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Environmental Overview of Benson Creek Falls Regional Park

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1.0 INTRODUCTION

1.1 General

This overview has been prepared to assist the RDN in updating the Benson Creek Falls Regional Park (BCFRP) Management Plan later in 2013. It is understood that opportunities to address some key environmental data gaps identified through this overview may be incorporated into the update of the BCFRP Management Plan.

This assessment is based on a review of existing information sources and site inspections carried out over February of 2013. It should be noted that seasonality constraints precluded a thorough inventory of floral and faunal resources in the park. Fieldwork involved mostly reconnaissance-level inspections, with a number of point features recorded using a hand-held GPS unit. A single owl call-playback survey was conducted in mid-February.

1.2 Scope & Objectives

The objectives of this assignment were to:

- Build on the information provided in the initial overview by J.C. Lee & Associates by incorporating more site-specific data; including areas added to the park after the 1999;
- Place natural resources of the park in a context that reflects recent changes in the conservation status of various species and ecosystems; and
- Discuss observable impacts to the park in the intervening 14 years since the first overview, with special reference to trail conditions and invasive vegetation.

1.3 Acknowledgements

We are grateful to Regional District of Nanaimo (RDN) personnel for providing background reports and mapping. Margaret Paridaen, RDN Parks Planner supplied copies of 1999 Preliminary Environmental Overview assessment prepared by J.C. Lee and Associates and the 1999 Management Plan Brief prepared by Archadia Landscape Architecture Ltd. Mr. Tom Sohler of RDN Development Services provided orthophoto coverage of the park. A site tour was provided by RDN Parks Technican Dave Wheldon.

2.0 ENVIRONMENTAL SETTING

2.1 Environmental Context

Benson Creek Falls Regional Park (BCFRP) extends across 22 hectares (ha) of forest near the confluence of Benson Creek and Flynnfall Creek (Fig. 1). Elevations within BCFRP range from approximately 210 m to 110 m above sea level. The main stem of Benson Creek originates on the southwestern flank of Mt. Benson. It flows in a northwesterly direction for approximately 5.7 km then flows to the northeast for approximately 5 km before draining into Brannen Lake. As part of the coastal plain extending across southeast Vancouver Island, topography in the vicinity of the park is for the most part gently undulating. The terrain in this region generally trends to the northeast. Reaches of Benson Creek and Flynnfall Creek occurring within BCFRP generally possess higher gradients than adjacent reaches both upstream and downstream. Riparian areas within the park are situated along deep ravines and steep bluffs.

According to maps prepared by the BC government (Neuzdorfer *et al.* 1992), the park is situated near the eastern margins of the Maritime Very Dry Variant of the Coastal Western Hemlock Biogeoclimatic Zone (CWHxm for short). However, the park's location less than 2 km from the western margins of the Moist Maritime Variant of the Coastal Douglas-fir Zone (or CDFmm) suggests BCFRP may occupy a transitional area between these two Variants. Both zones experience warm, dry summers and mild, moist winters, with brief periods of drought commonly occurring over mid-to-late summer (Green and Klinka 1994). Typical forest canopies within the CDFmm are dominated by Douglas-fir, Grand Fir and Western Redcedar, while common understorey plants include: Salal, Dull Oregon Grape, and Ocean-spray. Unlike the CDFmm, stands within the CWHxm Variant usually feature a large component of Western Hemlock, with less salal and ocean-spray in the shrub layers than occurs in the typical stand within the CDFmm (Green and Klinka 1994).

The BCFRP is located a short distance (< 2 km) from the Limits of the City of Nanaimo, within RDN Electoral Area D. Surrounding areas support diverse land uses commonly encountered along the urban/rural fringe of Vancouver Island including: forestry, gravel extraction, rural residential and competitive motocross. The two dominant land uses adjacent to the park are gravel extraction, which is concentrated to the east and north-east, and forestry, which occurs to the north, west, south, and southeast of the park. Tracts of forest surrounding the park are most often managed woodlots representing the early seral (< 40 years old) and mid-seral (40 - 80 years old) stages of forest succession.

Fisheries values within BCFRP have been summarized in the previous park overview by J.C. Lee and Associates (Cousens *et al.* 1999). No significantly updated information was available for the Benson Creek watershed through the Ministry of Environment's *HabitatWizard* online database. Cutthroat Trout and juvenile Coho Salmon were documented in the lower reaches of Benson Creek in the late 1990's. These salmonids have been stocked at neighbouring Brannen Lake at various times over the past decade or two. Both species have life histories that would require them to spend extended periods within the Benson Creek system.



Figure 1. Study Area context.

Cutthroat Trout are resident in the stream, and Coho rear there for at least a full year before migration. Cousens *et al.* (1999) note that these salmonids are considered to be present to the first significant obstacle in Benson Creek, a short falls downstream of the ravine trail crossing of the creek, located in the northern part of the park. Despite the likely absence of salmonids through the central and southern parts of the park, ravine areas throughout BCFRP are considered environmentally sensitive because they drain directly into fish habitat. Like many streams in the region, Benson Creek is reported to experience very low flows most summers.

3.0 EXISTING CONDITIONS

3.1 Expected & Documented Wildlife Occurrence

Mammals

Columbian Black-tailed Deer are reported to occur at fairly high densities in the region (Shackleton 1999), and deer sign was frequently encountered throughout the park in 2013 (Appendix A). Browsing sign on preferred shrubs (e.g. *Vaccinium*) appeared consistent with moderate levels of deer use. No evidence of use by Roosevelt Elk (a Blue-listed species) was noted during the site reconnaissance. In any event, the narrow riparian areas and limited occurrence of wetlands in BCFRP would provide little in the way of attractive habitats for elk.

Two of Vancouver Island's three large carnivore species are expected to occur infrequently within BCFRP; Black Bear and Cougar. In general, bear forage production appears fairly low within the park. However some use of streamside forest, semi-open forest, and individual large downed logs is expected over the early-to-late summer period. Typical Black Bear densities range from 0.3 to 1.3 bears per 100 ha on Vancouver Island (Davis and Hamilton 1996). Autumn concentrations of salmon-seeking bears are not expected at BCFRP. Cougars occur at higher densities on Vancouver Island than in most other locations in western North America, ranging from 1.5 to 3.8 individuals per 100 km². As cougars range over large territories, they are seldom seen. However, they often leave some indication of their presence in the form of prey remains, mark trees, or scats. No such sign was detected at BCFRP during the 2013 fieldwork. Because they are occasionally reported around the urban/rural fringe of Nanaimo, they are expected to traverse the park from time to time. The Island's other large carnivore, the Grey Wolf, is primarily associated with major river valleys on Vancouver Island, and is therefore not expected to occur here.

A number of smaller mammals expected to occur in the park have an affinity for riparian habitats including: Raccoon, Mink, and River Otter. High winter stream flows would appear to preclude use of the park by Beaver. Other mammals associated with upland forest are expected within the park, including: Eastern Cottontail, Marten, Red Squirrel, Deer Mouse, and Dusky Shrew. Of these, only squirrel sign was observed. The high degree of canopy closure, scattered mature trees, abundant woody debris, and high surface complexity found within BCFRP would be attractive for Marten.

Avifauna

Due to the timing of the 2013 fieldwork before breeding bird season, only 12 resident species were noted in and around BCFRP (Appendix A). Earlier work by Cousens *et al.* (1999) documented an additional 56 bird species occurring in the area. Overall, the BCFRP possesses a fairly diverse bird assemblage, with strong representation among several groups, including: raptors (12 species), sparrows (8 species), warblers/vireos (8 species), thrushes (5 species), corvids (4 species), and finches (4 species).

While many of the above are common forest species, there are several species of particular relevance to park management, due to their high conservation status and/or association with specialized habitats. The Northern Goshawk (*laingi* subspecies) is a Red-listed, or endangered, species according to the Conservation Data Centre (CDC). It has not been recorded in the area since the late 1990's. This large woodland hawk is associated with large tracts of mature forest with open forest floors (Fraser *et al.* 1999). Three Blue-listed, or threatened, species of birds have been recorded in the park in recent decades: the Band-tailed Pigeon, Northern Pygmy-owl and Olive-sided Flycatcher. The Band-tailed Pigeon is attracted to forests near gravelling areas during the breeding season, as these provide elements required for egg production and proper crop gland function (Campbell *et al.* 1990). The Northern Pygmy-owl is a forest-associated raptor that requires cavities in moderately large snags for nesting and roosting. The Olive-sided Flycatcher is an aerial insectivore that uses the tops of tall trees for foraging and territorial singing. Breeding habitat for this flycatcher includes semi-open coniferous forest and mixed forest, typically near a source of water (Campbell *et al.* 1997).

In addition to CDC-listed species, the park supports use by a number of bird species considered "Regionally Important," including the Cooper's Hawk, Sharp-shinned Hawk, Pileated Woodpecker, and Brown Creeper. The 2013 fieldwork confirmed the two later species still make extensive use of the park.

Although dozens of veteran trees and snags occur within BCFRP, no nests of nesting raptors or Great Blue Herons were detected in them during the winter 2013 fieldwork. A recent review of the Wildlife Tree Stewardship (WITS) online database revealed that the nearest known Bald Eagle nests are located about 3 km to the northeast (Brannen Lake) and southeast (Jingle Pot Road – see Appendix B). The WITS database includes two Great Blue Heron nest records relatively close to the BCFRP, one approximately 800 m to the northeast, and the other roughly 1000 m to the north of the park entrance. Government-sponsored nest inventory over 1994-2001 places the nearest goshawk nest roughly 14 km south of the park, within the Nanaimo River Valley.

As much of the bird inventory information for the park has become somewhat dated, it is recommended that additional field effort be directed toward determining the current occurrence of CDC-listed birds, as well as Regionally Important raptors, there.

Herptiles

Only one native amphibian species, the ubiquitous Pacific Treefrog, was observed within BCFRP during the winter 2013 fieldwork. This species likely breeds in the small wetland occurring along the eastern margin of the park. A relatively recent record (2003) was found in the CDC Rare Element Database indicating breeding by Red-legged Frogs, a Provincially Blue-listed species, in the lower quiet reaches of Flynnfall Creek (Appendix C). This species is associated with low-elevation forest with an abundance of coarse woody debris (Maxcy 2004). A variety of forest types are used by this species as "core" (or non-breeding) habitat, but riparian stands with a deciduous component are favoured. While moist streamside forest areas represent potential "core" habitat, Red-legged Frog breeding habitats appear restricted to a few small wetland areas within the park.

Several other amphibians species are likely to occur in the park, including pond-breeders and entirely terrestrial amphibians. Common pond-breeders in the region include the Rough-skinned Newt, Northwestern Salamander, and Long-toed Salamander. Native salamanders with entirely terrestrial habits may occur within moister parts of the park, particularly where large diameter recumbent logs and a heavy cover of leaf litter are present on the forest floor. These species include the Western Red-backed Salamander, the Wandering Salamander, and the *Ensatina*. The latter is closely associated with fir-dominated stands having a dense ground cover of mosses (Matsuda *et al.* 2006), a habitat type common in the southern part of the park. *Other than a lone CDC record, amphibian field inventory information for BCFRP is largely lacking, and additional surveys to determine the presence of two “at-risk” species (i.e. the Northern Red-legged Frog and Clouded Salamander) are recommended.*

In addition to amphibians, two species of garter snakes are expected to occur within BCFRP. Both are common and widespread on southern Vancouver Island, with considerable overlap in habits and habitats. The Northwestern Garter Snake is considered more terrestrial than the other snake, known as the Common Garter Snake (Matsuda *et al.* 2006).

3.2 Plants & Plant Communities

As given in Appendix D, a total of 52 vascular plants were identified during the 2013 field reconnaissance including 10 tree species, 17 shrub species, and 25 non-woody plants. Plant observations included five non-native species: English Holly, Spurge-laurel, Yellow Archangel, Herb-Robert, and Hairy Cat’s-ear. Additional plant species could likely be identified on-site during a spring or early summer plant search, as the timing of field activities was suboptimal for plant inventory. No endangered or threatened plants were detected on the site in 2013, and the potential for discovering rare plants is considered fairly low, given the dearth of wetlands and the dominance by upland forest types. Some potential exists for rare plants to occur within spray zones near waterfalls, as such habitats are very thinly distributed on Vancouver Island.

Though not CDC-Listed species, three regionally uncommon plants were noted within BCFRP. Several Pacific Yew trees (*Taxus brevifolia*), ranging in size from shrubs to small trees, were identified within the park (Fig. 1). This is a very slow-growing tree species, and would therefore be difficult to re-establish once removed. The Maidenhair Fern (*Adiantum pedatum*) requires specialized conditions for growth (high shade, soils with a thick humus layer) which are best met along stream-banks and in the misty areas around waterfalls. It is very sensitive to foot traffic along the many informal trails found in the vicinity of Ammonite Falls, and is deserving of protection as the characteristic plant of the park. A single occurrence of Evergreen Huckleberry (*Vaccinium ovatum*) was recorded in the southern part of the site (Fig. 2). This shrub is typically found within the salt spray zone of seaside conifer forests (Pojar and MacKinnon 1994) and it is not usually found this far from the coast. In addition to the above, it should be noted that Shore Pine (*Pinus contorta* var. *contorta*), while common elsewhere in the region, is found very infrequently within BCFRP. Only three specimens were observed in four days of fieldwork.



Figure 2. Several uncommon Pacific Yew trees occur within BCFRP. The largest specimen occurs near the Benson Creek crossing log.



Figure 3. A single specimen of Evergreen Huckleberry occurs near the old campground site beside Ammonite Falls.

Complications in classifying park ecosystems arising from transitional Biogeoclimatic Variants and variation in landform have been well-described in the previous BCFRP study by Cousens *et al.* (1999). While the existence of an intergrading between the CDDFmm and CWHxm Variants within the park is not denied, it is this author's opinion that the widespread presence of Western Hemlock trees in the park's forests, combined with the relative scarcity of Arbutus trees, suggests stands within BCFRP are more representative of the CWHxm Variant than the CDFmm Variant. Based on the presence of indicator plants, and inferred soil moisture/nutrient gradients, at least seven different CWHxm Variant plant communities have been identified within the park (Table 1). Four of these are upland forest ecosystems, and three are wetlands.

It is noteworthy that, due to high stream gradients and the presence of bluffs and ravines, floodplain plant communities are virtually absent from the park. Only a few small pockets of sparsely vegetated gravel bar were encountered below the confluence of Flynnfall Creek, and a few square metres of Salmonberry thicket (i.e. High Bench Floodplain units) were observed above the confluence. In the place of riparian ecosystems, streamside habitats within the park bear every resemblance to richer upland forest communities found on adjacent lower slopes (Site Series 01,05, and 07).

The most extensive plant community occurring within BCFRP is the HwFd-Kindbergia ecosystem type (CWHxm/01). Owing to historical logging patterns and continuing land development pressures in the region, the CDC considers this ecosystem type as critically imperiled within the South Island Forest District (Red-listed), and has assigned it the highest conservation priority under the Provincial Conservation Framework. Mid-seral stages of the HwFd-Kindbergia ecosystem type (40 – 80 years old) are broadly distributed across the gently sloping table lands of the southern and central parts of BCFRP. The tree canopy in these areas is typically dense and dominated by Douglas-fir, which sometimes forms pure stands (Fig. 3). The forest understory is dominated by Salal with a lesser occurrence of Dull Oregon Grape and Bracken Fern. Veteran trees occur infrequently in this ecosystem type.

Like the previous ecosystem, the FdPl-Cladina plant community (CWHxm/02) is also Red-listed by the CDC. However, it has been assigned a slightly lower priority for protection under the Provincial Conservation Framework (Priority 2). The FdPl-Cladina ecosystem type is broadly distributed across the park. Mid-seral stages of this ecosystem type occur along ridge crests and on the steep sides of ravines within the park. The tree canopy of this plant community is semi-open and dominated by Douglas-fir, with a lesser occurrence of Arbutus and the occasional Lodgepole Pine tree (Fig. 4). Clusters of veteran trees occur with some regularity within this ecosystem type, in areas that were historically difficult to harvest. The forest understory here is usually dominated by Salal, with a minor occurrence of Baldhip Rose, Prickly Rose, Trailing Blackberry and Dull Oregon Grape. Some areas support dense mats of moss, typically Step Moss and Oregon Beaked Moss.

Table 1. Summary of vegetation types observed within Benson Creek Falls Regional Park.

Plant Community (CWHxm Site Series)	Description	Conservation Status & Successional Stages	General Distribution in BCFRP
Upland Ecosystems			
HwFd – Kindbergia (01)	Average nutrient levels. Canopy predominantly fir with occasional cedar. Salal, Huckleberry, & Oregon Grape common on forest floor. Infrequent occurrence of veteran trees.	Red-list CF Priority 1 Mid-seral	Table lands to middle slopes of central & southern regions.
FdPl-Cladina (02)	Nutrient poor & rapidly-draining soils supporting Douglas-fir and Arbutus Salal dominates the understory. Patches of Baldhip Rose & Trailing Blackberry. Contains clusters of veteran trees.	Red-list CF Priority 2 Mid-seral	Ridge crests to middle slope of ravines.
Cw-Sword fern (05)	Above-average soil nutrients. Mixed canopy of conifers and Red Alder. Sword Fern dominates understory. Infrequent occurrence of veteran trees.	Blue-list CF Priority 2 Mid-seral	Benches and lower slopes near creeks; slopes of minor drainages.
Cw-Foamflower (07)	Above-average soil moisture and nutrient levels. Mixed canopy of firs, cedar, Big Leaf Maple & Red Alder. Sword Fern dominates understory with minor cover of Oregon Grape, Salmonberry, Lady Fern & Foamflower. Contains clusters of veteran trees.	Red-list CF Priority 2 Mid-seral Mature seral	Some lower slopes next to Benson & Flynnfall Creeks; Bottoms of minor drainages.
Wetland Ecosystems			
Hardhack Fen	Hardhack growing in association with Slough sedge and Salmonberry. Nutrient rich groundwater seepage.	n/a	2 small areas in eastern part of park
Sedge Fen	Patches of Slough Sedge and other herbaceous plants in shallow depressions. Remains moist in summer.	n/a	2 small areas on eastern part of park.
Cw-Slough Sedge	Patchy Slough Sedge and Salmonberry, with several fern species. Possibly of anthropogenic origin.	n/a	Confined to small area near old campground.



Figure 4. Mid-seral successional stage of the HwFd - Kindbergia ecosystem type.



Figure 5. Mid-seral successional stage of the FdPI - Cladina ecosystem type.

The Blue-listed Cw-Sword fern ecosystem type (CWHxm/05) possesses the second-highest conservation priority under the Provincial Conservation Framework. This ecosystem type is irregularly distributed across BCFRP. Mid-seral stages of the Cw-Sword fern ecosystem type occur on benchlands and slopes above Benson Creek, and on the slopes of most minor drainages. The tree canopy in these areas is typically dense, with a mix of conifers and Red Alder (Fig. 5). The forest understory is dominated by Sword Fern with a lesser occurrence of Red Huckleberry and juvenile shade-tolerant conifers. Veteran trees occur infrequently in this ecosystem type.

The Red-listed Cw-Foamflower ecosystem type (CWHxm/07) is yet another plant community with a relatively high conservation priority under the Provincial Conservation Framework (Priority 2). This ecosystem type has a spotty distribution within the park. Mid- and mature-successional stands of the Cw-Foamflower type occur on some lower ravine slopes, in a creek-side stand above Ammonite Falls, and along the bottom of a few minor drainages. The tree canopy in these areas contains a mix of conifers and deciduous trees, most notably Big Leaf Maple (Fig. 6). Soils in these areas are typically nutrient-rich due to deciduous litter fall and relatively moist owing to their lower slope locations. The forest understory is dominated by Sword Fern and juvenile conifers, with a minor amount of Salal and Red Huckleberry. With operational challenges to logging in times past, these sites often still possess clusters of veteran trees and snags.

The main water features of BCFRP include a high-gradient streams and associated waterfalls. However, a handful of small wetlands also occur within the park, all on the eastern side of Benson Creek. The largest of these wetlands measures approximately 20 m by 30 m. It occurs in the central part of the park, east of the Lower Falls. It was classified as a Hardhack Fen, a type of wetland that forms over peaty substrates and receives nutrient-rich groundwater. This wetland supports a heavy growth of Hardhack, with some native willows, and has little open water. A few metres to the southeast of this wetland is a small Slough Sedge Fen, measuring roughly 5 m wide by 30 m long (Fig.7). A second Hardhack Fen is located near the eastern park boundary. It measures only about 5 m wide and perhaps 50 m long, and supports Hardhack, Slough Sedge and Salmonberry, with a small open-water area (Fig. 8). Two other small wet depressions occur on the eastern side of Benson Creek, which may be anthropogenic in origin. The larger of these is situated adjacent to the old campground area. It currently supports a mix of sedges, ferns, and Salmonberry, suggesting a strongly fluctuating groundwater table. It was tentatively classified as a young example of the Cw-Slough Sedge ecosystem type.

The spatial distribution of the above plant communities within BCFRP is presented in Figure 9 below.



Figure 6. Mid-seral stage of the Cw – Sword fern ecosystem.



Figure 7. A mid-seral stage of the Cw - Foamflower ecosystem.



Figure 8. Small Sedge Fen wetland on table lands above Benson Creek.



Figure 9. Hardhack Fen wetland along the east-central margins of the BCFRP.

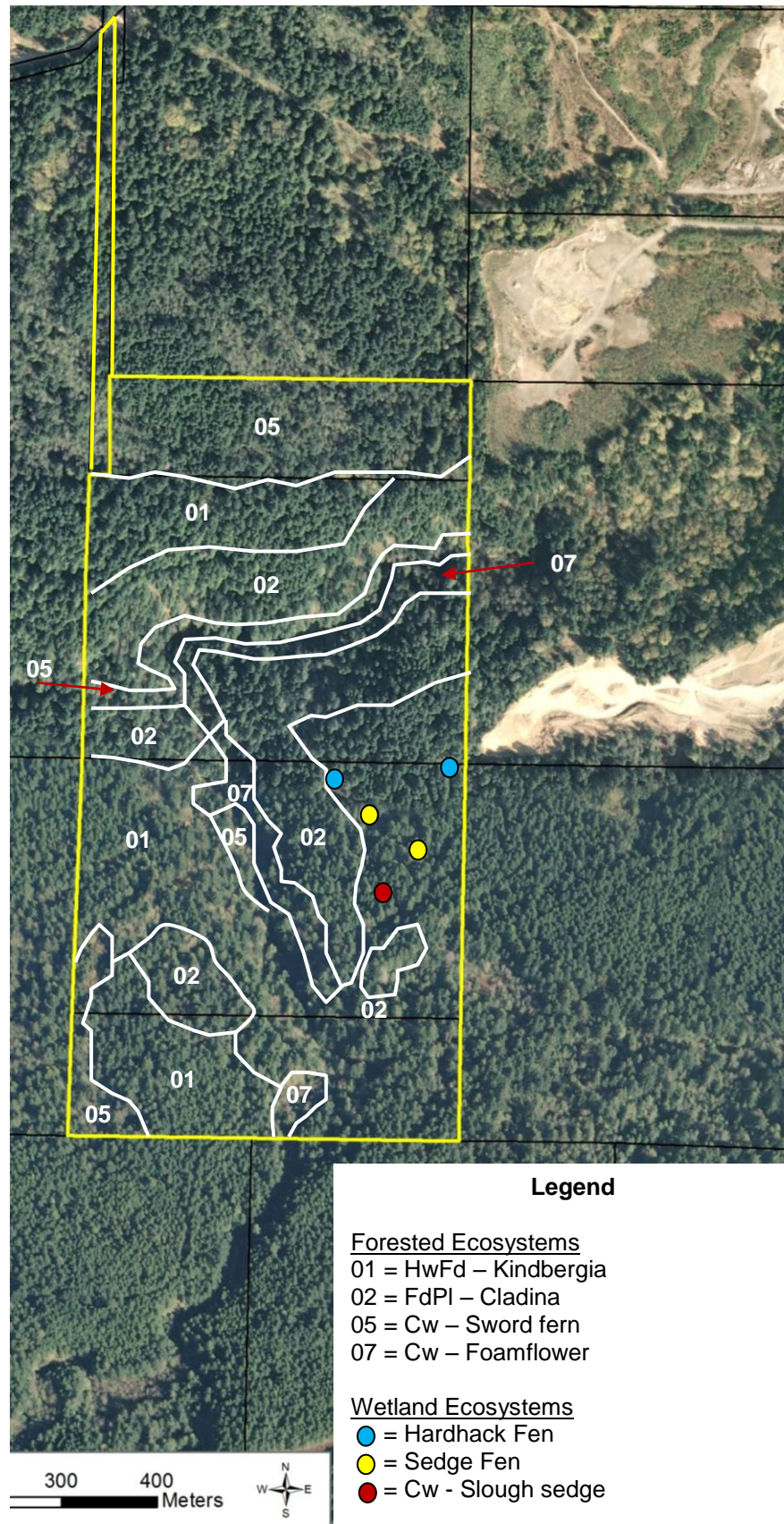


Figure 10. Generalized distribution of plant communities at Benson Creek Falls Regional Park.

3.3 Sensitive Ecosystem Inventory (SEI) Polygons

The bulk of SEI Polygon #N0930A runs through the central part of Benson Creek Falls Regional Park. This polygon was classified as a Riparian unit containing young and old streamside stands, and vegetation associated with gullies. Sensitivities related to this unit include above-average biodiversity values, the presence of specialized growing conditions, and a high susceptibility to erosion/damage to plant communities. The polygon appears to capture several ecosystem types including the FdPI-Cladina, Cw-Sword Fern, and Cw-Foamflower.

3.4 Veteran Trees & Snags

Benson Creek Falls Regional Park is a storehouse of large-diameter trees, which are important habitat elements for a variety of wildlife. Such veteran trees are becoming increasingly scarce within the Regional District of Nanaimo. A total of 38 veteran trees and snags/wildlife trees were opportunistically recorded during the 2013 fieldwork (Appendix E). Other such trees undoubtedly occur in BCFRP, within difficult to access areas. Overall, Douglas-fir was the most frequently recorded veteran tree. A total of 24 firs with diameters ranging from approximately 80 cm to 140 cm diameter-at-breast height (DBH) were noted. Three Western Redcedar trees ranging from 90 cm to 130 cm DBH and two Western Hemlocks exceeding 80 cm DBH were also recorded. Nine dead or dying trees, representing a wide range of decay classes and diameters, were detected within BCFRP. Snags bearing green branches but dead tops were detected in the park (Fig. 10), as were branchless trees with rotted stems. The diameter of the recorded snags ranges from about 35 cm to 110 cm.



Figure 11. Large-diameter fir snag on the eastern bank of Benson Creek within BCFRP.

The distribution of observed veteran trees, snags, and other notable trees is presented in Figure 11 below. As indicated below, veteran Douglas-fir trees are well-dispersed across the park, with a concentration of them on steep slopes and near slope breaks. Snags are relatively uncommon, as historically they would have been routinely removed before harvesting. They are virtually absent through the central part of BCFRP.

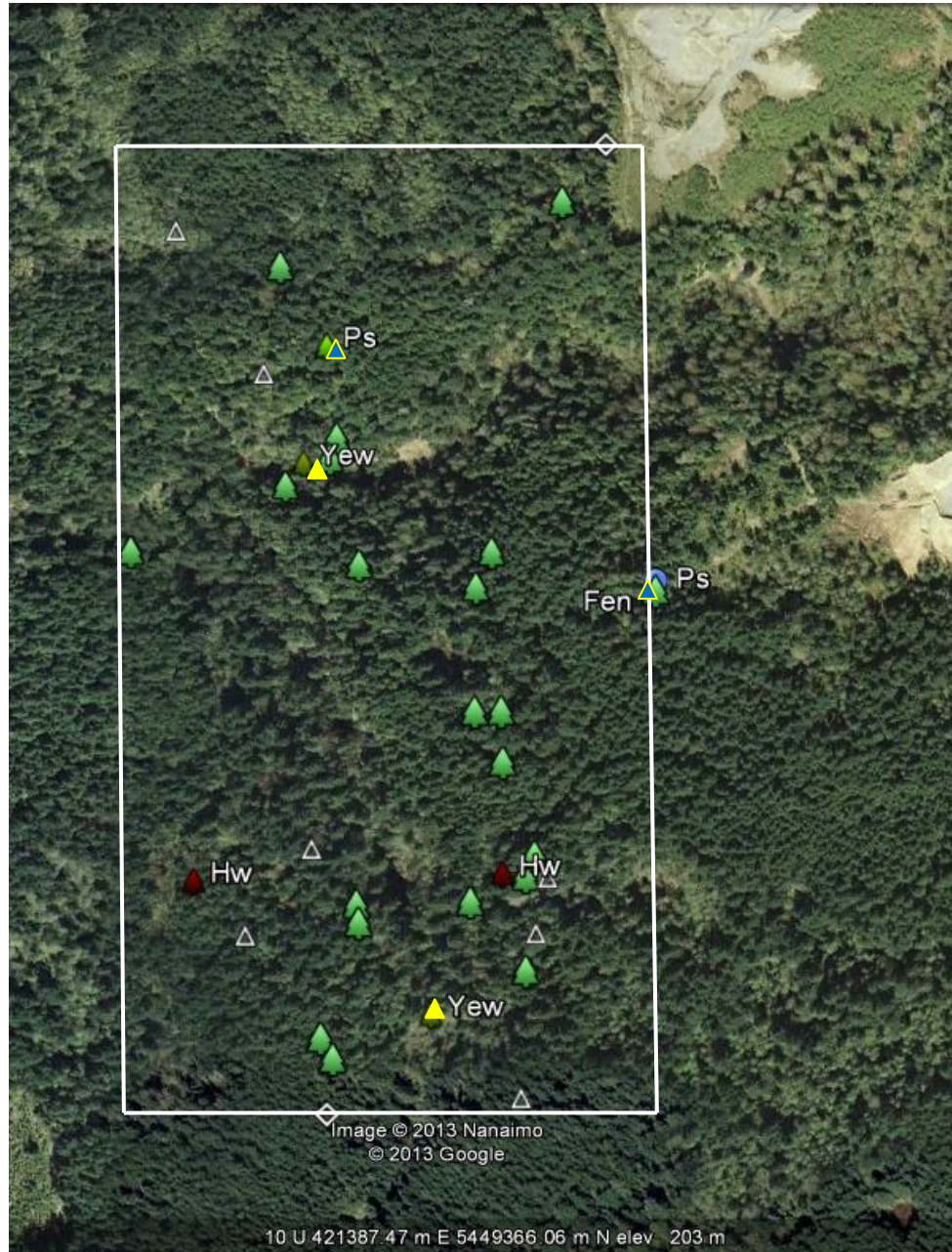


Figure 12. Distribution of some veteran trees, snags, and other notable trees in BCFRP.

Legend
Green trees = Douglas-fir Red trees = Western Hemlock Blue triangles = Shore Pine
Yellow triangles = Yew Blue triangles = Shore Pine White triangles = snags

4.0 DISCUSSION OF POTENTIAL DEVELOPMENT/ MANAGEMENT ISSUES

4.1 New Trail & Parking Lot Development

Benson Creek Falls Regional Park has no vehicular access at present, and it is unlikely that any parking improvements that might be contemplated would impact ecosystems within the park boundaries. Park users are currently required to park their vehicles at the main access off Weigles Road in the north, or near the gated end of Jameson Road in the south. There is a roughly 0.5 km long footpath leading south from the Weigles Road parking lot that passes through a narrow parcel of leased Crown Land leading to the central part of the park (Fig. 13). The southern end of the park is accessed via a forestry road through the Vancouver Island University Woodlot that runs west for approximately 1.1 km. A footpath at the end of this forestry road leads north for approximately 0.5 km before crossing the southern park boundary.

There is an existing network of formal and informal trails within BCFRP. However, the formal network is somewhat fragmented. One formal trail extends south from Weigles Road, heading south across Benson Creek, then terminating near the east-central park margins while the other starts in the southeast part of the park, runs southwest towards Ammonite Falls, then turns south crossing the southern park boundary (Fig. 13). There are opportunities to connect these two formal trails through a short (i.e. 150 m to 200 m long) trail through mid-seral forest in the east-central part of the park. *As this would run through a Red-listed ecosystem type (CWHxm/01), it is recommended that such a trail be routed to avoid larger standing trees and their drip lines.*

There are currently no formal trails on the western bank of Benson Creek, and public interest in forming a loop trail across this area may be expected at some point in the future. It is likely that a formal trail to scenic stair falls above Ammonite Falls (Fig. 14) will be popular with park users as well. *It is recommended that planning for any new trails on the west bank of Benson Creek involve detailed studies to identify environmental constraints such as highly-erodible slopes, the presence of “at-risk” ecosystems and amphibians, nesting birds, veteran trees, and large snags.*

4.2 Existing Trail Improvements

For the most part, formal trails within BCFRP have stood up to years of use without causing significant damage to adjacent vegetation. However, the short and over-steep spur trail to the bottom of Ammonite Falls is a prominent exception. First pointed out as a concern in 1999 by Cousens *et al.*, this spur trail has had no opportunity to naturally re-vegetate due to continuous heavy use, and the damaged area has gradually widened over the years (Fig.15). Given the loss of side-slope material, and the high gradient of Benson Creek through the park, it is possible that erosion here could affect the quality of downstream spawning fish habitats outside of the BCFRP boundaries. It should be considered the highest priority for existing trail improvement within BCFRP. *Given the RDN’s stated commitment to environmental stewardship, it is recommended that a significant investment be made in a set of stairs down to this popular destination.* Local examples of how access can be provided on steep, sensitive slopes are present at Stocking Creek Regional Park (Fig. 16), in the Cowichan Valley Regional District, and at Biggs Point Park, within the City of Nanaimo.

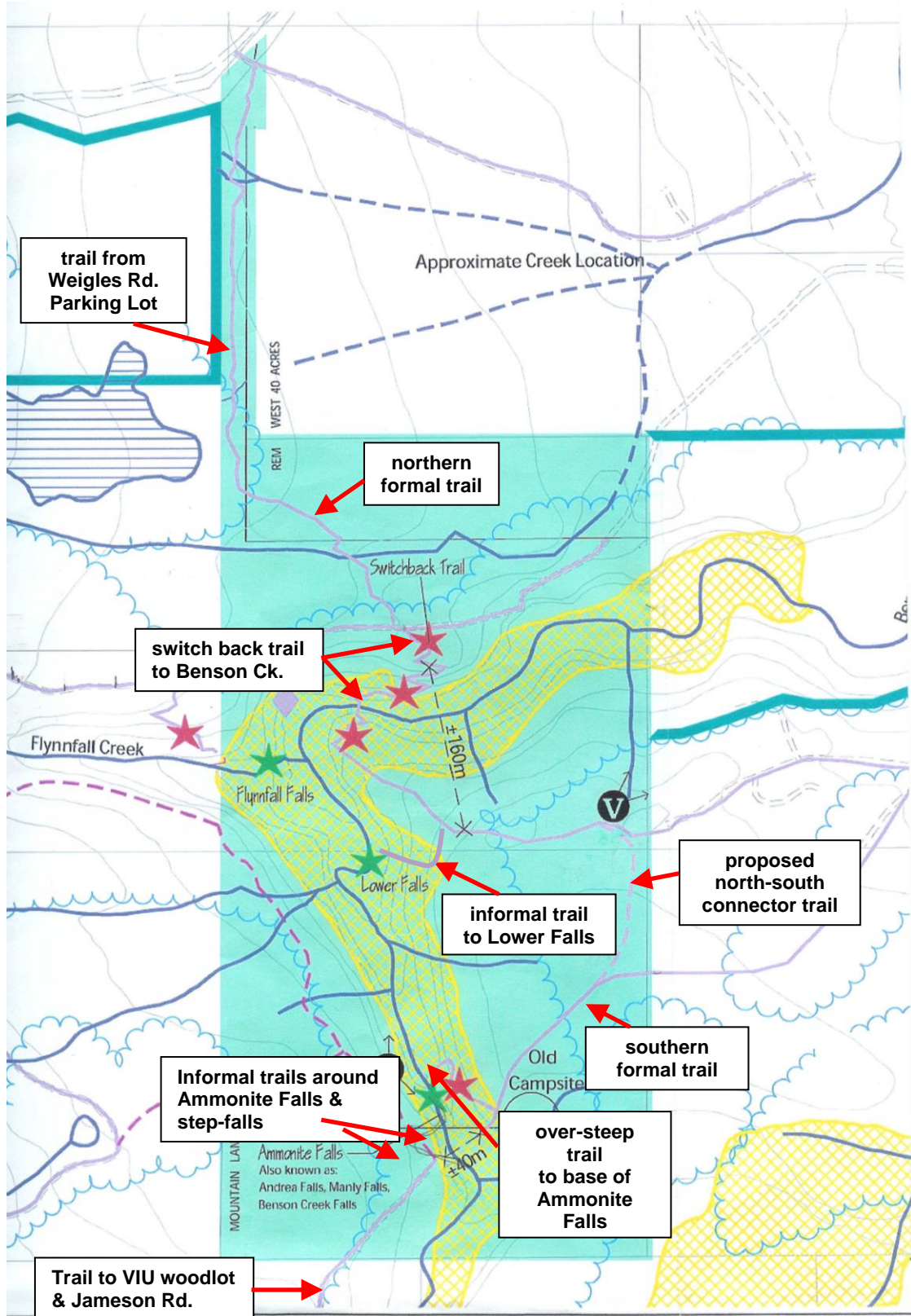


Figure 13. Overview of existing and proposed Benson Creek Falls Regional Park trail network.



Figure 14. A scenic step falls above Ammonite Falls has no formal trail for viewing at present.



Figure 15. No natural regeneration of vegetation has occurred (left) in the badly eroded path to the bottom of Ammonite Falls since it was pointed out in 1999 (right).



Figure 16. Stairs installed in steep, sensitive terrain within Stocking Creek Regional Park, in the Cowichan Valley Regional District park system.

The switchback section of the northern trail leading down a ravine to Benson Creek shows some early evidence of damage to sensitive soils, which may eventually imperil adjacent vegetation, including sizable trees growing along on the steep northern bank of Benson Creek. In this location, the main issue appears to be the development of short informal trails that shorten the many switchbacks down to the water's edge. *It is recommended that the RDN take steps to better delineate the switchback portion of the trail on the north bank of Benson Creek. Steps should also be taken to rehabilitate the informal shortened switchbacks in this area through replanting with appropriate native shrubs. Signage reinforcing the need for park users to stay on the designated trail in this area might also be helpful.* Trail delineation might be improved, and tread surfaces stabilized, through the use of staked small diameter logs, upland willow cuttings and other appropriate native shrub plantings on the down-slope side of the trail. Small diameter logs have been used with some success on some trails through the adjacent Vancouver Island University Woodlot (Fig. 17). Work here should be considered the second-highest priority for improvements within BCFRP.

The fragmented nature of the formal trail system has resulted in the creation of informal trails to the Lower Falls and around the top of Ammonite Falls. A spur trail of the latter leads hazardously to a ledge behind Ammonite Falls (Fig. 18). To avoid further erosion of slopes on the west side of Ammonite Falls, these informal over-steep trails either need to be closed, or taken into the formal trail network and significantly re-routed with switchbacks. There is a safe fording area near the base of Ammonite Falls, and some level streamside areas on the west side of the creek here. However, after a few metres steep terrain is encountered in any upslope direction.



Figure 17. Small diameter logs are used to stabilize and delineate trails adjacent to BCFRP.



Figure 18. Several informal trails within the park are hazardous and damage sensitive soils.

Another informal spur trail was noted during the fieldwork, presumably to a popular viewing area. This one branches off of the northern trail, leading west to a bluff above Benson Creek's Lower Falls. The upper part of this trail shows heavy rilling due to its poor alignment and is heavily overgrown by salal in places. While not significantly eroded along its entirety, this informal spur trail is very steep, and does not currently provide safe viewing of the Lower Falls. Consideration should be given to re-routing and upgrading this destination trail as well as its associated viewing area.

4.3 Invasive Species Management

Much of BCFRP is minimally disturbed and supports natural forest cover. The two main areas of potential concern with respect to invasive vegetation are the northern trailhead, where invasive Yellow Archangel has become established, and areas alongside the northern trail, where English Holly appears sporadically. The latter plant is typically spread by birds eating seeds and depositing them in forest areas.

Yellow Archangel is the more pernicious of the two, and should be the priority for management for at least the next two growing seasons. It re-sprouts readily from cut ends, so control should involve full removal of all root and stem fragments by hand shovel (for small patches) or by excavator (for larger patches) over autumn through early spring. Spot-spraying with the herbicide Glyphosate can be effective, especially when combined with manual control. This herbicide works best when the plants are actively growing (King County Washington Noxious Weeds website www.kingcounty.gov/weeds).

English Holly plants observed within BCFRP are typically small shrubs that, with some effort, could be dug or pulled up. Control should be scheduled for times when the soil is moist to ease removal. Weed wrenches such as those used for control of Scotch Broom can be used on larger Holly shrubs to pull out the entire root mass (King County Washington Noxious Weeds website).

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Conclusions

Based on background review and field inspections, the following have been concluded about the environmental values of Benson Creek Falls Regional Park:

1. The park supports a large assemblage of forest-associated birds including: raptors, sparrows, warblers/vireos, thrushes, corvids, and finches.
2. BCFRP provides habitat for several Vancouver Island mammals associated with forests and riparian areas. Use by large carnivores appears to be sporadic.
3. Moist forest stands provide core habitat for Blue-listed Red-Legged Frogs, but few potential breeding ponds for this and other lentic amphibians occur in the park.

4. Four upland and three wetland ecosystem types occur within BCFRP. All upland forest ecosystem types are considered “at-risk” by the Conservation Data Centre. The Fd-Hw – Kindbergia ecosystem type possesses the highest priority under the Provincial Conservation Framework, and occurs extensively across the southern part of the park.
5. Wetlands occur infrequently within the park, but represent three different wetland types; Hardhack Fen, Slough Sedge Fen, and Cw – Slough Sedge.
6. Owing to its high gradient, riparian floodplain habitats are largely absent from reaches of Benson Creek within BCFRP. Sensitive Ecosystem Inventory Polygon #N0930A is a designated “Riparian” unit that captures older forest types growing in gullies.
7. Benson Creek Falls Regional Park is a storehouse of large-diameter trees, which are important habitat elements for a variety of wildlife. A total of 38 veteran trees and snags/wildlife trees were mapped within the park.
8. Photographic documentation of site conditions from 1999 make it difficult to determine whether impacts from park use, windthrow events, and exotic invasive vegetation have increased, stabilized, or decreased within BCFRP since that time.

5.2 Summary of Recommendations

The following actions are recommended to provide a better understanding of natural values within BCFRP and address potential park management issues:

- Additional field effort should be directed toward determining the current occurrence of CDC-listed birds and raptors in the park.
- Targeted surveys should be conducted to determine the presence of two “at-risk” amphibian species within the park; the Northern Red-legged Frog and Clouded Salamander.
- Construction of a new trail to connect the two main formal trails in the park within the Red-listed HwFd - Kindbergia ecosystem type should involve routing to avoid larger standing trees and their drip-lines.
- Planning for any new trails on the west bank of Benson Creek should involve a detailed study to identify environmental constraints such as erodible slopes, “at-risk” species and ecosystems, nesting birds, and veteran trees/snags.
- The highest priority for trail improvement in BCFRP involves installing a set of stairs to address long-standing degradation of sensitive side slopes on the spur trail to the base of Ammonite Falls.
- The second-highest priority for trail improvement in BCFRP involves better delineation of the switchback trail on the north bank of Benson Creek. Staked logs should be used to protect sensitive slope vegetation and soils. Rehabilitation of informal shortened

switchbacks and signage to inform to park users of the need to stay on designated trails is recommended.

- A modest program to remove Yellow Archangel at the Weigles Road Trailhead should be undertaken over the next two years, along with periodic removal of English Holly along the northern trail network, as resources allow.
- To facilitate long-term monitoring of key areas within the park, the RDN should consider establishing a system for monitoring trails, parking lots, and sensitive environmental features at key locations using standardized forms, GPS locations, and digital photographs updated at 3 to 5 year intervals.

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Appendix A – Wildlife Tree Stewardship Nest Inventory results for areas in the vicinity of Benson Creek Falls Regional Park



Appendix B – Wildlife observations made within Benson Creek Falls Regional Park over February of 2013.

Species	Type of Observation	Comments
Mammals		
Columbian Black-tailed Deer	Sign	Winter droppings and trails in across the site.
Red Squirrel	Sign	Cone midden by eastern wetland.
Birds		
American Robin	Auditory	Forest near trailhead.
Belted Kingfisher	Auditory	Flying down north end of Benson Creek.
Brown Creeper	Auditory	Northern & southern parts of park.
Chestnut-backed Chickadee	Auditory	South end of park.
Common Raven	Auditory	Over southwest part of park.
Dark-eyed Junco	Auditory	Commonly heard in forested areas.
Pileated Woodpecker	Sign	Feeding sign on west bank of Benson Creek.
Pine Siskin	Visual	Small flock overflight north end of park.
Red-breasted Sapsucker	Sign	Sapwells in tree near call-playback station.
Spotted Towhee	Auditory	Forest in northern part of park.
Varied Thrush	Auditory	Forest near trailhead.
Winter Wren	Auditory	Near trailhead.
Amphibians		
Pacific Treefrog	Auditory	Forest adjacent to eastern pond.

Appendix C – Conservation Data Centre Rare Element Search Results for Benson Creek Falls Regional Park



BC Conservation Data Centre: Occurrence Report (55673)

March 5, 2013

Rana aurora
Northern Red-legged Frog

Field definition document available at

<http://www.env.gov.bc.ca/atrisk/ims.htm>

This is a summary report. For a complete record contact the CDC (cdcdata@gov.bc.ca).

Identifiers

Occurrence ID:	8588	Status:	
Shape ID:	55673	Global:	G4
Type:	Vertebrate Animal	Provincial:	S3S4
		COSEWIC:	SC (NOV 2004)
		BC List:	Blue
Taxonomic Class:	amphibians	SARA Schedule:	1
Data Sensitive:	N		

Locators

Survey Site: BENSON CREEK, WEST OF NANAIMO
Directions: South of Weigles Road, Benson Creek (tributary known as Flynnfall Creek), near Ammonite Falls, Nanaimo.

Survey Information

First Obs. Date: 2003-08-17 **Last Obs. Date:** 2003-08-17
Occurrence Data: 2003: 5 metamorphs observed in the stream (SPI database - incidental sightings, accessed July 19, 2010).

Occurrence Rank and Occurrence Rank Factors

Rank: E Verified extant (viability not assessed) **Rank Date:** 2003-08-17

Rank Comments:

Condition of Occurrence

Size of Occurrence: 5 metamorphs observed.

Landscape Context:

Description

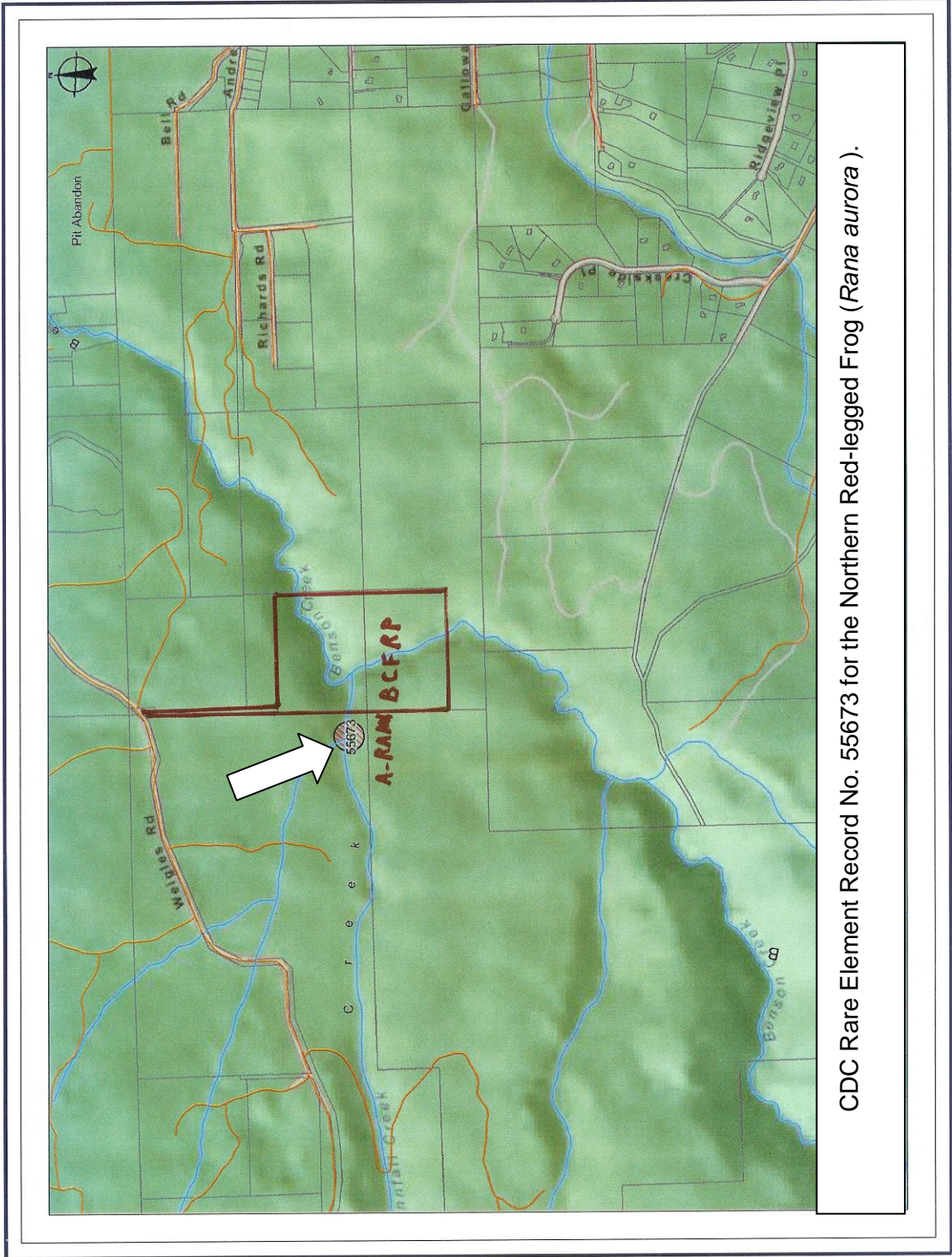
General Description: Stream habitat.
Vegetation Zone:
Habitat: RIVERINE: Creek

Documentation

References: SPI database - incidental sightings. Extract from Ministry of Environment's Species Inventory database, Incidental Sightings table. Project 0. Ecosystems Information Section, Victoria, BC. Available from <http://a100.gov.bc.ca/pub/siwe/details.do?id=0>

Version

Version Date: 02-FEB-11



CDC Rare Element Record No. 55673 for the Northern Red-legged Frog (*Rana aurora*).

Appendix D - Plant observations made within Benson Creek Falls Regional Park over February of 2013 (* denotes non-native plants).

<u>Common name</u>	<u>Scientific name</u>
TREES - 10 species	
Arbutus	<i>Arbutus menziesii</i>
Big leaf maple	<i>Acer macrophyllum</i>
Bitter cherry	<i>Prunus emarginata</i>
Douglas-fir	<i>Psuedotsuga menziesii</i> ssp. <i>menziesii</i>
Grand fir	<i>Abies grandis</i>
Pacific Yew	<i>Taxus brevifolia</i>
Red alder	<i>Alnus rubra</i>
Shore pine	<i>Pinus contorta</i> var. <i>contorta</i>
Western hemlock	<i>Tsuga heterophylla</i>
Western red cedar	<i>Thuja plicata</i>
SHRUBS - 17 species	
Baldhip rose	<i>Rosa gymnocarpa</i>
Black twinberry	<i>Lonicera involucrata</i>
Dull Oregon grape	<i>Mahonia nervosa</i>
* English holly	<i>Ilex aquifolium</i>
Evergreen huckleberry	<i>Vaccinium ovatum</i>
Hardhack	<i>Spiraea douglasii</i> ssp. <i>douglasii</i>
Ocean spray	<i>Holodiscus discolor</i>
Pacific willow	<i>Salix lucida</i> ssp. <i>lasiandra</i>
Prickly rose	<i>Rosa acicularis</i>
Prince's-pine	<i>Chimaphila umbellata</i>
Red huckleberry	<i>Vaccinium parvifolium</i>
Salal	<i>Gaultheria shallon</i>
Salmonberry	<i>Rubus spectabilis</i>
Scouler's willow	<i>Salix scouleriana</i>
* Spurge-laurel	<i>Daphne laureola</i>
Tall Oregon grape	<i>Mahonia aquifolium</i>
Trailing blackberry	<i>Rubus ursinus</i>
Twinflower	<i>Linnaea borealis</i>

FERNS & HERBS - 25 species

<u>Common name</u>	<u>Scientific name</u>
Blue wildrye	<i>Elymus glaucus</i>
Bracken fern	<i>Pteridium aquilinum</i>
Creeping buttercup	<i>Ranunculus repens</i>
Deer fern	<i>Blechnum spicant</i>
Early blue violet	<i>Viola adunca</i>
Foamflower	<i>Tiarella trifoliata</i>
Fringecup	<i>Tellima grandiflora</i>
Green spleenwort	<i>Asplenium viride</i>
* Hairy cat's-ear	<i>Hypochaeris radicata</i>
Henderson's sedge	<i>Carex hendersonii</i>
* Herb-Robert	<i>Geranium robertianum</i>
Lady fern	<i>Athyrium filix-femina</i>
Licorice fern	<i>Polypodium glycyrrhiza</i>
Maidenhair fern	<i>Adiantum pedatum</i>
Pale sedge	<i>Carex livida</i>
Piggy-back plant	<i>Tolmiea menziesii</i>
Rattlesnake-plantain	<i>Goodyera oblongifolia</i>
Siberian miner's lettuce	<i>Claytonia perfoliata</i>
Slough sedge	<i>Carex obnupta</i>
Spiny wood fern	<i>Dryopteris expansa</i>
Stream violet	<i>Viola glabella</i>
Sword fern	<i>Polystichium munitum</i>
Wall lettuce	<i>Lactuca muralis</i>
Western fescue	<i>Festuca occidentalis</i>
* Yellow archangel	<i>Lamium galeobdolon</i>

**Appendix E – UTM coordinates for significant trees identified in Benson Creek Falls
Regional Park over February of 2013**

GPS Label	Veteran Tree (V) Snag (S) Uncommon (U) Wildlf use (W)	UTM Northing	UTM Easting
SngFd72	70+cm DBH (S)	421189	5449709
Fd Vet 113	110+ cm DBH (V)	421272	5449659
Ps36	35+ cm DBH (U)	421307	5449596
Cw43wldlftree	40+ cm DBH (W)	421254	5449589
Fdvet 125+110	2 x 110 cm DBH (V)	421309	5449519
Fdvet94	90+cm DBH (V)	421302	5449502
Yew18	18+ cm DBH (U)	421279	5449503
Fd140	140+ cm DBH (V)	421262	5449481
Fd Vet87	85+ cm DBH (V)	421436	5449412
Fd Vet82	80+ cm DBH (V)	421421	5449383
Fd113	110+ cm DBH (V)	421323	5449408
Vet Fd122	120+ cm DBH (V)	421436	5449279
Vet Fd 102	100+ cmDBH (V)	421414	5449280
Vet Fd93	90+ cm DBH (V)	421435	5449237
Sng Fd91	90+ cm DBH (S)	421468	5449157
Fd Vet95+80	90+ & 80+ cm DBH (V)	421457	5449158
Fd Vet114	110+ cm DBH (V)	421449	5449141
Vet Hw87	85+ cm DBH (V)	421430	5449147
Wpkr Sngs3 35+	3 x 35+ cm DBH (W)	421456	5449111
Vet Fd109	105+ cm DBH (V)	421402	5449120
Vet Fd4 80-115	4 x 80 to 115 cm DBH (V)	421445	5449062
Sng Fd111	110+ cm DBH (S)	421436	5448977
Yew20	20+ cm DBH (U)	421364	5449032
Fd109	105+ cm DBH (V)	421281	5449000
Fd116	115+ cm DBH (V)	421272	5449018
Fd104	100+ cm DBH (V)	421308	5449110
Fd98	95+ cm DBH (V)	421307	5449125
Vetfirsng85	85+ cm DBH (S)	421273	5449190
Cw131	130+ cm DBH (V)	421258	5449171
Cw126	125+ cm DBH (V)	421236	5449173
Cw91	90+ cm DBH (V)	421223	5449143
Hw83	80+ cm DBH (V)	421175	5449157
Hwsng55	50+ cm DBH (S)	421216	5449124
Fd145	140+ cm DBH (V)	421130	5449430