

# Harrison Sensitive Ecosystems Inventory



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**TAARA**  
Environmental 

Prepared for:



**Fraser Valley Conservancy**  
*Placing lands in trust for our future*

## PREFACE

The Fraser Valley Conservancy is a not for profit charitable organization located within the Fraser Valley of British Columbia. It is dedicated to placing lands in trust for our future. As such, the organization believes that the Fraser Valley is a fragile wildlife oasis worth protecting and has mandated goals to, i) protect and preserve the land and watercourses that have recognized local and regional ecological value; ii) to promote, facilitate and engage in land stewardship activities; iii) to protect, preserve and enhance habitat for native species including rare and endangered species, and; iv) to protect and preserve land of recognized local and regional historic value.



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## 1.0 INTRODUCTION

The Fraser Valley Conservancy (FVC) is spearheading the creation of a Fraser Valley Regional Biodiversity Strategy (FVRBS)<sup>1</sup> to support current and ongoing stewardship and biodiversity actions. It will be a regionally based planning and conservation initiative that will increase partnerships and collaboration between Fraser Valley stewardship groups and all levels of government. The strategy will support the work of Fraser Valley organizations in the conservation and enhancement of biodiversity and will aid in the dissemination of and access to scientific and conservation data. This information will also reveal where there are gaps in data sets that create barriers to effective biodiversity enhancement and protection (FVC 2009).

The Harrison study area (Figure 1) was selected for a pilot conservation project for the Biodiversity Strategy because:

- (1) it is well-known as a biodiversity hotspot in the Lower Mainland,
- (2) It is multi-jurisdictional, encompassing lands administered by the Fraser Valley Regional District, multiple First Nations, and the province of BC (Crown land), allowing a wide variety of tenure-specific conservation options to be explored.
- (3) It is facing considerable pressure from industry, development and recreational use.

It is anticipated that that the information in this report and the accompanying maps will: (1) increase our knowledge of the species and ecosystems of the Harrison area, and (2) facilitate wise planning, management and land use by citizens and all levels of government so that conservation values of this highly environmentally significant location can be sustained.

## 1.1 ECOSYSTEMS OF CONCERN

The conservation importance of the Harrison study area is well know, but poorly described. A critical first step in protecting these values is identification of environmentally significant areas, including **Sensitive Ecosystems** and **Other Important Ecosystems**, concepts developed in previous Sensitive Ecosystem Inventories carried out in BC<sup>2</sup>. **Sensitive Ecosystem (SE)** classes represent generalized

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<sup>1</sup> For more information about the Biodiversity Strategy, please e-mail the Biodiversity Strategy Co-ordinator at biodiversity@fraservalleyconservancy.ca

<sup>2</sup> (McPhee, M., P. Ward, J. Kirkby, L. Wolfe, N. Page, K. Dunster, N.K. Dawe and I. Nykwist. 2000. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands, 1993-1997. Volume 2: Conservation Manual. Technical Report Series No. 345, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia; Iverson, K. and C. Cadrin. 2003. Sensitive

groupings of ecosystems that share many characteristics, particularly ecological sensitivities, ecological processes, rarity and wildlife habitat values (Iverson and Cadrin 2003). Ecosystems are classed as sensitive in this report if they have one or more of the following attributes:

- are rare or of restricted distribution
- have high biodiversity
- have high values as habitat, especially for known or potentially occurring species at risk
- are sensitive to disturbance and human impacts

Sensitive Ecosystem classes for the study were primarily adopted from Metro Vancouver Parks SEI project, as well as past SEI projects, and the FVC led Sumas Mountain SEI project.

***Other Important Ecosystems (OIE)*** provide values such as habitat, wildlife corridors and ecosystem services but in most cases have been modified by human use and are not usually considered as environmentally significant or sensitive as designated SEs.

The purpose of the SEI is to provide baseline information that can be used to inform planning, management, and conservation initiatives. Technical terminology has been kept to a minimum to make the report user-friendly for all anticipated users, including the general public, landholders, government, industry, developers, consultants and environmental non-governmental organizations. All levels of government will be able to use this data for a variety of resource management issues and it could also be used for updates to Regional Growth Strategies and Official Community Plans.

## **1.2 STUDY AREA**

The Harrison SEI study area encompasses 5,700ha along the north side of the Fraser River from Deroche in the West to Harrison Mills in the East (Figure 1).

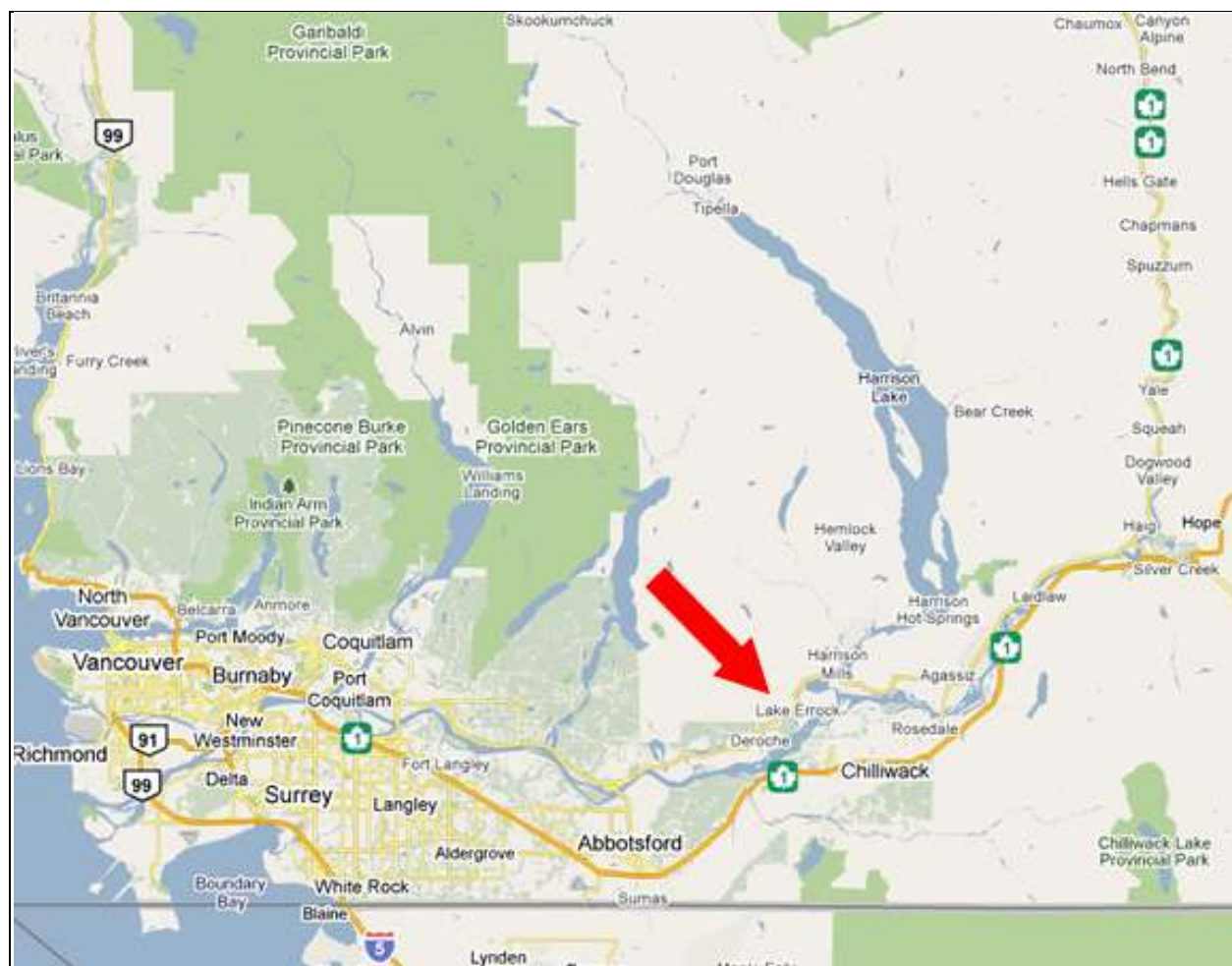


Figure 1. Overview of Harison Study Area.

## 2.0 MAPPING AND INVENTORY METHODOLOGY

SEI mapping was created in 1993 by the Canadian Wildlife Service and the BC Conservation Data Centre. It was created in *'response to a need for inventory of at-risk and ecologically fragile ecosystems, and critical wildlife habitat areas on the east side of Vancouver Island.'* Since then, numerous projects have been completed on the Sunshine Coast, Bowen Island, and throughout the Okanagan, from Osoyoos to Vernon (SEI Website date unknown). In 2006 a *Standard for Mapping Ecosystems At Risk in British Columbia* was created by the Resource Inventory Standards Committee to promote a standardized process province wide. (RISC 2006)

The main purpose of SEI mapping is to describe the ecological diversity of a given area, and determine the type and extent of vulnerable and rare elements (RISC 2006). The SEI standard (2006) describes an overview of the assessment process as follows:

'The SEI classification uses two primary groupings of ecosystems: ***Sensitive Ecosystems*** and ***Other Important Ecosystems***. Within each of these groups a series of classes and subclasses is defined that provides a general level of ecosystem description that is appropriate for public education and local planning exercises. Sensitive Ecosystem classes are generalised groupings of ecosystems that share many characteristics, particularly ecological sensitivities, ecosystem processes, at-risk status, and wildlife habitat values. Criteria for ecological sensitivity include: ***environmental specificity***, susceptibility to hydrological changes, soil erosion, especially on shallow soils, spread of invasive alien plants, and sensitivity to human disturbance. Other Important Ecosystems<sup>5</sup> have significant ecological and biological values associated with them that can be identified and mapped, although they are not defined as Sensitive Ecosystems because they have been substantially altered by human use. Consideration of Other Important Ecosystems is critical to capturing key elements of biodiversity of some project areas; they sometimes provide recruitment sites for ecosystems at risk or important wildlife habitat requiring recovery or restoration.'

SEI mapping can be a standalone product, or it can be modeled from Terrestrial Ecosystem Mapping (TEM) or other mapping products. The resultant product is a GIS and themed maps that can be used as a flagging tool to a variety of users to assist with land use planning.

## 2.1 STUDY LIMITATIONS

This study has the following limitations:

1. Most polygons were not ground-truthed due to the project budget, difficult or unsafe access (steep slopes, cliffs, distance from roads, etc.), and private property access. Visual checks were performed on steep slopes from lowland areas with the use of binoculars where possible.
2. Many small ecosystem types (primarily small wetlands and fluvial ecosystems) are not included in the final mapping product due to a maximum of three ecosystem types per polygon and minimum polygons sizes.
3. Mapping was performed on 2d images resulting in a coarse interpretation of many ecosystem types. In particular, distinguishing between the structural stages (young, mature, old) of forest stands was difficult and may have inaccuracies. Many ecosystem types, such as seepages and cliffs, were likely missed.

While the resultant mapping and descriptions should be considered an accurate representation of the Harrison area, site specific assessments should be conducted on any areas considered for development. Map and line work is considered accurate to 1:5 000; maps produced at larger scales may not provide an accurate representation of the classification.

## **2.2 MAPPING PROCEDURES**

Ecosystem mapping was performed on 2009 digital orthophotos provided by the Fraser Valley Regional District. Mapping was completed at a scale of 1:5 000 using ArcMap 9.3. Mapping procedures generally followed the protocol for *Terrestrial Ecosystem Mapping* (RISC 1998) and *Standard for Mapping Ecosystems At Risk in British Columbia* (RISC 2006), but was limited by the lack of stereo imagery.

## **2.3 GROUND-TRUTHING AND DATA COLLECTION**

Ground truthing and data collection were performed over 7 days in May and June, 2010. Sampling was limited to visual assessments from road edges and crown land. 75 visual plots were established (Figure 2). Each plot indicated a description of the SE class, conservation evaluation, species-at-risk habitat potential, and wildlife occurrences.

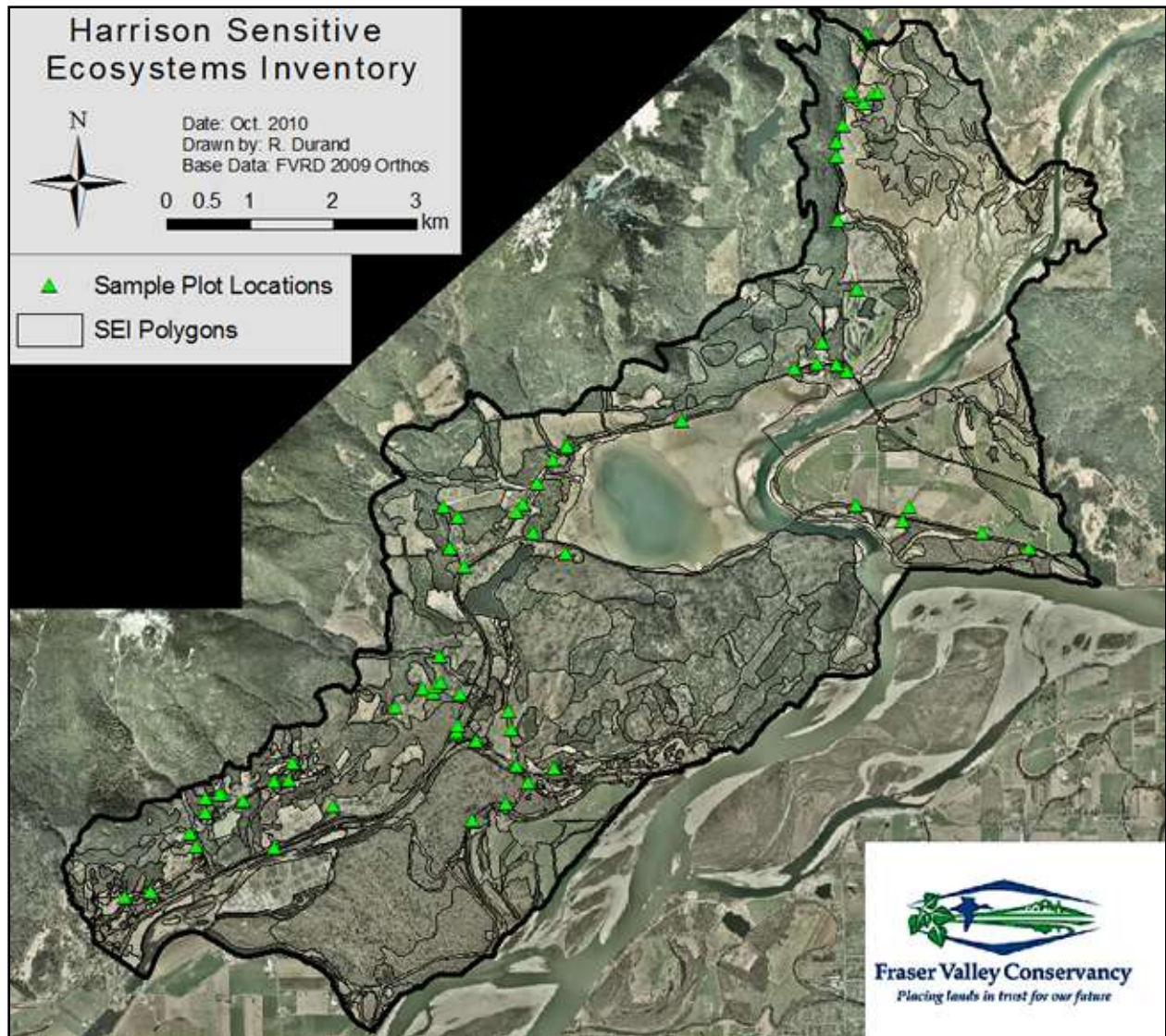


Figure 2. Sample Plot Locations.

## 2.4 DETERMINATION OF SENSITIVE ECOSYSTEMS

SEI classes for Harrison were primarily adapted from a SEI project currently under development by Metro Vancouver Parks (2010) in order to make the Harrison SEI consistent with other regional and provincial projects. Minimal modifications to the Metro Van Parks classes and subclasses were made for the Harrison SEI project. The Metro Vancouver Parks SE descriptions were discussed with and reviewed by provincial Ministry of Environment staff (Carmen Cadrin and Jo-Anne Stacey) and Canadian Wildlife Service (Jan Kirkby).

### 2.4.1 SENSITIVE ECOSYSTEM CLASSES

The following SEI classes and subclasses have been used to describe sensitive ecosystems in the Harrison study area (Table 1).

Table 1. Sensitive Ecosystem Classes

SEI Class	SEI Subclass	Brief Description
OF: Old Forest*		Forests > 250 yrs
OF	co: coniferous	Conifer > 75% of stand
OF	mx: mixed	Stand composition > 25% conifer and > 25% broadleaf
MF: Mature Forest		Forests > 80 yrs, < 250 yrs, > 5 ha
MF	co: coniferous	Conifer-dominated (> 75% of stand composition)
MF	mx: mixed	Stand composition > 25% conifer and > 25% broadleaf
WD: Woodland		Dry site, open stands with between 10 and 25% tree cover
WD	co: coniferous	Conifer > 75% of stand
WD	mx: mixed	Conifer > 25% and broadleaf > 25% of composition
RI: Riparian		Ecosystems associated with and influenced by freshwater
RI	fh: high bench	High bench floodplain terraces
RI	fm: medium bench	Medium bench floodplain terraces
RI	fl: low bench	Low bench floodplain terraces
RI	ff: fringe	Narrow band near ponds or lake shorelines, or streams with no floodplain
RI	ri: river	Large river watercourses including gravel bars
WN: Wetland		Terrestrial – freshwater transitional areas.
WN	ms: marsh	Graminoid or forb-dominated nutrient-rich wetlands
WN	sp: swamp	Shrub or tree-dominated wetlands
WN	sw: shallow water	Permanently flooded, water less than 2m deep at mid-summer.
SV: Sparsely Vegetated		Areas with 5 – 10% vascular vegetation.
SV	cl: cliff	Steep slopes, often with exposed bedrock.
SV	ro: rock outcrop	Rock outcrops – areas of bedrock exposure.
SV	ta: talus	Dominated by rubbly blocks of rock.
FW: Lakes and Ponds (Freshwater)		
FW	pd: pond	Open water > 2 m deep and generally < 50 ha.
FW	La: lake	Open water > 2 m deep and generally < 50 ha.

\*OF was not used in this project. The description has been retained for use if future ground truthing identifies this SE class.

## 2.4.2 OTHER IMPORTANT ECOSYSTEMS

Other Important Ecosystems (OIE) are mapped to identify important elements of biodiversity or recruitment sites for ecosystems at risk or important wildlife habitat requiring recovery or restoration (Table 4).

Table 2. Other Important Ecosystems

Other important Ecosystem Class	OEI Subclass	Brief Description
MF: Mature Forest		Small patches of forest – stands > 80 yrs, < 250 yrs
MF	bd: broadleaf	Broad-leaf dominated (> 75% of stand composition), any size
YF: Young Forest		Large patches of forest – stands > 30 yrs, < 80 yrs
YF	co: coniferous	Conifer-dominated (> 75% of stand composition)
YF	mx: mixed	Stand composition > 25% conifer and > 25% broadleaf
YF	bd: broadleaf	Broad-leaf dominated (> 75% of stand composition)

## 2.4.3 NOT SENSITIVE ECOSYSTEMS

Mapped areas that do not fall in the SE and OIE classes (primarily those with recent or permanent disturbances) are classified as Not Sensitive Ecosystems (NS).

## 3.0 SEI MAPPING

The following section describes the results of the SEI mapping. Section 3.1 provides a detailed description of each SE class and subclass, as well as distribution maps and representative photos. The results of the SEI mapping indicated that 64.8% of the Harrison study area should be considered Sensitive Ecosystems, 9.1% is Other Important Ecosystem, and 26.4% is Not Sensitive (Table 3 and Figures 3).

Table 3. CWdm Sensitive Ecosystem Distribution.

SE Class	Total Hectares	Total Percent
FW:pd	89.8	2.4%
FW:la	24.9	0.7%
MF:mx	583.0	15.8%
MF:co	318.7	8.6%
RI:ff	108.2	2.9%

RI:fh	136.4	3.7%
RI:fm	421.7	11.4%
RI:fl	359.1	9.7%
RI:ri	912.2	24.7%
SV:cl	18.0	0.5%
SV:ta	11.0	0.3%
WD:co	161.1	4.4%
WD:mx	239.4	6.5%
WN:ms	77.5	2.1%
WN:sp	175.7	4.8%
WN:sw	57.7	1.6%
<b>Total SE</b>	<b>3,694.4</b>	<b>64.5%</b>
OIE (MF:bd)	141.2	27.0%
OIE (YF:bd)	184.0	35.1%
OIE (YF:co)	101.6	19.4%
OIE (YF:mx)	96.9	18.5%
<b>Total OIE</b>	<b>523.7</b>	<b>9.1%</b>
<b>NS</b>	<b>1,513.6</b>	<b>26.4%</b>
<b>Total</b>	<b>5,731.7</b>	<b>100.00%</b>

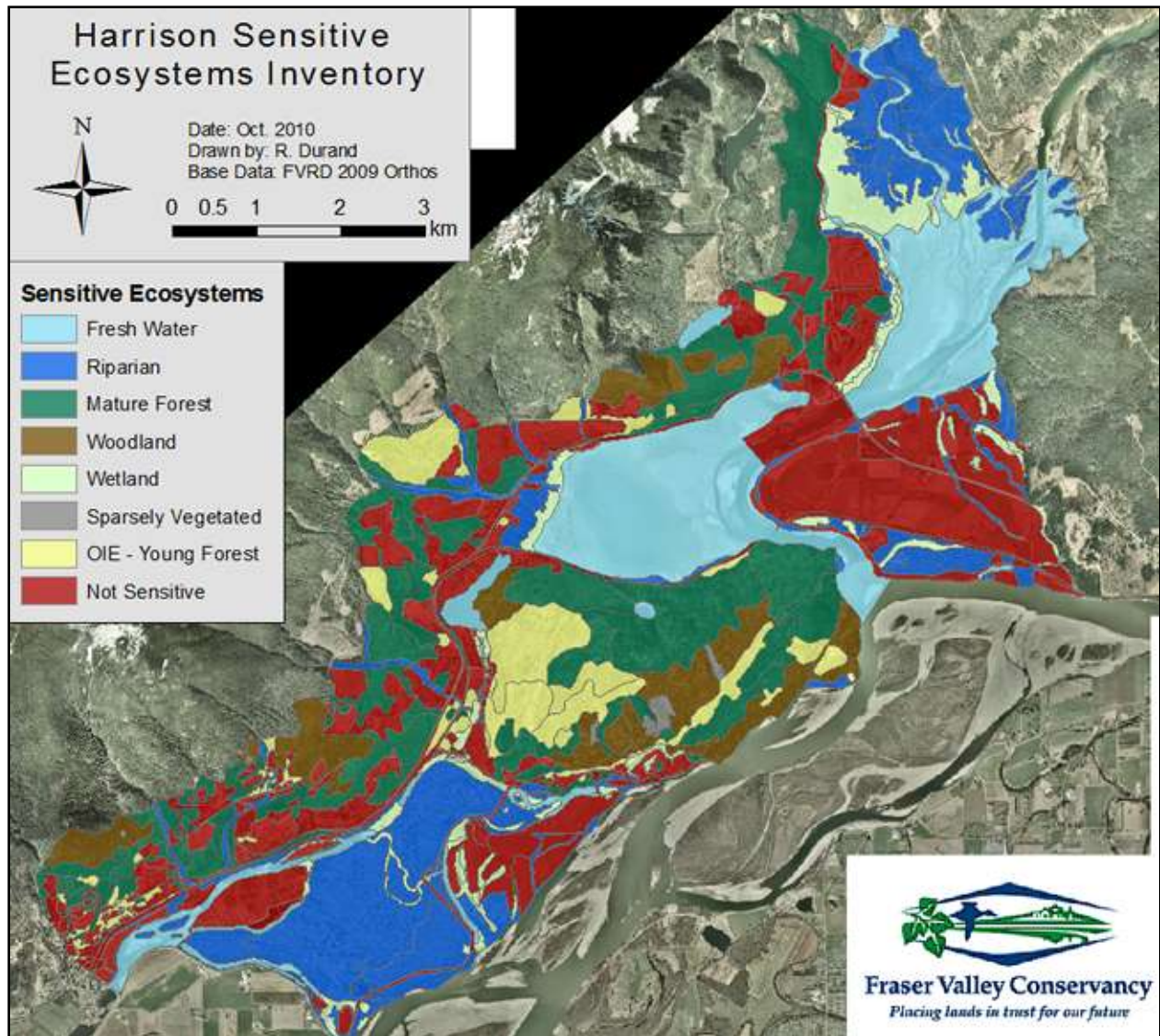


Figure 3. SEI Map of the Harrison Study Area

### 3.1 SENSITIVE ECOSYSTEMS (SE)

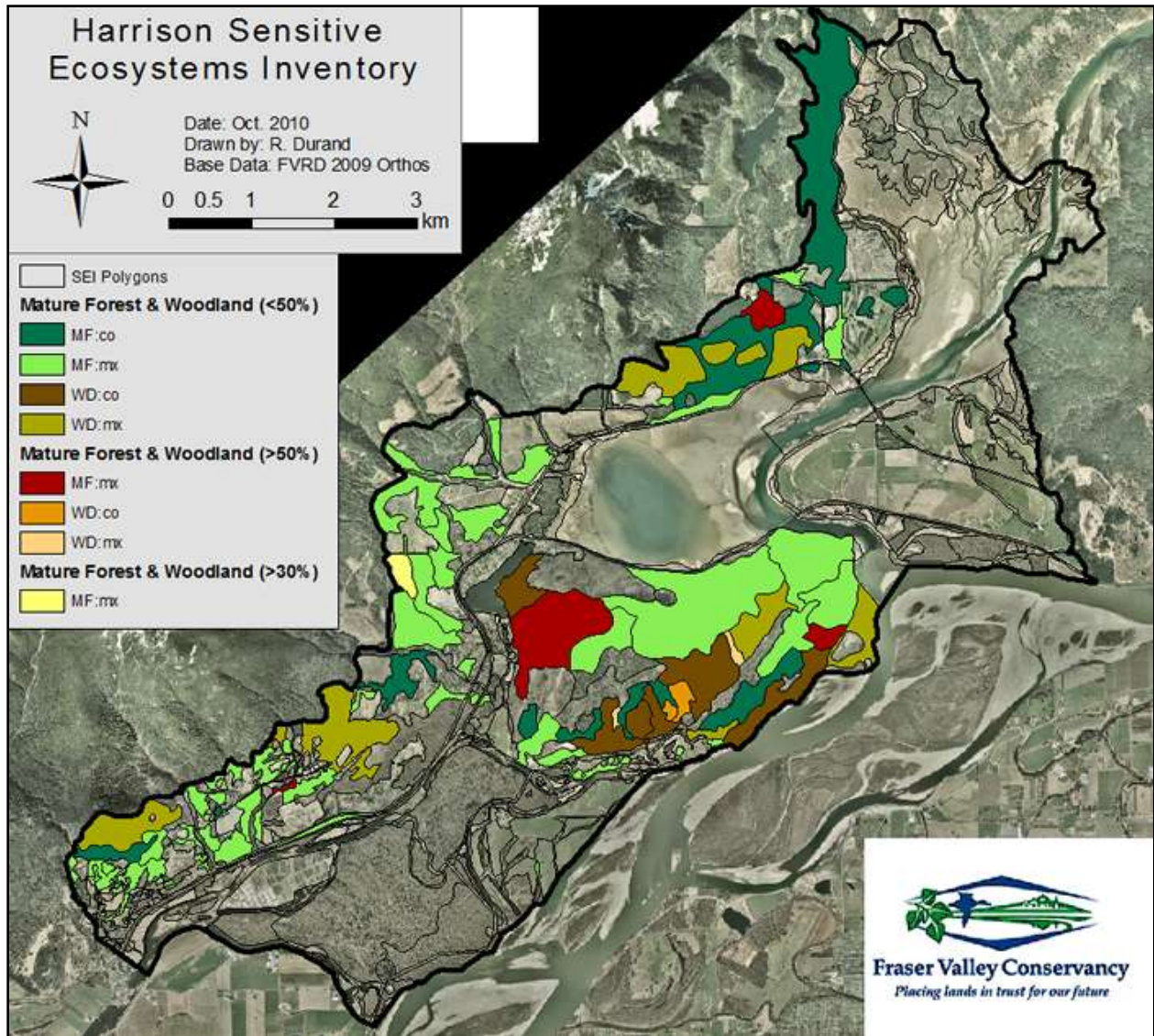
The following sections provide descriptions of the SE and OIE classes and sub-classes mapped in the Harrison study area.

#### 3.1.1 OLD FOREST (OF), MATURE FOREST (MF), AND WOODLAND (WD)

Forested ecosystems dominate the majority of the study area (Figure 4). Due to an extensive disturbance history, forest stands are largely second growth and highly variable. Two forested types are mapped as Sensitive Ecosystems. As the three forest types contain many similar ecological values and

threats, they have been combined into one section in this report. The following section describes the two classes.

**Mature Forest (MF):** Forests generally >80 yrs old and < 250 yrs old (Figures 21 and 22). Mature forests are not as structurally complex as old forests, but can function as essential habitat areas for many wildlife species and as primary connections between ecosystems in a highly fragmented landscape<sup>3</sup>. Two subclasses are recognized; MF:co and MF:mx. MF:co are conifer dominated (> 75% coniferous species) while MF:mx are mixed conifer and deciduous (<75% coniferous and < 75% broadleaf composition). Broadleaf dominated MF stands are considered to be Other Important Ecosystems. (Metro Van Parks, 2010)



<sup>3</sup> Metro Vancouver Parks proposed a minimum polygon size of 5 ha is proposed for inclusion in the MF sensitive ecosystem class. MF polygons of <5ha would be considered Other Important ecosystems. Due to the limited size of the study area, and the high number of species at risk, a minimum polygon size was not used for this classification.

Figure 4. Location of Forested Ecosystems.

**Woodland (WD):** Woodlands are open forests, generally between 10 and 30% tree cover, as a result of site conditions, i.e., they are ecological woodlands (Figures 23 and 24). They are found on dry sites, mostly on south facing slopes of rocky knolls and bedrock-dominated areas. The stands can be conifer dominated or mixed conifer and broadleaf stands and because of the open canopy, will often include non-forested openings, generally on shallow soils and bedrock outcroppings. Two subclasses are recognized; WD:co and WD:mx. WD:co are conifer dominated ecological woodlands (greater than 75% coniferous composition). WD:mx are mixed conifer and broadleaf ecological woodlands (minimum of 25% composition of each group comprises the total tree cover). (Metro Van Parks, 2010)

### 3.1.2 RIPARIAN (RI) AND FRESHWATER (FF)

Riparian Ecosystems are associated with and influenced by freshwater, generally along rivers, streams, and creeks, but for SEI, also includes fringes around lakes. Ecosystems are influenced by factors such as erosion, sedimentation, flooding and/or subterranean irrigation due to proximity to the water body. Five subclasses are recognized in the study area: RI:ri, RI:ff, RI:fm, RI:fh, and RI:fl (Figure 5). RI:fm are medium bench floodplains that flooded every 1-6 years for short periods (10-25 days). They contain deciduous or mixed forest dominated by species tolerant of flooding and periodic sedimentation. RI:fh are high bench floodplains that are periodically and briefly inundated by high waters, but contain lengthy subsurface flow in the rooting zone. RI:fl are low bench floodplains that are flooded at least every other year for moderate periods of growing season. They contain plant species adapted to extended flooding and abrasion, low or tall shrubs most common. (Metro Van Parks, 2010)

RI:ff are fluvial fringes located along larger creeks and small ponds. These riparian ecosystems are generally forested and often do not appear significantly different in terms of vegetation or structure than adjacent forested areas. They typically contain wetter soils and small fringes of vegetation adapted to high and/or fluctuating water tables (such as red osier dogwood). Riparian areas that are regularly or periodically flooded are generally classified in the preceding floodplain ecosystem classes.

RI:ri are large river ecosystems, including gravel bars. They are generally devoid of vegetation, or vegetation is sparse and susceptible to regular disturbance.

Riparian ecosystems form a transition zone between aquatic and terrestrial ecosystems and encompass areas (often linear) along creeks, streams, rivers and lakes that have more soil moisture, and therefore often have noticeably different vegetation, than the adjacent upland. They are subject to fluctuating water tables and flooding and the soils are usually nutrient-rich. Riparian ecosystems are also generally more humid and have greater air circulation than surrounding areas, resulting in a slightly different microclimate.

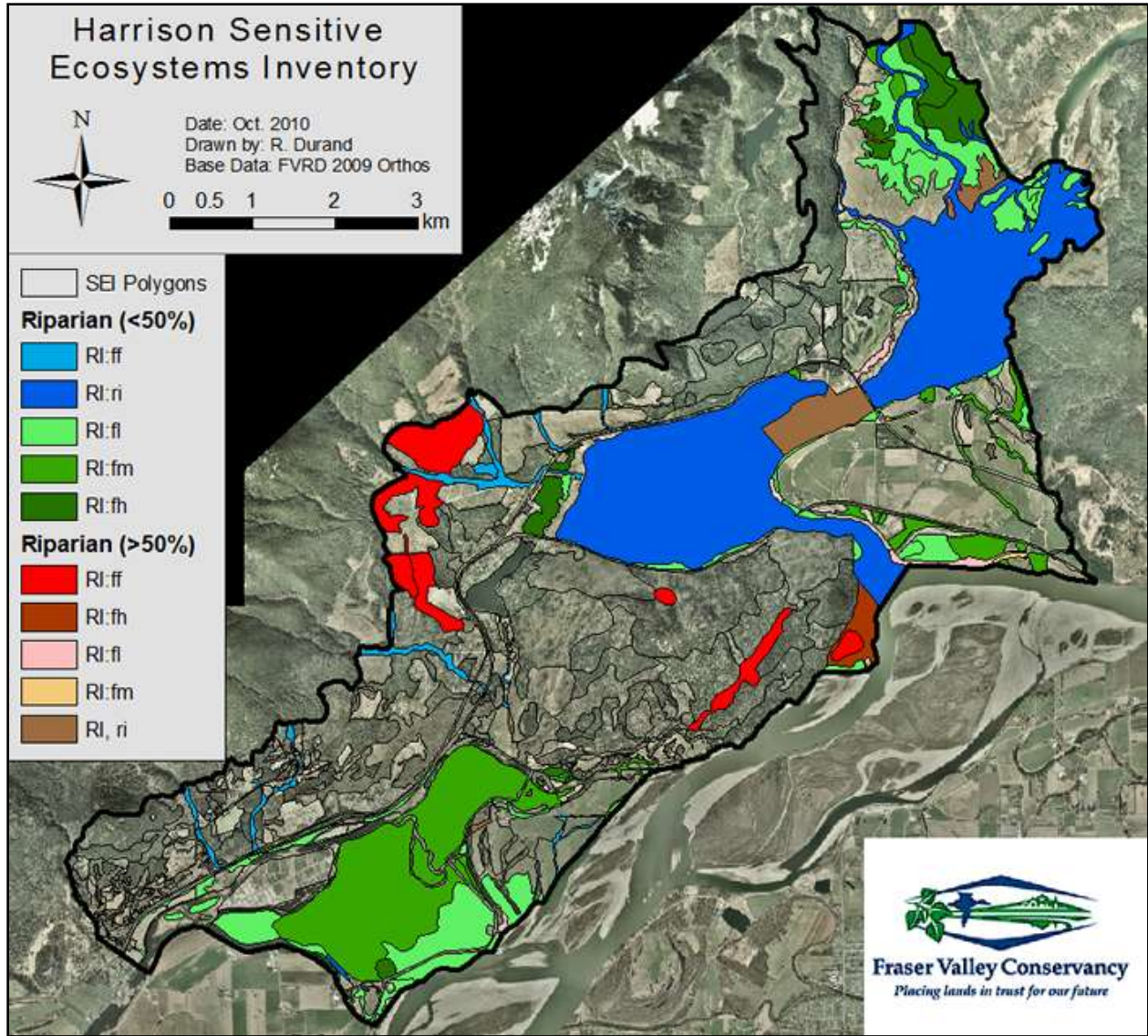


Figure 5. Location of Riparian Ecosystems.

Freshwater ecosystems include bodies of water such as lakes and ponds that usually lack floating vegetation. Two subclasses are recognized in the study area FF:pd and FF:la (Figure 6). FF:pd are naturally occurring, small bodies of open water (ponds), greater than 2 m deep and generally less than 50 ha, with little to no floating vegetation, while FF:la (lakes) are generally larger than 50 ha. (Metro Van Parks, 2010)

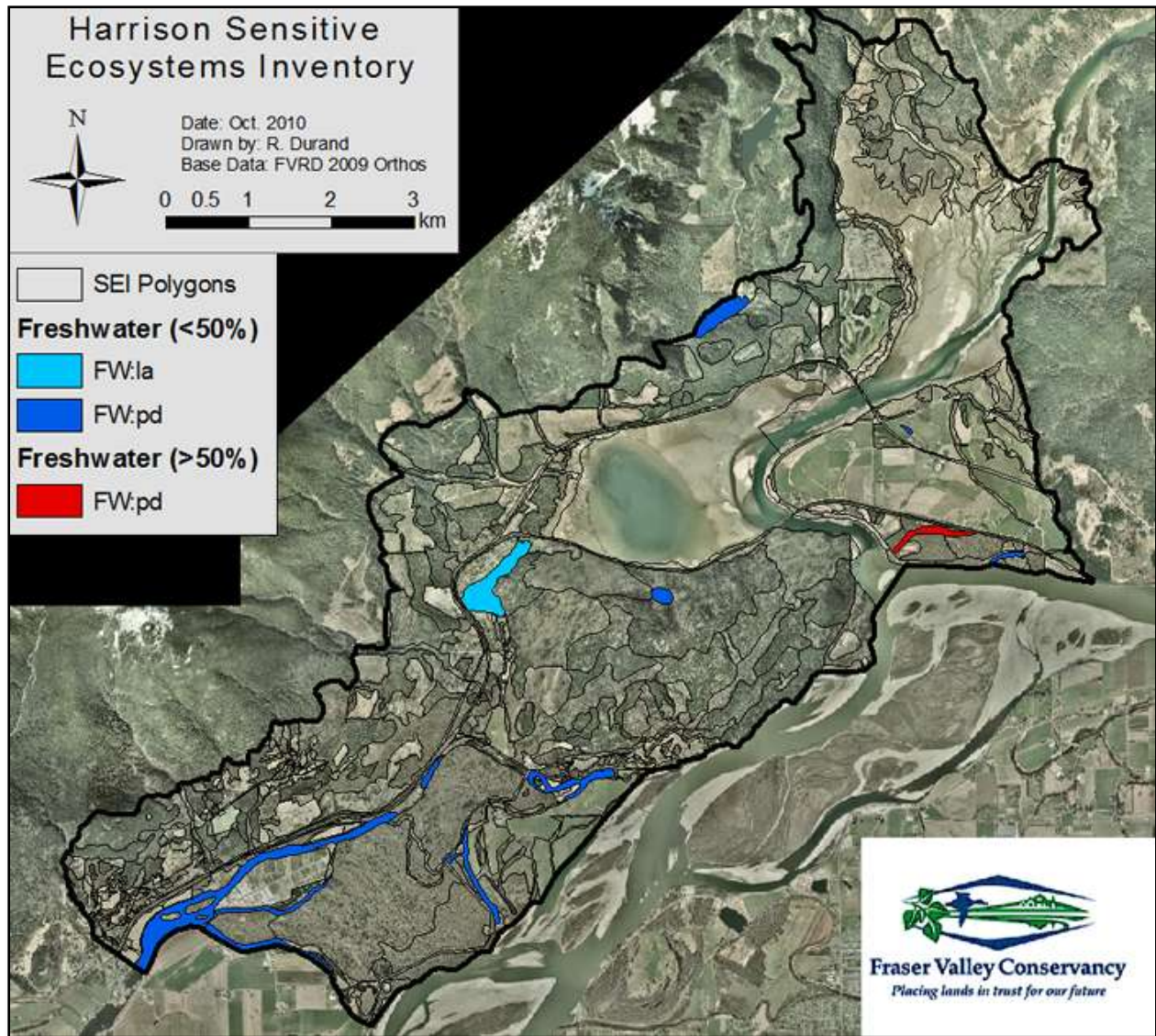


Figure 6. Location of Freshwater Ecosystems.

### 3.1.3 WETLAND (WN)

Wetland ecosystems are found where soils are saturated by water for enough time that the excess water and resulting low oxygen levels influence the vegetation and soil. The water influence is generally seasonal or year-round and occurs either at or above the soil surface or within the root zone of plants. Wetlands are usually found in areas of flat or undulating terrain. Three subclasses are recognized in the study area: marshes (WN:ms), swamps (WN:sp), and shallow water (WN:sw). (Metro Van Parks 2010)

WN:ms are characterized by permanent or seasonal flooding by nutrient-rich waters. They are dominated by sedges and rushes, often with one or two species forming the majority of the thick vegetative cover (MacKenzie & Moran 2004, Metro Van Parks 2010)

WN:sp are wooded wetlands dominated by 25% or more cover of flood-tolerant trees or shrubs. They are characterized by periodic flooding and nearly permanent sub-surface waterflow through mixtures of mineral and organic materials, swamps are high in nutrient, mineral and oxygen content. While swamps occur in a variety of landscape positions, they are most often found in small depressions in level areas, and gently sloping toes along creeks and streams. They are highly variable, but typically contain thick shrub layers and an irregular tree canopy. (MacKenzie & Moran 2004, Metro Van Parks 2010)

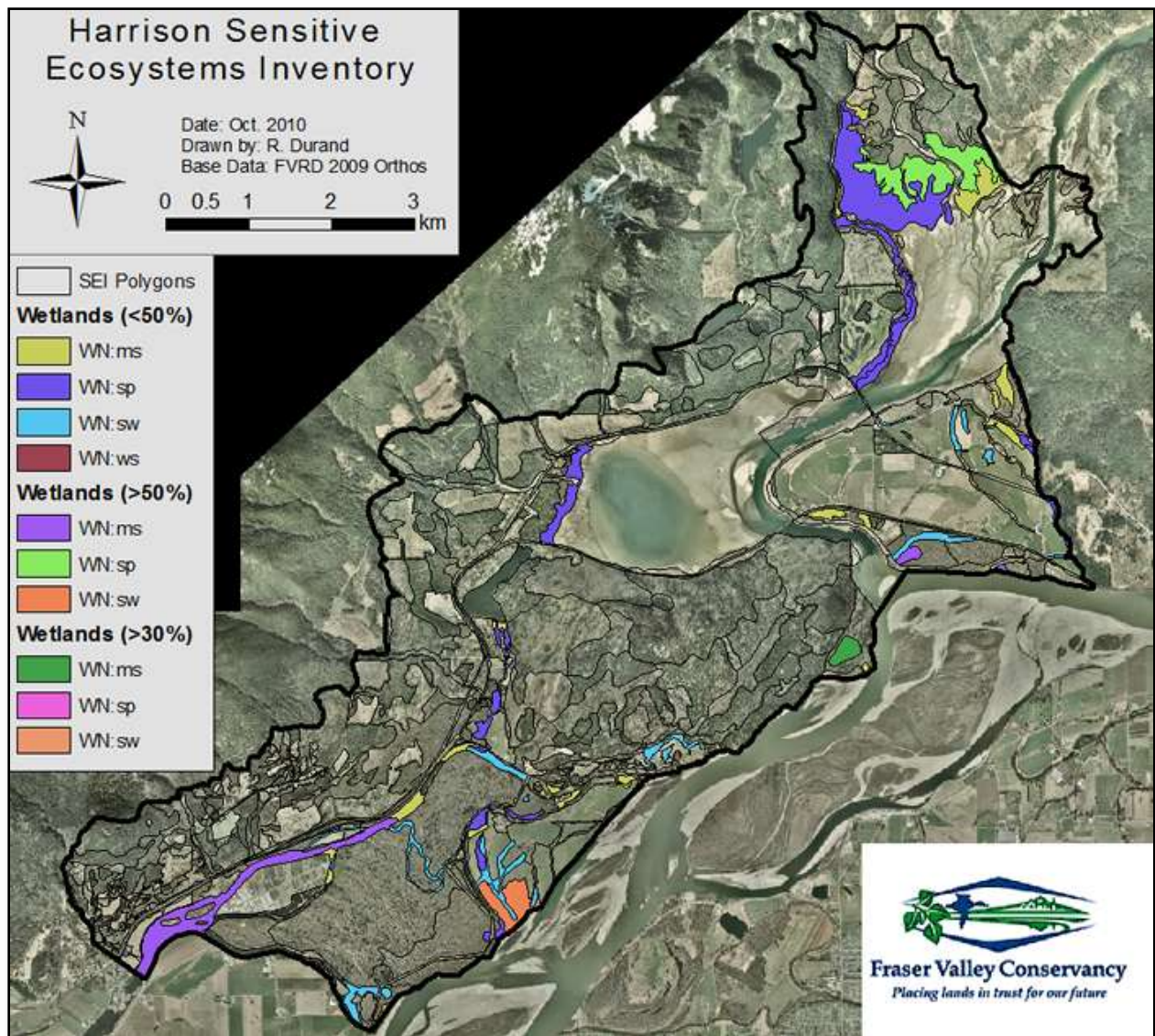


Figure 7. Location of Wetland Ecosystems.

WN:sw wetlands are characterized by still or slow-moving water less than 2 m in depth in mid-summer. They are often transitional between deep water bodies and other wetland ecosystems. Vegetation is general limited to a few species of floating aquatic species (such as Yellow Pond Lily and Duckweed) and/or submerged aquatic species. (MacKenzie & Moran 2004, Metro Van Parks 2010)

### 3.2 OTHER IMPORTANT ECOSYSTEMS (OIE)

Other Important Ecosystems (OIE) are mapped to identify important elements of biodiversity or recruitment sites for ecosystems at risk or important wildlife habitat requiring recovery or restoration. Two classes of OIE are recognized in the study area: Mature Forest (MF) and Young Forest (YF) (Figure 8). Sections 3.2.1 and 3.2.2 describe the OIE classes and subclasses.

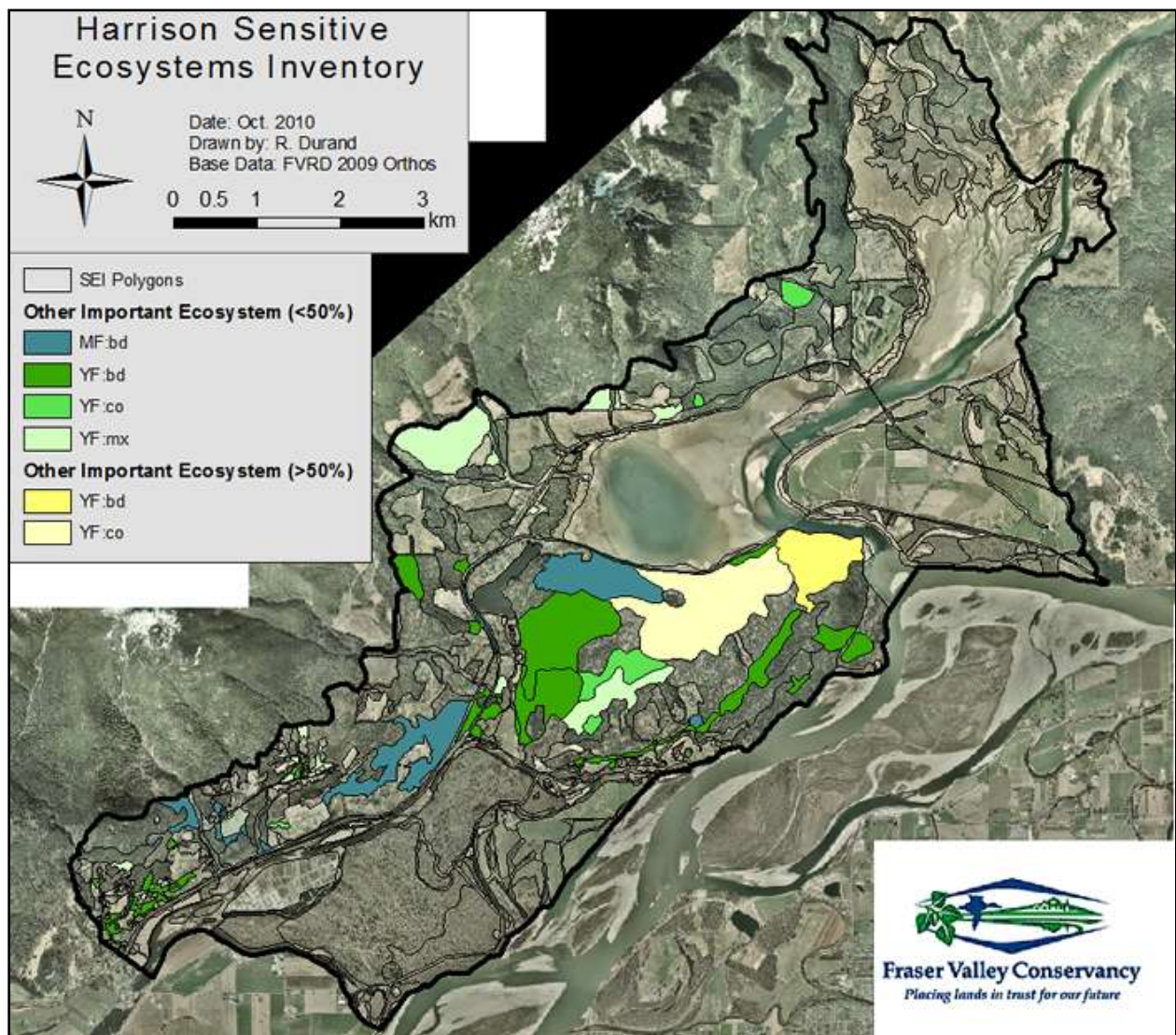


Figure 8. Location of Other Important Ecosystems.

### **3.2.1 MATURE FOREST (MF)**

Mature broadleaf forests (MF:bd) are deciduous dominated stands generally >80 yrs old and < 250 yrs old. These mature forests are not as valuable as old forests as far as representing the at-risk ecosystems, but can be important habitat areas for many wildlife species and serve as primary connections between ecosystems in a highly fragmented landscape. They are not classified as SE as many of these forests are expected to be disclimax stands that may not reach old conifer states (the expected climatic composition of most forested ecosystem in BC) due to past disturbances, edaphic conditions, or disturbance regimes. (Metro Van Parks 2010)

While not considered to be SE, MF:bd are important in the study area for a variety of species at risk habitat.

### **3.2.2 YOUNG FOREST (YF)**

Young Forests are generally >30 – 40 yrs old and < 80 yrs old (Figure 8). They can be important habitat areas for many wildlife species and serve as primary connections between ecosystems in a highly fragmented landscape. Over time, if no additional disturbances occur, many of these ecosystems may develop into a MF and eventually OF classes. Three subclasses are recognized in the study area; YF:co, YF:mx and YF:bd. YF:co are conifer dominated (> 75% coniferous species). YF:mx mixed conifer and deciduous (<75% coniferous and < 75% broadleaf composition). YF:bd are broadleaf dominated (>75% broad-leaved species). (Metro Van Parks 2010)

### **3.3 NOT SENSITIVE (NS)**

All TEM ecosystem polygons not classified as SE or OIE are considered to be NS (Figure 9). The majority of NS polygons are those that are permanently disturbed (such as roads, mine, urban and residential developments, and railways) or have recently been heavily disturbed (primarily logging and other types of extensive clearing). NS polygons also include disturbed areas that are dominated by shrubs. While these areas may still provide limited wildlife habitat or serve as movement corridors, they are generally expected to have limited biodiversity values.

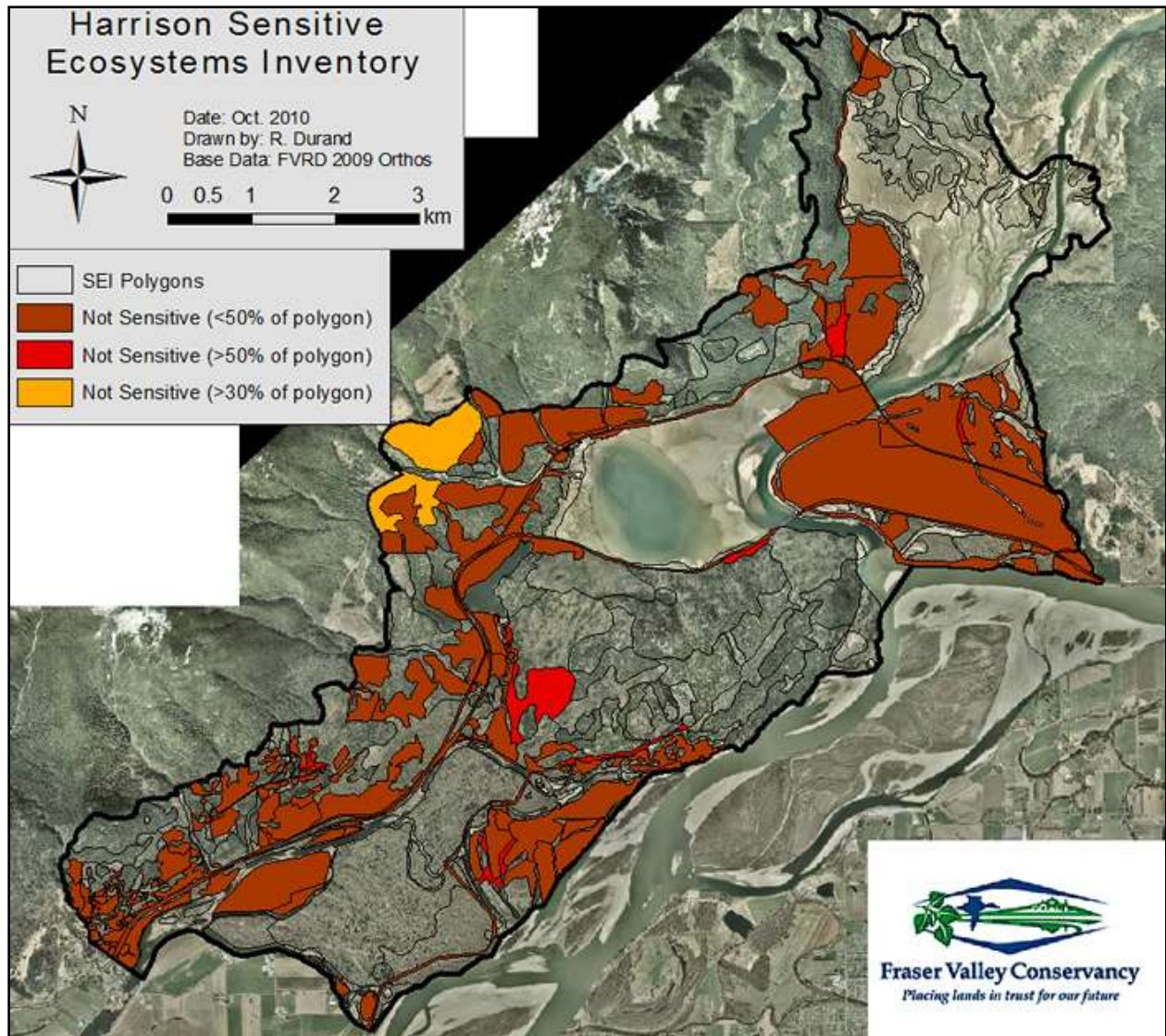


Figure 9. Location of Not Sensitive Ecosystems.

#### 4.0 FUTURE DIRECTIONS

This report should be considered to be a baseline study from which numerous other assessments can be conducted. In particular, the mapping can be used to identify areas in which more detailed assessments can be completed, and to begin landscape level conservation planning. The following species future directions are recommended:

- Additional sampling in under-sampled areas,

- Additional SAR surveys by species specialists,
- Future analyses with the mapping and inventory data (change over time, etc.), and
- Mapping of key landscape level linkages.

## 5.0 REFERENCES

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