitate other improvements (for example, to prevent bank erosion due to flow redirection by the log, or to enable or enhance passage by canoes and kayaks). Where removal of sunken logs is deemed necessary, it is recommended that the work should be undertaken under dry conditions in the summer (i.e., when there is a very low tide, no flow in the stream, and the substrate is sufficiently dry to enable easy access to the

logs). Disturbance of the sediments during any bucking or dragging of the logs is not considered a significant impact.

Mitigation effort in either type of log removal should focus on preventing release of any deleterious substance into the water or wetlands (e.g., fuels, lubricants, etc.) and minimizing damage to wetland or riparian vegetation.

5.4.2. Deepening of the Pond and Lagoon

Two approaches have been identified in order to create permanent, more aesthetically pleasing water bodies: excavation of accumulated sediments and/or raising of the Pond's outlet elevation. The environmental and other implications of both approaches, individually or in combination, are complex due to the facts that (a) these basins constitute the estuary of Kitchin Creek, which will continue to receive sediment either from the watershed or, tidally, from the adjacent foreshore; and (b) the two culverts and some of the adjacent lands are outside the park boundary and under the jurisdiction of the Ministry of Transportation (MoT).

Removal of silt and gravel which has built up over the years near the culverts under Redrooffs Road and Fisherman's Road would necessarily eliminate areas of existing wetland vegetation and increase the slope of the banks. Slope stability concerns would need to be addressed by a geotechnical engineer. If the steepened banks need to be supported by retaining walls, the substrate for wetland vegetation would be lost, reducing the overall habitat value of the wetlands.

Installation of an adjustable weir or "flap gate" at the Pond's outlet to raise the water level in the Pond and Lagoon has also been considered. This approach raises similar implications to excavation, and additionally may present a barrier to fish passage. The berm of Fisherman's Road would need to be assessed, in terms of both structural stability and impermeability, to ensure that it is suitable for impounding water permanently behind the road. Any necessary upgrades would need to be completed at the same time as the installation of the new water level control structure.

The main environmental impacts of raising the water level would be:

- (a) The water level control structure could, depending on the design, create a barrier to upstream fish movement. There is anecdotal evidence that juvenile salmonids fish used the Lagoon in the past; however, additional investigation is needed to confirm whether or not anadromous salmonids do use Kitchin Creek. If continuing fish presence is confirmed, any water level control structure would have to be designed to enable fish passage, and the project would likely need an Authorization under the Fisheries Act.
- (b) The existing wetland vegetation around the Pond and the Lagoon would be eliminated due to the combined effects of submersion by permanently higher water levels and a significant (if not complete) reduction of salinity due to the impoundment of freshwater. This effect would likely be most notable in the Pond, where the saltmarsh would likely not recover; whereas, in the Lagoon, wetland vegetation would likely become re-established around the new perimeter. Depending on the impounded water's depth and degree of drying during summer, it is also likely that wetland vegetation would progressively colonize the inner areas of the basins, which could, over time, become marshes rather than open-water ponds.

There is an also interesting jurisdictional implication here, if the existing estuarine habitat were to be replaced by freshwater habitat. It is conceivable that, after raising the Pond's outlet elevation, the mouth

of Kitchin Creek would actually be at Fisherman's Road or at least at Redrooffs Road. In this case, the Riparian Areas Regulation would apply to the shorelines around the Lagoon and/or the Pond.

5.4.3. Improvements to the shoreline of the Lagoon

Landscaping between the Lagoon and Redrooffs Road has been considered as a means of increasing the park area available for recreation (Anon., 2010). Described as an area where fill has been placed in the past, the improvements would entail selective removal of trees and other vegetation, followed by grading to create level ground and facilitate access to the edge of the Lagoon. It should be noted, however, that the northwest shore of the Lagoon appears to be within the MoT road allowance (Figure 1).

The environmental impacts of this activity would encompass elimination of selected areas of riparian vegetation, possible disturbance of the Lagoon bank (e.g., if steps to access the water were to be created), and increased risk of erosion and sedimentation while the disturbed soils remain exposed to rain. These impacts can be mitigated, however, through careful design and execution, including scheduling the work to take place entirely during the summer dry season. Once the landscaped sites are revegetated, however, the residual environmental impact would be low.

5.5. Replacement of the log culvert under Redrooffs Road

The culvert under Redrooffs Road is made of logs and is beginning to fail (Bates 2008 and present assessment). The Ministry of Transportation will likely be planning to replace this structure in the near future. However, no information is available on such plans or on the design of the new structure. It is therefore recommended that the SCRD should contact the MoT for an update on this issue.

The potential environmental impacts of replacing the log culvert centre on the direct disturbance of substrate and release of sediment into the estuarine habitat. These impacts can be readily mitigated by scheduling the work to take place under dry conditions (lower tides in summer when there is no flow in Kitchin Creek). In addition, however, such a project also presents an opportunity to enhance the ecological connection between the Pond and the Lagoon. Accordingly, we would recommend (as does Bates, 2008) that the log culvert should be replaced with an open-bottomed structure (clear-span bridge, box culvert or arch culvert) of equal or greater flow capacity.

5.6. Installation of one or more additional buildings within the park

Figure 3, provided by the SCRD, shows the locations where construction of possible additional buildings has been considered. Only building site #2 falls within the riparian zone of the Pond; all the other potential sites (# 1, #3 and #4) lie well away from the marine or estuarine riparian areas. It is also evident from the figure that there used to be two building beside the Pond in the past, which have since been removed. Site #2 is also located in an area that was formerly developed and no longer supports exclusively native riparian vegetation (Photo 23).



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Since the Pond's riparian zone falls under the jurisdiction of the SCRD, it is conceivable that any proposed building at site #2 could be designed to lie outside of the 7.5 m riparian protection zone or setback normally required under SCRD policy, or a variance approved. The potential environmental impacts of constructing and, in future, using such a building are considered negligible, provided that the setback is respected or adequate site-specific mitigation is implemented.

5.7. Construction of a recreational trail in the forested area of the park

The inland area of Coopers Green Park east of Redrooffs Road is entirely undeveloped at present. A recreational trail follows an old roadbed along the southwest boundary of the park and connects to an existing road to the south. The possibility of creating additional trails within the forested area of the park is also under consideration by the SCRD. The purpose of such a trail would be to provide a loop that park users could walk or bicycle along to view and enjoy the mature second-growth forest (which also includes several large old-growth western redcedar), Kitchin Creek, and the west side of the Lagoon. A conceptual alignment (prepared for illustrative purposes only) is shown in Figure 4.



Construction of such a trail poses minimal environmental risk if properly designed and carefully executed. Recommended mitigation measures would include, for example, aligning the trail to avoid the need to cut mature trees (as much as possible) or otherwise damage sensitive areas such as mossy bluffs, protecting tree roots as much as possible, ensuring that surface hydrology is not impaired by any fill, and timing the majority of construction (except the creek crossing) to avoid the bird nesting season, others. Part of the alignment would necessarily fall within the 30 m-wide SPEA of Kitchin Creek established under the RAR and would, therefore, need to follow that regulatory requirement. As mentioned in Section 4.1, the installation of a bridge or culvert on Kitchin Creek at the trail crossing would need to follow provincial requirements under Section 9 of the Water Act.

Table 3. Plant species observed or reported at Coopers Green Park.

	Species		Habitat t	Habitat type							
			Foreshor	е					Forest		
	Common Name	Scientific Name	Beach	Rock	Backshore	Developed	Wetland	Riparian	Upland	Inland rock bluff	Introduced
Trees											
coniferous	Douglas-fir	Pseudotsuga meziesii			х	х		х	х	x	
	Western redcedar	Thuja plicata				х		х	х		
deciduous	Bigleaf maple	Acer macrophyllum				х			х		
	Red alder	Alnus rubra							х		
	Arbutus	Arbutus menziesii			х	х			х		
	Bitter cherry	Prunus emarginata						х	х		
	Willow, Scouler's	Salix scouleri							х		
	Willow, Weeping	Salix sp.				х					x
Shrubs	Nootka rose	Rosa nootkana			х	х					
	Baldhip rose	Rosa gymnocarpa			Х			х	х		
	Oceanspray	Holodiscus discolor				х				x	
	Salmonberry	Rubus spectabilis									
	Saskatoon	Amelanchier alnifolia								x	
	Red Huckleberry	Vaccinium parvifolium									
	Evergreen huckleberry	Vaccimium ovatum									
	Thimbleberry	Rubus parviflorus									
	False box	Pachistima myrsinites									
	Snowberry	Symphoricarpus albus									
	Salal	Gaultheria shalon									
	Red elderberry	sambucus racemosa						х	х		
	Oregon grape	Mahonia nervosa				х					
	Crabapple	Malus fusca				х	х				
	(unidentified shrub)							х			x
	Scotch broom	Cytisus scoparus				х	х				x
	Juniper	Juniperus sp.									?
	Trailing blackberry	Rubus urcinus									
	Orange Honeysuckle	Lonicera ciliosa				х			х		
	Beach pea	Lathyrus japonicus			х						
	Himalaya blackberry	Rubus discolor		х		х	х				x
	"Yucca"	Yucca sp.?				х					Х
	Cotoneaster	Cotoneaster salicifolius				х					х
	Holly	llex sp.									x

COOPERS GREEN PARK: ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT 4 December 2014.

Shubs (continued)	Common Name	Scientific Name	Beach	Rock	Backshore	Developed	Wetland	Riparian	Upland	Inland rock bluff	Introduced
	lvy	Hedera sp.				х		х	х		х
	Apple, domestic	Malus sylvestris		х							х
	Cherry, domestic	Prunus sp.		х							х
	Laurel?	?						х	х		х
	Daphne, spurge laurel	Daphne laureola				х			х		х
Forbs	Curly dock	Rumex crispus		х			х				
	Gumweed	Grindelia integrifolia		х			х				
	Saxifrage	Saxifraga sp.		х						x	
	Stonecrop	Sedum		х							
	Plantain	Plantago sp.		х							?
	Pickleweed, saltwort	Salicornia virginica					х				
	Orache	Atriplex patula					х				
	Fringecup	Tellima grandiflora							х		
	Water plantain	Alisma plantago-aquatica					х				
	Hawkweed	Heracium sp.				х					?
	Rose campion	Lychnis coronaria									х
	Dandelion	Taraxacum officinale				х					
	Wall lettuce	Lactuca muralis									
	Strawberry	Fragaria sp.							х		?
	Herb-Robert	Geranium robertuanum								х	х
	St. John's-wort	Hypericum sp.									?
Ferns	Swordfern	Polystichum munitum						х	х		
	Deerfern	Blechnum spicant						х	х		
	Bracken	Pteridium aquilinum			х	х		х	х		
	Ladyfern	Athyrium filix-femina					х				
	Licorice fern	Polypodium glycyrrhiza							х	х	
Grasses & Sedge	S										
	Dune grass	Elymus mollis			х		х				
	Meadow barley?	Hordeum brachyantherum?					х				
	Tufted hairgrass	Deschampsia cespitosa					х				
	u.i. grasses			х	х	х	х	х	х	х	
	sedge	Carex sp.					х				
	woodrush	Luzula sp.						х	х		
Horsetails	Swamp horsetail	Equisetum fluviatile					х				
Mosses	Menzies' tree moss	Leucolepis acanthoneuron							х		
	Oregon beaked moss	Kindbergia oregana							х		
	Step moss	Hylocomium splendens							x	x	

Table 4. Animal species observed, reported or expected to occur at Coopers Green Park, September 2014.

	Species		Habitat type						
			Marine						Fo
	Common Name	Scientific Name	Beach	Rock	Backshore	Developed	Wetland	Riparian	Up
Birds	Northwestern Crow	Corvus caurinus	Х			х	Х		
	Glaucous-winged Gull	Larus glaucescens	Х	х					
	American Oystercatcher	Haematopus palliatus		Х					
	Common Merganser	Mergus merganser	Х						
	Common Goldeneye	Bucephala clangula	Х						
	Belted Kingfisher	Megaceryle alcyon	Х	Х			Х		
	Great Blue heron	Ardea herodias fannini	Х	Х	x	x	Х	Х	
	American Robin	Turdus migratorius							Х
	Steller's Jay	Cyanocitta stelleri							Х
	Spotted Towhee	Pipilo maculatus							X
Mammals	Douglas squirrel	Tamiasciurus douglasii							X
	Cougar*	Puma concolor					х	x	x
	Coyote*	Canis latrans				x	X	х	
	Black bear*	Ursus americanus				x	x	x	X
	Columbia black-tailed deer*	Odocoileus hemionus columbianus				X		X	х
	Roosevelt elk*	Cervus canadensis roosevelti				X		X	х
Invertebrates	Sea star	Pisaster ochraceus	Х	X					
	unidentified clams		Х						-
	unidentified barnacles								
	* - possible, not observed								

	-		
Forest			
Upland	Inland	rock	Introduced
	bluff		
Х			
Х			
X			
X			
X			
x			
x			
x			
Δ			

6. PHOTOGRAPHS



Photo 1. The beach at Coopers Green Park, Halfmoon Bay, viewed from north end of park. Tide level is approx. 2.0 m.



Photo 2. Bedrock outcrop on the beach at Coopers Green Park.



Photo 3. Armour of riprap boulders along the back-shore at Coopers Green park, viewed to north from top of boat ramp. Tide level is approx. 2.1 m.



Photo 4. Cement walls along top of beach at Coopers Green Park.

COOPERS GREEN PARK: ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT 4 December 2014.



Photo 5. Lower tidal pond (The Pond) at Coopers Green Park, viewed toward outlet under Fisherman Road. Seawater enters culvert when tide is greater than 3.96 m (13 ft).



Photo 6. Upper tidal pond (The Lagoon) viewed toward outlet under Redrooffs Road on left.



Photo 7. Mature second-growth coniferous forest in deeper-soil south-central area of Coopers Green Park.



Photo 8. Mature second-growth coniferous forest in rocky northeast area of Coopers Green Park.



Photo 9. Remnant coniferous forest beside the parking area at north end of Coopers Green Park.



Photo 10. Bedrock outcrop in riparian coniferous forest on east side of the Lagoon.



Photo 11. Blown-down Douglas-fir tree in an area of shallow soils where bedrock and boulders predominate in the substrate, on the east side of the park above the Lagoon.



Photo 12. Dry channel of Kitchin Creek immediately above the mouth, viewed toward the Lagoon.



Photo 13. Dry channel of Kitchin Creek in the central area of the park, viewed downstream. Scale is 1 m.



Photo 14. Abandoned waterworks (cement weir and pipes) on Kitchin Creek in the central area of the park (see Fig. 2). Inset: rotting segment of old wood-stave pipe.



Photo 15. Young deciduous forest at the south end of Coopers Green Park.



Photo 16. Developed area of Coopers Green Park viewed to north; Redrooffs Road is on right.

COOPERS GREEN PARK: ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT 4 December 2014.



Photo 17. Main building at Coopers Green Park, viewed from north side.



Photo 18. Concrete boat launching ramp on the beach at Coopers Green Park. Tide level is approx. 2.1 m.



Photo 19. Built infrastructure in the developed area on the north side of the Pond in Coopers Green Park, viewed east from Fisherman's Road.



Photo 20. Forest floor is completely covered with English ivy on both sides of trail on south edge of park near Redrooffs Road. Although sparser, the ivy is present deep in the forest as well.



Photo 21. Deposit of "older" garbage at the edge of the Lagoon at the southwest corner (see Fig. 2). The pile is well decomposed and much localized. Inset: bottom of broken Killmarnock Whisky bottle.



Photo 22. Deposit of "newer" garbage above the south bank of the Lagoon below the trail. There are several small deposits containing plastics and aluminum foil.

COOPERS GREEN PARK: ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT 4 December 2014.



Photo 23. Conceptual building Site #2 on the northeast side of the Pond, viewed from Redrooffs Road. Note that this site was formerly developed.

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Personal Communications

Ramona de Graaf, Forage Fish Specialist, Emerald Biological and Coastal Conservation Institute of B.C.

Trevor Fawcett, Park Planner, SCRD, Sechelt, BC.

Jim Wilson, Senior Fisheries Technician, Gibsons, B.C.

An attempt was made to communicate by telephone with Kai Goodwin was not successful.

APPENDICES

Appendix 1: Detailed Weather Data for Merry Island Lightstation (Halfmoon Bay)

Source: Canadian Climate Normals Station Data 1981 – 2010, Environment Canada. 2014 (<u>http://climate.weather.gc.ca/climate_normals/</u> (Accessed November 2014)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	5.4	5.7	7.3	9.7	13	16	18.2	18.2	15.2	10.8	7.3	5.2	11
Standard Deviation	1.2	1.2	1	0.9	1	1	0.9	0.8	0.8	0.7	1.4	1.3	1.2
Daily Maximum (°C)	7.1	7.7	9.6	12.4	16.1	19	21.4	21.3	18.1	12.9	9	6.8	13.5
Daily Minimum (°C)	3.6	3.6	4.9	6.9	10	12.9	14.9	15.1	12.3	8.7	5.5	3.5	8.5
Extreme Maximum (°C)	14.5	14.3	17.5	21	28.4	30.2	30	32.2	26.6	21.1	15.6	14	
Date (yyyy/dd)	2005/ 23	1986/ 27	2004/ 29	2004/ 30	1983/ 29	2003/ 06	2004/ 22	1961/ 04	1988/ 03	1975/ 01	1991/ 11	2005/ 24	
Extreme Minimum (°C)	-7.2	-10.1	-3.6	-1.1	2.5	5.6	9	8.9	3.9	-0.4	-7.3	-11.7	
Date (yyyy/dd)	1969/ 29	1990/ 13	2002/ 08	1975/ 03	2002/ 06	1966/ 01	1979/ 01	1973/ 18	1972/ 27	1984/ 31	1985/ 27	1968/ 28	

Temperature

COOPERS GREEN PARK: ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT – APPENDIX 1: DETAILED WEATHER DATA 4 December 2014.

Appendix 1 (continued). Detailed Weather Data for Merry Island Lightstation (Halfmoon Bay)

Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall (mm)	130.1	88.5	87.8	69.9	62.4	53.9	34.7	35.7	48.7	106	161.3	127	1006
Snowfall (cm)	5	4	2	0	0	0	0	0	0	0	4	8	23
Precipitation (mm)	135.5	92.2	90.1	69.9	62.5	53.9	34.7	35.7	48.7	106.1	165	134.5	1028.8
Average Snow Depth (cm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Median Snow Depth (cm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Snow Depth at Month-end (cm)	0	0	0	0	0	0	0	0	0	0	1	1	0
Extreme Daily Rainfall (mm)	78.2	49	51.8	31.8	37	41.9	37.1	42.4	69.4	63.4	50	66	
Date (yyyy/dd)	1968/	1983/	1997/	1962/	2004/	1972/	1968/	1962/	1983/	2003/	1989/	1972/	
	18	11	17	27	27	10	19	04	01	16	03	25	
Extreme Daily Snowfall (cm)	23	23	17	5	1	0	0	0	0	2	13	41	
Date (vvv/dd)	1971/	1975/	1997/	1975/	1985/	1958/	1958/	1958/	1958/	1991/	1996/	1968/	
	13	12	15	03	10	01	01	01	01	28	17	31	
Extreme Daily Precipitation(mm)	78.2	49	51.8	31.8	37	41.9	37.1	42.4	69.4	63.4	52.6	66	
Date (vvv/dd)	1968/	1983/	1997/	1962/	2004/	1972/	1968/	1962/	1983/	2003/	1964/	1972/	
	18	11	17	27	27	10	19	04	01	16	29	25	
Extreme Snow Depth (cm)	30	10	7	0	0	0	0	0	0	0	23	41	
Date (yyyy/dd)	1966/	1989/	1989/	1962/	1962/	1962/	1962/	1962/	1962/	1961/	1985/	1968/	
	05	17	01	01	01	01	01	01	01	01	28	31	

COOPERS GREEN PARK: ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT – APPENDIX 1: DETAILED WEATHER DATA 4 December 2014.

Appendix 1 (continued). Detailed Weather Data for Merry Island Lightstation (Halfmoon Bay)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<= 0 °C	0.4	0.2	0	0	0	0	0	0	0	0	0.4	0.8	1.8
> 0 °C	30.6	28	31	30	31	30	31	31	30	31	29.6	30.2	363.4
> 10 °C	4	3.7	13	25.1	30.9	30	31	31	30	28.2	9.6	2.8	239.2
> 20 °C	0	0	0	0.2	3	8.8	20.9	21.3	5.9	0	0	0	60.1
> 30 °C	0	0	0	0	0	0	0	0	0	0	0	0	0
> 35 °C	0	0	0	0	0	0	0	0	0	0	0	0	0

Days with Maximum Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
> 0 ° C	28	26.3	30.5	30	31	30	30.9	31	30	31	29	28.6	356.1
<= 2 °C	8.7	7.6	2.7	0.1	0	0	0	0	0	0.2	2.6	8.8	30.8
<= 0 °C	3	1.9	0.5	0	0	0	0	0	0	0	1	2.4	8.9
< -2 °C	0.6	0.3	0.2	0	0	0	0	0	0	0	0.6	0.9	2.6
< -10 °C	0	0	0	0	0	0	0	0	0	0	0	0	0
< -20 °C	0	0	0	0	0	0	0	0	0	0	0	0	0
< - 30 °C	0	0	0	0	0	0	0	0	0	0	0	0	0

Days with Minimum Temperature

COOPERS GREEN PARK: ECOSYSTEM SUMMARY AND RIPARIAN ASSESSMENT – APPENDIX 1: DETAILED WEATHER DATA 4 December 2014.

Appendix 1 (completed). Detailed Weather Data for Merry Island Lightstation (Halfmoon Bay)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
>= 0.2 mm	19	14.9	17.7	14.9	13.2	11	6.3	6.8	8.7	16.1	20.2	19	168
>= 5 mm	9.1	6.1	6.6	5.1	4.6	3.9	2.3	2.4	3.3	7.1	10.7	8.6	69.8
>= 10 mm	4.9	3.1	2.6	1.9	1.8	1.8	1.1	1	1.7	3.5	6.3	4.8	34.4
>= 25 mm	0.69	0.3	0.16	0.19	0.19	0.08	0.16	0.16	0.16	0.44	0.88	0.48	3.9

Days with Rainfall

Days With Snowfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
>= 0.2 cm	1.7	1.3	0.52	0.08	0.12	0	0	0	0	0.08	0.92	1.2	5.9
>= 5 cm	0.42	0.15	0.16	0	0	0	0	0	0	0	0.32	0.44	1.5
>= 10 cm	0.12	0.07	0.08	0	0	0	0	0	0	0	0.04	0.16	0.47
>= 25 cm	0	0	0	0	0	0	0	0	0	0	0	0.08	0.08

Bright Sunshine

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Total Hours	54.1	87	130.3	180.6	228.3	220.7	282	270.8	214.6	117.4	57.4	50.4	1893.6
Days with measureable	15.9	18.4	22.7	24.6	27	26.6	28.5	29	27.3	21.8	16	15	272.6
% of possible daylight hours	20.1	30.5	35.4	43.9	48	45.4	57.5	60.6	56.6	35	20.9	19.7	39.5
Extreme Daily	8.8	10.5	12	13.6	15.3	15.5	15.5	14.9	12.8	10.9	9.2	8	
Date (yyyy/dd)	1996/	1996/	2001/	1989/	1997/	1988/	1988/	1994/	1988/	2001/	1999/	1990	
	31	22	22	28	17	13	18	02	01	06	04	/ 19	

Appendix 2: Riparian Assessment Report prepared under the Riparian Areas Regulation

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Riparian Areas Regulation: Assessment Report

Please refer to submission instructions and assessment report guidelines when completing this report.
Date 14 November 2014

I. Primary QEP Information

First Name	Alan	Mie	/liddle Name: J					
Last Name	Whitehead							
Designation	R.P.Bio.		Company: W	hitehead Env	vironmental			
			Consultants L	td.				
Registration #	586		Email alanjw	@telus.net				
Address	P.O. Box 41							
City	Bowen Island	Postal/Zip	V0N 1G0	Phone #	604-947-0144			
Prov/state	BC	Country	Canada					

II. Secondary QEP Information (use Form 2 for other QEPs)

First Name	Middle	Name	
Last Name			
Designation		Company	
Registration #		Email	
Address			
City	Postal/Zip		Phone #
Prov/state	Country		

III. Developer Information

First Name	Trevor	Μ	iddle Na	ame	
Last Name	Fawcett				
Company	Sunshine Coast Regional	Distric	t, Parks	Department	
Phone #	604-885-6800 ext 6420		Email	Trevor.fawcwett@sc	rd.ca
Address	1975 Field Road				
City	Sechelt	Posta	l/Zip	VON 3A1	
Prov/state	BC	Count	try	Canada	

IV. Development Information

Development T	Recreational [Note to SCRD: see p. 2 of Assessment Report Guidelines]					
Area of Development (ha)		undetermined		Riparian Length (m)		undetermined
Lot Area (ha)		3.54		Nature of New and/or		w and/or
				Developmen	t Re	development
Proposed Start Date	unde	termined	Р	roposed End Date	unde	termined

V. Location of Proposed Development

Street Address (or nearest town)			5500 F	isherman Roa	d			
Local Government	Sunshi	ne Coas	t Regional District Ci		City	y (Halfmo	on Bay)	
Stream Name	Kitchin Creek							
Legal Description (PID)	006-60	006-605-591, 010-592-547, 010-592-512			512	Region	2	
Stream/River Type	stream				DFO Area	16-1		
Watershed Code	Jervis Inlet, 900-126-, 10,434275,5483779							
Latitude	49	30	10	Longitude	123	54	23	

Completion of Database Information includes the Form 2 for the Additional QEPs, if needed. Insert that form immediately after this page.

FORM 1 Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Table of Contents for Assessment Report

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1.	Description of Fisheries Resources Values	3
2.	Results of Riparian Assessment (SPEA width)	4
3.	Site Plan	6
4.	 Measures to Protect and Maintain the SPEA (detailed methodology only). 1. Danger Trees. 2. Windthrow. 3. Slope Stability. 4. Protection of Trees. 5. Encroachment 6. Sediment and Erosion Control. 7. Floodplain. 8. Stormwater Management. 	7
5.	Environmental Monitoring	9
6.	Photos	10
7.	Assessment Report Professional Opinion	12

Section 1. Description of Fisheries Resources Values and a Description of the Development proposal

(Provide as a minimum: Species present, type of fish habitat present, description of current riparian vegetation condition, connectivity to downstream habitats, nature of development, specific activities proposed, timelines)

Kitchin Creek:

- 1. Anecdotal account of unidentified anadromopus salmonid fry seen at mouth (Jim Wilson, personal communication); whether the fish originated within the stream or entered from the marine/estuaring side is unconfirmed;
- 2. Seasonal riffle pool habitat (Oct-Jul); channel goes completely dry during the summer dry season;
- 3. Riparian vegetation is native second-growth coniferous forest for over 30 m from stream bank;
- 4. Stream flows into tidally influenced ponds within Coopers Green Park (SCRD);
- 5. Proposed development is recreational within SCRD park;
- 6. Specific activities are not yet determined: conceptually, may include, for example, one or more of such developments as buildings, landcaping, foot trail, foot bridge, interpretive signage, etc.;
- 7. The timeline is not yet determined.

Section 2. Results of Riparian Assessment (SPEA width)

Attach or insert the Form 3 or Form 4 assessment form(s). Use enough duplicates of the form to produce a complete riparian area assessment for the proposed development

The Simple Assessment yielded a SPEA width of 30 m.

See attached Form 4.

Section 3. Site Plan Insert jpg file below

Please see following page.

FORM 1 Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report



Section 4. Measures to Protect and Maintain the SPEA

This section is required for detailed assessments. Attach text or document files, as need, for each element discussed in chapter 1.1.3 of Assessment Methodology. It is suggested that documents be converted to PDF *before* inserting into the assessment report. Use your "return" button on your keyboard after each line. You must address and sign off each measure. If a specific measure is not being recommended a justification must be provided.

NOTE from QEP: This form has not been completed for the following reasons:

- 1. A Simple Assessment was completed; and
- 2. There is no concrete development proposal at this time; therefore, since the location and nature of the development are not known, the site-specific measures needed to protect and maintain the SPEA are yet to be determined.

1.	Danger Trees					
I,	(name of qualified environmental professional), hereby certify that:					
a)	I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the Fish					
	Protection Act,					
b)	I am qualified to carry out this part of the assessment of the development proposal made by the developer					
	(name of developer);					
C)	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment					
	Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods					
	set out in the Schedule to the Riparian Areas Regulation					
2.	Windthrow					
Ι,	(name of qualified environmental professional), hereby certify that:					
а.	I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the Fish					
	Protection Act;					
b.	I am qualified to carry out this part of the assessment of the development proposal made by the developer					
	(name or developer);					
C.	Paperti and la consistent of the development proposal and my assessment is set out in this Assessment.					
	set out in the Schedule to the Rinarian Areas Regulation					
2						
<u></u> з.	Slope Stability					
I,	(name or qualified environmental professional), hereby certify that:					
a.	Protection Act					
h	Frotection Act, Lam qualified to carry out this part of the assessment of the development proposal made by the developer					
ν.	(name of developer) :					
c.	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment					
	Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods					
	set out in the Schedule to the Riparian Areas Regulation					
4.	Protection of Trees					
Ι,	(name of qualified environmental professional), hereby certify that:					
a.	I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the Fish					
	Protection Act;					
b.	I am qualified to carry out this part of the assessment of the development proposal made by the developer					
	(name of developer);					
C.	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment					
	Report, and in carrying out my assessment of the development proposal, I have followed the assessment methods					
_						
5.	Encroachment					
I,	(name of qualified environmental professional), hereby certify that:					
a.	i am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the Fish					
h	FIGUE CIUM ACL,					
D.	ram qualined to early out this part of the assessment of the development proposal made by the developer					
c.	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment					
Ŭ.	Report: and In carrying out my assessment of the development proposal. I have followed the assessment methods					
	set out in the Schedule to the Riparian Areas Regulation					

FORM 1 Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

6.	Sediment and Erosion Control				
Ι,	(name of qualified environmental professional), hereby certify that:				
a.	I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the Fish				
	Protection Act,				
b.	I am qualified to carry out this part of the assessment of the development proposal made by the developer				
	(name of developer);				
C.	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment				
	Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods				
-	set out in the Schedule to the Riparian Areas Regulation				
7.	Stormwater Management				
Ι,	(name of qualified environmental professional), hereby certify that:				
a.	I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the Fish				
	Protection Act;				
b.	I am qualified to carry out this part of the assessment of the development proposal made by the developer				
	(name of developer);				
C.	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment				
	Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods				
	set out in the Schedule to the Riparian Areas Regulation				
8.	Floodplain Concerns (highly				
	mobile channel)				
Ι,	(name of gualified environmental professional), hereby certify that:				
a.	I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the Fish				
	Protection Act;				
b.	I am qualified to carry out this part of the assessment of the development proposal made by the developer				
	(name of developer);				
C.	I have carried out an assessment of the development proposal and my assessment is set out in this Assessment				
	Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods				
	set out in the Schedule to the Riparian Areas Regulation				

Section 5. Environmental Monitoring

Attach text or document files explaining the monitoring regimen Use your "return" button on your keyboard after each line. It is suggested that all document be converted to PDF *before* inserting into the PDF version of the assessment report. Include actions required, monitoring schedule, communications plan, and requirement for a post development report.

Whether or not the QEP will recommend environmental monitoring will depend on the location and nature of the proposed development, once the detailed development proposal is established by the SCRD.

We are recommending that an environmental monitoring regimen should be included for those components of the project that are located within or adjacent to the SPEA.

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Section 6. Photos

Provide a description of what the photo is depicting, and where it is in relation to the site plan.



Photo 1. Mouth of Kitchin Creek (dry) viewed toward the estuarine lagoon in Coopers Green Park. 24-Sep-2014



Photo 2. Channel of Kitchin Creek viewed downstream approx. 50 m from mouth. Scale is 1 m. 24-Sep-14

FORM 1 Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report



Photo 3. Channel of Kitchin Creek viewed downstream approx. 100 m from the mouth. Channel is approx. 0.7m deep and up to 1.2 m wide. 24-Sep-14



Photo 4. Channel of Kitchin Creek (dry) viewed upstream at point of entry into Coopers Green Park property, approx. 220 m from mouth. 25-Sep-14

Section 7. Professional Opinion

Assessment Report Professional Opinion on the Development Proposal's riparian area.

Date 14 November 2014

1. I/We Alan J. Whitehead, M.Sc., R.P.Bio.

Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)

hereby certify that:

- a) I am/We are qualified environmental professional(s), as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
- b) I am/We are qualified to carry out the assessment of the proposal made by the developer <u>Sunshine Coast Regional District</u>, which proposal is described in section 3 of this Assessment Report (the "development proposal"),
- c) I have/We have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
- In carrying out my/our assessment of the development proposal, I have/We have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation; AND

2. As qualified environmental professional(s), I/we hereby provide my/our professional opinion that:

a) if the development is implemented as proposed by the development proposal there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed, <u>OR</u>
 (Note: include local government flex letter, DFO Letter of Advice, or description of

how DFO local variance protocol is being addressed)

b) X if the streamside protection and enhancement areas identified in this Assessment Report are protected from the development proposed by the development proposal and the measures identified in this Assessment Report as necessary to protect the integrity of those areas from the effects of the development are implemented by the developer, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed.

[NOTE: "qualified environmental professional" means an applied scientist or technologist, acting alone or together with another qualified environmental professional, if

(a) the individual is registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics and subject to disciplinary action by that association,

(b) the individual's area of expertise is recognized in the assessment methods as one that is acceptable for the purpose of providing all or part of an assessment report in respect of that development proposal, and (c) the individual is acting within that individual's area of expertise.]

Submission Instructions

Riparian Areas Regulation – Qualified Environmental Professional – Assessment Report RAR-QEP-AR

Forms you will need to complete are

- Form 1 which has the database information, the description of the fisheries resources, development site plan, measures to protect and maintain the SPEA, and environmental monitoring.
- Form 2, if more QEPs are part of the project team.
- Either Form 3 the detailed assessment form(s) or Form 4 simple assessment form(s) which is for the results of the riparian assessment (SPEA width). Use enough copies of the form to complete the assessment of the site.
- Form 5 is the photo form(s). Duplicate for additional photos.

NB: See the Guidelines and the Assessment Methods for detailed instructions on the information required for completing the Assessment Report.

A complete Riparian Assessment Report based on the template forms must be converted to a *single* Portable Document Format PDF file prior to uploading onto the Notification System.

The Assessment Report must be complete, by submitting the information specified, and posted to provide notification to the local government, Ministry of Water, Land and Air Protection and the Department of Fisheries and Oceans Canada.

Tips for working with MS Word Template Forms

Using the forms

- Before beginning, print a hard copy of the form and the guidance files for reference
- · Open the template
- Enter data into the shaded fields on the form
- Use TAB to move from one field to another; SHIFT-TAB to go in reverse
- Text and digital photos may be inserted from other applications
- The amount of text that can be entered in each box is limited and cannot be changed by the user; boxes with date information, for example, require input like: yyyy-mm-dd.

Saving the completed form

- Assign name to the completed form
- Save a word document (*.doc file)
- Do not overwrite the Template (*.dot file) with your completed form
- If you do overwrite the template, you can download a new copy from this web site

Section 2. Results of Simple Riparian Assessment

Refer to Chapter 2 and Appendix of the Assessment Methods. Duplicate this form as needed for each assessment report.

	Date: 14 November 2014
Stream x	
Area	
Potential Rinarian Width(m)	
30 I, Alan J. White	ehead, M.Sc., R.P.Bio, hereby certify that:
a) I am a quali	ified environmental professional, as defined in the Riparian Areas Regulation made under the Fish
30 b) I am qualifie	ed to carry out this part of assessment of the development proposal made by the developer
30 <u>Sunshine C</u>	Coast Regional District : ed out an assessment of the development proposal and my assessment is set out in this Assessment
30 Report; and	
30 d) In carrying (out my assessment of the development proposal, I have followed the assessment methods set out in le to the Riparian Areas Regulation.
30	
30	
30	
Average 30	Category 1
Existing of Fotential Vegetation	
Yes	No**
Fish bearing X	
**If non fish-bearing, insert non-1	fish bearing status report
at the mouth several years ago.	sumed from one unconfirmed anecdotal report of a salmonid fry being observed
	I, <u>Alan J. Whitehead, M.Sc., R.P.Bio.)</u> , hereby certify that:
	under the Fish Protection Act;
	b) I am qualified to carry out this part of the assessment of the development proposal made by the
	c) I have carried out an assessment of the development proposal and my assessment is set out in
	this Assessment Report; and
	methods set out in the Schedule to the Riparian Areas Regulation.
Stream Flow Permanent	Non Permanent*
X	
*If non permanent flow, indicate	how this was determined?
Note: stream was dry when asse	essed by the QEP on Sept. 24 and 25, 2014.
	a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made
	under the Fish Protection Act; b) I am qualified to carry out this part of the assessment of the development proposal
	made by the developer <u>Sunshine Coast Regional District</u> ;
	c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report: and
	d) In carrying out my assessment of the development proposal, I have followed the assessment
	methods set out in the Schedule to the Riparian Areas Regulation.
SPEA Width (m) 30	

Comments

It is our understanding that the RAR does not apply to the estuarine (tidally influenced) ponds shown in the orthophoto on the following page.

It is recommended that the fish bearing status of this small seasonal stream should be confirmed. It is possible that the anecdotal account of a fish being observed at the mouth was an observation of a fish that had accessed this area from the estuarine and marine side, rather than from the freshwater zone upstream.

If the fish bearing status of Kitchin Creek is confirmed, and once the detailed development proposals are known, the SCRD may wish to consider the merits of completing a Detailed Assessment to address those development components for which a narrower SPEA may be desirable and appropriate.

Orthophoto showing assessment area

Attach JPG file of air/orthophoto (scale less than 3,000) outlining the elements in chapter 2 of Assessment Methods.

