

Fisheries and Oceans Canada Pêches et Océans Canada

Ecosystems and Oceans Science Canada Sciences des écosystèmes

et des océans

Quebec Region

Canadian Science Advisory Secretariat Science Response 2025/016

UPDATE OF STOCK STATUS FOR SCALLOP IN SUBAREA 20A IN THE MAGDALEN ISLANDS IN 2024

CONTEXT

Fisheries and Oceans Canada (DFO) Fisheries Management has requested an update of the status of the scallop stock in subarea 20A in the Magdalen Islands, as well as a recommendation on the maximum fishing effort for the upcoming fishing season based on the decision rules proposed as part of the conservation approach (DFO 2010, Trottier et al. 2017).

This Science Response Report results from the regional peer review on March 14, 2025, on the Update of Stock Status for Scallop in Subarea 20A in the Magdalen Islands in 2024.

SCIENCE ADVICE

Status

• The catch per unit effort (CPUE) in the fishery in 2024 (2.44 kg/h·m) is above the upper reference level (1.50 kg/h·m), which places the subarea 20A scallop stock in the "High CPUE" classification zone of the conservation approach.

Trends

- The CPUE has been increasing since 2021 and is currently at values comparable to those observed when the fishery first began, in the late 1960s.
- The 2024 research survey shows high densities of sea scallop in the ≥ 100 mm (commercial), 85–99 mm (pre-recruit) and 70–84 mm (pre-recruit) size classes, near their maximum historical values. However, sea scallop densities in the < 70 mm size class are low and below the 15th percentile of the reference series (1987-2008).

Ecosystem and Climate Change Considerations

• The seabeds of the fishing sites, located at around 30 meters deep, are experiencing an increase in water temperature. However, the changes in the ecosystem and their effects on scallop stocks have not been quantified.

Stock Advice

- A high abundance of commercial-size and 85–99 mm pre-recruit scallops was observed in all beds; these scallops will be available to the fishery in 2025. However, the low densities of small sea scallops in the < 70 mm size class recorded in the 2023 and 2024 scientific surveys do not indicate strong cohorts to be expected in the medium term.
- According to the decision rules in the conservation approach, the projected fishing effort for 2025 based on the primary and secondary indicators is 401 days at sea, which is near the maximum fishing effort under the decision rules for subarea 20A.

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved

The assessment approach was adopted in the 2010 stock assessment (DFO 2010).

Assessment Type

Interim Year Update

Most Recent Assessment Date

- 1. Last Full Assessment: 2023 (DFO 2023).
- 2. Last Interim-Year Update: 2024 (DFO 2024)

Assessment Approach

- 1. Broad category: Index-based (trends in empirical indices only)
- 2. Specific category: Index-based (including fishery-dependent and fishery-independent indices)

Stock Structure Assumption

Two species of scallop are found in Quebec, namely sea scallop (*Placopecten magellanicus*) and Iceland scallop (*Chlamys islandica*). The sea scallop is the most abundant species on the Magdalen Islands fishing grounds and is the main species targeted by the fishing industry. A comparative genetic study of the different populations of the Estuary and Gulf of St. Lawrence is underway, but it is believed the connectivity between the Magdalen Islands scallop population and other populations in the Quebec region is relatively limited.

Reference Points

- Limit Reference Level (commercial CPUE): 0.85 kg/h·m
- Upper Reference Level (commercial CPUE): 1.5 kg/h·m
- Removal Reference (RR): Not available.
- Target Reference Point (TRP): Not available.

Harvest Decision Rule

Decision rules have been in place since 2010 (DFO 2010) to calculate the authorized annual fishing effort in subarea 20A. Fishing effort is calculated using the primary stock status indicator, i.e., the annual average CPUE from commercial logbooks, and secondary indicators, i.e., sea scallop density indices from the most recent DFO research survey.

Data

- Commercial Landings, effort and CPUE: 1987-2024 and 1965-2024
- Research survey: 1987-2024

Stock Status and Trends

ASSESSMENT



Figure 1. (A) Landings (t of meat); (B) annual catch per unit effort (CPUE) in the commercial fishery. The horizontal lines indicate the limit reference level ($0.85 \text{ kg/h} \cdot \text{m}$) and upper reference level ($1.5 \text{ kg/h} \cdot \text{m}$).



Figure 2. Density of sea scallops, by size class, sampled in research surveys in subarea 20A. The dotted lines indicate the 15th, 50th and 85th percentiles of the 1987-2008 series. Triangles indicate data collected in 2021 with a charter boat (Mytilus) different from the one normally used by DFO. A solid line connects survey points separated by one year.

Catch per unit effort (CPUE)

The CPUE fell sharply from a peak of 2.84 kg/h·m in 1968 to 0.99 kg/h·m in 1972, putting it in the "Mean CPUE" classification zone (Figure 1B). The CPUE was stable from 1978 to 1983 at high values ranging from 1.54 kg/h·m to 1.83 kg/h·m before gradually decreasing to 0.86 kg/h·m in 1987. It was stable from 1988 to 1997, at moderate values, before falling further to

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low-to-moderate values between 1998 and 2006. From 2007 onwards, the CPUE has been close to or above the upper reference level of 1.5 kg/h·m. In 2021, the CPUE began to rise rapidly, and it is currently around 2.44 kg/h·m, which is comparable to the values when the fishery began, in the late 1960s, and well above the upper reference level expressed as commercial CPUE.

Recruitment

According to the 2024 research survey, sea scallop densities for the \geq 100 mm (commercial), 85–99 mm (pre-recruit) and 70–84 mm (pre-recruit) size classes are high and close to their maximum historical values (Figure 2). However, sea scallop densities in the < 70 mm size class are low and below the 15th percentile of the reference series (1987-2008).

Current Status

The CPUE has been increasing since 2020, reaching 2.44 kg/h·m in 2024, well above the upper reference level. The short-term outlook for the stock in subarea 20A is very encouraging, but medium-term projections are less optimistic, given the absence of strong upcoming cohorts of small scallops (< 70 mm).

History of Landings

Landings have fluctuated greatly since the start of the fishery in 1965. They peaked at 357 t in 1969 but began to fall steeply in 1971. From 1975 to 2000, landings varied between 19 t and 67 t. In response to declines in yields and landings that caused concern over the health of the resource in 2007, the fishing effort was restricted by limiting the number of days at sea during the fishing season in subarea 20A. During the 2010 stock assessment, decision rules were put in place for subarea 20A. Since the introduction of the latter, landings have varied between 32 t and 60 t. There are three beds in this subarea, and the fishing effort is evenly distributed among them.

Ecosystem and Climate Change Considerations

Certain environmental conditions, notably water temperature and ocean acidification, can influence stock productivity and therefore fishing yields. In recent years, higher-than-normal surface and bottom temperatures (at depths of around 30 m) have been observed on the Magdalen Shallows (Galbraith et al. 2024). These changes may affect sea scallop and Iceland scallop stocks.



Harvest Decision Rule Outputs

Figure 3. Maximum fishing effort authorized in 2024 and 2025 under decision rules.

The update of the primary indicator indicates a higher CPUE in 2024 than in 2023 (Figure 1B). The average CPUE of the last two years is in the "High CPUE" classification zone. Projected fishing effort for 2025 according to the primary indicator is 391 days. The adjustment calculated from the secondary indicators is +10% for the \geq 100 mm, 85–99 mm and 70–84 mm size classes, and -20% for the < 70 mm size class according to the decision rules. The average adjustment calculated indicates that the maximum fishing effort recommended in subarea 20A for 2025 would be 401 days at sea [391 days + (+10+10+10-20)/4)%]. This value is higher than the effort actually expended in 2024 (230 days), in a context where fishing yield increased in 2024 as anticipated and the latest research survey shows good estimated densities for all scallops \geq 70 mm, but low estimated densities for small scallops (< 70 mm). Fisheries Management will determine the authorized fishing effort in 2025.

SOURCES OF UNCERTAINTY

Environmental factors may impact stocks but were not considered in the assessment. Ocean acidification, rising water temperatures, changes in the phenology and species composition of phytoplankton blooms, infestations of barnacles and shell-boring worms, changes in predation pressure, and the use of dredges could have an impact on various life stages. Studies are underway to examine the impact of environmental factors on scallops and to select indicators that can be used to monitor variations in the state of the environment and the biological effects on scallops.

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