

Executive Summary

The ecological impacts of fishing gear on seafloor habitat and the incidental catch of non-target marine species should play a significant role in fisheries management. Nevertheless, Canadian fisheries managers do not currently consider habitat impacts in management decisions, and only selected fisheries are managed with bycatch quota or with bycatch mitigation measures for non-target species. As a result, significant unrecorded discarding of marine species and damage to marine habitat are ongoing problems in a number of Canadian fisheries. The purpose of this study is to present a comprehensive analysis of the severity of habitat impacts and discarded bycatch resulting from major commercial fishing gears used in Canada.

The initial phase of this study consisted of a literature review of habitat impacts of fishing gear, and analysis of bycatch information where available, for all Canadian fisheries. We focused on experimental studies conducted in Canada on fishing gear impacts and international research conducted in adjacent or similar marine ecosystems to those found in Canada. Bycatch data were obtained from scientific reports on Canadian fisheries and wherever possible we analyzed data for individual fisheries, with catches greater than 1000 tonnes. The majority of the data compiled and synthesized in this review was from 2005, the most recent year for which comprehensive data was available. This information was presented at a multi-stakeholder workshop where we asked participants to review and comment on the data, contribute additional information on gear impacts and then rate those fishing gears according to their impacts. Their ratings became the basis of a survey comparing the severity of habitat and discard impact scenarios caused by 13 fishing gears used in Canada. Ninety-seven fishermen, scientists, marine conservation professionals and fisheries and marine managers across Canada completed the survey. Based on the survey results, we then ranked fishing gears according to their ecosystem impacts from most severe to least severe.

One of the most important results of this study is the agreement among stakeholders on the relative ecological impacts of fishing gear used in Canada. All respondent groups ranked the impacts associated with bottom trawls as the most severe. Canadian bottom trawl fisheries largely target groundfish in the Pacific, and shrimp and groundfish in the Atlantic and Arctic. Bottom gillnets were considered to be the second highest in the severity of habitat and bycatch impacts. Dredges, which include scallop and hydraulic clam dredges, were ranked third

in overall ecological impact. Bottom longlines followed as having the fourth highest ranking in impact severity. Midwater trawls, pots and traps, pelagic longlines and purse seines followed with respectively decreasing levels of severity of ecosystem impacts. Hook and line gear, which included rod and reel for pelagic fishes, salmon trolling and groundfish hook and line, was considered to have low impacts on habitat and bycatch. The least damaging fishing gear was the harpoon, used in the North Atlantic swordfish fishery, which was considered to have no impact on habitat or bycatch, and only affected the target species. Based on an analysis of the volume of fish caught by fishing gear type, the gear used most extensively in Canada also has the highest ecological impact.

Our results provide a clear direction for Canadian fisheries managers, scientists, and ocean policy makers, as well as a basis for a new fisheries management paradigm for how and where we should fish. As well, our results show that not all fishing gears cause the same level of damage, and that the use of less destructive fishing gear, wherever possible, will protect against further collateral damage to the Canadian marine environment. Based on the severity of fishing gear impacts reported in this study, we recommend the following to advance sustainable fisheries and resilient marine ecosystems in Canada:

- 1 *Fisheries managers should immediately implement ecologically risk averse strategies to minimize the impacts of fishing gear on habitat and bycatch. These strategies include habitat protection, and access to fishing grounds and quota allocations based on gear substitution.*
- 2 *Adequate monitoring, research and data collection on fishing gear impacts to habitat and non-target species must be undertaken, and made publicly available, to support ecosystem and spatial management practices.*
- 3 *Implement, inform and develop policies and management practices that prioritize the minimization of habitat destruction and incidental catch and discarding of target and non-target species.*



Wolffish, considered threatened under Canada's Species-At-Risk legislation are caught as bycatch in eastern Canadian groundfish fisheries. PHOTO: H.R. Yao.