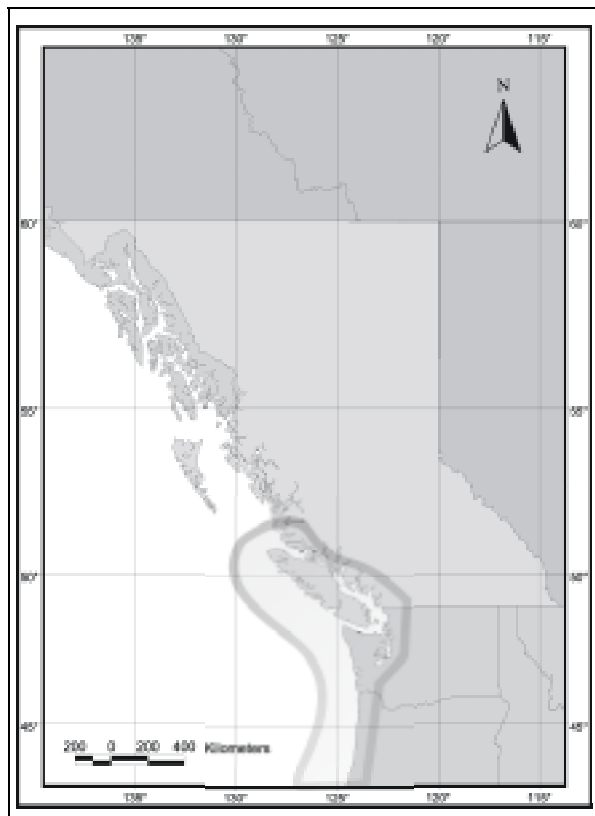




Northern Anchovy

Background

Northern anchovy (*Engraulis mordax*) is a pelagic, schooling species that is found between Baja California and central British Columbia. Three major stocks have been identified, a southern stock adjacent to Mexico, a central stock adjacent to California, and a northern stock adjacent to Oregon, Washington, and British Columbia. These three stocks are considered to be reproductively isolated. Also, it is possible that stock sub-structure exists and those populations in British Columbia could represent genetically distinct populations or, alternatively, migrants from more southern locations. Commercial fisheries for northern anchovy have been intermittent in British Columbia. Northern anchovy have been harvested since the late 1800s with the fishery peaking in 1941 with more than 6000mt landed. However, recent landings have been limited and currently the fishery is only opened by variation order. It is unknown if the recent decline is due to lower demand or reduced stock biomass.



Distribution of northern anchovy in British Columbia

Summary

- There is uncertainty regarding the status of northern anchovy stocks in British Columbia (i.e., resident vs. migratory).
- Northern anchovy in British Columbia are part of the northern stock and there is evidence this stock is declining.
- Market demand, as much as availability, will determine the amount of interest in northern

anchovy fisheries in British Columbia.

- The return of Pacific sardine (*Sardinops sagax*) to British Columbia and a renewed interest in that fishery will likely decrease interest for northern anchovy. Also, the negative relationship between anchovy and sardine might indicate northern anchovy biomass will be reduced for the near future.

Species Biology

Northern anchovy, *Engraulis mordax*, is the only representative of the Family Engraulidae in British Columbia. Globally, the family consists of 139 species belonging to 16 genera and is typical of tropical and sub-tropical regions. Northern anchovy are distributed from Baja California to central British Columbia. Three major stocks of northern anchovy have been identified along the West Coast of North America. The southern stock is confined between central and southern Baja California while the central stock ranges between central California and northern Baja California. The northern stock is distributed between northern California and central British Columbia. Genetic and morphological differences including the number of vertebrae, anal, dorsal, and pectoral fin rays, and gill rakers support the existence of these three major stocks (McHugh 1951; Vrooman et al. 1981).

There is considerable debate about northern anchovy spawning in British Columbia. Eggs have not been sampled in British Columbia, but larvae were sampled in the Strait of Georgia in 1967 (Robinson 1969). Since both eggs and larvae are pelagic, it is not possible

to discern whether local spawning has occurred or individuals were carried on oceanic currents. It is probable that during warm years, northern anchovy remain in British Columbia and spawn in Canadian waters the following spring. Such activities might coincide with El Niño events.

Size varies as a function of age (normally 3 to 4 years), but in British Columbia females reach a maximum length of 168mm at age 7 and males reach a maximum of 153mm at age 6 (Pike 1951). Northern anchovy are multiple batch spawners with females producing about 144,000 pelagic, ellipsoidal eggs (1.23–1.55mm long). Fecundity estimates for northern anchovy have proven problematic and could be further complicated by fluctuating inter-annually in response to environmental or biological conditions (Hunter et al. 1985). Although northern anchovy can mature after their first year, most mature during their third year. Embryo development is temperature dependant but eggs generally hatch within three days (about 3mm) and feeding begins four days after hatching (Bolin 1936). Northern anchovy are indiscriminate filter feeders with larvae feeding primarily on copepods and adults consuming a variety of zooplankton, eggs, and small fish (Baxter 1967).

The Fishery

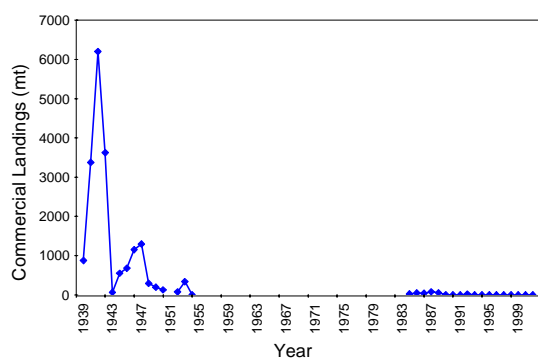
Average BC Landings (metric tonnes)

1939-49	1950-59	1960-79	1980-89	1990-99
1665.1	137.0	No Data	42.6	2.8

Commercial fisheries have operated intermittently since 1939. Various marketing initiatives were undertaken in the 1940s but proved unsuccessful,

likely due to competition from European imports (i.e., marinated, cured, paste). Presently, northern anchovy are fished in British Columbia for bait using seine nets. The last large influx of northern anchovy to British Columbia occurred in the mid-1980s when large, dense schools were observed in Barkley and Clayoquot Inlets on the West Coast of Vancouver Island. Aerial surveys estimated single schools of 50–100mt and resultant coast-wide estimates of 16,000–60,000mt. This surge resulted in increased commercial catches for five years. However, this influx was short-lived and the stock returned to typical, lower levels in the early 1990s.

Interestingly, northern anchovy fisheries attract the most attention when Pacific sardine (*Sardinops sagax*) fisheries collapse. There is a negative correlation between northern anchovy and Pacific sardine in the California Current ecosystem and although no causal relationship has been identified regimes have shifted every 50–60 years since the early 1700s (Holmgren-Urba and Baumgartner 1993).



Reported commercial landings of northern anchovy in British Columbia between 1939 and 2002

Recent BC Landings (kg)

1997	1998	1999	2000	2001
0	0	136	68	272

Resource Status

There have been no formal stock assessments for northern anchovy in British Columbia. It is assumed individuals belong to the northern stock and that no sub-stock structure exists. However, there may be resident populations and migratory ones. Additional genetic studies are needed to verify the number of stocks or sub-stocks in British Columbia. Furthermore, there are no routine assessments of the northern stock of northern anchovy in the United States either (Washington or Oregon). Only two scientific assessments have been made on the northern stock each using an egg production method. Richardson (1981) made one assessment in 1975–1976 and Emmett et al. (1997) made another assessment in 1994–1995. The most recent assessment suggests the northern stock has declined significantly. Also, in some areas, Pacific sardine is replacing northern anchovy as the dominant pelagic forage species. Incidentally, Pacific sardine has recently returned to British Columbia and commercial fisheries have been re-initiated. This could signal a regime shift between these two species in the eastern Pacific.

Currently, there is an Integrated Fisheries Management Plan (IFMP) for northern anchovy in British Columbia that controls licensing and is reviewed annually by the Department of Fisheries and Oceans Canada. This fishery operates as unlimited entry via a personal “ZK” license restricted to seine net with a maximum allowable catch of 10mt per license but amendments for additional catch are possible. The fishery is only opened by variation order when a request to open the fishery is

received by Fisheries Management at Fisheries and Oceans Canada.

Outlook

Since very little is known about factors that affect northern anchovy biomass and distribution in British Columbia, it is difficult to forecast future stock trends, especially for a species with naturally high inter-annual variability. Since the Department of Fisheries and Oceans has adopted a collaborative management initiative between government and industry, future assessments will depend on commercial interest in this species. Once interest has been indicated, the fishery should develop following the “phased approach” for new and developing fisheries given that northern anchovy are data limited in British Columbia.

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