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Technical Briefing

Capelin Stock
Assessment 2J3KL
Newfoundland & Labrador
March 7 and 8, 2018



Outline

- Purpose of this briefing
- Key points to understand about Capelin
- Science advice
- How we 'count' Capelin
- Key factors
- Stock assessment
- Next steps

Purpose of this briefing

- March 7 and 8, 2018 DFO held its Canadian Science Advisory Secretariat (CSAS) regional peer review meeting on Capelin.
- The advice that DFO Science provides fisheries managers to help inform management decisions on Capelin was discussed during this meeting, and will be explained throughout this presentation.

What is CSAS?

A national body that oversees the review and provision of science advice to inform DFO management decisions. Specifically, this group helps organize meetings where DFO scientists, biologists and others, including fish harvesters, university researchers, and other technical experts get together to review scientific information and help inform how fish stocks are managed.

Key points to understand about Capelin

- Capelin are important and preferred prey for many marine predators.
- Capelin are generally a short-lived species, surviving only up to 4 years. They mature after age 2, and most die after spawning.
- Environmental conditions are the main determinant of capelin abundance. Strong year classes can be produced from a small stock when environmental conditions are favourable for fish larval survival and visa versa. This is why we see a lot of variability in the stock.
- All available information indicates the abundance of a capelin at a given age (year-class) is primarily driven by environmental factors and appears to be determined at two critical points in their lives. First, by the conditions they experience as they emerge from their eggs, and second, through the feeding conditions they experience in the fall and spring prior to spawning.

Science advice

- The spring acoustic abundance index in 2017 declined 70% from the 2015 value, returning to values observed during the late 2000s.
- The size composition of capelin landed in the commercial fishery declined in 2017. This was largely due to a high proportion of age 2 spawners. This is consistent with what was observed in the spring acoustic survey.
- Spawning times since 2015 have been delayed. Late spawning is associated with poor larval survival.

Science advice

- There has been a relationship between the abundance of age 2 capelin and the near shore larval index in the 2001-2017 time series.
- This larval index has been low for the past four years and year classes entering the fishery in 2018 and 2019 are expected to be small.
- Fisheries productivity on the Newfoundland Shelf has declined since the early to mid 2010s. This decline was initially associated with a loss of shellfish and in the last two years includes declines in piscivores (fish that eat other fish). Despite this decline in predators, the index of fish predation on capelin increased in 2016 and 2017.

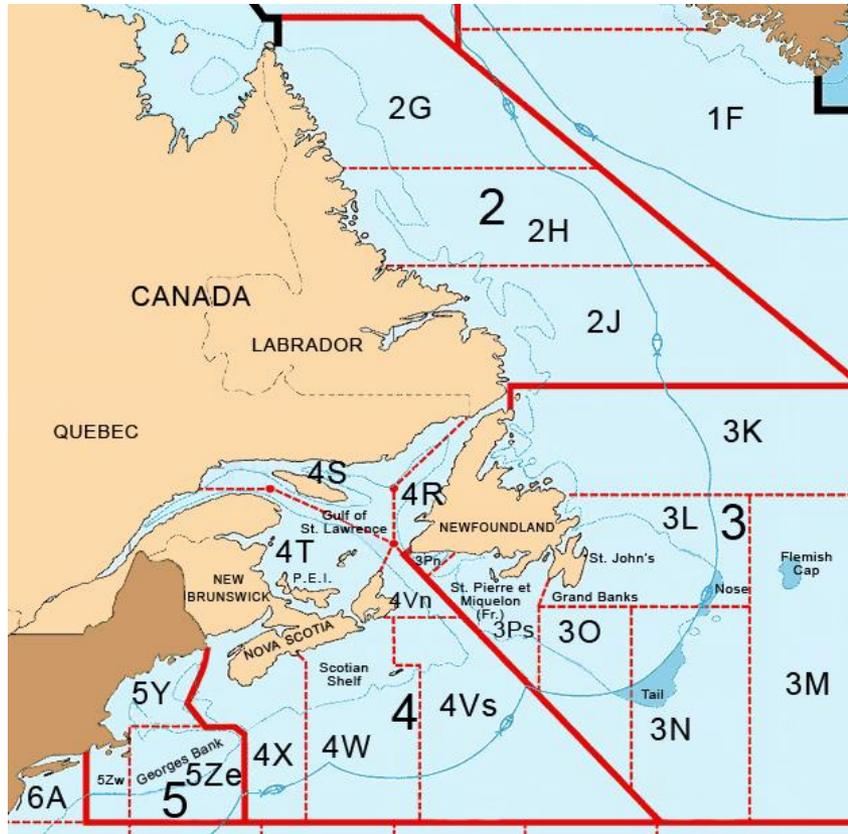
Science advice

- Landings were 23,065, 27,708 and 19,917 tonnes representing 81%, 97% and 70% of the TAC in 2015, 2016 and 2017 respectively.
- All reviewed information indicates that the year class strength of capelin is primarily impacted by environmental conditions.

HOW WE 'COUNT' CAPELIN

The science behind our advice

Capelin assessment areas



Capelin assessment areas

- Capelin is assessed in area 2 + 3KL, although the capelin management area included in the IFMP includes 3Ps.
- An absolute abundance estimate of capelin in 2017 is not available. The stock is assessed using index surveys of larval capelin and an acoustic survey of mostly immature (age 2) capelin.
- The capelin larval index is derived from sampling conducted Trinity Bay.
- The acoustic survey is conducted during May in NAFO Division 3L. This survey covers the primary distribution area of age 1 and age 2 capelin.
- Starting this year capelin assessments will occur on an annual cycle.

Capelin monitoring

- Commercial fishery data, including data from the Capelin fishery and bycatch data from the Northern Shrimp fishery.
- Spring 3L survey (1988-1991, 1996, 1999-2015, 2017)
- Bellevue larval capelin surface tows (2001-17)
- 2J3KL bottom trawl survey (1995-2017)
- Beach spawning timing across the province information based on spawning diaries.
- These data provide us with information on adult and larval capelin abundance, age-length composition of spawners, capelin fall distribution in the offshore, capelin diet and condition.

KEY FACTORS

Environmental conditions

- A decrease in large copepods in the offshore suggest poor environmental conditions for capelin feeding in 2015-2017.
- This is the most likely cause of the poor condition and late spawning timing exhibited by capelin during the same period.
- Zooplankton production is linked to colder oceanographic conditions during the same period.

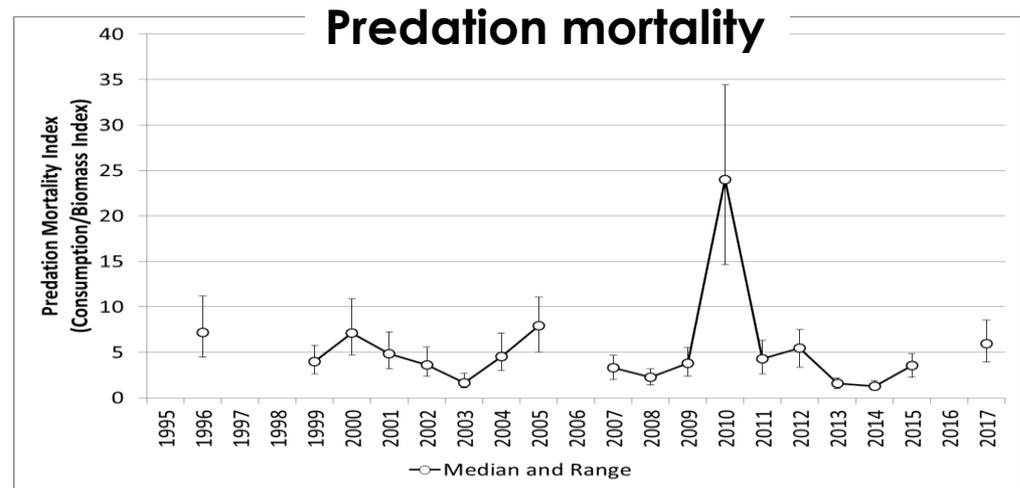
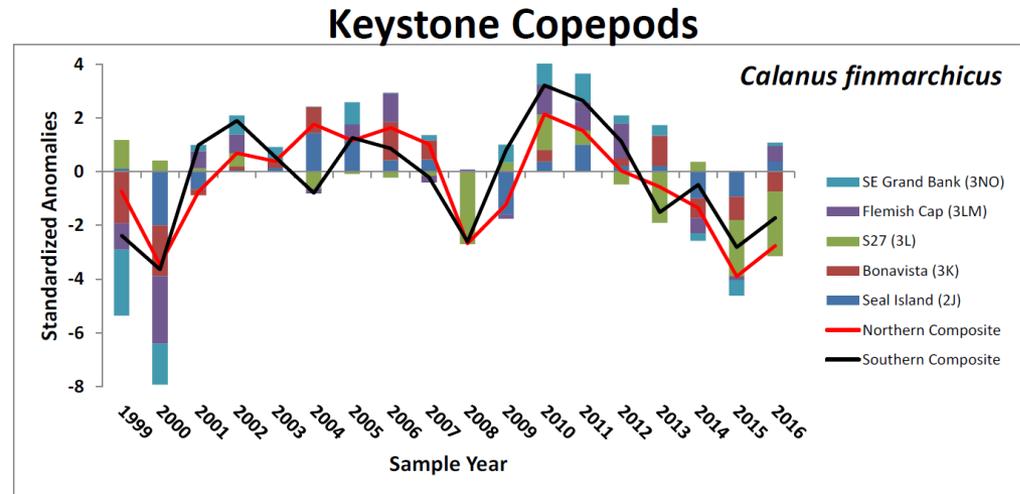
Capelin fishery/removals

- The effect of top-down pressures like fishing and consumption by predators (northern cod, seals, whales, birds) has not been quantified, although an increase in piscivores (fish that eat other fish) and decrease in alternate prey (shrimp) has likely increased capelin mortality due to predation in the last few years.
- Removals of capelin by the fishery are small relative to consumption in the ecosystem.
- Landings in the fishery are driven by market conditions and processing capacity. The combination of these factors lead to a reduction in the areas in which capelin were harvested in 2017.

STOCK STATUS

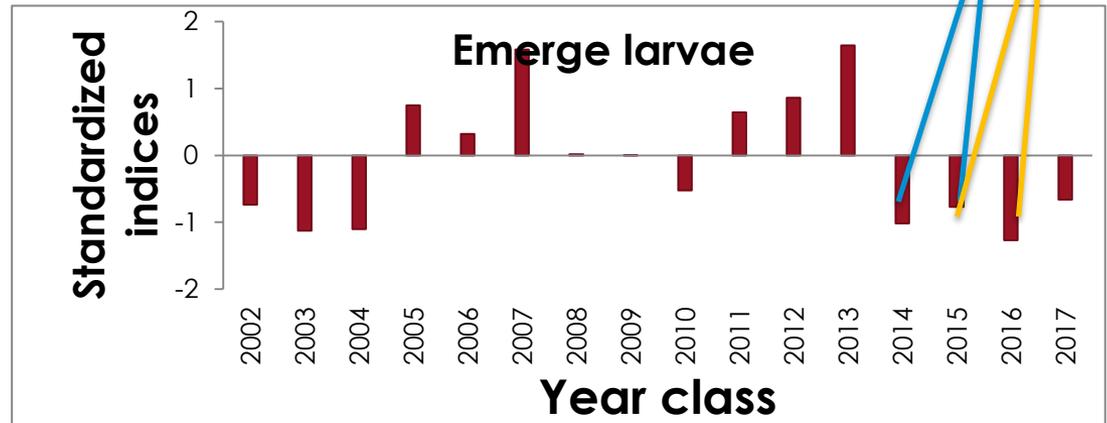
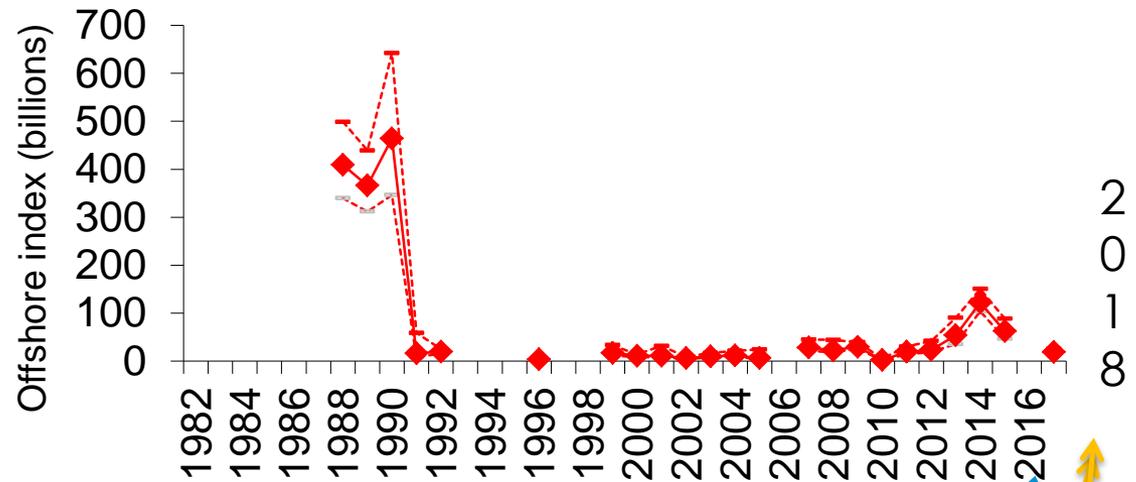
2J3KL Capelin – 2017 drivers

- The main prey species consumed by post-larval capelin have been limited in the last three years.
- Predation rates on capelin (amount of capelin eaten versus what is available) have increased in the last few years.



2J3KL Capelin – 2017 stock status

- Capelin stocks can undergo huge year to year changes in abundance.
- The age 2 capelin index increased in 2013-2015, but declined again in 2017 to levels more consistent with the late 2000s.
- Adult abundance is largely driven by the survival of freshly hatched larvae. This larval production has been poor for the last 4 years.



- No limit reference points currently in place for capelin
- Limit reference point discussions will be held next year

Overall status

- Current stock levels have returned to the low levels typical of the post 1991 period, this follows a brief period of more moderate levels observed from 2013-15.
- The outlook for spawning capelin abundance in 2018 is poor.
- The abundance of spawning capelin has varied widely over the time series (1982-2017). During this time, the stock has shown rapid recovery from levels lower than those observed in 2017.

Next steps

- The Capelin stock assessment results will be available on the CSAS website in the near future. Previous assessments are currently available.
- Fisheries management will be holding consultations with stakeholders and Indigenous groups throughout the province in the coming weeks. The Science advice will be presented and discussed at these meetings.
- The stock assessment advice, along with recommendations from DFO Fisheries Management, and input from industry will be considered by the Minister in developing future Total Allowable Catch (TAC) and other management actions.

Questions?

