Restoring Lost Saltmarsh to Create Habitat Connectivity

Comox Valley Project Watershed Society
Courtenay, B.C.

Article Prepared for the Society for Ecological Restoration – Western Canada Chapter
Prepared by Jennifer Sutherst, Estuary Coordinator & Staff Biologist

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The Comox Valley Project Watershed Society has been undertaking restoration work in the K'ómoks Estuary transplanting intertidal and subtidal eelgrass in an area, south of Courtenay, B.C. known as the "Royston Wrecks" for the past several years. From 1911 to the early 1950's steam locomotives hauled approximately 6-8 billion board feet of logs from logging camps throughout the Comox Valley to the Royston log dump which was located at this site. A mile long wharf extended from the end of the road into the estuary. Logs were tipped off the wharf and sorted into booms and towed to more protected waters for transportation to saw mills. Starting in 1937, large ships and tug boats were sunk off the site in order to form a breakwater to protect the log booms. Logs were stored north of the breakwater until 2006. This activity caused major habitat damage to the estuarine ecosystem.

In addition to the eelgrass restoration, in the fall of 2014 Project Watershed undertook a restoration of the foreshore saltmarsh habitat. Saltmarshes are coastal wetlands that are flooded and drained by salt water brought in by the tides. These intertidal habitats are common in estuaries and provide essential food, refuge or nursery habitat for many different species. Saltmarshes also protect shorelines from erosion by buffering wave action and trapping sediments. They reduce flooding by slowing and absorbing rainwater and protect water quality by filtering runoff. Intertidal saltmarsh areas aid in carbon sequestration as they function to absorb large quantities of carbon dioxide from the atmosphere and store it, thereby helping to counter some of the effects of global warming.

The concurrent restoration of these eelgrass and saltmarsh habitats creates connectivity between the subtidal, intertidal and foreshore zones within the estuary. These habitats form part of the "salmon highway" providing important foraging and refuge areas for Pacific salmon as they out-migrate to the ocean as juveniles, and then once again when they return to spawn as adults. Striving to re-establish habitat connectivity is an important element of restoration design because human alteration of the landscape has resulted in increasingly fragmented habitat.

This was the first time our organization was involved in a saltmarsh restoration and the first time, we believe, that the barrier island technique was used on the west coast of Canada to restore damaged saltmarsh habitat. In other similar projects the most common technique that is used is a saltmarsh bench design, whereby nutrient fill is added to existing foreshore saltmarsh areas and then planted, in order to increase the amount of habitat. The technique we employed was to create three individual linear islands, parallel to the existing saltmarsh, consisting of armoured planting berms with channels in between. By utilizing this methodology we created 360° of edge habitat therefore increasing the amount of habitat overall available to salmonids, and increasing the habitat complexity by allowing for many drainage channels around and in between the islands. This type of design is also useful in protecting the existing foreshore from erosion due to wave action and storm surges. The Comox Valley Regional District was concerned about erosion that was occurring near the Royston Seaside trail, a popular local pedestrian trail, and these barrier islands will help protect against further erosion.

Figure 1: Photo of eroding trail northwest of the site. This portion of the trail has been abandoned due to the erosion.

The restoration project featured the construction of 500m^2 of eulittorial marsh platforms or planting berms. Large equipment was used to add nutrient fill to the foreshore and re-contour it in order to create these berms. The berms had to be constructed at the correct elevation in order to achieve the proper tidal flooding characteristics for the desired vegetation community type to thrive. In this case a vegetation survey, conducted at the site the year before, determined that we had lower marsh communities dominated by *Salicornia depressa* and upper/middle marsh species that included *Distichilis spicata*, *Carex lyngbyei* and *Grindela integrifolia*. The elevation criteria we used were obtained by referencing the nearby saltmarsh habitat which was located in a similar geomorphic landscape setting. Based on these surveys, and the vegetative community we wanted to establish, it was determined that the planting berms had to be built at a 4% slope between 0.8 and 1.2 m high. The vegetation scheme and planting plant were designed by Tanis Gower of Fernhill Consulting.

Figure 2: Construction of the berms.

These planting berms also had to be armoured with large natural boulders in order to protect them from the prevailing wind and wave action as well as from tide and storm surges. As part of the preliminary planning for this project a detailed hydrological survey of the area was conducted by Northwest Hydraulic Consultants in order to understand the wave forces, tidal influences and patterns of sediment recruitment and erosion at the site. A hydrological engineer reviewed the saltmarsh concept plans and provided the details of the design.

The breakwater, that was put in place to protect the log booms, has disrupted the normal pattern of sediment delivery along the shoreline, starving the site of sediment and causing the erosion of existing saltmarsh. The newly constructed berms were stabilized along their lower margins with boulders, of specific size, placed at a 1:10 slope. This ensured the nutrient fill we used to enrich the beach would be retained on site. As well, the way in which the islands have been constructed should ensure long-term recruitment of sediment through natural processes.

Figure 3: Area before the saltmarsh islands.

Figure 4: Same area after the saltmarsh islands were completed.

Figure 5: Newly built islands showing tidal drainage channels.

The islands were allowed to overwinter. They successfully withstood the first winter storm season and were planted with over 6,000 saltmarsh plants in the spring. A mix of native species was planted, with an emphasis on those that have stabilizing root systems and can create dense cover. Some of these species include *Distichilis spicata*, *Triglochin maritimum*, *Salicornia depressa*, and *Carex lyngbyei*. The first spring after the islands were constructed pioneer plants, including *Atriplex patula* and *Spergularia Canadensis*, started to recolonize the islands. Much of this natural recruitment was observed on the shoulder areas of the saltmarsh islands; which were not planted as part of the project.

Figure 6: Shoulder areas showing natural recruitment of pioneer plants.

Saltmarsh restoration is an evolving practice that aims to preserve the integrity of coastal processes, while maintaining and enhancing habitat diversity and function on a local scale. This pilot project has been structured to allow for learning opportunities, and the experience gained will assist in developing a wider plan for the K'ómoks Estuary and hopefully for other sites along the British Columbia coast.

Contact Information

Jennifer Sutherst
Estuary Coordinator & Staff Biologist
estuary.projectwatershed@gmail.com

Funding for this project was secured from Fisheries and Oceans Canada, the Commission for Environmental Cooperation, the Comox Valley Regional District and the Walmart-Evergreen Green Grants program.