



SATURNA ISLAND RIPARIAN AREA REGULATION STREAM IDENTIFICATION

Prepared for:

**Robert Kojima
Islands Trust
Suite 200 - 1627 Fort Street
Victoria, BC, V8R 1H8**

Prepared by:

**Trystan Willmott, B. Sc., A.Sc.T.
MADRONE ENVIRONMENTAL SERVICES LTD.
1081 Canada Avenue, Duncan, BC, V9L 1V2**

March 31, 2010

Dossier 10.0038

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 METHODOLOGY	2
2.1 Background Research	2
2.2 Photo Interpretation	2
2.3 Assessment Areas.....	2
2.4 Definition of a “Stream” under the RAR.....	2
2.5 Field Assessment Procedures	5
2.6 Assessing for Fish Presence or Potential Fish Presence.....	5
3.0 RESULTS	6
3.1 Documented Stream Data	6
3.2 Drainage Descriptions.....	6
3.2.1 Lyall Creek	8
3.2.2 Lyall Creek Tributary.....	10
3.3 Non RAR - Applicable Watersheds	12
3.4 Non RAR - Applicable Wetlands and Fluctuating Water Table Sites.....	12
4.0 CONCLUSIONS.....	15
APPENDIX – PHOTOS	17



Saturna Island Riparian Area Regulation – Stream Identification



1.0 INTRODUCTION

The Riparian Areas Regulation (RAR) is the basis of streamside protection in British Columbia. The RAR was enacted in 2004 under Section 12 of the Fish Protection Act. The RAR is a joint initiative with Fisheries and Oceans Canada (DFO), the Ministry of Environment (MoE) and local government. The RAR uses a science-based approach to help ensure land development activities do not result in a harmful alteration, disruption or destruction (HADD) of fish habitat.

In BC, the definition of fish habitat includes all aquatic and terrestrial areas that affect fish life processes. Fish habitat, therefore, includes the area directly adjacent to a stream (*i.e.*, the riparian area) because it provides food, nutrients, and other functions vital to fish survival.

In order to become compliant with the provincial RAR, Islands Trust contracted Madrone Environmental Services Ltd. (Madrone) to conduct fieldwork to identify RAR-applicable drainages on Saturna Island. Islands Trust will develop a process that recognizes focus areas adjacent to applicable streams (e.g. by incorporating Development Permit Areas or implementing other regulations).

The primary objective of the project was to map the location of streams with a high level of accuracy (within 1 m – 5 m), to allow Islands Trust to accurately identify areas relevant to the RAR (usually within 30 m of an applicable watercourse – known as the Riparian Assessment Area - RAA). The scope of this project did not include locating the High Water Mark (HWM) or, in the case of ravines, the Top of Ravine Bank (TORB), which is where the RAA would ultimately be measured from.

Any subsequent proposed development inside any RAA would trigger the RAR process. Development within the RAA would be permitted if a Qualified Environmental Professional (QEP) completes and submits a Riparian Assessment Report to the local government, DFO and the MoE.

2.0 METHODOLOGY

2.1 Background Research

Background research was carried out using the Fisheries Information Summary System (FISS), Fish Wizard and Habitat Wizard data-bases to determine whether any documented stream information existed for the study area.

2.2 Photo Interpretation

Recent orthophotos (2009) were provided by the client prior to the field assessment. These photos were used as the base layer for detailed field map compilation, which included contour lines, TRIM stream data, watershed boundaries, park areas, lot lines and road networks. The orthophotos were studied prior to the initial field visit, in association with the background data research to highlight focal study areas. Given the degree of compiled background information, the high level of detail represented on the orthophoto field maps and the level of field effort, a detailed air photo interpretation was not considered to be appropriate for the project.

2.3 Assessment Areas

The watersheds identified by the MoE as potential “RAR watersheds” defined the study area. Drainages inside park areas were not assessed, although in order to accurately classify drainages as being either fish bearing or potentially fish bearing, certain drainages were assessed inside designated park land. The spatial coverage of the Gulf Islands National Park Reserve on Saturna Island resulted in a relatively small assessment area (Figure 1).

2.4 Definition of a “Stream” under the RAR

In order to identify applicable drainages in the field, the definition of a “stream” as listed under the provincial RAR, was used as a standard. As per Section 1.4.2 of the RAR Assessment Methodology

(http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/documents/assessment_methods.pdf), a “stream” is defined as follows:

“...any watercourse – natural or human made – that provides fish habitat that contains water on a perennial or seasonal basis, is scoured by water or contains observable deposits of mineral alluvium, or has a continuous channel bed including a watercourse that is obscured by overhanging or bridging vegetation or soil mats. A watercourse may not itself be inhabited by fish, but may provide water, food, and nutrients to streams that do support fish.”

The RAR further identifies a stream as:

“...any of the following that provides fish habitat:

- (a) a watercourse, whether it usually contains water or not;
- (b) a pond, lake, river, creek, brook;
- (c) a ditch, spring or wetland that is connected by surface flow to something referred to in paragraph (a) or (b).

If a barrier (either definitive or non-permanent) to the migration of fish is identified, a watercourse is classified as a stream above the barrier if: (1) there is potential fish habitat downstream of the barrier, or (2) if there is perennial habitat for resident fish above the barrier. Any part of a watercourse that is not inhabited by fish (e.g. above a barrier) that connects by surface flow to fish habitat is considered a stream under the RAR process.

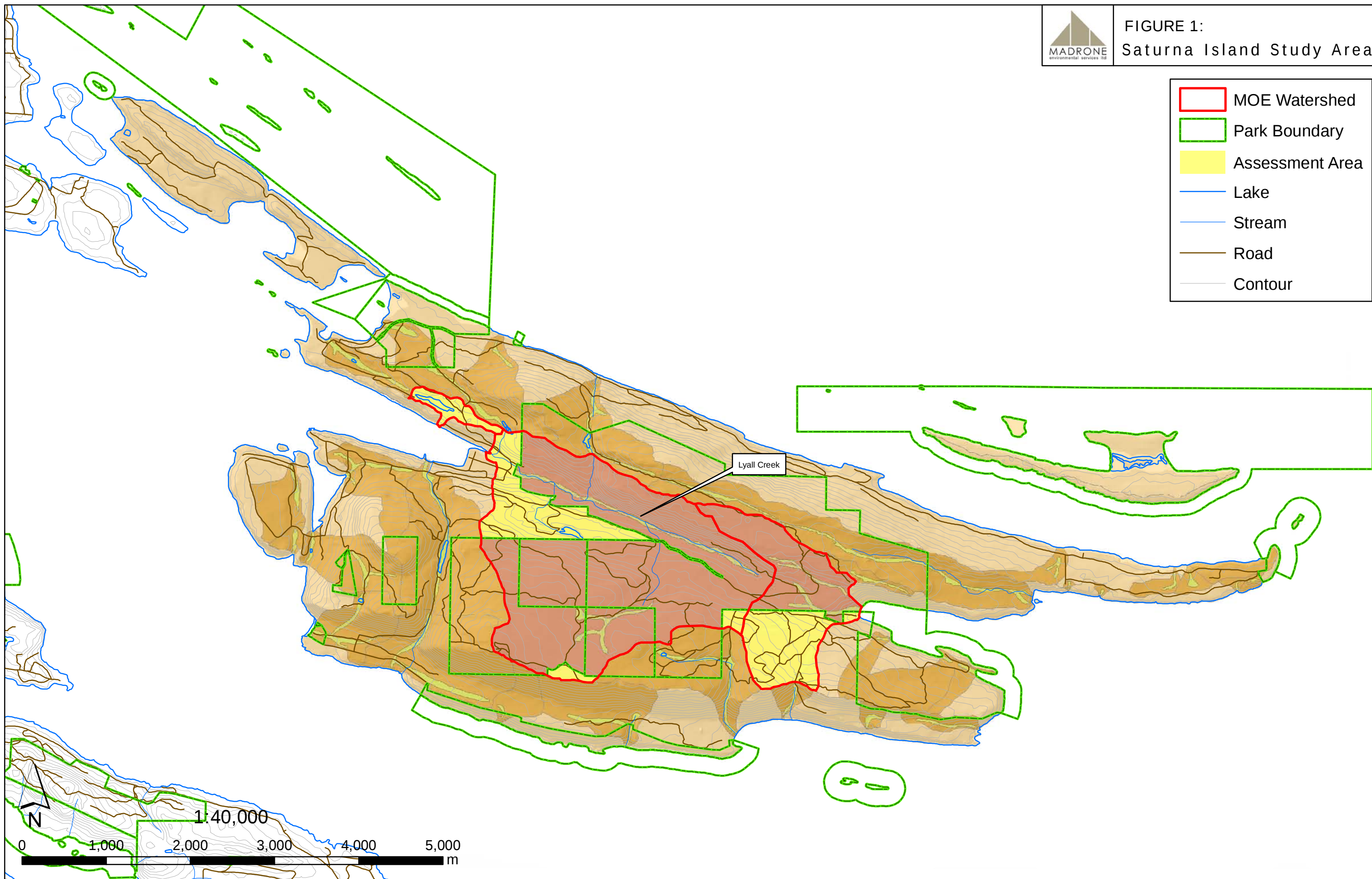
Watercourses that do not support fish or connect by surface flow to fish habitat (e.g. isolated wetlands) are not considered “streams” under the RAR process. These features were not mapped as part of the scope of this project, although it should be noted that wetland ecosystem types still provide benefits to a range of species and provide important functions (e.g. stormwater retention). Linear drainages that did not meet the definition of a stream were not mapped as part of this assessment, but where encountered, were referred to as “Non Classified Drainages” (NCDs).





FIGURE 1:
Saturna Island Study Area

- MOE Watershed
- Park Boundary
- Assessment Area
- Lake
- Stream
- Road
- Contour



2.5 Field Assessment Procedures

Field assessments were carried out on February 23rd and 24th 2010 using a two-person crew. On the first day, a detailed reconnaissance survey of all identified watersheds was carried out, focusing on potential “streams” identified during the background work. Stream surveys were carried out during the winter months, which represented the best season regarding the delineation of the drainage network.

Each applicable drainage identified during the background work and reconnaissance survey was assessed in the field with a two person crew, beginning from the downstream end where possible (e.g. tidal boundary or inflow into a lake). Traversing the drainages on foot helped to ensure that additional drainages that may not have been identified during the background work or reconnaissance survey were not missed.

Stream locations were determined by physically following the creek centre line while carrying a GPS unit and associated receiver. The GPS logged data every metre during the traverse of the creek. Concurrently with stream mapping, basic habitat data was also collected along the stream. Data collected included gradient, channel morphology (e.g. riffle-pool/cascade pool or step-pool), extent of riparian vegetation and fish habitat potential. Fish habitat attributes such as cover/security habitat, Large Woody Debris (LWD) cover and spawning substrate were also noted. Representative site photographs were taken during each creek traverse. Way points were collected to depict the location of features such as barriers to upstream fish movement (e.g. waterfalls), culverts, bridges and NCDs. The edges of wetlands and lakes were not traversed, although their approximate dimensions and attributes were recorded where encountered, for approximate delineation on orthophoto maps.

2.6 Assessing for Fish Presence or Potential Fish Presence

While background research using data bases is useful in determining the general distribution of fish, it cannot be relied upon as a complete inventory. For example, a lack of data for any given stream or watershed cannot be interpreted as indicating that the stream or watershed does not contain fish. Proving non fish presence generally requires rigorous sampling procedures during optimal seasons. Given the fact that the project was focused on identifying fish bearing or **potential** fish bearing drainages, no detailed sampling procedure was carried out. Fish sampling, therefore, was beyond the scope of this assessment.

For low gradient streams that connected directly to the ocean, a default “potentially fish bearing” status was used (considering the potential for access to the drainage by

anadromous fish). It should be noted that a stream is considered to be fish bearing even if it provides potential habitat for fish during a very short period of time, such as high flow ephemeral off-channel security habitat or seasonal spawning/rearing habitat.

The identification of barriers or high gradient reaches that could potentially limit the distribution of fish through a system was not the main focus of this assessment, as a “stream” under the RAR is not necessarily fish bearing. If a drainage connects by surface flow to fish habitat, it is considered a “stream” under the RAR.

3.0 RESULTS

3.1 Documented Stream Data

Documented fish distribution data for the Gulf Islands is limited, although Lyall Creek is listed under FISS. Lyall Creek (watershed code 925-257800-67353) flows from the southeast to the northwest through the centre of Saturna Island and discharges into Lyall Harbour. Lyall Creek is known to contain resident coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) and chum salmon (*Oncorhynchus keta*). The chum salmon originate from Goldstream stock and are, therefore, not native to the Lyall Creek system; the cutthroat trout, however, are indigenous to Lyall Creek.

3.2 Drainage Descriptions

In addition to Lyall Creek, one other drainage was classified as a “stream” under the RAR during the assessment procedure. The additional drainage is a tributary of Lyall Creek and originates on private land. This drainage connects by surface flow to Lyall Creek and, despite there being a definitive barrier on the system, it is also considered a stream above the barrier, due to the connectivity of the drainage to Lyall Creek. Significant wetland complexes were also found during the survey of the target watersheds, which do not represent “streams” under the RAR, due to their isolation and non connectivity to fish habitat. The wetlands represent important components of the Saturna Island ecosystem base, due to their spatial extent and characteristics.

Figure 2 provides an overview of the study area and depicts the locations of the mapped streams. Figures 3 and 4 indicate each creek and display waypoints of features collected during each stream traverse (e.g. barriers to fish migration, culvert inflows/outflows and NCD entry points).



FIGURE 2: Overview Map Showing RAR Applicable Streams
in Focus Watersheds - Saturna Island

CLIENT:
Islands Trust

LOCATION:
Saturna Island

DOSSIER:
10.0038

ASSESSED BY: Jackie Churchill, M.Sc. A.Sc.T., R.P.Bio. &
Justin Lange, B.Sc., BIT

FIELD VISIT:
February 23 & 24, 2010

MAP SCALE:
1:25,000

DRAWN BY:
Anna Jeffries

Lyall Creek

Lyall Creek Tributary

- Surveved Creek
- Focus Watershed
- Federal Park
- Community Park
- Protected Area



0 125 250 500 750 1,000 Meters

1:25,000

3.2.1 Lyall Creek

Lyall Creek empties into Lyall Harbour on the western side of Saturna Island and drains the central (largest) watershed on the island. The majority of the watershed is designated as National Park Reserve land, although the lower reaches of Lyall Creek flow through private land (Figure 3).

The creek flows into Lyall Harbour as a low gradient (1.5%) riffle-pool system. The estuarine habitat consists of a gently sloping bay, dominated by a fine sandy substrate. Mature forested stands exist on the edges of the estuary, with western redcedar (*Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*) and red alder (*Alnus rubra*) dominating. This forested habitat is providing important biological input into the adjacent fish habitat, including provision of shade, leaf/litter input, insect drop and bank stability. Above tidewater, the creek contains diverse fish habitat values, with potential spawning areas for resident trout and anadromous salmonids, rearing habitat in the form of deep pools and undercut banks and a functioning riparian zone consisting of mature forest.

The creek flows underneath the first road crossing via a substantial box culvert approximately 3 m high and 5 m wide. This feature does not represent a barrier to the movement of fish, including adults and juveniles. Above the culvert, the creek continues to display good quality fish habitat attributes, with a cobble/gravel substrate, riffles alternating with deeper pools, an intact forested riparian zone and an adequate cover of LWD. The creek was mapped up to the boundary of the National Park Reserve.

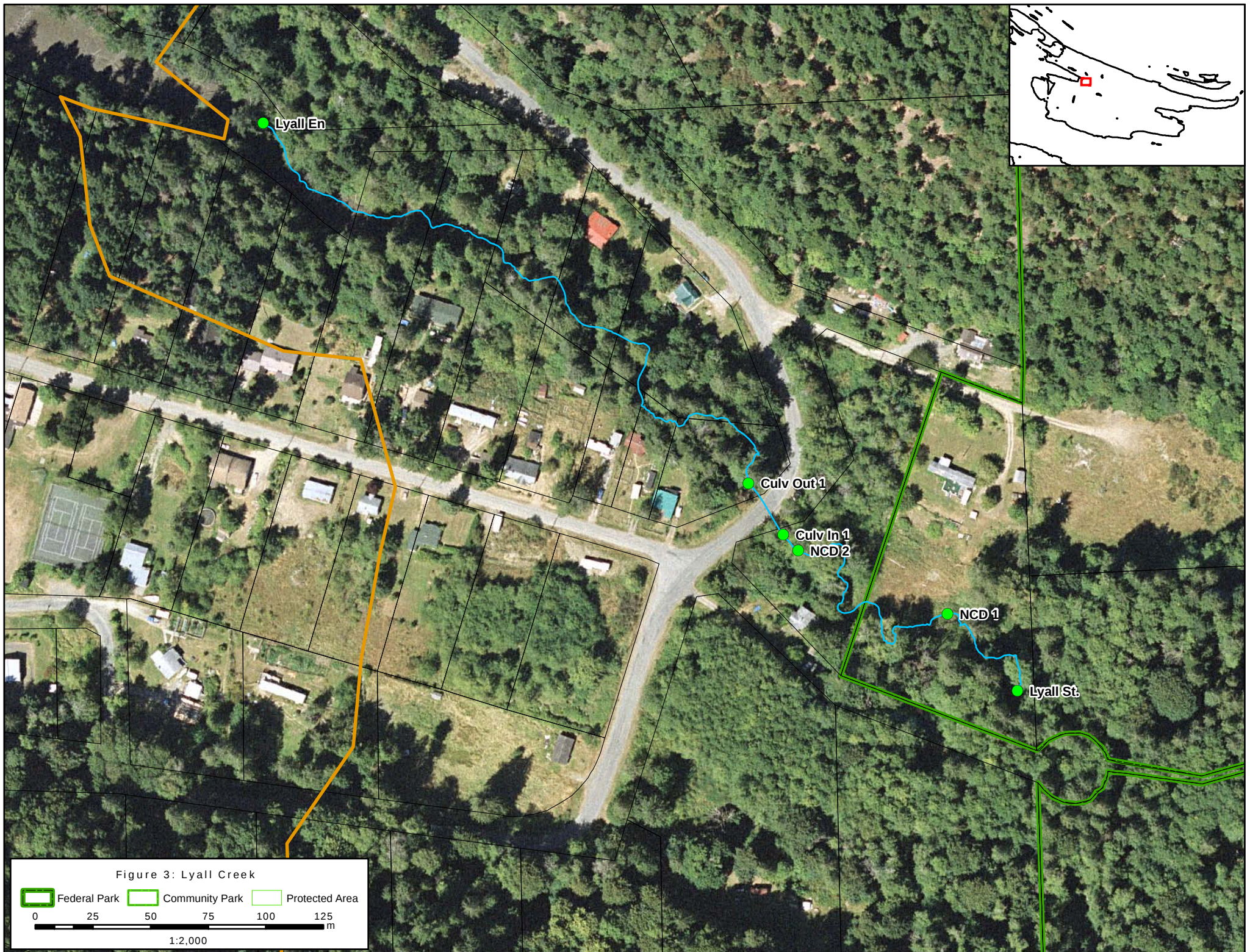


Figure 3: Lyall Creek

0 25 50 75 100 125 m

1:2,000

Federal Park Community Park Protected Area

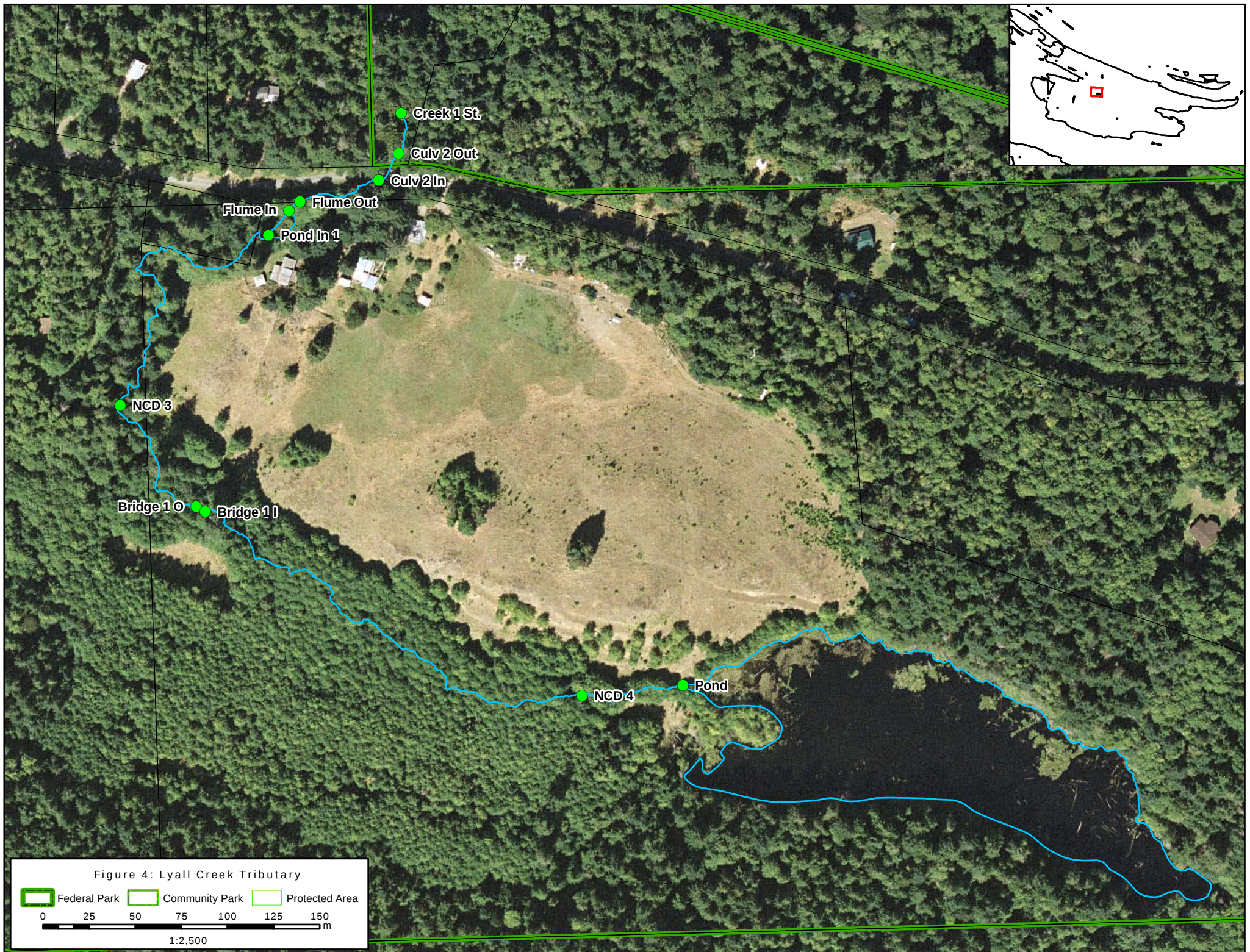
3.2.2 Lyall Creek Tributary

This drainage joins the Lyall Creek mainstem in an area designated as National Park reserve. The upper portion of the drainage, however, flows through private land (Figure 4). Immediately upstream of the confluence with Lyall Creek, a definitive barrier to the upstream migration of fish occurs, but the direct connectivity with Lyall Creek qualifies the tributary as a "stream" under the RAR. The drainage is also headed by a significant permanent lake, which may be inhabited by resident fish, allowing for a potential source of fish above the barrier.

Where it enters Lyall Creek, fish could enter the tributary from the mainstem for a distance of approximately 70 m upstream of the confluence. The near vertical waterfall (25 m high) located on the tributary prevents any further migration of fish from Lyall Creek upstream. Above the waterfall, the creek is represented by a steep (20%) step-pool channel type, with a substrate dominated by large cobble and boulders. Beyond the boundary between the National Park Reserve and private property (where the stream was mapped), the topography becomes more subdued and the drainage flows as a well defined riffle-pool system with a gradient of 3.5%. Riparian vegetation is relatively sparse in comparison with the area bounded by the National Park. As a result of the lack of riparian vegetation, the banks of the creek are unstable, with exposed roots and sloughing of material in places. The creek crosses under Narvaez Road, which runs parallel to the National Park boundary via a closed metal culvert. The inflow of this culvert is damaged and water flows underneath the inflow.

A dug pond exists upstream of the Narvaez Road crossing, which is approximately 8 m wide and 12 m long. The pond is drained by a concrete flume, although during the time of the assessment, the flume was dry. Water flowing underneath the flume, however, represented the main outflow of the pond and the continuation of the creek.

The middle to upper reaches of the creek meander through open stands dominated by red alder prior to joining with the lake at the head of the drainage. The outflow of the lake appears to be controlled by a beaver (*Castor canadensis*) dam, with evidence of recent beaver activity observed at the time of the assessment. The northern, southern and eastern margins of the lake are surrounded by continuous mature coniferous forest, although the western shores lie adjacent to an open field, with limited riparian cover. The lake offers potential perennial habitat for resident fish. Occurrence of fish in the outflow creek, however, is likely limited by the seasonal flow regime, lack of perennial habitat and lack of fish habitat diversity.



3.3 Non RAR - Applicable Watersheds

Of the three identified potential RAR watersheds, the central watershed on Saturna Island, which is drained by Lyall Creek, represents the only RAR-applicable watershed. The watershed located to the north of Lyall Harbour contains wetland ecosystem units, which do not qualify as “streams” under the RAR, due to the fact that the wetlands do not support fish, or connect by surface flow to fish habitat. These ecosystems are described in detail in the subsequent section. Following detailed field checks of potential areas, the assessed portions of the watershed located on the east of the island (*i.e.*, those portions located outside the National Park) were found not to contain any “streams”. The main conveyance zone indicated in Figure 1, draining from west to east, represents a defined stream, which flows on land designated as National Park. The system was traversed in the field, given its proximity to the edge of the study area to ensure that no parts of the drainage occurred on private land.

3.4 Non RAR - Applicable Wetlands and Fluctuating Water Table Sites

While the focus of the project was to identify and map streams that apply to the RAR process, it is important to note that isolated wetlands and other moist ecosystem types provide important biological functions. Wetlands provide breeding and forage habitat for amphibians, rich foraging areas for birds and bats, nesting habitat for birds and a water source for wildlife. Other hydrological functions, including water retention, are also provided. Moist habitat types also support unique, and often diverse, assemblages of plants.

No focused search was carried out to locate and map isolated wetland ecosystems, due to the scope of this project. During field checks of potential RAR-applicable areas that were identified during the background research phase and during the field assessments, one sensitive site was discovered. Figure 5 displays the wetlands that comprise the area of significance that was encountered during the assessment procedure.

The wetland complex located in the focal watershed situated on the northern shore of Lyall Harbour represents a significant ecosystem type. Five individual wetlands occur in a depression, with the largest wetland occurring in the north-western segment of the watershed. Water flows through the basin from the southeast towards the northwest, and the largest wetland appears to represent the recipient of water moving through the basin.

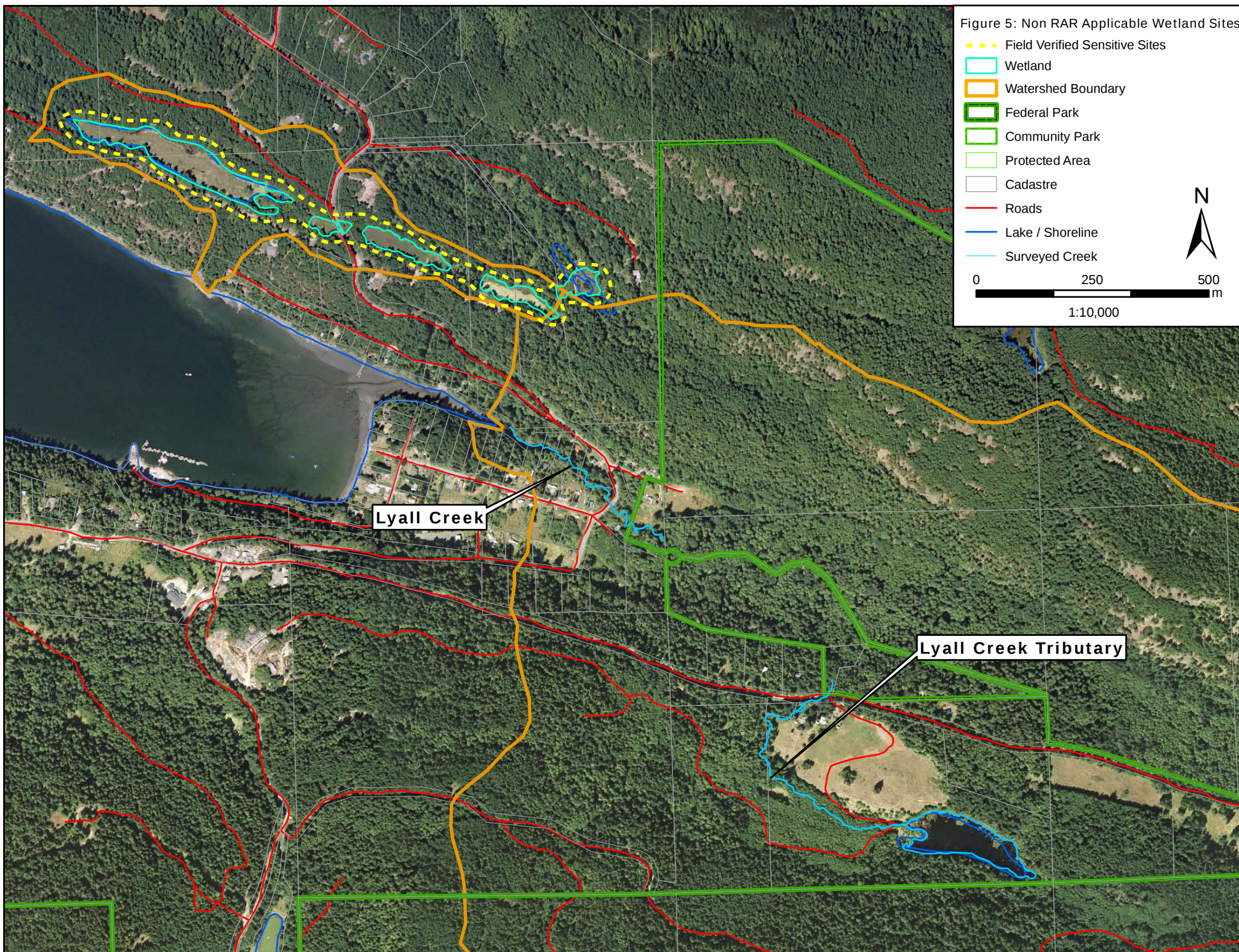
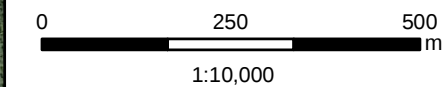
The wetlands are seasonally flooded ecosystems, which do not provide habitat for resident fish. In addition, the wetlands do not connect by surface flow to the ocean, or to any other fish habitat.

Vegetation in the wetlands is dominated by cattail (*Typha latifolia*), with pockets of slough sedge also occurring. The wetlands are surrounded by mature coniferous forest, with Douglas-fir and western redcedar the leading tree species. Red alder occurs in the immediate riparian area. All wetlands in the sequence will provide excellent foraging and breeding habitat for amphibians, as the emergent vegetation will provide adequate attachment media for egg masses. The surrounding riparian forested stands will provide roosting habitat for bats in close proximity to prime foraging habitat over the wetlands. Ample nesting opportunities exist for birds, again in close proximity to prime foraging habitat.

Despite not applying to the RAR, the wetlands encountered during the field assessment represent a significant habitat feature. On North Pender Island, Islands Trust has begun to develop a Development Permit (DP) map that includes riparian and wetland ecosystems. Given their significance, the wetlands in the focus watershed that occurs to the north of Lyall Harbour should be properly identified and included in a similar DP map for Saturna Island. Given the important function of the forested riparian areas adjacent to the wetlands, there should also be some provision for the protection of a riparian buffer around the wetlands.

Figure 5: Non RAR Applicable Wetland Sites

- Field Verified Sensitive Sites
- Wetland
- Watershed Boundary
- Federal Park
- Community Park
- Protected Area
- Cadastre
- Roads
- Lake / Shoreline
- Surveyed Creek



4.0 CONCLUSIONS

Detailed background research using appropriate data bases and field reconnaissance surveys resulted in the identification of two creeks that apply to the provincial RAR process. These creeks are subject to the RAR assessment procedure, given the fact that they meet the RAR definition of a “stream”. The mapped systems represent known fish habitat (in the case of Lyall Creek), or systems that connect by surface flow to potential fish habitat (Lyall Creek tributary). The creeks were mapped for inclusion into appropriate bylaws to be set up by Islands Trust to allow conformance with the provincial RAR process. The lake that represents the headwaters of the Lyall Creek tributary drainage is also applicable to the RAR, due to the fact that it connects by surface flow to known fish habitat (Lyall creek). The edges of the lake were not mapped during the field assessment, but the lake must still be included as an RAR-applicable water body.

Lyall Creek represents important fishery resource values and consists of diverse fish habitat. The tributary drainage consists of marginal fish habitat, although the direct connectivity with Lyall Creek indicates that it is applicable to the RAR. A stream may not itself be inhabited by fish, but if it has a reasonable connection by surface flow to fish habitat, it is considered a stream under the RAR.

The watershed to the north of Lyall Harbour did not contain any “streams”, as defined under the RAR. The isolated wetlands in this watershed do not contain fish, due to the lack of perennial habitat, nor do they connect by surface flow to fish habitat. Detailed field checks in the watershed located to the east of the central watershed revealed that the main conveyance zones are located on land designated as National Park and, therefore, were not included in this assessment. No streams were located in the portion of the watershed located outside the National Park.

A focused search for additional drainages that do not apply to the RAR (e.g. isolated wetlands) did not form part of the scope of this assessment. Streams that apply to the definitions and methodology under the RAR were included in the study. Wetlands and moist habitat types encountered during the assessment and during field checks of potential RAR areas did result in the identification of the wetland complex located in the focus watershed on the north side of Lyall Harbour. This wetland sequence represents a significant ecosystem feature and should be identified for protection on all future riparian and/or wetland Development Permit maps.

Prepared by:

A blue circular professional stamp for the Association of Science Technologists and Technicians of British Columbia (AScT). The stamp contains the number 25491 and the name TRYSTAN WILLMOTT. A handwritten signature in blue ink is written over the stamp.

Trystan Willmott, B. Sc., A.Sc.T.
Aquatic / Terrestrial Biologist
Madrone Environmental Services Ltd.

Reviewed by:

A blue circular professional stamp for the Association of Science Technologists and Technicians of British Columbia (AScT). The stamp contains the number 25557 and the name JACKIE CHURCHILL. A handwritten signature in blue ink is written over the stamp.

Jackie Churchill, M. Sc., A.Sc.T., R.P.Bio.



APPENDIX – PHOTOS

Lyall Creek



Looking northwest into Lyall Harbour through the estuarine habitat of Lyall Creek. Note mature riparian forested fringe.



Looking southeast (upstream) along the lower reaches of Lyall Creek. Note important biological functions provided by the mature forested fringe (bank stability, shading, litter input and insect drop).



Looking upstream (south east) along the lower reaches of Lyall Creek. Note fish habitat diversity in the form of deep pools complexed with LWD, forming excellent security/rearing habitat for fish.



Typical riffle-pool sequence in the lower reaches of Lyall Creek. Note cover/security habitat for fish in the form of the deep pool and adjacent undercut banks.



Deep pool and associated riffle crest located on the lower reaches of Lyall Creek. Deep pool and LWD provide excellent fish habitat diversity.



Typical channel characteristics of the lower reaches of Lyall Creek. Note deep pool and undercut bank, which provide excellent security habitat for fish.



Looking downstream (northwest) through the open-bottomed box culvert structure located on the first road crossing above tidewater.

Lyall Creek Tributary



Waterfall over bedrock representing a definitive barrier to the upstream movement of fish located approximately 70 m above the confluence with the mainstem Lyall Creek (located in the National Park Reserve).



Looking south (upstream) along the Lyall Creek tributary drainage immediately upstream of the waterfall (located in the National Park Reserve). Note steep gradient of the drainage (20%) in this area.





Looking southwest (upstream) along the Lyall Creek tributary drainage immediately downstream of the Narvaez Road crossing close to the point where the stream crosses the National Park Reserve boundary.



Looking upstream (southwest) along the Lyall Creek tributary drainage immediately upstream of the Narvaez Road crossing.



Looking over the dug pond located on the Lyall Creek tributary drainage.



Looking down the concrete pond overflow. During the assessment, water was flowing underneath the flume.



Typical example of unstable banks found in the upper reaches of the Lyall Creek tributary drainage. Note sparse nature of riparian vegetation, which has led to a decrease in the function of bank stability.



Looking downstream over the outflow from the lake situated at the head of the Lyall Creek tributary drainage.





Looking east over the lake located at the head of the Lyall Creek tributary drainage. Note mature riparian forested fringe, serving important biological functions in the form of bank stability, shade, litter input and insect drop. Given the perennial habitat and habitat features, there is the potential for resident fish to occur in this water body.

Wetland Complex



Looking west over the largest wetland located in the northwestern portion of the watershed located to the north of Lyall Harbour. Note mature riparian fringe and wildlife habitat complexity (e.g. wildlife tree in the foreground). Also note dominance of cattail and the abundance of potential amphibian egg mass attachment media in the form of woody debris and emergent vegetation.



Looking northwest over the slough sedge dominated wetland located immediately to the south east of the largest wetland in the complex (pictured above).



Looking east over the open water wetland located at the far eastern end of the wetland complex. Note mature riparian forested fringe and cattail-dominated vegetation type. Emergent vegetation will provide abundant egg mass attachment media for amphibians.