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Executive Summary: Caring for the Englishman River Estuary

A bio-inventory and volunteer monitoring project

In 2007 and 2008 the Mid Vancouver Island Habitat Enhancement Society (MVIHES) coordinated a project to create a more complete biological understanding of the state of the Englishman River estuary and generate some management recommendations that would be supported by the community. The estuary has been scoured by historic log booms, dyked and filled for agriculture or residential developments, and riddled with invasive plants and sedge devouring imported geese. Adjacent forests and much of the watershed has been logged and altered by development with impacts on river hydrology, water quality and quantity, as well as salmonid numbers. MVIHES wanted to increase public awareness of the environmental issues and their involvement in the long term monitoring and management of the estuary to foster a feeling of community stewardship of the estuary. The first goal was to collate existing biological information and local knowledge for the estuary, then compare and augment that with new inventories and mapping of the fish, water quality, vegetation, terrestrial fauna, invasive species and the state of the near shore environment (including forage fish habitat). The second goal was to engage the community in order to shift human behaviour patterns to minimize negative impacts and generate restoration efforts, while continuing monitoring programs.

The study area of this report is the delta of the Englishman River including river channels with salt water influence, banks, bars, and islands; the tidal flats, marshes, foreshores, beaches, spits and dykes and associated forested flood plain. For convenience, the area below the Island Highway bridge down to the lower limits of eelgrass beds was included in this study. For the nearshore inventory including the backshore, intertidal area, forage fish habitat and eelgrass beds the boundaries extended to the Little Qualicum River and Craig Creek.

The watershed is about 324 square kilometers, reaching back to the Beaufort Mountain Range and gathering surface water, snow melt and groundwater. Flow rates range from an extreme high of 393 cubic meters per second to a low of about 1.5 cubic meters per second. Active river channel change over time and erosion and sedimentation are active forces shaping the land. As the sediment builds up at the estuary from the river, the land area has a tendency to gradually expand and increase in elevation, but this may be offset by rising sea levels and certainly large estuary areas were lost to dyking and filling. The historic area of the estuary was around 275 hectares and it is now about 164 hectares of undeveloped land. There is also groundwater movement to and from the river and seepage that supports plant life in the dry months. At the estuary there are three layers of aquifers and complex interactions with changing river flows, groundwater levels and tides.

Estuary management planning requires an understanding of the historical natural condition and processes of the estuary and an up to date status report of existing plant and animal communities. Then a course can be charted to conserve remaining intact ecosystems and endangered species, and to work towards the restoration of lost or degraded habitat. The

estuary is a biological hot spot for birds, fish and wildlife. One example is to move systematically towards breaching of the San Pareil dyke and "reclaiming" the alienated lands for use by wildlife including fish, and by native plants. This action is based on the recommendations of the detailed report on breaching the dyke, if they meet with public approval at regular public meetings. It is important to consider the trade off in the full range of ecological values when planning enhancement projects for any one species. The timing of various biological events and how they relate to components of the ecosystem is another aspect that requires further study (herring spawn, insect surges, flowering, fruiting, leaf drop, algae, sedge growth, etc). Other management strategies are summarized within the various topic areas below.

The project was funded by a diverse collection of 15 foundations, government agencies and funds. There were 91 volunteers involved in the project, contributing over 1400 volunteer hours. A total of 458 homes around the estuary were visited with information, a brochure and a survey. Also, 345 people were reached through community events. New signs at the estuary and ongoing outreach programs will help raise awareness about the importance of estuaries, the rarity of the ecosystems and species, and the role for human stewardship. A sense of community ownership and responsibility combined with education programs will go a long way in preserving and restoring the estuary. However there still needs to be rules, fences and gates to limit access and the types of access to areas of the estuary.

Fish

There were 20 species of fish found in the estuary by project biologists and volunteers using seine nets during the 2007 and 2008 sampling periods which included the March to August time period. The fluctuating environmental conditions in the estuary limit the number of fish species found there, but the high nutrient levels and habitat complexity enable it to support high numbers of fish. The estuary is a staging ground for salmonids coming down the river or going up. Very low Steelhead numbers are an extreme conservation concern and they would benefit from improved estuary habitat. The area is also a vital nursery where many juvenile species feed, hide and grow. Three Spine Stickleback, Staghorn Sculpin and Shiner Perch were the most common fish, while pink salmon numbers were the highest of the salmon count. No salmon were caught in August. Chinook, Coho and Chum salmon were also captured, mostly during the April to June time period. Fish distribution was quite even between the Beach, Lagoon and Dyke location with fewest caught at the river location. Please refer to the map / Figure 1.1, page 16 for details of the above referenced locations. There seems to be little difference in fish numbers from the 1993 sampling, but the methods were different in that study. Water quality from the city storm drains that enter the estuary is poor in terms of coliforms, metals and PAH. More detailed sampling should be continued to determine distribution, residence period and growth rates. Key species abundance sampling could focus on Stickleback, Sculpins and Salmon. Many of the fish species could be impacted by the loss of salt marsh habitat (from geese and dyking) and reduced channel complexity and cover.

Water Quality

Temperature, oxygen, conductivity and salinity levels were measured at the four fish sampling locations and results varied according to the season, tide and location influences (fresh river water, ocean water, storm water or isolation from these elements.) None of the locations had lethal water quality, but the lagoon had the highest temperature and conductivity and the lowest oxygen levels to the limited exchange of water through the narrow dyke opening. However, the water quality for storm water outfalls into the estuary failed the BC guidlines for drinking water or fish due to high metals, polyaromatic hydrocarbons (oil and grease), and high coliform bacteria levels.

A management plan should be created for the estuary to conserve and restore the habitat and water quality that makes it a hotspot for biodiversity and productivity. Water quality sampling and management should be pursued to narrow down the sources of pollution. Rainwater management at the source is a key strategy that must be implement more (raingardens, swales, pervious surfaces.) Wetland treatment at the outfalls would be one way to trap the remaining contaminants before they enter the estuary. Other agencies could help with continued monitoring, analysis and plans.

Vascular Plants, Plant Communities and Ecosystems

Each plant community delineated is a marker for its associated wildlife habitat and the set of environmental conditions required to support the plant life. They are a kind of bell weather that can indicate changes, including those affecting anthropogenic interests. By monitoring changes over time, it is possible to discern the trends and implications for fish, birds and wildlife. The invasive species baseline mapping is useful for showing their spread and allocating and evaluating eradication efforts.

The estuary is in the Coastal Douglas Fir moist maritime biogeoclimatic zone. There are bands of vegetation in natural succession from water's edge, including low, mid and high estuarine marsh, shrubs and forest. Below, Kennedy's 1976 vegetation mapping is compared to the 2007-2008 mapping. Lyngbye's sedge was once dominant in much larger areas in 1976 than the fraction remaining in 2008. It is an especially important habitat for fish and waterfowl cover and food. The invasive version of the Canadian Geese over grazing parts of the estuary are likely one of the main reasons for the changes to the plant community and even the substrate. The dykes have also cut off or reduced salt water influence from some areas which is detrimental to salt marsh vegetation that exists in a range of salinity or these plants get shaded out by shrubs and trees. The marsh substrate has slumped into the tidal channels, removing overhanging vegetation and cut banks that provide cover for fish. Changes in salinity, erosion

and deposition of dredging material are other likely causes of sedge decline. The western dyke was breached in 1979 and has resulted in a return to more salt marsh habitat in that area. What are now the western tidal marshes of the Englishman River Estuary were isolated from tidal influences behind the Shelly Road dyke in 1976, when Kennedy (1982) did her field work. At that time, the area was occupied by pasture vegetation that was not a functional part of the estuary so Kennedy did not map it. As a result, the detailed comparisons and mapping of the changes in vegetation from 1976 to 2008 that were done for the eastern and central marshes of the estuary, were not possible in the western marshes.

Another force for change has been the river moving its main channel on the estuary further east since 1976. However important this powerful current of water may be to the vegetation patterns observed, it does not explain the transformation in vegetation that occurred in areas where the river flow patterns appear to have remained unchanged since 1976, based on ortho photo interpretation and field observation of erosion and deposition. Other possible processes for change were also considered.

In summary 3 factors appear to account for the vegetation changes observed since the Kennedy
made her observations in 1976:
1) movement of the river's main channel in an easterly direction
2) breaching of the dyke
3) grazing by Canada Geese

A large area of the western part of the estuary (the West Marsh/ Lagoon) supported a plant community that is a likely occurrence of the CDFmm/Em03 Distichlis spicata Ecosystem which is RED-listed (equivalent to "endangered" or "threatened") by the Province of BC. Near the tidal channels, this ecosystem appeared to be complexed with the CDFmm/Em02 Salicornia virginica-Glaux maritima Ecosystem which is also RED-listed. Two other plant communities were identified thus far with likely correspondence to existing BEC classifications: the CDFmm/Em01 Ruppia maritima Herbaceous Vegetation Ecosystem which is also RED-listed, and the CDFmm Em05 Carex lyngbyei Herbaceous Vegetation Ecosystem which is BLUE-listed.

Behind the Mine Road Dyke, the plant community has changed from herbaceous plants with very few shrubs to mostly shrubs and trees, as occurs naturally in succession with few disturbances. As the canopy closes, most of the invasive species will be shaded out of this area. When the dyke is breached, the area will again return to herbaceous salt tolerant plant communities. New invasive species from the surrounding residential areas is currently a significant threat. The Jamieson Wetland has changed from a sedge saltmarsh to mostly bulrushes, with some sedges. When the dyke is breached, the sedge saltmarsh will return. The San Pareil spit habitat is some of the rarest on Vancouver Island and includes low growing plant species such as Dunegrass and Silver Burweed. While there are some invasives there like Scotch Broom, the remaining area remains fairly natural. Due to its small size, it is vulnerable to increased foot traffic. Only 0.75 hectares of the 3.5 - 5 hectare spit area remains

in natural condition because residential development covers most of the spit. The mud flats marsh habitat in San Pareil Lagoon consist of sparsely vegetated mudflats covered in algae with a fringe of saltwater and brackish plants. Plants such as Seashore Saltgrass and American Saltwort have been heavily grazed by geese in this area as well. The San Pareil High-Marsh finger mostly has a high density and diversity of vegetation such as Sea Shore Saltgrass, Sea Arrowgrass and American Saltwort. However, areas of heavy grazing by geese has denuded portions of the area and encouraged more dominant stands of Milkwort which is typical of more frequent disturbance. The mid and high marsh between Mine Road Dyke and the East river Channel has diversified since 1976 and now includes Lyngbye's sedge over half of the area. This expansion of the sedge is quite rare on the estuary and the plant community is rare on the coast. People and their dogs using the adjacent trails may have protected the area from over grazing by geese. The Big Island Marsh has been affected by the main river channel moving east up to 75 meters, eliminating much of the sedge marsh. The main part of the island is a mosaic of plants and shrubs and trees are expanding into the marsh on many edges. The main tidal channel on the Big Island has also lost sedge communities, perhaps due piling up of historic dredging material. The plant communities in Center marsh have also changed, most notably with a loss of sedges. A major loss of biomass and biodiversity has resulted as the dominant Milkwort does not grow as tall or as thickly as sedge. The loss of sedge could be due to increased salinity, erosion or grazing by waterfowl. The west marsh is the treeless area west of the Shelly Road tower and the dyke which was breached in 1979.

Terrestrial Fauna

The confirmed observations that volunteers and staff in this study made of terrestrial animals produced records that totaled 24 species and other tallies include up to 162 species of birds. Many of the observations were recorded with coordinates from a GPS unit so these records added to the mapping of animal uses as part of mapping special places and features on the estuary. The observations are presented in text form for management purposes and are in the process of being developed into maps for easier visual interpretation. The team of Arrowsmith Naturalists that undertook a systematic monthly bird survey from 2005 to 2009 observed 143 species of birds.

Of the birds that were observed, either by the naturalist or as part of this study, the Western Grebe and Short-eared Owl are RED-listed and the Peregrine Falcon (local pealei subspecies and the Great Blue Heron (local fannini subspecies) are BLUE-listed. A number of other listed (endangered, threatened, of special concern) animal taxa, such as the Vancouver Island subspecies of Common Water Shrew or Navigator Shrew (Sorex palustris brooksi) and the Vancouver Island subspecies of Ermine or Short-tailed Weasel (Mustela erminea anquinae) are likely present on the estuary but their presence was not confirmed in this study. Preserving the habitat for these species and reducing human disturbance around nesting and feeding areas is vital. Some areas should be off limits and motorized vehicle access prevented. Maintaining wildlife corridors and controlling invasive species are also essential. There is a summary of the fauna recording during this study on page 68-69. See Appendix 2.2 (p. 172) for more detailed bird lists compiled by the Arrowsmith Naturalists.

Mapping Special Places and Features on the Estuary

The purpose of this part of the project was to record some of the places that might be of special importance to someone trying to make a ecosystem-based management decision about the estuary. The concept was introduced to volunteers and the results suggest that some understanding and appreciation has been developed. Thus, this technique is a useful tool to bring together the public, the land owners and the land managers. The results documented 26 locations on the estuary that are of particular importance to certain species. It is expected the list will grow to many times that number as the photographs and records are processed by volunteers and, as new data is collected. The result will be a map where these features will be conveniently visible to anyone making decisions that might affect the estuary. In addition, this field-based process coupled with a review of the literature, highlighted the need for some specific spatial data.

For example, the Band-tailed Pigeons that were recorded using the estuary in this study are likely to be dependent on a mineral resource whose geographic location is not known. Similarly, the roosting spot that hundreds of Northwestern Crows depend on is on or near the estuary but not yet located. In another example, a few solitary bee condominiums were located that might be important to many species of plants and animals, but a careful inventory of the estuary in the autumn would be needed to locate the remainder of these condominiums. Northern Riceroot and Indian Consumption plant was found in a few areas and was an important First Nations food source. One red-legged frog (rare blue-listed species) was found and the area should be protected by exclusion from any recreational use or other habitat enhancement projects. Two Bald Eagle nests were found and Merlin activity was noted. Five river otters were observed and a possible den located on the big island.

The process of doing inventory, as described in the section on Vascular plants, Plant Communities and Ecosystems, and the section on Invasive Species, has created a database of occurrences of listed (endangered, threatened) plant communities, thus providing another layer of information that could be useful to guide decisions about the estuary. The information will be mapped to make it conveniently accessible.

Invasive Species

The presence of more than 30 invasive plant species was confirmed on the Englishman River estuary. This number is expected to rise as confirmation found for many other invasive species. This part of the project involved the greatest amount of volunteer effort: approximately 34 people were involved in various training activities. Experiments with control of some species, especially English Ivy, involved 2 volunteers and 2 students spending 4 days of physical labour clearing the vines off of 7 large trees and approximately 20 shrubs. In total, approximately 684 hours of unpaid volunteer time was given to the invasive species part of this project, not including the many hours that the Arrowsmith Naturalists spent pulling Scotch Broom and knapweed. Another result was maps of Scotch Broom, English Ivy and Lesser Periwinkle distributions on the estuary using a combination of ground records and orthophoto interpretation. Maps of occurrences of knapweed, Armenian Blackberry, European Holly, Spurge Laurel and Yellow Archangel were also made and these are still being added to. This project has identified a need for distribution maps of Robert Geranium, Quackgrass and Field Bindweed but volunteers have not yet started on these tasks. From the maps, recommendations for inclusion in a detailed management plan for those species was developed, starting with Scotch Broom. In this study, the Canada Goose was considered an invasive species because the local population of the Canada Goose is recently established and still growing, and already it appears to exceed the carrying capacity of the estuary. In addition, the genetics and behaviour of these birds appears to be different from any of the smaller, native migratory Canada Geese that would sometimes visit the Englishman River estuary in small numbers for a brief period. Control of the goose population is a priority, along with eradication of periwinkle and birch. Nearshore management of invasive Sargassum. Broom removal should continue with a focus on areas of highest ecological benefit and highest chance of success. This report concludes that Broom Management Zones A, B and C satisfy these two conditions. See appendix 2.3 (page 183) for a detailed list of invasive species and watch lists.

Through the outreach program many people learned about the problems of invasive species, how they spread and the how everyone can help to control and eradicate some of them. This education component should be ongoing and include signage. At the end of the project, it appears that there are enough interested people forming a network to complete many more of these tasks in the near future.

Nearshore Studies - Shoreline Inventory

The hardening and modification of the shoreline is having a negative effect on the ecological functions of the shore of the Parksville-Qualicum Beach area, and the Englishman River estuary. We need to educate the public, developers, elected officials and property owners about alternatives to armouring a shoreline. We need to review the possibilities for restoration of softer, greener shores within the study area. We need to have laws to protect our nearshore including local bylaws and enforcement of the Fisheries Act. We need to review our shoreline

variances in order to understand how shoreline modifications are approved and then develop tools and/or a revised process to assist in better decisions regarding nearshore health.

Nearshore Studies – Marine Riparian Areas

The marine riparian area has been impacted by development. It provides important biological function to the nearshore and to humans. A more complete study of the marine riparian area should be conducted. A study of the marine riparian vegetation that is not in existence but should be needs to be completed. Information from such a study should be shared through education programs, and incentives given to plant and restore the riparian zone. Bylaws to preserve marine riparian vegetation and prevent introductions of known invasives should be implemented. Removal of existing invasives should be encouraged.

Eel Grass Mapping

The eelgrass beds of Parksville-Qualicum Beach cover a significant distance of shoreline. However, changes seem to be occurring in the eelgrass bed distribution and ecology. More research is needed to explain these changes and potential impacts on food chains in the ocean. Attempts should be made to determine whether any water quality issue is due to local or regional influences or if it concerns the whole of Georgia Basin. The Bamfield Marine Science Centre is currently researching wasting disease and will work with the Seagrass Conservation Working Group to promote partnerships in research and management in the Georgia Basin and West Coast of Vancouver Island. MVIHES and land managers should continue to work together on this research. Once reasons for decline have been identified, consideration of transplants would be possible. Mapping of Zostera Japonica should be undertaken to monitor its spread. This would include a detailed study comparing growth rates of Z. Marina to Z. Japonica. An ecosystem approach must continue in monitoring of eelgrass, relating the habitat to other species that benefit from healthy eelgrass beds. Human actions that can impair the health of the system and mapping of kelp in the area would be useful and help complete the picture of nearshore function.

Forage Fish Mapping

The beaches of Parksville-Qualicum Beach seem to offer a selection of Sand Lance and Surf Smelt habitat. Mapping for Pacific Smelt should be completed as well, using a methodology similar to that used for Sand Lance. Sand Lance spawning sampling need to be collected in November, and early December. Several years of data collection should occur in order to capture Sand Lance's use of different beaches over time. A photo-point monitoring program to identify and monitor forage fish habitat should be considered. This section of coastline contributes 3-4 percent of the herring spawn habitat for the province. Monitoring eelgrass and mapping kelp would be of great value to forage fish management. The value of the local

nearshore to the herring and the many food chains dependent on herring, needs be reflected in our management of this ecosystem, including by local governments. This information should be included in a variety of education programs. There should also be further development of policies and regulations to protect and restore the fish habitat.

The Nearshore

As expected before the study was done, the nearshore is a complex zone as a result of many interrelationships, some of which are still not well understood. In order to ensure a healthy nearshore in the study area a multi-faceted approach will be necessary.

- The combination of harvesting eelgrass and kelp for gardening and cleaning up the “messy” beaches are stripping beaches of important nutrients. An education program focused on both the coastal home owner, and the avid gardener would be a useful next step.

- A more detailed review of the marine riparian area would be extremely useful to indicate health of the whole nearshore, and possible management actions and best practices to suggest to property owners.

- There is a need to raise the profile of the Canada Goose overgrazing and create an understanding and support for potential solutions through a public education program. This would include presentations to the public, mainstream animal rights groups and other key audiences.

- The role of groundwater in the estuary and nearshore areas is an area that has not been well studied. Further research is needed in order to determine the role of groundwater in an estuary and nearshore areas generally and the ER estuary and nearshore specifically. This needs to be completed before further water management planning is conducted for the area.

- There are some real concerns over the future of water supplies to the estuary and nearshore. Studies should be done to clarify flow, salinity and dissolved oxygen within the estuary to better understand what levels are required and set baselines in different areas of the estuary. Similar work should be done within the nearshore as well.

- This study has shown some of the complexity of the nearshore and this information should be communicated to the public, land managers and politicians. A communications/education program would help increase understanding and support for various management approaches and protection options for the nearshore.

- As public understanding and support grow, a regional shoreline planning process would be a strong step towards a wide-ranging healthy nearshore.

Public Involvement

- There is definitely an interest in the community in participating in citizen science, or the stewardship of their ecosystems. By using a variety of methods to contact the community and engage them, a range of resident type and a good number of residents were reached with messaging and/or a chance for a hands-on experience.

- Given the value placed on the estuary by the community, it is important that upcoming OCP reviews consider these values. Bylaws protecting estuary and nearshore areas should be reviewed

- Public education programs regarding the function of their estuary and nearshore and how to care for them should be offered. Topics could include invasive plants and how to remove them, alternatives to seagrasses and algae in the garden as fertilizer, role of the wrack line on the beach, alternatives to hardening, etc.

- Continued opportunities for stewardship and monitoring should be offered. Topics could include alternatives to pesticides, herbicides and fertilizers; continued monitoring of the estuary and nearshore elements of this study such as vegetation, fish distribution, water flow monitoring, etc.