



PACIFIC BIRDS HABITAT JOINT VENTURE

Fraser Lowland Wetland Inventory Data Report: Assessment of Wetland Loss 1989 to 2019 and Priority 1 Wetland Protection 1992 to 2024



Pitt Polder Wetland [Photo Credit: Ducks Unlimited Canada]

Partner Organizations of the Pacific Birds Habitat Joint Venture (British Columbia)



Environment and
Climate Change Canada
Canadian Wildlife Service

Environnement et
Changement climatique Canada
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TERRITORIAL LAND ACKNOWLEDGEMENT

The Pacific Birds Habitat Joint Venture (PBHJV) acknowledges that the lands on which we work are the traditional lands of many different Indigenous nations across British Columbia. The act of acknowledging these lands, and the signed treaties where applicable, is an act of reconciliation with Indigenous peoples and an expression of respect and gratitude for the land. This action is to remind us that our places of work, where we live and where we gather, are on the traditional lands of First Nations, Inuit and Métis people who historically resided here and still presently do. It is also a recognition that all of us are accountable to these relationships on a daily basis. The aims of the PBHJV involves the conservation, protection and enhancement of wildlife and habitat that directly impacts Indigenous communities. We acknowledge the need for meaningful consultation with Indigenous communities throughout the implementation of this plan.

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
PBHJV	Pacific Birds Habitat Joint-Venture
CWS	Canadian Wildlife Service
ECCC	Environment and Climate Change Canada
BC	British Columbia
FLWI	Fraser Lowland Wetland Inventory
FREMP	Fraser River Estuary Management Program
DUC	Ducks Unlimited Canada
NTBC	Nature Trust of British Columbia
BC Nature	Federation of BC Naturalists
WMA	Wildlife Management Area
NGO	Non – government Organization
CWCS	Canadian Wetland Classification System

1. Introduction

The [Pacific Birds Habitat Joint Venture \(PBHJV\)](#) is a partnership between government and non-governmental groups established to conserve birds and their habitat along the west coasts of Canada and the United States. It includes the Pacific coastal areas of British Columbia (BC), Washington, Oregon, and Northern California, as well as all of Alaska, Hawaii, and the Pacific Islands. Coastal wetlands are a key focus of the PBHJV partnership because of their tremendous ecological value to migratory birds. The wetlands in the Fraser River Lowland in southwestern BC (see [Map 1](#)) are of particular significance because of their linkage to the Fraser River Delta, a major stopover for migratory birds along the Pacific Flyway. In addition to their importance for migratory birds, these wetlands provide other ecological benefits such as buffering floodwaters and filtering sediments and pollutants.

Recognizing the ecological importance of wetlands in the region, in 1989 the Canadian Wildlife Service (CWS) of Environment and Climate Change Canada (ECCC) mapped the extent of the remaining wetlands as part of the [Fraser Lowland Wetland Inventory \(FLWI\)](#). Following this inventory, CWS collaborated with the BC Ministry of Environment, Ducks Unlimited Canada (DUC), The Nature Trust of British Columbia (NTBC), and the Federation of BC Naturalists (BC Nature) to assess the [protection status of these wetlands](#) (1992) and then assigned their conservation priority based on degree of threat, wildlife value, and size (1993). Furthermore, CWS has undertaken successive assessments of wetland loss, examining the change in wetland extent between 1989-1999, 1999-2009, and 2009-2019. These studies provided critical insights into urban encroachment and long-term degradation of wetlands. In 2025, over three decades of wetland data were consolidated into a comprehensive and updated version of the Fraser Lowland Wetland Inventory. This report summarizes results for two main objectives: Section One assesses wetland loss between 1989 and 2019, while Section Two assesses wetland loss and the level of high protection (Government, Non-governmental Organization (NGO), Regional Parks) of Priority 1 wetlands as of 1992 and as of 2024.

Study Area - Fraser Lowland Ecoregion

Legend
 Study Area



0 10 20 30
 Kilometers

1:350,000
 NAD 1983 UTM Zone 10



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 Climate Change Canada
 Canadian Wildlife Service

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Map 1. Study Area, Fraser Lowland Ecoregion

2. Methods

The Fraser Lowland Wetland Inventory was first created by CWS in 1989 to map and classify wetlands using a combination of mid to late 1980s air photos (primarily 1:12,000 to 1:15,000 scale) and the [Canadian Wetland Classification System](#) (CWCS). This methodology is fully described in [CWS Technical Report #146](#). Each wetland was assigned a “Unit Number”, along with corresponding wetland classes (bog, fen, marsh, swamp, shallow water, gravel bar) and vegetation types. While “gravel bar” is not an official class in the CWCS this category was added in the 1989 inventory because they function as wetlands due to periodic inundation, seasonal high water tables and adaptive vegetation as a result of the hydrologic conditions in the Fraser River in the eastern part of the study area. In addition, cottonwood forests which grow on those gravel bars are not classified as floodplain swamps but instead are dealt with as part of the gravel bar unit. Some wetland units contained up to three different wetland classes with numerous vegetation types. Roughly 75% of the wetland units have a mix of two or more wetland classes, and the remainder consist of a single class. The methods and minimum mapping unit size (0.5 hectares) resulted in a [regional-scale](#) spatial dataset. As a result, several wetland units contained mixed wetland classes, and smaller, local wetlands may not have been included. Based on new information in 1995, some additional wetland units were incorporated into the dataset and one erroneous wetland unit was removed.

Between 2000 and 2001, the mapping was revised through minor corrections and adjustments such as digitizing linework to create a vector-based layer from the original 1989 raster. An additional change was including the full size of Burns Bog into the inventory, including the centre portion that had been subjected to peat mining in the past. While this area is disturbed, the wetland plants in this area still contribute to the ecological significance of the entire bog. Importantly, the inventory includes only natural wetlands. Constructed wetlands were not incorporated since their immature state means they typically lack full ecological functioning. This revision also incorporated wetland units newly digitized by the Fraser River Estuary Management Program (FREMP) (1:2,500 scale), that replaced the coarser-scale version used in the original 1989 dataset. Following the revision, the FLWI contained a total of 432 mapped wetland units for a total of 44,891.6 hectares (See [Appendix A](#)). The extent in terms of wetland class was: shallow open water 62% (27,859 ha); marsh 14% (6,473 ha); bog 8% (3,410 ha); gravel bar 7% (3,134 ha); fen 5% (2,256 ha); swamp 4% (1,759 ha).

Using the 1989 version of the FLWI, in 1992, CWS collaborated with the BC Ministry of Environment, DUC, NTBC, and BC Nature to assess the protection status of these wetlands ([CWS Technical Report #200](#), 1992). Wetland units were assigned into three levels of protection – high,

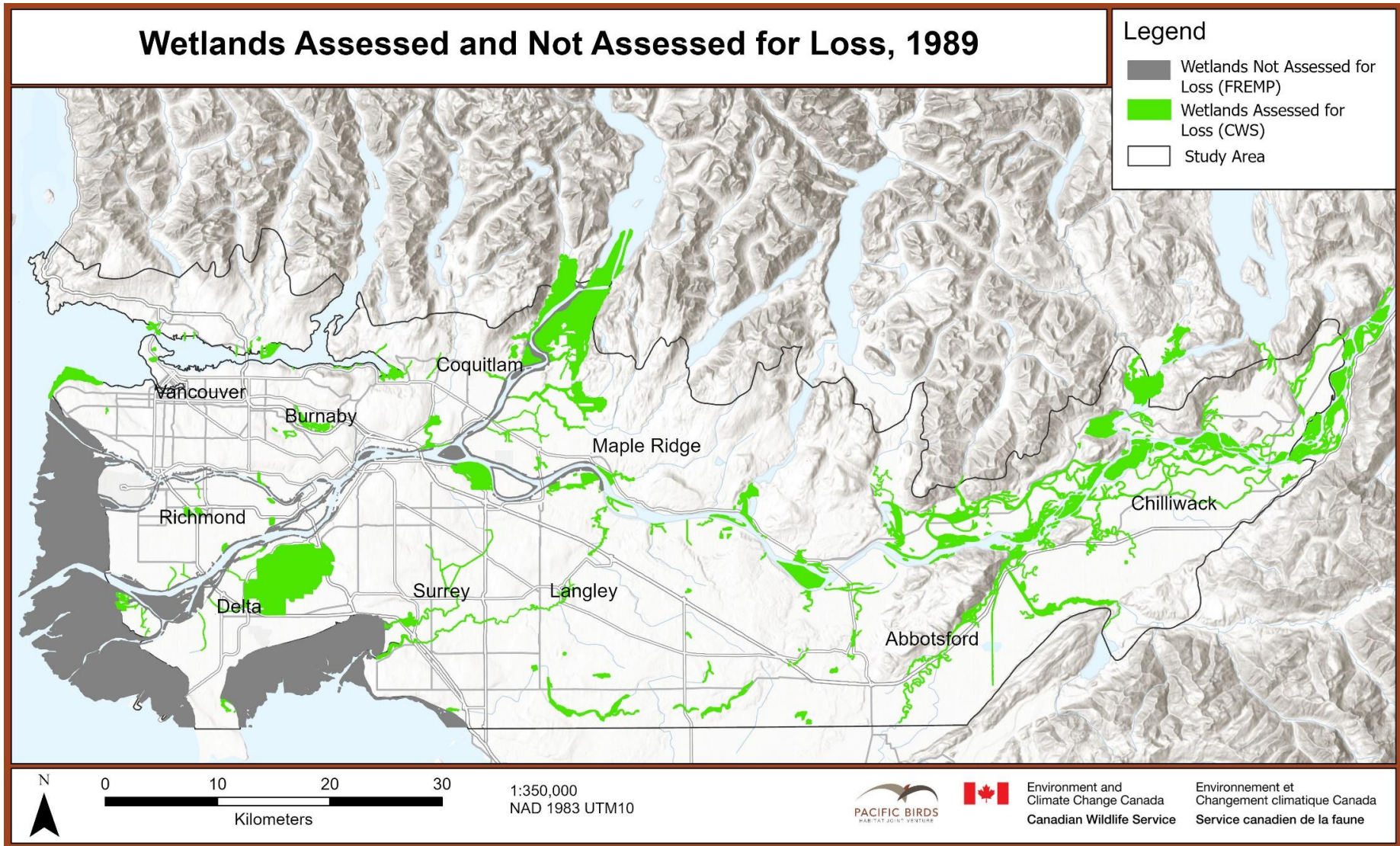
medium and low. Importantly, this assessment was largely a manual process of comparing paper protected areas maps with the wetlands and therefore the results meet regional-scale accuracy. In 1993, the partners then categorized the wetland units into their priority based on degree of threat, wildlife value and size: Priority 1 (high priority for conservation action), Priority 2 (medium priority for conservation action), Priority 3 (lower priority for conservation action), and Priority 4 (sufficiently protected). In 2024, CWS reassessed the extent of high protection on the 51 wetland units that had been identified as Priority 1 (high priority for conservation action) in 1993 (**Map 9; Appendix B**). Due to the availability of fine-scale digital mapping of protected areas now available from the [Canadian Protected and Conserved Areas Database](#) (CPCAD) and [Metro Vancouver](#), it was decided to redo the paper-based 1992 protection assessment ([CWS Technical Report #200, 1992](#)) to make it more comparable to the precision of the 2024 FLWI revision. The CPCAD “designation year” was used to assess which wetlands had been protected as of 1992 and as of 2024. To ensure consistency over time it was decided to focus exclusively on tracking the progress towards high protection of Priority 1 wetlands. The definition of high protection was limited to protected areas under the ownership of the provincial and federal government (Provincial Parks, Ecological Reserves, Wildlife Management Areas, Federal Nature Reserves and Wildlife Areas), NGO’s (NGO Conservation Areas) and Metro Vancouver (Regional Parks). Municipal parks were not considered to be high protection due to their generally greater emphasis on active recreation.

In 2002, CWS assessed anthropogenic encroachment on wetland units by comparing the original air photos with 1999 orthophotos to yield a spatial layer of wetland loss between 1989 and 1999. The encroachment categories included agriculture, commercial, golf course, “In Transition” (final outcome of the observed disturbance couldn’t be determined), landfill, manufacturing, residential and transportation. Although the locations where loss due to encroachment occurred in a wetland unit can be identified, it was difficult to determine how much was lost from each individual type of encroachment. This is because wetland units often contained multiple types of encroachments, and the available data only recorded the presence or absence of each type and not their specific spatial extent within the unit. As a result, only the total cumulative loss from all encroachment types could be assessed.

Due to the improved resolution of imagery, digitized loss wetland units were as small as 0.01 hectares. Importantly, the loss assessment focused only on those 328 wetland units outside of the FREMP zone (**Map 2**). At that time, FREMP administered authorizations for developments that would have affected 104 wetland units within the FREMP zone which were outside of the dykes downstream of Kanaka Creek. As a result, it was felt that FREMP was in a better position to monitor wetland loss in that zone. In 2010, the Greater Vancouver Regional District (Metro Vancouver) collaborated with CWS to ensure a consistent methodology when assessing wetland loss between 1999 and 2009, which used 2009 orthophotos and additional data sources, including historical air

photos, digital orthophotos, and online mapping platforms. In 2020, CWS then followed the same methodology for the 2009 – 2019 wetland loss assessment.

In 2025, over three decades of wetland data were consolidated into a comprehensive and updated version of the Fraser Lowland Wetland Inventory. The intent of the revision was to transform the dataset into a modern database structure that would facilitate future analysis and updates. The geodatabase (*FraserLowlandWetlandInventory_2025.gdb*) includes the original wetland inventory, the loss assessments for 1989-1999, 1999-2009, and 2009-2019, as well as the Priority 1 (high priority for conservation action) protection assessments for 1992 and 2024.



Map 2. Wetland Units Assessed for Loss and Wetland Units Inside the FREMP Zone, 1989

3. Results

Section One: Assessment of Wetland Loss

3.1 Wetland Loss Overview

In 1989, the wetland units in the study area (n=432) totaled 44,892 hectares. Between 1989 and 2019, 328 wetland units were assessed for losses from anthropogenic encroachment. While 219 wetland units did not experience any loss, 109 units did, totaling 1,516 ha. The full wetland extent as of 2019 following the 1,516 hectares lost between 1989 and 2019, was 43,376 hectares. It is important to recognize that the wetland units in the FREMP zone (n=104) were not assessed for loss (see **Map 2**). Although these 104 wetlands total 25,723 hectares, they consist largely of the extensive tidal flats outside of the dykes in Boundary Bay, Roberts Bank and Sturgeon Bank (see **Map 1**) where anthropogenic impacts since 1989 have mainly involved port expansion on Roberts Bank.

The degree of loss by wetland class is difficult to report. This is because while the extent of each wetland class in 1989 is known, reporting loss is confounded by two issues – a) since 75% of the wetland units consist of a mix of two or more wetland classes in a single wetland unit, it was not possible to identify which class was impacted by anthropogenic encroachment; and b) 104 of the 432 wetland units were not assessed for loss at all.

The 1989 wetland class breakdown is presented in **Table 1** for:

- a. The **219 assessed** wetland units (total 9,217 ha) that **did not experience loss** and remain intact as of 2019
- b. The **109 assessed** wetland units (total 9,952 ha) that **experienced** a total **loss** of 1,516 ha between 1989 and 2019, though the specific classes lost or remaining cannot be determined
- c. The **104** wetland units in the FREMP zone that were **not assessed** for loss (total 25,723 ha), where the area that remains intact as of 2019 cannot be determined

Table 1. 1989 Wetland Class Breakdown

Wetland Class	Assessed (No Loss) = 219 Units		Assessed (Loss) = 109 Units		Not Assessed = 104 Units		Wetland Class Grand Total
	Area (ha)	%	Area (ha)	%	Area (ha)	%	
Shallow Open Water	3,288	36	2,517	25	22,054	86	27,859
Marsh	1,756	19	1,550	16	3,168	12	6,474
Swamp	560	6	863	8	336	1	1,759
Bog	147	1	3,237	33	139	<1	3,523
Fen	377	4	1,740	18	26	<1	2,143
Total	6,128	66	9,907	99	25,723	100	41,758
Gravel Bar*	3,089	34	45	<1	0	0	3,134
Grand Total	9,217	100	9,952	100	25,723	100	44,892

*Gravel bars are not an official class in the CWCS and are therefore reported separately

3.2 Rate of Wetland Loss

In terms of the three wetland loss assessment periods (1989-1999, 1999-2009, 2009-2019), the highest rate of loss occurred in the first time period at 105 ha/year. The rate of loss declined after that to 31 ha/year and finally, more recently, it was 16 ha/year. Similarly, the total loss has declined over the three time periods from 1,047 ha to 307 ha, and finally 163 ha (**Figure 1; Table 2**).

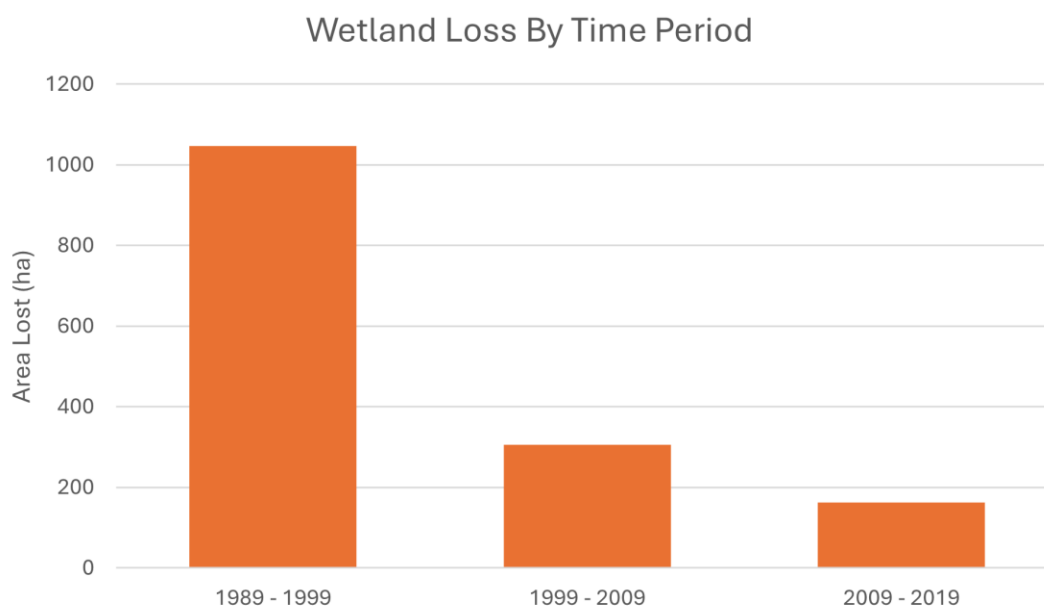


Figure 1: Wetland Loss by Time Period, 1989 to 2019

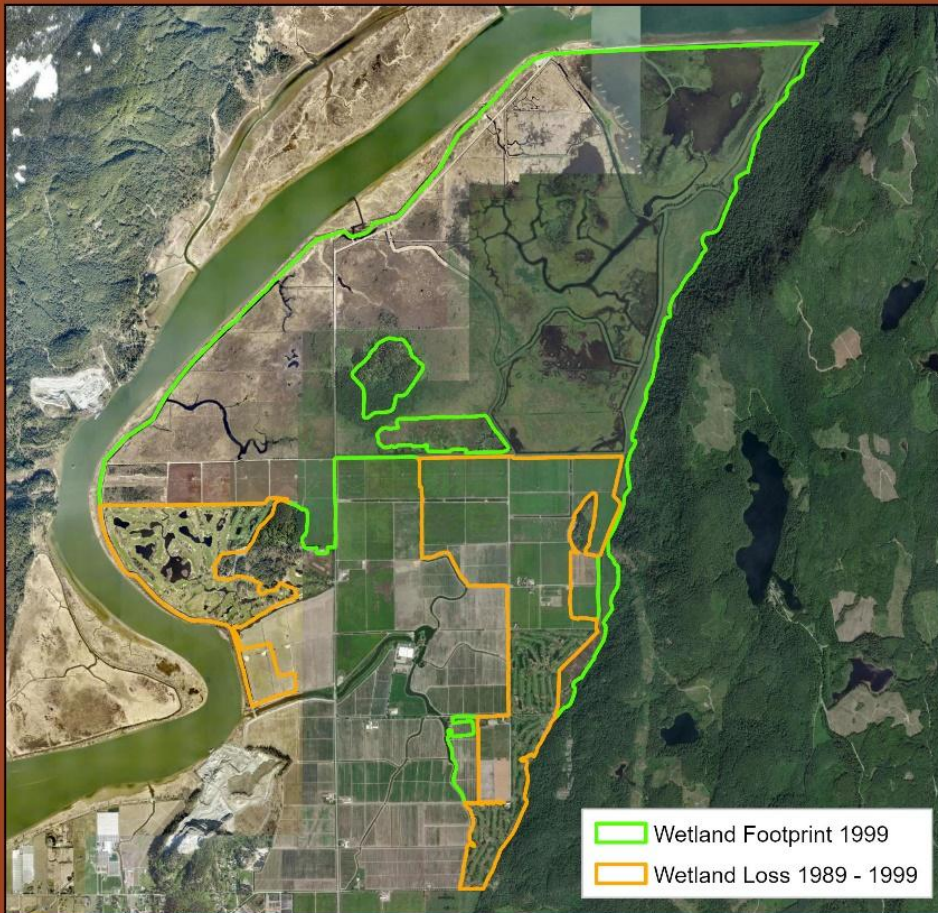
The decrease in total hectares of wetland lost between 1999 and 2019, compared to between 1989 and 1999, can be attributed to two major loss events that occurred during the earlier timeframe. These major loss events can be attributed to agriculture, landfill, and golf course development affecting two specific wetland units: 477 hectares lost in Pitt Polder and 266 hectares lost in Burns Bog, resulting in a combined loss of 743 hectares (**Map 3; Table 2**). By comparison, the largest single loss recorded between 1999 and 2009 was 91 hectares in Pitt Polder, while between 2009 and 2019 the largest loss was 67 hectares in Strawberry Island (**Table 2**).

Between 1989 and 2019, a total of 109 wetland units were affected by loss (see **Map 4** and **Map 5**).

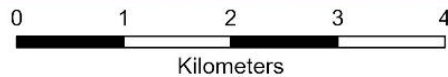
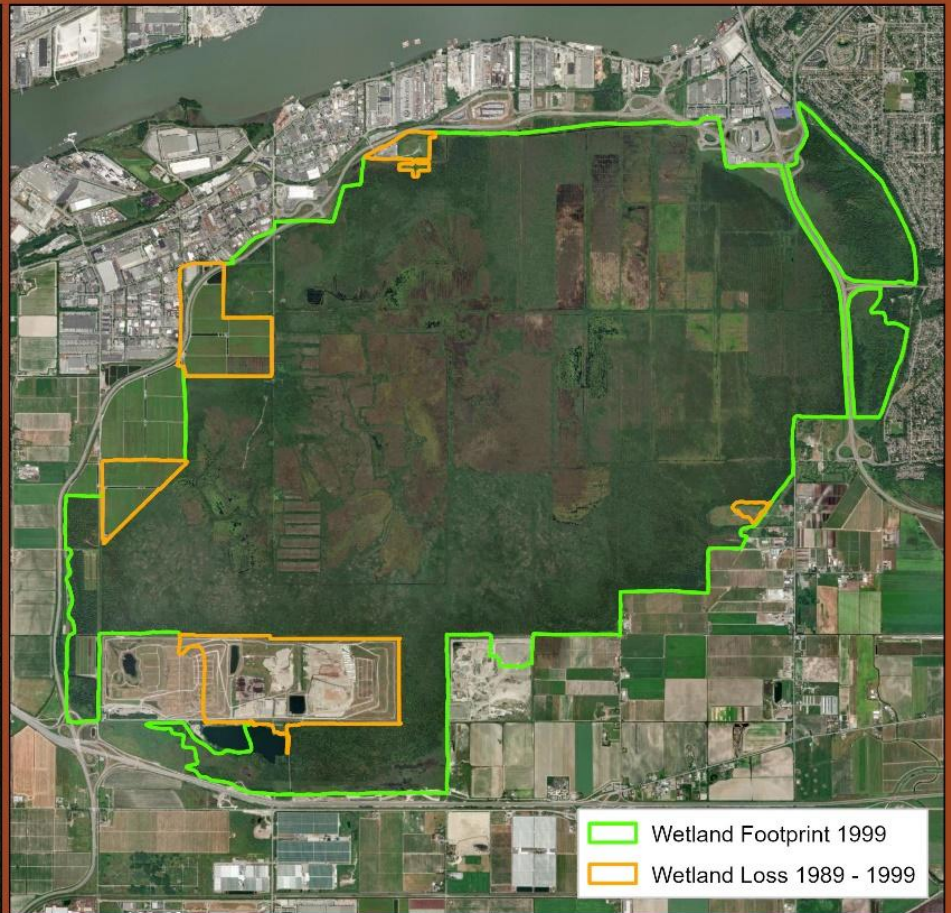
Of those 109 wetlands:

- 71 wetlands experienced loss between 1989 and 1999
- 76 wetlands experienced loss between 1999 and 2009
- 43 wetlands experienced loss between 2009 and 2019
- 23 experienced losses in all three time periods

Pitt Polder Wetland Loss 1989 - 1999



Burns Bog Wetland Loss 1989 - 1999



1:50,000
NAD 1983 UTM10



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Map 3. Wetland Loss to Pitt Polder and Burns Bog (1989 – 1999). Encroachment on Pitt Polder caused by Golf Course and Agriculture (1989 – 1999). Encroachment on Burns Bog caused by Agriculture and Landfill (1989 – 1999)

Table 2 lists all wetland units that experienced loss from 1989 to 2019 (n=109). It includes the 1989-99, 1999-2009, and 2009-2019 loss in hectares, and the total loss over the three periods.

Table 2. Wetland Loss, 1989 to 2019

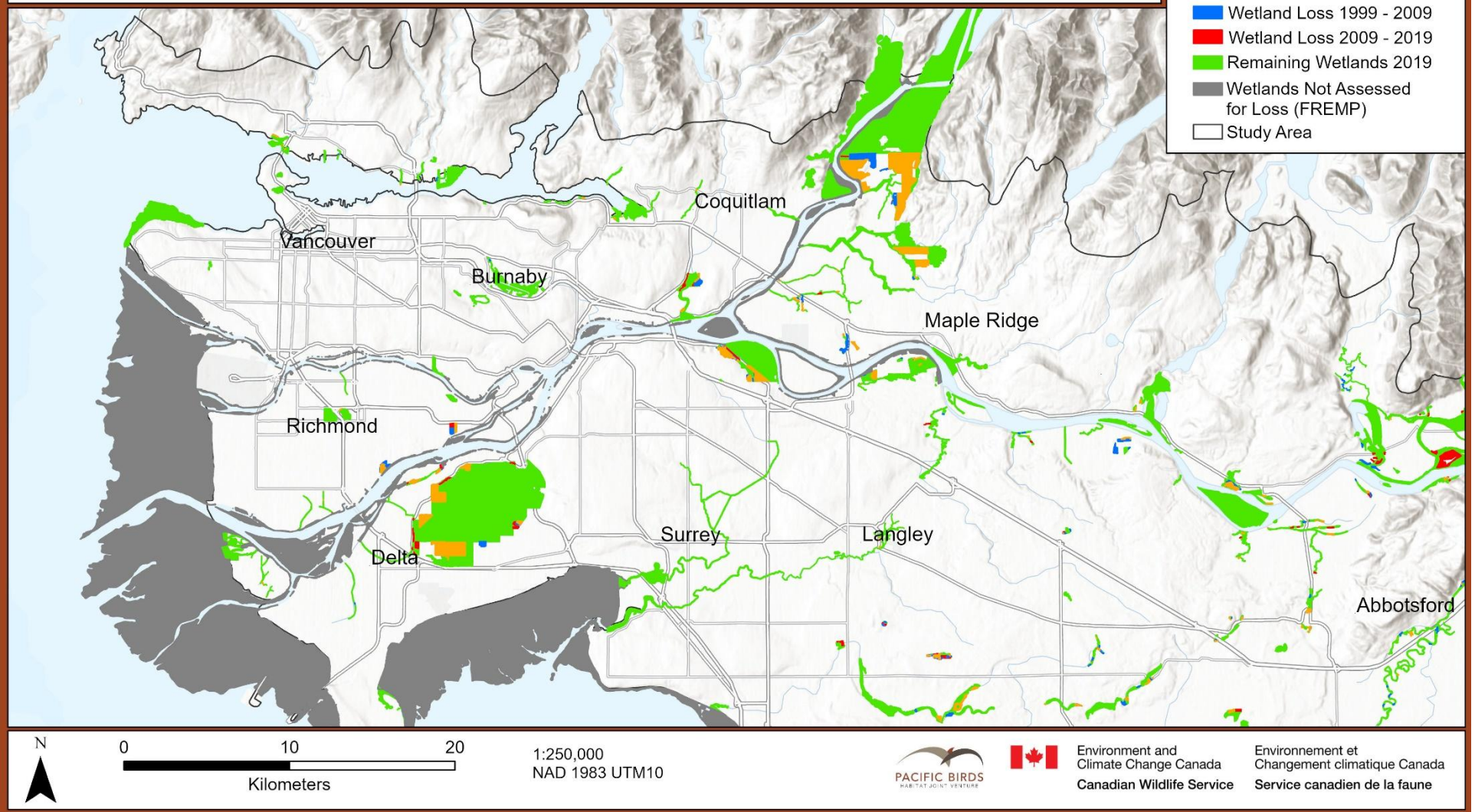
Unit #	Wetland Name	Total Area 1989 (ha)	Area Lost 89-99 (ha)	Total Area 1999 (ha)	Area Lost 99-09 (ha)	Total Area 2009 (ha)	Area Lost 09-19 (ha)	Total Area 2019 (ha)	Total Area Lost 89-19 (ha)
135	Pitt Polder	1933.4	477.1	1456.2	91.1	1365.2	0.9	1364.3	569.1
100	Burns Bog	3140.6	265.5	2875.2	13.3	2861.9	19.8	2842.1	298.5
125	N. Alouette River	211.4	97.7	113.7	0.0	113.7	0.0	113.7	97.7
113	Surrey Bend	507.9	59.1	448.8	10.5	438.3	6.2	432.1	75.8
219	Strawberry Island	241.6	0.0	241.6	0.0	241.6	67.2	174.4	67.2
178	Campbell River upper	278.2	20.7	257.5	5.2	252.2	0.0	252.2	26.0
433	Graybar Road	24.4	5.4	18.9	9.9	9.1	9.1	0.0	24.4
84	Lulu Island southeast	24.2	10.9	13.3	13.3	0.0	0.0	0.0	24.2
189	Glen Valley	30.1	1.9	28.1	21.8	6.4	0.0	6.4	23.7
196	Silverdale Creek	58.0	15.2	42.8	8.4	34.4	0.0	34.4	23.6
417	Southeast of 224 th Street & 24 th Ave	33.6	6.0	27.6	7.7	19.9	9.3	10.6	23.0
108	Coquitlam River lower	136.7	3.0	133.7	10.8	122.9	7.2	115.7	21.0
149	Katzie Slough, upper	22.8	6.6	16.2	9.5	6.7	0.4	6.3	16.5
396	Morris and Weaver Creeks	227.3	0.0	227.3	15.1	212.2	1.1	211.1	16.2
254	Chilliwack and Atchelitz Creeks	152.9	5.5	147.4	6.3	141.2	3.2	138.0	14.9
212	Hatzic Lake	247.4	0.0	247.4	6.9	240.5	6.0	234.5	12.9
406	Tilbury Slough	26.1	9.2	16.8	0.5	16.4	2.6	13.7	12.3
411	North end of 208 th	12.7	11.2	1.5	0.0	1.5	0.0	1.5	11.2
271	Wilson Slough	32.4	3.8	28.6	5.0	23.6	0.3	23.2	9.2
181	Pepin Creek	119.3	3.3	115.9	5.2	110.7	0.0	110.7	8.6
315	Mountain Slough	50.4	3.3	47.0	2.3	44.7	2.7	42.0	8.4
208	Laxton Lake	36.7	3.6	33.0	0.0	33.0	3.6	29.4	7.2
227	Nicomen Island north central 3	14.0	0.0	14.0	6.6	7.4	0.0	7.4	6.6
120	Katzie Slough	31.2	3.3	27.9	2.4	25.5	0.6	25.0	6.2
422	Upper Wilband Creek north	23.5	4.7	18.8	0.5	18.3	0.0	18.3	5.2
202	Matsqui Slough	38.6	1.8	36.8	0.7	36.1	2.3	33.9	4.7
391	Bateson and Duncan Sloughs	26.2	0.0	26.2	2.3	23.9	2.2	21.7	4.5
231	Nicomen Island south central	5.8	0.0	5.8	4.0	1.8	0.0	1.8	4.0
290	Vedder Canal	22.3	0.0	22.3	3.5	18.8	0.3	18.5	3.8

	Marsh								
180	Bertrand Creek	19.4	1.0	18.4	2.1	16.3	0.6	15.7	3.7
285	Sumas River, upper reaches	81.6	0.3	81.4	3.3	78.1	0.0	78.1	3.5
415	Mirror Ponds	16.4	0.0	16.4	0.0	16.4	3.2	13.2	3.2
179	Aldergrove, south	25.8	1.3	24.5	1.9	22.6	0.0	22.6	3.2
297	Nelson and Bell sloughs	65.2	0.6	64.6	2.4	62.2	0.0	62.2	3.0
238	Yaalstrik Island Slough	15.4	0.0	15.4	2.2	13.2	0.7	12.6	2.9
252	Hope Slough	131.0	1.6	129.4	1.2	128.3	0.0	128.3	2.8
292	Yarrow	10.6	0.1	10.5	1.8	8.7	0.9	7.9	2.7
405	Crescent Slough	25.1	0.0	25.1	0.0	25.1	2.7	22.4	2.7
205	Page Lake	10.9	0.8	10.2	0.8	9.3	0.8	8.5	2.4
416	Upland Bog	5.6	0.0	5.6	0.9	4.6	1.5	3.1	2.4
296	Sardis Park	4.7	0.0	4.7	2.3	2.3	0.0	2.3	2.3
427	Norrish Creek Floodplain	60.8	0.0	60.8	2.3	58.5	0.0	58.5	2.3
413	Walnut Grove east sloughs	77.9	1.1	76.8	0.9	75.9	0.2	75.7	2.1
197	Mandale Slough	34.7	1.9	32.8	0.0	32.8	0.0	32.8	1.9
134	Sturgeon Slough	46.5	0.1	46.5	1.6	44.9	0.2	44.7	1.8
284	Lonzo Creek	19.7	1.4	18.3	0.4	17.9	0.0	17.9	1.8
279	Sumas River	131.5	0.3	131.2	1.4	129.8	0.0	129.8	1.7
327	Cheam and Agassiz sloughs	50.6	0.1	50.5	1.0	49.5	0.5	48.9	1.6
281	Sumas Lake Canal	39.5	0.9	38.6	0.7	37.9	0.0	37.9	1.6
239	Zaitscullachan Slough	37.9	1.1	36.8	0.1	36.8	0.5	36.3	1.6
280	Lakemount Marsh	68.4	0.0	68.4	1.6	66.9	0.0	66.9	1.6
216	Wades Creek	26.3	0.8	25.5	0.0	25.4	0.7	24.7	1.5
390	Bateson and Duncan Slough area	1.5	0.0	1.5	0.0	1.5	1.5	0.0	1.5
224	Nicomen Island north central 1	4.9	1.5	3.4	0.0	3.4	0.0	3.4	1.5
221	Norrish Creek delta	123.6	0.0	123.6	0.0	123.6	1.4	122.2	1.4
421	Upper Wilband Creek	7.7	1.2	6.5	0.2	6.3	0.0	6.3	1.4
425	West of Clearbrook	2.1	0.4	1.7	0.9	0.8	0.0	0.8	1.3
228	Nicomen Island central 1	2.4	1.3	1.0	0.0	1.0	0.0	1.0	1.3
288	Millar/McGillivray Sloughs	22.3	0.1	22.2	1.2	20.9	0.0	20.9	1.3
226	Nicomen Island north central 2	2.4	0.4	2.0	0.9	1.2	0.0	1.2	1.3
203	Matsqui Slough, northern	6.7	0.9	5.8	0.3	5.5	0.0	5.5	1.2

	tributary								
123	Alouette & North Alouette Rivers	175.5	0.4	175.0	0.8	174.2	0.0	174.2	1.2
192	Stave River, lower	124.9	1.2	123.7	0.0	123.7	0.0	123.7	1.2
232	Nicomen Island north central 4	2.3	0.0	2.3	1.2	1.1	0.0	1.1	1.2
200	McLennan Creek/Gifford Slough	18.0	0.9	17.2	0.1	17.1	0.2	16.9	1.2
251	Shefford Slough	38.0	0.5	37.5	0.2	37.3	0.4	36.9	1.1
408	Walnut Grove	18.9	0.0	18.9	1.0	17.9	0.0	17.9	1.0
4	Ambleside	8.5	0.8	7.7	0.1	7.6	0.0	7.6	0.9
185	Palmateer Creek	5.9	0.4	5.5	0.0	5.5	0.5	5.0	0.9
183	Aldergrove, north	7.2	0.0	7.2	0.7	6.5	0.1	6.4	0.8
16	Port Moody, Pacific Coast Terminals	19.6	0.8	18.8	0.0	18.8	0.0	18.8	0.8
223	Nicomen Slough, north shore	5.0	0.0	5.0	0.8	4.2	0.0	4.2	0.8
253	Coco-oppelo Slough north end	7.6	0.0	7.6	0.8	6.9	0.0	6.9	0.8
282	Sumas River (old scar)	4.2	0.0	4.2	0.7	3.4	0.0	3.4	0.7
222	Mud Slough, Nicomen Island	10.8	0.0	10.8	0.7	10.0	0.0	10.0	0.7
424	McClure Park	2.6	0.6	2.0	0.1	1.9	0.0	1.9	0.7
161	Fort Langley, north of 88	1.2	0.0	1.1	0.0	1.1	0.7	0.5	0.7
186	Fraser River, south	4.2	0.0	4.2	0.6	3.7	0.0	3.7	0.6
191	Stave River Mouth, west	4.0	0.5	3.5	0.0	3.5	0.0	3.5	0.5
213	Chilqua Slough	37.7	0.1	37.6	0.0	37.6	0.4	37.2	0.5
206	Pond northwest of Clearbrook	2.0	0.2	1.8	0.3	1.5	0.0	1.5	0.5
384	Lake Errock	4.5	0.0	4.5	0.5	4.0	0.0	4.0	0.5
210	Hatzic Slough System	5.1	0.0	5.1	0.4	4.7	0.0	4.7	0.4
204	Clayburn Creek	13.1	0.0	13.1	0.0	13.1	0.4	12.6	0.4
419	Cranberry Slough	11.6	0.2	11.5	0.2	11.2	0.0	11.2	0.4
15	Port Moody, Reed Point	1.3	0.4	0.9	0.0	0.9	0.0	0.9	0.4
237	Quaamitch Slough	23.8	0.0	23.8	0.4	23.5	0.0	23.5	0.4
69	Tamboline Slough	6.8	0.3	6.5	0.0	6.5	0.0	6.5	0.3
326	Fraser River, west of Agassiz Br. 4	4.0	0.0	4.0	0.3	3.6	0.0	3.6	0.3
235	Nicomen Slough north bank 1	2.2	0.0	2.2	0.3	1.9	0.0	1.9	0.3
403	Central Bog	27.6	0.3	27.3	0.0	27.3	0.0	27.3	0.3

	Forest, Richmond								
160	Salmon River, near mouth	3.5	0.0	3.5	0.3	3.1	0.0	3.1	0.3
397	Miami Creek	33.3	0.3	33.0	0.0	33.0	0.0	33.0	0.3
18	Burnaby Lake and Still Creek	110.7	0.0	110.7	0.3	110.5	0.0	110.5	0.3
11	Maplewood Flats	97.8	0.0	97.8	0.2	97.6	0.0	97.6	0.2
431	Hoy Creek	8.7	0.2	8.5	0.0	8.5	0.0	8.5	0.2
176	Nicomekl River, upper east	3.2	0.2	3.1	0.0	3.1	0.0	3.1	0.2
9	Lynn Creek Mouth	5.4	0.2	5.2	0.0	5.2	0.0	5.2	0.2
404	Cohilukthan Slough	7.7	0.0	7.7	0.2	7.5	0.0	7.5	0.2
400	Horseshoe Slough	4.7	0.0	4.6	0.0	4.6	0.1	4.5	0.1
381	Johnsons Slough	31.0	0.0	31.0	0.0	31.0	0.1	30.9	0.1
412	Allard Crescent	3.7	0.0	3.7	0.1	3.6	0.0	3.6	0.1
177	Nicomekl River, headwaters	17.7	0.1	17.6	0.0	17.6	0.0	17.6	0.1
214	Chilqua Slough, north of	2.0	0.0	2.0	0.0	2.0	0.1	1.9	0.1
6	First Narrows, north	7.0	0.1	6.9	0.0	6.9	0.0	6.9	0.1
5	Capilano River Mouth	26.5	0.1	26.5	0.0	26.5	0.0	26.5	0.1
8	Mosquito Creek Mouth	1.9	0.0	1.9	0.0	1.9	0.0	1.9	0.0
156	Kanaka Creek	94.4	0.0	94.3	0.0	94.3	0.0	94.3	0.0
410	Walnut Grove south	6.0	0.0	5.9	0.0	5.9	0.0	5.9	0.0
Total	109	9952.1	1046.8	8904.8	306.5	8598.5	163.4	8435.3	1516.2

Wetland Loss 1989 - 2019, Western Half of Study Area

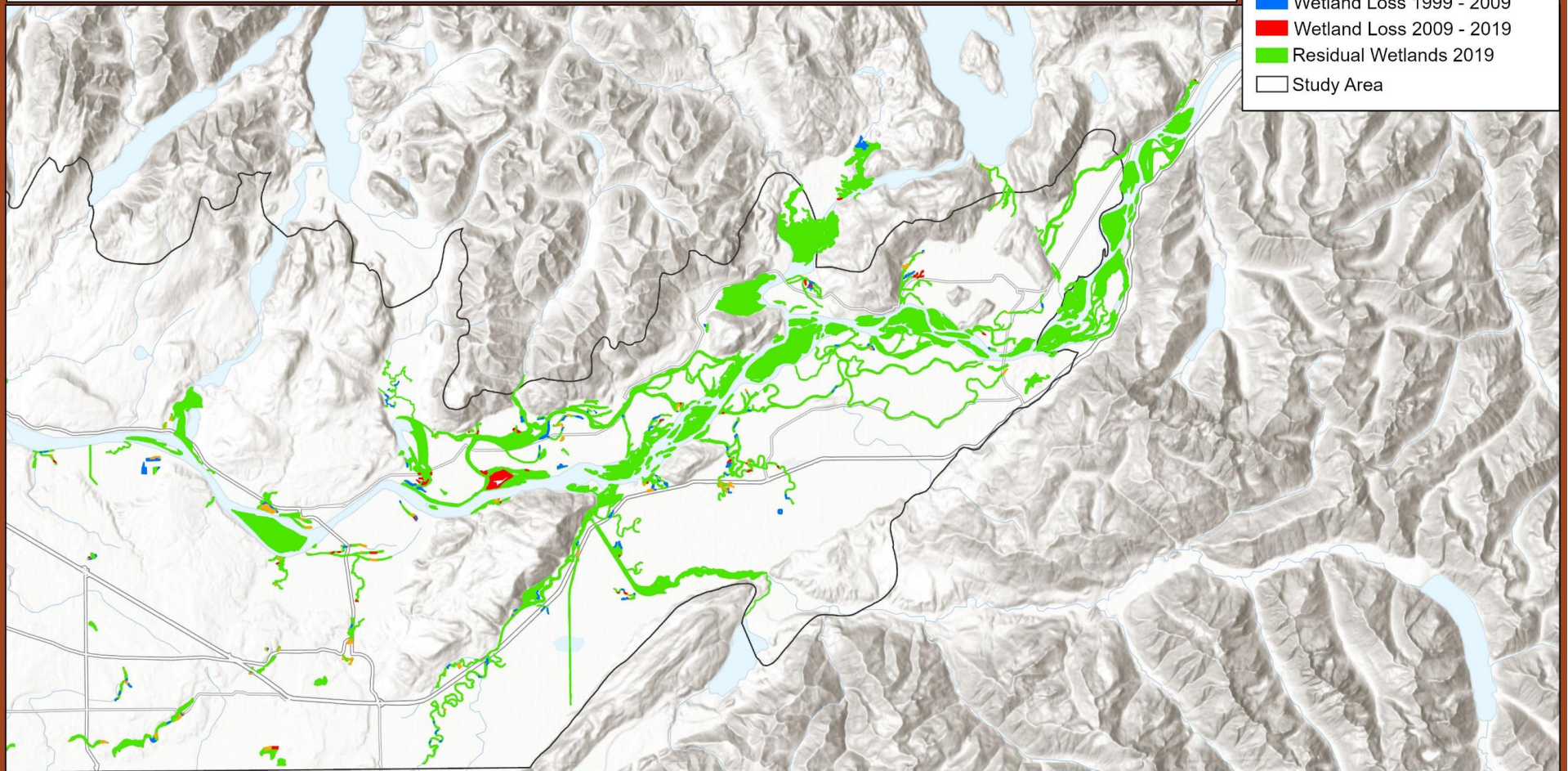


Map 4. Wetland Loss 1989 – 2019 and Remaining Wetlands (2019), Western Half of Study Area

Wetland Loss 1989 - 2019, Eastern Half of Study Area

Legend

- Wetland Loss 1989 - 1999
- Wetland Loss 1999 - 2009
- Wetland Loss 2009 - 2019
- Residual Wetlands 2019
- Study Area



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Kilometers

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Map 5. Wetland Loss 1989 – 2019 and Remaining Wetlands (2019), Eastern Half of Study Area

3.3 Degree of Wetland Loss

A total of 190 anthropogenic encroachments occurred between 1989 and 2019, impacting 109 wetland units, affecting roughly one third of the 328 wetland units assessed for loss outside of the FREMP zone. The most significant type of encroachment was from agriculture, followed by transportation, and land “In Transition” to an unidentified urban use (**Figure 2**). Collectively, these three encroachment types account for approximately half of the total wetland area lost over the thirty year period. Although the locations where loss due to encroachment occurred in a wetland unit can be identified, it was difficult to determine how much was lost from each individual type of encroachment. This is because wetland units often contained multiple types of encroachments, and the available data only recorded the presence or absence of each type and not their specific spatial extent within the unit. As a result, only the total cumulative loss from all encroachment types could be assessed.

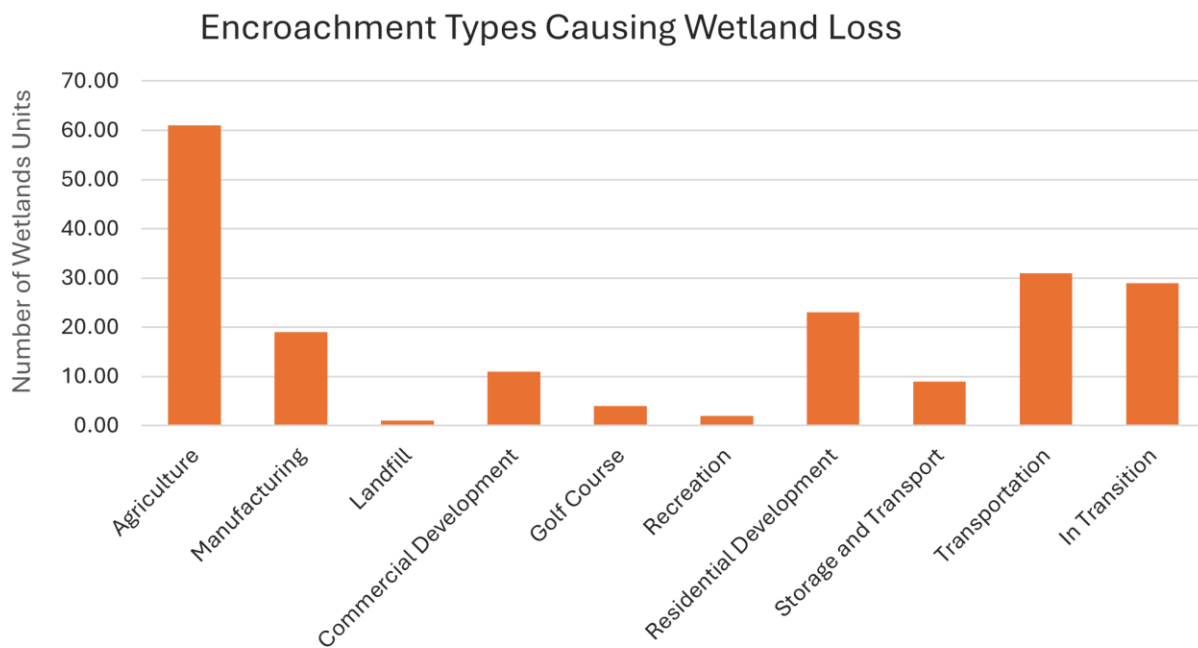


Figure 2: Encroachment Type by Number of Wetland Units Affected, 1989 to 2019

Most wetland losses were small, representing a “nibbling” effect (**Map 6**). While seemingly minor, the impact of nibbling gradually undermines the ecological integrity of a wetland over time and contributes to the cumulative loss of wetland area in the region. **Figure 3** illustrates the distribution of wetland loss by loss size classes: 0-5%, >5-15%, >15-30%, >30-50%, and >50-100%. A wetland loss in the 0-5% category means that between 0 and 5 percent of the wetland was lost during the assessed period.

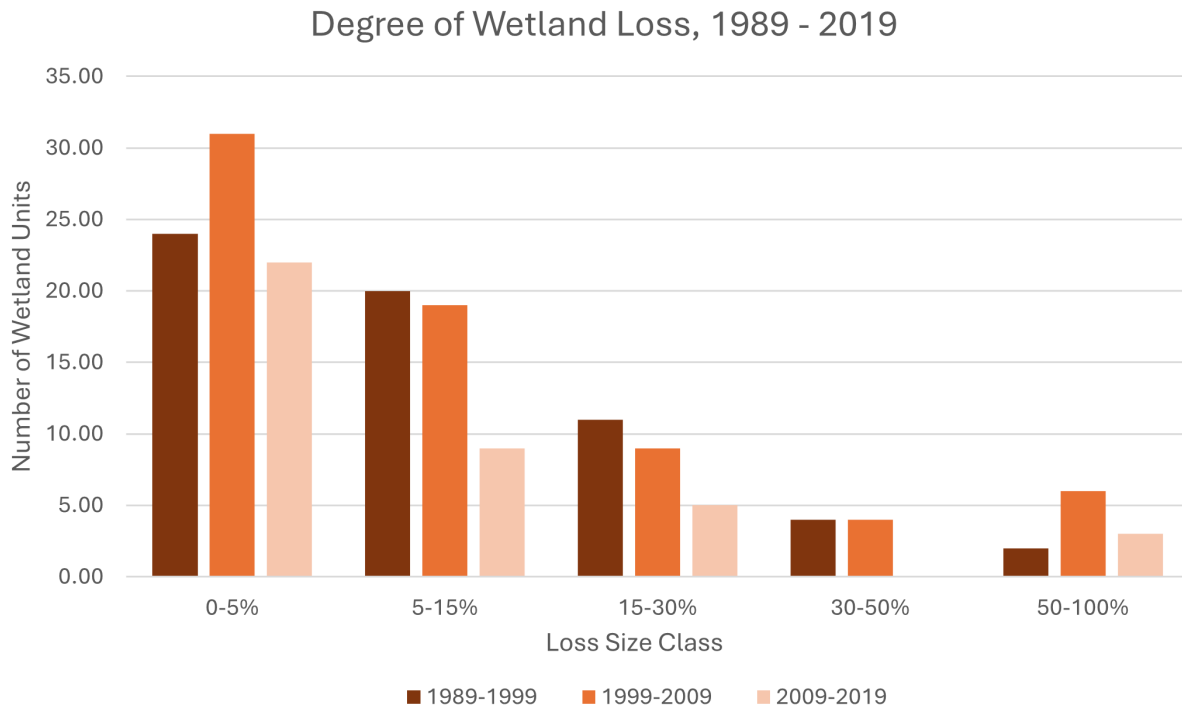



Figure 3: Degree of Wetland Encroachment by Loss Size Class, 1989 to 2019

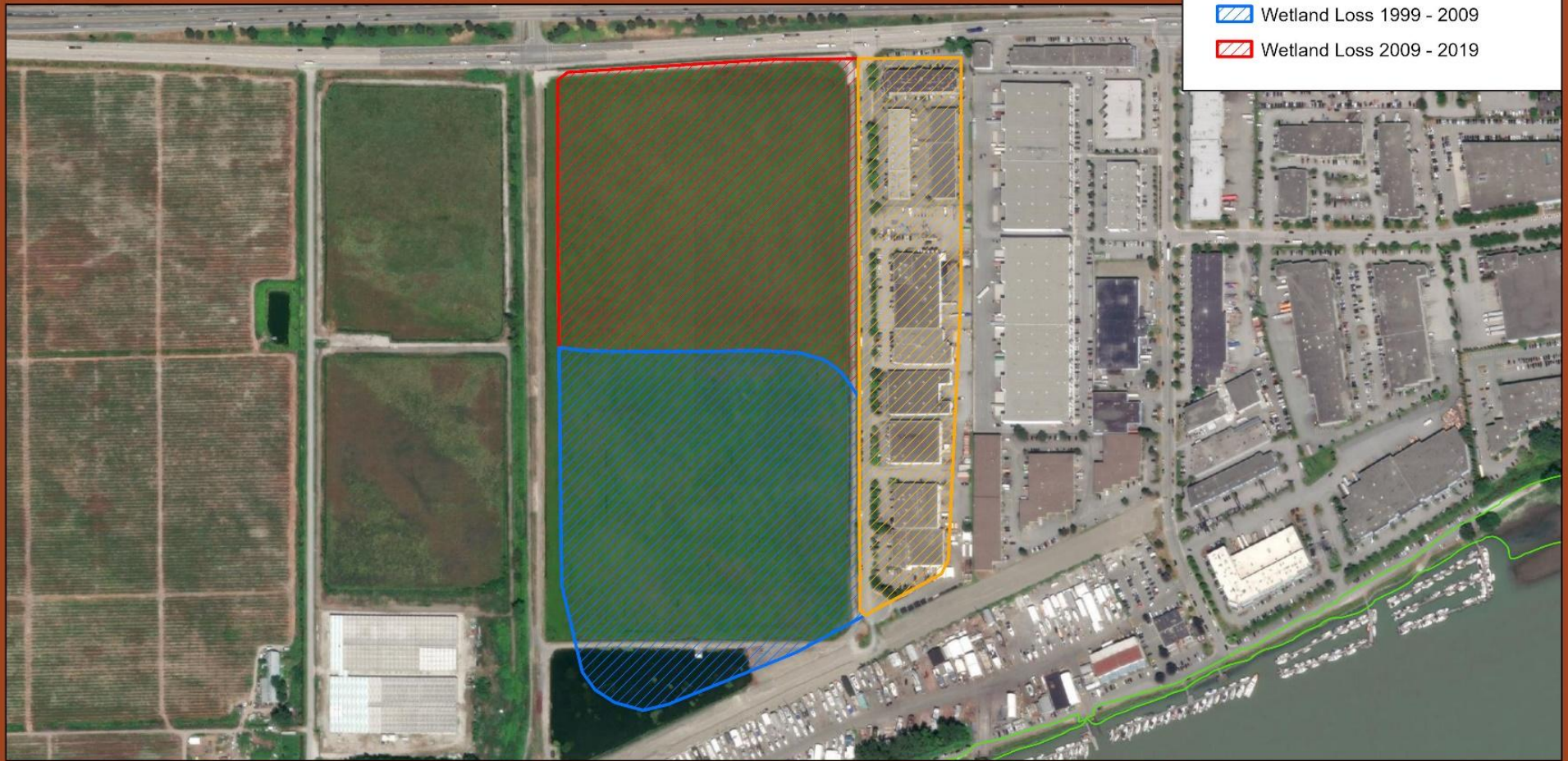
The breakdown of wetland loss size classes for all three time periods fell shows that the majority of wetland units (n=60) fall within the 0-5% range. The most severe losses, ranging from > 50% to 100%, were most frequent between 1999 and 2009, with six or more losses greater than 50% of the remaining wetland area. Over the entire 1989 to 2019 period, 14 unique wetland units lost between >50-100% of their remaining area (**Table 3**). Of those 14 wetlands, 3 have been completely lost: Bateson and Duncan Slough area, Graybar Road (**Map 6**), and Lulu Island southeast, totaling 50 ha (**Table 3**).

Maps 6, 7 and 8 illustrate the spatial distribution of various encroachment types across five wetland units: Graybar Road, Yarrow, Page Lake, Coquitlam River Lower, and Mountain Slough. These maps provide a visual example of encroachment types such as agriculture, residential development, manufacturing, and loss in transition.

Graybar Road Wetland Loss 1989 - 2019

Legend

-  Wetland Loss 1989 - 1999
-  Wetland Loss 1999 - 2009
-  Wetland Loss 2009 - 2019



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Meters

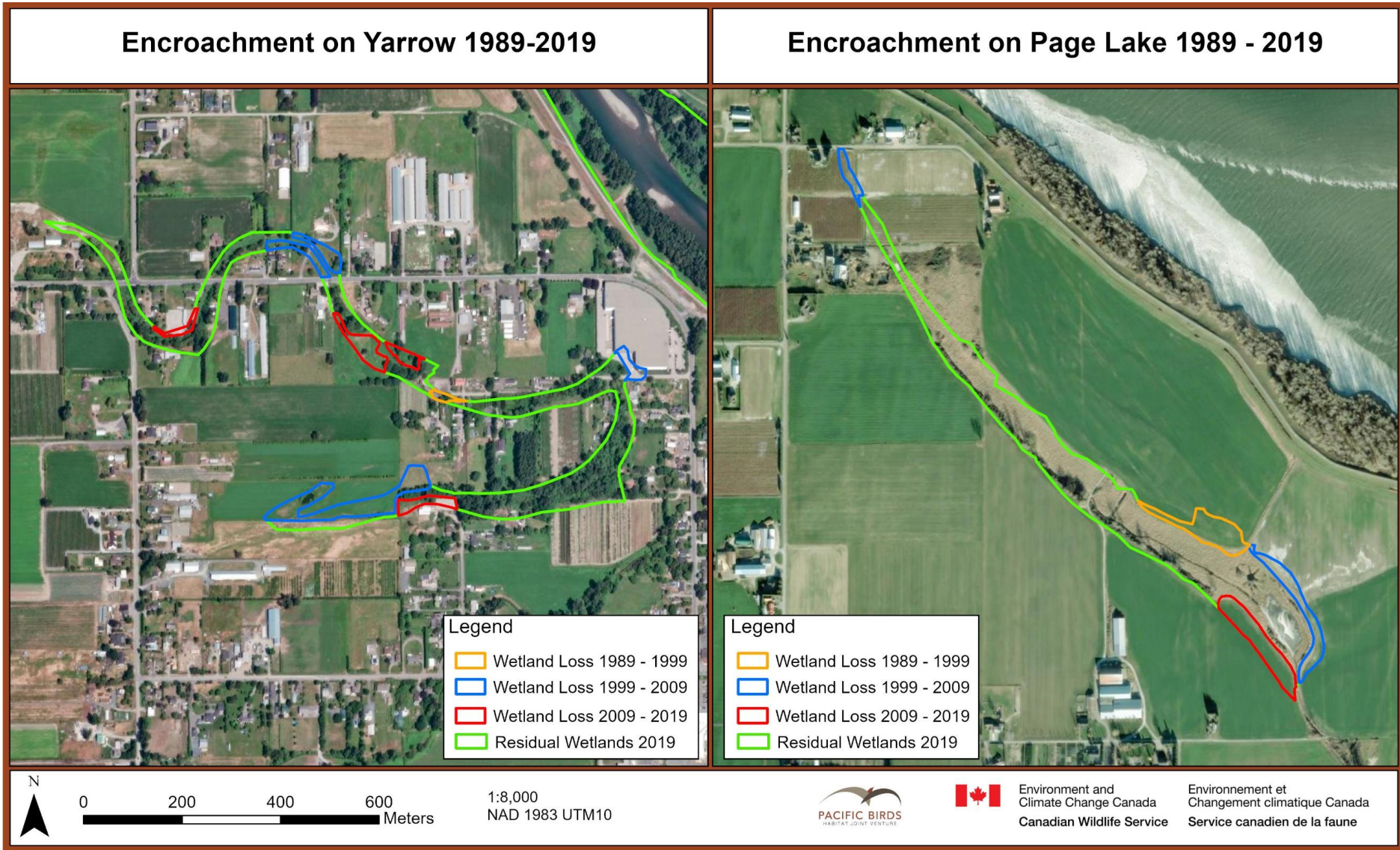
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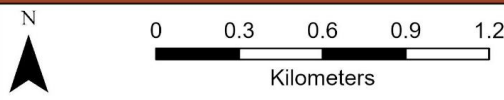
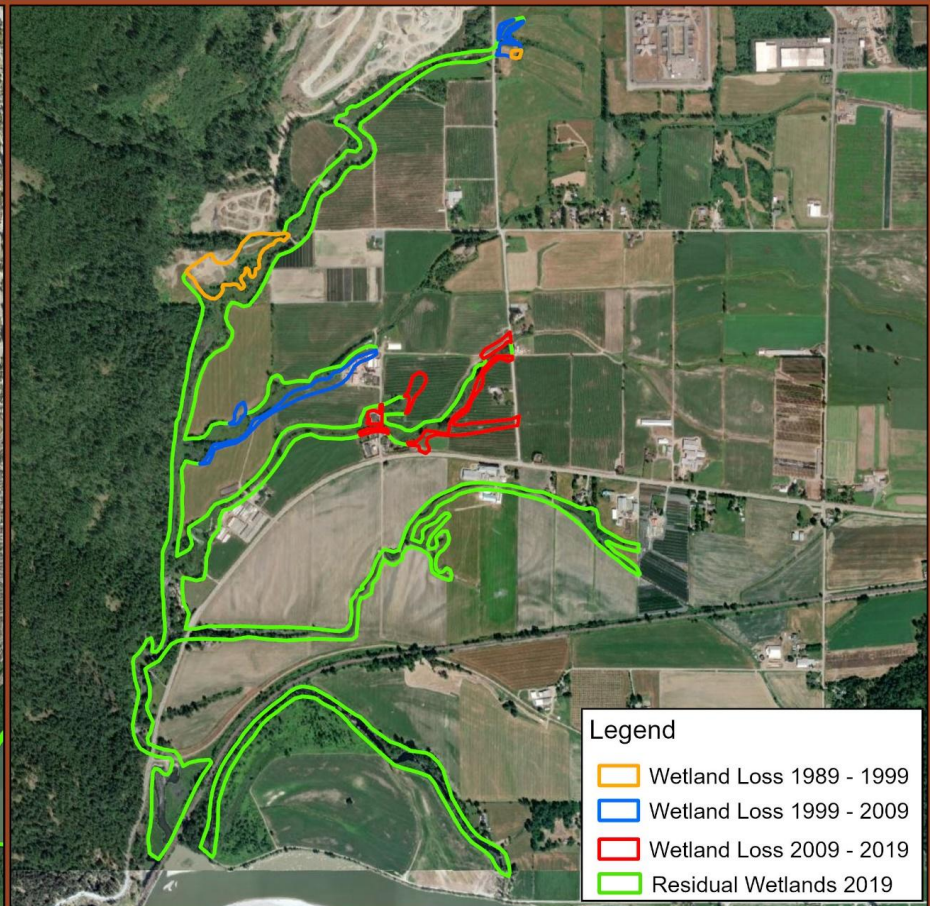
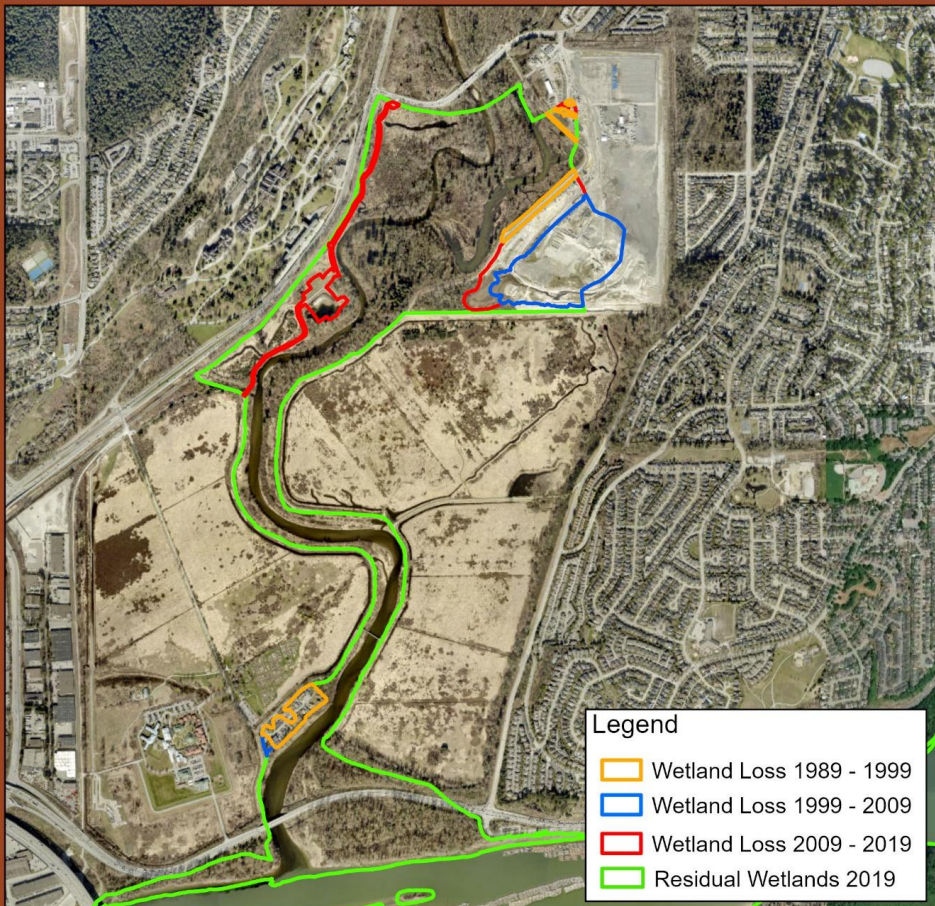
Map 6. Example of “Nibbling” at Graybar Road, Wetland Loss 1989 – 2019. Encroachment Caused by Residential/Commercial Development (1989-1999) and Loss in Transition (1999-2019)



Map 7. Encroachment on Yarrow Caused by Transportation (1989-1999), Agriculture and Residential Development (1999-2009) and Transportation, Agriculture, and Residential Development (2009-2019). Encroachment on Page Lake Caused by Agriculture in all Time Periods

Encroachment on Coquitlam River Lower 1989-2019

Encroachment on Mountain Slough 1989 - 2019



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Map 8. Encroachment on Coquitlam River Lower Caused by Residential Development, Transportation, and Loss in Transition (1989 – 1999), Residential Development and Loss in Transition (1999-2009), and Manufacturing (2009-2019). Encroachment on Mountain Slough Caused by Agriculture in all three time periods and Residential Development (2009-2019)

Table 3 shows the percent of wetland loss for each wetland unit that experienced loss at some point between 1989 and 2019 (n=109), as well as the loss size class.

Table 3. Percent of Wetland Loss and Loss Size Class, 1989 to 2019

Unit #	Wetland Name	Percent Loss 89-99	Loss Size Class 99	Percent Loss 99-09	Loss Size Class 09	Percent Loss 09-19	Loss Size Class 19	Total Percent Loss 89-19
135	Pitt Polder	25	15-30%	6	0-5%	0		29
100	Burns Bog	8	5-15%	0		1	0-5%	10
125	N. Alouette River	46	30-50%	0		0		46
113	Surrey Bend	12	5-15%	2	0-5%	1	0-5%	15
219	Strawberry Island	0		0		28	15-30%	28
178	Campbell River upper	7	5-15%	2	0-5%	0		9
433	Graybar Road	22	15-30%	52	50-100%	100	50-100%	100
84	Lulu Island southeast	45	30-50%	100	50-100%	0		100
189	Glen Valley	6	5-15%	77	50-100%	0		79
196	Silverdale Creek	26	15-30%	20	15-30%	0		41
417	Southeast of 224 th Street & 24 th Ave	18	15-30%	28	15-30%	47	15-30%	68
108	Coquitlam River lower	2	0-5%	8	5-15%	6	5-15%	15
149	Katzie Slough, upper	29	15-30%	59	30-50%	5	0-5%	72
396	Morris and Weaver Creeks	0		7	5-15%	1	0-5%	7
254	Chilliwack and Atchelitz Creeks	4	0-5%	4	0-5%	2	0-5%	10
212	Hatzic Lake	0		3	0-5%	3	0-5%	5
406	Tilbury Slough	35	30-50%	3	0-5%	16	15-30%	47
411	North end of 208 th	88	50-100%	0		0		88
271	Wilson Slough	12	5-15%	18	15-30%	1	0-5%	28
181	Pepin Creek	3	0-5%	5	0-5%	0		7
315	Mountain Slough	7	5-15%	5	0-5%	6	5-15%	17
208	Laxton Lake	10	5-15%	0		11	5-15%	20
227	Nicommen Island north central 3	0		47	30-50%	0		47
120	Katzie Slough	10	5-15%	8	5-15%	2	0-5%	20
422	Upper Wilband Creek north	20	15-30%	2	0-5%	0		22
202	Matsqui Slough	5	0-5%	2	0-5%	6	5-15%	12
391	Bateson and Duncan Sloughs	0		9	5-15%	9	5-15%	17

231	Nicomen Island south central	0		69	50-100%	0		69
290	Vedder Canal Marsh	0		16	15-30%	1	0-5%	17
180	Bertrand Creek	5	5-15%	11	5-15%	4	0-5%	19
285	Sumas River, upper reaches	0		4	0-5%	0		4
415	Mirror Ponds	0		0		20	15-30%	20
179	Aldergrove, south	5	5-15%	8	5-15%	0		12
297	Nelson and Bell sloughs	1	0-5%	4	0-5%	0		5
238	Yaalstrik Island Slough	0		14	5-15%	5	0-5%	19
252	Hope Slough	1	0-5%	1	0-5%	0		2
292	Yarrow	1	0-5%	17	15-30%	10	5-15%	26
405	Crescent Slough	0		0		11	5-15%	11
205	Page Lake	7	5-15%	8	5-15%	9	5-15%	22
416	Upland Bog	0		17	15-30%	32	15-30%	43
296	Sardis Park	0		50	50-100%	0		50
427	Norrish Creek Floodplain	0		4	0-5%	0		4
413	Walnut Grove east sloughs	1	0-5%	1	0-5%	0		3
197	Mandate Slough	5	5-15%	0		0		5
134	Sturgeon Slough	0		3	0-5%	0		4
284	Lonzo Creek	7	5-15%	2	0-5%	0		9
279	Sumas River	0		1	0-5%	0		1
327	Cheam and Agassiz sloughs	0		2	0-5%	1	0-5%	3
281	Sumas Lake Canal	2	0-5%	17	15-30%	0		4
239	Zaitscullachan Slough	3	0-5%	0		1	0-5%	4
280	Lakemount Marsh	0		2	0-5%	0		2
216	Wades Creek	3	0-5%	0		3	0-5%	6
390	Bateson and Duncan Slough area	0		0		100	50-100%	100
224	Nicomen Island north central 1	30	30-50%	0		0		30
221	Norrish Creek delta	0		0		1	0-5%	1
421	Upper Wilband Creek	16	15-30%	3	0-5%	0		18
425	West of Clearbrook	20	15-30%	53	30-50%	0		62
228	Nicomen Island central 1	56	50-100%	0		0		56
288	Millar/McGillivray Sloughs	0		6	5-15%	0		6
226	Nicomen Island north central 2	16	15-30%	43	30-50%	0		52
203	Matsqui Slough, northern tributary	14	5-15%	5	0-5%	0		19

123	Alouette & North Alouette Rivers	0		0		0		1
192	Stave River, lower	1	0-5%	0		0		1
232	Nicomen Island north central 4	0		53	50-100%	0		53
200	McLennan Creek/Gifford Slough	5	0-5%	0		1	0-5%	7
251	Shefford Slough	1	0-5%	1	0-5%	1	0-5%	3
408	Walnut Grove	0		5	0-5%	0		5
4	Ambleside	10	5-15%	1	0-5%	0		11
185	Palmateer Creek	7	5-15%	0		8	5-15%	15
183	Aldergrove, north	1	0-5%	9	5-15%	2	0-5%	11
16	Port Moody, Pacific Coast Terminals	4	0-5%	0		0		4
223	Nicomen Slough, north shore	0		15	15-30%	0		15
253	Coco-oppelo Slough north end	0		10	5-15%	0		10
282	Sumas River (old scar)	0		17	15-30%	0		17
222	Mud Slough, Nicomen Island	0		7	5-15%	0		7
424	McClure Park	23	15-30%	4	0-5%	0		27
161	Fort Langley, north of 88	0		0		61	50-100%	61
186	Fraser River, south	0		13	5-15%	0		13
191	Stave River Mouth, west	13	5-15%	0		0		13
213	Chilqua Slough	0		0		2	0-5%	1
206	Pond northwest of Clearbrook	10	5-15%	15	5-15%	0		24
384	Lake Errock	0		11	5-15%	0		11
210	Hatzic Slough System	0		8	5-15%	0		8
204	Clayburn Creek	0		0		3	0-5%	3
419	Cranberry Slough	1	0-5%	2	0-5%	0		3
15	Port Moody, Reed Point	28	15-30%	0		0		28
237	Quaamitch Slough	0		2	0-5%	0		2
69	Tamboline Slough	5	5-15%	0		0		5
326	Fraser River, west of Agassiz Br. 4	0		9	5-15%	0		9
235	Nicomen Slough north bank 1	0		15	5-15%	0		15
403	Central Bog Forest, Richmond	1	0-5%	0		0		1
160	Salmon River, near mouth	0		9	5-15%	0		9
397	Miami Creek	1	0-5%	0		0		1
18	Burnaby Lake and Still Creek	0		0		0		0
11	Maplewood Flats	0		0		0		0

431	Hoy Creek	2	0-5%	0		0		2
176	Nicomekl River, upper east	5	5-15%	0		0		5
9	Lynn Creek Mouth	3	0-5%	0		0		3
404	Cohilukthan Slough	0		2	0-5%	0		2
400	Horseshoe Slough	1	0-5%	0		2	0-5%	3
381	Johnsons Slough	0		0		0		0
412	Allard Crescent	0		4	0-5%	0		4
177	Nicomekl River, headwaters	1	0-5%	0		0		1
214	Chilqua Slough, north of	0		0		5	0-5%	5
6	First Narrows, north	1	0-5%	0		0		1
5	Capilano River Mouth	0		0		0		0
8	Mosquito Creek Mouth	0		2	0-5%	0		2
156	Kanaka Creek	0		0		0		0
410	Walnut Grove south	0		0		0		0

Section Two: Assessment of Priority 1 Wetlands

3.4 Loss of Priority 1 Wetlands

See **Appendix B** for the full 1993 list of wetlands assigned as high priority for conservation (Priority 1) based on degree of threat, wildlife value and size.

In 1993, a total of 51 wetland units were identified as high priority for conservation action (Priority 1), totalling 32,991 hectares (see **Map 9**). Of the 51, 19 were assessed but did not experience loss (total 2,285 ha), 14 experienced loss (total 6,797 ha), and 18 were in the FREMP zone and were not assessed (total 23,910 ha). As previously stated, it is not possible to state the specific wetland classes that remain intact as of 2019 due to the uncertainty around the composite wetland units.

As previously discussed, the degree of Priority 1 wetland loss by wetland class is more difficult to report. While the extent of each wetland class in 1989 is known, reporting loss is confounded by two issues – a) since 75% of Priority 2-4 wetland units consist of two or more wetland classes and 80% (39) of Priority 1 wetland units consist of a mix of two or more wetland classes within a single unit, it was not possible to identify which class was impacted by anthropogenic encroachment; and b) 18 of the 51 Priority 1 wetland units were not assessed for loss at all.

Table 4 shows the wetland class breakdown for the 51 Priority 1 wetlands compared to the 381 Priority 2-4 wetlands in 1989.

Table 4. Wetland Class Breakdown for Priority 1 Wetlands and Priority 2-4 Wetlands

Wetland Class	Priority 1 = 51 Units		Priority 2- 4 = 381 Units		Wetland Class Grand Total
	Area (ha)	%	Area (ha)	%	Area (ha)
Shallow Open Water	23,139	70	4,720	40	27,859
Marsh	3,727	11	2,747	23	6,474
Swamp	797	2	962	8	1,759
Bog	3,113	9	410	3	3,523
Fen	1,913	6	230	2	2,143
Total	32,689	99	9,069	97	41,758
Gravel Bar*	302	1	2,832	24	3,134
Grand Total	32,991	100	11,901	100	44,892

*Gravel bars are not an official class in the CWCS and are therefore reported separately

A closer examination of Priority 1 wetlands shows a similar trend of wetland loss to all priority wetland units (Priority 1-4) whereby, the total area lost has declined with each successive assessment period (**Maps 10 and 11; Figure 4**). Note that the following summaries report only on the 14 Priority 1 wetland units that were assessed and where loss was detected (6,797 ha).

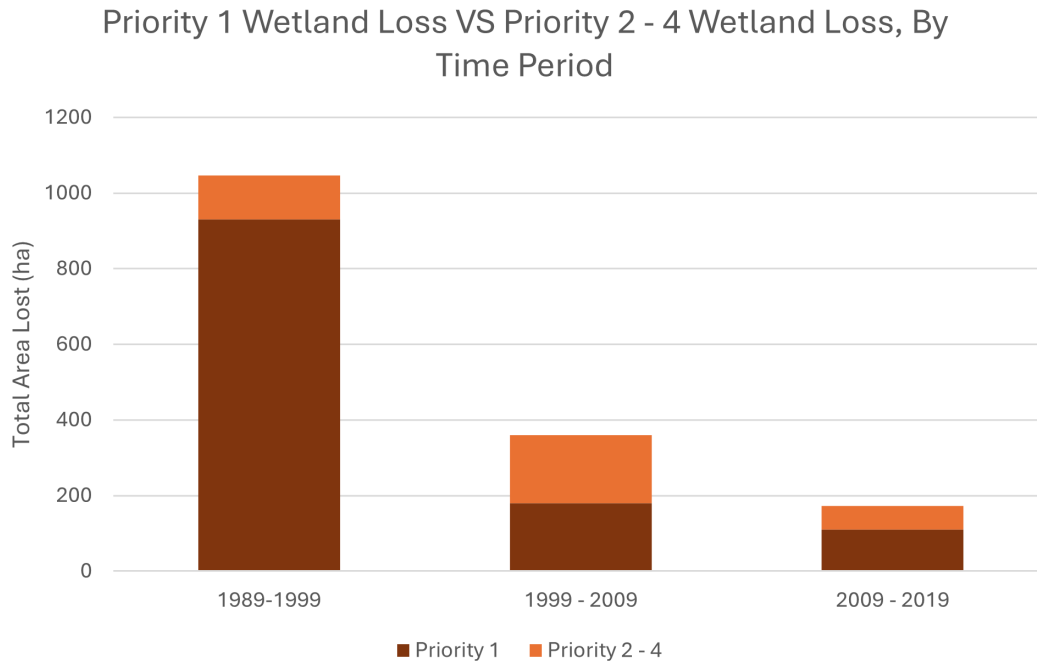


Figure 4: Priority 1 Wetland Loss Compared to Priority 2–4 Wetland Loss, 1989 to 2019

Importantly, losses to Priority 1 wetland units account for between 50% to 90% of the total area lost across all wetland units (Priority 1-4) in all three time periods of loss assessment (**Table 5**). In 1989, 931 hectares of Priority 1 wetland were lost, representing the majority of the total 1,047 hectares lost across all wetlands. In 1999, 180 hectares of Priority 1 wetland was lost compared to a total of 360 hectares lost across all wetlands. In 2019, 110 hectares of Priority 1 wetland was lost, which similarly to the previous periods, accounted for the majority of the total 163 hectares lost (**Table 5**).

Table 5 lists the Priority 1 wetland units that experienced loss from 1989 to 2019. It includes the 1989-1999, 1999-2009, and 2009-2019 loss in hectares, and the total loss over the three periods.

Table 5. Priority 1 Wetland Loss, 1989 to 2019

Unit #	Wetland Name	Total Area 1989 (ha) - Recalculated	Area Lost 1989-1999 (ha)	Total Area 1999 (ha)	Area Lost 1999 - 2009 (ha)	Total Area 2009 (ha)	Area Lost 2009-2019 (ha)	Total Area 2019 (ha)	Total Area Lost 1989 - 2019 (ha)
135	Pitt Polder	1933.4	477.1	1456.3	91.1	1365.2	0.9	1364.3	569.1
100	Burns Bog	3140.6	265.5	2875.2	13.3	2861.9	19.8	2842.1	298.5
125	N. Alouette River	211.4	97.7	113.7	0.0	113.7	0.0	113.7	97.7
113	Surrey Bend	507.9	59.1	448.8	10.5	438.3	6.2	432.1	75.8
219	Strawberry Island	241.6	0.0	241.6	0.0	241.6	67.2	174.4	67.2
189	Glen Valley	30.1	1.9	28.1	21.8	6.4	0.0	6.4	23.7
196	Silverdale Creek	58.0	15.2	42.8	8.4	34.4	0.0	34.4	23.6
108	Coquitlam River lower	136.7	3.0	133.7	10.8	122.9	7.2	115.7	21.0
149	Katzie Slough, upper	22.8	6.6	16.2	9.5	6.7	0.4	6.3	16.5
212	Hatzic Lake	247.4	0.0	247.4	6.9	240.5	6.1	234.5	12.9
181	Pepin Creek	119.3	3.4	116.0	5.2	110.7	0.0	110.7	8.6
180	Bertrand Creek	19.4	1.0	18.4	2.1	16.3	0.6	15.7	3.7
221	Norrish Creek delta	123.6	0.0	123.6	0.0	123.6	1.4	1.4	1.4
384	Lake Errock	4.5	0.0	4.5	0.5	4.0	0.0	4.0	0.5
Total			930.5		180.1		109.7		1220.3

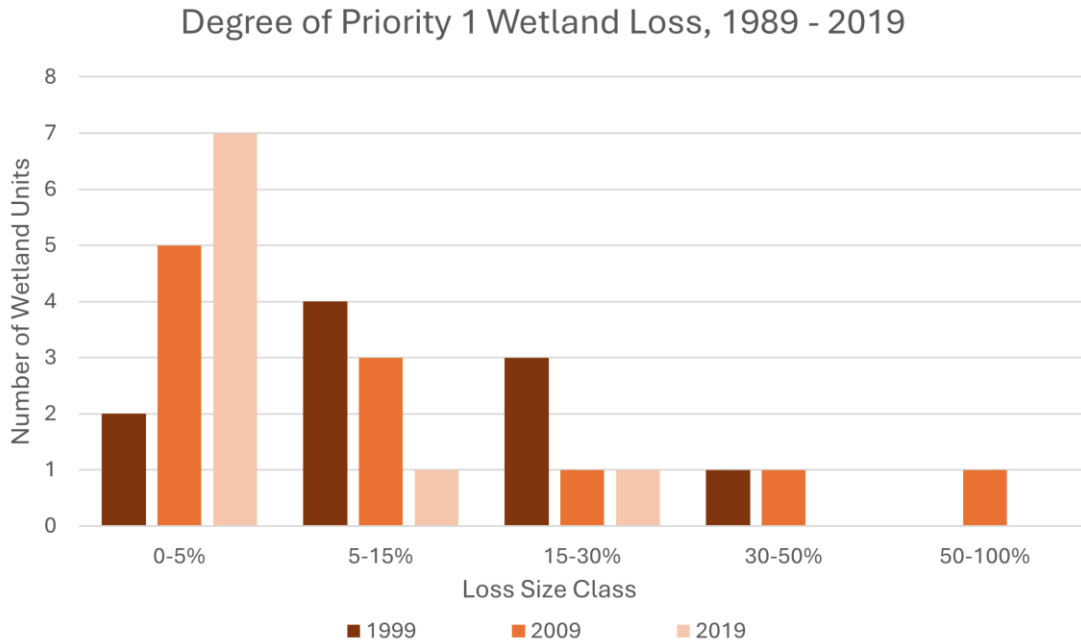


Figure 5: Degree of Wetland Encroachment on Priority 1 Wetlands by Loss Size Class Category, 1989 to 2019

The majority of losses affecting Priority 1 wetland units fall within the 0-5% loss size class (**Figure 5**). The most significant losses, ranging from >30-50% and >50-100%, occurred in Glen Valley and Katzie Slough (Upper) where, as of 2019, less than 25% of the 1989 wetland area remains intact (**Table 6**). Overall, 77% of the 1989 area of Priority 1 wetland remains intact and 23% was lost between 1989 and 2019. Note this does not include the Priority 1 wetlands in the FREMP zone that were not assessed. However, much of this area includes the extensive tidal flats of Boundary Bay, Roberts Bank and Sturgeon Bank where anthropogenic encroachments have largely focused on port expansion on Roberts Bank.

Table 6 shows the percent of wetland loss for Priority 1 wetlands between 1989 and 2019 as well as the loss size class.

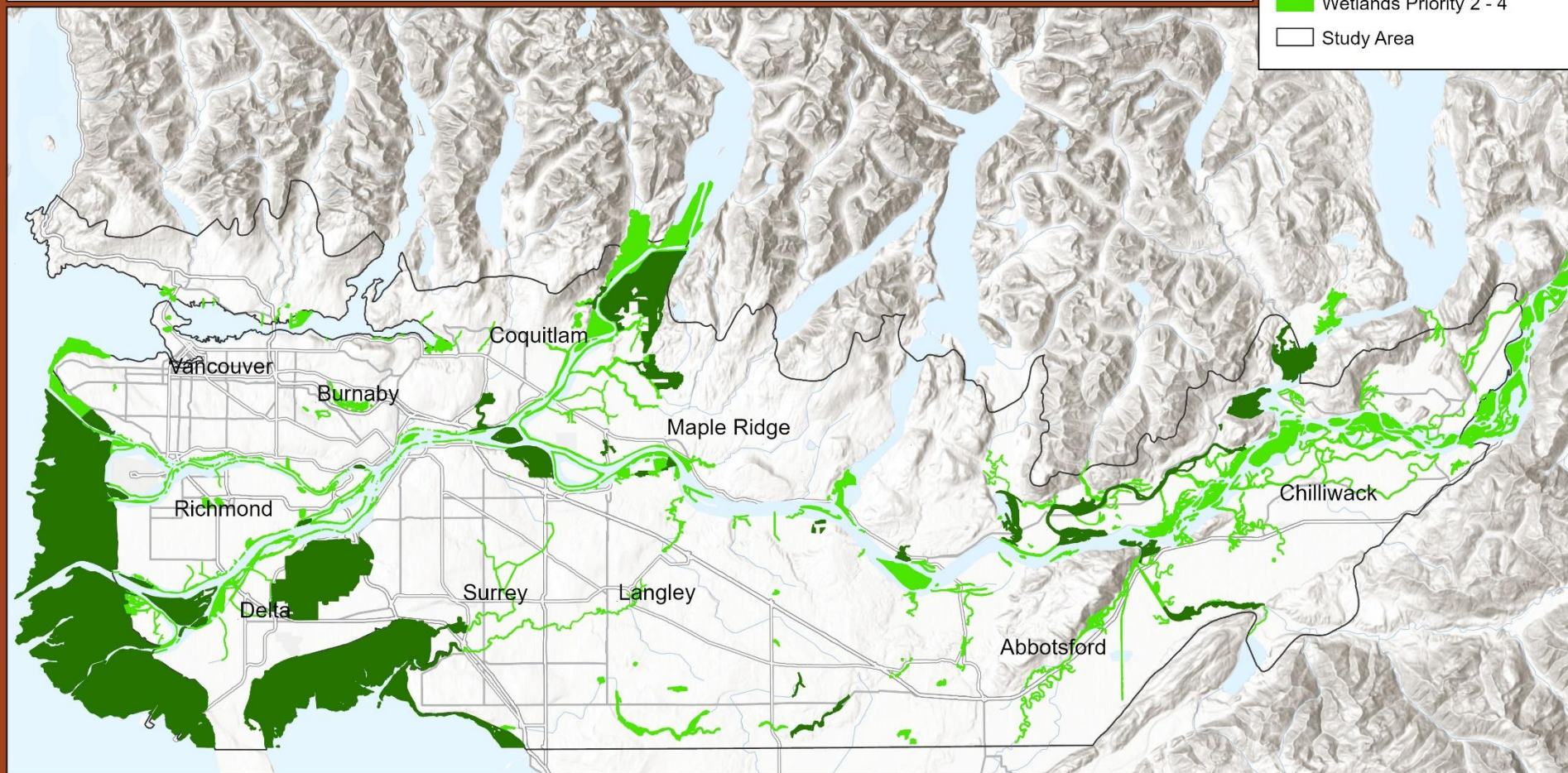
Table 6. Percent of Wetland Loss and Loss Size Class of Priority 1 Wetlands, 1989 to 2019

Unit #	Wetland Name	Percent Loss 1989-1999	Loss Size Class 1999	Percent Loss 1999-2009	Loss Size Class 2009	Percent Loss 2009-2019	Loss Size Class 2019	Total Percent Lost 1989 - 2019
189	Glen Valley	6	5-15%	77	50-100%	0		79
149	Katzie Slough, upper	29	15-30%	59	30-50%	5	0-5%	72
125	N. Alouette River	46	30-50%	0		0		46
196	Silverdale Creek	26	15-30%	20	15-30%	0		41
135	Pitt Polder	25	15-30%	6	0-5%	0	0-5%	29
219	Strawberry Island	0		0		28	15-30%	28
180	Bertrand Creek	5	5-15%	11	5-15%	4	0-5%	19
108	Coquitlam River lower	2	0-5%	8	5-15%	6	5-15%	15
113	Surrey Bend	12	5-15%	2	0-5%	1	0-5%	15
384	Lake Errock	0		11	5-15%	0		11
100	Burns Bog	8	5-15%	0	0-5%	1	0-5%	10
181	Pepin Creek	3	0-5%	5	0-5%	0		7
212	Hatzic Lake	0		3	0-5%	3	0-5%	5
221	Norrish Creek delta	0		0		1	0-5%	1

Wetlands Priority 1 and Priority 2-4, 1989

Legend

- Wetlands Priority 1
- Wetlands Priority 2 - 4
- Study Area



0 10 20 30
Kilometers

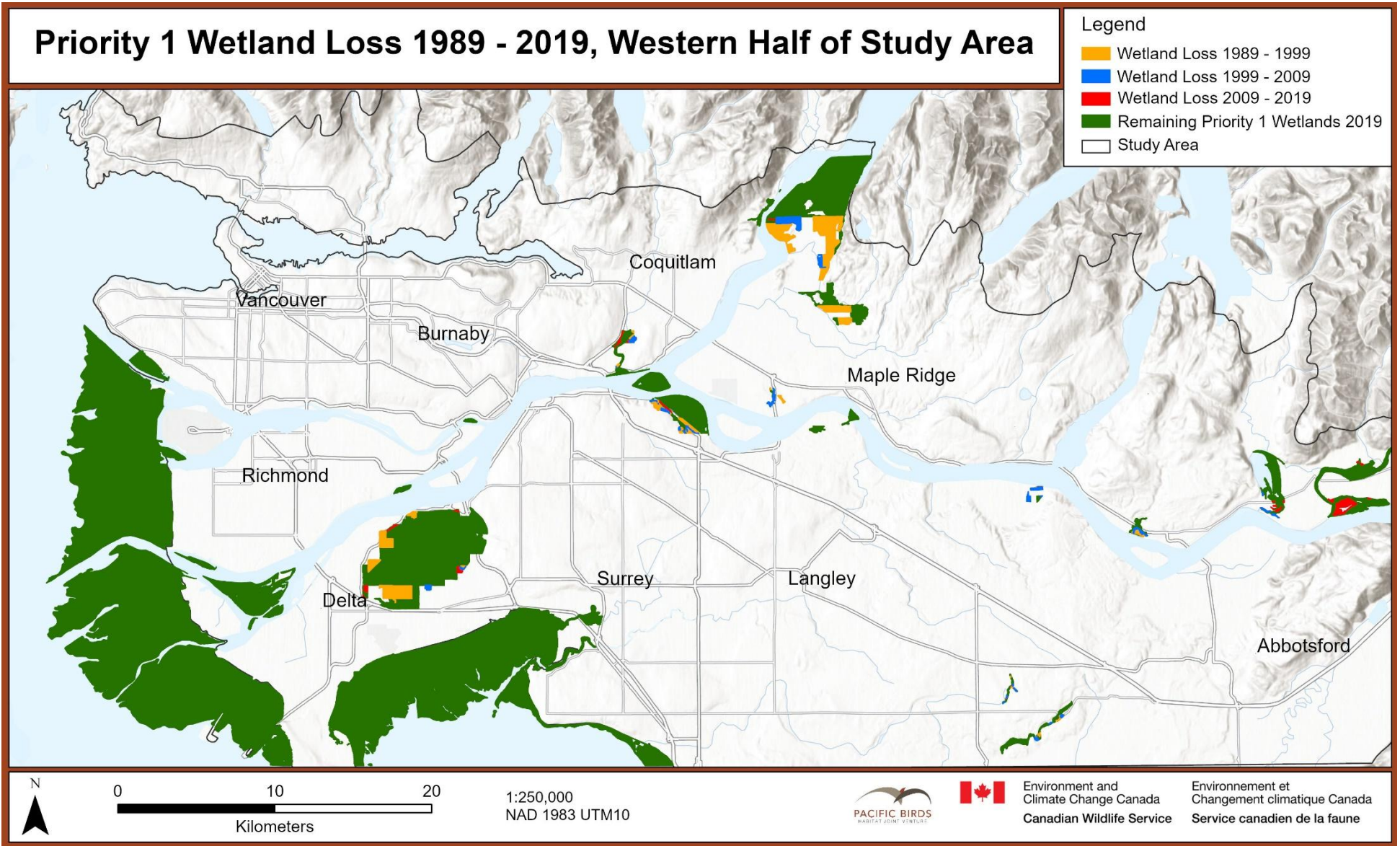
1:350,000
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Canadian Wildlife Service

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Changement climatique Canada
Service canadien de la faune

Map 9. Locations of Priority 1 Wetlands, 1989

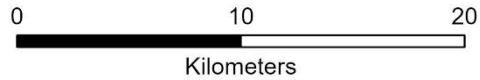
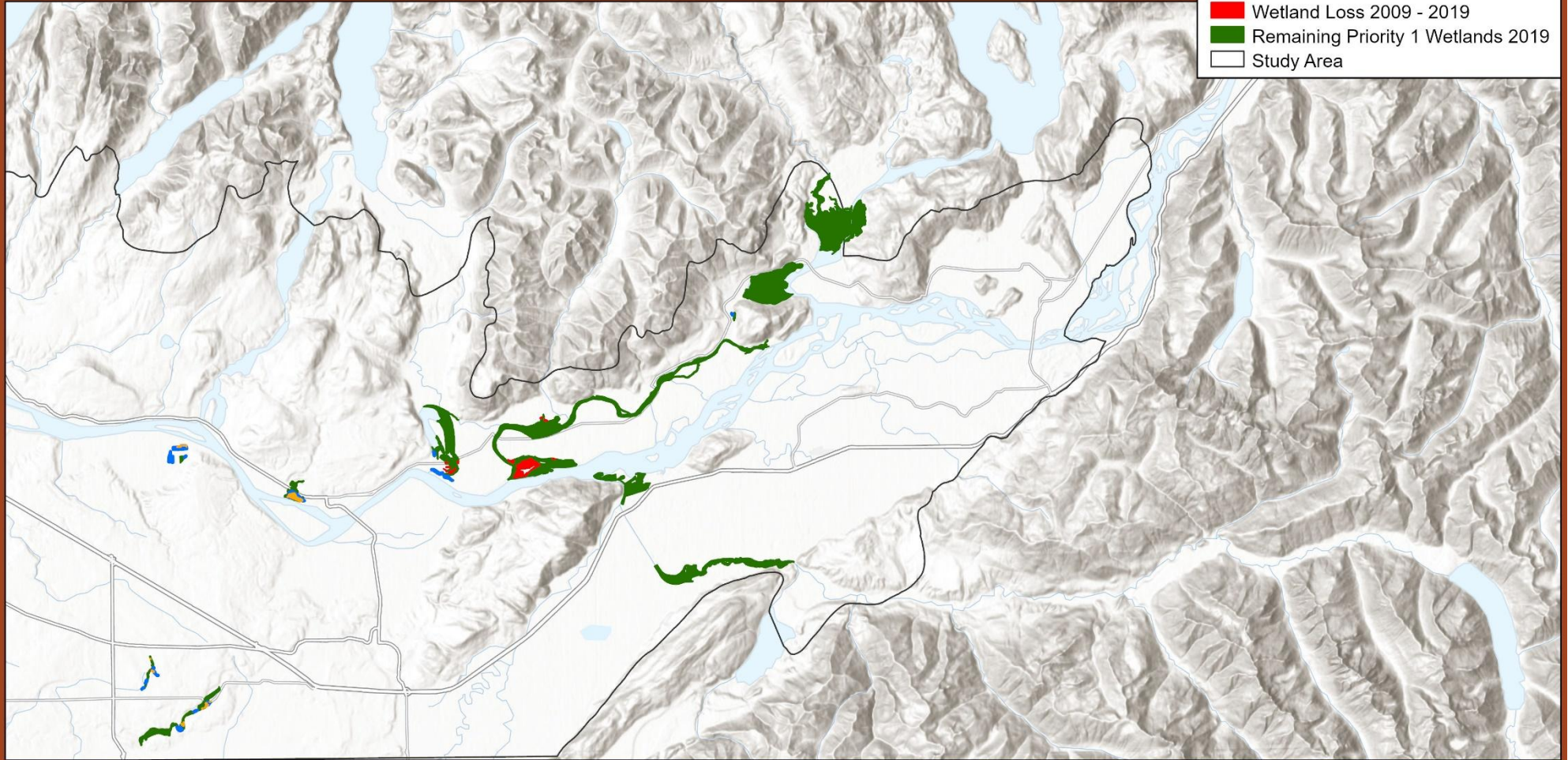


Map 10. Priority 1 Wetland Loss 1989 – 2019 and Remaining Priority 1 Wetlands (2019), Western Half of the Study Area

Priority 1 Wetland Loss 1989 - 2019, Eastern Half of Study Area

Legend

- Wetland Loss 1989 - 1999
- Wetland Loss 1999 - 2009
- Wetland Loss 2009 - 2019
- Remaining Priority 1 Wetlands 2019
- Study Area



1:250,000
NAD 1983 UTM10



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Climate Change Canada
Canadian Wildlife Service

Environnement et
Changement climatique Canada
Service canadien de la faune

Map 11. Priority 1 Wetland Loss 1989 – 2019 and Remaining Priority 1 Wetlands (2019), Eastern Half of the Study Area

3.5 Protection of Priority 1 Wetlands

In 1993, a total of 51 wetland units were identified as high priority for conservation action (Priority 1), totalling 32,991 hectares. Tracking the change in protection between 1992 and 2024 for the 51 Priority 1 wetland units involves two aspects: the progress from low/no protection to high protection, and the percent of a wetland under high protection (fully/partly). As of 2024, 38 out of 51 wetland units classified as Priority 1 by CWS, the BC Ministry of Environment, DUC, NTBC, and BC Nature in 1993 are partly or fully under high protection. Of the 38 Priority 1 wetland units under high protection, 27 are more than 50% protected (**Table 7; Figure 7**). This marks a significant improvement from 1992, when only 10 Priority 1 wetland units were under high protection, and just 4 of those were more than 50% protected (**Table 7**). Overall, over 80% (26,275 hectares) of the total area of Priority 1 wetland is now under high protection, a significant increase from a mere 8% (2,780 hectares) in 1992 (**Figure 6; Maps 12 and 13**).

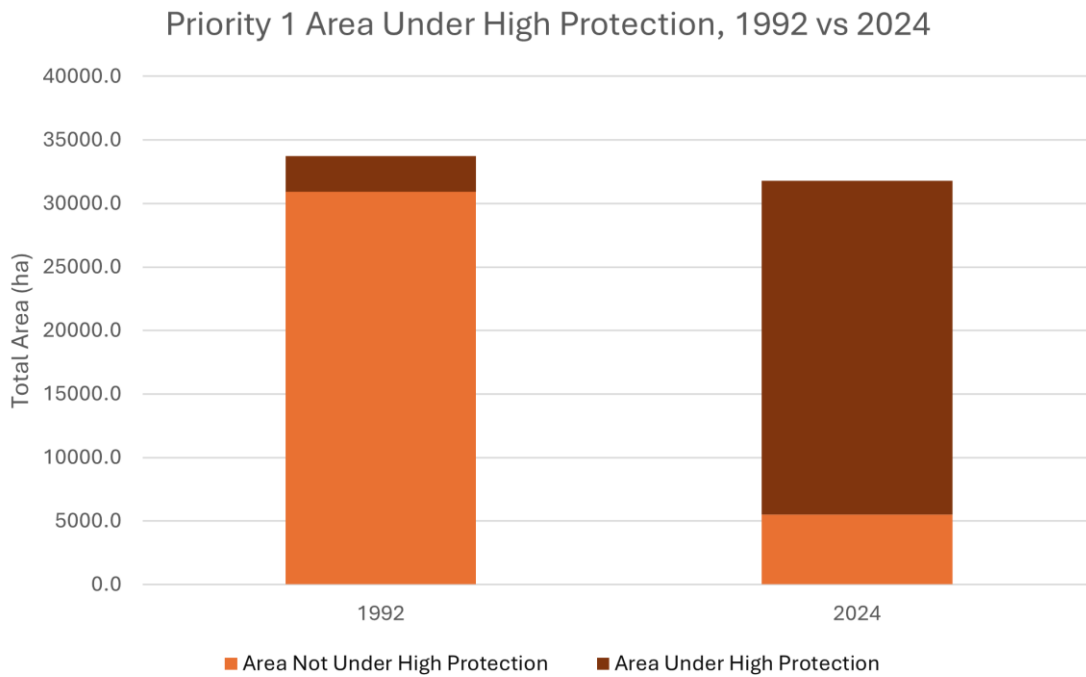


Figure 6: Comparison of the Total Area of Priority 1 Wetland Under High Protection as of 1992 and as of 2024

Table 7 shows the comparison between the area and percent of Priority 1 wetlands under high protection as of 1992 and 2024.

Table 7. Area and Percent of Priority 1 Wetland Protection, 1992 vs 2024

Unit #	Wetland Name	Total Area 1989 (ha)	Area Under High Protection 1992	Percent (%) Under High Protection 1992*	Total Area 2019 (ha)	Area Under High Protection 2024	Percent (%) Under High Protection 2024*
27	Boundary Bay	5108.2	11.2	0	5108.2	5068.3	99
392	Chehalis River delta	441.8			441.8	436.7	99
154	Derby Reach Regional Park	31.2	30.7	98	31.2	30.7	98
286	Sumas River mouth	46.7	0	0	46.7	46.0	98
29	Crescent Beach	339.0			339.0	330.8	98
22	Westham Island, west -edited	5191.8	38.2	1	5191.8	5058.7	97
28	Mud Bay	759.6	6.4	0.8	759.6	731.7	96
135	Pitt Polder	1933.4	1308.3	96	1364.3	1308.3	96
111	Douglas Island	187.3	0	0	187.3	179.1	96
26	Centennial Beach backshore	39.1	30.1	77	39.1	36.2	92
125	N. Alouette River	211.4	0	0	113.7	103.2	91
21	Lulu Island foreshore west	3987.8	0	0	3987.8	3619.7	91
20	Sea & Iona Is. west	2634.4	748.5	28	2634.4	2351.9	89
75	South Arm Marshes	624.0	551.7	88	624.0	556.3	89
124	Cod Island	123.8	0	0	123.8	110.3	89
168	Serpentine WMA	75.5	0	0	75.5	67.0	89
30	Semiahmoo Bay/Ocean Park foreshore	355.7	0	0	355.7	314.9	89
394	Chehalis River, lower reach	53.0	0	0	53.0	46.3	87
393	Harrison River, east bank	121.1	0	0	121.1	103.2	85
167	Serpentine River, lower	60.0	0	0	60.0	50.3	84
113	Surrey Bend	507.9	0	0	432.1	358.8	83
100	Burns Bog	3140.6	0	0	2842.1	2328.8	82

287	McGillivray Creek Wildlife Sanctuary	93.3	0	0	93.3	76.1	82
23	Brunswick Point	2928.0	0	0	2928.0	2295.5	78
166	Nicomekl River, lower	84.4	0	0	84.4	64.1	76
221	Norrish Creek delta	123.6	0	0	122.2	89.4	73
43	Swishwash Island	101.3	0	0	101.3	57.1	56
196	Silverdale Creek	58.0	0	0	34.4	16.4	48
181	Pepin Creek	119.3	52.3		110.7	52.3	47
25	Tsawwassen Beach	336.7	0	0	336.7	154.6	46
89	Don & Lion Islands	24.6	0	0	24.6	10.1	41
219	Strawberry Island	241.6	0	0	174.4	67.7	39
108	Coquitlam River lower	136.7	0	0	115.7	39.2	34
136	McIntyre Creek East	37.2	0	0	37.2	8.2	22
24	Roberts Bank interjetty area	1079.3	0	0	1079.3	90.7	8
293	Vedder River	272.4	0	0	272.4	10.2	4
34	Musqueam Marsh	176.2	2.2	1	176.2	2.2	1
220	Nicomen Slough	386.8	0	0	386.8	3.7	1
58	Poplar Island	13.7	0	0	13.7	0.0	0
61	Steveston Island	49.9	0	0	49.9	0.0	0
72	Canoe Pass northeast	11.8	0	0	11.8	0.0	0
149	Katzie Slough, upper	22.8	0	0	6.3	0.0	0
153	Fort Langley northwest	24.5	0	0	24.5	0.0	0
180	Bertrand Creek	19.4	0	0	15.7	0.0	0
189	Glen Valley	30.1	0	0	6.4	0.0	0
212	Hatzic Lake	247.4	0	0	234.5	0.0	0
384	Lake Errock	4.5	0	0	4.0	0.0	0
385	Harrison Bay, western shore	11.2	0	0	11.2	0.0	0
386	Harrison Bay	375.2	0	0	375.2	0.0	0

387	Harrison Bay Is. 1	2.5	0	0	2.5	0.0	0
388	Harrison Bay Is. 2	4.9	0	0	4.9	0.0	0
Total		32990.6	2779.6		31770.4	26274.6	

*Percent protection values listed as “0” represent percentages <0.5% due to rounding

Figure 7 shows that overall, between 1992 and 2024 of the 51 Priority 1 wetlands under high protection, 27 are more than 50% protected, 11 are less than 50% protected, and 13 remain fully unprotected.

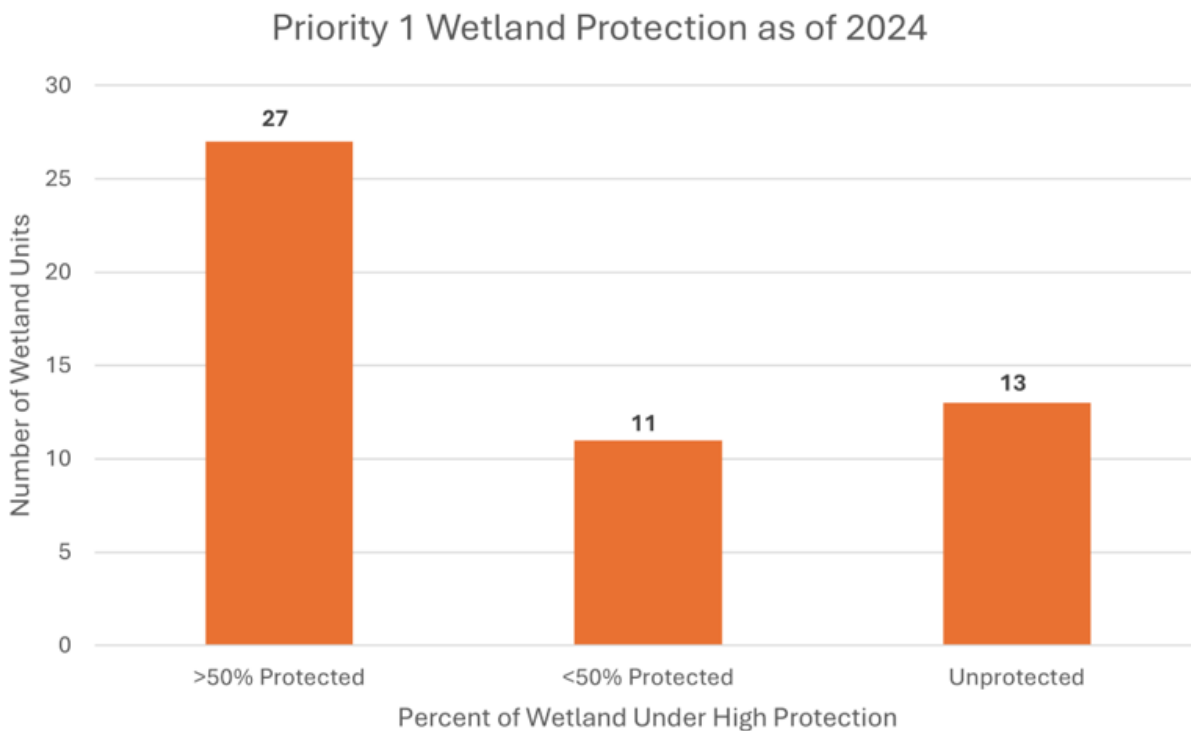


Figure 7: Degree of High Protection Coverage of Each Priority 1 Wetland Unit

As of 2024, four protected area types were found to be actively protecting Priority 1 wetlands: Federal Nature Reserves (NR), NGO Conservation Areas, Metro Vancouver Regional Parks, Provincial Government Ecological Reserves and Wildlife Management Areas (WMA). WMA’s and Provincial Ecological Reserves are owned by the provincial government, Regional Parks are owned by Metro Vancouver, and Nature Reserves are owned by CWS. NGO Conservation Areas are owned by either DUC, NCC or NTBC.

Table 8 shows the area and percent of Priority 1 wetlands under high protection as of 2024 by protected area type.

Table 8. Area and Percent of Protected Priority 1 Wetland by Protected Area type, 2024

Unit #	Wetland Name	Area Protected WMA/NR/Ecological Reserve (Government) (ha)**	Percent (%) Protected WMA/NR/Ecological Reserve (Government)*	Area Protected NGO (ha)**	Percent (%) Protected NGO*	Area Protected Regional Park (ha)**	Percent (%) Protected Regional Park*
20	Sea & Iona Is. west	2310.1	88	0	0	41.9	2
21	Lulu Island foreshore west	3569.7	90	50.1	1	0	0
22	Westham Island, west -edited	5056.0	97	2.8	0	0	0
23	Brunswick Point	2295.5	78	0	0	0	0
24	Roberts Bank interjetty area	90.7	8	0	0	0	0
25	Tsawwassen Beach	154.6	46	0	0	0	0
26	Centennial Beach backshore	6.4	16	0	0	29.8	76
27	Boundary Bay	5058.1	99	0	0	10.2	0
28	Mud Bay	726.2	96	0	0	5.5	1
29	Crescent Beach	330.8	98	0	0		
30	Semiahmoo Bay/Ocean Park foreshore	314.9	89	0	0	0	0
34	Musqueam Marsh	0	0	0	0	2.2	1
43	Swishwash Island	42.7	42	14.4	14	0	0
58	Poplar Island	0	0	0	0	0	0
61	Steveston Island	0	0	0	0	0	0
72	Canoe Pass northeast	0	0	0	0	0	0
75	South Arm Marshes	551.7	88	4.6	1		
89	Don & Lion Islands	0	0	0	0	10.1	41
100	Burns Bog	0	0	0	0	2328.8	82
108	Coquitlam River lower	14.4	12	0	0	24.8	21
111	Douglas Island	0	0	0	0	179.1	96

113	Surrey Bend	0	0	12.2	3	346.6	80
124	Cod Island	0	0	69.1	56	41.2	33
125	N. Alouette River	0	0	0	0	103.2	91
135	Pitt Polder	1308.3	96	0	0	0	0
136	McIntyre Creek East	8.2	22	0	0	0	0
149	Katzie Slough, upper	0	0	0	0	0	0
153	Fort Langley northwest	0	0	0	0	0	0
154	Derby Reach Regional Park	0	0			30.7	98
166	Nicomekl River, lower	64.1	76	0	0	0	0
167	Serpentine River, lower	50.3	83	0	0	0	0
168	Serpentine WMA	67.0	89	0	0	0	0
180	Bertrand Creek	0	0	0	0	0	0
181	Pepin Creek	0	0	0	0	52.3	47
189	Glen Valley	0	0	0	0	0	0
196	Silverdale Creek	0		16.4	48		
212	Hatzic Lake	0	0	0	0	0	0
219	Strawberry Island	67.7	39	0	0	0	0
220	Nicomen Slough	0	0	3.7	1	0	0
221	Norrish Creek delta	0	0	89.4	73	0	0
286	Sumas River mouth	46.0	98	0	0	0	0
287	McGillivray Creek Wildlife Sanctuary	76.1	82	0	0	0	0
293	Vedder River	10.2	4	0	0	0	0
384	Lake Errock	0	0	0	0	0	0
385	Harrison Bay, western shore	0	0	0	0	0	0
386	Harrison Bay	0	0	0	0	0	0
387	Harrison Bay Is. 1	0	0	0	0	0	0
388	Harrison Bay Is. 2	0	0	0	0	0	0
392	Chehalis River delta	436.7	99	0	0	0	0

393	Harrison River, east bank	103.2	85	0	0	0	0
394	Chehalis River, lower reach	46.3	87	0	0	0	0
Total		22805.6		262.6		3206.6	

*Percent protection values listed as “0” represent percentages <0.5% due to rounding

**As CPCAD may contain overlapping ownership arrangements, the calculation of protected area (ha) by protected area type removes this overlap to provide a true protected area value.

As of 2024, WMAs, Ecological Reserves, and Nature Reserves, together protect 87% (22,806 ha) of the total area of Priority 1 wetland under high protection (Table 8; Figure 8). Regional Parks contribute a further 12% (3,207 ha) of protection, while NGO Conservation Areas protect the remaining 1% (263) (Table 8; Figure 8).

In 1992, the total area under high protection was significantly smaller, yet the distribution of protected area types was similar. WMA’s, Nature Reserves, and Ecological Reserves provided 68% (1,898 ha) of high protection (Table 9; Figure 8). Regional Parks protected 32% (881 ha) of the total area under high protection and NGO Conservation Areas provided no protection (0 ha) (Table 9; Figure 8).

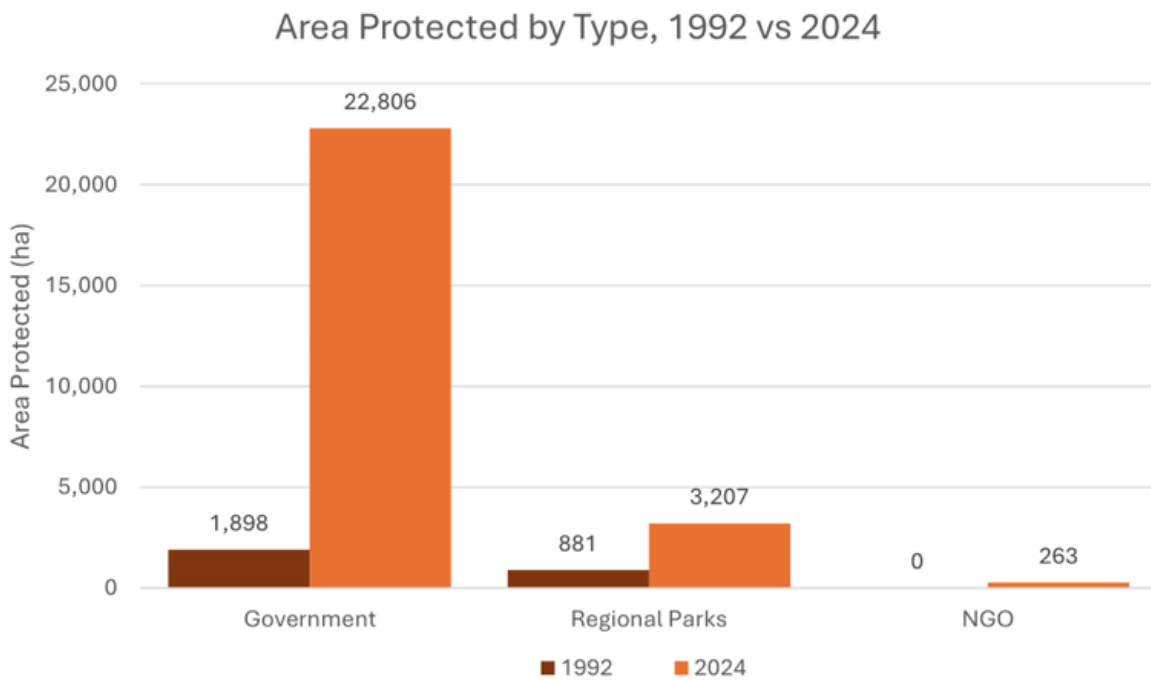


Figure 8: Area Protected by Type, 1992 vs 2024

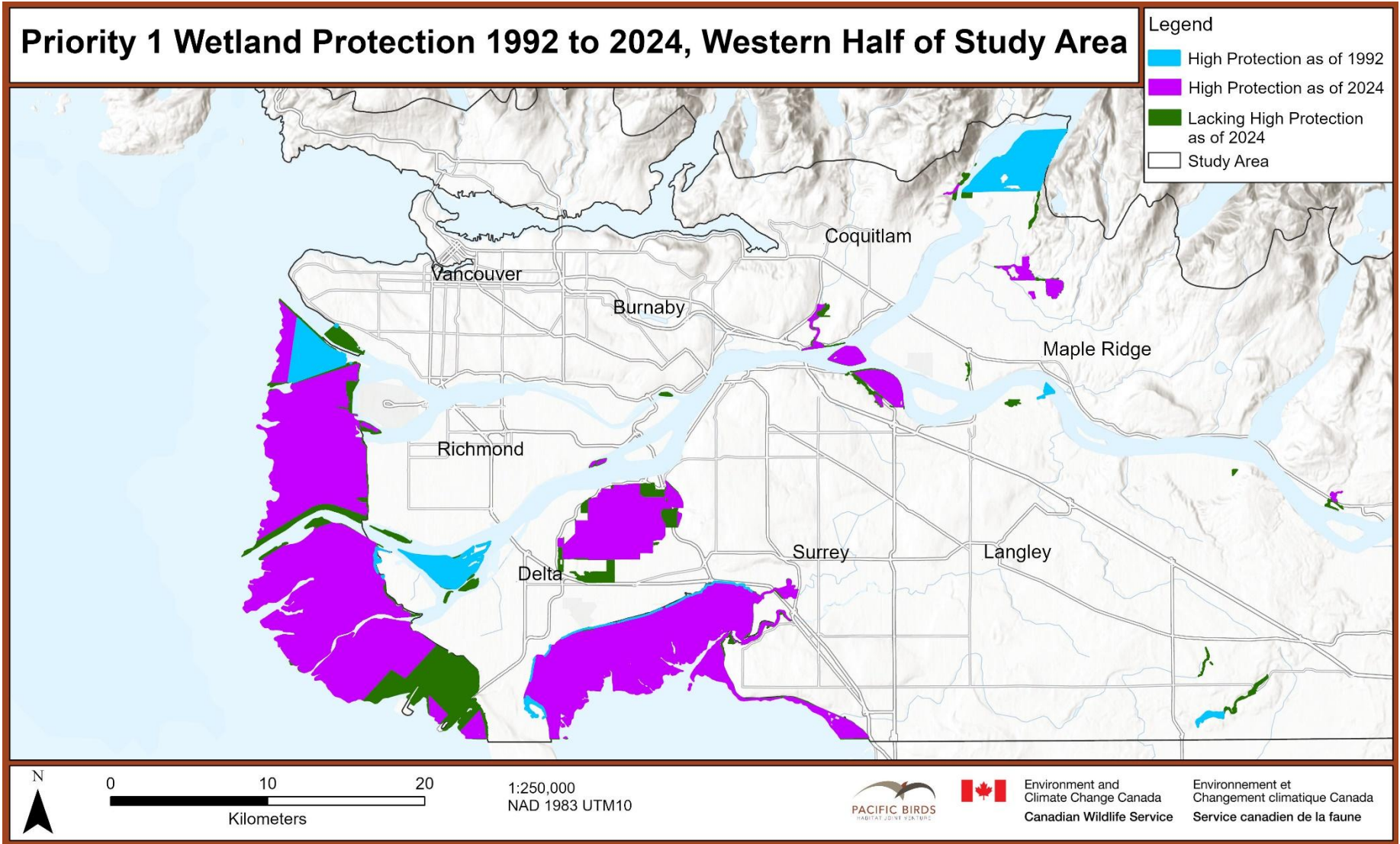
Table 9 shows the area and percent of Priority 1 wetland units under high protection as of 1992 by protected area type.

Table 9. Area and Percent of Protected Priority 1 Wetland Units by Protected Area type, 1992

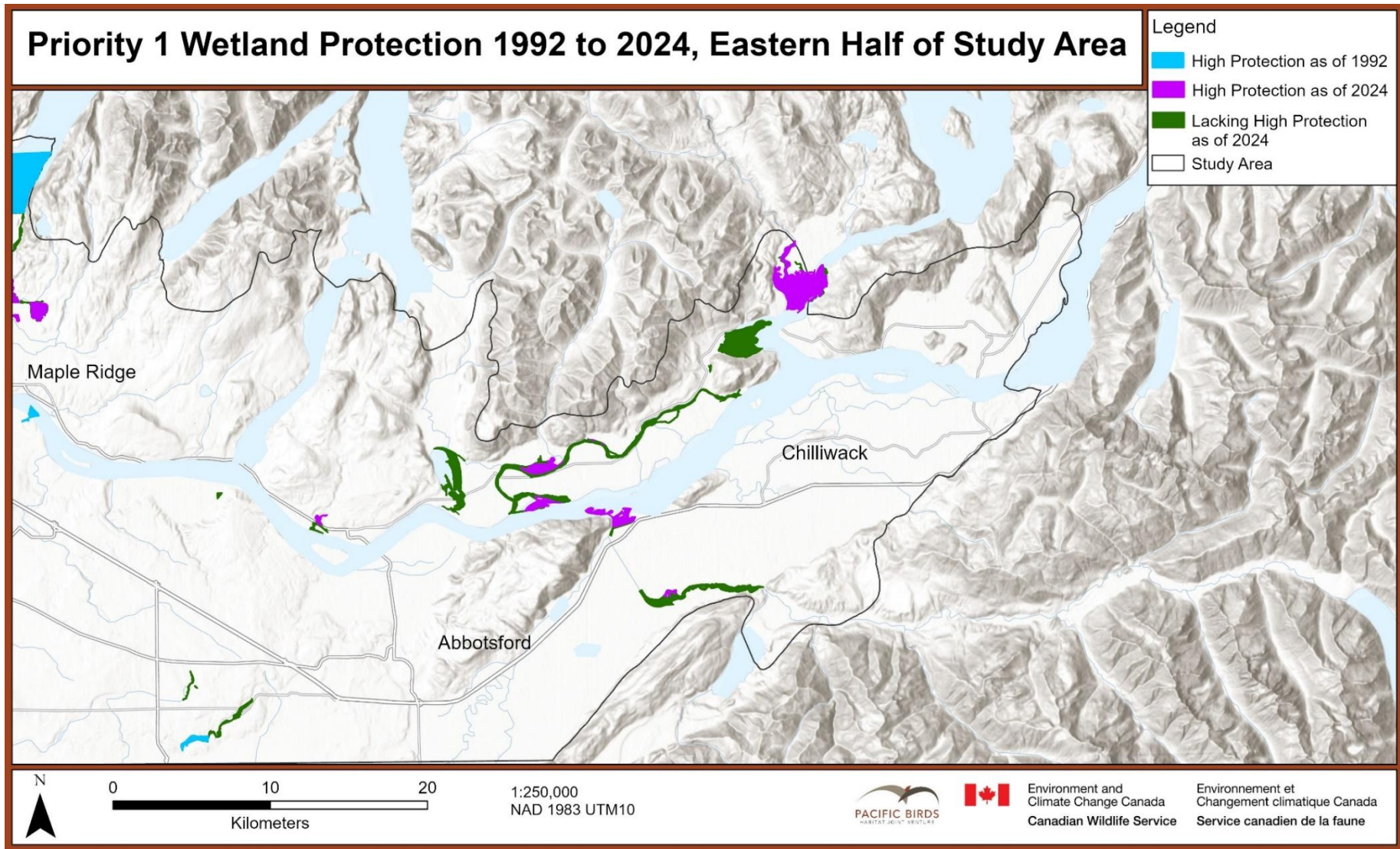
Unit #	Wetland Name	Area Protected WMA/NR/Ecological Reserve (Government) (ha)**	Percent Protected WMA/NR/Ecological Reserve (Government) *	Area Protected NGO (ha)**	Percent Protected NGO*	Area Protected Regional Park (ha)**	Percent Protected Regional Park*
20	Sea & Iona Is. west	0	0	0	0	748.5	28
22	Westham Island, west - edited	38.2	1	0	0	0	0
26	Centennial Beach backshore	0	0	0	0	30.1	76
27	Boundary Bay	0	0	0	0	11.2	0
28	Mud Bay	0	0	0	0	6.4	0.8
34	Musqueam Marsh		0	0	0	2.2	1
75	South Arm Marshes	551.7	88	0	0	0	0
135	Pitt Polder	1308.3	96	0	0	0	0
154	Derby Reach Regional Park	0	0	0	0	30.7	98
181	Pepin Creek	0	0	0	0	52.3	47
Total		1898.2		0		881.4	

*Percent protection values listed as “0” represent percentages <0.5% due to rounding

**As CPCAD may contain overlapping ownership arrangements, the calculation of protected area (ha) by protected area type removes this overlap to provide a true protected area value.



Map 12. Priority 1 Wetland Protection as of 1992 and as of 2024, Western Half of Study Area



Map 13. Priority 1 Wetland Protection as of 1992 and as of 2024, Eastern Half of Study Area

4. Discussion

4.1 Overall Wetland Loss

This report summarized the impacts of development on wetland units (outside of the FREMP zone) in the Fraser Lowland from anthropogenic encroachment such as agriculture, residential, and commercial development. It assesses both the similarities and differences across the three time periods of loss assessment, 1989 to 1999, 1999 to 2009, and 2009 to 2019, evaluating the overall trend of wetland loss in the region. The total hectares lost between 1989 and 2019 was 1,516 hectares, but the most notable trend is a cumulative decline in total wetland loss with each successive decade of assessment. The period from 1989 to 1999 experienced the most significant losses, primarily due to two major encroachments in Burns Bog and Pitt Polder. No losses of comparable scale occurred in the two decades that followed. However, incremental wetland loss continues. As of 2019, three wetland units - Bateson and Duncan Slough area, Graybar Road, and Lulu Island southeast have lost 100% of their remaining area and an additional 11 wetlands have lost more than 50% of their original area (**Table 2**).

Between 1989 and 1999, 71 wetlands were affected by encroachment, rising slightly to 76 between 1999 and 2009, but dropping significantly to 43 between 2009 and 2019. In total, 109 wetland units experienced encroachment over the 30-year period of loss assessment. The primary drivers of wetland loss have been agriculture, transportation infrastructure, and land in transition to an unidentified urban use. While the overall rate of loss has declined, the cumulative impact of small-scale losses, or “nibbling” remains a concern. More than half of the 109 wetlands affected by loss experienced minor reductions within the 0-5% loss size class. These incremental losses, while often overlooked, add up over time to diminish the total wetland area and compromise the long-term viability of the region’s wetland classes. This impact is particularly important considering that the total wetland area in 1989 represented a fragment of the region’s historic wetland extent prior to European settlement.

Reporting loss trends by wetland class is difficult due to the presence of up to three classes within a single wetland unit. Based on assessments over time, almost 21% (9,217 ha) of the total wetland area in 1989 was still intact by 2019 consisting of 36% shallow open water, 34% gravel bar, 19% marsh and smaller percentages of swamp, bog and fen. The wetland area that has not been assessed over time because it was in the FREMP zone totaled 25,723 ha consisting of 86% shallow open water, 12% marsh and miniscule percentages for the other wetland classes. Although this area was not assessed, the majority of it consists of shallow open water, largely occurring on the tidal flats of Sturgeon Bank, Roberts Bank and Boundary Bay. Anthropogenic impacts since 1989 have largely occurred during port expansion on Roberts Bank. While the FREMP zone wetlands were assumed to be assessed by FREMP, that program ended in 2013 and this type of tracking has never been applied to these wetlands. Finally, only the original wetland class as it was in 1989 can be reported for the 1,516 ha that were lost over time, or for the 9,217 ha that remained intact as of 2019. The precision of the original mapping and the assessment methodology used in this report does not allow for detailed reporting on impacts to each wetland class.

4.2 Loss of Priority 1 Wetlands

The findings of this report also reveal the disproportionate impact of development on Priority 1 wetland units in the Fraser Lowland. Despite representing 15% of all wetland units (Priority 1 – 4), between 1989 and 2019, 50% - 90% of the total area of wetland lost within each decade impacted solely Priority 1 wetland units. This concentration of degradation on Priority 1 wetland units is particularly concerning, as these wetlands have been classified as the highest priority for conservation action. Similar to the overall wetland loss trends, the majority of losses to Priority 1 wetland units fell within the 0-5% loss size class range. However, one major loss event in the >50-100% range occurred in 2009, decreasing the area of Glen Valley by 79%. Although the disproportionate impact of loss on Priority 1 wetland units is concerning, it is important to note that over 70% of these wetlands remain intact as of 2019.

4.3 Protection of Priority 1 Wetlands

In addition to assessing wetland loss, this report also summarizes the change in protection on wetlands classified as being the highest priority for protection. Encouragingly there has been a significant increase in the level of high protection of Priority 1 wetland units since 1992. As of 2024, over 80% of the total area of Priority 1 wetland is under a high level of protection, contrasting to only 8% in 1992. Protected area type and protected area ownership have played a key role in this increase. As of 2024, WMAs, Ecological Reserves, and Nature Reserves, together protect 87% (22,806 ha) of the total area of Priority 1 wetland under high protection. Regional Parks contribute a further 12% (3,207 ha) of protection, while NGO Conservation Areas protect the remaining 1% (263).

In the last 30 years, there has been a significant improvement in the extent of high-level protection over wetlands. However, wetlands remain vulnerable to small incremental losses and development pressures. Consistent monitoring is essential for accurately tracking these trends. The FLWI database, with its streamlined functionality following the latest update, will be instrumental in enabling the continued evaluation of long-term trends in wetland loss and protection in the region. Although more precise mapping programs such as Metro Vancouver's Sensitive Ecosystem Inventory (SEI) are now available, the regional-scale FLWI remains useful as an index of change given the standardized tracking methods used in each time period. Continuing the updates to the FLWI every 10 years will enable consistent reporting of wetland loss and protection levels over many decades.

5. Conclusion

Over the past three decades, a total of 1,516 hectares of wetland habitat in the Fraser Lowland region of BC have been lost to urban and agricultural encroachment. Encouragingly, the rate of encroachment has been declining in each time period of loss assessment. However, losses are still ongoing, particularly through small-scale encroachments. Priority 1 wetlands, despite being identified as high priority for conservation action, have been disproportionately affected by wetland loss.

At the same time, there has been notable progress in conservation efforts for Priority 1 wetlands. Since 1992, there has been a significant increase in the level of protection for Priority 1 wetlands, with over 80% of their area now under high protection as of 2024. This success is largely due to the increase in the establishment of large WMAs and Ecological Reserves by the provincial government in addition to smaller NGO Conservation Areas, Regional Parks, and Federal Nature Reserves.

Despite the findings in this report, important limitations to assessing wetland loss and protection persist. Firstly, 25,723 hectares of wetlands within the FREMP zone remain unassessed for loss, highlighting a significant data gap. Secondly, wetlands under Priority levels 2–4 have not yet been examined in detail, limiting a broader understanding of regional wetland health. Additionally, small linear wetlands present challenges for monitoring and loss assessment, where higher-resolution imagery and more detailed mapping may be required. The increasing availability of high-resolution imagery from local governments and platforms such as Google Earth may offer opportunities for more frequent verification of wetland conditions, complementing existing tools like the FLWI.

Appendix A

List of mapped wetlands units of the Fraser Lowland Wetland Inventory.

Unit #	Wetland Name	FREMP Zone (Not Assessed for Loss)*	Total Area 1989 (ha)	Total Area 2019 (ha)
1	Spanish Banks	N	336.0	336.0
2	Lost Lagoon	N	17.9	17.9
3	Beaver Lake	N	6.6	6.6
4	Ambleside	N	8.5	7.6
5	Capilano River Mouth	N	26.5	26.5
6	First Narrows, north	N	7.0	6.9
7	McKay Creek Mouth	N	3.5	3.5
8	Mosquito Creek Mouth	N	1.9	1.9
9	Lynn Creek Mouth	N	5.4	5.2
10	Seymour River, lower	N	6.7	6.7
11	Maplewood Flats	N	97.8	97.6
12	Burrard Inlet east, south shore	N	0.7	0.7
13	Barnet Marine Park	N	2.0	2.0
14	Port Moody, south	N	2.7	2.7
15	Port Moody, Reed Point	N	1.3	0.9
16	Port Moody, Pacific Coast Terminals	N	19.6	18.8
17	Port Moody foreshore	N	92.9	92.9
18	Burnaby Lake and Still Creek	N	110.7	110.5
19	Deer Lake	N	18.9	18.9
20	Sea & Iona Is. west	Y	2634.4	2634.4
21	Lulu Is. west	Y	3987.8	3987.8
22	Westham Island, west	Y	5191.8	5191.8
23	Brunswick Point	Y	2928.0	2928.0
24	Roberts Bank interjetty area	Y	1079.3	1079.3
25	Tsawwassen Beach	Y	336.7	336.7
26	Centennial Beach backshore	N	39.1	39.1
27	Boundary Bay	Y	5108.2	5108.2

28	Mud Bay	Y	759.6	759.6
29	Crescent Beach	Y	339.0	339.0
30	Semiahmoo Bay Ocean Park foreshore	Y	355.7	355.7
31	Campbell River Mouth	N	17.4	17.4
32	Musqueam Flats	Y	280.5	280.5
33	North Arm Jetty	Y	10.6	10.6
34	Musqueam Marsh	Y	176.2	176.2
35	Camosun bog	N	3.1	3.1
36	Iona Island, north	Y	15.5	15.5
37	Southlands	Y	2.6	2.6
38	McDonald Slough	Y	46.2	46.2
39	Marpole	Y	8.5	8.5
40	Sea Island north	Y	8.1	8.1
41	Sea Island southeast	Y	9.6	9.6
42	Sea Island south	Y	15.3	15.3
43	Swishwash Island	Y	101.3	101.3
44	Middle Arm south	Y	36.6	36.6
45	Middle Arm southeast	Y	5.1	5.1
46	Bridgepoint to No. 8	Y	15.4	15.4
47	Mitchell Island	Y	13.6	13.6
48	Arthur Laing Bridge to Boundary Road	Y	7.2	7.2
49	Richmond Nature Park	N	43.9	43.9
50	East of Boundary Road	Y	2.4	2.4
51	Fraser River Foreshore Park south	N	11.1	11.1
52	Fraser River Foreshore Park central	N	3.4	3.4
53	Fraser River Foreshore Park north	N	4.3	4.3
54	No. 8 to CN Bridge	Y	8.5	8.5
55	Burnaby Big Bend foreshore	Y	19.5	19.5
56	Tree Island area	Y	12.7	12.7
57	NWM border to RR bridge	Y	0.6	0.6
58	Poplar Island	Y	13.7	13.7

59	Queensborough	Y	0.9	0.9
60	Garry Point	Y	1.6	1.6
61	Steveston Island	Y	49.9	49.9
62	Cannery Row	Y	11.2	11.2
63	Gilbert Beach	Y	20.1	20.1
64	Harlock and Albion Island	Y	13.4	13.4
65	Westham Island east	Y	26.4	26.4
66	Canoe Pass north	Y	33.1	33.1
67	Alaksen National Wildlife Area	N	115.0	115.0
68	Robertson and London Sloughs	N	10.2	10.2
69	Tamboline Slough	N	6.8	6.5
70	Westham Island Slough	N	1.7	1.7
71	Canoe Pass south	Y	3.4	3.4
72	Canoe Pass northeast	Y	11.8	11.8
73	Port Guichon	Y	6.0	6.0
74	Ladner Marsh	Y	144.3	144.3
75	South Arm Marshes	Y	624.0	624.0
76	Gilmour Island	Y	11.6	11.6
77	Woodward Landing	Y	5.7	5.7
78	Deas Island west	Y	18.3	18.3
79	Deas Island east	Y	26.3	26.3
80	Green Slough	Y	12.8	12.8
81	Deas Slough south	Y	10.8	10.8
82	Tilbury Island west	Y	34.9	34.9
83	Tilbury Slough west	Y	10.6	10.6
84	Lulu Island southeast	N	24.2	0.0
85	Tilbury Island central	Y	26.8	26.8
86	Tilbury Island east	Y	16.3	16.3
87	Gravesend Reach	Y	25.6	25.6
88	Annacis Channel north shore	Y	15.2	15.2
89	Don & Lion Islands	Y	24.6	24.6
90	Sunbury	Y	9.7	9.7

91	City Reach	Y	4.8	4.8
92	North Delta foreshore	Y	14.7	14.7
93	Fraser Surrey Docks	Y	9.7	9.7
94	Annacis Channel north	Y	15.7	15.7
95	Pufleet Point	Y	26.3	26.3
96	Annacis Island north	Y	23.7	23.7
97	Annacis Island south	Y	9.8	9.8
98	Annacis Island northeast	Y	4.6	4.6
99	NWM waterfront	Y	0.1	0.1
100	Burns Bog	N	3140.6	2842.1
101	Brownsville	Y	10.2	10.2
102	Sapperton	Y	7.6	7.6
103	Sapperton Flats	Y	33.8	33.8
104	Sapperton Dyke	Y	3.7	3.7
105	Fraser Mills	Y	4.6	4.6
106	Queens Reach south	Y	6.8	6.8
107	Queens Reach north	Y	9.6	9.6
108	Coquitlam River lower	N	136.7	115.7
109	Tree Island	Y	6.0	6.0
110	Essondale Islets	Y	2.4	2.4
111	Douglas Island	Y	187.3	187.3
112	Port Mann	Y	4.5	4.5
113	Surrey Bend	N	507.9	432.1
114	Fraser Glen House	N	0.6	0.6
115	Pitt Meadows Fraser east	Y	15.9	15.9
116	Pitt Meadows Fraser west	Y	9.9	9.9
117	Pitt River Mouth west	Y	18.1	18.1
118	Chatham Flats	Y	2.7	2.7
119	Pitt River Mouth east	Y	25.5	25.5
120	Katzie Slough	N	31.2	25.0
121	Pitt River, RR bridge to DeBoville Slough	Y	44.8	44.8
122	Pitt River, bridge to Alouette River	Y	25.6	25.6

123	Alouette & North Alouette Rivers	N	175.5	174.2
124	Cod Island	N	123.8	123.8
125	N. Alouette River	N	211.4	113.7
126	DeBoville Slough	N	20.8	20.8
127	Pitt River, DeBoville to Addington Marsh	Y	4.2	4.2
128	Goose Bar	Y	36.1	36.1
129	Alouette River to Sheridan Hill	Y	38.6	38.6
130	Sheridan Hill	Y	12.1	12.1
131	Minnehada Regional Park	N	43.8	43.8
132	Addington Point Marsh	N	170.6	170.6
133	Addington Marsh	Y	63.2	63.2
134	Sturgeon Slough	N	46.5	44.7
135	Pitt Polder	N	1933.4	1364.3
136	McIntyre Creek East	N	37.2	37.2
137	Pitt Polder Foreshore South	Y	50.4	50.4
138	Pitt Polder foreshore north	Y	42.9	42.9
139	Widgeon Creek Valley	N	733.0	733.0
140	Grant Narrows north	Y	13.1	13.1
141	Pitt Lake south	N	25.1	25.1
142	Pitt Lake Delta	N	562.6	562.6
143	Parsons Channel	Y	8.1	8.1
144	Barnston Island south	Y	19.0	19.0
145	Barnston Island north	Y	22.6	22.6
146	Mann Point	Y	12.7	12.7
147	Pitt Meadows Airport	Y	14.6	14.6
148	Bishops Reach	Y	13.3	13.3
149	Katzie Slough, upper	N	22.8	6.3
150	Derby Reach northwest	Y	3.1	3.1
151	Derby Reach northeast	Y	11.6	11.6
152	Derby Reach southwest	Y	51.8	51.8
153	Fort Langley northwest	N	24.5	24.5
154	Derby Reach Regional Park	N	31.2	31.2

155	Derby Reach southeast	Y	51.4	51.4
156	Kanaka Creek	N	94.4	94.3
157	Derby Reach Regional Park, south	N	1.7	1.7
158	McMillan Island (at ferry terminal)	N	16.2	16.2
159	McMillan Island (near Fort Langley)	N	14.8	14.8
160	Salmon River, near mouth	N	3.5	3.1
161	Fort Langley, north of 88	N	1.1	0.5
162	Fort Langley southwest	N	2.2	2.2
163	Salmon River, Fort Langley	N	38.6	38.6
164	Glover & Rawlinson C.	N	0.6	0.6
165	Trinity Western University	N	4.5	4.5
166	Nicomekl River, lower	N	84.4	84.4
167	Serpentine River, lower	N	60.0	60.0
168	Serpentine WMA	N	75.5	75.5
169	Serpentine River, middle	N	30.3	30.3
170	Nicomekl River, middle west	N	34.0	34.0
172	Serpentine River, upper	N	50.9	50.9
173	Nicomekl River, middle central	N	15.9	15.9
174	Nicomekl River, middle east	N	2.2	2.2
175	Nicomekl River, upper west	N	3.2	3.2
176	Nicomekl River, upper east	N	3.2	3.1
177	Nicomekl River, headwaters	N	17.7	17.6
178	Campbell River upper	N	278.2	252.2
179	Aldergrove, south	N	25.8	22.6
180	Bertrand Creek	N	19.4	15.7
181	Pepin Creek	N	119.3	110.7
182	CFB Aldergrove	N	7.2	7.2
183	Aldergrove, north	N	7.2	6.4
184	West Creek	N	6.2	6.2
185	Palmateer Creek	N	5.9	5.0
186	Fraser River, south	N	4.2	3.7
187	Nathan Canal	N	10.7	10.7

188	Nathan Slough	N	6.3	6.3
189	Glen Valley	N	30.1	6.4
190	Crescent Island	N	41.1	41.1
191	Stave River Mouth, west	N	4.0	3.5
192	Stave River, lower	N	124.9	123.7
193	Stave River Mouth, southeast	N	77.6	77.6
194	Chester Creek mouth	N	2.0	2.0
195	Hanna Creek	N	4.4	4.4
196	Silverdale Creek	N	58.0	34.4
197	Mandale Slough	N	34.7	32.8
198	Matsqui Island	N	408.9	408.9
199	Creek mouth, west of McLennan Ck.	N	2.8	2.8
200	McLennan Creek/Gifford Slough	N	18.0	16.9
201	Fraser River, near Matsqui Island	N	2.1	2.1
202	Matsqui Slough	N	38.6	33.9
203	Matsqui Slough, northern tributary	N	6.7	5.5
204	Clayburn Creek	N	13.1	12.6
205	Page Lake	N	10.9	8.5
206	Pond northwest of Clearbrook	N	2.0	1.5
207	Mill Lake, Clearbrook	N	19.9	19.9
208	Laxton Lake	N	36.7	29.4
209	Judson Lake	N	13.2	13.2
210	Hatzic Slough System	N	5.1	4.7
211	Neilson Regional Park	N	3.9	3.9
212	Hatzic Lake	N	247.4	234.5
213	Chilqua Slough	N	37.7	37.2
214	Chilqua Slough, north of	N	2.0	1.9
215	Hatzic Lake, southeast of	N	2.2	2.2
216	Wades Creek	N	26.3	24.7
217	Fraser River, north shore	N	54.6	54.6
218	Fraser River, near Hatzic River	N	4.6	4.6
219	Strawberry Island	N	241.6	174.4

220	Nicomen Slough	N	386.8	386.8
221	Norrish Creek delta	N	123.6	122.2
222	Mud Slough, Nicomen Island	N	10.8	10.0
223	Nicomen Slough, north shore	N	5.0	4.2
224	Nicomen Island north central 1	N	4.9	3.4
225	Nicomen Island north central 2a	N	2.2	2.2
226	Nicomen Island north central 2	N	2.4	1.2
227	Nicomen Island north central 3	N	14.0	7.4
228	Nicomen Island central 1	N	2.4	1.0
229	Nicomen Island central 2	N	10.3	10.3
230	Nicomen Island central 3	N	2.0	2.0
231	Nicomen Island south central	N	5.8	1.8
232	Nicomen Island north central 4	N	2.3	1.1
233	Nicomen Slough side channel	N	14.7	14.7
234	Nicomen Slough, north of	N	6.6	6.6
235	Nicomen Slough north bank 1	N	2.2	1.9
236	Nicomen Slough north bank 2	N	7.5	7.5
237	Quaamitch Slough	N	23.8	23.5
238	Yaalstrik Island Slough	N	15.4	12.6
239	Zaitscullachan Slough	N	37.9	36.3
240	Queens Island Slough	N	32.7	32.7
241	Queens Island	N	3.0	3.0
242	Queens Island south shore	N	5.0	5.0
243	Fraser River north bank	N	5.5	5.5
244	Fraser River, west of Harrison R.	N	5.9	5.9
245	Fraser River, at Harrison R.	N	478.1	478.1
246	Fraser River, near Queens Island 1	N	26.8	26.8
247	Fraser River, near Queens Island 2	N	79.6	79.6
248	Fraser River, near Queens Island 3	N	14.8	14.8
249	Fraser River, near Chilliwack	N	2.3	2.3
250	Fraser River, near Chilliwack Ck. 1	N	8.3	8.3
251	Shefford Slough	N	38.0	36.9

252	Hope Slough	N	131.0	128.3
253	Coco-oppelo Slough north end	N	7.6	6.9
254	Chilliwack and Atchelitz Creeks	N	152.9	138.0
255	Fraser River, Nicomen Island east 1	N	0.7	0.7
256	Fraser River, Nicomen Island east 2	N	5.9	5.9
257	Fraser River, near Chilliwack Ck. 2	N	83.1	83.1
258	Fraser River, Chilliwack Ck. mouth	N	15.4	15.4
259	Fraser River, near Chilliwack Ck. 3	N	93.5	93.5
260	Fraser River, near Yaalstrick I. 1	N	12.4	12.4
261	Nicomen Island slough	N	5.9	5.9
262	Yaalstrick Island 1	N	10.3	10.3
263	Yaalstrick Island 2	N	36.7	36.7
264	Fraser River, near Yaalstrick I. 2	N	1.1	1.1
265	Fraser R., near Chilliwack Mountain Is. 1	N	0.5	0.5
266	Fraser R., near Chilliwack Mountain Is. 2	N	7.7	7.7
267	Yaalstrick Island west	N	33.6	33.6
268	Fraser R., near Chilliwack Mountain Is. 3	N	3.8	3.8
269	Fraser R., near Chilliwack Mountain Is. 4	N	2.1	2.1
270	Fraser R., near Chilliwack Mountain Is. 5	N	3.5	3.5
271	Wilson Slough	N	32.4	23.2
272	Fraser River, near Yaalstrick I. 3	N	1.9	1.9
273	Fraser River, near Yaalstrick I. 4	N	33.8	33.8
274	Fraser R., near Chilliwack Mountain Is. 6	N	7.7	7.7
275	Fraser R., near Chilliwack Mountain Is. 7	N	1.3	1.3
276	Fraser R., near Chilliwack Mountain Is. 8	N	5.6	5.6
277	Fraser R., near Nicomen Island Is. 1	N	115.6	115.6
278	Fraser R., near Nicomen Island Is. 2	N	8.4	8.4
279	Sumas River	N	131.5	129.8

280	Lakemount Marsh	N	68.4	66.9
281	Sumas Lake Canal	N	39.5	38.6
282	Sumas River (old scar)	N	4.2	3.4
283	Sumas River, former tributary	N	8.4	8.4
284	Lonzo Creek	N	19.7	17.9
285	Sumas River, upper reaches	N	81.6	78.1
286	Sumas River mouth	N	46.7	46.7
287	McGillivray Creek Wildlife Sanctuary	N	93.3	93.3
288	Millar/McGillivray Sloughs	N	22.3	20.9
289	Vedder Canal	N	56.9	56.9
290	Vedder Canal Marsh	N	22.3	18.5
291	Lewis Slough	N	5.9	5.9
292	Yarrow	N	10.6	7.9
293	Vedder River	N	272.4	272.4
294	Barrett Creek	N	8.3	8.3
295	Sweltzer Creek	N	1.0	1.0
296	Sardis Park	N	4.7	2.3
297	Nelson and Bell sloughs	N	65.2	62.2
298	Harrison River mouth east	N	2.3	2.3
299	Fraser River, Harrison R. mouth Is. 1	N	5.1	5.1
300	Fraser River, Harrison R. mouth Is. 2	N	33.8	33.8
301	Fraser River, near Nelson Slough Is. 1	N	2.9	2.9
302	Fraser River, near Nelson Slough Is. 2	N	1.8	1.8
303	Fraser River, near Nelson Slough Is. 3	N	0.9	0.9
304	Fraser River, near Nelson Slough Is. 4	N	12.4	12.4
305	Fraser River, near Nelson Slough Is. 5	N	9.2	9.2
306	Fraser River, near Nelson Slough Is. 6	N	39.4	39.4
307	Windermere Island	N	0.6	0.6
308	Camp and Gravel Sloughs	N	89.2	89.2

309	Fraser River, near Mountain Slough 1	N	7.5	7.5
310	Fraser River, near Mountain Slough 2	N	48.3	48.3
311	Fraser River, near Greyell Slough 1	N	6.0	6.0
312	Greyell Slough/Island	N	138.4	138.4
313	Fraser River, near Mountain Slough 3	N	182.3	182.3
314	Formerly part of Mountain Slough	N	6.8	6.8
315	Mountain Slough	N	50.4	42.0
316	Fraser River, near Mountain Slough 4	N	61.3	61.3
317	Fraser River, near Greyell Slough 2	N	21.3	21.3
318	Fraser River, near Greyell Slough 3	N	8.6	8.6
319	Fraser River, near Greyell Slough 4	N	29.0	29.0
320	Fraser River, near Cheam Slough Is. 1	N	4.2	4.2
321	Fraser River, near Cheam Slough Is. 2	N	24.4	24.4
322	Fraser River, west of Agassiz Br. 1	N	11.8	11.8
323	Fraser River, near Cheam Slough	N	5.5	5.5
324	Fraser River, west of Agassiz Br. 2	N	9.8	9.8
325	Fraser River, west of Agassiz Br. 3	N	27.1	27.1
326	Fraser River, west of Agassiz Br. 4	N	4.0	3.6
327	Cheam and Agassiz sloughs	N	50.6	48.9
328	Agassiz slough, southeast of	N	1.5	1.5
329	Ferry Island slough, south shore	N	0.6	0.6
330	Ferry Island slough	N	11.1	11.1
331	Fraser River at Agassiz Bridge	N	61.8	61.8
332	Cheam Lake, Popkum	N	37.1	37.1
333	Fraser River south shore, Popkum	N	3.8	3.8
334	Fraser River, east of Agassiz Br. Is. 1	N	1.3	1.3
335	Fraser River, east of Agassiz Br. Is. 2	N	17.4	17.4
336	Fraser River, east of Agassiz Br. Is. 3	N	99.3	99.3
337	Herrling Island	N	130.5	130.5
338	Fraser River, west of Maria Slough 1	N	2.8	2.8
339	Fraser River, west of Maria Slough 2	N	22.0	22.0

340	Fraser River, west of Maria Slough 3	N	4.8	4.8
341	Fraser River, Maria Slough mouth Is. 1	N	59.4	59.4
342	Fraser River, east of Herrling I. 1	N	7.1	7.1
343	Fraser River, se of Herrling I.	N	5.3	5.3
344	Fraser River, east of Popkum 1	N	1.5	1.5
345	Fraser River, east of Popkum 2	N	2.6	2.6
346	Fraser River, south of Herrling I.	N	14.4	14.4
347	Fraser River, Maria Slough mouth Is. 2	N	88.8	88.8
348	Fraser River, east of Maria Slough	N	5.9	5.9
349	Fraser River, east of Herrling I. 2	N	26.0	26.0
350	Fraser River, nw of Herrling I.	N	188.9	188.9
351	Maria Slough, adjacent to	N	0.8	0.8
352	Maria Slough, west bank	N	2.9	2.9
353	Maria Slough, Seabird Island	N	5.5	5.5
354	Maria Slough, middle reach south	N	3.6	3.6
355	Maria Slough tributary	N	3.8	3.8
356	Maria Slough, middle reach central	N	42.4	42.4
357	Maria Slough, middle reach north	N	47.7	47.7
358	Maria Slough, upper reach	N	28.2	28.2
359	Fraser River, east of Seabird I.	N	188.1	188.1
360	Fraser River, north of Herrling I. 2	N	1.5	1.5
361	Fraser River, north of Herrling I. 3	N	2.4	2.4
362	Fraser River, north of Herrling I. 4	N	2.9	2.9
363	Fraser River, north of Herrling I. 1	N	1.2	1.2
364	Fraser River, north of Herrling I. 5	N	9.6	9.6
365	Fraser River, north of Herrling I. 6	N	10.0	10.0
366	Fraser River, north of Herrling I. 7	N	5.4	5.4
367	Fraser River, near Seabird Island	N	109.9	109.9
368	Fraser River, near Peters IR Is. 1	N	14.1	14.1
369	Peters Indian Reserve	N	30.9	30.9
370	Fraser River, near Peters IR Is. 2	N	81.0	81.0

371	Peters Indian Reserve No.1	N	8.7	8.7
372	Fraser River, near Laidlaw	N	36.3	36.3
373	Fraser River, southwest of Laidlaw 1	N	14.0	14.0
374	Fraser River, southwest of Laidlaw 2	N	4.6	4.6
375	Fraser River, west of Laidlaw 1	N	60.7	60.7
376	Fraser River, west of Laidlaw 2	N	2.3	2.3
377	Fraser River, west of Laidlaw 3	N	6.1	6.1
378	Fraser River, west of Laidlaw 4	N	37.4	37.4
379	Johnsons Slough mouth 1	N	3.3	3.3
380	Johnsons Slough mouth 2	N	1.1	1.1
381	Johnsons Slough	N	31.0	30.9
382	Harrison River mouth central	N	5.9	5.9
383	Harrison River mouth west	N	5.0	5.0
384	Lake Errock	N	4.5	4.0
385	Harrison Bay, western shore	N	11.2	11.2
386	Harrison Bay	N	375.2	375.2
387	Harrison Bay Is. 1	N	2.5	2.5
388	Harrison Bay Is. 2	N	4.9	4.9
389	Harrison River south shore	N	5.9	5.9
390	Bateson and Duncan Slough area	N	1.5	21.7
391	Bateson and Duncan Sloughs	N	26.2	0.0
392	Chehalis River delta	N	441.8	441.8
393	Harrison River, east bank	N	121.1	121.1
394	Chehalis River, lower reach	N	53.0	53.0
395	Chehalis Indian Reserve No.6	N	1.3	1.3
396	Morris and Weaver Creeks	N	227.3	211.1
397	Miami Creek	N	33.3	33.0
398	Miami Creek area	N	11.5	11.5
399	Woodward Slough	N	6.7	6.7
400	Horseshoe Slough	N	4.7	4.5
401	Bath Slough	N	2.7	2.7
402	Northeast Bog, Richmond	N	12.7	12.7

403	Central Bog Forest, Richmond	N	27.6	27.3
404	Cohilukthan Alough	N	7.7	7.5
405	Crescent Slough	N	25.1	22.4
406	Tilbury Slough	N	26.0	13.7
407	Bryant Nature Park	N	3.4	3.4
408	Walnut Grove	N	18.9	17.9
409	Walnut Grove north	N	7.0	7.0
410	Walnut Grove south	N	6.0	5.9
411	North end of 208 th	N	12.7	1.5
412	Allard Crescent	N	3.7	3.6
413	Walnut Grove east sloughs	N	77.9	75.7
414	Langley North of 88th	N	21.8	21.8
415	Mirror Ponds	N	16.4	13.2
416	Upland Bog	N	5.6	3.1
417	Southeast of 224 th Street & 24 th Ave	N	33.6	10.6
418	Bear Creek	N	5.4	5.4
419	Cranberry Slough	N	11.6	11.2
420	Polder Ridge	N	23.0	23.0
421	Upper Wilband Creek	N	7.7	6.3
422	Upper Wilband Creek north	N	23.5	18.3
423	Upper East Fish Trap Creek	N	10.7	10.7
424	McClure Park	N	2.6	1.9
425	West of Clearbrook	N	2.1	0.8
426	Gardner Park	N	0.5	0.5
427	Norrish Creek Floodplain	N	60.8	58.5
428	Mossom Creek	N	6.6	6.6
429	Noons Creek	N	4.8	4.8
430	McIntyre Creek West	N	30.3	30.3
431	Hoy Creek	N	8.7	8.5
432	Hogan's Pools	N	3.4	3.4
433	Graybar Road	N	24.4	0.0
Total	432	104	44,891.6	43,375.6

*"N" meaning the wetland was outside the FREMP zone and assessed for loss, "Y" meaning the wetland was

inside the FREMP zone and not assessed for loss

Note: Wetland Unit #171 was an error and removed from the inventory. There are a total of 432 valid wetland units.

Appendix B

Full 1993 list of wetlands assigned the highest priority for conservation (Priority 1) based on degree of threat, wildlife value and size.

Unit #	Wetland Name	Priority Number (1993 List)	FREMP Zone (Not Assessed for Loss)*	Total Area 1989 (ha)	Total Area 2019 (ha)
20	Sea & Iona Is. west	1	Y	2634.4	2634.4
21	Lulu Island foreshore west	1	Y	3987.8	3987.8
22	Westham Island, west	1	Y	5124.4	5124.4
23	Brunswick Point	1	Y	2928.0	2928.0
24	Roberts Bank interjetty area	1	Y	1079.3	1079.3
25	Tsawwassen Beach	1	Y	336.7	336.7
26	Centennial Beach backshore	1	Y	39.1	39.1
27	Boundary Bay	1	Y	5108.2	5108.2
28	Mud Bay	1	Y	759.6	759.6
29	Crescent Beach	1	Y	339.0	339.0
30	Semiahmoo Bay/Ocean Park foreshore	1	Y	285.6	285.6
34	Musqueam Marsh	1	Y	176.2	176.2
43	Swishwash Island	1	Y	101.3	101.3
58	Poplar Island	1	Y	13.7	13.7
61	Steveston Island	1	Y	49.9	49.9
72	Canoe Pass northeast	1	Y	11.8	11.8
75	South Arm Marshes	1	Y	624.0	624.0
89	Don & Lion Islands	1	Y	24.6	24.6
100	Burns Bog	1	N	3140.6	2842.1
108	Coquitlam River lower	1	Y	136.7	115.7
111	Douglas Island	1	Y	187.3	187.3
113	Surrey Bend	1	Y	507.9	432.1
124	Cod Island	1	N	123.8	123.8

125	N. Alouette River	1	N	211.4	113.7
135	Pitt Polder	1	Y	1933.4	1364.3
136	McIntyre Creek East	1	Y	37.2	37.2
149	Katzie Slough, upper	1	N	22.8	6.3
153	Fort Langley northwest	1	N	24.5	24.5
154	Derby Reach Regional Park	1	Y	31.2	31.2
166	Nicomekl River, lower	1	Y	84.4	84.4
167	Serpentine River, lower	1	Y	60.0	60.0
168	Serpentine WMA	1	N	75.5	75.5
180	Bertrand Creek	1	N	19.4	15.7
181	Pepin Creek	1	N	119.3	110.7
189	Glen Valley	1	N	30.1	6.4
196	Silverdale Creek	1	N	58.0	34.4
212	Hatzic Lake	1	N	247.4	234.5
219	Strawberry Island	1	N	241.6	174.4
220	Nicomien Slough	1	N	386.8	386.8
221	Norrish Creek delta	1	N	123.6	122.2
286	Sumas River mouth	1	N	46.7	46.7
287	McGillivray Creek Wildlife Sanctuary	1	N	93.3	93.3
293	Vedder River	1	N	272.4	272.4
384	Lake Errock	1	N	4.5	4.0
385	Harrison Bay, western shore	1	N	11.2	11.2
386	Harrison Bay	1	N	375.2	375.2
387	Harrison Bay Is. 1	1	N	2.5	2.5
388	Harrison Bay Is. 2	1	N	4.9	4.9
392	Chehalis River delta	1	N	441.8	441.8
393	Harrison River, east bank	1	N	121.1	121.1
394	Chehalis River, lower reach	1	N	53.0	53.0
Total	51		18	32990.6	31770.4

**"N" meaning the wetland was outside the FREMP zone and assessed for loss, "Y" meaning the wetland was inside the FREMP zone and not assessed for loss*