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Newfoundland and Labrador Region

Canadian Science Advisory Secretariat
Science Advisory Report 2020/009

ASSESSMENT OF ICELAND SCALLOP (*CHLAMYS ISLANDICA*) IN THE STRAIT OF BELLE ISLE

Image. Iceland Scallop (Chlamys islandica).

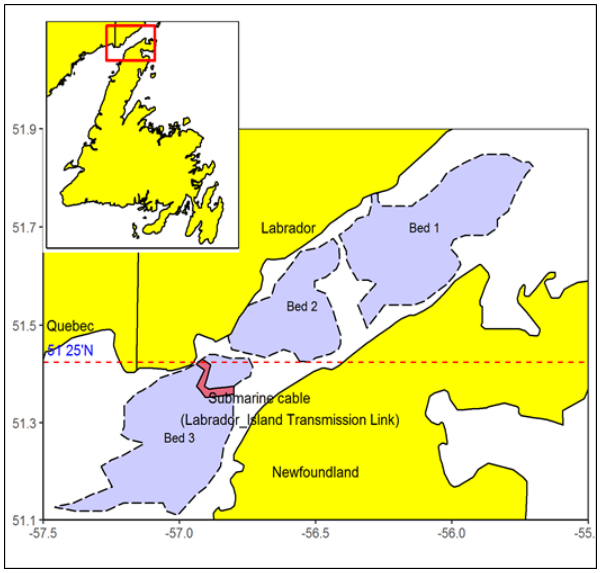

Figure 1. Newfoundland and Labrador showing the scallop fishing area in the Strait of Belle Isle.

Context:

The directed fishery for Iceland Scallop (Chlamys islandica) started in the Strait of Belle Isle (Northwest Atlantic Fisheries Organization [NAFO] Division (Div.) 4R) in 1969 and has been prosecuted annually with the exception of four years (1975-79). This fishery takes place predominantly in three main Scallop beds, which are considered a single stock for assessment purposes (Figure 1). Aggregations in the southern bed were particularly hard hit throughout the 1990s with the landings sometimes exceeding 90% of the total catch. In an attempt to redistribute effort to the northern beds it was decided in 2000 to partition the Total Allowable Catch (TAC) equally north and south of the 51° 25' North latitude line.

The number of active licenses has ranged from a high of 107 in 1985 to the current low of 8 licenses on average in the last few years. The fishery has been cyclical in nature, often driven by market considerations. The fishery has been regulated by a TAC since 1996. Other management measures include weekly catch limits and spatial regulation of removals.

The last assessment for this scallop resource in Div. 4R was in 2009. There is no assessment schedule for this stock. For this assessment the resource status was evaluated based on trends in fishery catch per unit effort (CPUE), biomass indices, mortality indices, and meat yields. Data are derived from harvesters' logbooks and DFO scallop surveys.

The Science Advisory Report is from the February 19, 2019 4R Iceland Scallop Assessment. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

SUMMARY

- Landings have averaged approximately 250 t since 2009 with lower than average landings of 115 t and 127 t in 2017 and 2018. The Total Allowable Catch (TAC) of 1,000 t has not been taken since 2000.
- Catch per unit effort (CPUE) over the last decade has remained stable. The number of active licenses has declined in recent years to the lowest level. Since 2006 more than 90% of the landings has been taken from Bed 3 (southern bed).
- Fisheries and Oceans Canada (DFO) research surveys from September 2011 and 2018 resulted in minimum dredgeable biomass (MDB) estimates of 4,123 t and 3,432 t respectively. For the duration of the survey time series since 1995 the biomass estimates have varied without trend.
- The natural mortality estimate was 0.26 in 2018 which was the highest in the survey time series.

BACKGROUND

Species Biology

The Iceland Scallop *(Chlamys islandica)* is widely distributed within the subarctic, but is also found in fishable aggregations as far south as the coast of Massachusetts. Populations in the Strait of Belle Isle area are found on three beds at depths from 40-100 m. They are predominantly found on hard substrates, consisting largely of sand, gravel, shell fragments, and stones. The Iceland Scallop is a filter-feeder, consuming plankton and detritus, and is associated with areas of strong currents. To reside in such areas, the scallop is attached to the substrate by a byssal thread. Unlike other scallops, the byssus is maintained to the adult stage.

Iceland Scallop are dioecious (having separate sexes), become sexually mature at 3-6 years of age, and fully recruit to the commercial fishery at 60 mm shell height (about age 9). Spawning in Newfoundland waters begins in April to May and is thought to be initiated by short-term variation in temperature. Eggs are externally fertilized and larvae are planktonic for as long as 10 weeks before settling to the bottom, possibly at considerable distances from the spawning adults. Iceland Scallop frequently live more than 25 years, but seldom exceed 100 mm in shell height.

Fishery

The fishery, the longest existing scallop fishery in Newfoundland and Labrador, started in 1969 and has been prosecuted annually with the exception of four years (1975-79). The number of active licenses has ranged from a high of 107 in 1985 to the current low of eight licenses on average in the last few years. The fishery has been cyclical in nature, often driven by market considerations.

The fishery has been regulated by a TAC since 1996. Other management measures include weekly catch limits and spatial regulation of removals. The majority of vessels in this fishery are less than 45’ length overall (LOA). They make daily excursions and land fresh product with nearly all scallops shucked at sea.

The fishery in the Strait of Belle Isle for Iceland Scallop takes place in three main Scallop beds, which are considered a single stock for assessment purposes. Bed 1 is the most northerly, Bed 3 is the most southerly and Bed 2 is between Beds 1 and 3 (Fig. 1). Aggregations in the southern bed were particularly hard hit throughout the 1990s, with greater than 90% of the total

landings sometimes coming from Bed 3. In an attempt to redistribute effort to the northern beds it was decided in 2000 to partition the TAC equally north and south of the 51° 25' North latitude line. As well, in 2000, in consultation with stakeholders, a refugium (a corridor 5 miles wide across the Strait of Belle Isle) was established in hopes of promoting survival of newly settled scallop in the absence of fishing. In 2009, after a review and assessment of the stock it was determined that there were limited benefits to the stock and the refugium was eliminated. In 2014, upon request and after agreement between fish harvesters and the proponent, DFO closed an area to all Scallop dragging in the Strait of Belle Isle Scallop Fishing Area (SFA) 14 to protect a submarine transmission cable and berm (Fig. 2) (Fisheries and Oceans Canada, 2016).

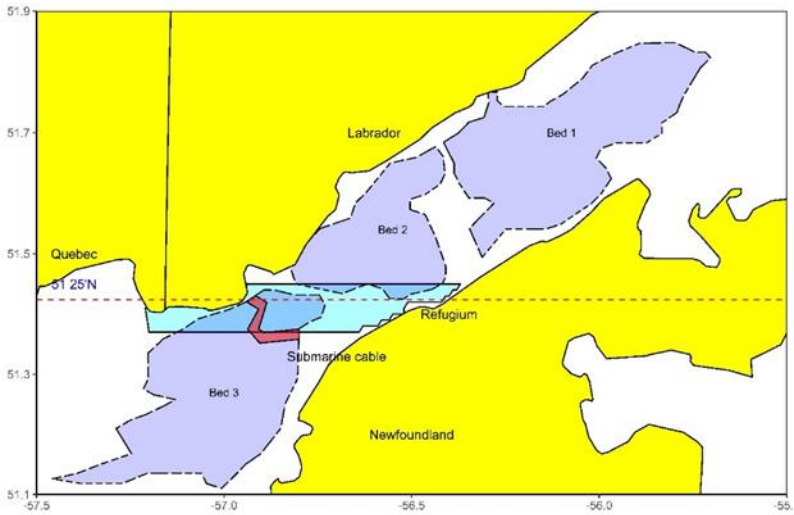

Figure 2. Map of the scallop fishing area in the Strait of Belle Isle, including the Refugium (2000-09) and the submarine cable (established in 2014) .

ASSESSMENT

Commercial Fishery

Landings (Fig. 3) peaked in 1972, 1985, and 1994 at ~ 2,500 t each year (Naidu, 1998). Landings have averaged less than 400 t since 2000 although the TAC was 1,000 t. Only 115 t and 127 t were landed in 2017 and 2018, respectively. Since 2000, with the exception of 2004, over 85-90% of the landings have been from the southern bed (Bed 3).

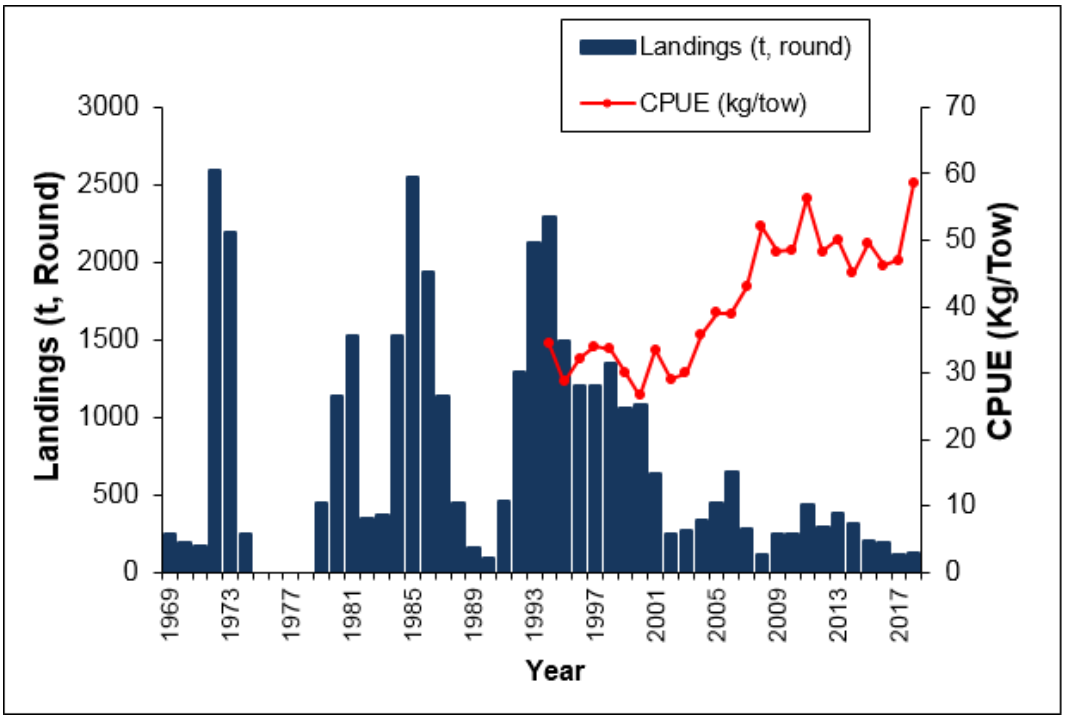

Figure 3. Landings (t, Round) of Iceland Scallop from the Strait of Belle Isle (Div. 4R), 1969-2018. Trends in Div. 4R commercial CPUE (kg/tow), 1994 to 2018.

Commercial catch per unit of effort (**CPUE**) (Fig. 3) indicates that fishery performance has improved since 2002. Since 2002, the average CPUE has been approximately 45 kg/tow and reached its highest level at 59 kg/tow in 2018. During this period the number of active licenses has fluctuated between 13 in 2002 and 26 in 2006 and has since declined to 13 in 2009 and to eight licenses on average since 2016.

Biomass

Resource assessment surveys were conducted in 1995, 1997, 1999, 2000, 2007, 2011 and 2018. Between 1995 and 2000, bottom mapping techniques were used to delineate scallop habitat, resulting in the identification of three strata or beds in the survey area. The original survey strata used from 1995-99 were redesigned to match the stratification scheme used in the 2000 and 2007 surveys for comparison (DFO, 2009).

The MDB estimate has shown no clear trend since 1995 and has decreased from 5,748 t in 2007 to 4,123 t and 3,432 t in 2011 and 2018 respectively (Fig. 4). This is a decrease of approximately 40% in the biomass since the 2007 survey. The survey biomass estimate has always been higher in the north bed (Bed 1) while the fishery has taken place primarily in the south bed (Bed 3) since 1995 (Fig. 5).

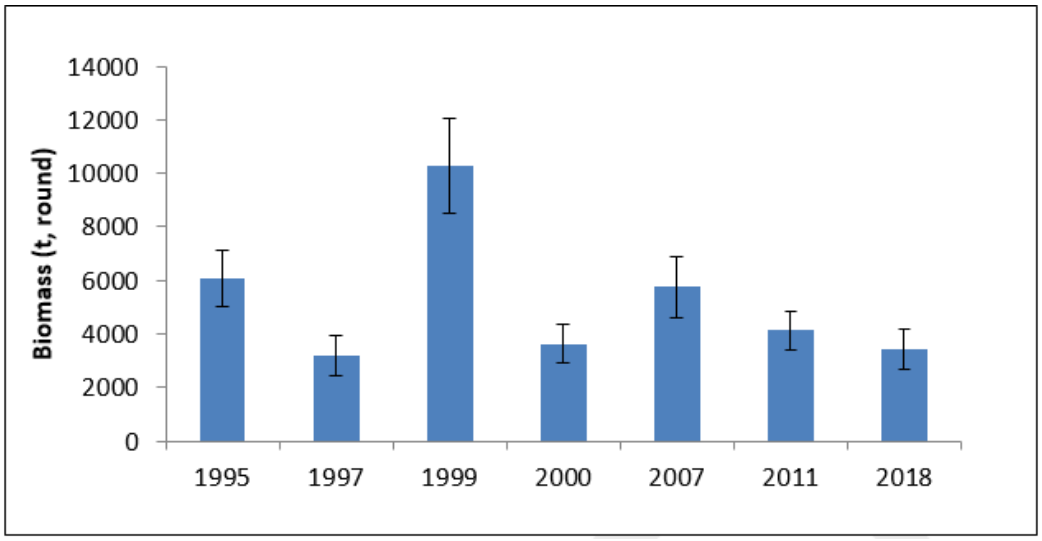

Figure 4. Biomass (MDB) estimates for Iceland Scallop in the Strait of Belle Isle (Bar indicates upper 95% CI).

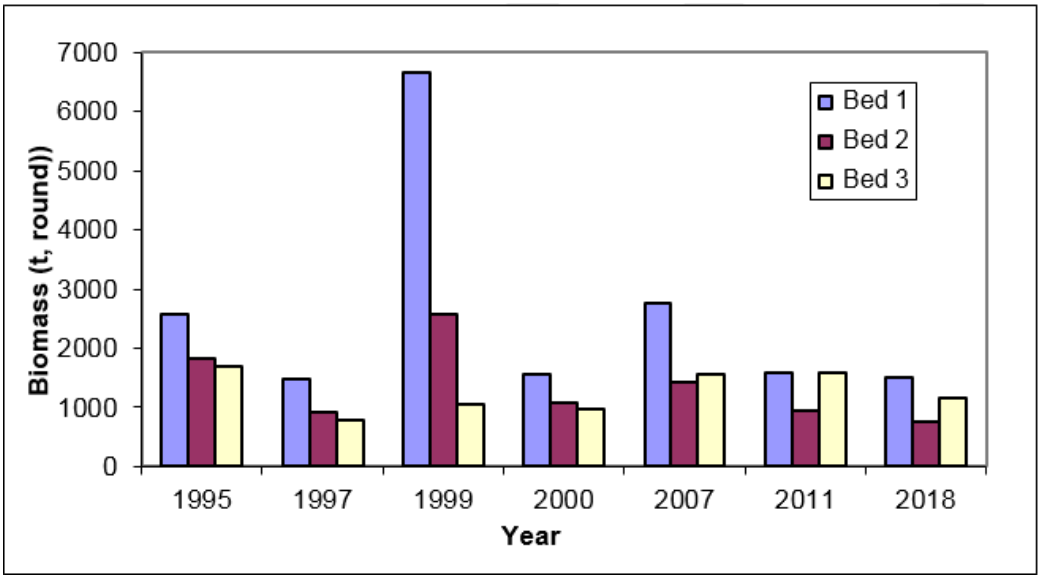

Figure 5. Biomass (MDB) estimates for Iceland Scallop in the Strait of Belle Isle by bed. Beds 1 and 2 are north of the 51°25' N line, which bisects the refugium, and Bed 3 is to the south.

Meat Yield and Shell Height

The meat count (# /500 g) and meat yield (%) throughout the survey time series for all three beds showed little change (Fig. 6). However, when looking at the results from the last three scallop surveys for each of the three beds the meat count showed the strongest change in Bed 1 with an increase from 35/500g to 48.6/500g indicating a reduced meat yield (Fig. 7). Meanwhile in Beds 2 and 3 the meat counts remained stable over the last three survey years with the lowest meat count of 25/500g in Bed 2 indicating a higher meat yield (Fig. 7).

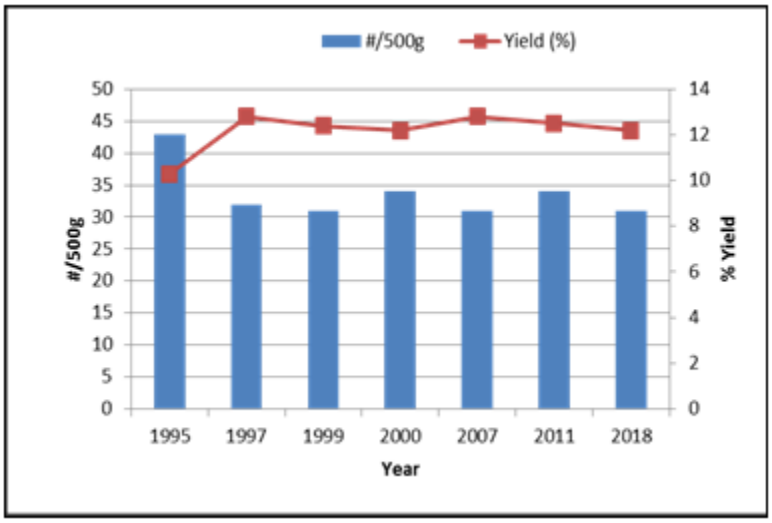

Figure 6. The meat count (#/500g) and meat yield (%) throughout the survey time series for all three beds in the Strait of Belle Isle.

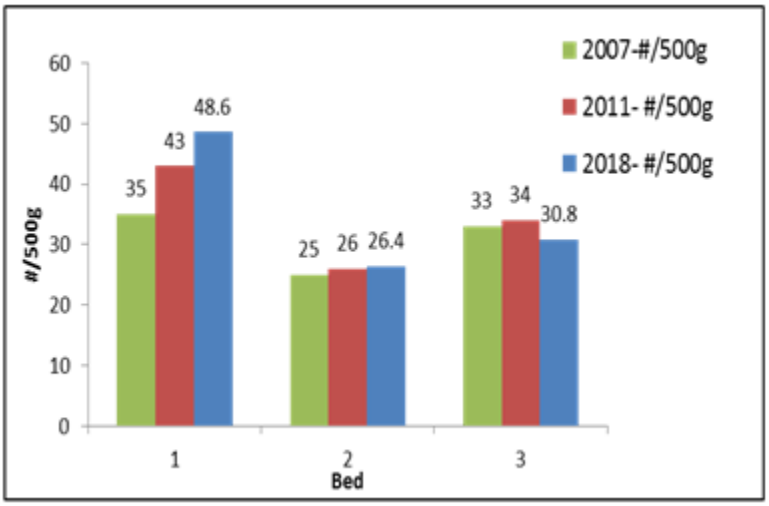

Figure 7. The meat count (#/500g) in each of the three beds from the last three surveys in the Strait of Belle Isle.

Over the survey time series Iceland Scallop from Bed 2 were larger in size, while on average the Iceland Scallop from Bed 1 were smaller (Fig. 8). In Bed 3, where most of the fishing activity is taking place, the shell height in the last three survey years has decreased while the meat count has increased again indicating a decrease in the meat yield (lower quality meats).

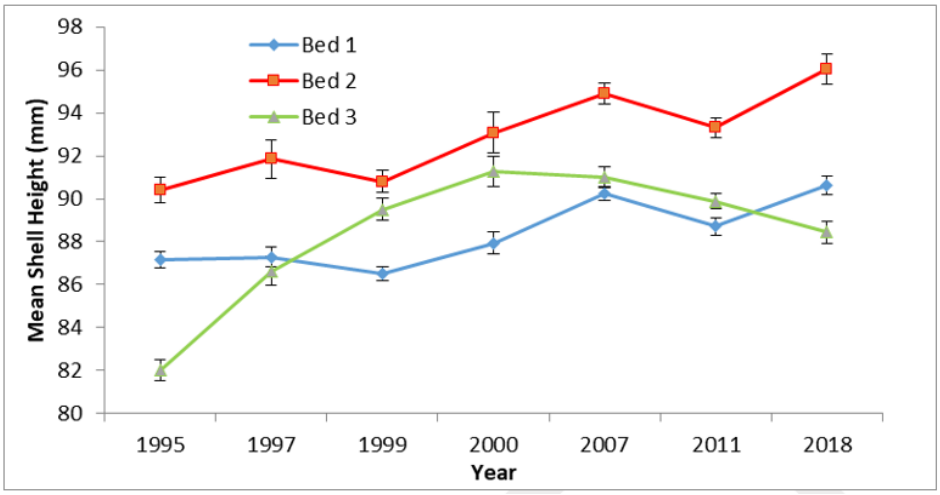

Figure 8. The mean shell height (mm) of Iceland Scallop from each of the beds in the Strait of Belle Isle over the survey time series.

Recruitment

There has been no signal of incoming recruitment (< 60 mm) throughout the survey time series. The largest Iceland Scallops were found in Bed 2 with an average mode of 94 mm and the smallest Iceland Scallops were found in Bed 3 with an average mode of 87 mm (Fig. 9).

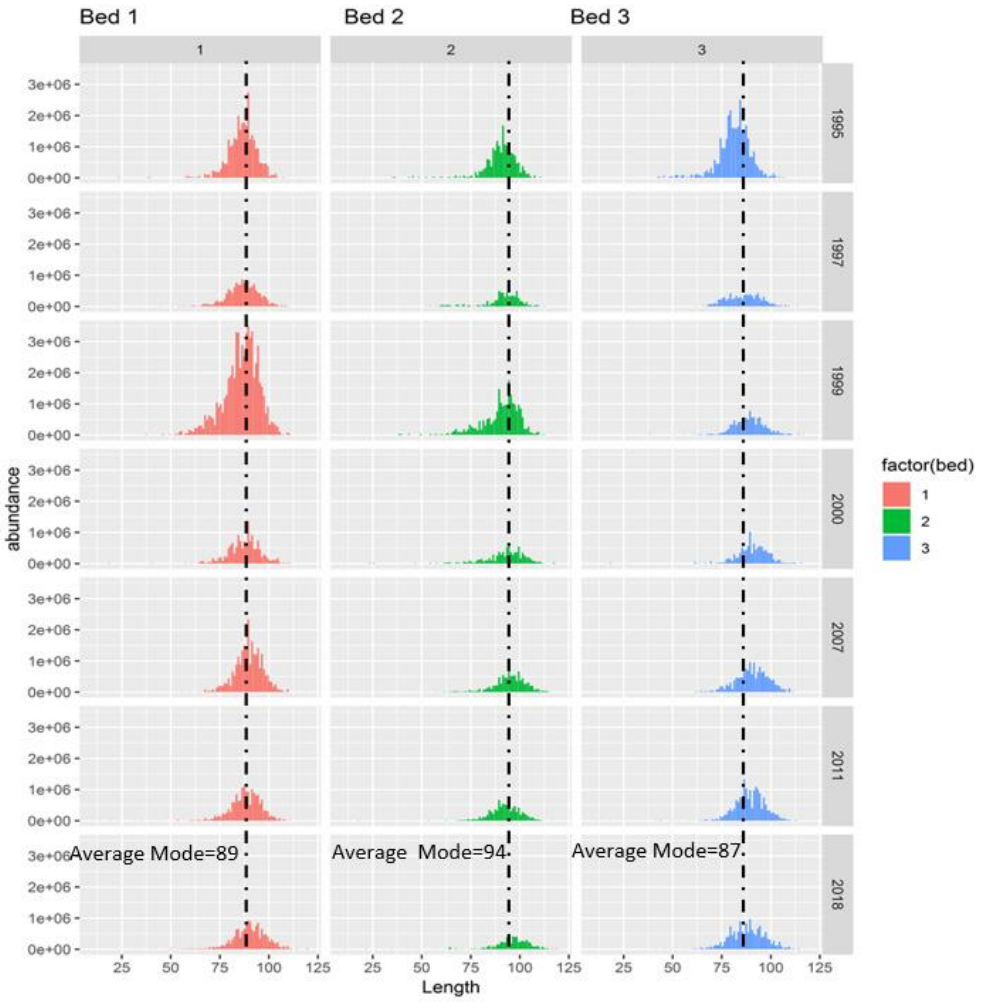

Figure 9. Length (shell height, mm) frequencies showing abundance at shell height (from STRAP analysis) for each bed over the survey time series (1995, 1997, 1999-2000, 2007, 2011, 2018).

Mortality

Natural mortality rates (Fig. 10), computed from the proportion of cluckers (non-disarticulated valves) to live scallop (Dickie 1995, Mercer, 1974) , were higher in the two northern beds (Beds 1 and 2) where there is less fishing than in the southern bed (Bed 3). Over the survey time series natural mortality estimates varied without trend and averaged 0.20 in Bed 1, to 0.31 in Bed 2 and 0.09 in Bed 3. The natural mortality estimate for all beds combined was 0.26 in 2018 which was the highest in the survey time series (Fig. 10).

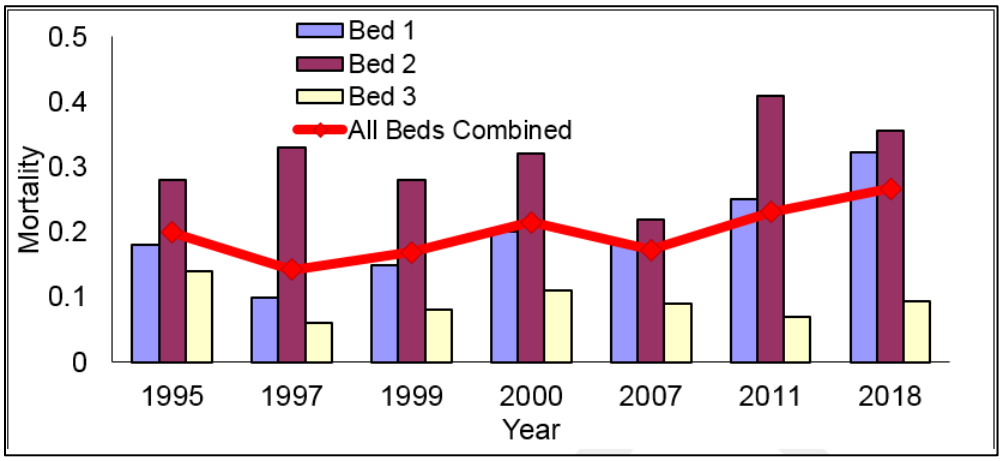

Figure 10. Natural mortality estimates for Iceland Scallop in Div. 4R by bed and for all three beds combined (red line) over the survey time series.

Predation

Biomass (MDB) estimates of *Leptasterias polaris,* a predatory starfish of Iceland Scallop, has changed little over the survey time series (Fig. 11). However, densities of starfish were higher in the northern beds than in the beds to the south, as were the natural mortality rates of Iceland Scallop.

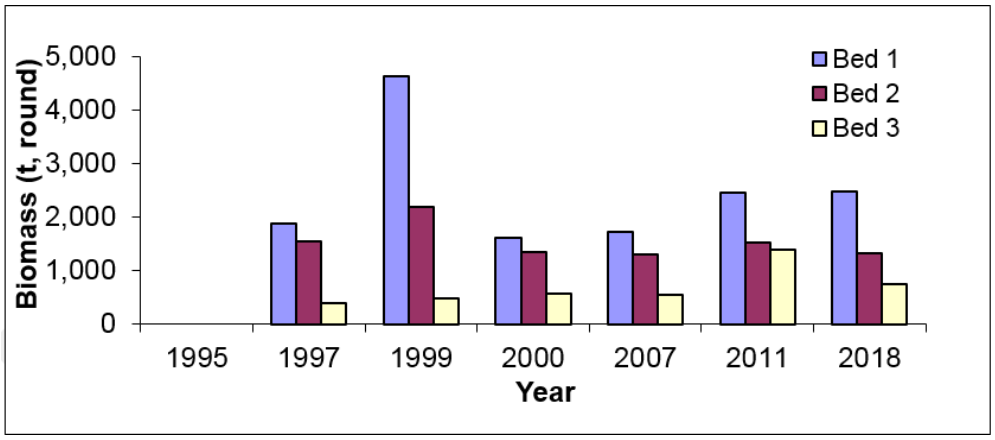

Figure 11: Biomass (MDB) estimates for Leptasterias polaris in the Strait of Belle Isle (Div. 4R) by bed over the survey times series.

Sources of Uncertainty

Iceland Scallops recruit to the exploitable biomass at approximately seven years of age. Over the survey time series there has been no sign of recruitment to the exploitable biomass (DFO, 2009). This could be related to the type of gear that is utilized, combined with the substrate type (bedrock, large stone).

CONCLUSION

Landings of Iceland Scallop from the Strait of Belle Isle in 2018 were at a time series low of 129 t . There have been no clear trends in recruitment or biomass of this scallop stock. The most recent biomass estimate from the 2018 scallop survey is 3,432 t. Natural mortality rates

varied without trend and were higher in the two northern beds (Beds 1 and 2) where there is less fishing than in the southern bed (Bed 3).

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SOURCES OF INFORMATION

The Science Advisory Report is from the February 19, 2019 4R Iceland Scallop Assessment. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

Dickie, L.M. 1955. Fluctuations in abundance of the giant scallop, Placopecten magellanicus (Gmelin) in the Digby area of the Bay of Fundy. J. Fish. Res. Board Can. 12(6): 797-857.

DFO. 2009. An Assessment of the Iceland Scallop (*Chlamys islandica*) Resource in the Strait ofBelle Isle and the Lilly Carson Canyons. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2009/043.

Fisheries and Oceans Canada, 2016. Integrated Fisheries Management Plan Scallop, Newfoundland and Labrador Region. March 14, 2016.

Mercer, M.C. 1974. Natural mortality of the Iceland Scallop (Chlamys islandicus) in the Gulf of St. Lawrence. ICES C.M. 1974/K:7, 11p.

Naidu, K.S, F.M Cahill and E.M Seward, 1998, Medium- to Long Term Sustainability Threatened in the 4R Fishery for the Iceland Scallop. Science Branch, Department of Fisheries and Oceans, Canadian Stock Assessment Secretariat Research Document 98/148.

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ISSN 1919-5087

Correct Citation for this Publication:

DFO. 2020. An Assessment of Iceland Scallop *(Chlamys islandica)* in the Strait of Belle Isle. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/009.

Aussi disponible en français :

MPO. 2020. Évaluation du pétoncle d'Islande (Chlamys islandica) dans le détroit de Belle Isle. Secr. can. de consult. sci. du MPO, Avis sci. 2020/009.