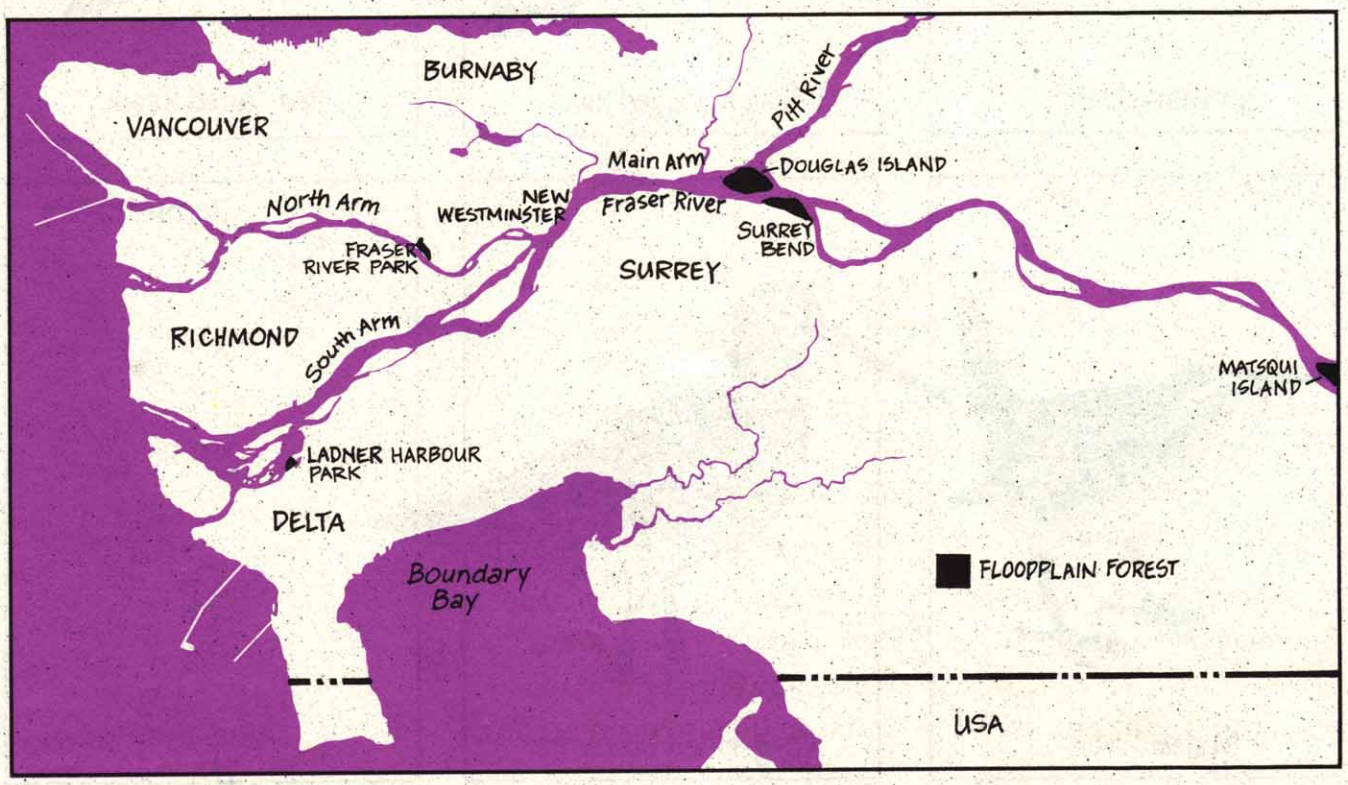
Active Floodplain Forest

Where is this habitat located ?

Floodplain forests are located at and above the high tide level, and also exist on the floodplain where rising river levels create seasonally flooded conditions. These forests tend to blend into other forest types. For example, in drier sites, and at higher elevations, floodplain forests merge into coniferous coastal forest, whereas in wet and poorly drained sites, bogs tend to dominate. Thus, undiked and well drained areas in the estuary which are periodically flooded by high tides or high river levels, will likely support some type of floodplain forest.

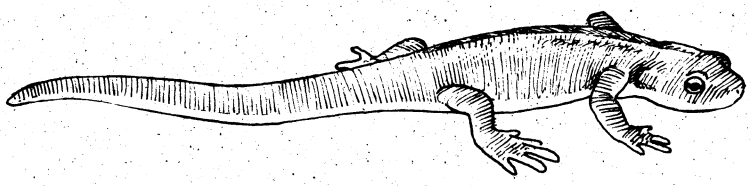
Most of the extensive floodplain forests that once grew in the lower Fraser Valley have long ago been converted to farmland or urban-industrial development. There are only a few remaining pockets of large and active floodplain forest such as Matsqui Island, Surrey Bend, Douglas Island, and a scattering of fringe forests along the riverbanks and sloughs of the estuary. Figure 2-21 shows the location of some of these remnant floodplain forests.

FIGURE 2-21
Location of Undiked Floodplain Forest



What's the difference between a swamp and a marsh ?

It is quite common to hear people refer to any wetland area as swamp, regardless of what type of habitat actually exists there. However, trees and shrubs are the main characteristics that set a swamp apart from other wetland types. Swamps, which represent the wettest locations of the floodplain forest, support trees and shrubs well adapted to water-saturated soils. Marshes, on the other hand, are dominated by grass-like plants (grass, sedge, and rush) because they are adapted to even wetter conditions than are trees.



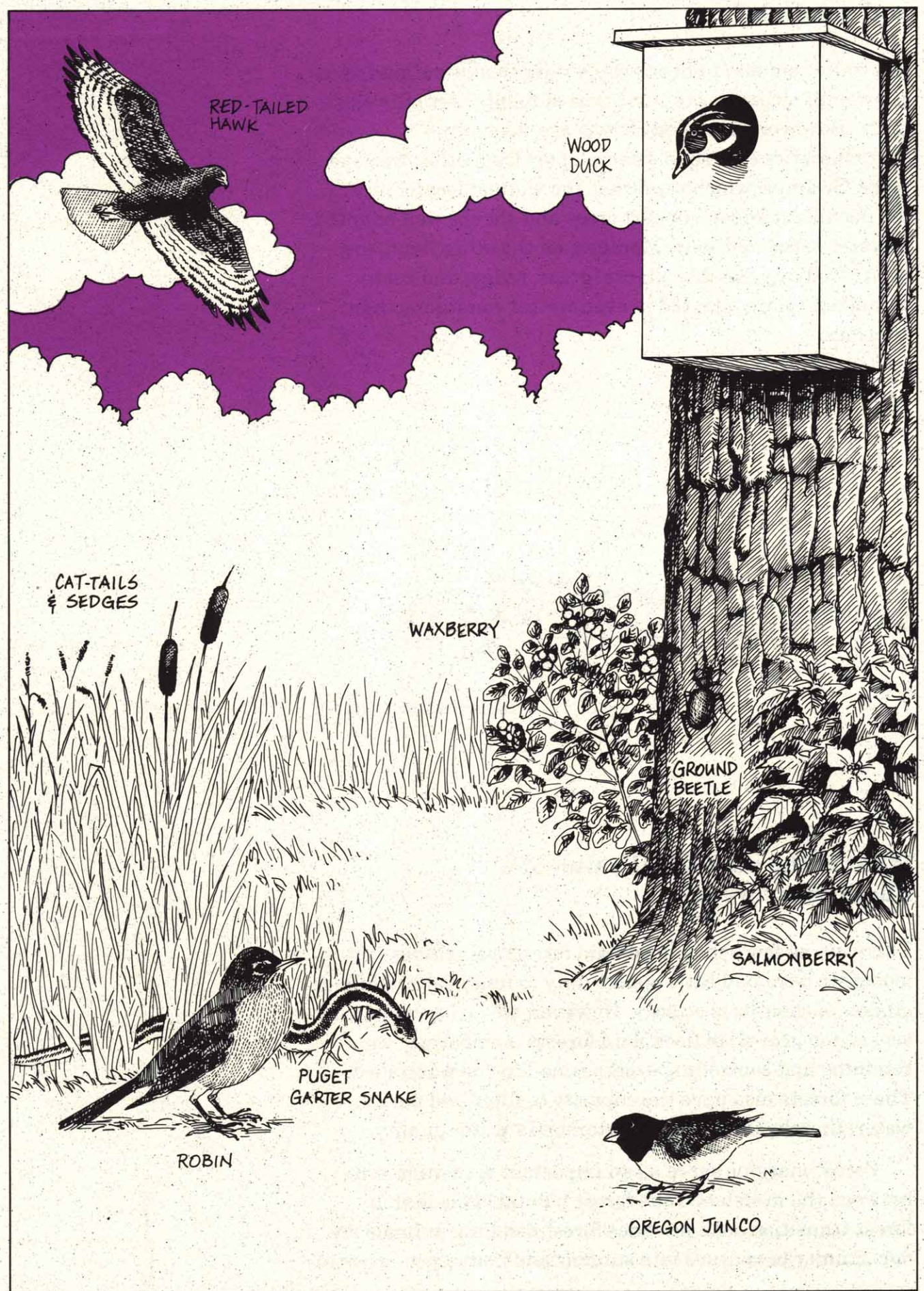
ROUGH-SKINNED NEWT

What is the ecological value of a floodplain forest ?

There are so few active floodplain forests remaining that biologists have had little opportunity to undertake detailed studies of their local ecology. However, we do know that the vegetation growth in floodplain forests is important in retaining and controlling excess runoff in the watershed. These forests also have the capacity to filter and purify water, thereby improving a watershed's water quality.

Forest margins serve as an important transition zone between the marsh and the forest habitat. This marsh-forest transition zone provides forest-dwelling animals an opportunity to venture into sunnier and more open areas to

FIGURE 2-22 Wildlife Crossroads in the Floodplain Forest



feed, while marsh creatures can seek food, cover and shelter in the swamp forest. Birds such as Great Blue Herons, owls, hawks, Wood Ducks and songbirds feed in the open marshes and use tall trees in the nearby swamp for nesting or perching. The Puget Garter Snake seeks cover at the forest edge and feeds near marshes on amphibians, earthworms and the occasional small fish. The edge between the marsh and forest is therefore a rich "wildlife crossroad" for marsh and forest creatures (Figure 2-22).

Trees and shrubs on the banks of river channels and sloughs provide cover as well as a source of food for organisms living in the water. Juvenile fish, especially salmon, benefit from the cooler water provided by the shade of wooded riverbanks. Dead branches and other snags that have fallen into the water offer excellent hiding places for small fish, which feed on insects that fall from the tree and shrub canopy. Deciduous trees also contribute detritus to the estuary as they shed their leaves each year.

Some of the Dominant Plants

Identification of trees and shrubs in the floodplain forest is relatively easy if you look at the shape of the leaves. In winter, when there are no leaves present, the shape and structure of branches can be used to identify the trees and shrubs.

The biggest and most majestic tree of the floodplain forest is the Black Cottonwood (*Populus trichocarpa*). It attains heights of up to 38 m (125 ft.) and is the largest broad-leaved tree native to British Columbia. Most of these big trees have been cut down because their logs produce wide boards of knot-free lumber, or more recently, wood pulp for tissue paper.

Other typical and commonly found trees and shrubs are illustrated in Figure 2-24. This figure can be used as a simple summer and winter key to help identify the leaf and branch structures of trees and shrubs.

FIGURE 2-23
Black Cottonwood
(*Populus trichocarpa*)

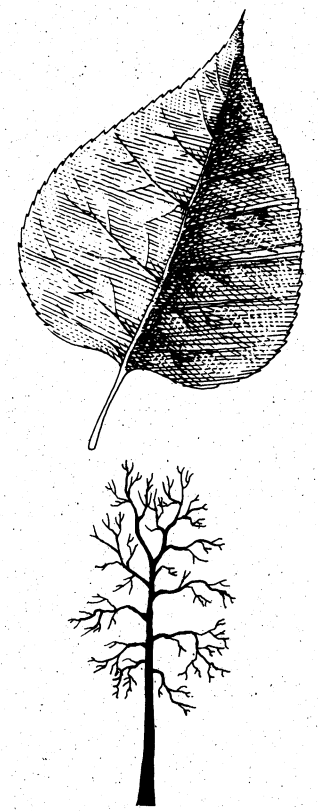
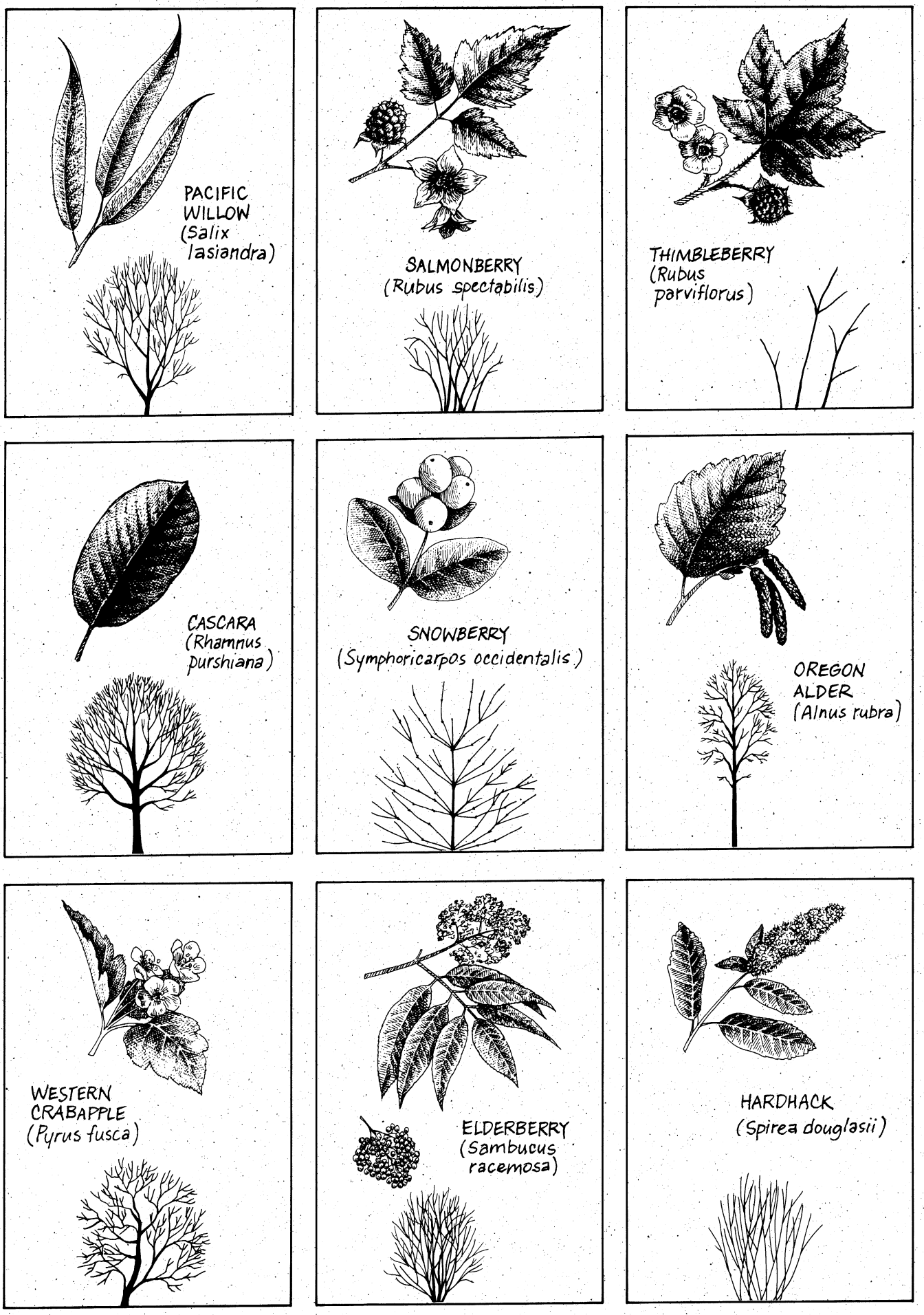


FIGURE 2-24 Trees and Shrubs of the Floodplain Forest



FIELD TRIP DESTINATION: Riverside Parks

The most convenient places to study remaining active floodplain forests are two riverside parks: Ladner Harbour Park in Ladner and Fraser Foreshore Park in Burnaby (Figure 2-25 and 2-26).

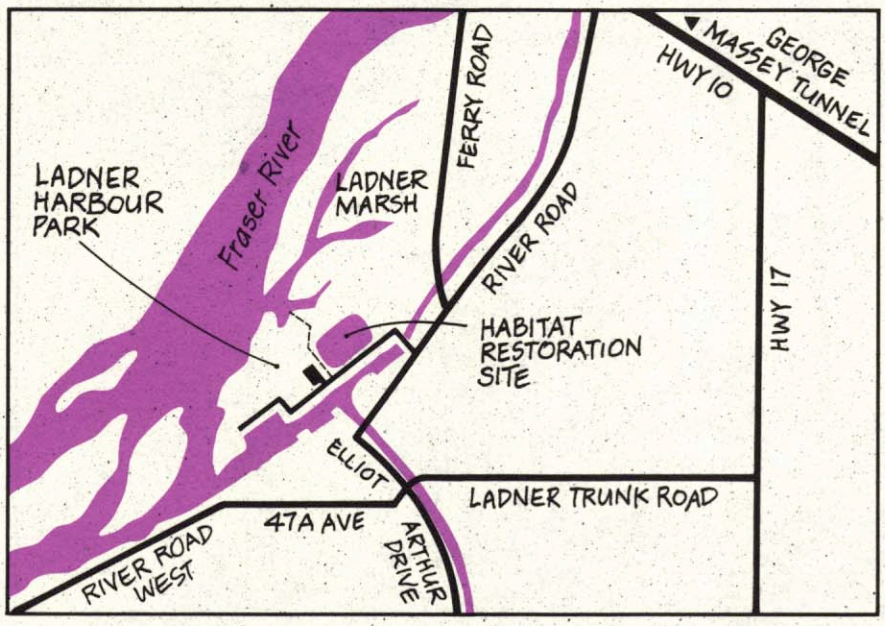


FIGURE 2-25
Location of Ladner Harbour Park

Ladner Harbour Park can be reached from River Road in Ladner. It has been developed into a family park, yet it retains a forest, dominated by large cottonwood trees which blend naturally into an extensive tidal marsh. The wet transition zone between the cottonwood forest and the marsh represents the type of forest habitat which once occurred along much of the undiked areas of the estuary.

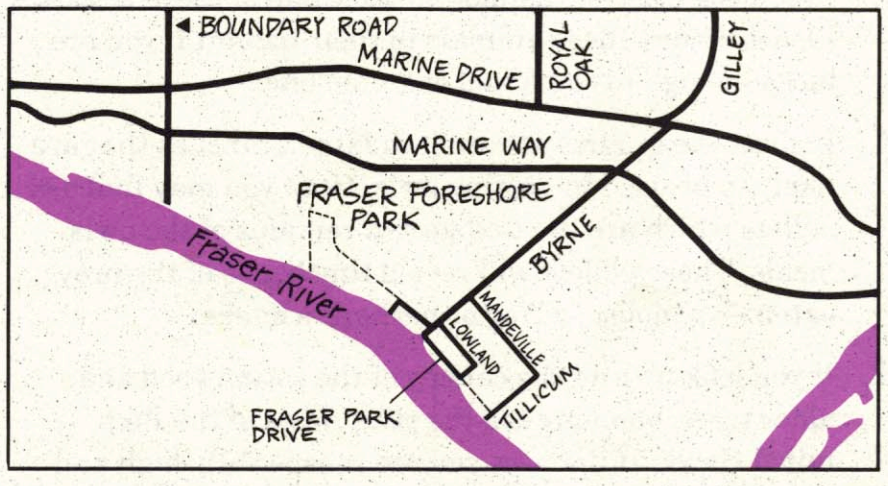
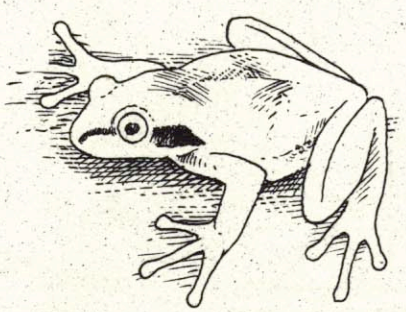


FIGURE 2-26
Location of Fraser Foreshore Park

Fraser Foreshore Park is located in Burnaby on the North Arm of the Fraser River (Figure 2-26). It is accessible from the foot of Byrne Road (south of Marine Way) by a trail which heads west, and then north all the way to Marine Way.

PACIFIC TREEFROG



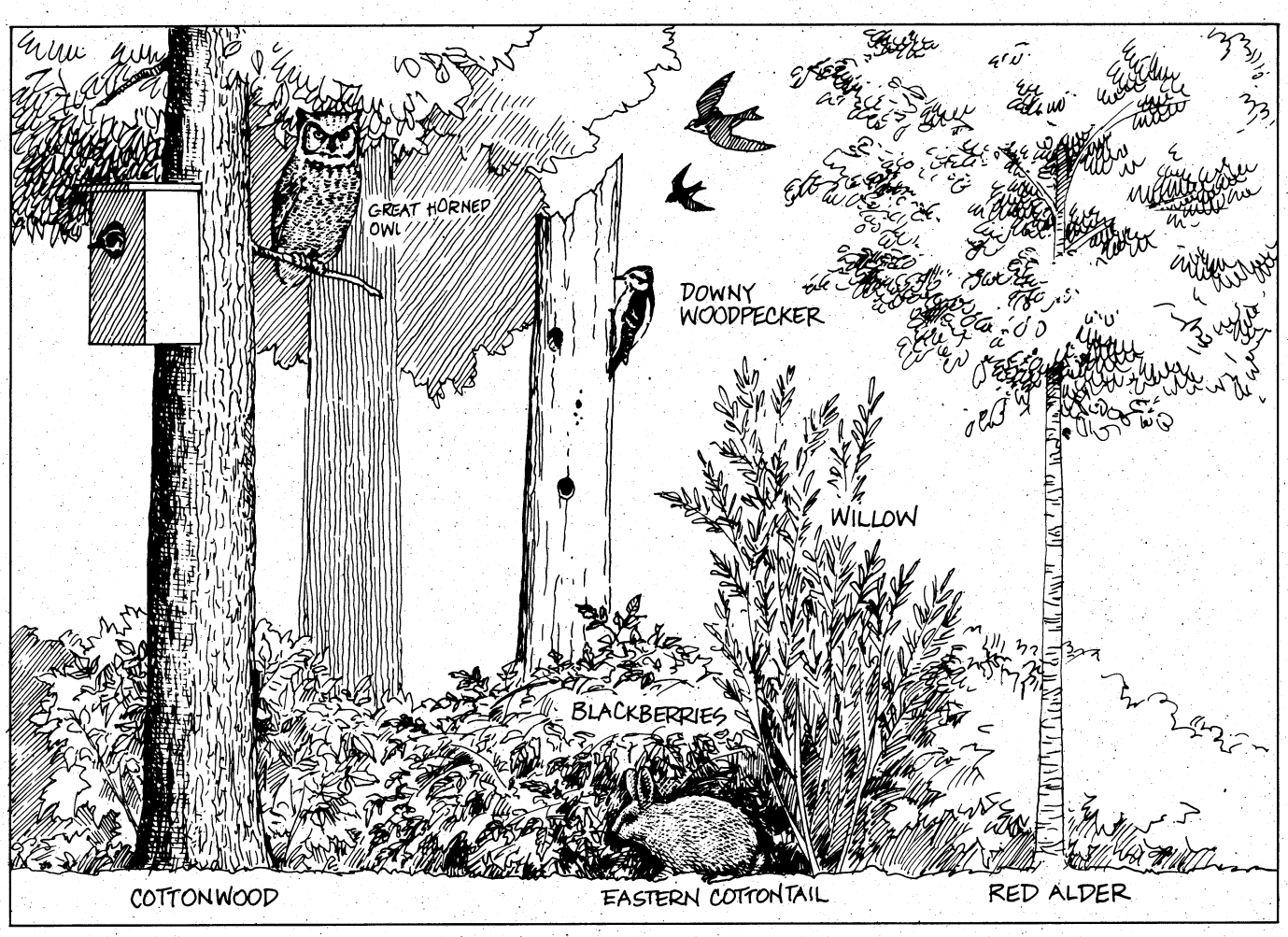


FIGURE 2-27
Floodplain Forest Community

What to Look For

- ☐ The floodplain forest is an excellent habitat for reptiles and amphibians. The Puget Garter Snake and Pacific Tree Frog are two common inhabitants of these forests. Please return these animals to their habitat if you are lucky enough to catch and examine one.
- ☐ Inspect the ground underneath large branches that are likely to be used by resting owls. Here you may find owl pellets which are the undigested remains of the owls' meals. These pellets will reveal tiny bones of the prey eaten — a mouse, a frog or perhaps a snake.
- ☐ If you look up into the canopy of the cottonwood and alder trees, you may see the stick nests of the Red-tailed Hawk. If the nest you see is especially high and gigantic, it could belong to a pair of Bald Eagles. There may also be nesting boxes attached to the tree trunks to provide additional nesting sites for Wood Ducks.

☐ The Eastern Cottontail Rabbit is abundant at Ladner Harbour Park. This rabbit is an arrival from an introduced population in the State of Washington. Their nests are constructed in underground burrows.

ACTIVITY 6: A FLOODPLAIN FOREST MICRO-HABITAT STUDY

The floodplain forest contains a diverse variety of plants and animals, mainly because it supports many different micro-habitats. A micro-habitat is a small habitat within a larger habitat where a plant or animal can live. In a floodplain forest, micro-habitats may include a rotting log, the canopy of a tree, a small pool of water, and so on. A scavenger hunt will serve as a good opportunity to increase your awareness about the rich and varied forest environment.

Objectives:

Participants in the scavenger hunt will be able to describe some of the many different micro-habitats found in the floodplain forest. They will acquire the ability to collect and record information about the environment.

Equipment:

This activity will require: trowels, buckets, shallow trays, plastic jars, plastic spoons, hand lenses, binoculars, clipboards and notepads. To help with your search and record keeping, a sample form, "Micro-habitat Study Sheet", is provided (Figure 2- 28). Consider studying the following micro-habitats: rotting log, small pool of water, tree canopy, pile of fallen leaves. You may also use other examples in the first row of the Study Sheet.

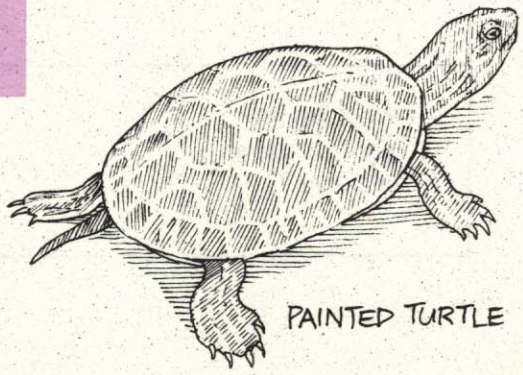
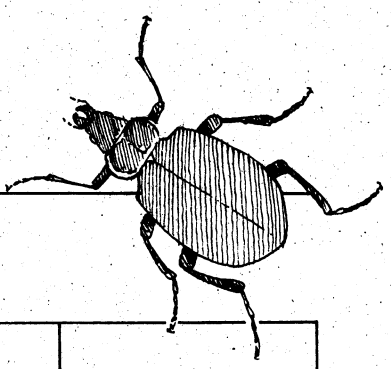


FIGURE 2-28 Micro-habitat Study Sheet



MICRO-HABITAT STUDY SHEET

For each micro-habitat answer the following questions

1. What is the name of the micro-habitat?				
2. Describe it.				
3. What animals or their signs do you see there?				
4. What else might live in this habitat?				
5. Why would an animal want to live in this habitat?				
6. Describe the plants you find there?				
7. Draw a plant and an animal you see.				
8. What are the signs of human influence?				

Procedure:

1. Divide the participants into groups of 4-5 and give them any of the equipment listed above that you can acquire. Give each group a clipboard with a copy of the Micro-habitat Study Sheet.

2. Each group should look for four different micro-habitats, and answer the questions for each of these on the Study Sheet. Everyone should also find or describe items indicated on the Sheet.

IMPORTANT

This is an excellent time and situation to encourage respect for the outdoors. The following guidelines should be remembered on any outing.

Don't collect any living plants or their parts (bark, flowers, leaves).

Don't collect bird eggs or disturb their nests.

Don't mar the landscape while collecting.

Return anything gathered back to the environment.

Refill all holes dug and return overturned rocks or logs to their original positions.

Treat the area with respect and preserve its beauty for others.

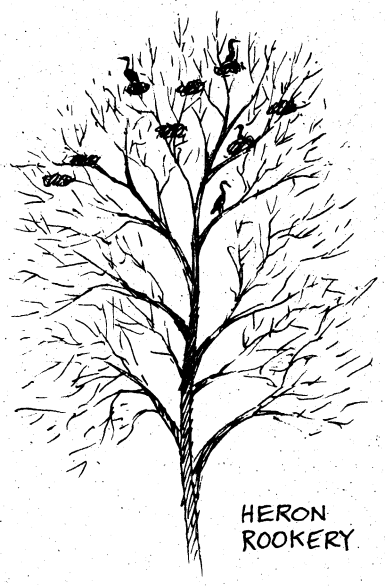
3. After the study, gather together in a group to discuss the following:

Review and compare answers to the questions on the Micro-habitat Study Sheet.

What are some ways that these micro-habitats can be damaged or destroyed by careless people?

Are there any ways to help protect, restore, or enhance these micro-habitats?

Why is this specific habitat in such imminent danger of disappearing?



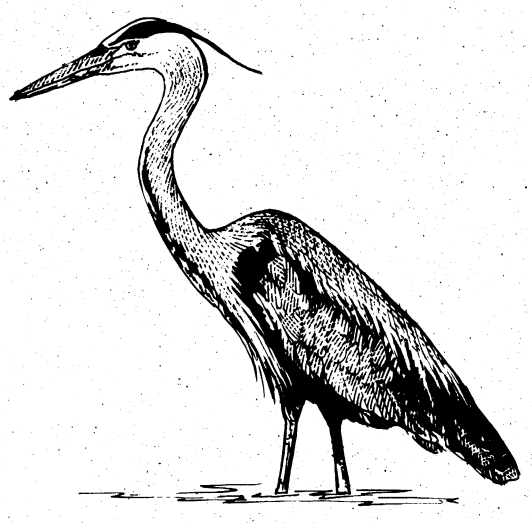
OTHER FACTS AND FIGURES

Heron Rookeries - A Vulnerable Micro-habitat

The Fraser River Estuary provides a rich feeding ground for Great Blue Heron. Adult herons have the opportunity to feed on small fish, frogs and rodents in the many wetland habitats of the estuary. However, young nesting herons need to be close to a source of food; otherwise the longer the adults are away from the nests obtaining food for their young, the greater the chance for predators to raid the nest.

Many herons moved to Point Roberts to nest after their colonies were repeatedly destroyed in Tsawwassen — first by logging around 1955 and then by urban development. They have now been in Point Roberts for at least 16 years. There are over 300 nests in the Point Roberts heron rookery, and it may be the largest in the Pacific Northwest. The Creston Colony near the Nicomekl River in south Surrey has also moved numerous times due to disturbances related to development.

Herons need undisturbed stands of large trees close to wetlands. The destruction of these habitats has eliminated or endangered heron populations in local areas of the estuary. Heron rookeries represent a vulnerable habitat for the survival of this famous natural symbol of the estuary.



River Channels and Sloughs

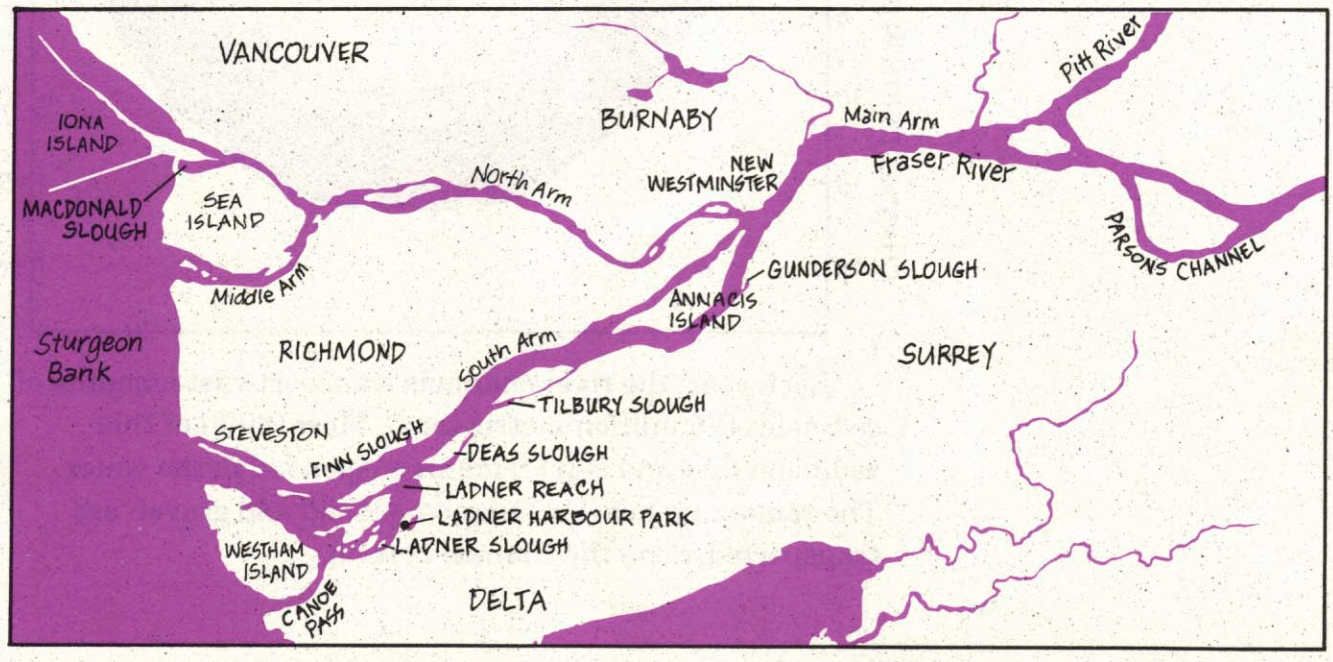
Sloughs are the relatively shallow and quiet backwater channels found in the estuary. River channels are the fast flowing, deeper water areas while marsh, tideflat and floodplain forest habitats are exposed each day as the tide ebbs. The sloughs and river channels of the estuary are an aquatic environment that is almost always submerged.

Where is this habitat located?

The Main Arm of the Fraser River downstream of New Westminster splits into two channels, the South Arm and the North Arm. Secondary channels include the Middle Arm and Canoe Pass. There are also several minor channels such as Annacis Channel, Ladner Reach and Parsons Channel. These river channels make up a network of secondary channels typical of most estuaries with deltas.

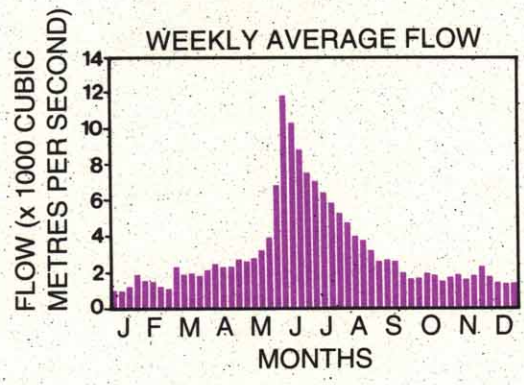
Some of the better known and largest sloughs in the Fraser Estuary are MacDonald Slough, Finn Slough, Deas Slough (adjacent to Deas Island Park), nearby Tilbury Slough and Gunderson Slough, located farther upstream (Figure 2-29). Most of these sloughs were once open to the Fraser River at both ends, but due to diking and filling, the upstream ends of most sloughs are now closed off by a causeway.

FIGURE 2-29
Major River Channels and Sloughs



What are their physical features?

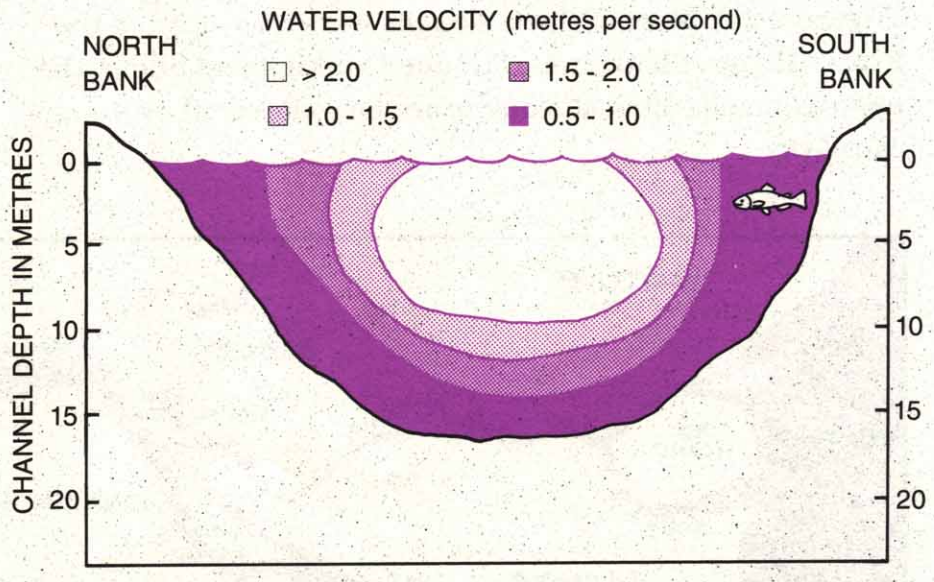
FIGURE 2-30
Fraser River Hydrograph



In June, during peak flow (also known as "freshet"), the main river channels of the Fraser carry a huge amount of water — up to 15 000 cubic metres of water per second flows past Hope. Figure 2-30 shows what is called a hydrograph — the seasonal flow of the Fraser River. The South Arm, representing the largest channel (200 - 300 metres wide) and deepest (approximately 12 metres), carries 85% of the flow. The fresh river water flows over top of the saltier and denser seawater, which is pushed up each channel bottom with every flood tide.

Water velocity is of importance since the main river channels are the route used by millions of migrating salmon. The highest water velocities (1.0 - 2.0 metres per second) occur in the centre of the channel. Near the bottom and banks of the channels, velocities decline to less than 1.0 metre per second (Figure 2-31). If you were a fish looking for the easiest migration route up the river, where would you swim?

FIGURE 2-31
Cross-section of River Showing Water Velocities



Each year, the river channels transport vast amounts of sediment (25 million metric tons). Most (80%) of this sediment (silt and clay) remains suspended in the water. The remaining heavier sediments (sand and gravel) are transported along the channel bottom.

Is there any life on the river bottom?

The river channel habitat is a cold, dark environment with fast-flowing water and shifting sediments. Other than floating and drifting algae, there is no plant production in the river channels. However, despite the seemingly harsh conditions on the river bottom, it is home to numerous different invertebrates which feed on the plentiful supply of detritus. These bottom-dwelling organisms are collectively referred to as benthos (Figure 2-32).

Small aquatic worms known as Oligochaetes are found living in the mud throughout most of the estuary's river bottom. These worms are especially abundant (up to 1 000 worms per square metre) in organically polluted parts of the estuary because they can tolerate very low dissolved oxygen levels. Therefore, Oligochaetes are often used as bioindicators to show which regions of the estuary are most polluted.

The river bottom is also home to several species of aquatic fly larvae, one of the most common being the midge larva (*Chironomid*). These larvae, which are quite common in the estuary, are a favorite food for juvenile salmon.

Bottom-dwelling organisms living on the surface of the river bottom are known as epibenthos. One of the most common epibenthic invertebrates is the Mysid Shrimp (*Neomysis mercedis*). A fine meshed net towed on the river bottom will yield thousands of these small shrimp.

The water in the river channel is occupied by another group of organisms referred to as plankton. In the Fraser Estuary, much of this plankton fauna consists of tiny invertebrates called zooplankton — the most common types being cladocerans and copepods (small crustaceans, only one or two millimetres in size, Figure 2-33).

Because of this fish's huge size and long life span, White Sturgeon are one of the most interesting dwellers of the river bottom. Earlier in the century, sturgeon over 500 kilograms were common (one weighing 850 kilograms was reported caught near Mission City). Fish up to 71 years old have been caught commercially, and one angler caught a fish that was well over 100 years old.

FIGURE 2-32 Benthos

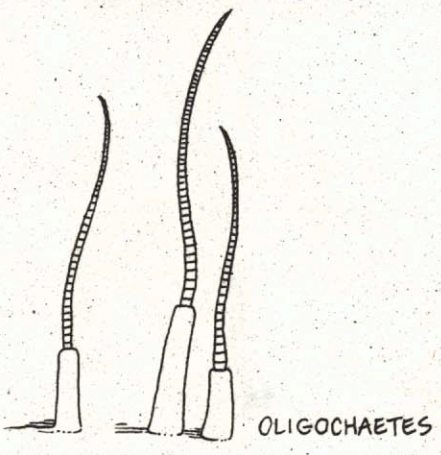
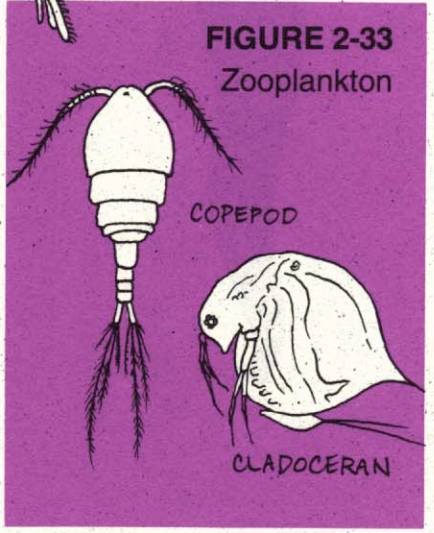


FIGURE 2-33
Zooplankton



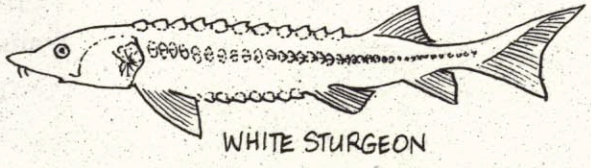
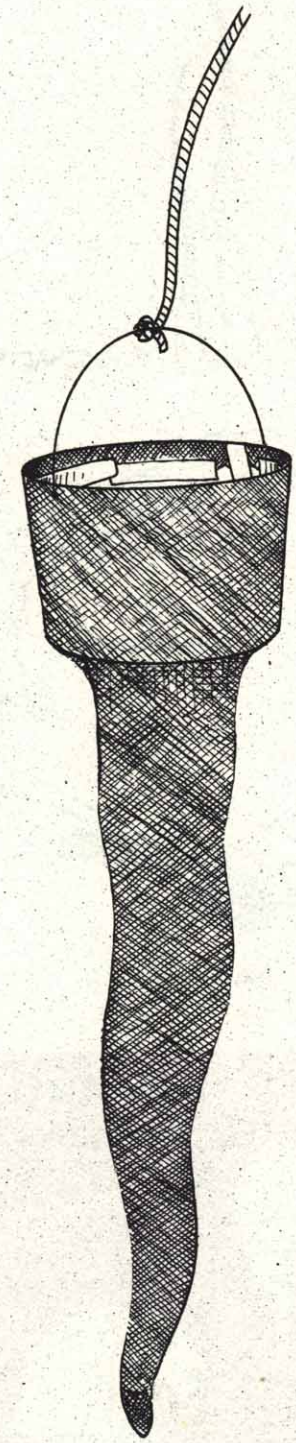


FIGURE 2-34
A Self-made Plankton Net



ACTIVITY 7:
AN EXAMINATION OF PLANKTON

Sampling and studying zooplankton is an interesting activity because it helps you appreciate the diversity of life that exists in the muddy waters of river channels and sloughs. To capture zooplankton you will need a plankton net, which is conical in shape with a fine meshed net.

Objective:

To capture, examine and identify samples of zooplankton which live in the estuary.

Construction of Plankton Net:

You can make your own plankton net by using the thin fine-meshed fabric of womens' stockings or panty hose. Cut out the bottom of a plastic ice cream bucket. Slip the top of a large size stocking over the cut end of the ice cream bucket. Fasten the stocking to the bucket using waterproof tape. Fasten a rope or long pole to the handle of the ice cream bucket.

Procedure:

Normally a plankton net is dragged through the water on the end of a rope behind a boat. However, the net can also be rigged to a pole and drawn back and forth through the water from a river bank or the end of a dock.

To remove the captured organisms from the net shown in Figure 2- 34, first turn the net inside out. Touch the end of the net to some water in a wide mouthed container. Many of the organisms will swim off the net on their own, while others may need to be gently rinsed free using a spray bottle. Remember that the less water you use in this transfer, the more concentrated will be your plankton sample.

It is best to examine the zooplankton under a microscope while they are still alive. Using an eye dropper to pick up a few organisms, place these on a slide (preferably a well slide), and top it with a cover slip.

Sloughs

What is a slough?

Slough is a popular term applied to almost any slow-flowing, muddy, shallow water habitat in the estuary. Thus, any still backwater area connected to a river channel can be designated as slough habitat. The important physical features of sloughs are the absence of any strong currents, relatively shallow water (0 - 3 m depth) and a muddy bottom. The summer water temperature in sloughs is also generally higher than in the adjacent river channels.

Over several hundred years, as river channels shift and change course throughout the estuary, old and abandoned river channels gradually silt in and become sloughs. Sloughs have also been created with the construction of connections (causeways) between the river shoreline and adjacent islands. Deas Slough is an example of such a man-made slough.

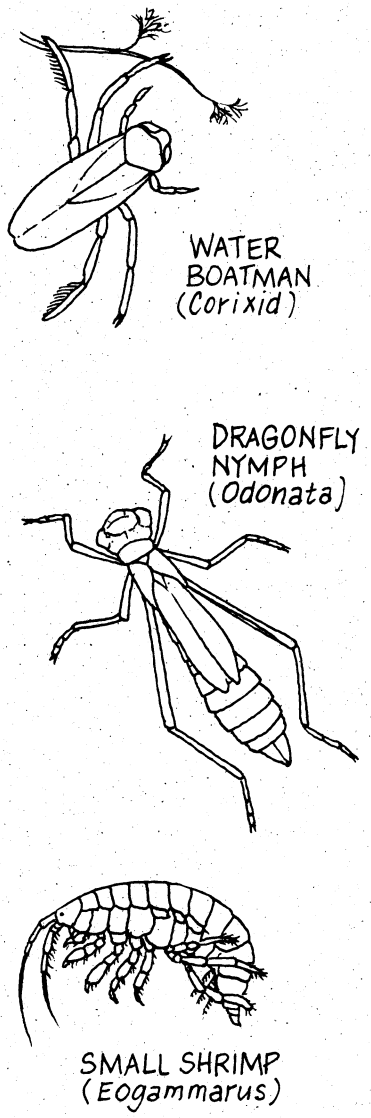


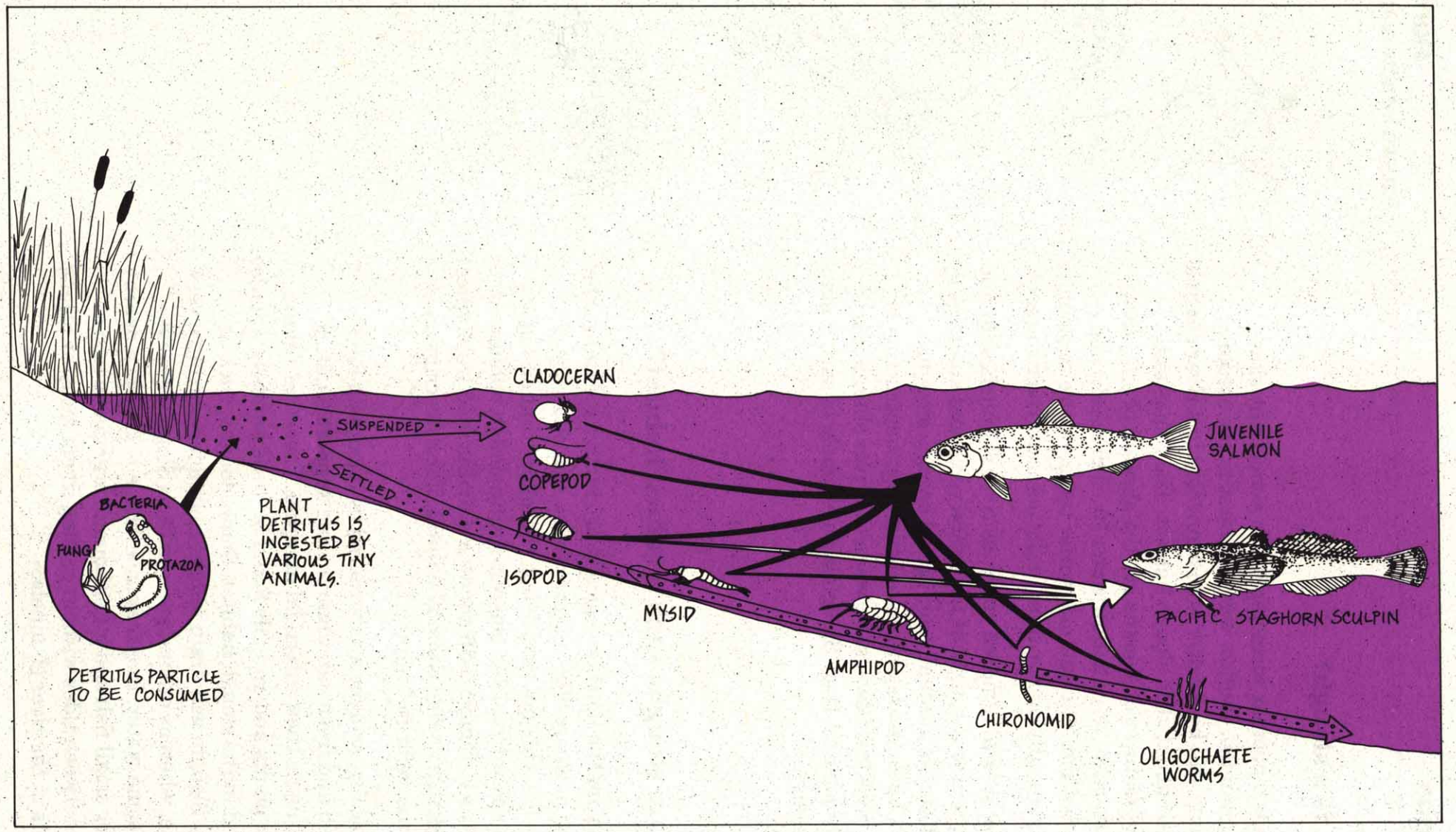
FIGURE 2-35
Aquatic Insects and Shrimp

Why are sloughs such a valued habitat?

Sloughs are the most biologically productive habitat in the estuary; nowhere else is there such a rich diversity of aquatic life. It is not surprising, therefore, that ecologists place a special value on the remaining slough habitats of the estuary. Figure 2-36 shows a detritus food web typical of the slough or side channel habitat. For a description of food webs, refer to Chapter 1.

Typically, sloughs are bordered by floodplain forest, brackish and freshwater marsh, and support mudflat habitat along their intertidal margins. Therefore, all the aquatic plants and animals found in these habitats will also be found in the slough habitat. Some sloughs, such as Tilbury Slough, will drain almost completely during a very low tide, whereas others, such as Deas Slough, always retain some water. In either case, there is always a nearby place for small fish and other aquatic organisms to seek refuge between tides without getting swept away by strong currents in the river channels.

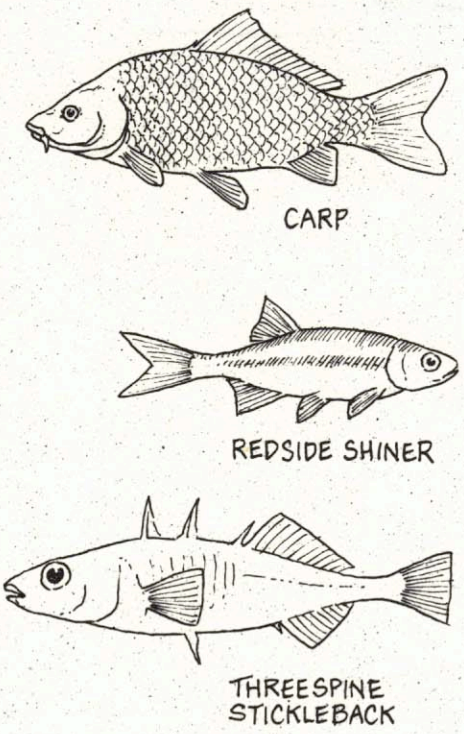
FIGURE 2-36. Detritus Food Web of Sloughs



In addition to the bottom-dwelling invertebrates previously described for the river channel habitat, the quiet sheltered water of the slough also supports a number of other aquatic invertebrates. There are snails, leeches, aquatic insects such as Water Boatmen (*Corixidae*), dragonfly (*Odonata*) nymphs, and small shrimp (*Eogammerus*), to name only a few (Figure 2-35).

The slough is also the home of small resident fish such as the Three-spine Stickleback (*Gasterosteus aculeatus*) and Redside Shiner (*Richardsonius balteatus*) that could not live in the strong currents of the river channels. Large fish, such as the Common Carp (*Cyprinus carpio*), which can reach nearly five kilograms in weight, will seek out sloughs in summer to spawn (Figure 2-37).

FIGURE 2-37
Common Slough Fish



FIELD TRIP DESTINATION: Deas Island Park

Deas Island Park can be reached by taking the second turnoff from Highway 99 south of George Massey Tunnel and proceeding approximately two kilometres north along River Road to the park entrance (Figure 2-38). This park belongs to the Greater Vancouver Regional District, has plenty of parking, and sponsors several public events -- the most notable of which is the Fraser River Festival, usually held on the first Sunday in June, during national Environment Week.

The location of Deas Island Park is ideal for studying the river channel and slough habitat. In addition to Deas

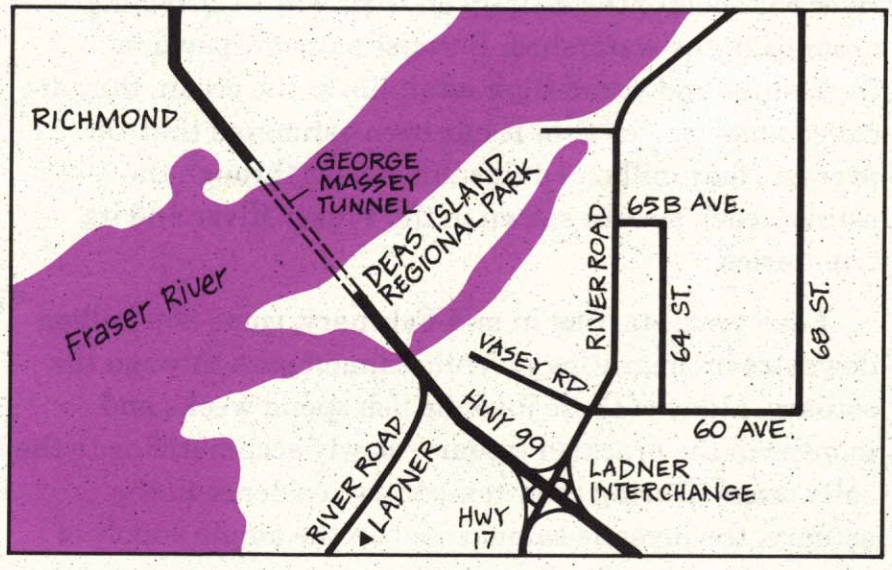
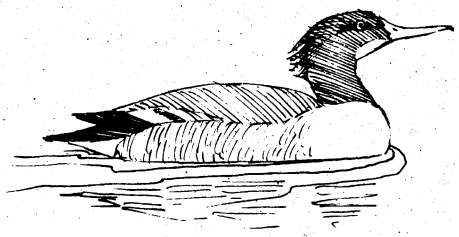


FIGURE 2-38
Location of Deas Island Regional Park



Slough itself, which represents a large, man-made slough, there are several smaller, natural sloughs. The South Arm of the Fraser River, a major river channel, can be viewed at several locations in the park as well as from an elevated observation platform.

What to Look For

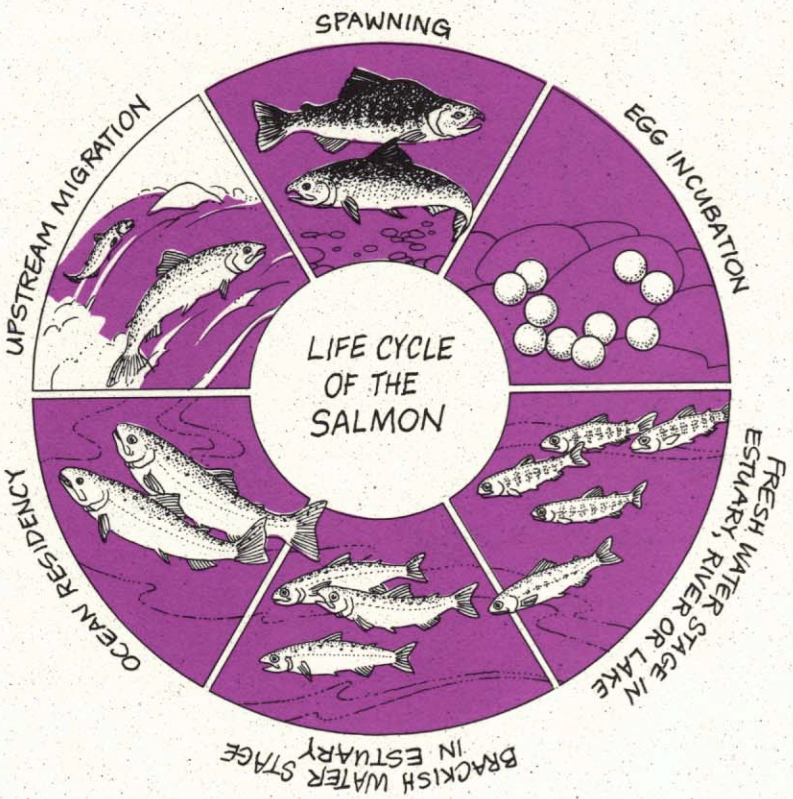
- ☐ Look for evidence of the seasonal movement of fish through the river channel. The presence of fish-eating diving birds such as the Western Grebe and the Common Merganser signal the spawning run of Eulachon from mid-March to mid-May. Gill net boats fishing in July and August indicate the probable presence of thousands of migrating Sockeye Salmon.
- ☐ Migrating salmon must now share the river with deep sea vessels, tugs and barges, log booms, commercial fishboats and recreational boats. It is interesting to watch this vessel traffic and think about their port of origin, cargo and purpose on the river.

OTHER FACTS AND FIGURES

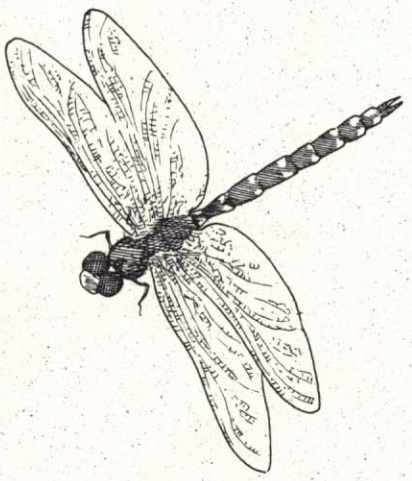
Salmon - The King of the Fraser

The Fraser River produces more salmon than any other river system in the world. Five Pacific salmon species (Chinook, Coho, Pink, Sockeye, Chum) as well as sea-run trout (Steelhead) migrate upstream as adults through the river channels of the estuary on their way to spawning grounds in the watershed. Because salmon spawn in freshwater and spend their adult life in the ocean, they are called anadromous fish. It has been estimated that, on average, four million adult salmon pass through the estuary each year to spawn in the Fraser River and its tributaries.

Each year, starting in mid-February, some 800 million downstream migrating juvenile salmon pass through the estuary. Many of these juvenile fish spend weeks and months in the brackish estuary, slowly acclimatizing to the salty ocean. During their temporary residence in the estuary, the juvenile salmon feed on the ample supply of



invertebrates provided by the marshes, sloughs and swamps. That is why the salmon's future survival depends on the preservation of a healthy aquatic environment in the estuary.



Dragonflies - Elegant Helicopters of the Marsh

The metallic dash of a large dragonfly zipping over the estuarine marsh brings surprise and wonder. Dragonflies can be seen tirelessly hawking after the insects that are their prey.

While dragonflies do not sting or bite people, they do have a huge appetite. Using its large compound eye with 30 000 separate lenses to locate prey, and its spiny legs as a basket, the dragonfly hunts, captures and eats its prey in flight. Over several hours, it may consume its own weight in mosquitoes and gnats.

Late in summer, dragonflies mate and lay their eggs. While in flight, the female deposits her eggs under the leaves of aquatic plants by rhythmically dipping her long slender abdomen below the water. The eggs develop into nymphs (*Odonata*, Figure 2-35) that live underwater for one to three years, after which they emerge as flying adults. Look for the outer skin of nymphs left behind on marsh plants by the emerging adults.