Environment and Climate Change Canada
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HARVEST LEVELS OF KEY FISH STOCKS

CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

Canada

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Table of contents

List of Figures

List of Tables

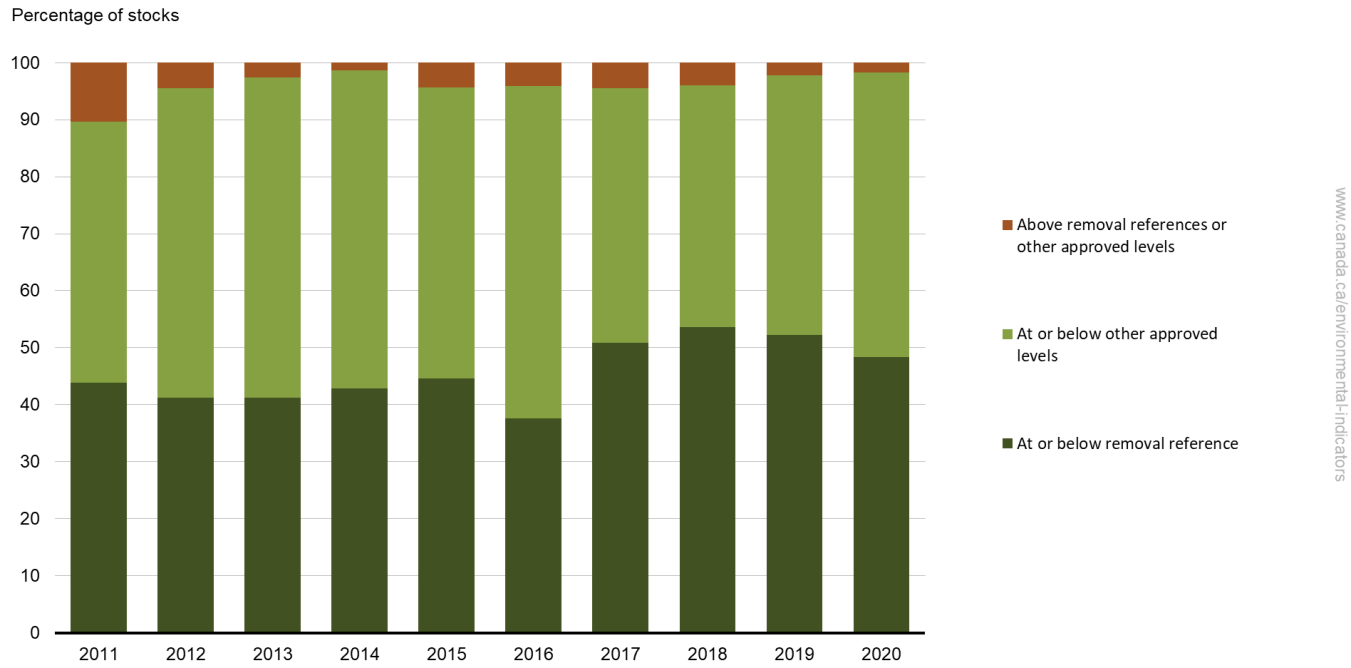
Harvest levels of key fish stocks

Harvest limits for wild fish and other marine animals are set to protect these stocks for the future. This indicator reports the number of key stocks that are harvested within these limits and those that are harvested above these limits. By 2027, Canada aims to have all key fish stocks harvested at or below an approved removal reference or other approved level.

Key results

- Of the 180 key stocks assessed in 2020:
  - 177 stocks (98%) were harvested at or below a removal reference or an approved level
  - 3 stocks (2%) were harvested above an approved level
- From 2012 to 2020, the percentage of stocks harvested above approved levels has been consistently low

Figure 1. Harvest of key stocks relative to approved levels, Canada, 2011 to 2020



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, other approved levels are established. Comparisons between years should be made with caution as the list of key stocks has changed.
Source: Fisheries and Oceans Canada (2022) Sustainability Survey for Fisheries.

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

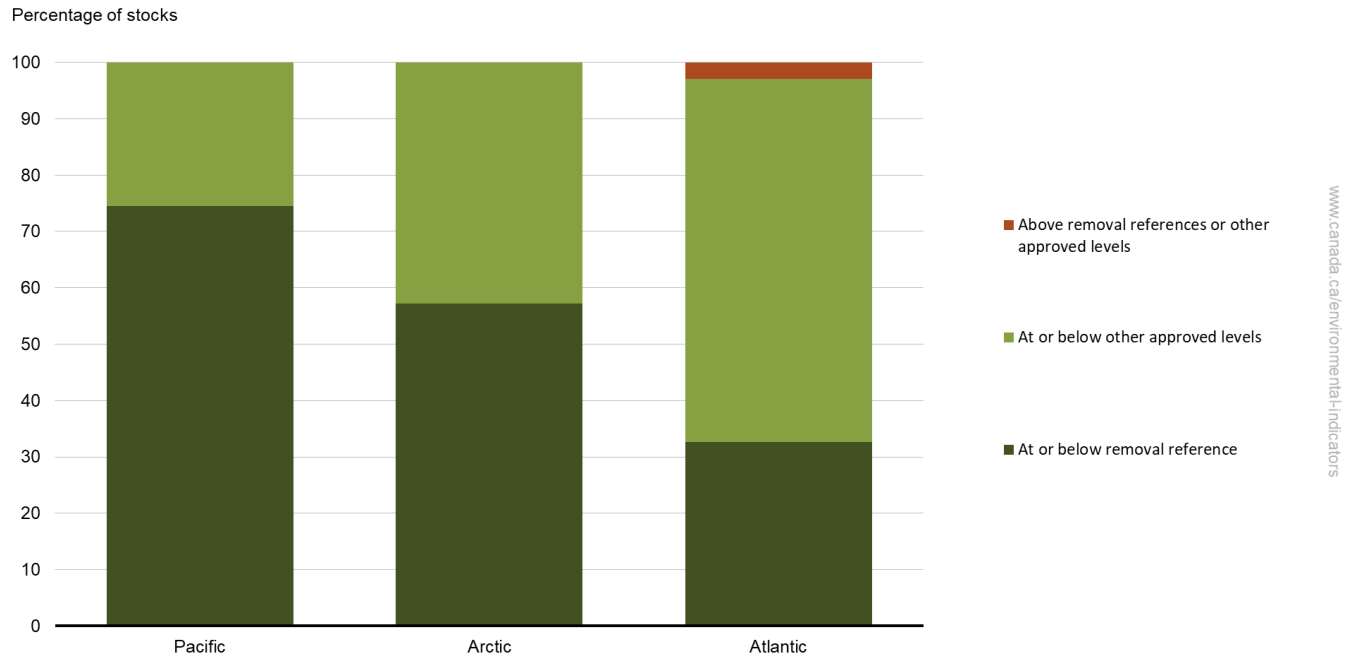
Harvest rates/levels include all removals of fish by all types of fishing. Harvesting above the removal reference or approved rates/levels can occur when fish are accidentally caught as bycatch (that is, caught unintentionally while fishing for another stock or size class) or if fishers exceed their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

Harvest rates/levels are reported against the removal reference baseline when it is known. A removal reference can be determined where there is sufficient historical data on stock productivity. 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, 2020



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, other approved levels are established. Comparisons between years should be made with caution as the list of key stocks has changed.
Source: Fisheries and Oceans Canada (2022) Sustainability Survey for Fisheries.

In 2020, 3 stocks were listed as harvested above approved levels or removal reference (Table 1). The Atlantic management region had the only proportion of stocks harvested above approved levels or removal reference at 3%. The Pacific and Arctic management regions had no stocks harvested above approved levels or removal reference.

Table 1. Fish stocks harvested above approved levels, Canada, 2020

Stock name	Stock group	Region	Reason for harvest above removal reference or other approved level
Atlantic Salmon – Gulf	Salmonids	Atlantic	Uncertainty in catch information
Beluga – Northern Quebec (Nunavik)	Marine Mammals	Atlantic	Harvest exceeded approved level
Snow Crab – 17	Crustaceans	Atlantic	Harvest exceeded approved level

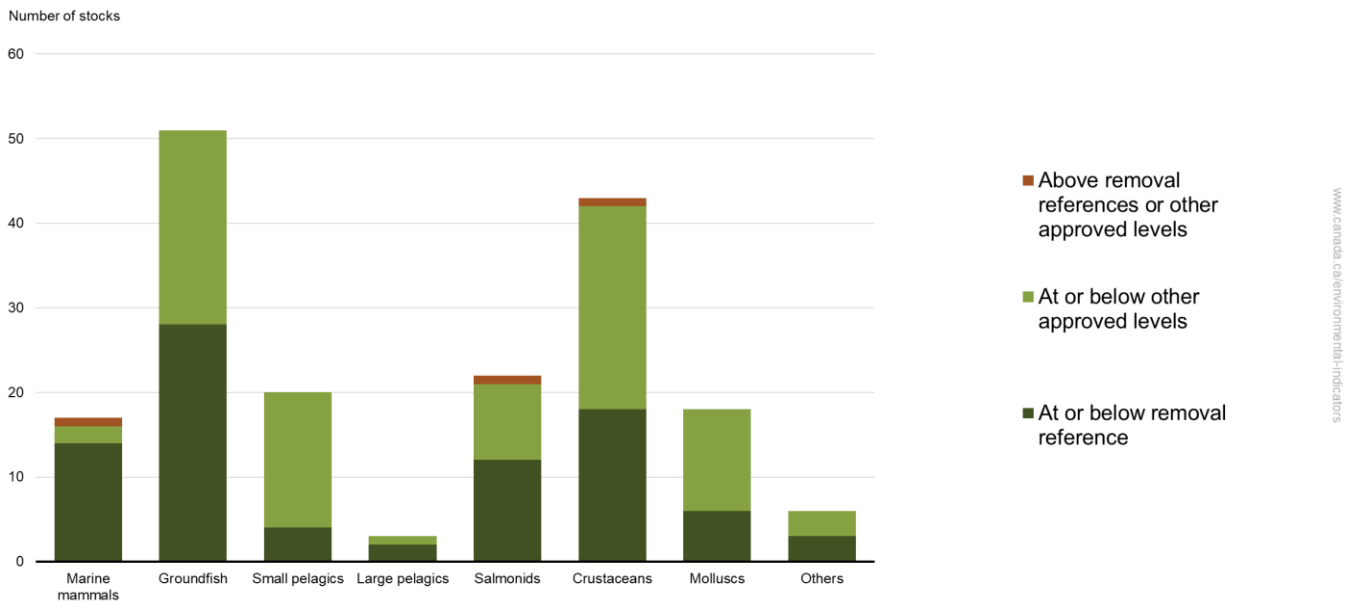
Note: Where there is a lack of reporting, data or information on a particular stock, it is deemed as being harvested above an approved rate or level.
Source: Fisheries and Oceans Canada (2022) Sustainability Survey for Fisheries.

Harvest levels by stock group

Key results

- In 2020:
  - Of the 8 stock groups, 5 had all stocks harvested within limits
  - Marine mammals, Salmonids, and Crustaceans stock groups all had one stock that were harvested above the removal reference or other approved levels

Figure 3. Number of key stocks harvested relative to approved levels by stock group, Canada, 2020



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, other approved levels are established.
Source: Fisheries and Oceans Canada (2022) Sustainability Survey for Fisheries.

Canada's key fish stocks have been grouped into 8 categories. Pelagic fish live in midwater or close to the surface, whereas groundfish are usually caught near the ocean bottom. Crustaceans are shelled animals with joints, such as lobster, crab and shrimp. Molluscs are species we commonly think of as shellfish, including bivalve species such as clams, oysters and mussels.

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 have 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.

Healthy coasts and oceans

This indicator tracks progress on the 2019 to 2022 Federal Sustainable Development Strategy, supporting the target: By 2020, all major fish and invertebrate stocks are managed and harvested at levels considered to be sustainable, from a baseline of 96% harvested within established ecosystem limits in 2016. The most recent data available shows that, of the 180 key fish and invertebrate stocks assessed in 2020, 98% were harvested at or below removal references or other approved levels. This indicator is being proposed to track progress in the draft 2022 to 2026 Federal Sustainable Development Strategy.

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 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 2020 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:

    - straddling[1]
    - 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.

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, other approved levels are 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

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

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 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 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 species we commonly think of as shellfish, including bivalve species such as clams, oysters and mussels. Others include eels and elvers, sea cucumber, and sea urchin. 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)

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

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Fisheries and Oceans Canada (2021) Fisheries management decisions. Retrieved on January 20, 2022.

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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 2020

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	80	4	176
2020	87	90	3	180

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, other approved levels are established. Comparisons between years should be made with caution as the list of key stocks has changed.
Source: Fisheries and Oceans Canada (2022) Sustainability Survey for Fisheries.

Table A.2. Data for Figure 2. Harvest of key stocks relative to approved levels by region, Canada, 2020

Harvest level	Pacific (number of stocks)	Arctic (number of stocks)	Atlantic (number of stocks)
At or below removal reference	41	12	34
At or below other approved levels	14	9	67
Above removal references or other approved levels	0	0	3

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, other approved levels are established. Comparisons between years should be made with caution as the list of key stocks has changed.
Source: Fisheries and Oceans Canada (2022) Sustainability Survey for fisheries.

Table A.3. Data for Figure 3. Number of key stocks harvested relative to approved levels by stock group, Canada, 2020

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	28	23	0
Small pelagics	Albacore tuna, capelin, eulachon, herring, gaspereau, mackerel, sardine, striped bass	4	16	0
Large pelagics	Bluefin tuna, swordfish	2	1	0
Salmonids	Char, chum, north slope dolly varden, salmon, trout	12	9	1
Crustaceans	Crab, krill, lobster, prawn, shrimp	18	24	1
Molluscs	Clam, geoduck, scallop, oyster, whelk	6	12	0
Others	Eel and elvers, sea cucumber, sea urchin	3	3	0
Total	**n/a**	**87**	**90**	**3**

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, other approved levels are established.
Source: Fisheries and Oceans Canada (2022) Sustainability Survey for Fisheries.

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