

**WETLANDS OF THE FRASER LOWLAND:
Ownership, Management and Protection Status, 1992**

Michael McPhee
Peggy Ward



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Canadian Wildlife Service



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Peggy Ward, Canadian Wildlife Service was the Scientific Authority for the project, responsible for overall coordination, and co-author of this report. Michael McPhee, Quadra Planning Consultants Ltd. was project manager and co-author. He was assisted by Larry Wolfe, Quadra Planning Consultants Ltd. Francois Depey, Federation of British Columbia Naturalists - Land For Nature Project, collected the land status information and tabulated data. He was assisted by Sol Jackson, Jackson Consultants. Tom Burgess, BC Environment, Michael Dunn and André Breault, Canadian Wildlife Service provided valuable information and advice while reviewing various drafts of this report.

Abstract

This is a **companion report** to the 1989 Fraser Lowland wetlands inventory (published in June 1992 as Technical Report Series No. 146). This report answers the following questions: What is the ownership status of the wetlands identified in the 1989 inventory? What is the current level of protection for each of these wetlands? Which agencies are responsible for managing public lands on which these wetlands are located? What is meant by 'protection' is discussed and the criteria used to categorize the Fraser Lowland wetlands for this report are described.

The results of this inventory show that the majority (76.9%) of Fraser Lowland wetlands are owned by the Provincial Crown; 13.3% are privately owned; 4.6% are municipal or regional lands; and the Federal Crown and Indian Reserves each account for 2.6%. The results also show that 12.8% have a high level of protection; 68.8% have medium protection and 15.8% have a low level or no protection. In total, government agencies have management authority over 89% of the wetland area in the Fraser Lowland: Provincial Government 75.1%; Federal Government 6.5%; regional and municipal governments 4.5%; and Indian Bands 2.6%.

Copies of the original 1:50,000 maps from the 1989 report are included in an appendix showing the location of each of the wetland units. A dBase III file is also included with all inventory material collected to date ie. 1989 data as well as the status data from this report.

Résumé

Le présent rapport est un complément à l'inventaire des terres humides de 1989 (publié en juin 1992 dans le Rapport technique n° 146); il répond aux questions suivantes ; A qui appartiennent les terres humides répertoriées dans l'inventaire de 1989 ? Comment chacune de ces terres humides est-elle protégée ? Quels sont les organismes responsables de l'administration des terres publiques où se trouvent ces terres humides ? Il est question de ce que l'on entend par « protection », et des critères de protection utilisés pour classer par catégories les basses terres humides du Fraser.

Cet inventaire montre que la majorité (76,9 %) des basses terres humides du Fraser appartiennent à la province; 13,3 % sont des terres privées; 4,6 % sont des terres municipales ou régionales; et le gouvernement fédéral et les réserves indiennes en détiennent chacun 2,6 %. Il révèle également que 12,8 % de ces terres sont très protégées, 68,9 % le sont partiellement et 15,8 % ne font l'objet que d'une protection minimale. Au total, les organismes gouvernementaux administrent plus de 89 % de la superficie des basses terres humides du Fraser, soit : gouvernement provincial 75,1 %, gouvernement fédéral 6,5 %, administrations régionales et municipales 4,5 %, terres indiennes 2,6 %.

Sont annexées à ce rapport des copies des cartes originales (1:50 000) qui accompagnaient le rapport de 1989; elles montrent l'emplacement de chacune de ces terres humides. Le rapport comprend également un fichier dBase III qui contient toutes les données d'inventaire recueillies jusqu'à maintenant, soit les données de 1989 et celles du présent rapport.

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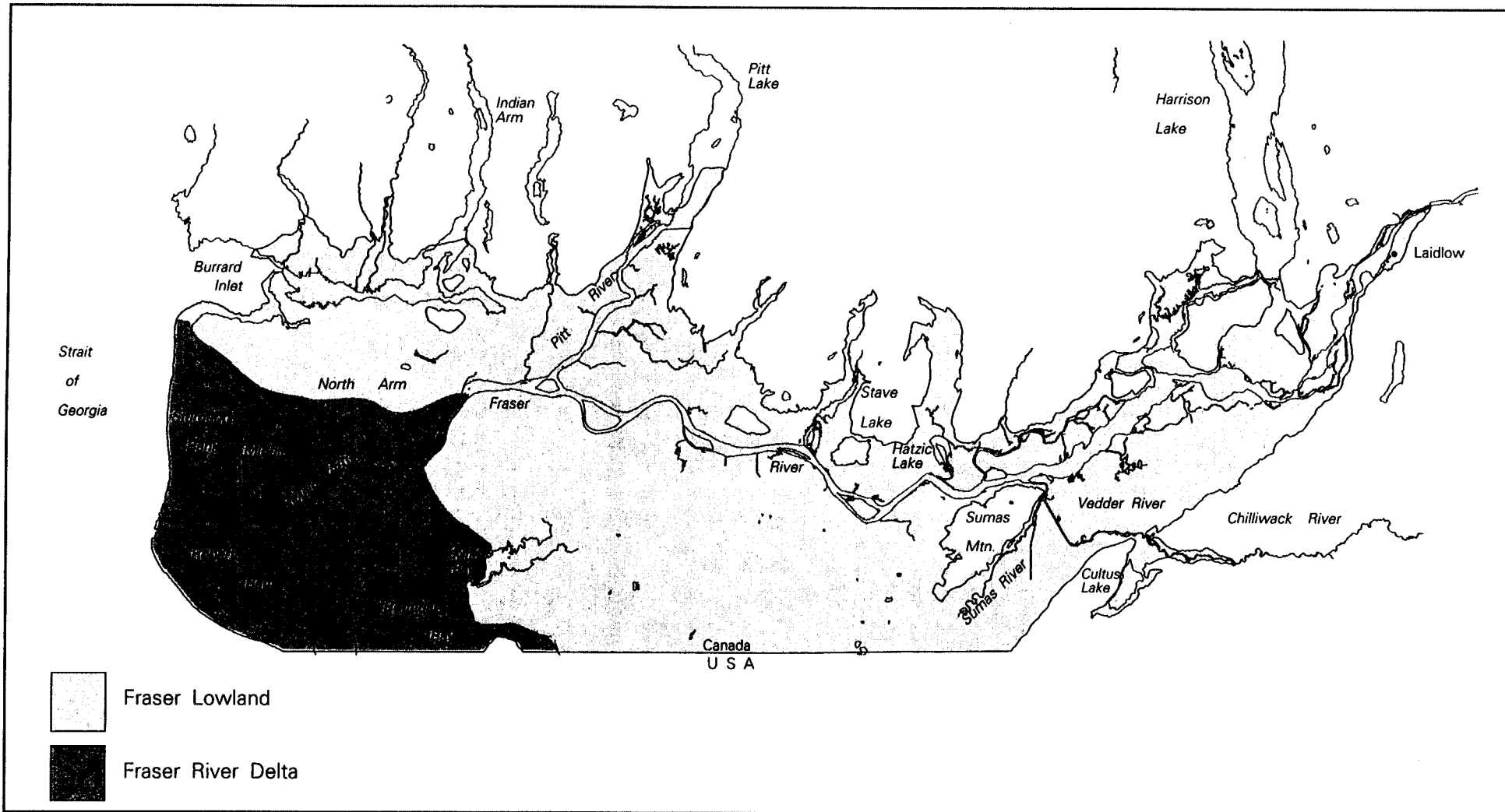
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Approx. Scale 1 : 600 000

Fig. 1 Fraser Lowland

BACKGROUND

Fraser Lowland wetlands¹ provide valuable habitat for vast numbers and species of wildlife. The Fraser Lowland is an integral component of the internationally important Pacific Flyway, providing resting and staging for millions of migratory birds annually. The Fraser River is the largest salmon-producing stream in the world.

As a result of continual in-migration and settlement over the past 150 years, many thousands of hectares of the original Fraser Lowland wetlands have been drained, dyked and filled. The population has continued to grow at a fast pace in the region. Between 1981 and 1991 the number of people living in the area increased from 1,248,638 to 1,698,514, or 36%. This represents an average annual growth rate of 3.6 percent over the ten year period. This growth rate is expected to continue into the next century (Greater Vancouver Regional District 1993), bringing with it increasing demand for the use of the land, including wetlands. This demand will be primarily for residential and industrial development and also for agriculture and recreation.

This report provides information about the ownership, management and level of protection for wetlands in the Fraser Lowland. It is a **companion report** to the 1989 wetlands inventory report published in June 1992 (Ward *et al.* 1992). The wetlands inventory report has been widely circulated and has become an important reference and planning tool for local and regional governments in identifying natural and environmentally sensitive areas. It also resulted in the publication of a pamphlet aimed at increasing public awareness of the importance of wetlands (Canadian Wildlife Service and Vancouver Aquarium 1993).

INTRODUCTION

Now that the identification and biophysical assessment of these Fraser Lowland wetlands has been completed, additional information is required if action is to be taken to protect them. The purpose of this report is to provide answers to the following questions:

What is the ownership status of the wetlands identified in the 1989 inventory?

What is the current level of protection for each of these wetlands?

Which agencies are responsible for managing the public lands on which these wetlands are located?

Because land ownership can quickly change, as can land use designations and zoning, readers are cautioned that the information contained in this report represents a snap-shot of conditions existing in 1992. While efforts were made to collect the most up-to-date information, current ownership and land status information were not always available.

¹ A wetland as defined by the Canadian Wetland Classification System is "land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation, and various kinds of biological activity which are adapted to a wet environment". National Wetlands Working Group. 1987. Canadian Wetland Classification System. Ecological Land Classification Series No. 21. Provisional Edition. Ottawa: Canadian Wildlife Service, Environment Canada.

STUDY AREA

The Fraser Lowland is located in the southwestern corner of mainland British Columbia and northwestern Washington State. It is shaped like a triangle, with its apex near Hope in the east, where the river exits from the Coast Mountain Range, and its base in the Strait of Georgia to the west (Fig.1). The base of the triangle extends from Burrard Inlet in the north to Bellingham Bay in the south. The Fraser River flows through this area of gently rolling upland and extensive floodplain, and at its mouth forms the largest delta (678 sq. km.) on the Pacific coast of Canada.

This report deals only with the Canadian portion of the Fraser Lowland; it measures 3092 square kilometres and accounts for approximately two-thirds of the total lowland area. The study area corresponds to the Fraser Lowland Ecosection, a subdivision of the Lower Mainland Ecoregion as identified by Demarchi (1993). It is also defined as that area below 150 meters in elevation, which is considered to be roughly the area of maximum marine overlap before the land rebounded after the last glaciation. The seaward boundary for this study is 10 meters below the lowest normal tide level.

METHODS

Data Collection - Ownership and Land Status

Several types of data were collected to determine the ownership, management agency and level of protection for the wetland units identified in the 1989 inventory. Fifty sample sites were initially selected in order to test our proposed methodology. Criteria for sample site selection included a cross section of wetland classification types, wetland size and ownership (private vs. Crown).

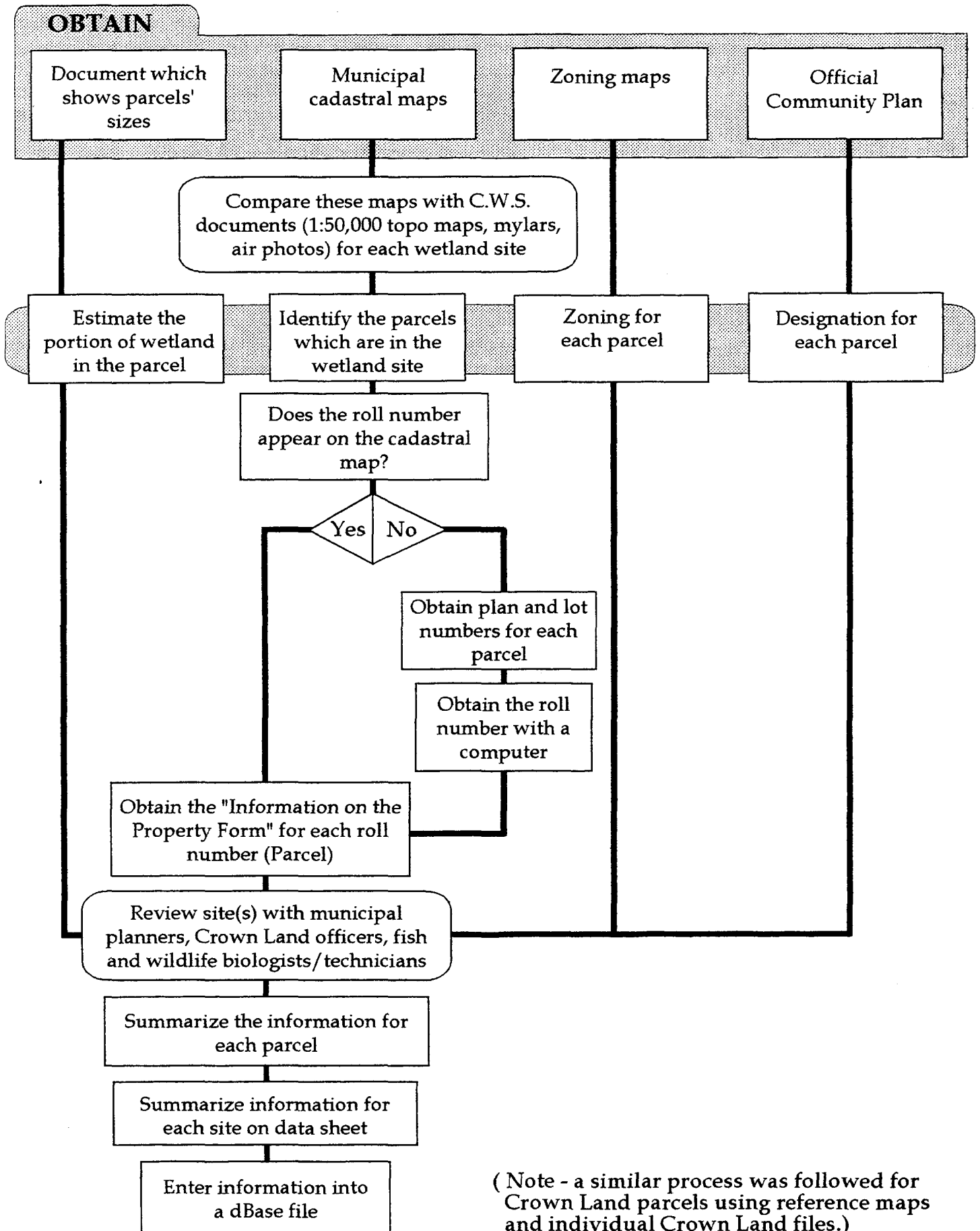
A data collection form was devised to contain the following information: wetland site number (1-398), site name (e.g, Sumas River mouth), location (regional district, municipality), ownership - private or public land (provincial, federal, municipal or regional district), proportion of a legal parcel within a wetland site, public land management authority (e.g., BC Lands, BC Environment, Canadian Wildlife Service), Indian Reserve, zoning, Official Community Plan (OCP) designation, Agricultural Land Reserve, Fraser River Estuary Management Program (FREMP) habitat classification, and municipal/regional district contact person. A space for comments (e.g., known threats, surrounding land use) was provided on the data form.

Additional information collected for the initial 50 sample sites included the legal description of the property, assessment roll number, property identification number, parcel owner, parcel address, owner address, assessed value for land and improvements. This involved making prior arrangements to visit municipal planning offices and reviewing the data requirements with a municipal planner. Data collection involved the following steps (Fig. 2):

- Obtain municipal cadastral maps for area containing relevant wetland sites
- Compare these maps with Canadian Wildlife Service documents (1:50,000 topographical maps, mylar overlays of wetland units, air photographs) for each site
- Identify the legal parcels located within a wetland site

FIGURE 2

Wetland Ownership and Land Status Data Collection Procedure



- Identify the property assessment roll numbers for each parcel from the cadastral maps. If these numbers were unavailable, it was necessary to obtain the plan number and lot number for each parcel
- Via computer or paper file access, obtain the information on each parcel using the assessment roll numbers.
- Obtain zoning maps and examine zoning for each parcel
- Obtain OCP and examine designation for each parcel
- Discuss site(s) with municipal planners, Crown land officers and fish and wildlife biologists and technicians to determine land use status, ie. threats, development plans, etc.
- Enter the information onto data forms
- Enter the information into a dBase file

For provincial Crown land parcels, reference maps were consulted at the BC Lands regional office in Burnaby. Reference file numbers were identified and, if available, files were obtained containing information on tenures, leases, management agencies, etc.

A field survey of the initial 50 sample sites was also conducted to provide more detailed information on habitat type and wildlife use, management/protection requirements and opportunities for public information and education (Summers 1992).

Data Collection Problems

Boundaries and Scales

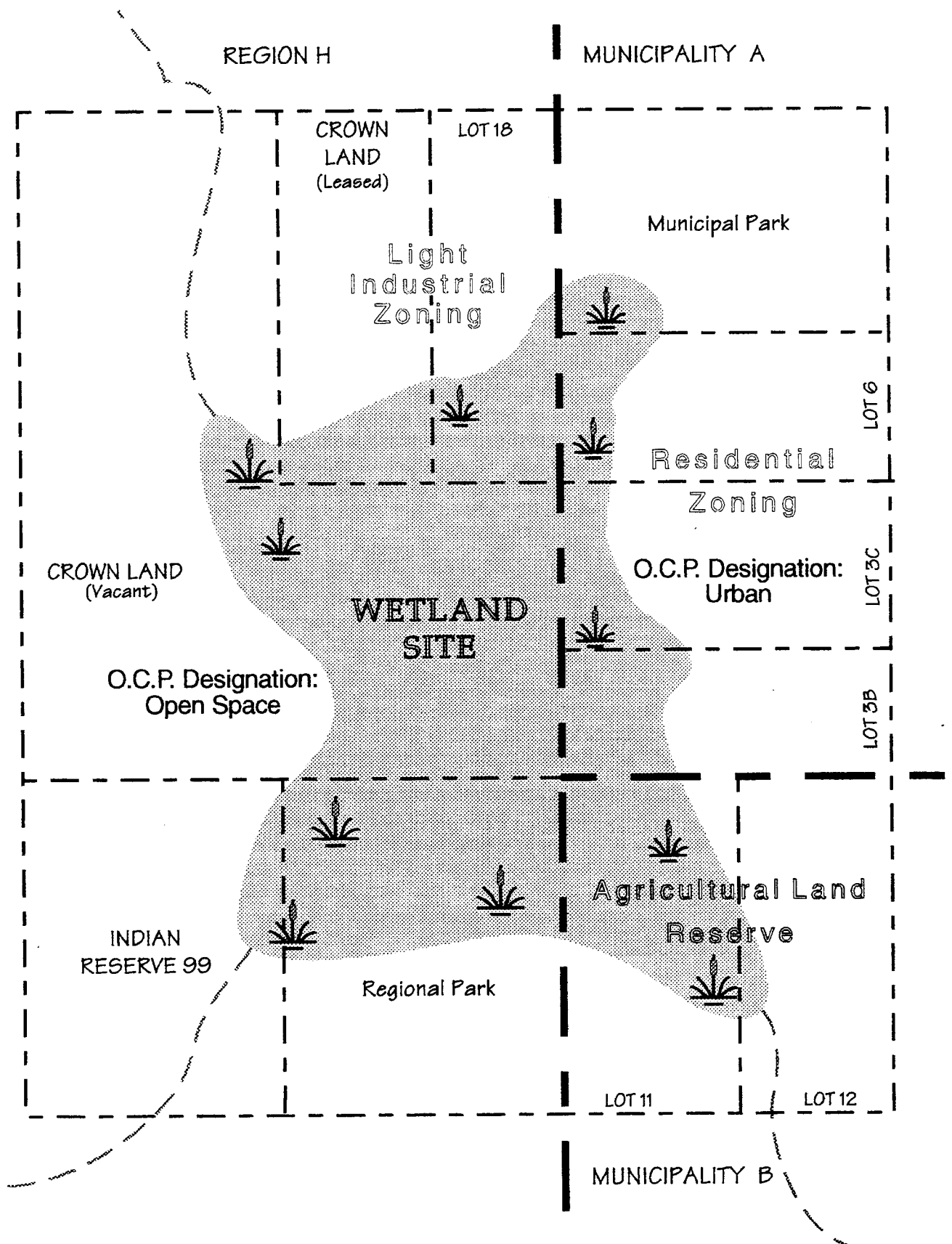
Wetland sites are based on naturally occurring features, their boundaries rarely follow legal lot lines. For many wetland sites, several legal parcels can be involved, including both private and public land. The first step was to determine what proportion of a parcel was within a wetland site. This often proved difficult as the cadastral maps, if available, were usually a different scale than the wetland site maps which were approximately 1:50,000. As the total area of each wetland site was known from the 1989 inventory, estimates were made of legal lot boundaries and the proportion of private, public or Indian Reserve land contained within a wetland unit, using air photos (mostly at 1:12,000) and available maps. In addition, various zoning and OCP designations can apply to a particular wetland site. Figure 3 portrays the complex array of administrative, legal, planning and political boundaries, and designations that can cover a wetland site.

Information Availability

Information availability varies greatly from municipality to municipality. Some municipalities have a Geographic Information System (GIS) which contains legal lots and corresponding assessment roll numbers. Other municipalities are in the process of establishing a GIS, while many use paper copy cadastral maps. Assessment roll numbers for legal parcels may or may not appear on cadastral maps or

FIGURE 3

Potential boundaries, zoning and designations covering a wetland site



in a computerized data base. If there were good cadastral maps available and the assessment roll number was readily available and the information from the roll easily accessible, via computer, then the data collection went relatively smoothly, notwithstanding the boundary and scale problems discussed above.

The availability of Provincial Crown land information from BC Lands of the Ministry of Environment, Lands and Parks also varied. Land status information is computerized, but because it was necessary to consult maps, retrieval of paper files was required. Maps were not always available. When they were available, they were of various scales and quality. For several sites, current files were unavailable as they had been placed in the archives. A Crown land officer was consulted to clarify information for several sites.

Modified Data Collection Approach

After two months of data collection using the above procedures, the approach was modified in order to collect as much information as possible by March 1993. It should be noted that the initial approach was used to complete the collection of ownership information for the 50 sample sites.

Rather than attempting to access assessment roll information for each parcel of land contained within a wetland site, the modified approach involved interviewing knowledgeable individuals in municipalities, regional districts, and provincial and federal agencies. These individuals were asked to provide an assessment of the ownership of wetland sites, and current zoning and OCP designations. Where information was not readily available through an interview, many individuals mailed or faxed the information. In some cases, follow-up meetings and telephone/fax contact were required to verify information. While some accuracy may have been sacrificed in this approach, the data collection was completed within the available time period.

WETLAND PROTECTION

One of the objectives of this study is to determine the level of protection provided for wetlands in the Fraser Lowland through existing land use designations and policies. Such designations can exclude or restrict certain land uses which are damaging to wetlands. However, land use designations alone may not necessarily protect the long term viability of wetlands. For example, surrounding land use activities, over time, can harm the ecological integrity and functioning of wetlands. The varying degrees of protection which can be achieved through legal protection, land tenure and the protection policies of various management agencies are discussed below.

Legal Protection

Often, protection is defined in terms of legal protection. A site can be considered protected if there is sufficient legal means to prevent harmful activities from affecting the site. Legislation usually provides the basis for wetland protection. For example, in British Columbia, the type of activity that can occur in Ecological Reserves is strictly regulated under the Ecological Reserves Act. The same is true for Class A Provincial Parks, National Parks and federal and provincial wildlife areas.

Land Tenure

Land tenure² is the set of legal rights associated with a defined parcel of land. For example, when a family, business or institution owns a parcel of land, they have legal rights of ownership.³ Other forms of tenure include strata title, leasehold, rental and licence of occupancy. In all cases, the family or owner have some legally defined rights to use the property.⁴

These rights do not give property owners the right to do anything they please on the site. Their rights may be limited by covenants, rights-of-way, easements and other "charges" against the land. Their rights may also be limited by zoning, government regulations, and other land use and regulatory controls.

Some degree of protection for wetlands can exist on private lands. Various government regulations can protect a wetland on privately owned sites. For example, the federal Fisheries Act, for a wetland defined as fish habitat, can prohibit human activities that 'damage' such fish habitat. Municipalities also may exercise some authority to protect wetlands. When a parcel of land is developed, a municipality may impose certain conditions on the development. Where a municipality has previously identified a "Development Permit Area", for example, it can impose requirements to protect wetlands as a condition of development.

Many wetlands occur on Crown and other public lands. Just like private lands, these lands may be affected by a variety of limitations. For example, federal fish habitat policies apply to provincial and federal Crown land. Under the provincial Land Act, notations of interest and various types of reserves can be registered or established on provincial Crown land. These can be for a variety of uses, including conservation and recreation.

Protection Policies

In addition to legal protection, some protection is afforded by government or management agency policies. A policy, in this context, is the expressed intention, objectives or predetermined course of action of an owner or manager of a parcel of land.

In the case of private lands, some owners have the expressed intent to protect wetlands on their property. For example, non-governmental organizations such as The Nature Trust of British Columbia, The Nature Conservancy of Canada and Ducks Unlimited Canada purchase wetlands to preserve them for habitat. These policies are integral to the purpose of these organizations and are unlikely to be changed easily. Some private corporations also may set aside lands for habitat. Since this type of policy may not be integral to the corporation, a change in policy could easily change the level of protection of the site.

² In this report, "land" is defined as dry land, wetland, or the bed of a waterbody or watercourse. Land is a spatial concept rather than a landform. Land should be considered "land and water".

³ Referred to as ownership in "fee simple".

⁴ These rights are usually referred to as a "bundle" of rights.

In the case of Crown or other public lands, government policy may determine the level of protection of a specific wetland. "Vacant" Crown land is not designated for any specific use. Many wetlands are on vacant Crown land. Because there is no policy to protect these wetlands, they are vulnerable to development. Municipalities may designate Crown land for certain types of uses, consistent with the objectives of their Official Community Plans.

Some wetlands may be protected by various protected area designations, for example, Wildlife Management Areas (under the provincial Wildlife Act) and parks. Even in these cases, however, the level of protection is affected by policy. For example, the level of protection afforded by "park" status depends on the policy of the park authority concerning park development and regulation of human activities in the park.⁵ The level of protection can be affected as park plans and policies change.

In the area covered by the Fraser River Estuary Management Program (FREMP)⁶, wetlands are protected through development guidelines based on habitat classifications. In areas considered to have high biological productivity, the majority of which are wetlands, no development is permitted which could impair biological productivity. These guidelines, which in effect are policies, provide a high degree of protection because both the environmental agencies and the port authorities have agreed to them.

The Department of Fisheries and Oceans (DFO) has a national "no net loss" policy to protect fish habitat. Where the productivity of fish habitat will be affected by a proposed development, DFO usually requires compensation through physical replacement. For affected intertidal marsh areas, a 2:1 compensation ratio is usually stipulated and for mud and sand flat, the ratio is 1:1. DFO has begun a practice of requiring property owners and developers to enter into compensation agreements as a condition of project approval. In some cases, bonds may also be posted. Developers may also be required to monitor the success of the compensation and take remedial action if necessary. Over time, DFO expects to achieve a net gain in fish habitat.

Vulnerability

All wetlands are under varying degrees of threat, whether or not they are subject to protective land use designations and conservation oriented policies. Historically, most wetland areas in the Fraser Lowland were impacted by dyking and draining in order to create land for agriculture. In more recent times, wetlands are being dredged, cleared and filled to accommodate development of all types - residential, commercial, industrial, ports, transportation, landfills. The Fraser Lowland wetlands also have the potential to be contaminated from fertilizers, herbicides, pesticides, urban runoff, sewage and industrial discharges.

⁵Many parks contain wetlands. Wetlands and lakes are strong attractions to people. For example, Lost Lagoon in Stanley Park is a prime habitat area adjacent to the most densely populated area in British Columbia.

⁶FREMP is a coordinating body comprised of federal and provincial agencies, Harbour Commissions and the Greater Vancouver Regional District which exercise control over water and land uses within the Fraser River estuary. Created in 1985 through a federal-provincial agreement and renewed in 1991, FREMP's overall goal is "to provide the means for accommodating a growing population and economy, while maintaining the quality and productivity of the Fraser estuary's natural environment". FREMP's habitat management goal is "to maintain and where feasible increase the productivity of fish and wildlife habitat". Habitat inventories and a classification system were developed in the late 1980's.

Many vulnerable wetlands are privately owned and are unlikely to be formally protected. As discussed above, private property ownership grants rights to use land in certain ways, within limitations. However, if appropriate zoning is in place and development approvals have been granted, owners have the right to develop land. There may be limitations on development, for example, if the property is considered to be fish habitat.

Increasingly, municipalities in the Lower Fraser Valley are undertaking natural area inventories to document sensitive environmental sites. These sites usually include wetlands. To protect these sites from inappropriate development, municipalities are adopting conservation bylaws and creating 'Development Permit Areas'. These afford some protection to wetlands. Where development occurs near sensitive watercourses, environmental agencies usually require setbacks or buffer strips (Chilibeck *et al.* 1992). In some cases, developers may be required to post a bond to ensure sensitive areas are not adversely impacted.

For development proposals on Crown land, and within the FREMP area, inter-agency referral systems operate which provide opportunities for environmental agencies to review and comment on proposed developments. Conditions may be placed on developments to safeguard sensitive wetlands.

WETLAND PROTECTION CRITERIA

There are no nationally agreed upon criteria in Canada to determine what constitutes a protected area. The World Wildlife Fund's (WWF) Endangered Spaces campaign has used the World Conservation Union criteria for protection. It is based on no industrial or resource extraction activity being permitted in an area, particularly logging, mining, and hydroelectric development. Other criterion required by WWF to qualify as protected include long-term security, some form of legal status and a specified management authority.

Table 1 lists a number of land use designations which currently provide varying degrees of protection for wetlands in British Columbia. It illustrates the **range of powers** these land use designations provide. The order in which they are listed gives only a general indication of their relative power; a more definitive ranking would require an in-depth legal analysis. Senior government land use designations generally have more power in that their decisions cannot be overruled by a lower government. There are also international designations such as RAMSAR and Biosphere Reserves which could be used to designate wetlands in B.C. In themselves, such designations may not afford a high level of protection, but they do bring international recognition, and the responsibility of managing an area according to internationally accepted criteria.

Table 1 Selected Land Use Designations/Mechanisms Providing Relative Degrees of Protection for Wetlands in British Columbia (not strictly ranked)

Land Use Designations/Mechanisms	Jurisdiction
National Park	Federal
National Wildlife Area	Federal
Ecological Reserve	Provincial
Provincial Park (Class A)	Provincial
Wildlife Management Area	Provincial
Wilderness Area	Provincial
Nature Park	Municipal/Regional
Migratory Bird Sanctuary	Federal
Fisheries Act	Federal
Provincial Park (Class B & C)	Provincial
Land Act Order-in-Council Reserve	Provincial
Land Act Designated Use Reserve	Provincial
Covenants, Easements	Provincial
FREMP Habitat Classification	Federal/Provincial
Regional Park	Regional
Municipal Park	Municipal
Agricultural Land Reserve	Provincial
Zoning bylaws	Municipal/Regional
OCP Designation	Municipal/Regional
Land Act Map Reserve	Provincial

Level of Protection Criteria for Fraser Lowland Wetlands

The wetlands protection criteria developed for use in this report have utilized and adapted the criteria used in the WWF Endangered Spaces report, as described above. The levels of protection have been defined by the security of tenure, the type of land use designation and the degree of human impact.

High Protection - to qualify for a high level of protection, wetland sites must meet the following criteria:

1. They must be owned and managed by an entity for which protection and/or conservation of wetlands is a primary objective (e.g., Canadian Wildlife Service, BC Environment, The Nature Trust of British Columbia); and
2. They must be appropriately designated through legal means such as legislation or zoning, to protect and/or conserve intrinsic natural features, (e.g., National Parks, National Wildlife Areas, Wildlife Management Areas, Ecological Reserves, nature parks); and
3. Human uses may be permitted, however, such uses are strictly regulated, secondary to and must be compatible with, the primary objective of protection and conservation of wetland values (e.g. Wildlife Management Areas and nature parks).

Medium Protection - to qualify for a medium level of protection, wetland sites must meet the following criterion:

They must be appropriately designated either by legal means or by policies, for which protection and/or conservation of natural features is a major consideration (e.g. municipal or regional parks, conservation or open space zoning or OCP conservation designation, Agricultural Land Reserve, FREMP high productivity habitat classification, DFO habitat compensation sites, covenants or easements).

Low Protection - wetland sites with a low level of protection or no protection, usually meet at least one of the following criteria:

1. Tenure of the site is unlikely to be held by an entity with a mandate to protect or conserve wetland values; or
2. The zoning or designation of the site is such that protection or conservation of the site is not a priority (e.g. residential, commercial, industrial zoning); or
3. The site usually has a high degree of human activity, or the potential for such activity, either on the site or nearby (e.g. current land uses are not compatible with preservation or conservation objectives); or
4. There are known threats to the site, or potential for negative impacts on the site (e.g. activities such as dredging, clearing, filling).

In applying these criteria to the 398 wetland sites, it was first necessary to collect information on the ownership, designation and zoning for each site. The sites which qualified for a 'high' level of protection were usually quickly identified. The greatest degree of difficulty was in distinguishing between the 'medium' and 'low' levels of protection. Wherever possible, discussions were held with municipal and regional planners, to determine the zoning and designation of sites. In addition, fish and wildlife biologists familiar with the wetland sites were consulted for their knowledge of human activity and/or threats associated with the sites. The FREMP habitat classification maps were also consulted.

Despite these methods for determining the level of protection, judgement was still required. Also, given that human activity and land use planning are not static, land status can change very quickly.

Table 2 Summary of Wetland Inventory Data by Ownership and Regional District⁷
(in hectares)

Ownership	GVRD	DARD	CFVRD	FCRD	TOTAL
Crown Federal	926	85	<1	75	1,087 2.6%
Crown Provincial	24,371	3,587	125	4,075	32,158 76.9%
Municipal	1,587	110	85	128	1,910 4.6%
Private	3,181	1,566	443	377	5,568 13.3%
Indian Reserve	236	417	28	393	1,074 2.6%
TOTALS	30,301	5,765	682	5,048	41,796

Table 3 Summary of Wetland Inventory Data by Level of Protection and Regional District
(in hectares)

Level of Protection	GVRD	DARD	CFVRD	FCRD	TOTAL
High	3304	1,741	22	284	5,351 12.8%
Medium	24,345	1,509	393	2,513	28,761 68.8%
Low	2,414	2,099	238	1,858	6,609 15.8%
Indian Reserve	236	417	28	393	1,074 2.6%
TOTALS	30,299	5,766	681	5,048	41,795

NOTE - any minor discrepancies in totals are due to rounding

⁷ The Fraser Lowland encompasses four regional districts: GVRD - Greater Vancouver Regional District; DARD - Dewdney-Alouette Regional District; CFVRD - Central Fraser Valley Regional District; FCRD - Fraser-Cheam Regional District.

RESULTS AND DISCUSSION

In undertaking this study, it was found that the availability and quality of land status information varied greatly from municipality to municipality. While many municipalities and regional districts are using GIS, obtaining land status information for many wetland sites was a cumbersome and time consuming task. It should also be remembered that land ownership and status information is changing constantly as properties are bought and sold, leased, rezoned and designated. The information contained in this report represents a snapshot of the situation in 1992.

The results of this inventory show that wetlands in Boundary Bay and on Roberts and Sturgeon Banks (Delta Front) represent 55% of the total wetland area in the Fraser Lowland and 87% of the wetland area of the Fraser Delta. It was found during analysis of the status data that the sheer size of these two areas tends to overwhelm the overall pattern of ownership and protection of wetlands in the remaining portion of the Fraser Lowland. For this reason, the status data was analyzed both including and excluding these two areas (Figures 4 and 5).

Ownership

Table 2 shows the breakdown of wetland ownership for the total area and by regional district. In addition, Table 4 presents wetland ownership by geographic region.

The majority of the wetland area in the Fraser Lowland is Provincial Crown land, comprising approximately 32,158 hectares (ha) or 76.9 percent of the total wetland area of 41,796 ha⁸. The large wetlands on Roberts and Sturgeon Banks and in Boundary Bay are almost entirely Provincial Crown land (98% and 95% respectively) and account for nearly 70% of all wetland areas owned by the Province. Figure 4 illustrates that the proportion of provincially owned wetlands decreases to 53% (10,087 ha) outside of these two large areas.

Private lands comprise the next largest ownership category, 13.3 percent of the total, or 5,568 ha. The proportion of privately owned wetlands increases to 29% for the area outside of the Delta Front and Boundary Bay. Geographic regions with the highest proportion of private ownership occur in Burns Bog (80%), the Central Fraser Valley Uplands (71%) and Surrey Bend to Kanaka Creek (70%).

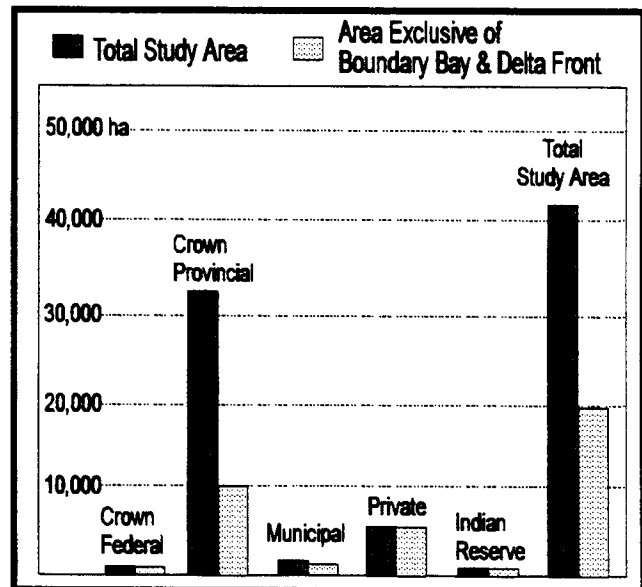


Figure 4 Pattern of Wetland Ownership including and excluding Boundary Bay and Delta Front

⁸ This figure does not correspond to the figure in the 1989 inventory due to the incorrect identification of one of the wetland units; the corresponding figures have been deleted from this report.

Table 4 Ownership of Wetlands by Geographic Region (in hectares)

Geographic Regions	Crown Federal	Crown Provincial	Municipal	Private	Indian Reserve	TOTALS
Agassiz/Seabird Island	0.0	136.4	0.7	75.7	24.7	237.5
Burrard Inlet	97.0	300.3	88.8	1.8	38.9	526.8
Burrard Peninsula	0.0	55.4	74.7	1.8	0.0	131.9
Central Fraser Valley Uplands	6.6	2.1	145.3	370.6	0.0	524.6
Chilliwack Sloughs	0.0	449.7	10.5	40.8	10.6	511.6
Fort Langley to Wades Creek	0.3	140.2	26.6	379.5	347.5	894.1
Fraser River Delta	310.8	23,069.9	1,025.4	1,640.2	110.2	26,156.5
Boundary Bay	23.0	6,593.3	18.5	49.2	17.4	6,701.4
Burns Bog	0.0	0.0	332.6	1,330.4	0.0	1,663.0
Delta Front (Sturgeon & Roberts Banks)	19.3	15,477.4	527.8	54.6	89.0	16,168.1
Main Arm	256.4	826.5	50.1	156.7	0.0	1,289.7
North and Middle Arms	12.1	172.7	48.6	49.3	3.8	286.5
Richmond Nature Park	0.0	0.0	47.8	0.0	0.0	47.8
Fraser River, Sumas to Laidlaw	0.0	2,936.0	66.8	40.4	233.1	3,276.3
Harrison River Valley	43.9	991.9	0.0	133.7	121.9	1,291.4
Hatzic/Nicomen	0.0	926.3	23.0	354.7	5.9	1,309.9
New Westminster to Douglas Island	76.0	35.5	23.4	187.0	73.2	395.1
Pitt River Valley	304.3	2,406.0	204.7	1,491.4	6.1	4,412.5
Port Moody	109.3	0.0	2.4	0.0	0.0	111.7
Serpentine-Nicomekl Lowland	0.0	330.2	14.2	30.0	0.0	374.4
Sumas	0.0	211.0	41.6	230.2	22.5	505.3
Surrey Bend to Kanaka Creek	106.8	11.5	112.4	535.9	0.0	766.6
Vedder	31.4	155.2	49.2	53.8	79.8	369.4
TOTAL STUDY AREA	1,086.4	32,157.6	1,909.7	5,567.5	1,074.4	41,795.6
	2.6%	76.9%	4.6%	13.3%	2.6%	

Table 5 Level of Protection of Wetlands by Geographic Region (in hectares)

Geographic Regions	High	Medium	Low	Indian Reserve	TOTALS
Agassiz/Seabird Island	0.0	161.3	51.5	24.7	237.5
Burrard Inlet	39.8	360.1	88.0	38.9	526.8
Burrard Peninsula	113.4	18.4	0.0	0.0	131.8
Central Fraser Valley Uplands	118.4	51.0	355.3	0.0	524.7
Chilliwack Sloughs	0.0	94.8	406.2	10.6	511.6
Fort Langley to Wades Creek	0.0	311.8	234.6	347.5	893.9
Fraser River Delta	1,662.9	22,658.3	1724.9	110.2	26,156.3
Boundary Bay	164.9	6,501.8	17.3	17.4	6,701.4
Burns Bog	83.2	0.0	1,579.9	0.0	1,663.1
Delta Front (Stungoon & Roberts Banks)	520.6	15,558.5	0.0	89.0	16,168.1
Main Arm	845.5	330.0	114.0	0.0	1,289.5
North and Middle Arms	0.9	268.0	13.7	3.8	286.4
Richmond Nature Park	47.8	0.0	0.0	0.0	47.8
Fraser River, Sumas to Laidlaw	113.5	1,312.4	1,617.3	233.1	3,276.3
Harrison River Valley	152.7	545.8	471.0	121.9	1,291.4
Hatzic/Nicomien	0.0	758.8	545.2	5.9	1,309.9
New Westminster to Douglas Island	0.0	244.8	77.1	73.2	395.1
Pitt River Valley	2,985.5	703.1	717.8	6.1	4,412.5
Port Moody	0.0	88.8	22.9	0.0	111.7
Serpentine-Nicomel Lowland	77.7	170.9	125.8	0.0	374.4
Sumas	17.7	356.6	108.6	22.5	505.4
Surrey Bend to Kanaka Creek	69.8	652.0	44.8	0.0	766.6
Vedder	0.0	271.7	17.8	79.8	369.3
TOTAL STUDY AREA	5,351.4	28,760.6	6,608.8	1,074.4	41,795.2
	12.8%	68.8%	15.8%	2.6%	

Wetlands located on 1,910 ha of municipal and regional district land represent 4.6% of the total wetland area. The largest areas of these municipally/regionally owned wetlands occur on the Delta Front (Iona Island Regional Park), in Burns Bog, and in two regional parks in the Pitt River Valley - Minnekhada and Widgeon Creek Valley.

Wetlands occur on 1,087 ha (2.6% of the total) of Federal Crown land. They are located mainly in the National Wildlife Areas (Alaksen and Widgeon Creek Valley) and on the federally owned portion of the Fraser River which includes the Main Arm of the Fraser River from Tilbury Island upstream to Kanaka Creek and the Pitt River to the mouth of Pitt Lake, Burrard Inlet and Port Moody.

Indian Reserves contain 1,074 ha of wetland (representing 2.6% of the total). Over half (54%) of these are located along the Fraser River from Fort Langley to Laidlaw with other concentrations in the Harrison River Valley (11%) and the Fraser Delta (10%).

Level of Protection

Wetlands were categorized in this report by three levels of protection, as described above. The area of wetland on Indian Reserves is provided in a separate category since it was beyond the scope of this study to fully assess the level of wetland protection in these areas. The Fisheries Act and FREMP habitat classifications apply to these wetlands, but municipal zoning and OCP designations do not. The current land claims negotiations will ultimately determine the ownership and responsibility for land management on Indian Reserves.

Table 3 shows the area of wetlands in each of these categories by regional district. Table 5 presents this protection data by geographic region.

High Protection

Wetlands with a high level of protection account for 12.8 percent of the total wetland area (5,351 ha out of a total area of 41,795 ha). As was the case with the ownership results, the pattern of wetland protection changes when considered without the wetlands on the Delta Front and in Boundary Bay (Fig. 5). Nearly 25% of the wetlands throughout the rest of the study area have high protection.

Wetlands in this category occur in forty wetland units (Table 6). Fourteen of the 40 units are entirely in the high protection category. The majority of these sites are managed by BC Environment as Wildlife Management Areas (WMA) or in the case of the Alaksen National Wildlife Area (NWA), by the Canadian Wildlife Service of Environment Canada. Several sites are managed as municipal and regional parks and one site is an Ecological Reserve. Some of the sites, or portions of them, are owned by The Nature Trust of British Columbia and leased to BC Environment or Canadian Wildlife Service for management.

The largest concentration (55.8%) of highly protected wetland areas occurs in the Pitt River Valley; this protection is provided mainly by the Pitt-Addington WMA and the Widgeon Creek Valley NWA and Regional Park. The Fraser River Delta accounts for a further 31.1 percent of highly protected wetland area; most of these wetlands are protected under the South Arm Marshes WMA and the Alaksen NWA.

Table 6 Wetland Units With a High Level of Protection

Unit No.*	Location	Area (ha) protected	Percent of total unit
135	Pitt Polder	1,472.0	75
139	Widgeon Creek Valley	648.6	90
142	Pitt Lake Delta	545.1	100
95	South Arm Marshes	538.6	95
22	Westham Island foreshore west	402.0	8
132	Addington Point Marsh	168.6	100
74	Ladner Marsh	148.9	100
21	Lulu Island foreshore west	118.6	3
67	Alaksen National Wildlife Area	113.2	100
18	Burnaby Lake and Still Creek	110.7	100
27	Boundary Bay	106.2	2
392	Chehalis River Delta	86.8	20
100	Burns Bog	83.2	5
168	Serpentine Wildlife Area	77.7	100
259	Fraser River Ecological Reserve	75.3	80
28	Mud Bay	58.7	10
396	Morris and Weaver Creeks	65.9	30
178	Campbell River, upper reach	65.8	25
181	Pepin Creek	52.6	40
49	Richmond Nature Park	47.8	100
133	Addington Point foreshore	44.9	80
131	Minnekhada Regional Park	43.8	100
138	Pitt Polder foreshore north	30.3	75
332	Cheam Lake	38.2	100
156	Kanaka Creek	37.7	40
154	Derby Reach Regional Park	24.6	80
141	Pitt Lake south shore	23.8	100
64	Harlock and Albion Islands	22.8	90
2	Lost Lagoon, Stanley Park	18.4	100
287	McGillivray Creek Wildlife Sanctuary	17.7	20
11	Maplewood Flats	14.2	15
68	Robertson and London Sloughs	10.8	100
65	Westham Island foreshore east	8.8	40
3	Beaver Lake, Stanley Park	7.2	100
155	Derby Reach foreshore southeast	5.9	55
137	Pitt Polder foreshore south	8.4	25
35	Camosun Bog	2.7	100
83	Tilbury Slough	2.4	20
157	Derby Reach Regional Park	1.6	95
46	Bridgepoint to No. 8 Road	0.9	5

TOTAL

5,351.4 ha

*refers to unit no. assigned in Ward *et. al.* 1992

Medium Protection

The majority of Fraser Lowland wetlands (68.8 percent or 28,761 ha) have a medium level of protection. Over three-quarters of the wetland area in this category occurs on the Delta front and in Boundary Bay (54% and 22.6% respectively). When these two areas are excluded, the percentage of wetlands with medium protection drops to 35.4% (Fig. 5); they are relatively evenly distributed throughout the rest of the study area.

Table 7 lists 41 units containing the largest wetland areas which meet the criteria for medium protection; these units represent 92% of the total area in the medium protection category. Twenty-five units have that level of protection over the entire site. BC Lands has management authority on fourteen of the units (in five of these units BC Environment and Canadian Wildlife Service have authority on small portions of the units); the Ministry of Forests has authority on an additional seven. Various municipalities manage lands on which 10 of these wetland units occur and six units are managed by the North Fraser Harbour Commission and Vancouver Port Corporation. The Fraser River Harbour Commission also has management authority on many wetland units with medium protection, however, they are all smaller than 60 ha and do not appear in Table 7.

This variety of management authorities illustrates the complexity of ownership and overlapping jurisdictions which apply to wetland units meeting the medium protection criteria. In fact, fifteen of the 41 units are under the jurisdiction of two or more management agencies. These wetlands are subject to numerous designations which encompass a wide range of protection from designation as fish habitat to a FREMP designation restricting development to a Land Act Map Reserve indicating an area of interest for fish and wildlife purposes.

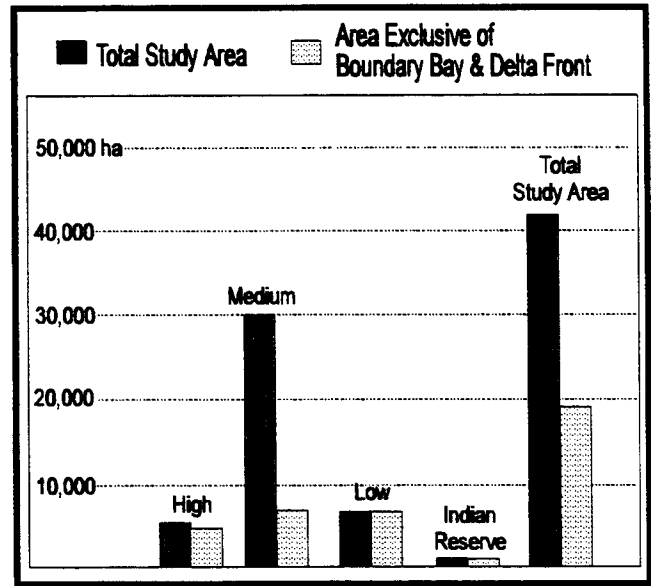


Figure 5 Pattern of Wetland Protection including and excluding Boundary Bay and Delta Front

Table 7 Wetland Units with the Largest Areas of Medium Protection

Unit No*	Location	Area (ha) of m e d i u m protection	Percent of total unit
27	Boundary Bay	5,205.9	98
22	Westham Island foreshore west	4,656.0	92
21	Lulu Island foreshore west	3,834.7	97
23	Brunswick Point	2,827.8	100
20	Sea/Iona Is. foreshore west	2,563.0	100
24	Roberts Bank interjetty area	954.0	92
28	Mud Bay	632.0	92
113	Surrey Bend	506.7	100
220	Nicomén Slough	376.3	98
392	Chehalis River Delta	347.3	80
1	Spanish Banks	345.7	100
29	Crescent Beach	327.4	100
30	Semiahmoo Bay/Ocean Park	318.0	100
25	Tsawwassen Beach	292.0	98
32	Musqueam Flats	273.9	100
350	Fraser River, nw of Herrling I.	189.5	100
293	Vedder River	188.5	72
313	Fraser River, near Mountain Sl.	186.3	100
111	Douglas Island	178.7	100
123	Alouette R. and N. Alouette R.	173.3	100
359	Fraser River, e. of Sea Bird I.	148.2	80
34	Musqueam Marsh	148.0	100
312	Greyell Slough/Island	130.8	100
337	Herrling Island	129.9	100
221	Norrish Creek Delta	123.2	100
393	Harrison River, east bank	121.4	100
124	Cod Island	117.4	100
192	Stave River, lower reach	104.5	80
279	Sumas River	102.7	80
308	Camp and Gravel Sloughs	90.6	100
347	Fraser R., Maria Sl. mouth	88.7	100
166	Nicomekl River, lower reach	88.1	100
17	Port Moody foreshore	86.4	100
139	Widgeon Creek Valley	72.1	10
287	McGillivray Ck. Wildlife Sanc.	70.6	80
125	North Alouette River area	70.4	33
280	Lakemount Marsh	68.5	100
167	Serpentine River, lower reach	62.9	100
43	Swishwash Island	62.1	100
316	Fraser River near Mountain Sl.	61.7	100
219	Strawberry Island	60.8	25

Total

26,498.0 ha

* refers to unit no. assigned in Ward *et. al.* 1992

Low Protection

Wetlands with a low level of protection or no protection occur on 15.8 percent (6,609 ha) of the total wetland area; this increases to 34.6% in the area exclusive of the Delta Front and Boundary Bay. The geographic regions containing the largest areas of wetlands in this category are in Burns Bog (23.9 percent), Fraser River from Sumas to Laidlaw (24.5 percent) and Pitt River Valley (10.7 percent).

Table 8 lists the units containing the largest areas of wetland with low or no protection, representing roughly 82% of all the wetland area in this category. Of these 39 sites, 21 are 100% Provincial Crown land (a further 5 sites are at least 70% Provincial Crown land) with BC Lands being the primary management authority. The Federal Crown has authority on four of the sites, all of which are in federal harbours. The largest private holdings of wetland in this category are in Burns Bog, Pitt Polder, the upper reaches of the Campbell, Serpentine and Sumas Rivers, the North Alouette River area, Pepin Creek, Salmon River and Katzie Slough.

Table 8 Wetland Units with the Largest Areas of Low Protection

Unit No*	Location	Area (ha) of low protection	Percent of total unit
100	Burns Bog	1579.9	95
135	Pitt Polder	490.7	25
245	Fraser River at Harrison R.	481.8	100
386	Harrison Bay	364.0	100
178	Campbell River upper reach	197.3	75
212	Hatzic Lake	189.8	80
219	Strawberry Island	182.4	75
125	North Alouette R., adjacent to	142.9	67
254	Chilliwack and Atchelitz Creeks	137.3	95
252	Hope Slough	129.3	100
277	Fraser R. near Nicomen I.	117.7	100
367	Fraser R. near Seabird I.	117.4	100
257	Fraser R. near Chilliwack Ck.	84.8	100
370	Fraser R. near Peters IR	84.3	100
181	Pepin Creek	78.8	60
247	Fraser R. near Queens I.	76.0	100
285	Sumas River upper reaches	68.3	85
297	Nelson and Bell sloughs	64.1	100
375	Fraser R. west of Laidlaw	63.3	100
11	Maplewood Flats	61.5	65
331	Fraser River at Agassiz Bridge	61.0	100
341	Fraser R. at Maria Slough mouth	60.0	100
217	Fraser River north shore	55.3	100
394	Chehalis River lower reach	51.9	100
169	Serpentine River middle reach	47.0	100
172	Serpentine River upper reach	39.9	100
378	Fraser River west of Laidlaw	38.9	100
163	Salmon River	38.3	100
213	Chilqua Slough	38.1	100
251	Shefford Slough	38.0	100
372	Fraser River near Laidlaw	34.6	100
103	Sapperton Flats	33.8	100
273	Fraser R. near Yaalstrick I.	32.8	100
120	Katzie Slough	32.0	100
246	Fraser R. near Queens Island	30.7	100
271	Wilson Slough	30.7	90
129	Pitt R., Alouette R. to Sheridan Hill	30.5	90

TOTAL 5,405.1 ha

* refers to unit no. assigned in Ward et. al. 1992

Management Authority

Many different authorities are responsible for managing lands on which wetlands occur (see Table 9). As well, a single wetland may be managed by more than one authority. This is primarily due to the mix of ownership which characterizes many sites as well as to overlapping jurisdictions. In total, government agencies at all levels have management authority over 37,156 ha of wetland or 89% of the wetland area in the Fraser Lowland.

The discrepancy between the management authority figures in Table 9 and the ownership figures in Table 2 is due to the fact that management authority is not always directly related to ownership. For example, BC Environment or Canadian Wildlife Service may manage wetlands that are privately held by The Nature Trust of British Columbia. Other examples include provincially owned wetlands in the North Arm of the Fraser River which are under the authority of the North Fraser Harbour Commission; similarly the Fraser River Harbour Commission has authority over both provincially and federally owned portions of the Fraser River. Municipal and regional governments usually manage their own lands except in the case of municipal lands in the Vedder River area which are jointly managed by the Vedder River Management Committee, a joint federal/provincial/municipal committee.

The Provincial Government is responsible for managing 75.1% of the area of wetland in the Fraser Lowland. BC Lands has authority on 61.8% of them, followed by BC Environment, currently with 9.2% and B.C. Ministry of Forests with 3.5%. BC Environment has proposals for the establishment of several additional WMA's which would increase the protection of several important wetland sites, namely, Boundary Bay, Sturgeon and Roberts Banks, Coquitlam River mouth, Serpentine/Nicomekl River mouths, Serpentine Wildlife Area, the mouth of the Sumas River and Harrison Bay/Chehalis River Delta. The figures relating to the protection of Fraser Lowland wetlands would change considerably once these proposed WMA's become official.

Various federal government agencies manage 6.5% of all wetland area in the study area. The Canadian Wildlife Service manages 2% and the three port authorities together manage 3.9% of the wetland area. Other federal agencies with management authority over lands on which wetlands occur are listed in Table 9.

Regional and municipal governments are responsible for 4.5% of the wetland area. The agency responsible for managing the largest area of wetland is the GVRD with responsibility for 3.3% of all the wetland in the Fraser Lowland; most of this area is managed within the Regional Park system.

Table 9 Management Authorities for Fraser Lowland Wetlands

	Area (ha) managed
Provincial Government Agencies	31,474
BC Lands	25,897
BC Environment	3,872
B.C. Ministry of Forests	1,489
Vedder River Management Committee (Fed/Prov/Mun)	188
B.C. Ministry of Transportation and Highways	22
B.C. Min. of Mun. Affairs, Rec. and Housing	5
B.C. Min. of Agriculture, Fisheries and Food	1
Federal Government Agencies	2,733
Canadian Wildlife Service	860
North Fraser Harbour Commission	612
Fraser River Harbour Commission	580
Vancouver Port Corporation (Crown Corp.)	451
Department of Fisheries and Oceans	89
Canadian National Railway (Crown Corp.)	51
International Pacific Salmon Commission	44
Department of National Defence	31
Transport Canada	11
Public Works and Government Services Canada	3
League of Canada/National Council (Crown Corp.)	1
Regional and Municipal Governments	1,875
Greater Vancouver Regional District	1,380
Richmond City	103
Vancouver City	69
Mission District	43
Abbotsford District	41
Fraser-Cheam Regional District	38
Chilliwack District	31
Kent District	29
Coquitlam City	23
Surrey District	23
Burnaby City	20
Matsqui District	19
North Vancouver District	18
Maple Ridge District	16
Pitt Meadows District	7
Dewdney-Alouette Regional District	6
Langley City and District	5
Port Moody City	2
West Vancouver District	1
Delta District	1
Indian Bands	1,074
TOTAL WETLAND AREA (ha) MANAGED BY GOVERNMENT	37,156

RECENT INITIATIVES - WETLAND PROTECTION

In recent years, wetland protection has become the focus of several initiatives at the international, national and provincial levels.

Pacific Coast Joint Venture

As a key component of the Pacific Flyway, the Fraser Lowland is one of several critical habitat areas identified by the Pacific Coast Joint Venture (PCJV). The PCJV, formed in 1991, is an initiative under the North American Waterfowl Management Plan (NAWMP) which was launched by Canada, the United States and Mexico in the mid 1980's. One of the primary goals of NAWMP is to secure, restore and enhance critical wetlands. The PCJV provides an opportunity for resource agencies and private interests to work together to restore and conserve wetlands and adjacent uplands in coastal British Columbia, Washington, Oregon, and northern California.

A wide range of interests is represented on the steering committees of these four jurisdictions and the overall PCJV Management Board. Members of the B.C. Steering Committee include Environment Canada (Canadian Wildlife Service), The Ministry of Environment, Lands and Parks (Wildlife Branch), B.C. First Nations, the B.C. Ministry of Forests, the B.C. Federation of Agriculture, Agriculture Canada, the Department of Fisheries and Oceans, Ducks Unlimited Canada, The Nature Trust of British Columbia, Wildlife Habitat Canada, the Nature Conservancy of Canada, the B.C. Ministry of Agriculture, Fisheries and Food, the Federation of British Columbia Naturalists, and the B.C. Wildlife Federation. The Pacific Estuary Conservation Program (PECP) which has many of the same partners and has been acquiring critical B.C. coastal wetlands for a number of years, is responsible for land acquisition for the PCJV as well.

Commission on Resources and Environment

The Commission on Resources and Environment (CORE) was established by the Provincial Government in 1992 and is in the process of preparing a Provincial Land Use Strategy. Draft goals have been prepared which specifically address wetlands; namely, "to ensure no loss of provincially-significant wetlands and estuaries" and "to ensure no net loss of total wetland functions in the province, and to increase the quantity and quality of the Province's wetlands resource base" (Sandborn 1993).

There are a number of other Provincial planning initiatives underway such as Land and Resource Management Plans which are at a sub-regional level. These will all be expected to address wetlands conservation.

Protected Areas Strategy

The aim of the Provincial Protected Areas Strategy (PAS), announced in June 1993, is to deliver an expanded and integrated system of protected areas that protects 12% of the province by the year 2000 (Province of British Columbia 1993). Both of the major goals of the PAS include the protection of wetlands:

Goal 1: Representativeness - to protect viable, representative examples of the natural diversity in the province, representative of the major terrestrial, marine and freshwater ecosystems, the

characteristic habitats, hydrology and landforms, and the characteristic backcountry recreational and cultural heritage values of each ecosystem.

Goal 2: Special Features - to protect the special natural, cultural heritage and recreational features of the province, including rare and endangered species and critical habitats, outstanding or unique botanical, zoological, geological and paleontological features, outstanding or fragile cultural heritage features, and outstanding outdoor recreational features such as trails.

Wetlands Working Group

Once the Fraser Lowland wetland inventory was completed (Ward *et. al.* 1992) an interagency Wetlands Working Group (WWG) was established to begin planning for the protection of as many of the remaining wetlands as possible. Funding was provided by both federal and provincial governments and participation in the group included government as well as non-government agencies, namely: Canadian Wildlife Service, BC Environment, Ducks Unlimited Canada, The Nature Trust of British Columbia and the Federation of British Columbia Naturalists.

Priorities for action were set by the WWG during the summer of 1993 and are being actively pursued by both federal and provincial governments. Suggested options for protection include acquisition or stewardship for privately owned wetlands, Crown land reserve applications for wetlands on Provincial Crown land and protective land use designations in Official Community Plans and the use of Development Permit Areas by local governments.

CONCLUSIONS

This study represents one of the first major attempts to document the ownership and level of protection of wetlands in the Fraser Lowland. This information will be useful in setting conservation priorities and making recommendations for protecting wetland sites.

The data generated for this report show that approximately 80 percent of the remaining natural wetland area in the Fraser Lowland has some form of protection. Most of the area has a medium level of protection. In most cases, agencies, whether federal, provincial, regional or local, are aware of these wetland areas and have taken some steps toward recognizing and protecting them. Local governments, which have a key role to play in how land is used are increasingly undertaking inventories of environmentally sensitive areas and designating and zoning these sites for conservation purposes.

Only 12.8% percent (5,351 ha) of the remaining wetland area within the Fraser Lowland has a high level of protection. It should be remembered that these remaining wetlands represent only about one-quarter of the original extent of wetlands in this ecologically valuable area. Given the critical role wetlands play in sustaining fish and wildlife populations and biodiversity, maintaining and improving water quality, flood protection, nature study, aquifer recharge, education and recreation, this figure is not impressive.

There may be areas where protection efforts could be focused. Given that over three-quarters of all Fraser Lowland wetlands are owned by the Provincial and Federal Crown, there may be a higher potential of securing wetlands here than in other locations.

It may also be important to discover the proportion of representation of the types of wetland which are protected. However, it is not possible to answer this question using the level of detail in this report because the ownership and protection status is not related to different wetland types within a unit but rather to a whole unit.

This report was not able to fully examine which wetland areas within the Fraser Lowland are most at risk. The tremendous growth of the region over the past 10 years is expected to continue for at least another 20 years. How well our wetlands will fare in the face of this growth will be an indicator for the overall environmental quality of the region.

Recent initiatives to protect wetlands are encouraging. However, much remains to be done at all levels of government. Partnerships need to be established between governments and private landowners and non-government organizations to protect and manage wetlands.

APPENDIX A

APPENDIX A Inventory of Ownership, Management Authority and Protection status of Wetlands in the Fraser Lowland

LEGEND CODES

Map No: refers to maps in Appendix B.

Unit No: refers to wetland units from Ward *et.al.* 1992; see maps in Appendix B.

Ownership:

CF = Crown Federal; CP = Crown Provincial; M = Municipal

IR = Indian Reserve; P = Private

(Numbers following legend codes represent percentage)

Level of Protection: [does not apply to wetlands on Indian Reserves (see p. 16); see also pages 10-11 for criteria used in categorizing wetlands]

H = High; M = Medium; L = Low.

(Numbers following legend codes represent percentage)

Management Authority:

(Note: 'Management Authority' applies only to the portion of wetland that occurs on public land or on private land held by The Nature Trust of British Columbia; where wetlands occur on Indian Reserves or private land no management authority is given)

BCAGRI = B.C. Ministry of Agriculture, Fisheries and Food

BCE = BC Environment, Ministry of Environment, Lands and Parks

BCHI = B.C. Ministry of Transportation and Highways

BCHOUS = B.C. Min. of Municipal Affairs, Recreation & Housing

BCL = BC Lands, Ministry of Environment, Lands and Parks

CBC = Canadian Broadcasting Corporation

CNR = Canadian National Railway

CWS = Canadian Wildlife Service, Environment Canada

DARD = Dewdney-Alouette Regional District

DFO = Department of Fisheries and Oceans

DND = Department of National Defence

DPW = Department of Public Works and Government Services

FCRD = Fraser-Cheam Regional District

FRHC = Fraser River Harbour Commission

GVRD = Greater Vancouver Regional District

IPSC = International Pacific Salmon Commission

L0C = League of Canada/National Council

MOF = B.C. Ministry of Forests

NFHC = North Fraser Harbour Commission

TC = Transport Canada

VanPark = Vancouver Parks

VanPort = Vancouver Port Corporation

VRMC = Vedder River Management Committee

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
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MAP 1 BURRARD INLET WEST

1	Spanish Banks	346	CP80, M20	VanPort, VanPark	M100
2	Lost Lagoon	18	CF100	VanPark	H100
3	Beaver Lake	7	CF100	VanPark	H100
4	Ambleside	8	IR100	-	-
5	Capilano River mouth	27	CP50, M5, IR45	BCL, WVan Parks	M5, L50
6	First Narrows north shore	6	IR100	-	-
7	McKay Creek mouth	4	P50, M50	North Van District	L100
8	Mosquito Creek mouth	2	IR100	-	-

MAP 2 BURRARD INLET EAST

9	Lynn Creek mouth	5	CP100	BCL	L100
10	Seymour River mouth	8	CP60, M30, IR10	BCL, North Van District	M45, L45
11	Maplewood Flats	95	CF75, M15, IR10	VanPort, CWS, North Van District	H15, M10, L65
12	Burrard Inlet east, south shore	.4	CF100	VanPort	L100

MAP 3 PORT MOODY

13	Barnett Marine Park	2	M100	Port Moody City	M100
14	Port Moody south shore	3	CF100	VanPort	L100
15	Port Moody near Reed Point	1	CF100	VanPort	L100
16	Port Moody, Pacific Coast Terminals	19	CF100	VanPort	L100
17	Port Moody foreshore	86	CF100	VanPort	M100

MAP 4 BURNABY AND DEER LAKES

18	Burnaby Lake and Still Creek	111	CP50, M50	BCL, GVRD Parks	H100
19	Deer Lake	18	P10, M90	Burnaby District	M100

MAP 5 STURGEON BANK

20	Sea & Iona Islands foreshore west	2563	CP80, M20	BCL, NFHC, GVRD Parks	M100
21	Lulu Island foreshore west	3953	P1.4, CP98, CF.5, M.4	BCL, BCE, CWS, CBC, DPW, Richmond Parks	H3, M97

MAP 6 ROBERTS BANK

22	Westham Island foreshore west	5058	CP100	BCL, CWS	H8, M92
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Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
23	Brunswick Point foreshore	2828	CP100	BCL	M100
24	Roberts Bank interjetty area	1037	CP92, IR8	BCL	M92
25	Tsawwassen Beach foreshore	298	CP98, IR2	BCL	M98

MAP 7 BOUNDARY BAY

26	Centennial Beach backshore	29	P60, M40	GVRD Parks	M40, L60
27	Boundary Bay	5312	P.6, CP99, CF.4	BCL, BCE, CWS	H2,M98
28	Mud Bay	698	CP99, M1	BCL, BCE, Surrey Parks	H8, M93
29	Crescent Beach	327	CP100	BCL	M100
30	Semiahmoo Bay/ Ocean Park foreshore	318	CP100	BCL	M100
31	Campbell River mouth	17	IR100	-	-

MAP 8 NORTH ARM WEST & MIDDLE ARM

32	Musqueam Flats	274	CP100	NFHC	M100
33	North Arm Jetty	9	CP100	NFHC	M100
34	Musqueam Marsh	148	CP100	NFHC	M100
35	Camosun Bog	3	M100	GVRD Parks	H100
36	Iona Island north	17	CP100	NFHC	M100
37	Southlands	4	P5, CP95	NFHC	M95, L5
38	McDonald Slough	38	P10, CP20, M60, IR10	NFHC, GVRD	M90
39	Marpole	3	CP100	NFHC	M100
40	Sea Island north	12	CP80, M20	NFHC, Richmond Parks	M100
41	Sea Island southeast	9	CP60, CF40	TC, NFHC	M100
42	Sea Island south	15	CP50, CF50	TC, NFHC	M100
43	Swishwash Island	62	P50, CP50	NFHC	M100
44	Middle Arm south shore	22	CP90, M10	NFHC, Richmond Parks	M100
45	Middle Arm southeast shore	2	P10, CP50, CF25, M15	LOC, NFHC, Richmond City	M100

MAP 9 NORTH ARM CENTRAL

46	Bridgepoint to No. 8 Road	18	CP95, M5	NFHC, Richmond City	H5, M95
47	Mitchell Island	10	CP100	NFHC	M100
48	Arthur Laing Bridge to Boundary Rd.	6	CP100	NFHC	L100
49	Richmond Nature Park	48	M100	Richmond Parks	H100

MAP 10 NORTH ARM EAST

50	North Arm shore east of Boundary Rd	2	CP100	NFHC	M100
51	Fraser River Foreshore Park	13	M100	Burnaby Parks	M100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
52	Fraser River Foreshore Park	4	M100	Burnaby Parks	M100
53	Fraser River Foreshore Park	4	M100	Burnaby Parks	M100
54	No.8 Road to CN Bridge	4	CP100	NFHC	L100
55	Burnaby Big Bend foreshore	15	CP100	NFHC	M100
56	Tree Island area	9	CP100	NFHC	M90, L10
57	New Westminster border to RR bridge	1	CP50, CF50	FRHC, NFHC	L100
58	Poplar Island	16	P90, CP10	FRHC	M100
59	Queensborough	3	CP100	NFHC	M50, L50

MAP 11 STEVESTON TO LADNER MARSH

60	Garry Point	2	CP100	FRHC	M100
61	Steveston Island	35	CP100	FRHC	M100
62	Cannery Row	5	P40, CF30, M30	FRHC, Richmond Parks	M100
63	Gilbert Beach	10	P30, CP50, M20	FRHC, Richmond Parks	M100
64	Harlock & Albion Islands	25	P30, CP20, CF50	CWS, FRHC	H90, M10
65	Westham Island foreshore east	22	CP60, CF40	FRHC, CWS	H40, M60
66	Canoe Pass north shore	26	P50, CP50	FRHC	M100
67	Alaksen National Wildlife Area	113	CP2, CF98	CWS	H100
68	Robertson & London Sloughs	11	CF100	CWS	H100
69	Tamboline Slough	8	CP100	BCL	L100
70	Westham Island slough	2	P100	-	L100
71	Canoe Pass south shore	1	CP100	FRHC	M100
72	Canoe Pass northeast shore	10	P50, CP50	FRHC	M50, L50
73	Port Guichon	1	CP100	FRHC	L100
74	Ladner Marsh	149	CP100	BCE	H100
75	South Arm Marshes	567	P15, CP85	BCE	H95, M5
76	Gilmour Island	7	P100	-	M100
77	Woodward Landing	3	CP100	FRHC	L100

MAP 12 DEAS ISLAND TO ANNACIS ISLAND

78	Deas Island west	15	CP2, M98	FRHC, GVRD Parks	M100
79	Deas Island east	29	CP16, M84	FRHC, GVRD Parks	M100
80	Green Slough	8	CP100	BCL	M100
81	Deas Slough south shore	4	P10, CP90	FRHC	M100
82	Tilbury Island foreshore west	30	CP100	FRHC	M100
83	Tilbury Slough	12	P10, CP70, CF20	BCL, DFO	H20, M70, L10

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
84	Lulu Island southeast shore	23	CF75, M25	FRHC, Richmond City	L100
85	Tilbury Island north shore	24	CP90, P10	FRHC	L100
86	Tilbury Island foreshore east	16	CP100	FRHC	M100
87	Gravesend Reach	14	P20, CP55, CF20, M5	FRHC, Richmond City	M30, L70
88	Annacis Channel north shore	11	CF100	FRHC	L100
89	Don & Lion Islands	25	P70, CF30	FRHC	M100
90	Sunbury shoreline	9	P20, CF80	FRHC	M80, L20
91	City Reach shoreline	4	CF100	FRHC	L100
92	North Delta shoreline	7	CF100	FRHC	L100
93	Fraser Surrey Docks	8	CF100	FRHC	L100
94	Annacis Channel north shore	7	CF100	FRHC	M100
95	Purfleet Point	24	CF100	FRHC	M100
96	Annacis Island north shore	22	P20, CF75, M5	FRHC, Delta District	M80, L20
97	Annacis Island south shore	7	P20, CF80	FRHC	L100
98	Annacis Island northeast shore	1	CF100	FRHC	L100
99	New Westminster waterfront	.1	CF100	FRHC	L100
100	Burns Bog	1663	P80, M20	GVRD	H5, L95

MAP 13 NEW WESTMINSTER TO SURREY BEND

101	Brownsville	7	CF100	FRHC	L100
102	Sapperton	2	CF100	FRHC	L100
103	Sapperton Flats	34	CF100	FRHC	L100
104	Sapperton Dyke	3	CF100	FRHC	L100
105	Fraser Mills shore	2	CF100	FRHC	L100
106	Queens Reach south shore	5	CF100	FRHC	M100
107	Queens Reach north shore	7	CF100	FRHC	M100
108	Coquitlam River lower reaches	138	P6, CP23, CF1, M17, IR53	BCHI, BCL, FRHC, Coquitlam City	M33, L14
109	Tree Island	6	CP60, CF40	BCL, FRHC	M100
110	Essondale Islets	2	CF100	FRHC	M100
111	Douglas Island	179	P100	-	M100
112	Port Mann	2	CF100	FRHC	L100
113	Surrey Bend	507	P82, CF10, M8	CNR, GVRD, Surrey Dist.	M100
114	Fraser Glen House	.7	M100	Surrey District	M100
115	Pitt Meadows Fraser foreshore	5	P90, M10	Pitt Meadows District	M10, L90
116	Pitt Meadows Fraser foreshore	11	P92, M8	Pitt Meadows District	M10, L90

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
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MAP 14 LOWER PITT RIVER VALLEY

117	Pitt River mouth west	11	P5, CF95	FRHC	M100
118	Chatham Flats	2	CF100	FRHC	M100
119	Pitt River mouth east	22	P100	-	M100
120	Katzie Slough	32	P100	-	L100
121	Pitt R.RR Bridge to DeBoville Sl.	35	CF100	FRHC	M100
122	Pitt R.RR Bridge to Alouette River	19	P100	-	M100
123	Alouette & North Alouette Rivers	173	P25, CP69, M6	BCL, Maple Ridge District	M100
124	Cod Island	117	P100	-	M100
125	North Alouette River, adjacent to	213	P100	-	M33, L67
126	DeBoville Slough	21	CP100	BCL	M100
127	Pitt River west shore, DeBoville Slough to Addington Marsh	4	CF100	FRHC	M100

MAP 15 UPPER PITT RIVER VALLEY

128	Goose Bar	35	CF100	FRHC	M100
129	Pitt River east shore, Alouette River to Sheridan Hill	34	P10, CF90	FRHC	M10, L90
130	Sheridan Hill foreshore	9	P10, CF90	FRHC	M100
131	Minnehada Regional Park	44	M100	GVRD Parks	H100
132	Addington Point Marsh	169	P100	BCE	H100
133	Addington Marsh foreshore	56	CP80, CF20	BCE, FRHC	H80, M20
134	Sturgeon Slough	48	P30, CP70	BCL	M100
135	Pitt Polder	1963	P25, CP75	BCE	H75, L25
136	McIntyre Creek	9	P20, CP80	BCHOUS, BCL	M100
137	Pitt Polder foreshore south	34	CP25, CF50, P25	BCE, FRHC	H25, M75
138	Pitt Polder foreshore north	40	CP75, CF20, M5	BCE, FRHC, DARD	H75, M25
139	Widgeon Creek Valley	721	P47, CP14, CF20, M19	BCE, CWS, GVRD Parks	H90, L10
140	Grant Narrows north	6	IR100	-	-
141	Pitt Lake south shore	24	CP100	BCE	H100
142	Pitt Lake Delta	545	CP100	BCE	H100

MAP 16 BARNSTON ISLAND TO FORT LANGLEY

143	Parsons Channel	3	CF100	FRHC	M50, L50
144	Barnston Island south	9	P50, CF50	FRHC	M100
145	Barnston Island north	12	P50, CF50	FRHC	M100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
146	Mann Point	10	P20, CF80	FRHC	M100
147	Pitt Meadows Airport foreshore	9	P40, CF60	DPW, FRHC	L100
148	Bishops Reach north shore	12	P70, CF30	FRHC	M30, L70
149	Katzie Slough upper reaches	29	P60, M40	Pitt Meadows District, Maple Ridge District	M25, L75
150	Derby Reach northwest	1	CF100	FRHC	L100
151	Derby Reach northeast	6	P10, CF90	FRHC	L100
152	Derby Reach southwest	20	P50, CF50	FRHC	M100
153	Fort Langley, northwest of	24	P100	-	M100
154	Derby Reach Regional Park	31	P15, CF5, M80	FRHC, GVRD Parks	H80, M5, L15
155	Derby Reach southeast	11	CP20, CF25, M55	BCL, FRHC, GVRD Parks	H55, M45
156	Kanaka Creek	94	P45, CP10, CF5, M40	BCL, FRHC, GVRD Parks	H40, M60
157	Derby Reach Regional Park	2	P5, M95	GVRD Parks	H95, L5
158	McMillan Island foreshore north	14	CP50, IR50	BCL	L50
159	McMillan Island west	15	P25, CP73, IR2	BCL	L98
160	Salmon River, near mouth	3	P100	-	L100
161	Fort Langley, north of 88th Ave.	1	P100	-	M100
162	Fort Langley, southwest of	2	P100	-	M100
163	Salmon River	38	P100	-	L100
164	Glover & Rawlinson Creeks	.6	P100	-	L100
165	Trinity Western University	3	P100	-	L100

MAP 17 SERPENTINE - NICOMEKL LOWLAND

166	Nicomekl River lower reach	88	P5, CP95	BCL	M100
167	Serpentine River lower reach	63	CP100	BCL	M100
168	Serpentine Wildlife Area	78	CP100	BCE	H100
169	Serpentine River middle reach	47	CP100	BCL	L100
170	Nicomekl River middle reach	23	CP100	BCL	L100
171	not a wetland				
172	Serpentine River upper reach	40	P60, CP40	BCL	L100
173	Nicomekl River middle reach	14	CP100	BCL	M100
174	Nicomekl River middle reach	1	P15, CP85	BCL	M100
175	Nicomekl River upper reach	2	CP35, M65	BCL, Langley City	M100
176	Nicomekl River upper reach	3	M100	Langley City	M100
177	Nicomekl River headwaters	16	P9, CP31, M60	BCL, BCHI, Langley City, Langley District	L100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
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MAP 18 CAMPBELL RIVER VALLEY

178	Campbell River upper reach	263	P72, M28	GVRD Parks	H25, L75
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MAP 19 CENTRAL FRASER VALLEY UPLANDS

179	Aldergrove, south of	25	P100	-	L100
180	Bertrand Creek	21	P89, CP10, M1	BCL, Langley District	M10, L90
181	Pepin Creek	131	P60, M40	GVRD Parks	H40, L60
182	Canadian Forces Base Aldergrove	7	CF100	DND	L100
183	Aldergrove, north of	8	P100	-	L100

MAP 20 GLEN VALLEY / STAVE RIVER

184	West Creek	7	P100	-	M40, L60
185	Palmateer Creek	7	P100	-	M100
186	Fraser River south shore	3	P100	-	M100
187	Nathan Canal	8	CP100	BCL	L100
188	Nathan Slough	6	P100	-	L100
189	Glen Valley	29	P100	-	L100
190	Crescent Island	43	P85, CP15	BCL	M100
191	Stave River mouth, west of	4	P100	-	L100
192	Stave River lower reach	131	P40, CP60	BCL	M80, L20
193	Stave River mouth east bank	80	P60, M10, IR30	Mission District	M35, L35
194	Chester Creek	1	P75, CP25	BCL	L100
195	Hanna Creek	3	P100	-	M100

MAP 21 MATSQUI / MISSION

196	Silverdale Creek	44	P90, M10	Mission District	M85, L15
197	Mandale Slough	26	P40, CP15, M45	BCL, Mission District	L100
198	Matsqui Island	311	IR100	-	-
199	Coligny Creek	3	CP10, CF10, IR80	BCL, CNR	L20
200	Gifford Slough/McLennan Creek	17	P80, IR20	-	M80
201	Matsqui Trail	2	M100	GVRD Parks	M100
202	Matsqui Slough/ Page Creek	37	P100	-	M100
203	Matsqui Slough tributary	6	P100	-	M100
204	Clayburn Creek	13	P100	-	M100
205	Page Lake	9	P100	-	M100
206	Pond northwest of Clearbrook	2	P75, M25	Matsqui District	L100
207	Mill Lake	19	P5, M95	Matsqui District	L100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
208	Laxton Lake	35	P100	-	M100
209	Judson Lake	14	P100	-	M100

MAP 22 HATZIC / NICOMEN WEST

210	Hatzic Slough System	12	CP100	BCL	M100
211	Neilson Regional Park	4	M100	DARD	M100
212	Hatzic Lake	237	P17, CP75, M8	BCL, Mission District	M20, L80
213	Chilqua Slough	38	CP100	BCL	L100
214	Chilqua Slough, north of	2	CP100	BCL	L100
215	Hatzic lake, southeast of	2	P100	-	L100
216	Wades Creek	28	P10, CP90	BCL	L100
217	Fraser River north shore	55	P95, CP5	BCL	L100
218	Fraser River near Hatzic	5	CP100	BCL	L100
219	Strawberry Island	243	CP100	BCL, MOF	M25, L75
220	Nicomen Slough	384	P3, CP97	BCL	M98, L2
221	Norrish Creek Delta	123	P100	-	M100
222	Mud Slough, Nicomen Island	11	P100	-	L100
223	Nicomen Slough north shore	3	P100	-	L100
224	Nicomen Island north central	5	P100	-	M100
225	Nicomen Island north central	2	P100	-	L100
226	Nicomen Island north central	2	P100	-	M100
227	Nicomen Island north central	9	P100	-	L100
228	Nicomen Island central	3	P100	-	M100
229	Nicomen Island central	10	P100	-	M100
230	Nicomen Island central	2	P100	-	M100
231	Nicomen Island south central	6	P50, IR50	-	M50
232	Nicomen Island north central	3	P100	-	M100

MAP 23 NICOMEN EAST / CHILLIWACK WEST

233	Nicomen Slough side channel	15	P100	-	M100
234	Nicomen Slough, north of	6	P100	-	M100
235	Nicomen Slough north bank	2	P100	-	M100
236	Nicomen Slough north bank	7	P100	-	M100
237	Quaamitch Slough	23	P77, CP23	BCL	M100
238	Yaalstrik Island Slough	14	P66, CP34	BCL	M100
239	Zaitscullachan Slough	37	P34, CP66	BCL	M100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
240	Queens Island Slough	30	CP90, IR10	BCL	L90
241	Queens Island	3	P100	-	M100
242	Queens Island south	5	CP100	BCL	L100
243	Fraser River north bank	2	P90, CP10	BCL	L100
244	Fraser River, west of Harrison R.	6	CP100	BCL	L100
245	Fraser River at Harrison R. mouth	482	CP100	MOF, BCL	L100
246	Fraser River east of Queens I.	31	CP100	BCL, MOF	L100
247	Fraser River near Queens I.	76	CP100	MOF, BCL	L100
248	Fraser River near Queens I.	14	CP100	BCL	L100
249	Fraser River near Chilliwack	2	CP100	BCL	L100
250	Fraser River near Chilliwack Creek	6	P40, CP60	BCL	L100
251	Shefford Slough	38	P20, CP80	BCL	L100
252	Hope Slough	129	CP100	BCL	L100
253	Coco-oppelo Slough north end	7	CP100	BCL	L100
254	Chilliwack & Atchelitz Creeks	145	P20, CP70, M5, IR5	BCL, Chilliwack District	L95
255	Fraser River, Nicomen Island east	1	CP100	BCL	L100
256	Fraser River, Nicomen Island east	6	CP100	BCL	L100
257	Fraser River near Chilliwack Creek	85	CP100	BCL	L100
258	Fraser River near Chilliwack Creek	17	CP100	BCL	L100
259	Fraser River near Chilliwack Creek	94	CP100	BCL, BCE	H80, L20
260	Fraser River near Yaalstrick I.	12	CP100	BCL	L100
261	Nicomen Island Slough	6	CP100	BCL	L100
262	Yaalstrick Island	11	CP100	BCL	M100
263	Yaalstrick Island	37	IR100	-	-
264	Fraser River near Yaalstrick I.	1	IR100	-	-
265	Fraser River near Chilliwack Mt.	.5	CP100	BCL	L100
266	Fraser River near Chilliwack Mt.	7	CP100	BCL	L100
267	Yaalstrick Island west	36	IR100	-	-
268	Fraser River near Chilliwack Mt.	4	CP100	BCL	L100
269	Fraser River near Chilliwack Mt.	2	CP100	BCL	L100
270	Fraser River near Chilliwack Mt.	4	CP100	BCL	L100
271	Wilson Slough	34	P10, CP80, IR10	BCE	L90
272	Fraser River near Yaalstrick I.	2	P100	-	M100
273	Fraser River near Yaalstrick I.	33	CP100	BCL	L100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
274	Fraser River near Chilliwack Mt.	8	CP100	BCL	L100
275	Fraser River near Chilliwack Mt.	2	CP100	BCL	L100
276	Fraser River near Chilliwack Mt.	6	CP100	BCL	L100
277	Fraser River near Nicomen I.	118	CP100	BCL	L100
278	Fraser River near Nicomen I.	11	CP100	BCL	L100

MAP 24 SUMAS RIVER VALLEY

279	Sumas River lower reach	128	P24, CP72, M4	BCL, Abbotsford District	M80, L20
280	Lakemount Marsh	69	P100	-	M100
281	Sumas Lake Canal	36	M100	Abbotsford District	M100
282	Sumas River (old scar)	4	P90, CP10	BCAGRI	L100
283	Sumas River, former tributary	10	P100	-	L100
284	Lonzo Creek	21	P50, IR50	-	M50
285	Sumas River upper reach	80	P85, IR15	-	L85

MAP 25 VEDDER RIVER VALLEY

286	Sumas River mouth	47	CP100	BCL	M100
287	McGillivray Ck. Wildlife Sanctuary	88	P20, CP80	BCL, BCE	H20, M80
288	Millar/McGillivray Sloughs	22	P94, CP4, M2	BCL, Chilliwack District	M100
289	Vedder Canal	59	P5, CP80, M15	VRMC	M100
290	Vedder Canal Marsh	23	P55, M45	Chilliwack District	M100
291	Lewis Slough	5	P55, M45	Chilliwack District	L100
292	Yarrow	9	P95, M5	Chilliwack District	L100
293	Vedder River	262	P10, CP40, CF12, M10, IR28	VRMC, DND	M72
294	Barrett Creek	7	M10, IR90	VRMC	M10
295	Sweltzer Creek	3	CP100	BCL	L100
296	Sardis Park	3	M100	Chilliwack District	M100

MAP 26 WINDERMERE / MOUNTAIN SLOUGH

297	Nelson & Bell Sloughs	64	CP100	BCL	L100
298	Harrison River mouth	2	P100	-	M100
299	Fraser River, Harrison River mouth	5	CP100	BCL	L100
300	Fraser River, Harrison River mouth	33	P100	-	M100
301	Fraser River near Nelson Slough	4	CP100	MOF	M100
302	Fraser River near Nelson Slough	2	CP100	MOF	M100
303	Fraser River near Nelson Slough	1	CP100	MOF	M100
304	Fraser River near Nelson Slough	14	CP100	MOF	M100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
305	Fraser River near Nelson Slough	10	CP100	MOF	M100
306	Fraser River near Nelson Slough	45	CP100	MOF	M100
307	Windermere Island	1	P100	-	M100
308	Camp & Gravel Sloughs	91	CP100	BCL	M100
309	Fraser River near Mountain Slough	7	CP100	BCL	M100
310	Fraser River near Mountain Slough	52	CP100	BCL	M100
311	Fraser River near Greyell Slough	6	CP100	MOF	M100
312	Greyell Slough/Island	131	CP100	MOF	M100
313	Fraser River near Mountain Slough	186	CP100	MOF	M100
314	formerly part of Mountain Slough	7	P90, M10	Kent District	M100
315	Mountain Slough	49	P100	-	M100
316	Fraser River near Mountain Slough	62	CP100	MOF	M100
317	Fraser River near Greyell Slough	24	CP100	MOF	M100
318	Fraser River near Greyell Slough	9	CP100	MOF	M100
319	Fraser River near Greyell Slough	26	CP100	MOF	M100
320	Fraser River near Cheam Slough	5	CP100	BCL	M100
321	Fraser River near Cheam Slough	24	CP100	BCL	M100
322	Fraser River west of Agassiz Bridge	11	IR100	-	-

MAP 27 AGASSIZ / POPKUM

323	Fraser River near Cheam Slough	5	CP100	BCL	M100
324	Fraser River west of Agassiz Bridge	10	CP100	BCL	L100
325	Fraser River west of Agassiz Bridge	27	CP100	BCL	L100
326	Fraser River west of Agassiz Bridge	4	CP100	BCL	M100
327	Cheam & Agassiz Sloughs	49	CP100	BCL	M100
328	Agassiz Slough, southeast of	1	P100	-	M100
329	Ferry Island Slough south shore	1	CP100	BCL	L100
330	Ferry Island Slough	11	CP100	BCL	M100
331	Fraser River at Agassiz Bridge	61	CP100	BCL, MOF	L100
332	Cheam Lake, Popkum	38	M100	FCRD	H100
333	Fraser south shore, Popkum	4	CP100	BCL	L100
334	Fraser River east of Agassiz Bridge	1	CP100	BCL	L100
335	Fraser River east of Agassiz Bridge	17	CP100	BCL	M100
336	Fraser River east of Agassiz Bridge	95	M30, IR70	Kent District	M30
337	Herring Island area	130	CP100	MOF	M100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
338	Fraser River south of Maria Slough	3	CP100	MOF	M100
339	Fraser River south of Maria Slough	23	CP100	MOF	M100
340	Fraser River south of Maria Slough	4	CP100	MOF	M100
341	Fraser River, Maria Slough mouth	60	CP100	BCL	L100
342	Fraser River east of Herrling I.	7	CP100	BCL	L100
343	Fraser River east of Herrling I.	7	CP100	BCL	L100
344	Fraser River south of Herrling I.	2	CP100	BCL	L100
345	Fraser River south of Herrling I.	2	CP100	BCL	L100
346	Herrling Island	15	CP100	BCL	L100

MAP 28 SEA BIRD ISLAND

347	Fraser River, Maria Slough mouth	89	CP100	MOF	M100
348	Fraser River east of Maria Slough	6	CP100	MOF	M100
349	Herrling Island east	26	CP100	BCL	L100
350	Herrling Island	190	CP100	MOF	M100
351	Maria Slough area	1	P100	-	M100
352	Maria Slough west bank	2	CP100	BCL	L100
353	Maria Slough, Sea Bird Island	6	CP100	BCL	L100
354	Maria Slough middle reach	3	CP100	BCL	L100
355	Maria Slough tributary	5	CP100	BCL	L100
356	Maria Slough middle reach	42	CP100	BCL	M100
357	Maria Slough middle reach	46	P25, CP50, IR25	BCL	M25, L50
358	Maria Slough upper reach	26	P25, CP25, IR50	BCL	L50
359	Fraser River east of Sea Bird I.	185	CP80, IR20	MOF	M80
360	Fraser River north of Herrling I.	2	CP100	BCL	M100
361	Fraser River north of Herrling I.	2	CP100	BCL	L100
362	Fraser River north of Herrling I.	3	CP100	BCL	L100
363	Fraser River north of Herrling I.	1	CP100	BCL	L100
364	Fraser River north of Herrling I.	10	CP100	BCHI	L100
365	Fraser River North of Herrling I.	10	CP100	BCL	L100
366	Fraser River north of Herrling I.	5	CP100	BCHI	L100
367	Fraser River near Sea Bird I.	117	CP100	BCL	L100
368	Fraser River near Peters IR	15	CP100	BCL	L100
369	Peters Indian Reserve	33	CP30, IR70	BCL	L30
370	Fraser River near Peters IR	84	CP100	BCL	L100

Unit No	Location	Area (ha)	Ownership	Management Authority	Level of Protection
371	Peters IR No. 1	7	IR100	-	-
372	Fraser River near Laidlaw	35	CP100	BCL	L100
373	Fraser River southwest of Laidlaw	13	CP100	BCL	L100
374	Fraser River southwest of Laidlaw	5	CP100	BCL	L100
375	Fraser River west of Laidlaw	63	CP100	BCL	L100
376	Fraser River west of Laidlaw	2	CP100	BCL	L100
377	Fraser River west of Laidlaw	7	CP100	BCL	L100
378	Fraser River west of Laidlaw	39	CP100	BCL	L100
379	Johnsons Slough mouth	3	CP100	BCL	L100
380	Johnsons Slough mouth	1	CP100	BCL	L100
381	Johnsons Slough	30	CP50, IR50	BCL	L50

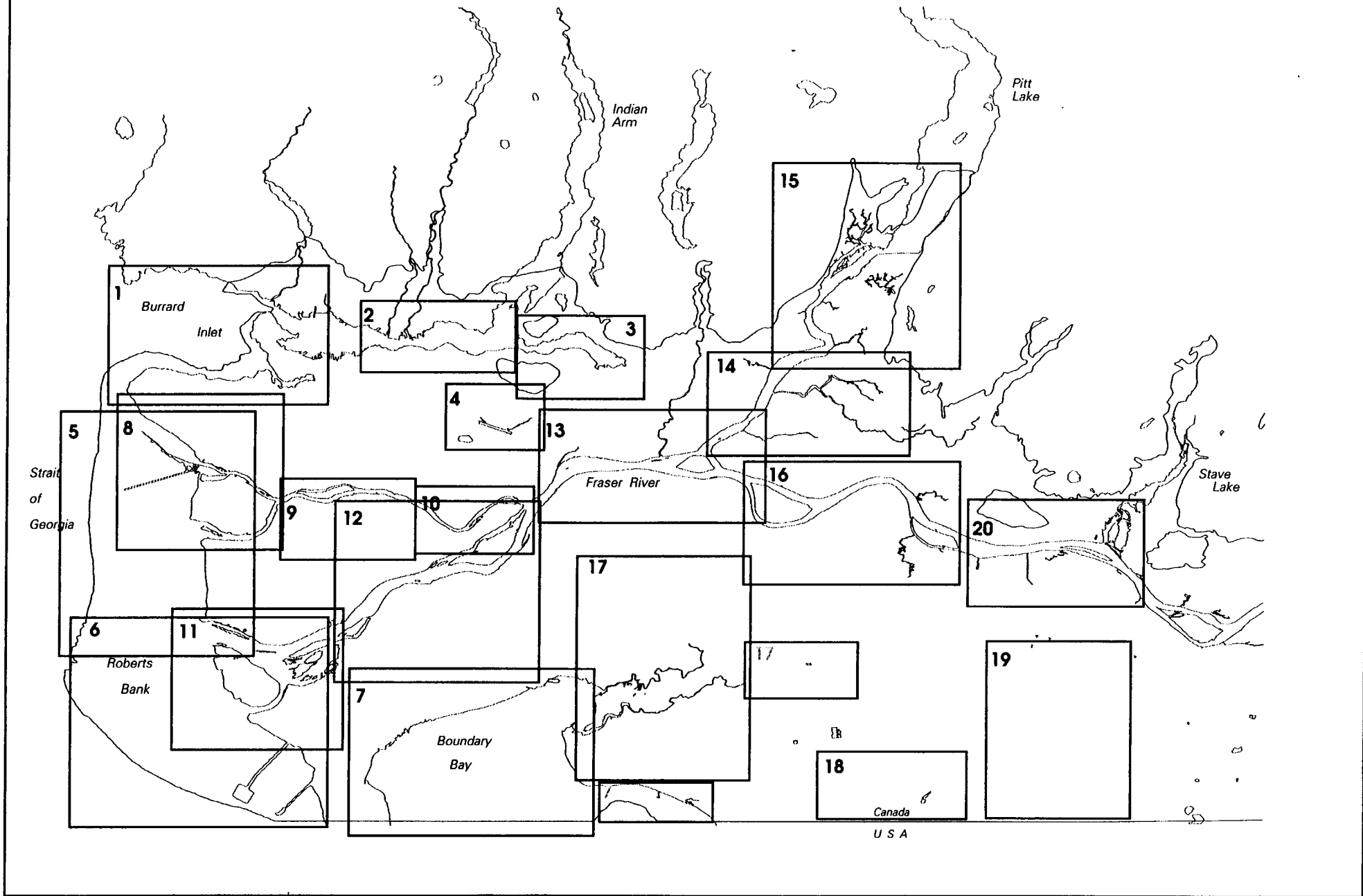
MAP 29 HARRISON RIVER VALLEY

382	Harrison River mouth	5	IR100	-	-
383	Harrison River mouth	5	P50, IR50	-	M50
384	Lake Errock	5	P10, CP90	BCL	L100
385	Harrison Bay west	11	P10, CP60, IR30	BCL	L70
386	Harrison Bay	364	CP100	BCL	L100
387	Harrison Bay	2	CP100	BCL	L100
388	Harrison Bay	3	CP100	BCL	L100
389	Harrison River south shore	4	P100	-	M100
390	Bateson & Duncan Sloughs	2	P100	-	M100
391	Bateson & Duncan Sloughs	25	P100	-	M100
392	Chehalis River delta	434	P20, CP80	BCL, DFO	H20, M80
393	Harrison River east bank	121	P10, CP90	BCL	M100
394	Chehalis River lower reach	52	CP100	BCL	L100
395	Chehalis IR No. 6	1	IR100	-	-
396	Morris & Weaver Creeks	220	CP30, CP20, IR50	BCL, IPSC, DFO	H30, M20
397	Miami Creek	30	CP100	BCL	L100
398	Miami Creek area	8	CP100	BCL	L100

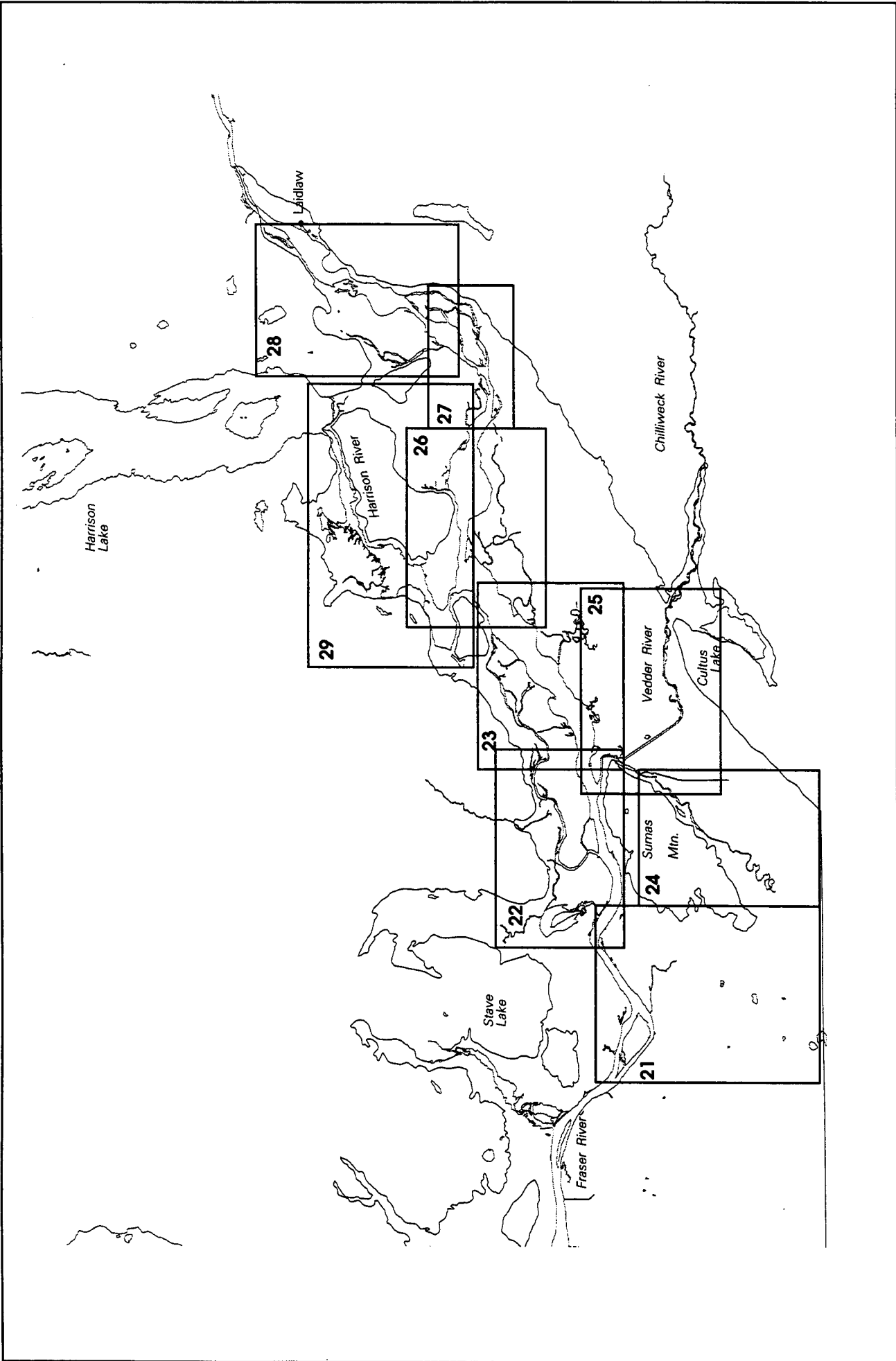
APPENDIX B Maps of Fraser Lowland Wetlands

List of Maps

MAP 1	BURRARD INLET WEST
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MAP 27	AGASSIZ / POPKUM
MAP 28	SEA BIRD ISLAND
MAP 29	HARRISON RIVER VALLEY





Index Map A



Index Map B

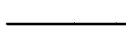
MAP LEGEND


 **Fraser Lowland** - the landward boundary of the study area is the 150 m contour as shown on the 1:125 000 B.C. Land Status maps 92G/SE,/SW and 92H/SW; the seaward boundary is the -10 m hydrographic contour, ie. 10 m below chart datum (lowest normal tide level) on the 1:80 000 Canadian Hydrographic Chart No. 3463 (1988).


 **Tidal flats** - the outer limit of the tidal flats on Sturgeon and Roberts banks and in Boundary, Mud and Semiahmoo bays is chart datum on the 1:80 000 Canadian Hydrographic Chart No. 3463 (1988).


The tidal flat boundaries in Burrard Inlet East were determined from air photo interpretation.


The tidal flat boundaries shown in the river were transferred manually from the 1:2500 FREMP maps to 1:25 000 NTS maps and then digitized for display only.

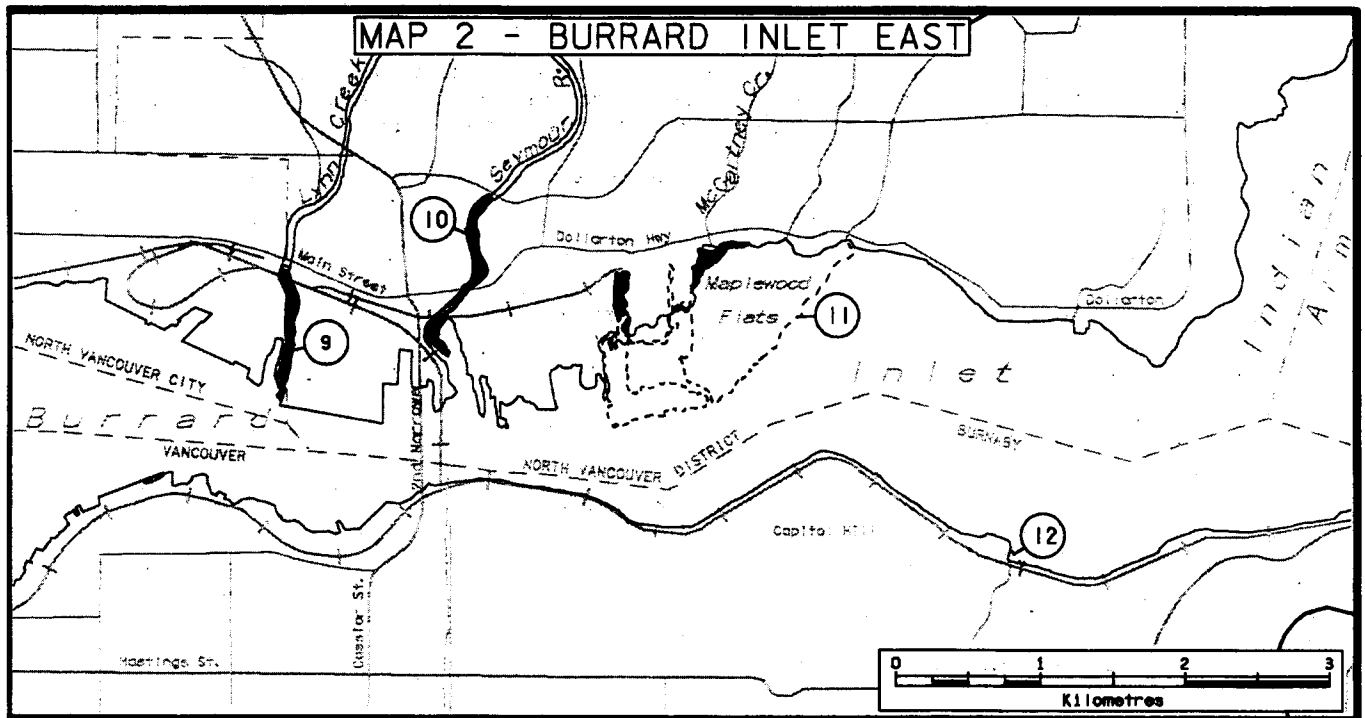
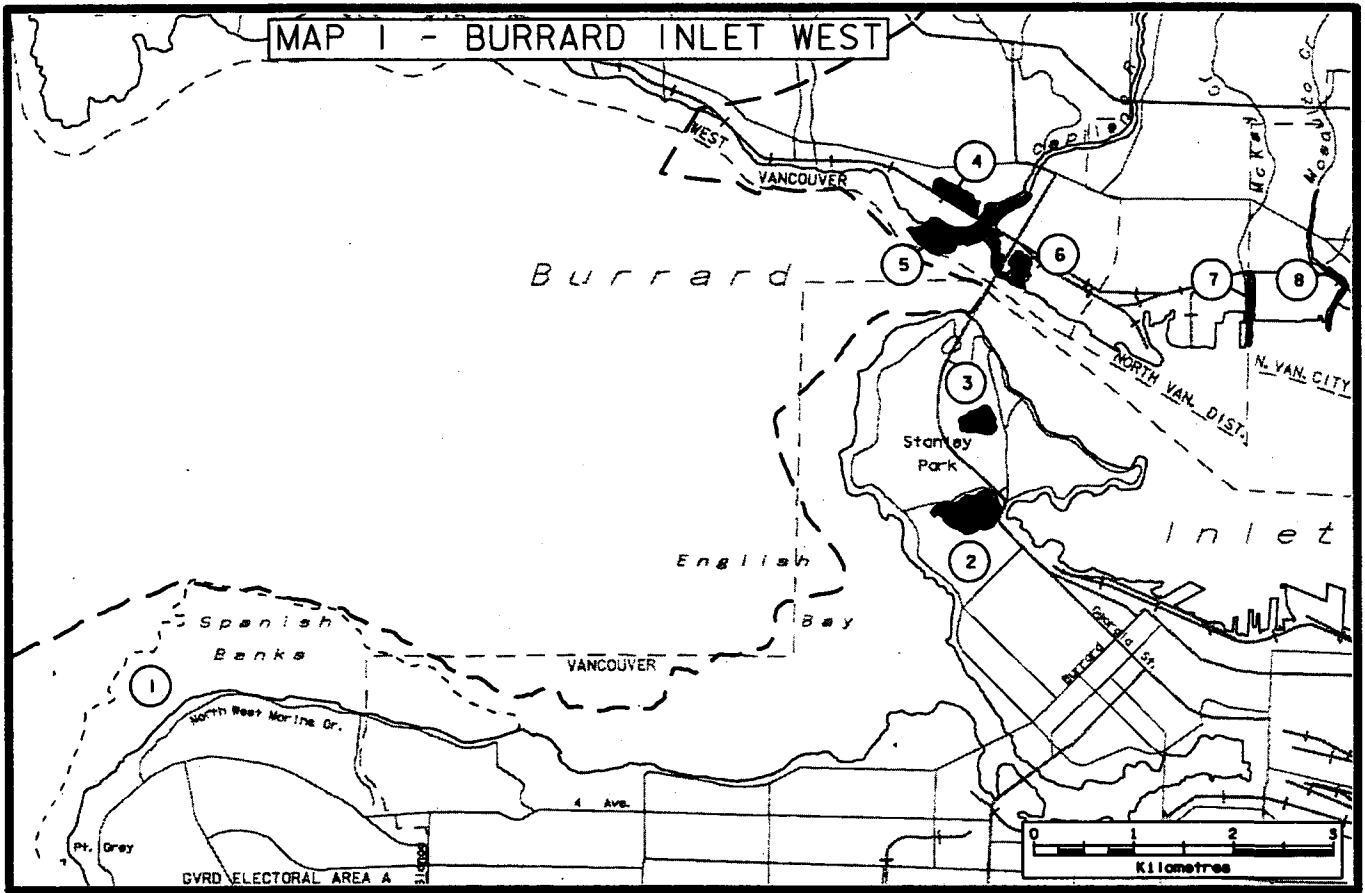
 **Shoreline and streams** - these were digitized by CWS from 1:50 000 NTS mylar maps -92G/2,/3,/6,/7 (1989) and 92G/1, 92H/4,/5 (1980) under agreement with Energy, Mines and Resources Canada.

 **Municipal boundaries** - municipal boundaries were digitized from the same 1:50 000 NTS maps mentioned above. For regional district boundaries, see Figure 3 which is based on the publication by the Ministry of Municipal Affairs, Recreation and Culture, 1989.

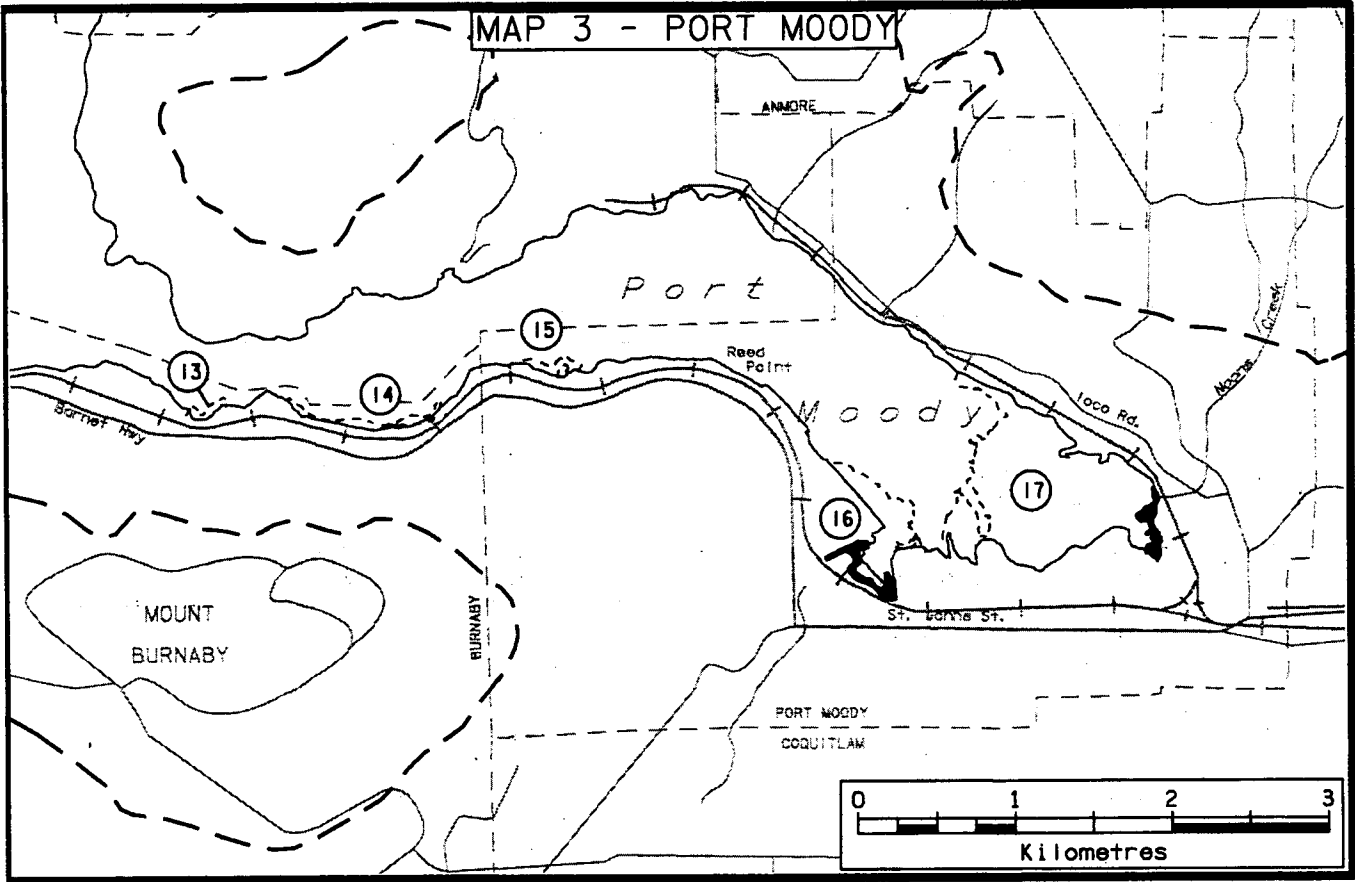
 **Wetland** - includes both CWS and FREMP-inventoried wetlands. The CWS wetlands were identified by air photo interpretation and subsequent field checking. The FREMP wetlands were identified by separate habitat inventories (FREMP 1990a, 1990b).

 **Eelgrass beds** - determined by interpretation of 1:30 000 colour infrared air photos taken in June 1990 at low water and of 1:12 000 colour air photos taken in 1986 at low water.

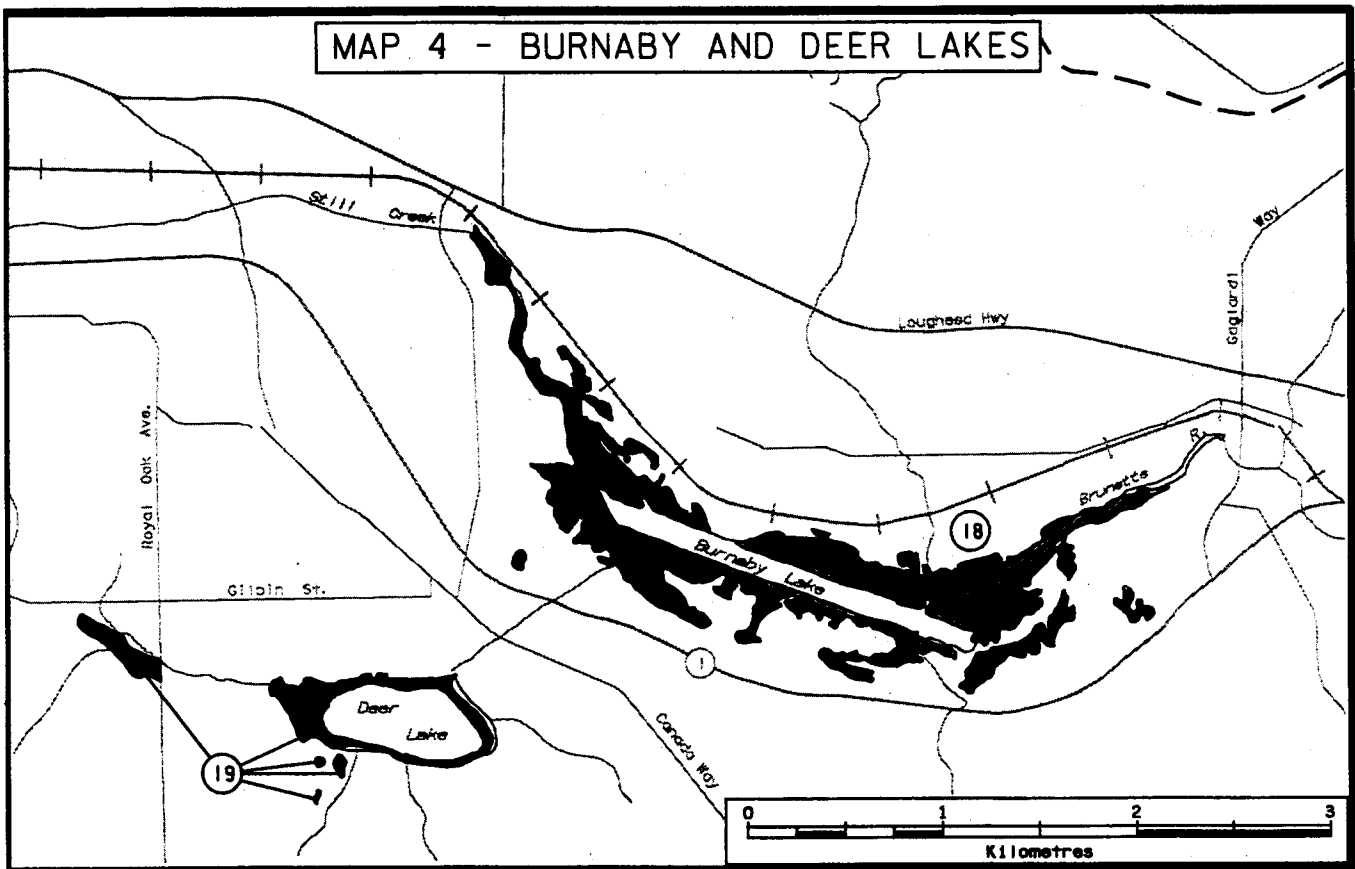
 **Wetland identification number** - this number corresponds to the specific wetland units described in the following data report and identified on the appropriate sub-region map.



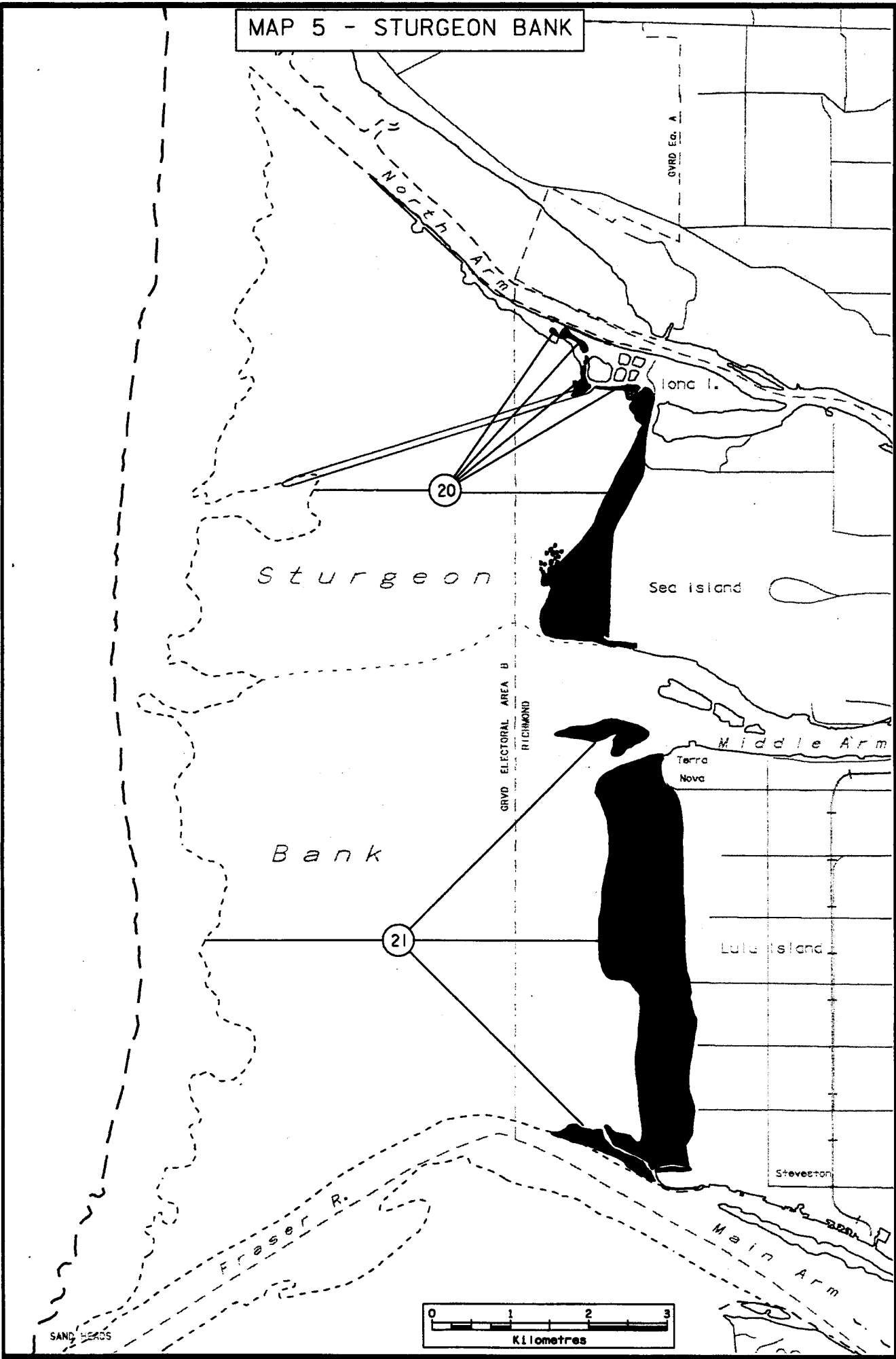
MAP 3 - PORT MOODY



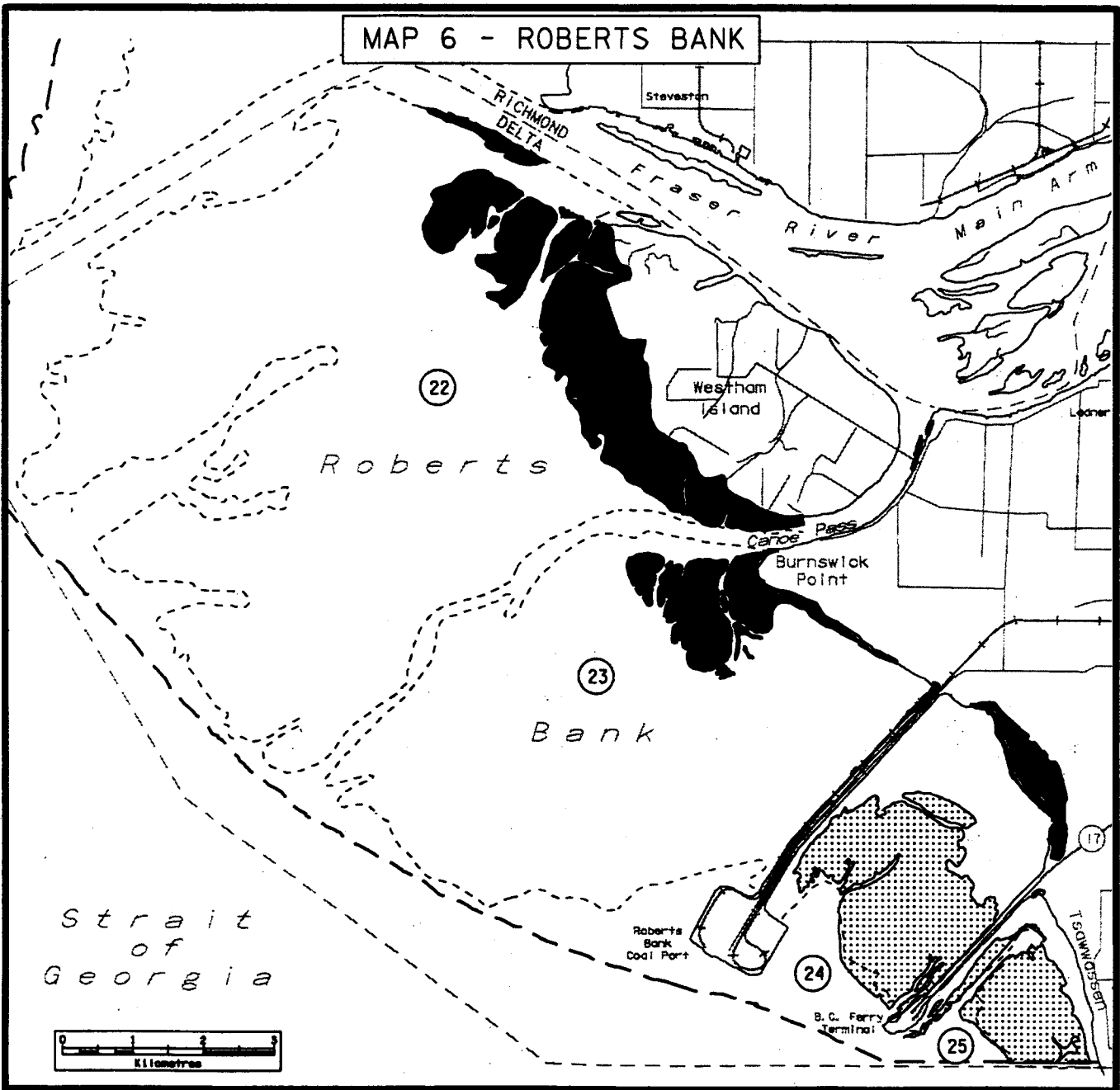
MAP 4 - BURNABY AND DEER LAKES



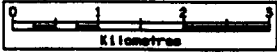
MAP 5 - STURGEON BANK



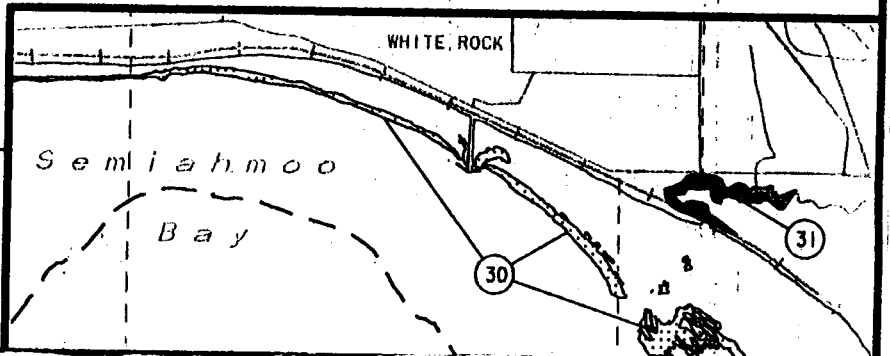
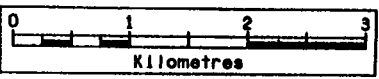
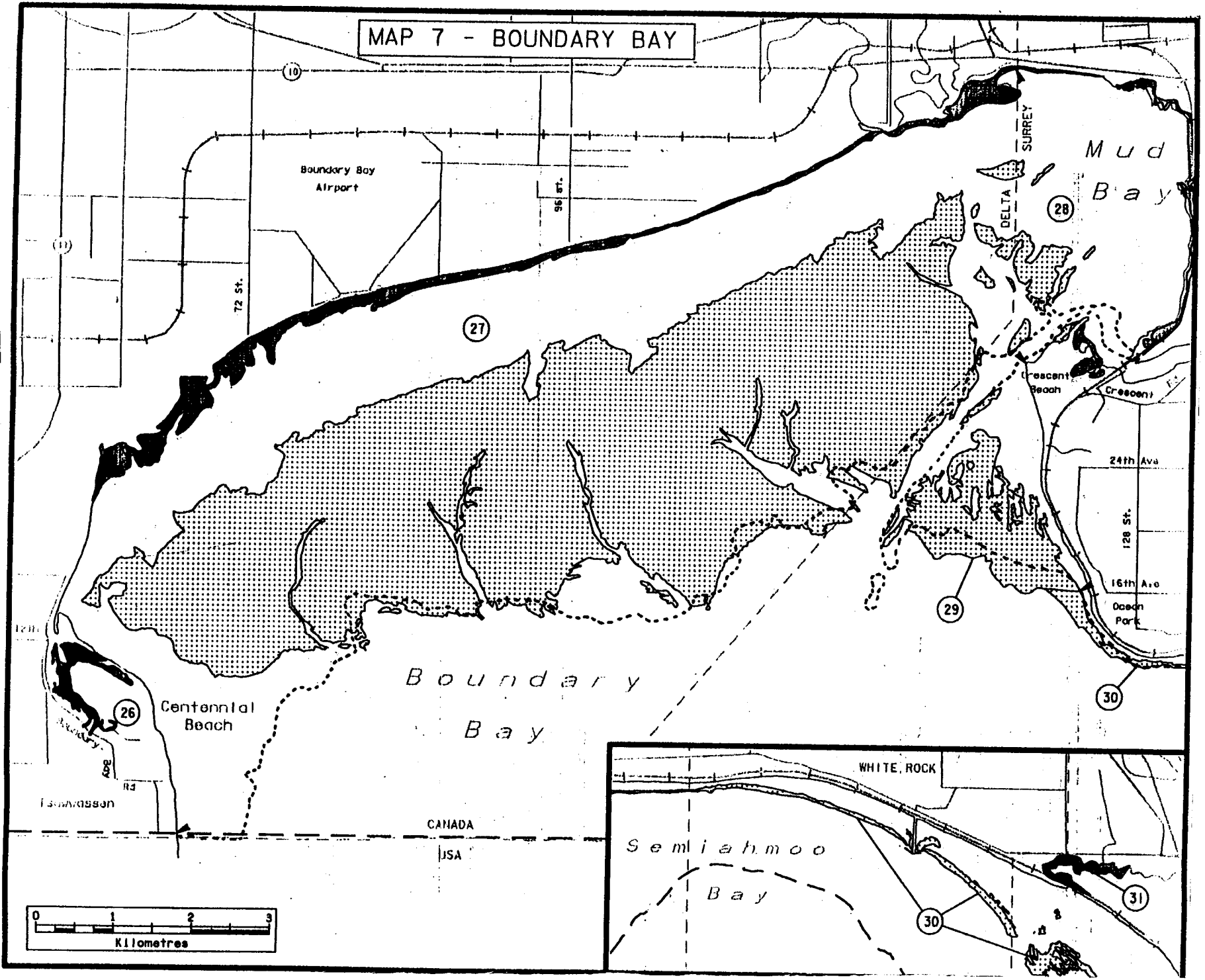
MAP 6 - ROBERTS BANK



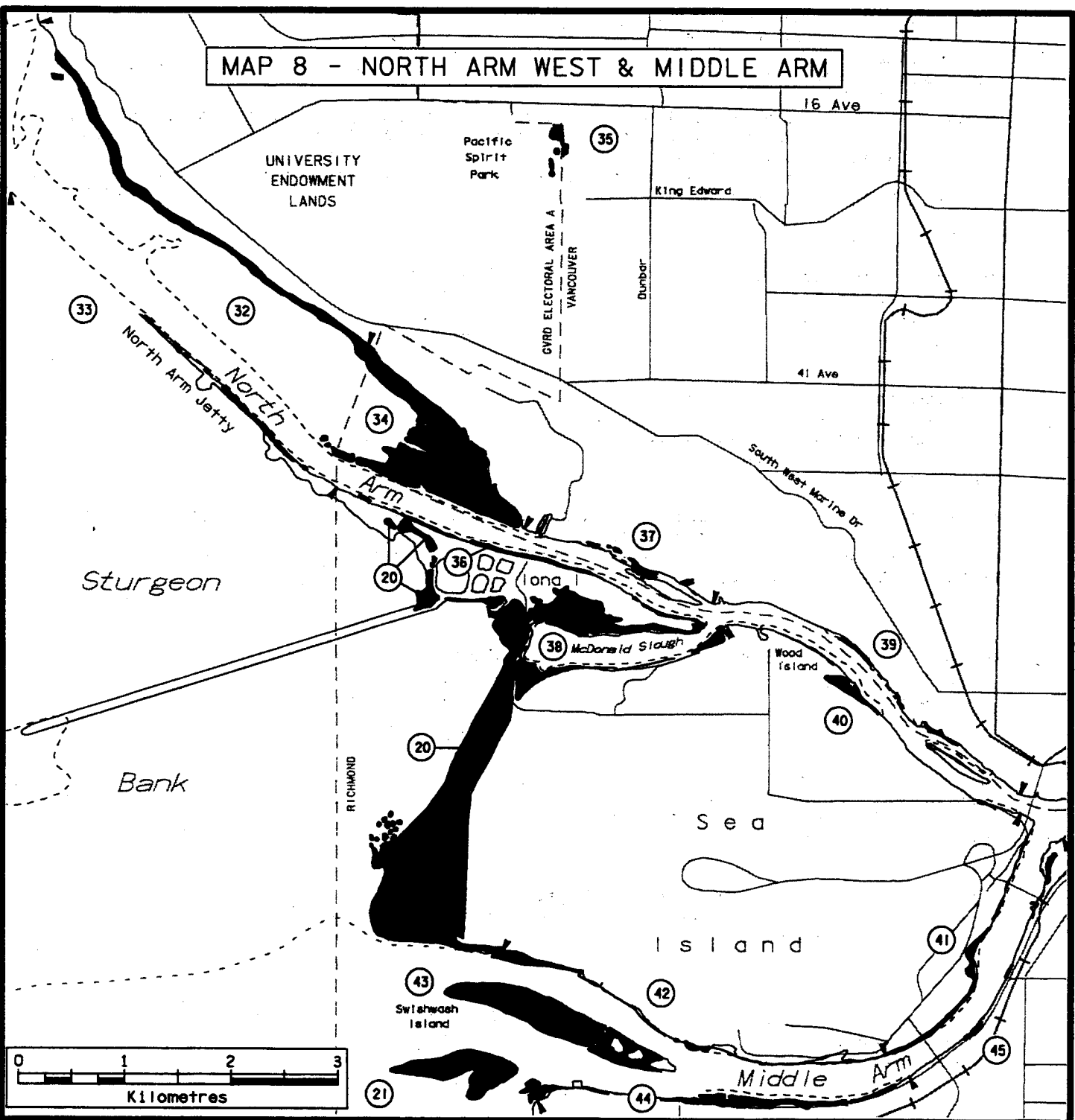
Strait
of
Georgia

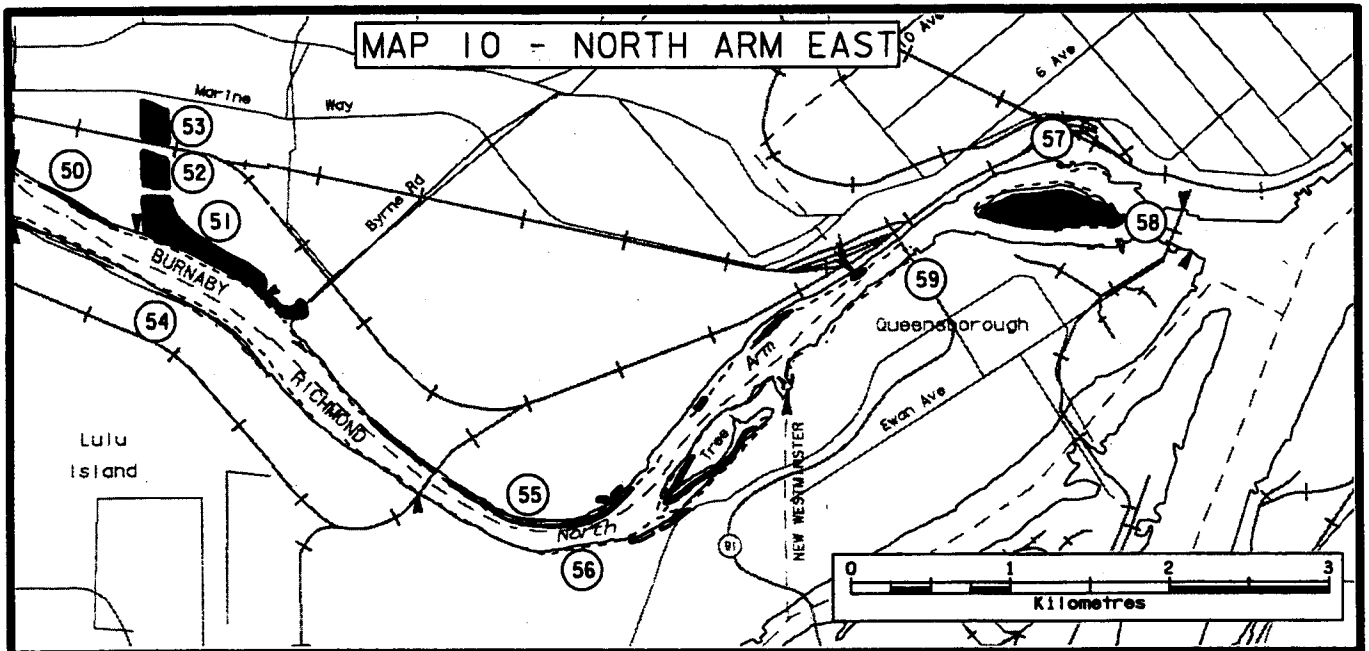
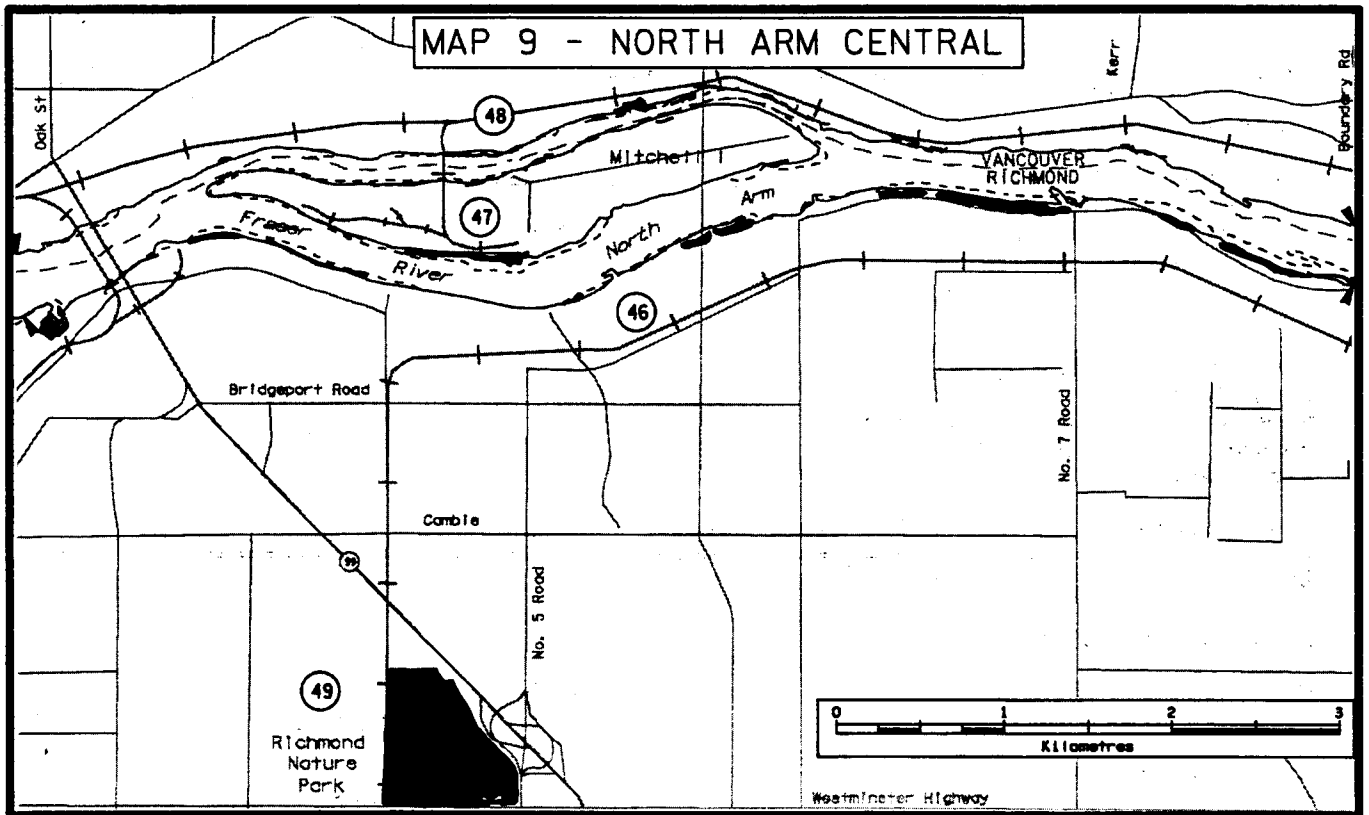


MAP 7 - BOUNDARY BAY

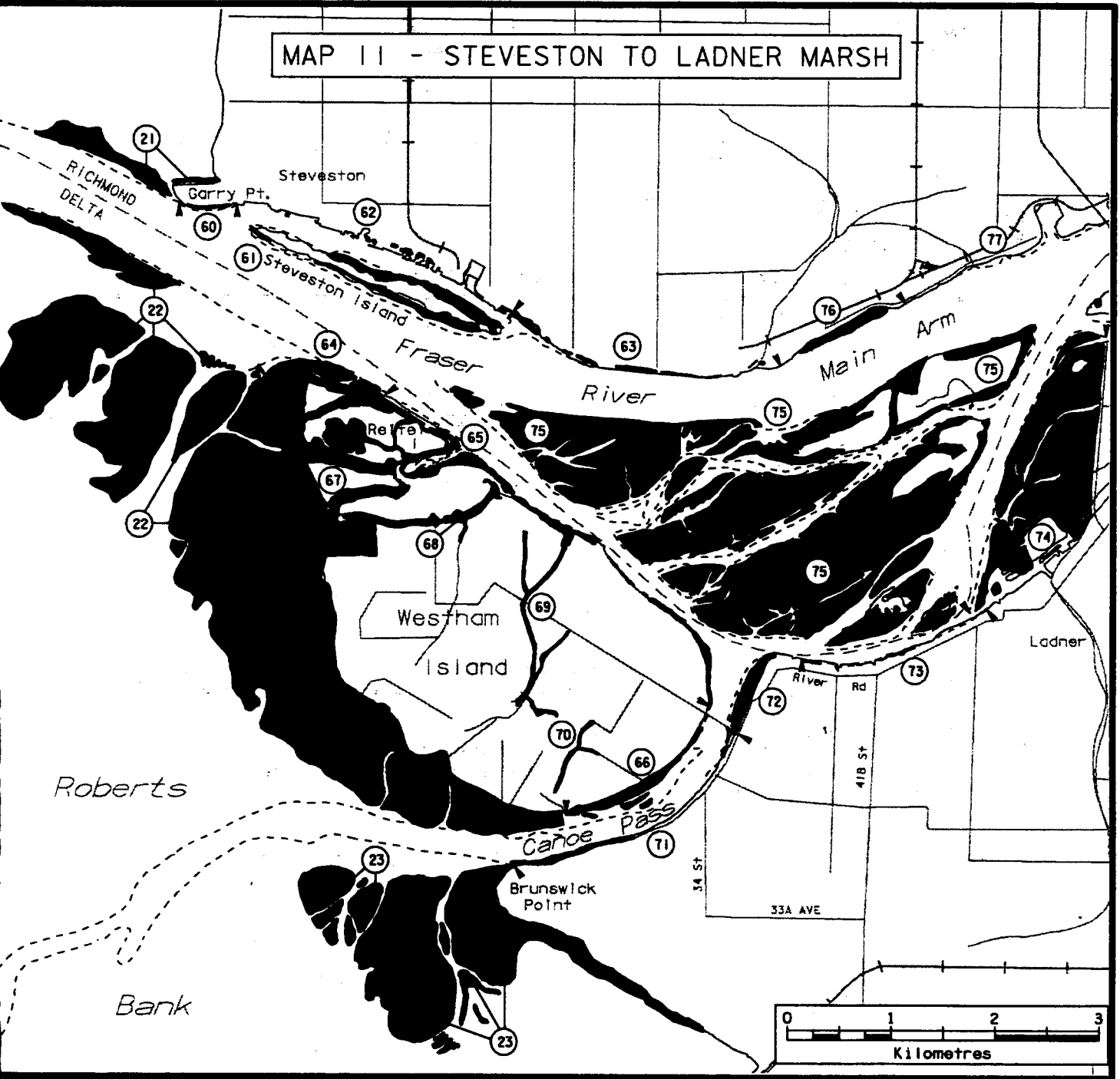


MAP 8 - NORTH ARM WEST & MIDDLE ARM





MAP 11 - STEVESTON TO LADNER MARSH



MAP 12 - DEAS ISLAND
TO ANNACIS ISLAND

Westminster Hwy

Lulu
Island

No. 6 ROAD

Tilbury
Island

River Rd

Burns Bog

North
Delta

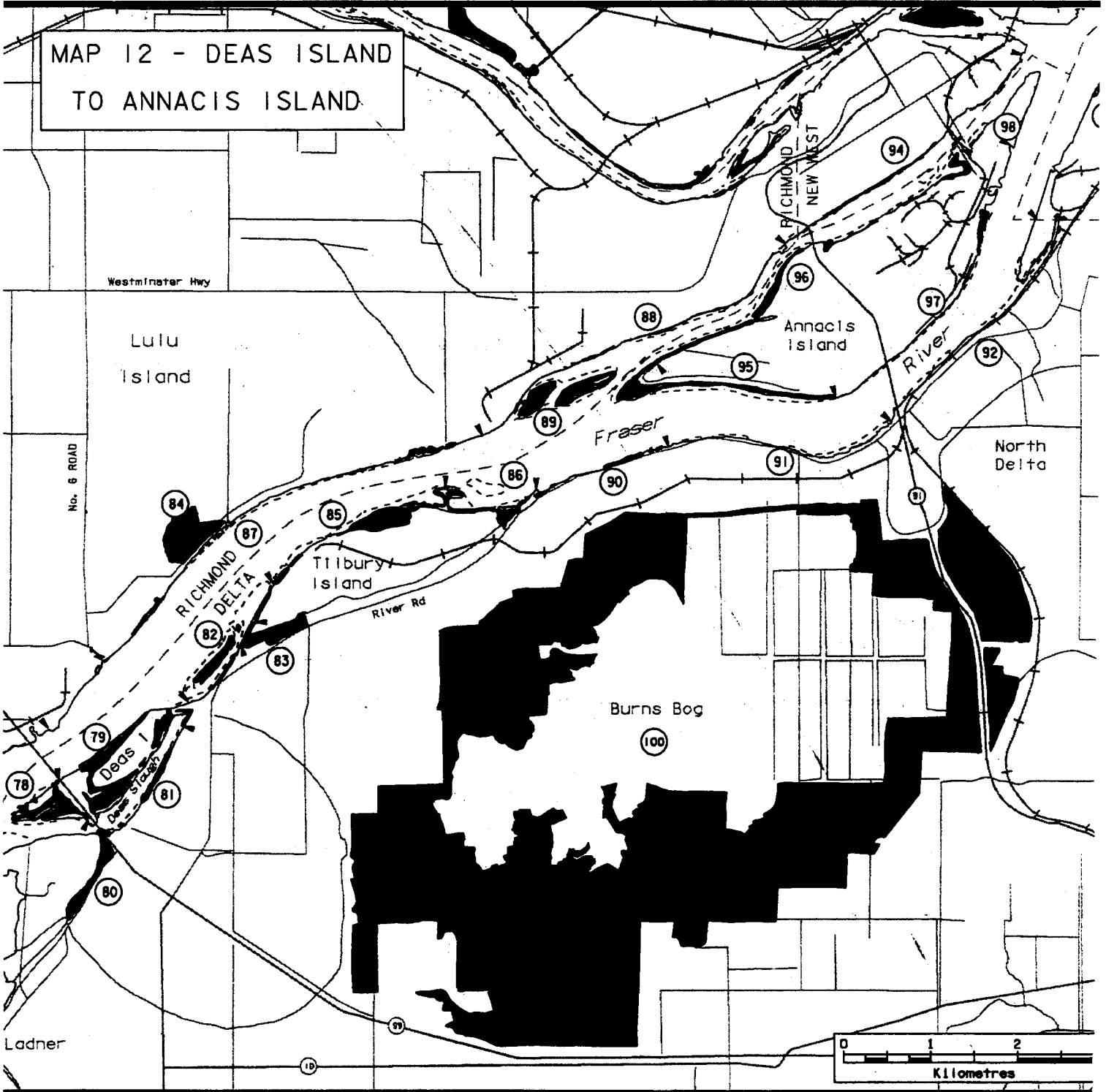
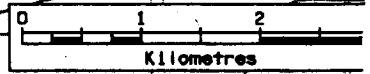
RICHMOND
NEW WEST

Annacis
Island

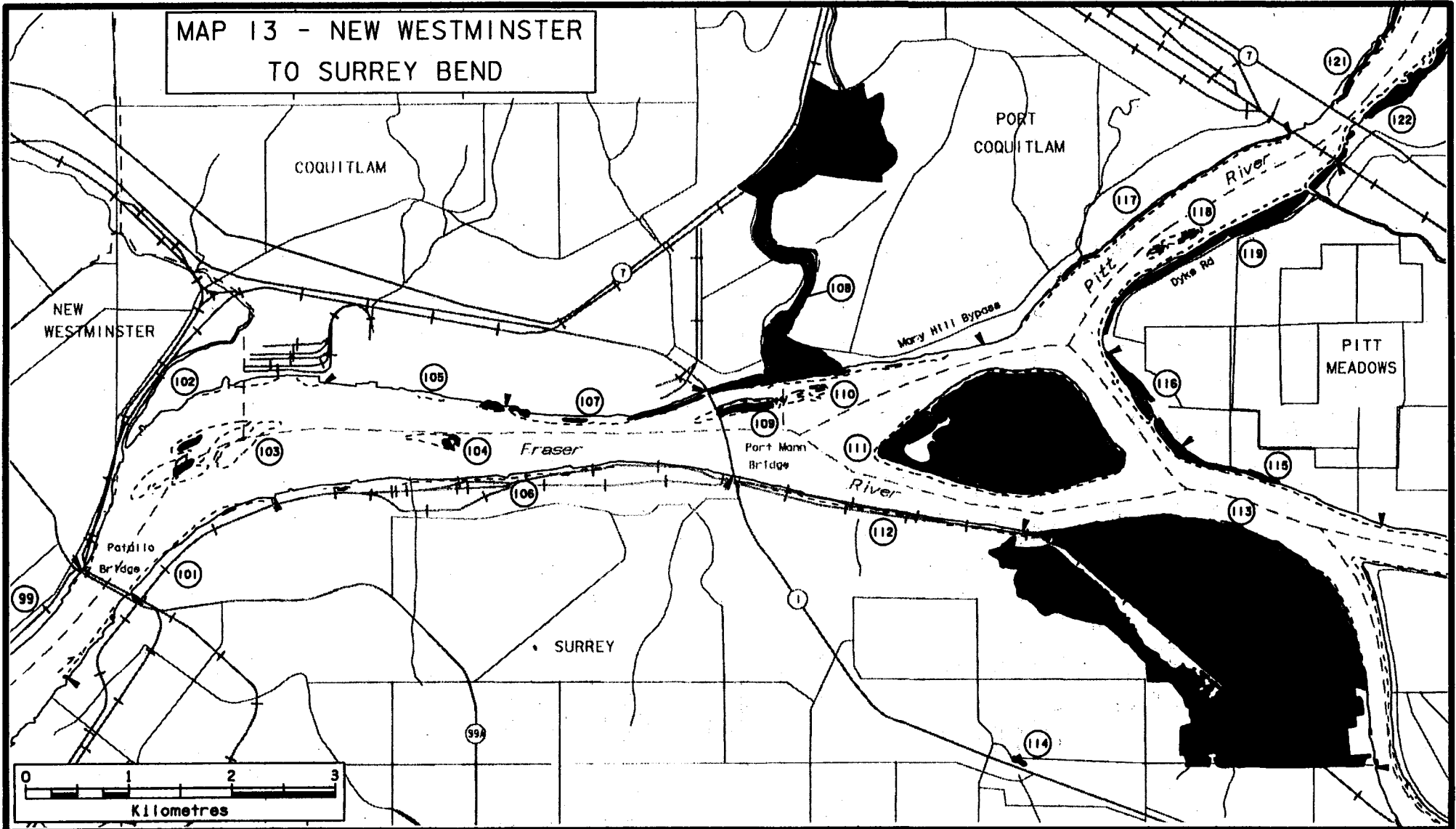
Fraser
River

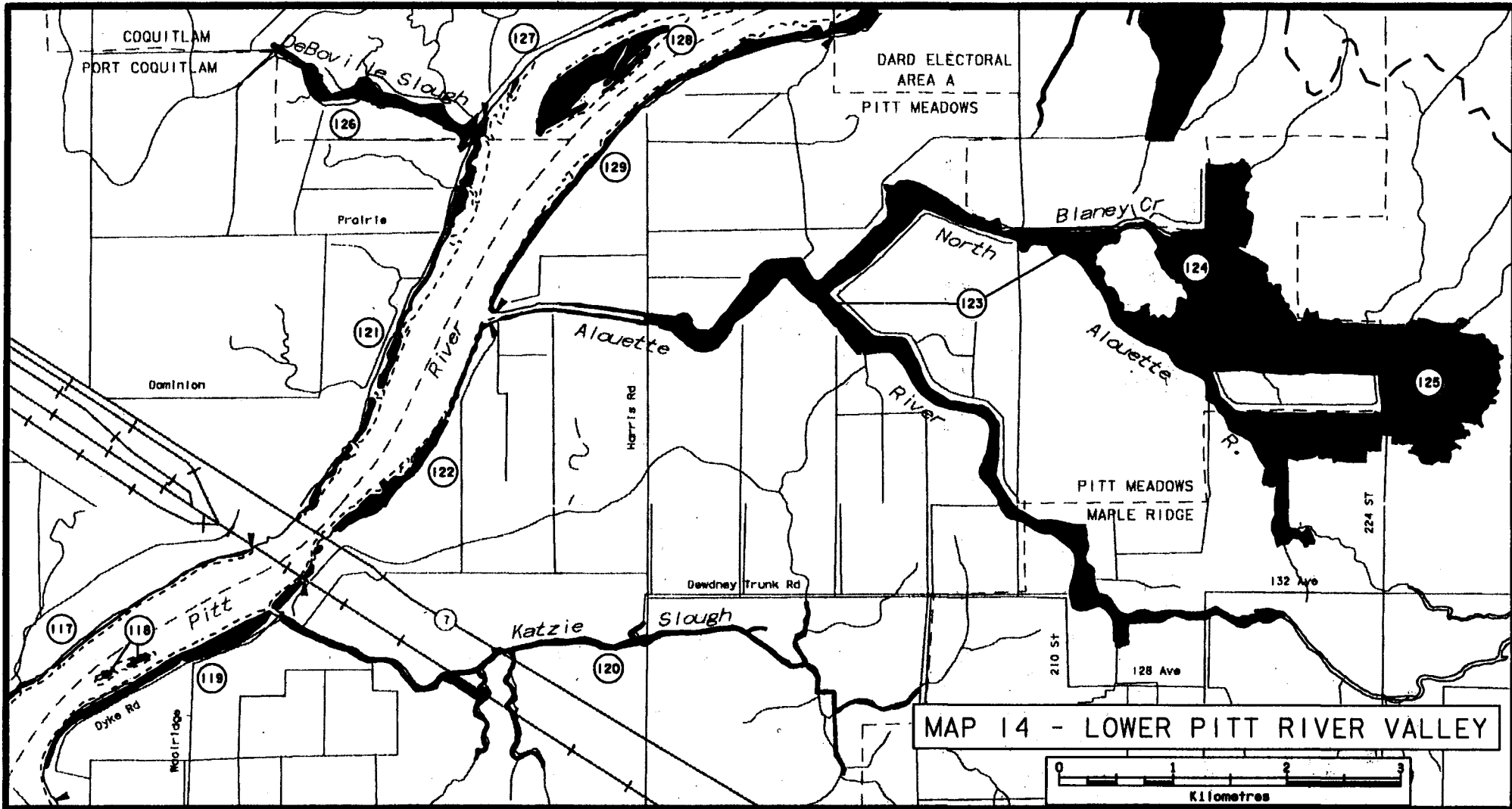
Fraser
River

Ladner

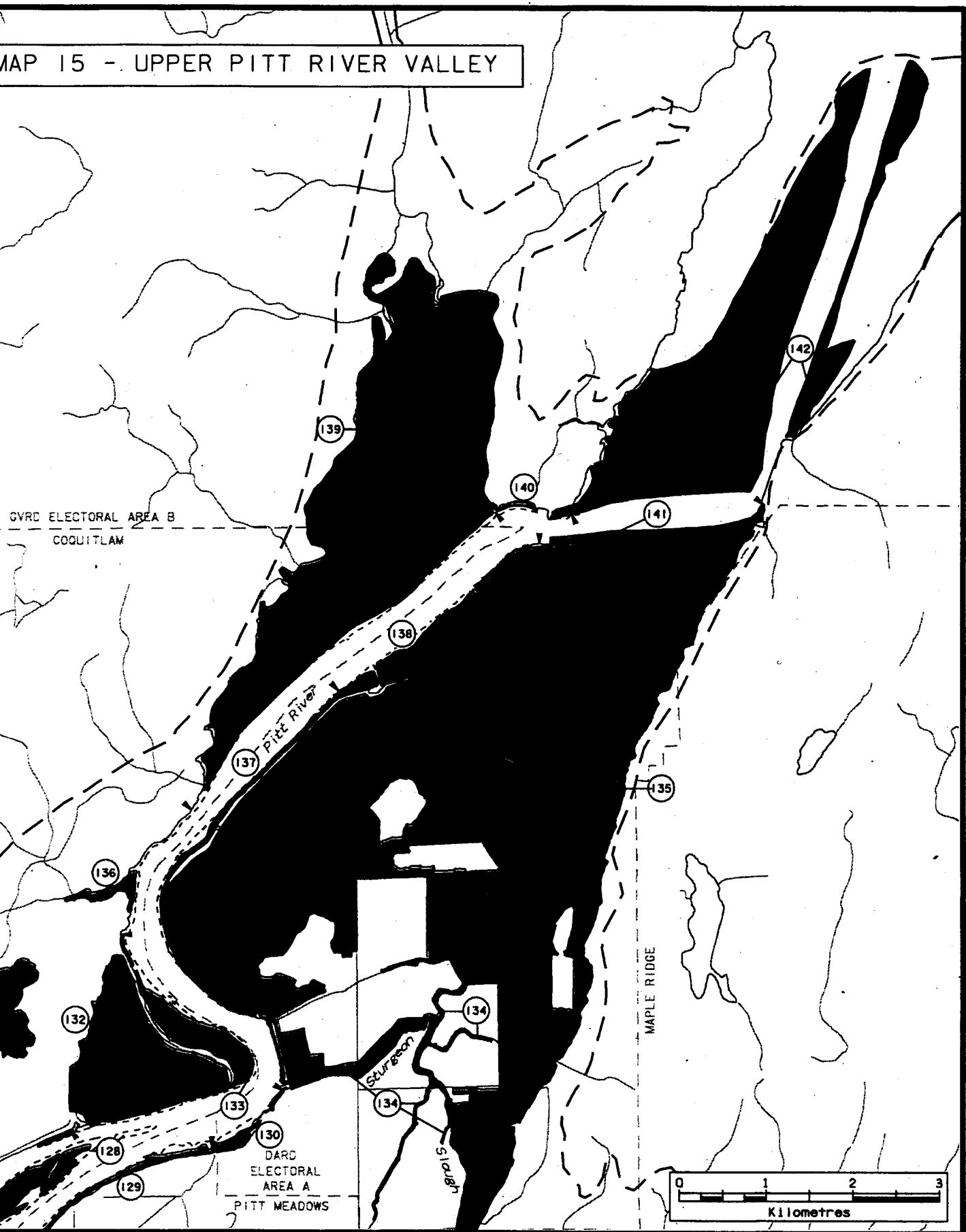


MAP 13 - NEW WESTMINSTER
TO SURREY BEND



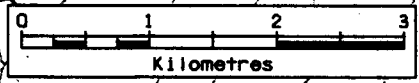


MAP 15 - UPPER PITT RIVER VALLEY

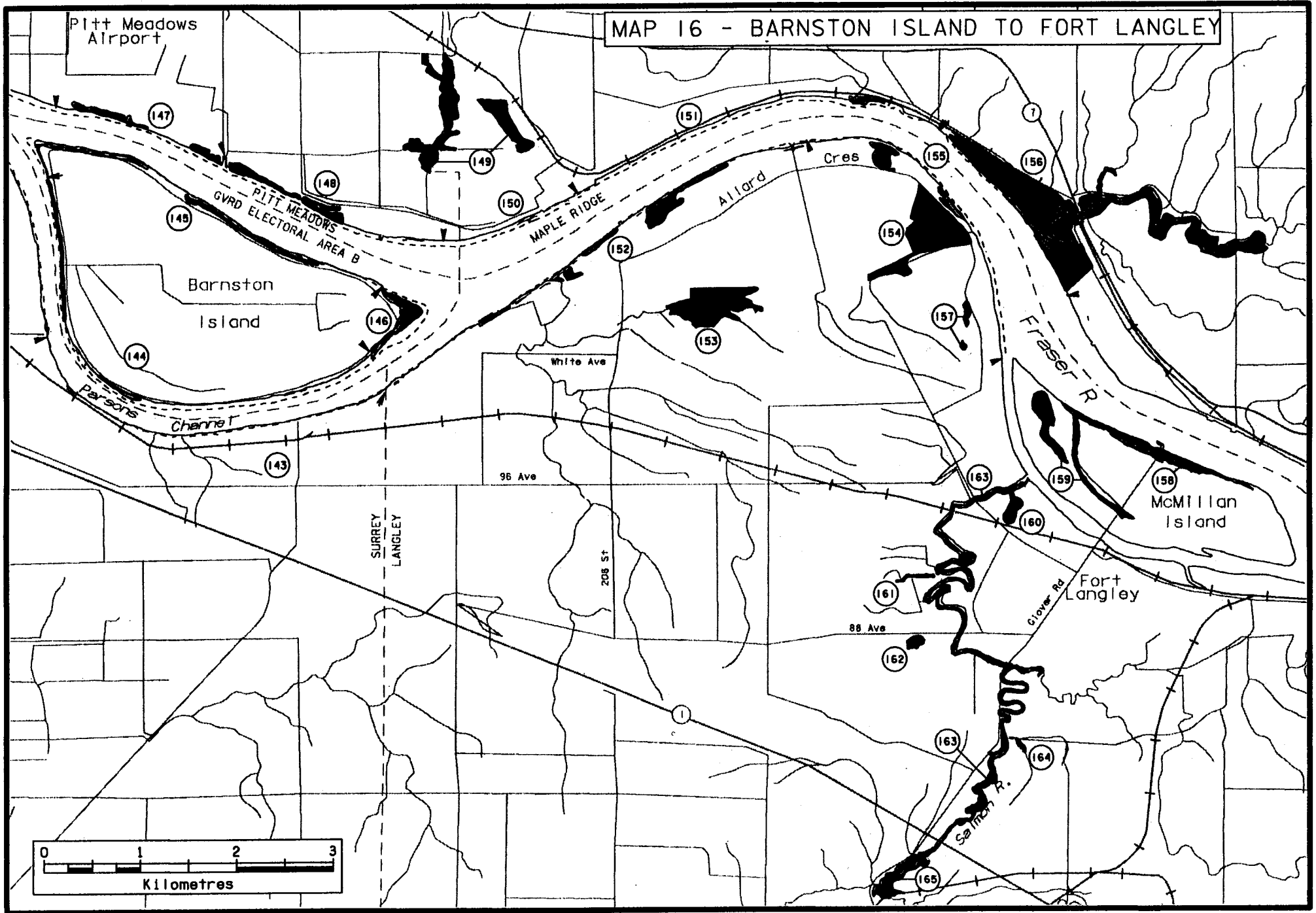


GVRD ELECTORAL AREA B
COQUITLAM

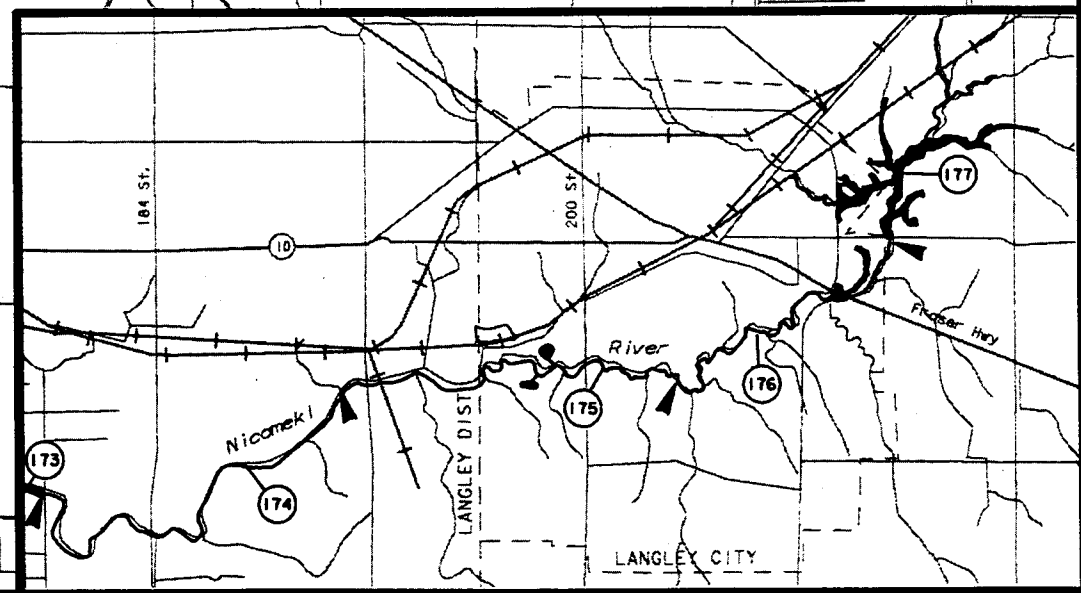
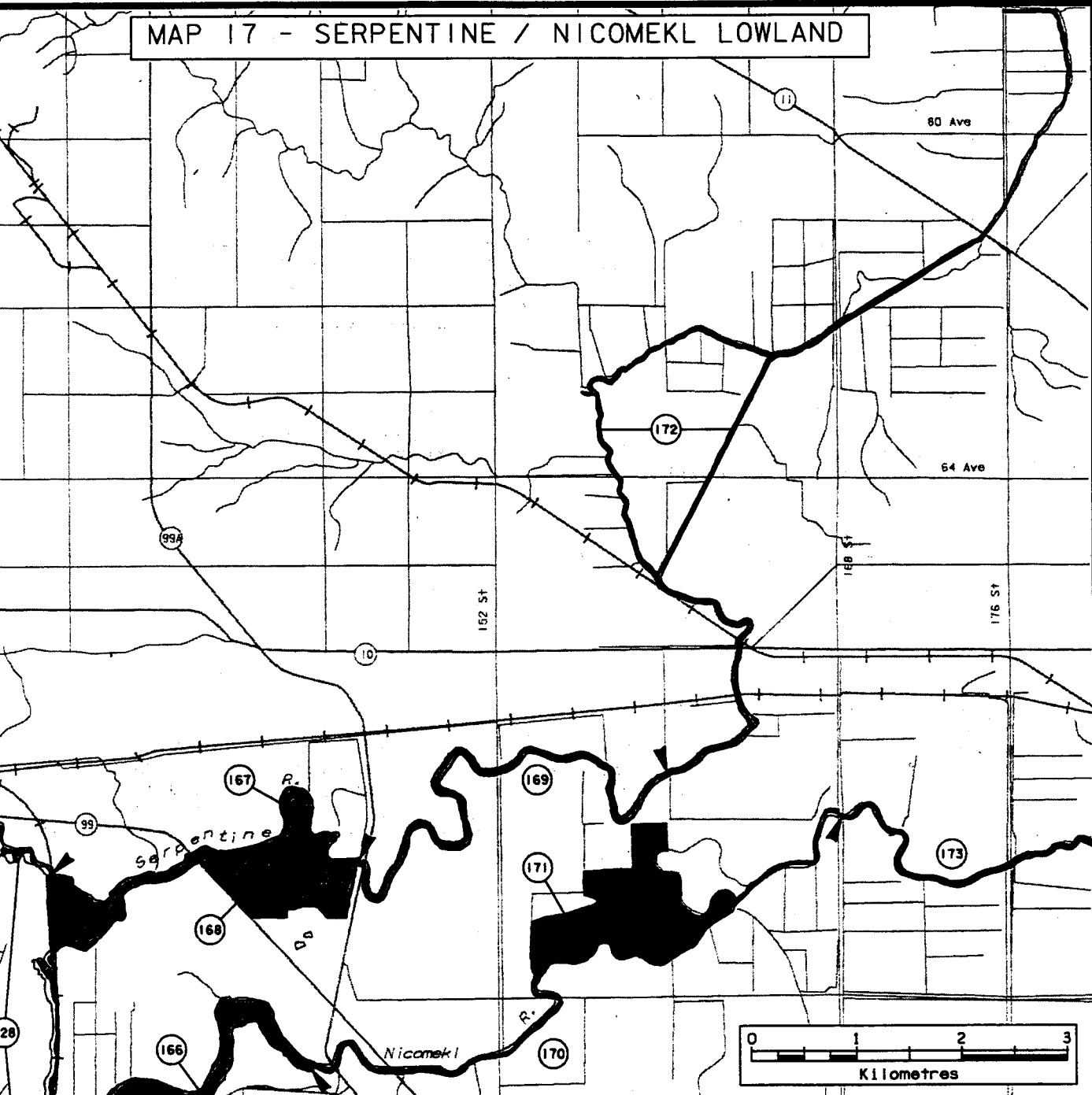
DARC
ELECTORAL
AREA A
PITT MEADOWS

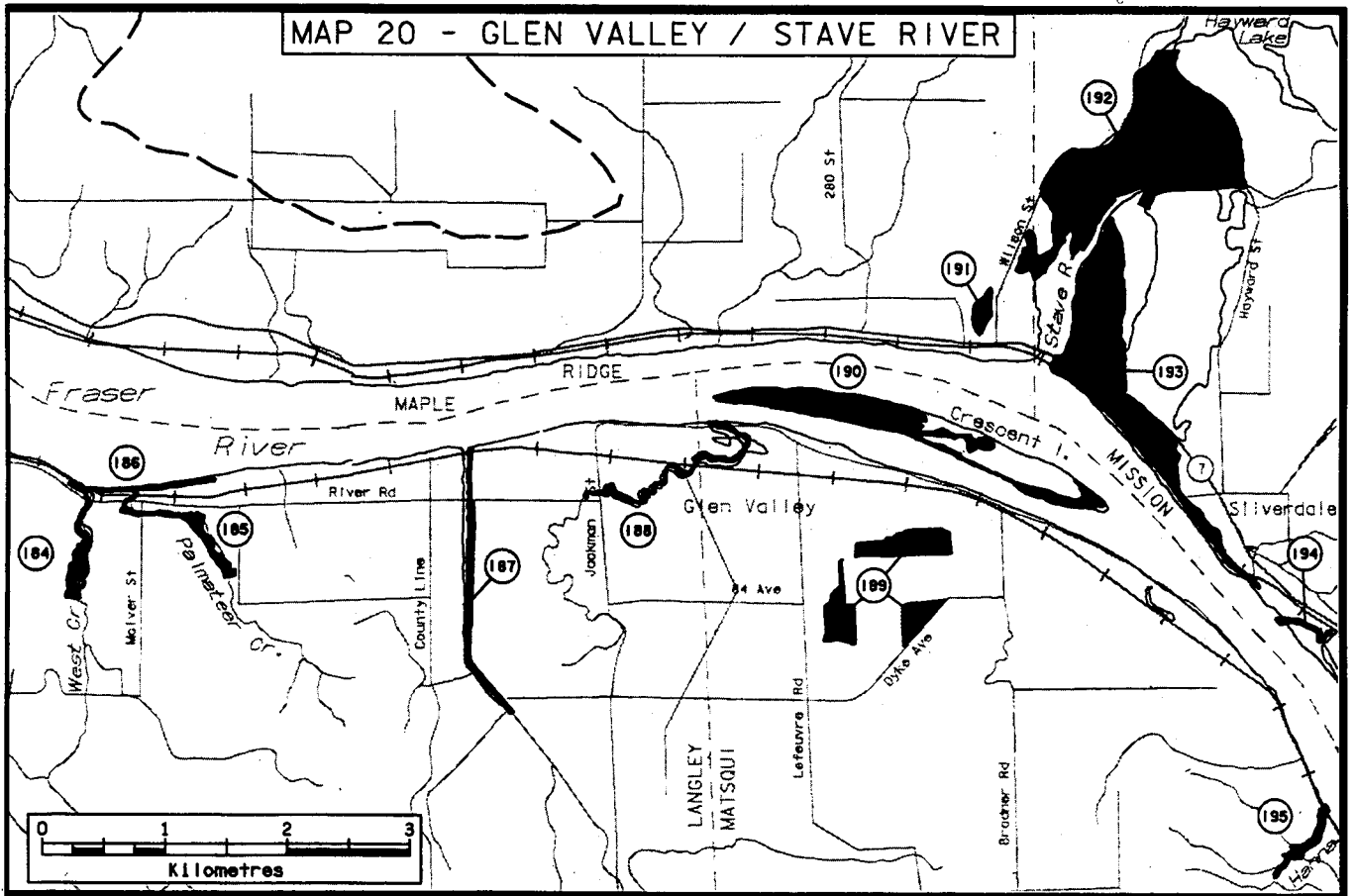
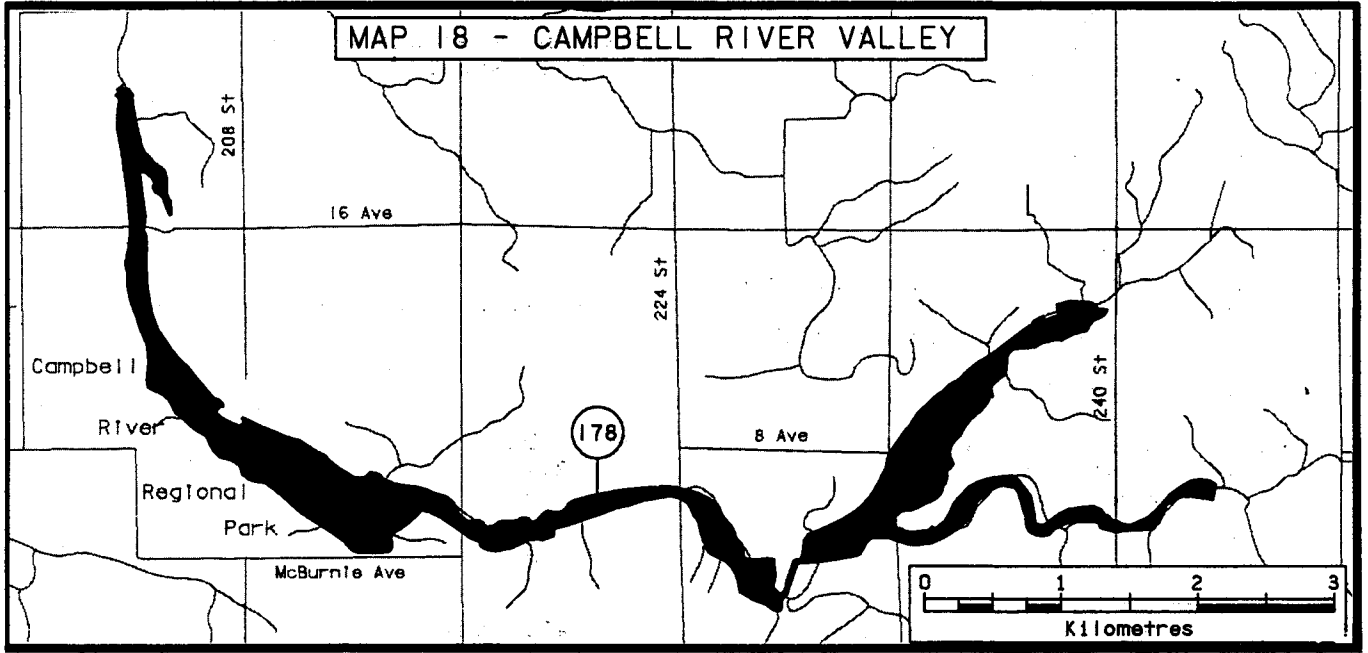


MAP 16 - BARNSTON ISLAND TO FORT LANGLEY

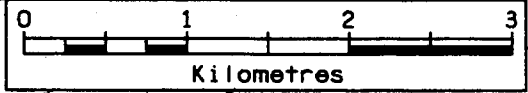


MAP 17 - SERPENTINE / NICOMEKL LOWLAND





MAP 19 - CENTRAL FRASER VALLEY UPLANDS



County Line

183

56 Ave

48 Ave

264 St

Robertson Cr.

182

Downes Rd

36 Ave

LANGLEY
MATSQUI

Fraser Hwy

Aldergrove

24 Ave

180

King Ave

272 St

Bradner Rd

179

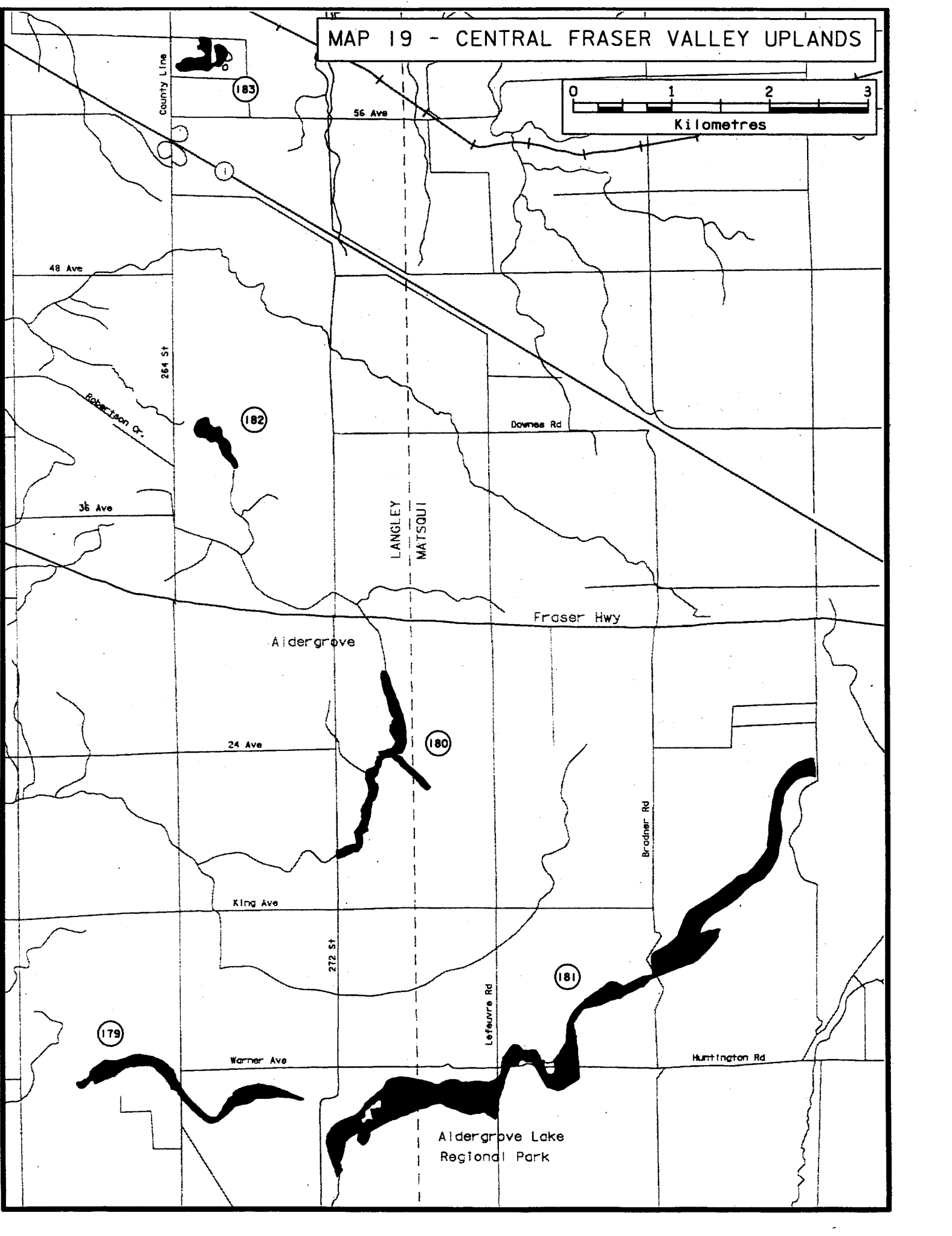
Warner Ave

Lefevre Rd

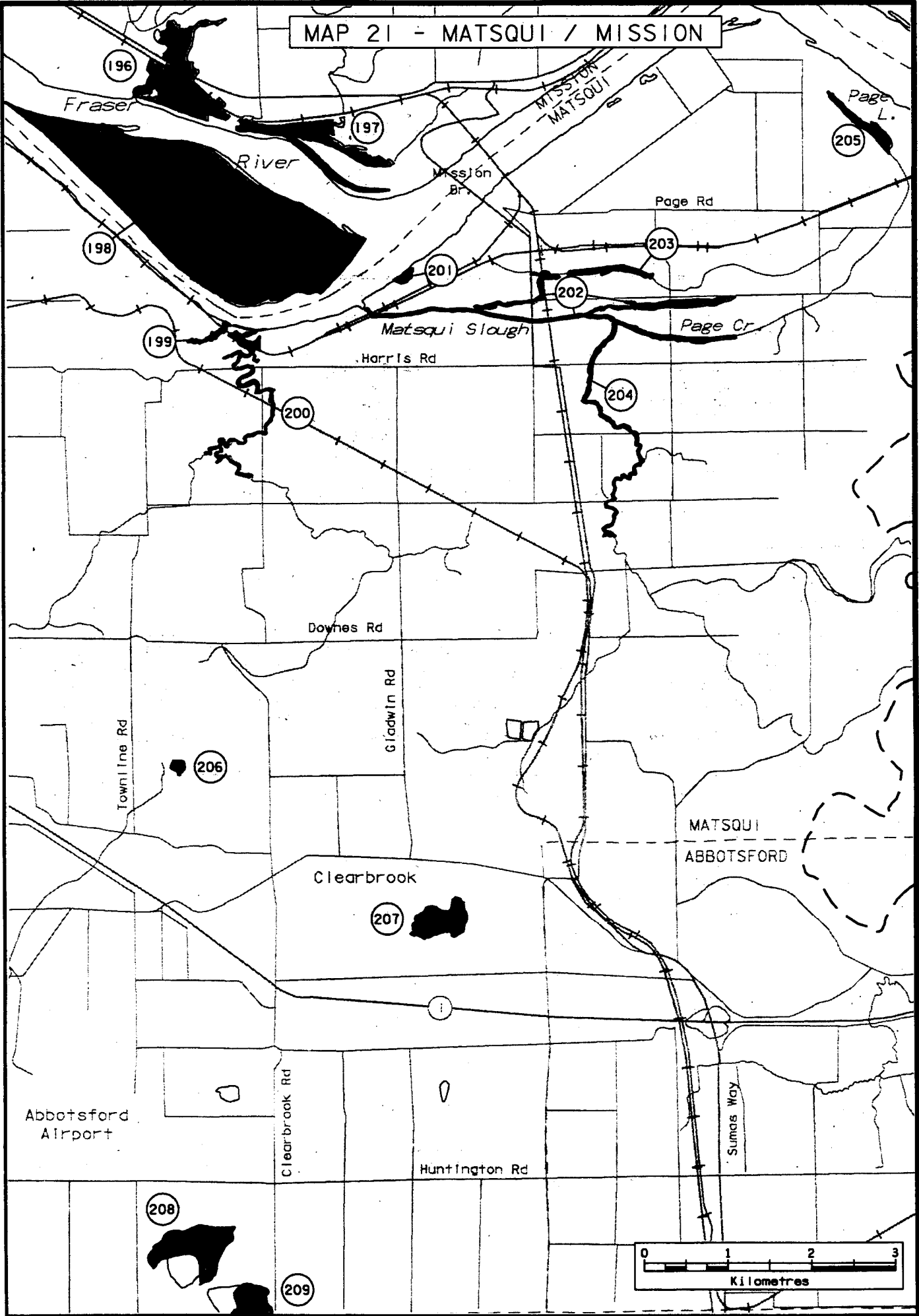
181

Huntington Rd

Aldergrove Lake
Regional Park



MAP 21 - MATSQUI / MISSION



196

197

205

198

201

203

199

202

200

204

206

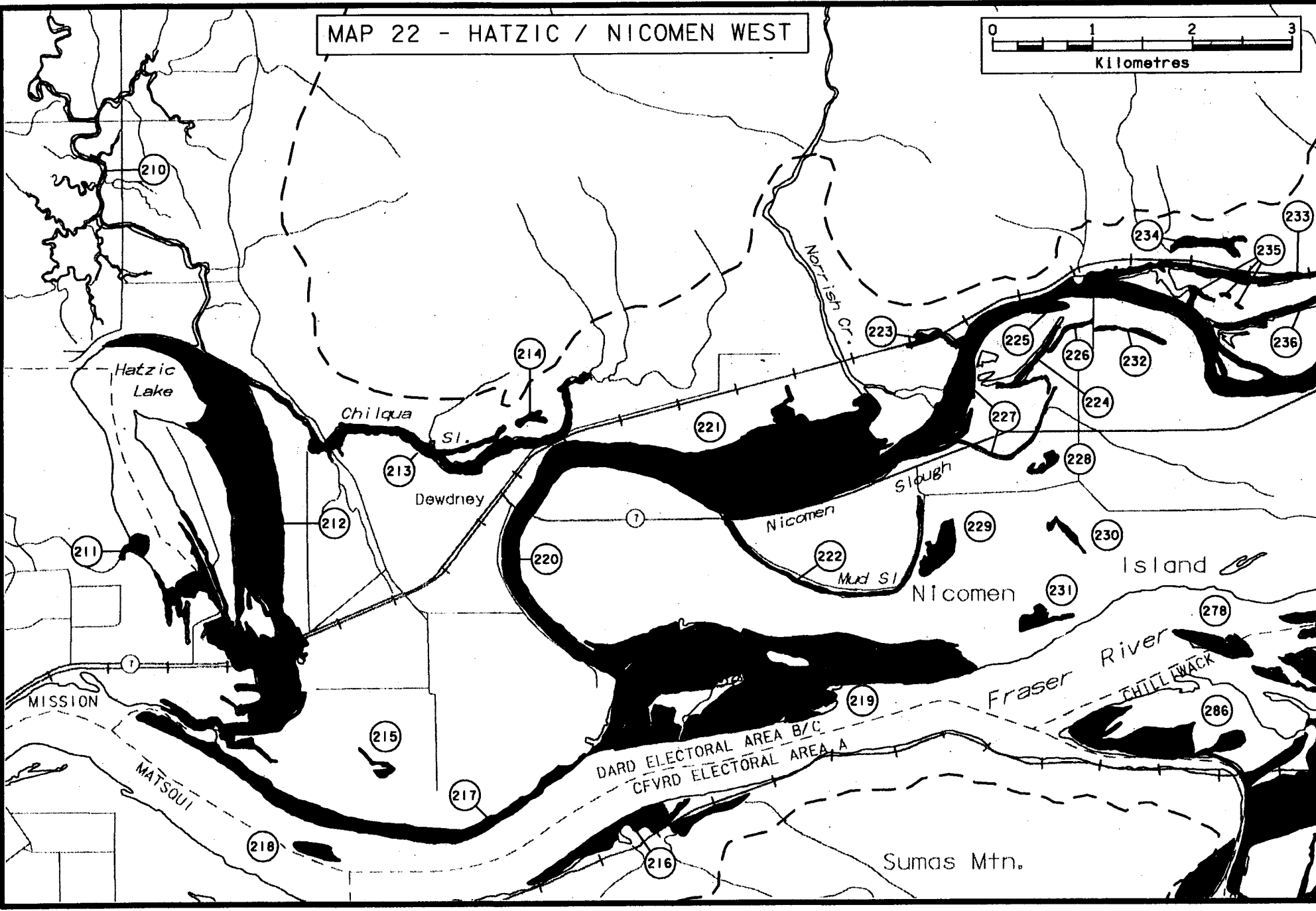
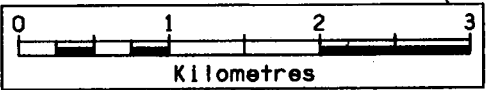
207

208

209

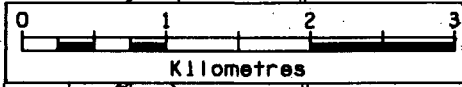
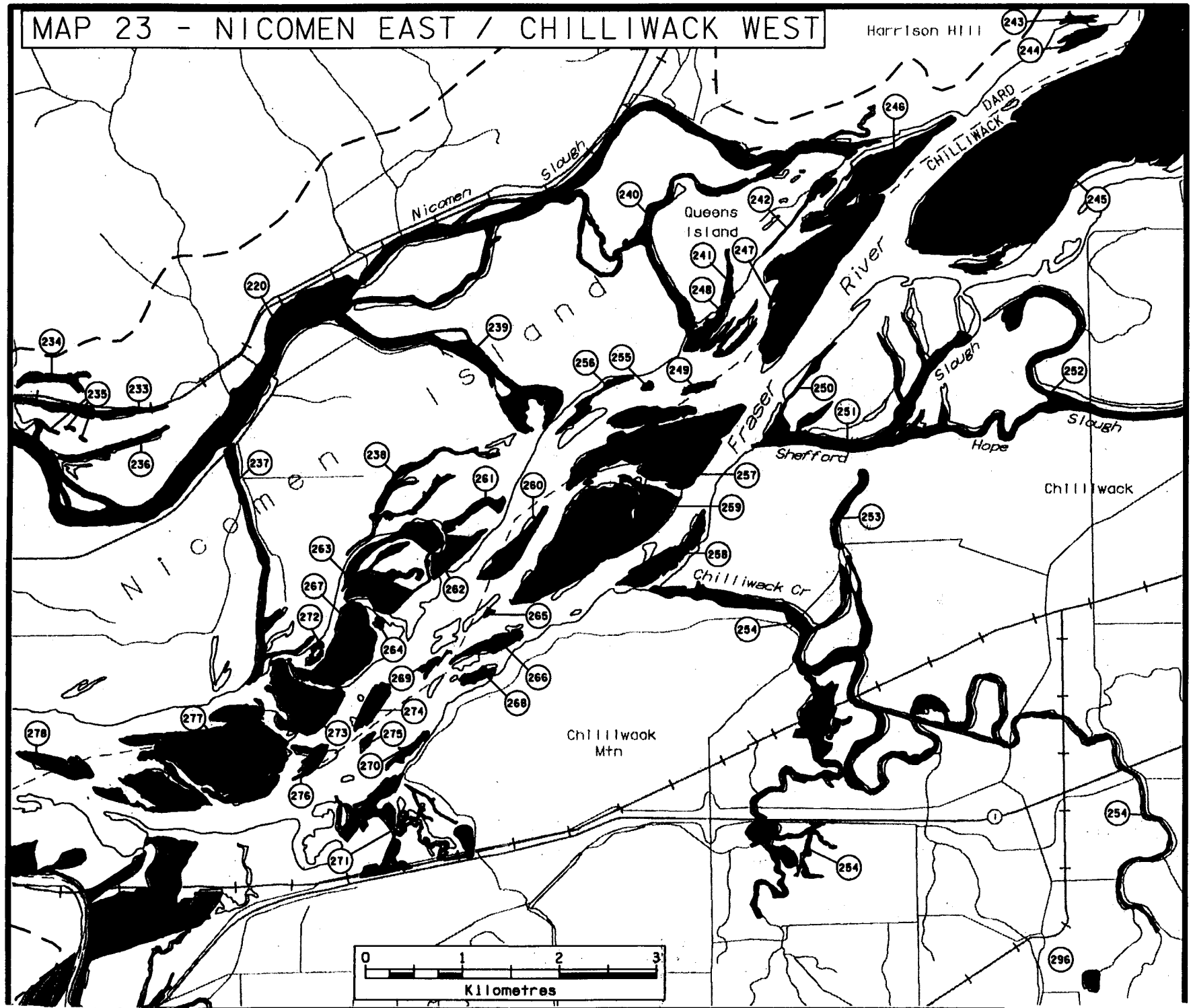


MAP 22 - HATZIC / NICOMEN WEST

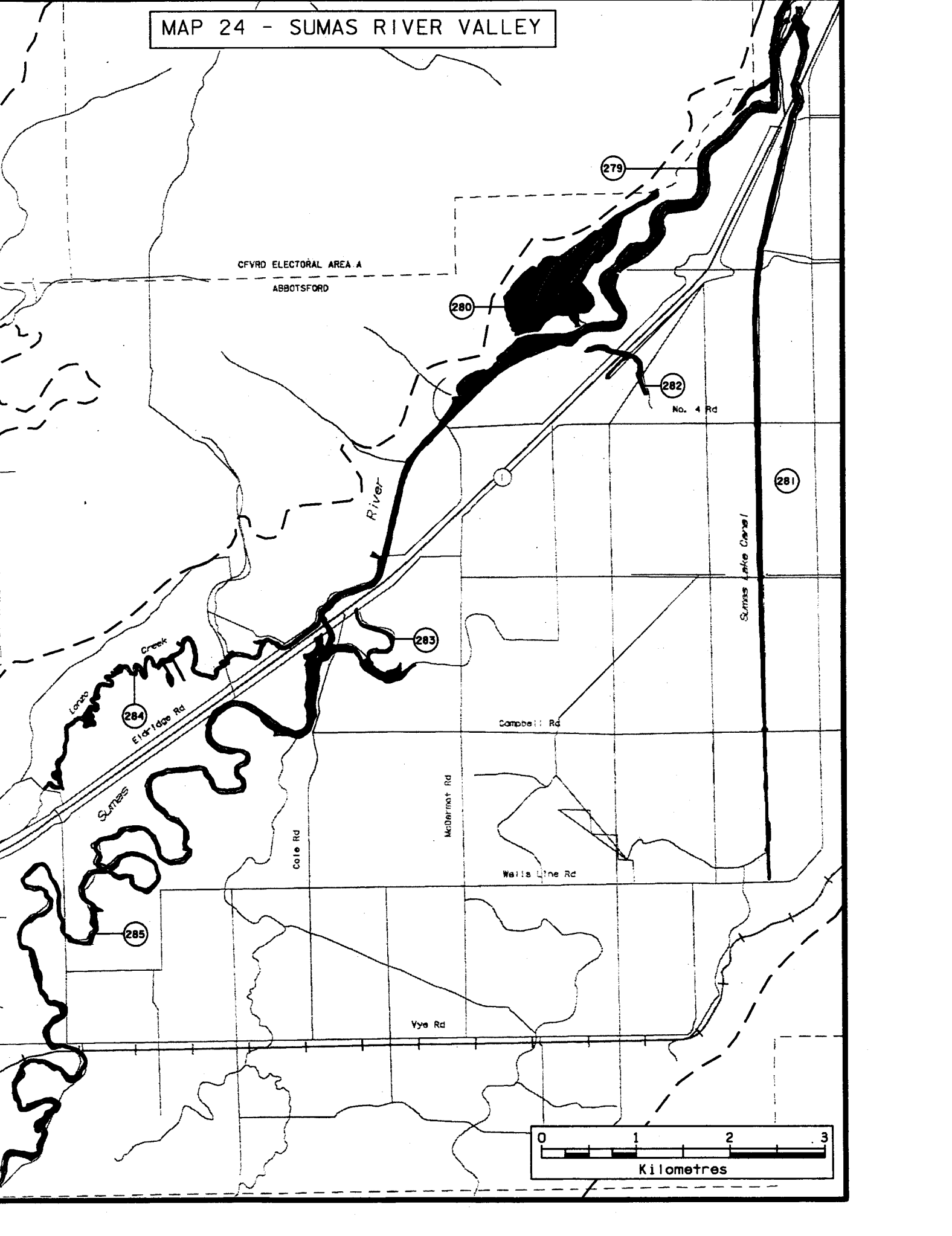


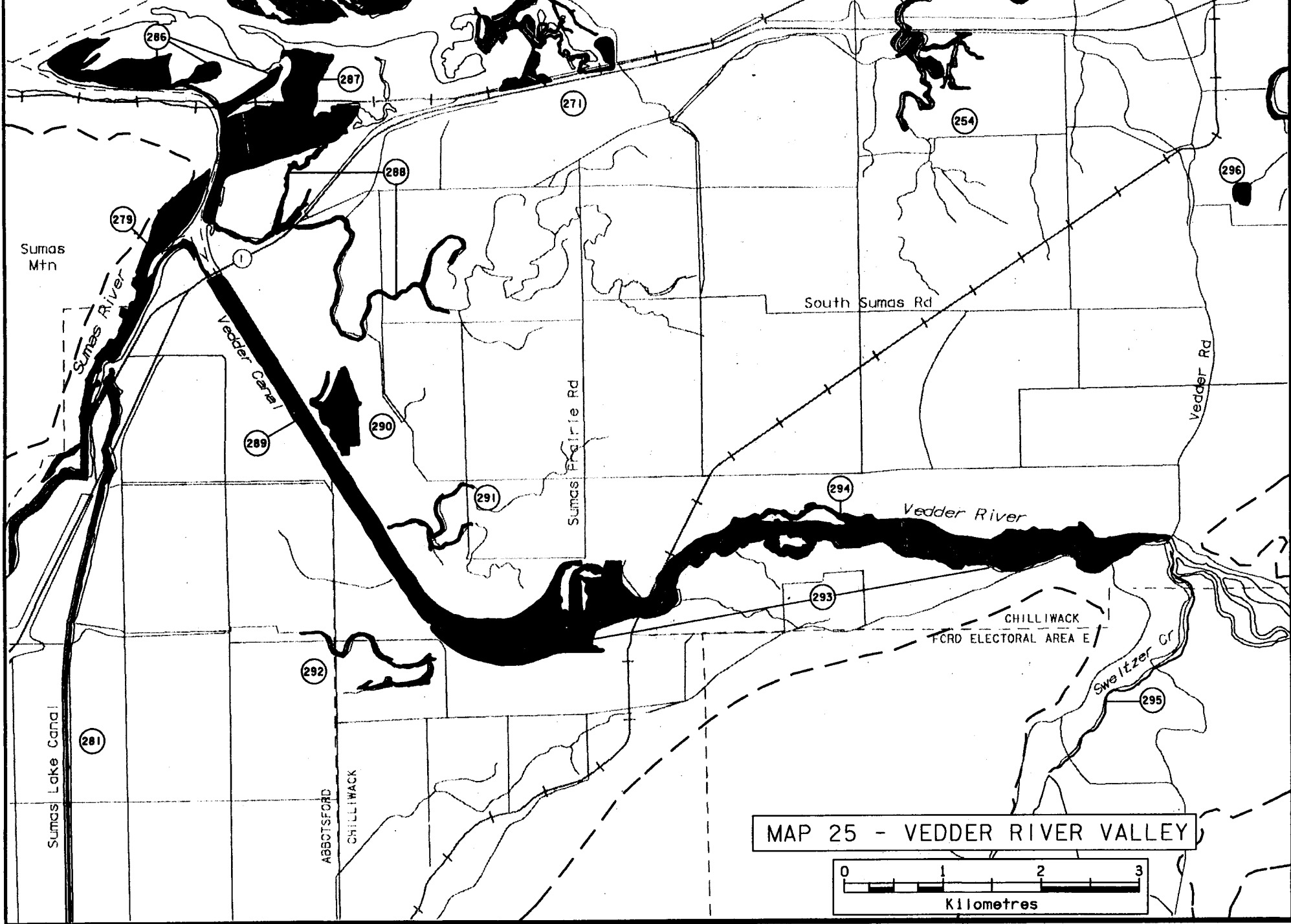
MAP 23 - NICOMEN EAST / CHILLIWACK WEST

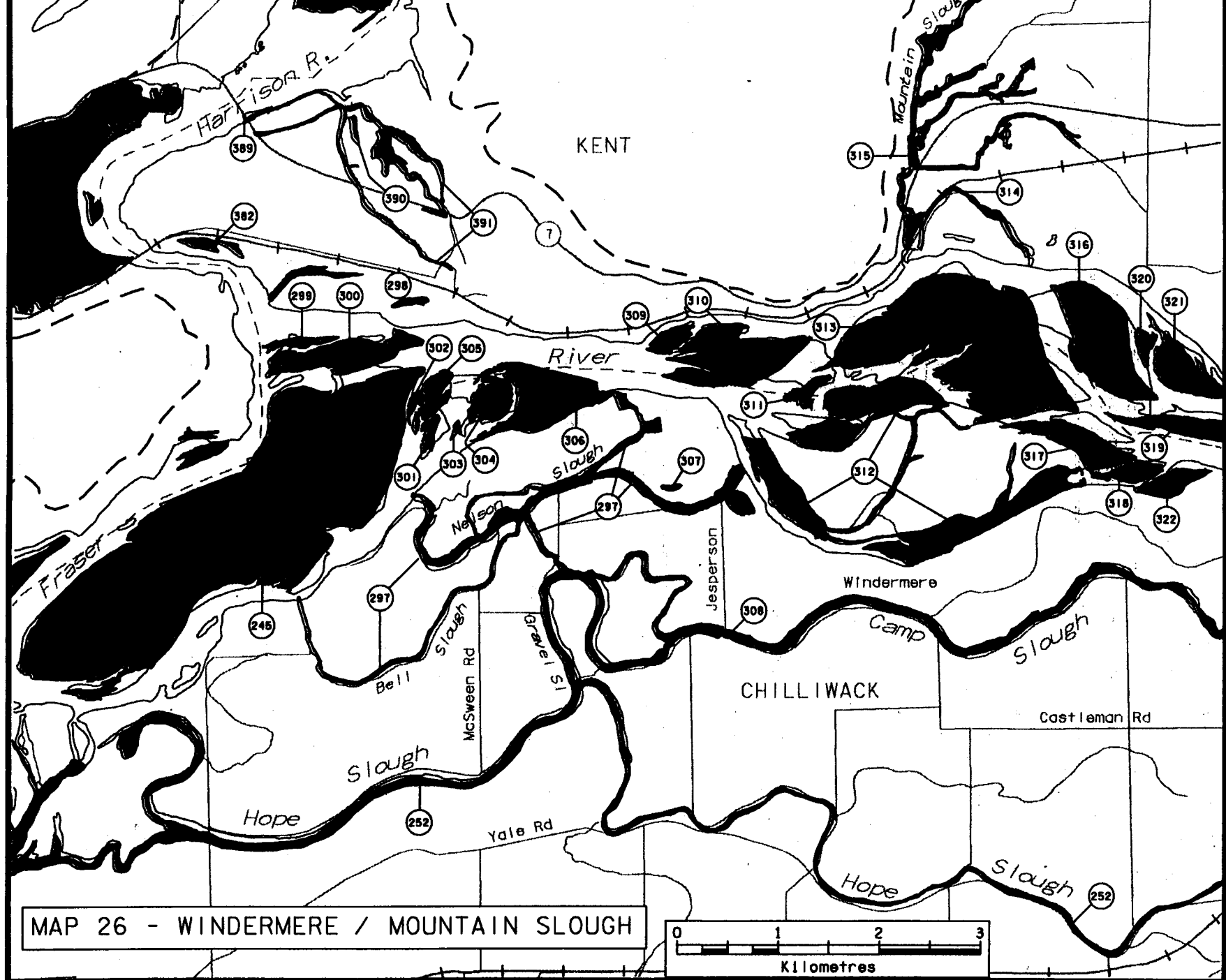
Harrison Hill



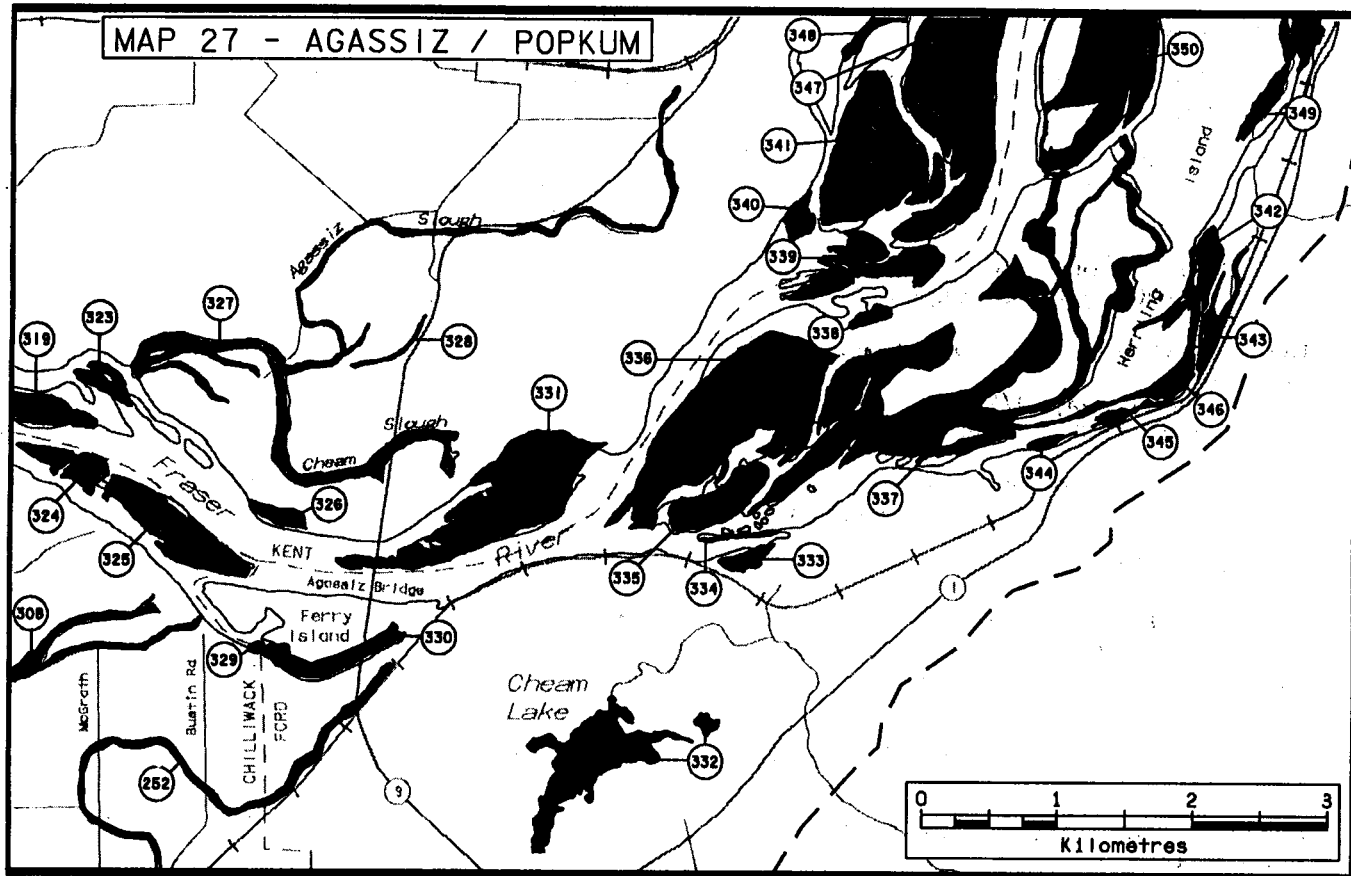
MAP 24 - SUMAS RIVER VALLEY



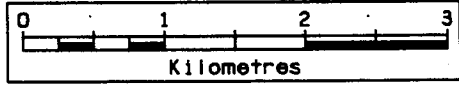
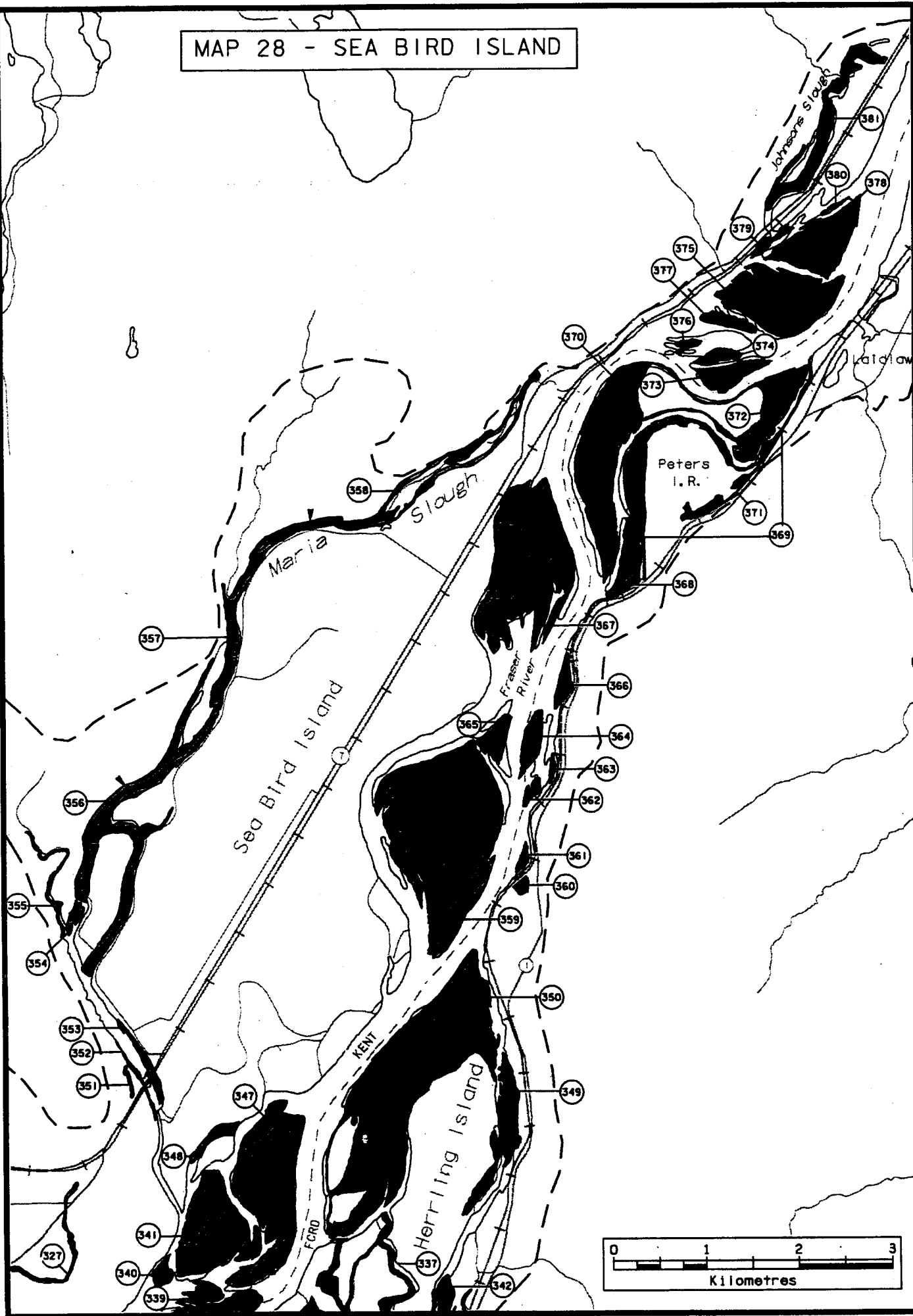




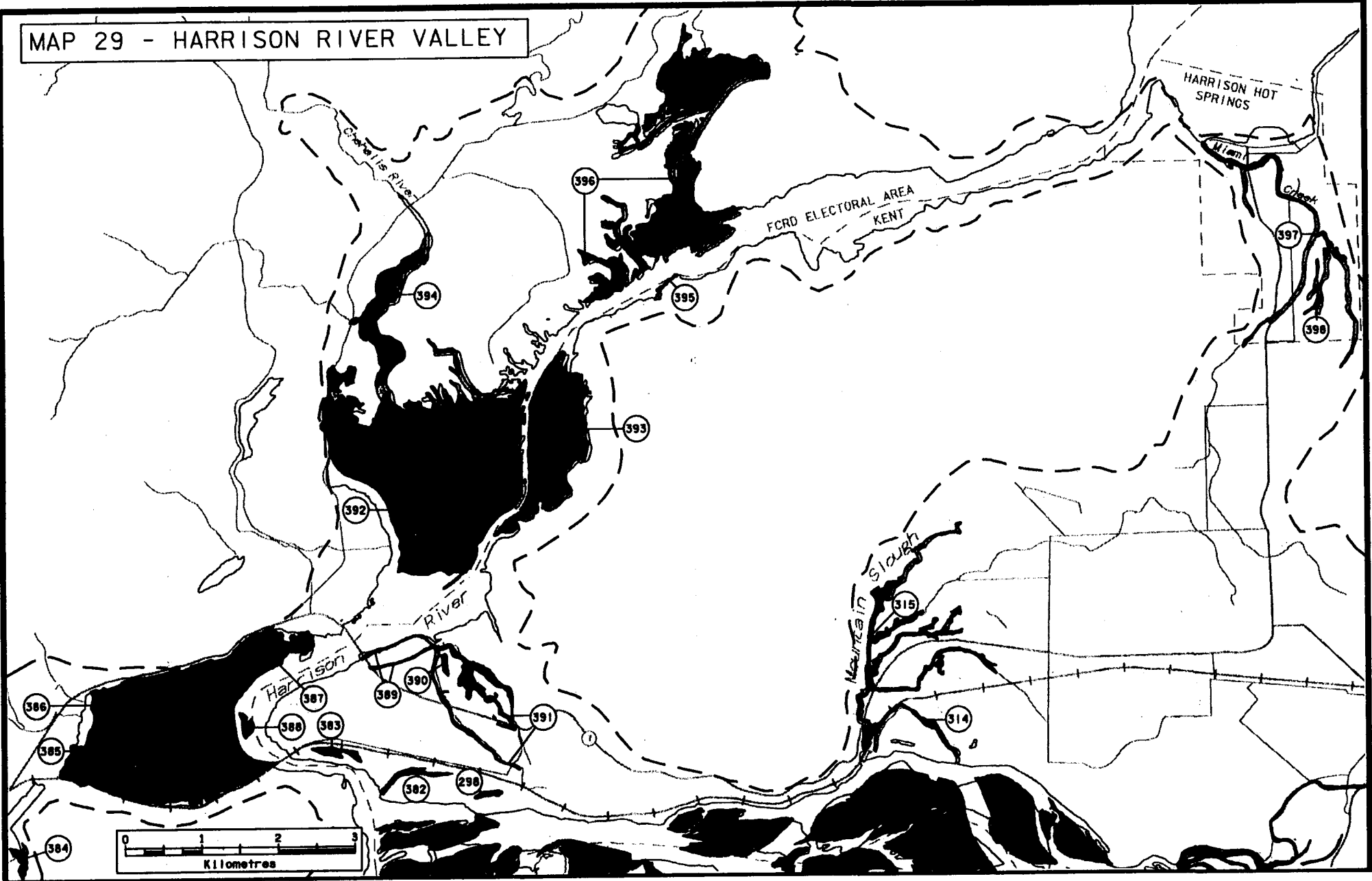
MAP 27 - AGASSIZ / POPKUM



MAP 28 - SEA BIRD ISLAND



MAP 29 - HARRISON RIVER VALLEY



REFERENCES

- Canadian Wildlife Service and Vancouver Aquarium. 1993. Is there a wetland in your neighbourhood?
- Chilibeck, Barry, Geoff Chislett and Gary Norris. 1992. Land Development Guidelines for the Protection of Aquatic Habitats. Co-published by Department of Fisheries and Oceans and B.C. Ministry of Environment, Lands and Parks.
- Demarchi, Dennis A. 1993. Ecoregions of British Columbia. Map, 1:2,000,000. Wildlife Branch, B.C. Ministry of Environment, Victoria, British Columbia.
- Greater Vancouver Regional District. 1993. Creating Our Future: Steps to a More Liveable Region. Burnaby, B.C.
- Province of British Columbia. 1993. A Protected Areas Strategy for British Columbia. Victoria, B.C.
- Sandborn, Calvin. 1993. Wetlands: The Wetlands of North America are Rapidly Disappearing. In: Conference Proceedings of Wetlands: Trans-Boundary Agenda Conference. September 1993. White Rock, B.C.
- Summers, Ken. 1992. A Field Survey of 50 Wetland Sites in the Fraser Lowland. Unpublished report prepared on behalf of Quadra Planning Consultants Ltd. for the Fraser Wetlands Planning Group, Canadian Wildlife Service and B.C. Ministry of Environment, Lands and Parks.
- Ward, Peggy, Kathleen Moore and Ron Kistriz. 1992. Wetlands of the Fraser Lowland, 1989: An Inventory. Technical Report Series No. 146. Canadian Wildlife Service, Pacific and Yukon Region, British Columbia.