



## FRASER RIVER EULACHON (*Thaleichthys pacificus*): 2007 POPULATION ASSESSMENT AND HARVEST RECOMMENDATIONS FOR 2008

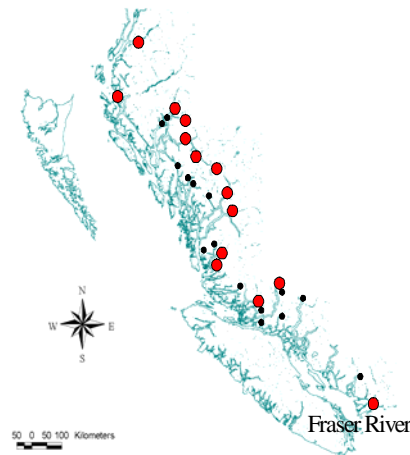
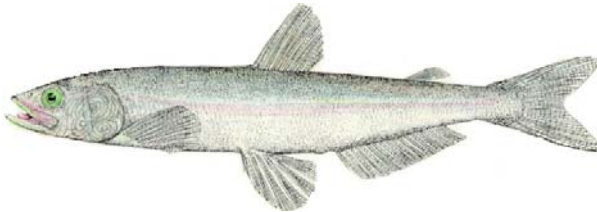


Figure 1. Adult eulachon (*Thaleichthys pacificus*).

Figure 2. Eulachon rivers in British Columbia, including the Fraser River.

### Context :

The Fraser River eulachon (*Thaleichthys pacificus*) fishery has an important cultural significance, especially to local First Nations. These small anadromous smelt return annually to the Fraser River to spawn and are targeted by First Nation, recreational and commercial fishermen during their run. A sudden and synchronous population decline occurred around 1993-94 among several major eulachon-bearing rivers including the Fraser River. Continued low returning biomass in the Fraser River prompted a review of research and management considerations with a traffic light approach for making management decisions adopted in 2003. This approach considered four annual and independent measures of stock status: 1) spawning stock biomass (SSB) based on the Fraser River egg and larval survey; 2) an offshore biomass index derived from the shrimp research survey off the south-west coast of Vancouver Island; 3) Columbia (and Fraser) River catch; and 4) the Fraser River test fishery catch. In 2005 it was suggested the SSB estimated from the egg and larval survey provided the best estimate of escapement for Fraser River eulachon and should be continued to assess population trends and used to recommend years of fishery closures.

### SUMMARY

- The Fraser River eulachon stock remains depressed.
- Spawning stock biomass (SSB) estimated from the egg and larval survey in 2007 remained low at 44 tonnes.

- The offshore eulachon index in 2007 from Shrimp Management Areas (SMAs) was low (206 tonnes for SMA 124Off and 52 tonnes for SMA 125Off).
- The commercial eulachon fishery in the Columbia River landed less than 4 tonnes and the Fraser River remained closed to commercial harvest in 2007.
- There was no eulachon test fishery in the Fraser River in 2007.

## INTRODUCTION

Eulachon (*Thaleichthys pacificus*) belong to the Family Osmeridae (smelts) and are distributed from northern California to the southern Bering Sea, although populations south of the Columbia River appear to be nearly extirpated. Inhabiting predominately spring freshet rivers, most eulachon spawning occurs during March and April when the fish are age-3 but two of the largest eulachon runs occur either earlier (January for the Columbia River) or later (into May for the Fraser River) (Hay et al. 2002).

Diminished eulachon returns coastwide during the 1990s raised concerns about the status of stocks in both the United States and Canada and the possibility for continued fishing opportunities for this species. Based on these conservation concerns, fishing restrictions were implemented both in BC and Washington State. The Canadian Department of Fisheries and Oceans (DFO) Science Branch initiated an egg and larval survey in 1995 to estimate spawning stock biomass on the Fraser River for stock assessment purposes. In the same year, DFO Fisheries Management initiated an in-season test fishery program to provide information on the number of eulachon returning to spawn in the Fraser River. Reasonably abundant early catches from these surveys were used as a basis to open fisheries in some years. Two additional indicators have been used to make recommendations concerning Fraser River eulachon. These include the offshore biomass index derived from the annual shrimp trawl survey conducted on the west coast of Vancouver Island since 1973 and the Columbia River catch data. Hay et al. (2003) and Hay et al. (2005) developed a stoplight approach for fisheries management to interpret the three pre-season indicators and one in-season indicator for Fraser River eulachon. Therriault and McCarter (2005) modified this framework slightly to discount the weight of commercial catches due to the bias associated with directed management intervention in recent years (e.g., negligible or no catches because the fishery was partially or totally closed), market availability and completeness of reporting. To make harvest recommendations for 2007 the four proposed indicators on eulachon abundance and population trends have been compiled and assessed. However, as suggested by Therriault and McCarter (2005) the SSB estimate from the egg and larval survey should be given the most weight in decision making as this indicator provides the best estimate of escapement for Fraser River eulachon at this time. The other three indicators are included for completeness.

## ASSESSMENT

There are no forecasts of eulachon returns to the Fraser River. Thus, in order to provide science-based advice for Fisheries Managers, a multi-indicator framework was developed (Hay et al. 2003; Hay et al. 2005). Each of these four indicators, three pre-season and one in-season varies greatly in potential usefulness and Therriault and McCarter (2005) provided some suggestions on the relative importance of these indicators through a retrospective analysis. Details on how each of the four indicators is determined and interpreted can be found in the three framework documents that have been compiled and used to provide advice on harvest recommendations for Fraser River eulachon.

## **Indicator 1: Egg and Larval Survey in 2007**

An egg and larval survey has been conducted on the Fraser River since 1995 (Figure 3). Despite limited directed fisheries in recent years, the Fraser River eulachon stock remains at a precariously low level (Figure 4). This stock has failed to recover from its collapse. SSB estimated from the egg and larval survey conducted in 2006 was 29 tonnes. The framework documents suggest that a low SSB (<150 tonnes) for one year is cause for concern and a restriction on removals should be activated while a low SSB for two (or more) consecutive years is more cause for alarm and should signal a halt to all removals (Hay et al. 2003; Hay et al. 2005). Since 2007 is the fourth consecutive year where Fraser River eulachon SSB has been below 150 tonnes, unprecedented in this short time series, no removals should be allowed in 2008.

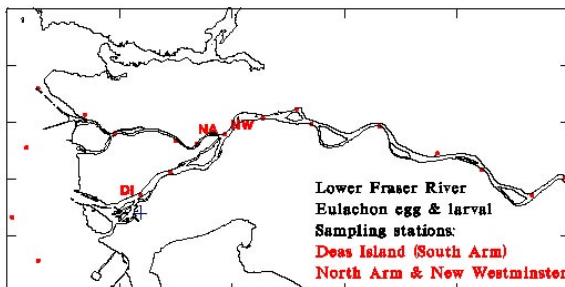


Figure 3. Sampling stations on the lower Fraser River. DI – Dease Island, NA – North Arm, NW – New Westminster.

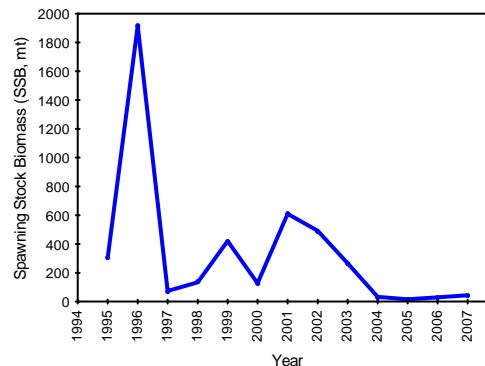


Figure 4. Spawning stock biomass (SSB) estimated by the egg and larval survey on the Fraser River, 1995-2007.

## **Indicator 2: Offshore Eulachon Index in 2007**

An offshore eulachon biomass index has been calculated annually for both Shrimp Management Areas (SMAs) 124Off and 125Off (Figure 5). This index has been highly variable between 1973 and 2007 for both areas (Figure 6). In some years changes in biomass are mirrored between areas 124Off and 125Off while in others they are not. Although the biomass in areas 124Off and 125Off was very low in 2004 and 2005, this index was lower in the mid- to late-1990s. In 2007, the index remained low and is at comparable levels to the mid- to late-1990s. The biomass index for 124Off was 206 tonnes while for 125Off it was 52 tonnes. The framework documents suggest a management alert (i.e., “yellow” signal in the traffic light approach) when the offshore index decreases below 500 tonnes and 1000 tonnes, respectively. Both areas between 2004 and 2007 have had an offshore biomass index less than 500 tonnes and the eulachon index continues to remain at a low level in each of these areas. Thus, based on the suggested response points, reduced fishing opportunities (if any) should be provided in 2008. In more recent years, this survey has extended into 123Off and 23In (Barkley Sound). The index for this more southern location also declined in 2007 (Figure 6) suggesting offshore eulachon have not simply moved to another area and thus not observed by the survey.

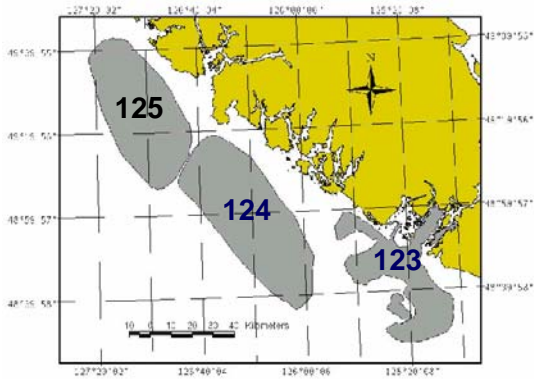


Figure 5. Location of offshore Shrimp Management Areas 124Off and 125Off. 123Off is included for reference

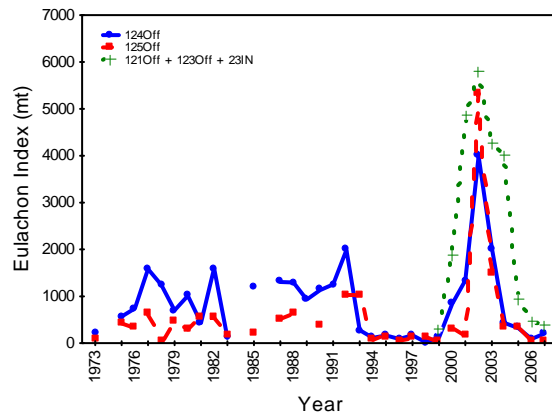


Figure 6. Offshore eulachon index for Shrimp Management Areas 124Off, 125Off and 121Off/123Off/23In combined, 1973-2007.

### Other Indicators

Previously, Hay et al. (2003) and Hay et al. (2005) have suggested that a “poor” fishery in the Columbia River would have reported catches of less than 500 tonnes, a situation that has occurred since 1993 when eulachon stocks collapsed in many BC and US rivers. Commercial eulachon landings from the Columbia River in 2007 were 3.8 tonnes (Figure 7) and the recreational fishery was very poor (O. Langness, Washington Department of Fish and Wildlife, pers. comm.). Thus, caution should be exercised in 2008 if harvest opportunities for Fraser River eulachon are considered.

Although not a pre-season indicator, the Fraser River test fishery has provided a post-season perspective on run size (Figure 8). A test fishery for eulachon on the Fraser River was not conducted in 2006 or 2007.

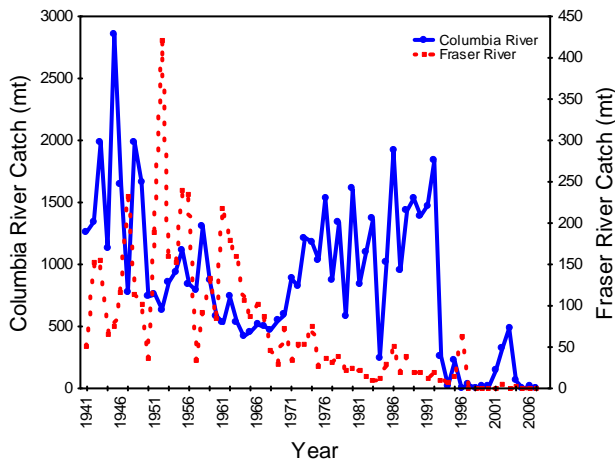


Figure 7. Commercial eulachon catches from the Columbia River (left axis) and Fraser River (right axis) from 1941-present.

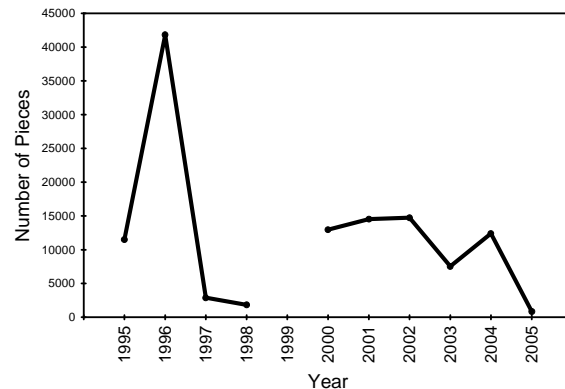


Figure 8. Fraser River eulachon test fishery, 1995-2005.

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## CONCLUSIONS AND ADVICE

The Fraser River eulachon stock has collapsed and remains at a precariously low level. Entertaining directed eulachon removals in 2008 by First Nation, commercial or recreational harvesters would increase the probability of further stock decline, potentially limiting stock rebuilding and recovery. Furthermore, incidental mortality should be minimized in other fisheries where Fraser River eulachon are caught as bycatch. The two key indicators continue to signal conservation concerns, especially an estimated SSB of less than 150 tonnes in each of the previous four years based on annual egg and larval surveys. Continued depressed SSB suggests the status of the stock in the near future also is of concern. Given the short life cycle of this species, consecutive years of poor returns suggest that long term strategies are required to minimize fishing mortality and allow stock rebuilding. Stock rebuilding is further complicated by larger scale processes that could be impacting Fraser River eulachon including decreased marine survival, possibly related to climate change and loss or degradation of river spawning habitat. Spawning habitat should be protected from deleterious effects of foreshore development.

The egg and larval survey on the Fraser River currently provides the best estimate of SSB. This survey should be continued in future years to track the changes in this stock.

## SOURCES OF INFORMATION

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