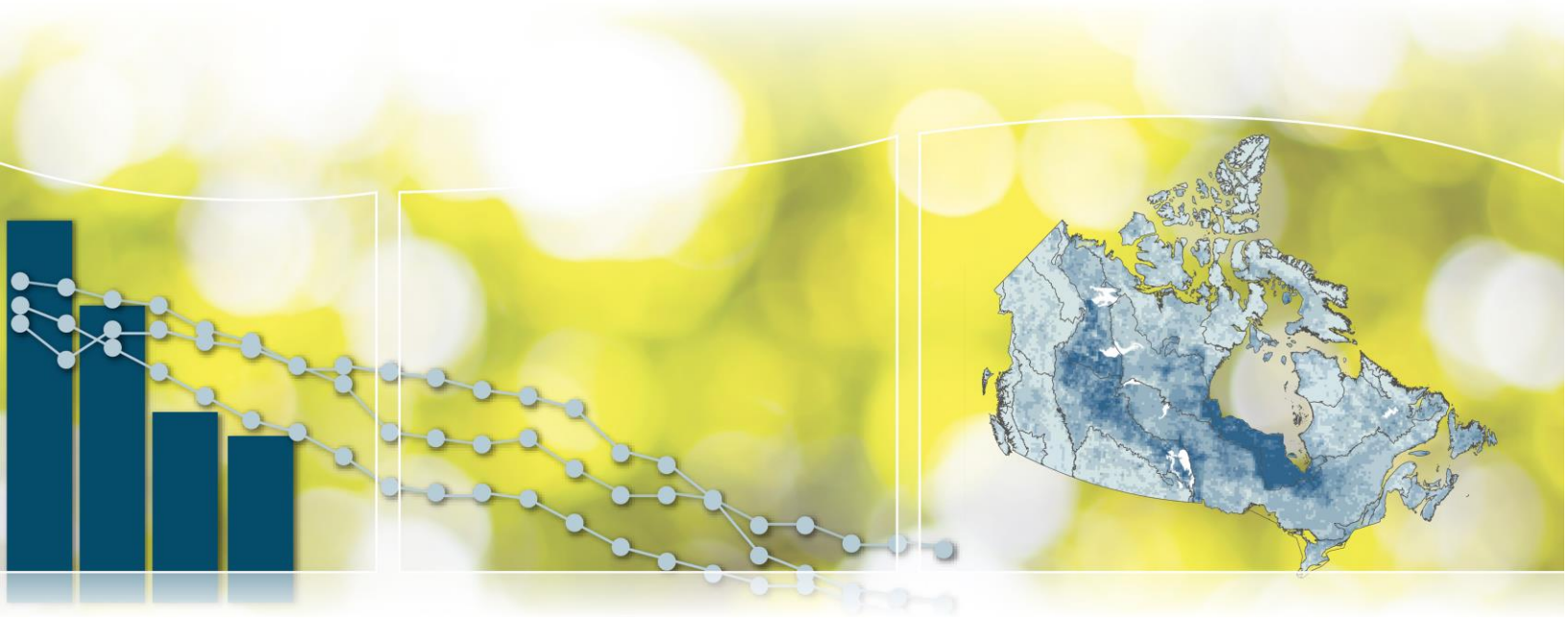
Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canadian Environmental Sustainability Indicators

Status of major fish stocks



Canada

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Canadian Environmental Sustainability Indicators

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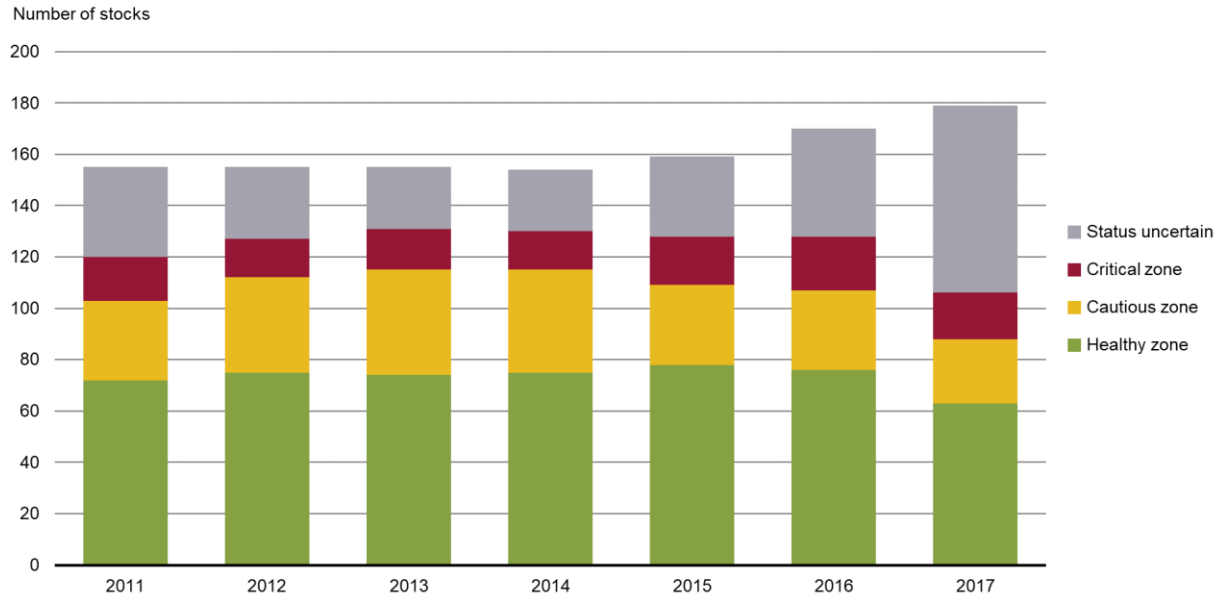
Status of major fish stocks

Environmental conditions and human use of the oceans affect the abundance and health of fish stocks, at national and global levels. In order to maintain fish stocks for future generations, it is important to track their condition and adjust management, such as harvest limits, accordingly. The indicator reports the status of major Canadian fish stocks.

Key results

- Many of the new stocks added in recent years have an uncertain status, contributing to an increase in the number of uncertain stocks
- Of the 179 major stocks assessed in 2017:
    - 63 stocks (35%) were in the Healthy zone
    - 25 stocks (14%) were in the Cautious zone
    - 18 stocks (10%) were in the Critical zone
    - 73 stocks (41%) could not be classified and have uncertain status

Figure 1. Status of major fish stocks, Canada, 2011 to 2017



Data for Figure 1

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 (2018) Sustainability Survey for Fisheries.

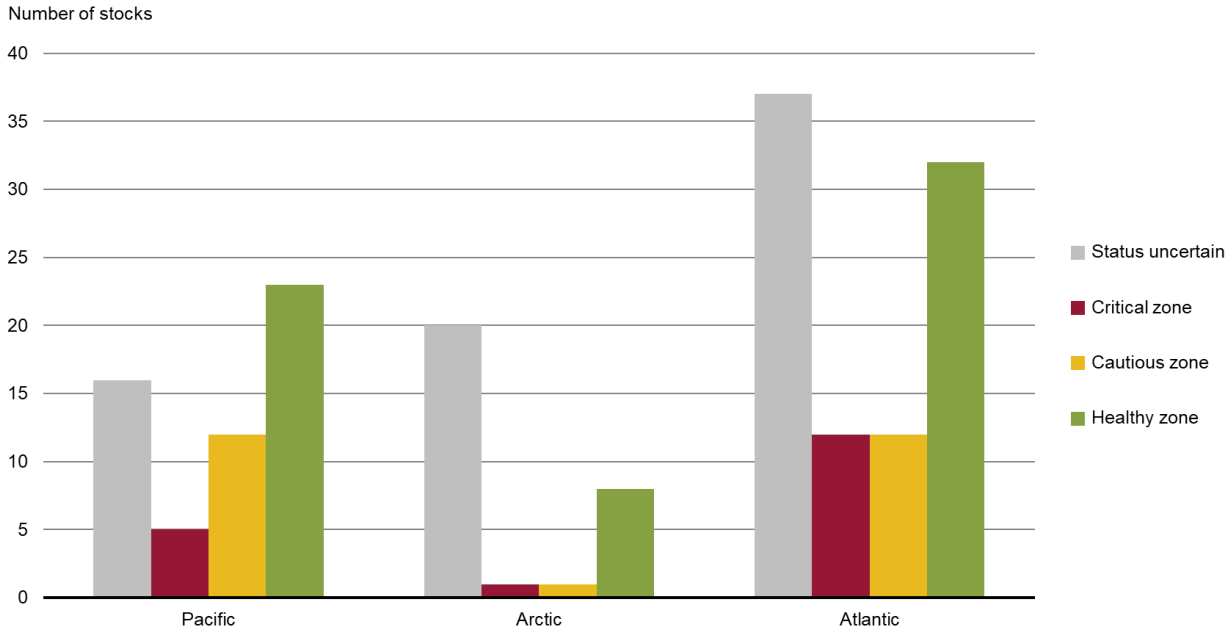
The implementation of the precautionary approach in fisheries management, which began in 2009, has been done in a phased and progressive manner over a number of years and is ongoing. The current precautionary approach components within the Sustainable Survey for Fisheries (the survey) have contributed to the changes seen in the overall status of stocks for 2017. In addition, lack of sufficient information and scientific studies for stock reassessments, especially for new stocks that are added to the survey, has contributed to the high number of uncertain stocks.

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 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 and monitoring tool.

Stocks can be divided into regions based on the managing office. The Pacific management region has the highest proportion of heathy stocks. A greater proportion of stocks have 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 uncertain status or are in the healthy zone.

Figure 2. Status of major fish stocks by region, Canada, 2017



Data for Figure 2

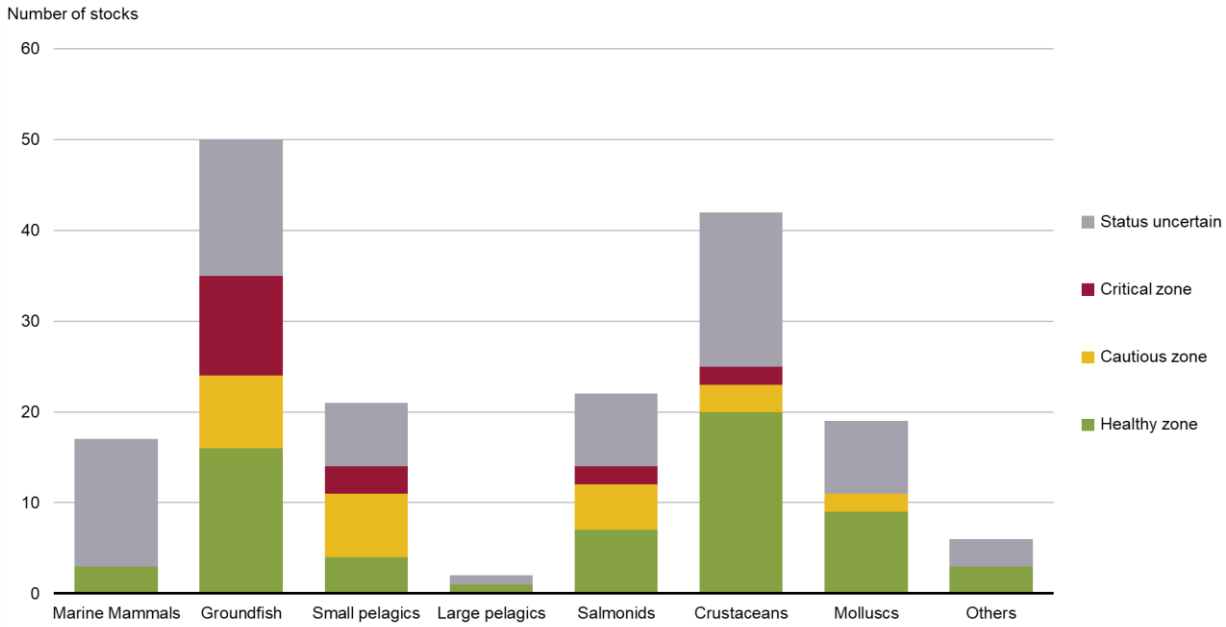
Note: Stocks managed from the central National office were allocated to Atlantic and Arctic regions as appropriate.
Source: Fisheries and Oceans Canada (2018) Sustainability Survey for Fisheries.

Status of major fish stocks, by stock group

Key results

- Groundfish stocks, for example Atlantic cod, Atlantic halibut and haddock, have the highest proportion of stocks in the Critical zone
- Crustacean stocks, for example crab, lobster and shrimp, have the highest proportion of stocks in the Healthy zone

Figure 3. Status of major fish stocks by stock group, Canada, 2017



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 (2018) Sustainability Survey for Fisheries.

In the Atlantic region, groundfish stocks are more likely to be in the Critical zone, in part due to formerly high harvest levels and unfavourable environmental conditions in the 1990s. Recent improvements in some groundfish stocks may be attributed to low harvest levels and warmer conditions that are favourable for them.

Most crustacean stocks are in the Healthy zone due to factors such as favourable environmental conditions in the 2000s, low predation rates and effective stock management. However, in the Atlantic region, warmer conditions and high predation in recent years have negatively impacted many stocks of shrimp and snow crab.

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 to 1 of 3 stock status zones (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
- for stocks in the Cautious zone, management promotes 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

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 2016–2019 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."

It 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 overharvested.

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

Data sources and methods

Data sources

Data for 2015, 2016 and 2017 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 to the survey.

The survey includes major stocks used by commercial, recreational and Indigenous fisheries. A fish stock is a population of individuals of 1 species found in a particular area. It is used as a unit for fisheries management.

- Major stocks are identified by regional managers within Fisheries and Oceans Canada and include all stocks that meet at least 1 of the following criteria:
  - have an annual landed value greater than $1 million
  - have an annual landed weight greater than 2 000 tonnes
  - have an Integrated Fisheries Management Plan
  - are highly migratory or are a transboundary stock that is internationally managed
  - have been assessed by Committee on the Status of Endangered Wildlife in Canada as being of special concern and are subject to a directed fishery
  - are deemed to be of regional significance
- 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.

More information

Fish stock levels 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 are 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.

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 (crab, lobster and shrimp), molluscs, and others. 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 Sustainable 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 from the list (-1)
- 6 stocks (3 shrimp, 1 elver, 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 from the list (-3)
- 3 salmon stocks (1 chum, 2 sockeye) were split into revised management units (+5)
- 10 commercially fished stocks (6 snow crab, 2 seal, 1 shrimp and 1 scallop) were added to the list (+10)

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

- 4 Atlantic walrus stocks (West Jones Sound, Penny Strait-Lancaster Sound, Hudson Bay-Davis Strait and South and East Hudson Bay) 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 herring spawn on kelp stock was removed (-1)

Caveats and limitations

Ongoing improvement of the application of the precautionary approach can affect the survey results such that 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 2017. 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 December 10, 2018.

Fisheries and Oceans Canada (2018) Sustainability Survey for Fisheries. Retrieved on December 10, 2018.

Fisheries and Oceans Canada (2019) About the Sustainability Survey for Fisheries. Retrieved on January 22, 2019.

Related information

Aquatic species

Fisheries

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 2017

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

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 (2018) Sustainability Survey for Fisheries.

Table A.2. Data for Figure 2. Status of major fish stocks by region, Canada, 2017

Status	Pacific (number of stocks)	Arctic (number of stocks)	Atlantic (number of stocks)
Healthy zone	23	8	32
Cautious zone	12	1	12
Critical zone	5	1	12
Status uncertain	16	20	37

Note: Stocks managed from the central National office were allocated to Atlantic and Arctic regions as appropriate.
Source: Fisheries and Oceans Canada (2018) Sustainability Survey for Fisheries.

Table A.3. Data for Figure 3. Status of major fish stocks by stock group, Canada, 2017

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	3	0	0	14
Groundfish	Cod, dogfish, flounder, haddock, hake, halibut, lingcod, ocean perch, plaice, pollock, redfish, rockfish, sablefish, skate, thornyhead, whitefish	16	8	11	15
Small pelagics	Albacore tuna, capelin, eulachon, herring, gaspereau, mackerel, sardine, striped bass	4	7	3	7
Large pelagics	Bluefin tuna, swordfish	1	0	0	1
Salmonids	Char, chum, north slope dolly varden, salmon, trout	7	5	2	8
Crustaceans	Crab, krill, lobster, prawn, shrimp	20	3	2	17
Molluscs	Clam, geoduck, scallop, oyster, whelk	9	2	0	8
Others	Eel and elvers, sea cucumber, sea urchin	3	0	0	3
Total		**63**	**25**	**18**	**73**

Note: 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 (2018) Sustainability Survey for Fisheries.

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