

ECOLOGICALLY SIGNIFICANT AREAS | CASE STUDY: THE SKEENA RIVER ESTUARY

Produced by Northern Confluence Initiative¹

Case studies have been developed to inform the federal government consultation on the regulatory process to establish “ecologically significant areas” under Section 34 of the *Fisheries Act*. An ESA designation could provide additional conservation and long-term protection, through regulation, to better protect fish and fish habitat in candidate areas that are sensitive, highly productive, rare or unique.

I. OVERVIEW

The Skeena (*Ksyeen*) River is the second largest salmon producing watershed in Canada and includes the ancestral and unceded territories of the Ts’msyen (Tsimshian), Gitxsan, Tahltan, Wet’suwet’en and Ned’u’ten Nations. Major tributaries of the Skeena River include the Morice and Bulkley (*Wetzink’wa*) Rivers, the Babine River, Sustut River, Kispiox River and Kalum River. The Skeena estuary is a compound mega-estuary that extends from the Kwinitza/Kasiks area through the mouth of the river, flaring to Pitt Island in the south and to Dundas Island in the north where it mixes with waters of the Nass River. The central and most productive area of the estuary is located where the Skeena River meets the ocean near Prince Rupert on Ts’msyen territory and includes Lelu Island, Flora Bank, Inverness Passage, Smith Island, DeHorsey Island, Marcus Passage, Kennedy Island, and Telegraph Passage.

The Skeena River estuary is sensitive, highly productive and essential salmon-rearing habitat. Hundreds of millions of juvenile salmon from populations throughout the watershed feed, adapt to the marine environment, and evade predators in the eelgrass habitat of Flora Bank and surrounding nearshore region. Eelgrass is considered one of the most important marine macrophytes for maintenance of marine resources.² Researchers, including those from the Department of Fisheries and Oceans Canada, have classified this area as the most critical habitat for Skeena salmon survival and have noted how extremely sensitive to disturbance this ecosystem is.^{3,4,5,6}

II. DESCRIPTION OF AREA

The Skeena watershed covers a 55,000 square kilometre area and is of high ecological, cultural and economic value to the region. An economic benefit analysis conservatively estimated that wild

¹ Authored by Nadia Nowak and Nikki Skuce. Reviewed by Dr. Michael Price, Dr. Jonathan Moore, Dr. Jim Pojar, Salmon Watersheds Lab; Greg Knox, SkeenaWild Conservation Trust.

² C. Sharpe, Moore, J.W., Carr-Harris, C., Butts, K., “Skeena River Estuary Synthesis Report,” (Vancouver, BC: Simon Fraser University, 2021).

³ C. Carr-Harris, Moore, J.W., “Juvenile Salmonid Habitat Utilization in the Skeena River Estuary,” (2013).

⁴ J.W. Moore, Gordon, J., Carr-Harris, C., Gottesfeld, A.S., Wilson, S.M., Russell, James Harvey, “Assessing Estuaries as Stopover Habitats for Juvenile Pacific Salmon,” *Marine Ecology Progress Series* 559 (2016).

⁵ P. McLaren, “The Environmental Implications of Sediment Transport in the Waters of Prince Rupert, British Columbia, Canada: A Comparison between Kinematic and Dynamic Approaches,” *Journal of Coastal Research* 32, no. 3 (2016).

⁶ R.J. Higgins and W.J. Schouwenburg, “A Biological Assessment of Fish Utilization of the Skeena River Estuary, with Special Reference to Port Development in Prince Rupert,” *Dept. of Envir. Fish. & Mar. Ser. Tech. Rep* (1973).

salmon in the Skeena contribute \$110 million to the annual economy of the watershed.⁷ a figure that does not fully account for the cultural and sustenance contributions of wild salmon to Indigenous Nations.

The Skeena River estuary is a critical, highly productive and sensitive habitat within the Skeena watershed; an area that salmon from the entire watershed depend on at the most vulnerable stage of their life.

The Nine Allied Tribes of the Lax Kw'alaams (of the Ts'msyen Nation) have stated that their "...ancestral knowledge, supported by modern science, confirms this area is critical to the future abundance of the wild salmon our communities rely on."⁸ In recognition of this, and alongside their upriver Indigenous allies, they declared in 2016 that "Lelu Island, and Flora and Agnew Banks are hereby protected for all time, as a refuge for wild salmon and marine resources, and are to be held in trust for all future generations."⁸

The lower Skeena River is characterized by steep mountains, which result in coarse fluvial deposits along the channel and fine sediment deposits in protected embayments beyond the river mouth. These finer sediments are mainly deposited around a complex of islands and channels including Kitson, Kennedy, and Smith Islands.²

This geology and pattern of sedimentation shapes the available habitat in the Skeena River estuary. Much of the eelgrass habitat, which is one of the most highly productive areas of the estuary for juvenile salmon and other species including Dungeness crab, is located on Flora Bank between Lelu (*Lax Uula*) and Kitson Islands.²

Flora bank is estimated to be ~8,000 years old; a rare 'relic' glacial deposit (rather than being maintained by sediment coming out of the Skeena River).² The bank is held in place by surrounding currents and processes, making it particularly vulnerable to developments, such as docks and pilings, which could disrupt this fine balance.⁵ Once degraded or lost, it is predicted that there would be no new source of sediment that could replace this unique habitat.

Studies of the Skeena estuary have shown that the highest abundance of juvenile salmon are associated with the Flora Bank area. While juvenile salmon abundance appears to be influenced by several dynamic environmental variables, including water temperature and turbidity, juvenile sockeye and Chinook salmon were much more abundant in locations with eelgrass.^{2,3}

III. ECOSYSTEM SERVICES PROVIDED

- The Skeena estuary provides critical nursery habitat for juvenile salmon as they transition from freshwater to ocean environments, feed, and seek protection from predators. A key food source for Skeena sockeye was a specific type of small invertebrate (harpacticoid copepods) thought to be produced from eelgrass habitats.²



Figure 1: Aerial view of Flora Bank at low tide (copyright Brian Huntington).

⁷ Northwest Institute of Bioregional Research, Valuation of the Wild Salmon Economy of the Skeena River Watershed (Smithers, BC: IBM Business Consulting Services, 2006).

⁸ "Lelu Island Declaration," 2016, http://friendsofwildsalmon.ca/campaigns/detail/liquefied_natural_gas_lng_development/the_lelu_island_declaration/.

- The estuary also provides nursery habitat for other commercially and culturally significant marine species including: herring, eulachon, Dungeness crab, clams and cockles.
- The eelgrass and kelp beds of the estuary provide a natural climate solution through blue carbon storage.⁹
- Research has identified the Skeena estuary as an extended stopover habitat on the juvenile migratory path of numerous salmon populations from the Skeena watershed and beyond.¹⁰ Some species have been found to spend over 30 days feeding and rearing before migrating northward.¹¹ Stopover habitats that support multiple populations or species are of high conservation priority as they can underpin the survival of a large number of populations.^{10,12,13}



Figure 2: Underwater juvenile salmon at Flora Bank (copyright Tavish Campbell)

IV. CONSERVATION AND PROTECTION OBJECTIVES

- No loss of eelgrass habitat within the Skeena estuary. The Prince Rupert Port Authority (PRPA) has identified habitat replacement as a suitable mitigation measure for development projects that harm existing habitat. Due to the critical importance, sensitivity and unique nature of the Skeena estuary eelgrass beds - and importantly, the lack of evidence that such habitat offsets are successful^{14,15} – degradation of existing eelgrass habitat should not be permitted in the Skeena estuary.
- Protect the ecological integrity of all estuarine habitat.
- No development (e.g., pilings, docks, jetties, or other) be permitted atop sediment deposits or eelgrass habitat throughout the estuary.
- Protect the foreshore of Lelu Island, and entirety of Flora, Agnew and Horsey Banks “as a refuge for wild salmon and marine resources, to be held in trust for all future generations.”⁸
- Maintain, as much as possible, all shoreline and foreshore vegetation within the mid-estuary, including Ridley Island.

⁹ Peter I Macreadie et al., “Blue Carbon as a Natural Climate Solution,” *Nature Reviews Earth & Environment* 2, no. 12 (2021).

¹⁰ S. Tucker et al., “Seasonal Stock-Specific Migrations of Juvenile Sockeye Salmon Along the West Coast of North America: Implications for Growth,” *Transactions of the American Fisheries Society* 138, no. 6 (2009).

¹¹ Moore.

¹² T. Iwamura, Possingham, H. P., Chadès, I., Minton, C., Murray, N. J., Rogers, D. I., ... & Fuller, R. A., “Migratory Connectivity Magnifies the Consequences of Habitat Loss from Sea-Level Rise for Shorebird Populations,” *Proceedings of the Royal Society B: Biological Sciences* 280, no. 1761 (2013).no. 1761 (2013)

¹³ Deborah M Buehler and Theunis Piersma, “Travelling on a Budget: Predictions and Ecological Evidence for Bottlenecks in the Annual Cycle of Long-Distance Migrants,” *Philosophical Transactions of the Royal Society B: Biological Sciences* 363, no. 1490 (2008).

¹⁴ C.D. Ives and S.A. Bekessy, “The Ethics of Offsetting Nature,” *Frontiers in Ecology and the Environment* 13, no. 10 (2015).

¹⁵ M. Maron, Ives, C. D., Kujala, H., Bull, J. W., Maseyk, F. J., Bekessy, S., ... & Evans, M. C., “Taming a Wicked Problem: Resolving Controversies in Biodiversity Offsetting,” *BioScience* 66, no. 6 (2016).

- Climate change is influencing the Skeena estuary with earlier spring melts, warming ocean temperatures, and sea level rise, which could affect food availability for juvenile salmon and eulachon.^{2,23}
- The cumulative impact of activities on the Skeena watershed and estuary include forestry, transportation, mining, agriculture, fishing, and pipeline and urban development, which add additional strain to the currently vulnerable and sensitive estuarine habitat.

JURISDICTIONAL ISSUES

- The Skeena Estuary is within a multi-jurisdictional space that includes Indigenous, federal, provincial and local laws. It is within the unceded territory of the Gitwilgyots Tribe of the Ts'msyen Nation who hold inherent Title to the lands and waters, and have demonstrated long-standing use and occupation of the estuary.²⁴ The Ts'msyen have a system of *Waaps* (houses) that govern the area.
- Indigenous Title has been recognized in Section 35 of the Canadian constitution, and both the federal and provincial governments have made important commitments to implement United Nations Declaration on the Rights of Indigenous Peoples which includes gaining the Free, Prior, and Informed Consent of Indigenous Nations whose territories may be impacted by development.²⁵
- The PRPA is a federally regulated body that has been granted special powers within lands and Navigable Waters under its jurisdiction.²¹(
See Figure 13, p. 30) The PRPA acts as a permitting authority and regulator for Navigable Waters that are within its jurisdiction. For lands within its jurisdiction, the PRPA is the landlord and leaser. PRPA jurisdiction can create conflicts of interest when they are both the regulator and proponent of activities and development on port authority lands and waters.
- While the marine environment falls within both provincial and federal jurisdictions, fish and navigable waters are federal.²⁶ Lelu and Ridley Islands are federal jurisdiction (port land), while other surrounding islands are within provincial jurisdiction, as is the water that flows in the Skeena River.
- In 2019, the PRPA placed a moratorium on development of Flora, Agnes and Horsey banks.^{21,27} As part of their plans for future industrial development of Lelu Island, the moratorium allows for some activities to occur on Horsey bank,



Figure 4: Eulachon migrating upriver to spawn (copyright NOAA Fisheries)

²³ WWF - Canada, "Skeena Cumulative Effects Assessment: Advancing Policy Options for the Conservation of the Skeena Watershed and Estuary," (2018).

²⁴ "Canadian Environmental Assessment Agency Draft Environmental Assessment Report on the Pacific Northwest Lng Project and Crown's Legal Duty to Consult," (Letter sent to CEAA March 2016), Letter sent to CEAA March 2016, 2016.

²⁵ UN General Assembly, "United Nations Declaration on the Rights of Indigenous Peoples," ed. United Nations (UN General Assembly, 2007).

²⁶ L. Nowlan, Hewson, S., "Faq: Provincial Jurisdiction of British Columbia over Coastal and Ocean Matters," (West Coast Environmental Law, 2019).

²⁷ "A First Step for Skeena Estuary Protections," 2019, <https://wildsalmoncenter.org/2019/01/30/first-step-for-skeena-estuary-protections/>.

such as submerged cables and pipelines. The PRPA's development moratorium should evolve into permanent protection, and be extended so as to include the entirety of Lelu Island in the establishment of an Ecologically Significant Area.

- Lack of coordination across sectors and levels of government for upstream activities that impact the downstream health of the estuary, which include changes to the climate and snowpack that influence spring run-off, as well as increased sedimentation from activities like forestry and agriculture.

VI. MONITORING & RESEARCH NEEDS^{1,23}

- Research on the impact of a changing climate on the Skeena Estuary, including sea level rise and the documented shift in Skeena flow regimes.¹
- Research to date has, importantly, been focused on the eelgrass beds of Flora Bank while other areas of the estuary remain less understood. Further research is required to better understand the extent of eelgrass distribution throughout the estuary, as well as to monitor eelgrass habitats over time to understand trends and detect changes.
- Research has primarily focused on estuarine use by juvenile salmon, and there is opportunity to extend these studies and also invest more in other components of the ecosystems, including eulachon, forage fish, and dungeness crab.
- While there is no current evidence of the invasive European green crab having migrated to the Skeena estuary this should be monitored. European green crab feed on bivalves, can outcompete native crab species, and are particularly disruptive to eelgrass beds.^{28,29}
- Integration of multi-jurisdictional initiatives and efforts to protect and steward the sensitive habitat of the Skeena estuary in support of an Ecologically Sensitive Area designation. For example, the Marine Area Planning Partnership,³⁰ the Pacific North Coast Integrated Management Area Plan,³¹ Indigenous Guardians program, and BC's Wild Salmon Strategy.³²
- The decision-making and policy implications of the PRPA's jurisdiction over Navigable Waters within the Skeena estuary.
- Exploring opportunities for revitalization of Indigenous management practices such as clam gardens.



Figure 5: European green crab (copyright USFWS - Pacific Region)

²⁸ "European Green Crab," 2022, https://www.dfo-mpo.gc.ca/species-especies/profiles-profil/europeangreencrab-crabevert-eng.html#_Impacts.

²⁹ Christine Van Reeuyk, "Extreme Weather Could Help Invasive Green Crab Crawl Along B.C. Coast," *Kitimat Northern Sentinel* 2022.

³⁰ North Coast-Skeena First Nations Stewardship Society & Province of British Columbia, "North Coast Marine Plan," (2015).

³¹ Pacific North Coast Integrated Management Area Initiative, "Pacific North Coast Integrated Management Area Plan," (2017).

³² Province of British Columbia, "Bc's Wild Salmon Strategy Summary Document," (2018).