

Southeast Alaska Eulachon

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Description of index: In Southeast Alaska, Eulachon (*Thaleichthys pacificus*) are a culturally and biologically important anadromous fish. Eulachon populations have declined throughout their range since the 1990's and today all populations south of the Nass River in British Columbia have been severely depleted or extinct (Hay & Mccarter, 2000). There are at least thirty-five rivers in Alaska where eulachon are known to spawn (Moffitt et al., 2002); however, it is thought that most runs are either unknown or anecdotal (Betts, 1994). To better understand the eulachon spawning population in northern Southeast Alaska the Chilkoot Indian Association initiated a mark-recapture study on the Chilkoot River in 2010. In 2014 this was complemented with the addition of environmental DNA (eDNA) sampling. Furthermore, in 2017 eDNA sampling was expanded to five additional rivers within the northern Southeast Alaska region to monitor the annual Eulachon spawning population. In 2022 the use of eDNA to monitor eulachon spawning populations was expanded to include the Unuk River in southern Southeast Alaska in partnership with the Ketchikan Indian Community and US Forest Service (Figure 1).

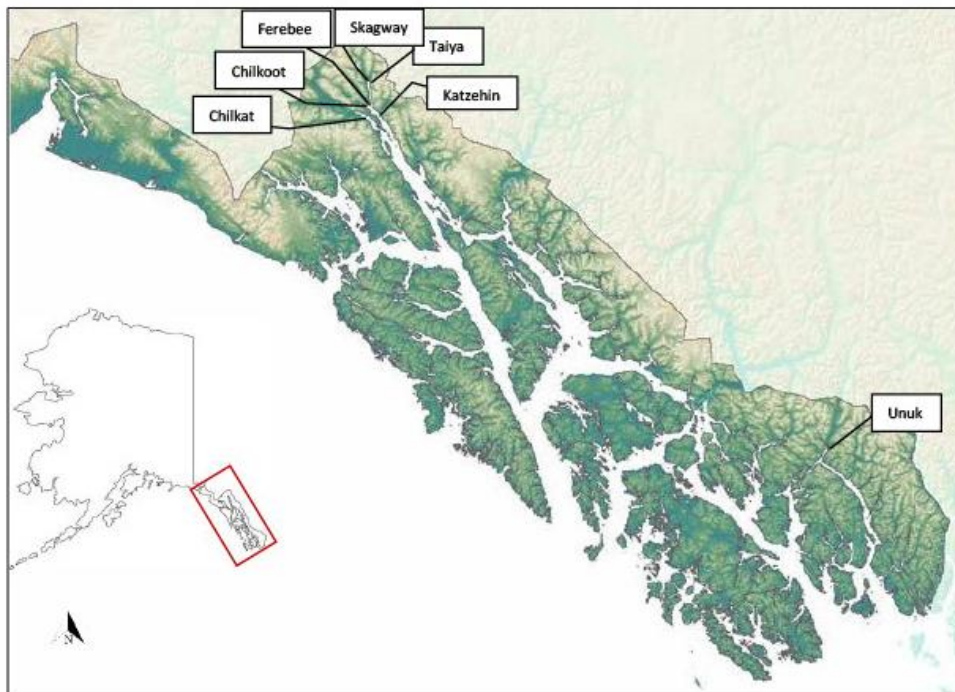


Figure 1: Location of Eulachon eDNA population monitoring sites in 2022.

Status and Trends: In recent decades a decline in eulachon populations has increased concern about the health of eulachon across their range. In 2007 the Cowlitz Indian Tribe petitioned the National Marine Fisheries Service (NMFS) to list eulachon under the Endangered Species Act. And in May 2010, the southern Distinct Population Segment (SDP) including California, Oregon, and Washington was listed as

“threatened” under the Endangered Species Act (NOAA, 2010). In May 2011 the Canadian Committee on the Status of Endangered Wildlife listed three British Columbia populations for protection including the Central Pacific Coast, Fraser River, and Nass/Skeena River populations (COSEWIC, 2011). In Southeast Alaska there has been limited monitoring of eulachon spawning populations. The Forest Service has conducted aerial surveys along the Unuk River since 2001 and a mark-recapture population estimate on rivers within Berners Bay from 2004-2008. However, these studies only represent a small portion of the eulachon spawning habitat in Southeast Alaska. On the rivers north of Berners Bay there was no population data being collected until the Chilkoot Indian Association initiated a mark-recapture study in 2010 out of concern for declining eulachon populations elsewhere and a lack of data available.

The mark-recapture population estimate for the Chilkoot river near Haines, Alaska has seen a wide range in eulachon spawning abundance; estimates have ranged from a couple hundred thousand to over 20 million (Figure 2). The mark-recapture population estimate was not conducted in 2020 due to covid-19 restrictions and was not conducted in 2021 and 2022 due to a lack of return. The 2021 return had been the lowest observed since the study was initiated in 2010, and 2022 showed two years in a row of unprecedented low return to the Chilkoot River. Interestingly though, eulachon are thought to exhibit a regional population structure (Flannery et al., 2013) and the extent to which they return to their natal stream to spawn is not well documented. Rather, it is thought that eulachon home to a broader regional area and not necessarily a specific river (Candy et al., 2015). This can complicate population monitoring since trends exhibited at one river may not be indicative of the larger regional population.

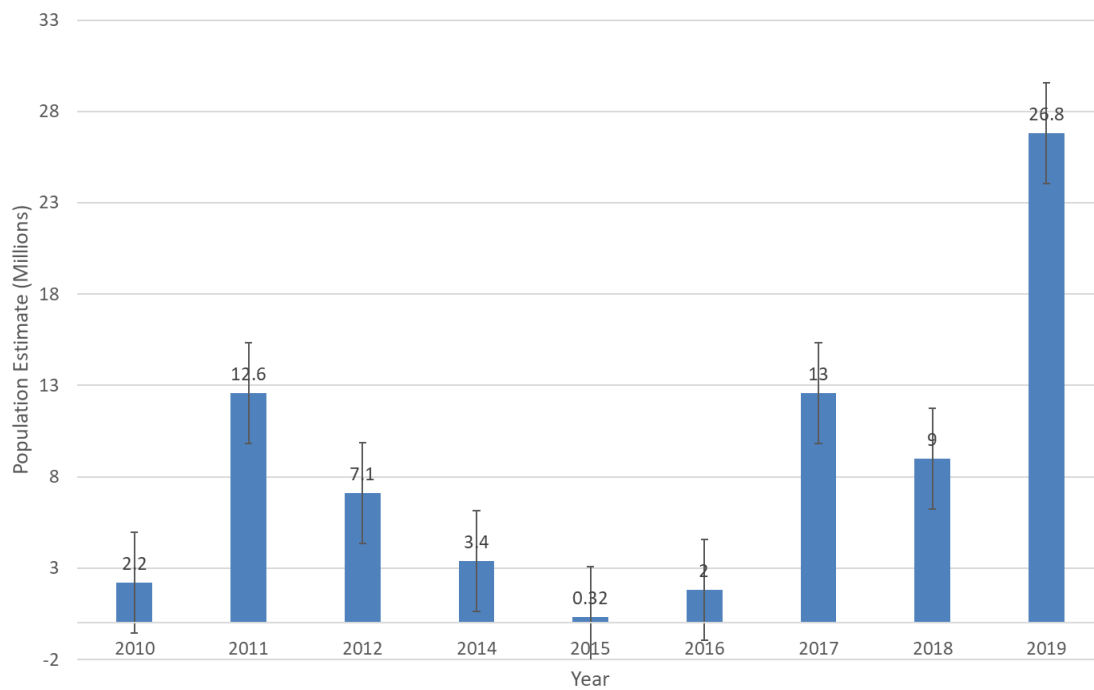


Figure 2: Eulachon population estimate on the Chilkoot River using mark-recapture method. Error bars represent 1 standard deviation. *no survey conducted in 2020 due to covid-19 restrictions, and no survey conducted in 2021 and 2022 due to lack of return.

The eulachon eDNA concentration at the Chilkoot River followed similar trends to the mark-recapture data in the years that the methods coincided. Sample years 2014, 2015, 2016, 2017, 2018, 2021, and 2022 were much lower than the large returns observed in 2019 and 2020 (Figure 3).

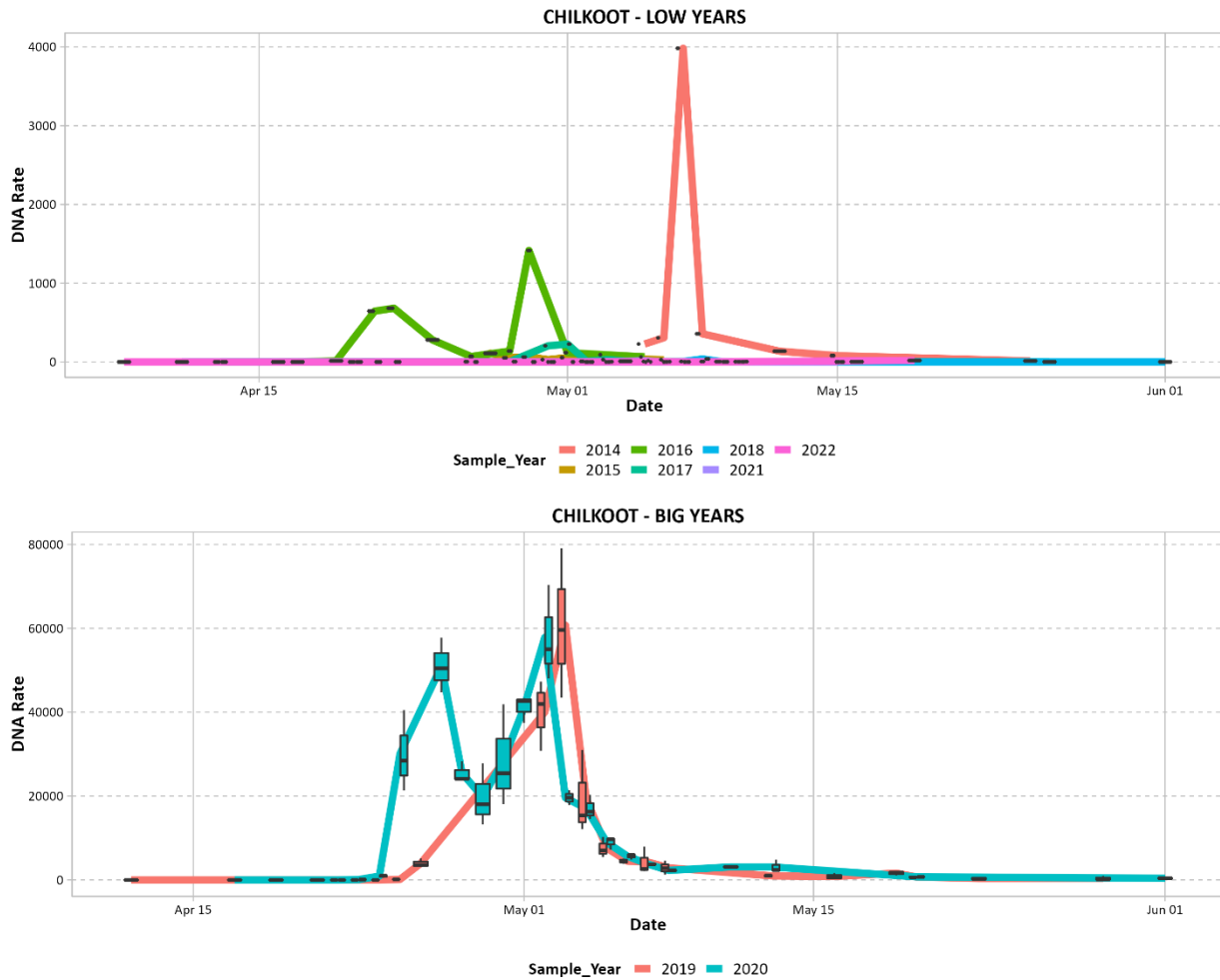


Figure 3: Chilkoot River Eulachon eDNA rate (eDNA concentration * Discharge) for low return years (top panel) and big return years (bottom panel)

The regional population structure of eulachon initiated the need to begin a regional population monitoring effort in 2017 through the use of eDNA. The northern Southeast Alaska eulachon eDNA concentrations were similarly low across all monitoring locations in 2022 (Figure 4). The Chilkat River, which did have a sizeable return in 2021, had a lower than previously observed return in 2022. The Chilkat river monitoring location was changed in 2021 to a channel that better represented eulachon spawning habitat. The site monitored from 2017-2020 is no longer being utilized for eulachon spawning. Overall, 2019 was a large return across the northern Southeast Alaska region.

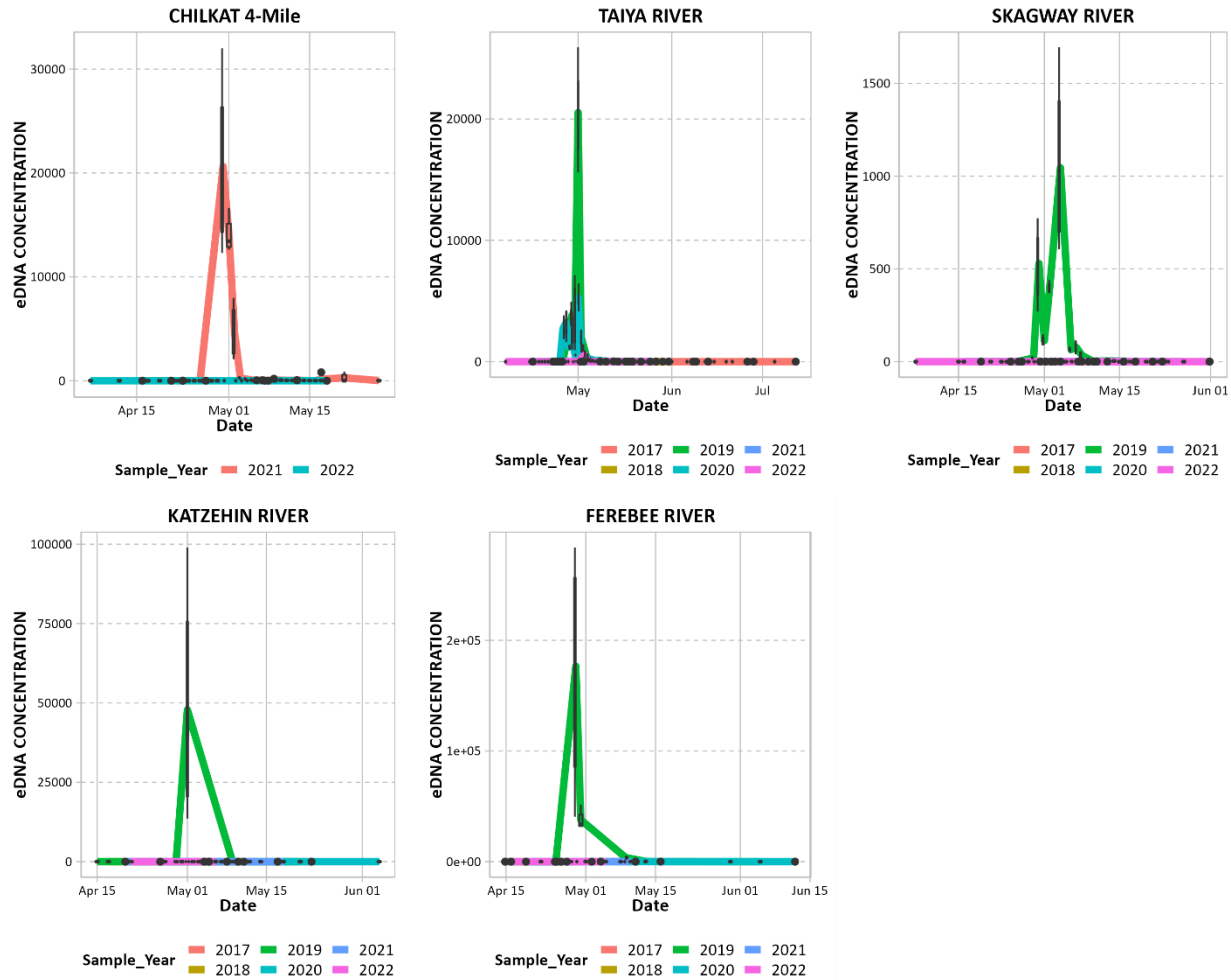


Figure 4: Eulachon eDNA concentration for five rivers in northern Southeast Alaska 2017-2022; Chilkat River location only 2021-2022.

Factors influencing observed trends: Eulachon populations are sensitive to environmental influences and the annual spawning population at a river can vary substantially (Olds et al., 2016). Additionally, there is little known about the life history of eulachon (Spangler, 2002), which makes assessing trends between parent-year and offspring difficult. It is thought that eulachon in Alaska are approximately two to five years of age at spawning (Spangler, 2002). Most eulachon are thought to be semelparous (Clarke et al., 2007), however it has been observed that eulachon do move back into the marine environment after spawning. The low returns observed in 2021 and 2022 could be the offspring of the 2015 and 2016 parent years, although that would indicate that eulachon that spawn in northern Southeast Alaska are approximately 6 years old.

Implications: Anecdotal information and traditional knowledge indicates that eulachon spawning populations have historically varied in abundance (Olds et al., 2016). The limited timeseries of data available on eulachon spawning populations across the Southeast Alaska region limits any inference into the health of the overall health of the eulachon population. Continued, and expanded monitoring will be necessary to reliably assess the overall eulachon spawning population. A decline in the eulachon population in Southeast Alaska would have adverse impacts both culturally and ecologically. Eulachon have been termed the “salvation fish” by Northwest Coast Native peoples and eulachon oil was the most

important trade item on a network of ‘grease trails’ between coastal and interior peoples (Moody & Pitcher, 2010). Today, eulachon are still a valued subsistence resource. Additionally, eulachon are an important prey item for sea birds and marine mammals. Eulachon spawn prior to the breeding season for many predators, thus providing a high-energy resource at an energetically demanding time (Sigler et al., 2004).

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