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Newfoundland and Labrador Region

Canadian Science Advisory Secretariat
Science Advisory Report 2019/048

ASSESSMENT OF 2J3KL CAPELIN IN 2018

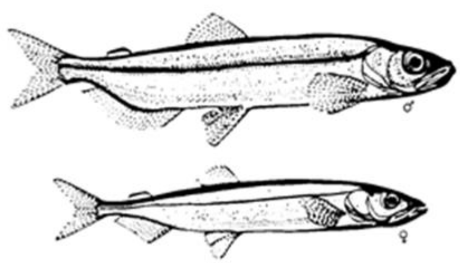

Image: Capelin, adapted from a drawing in C. E. Hollingsworth. 2002. Preface. ICES J. Mar. Sci. 59, p. 861

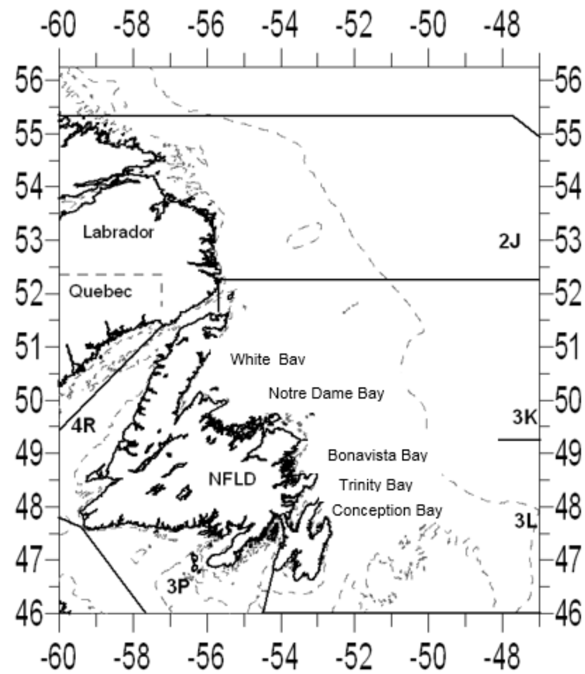

Figure 1. Capelin stock area with 100 m and 500 m contours.

Context:

*Capelin (*Mallotus villosus*) is a small pelagic schooling species with a circumpolar distribution with major populations occurring in the Northwest Atlantic Ocean, the waters around Iceland, the Barents Sea and the northern Pacific Ocean. Since 1992, Capelin in Northwest Atlantic Fisheries Organization (NAFO) Divisions (Divs.) 2J, 3K and 3L (Fig. 1) have been considered a single stock complex and assessed as such. There are four other recognized Capelin stocks in Canadian waters: the Southeast Shoal (Divs. 3NO), St. Pierre Bank (SubDivs. 3Ps), Gulf of St. Lawrence (Divs. 4RST), and the Scotian Shelf (Divs. 4W).*

Historical catches of Capelin for food, fertilizer, and bait in Newfoundland and Labrador (NL) did not exceed 25,000 t. An offshore foreign fishery for Capelin occurred from the 1970s to early 1990s with a peak catch of 250,000 t in 1976. The offshore fishery was closed in Divs. 3L in 1979 and in Divs. 2J3K in 1992. An inshore commercial fishery started in Divs. 3KL in the late 1970s with peak landings of about 80,000 t from 1988-90. Recent landings have averaged around 25,000 t.

The 2J3KL Capelin stock experienced a collapse in the early-1990s, with the annual spring acoustic survey index of largely immature (age 2) Capelin declining by an order of magnitude from 6 million tonnes in the late 1980s to less than 150,000 t in 1991. Since then the index has remained low, averaging 250,000 t over the past three decades. There was an increase in the acoustic index from 2013 to 2015, with the index reaching almost 1 million tonnes in 2014 but the survey biomass has since declined to levels similar to the late 2000s (~300,000 t).

The previous assessment for this stock was in the winter of 2018 (DFO 2018) and included research and commercial fishery data up to 2017. The 2J3KL Capelin stock has been assessed on both an annual (1992-2001, 2017 onwards) and bi-annual (2008-2015) basis, with no stock assessments occurring from 2002 to 2007. The fishery for 2J3KL Capelin was managed with three-year Capelin management plans from 1999 to 2008 and with single year plans from 2009 – 2011. The current (evergreen) Integrated Fisheries Management Plan (IFMP) commenced in April 2011 and has no fixed end-date.

This Science Advisory Report is from the March 19-21, 2019 Assessment of 2J+3KL Capelin. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

SUMMARY

- Since 2015, primary and secondary production indices (phytoplankton and zooplankton) for the NL Shelf have been below the 1999-2015 average and zooplankton community structure has changed, with a shift to smaller species. These changes have potential negative impacts on energy transfer to higher trophic levels, including pelagic planktivorous species.
- The 2018 spring acoustic abundance index increased relative to 2017, but was still only approximately 25% of the post-collapse (after 1990) high in 2014.
- Distribution during the spring acoustic survey in 2018 was more concentrated inshore and shifted towards the northwest portion of NAFO Divs. 3L compared to recent years.
- The size at age of younger Capelin (age 1-2) increased post-1990, while the age at maturity decreased. Most Capelin now mature at age 2 or 3. The age structure of the stock has truncated with substantially fewer Capelin in older age classes (4-5) and no age 6's in recent years.
- The condition of Capelin was above average in 2018 and the proportion of fish with empty stomachs was low, potentially indicating good feeding conditions and/or low density/abundance of Capelin.
- The entire Total Allowable Catch (TAC) (19,823 t) was landed in 2018.
- The mean length and weight of Capelin landed in the 2018 commercial fishery increased from the time series low in 2017 due to a higher proportion of older (age 3) fish. Capelin in the commercial fishery, however, remain smaller than the early to mid-2010s.
- Spawning in 2018 was more broadly distributed and approximately five days earlier than previous years (2016-17). Overall, spawning times since 2015 have been delayed and productivity (i.e. emergent larvae) at monitored spawning sites in 2018 was at a time series low.
- The Capelin larval abundance index has been low for five consecutive years, similar to the early 2000s. The larval abundance index and larval emergence patterns suggest that the 2018 year class may be small.
- A forecast model which incorporates the Capelin larval abundance index, adult fall Capelin condition, and the timing of sea ice retreat predicts that the spring acoustic abundance index will increase again in 2019, but decrease in 2020.
- The results of the forecast model, in conjunction with the results of the spring 2018 acoustic survey, suggest that the amount of Capelin available to the fishery in 2019 should be similar to that of 2018.

BACKGROUND

Species Biology

Capelin are a key forage species in the Newfoundland and Labrador (NL) ecosystem, with adults ranging in size from 12 to 23 cm and, males being larger than females. Capelin feed on zooplankton and provide energy to higher trophic level predators including marine mammals, seabirds, and larger fish species. Since 2015, primary and secondary production indices (phytoplankton and zooplankton) for the Newfoundland shelf have been below the 1999-2015 average. The zooplankton community structure has changed, with a shift to smaller species and a substantial reduction in biomass. This may have negative impacts on Capelin going forward as their preferred prey species have declined.

During the fall, both immature and maturing Capelin are distributed offshore in NAFO Divs. 2J3KL where they feed and overwinter. In the spring, maturing Capelin begin to migrate south and move inshore to spawn during the summer. Capelin spawn on beaches and on demersal (bottom) spawning sites. Historically, Capelin matured and spawned at age 3 or 4. Following the collapse of Capelin stocks in the early-1990s, there was a subsequent decline in the proportion of older year classes and increased size at age of younger fish (age 1 and 2). This shift in turn lead to a decrease in age at maturity. Most Capelin now mature at age 2 or 3, with very few age 4 (or older) Capelin present in the stock (Fig. 2). The timing of peak spawning has been delayed by up to four weeks since 1991, shifting from June to July and August (Fig. 3). Post-spawning mortality is believed to be extremely high for both sexes (Shackell et al. 1994).

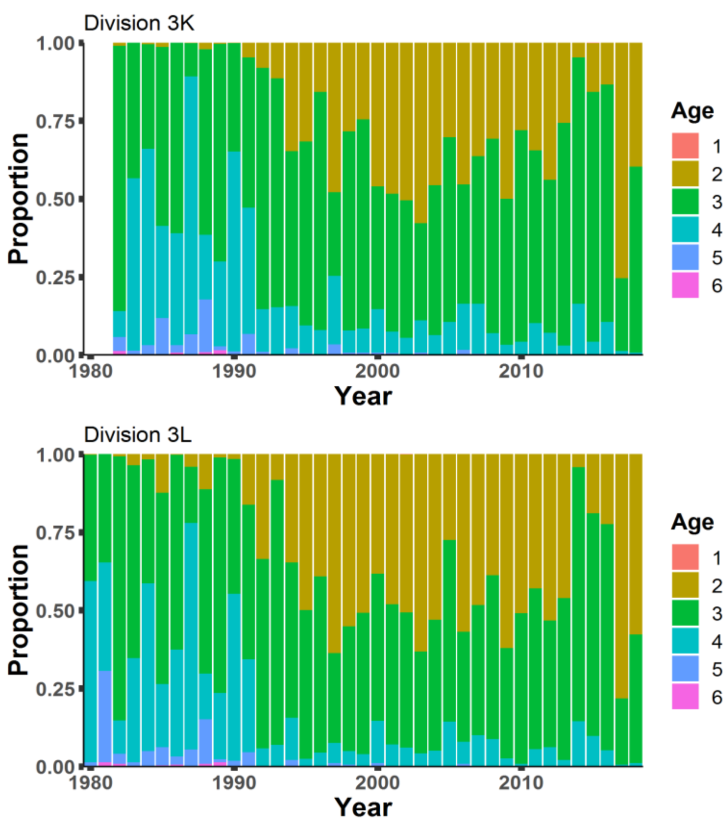

Figure 2. Age composition (proportion) of Capelin in the commercial inshore fisheries in NAFO Divs. 3K (top panel; 1982-2018) and 3L (bottom panel; 1980-2018).

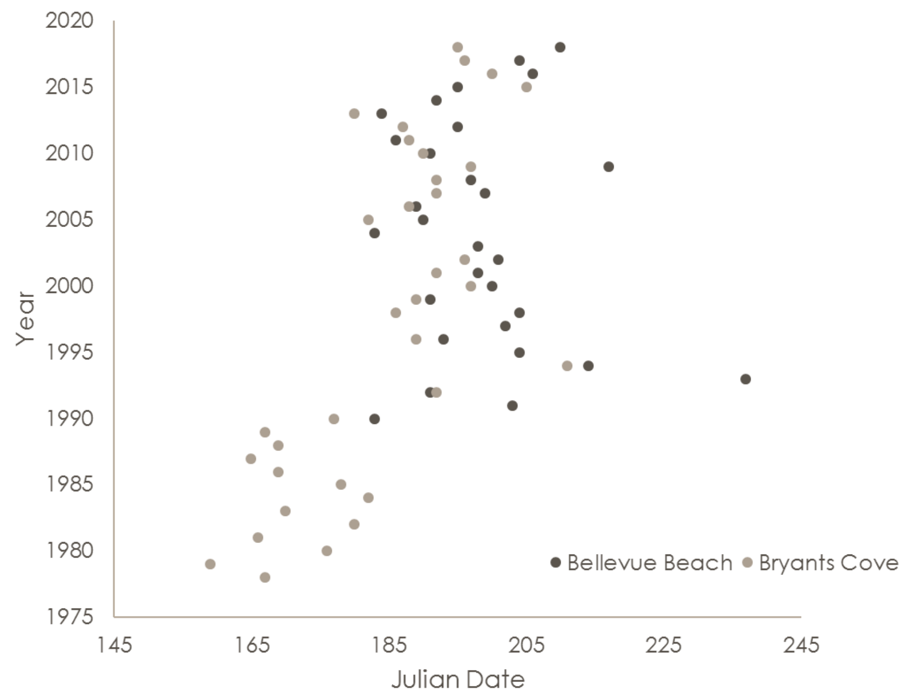

Figure 3. Peak spawning times at Bryants Cove, Conception Bay (1978-2018, light grey points) and Bellevue Beach, Trinity Bay (1990-2018, dark grey points).

Capelin recruitment is highly variable and year class strength is set early during the larval stage (Frank and Leggett 1981; Leggett et al. 1984; Dalley et al. 2002; Murphy et al. 2018). Larval survival in the first two weeks was previously related to the occurrence of onshore winds for the years 1966-90 (Leggett et al. 1984; Carscadden et al. 2000). Onshore wind events act as the mechanism to get the larvae off of beaches as well as instigating a rapid coastal water mass replacement where cold, high-salinity waters are replaced with warmer, less-saline waters (Frank and Leggett 1982). This water mass replacement was positively related to increased availability of small zooplankton prey (< 250 µm) and a decrease in abundance of invertebrate predators (Frank and Leggett 1982). Post-1990, larval survival was no longer related to onshore wind events (Murphy et al. 2018). This lack of relationship may be due to the delay in spawning that has persisted since 1991 (Fig. 3). With predominately south-westerly wind events later in the summer, the number of onshore wind events has decreased during the Capelin spawning period (Murphy et al. 2018). This suggests that Capelin larvae are trapped on the beaches for longer and may not be released into ideal environmental conditions. Post-1990, a match between larval occurrence and prey availability was important for larval survival (Murphy et al. 2018). Increased availability of preferred prey in autumn, due to a shift in zooplankton phenology seen around 2006, may have improved larval survival from 2011-14. Another important driver of Capelin survival is the timing of ice-mediated spring plankton blooms, which may affect adult Capelin survival (Buren et al. 2014).

Fishery

Historically, Capelin were harvested inshore on spawning beaches for food, bait and fertilizer. A directed foreign offshore fishery began in the early-1970s and was closed in Divs. 3L in 1979 and in Divs. 2J3K in 1992. The peak offshore catch of 250,000 t occurred in 1976 (Fig. 4).

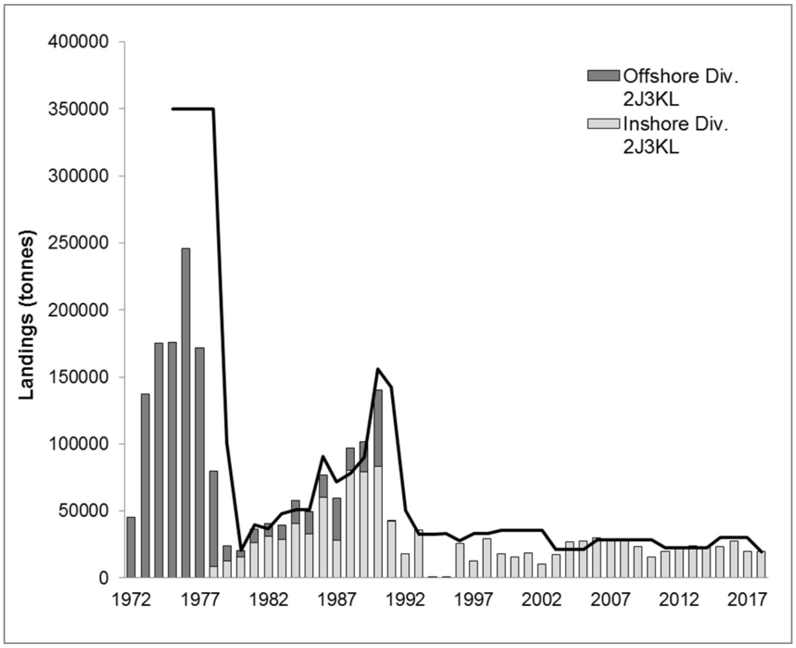

Figure 4. Inshore landings (light grey bars), offshore landings (dark grey bars) and TAC (line) for Capelin in Divs. 2J3KL in 1972-2018. Note that annual inshore landings were likely greater than 0 t between 1972 and 1977, but these were not recorded prior to 1978.

During the late-1970s, an inshore fishery for roe-bearing female Capelin began. The inshore fishery has been prosecuted using Capelin traps, purse seines, and, to a lesser extent, beach seines. Since 1998, modified beach seines called “tuck seines” have been deployed to target Capelin in deeper waters. Peak inshore landings of approximately 80,000 t occurred from 1988-90, since then annual landings have averaged 25,000 t (Fig. 3). Interest in the Capelin fishery varies depending on the status of other resources such as Snow Crab and market demand and is related to the success of Capelin fisheries in the Barents Sea and Iceland. Newfoundland processing capacity also limits the fishery.

There are a number of different markets for Capelin, with the highest demand being for frozen roe-bearing females for Japan, where the demand for quality is high. During the 1980s and early-1990s this demand for females led to high levels of discarding at sea and dumping of (predominantly male) Capelin. To address these issues, several management measures were implemented from the early-1990s onward: Capelin quality is monitored prior to opening the fishery; fisheries are relatively short (two to three days); and a license condition (since 2006) requires harvesters to land all Capelin captured (both male and female). In addition, new markets for male Capelin, including use as animal feed for zoos and aquaculture, have helped to ensure full utilization of the catch and reduced discarding.

In 2018, the entire 19,823 t TAC was taken (Fig. 4). Capelin arrived early inshore in 2018 (April-May) and harvesters reported that fish were abundant and densely schooled together during the fishery. Landings occurred in Conception Bay, Trinity Bay, Bonavista Bay, Notre Dame Bay and White Bay.

ASSESSMENT

The Capelin fishery targets spawning fish, but no estimate of spawning stock biomass is available. Absolute Capelin abundance cannot be derived from the spring acoustic survey as it has been designed to target immature Capelin (ages 1 and 2) and does not cover the entire distributional range of the 2J3KL stock. The Capelin assessment is based on trends in the spring acoustic survey abundance index, larval index from Trinity Bay, Capelin distribution data obtained from the bottom trawl surveys, biological characteristics of the stock, environmental parameters, and the results of a new forecast model.

Offshore Distribution

In 2018, the spatial distribution of Capelin observed during the spring acoustic survey was largely concentrated in the northwest portion of Divs. 3L and inshore; this contrasted with recent years when Capelin were predominately distributed along the 200 m depth contour on the shelf break.

The only information on fall Capelin distribution comes from multi-species bottom trawl surveys from 1983-2018. When the gear changed in these surveys from the Engels otter trawl to the Campelen 1800 shrimp trawl in 1995, catchability increased for smaller fish (Warren 1997) and more Capelin were generally caught in survey fishing sets. However, bottom trawl surveys cannot provide abundance estimates for pelagic species. A center of gravity analysis of the fall bottom trawl data (1983-2018) found that Capelin generally exhibited a more northerly distribution when abundance was high and a southerly distribution when abundance was low (Fig. 5). In the past decade, the center gravity of Capelin shifted northwards (2011-14), then southwards (2015-16), and more recently westward/inshore (2017-18).

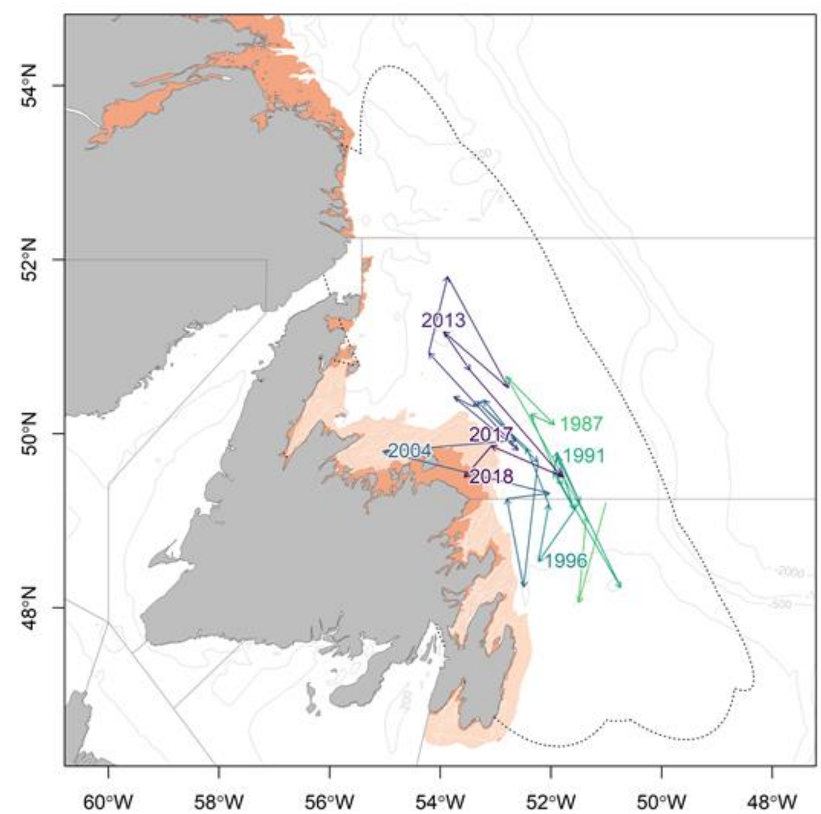

Figure 5. Distribution of the center of gravity of Capelin computed from the fall bottom-trawl survey in NAFO Divs. 2J3KL from 1983 to 2018. Annual center of gravity estimates are connected by lines through time, and composite ellipses of deviation around these estimates (i.e. inertia) are indicated by the dotted black line. Center of gravity and inertia were calculated using equations found in Woillez et al. (2007). The orange area indicates areas not covered by the fall survey and the light cream area indicates inshore strata that are poorly covered by the fall bottom-trawl survey. Based on an analysis in Buren et al. (2019).

Spring Acoustic Survey Index

Data from spring acoustic surveys were presented for 1988-92, 1996, 1999-2005, 2007-15 and 2017-18. Acoustic data collected in the early 1980s could not be treated in the same manner as more recent acoustic data and thus were not included in the time series. Estimates of Capelin abundance, including 95% confidence limits, were calculated using a Monte Carlo simulation technique to capture variability in the acoustic data over time associated with advances in hydro-acoustic technology and calibration, changes in Capelin spatial and vertical distribution patterns, and changes in Capelin size (Mowbray 2014).

The acoustic survey abundance index remains below that observed in the late-1980s (Fig. 6). Following a period of very low abundance in the 1990s and early 2000s, the index increased slightly from 2007-12 with the exception of a record low value recorded in 2010. From 2013-15, the abundance index was the highest observed since 1990, ranging from 53-122 billion individuals. During this period, the abundance index was approximately 25% of the values recorded in the late 1980s. However, in 2017, the acoustic survey abundance index declined, returning to a level similar to that observed during the late 2000s. The abundance index increased slightly in 2018 but was still only approximately 25% of what was observed in 2014 (Fig. 6). Because the spring survey covers only a portion of the stock area, the abundance index is considered to be a minimum abundance estimate and may be subject to unquantified inter-annual variations due to changes in the distribution of the stock within the surveyed area.

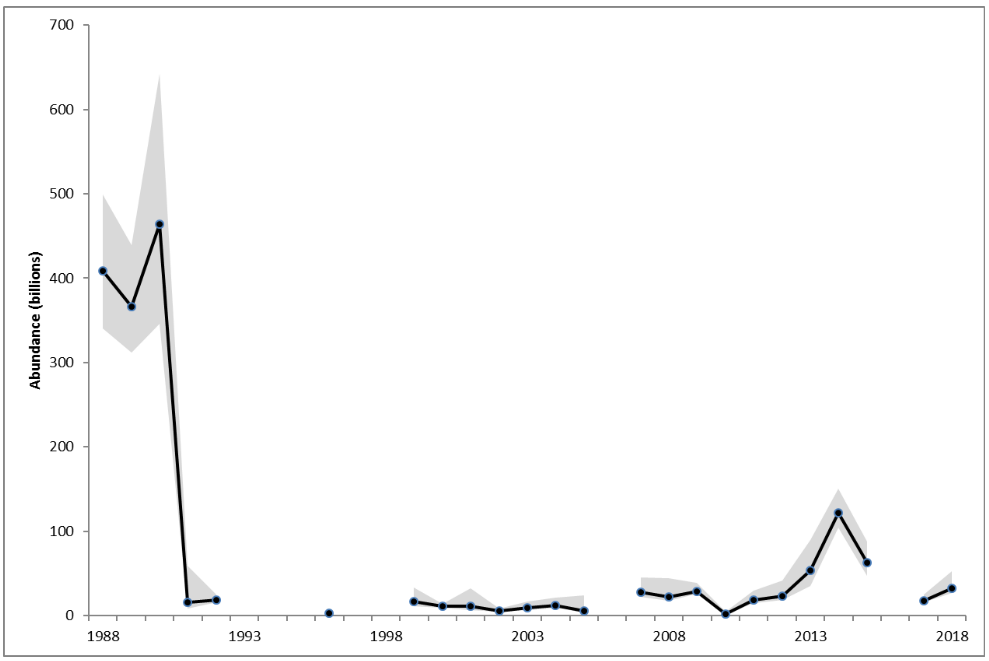

Figure 6. Spring (May) offshore acoustic abundance index of Capelin in NAFO Divs. 3L and southern Divs. 3K (solid line) with 95% confidence intervals (shaded area) (1988-92, 1996, 1999-2005, 2007-15, 2017-18).

Biological Information

Feeding and Condition

Diet and condition data are collected for Capelin sampled in the fall and spring multi-species bottom trawl surveys. Stomach content analysis found that the proportions of empty Capelin stomachs in the fall of 2017 and 2018 were at time series lows, as was the proportion of empty stomachs in the spring of 2018 (Fig. 7).

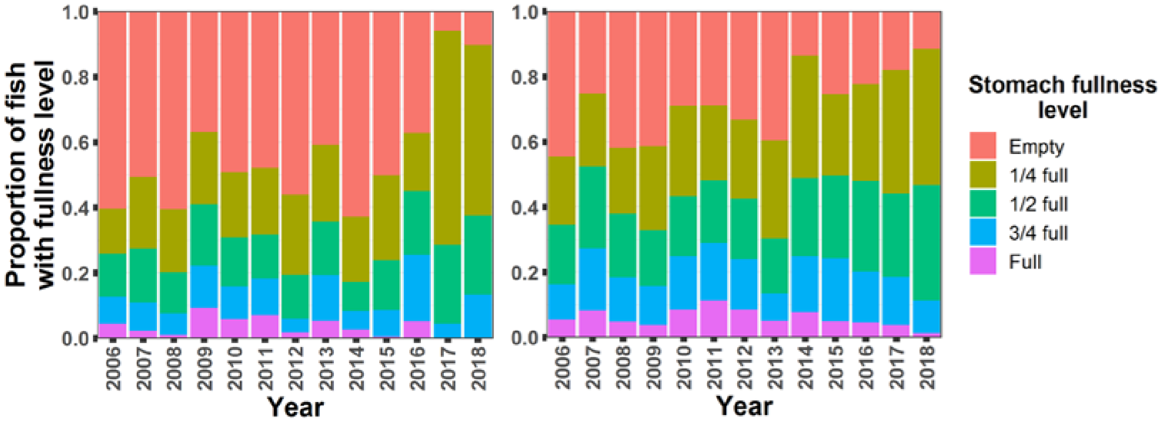

Figure 7. Proportion of Capelin stomach fullness level during fall (left) and spring (right) multi-species bottom trawl surveys (2006-18).

Relative condition of male Capelin collected during the fall multi-species survey is calculated by NAFO division and age. Female condition is not calculated in the fall due to issues with energy reallocation to gonads and mixed spawning history. Fall condition of age 1 male Capelin in Divs. 2J3K varied without trend. Fall condition of age 2 male Capelin was at a time series high in Divs. 3K (their main distribution area) in 2017 and was average in 2018 (Fig. 8).

Fulton's K condition factor is calculated for mature females by 2 cm length class sampled during the spring acoustic survey. Condition in 2018 improved from the low levels observed in 2017, with the exception of the 10-11 cm length class (Fig. 9).

Collectively, these results, indicate good feeding conditions for Capelin.

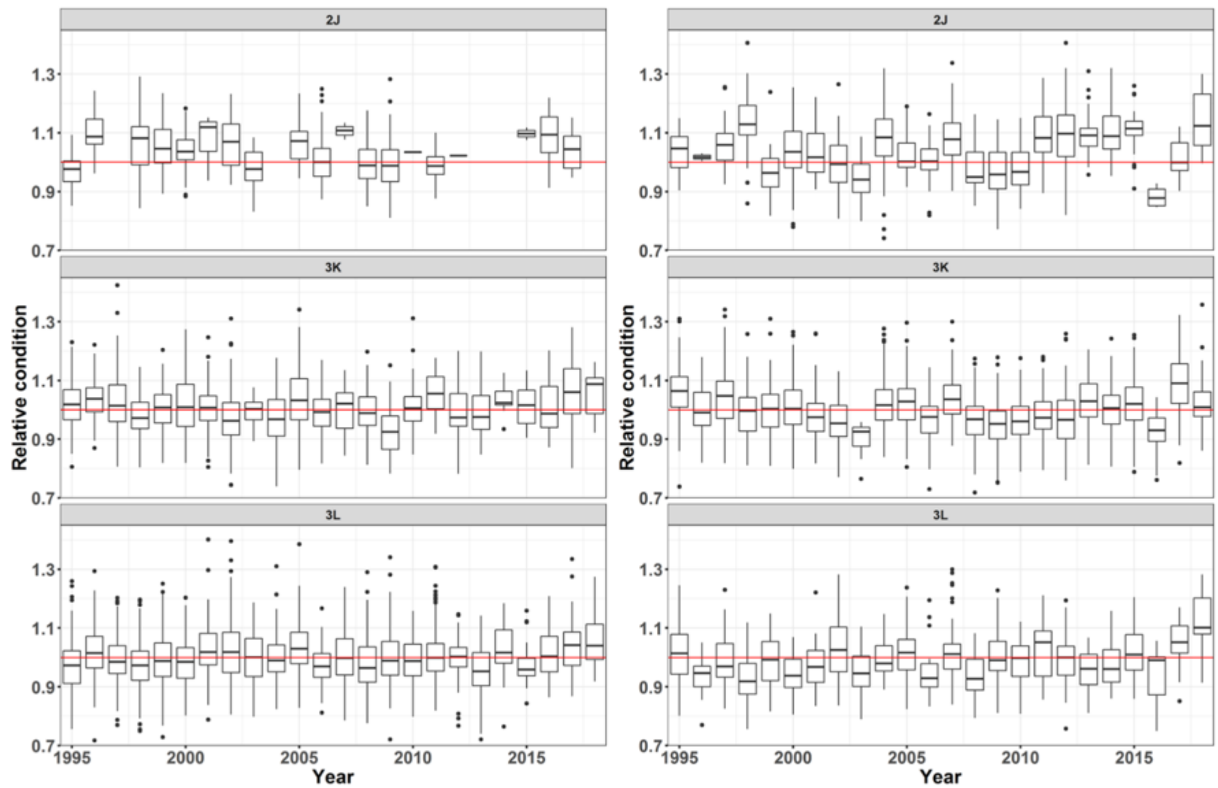

Figure 8. Relative condition of age 1 (left panel) and age 2 (right panel) male Capelin sampled in the fall multi-species bottom trawl survey by year (1995-2018) and NAFO division (2J, 3K, and 3L).

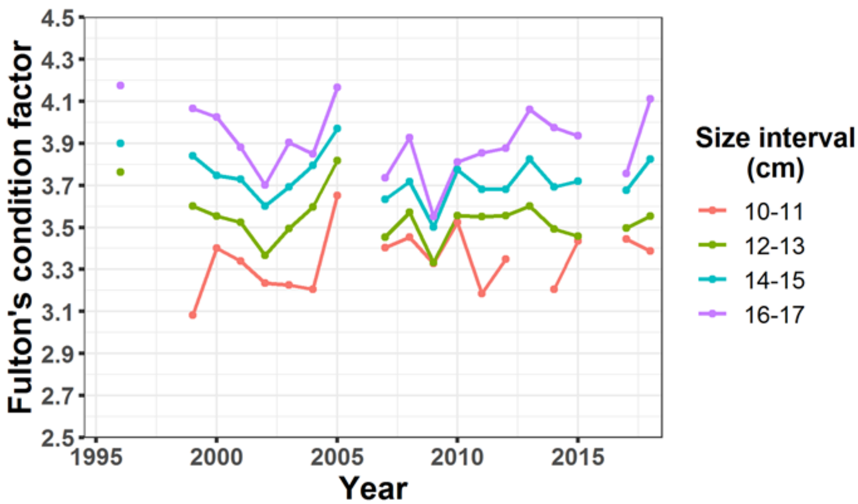

Figure 9. Fulton's K condition factor ($K*10^3$) for 2 cm length classes of maturing female Capelin sampled during the spring offshore acoustic survey (1996, 1999-2005, 2007-15, 2017-18).

Size and Age

The spring acoustic survey was designed to target immature Capelin and has typically sampled primarily age 2 Capelin while capturing smaller proportions of other age classes. Consistent with previous years, in 2017 and 2018, very few age 1s or 4s were present in the survey. There have been no or very few age 5 or 6 Capelin since the 1990s (Fig. 10).

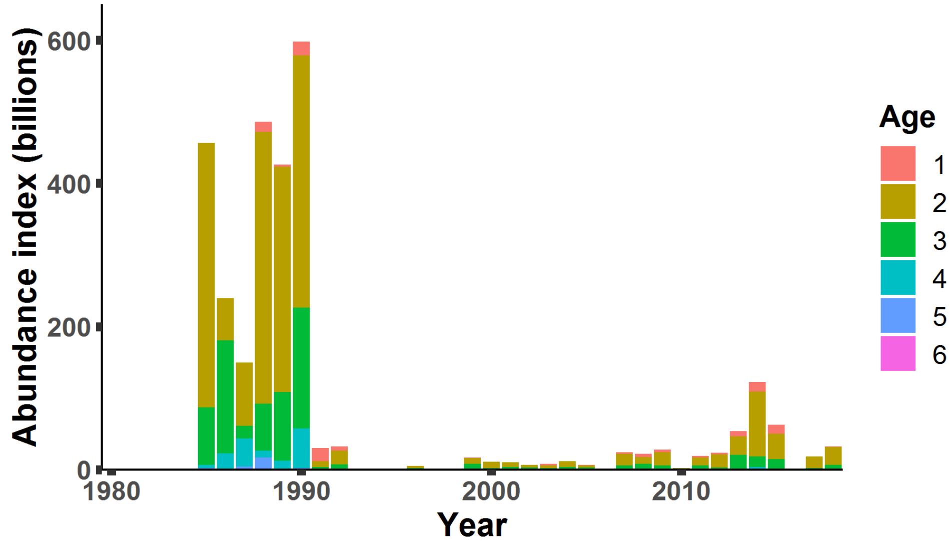

Figure 10. Abundance index at age (billions) of Capelin surveyed during the spring (May) Divs. 3L acoustic survey (1985-92, 1996, 1999-2005, 2007-15, 2017-18).

Observed changes in the age composition of spawners since 1991 is attributable to earlier maturation of the Capelin stock which has resulted in an increased proportion of age 2 Capelin maturing and spawning in a given year. In the 2000s, the proportion of age 2 Capelin maturing was as high as 80%; since 2014, this proportion has been stable at about 25-35% (Fig. 11). The mean length at age of Capelin sampled during the spring acoustic survey increased slightly in 2018 compared to 2017 and are currently at or near the time series mean, with the exception of age 1 Capelin which are above average (Fig. 12).

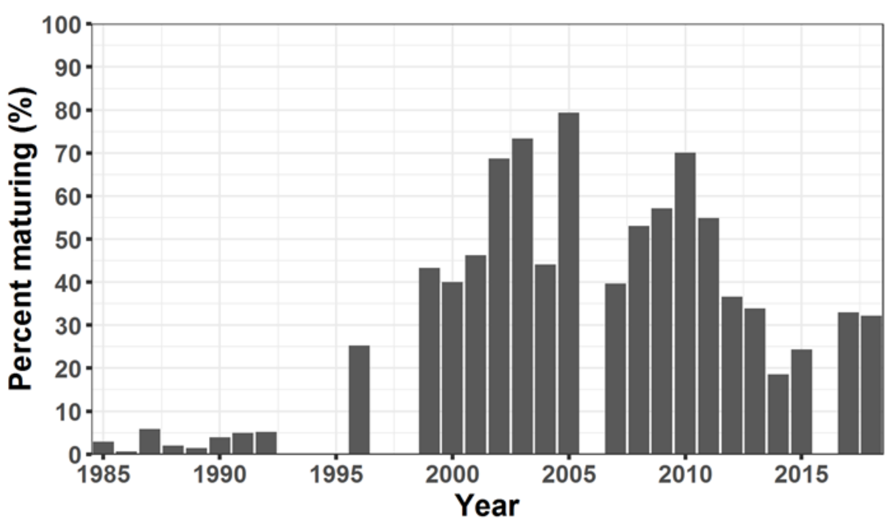

Figure 11. Proportion of age 2 Capelin maturing sampled during the spring acoustic surveys (1985-92, 1996, 1999-2005, 2007-15, 2017-18).

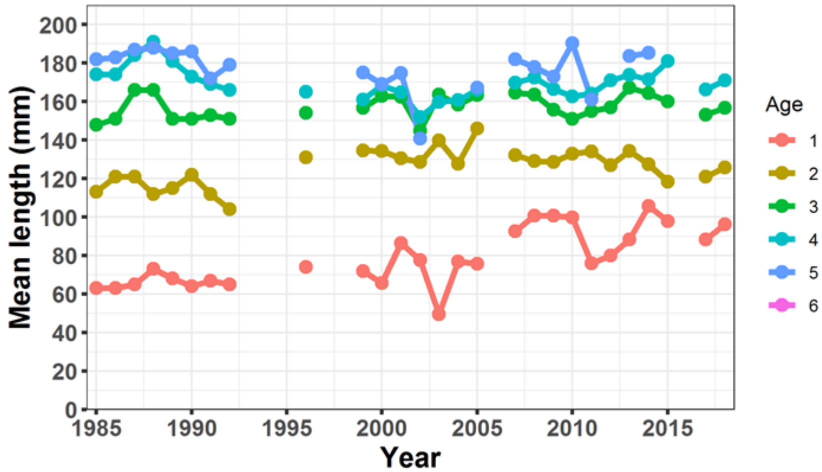

Figure 12. Mean length at age of Capelin sampled during spring acoustic surveys (1985-92, 1996, 1999-2005, 2007-15, 2017-18)

Biological samples from the commercial inshore Capelin fishery in Divs. 3KL have been collected from fish processing plants and processed by DFO Science since 1980. The mean length and weight of Capelin landed has declined over the time-series with males and females exhibiting similar trends. This is likely due to changes in Capelin biology since 1991, including early maturation (Carscadden et al. 2000). The mean size of Capelin landed in 2017 in both Divs. 3K and 3L was the smallest in the time-series. In 2018, there was an improvement in mean size of landed Capelin; however, mean size in 2018 was still below the recent highs observed in the 2010s (Fig. 13). The small mean size recorded in the fishery in 2017 was associated with an unusually high proportion of age 2 spawning Capelin in both Divs. 3L and 3K. In 2018, the proportion of spawning age 2 Capelin decreased but was still high compared to 2013-16 (Fig. 14).

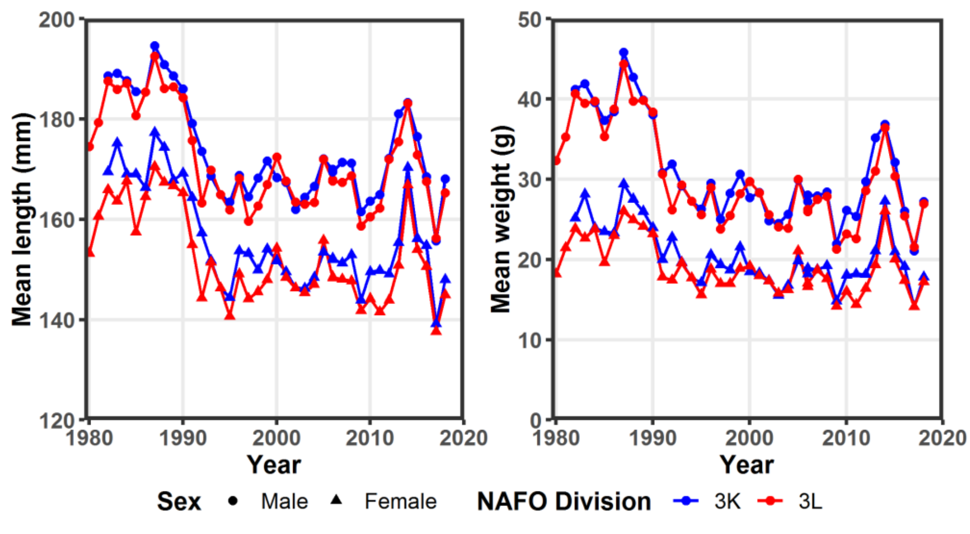

Figure 13. Mean total lengths (mm) (left panel) and weights (g) (right panel) of spawning males (triangles) and spawning females (circles) captured in the commercial fisheries in Divs. 3L (red) and 3K (blue) from 1980-2018.

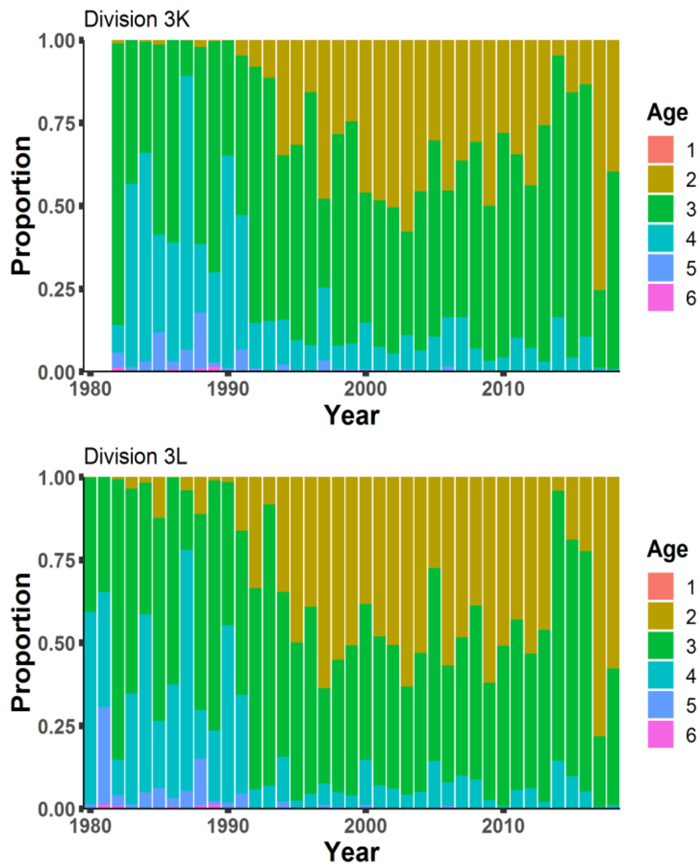

Figure 14. Age composition of Capelin landed in the commercial fishery in divisions 3K (upper; 1982-2018) and 3L (lower; 1980-2018).

Larval and recruitment indices

Recruitment in Capelin has been related to larval survival (e.g., Murphy et al. 2018). The Capelin larval index is the main fishery-independent inshore index used in the assessment. From 2001-18, the nearshore area adjacent to Bellevue Beach, Trinity Bay (0.5 – 1 nm from the beach; 20 m depth) was surveyed for larval Capelin emerging from one large and four small spawning beaches, and two nearshore demersal spawning sites. Surveys were conducted using surface tows at five stations. Each surface tow was 10 minutes in duration at a speed of 2.1 knots using a 0.5 m diameter ring net with 270 µm mesh. Surface tows were conducted every 1-2 days from the start of larval emergence to the end of emergence in July and August. The Capelin larval index has been below average since 2014 and reached a time-series low in 2018 (Fig. 15).

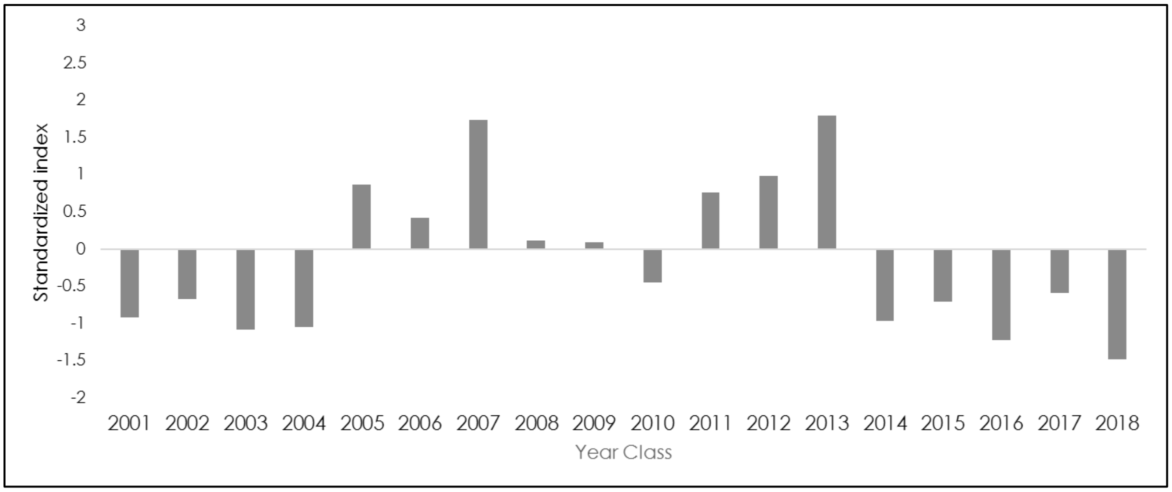

Figure 15. Standardized recruitment index of Capelin larvae from Bellevue Beach, Trinity Bay for the 2001 to 2018 year classes.

Spawning Time

A time-series of the annual date of peak spawning, which is based on daily observations of Capelin spawning behavior, has been developed for the beaches at Bryants Cove, Conception Bay (1978-2018) and Bellevue Beach, Trinity Bay (1990-2018; Fig. 3). Both beaches are in Divs. 3L. Compared to spawning times for Bryants Cove in the 1980s, spawning times for both beaches have been delayed by as much as four weeks from the early-1990s through 2010. Spawning times improved to only two weeks late from 2011-14. Peak spawning times at Bryants Cove and Bellevue Beach over the last four years have been up to four weeks later compared to the 1980s. Later spawning times have been related to lower Capelin larval survival, which is related to a mismatch between larval emergence timing and onshore wind events and less time for larvae to grow before their first winter (Murphy et al. 2018).

From 1991-2018, Capelin beach spawning has been monitored throughout the province by paid spawning diarists who checked their local beaches every day during the Capelin spawning period (June-August). While participation in this program has varied inter-annually, and has decreased in recent years, this data can be used to track Capelin beach spawning timing along the northeast coast of Newfoundland. Generally, beach spawning occurs earlier in the south and later in the north (Nakashima 1996), but for 2015-18, beach spawning occurred at similar times on beaches in Divs. 3KL (Fig. 16). In 2018, peak Capelin spawning was approximately five days earlier than in 2017 (2018: 4-18 July; 2017: 9-25 July). In 2018, there was evidence of protracted spawning occurring at many beaches as is common for Capelin since 1991. Compared to 2017, more beach spawning was evident across the island of Newfoundland in 2018 based on spawning diary data.

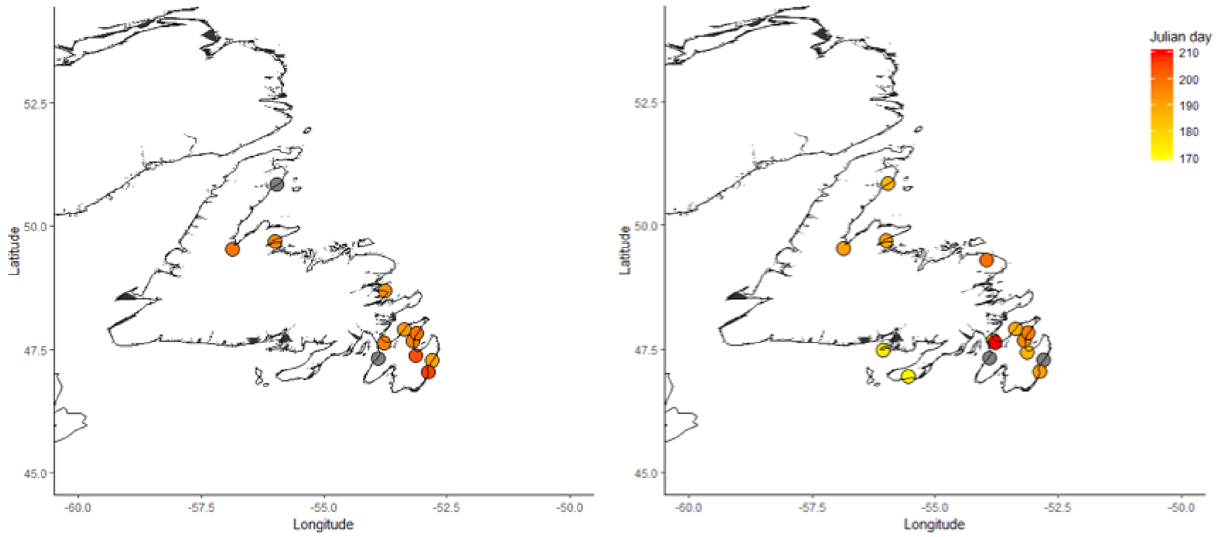

Figure 16. Peak spawning date at monitored beaches in Newfoundland in 2017 (left) and 2018 (right). Grey dots are monitored beaches where no beach spawning was detected.

Forecast Model

A Capelin forecast model, which was presented for the first time at the 2018 assessment, was used to provide science advice in the 2019 assessment. A variety of mechanisms have been previously explored to explain the inter-annual variation in Capelin biomass. Murphy et al. (2018) found Capelin larval abundance and larval food availability explained ~40% of the variability in age-2 Capelin recruitment variability. Buren et al. (2014) found a dome-shaped relationship between Capelin biomass and timing of the sea ice retreat (as a proxy for timing of the spring bloom). The Capelin forecast model was developed using a Bayesian approach (see Lewis et al. 2019 for more details on model development). The advantage of the Bayesian approach is that we can use known relationships in the model (based on previous Capelin models [Buren et al. 2014, Murphy et al. 2018]) and we can use the model to forecast Capelin biomass. The model also investigated the relationship between fall adult condition and Capelin biomass. The most parsimonious model included larval abundance from Bellevue Beach, timing of the sea ice retreat, and adult Capelin condition in the fall (Lewis et al. 2019). The model uses various time lags of the data: the Bellevue Beach larval index and condition of adult Capelin in the fall were lagged by two years and one year, respectively, while timing of the sea ice retreat is from the current year (Lewis et al. 2019). The 2019 model forecast is based on the 2017 larval index, 2018 fall condition index for adult Capelin, and 2019 day of sea ice retreat. The 2020 model forecast is based on the 2018 larval index, average male fall condition index (to be updated with 2019 fall index), and average day of sea ice retreat (to be updated with 2020 day of sea ice retreat). The Capelin forecast model predicted no change or a small increase in the spring 2019 acoustic biomass estimate and a decline in the spring 2020 acoustic biomass estimate (Fig. 17). The Capelin forecast model will be updated as data becomes available.

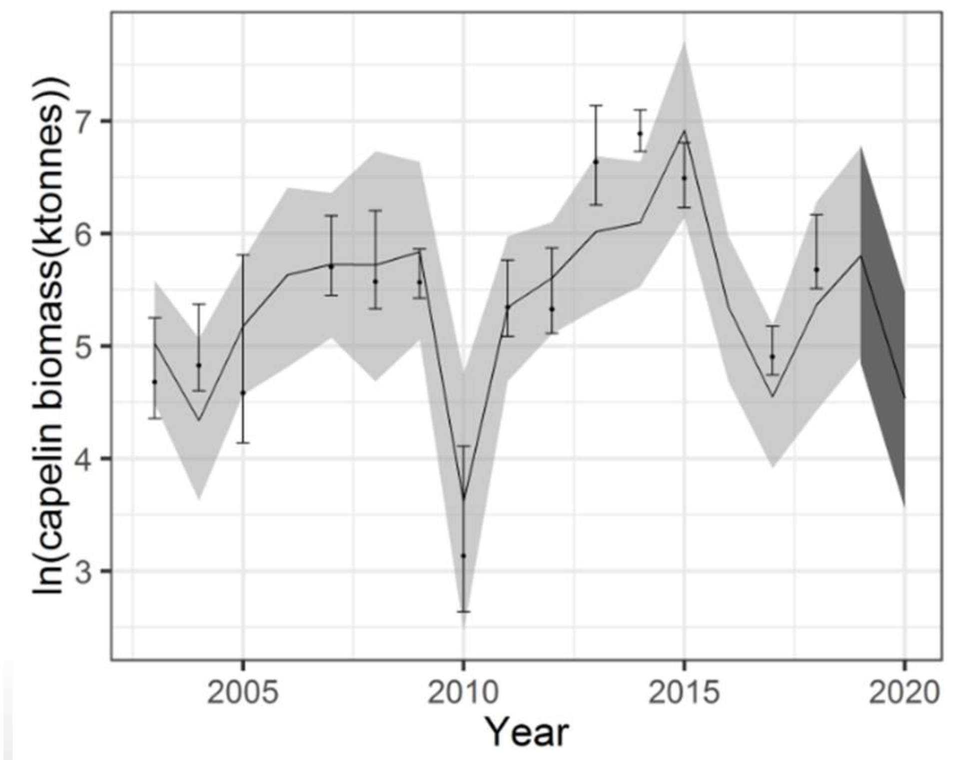

Figure 17. The results from the Capelin forecast model including the 95% credible (light grey) and 80% prediction intervals (dark grey) for expected values of Capelin biomass in the spring acoustic survey (solid line) and observed values (point estimates with ±95% confidence intervals). The model forecasts a slight increase in the Capelin biomass in the 2019 spring acoustic survey and a decrease in Capelin biomass in the 2020 spring acoustic survey.

Sources of Uncertainty

Capelin have a short life span, typically with only two year classes contributing significantly to the spawning biomass each year and few individuals living more than four years. Capelin can produce large quantities of eggs; however, mortality rates during their egg and larval stages are extremely high – this creates the potential for small fluctuations in environmental conditions to lead to order of magnitude changes in recruitment (Houde 1987). An increase in the magnitude and frequency of anomalies in environmental parameters is associated with climate change; environmental variability may increase uncertainty with regard to Capelin stock dynamics.

At present, no estimates of absolute abundance (stock size) for Capelin in Divs. 2J3KL are available. The spring acoustic survey provides an index of Capelin abundance as it surveys only Divs. 3L and the southern portion of Divs. 3K. While the Capelin acoustic abundance index provides consistent information on cohort strength of age 2 fish, information on age 1 and older age classes is incomplete as they are not fully recruited to the acoustic survey.

The stock recruit relationship and relative impact of fishing mortality on the Capelin stock are not quantified and are poorly understood.

While the larval index is collected in one nearshore area of Trinity Bay and may not be reflective of larval productivity in other bays or regions, previous research found a synchronous release of Capelin larvae in the northeastern bays of Newfoundland (Nakashima 1996). Furthermore, the larval index has been positively related to the spring acoustic index, which suggests that larval sampling at Bellevue beach provides a proxy for larval productivity in other bays in

Newfoundland (Murphy et al. 2018). The contribution of demersal spawning to Capelin recruitment is unknown.

The use of bottom trawl survey data in stock assessments of pelagic fish species should always be treated with caution.

CONCLUSIONS AND ADVICE

The 2018 acoustic abundance index increased compared to 2017; however, the 2018 Capelin abundance index is still only ~25% of the post-collapse (1990-91) high in 2014.

The current low values of the two Capelin indices (acoustic and larval abundance) are likely attributable to environmental conditions (e.g., bottom-up processes). Capelin abundance is also affected by a shift to earlier maturation since 1991, which reduces the total number of older aged individuals in the population due to high post-spawning mortality. The age structure of the stock has truncated compared to the 1980s with substantially fewer Capelin in older age classes (4-5) and no age 6's in recent years.

A forecast model which incorporates the Capelin larval abundance index, adult fall Capelin condition, and the timing of sea ice retreat predicts that the spring acoustic abundance index will increase again in 2019, but decrease in 2020. The results of the forecast model, in conjunction with the results of the spring 2018 acoustic survey, suggests that the amount of Capelin available to the fishery in 2019 should be similar to that of 2018.

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This Science Advisory Report is from the March 19-21, 2019 Assessment of 2J+3KL Capelin. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

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