

Mapping Wetland Vegetation in the Fraser River Delta

Brown, L. N., G.A. Borstad, M. Álvarez, and L. Beckman (1998)

The South Arm Marshes and Ladner Marsh in the Fraser River delta, British Columbia, together make up an internationally important stopovers for hundreds of thousands of migratory birds on the Pacific Flyway. The area provides breeding and feeding habitat for one of the largest overwintering waterfowl populations in Canada, comprising some 40 species of ducks, geese and swans. As well, it provides prime habitat for large numbers of fish and wildlife species. Yet the marshes are located adjacent to one of the fastest growing urban centres in the country and are subject to intense pressure from urban and agricultural development.

In 1977 the South Arm Marshes and Ladner Marsh were jointly purchased by the Canadian and British Columbia governments to form the South Arm Marshes Wildlife Management Area, now managed by the BC Ministry of Environment, Lands and Parks.



In July 1993 Borstad Associates acquired multispectral imagery of wetlands in the Fraser River estuary, British Columbia, Canada, including the Ladner and South Arm Marshes, the Reifel Migratory Bird Sanctuary and the Alaksen National Wildlife Area. The Reifel Migratory Bird Sanctuary and Alaksen National Wildlife Area have together been designated a Ramsar wetland site.

Figure 1. *Typha sp.* (cattail) is characteristic of the wetland vegetation in the South Arm and Ladner Marshes.

In 1998, with funding from Fisheries and Oceans Canada through the Canadian Ocean Frontiers Research Initiative, habitat analysis was performed for the Ladner and South Arm Marshes portion of the imagery. Illustrated is a vegetation map for those areas.

VEGETATION CLASSES

Sedge. *Carex* spp., common coastal marsh grass

Bulrush. *Scirpus* spp., typically found in saturated mud, often submerged at high tide

Cattail. *Typha* spp., found at slightly higher elevation than bulrush or sedge, but may also occur in mixed stands

Willow. *Salix* spp., bushes 4-8m high, common along drainage channels

Forest. Mixed tree species, predominantly *Populus trichocarpa* associated with *Alnus rubra*, *Cornus stolonifera* & *Rubus ursinus*

Dead vegetation. Incompletely flushed marsh areas characterized by dead vegetation from the previous season

Bare ground & drift logs. Unvegetated substrate & drift logs

Unclassified vegetation. Unidentified wetland vegetation and non-wetland vegetation (urban,

agricultural, etc)

Water. Areas covered by water at the time of imaging

Unclassified. Imaged areas which do not fall into any of the above classes, including human development, cloud, etc

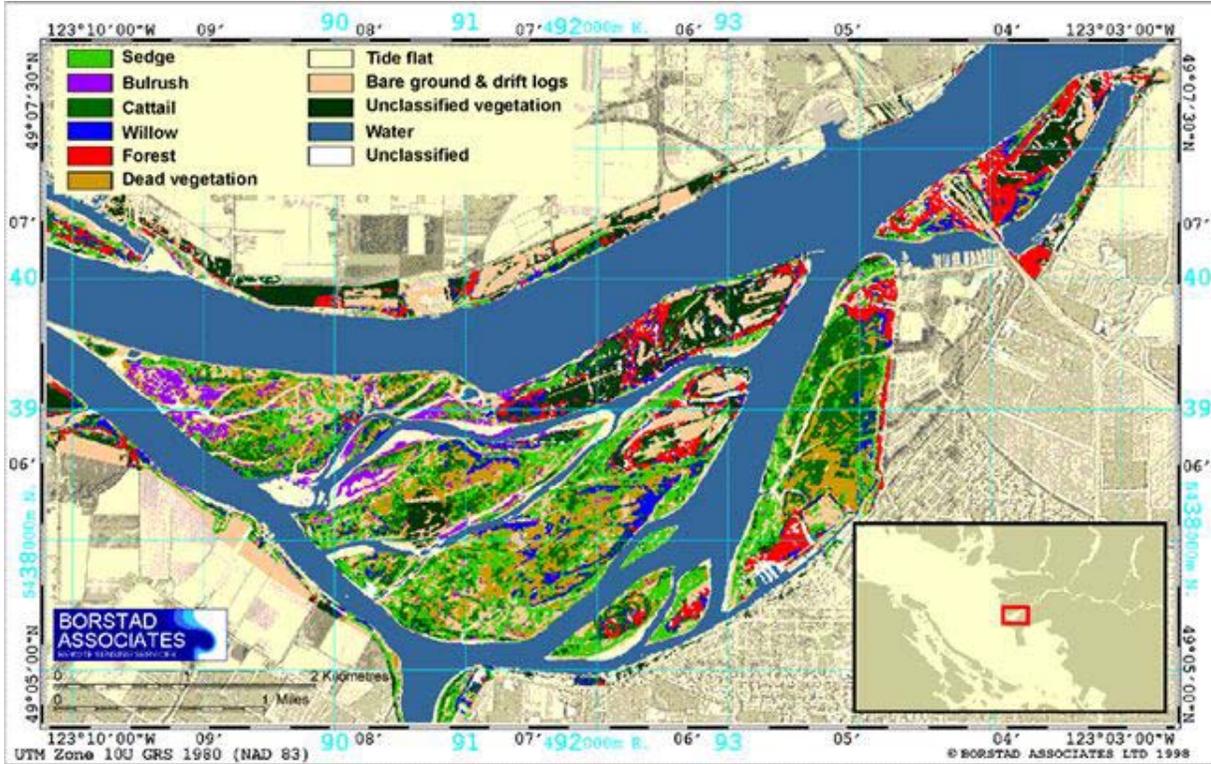


Figure 2. Classification map of Ladner and South Arm Marsh wetland vegetation, with digital orthophoto in the background showing the extent of local urban and agricultural development. Inset shows location.

Advantages of Multispectral Imagery

Unlike satellite imagery which typically is restricted to a few fixed spectral bands at relatively low resolution, airborne imagery can be custom configured to the particular spectral properties of the target of interest, whether it be wetland, agricultural, marine or forestry related. Because it is acquired at low altitude the spatial resolution is high. In the Fraser estuary marshes, it is clear from [Figure 2](#) that species distributions can be highly complex and difficult to resolve at satellite image scales. In addition, for marine applications the timing of data acquisition from an airborne system can be arranged to coincide with low tide, when the signal from vegetation is strongest. Flight passes can be arranged to avoid cloud or if necessary repeated to ensure cloud-free coverage of all target areas.

Having an accurate, detailed inventory of wetlands is a vital first step in their management and preservation. Rates of loss or change need to be assessed as environmental and development pressures impact upon individual species. Airborne multispectral imaging has been demonstrated to be a useful tool in creating and maintaining such an inventory and in the development of an overall environmental management plan.