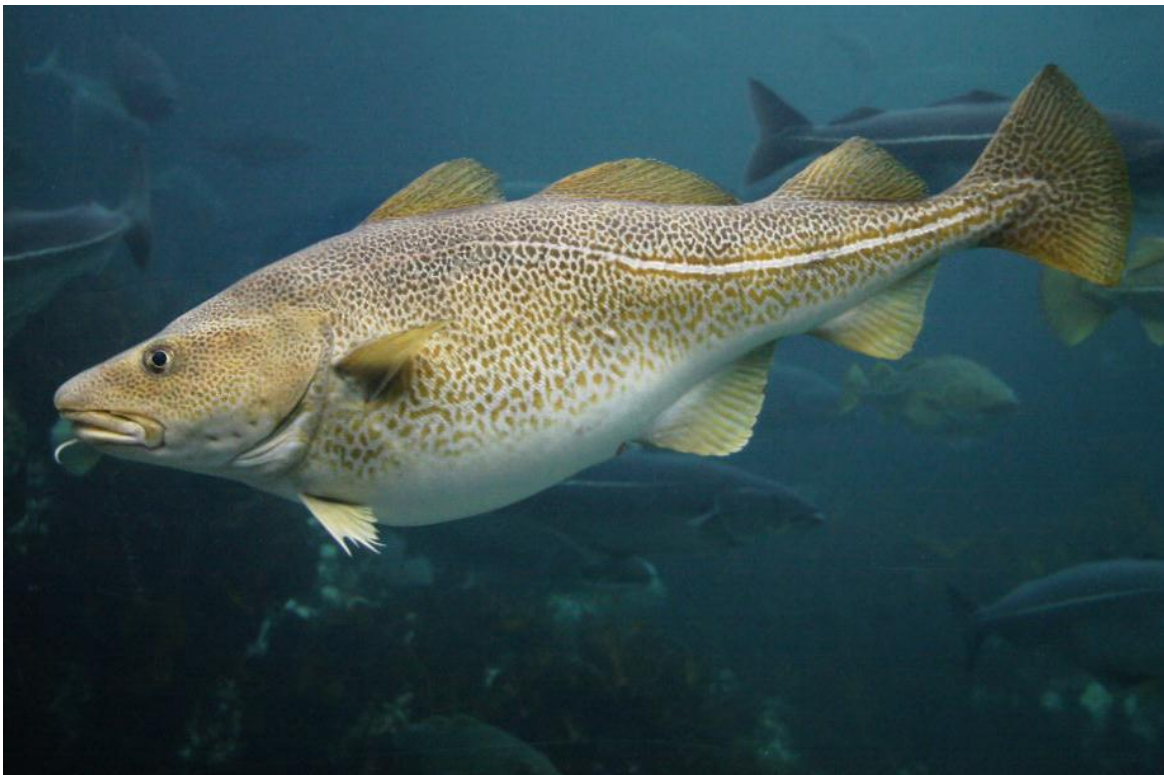




Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

## **SOCIO-ECONOMIC ANALYSIS FOR THE ATLANTIC COD (Arctic Lakes population) (*Gadus morhua*)**



*Photo credit: Dieter Craasmann*

**Policy and Economics  
Central and Arctic Region  
Fisheries and Oceans Canada  
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## Summary

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### 1. Purpose

- To estimate the costs and benefits to Canadians of listing Atlantic Cod (Arctic Lakes) as Special Concern under the federal *Species At Risk Act* (SARA).

### 2. Background

- COSEWIC has assessed Atlantic Cod (Arctic Lakes) as Special Concern – the species may become listed as Special Concern under SARA.
- A socio-economic analysis of impacts is one of many components required for the listing decision.

### 3. COSEWIC Reason for Designation

- *“This designatable unit (DU) exists in 3 isolated lakes on Baffin Island, Nunavut. The combined surface area of the 3 lakes is less than 20 km<sup>2</sup>. Rescue from other DUs is not possible. One of the lakes, Ogac Lake, is accessible for fishing and large numbers of the species may be removed from the lake if fishing increases”* (COSEWIC, 2010).

### 4. Benefit-Cost Analysis (BCA)<sup>1</sup>

- A BCA approach is used to evaluate the socio-economic impacts of listing Atlantic Cod (Arctic Lakes) under SARA.

### 5. Impacts from SARA-listing (see panel following)

**One management scenario is considered: listing with the development of a SARA Management Plan.**

- The small recreational fishery will continue to exist.
- Future changes to the fishery, if required, would likely be made through fishing regulations under the *Fisheries Act*.
- A SARA Management Plan will be developed and will provide an alternate way of managing the recreational fishery.
- No changes to compliance activities are anticipated as a result of listing.

### 6. Conclusion

- There is a net cost from listing Atlantic Cod (Arctic Lakes) as Special Concern under SARA as a result of costs to develop and implement the SARA Management Plan.

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<sup>1</sup> A benefit-cost analysis (BCA) is a broad tool that evaluates benefits and costs of alternative measures, using a common baseline. BCA is an overarching framework where the important factor is marginal benefits and costs and comparison of situations with versus without intervention. In this context, BCA examines impacts from SARA recovery measures as compared to a situation without SARA intervention. While a benefit-cost analysis approach is generally undertaken with respect to public investment decisions, this method is particularly relevant at the listing stage in order to provide information to decision makers on whether regulatory action is the best option for protecting and recovering a species at risk (SARA SE framework 2006, pg. 10).

| <b>Current Situation and Potential SARA Actions</b>  |   |
|--|---|
| Current situation  | <ul style="list-style-type: none"> <li>- In April 1998, Atlantic Cod (species) was assessed by COSEWIC as Special Concern.</li> <li>- In May 2003, Atlantic Cod (Arctic population) was assessed by COSEWIC as Special Concern.</li> <li>- In April 2010, Atlantic Cod (Arctic Lakes population) was assessed by COSEWIC as Special Concern.</li> <li>- Not currently listed under the <i>Species At Risk Act</i> (SARA).</li> <li>- Atlantic Cod (Arctic Lakes) inhabit three remote lakes on south Baffin Island, Nunavut.</li> </ul> |
| Fisheries Actions  | <ul style="list-style-type: none"> <li>- A small recreational fishery occurs in Ogac Lake.</li> <li>- No changes anticipated as a result of listing.</li> </ul>   |
| Habitat Actions  | <ul style="list-style-type: none"> <li>- No changes anticipated as a result of listing.</li> </ul>  |
| <b>Potential Socio-economic Impacts of Listing as Special Concern under SARA</b>   |   |
| Inuit  | <b>No impact</b> <ul style="list-style-type: none"> <li>- Inuit generally do not harvest Atlantic Cod (Arctic Lakes).</li> </ul>  |
| Business   | <b>No impact</b> <ul style="list-style-type: none"> <li>- There are no industry stakeholders.</li> </ul>  |
| Government   | <b>Some costs</b> <ul style="list-style-type: none"> <li>- No additional costs for compliance activities.</li> <li>- Some costs to develop and implement the SARA Management Plan.</li> </ul>   |
| Regional Development   | <b>No potential for losses in GDP, wages and employment.</b>  |
| Social and Community   | <b>No impact</b> <ul style="list-style-type: none"> <li>- Direct use (recreational fishing), existence and bequest values are not affected by a listing decision.</li> </ul>  |
| <b>Conclusion</b>  |   |
| There is a net cost from listing Atlantic Cod (Arctic Lakes) as Special Concern under SARA as a result of costs to develop and implement the SARA Management Plan.   |   |
| <b>Key Assumptions</b>   |   |
| <ol style="list-style-type: none"> <li>1) There is no evidence at this time of a decline in the population.</li> <li>2) There is no evidence at this time to warrant closing the recreational fishery.</li> <li>3) The development of a SARA Management Plan is not expected to increase the population size.</li> </ol> |   |

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## Purpose

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The objective of listing species under the *Species at Risk Act* (SARA) is to prevent the species from becoming Extirpated or Extinct and to provide for the recovery of wildlife species that are Extirpated, Endangered or Threatened as a result of human activity.

This report estimates the benefits and costs to Canadians of listing the Atlantic Cod (Arctic Lakes population) as Special Concern under SARA. Benefit cost analysis is carried out to inform the listing decision, as mandated by the federal *Cabinet Directive on Streamlining Regulations* (2007), so that decision makers and Canadians as a whole can consider the impacts of proposed regulatory measures.

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## Background

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In April 1998, the Atlantic Cod species was considered a single unit and was assessed as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). In May 2003 COSEWIC split the species into separate populations and assessed the Arctic population as Special Concern.

In April 2010 COSEWIC further split the Arctic population into two populations (Arctic Lakes population and Arctic Marine population). The Arctic Lakes population was assessed as Special Concern and the original Arctic population was de-activated<sup>2</sup>.

Atlantic Cod (Arctic Lakes population or other populations) is not currently listed under SARA.

### COSEWIC Reason for Designation

*"This designatable unit (DU) exists in 3 isolated lakes on Baffin Island, Nunavut. The combined surface area of the 3 lakes is less than 20 km<sup>2</sup>. Rescue from other DUs is not possible. One of the lakes, Ogac Lake, is accessible for fishing and large numbers of the species may be removed from the lake if fishing increases"* (COSEWIC, 2010).

### Distribution, Habitat and Population<sup>3</sup>

Atlantic Cod (Arctic Lakes population) inhabit coastal lakes along the eastern coast of Baffin Island, Nunavut that receive intermittent tidal intrusions of salt water. The three documented lakes are Ogac Lake, Qasigialimniq Lake and Tariujarusiq Lake. These lakes have physical barriers which restrict connectivity with the coastal environment and result in high levels of genetic isolation.

There is no regular assessment of the population in these lakes; however, a mark-recapture study conducted in 1957-1962 and a recent estimate of population size (2003-2004) in Ogac Lake suggest little change.

The probability of migration among lakes is likely very low.

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<sup>2</sup> "De-activated" means the original population is no longer under consideration.

<sup>3</sup> Information in this section is from the 2010 COSEWIC Assessment and Status Report on Atlantic Cod.

## Threats

Increased angling pressure in Ogac Lake has been identified as a concern by local inhabitants (COSEWIC, 2010).

## Consultations

Consultations on whether Atlantic Cod (Arctic population) should be listed as Special Concern under SARA were conducted by Fisheries and Oceans Canada (DFO) in November 2004 with the Government of Nunavut, Aboriginal people and organizations, other stakeholders, and the general public.

According to the comments received during consultations:

- fishing pressure on land-locked Atlantic Cod (i.e. the current Atlantic Cod (Arctic Lakes) DU) was insignificant (Pangnirtung HTA) and stable (individual in Iqaluit),
- few fishers venture as far as these remote lakes to fish (Elders group in Iqaluit; individual in Iqaluit),
- Inuit generally do not harvest Atlantic Cod (Arctic Lakes) as Arctic Char are more readily available and preferred (Nativak HTO; Pangnirtung HTA; Amarok HTA; individual in Iqaluit), and
- the Government of Nunavut supported protecting land-locked Atlantic Cod but felt this protection could be provided through closures, catch limits and gear restrictions (i.e. through fishing regulations under the *Fisheries Act*).

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## Current Regulatory Environment

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In Canada, the Atlantic Cod is protected federally by the *Fisheries Act* (FA) and by the *Oceans Act*.

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## Socio-economic Analysis

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Socio-economic analysis is one of many components to be considered in determining whether a species should be listed under Schedule 1 of SARA<sup>4</sup>.

An analysis of benefits and costs was conducted to assess the incremental impacts of listing the Atlantic Cod (Arctic Lakes population) as Special Concern under SARA on stakeholders, including the Canadian public, industry and government.

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<sup>4</sup> See Annex A for a discussion of SARA requirements.

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## Benefits

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The total economic value<sup>5</sup> for Atlantic Cod (Arctic Lakes population) consists of:

- direct use values (recreational fishing)
- non-use values:
  - o bequest values (conservation for future generations)
  - o existence values (the intrinsic value people put on the existence of a species).

These values have not been quantified, as the impact of listing Atlantic Cod (Arctic Lakes population) as Special Concern under SARA is not anticipated to be great<sup>6</sup>.

Atlantic Cod (Arctic Lakes population) is not believed to have any special significance to Inuit, as Inuit generally do not use Atlantic Cod (Arctic Lakes)<sup>7</sup>.

### ***Direct Use Values: Recreational Fishing***

A small recreational fishery is known to occur in Ogac Lake. According to comments received during DFO's consultations, few fishers venture this far to fish and "only a handful of individuals" go to Ogac Lake regularly.

### ***Non-use Values***

Historically, Atlantic Cod was a species of great significance in Canada. It brought the first Europeans to Newfoundland waters in the late tenth century and until the early 1990s was the economic mainstay for Newfoundland and Labrador, and a large part of the population in the Maritimes and along Quebec's north shore and Gaspé Peninsula (COSEWIC, 2010). It was also one of the top predators of the marine food web in the Northwest Atlantic (COSEWIC, 2010).

The historical and contemporary importance of this species is expected to result in high non-use values for the species as a whole. However, this analysis is for one specific DU rather than the species, and this particular DU does not have particularly high historical or contemporary importance due to its remoteness.

The Atlantic Cod in the three confirmed Arctic lakes have high levels of genetic isolation from marine stocks and from each other, and represent a significant component of the evolutionary legacy of the species (COSEWIC, 2010).

### ***Bequest Values***

Canadians would likely have a positive value for conserving Atlantic Cod (Arctic Lakes) for future generations.

### ***Existence Values***

Existence values for this species are likely to be large. Existence values for this particular DU, given its remoteness and low levels of historical and contemporary use, are expected to be much lower.

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<sup>5</sup> See Annex B for a discussion on total economic value.

<sup>6</sup> A qualitative analysis is suitable for species where the impacts are not anticipated to be great or where recovery actions would not negatively affect many people (Fisheries and Oceans Canada, 2006).

<sup>7</sup> According to comments received during DFO's consultations.

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## Baseline and Management Scenarios<sup>8</sup>

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### ***Key Assumptions:***

- 1) There is no evidence at this time of a decline in the population at any of the three lakes.
- 2) There is no evidence at this time to warrant closing the recreational fishery (which may currently exist only in Ogac Lake).
- 3) The development of a SARA Management Plan is not expected to increase the population size.

### ***Baseline Scenario – do not list Atlantic Cod (Arctic Lakes population) as Special Concern under SARA***

Under the baseline scenario, the COSEWIC recommendation is rejected and Atlantic Cod (Arctic Lakes population) is not listed as Special Concern under SARA.

- The small recreational fishery will continue to exist.
- Future changes to the recreational fishery, if required, would be made through fishing regulations under the *Fisheries Act*.
- No changes to compliance activities are anticipated.

### ***Management Scenario – list Atlantic Cod (Arctic Lakes population) as Special Concern under SARA***

Under the management scenario, the COSEWIC recommendation is accepted and Atlantic Cod (Arctic Lakes population) is listed as Special Concern under SARA.

- The small recreational fishery will continue to exist.
- Future changes to the recreational fishery, if required, would likely be made through fishing regulations under the *Fisheries Act*.
- A SARA Management Plan<sup>9</sup> must be developed within three years of listing. The SARA Management Plan could also make changes to the recreational fishery, such as defining fishing limits, gear and/or season, and/or closing lakes. It could also restrict or call for increased research. The SARA Management Plan would be developed in consultation with appropriate people and organizations (SARA S. 66) such as Hunters and Trappers Organizations<sup>10</sup> (HTOs) that fish this population and other institutions of public governance under the Nunavut Land Claim Agreement.
- No changes to compliance activities are anticipated.

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<sup>8</sup> These scenarios were developed in consultation with DFO Species At Risk, Fisheries and Aquaculture, and Conservation and Protection personnel and are viewed as probable outcomes of the listing decision. The actual scenario that results from the listing decision may differ from what is described here.

<sup>9</sup> A SARA Management Plan is a document that sets goals and objectives for maintaining sustainable population levels of one or more species that are particularly sensitive to environmental factors, but which are not in danger of becoming extinct (Species At Risk Public Registry, 2010).

<sup>10</sup> Organizations that oversee harvesting at the local and regional levels in Nunavut



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## Benefit Cost Analysis

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In both scenarios the small recreational fishery is expected to continue, resulting in the same direct use benefits.

Future changes to the recreational fishery, if required, would likely be made through the fishing regulations under the *Fisheries Act*. Under the management scenario, the SARA Management Plan provides an alternate way of achieving the same level of protection.

There is no evidence at this time of a decline in the population; therefore the development of a SARA Management Plan for the Arctic Lakes population is not expected to increase the population size.

The same level of bequest and existence values are anticipated in the baseline and management scenarios because Atlantic Cod (Arctic Lakes) receives the same level of protection in both scenarios and the development of a SARA Management Plan is not expected to increase the population size.

There will be some costs to government for the development of a SARA Management Plan and possibly to implement measures in the plan (e.g. research activities) if Atlantic Cod (Arctic Lakes) is listed as Special Concern under SARA.

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## Conclusion

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The same level of benefits to Canadians is expected regardless of whether Atlantic Cod (Arctic Lakes) is listed as Special Concern under SARA.

If Atlantic Cod (Arctic Lakes) is listed, there will be some costs to government as a result of the development and implementation of a SARA Management Plan.

Consequently, there is a net socio-economic cost to listing Atlantic Cod (Arctic Lakes) as Special Concern under SARA.

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## References

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COSEWIC. 2010. COSEWIC assessment and status report on the Atlantic Cod *Gadus morhua* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 105 pp. ([www.sararegistry.gc.ca/status/status\\_e.cfm](http://www.sararegistry.gc.ca/status/status_e.cfm)).

Fisheries Act (R.S., 1985, c. F-14)

Northwest Territories Fishery Regulations (C.R.C., c. 847)

Oceans Act (1996, c.31)

Species at Risk Act (2002, c. 29)

Species At Risk Public Registry. 2010. Glossary of Terms.

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## **Annex A: *Species At Risk Act* Requirements**

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### *Prohibitions*

The addition of a species to the List of Wildlife Species at Risk as set out in Schedule 1 of the *Species At Risk Act* (SARA) results in the automatic application of certain prohibitions. These prohibitions make it an offence to kill, harm, harass, capture or take an individual of a listed species that have an Extirpated, Endangered or Threatened status (SARA sec. 32(1)). SARA prohibitions also make it an offence to possess, collect, buy, sell or trade individuals for species listed under one of the three types of status mentioned above (SARA sec. 32(2)).

### *Exemptions*

Under SARA, there are provisions that allow for an incidental harvest of species that have an Extirpated, Endangered or Threatened status through allowable harm permits and/or exempting mechanisms. These mechanisms may be invoked if the survival or recovery of the species is not hindered (SARA sections 73, 74). SARA also provides for the development of regulations that exempt individuals who possess an individual species from the application of prohibitions on possessing, buying, selling, collecting or trading an individual with an Extirpated, Endangered or Threatened status (SARA sec. 83).

### *Recovery Strategies*

For species that are listed under SARA with a status of Extirpated, Endangered or Threatened, a recovery strategy must be developed (SARA sec. 37(1)). The recovery strategy aims to identify population goals and broad approaches to aid in the recovery of a species. Under section 40 of SARA the Minister must determine whether the recovery of the species listed is technically and biologically feasible. If the recovery of a species is deemed not to be feasible by the Minister then an abridged recovery strategy will be developed, as defined in subsection 41(2). Where possible, timelines are incorporated into recovery strategies.

Once a recovery strategy has been finalized, an action plan is developed to implement the recovery strategy. The action plan must include information about critical habitat, measures to be taken to implement the recovery strategy and an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation (SARA sec. 49(1)).

### *Management Plans*

For species that are listed under SARA with a status of Special Concern, a management plan must be developed (SARA sec. 65).

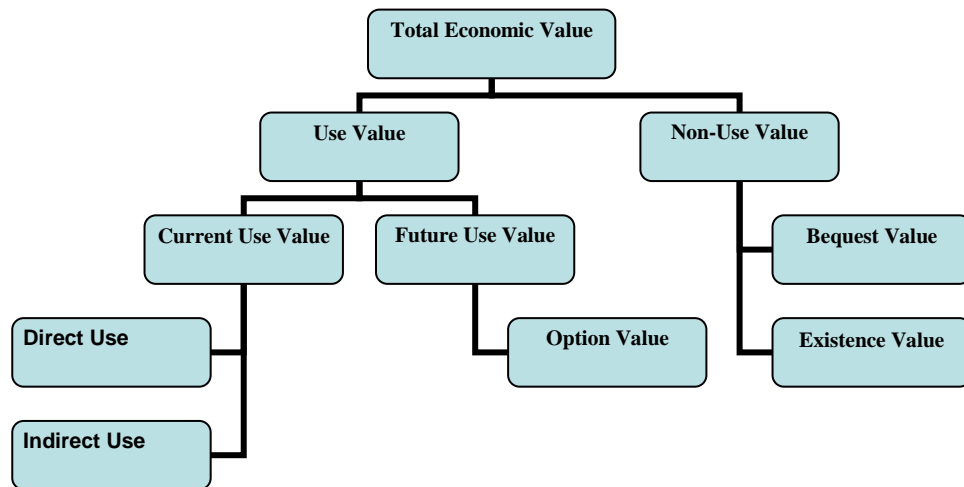
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## Annex B: Total Economic Value

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The Total Economic Value (TEV) model can be used to assess economic benefits quantitatively or qualitatively. It is an organizing principle for benefits and the categories are developed according to the reasons that individuals value a species<sup>11</sup>. It can consist of use values (current direct use, current indirect use and future use values) and non-use values (bequest and existence values).

Based on the TEV framework developed by EnviroEconomics<sup>12</sup>, a revised chart showing the total economic value is provided below.



### Definitions

**Total Economic Value:** total willingness to pay to preserve a species.

**Use Value:** the value people derive from using a good.

- **Direct use:** directly consumable goods and services (e.g. a commercial or recreational fishery for a species).
- **Indirect use:** ecosystem services (e.g. species provide nutrient cycling or act as an indicator of water quality).
- **Option value:** the amount someone is willing to pay to keep open the option of future use of the species (e.g. possibility of recreational fishing in the future).

**Non-Use Value:** the value people derive from a good, independent of any use people might make of that good.

- **Bequest value:** conservation for future generations (e.g. future biodiversity).
- **Existence value:** the intrinsic value people put on the existence of a species (e.g. recovery of species at risk, ecosystem conservation, biodiversity).

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<sup>11</sup> Fisheries and Oceans Canada, 2006. Draft Framework for Integrating Socio-economic Analysis in *Species At Risk Act* Decision Making.

<sup>12</sup> EnviroEconomics, 2009. A SocioEconomic and Cost-Benefit Analysis Framework for the Establishment of Marine Protected Areas in Canada.