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STATUS OF MAJOR FISH STOCKS

CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

Canada

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CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

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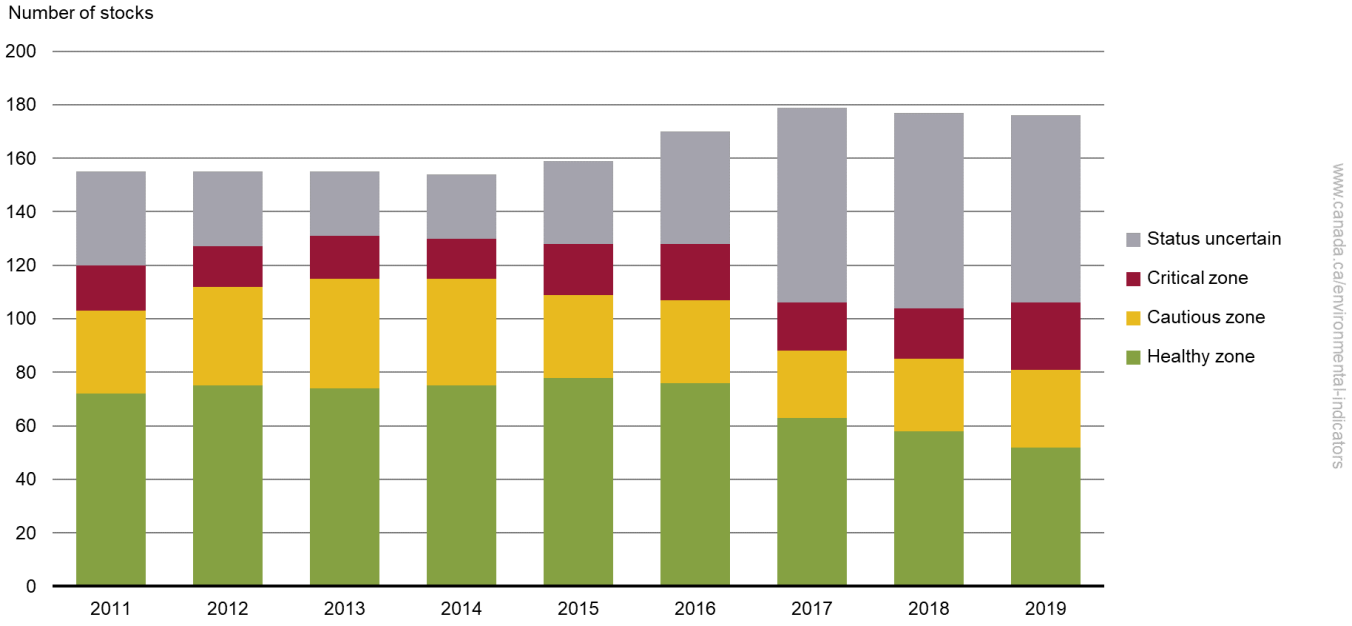
Status of major fish stocks

Human use of the oceans, including fishing, and environmental conditions affect the abundance and health of fish stocks[1] at national and global levels. In order to maintain fish stocks for future generations, it is important to track their status and adjust management measures, such as harvest rates and limits, accordingly. The indicator reports the status (Healthy, Cautious, Critical or Uncertain) of major Canadian fish stocks as found in the Sustainability Survery for Fisheries.

Key results

- Many of the new stocks added in recent years have an uncertain status, contributing to an increase in the number of stocks with an uncertain status
- Of the 176 major stocks assessed in 2019:
  - 52 stocks (30%) were in the Healthy zone
  - 29 stocks (16%) were in the Cautious zone
  - 25 stocks (14%) were in the Critical zone
  - 70 stocks (40%) could not be classified and have an uncertain status

Figure 1. Status of major fish stocks, Canada, 2011 to 2019



Data for Figure 1

Note: Fish stocks are classified by comparing the status, such as the abundance, of stocks to reference points. Stocks include a variety of harvested marine animal species, not only finfish. Comparisons between years should be made with caution, as the list of major stocks has changed.
Source: Fisheries and Oceans Canada (2021) Sustainability Survey for Fisheries.

The number of stocks with an uncertain status increased from 2014 to 2018. Lack of sufficient information to reliably assess the stock status of some stocks, including some of the stocks that were added to the Sustainability Survey for Fisheries since 2014, has contributed to the high number of stocks with an uncertain status.

Changes in stock status typically happen slowly. Recovery time depends on the biology of the stock, environmental conditions, and management actions. For example, environmental changes such as shifts in

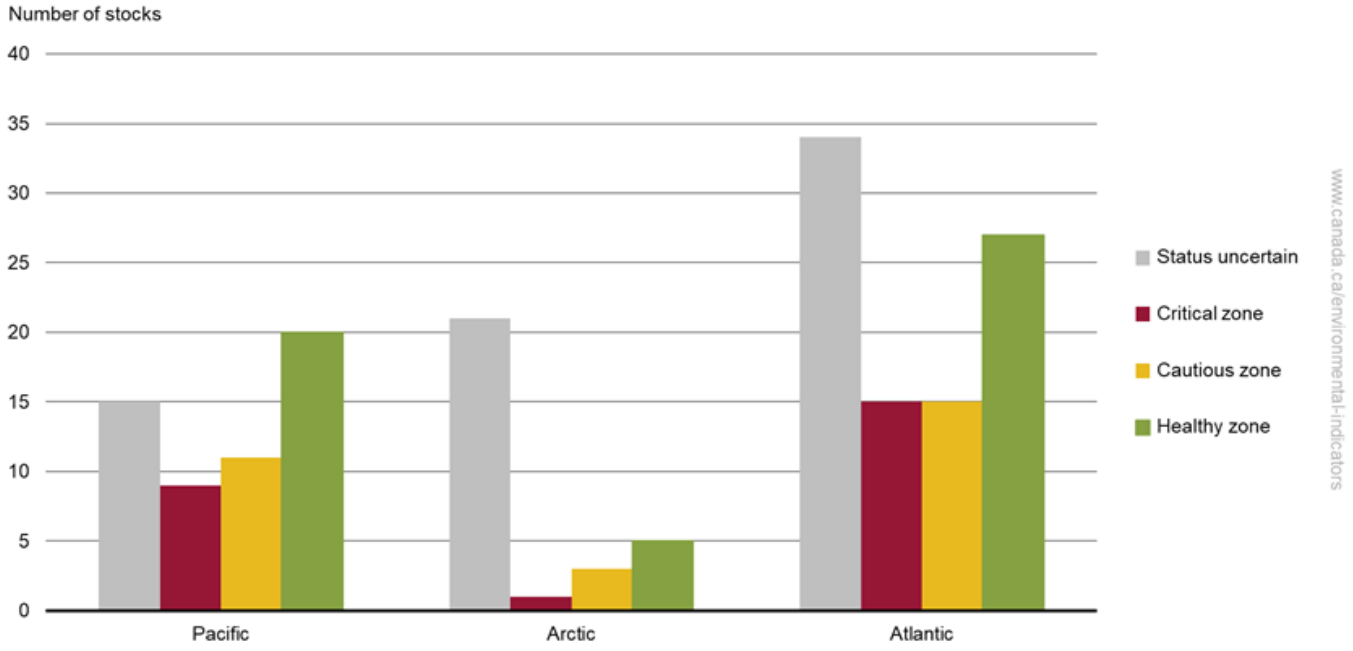
[1] A population of individuals of a species located in a particular area.

climate and ocean currents may cause some stocks to reproduce and grow more slowly. It may take many years for biological systems to respond to changes in management practices such as limiting annual fish harvest.

Harvest rates are adjusted to help rebuild stocks that are not in the Healthy zone. Stock assessments for major stocks are peer-reviewed and made publicly available through Science Advisory Reports. The stock status is reported as part of the Sustainability Survey for Fisheries, which is a key planning, monitoring and evaluation tool.

Stocks can be grouped according to the Fisheries and Oceans Canada region in which they are managed. The Pacific management region has the highest proportion of stocks in the heathy zone. A greater proportion of stocks have an uncertain status in the Arctic region. Of the 3 regions, the Atlantic region has the highest number of major fish stocks and a high proportion have an uncertain status or are in the Healthy zone. The Atlantic region here includes Fisheries and Oceans Canada's Newfoundland and Labrador, Maritimes, Gulf and Quebec regions.

Figure 2. Status of major fish stocks by region, Canada, 2019



Data for Figure 2

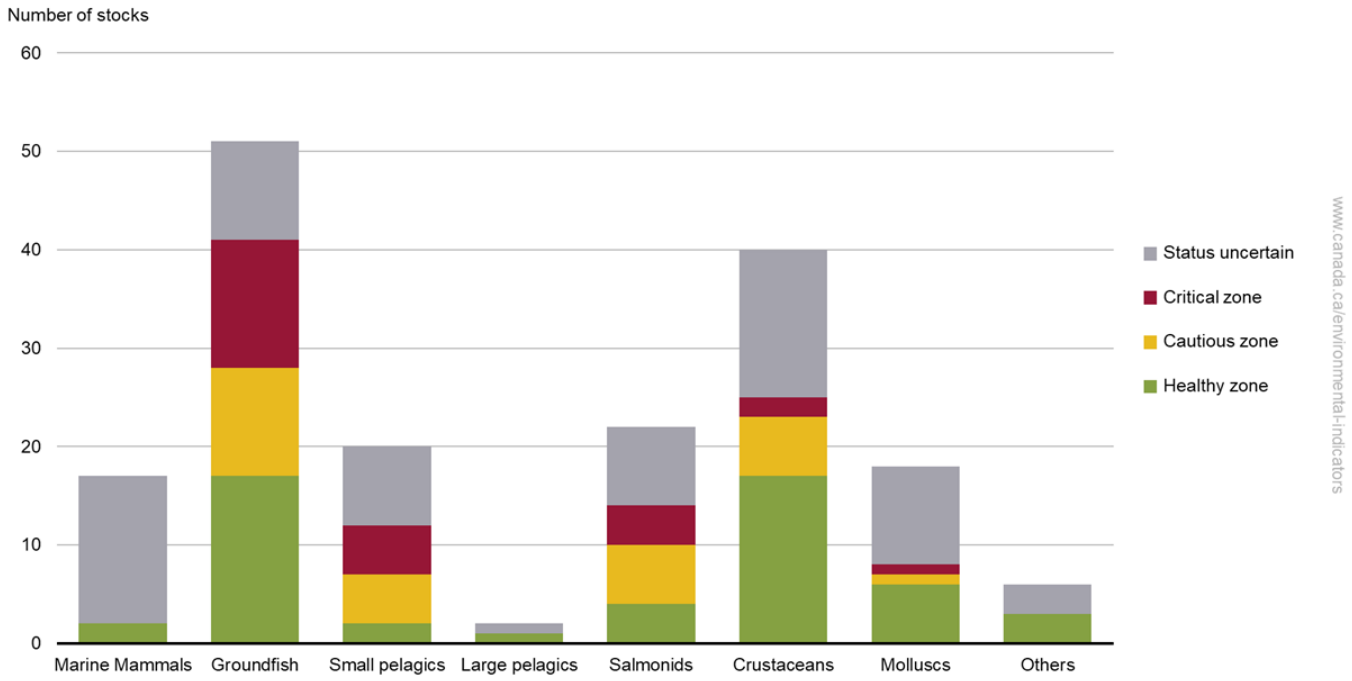
Note: Stocks managed from the central National office were allocated to Atlantic and Arctic regions as appropriate.
Source: Fisheries and Oceans Canada (2021) Sustainability Survey for Fisheries.

Status of major fish stocks, by stock group

Key results

- Groundfish, for example Atlantic cod, Yelloweye Rockfish and Redfish, have the greatest number and highest proportion of stocks in the Critical zone
- Crustaceans, for example crab, lobster and shrimp, have a high proportion of stocks in the Healthy zone

Figure 3. Status of major fish stocks by stock group, Canada, 2019



Data for Figure 3

Note: The species or stock in each stock group are listed in the figure's data table. Pelagic fish live in midwater or close to the surface, in contrast to groundfish, which live in deeper waters. Crustaceans are shelled animals with joints, such as lobster, crab and shrimp. Molluscs are the species we commonly think of as shellfish, including bivalve species like clams, oysters and mussels.
Source: Fisheries and Oceans Canada (2021) Sustainability Survey for Fisheries.

Similar to previous years, groundfish had the greatest number and highest proportion of stocks in the Critical zone. However, groundfish also had the lowest proportion of stocks with an uncertain status. This is likely because groundfish are monitored through long-standing surveys.As such, there is more information to assess stock status.

There is a high number and proportion of crustacean stocks in the Healthy zone. For example, most lobster stocks are in the Healthy zone.

Marine mammals had the highest proportion of stocks with uncertain status. The majority of these stocks are in the Arctic region and are typically surveyed less frequently, leading to challenges with data availability and assigning stock status.

About the indicator

What the indicator measures

The indicator reports the status of major fish stocks. Federal scientists use a variety of scientific methods to assess fish stock levels and assign them a stock status zone (Healthy, Cautious or Critical) by comparing the size of the stocks to reference points. If there is insufficient information to be able to determine the stock status zone, the status is uncertain.

Stock status is an important element of the precautionary approach.

Why this indicator is important

The status of the stock affects management decisions, including harvest rates:

- for stocks in the Healthy zone, fisheries management decisions (including harvest strategies) are designed to maintain fish stocks within this zone, while providing sustainable benefits to Canadians
- for stocks in the Cautious zone, the management objective is to promote stock rebuilding to the Healthy zone
- for stocks in the Critical zone, stock growth is promoted and removals are kept to the lowest possible level until the stock status improves
- for stocks that have an uncertain status, the uncertainty is factored into harvest level decisions. Greater uncertainty leads to more precautionary harvest levels

Successful management leads to sustainable fisheries for the long-term benefit of all Canadians.

Healthy coasts and oceans

This indicator supports the measurement of progress towards the following 2019 to 2022 Federal Sustainable Development Strategy long-term goal: Coasts and oceans support healthy, resilient and productive ecosystems.

In addition, the indicator contributes to the Sustainable Development Goals of the 2030 Agenda for Sustainable Development. It is linked to the 2030 Agenda's Goal 14, Life Below Water and Target 14.4, " By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics."

The indicator also contributes towards reporting on Target 9 of the 2020 Biodiversity goals and targets for Canada: "By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches."

Related indicators

The Sustainable fish harvest indicator reports on the proportion of major stocks that are harvested within limits and those that are overharvested.

The Canadian species index indicator has a fish sub-index that shows the population trend of monitored fish species.

Data sources and methods

Data sources

Data from 2015 to 2019 are from the annual Sustainability Survey for Fisheries (the survey). The survey replaces the Fishery Checklist, which was used from 2011 to 2014. The survey provides a systematic review of national progress towards conservation and sustainable-use objectives.

More information

The survey is conducted each spring and captures data for the previous year. The same survey supports the Sustainable fish harvest indicator.

The data provide a qualitative snapshot of how a fishery is addressing a range of factors for sustainable management. The data also give an indication of progress in implementing sustainable fisheries policies. Fisheries managers and scientists include results from the most recent stock assessments in their response for the survey year being reviewed.

The survey includes major stocks used by commercial, recreational and Indigenous fisheries. A fish stock is a population of individuals of a species found in a particular area. It is used as a unit for fisheries management purposes.

Major stocks are identified by regional fisheries managers within Fisheries and Oceans Canada and include stocks that are:

- an important economic stock, which have an:
  - annual landed value greater than $1 million
  - annual landed weight greater than 2 000 tonnes
- an important stock for:
  - cultural reasons
  - iconic value
  - ecosystem reasons
- an international stock, which is one that is:
  - straddling[2]
  - migratory
  - transboundary
  - managed by or subject to an international agreement
- included in an integrated fisheries management plan
- targeted in a fishery
- caught as bycatch and are economically important
- in a depleted state, but were part of a significant commercial fishery and thus are a candidate for or subject to a rebuilding plan under the Precautionary Approach policy

Fish stocks include marine mammals, finfish, shellfish and other marine invertebrates. A year is defined based on fishing seasons and closures for individual stocks. It may not align exactly with the calendar year and may vary between stocks.

Methods

A variety of scientific methods are used to assess fish stock levels and assign 1 of 3 stock status zones (Healthy, Cautious or Critical). The indicator is a simple count of the stocks in each status zone. The number of stocks that cannot be assigned to a status zone is also reported and given an uncertain status.

More information

Fish stock status are impacted by a number of factors, including the amount harvested, reproductive success, environmental and ecosystem conditions, and predation levels.

- A stock is in the Healthy zone when its biomass is above the upper stock reference point. The upper stock reference point is determined by the productivity of the stock, broader biological considerations, and the social and economic objectives for the fishery
- A stock is in the Critical zone if it falls below the limit reference point. The limit reference point is the stock level below which productivity is sufficiently impaired to cause serious harm to the stock
- Between these 2 points, the stock is in the Cautious zone

If reference points have not yet been established, zones may be assigned based on the best available information on the fish's biology and its historic abundance levels. If zones cannot be determined with current information, the stock is assigned an uncertain status.

Stock assessments are conducted in a variety of ways and use many types of data, including abundance indices and biomass estimates. Many sources of data contribute to assessments, including data from fishery monitoring (such as catch rates and fish body-size distribution), research surveys, community knowledge and directed research.

[2] Straddling fish stocks migrate across the outer limit of coastal States and the adjacent high seas. Examples include cod, flounder and turbot.

Regional information

Regions are defined based on information from the managing office. Stocks managed from the Pacific regional office of Fisheries and Oceans Canada are assigned the Pacific region. Stocks managed from the Central and Arctic office are assigned to the Arctic region; this region contains some freshwater stocks. Stocks managed from the central National office were allocated to Atlantic and Arctic regions as appropriate. All remaining regional offices are assigned to the Atlantic region: Gulf, Maritimes, Newfoundland and Labrador, and Quebec.

Stock groups

Stock groups used for reporting on this indicator are marine mammals, salmonids, groundfish, large pelagics, small pelagics, crustaceans, molluscs, and others. These are the groupings used in the Sustainability Survey for Fisheries. Pelagic fish live in midwater or close to the surface, in contrast to groundfish, which live in deeper waters. Crustaceans are shelled animals with joints, such as lobster, crab and shrimp. Molluscs are the species we commonly think of as shellfish, including bivalve species like clams, oysters and mussels. The same groupings are used in the Sustainable fish harvest indicator.

Recent changes

Implementation of the precautionary approach in fisheries management began in 2009. Precautionary approach components are built into the Sustainability Survey for Fisheries (the survey) and, on an annual basis, are improved on or added to in a progressive manner.

The survey, previously called the Fishery Checklist, has been revised over time to improve its usefulness as a management tool. The Fishery Checklist was used from 2011 to 2014 and became the annual Sustainability Survey for Fisheries in 2015.

In 2011, the checklist and a set of 155 major stocks were finalized for the period 2011 to 2014, allowing comparability between years. The porbeagle shark was classified in the Critical zone in 2013 and the fishery was subsequently closed. The stock was therefore removed from the list in 2014, leaving a total of 154 stocks.

In 2015, the list of major stocks was revised to a total of 159:

- 3 Snow crab stocks were merged (-2)
- 1 Northern shrimp fishery was closed and the stock removed (-1)
- 6 stocks (3 shrimp, 1 eel, 1 redfish and 1 witch flounder) were added (+6)
- Pacific ocean perch was split into 3 stocks (+2)

In 2016, the list of major stocks was revised to a total of 170:

- 2 lobster stocks were merged (-1)
- 3 stocks with no commercial fishery in 2016 (Pink salmon, Coho salmon, whelk) were removed (-3)
- 3 salmon stocks (1 Chum, 2 Sockeye) were split into revised management units (+5)
- 10 stocks (6 Snow crab, 2 seal, 1 shrimp and 1 scallop) were added (+10)

In 2017, the list of major stocks was revised to a total of 179:

- 4 Atlantic walrus stocks were added (+4)
- 2 Greenland halibut stocks were merged (-1)
- 7 stocks (Sea cucumber, Atlantic salmon, Witch flounder, Pink and Spiny scallop, Pacific oyster, Fraser pink and common clam) were added (+7)
- 1 Pacific herring stock was removed (-1)

In 2018, the list of major stocks was revised to a total of 177:

- 2 Gulf herring stocks were merged (-1)
- 1 Quebec Snow crab stock was removed (-1)

In 2019, the list of major stocks was revised to a total of 176:

- 1 intertidal clam stock was removed (-1)

Caveats and limitations

Ongoing improvement of how Fisheries and Oceans Canada applies the precautionary approach can affect the survey results. As such, comparisons between years should be made with caution.

The Sustainability Survey for Fisheries (the survey) is completed with the best available information. The criteria used to assign a stock status to a stock for which no reference points have been identified have changed over time. This has resulted in revisions to the reported stock status for a number of stocks between 2011 and 2019. Comparisons between years should therefore be made with caution.

Changes in the set of surveyed stocks occur due to changes in the way stocks are assessed or managed. Results should be interpreted with this in mind.

Stock status assessments are not conducted for every stock every year, meaning that recent changes in status may not be captured for every stock.

The indicator includes major stocks of fish, invertebrates, and marine mammals. Seaweeds and other aquatic plants are excluded.

Resources

References

Fisheries and Oceans Canada (2009) A fishery decision-making framework incorporating the precautionary approach. Retrieved on February 1, 2021.

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Fisheries and Oceans Canada (2020) Fisheries management decisions. Retrieved on February 1, 2021.

Fisheries and Oceans Canada (2020) Sustainable Fisheries Framework. Retrieved on February 1, 2021.

Fisheries and Oceans Canada (2021) Sustainability Survey for Fisheries. Retrieved on March 23, 2021.

Related information

Aquatic species

Fisheries

Fisheries management

Integrated fisheries management plans

Policy on managing bycatch

Science Advisory Reports (includes Stock Status Reports)

Sustainable fish and seafood

Annex

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Figure 1. Status of major fish stocks, Canada, 2011 to 2019

Year	Healthy zone (number of stocks)	Cautious zone (number of stocks)	Critical zone (number of stocks)	Status uncertain (number of stocks)	Total (number of stocks)
2011	72	31	17	35	155
2012	75	37	15	28	155
2013	74	41	16	24	155
2014	75	40	15	24	154
2015	78	31	19	31	159
2016	76	31	21	42	170
2017	63	25	18	73	179
2018	58	27	19	73	177
2019	52	29	25	70	176

Note: Fish stocks are classified by comparing the size of stocks to reference points. Stocks include a variety of harvested marine animal species, not only finfish. Comparisons between years should be made with caution, as the list of major stocks has changed.
Source: Fisheries and Oceans Canada (2021) Sustainability Survey for Fisheries.

Table A.2. Data for Figure 2. Status of major fish stocks by region, Canada, 2019

Status	Pacific (number of stocks)	Arctic (number of stocks)	Atlantic (number of stocks)
Healthy zone	20	5	27
Cautious zone	11	3	15
Critical zone	9	1	15
Status uncertain	15	21	34

Note: Stocks managed from the central National office were allocated to Atlantic and Arctic regions as appropriate.
Source: Fisheries and Oceans Canada (2021) Sustainability Survey for Fisheries.

Table A.3. Data for Figure 3. Status of major fish stocks by stock group, Canada, 2019

Stock group	Species / stocks included	Healthy zone (number of stocks)	Cautious zone (number of stocks)	Critical zone (number of stocks)	Status uncertain (number of stocks)
Marine mammals	Atlantic walrus, beluga, bowhead, grey seal, harp seal, narwhal	2	0	0	15
Groundfish	Cod, dogfish, flounder, haddock, hake, halibut, lingcod, ocean perch, plaice, pollock, redfish, rockfish, sablefish, skate, thornyhead, whitefish	17	11	13	10
Small pelagics	Albacore tuna, capelin, eulachon, herring, gaspereau, mackerel, sardine, striped bass	2	5	5	8
Large pelagics	Bluefin tuna, swordfish	1	0	0	1
Salmonids	Char, chum, north slope dolly varden, salmon, trout	4	6	4	8
Crustaceans	Crab, krill, lobster, prawn, shrimp	17	6	2	15
Molluscs	Clam, geoduck, scallop, oyster, whelk	6	1	1	10
Others	Eel and elvers, sea cucumber, sea urchin	3	0	0	3
Total	**n/a**	**52**	**29**	**25**	**70**

Note: n/a = not applicable. Pelagic fish live in midwater or close to the surface, in contrast to groundfish, which live in deeper waters. Crustaceans are shelled animals with joints, such as lobster, crab and shrimp. Molluscs are the species we commonly think of as shellfish, including bivalve species like clams, oysters and mussels.
Source: Fisheries and Oceans Canada (2021) Sustainability Survey for Fisheries.

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