

Section 4 MAPPING SPECIAL PLACES AND FEATURES

4.1 Rationale and Method

In the process of doing other work, volunteers were encouraged to make notes and photographs to record spatial information about special features and sightings on the estuary. They were supplied with some field guides (Sheldon and Hartson, 1999; Alden, 1987; Pojar and MacKinnon, 1994). The UTM coordinates were recorded afterwards, either on paper together with the notes, or on camera by taking a photograph of the face of the GPS unit. Normally, waypoints on the GPS were not used because that would slow down the process of data entry because each point would need to be entered separately.

Sometimes features and sightings important to some aspect of the ecology of the estuary came from a member of the public; volunteers and staff then went into the field to confirm those locations. Using various records of this sort, we were able to map special features and sightings with the intent that they will be included and considered in any planning or management activities that might have impacts on the estuary.

Special features for consideration in the management planning process should also include abiotic features. For example, it might be useful for managers to have a map of the areas where erosion, deposition and natural succession of the vegetation are dominant processes. Volunteers could undertake this as a project separate from any biological inventory work. What follows is a small fraction of the spatial data that was collected about special places and features during this study.

4.2 Results and Discussion - Spatial Data About Some Species

Northern Riceroor was observed in only a few areas, these are important as repositories of genetic material, likely remnants from a pre-agricultural population of this plant on the Englishman River estuary. **Indian Consumption Plant** was surprisingly limited in distribution on the estuary even though suitable habitat for it seemed abundant. This might be another effect of agricultural grazing that started in the 1800's. Volunteer mapping of these and other remnant native populations would be a very useful tool to assist in management decisions; this could be done using the GPS methods developed in this study for individual invasive species. As much as possible, without compromising the reproduction of the plants on site, restoration of the Englishman River estuary should be done using seeds from the same estuary.

Solitary bee condominiums, where large numbers of these insects bury pollen from Gumweed for their larvae to eat, are important areas for those bees, and possibly to the Gumweed and other native species that the bees pollinate in the fall. It is unknown whether the conditions required for the solitary bees to create a condos are highly specific or can they met easily at other locations on the estuary.

The **Red-legged Frog** is listed as a species of special concern by the Committee on the Status of Endangered Wildlife In Canada (COSEWIC). It is also on the Province of B.C. BLUE-list (BCCDC, 2009). One Red-legged Frog was found on the estuary; the area where it was found, the pool and the surroundings should be excluded from any future plans for recreational use or habitat enhancement. Existing trails should be diverted from that area, if human presence becomes

damaging to the habitat of the Red-legged Frog.

Some shaded pools around Big Island on the Englishman River estuary supported schools of **juvenile salmonids** through the summer of 2007. At times, these pools of fish were trapped. Small schools of salmonids were also often observed using the small, permanently flooded tidal channels with steep banks and overhanging vegetation in the West Marsh / West Lagoon areas. No changes should be made to the estuary that do not take these uses into account.

The uppermost areas of the tidal channels sometimes supported **Three Spine Stickleback** of various sizes that appeared to move with the tides from the permanently flooded lower channels; the sticklebacks were distinguishable from other fish without sampling because of the way they sometimes hold their tail kinked to one side.

Two **Bald Eagle** nests were observed in this study. One in a Black Cottonwood on Big Island, had eagles around it during the spring of 2007. The other, in a conifer (possibly a Douglas-fir), appeared to be in active use on 15 February 2009. Bald Eagle nests have statutory protection in the province of B.C.

On one occasion, a **Peregrine Falcon** was observed in 2007 using the area from San Pareil Lagoon to the Centre Marsh for hunting. The ducks present took flight in flocks and seemed to be moving away from the falcon. It perched on a tall conifer near the Shelly Road Viewing Tower but the perch at the other end was not clear. Those perch trees, whether on the estuary or in the suburb, should be preserved. The Peregrine Falcon subspecies likely to present on the study area (*F. peregrinus pealei*) is BLUE-listed by the Province of B.C. (BCCDC, 2009).

One **Merlin** was often observed using an area in the high marsh of the West Marsh Lagoon during the summer of 2008. This "Merlin Runway" consisted mainly of a series of perching spots on tall stumps and upturned root balls. One Northern Cottonwood was also used which appears to be on the property of Surfside RV Park. The principle prey item that was being sought at that time seemed to be **Savannah Sparrows**; some close misses, but no kills, were observed. The sparrows would rise up, notice the high speed approach of the Merlin, and then dive dramatically into tall vegetation. **Sandpipers**, another common prey item for the Merlin, were observed using the tidal channels between the areas of high marsh, but none were observed under pursuit by the Merlin in this study. The stumps on the estuary and the surrounding trees, as much as possible, should be left as they are.

Two **Northern Harriers** were observed on three occasions, hunting for ground-based prey, probably voles, in one area of the Big Island marsh. They were observed using stumps and posts, although they also seemed to land on the ground surface. The presence of humans (in this case doing vegetation survey work) seemed to displace their activities to the edge of the area where the people were. We recommend that the goal for Big Island on the Englishman River estuary be that it is kept free of bridges and trails, that dogs (*Canis lupus familiaris*) and domestic cats (*Felis catus*) be excluded, that wildlife corridors for predators be maintained to connect it with other natural areas. We also recommend that signs be posted to marijuana growers know that many people know about their clearings among the Nootka Rose thickets and it will only take one person to prevent their hard work from paying off.

Dunlin, Yellowlegs and **Killdeer** were common sights foraging in the muddy substrate of San Pareil Lagoon.

The American Golden Plover is BLUE-listed by the Province of B.C. (BCCDC, 2009). It was seen on the lowest intertidal bars at the mouth of the river during an exceptional low tide.

The **Great Blue Heron** occurs on intertidal areas of the estuary wherever there is some standing or flowing water with fish, and also but rarely on the intertidal marshes. The local subspecies is *Ardea herodias fannini*, which is a BLUE-listed species by the Province of B.C. (BCCDC, 2009).

The **Band-tailed Pigeon** is listed by COSEWIC as a species of special concern. It is also a BLUE-listed species by the Province of B.C. (BCCDC, 2009). In this study, flocks of up to 20 birds were observed using the area of forest on Big Island where the forest meets the broad shrub zone adjacent to the main river channel, and in similar habitat near where the forest meets the narrow shrub zone and marsh at the southwest corner of the estuary. This represents observations made in on different days spread out over two years, so it might represent the same group of up to 20 birds. However, in one survey on July of 2007, the Arrowsmith Naturalists team counted 33 Band-tailed Pigeons on the Englishman River estuary. The peak number from an earlier study (Dawe et al., 1994) was 49 Band-tailed Pigeons observed on 15 June 1980, in the upland area behind the Mine Road Dyke.

The success of Band-tailed Pigeons in an area seems to be linked with roosting sites and especially to their access to certain mineral supplements. "Mineral sites used by Band-tailed Pigeons should be included in the overall management scheme for maintaining stable breeding populations of this species (Sanders and Jarvis, 2000)." More information about Band-tailed Pigeon use of the Englishman River estuary would be needed before any changes were proposed to any of the areas used by these birds.

Hundreds of **Northwestern Crows** were often observed in the evenings flying east over the Centre Marsh and Big Island Marsh of the Englishman River Estuary. They seemed to be coming from the beaches of the Parksville area, where they are known to forage in numbers, and going to a roosting area in the vicinity of the Plummer Road Forest, the adjacent pasture lands or, more likely, further east in Rath Trevor Park. That roosting area should be located and protected by agreement if possible.

A group of approximately five **Northern River Otters**, with two large members and three smaller members, was observed frequently in 2007 and again in 2008 in the area from the entrance of San Pareil Lagoon up the main channel of the Englishman River estuary about half way upstream beside Big Island. The area is full of rest spots and trails, many with marking spots and piles of fecal matter, along the river's edge. A possible den location was found near the northern edge of the forest on Big Island in an area where the river is rapidly eroding the steep bank.

The otter's presence dominates the banks on Big Island but they share these swimming areas in the main channel of the river with the **American Beaver** and the **Harbour Seal**. The beavers seem to be cutting trees among the new growth of cottonwoods, willows and alders along the river near the south end of Big Island and also where the big log jam is buried at the south end of the Centre Marsh area, adjacent to the estuary forest and near to the Shelly Road Trail. No lodge was observed but, from the presence of canal work and beaver pathways and wood cutting in the latter area, it appears that they den in that area, where the former main river channel (1976) joins the channel that is the main river channel today (2009).

In the estuary study area, the areas of highest use by **Humans** are those with the easiest access. The most accessible and least vulnerable areas for human use are the two viewing towers and other viewing spots along the banks of the river, the Mine Road Dyke and Trail, the remnants of the Shelly Road Dyke and Shelly Road Trail, and the Forest Perimeter Trail. Any trend from the public, or plans from landowners or the municipal and regional governments, that would change this pattern of human access should be considered carefully because it could have a large impact on the natural ecosystems of the estuary.

4.3 Understanding Estuary Ecology in Four Dimensions

Mapping special places and features gives another spatial dimension to this report about the Englishman River estuary. However, ecologically important information is not static; ecology is also about the timing of events. For example, each niche is often described by a species' place on the food chain, but the food of some organisms changes from week by week.

Seasonal changes in the ecology of the estuary appear to be dominated by a sequence of pulses in the availability of nutrients (essential elements, organic compounds, biomass) which overlays the yearly cycles of the availability of solar energy and fresh water. Some events that might function as pulses of nutrients were recorded in this study; it is likely that many others are not yet understood. A useful project for volunteers would be to work with biologists to develop criteria for systematically recording the timing of the onset, peak and closure of these nutrient peaks. Some of these examples need only a way of interpreting existing data; others would require new observations. The purpose would be to develop the kinds of information that would be required to show the complexity of the ecosystems, and the ecosystem changes that might result from any planned perturbation, including habitat restoration proposals.

As a record of the timing of these events is developed, it also might be possible to develop some understanding of how these events synchronize with each other in a way that meets the needs of the various species on the estuary. For example, it is impossible to understand the bird count data collected on the Englishman estuary by the Arrowsmith Naturalists without understanding that in March 2008, the main herring spawn on this part of the coast took place elsewhere (Deep Bay to French Creek) and so the birds that follow that abundant food supply were mostly gone from study area during that period.

Below are listed some examples of natural events which might be important to estuary ecology. A first step to understanding would be to monitor the timing of these events, and that would require clear definitions of onset, peak and closure for each event so that volunteers all mean the same thing when they are recording and sharing information:

- herring spawn (Are the year to year changes in location connected to changes in commercial harvest? How do these changes affect the estuary?)
- salmon run upriver for adults of each species (Who eats the fish before and after they spawn? What is the importance of this nitrogen to the estuary forest and marsh?)
- salmon smolt arrivals coming downstream (Who eats whom in the world of young salmon? Are there cycles in food availability for Belted Kingfishers, (*Megaceryle alcyon*)?)
- alder pollen drop (What utilizes this layer of nitrogen rich organic material on the soil?)
- leaf drop of maples, cottonwoods and alders, and also deciduous shrubs that are abundant on the estuary (Has the soil of the estuarine forest been accumulating organic matter since the Ice Age?)
- first active insects (Who eats winter craneflies, springtails, midges and mayflies?)
- first flush of fungal fruiting bodies, such as Oyster Mushrooms (*Pleurotus ostreatus*) (The huge numbers of fungus gnats that emerge - are they important to the early success of young salmonids and young spiders?)
- first pollen and nectar sources such as: the flowers of Skunk Cabbage (*Lysichiton americanum*) (Is this important to the beetles and flies that attend?)
- first flowers of Red-flowering Current (*Ribes sanguineum*) and Salmonberry (Are these important to Rufous Hummingbird, *Selasphorus rufus*, arrival times?)
- maple nectar and flower drop (Is this important to nectar feeding bees and other insects?)
- amphibian migration and occupation of ponds (Amphibian eggs, larvae and adults are food for pond insects, snakes and many other species. Is this important?)

- the huge increase in insects in mid April and May (How important is this to salmonids? Why were bluebirds not observed on the estuary in this study?)
- queen ant flights (How important is this to salmonids, hawking flycatchers, warblers and nighthawks, and salmonids, etc?)
- queen termite flights (How important is this to hawking flycatchers, warblers and nighthawks, etc?)
- algae (likely *Enteromorpha spp*) bloom in spring (Is this important to provide cover for fish?)
- arrival of earliest song birds, such as the Yellow-rumped Warbler (*Dendroica coronata*) (Is this important to the arrival times of some raptors?)
- goose moulting period (Does this change the feeding patterns of the geese on the estuary?)
- Is the volume of high nitrogen feathers that wash onto the beaches and marshes significant?)
- the burst of growth (biomass increase) by marsh plants such as Lyngbye's Sedge (How quickly can the marsh platform replace itself if waterfowl grazing is reduced?)
- waterfowl feces as a form of available nutrients to plants and invertebrates
- waterfowl eggs (Is this an important seasonal food for carnivores? If not, why not?)
- shorebirds migrating through the estuary (Is this an important food for falcons? Why are there so few sightings of the Peregrine Falcon?)
- a burst of mycelial activity by fungi that seems to occur in Spring and Fall (Does this release nutrients to the soil? Where do these nutrients go?)
- arrival of leafy structures (How do changes in species composition over decades, as described in this report through When river erosion, goose grazing, natural succession, or the the arrival of an invasive species changes the the leaves available on the estuary, as described in this report, how does that affect the herbivores like geese and deer or caterpillars?)
- berries and fruit - salmonberries, Nootka Rose hips, pacific crabapples, bitter cherries (What eats them and when? What are the Band-tailed Pigeons eating throughout their spring, summer and autumn seasons on the estuary?)
- last pollen sources such as Gumweed (How important is this to solitary bees and their parasites and commensal insects within the same condominium?)
- Are the bees important to Gumweed seed production? What eats Gumweed seeds?)

A few timelines that are locally applicable to the study area are available. Campbell (1990) presents biweekly changes in abundance of each species of bird in the Parksville/Qualicum Area. Her report draws on the work of Dawe (1976, 1980) in which baseline phenology data for this region is presented, primarily for bird and plant species on the Little Qualicum River estuary, but also for non-avian animals there including some invertebrates. However, it should be noted that each estuary is different and therefore unique.