

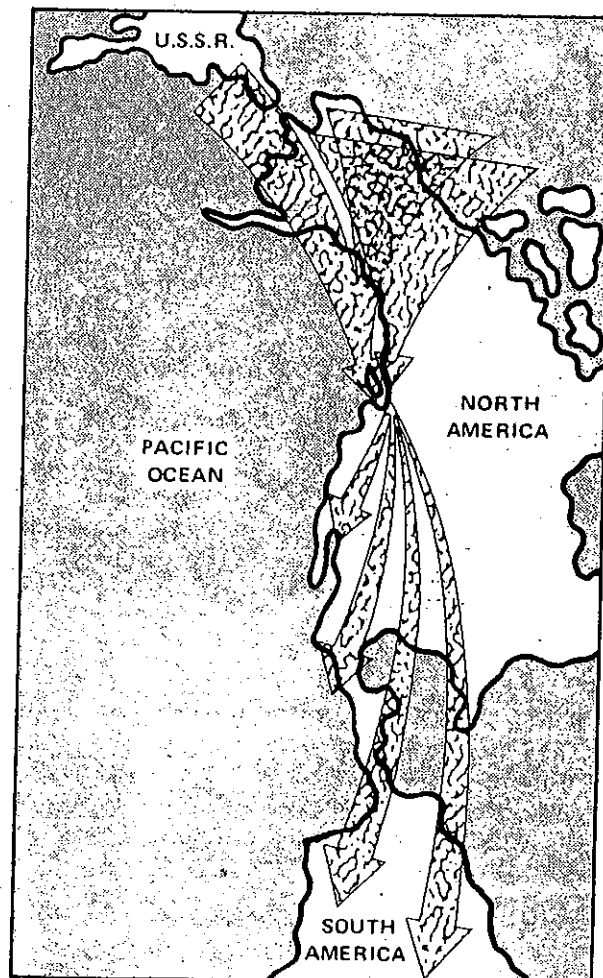
...Supporting the waterfowl of three continents

Schedule 1 to the Minutes of the Public Works and Transportation Committee meeting held on Wednesday, December 15, 2010.

The waterfowl of 3 continents converge at the Fraser wetlands on their way to and from breeding and wintering areas that extend from eastern Russia to South America. By nature of its size, climate, geographic location and the nutrient supply in its waters and delta lands, the Fraser River delta is the most important single area of aquatic bird habitat in British Columbia.

Two million ducks, five million shorebirds and thousands of other bird species migrate annually through the Lower Fraser Valley. In addition, about 250,000 ducks, 20,000 snow geese and 1,000,000 shorebirds remain to winter on the tidal marshes and agricultural lands of the valley. These birds attract, in turn, a variety of the often more spectacular raptorial birds such as hawks and falcons. The result is a dazzling array of wildlife made available not only to the people of British Columbia but also to the countless others who must rely on the capabilities of the Fraser wetlands to ensure the survival of birds which will eventually reach their lands.

Proper wintering and staging areas are critical to the survival of migratory as well as resident bird populations. The security of the valuable Fraser wetlands will, then, determine the fate of a variety of birds over an enormous area of North America, South America and North Eastern Asia.



STURGEON BANK

Sturgeon Bank is an extensive foreshore area lying north of the Fraser River main arm and covered under map reserve no. 0240051 for the Fish and Wildlife Branch. This area is largely mudflat with a strip of marshland running along the foreshores of Sea and Lulu islands. Airport extensions off Sea Island will inevitably remove most of the marsh portion of this foreshore from bird use (ca 1300 acres) and greatly diminish aquatic bird habitat over the remaining portion of ca 4,000 acres. Additional losses of marsh and mudflat habitat will be incurred as a result of the proposed development of marina or light industrial complexes at Iona Island on the north arm (ca 300 acres), Swishwash Island in the middle arm (ca 320 acres) and at Garry Point at Steveston (ca 200 acres). Losses of the marsh portions of the foreshore are critical since the marsh vegetation is the principal primary producer of food which sustains animal life on the estuary, particularly for birds.

At present a strip of private land (ca 600 acres) runs outside the dyke nearly the full length of the Lulu Island foreshore. This private land is a vital portion of the foreshore in both a legal sense (since it affords riparian rights to its owners) and a biological sense (since it encompasses a considerable portion of the foreshore marsh. Its purchase is recommended to secure the foreshore area for aquatic bird management and to facilitate the development of a recreational green belt between the present dyke and the open foreshore. The concept of this development has already been presented to planners and administrators of the Vancouver-Fraser Regional District and Richmond Municipality who have favoured the proposal if the Crown purchases the land and carries out the necessary works. Under this plan most of the foreshore beyond existing private lands would remain in a wild state.

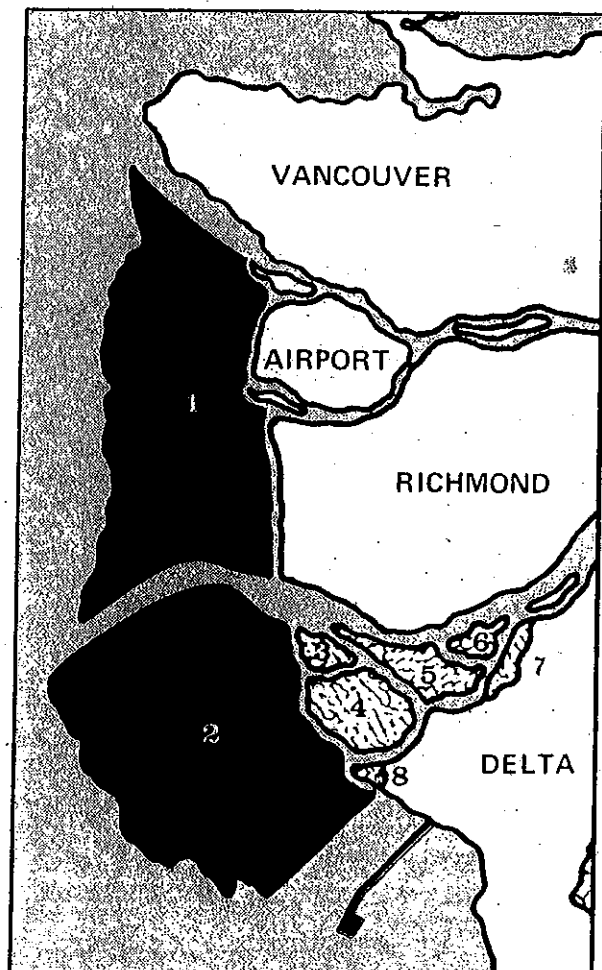
ROBERTS BANK

Roberts Bank is an extensive foreshore area lying south of the main arm of the Fraser River and extending to the international border near Point Roberts. This area is largely mudflat with a strip of marshland running along the foreshores off Reifel and Westham islands from Canoe Pass to English Bluff at the Tsawwassen ferry slip.

The larger portion of this bank is under Provincial Order-in-Council Reserve (no. 2374) which covers all foreshore areas from the Tsawwassen ferry slip to the main arm of the Fraser River (ca 27,000 acres). However, the Roberts Bank Super port development occurs within the reserve and has alienated ca 3,000 acres lying between the Tsawwassen ferry slip and Brunswick foreshore near Canoe Pass. Additional alienations in the form of marina developments are occurring within the bank area south of the Tsawwassen ferry slip.

It is recommended that the important remaining foreshore areas off of Brunswick Point north of the super port boundary and Reifel and Westham Islands be secured for aquatic bird conservation and management. These areas, along with the foreshore off Lulu Island, are a major part of vital habitat required for the survival of the aquatic bird resource. It is intended that these areas largely remain in a natural state with minor development to improve public access for recreation.

1. Sturgeon Bank
2. Roberts Bank



2.4 Sedimentology

Luternauer and Murray (1973) present an account of the sedimentology of the delta front. They divide the intertidal and nearshore subtidal environments into salt marsh and platform zones. The salt marsh is described as occurring near the high tide level and as a vegetated bank of flat to hummocky muddy sediment. The platform is described as that area that gently slopes for approximately 6 km from the salt marsh to the level of the most distinct, first break-in-slope (approximately 9 m below lowest normal tide level). This zone is mantled mainly with well-sorted 0.35mm to 0.125 mm sand. It is generally featureless except for the presence of tidal channels and hydraulic bedforms (current and wave ripples).

Sturgeon Bank is covered almost entirely by sand-size sediment. A "lobe" of uniform, well sorted, medium sand extends from the mouth of Middle Arm to the edge of the platform. Sediments of this coarseness are discharged during the periods of higher river flow.

Sediment migration across the tidal flats has been increasingly interrupted with the construction of successive jetties and causeways, including:

- Steveston Jetty (1912; reconstructed 1978);
- Airport Approach Lights Causeway (1962);
- Iona Island Causeway (1958);
- Iona Jetty (1961; 1988 upgrade associated with installation of deep water sewage outfall pipes);
- North Arm Jetty (1917; extended 1935, 1951; repaired 1994); and
- North Arm Breakwater (1951).

Although the closure of McDonald Slough (known as Iona Channel prior to construction of the causeway) and the construction of jetties and other causeways has altered the sedimentation regime of northern Sturgeon Bank, significant impacts to the sedimentology of the delta front has likely not occurred as a result of these structures. Williams and Hamilton (1995) found that sedimentation rates on the Lulu Island foreshore have declined significantly; post-1964 sedimentation rates are, on average, 51 percent lower than pre-1964 rates. Williams and Hamilton (1995) attributed the reduction in sedimentation rates to erosion of the marsh surface. Erosion is a recent phenomenon (post-1964). Geomorphic evidence suggests that widespread surficial erosion may be occurring throughout the low marsh. The Iona Causeway and the Airport Approach Lights Causeway were both constructed during the early 1960's, but both are north of Lulu Island while sediment movement over the delta has been found to be persistently from south to north (Luternauer 1980). Steveston Jetty, at the southwest corner of Lulu Island disrupts longshore circulations and increases offshore sediment transport by channelizing flow (Milliman 1980); however, the jetty was completed in 1932, which suggests that it is not responsible for changes in the sediment budget that have since 1964. Note: The Steveston jetty was below high tide levels at Steveston Bend until it was raised in 1978. Williams and Hamilton (1995) suggest that a factor likely contributing to recent erosion of the marsh is increased dredging in the Fraser River distributary channels, resulting in the reduction of sediment supply to the delta front. The dredging has reduced sediment input and caused net erosive lowering throughout much of the flats.

The Iona Island Recreation and Conservation Master Plan recommends recreation (beach) and habitat creation/enhancement development for intertidal areas within the interjetty area (Guzzi Perry & Associates 1989). A beach is proposed for the south side of the North Arm Jetty; development of a marsh is proposed as compensation for beach development.

3.6.5.3 City of Richmond

The City of Richmond has designated the Lulu Island dyke for recreation purposes. Dyke maintenance is Richmond's responsibility.

All intertidal marsh and mud flats within the Richmond city limits, including all of Sturgeon Bank, has been designated as a conservation area according to Bylaw No. 5746 (1991) which places restrictions on development permits, generally requiring a set back of 30 m from the high water mark and 15 m from the seaward crest of the dyke.

4.0 MANAGEMENT PLAN

4.1 Conservation of Fish and Wildlife Resources

* Urban and industrial development has alienated a large percentage of the natural habitat in the Fraser River estuary. The estuary has been shown to be an important staging and wintering area for waterfowl and shorebirds and provides essential habitat for herons and for juvenile salmon before they migrate to sea. It has been estimated that 70 percent of the area once encompassed by intertidal swamp, marsh and mudflat of the lower delta has been altered or lost due to dyking (Butler and Campbell 1987).

Sturgeon Bank represents approximately 26 percent of the 288 km² estuarine habitat of the delta front (Sturgeon Bank, Roberts Bank and Boundary Bay) (Hayes *et al.* 1993).

For waterfowl, herons and gulls, maximum use of intertidal areas depends on the presence of nearby agricultural lands. The value of each of these habitats is increased by the presence of the other. However, as the agricultural land required by wintering waterfowl becomes scarcer, the relative value of intertidal habitats increases. Accordingly, securing tenure of intertidal marsh and mudflat habitats of Sturgeon Bank for conservation purposes would contribute significantly to maintaining the functional capacity and biological diversity of the Fraser River estuary.

Note: At the same time as the agricultural land required by over wintering waterfowl has decreased, so has the holding capacity of the intertidal marsh and mudflats decreased.

of the pancreas in crab populations off Sturgeon Bank (J. Thompson, Institute of Ocean Sciences, Department of Fisheries and Oceans).

4.7.2 Recommended Studies

Studies that would facilitate the effective management of the WMA include, but are not limited to, the following:

- a. an investigation into the extent and nature of intertidal habitat use by Canada geese, and the relationship to use of urban habitats such as playing fields, lawns, etc.;
- b. an investigation of the extent and nature of shorebird use of intertidal mudflats during the summer;
- c. an assessment of the efficacy of aerial and ground census techniques for shorebirds, and the effects of weather, tides and season on counts;
- d. an investigation of the relationship of the distribution and abundance of black-bellied plover and dunlin within intertidal and agricultural environments;
- e. an investigation regarding the dependency of bitterns and rails on intertidal marshes;
- f. a year round census of duck abundance within, and use of, intertidal and nearshore subtidal environments;
- g. an investigation of the relative use of intertidal and agricultural environments by dabblers;
- h. a year round census of raptor abundance within, and use of intertidal and upland environments;
- i. an assessment of the feasibility of introducing yellow-headed blackbirds into high elevation *Scirpus validus* and *S. acutus* marshes and the conversion of *Typha latifolia* marshes into *S. validus* or *S. acutus* marshes;
- * j. an assessment of the feasibility of establishing eelgrass (*Zostera marina*) into the interjetty area;

- k. a comprehensive baseline inventory of soil and water quality throughout the WMA, including storm sewer outfall locations;
- * l. a comprehensive account of the sedimentology of the delta front;
- * m. an assessment of the feasibility of placing dredge spoil at strategic locations with Sturgeon Bank to offset the deficit in the sediment balance and to create new intertidal habitats for wildlife;
- n. a detailed inventory and map of marsh plant species, both in terms of species presence and areal cover, within intertidal marshes located throughout the WMA;
- o. an investigation into interstitial soil and ambient salinity environments within intertidal marshes, the influence on marsh community structure, and the factors that influence the prevailing salinity regimes;
- p. an assessment of the feasibility of planting shrubs and trees within high intertidal and upland environments within, and in proximity to, the WMA;
and
- q. an assessment of use, and the impacts thereof, of intertidal and nearshore subtidal environments by the public.

* Note: To provide with intertidal and potential agricultural upland habitat Richard should purchase the Gravel Land. This could be a long term solution to keeping the overwintering snow geese out of marshes.

5.0 LEGAL ARRANGEMENTS

The management of Sturgeon Bank, and the ownership of crown held lots is shared jointly with other agencies, as follows:

- all management activities which could impact on fish habitat must be handled through the FREMP referral process;
- the existing crown lots held in the interest of B.C. Environment, were purchased jointly by B.C. Environment and the Canadian Wildlife Service; and
- the Canada-British Columbia Wildlife Agreement (1989), requires both the Canadian Wildlife Service and B.C. Environment to be informed of, and to provide input into, all habitat management projects under the jurisdiction of the other party.