



HARVEST LEVELS OF KEY FISH STOCKS

CANADIAN ENVIRONMENTAL
SUSTAINABILITY INDICATORS



Suggested citation for this document: Environment and Climate Change Canada (2023) Canadian Environmental Sustainability Indicators: Harvest levels of key fish stocks. Consulted on *Month day, year*. Available at: www.canada.ca/en/environment-climate-change/services/environmental-indicators/harvest-levels-key-fish-stocks.html.

Cat. No.: En4-144/100-2023E-PDF
ISBN: 978-0-660-48745-8
Project code: EC23015

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CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

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July 2023

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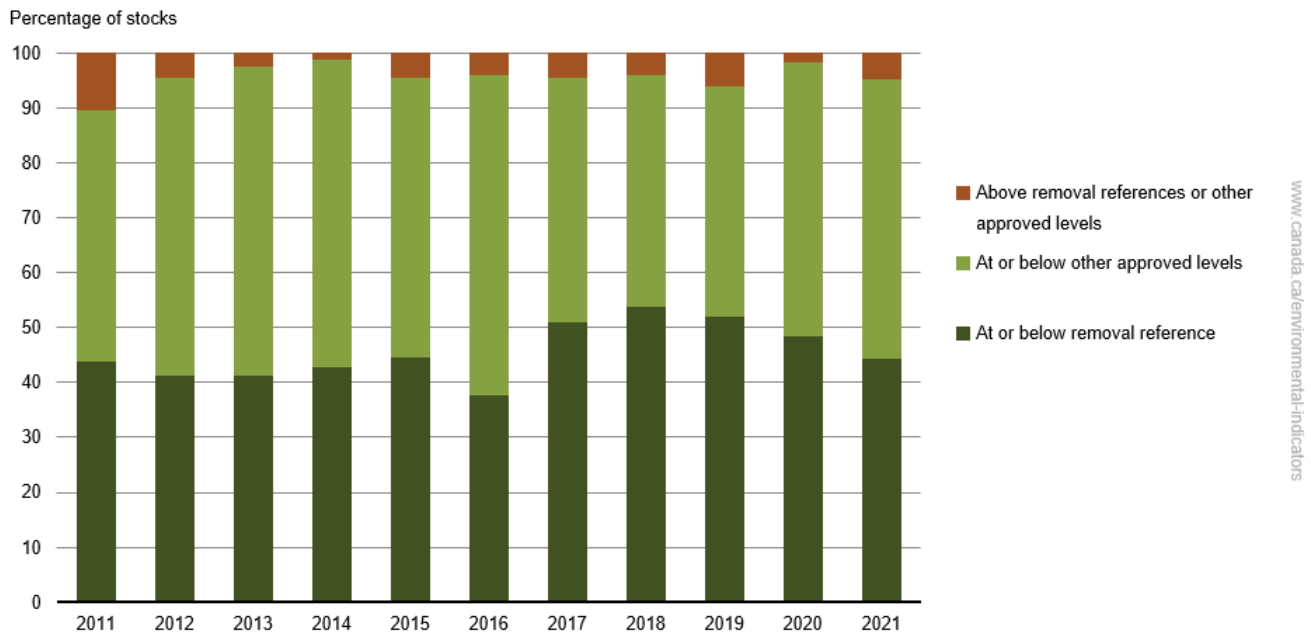
Harvest levels of key fish stocks

Harvest limits for wild fish and other marine animals are set to protect these stocks for the future. Some fish stocks have a removal reference, which is the maximum acceptable removal rate, or level, for the stock based on historical stock productivity data. When removal references are not available, actual harvest levels are compared to other approved levels like total allowable catch. Canada's [2022-2026 Federal Sustainable Development Strategy](#) aims to have all key fish stocks harvested at or below an approved removal reference or other approved level by 2027.

Key results

- Of the 192 key stocks assessed in 2021:
 - 183 stocks (95%) were harvested at or below a removal reference or an approved level
 - 9 stocks (5%) were harvested above an approved level
- From 2012 to 2021, the percentage of stocks harvested above approved levels has been consistently low (below 5% of total stocks)

Figure 1. Harvest of key stocks relative to approved levels, Canada, 2011 to 2021



[Data for Figure 1](#)

Note: The removal reference is defined as the maximum acceptable removal rate, or level, for the stock based on an analytical assessment of historical stock productivity data. When removal references are not available, actual harvest levels are compared to other approved levels. Comparisons between years should be made with caution as the list of key stocks has changed.

Source: Fisheries and Oceans Canada (2023) [Sustainability Survey for Fisheries](#).

Fish stocks are populations of a species that are found in a particular area, are generally isolated from other stocks of the same species, and are self-sustaining. For example, the Atlantic Walrus has 6 stocks all representing different areas of the Arctic region.

Harvesting of stocks above the removal reference or other approved rates/levels is avoided through [conservation and sustainable use policies](#). The key decisions in fisheries management are:

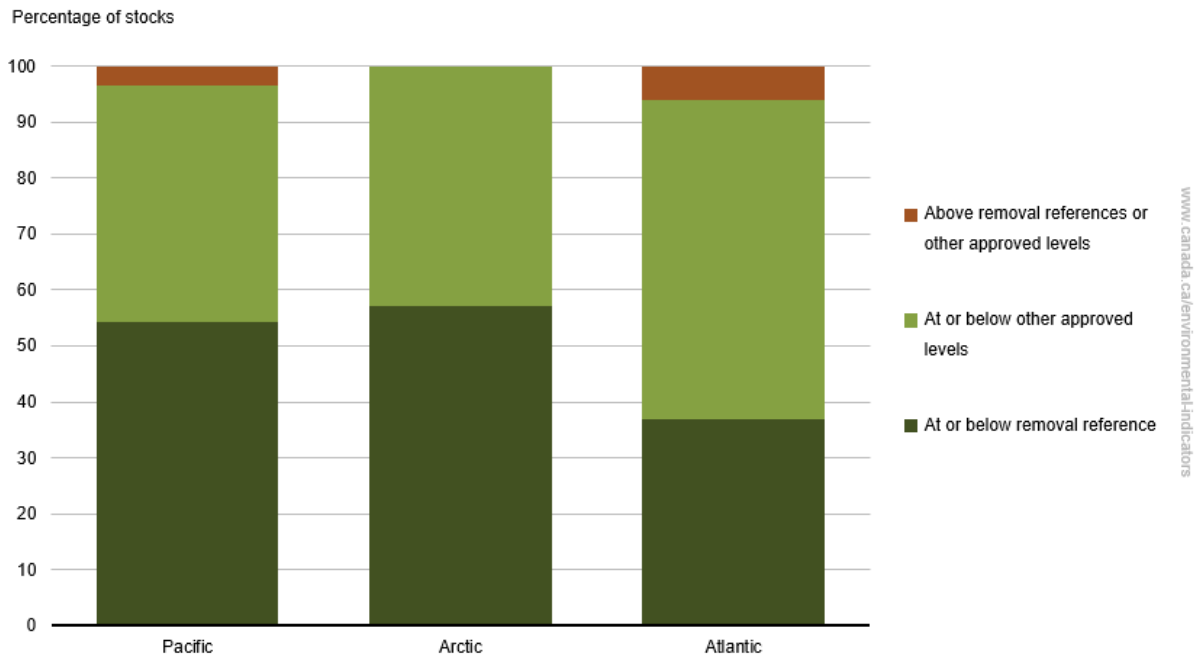
- how much of a stock should be harvested
- who should harvest

Harvest rates/levels include all removals of fish by all types of fishing. Harvesting above the removal reference or approved rates/levels can occur when fish are accidentally caught as bycatch (that is, caught unintentionally while fishing for another stock or size class) or if fishers exceed their quotas/allowable catch on the stock.

Harvest rates/levels are reported against the removal reference when it is known. A removal reference can be determined where there is sufficient historical data on stock productivity. Approved levels for stocks that do not have removal references are set using other scientific approaches. See the related [Status of key fish stocks](#) indicator for information on whether key stocks are in the healthy, cautious or critical zone.

Stocks can be divided into regions based on the Fisheries and Oceans Canada managing office.

Figure 2. Harvest of key stocks relative to approved levels by region, Canada, 2021



[Data for Figure 2](#)

Note: Stocks managed from the central National office were allocated to Atlantic and Arctic regions as appropriate. The removal reference is defined as the maximum acceptable removal rate, or level, for the stock based on an analytical assessment of historical stock productivity data. When removal references are not available, actual harvest levels are compared to other approved levels. Comparisons between years should be made with caution as the list of key stocks has changed.

Source: Fisheries and Oceans Canada (2023) [Sustainability Survey for Fisheries](#).

In 2021, 9 stocks were listed as harvested above a removal reference or other approved levels (Table 1): 7 in the Atlantic management region and 2 in the Pacific management region. The Arctic management region had no stocks harvested above a removal reference or other approved level.

Table 1. Fish stocks harvested above approved levels, Canada, 2021

Stock name	Stock group	Region	Reason for harvest above removal reference or other approved level
Beluga – Northern Quebec (Nunavik)	Marine Mammals	Atlantic	Harvest exceeded approved level for the season
Mackerel – Atlantic	Small Pelagics	Atlantic	Harvest exceeded approved level for the season
Atlantic Salmon – Gulf	Salmonids	Atlantic	Uncertainty in catch information

Stock name	Stock group	Region	Reason for harvest above removal reference or other approved level
Northern Shrimp (<i>Borealis</i>) – SFA 4	Crustaceans	Atlantic	Harvest exceeded approved level for the season
Striped Shrimp (<i>Montagu</i>) – Eastern Assessment Zone	Crustaceans	Atlantic	Harvest exceeded approved level for the season
Snow Crab – Crab Fishing Area 16	Crustaceans	Atlantic	Harvest exceeded approved level for the season
Snow Crab – Crab Fishing Area 17	Crustaceans	Atlantic	Harvest exceeded approved level for the season
Barkley Sockeye Salmon – West Coast-Vancouver Island	Salmonids	Pacific	Harvest exceeded approved level for the season
Intertidal Clams – South Coast-Vancouver Island	Molluscs	Pacific	Harvest exceeded approved level for the season

Note: Where there is a lack of reporting, data or information on a particular stock, it is deemed as being harvested above an approved rate or level.

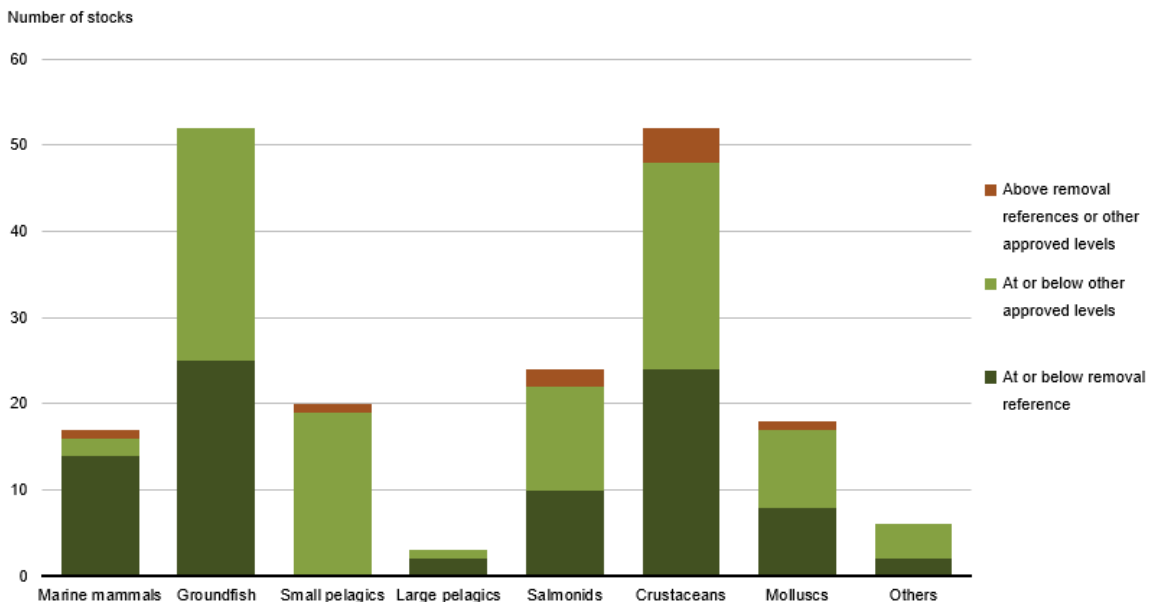
Source: Fisheries and Oceans Canada (2023) [Sustainability Survey for Fisheries](#).

Harvest levels by stock group

Key results

- In 2021:
 - Of the 8 stock groups, 3 had all stocks harvested within limits
 - Crustaceans had 4 stocks that were harvested above the approved levels
 - Salmonids had 2 stocks that were harvested above the approved levels
 - Marine mammals, Small pelagic fish, and Molluscs had 1 stock that was harvested above the approved levels

Figure 3. Number of key stocks harvested relative to approved levels by stock group, Canada, 2021



[Data for Figure 3](#)

Note: Others include eels and elvers, sea cucumber, and sea urchin. The removal reference is defined as the maximum acceptable removal rate, or level, for the stock based on an analytical assessment of historical stock productivity data. When removal references are not available, actual harvest levels are compared to other approved levels. Comparisons between years should be made with caution as the list of key stocks has changed.

Source: Fisheries and Oceans Canada (2023) [Sustainability Survey for Fisheries](#).

Canada's key fish stocks have been grouped into 8 categories:

- Marine mammals are mammals that rely on the ocean for part or all of their existence. Marine mammals include seals, whales and narwhals
- Groundfish are usually caught near the ocean bottom. Groundfish include cod, halibut and flounder
- Pelagic fish live in midwater or close to the surface
 - Large pelagic fish include tuna and swordfish
 - Small pelagic fish include herring, mackerel and sardine
- Salmonids are a family of ray-finned fish. Salmonids include salmon, char and trout
- Crustaceans are shelled animals with joints, such as lobster, crab and shrimp
- Molluscs are species we commonly think of as shellfish. Molluscs include clams, oysters and mussels
- Others include eels and elvers, sea cucumber and sea urchin

About the indicator

What the indicator measures

The indicator compares harvest rates with established harvest limits. These limits are based on scientific information, providing a direct measure of whether we are managing the use of these resources within ecosystem limits. It is one measure of fishing pressure on wild fish stocks.

Why this indicator is important

The preservation of the ecological, social and economic value of fish stocks requires limiting harvest. Harvesting above the removal reference or other approved levels, along with other pressures, can reduce the size and productivity of fish stocks, and in the past has even led to their collapse. The harvest rate is the proportion of the stock that is taken from the water, either intentionally or as bycatch. Harvest rates must be adjusted to reflect changing conditions and to protect stocks for the future.

Related initiatives

This indicator supports the measurement of progress towards the following [2022 to 2026 Federal Sustainable Development Strategy](#) long-term goal: Conserve and protect Canada's oceans.

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 to the [Kunming-Montreal Global Biodiversity Framework](#). It is linked to Target 5: "Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spill-over, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities."

Related indicators

The [Status of key fish stocks](#) indicator provides information on whether key stocks are in the healthy, cautious or critical zone.

Data sources and methods

Data sources

Data from 2015 to 2021 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/summer and captures data for the previous year. The same survey supports the [Status of key fish stocks](#) 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 key 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.

Key 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:
 - straddling¹
 - 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

The indicator compares harvest rates with harvest limits. These limits are based on scientific information and provide a direct measure of whether we are managing the use of these resources within ecosystem limits.

The indicator is a simple tabulation of stocks based on whether harvest levels are within removal reference levels, within other harvest limits, or over harvest limits.

¹ Straddling fish stocks migrate across the outer limit of coastal States and the adjacent high seas. Examples include cod, flounder and turbot.

More information

The Harvest levels of key fish stocks indicator classifies stocks based on 2 elements:

1. Approved harvest limit: this indicates the maximum sustainable harvest level established for a fish stock, and may be a removal reference or another approved level.
2. Actual harvest level: this indicates whether the actual harvest was above, at or below the approved harvest limit. Harvest includes all bycatch, whether it is retained or returned to the water.

Removal references and other harvest limits

A removal reference is the maximum acceptable removal rate for the stock. Harvest rates should not exceed the removal reference. All allowable harvest rates are based on scientific assessments, the condition of the stock, and economic and social considerations.

A removal reference is determined when there is sufficient historical data on stock productivity to allow the maximum acceptable removal rate to be estimated analytically. It is one element of a formal [precautionary approach](#) that uses a rigorous, risk-based analysis, common across stocks. In this approach, the harvest strategy for a fishery must contain a set of standard components including reference points, harvest decision rules, and other elements. Removal references vary with the stock's abundance and its location in the 3 stock status zones defined in federal policy (that is, Healthy, Cautious and Critical zones; see the [Status of key fish stocks](#) indicator for more information on stock status).

While most of the key stocks have had some components of the [precautionary approach](#) implemented (87%), only 28% of the key stocks have had all components fully implemented and 13% have not implemented any components. The number of removal references varies from year to year as they are reviewed.

For stocks where the removal reference has not been set, actual harvest levels are compared to other approved levels established by Fisheries and Oceans Canada. Approved levels are determined on the basis of the best available information and knowledge of the biological, economic and social aspects associated with a given stock.

All limits are determined using a precautionary approach. When scientific information is insufficient, decisions must still be made. The absence of adequate scientific information should not be used as a reason to postpone or fail to take action that prevents serious harm to the resource. According to the [Food and Agriculture Organization](#), the "precautionary approach to fisheries recognizes that changes in fisheries systems are only slowly reversible, difficult to control, not well understood, and subject to changing environment and human values."

Harvest rates

The harvest rate, also called the removal rate, is the ratio of all human-induced removals to the total exploitable stock size. Each year, managers report whether the harvest rate is above or below the acceptable level.

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 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 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](#). The same groupings are used in the [Status of key fish stocks](#) indicator.

Recent changes

The [Sustainability Survey for Fisheries](#) (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 key 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 key 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)
- 1 Pacific ocean perch stock was split into 3 stocks (+2)

In 2016, the list of key 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 key 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 key 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 key stocks was revised to a total of 176:

- 1 intertidal clam stock was removed (-1)

In 2020, the list of key stocks was revised to a total of 180:

- Gulf shrimp was split into 4 stocks (+3)
- Herring was split into 2 units (Fall and Spring spawner) (+1)
- Red fish was previously 2 units and was split into 2 species (+0)

In 2021, the list of key fish stocks was revised to a total of 192:

- Inshore Lobster was previously 2 units and was split into 11 (+9)
- 1 Yellowtail Flounder stock was added (+1)
- 1 Chinook Salmon stock was added (+1)
- 1 Coho Salmon stock was added (+1)

The criteria for classifying harvest relative to removal references were tightened in 2015. Survey results are reviewed each year to track progress, gather information about key fish stocks and assist in setting priorities for improving fisheries management.

Caveats and limitations

A harvest level above the removal reference or other approved level in a single year does not mean that a stock is harvested unsustainably. Rather, it leads to a management response. Stocks managed through quotas, for example, are subject to quota reconciliation, meaning that any stocks harvested above an approved level in one year is deducted from the harvest limit established for the following year.

The [Sustainability Survey for Fisheries](#) (the survey) is completed with the best available information. Since the oceans are wide and deep, and fish move between habitats, their populations are difficult to monitor.

The survey summarizes information across a wide variety of species, management regimes, types of fisheries, geographic regions, and socio-economic contexts. Small 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.

For most stocks, including all groundfish, quota reconciliation is implemented where there are seasonal harvests above approved levels. In-season transfers allow exchanges to be made between licence holders, such as a harvest above approved levels by one fisher being applied to the unused quota of another. When in-season transfers do not sufficiently cover harvests above approved levels, the harvest is deducted from the harvest limit established for the following year.

The indicator does not account for fished stocks that do not meet the criteria for key stocks. Seaweeds and other aquatic plants are also excluded.

Resources

References

Fisheries and Oceans Canada (2009) [A fishery decision-making framework incorporating the precautionary approach](#). Retrieved on March 10, 2023.

Fisheries and Oceans Canada (2021) [About the Sustainability Survey for Fisheries](#). Retrieved on March 17, 2023.

Fisheries and Oceans Canada (2022) [Fisheries management decisions](#). Retrieved on March 17, 2023.

Fisheries and Oceans Canada (2022) [Sustainable Fisheries Framework](#). Retrieved on March 17, 2023.

Fisheries and Oceans Canada (2023) [Sustainability Survey for Fisheries](#). Retrieved on March 17, 2023.

Related information

[Aquatic species](#)

[Canada's fisheries funds](#)

[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. Harvest of key stocks relative to approved levels, Canada, 2011 to 2021

Year	At or below removal reference (number of stocks)	At or below other approved levels (number of stocks)	Above removal references or other approved levels (number of stocks)	Total (number of stocks)
2011	68	71	16	155
2012	64	84	7	155
2013	64	87	4	155
2014	66	86	2	154
2015	71	81	7	159
2016	64	99	7	170
2017	91	80	8	179
2018	95	75	7	177
2019	92	74	10	176
2020	87	90	3	180
2021	85	98	9	192

Note: The removal reference is defined as the maximum acceptable removal rate, or level, for the stock based on an analytical assessment of historical stock productivity data. When removal references are not available, actual harvest levels are compared to other approved levels. Comparisons between years should be made with caution as the list of key stocks has changed.

Source: Fisheries and Oceans Canada (2023) [Sustainability Survey for Fisheries](#).

Table A.2. Data for Figure 2. Harvest of key stocks relative to approved levels by region, Canada, 2021

Harvest level	Pacific (number of stocks)	Arctic (number of stocks)	Atlantic (number of stocks)
At or below removal reference	31	12	42
At or below other approved levels	24	9	65
Above removal references or other approved levels	2	0	7

Note: Stocks managed from the central National office were allocated to Atlantic and Arctic regions as appropriate. The removal reference is defined as the maximum acceptable removal rate, or level, for the stock based on an analytical assessment of historical stock productivity data. When removal references are not available, actual harvest levels are compared to other approved levels. Comparisons between years should be made with caution as the list of key stocks has changed.

Source: Fisheries and Oceans Canada (2023) [Sustainability Survey for fisheries](#).

Table A.3. Data for Figure 3. Number of key stocks harvested relative to approved levels by stock group, Canada, 2021

Stock group	Species / stocks included	At or below removal reference (number of stocks)	At or below other approved levels (number of stocks)	Above removal references or other approved levels (number of stocks)
Marine mammals	Atlantic walrus, beluga, bowhead, grey seal, harp seal, narwhal	14	2	1
Groundfish	Cod, dogfish, flounder, haddock, hake, halibut, lingcod, ocean perch, plaice, pollock, redfish, rockfish, sablefish, skate, thornyhead, whitefish	25	27	0
Small pelagics	Capelin, eulachon, herring, gaspereau, mackerel, sardine, striped bass	0	19	1
Large pelagics	Albacore tuna, bluefin tuna, swordfish	2	1	0
Salmonids	Char, chum, north slope dolly varden, salmon, trout	10	12	2
Crustaceans	Crab, krill, lobster, prawn, shrimp	24	24	4
Molluscs	Clam, geoduck, scallop, oyster, whelk	8	9	1
Others	Eel and elvers, sea cucumber, sea urchin	2	4	0
Total	n/a	85	98	9

Note: n/a = not applicable. The removal reference is a limit fishing mortality reference point defined as the maximum acceptable removal rate, or level, for the stock based on an analytical assessment of historical stock productivity data. When removal references are not available, actual harvest levels are compared to other approved levels.

Source: Fisheries and Oceans Canada (2023) [Sustainability Survey for Fisheries](#).

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