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Data Sources and Methods for the Sustainable Fish Harvest Indicator

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1 Introduction

The Sustainable Fish Harvest indicator is part of the Canadian Environmental Sustainability Indicators (CESI) program, which provides data and information to track Canada's performance on key environmental sustainability issues.

The long-term maintenance of the ecological, social and economic value of fish stocks requires controlling harvest to avoid overexploitation. Fisheries and Oceans Canada (DFO), in partnership with industry, implements plans, policies and programs to protect stocks, assist in long-term sustainability, and provide for the fair allocation and distribution of harvestable surpluses among those dependent on the resource, in accordance with the precautionary approach.[1] This indicator measures compliance with harvest limits as a measure of pressures on wild fish stocks.

Established harvest limits can be exceeded due to a number of factors, including short time-frame competitive fisheries and unforeseen bycatch. These factors are monitored by DFO and corrective actions are taken to address these situations as they arise. Actions include implementing moratoria on fishing when necessary and adjusting harvest limits in future years, to assure conservation is not compromised.

2 Description and rationale of the Sustainable Fish Harvest indicator

2.1 Description

The Sustainable Fish Harvest 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.

The Sustainable Fish Harvest indicator has two elements:

- ***Removal reference*** – This indicates the maximum sustainable harvest level established for a fish stock; and
- ***Actual harvest level*** – This indicates whether the actual harvest was above, at or below the established maximum sustainable harvest level.

Where removal references have already been set as a component of the precautionary approach, the indicator measures whether harvest is above, at or below the established removal reference.

In the case of stocks for which removal references have yet to be set, the indicator measures whether stocks are being harvested within levels[2] established by Fisheries and Oceans Canada (DFO).

[1] Fisheries and Oceans Canada (2009) A fishery decision-making framework incorporating the Precautionary Approach. Retrieved on 10 September, 2012. Available from: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm.

[2] Fisheries and Oceans Canada (2008) Fisheries Management Decisions. Retrieved on 12 September, 2012. Available from: http://www.dfo-mpo.gc.ca/decisions/index-eng.htm.

2.2 Rationale

Fisheries must be consistently harvested at or below established limits to avoid overfishing.

Two types of harvest limits exist. Traditionally, annual harvest levels were set on the basis of scientific and economic information and consultation with stakeholders and were approved by the Minister of Fisheries and Oceans Canada. The *Precautionary Approach Policy Framework* is being implemented for an increasing number of major stocks. This is a more rigorous approach, common across stocks, and includes the use of a removal reference for assessing whether harvests are sustainable. The precautionary approach requires that a harvest strategy for a fishery contain a set of standard components (reference points and harvest decision rules, etc.). This approach allows us to evaluate more consistently how well we are managing harvests.

Overharvest leads to a management response to avoid loss to fish stocks. Adjusting harvest limits is referred to as ***quota reconciliation***, which provides that any overharvest of a stock in one year is deducted from the harvest limit established for the following year.

2.3 Changes since last report

- Since the Fishery Checklist was begun in 2007, it has been revised every year to improve its usefulness as a management tool, and the set of stocks addressed has also changed.

- Since first reported in CESI for 2010 data, Checklist questions have been revised to improve alignment with the *Sustainable Fisheries Framework*[3] and other policies of Fisheries and Oceans Canada.

- All stocks meeting the criteria for "major stocks" in 2011 are included, but these are not identical to the set of stocks that met the criteria in 2010.

- A standard set of 155 stocks established in 2011 is now part of the Fishery Checklist and will be used until at least 2014 to ensure consistent reporting

3 Data

3.1 Data source

Data were drawn from the Fishery Checklist version 4. The Fishery Checklist is an internal, self-diagnostic tool that provides a systematic review of progress on conservation and sustainable-use objectives. Different data are drawn from the same Checklist to generate the Status of Fish Stocks indicator.

Fisheries and Oceans Canada surveys the management of major fish stocks each year. Regional Sustainable Fishery Framework[4] coordinators receive this comprehensive checklist, which provides them with assessments of fish harvest rates, bycatch, ecological impacts, stakeholder consultation and other activities, and includes the impacts of commercial, recreational and Aboriginal fisheries. This data provides a qualitative snapshot of a stock for a certain period,

[3] Fisheries and Oceans Canada (2009) Sustainable Fisheries Framework. Retrieved on 10 September, 2012. Available from: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/overview-cadre-eng.htm.

[4] Fisheries and Oceans Canada (2009) Sustainable Fisheries Framework. Retrieved on 10 September, 2012. Available from: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/overview-cadre-eng.htm.

capturing how a fishery is addressing a range of factors considered necessary for sustainable management.

3.2 Spatial coverage
National, for all major fish stocks.

3.3 Temporal coverage
The Fishery Checklist has been completed annually since 2007. Checklist questions have been refined over this time, so that data from previous years is not exactly comparable. Beginning in 2011, the Fishery Checklist questions have been finalized and will be maintained for at least four years (2011–2014), allowing comparisons over time to be made.

3.4 Data completeness
All 155 major stocks are included in the Fishery Checklist for 2011.

Major stocks are identified by regional managers and include all stocks that meet one or more of the following criteria:

- have an annual landed value greater than $1 million;
- have an annual landed weight greater than 2000 tonnes;
- have an Integrated Fisheries Management Plan (http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/index-eng.htm);
- be highly migratory or be a transboundary stock that is internationally managed;
- have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being of special concern and be subject to a directed fishery (http://www.cosewic.gc.ca/); and/or
- be deemed to be of regional significance.

These stocks include finfish, shellfish, marine mammals and other marine invertebrates.

3.5 Data timeliness
Data for the Fishery Checklist is reported for the previous year by April 1. At present, the indicator is current to the end of 2011. A "year" is defined variably, depending on how fishing seasons and closures are defined for individual stocks, and may not align exactly with the calendar year.

4 Methods

The Sustainable Fish Harvest 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.

Stocks are subpopulations of a particular species of fish or other marine animal, for which factors such as growth, recruitment, and natural and fishing mortality are the only significant factors in determining population dynamics. Other factors such as immigration and emigration are considered to be insignificant.

The ***removal reference*** is the maximum acceptable removal rate. The removal rate is the ratio of all human-induced removals and total exploitable stock size. The removal reference is adjusted depending on the stock's abundance and its location in the three stock status zones (*i.e.* healthy, cautious and critical zones; see the Status of Fish Stocks indicator for more information on stock status). In the cautious zone, the adjustment of the removal reference does not have to follow a linear relationship with stock abundance, but a progressive reduction

in removals is required. Managers report whether the harvest rate is above or below the reference level, or if the information is unknown.

The precautionary approach has not been completely implemented for all stocks and there are many different fisheries management measures in place. These measures depend on the species, area, gear used, seasons, stock assessments, etc. that facilitate the tracking of harvest levels.

In cases where a removal reference has not been determined, allowable harvest rates are determined by Fisheries and Oceans Canada based on science assessments, the condition of the stock, and economic and social considerations. The overall goal is always conservation, responsible and sustainable harvesting practices, and equitable distribution of the resource among user 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. Each group comprises species with similar life history characteristics. For example, groundfish spend their adult life at or near the bottom of the ocean. These same groupings are used in the Status of Fish Stocks indicator.

5 Caveats and limitations

- The Fishery Checklist program was initiated in 2007. A number of changes have been made as the program has developed. In particular, the stocks included in the Checklist program have changed and questions have been revised. A standard list of stocks and checklist questions are now established. Year-to-year comparisons are not yet possible, but 2012 results will be comparable to 2011.
- The Fishery Checklist is completed with the best available information. Given the challenges and expense of monitoring mobile fish in a large volume, comprehensive information is not always readily available.
- The Fishery Checklist summarizes information across a wide variety of species, management regimes, types of fisheries, geographic regions, and socio-economic contexts. Results should be interpreted with this in mind.
- Corrective actions that limit fish harvest are not included in this indicator. In particular, quota reconciliation provides that any overharvest of a stock in one year is deducted from the harvest limit established for the following year.

6 References and further reading

6.1 References

Fisheries and Oceans Canada (2009) A Fishery Decision-Making Framework Incorporating the Precautionary Approach. Retrieved on 10 September, 2012. Available from: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm.

Fisheries and Oceans Canada (2008) Fisheries Management Decisions. Retrieved on 10 September, 2012. Available from: http://www.dfo-mpo.gc.ca/decisions/index-eng.htm.

Fisheries and Oceans Canada (2009) Sustainable Fisheries Framework. Retrieved on 10 September, 2012. Available from: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/overview-cadre-eng.htm.

6.2 Further reading

Fisheries and Oceans Canada (2009) Resource Management. Retrieved on 10 September, 2012. Available from: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/index-eng.htm.

Fisheries and Oceans Canada (2012) Quota Reconciliation. Retrieved on 10 September, 2012. Available from: http://www.glf.dfo-mpo.gc.ca/e0012110.

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