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Using Ethnohistoric Data to Correct Historical Ecological Baselines: Urbanization and the Collapse of Forage Fish in Vancouver

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Using Ethnohistoric Data to Correct Historical Ecological Baselines:

Urbanization and the Collapse of Forage Fish in Vancouver

Jesse Morin¹, Blake Evans², and Meaghan Efford¹

SUMMARY

Indigenous people and government bodies are often at odds when it comes to acceptable levels of impacts to local ecology that are based on two very different historical and cultural perspectives. For Coast Salish peoples such as Tseil-Waututh Nation (TWN), who have lived around the Salish Sea for thousands of years, recent historical fisheries records are a pale reflection of the former abundance harvested by their ancestors. For modern ecologists and fisheries scientists, recent fisheries records (post colonization) provide historic baseline and objectives for current management. While this latter perspective is pervasive among regulators, we argue that historical and ongoing negative impacts on local marine resources remain severe and greatly underestimated. In Canada, this historically distorted perspective of both federal and provincial government policymaking leads to mismanagement of current and future fisheries. The historical ecology of forage fish in the Vancouver region is an excellent example of this, and of how Indigenous knowledge can be used to correct currently accepted, but misleading, baselines and objectives for conservation management.

Cultural and Historical Background

Before European settlement of the Vancouver region, large populations of Indigenous Coast Salish peoples lived there. Archaeological research indicates that Ancestral Coast Salish peoples lived in large, relatively permanent settlements near the

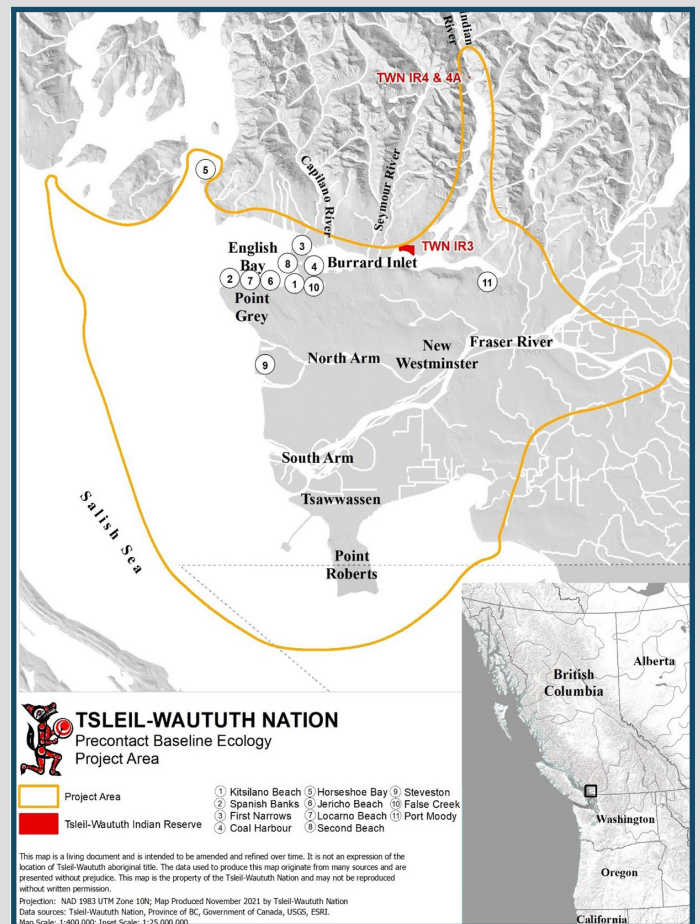


Figure 1. The study area and locations discussed herein.

shore and subsisted primarily on plentiful local marine and riverine resources, beginning at least by about 1500 BCE (Matson & Coupland 1995).

Substantial Euro-Canadian colonization of the Northwest Coast of North America occurred in the 1840s-1860s. Colonization of the Vancouver area included the arrival of several hundred settlers who established

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sawmills, and then salmon canneries. The earliest colonial settlement was Granville, with 50 colonial residents (i.e., non-Indigenous people) in 1870, growing to 300 a decade later. Confederation of the colony of British Columbia with Canada in 1871 and the arrival of the transcontinental Canadian Pacific Railroad at Burrard Inlet in 1886 dramatically changed the trajectory of Vancouver's growth, adding another 120,000 colonists by 1911.

Around 1900 there were about 20 canneries along a few kilometers of the Lower Fraser River (Harris 1992:61). Colonial fishing operations exploited local fisheries on an industrial scale causing a rapid and significant decline in a region that had previously supported significant Indigenous Coast Salish populations for millennia. Between 1885 and 1920 was a period of critical ecological change. During this time, there were few to no environmental regulations or fisheries restrictions, causing untold ecosystem damage. Current fisheries management strategies are based on stock assessments conducted much later in the latter half of the twentieth century. These stock assessments are taken as historical baselines, but as they don't account for this earlier period of ecological change, they are inaccurate representations of the historical ecological abundance of these species in this region.

Pre-Contact Coast Salish Forage Fish Fisheries

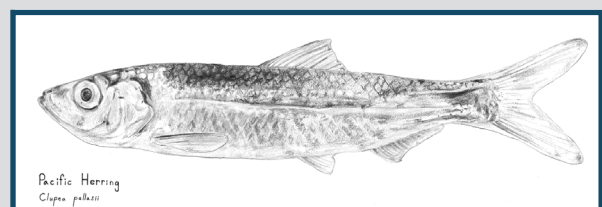
To address the lack of historical data of forage fish populations in the Vancouver region, an extensive meta-analysis of the regional ethnohistoric and scientific/regulatory literature of relevant sources was conducted (Figure 1). This included reviews of archaeological records, oral history, Indigenous place names, historical/archival documents, early fisheries records, historical maps, ethnographic sources, and Traditional Use Study data for spatial and temporal coverage of the study area.

Fish remains recovered from eight archaeological sites (the remains of ancestral Coast Salish settlements) indicate that some combination of forage fish and salmon are the two most abundant taxa (Arcas 1995 and 1999; Casteel 1976; Coupland 1991; Lepofsky et al. 2007; Pierson 2011; Madrone 2012), with forage fish often rivaling salmon in importance. Based on these data, forage fish were clearly as much a staple as were salmon to ancestral Coast Salish people.

The documentary evidence from early colonization around 1885 to 1915, similarly identifies very rich forage fisheries, followed by sequential collapses of taxa, beginning with herring in Burrard Inlet in 1885, eulachon in Fraser River by 1899, and smelt in the eastern Salish Sea in 1912. In each of these cases, the reduction in taxa abundance approaches or exceeds 99% and occurred at least 50 years prior to local baseline ecological studies. The following are examples for each fish species (herring - *Clupea pallasii*, smelt (surf smelt) - *Hypomesus pretiosus* and eulachon - *Thaleichthys pacificus*) documenting their pre-contact abundance, and post-colonization collapses.

Herring

Within the first decades of Euro-Canadian settlement on Burrard Inlet in the late nineteenth century, the preferred method for fishing herring was with dynamite. The earliest record of commercial (non-Indigenous) herring harvests is in 1877 in New Westminster and 1881 in Burrard Inlet. Herring was rendered into oil that was used for lubricating skid rows in forestry. A floating oil processing vessel, called Spratt's Oilery (1881–85), rendered herring into oil and dumped the resulting waste directly into the Coal Harbour area of Burrard Inlet (Matthews 1955:239). After 1884, herring did not return to Inner Burrard Inlet in quantities large enough to justify harvests for oil production (DFO, 1885:259).



After 1887, there are only three TWN Traditional Use Study references to harvesting herring and herring spawn dating to the 1930s and 1940s. There are no records of any settler herring harvests east of First Narrows during this time frame. Canadian Fishery officials noted this dramatic loss of herring but did not place blame on fishery practices: “through some unknown cause, the herring, although plentiful in the Gulf of Georgia, did not enter the Narrows at Burrard Inlet as usual, in sufficient quantities to justify the working of Mr. Spratt’s oil and scrap manufactory” (DFO 1885:259), and “since the increase in the shipping traffic, this fish [herring] have almost deserted Burrard Inlet, and only a few can now be caught with a seine where the supply formerly seemed to be inexhaustible” (Department of Fisheries 1888:246). Others, including TWN members, noted that Spratt’s practice of dumping processed herring meal into the water drove the herring from Inner Burrard Inlet (Matthews 1955:239).

By 1887, in response to the collapse of the herring fishery east of First Narrows, the local herring fishery shifted west to English Bay in Burrard Inlet, and a herring fishery based in New Westminster (Department of Fisheries 1888:260). While the herring fishery in English Bay appears to have been quite rich, it was never described as of the same abundance as that east of First Narrows. By 1889, the herring fishery appears to have shifted again to the west of Point Grey (Department of Fisheries 1890:300). The Point Grey herring fishery was the first to use gillnets around 1905 (Carrothers, 1941:111), likely increasing herring landings but decreasing their stocks. The herring fishery off Point Grey continued until it collapsed around 1915 (Fisheries Branch 1917:261). The westward annihilation of herring, beginning in 1885 in Coal Harbour, is well documented and a stark example of modern fisheries mismanagement.

Smelt

Smelt appear to have been seasonally abundant along the south shore of Burrard Inlet, especially in Coal Harbour, English Bay, Spanish Banks, and False Creek. Available references describe an earlier Indigenous fishery (late nineteenth century), followed by a sporadic settler fishery, and then after about

1911, a marked reduction of smelt abundance. The number of references describing Indigenous smelt fisheries in the study area indicates their importance as a staple for local Coast Salish people (Matthews 2011:48).



The earliest written historic records within Burrard Inlet are George Vancouver’s and Peter Puget’s accounts of their explorations of the region, and around near First Narrows by a party of Indigenous people who offered them fish “resembling the smelt” (Lamb 1984:581). The earliest known sketch of the Vancouver area (1861) represents a scene of the south shore of Burrard Inlet at Kitsilano Beach, with Indigenous people harvesting smelt with beach seines (Matthews 1887) (Figure 2).



Figure 2. The earliest known sketch of the Vancouver area, depicting Coast Salish people harvesting smelt (Willis 1861, Vancouver Archives BE.N.14.P.42). The location is the Kitsilano area of Vancouver, looking east. Matthews (1887) describes the scene: “one end of the net is held to the land; the other end is encircled around to enmesh the myriads of smelts, while Indian women squat before their lodges awaiting the catch, to be dried for winter food.”

Numerous references to abundant smelt from both Indigenous and settler sources identify the Kitsilano Beach and Spanish Banks as the premier smelt fisheries, where they numbered in the millions. The large Indigenous fish trap in False Creek was reportedly used to harvest smelt and flounder (Matthews 2011:15).

Department of Fisheries (1887:274) reported a modest commercial smelt fishery in the study area by 1886. Therraiult et al. (2002:26) report

that commercial catches of smelt in Burrard Inlet peaked in 1911 CE, and have steadily declined after that (Figure 3). As late as 1918 local settlers could still harvest large quantities of smelt at Kitsilano Beach using garden rakes. However, by the 1930s, the commercial smelt fishery off Point Grey was reported as “destroyed” by commercial fishermen (Safarik & Safarik 2012:180). The absence of smelt in the TWN Traditional Use Study data perhaps indicates that after about 1930, smelt populations were too low to warrant harvesting. By 2000, landings of smelt in Burrard Inlet totalled 51 kg, marking a reduction from ~ 114,600 kg in 1911 (Therriault et al. 2002:14, 26) - about 99.96%. The first declines of smelt after 1911 were probably due to overfishing and later declines due to pollution and habitat loss.

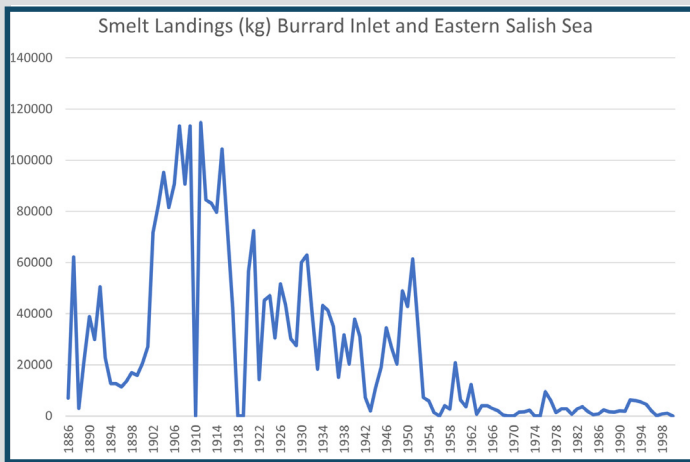


Figure 3. Smelt landings in Burrard Inlet and Eastern Salish Sea, data from Therriault et al. (2002:26-28).

Eulachon

Early historical descriptions of Fraser River eulachon indicate that these small fish were seasonally hyper-abundant (MacLachlan 1998:60–61). In the late nineteenth century, the eulachon returns were described as “vast” and “immense” (Department of Fisheries 1898:lix). The earliest reported commercial landings of eulachon at New Westminster are about 4,500 kg in 1884 (Department of Fisheries 1885:264), and had increased to a peak of about 1,136,000 kg by 1898 (Department of Fisheries 1899:228).



Decreases in Fraser River eulachon returns were noted as early as 1887: “These fish [eulachon] appear to be decreasing in the Fraser River, whether from overfishing or other causes, I am unable to say; but I think the large amount of traffic on the river by stern wheel steamers has a tendency to keep them away” (Department of Fisheries 1888:238). In 1890, the Fraser River eulachon fishery was described as a failure (Department of Fisheries 1891:182). By the late nineteenth century eulachon were reported in Burrard Inlet and Indian River, but the rarity of eulachon in TWN Traditional Use Study data suggests a continued decline so that they were absent or very rare in Burrard Inlet by the 1930s. Eulachon returns appeared to increase after 1940 (Moody & Pitcher 2010:30; Ricker et al. 1954), but by 1957, they were absent over most of their spawning area on the Fraser River (Moody & Pitcher, 2010:31) (Figure 4).

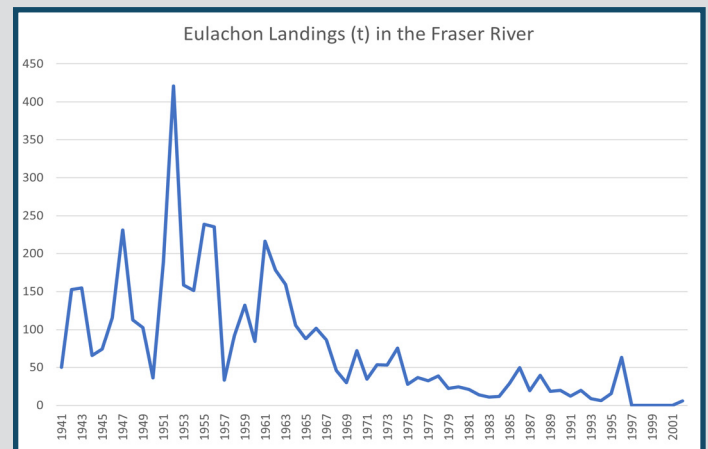


Figure 4. Eulachon landings on the Fraser River, data from Hay et al. (2003:23). Note peak landings of eulachon reported in 1952 CE are less than 40% landings reported in 1898 (Department of Fisheries 1899:228).

Fraser River eulachon are known to have suffered at least a 98% decline in abundance since 2000 (COSWEIC, 2011:xii): “Recent runs have been so poor that no eulachon have been captured from any of these fishing sectors [commercial, recreational, Indigenous]” (Moody & Pitcher 2010:28), a stark contrast to early historic and ethnographic accounts of hyper-abundant returns. Given a decline of about 95% of the eulachon stock during the twentieth century (1,136,000 kg in 1898, and 5,760 kg in 2002), and additional 98% decline since 2000, the current Fraser River eulachon stocks must be far less than 1% of their early nineteenth century and pre-contact levels.

Implications for Current Management Practices

Based on our data, it is evident that within a few decades of initial Euro-Canadian settlement of the Vancouver area, the Coast Salish communities who had inhabited the area for millennia witnessed a massive transformation of their home waters. This included the loss of forage fish that, along with salmon, had comprised a significant portion of their subsistence and economic base, and represented a profound change to the local ecology. Forage fish are prey for many animals including Chinook and coho salmon, sturgeon, dogfish, sea gulls, waterfowl, seals, and sea lions. Coast Salish people traditionally harvested across the entire food chain. A reduction of forage fish by about 99% would result in a corresponding collapse in species at higher trophic levels, furthering the ecological and cultural damage that occurred from these fisheries collapses.

Given this history of 3,000 years of intensive Indigenous harvesting supporting local populations of thousands of people, the collapse in forage fish stocks within a few decades of industrial scale colonial fisheries strongly indicates these losses were driven by anthropogenic impacts rather than natural processes. These were primarily from over-fishing and poor fishery practices. But other impacts such as habitat loss, increased shipping, and pollution likely also contributed. The historical-ecological information presented here has important implications for understanding the impact of colonial settlement and development on local Indigenous peoples. The collapse of forage fish populations and the corresponding ecosystem-wide effects continues to be experienced by local Indigenous populations as a crisis to their historical, physical, and spiritual dependence almost entirely upon local marine resources. Current ecological conditions have precluded harvesting many of their former staples for more than a century. This has impacted not only their diet, but also their ability to conduct most of their cultural and ceremonial events that remain central to Indigenous communities.

Additionally, this information is vital for the creation of meaningful conservation and restoration measures. Modern local ecological descriptions and fisheries stock assessments describing baseline conditions differ significantly from early historic and pre-contact conditions, and the implication of these significant documented reductions in abundance (~ 99%) are not broadly acknowledged. More recent assessments in the later twentieth and early twenty-first centuries describe increasingly degraded ecological conditions, shifting the presumed baseline conditions to an even less productive state that may hinder restoration efforts (shifting baseline syndrome, Pauly 1995, 2019). This historically distorted perspective of baseline data has caused mismanagement of both current and future fisheries.

Restoration efforts should focus on re-establishing pre-contact ecological richness (not modern baselines). This will require significant investment in enhancing herring, smelt, and eulachon abundance and will have profound positive impacts on the species that prey on them, the ecosystem as a whole, and the humans that depend on them. This is particularly important to the TWN and other Coast Salish peoples who have experienced the largest impacts from these historical fisheries collapses. The historical-ecological data presented here provides a more complete view of the ecology of a region. These stories may be echoed in the history of other species as well. This is a cautionary tale, emphasizing the importance of incorporating Indigenous knowledge into modern management plans in order to provide the best management and conservation measures for a species.

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