Assessing Habitat Compensation in the Lower Fraser River and Estuary

Megan A. Lievesley  
*Community Mapping Network and BC Conservation Foundation, mlievesley@gmail.com*

Dan Stewart  
*Community Mapping Network and BC Conservation Foundation, danjstew@gmail.com*

Brad Mason  
*Community Mapping Network, masonb12@telus.net*

Rob Knight  
*Community Mapping Network, rknight@telus.net*

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Lievesley, Megan A.; Stewart, Dan; Mason, Brad; and Knight, Rob, "Assessing Habitat Compensation in the Lower Fraser River and Estuary" (2016). *Salish Sea Ecosystem Conference*. 20.  

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Assessing Wetland Compensation and Examining Limitations to Native Plant Establishment in the Lower Fraser River Estuary

Megan Lievesley, MSc, BIT & Dan Stewart, BSc, Dipl. Tech; BC Conservation Foundation

In collaboration with Rob Knight & Brad Mason (Community Mapping Network) & Canadian Wildlife Service – Environment and Climate Change Canada. Funded by the National Wetland Conservation Fund

Introduction

- Development projects in the Fraser River Estuary have been guided by the No-Net-Loss principle and Net Gain Objective, which aim to off-set unavoidable habitat loss through habitat compensation, restoration, and creation.
- Fraser River Estuary Management Plan (FREMP) compensation projects and their associated monitoring data are catalogued on the Community Mapping Network website in the FREMP-BIEAP Habitat Atlas.

Objectives:

1. Consolidate compensation site monitoring information and build upon existing database accessible via the FREMP-BIEAP Habitat Atlas
2. Revisit select compensation sites, use standardized methods to assess compensation success, and examine limiting factors to success.
3. Publish report of compensation assessments and make recommendations for current and future habitat compensation projects

Methods - Field

Vegetation surveys were conducted at 54 tidal marsh compensation sites and 7 reference sites, July – October 2015. Using 1 m² quadrats we identified and recorded all species, estimated their percent cover, recorded origin (native, exotic, invasive), recorded wetland indicator status, and measured the maximum stem height of all sedge and rush species. Compensation area and proportion of target habitat established was determined by walking the perimeter using a Trimble Geo 7x.

Results – Compensation Assessment

- Compensation success assessed on (1) Proportion target habitat established (Criterion 1) and (2) Proportion native species, normalized to reference sites (Criterion 2)
- Only 33% of wetland compensation sites ranked “Good” in both criteria. However, assessing the criterion individually, 65% of sites ranked “Good” for Criterion 1, and 50% for Criterion 2.
- Proportion of native species was the greater limiting factor to compensation success.

Results – Native Species Across Fraser River Estuary

- The proportion of native species was found to negatively correlate with increased distance from the mouth of the river on compensation sites and on reference sites. Likely due to decreasing salinity and/or intensified urbanization.

Results – Wetland Indicator Status (WIS)

- Wetland indicator status (WIS) (value 1 – 5) of a species reflects the likelihood that that species occurs in a wetland (lower value) or upland environment (higher value). Using species’ dominance and WIS we can calculate Site WIS, which can reflect whether an entire site is more representative of a wetland or upland environment. Compensation sites had a significantly higher site WIS on average than reference sites. Increasing site WIS was found to correlate with increasing proportion of non-native species on both compensation and reference sites. Higher site WIS may be attributed to short submergence time or substrate type (poor water retention).

Methods – Analysis

- Mean percent cover of each species determined for each site.
- Species dominance calculated by:
  \[ \text{absolute dominance (sp.x)} = \frac{(\text{mean }% \text{ cover})(\text{frequency})}{\text{total cover}} \]
  \[ \text{relative dominance (sp.x)} = \frac{\text{absolute dominance (species x)}}{\text{total absolute dominance all spp.}} \]
- Site wetland indicator status = \[ \sum \frac{\text{species relative dominance} \times \text{species WIS}}{100} \]
- Statistical analysis conducted: regression, ANOVA, ANCOVA

Results – Native Species and Carex lyngbyei

- The mean proportion of native species on compensation sites was 63% ± 7, compared with 77% ± 10 on reference sites. Carex lyngbyei is the most common native shoreline sedge in the Pacific Northwest and is often the target species for wetland compensation. It was found to be the dominant species in compensation sites and reference sites; however, it was twice as dominant on reference sites. Once established C. lyngbyei often creates monotype stands; therefore, the limiting factors to C. lyngbyei dominance may occur soon after site creation, while plants are poorly established.

Recommendations for Future and Current Compensation Projects

- Employ adaptive management strategies in future compensation projects and to restore poorly-functioning existing compensation sites.
- Increase monitoring and employ adaptive management of Carex lyngbyei during initial years of establishment, mitigate losses where necessary, and control non-native species.
- Consider location along River (West – East) in monitoring plan and adaptive management strategies.
- Ensure adequate submergence time by verifying appropriate elevation and ensure appropriate substrate material is used in creation of compensation wetland.

Figure 1: Proportion native species with distance from the mouth of the river. Compensation sites N = 52, reference sites N = 7.

Figure 3: Proportion native species with distance from the mouth of the river. Compensation sites N = 52, reference sites N = 7.