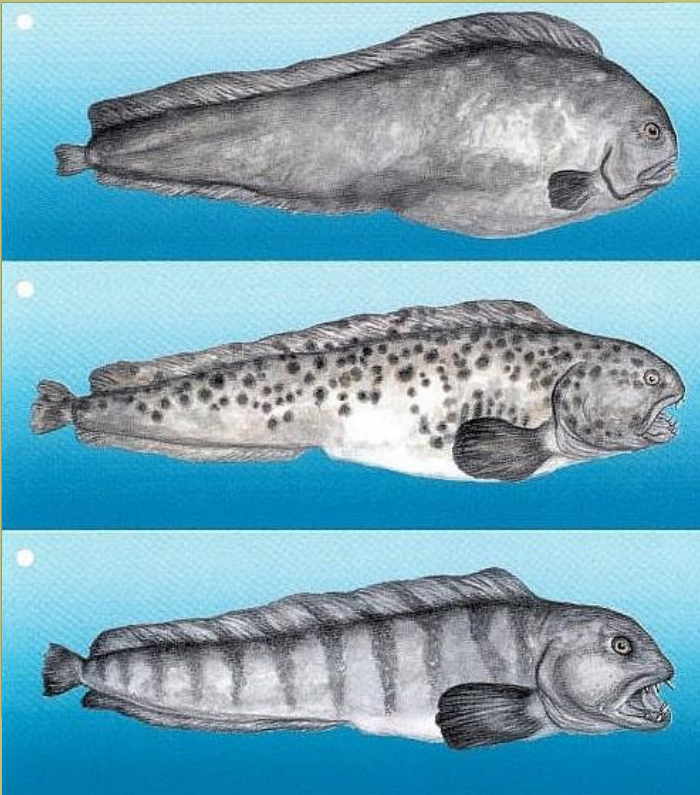


Report on the Progress of Recovery Strategy
Implementation for the Northern Wolffish (*Anarhichas
denticulatus*) and Spotted Wolffish (*Anarhichas minor*),
and Management Plan Implementation for the Atlantic
Wolffish (*Anarhichas lupus*) in Canada for the Period
2013 to 2018

Northern Wolffish, Spotted Wolffish and Atlantic Wolffish



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For copies of the progress report, or for additional information on species at risk, including Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status reports and other related recovery documents, please visit the [Species at Risk Public Registry](#).

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Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#) agreed to establish complementary legislation and programs that provide for the protection of species at risk throughout Canada. Under Section 46 of the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the competent ministers are responsible for reporting on the implementation of the recovery strategy for a species at risk, and on the progress towards meeting its objectives within five years of the date when the final recovery strategy was placed on the Species at Risk Public Registry and in every subsequent five-year period, until the recovery strategy is no longer required under SARA or the species' recovery is no longer feasible. SARA (sections 65 to 66) also requires the competent minister to prepare management plans for species listed as special concern, in cooperation and consultation with affected and interested parties. The competent minister must monitor the implementation of the management plan and must assess its implementation five years after the plan is included in the public registry, and in every subsequent five-year period, until its objectives have been achieved.

Reporting on the progress of recovery strategy and management plan implementation requires reporting on the collective efforts of the competent minister(s), provincial and territorial governments and all other parties involved in conducting activities that contribute to the species' recovery. Recovery strategies identify broad strategies and approaches that will provide the best chance of recovering species at risk. Some of the identified strategies and approaches are sequential to the progress or completion of others and not all may be undertaken or show significant progress during the timeframe of a report on the progress of recovery strategy implementation (that is, progress report). Management plans provide advice to jurisdictions and organizations that may be involved or wish to become involved in activities to conserve the species.

It should also be noted that this report covers a specific period (2013 to 2018) and, as such, some initiatives have progressed since the writing of this report (for example, establishment of the [Banc-des-Américains Marine Protected Area \(MPA\)](#) in 2019; identification of critical habitat for Northern and Spotted Wolffish in the [Recovery Strategy for the Northern Wolffish \(*Anarhichas denticulatus*\) and Spotted Wolffish \(*Anarhichas minor*\), and Management Plan for Atlantic Wolffish \(*Anarhichas lupus*\) in Canada](#) which was finalized on the Species at Risk Public Registry in 2020; [protection of identified critical habitat through an order in 2020](#), etc.). The next progress report will cover 2019 to 2023 and will provide more details on these initiatives.

Please note, previous reports may refer to the Central and Arctic region; DFO has since made an administrative change by adopting two administrative regions: Arctic region and Ontario and Prairie region. At the time of this publication, DFO Ontario and Prairie region fulfills the requirements of the *Species at Risk Act* for all aquatic species found within the former Central & Arctic region; therefore, this document refers to Ontario and Prairie region.

The Minister of Fisheries and Oceans Canada is the competent minister under SARA for the Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish and has prepared this progress report.

As stated in the preamble to SARA, success in the recovery of species at risk depends on the commitment and cooperation of many different groups that will be involved in implementing the directions set out in the recovery strategy and will not be achieved by DFO, or any other jurisdiction alone. The cost of conserving species at risk is shared amongst different

constituencies. All Canadians are invited to join in supporting and implementing the recovery strategy for the Northern Wolffish and Spotted Wolffish and the management plan for the Atlantic Wolffish for the benefit of these species and Canadian society as a whole.

Acknowledgments

This progress report was prepared by DFO – Newfoundland and Labrador region. To the fullest extent possible, this progress report has been prepared with input from DFO's Maritimes region, Gulf region, Québec region, and Ontario and Prairie region. DFO would also like to express its appreciation to all individuals and organizations who have contributed to the recovery of the Northern, Spotted, and Atlantic Wolffish.

Executive summary

The Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*) were listed as threatened, and the Atlantic Wolffish (*Anarhichas lupus*) as special concern under the SARA in 2003. The “Recovery Strategy for Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*), and Management Plan for Atlantic Wolffish (*Anarhichas lupus*) in Canada” ([Kulka et al. 2008](#)) was finalized and published on the Species at Risk Public Registry in 2008, and is hereafter referred to as the recovery strategy.

The main threat to wolffish is bycatch in fisheries targeting other species. Climate change could also affect the distribution and abundance of wolffish.

The recovery strategy identified five recovery objectives:

- 1) enhance knowledge of the biology and life history of wolffish species
- 2) identify, conserve and/or protect wolffish habitat required for viable population sizes and densities
- 3) reduce the potential of wolffish population declines by mitigating human impacts
- 4) promote wolffish population growth and recovery
- 5) develop communication and education programs to promote the conservation and recovery of wolffish populations

The “Report on the Progress of Recovery Strategy Implementation for Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*) and Management Plan Implementation for Atlantic Wolffish (*Anarhichas lupus*) in Canada for the period 2013 to 2018” (hereafter referred to as the progress report) reports on the progress made by DFO and its partners on the implementation of the objectives identified in the recovery strategy.

During this time period, progress has been made including:

- multispecies Research Vessel (RV) surveys, which constitute the primary source of information regarding the abundance/biomass, population structure, and distribution of the three wolffish species ([Collins et al. 2014](#))
- research into the impact of hypoxia on the hatching success of Spotted Wolffish eggs
- SCUBA (Self Contained Underwater Breathing Apparatus) research on inshore populations of wolffish involving the use of acoustic tags and a hydrophone network to monitor movements of individuals
- SCUBA studies of wolffish den habitats to enhance knowledge of the reproductive biology and life history of wolffish and their habitat
- the development of Marine Protected Areas (MPAs) and Conservation Areas which provide protection to wolffish and their habitat by restricting fishing activities
- the collection of data from commercial harvesters using logbooks, which provide detailed information about catches and mortality of wolffish during fishing operations
- a logbook analysis initiative that was conducted to compare observer data to logbook data to identify compliance issues
- outreach activities involving the provision of species at risk-related books to local schools, development of presentations to be delivered to school-aged children and adults, sharing of expertise among DFO regions to build Conservation and Protection Officer capacity with respect to species at risk (including wolffish), and development and distribution of wolffish educational products at local events

While there has been progress towards meeting the recovery objectives presented in the recovery strategy, continued monitoring, further clarification of threats and knowledge gaps, and increased scientific understanding will be necessary.

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1. Introduction

The “Report on the Progress of Recovery Strategy Implementation for Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*) and Management Plan Implementation for Atlantic Wolffish (*Anarhichas lupus*) in Canada for the period 2013 to 2018” (hereafter referred to as the progress report) outlines the progress made towards meeting the objectives listed in the “Recovery Strategy for Northern Wolffish (*Anarhichas denticulatus*), and Management Plan for Atlantic Wolffish (*Anarhichas lupus*) in Canada” ([Kulka et al. 2008](#)) (hereafter referred to as the recovery strategy) during the indicated time period and should be considered as one in a series of documents for these species that are linked and should be taken into consideration together. This includes the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status reports for Northern Wolffish ([COSEWIC 2001a](#) and [COSEWIC 2012a](#)), Spotted Wolffish ([COSEWIC 2001b](#) and [COSEWIC 2012b](#)), and Atlantic Wolffish ([COSEWIC 2000](#) and [COSEWIC 2012c](#)); the above-mentioned recovery strategy (Kulka et al. 2008), and the previous progress report ([DFO 2013](#)).

Section 2 of this progress report provides an overview of key information on the threats to the species, recovery and management objectives, approaches to meeting the objectives, and information on the progress of recovery. For more details, readers should refer back to the recovery strategy.

Section 3 reports on the progress of activities identified in the recovery strategy to support achieving the recovery and management objectives. Section 4 summarizes the progress toward achieving those objectives.

2. Background

2.1. COSEWIC assessment summary and threats to the species and its critical habitat

The listing of Atlantic, Northern and Spotted Wolffish under SARA in 2003 led to the development and publication of the recovery strategy in 2008 which is consistent with the information provided in the COSEWIC status report for Northern Wolffish ([COSEWIC 2001a](#)), Spotted Wolffish ([COSEWIC 2001b](#)), and Atlantic Wolffish ([COSEWIC 2000](#)). This information is included in section 1.1 of the recovery strategy.

In 2012, COSEWIC re-examined and confirmed the status of the Northern Wolffish as threatened ([COSEWIC 2012a](#)), Spotted Wolffish as threatened ([COSEWIC 2012b](#)), and Atlantic Wolffish as special concern ([COSEWIC 2012c](#)).

The recovery strategy identifies and provides information on the threats to survival and recovery of the Northern, Spotted, and Atlantic Wolffish.

Critical habitat for Northern and Spotted Wolffish was not initially identified in the original recovery strategy. However, it has been identified in the proposed amended “Recovery Strategy for Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*), and Management Plan for Atlantic Wolffish (*Anarhichas lupus*) in Canada” ([DFO 2018a](#)) which was posted on the Species at Risk Public Registry in July 2018. The amended recovery strategy was finalized outside the reporting period, and will be reported on in the next progress report.

Part B, section 2.5.1 of the original recovery strategy includes a schedule of studies that outlines the research required to identify critical habitat to achieve the species' recovery objectives. Progress in undertaking the schedule of studies is reported in section 3.2 of this document.

2.2. Recovery

This section summarizes the information, found in the recovery strategy, pertaining to recovery and management objectives that are necessary for the recovery of the Northern, Spotted, and Atlantic Wolffish and on recovery strategies and specific actions to meet recovery objectives.

The recovery strategy did not include performance indicators. The progress towards achieving recovery and management objectives will be informed by the progress made under the recovery strategies and studies in section 3.1 and 3.2 below. Part B, section 2.3 of the recovery strategy describes the five strategies that constitute the basis of a framework for recovery: A) research, B) habitat conservation and protection, C) mitigation of human activities, D) promotion of public knowledge and stakeholder participation in the recovery of wolffish populations and the conservation and protection of their habitat, and E) monitoring of human activities. Table 21 of the recovery strategy (table 1 below) lists specific actions associated with these strategies that are required to achieve species recovery and anticipated effects of those actions.

Table 1. Linking recovery objectives to strategies and specific actions required to promote recovery of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish, reproduced from recovery strategy (Kulka et al. 2008).

Priority	Recovery objective	Recovery strategy	Recovery actions	Anticipated effect
Necessary, ongoing	1, 2, 4	A. Research	Conduct directed research on: <ol style="list-style-type: none"> 1. life history 2. population structure 3. identify limit reference points 4. ecosystem interactions 	Better adaptive management decisions
Necessary, ongoing	2, 4, 5	B. Habitat conservation and protection	<ol style="list-style-type: none"> 1. identify habitat 2. define measures to conserve and/or protect wolffish habitat 	Increase potential of spawning, rearing, feeding, and other life processes
Urgent	3, 4, 5	C. Mitigate human activities	<ol style="list-style-type: none"> 1. identify and mitigate impacts 	Direct benefit to species numbers, reducing mortality at all life stages

Priority	Recovery objective	Recovery strategy	Recovery actions	Anticipated effect
Necessary, ongoing	3, 4, 5	D. Promote public knowledge and stakeholder participation in the recovery of wolffish populations and the conservation and protection of their habitat	Through: 1. education 2. stewardship 3. consultation 4. cooperation	Support for management measures and other recovery strategies
Ongoing	3, 4	E. Monitor human activities	1. monitor wolffish spatial and temporal abundance patterns 2. monitor spatial and temporal patterns in natural and human induced mortality	Better adaptive management decisions

3. Progress towards recovery

The recovery strategy identifies the following five broad inter-related objectives, all of which are relevant to activities that may be mitigated through human intervention:

- Objective 1:** enhance knowledge of the biology and life history of wolffish species
- Objective 2:** identify, conserve and/or protect wolffish habitat required for viable population sizes and densities
- Objective 3:** reduce the potential of wolffish population declines by mitigating human impacts
- Objective 4:** promote wolffish population growth and recovery
- Objective 5:** develop communication and education programs to promote the conservation and recovery of wolffish populations

These objectives are linked to the five recovery strategies that include specific actions required for implementing the recovery strategy and constitute the basis of a framework for recovery: A) research, B) habitat conservation and protection, C) mitigation of human activities, D) promotion of public knowledge and stakeholder participation in the recovery of wolffish populations, and the conservation and protection of their habitat, and E) monitoring of human activities.

Progress in carrying out these strategies is reported in section 3.1. Section 3.2 reports on the activities identified in the Schedule of Studies to identify critical habitat. Section 3.3 reports on

the progress of recovery through commitments identified in the recovery strategy (that is, action plan and critical habitat order) and information obtained through implementing the recovery strategy.

3.1. Activities supporting recovery

Table 2 provides information on the implementation of activities undertaken to address the strategies and actions identified in the recovery planning table of the recovery strategy (table 1).

Table 2. Details of activities supporting the recovery of the Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish from 2013 to 2018.

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
A	Conduct directed research on: 1) life history 2) population structure 3) identify limit reference points 4) ecosystem interactions	Fisheries and Oceans Canada (DFO) conducts multispecies Research Vessel (RV) surveys, which constitute the primary source of information regarding the abundance/biomass, population structure, and distribution of all three wolffish species in the Northwest Atlantic and Arctic Oceans (Collins et al. 2014). For the Newfoundland and Labrador (NL) region, the most recent available indices for the time period covered by this report can be found in Rideout et al. (2017) . Since the mid-90s in the Newfoundland and Labrador region, the spring survey biomass index for Northern Wolffish has varied without trend, while the fall survey biomass index increased considerably. Since the mid-90s, spring survey biomass index for Spotted Wolffish has varied without trend, while fall survey biomass index has increased. In 2016, spring and fall survey catches occurred in Div. 3LN, but the fall survey, which covers a greater area, including the northern Newfoundland and Labrador Shelves, consists of catches in Div. 2HJ and 3KL. In the Maritimes region, trends in the abundance/biomass and distribution of Atlantic Wolffish are monitored on the Scotian Shelf and Bay of Fundy by the annual summer ecosystem RV survey. The biomass index has been less than 40% of the long-term geometric mean since 2009. The Gulf region contributes biological and distribution data for all three species of wolffish found in the southern Gulf of St. Lawrence (4T), through multispecies bottom trawl RV surveys, the at-sea observer program, and the sentinel survey program. For the Quebec region (4RS), wolffish distribution and abundance varied without trends for all three species between 1990 and 2013 (Collins et al. 2014).	1, 2, and 4	DFO

¹ Lead participant(s) is/are listed on top and in bold; other participants are listed alphabetically

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
		<p>In the Quebec region, research is being conducted on the impact of hypoxia on the hatching success of Spotted Wolffish eggs. Deep water is typically poorer in dissolved oxygen than surface water. This is particularly the case in the Gulf of St. Lawrence, where the water is hypoxic (20% to 40% saturation) at depths greater than 175 m. However, Spotted Wolffish eggs develop on the sea floor. The research objective is to determine the hatching success of Spotted Wolffish eggs at four dissolved oxygen levels and to measure embryonic development and hatching success. Preliminary analysis of the results shows that at 15 to 25% saturation, a very high number of malformations occur and no hatching is possible. At 35%, the occurrence of malformations is higher and hatching success lower than at normoxia (20% oxygen). The principals have indicated that dissolved oxygen should be considered in defining the critical habitat of this species.</p>		
B	<p>1) Identify habitat 2) Define measures to conserve and/or protect wolffish habitat</p>	<p>DFO has conducted smaller-scale SCUBA (Self Contained Underwater Breathing Apparatus) research on inshore populations of wolffish. Specifically, this involves the use of acoustic tags and a hydrophone network to monitor movements of individuals. Further information on this project can be found in Simpson et al. (2015). DFO is also conducting nearshore SCUBA studies of wolffish den habitats to enhance our knowledge of the reproductive biology and life history of wolffish and their habitat.</p> <p>Wolffish data was used to support species at risk as a conservation priority within the draft Marine Protected Area (MPA) Network Configuration, Marine Protected Areas (MPAs) Network Plan in the Estuary and Gulf of St.</p>	2, 4, and 5	<p>DFO, other federal government departments, Québec government, Indigenous groups, fishing industry</p>

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
		<p>Lawrence and Newfoundland-Labrador Shelves bioregions. The draft network plan should help identify areas of potential interaction between human activities and these species or their habitats and a resultant risk analysis will be carried out as part of an action plan. The exercise to develop a network of MPAs in the Estuary and Gulf of St. Lawrence Bioregion ceased in 2018 and since then DFO has been undertaking conservation planning under its marine spatial planning process. Information from these processes will be made available to species at risk practitioners for recovery planning.</p> <p>The proposed amended recovery strategy (DFO 2018a) as well as the “Action Plan for the Northern Wolffish (<i>Anarhichas denticulatus</i>) and Spotted Wolffish (<i>Anarhichas minor</i>) in Canada” (DFO 2018b) were posted on the Species at Risk Public Registry in July 2018.</p> <p>The Government of Canada is in the process of establishing the Banc-des-Américains (American Bank) Marine Protected Area.² This will be the first joint project under the Canada–Quebec Collaborative Agreement to Establish a Network of Marine Protected Areas in Quebec. This MPA will promote the recovery of the three wolffish species at risk by preserving unique, rich, and productive habitat. The federal and provincial regulations will protect a 1,000 km² area (the Banc-des-Américains) described as a “biological crossroads”. The area is home to species including the Atlantic Wolffish, which is particularly fond of the rocky cavities found there. The Northern Wolffish and Spotted Wolffish, rarer species in the area, have also previously been observed. Oil and gas exploration or development will</p>		

² The Banc-des-Américains Marine Protected Area was established in 2019, outside of the reporting period.

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
		<p>be prohibited in the Banc-des-Américains. A more sensitive core protection zone measuring 127 km² will be closed to all commercial or recreational fishing. Specific activities that do not compromise conservation objectives will be permitted within the MPA (as exceptions to the general prohibition).</p>		
C	Identify and mitigate impacts	<p>During the regulatory review of marine projects by DFO, wolffish are considered in the analysis of potential environmental interactions and effects, and standard mitigation measures are recommended to avoid or reduce adverse interactions with species at risk.</p> <p>The St. Ann’s Bank MPA, located east of Cape Breton, Nova Scotia, contains habitat considered important for wolffish. Fisheries closures within the MPA may provide some level of protection to wolffish and their habitat.</p> <p>The Western/Emerald Banks Conservation Area is a closed area on the Scotian Shelf where wolffish are known to occur. The measures in place in this closed area are intended to prevent the incidental or directed catch of groundfish (including wolffish species) and the destruction of their habitat. Measures include a prohibition on bottom-contact gear and/or gear known to interact with groundfish, in a large percentage of the closed area.</p> <p>In the Maritimes region, there is no assessment model nor are there reference points for Atlantic Wolffish; however a harvest strategy has been developed and implemented (via bycatch limits and caps). In the NL region, bycatch limits for Atlantic Wolffish are stipulated in the Groundfish General Licence Conditions.</p>	3, 4, and 5	DFO , at-sea observers, fishing industry

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
		<p>DFO conducts inspections on wharves and at-sea (lobster, crab, herring, shrimp, and halibut fisheries) and check for bycatch retention of wolffish and other species at risk.</p> <p>Observers are usually trained to identify the three wolffish species and know to ensure Northern Wolffish and Spotted Wolffish are returned to the water promptly and in a manner that causes the least harm. A wolffish identification card is available for use in At-Sea Observer training programs. Wolffish catches are recorded in observer data as a capture that is discarded.</p> <p>In accordance with the recovery strategies for the Northern Wolffish and Spotted Wolffish, licence holders are permitted to carry out commercial fishing activities authorized under the <i>Fisheries Act</i> that may incidentally kill, harm, harass, capture or take the Northern Wolffish and/or Spotted Wolffish as per subsection 83(4) of the <i>Species at Risk Act</i> (SARA). Licence holders are required to return Northern Wolffish and Spotted Wolffish to the place from which it was taken, and where it is alive, in a manner that causes the least harm. Licence holders are also required to report in their logbook any interaction with Northern Wolffish and Spotted Wolffish. Logbook data (which may include the number of specimens, the weight, date and the gear's position at the time) will help determine the impact of commercial fisheries on wolffish recovery and conservation.</p> <p>While not specifically done for wolffish, snow crab pots and lobster traps must have escape vents and biodegradable panels to reduce bycatch. These measures would help mitigate wolffish bycatch to some extent, as it does for other groundfish species.</p>		

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
D	<p>Promotion through:</p> <ol style="list-style-type: none"> 1) Education 2) Stewardship 3) Consultation 4) Cooperation 	<p>DFO has helped to increase awareness of wolffish by developing and distributing items such as brochures, factsheets, posters, and DVDs, which have been given out to fish harvesters and fish plant workers, to students during school visits, and to the public at various outreach events. For example, DFO developed species at risk “fact-tellers” featuring the Atlantic Wolffish which were distributed at events such as World Ocean’s Day and BIO Expo 2017. Other promotional items developed by DFO include stickers, temporary tattoos, and species at risk identification cards.</p> <p>DFO provided materials for outreach and education in schools - four bookcases containing books relating to SARA species and sea life. Special DFO/SARA decals were purchased for local schools in Québec and Ontario.</p> <p>Slideshow presentations appropriate for primary/elementary, junior high/high school and adults have been developed and are delivered in the regions by DFO.</p> <p>DFO-NL Region provided expertise and materials to Québec Region and Ontario and Prairie Region to share best practices and help build Conservation and Protection Officer capacity in those regions. In November 2017, DFO held the Gulf region Open House, and information about the three species of wolffish was presented to all visitors. This event targeted members of municipal, provincial and other federal government departments, Indigenous groups and stakeholders (fishing industry, non-government organizations [NGOs]).</p> <p>DFO disseminated video clips and other educational material (via social media and distribution lists) on topics</p>	3, 4, 5	DFO, ECCC, NGOs

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
		<p>such as the appropriate release technique for accidentally caught wolffish.</p> <p>Two Open Houses were organized in October 2017 for the 30th anniversary of the Maurice Lamontagne Institute (DFO, Mont-Joli, QC). They allowed the general public to see Spotted Wolffish live, in tanks, or placed in respirometers to illustrate the method used to measure their oxygen consumption. A survey of visitors asked if they found the fish "pretty" or "ugly": the majority of respondents chose "pretty".</p> <p>Habitat Stewardship Program (HSP) funding is provided by DFO to support local stewardship initiatives led primarily by environmental non-government organizations. Several projects that have been funded have a focus on implementing activities described in the recovery strategy for wolffish. For example, in 2014 the Quebec-Labrador Foundation (QLF) conducted a project to help address the threat of mortality due to by-catch for Northern, Spotted, and Atlantic Wolffish by interacting with fishers to encourage live release of wolffish in the place where caught and encouraging fishers to record by-catch in logbooks. Other stewardship related funding is available such as the Aboriginal Fund for Species at Risk (AFSAR).</p>		
E	<p>1) Monitor wolffish spatial and temporal abundance patterns</p> <p>2) Monitor spatial and temporal patterns in natural and human induced mortality</p>	<p>DFO conducts multispecies RV surveys, which constitute the primary source of information regarding the distribution and biomass/abundance of the three wolffish species in the Northwest Atlantic and Arctic Oceans (Collins et al. 2014; Rideout et al. 2017). In addition, DFO conducts inshore dive surveys to identify and collect relevant data on wolffish nesting sites, and employs acoustic tags in conjunction with a hydrophone network to monitor movements. Further</p>	3 and 4	<p>DFO, commercial fishers, at-sea observers</p>

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
		<p>information on this project can be found in Simpson et al. (2015).</p> <p>DFO incorporates fishery removal data into assessments of Northern and Spotted Wolffish, which can be used in conjunction with changes in survey biomass/abundance indices to provide scientific advice and promote conservation.</p> <p>As per the Groundfish General License Conditions and/or Conservation Harvesting Plans, bycatch limits and/or caps are implemented. In the Maritimes region, Atlantic Wolffish (Special Concern; no prohibitions under SARA) may be landed in commercial Groundfish fisheries. Commercial licence holders are required to complete monitoring documents that include the round weight of landed catch of Atlantic Wolffish, as well as information on the fishing activity. No other fishery is permitted to land Atlantic Wolffish. In the NL region, licence holders are encouraged to release Atlantic Wolffish in commercial Groundfish fisheries but they are not legally required to do so. Any catches, including discards, must be recorded in their commercial logbooks as per the conditions of licence. There is also 100% dockside monitoring for commercial landings. For the NL recreational Groundfish fishery, participants must release Northern and Spotted Wolffish and catches of Atlantic Wolffish must be retained and counted toward their daily bag limit. In the Gulf region, all licence conditions issued through the National Online Licensing System has a series of conditions on how species at risk, including the three species of wolffish, must be treated and how to report the interactions.</p>		

Recovery strategies	Recovery actions	Descriptions and results	Recovery objectives	Participants ¹
		<p>DFO collects data from commercial harvesters using SARA logbooks, which provide detailed information about catches and mortality of wolffish during fishing operations.</p> <p>In 2017/18, DFO conducted a national logbook analysis initiative, where observer data was collected to enable evaluation of the reliability of bycatch data. The initiative provided data to support analysis of allowable harm and verified monitoring and educational needs. Observer data was collected on vessels that were heading into areas known for wolffish bycatch, with the observer being briefed on the purpose of the project. The observer data in comparison to the logbook data is currently being reviewed to determine any trends and compliance issues.</p>		

3.2. Activities supporting the identification of critical habitat

Table 3 provides information on the implementation of the studies outlined in the schedule of studies to identify critical habitat found in the original recovery strategy. Each study has been assigned one of four statuses:

- 1) completed: the study has been carried out and concluded
- 2) in progress: the study is underway and has not concluded
- 3) not started: the study has been planned but has yet to start
- 4) cancelled: the study will not be started or completed

Table 3. Status and details of the implementation of the schedule of studies outlined in the original recovery strategy for Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish.

Study	Status	Descriptions and results	Participants
Habitat characteristics and the environmental factors that control or limit distribution, abundance, growth, reproduction, mortality and productivity of wolffish.	In progress	Fisheries and Oceans Canada (DFO) conducts multispecies Research Vessel (RV) surveys, which constitute the primary source of information regarding the distribution of the three species of wolffish in the Atlantic and Arctic Oceans. The most recent available indices can be found in Rideout et al. (2017) . Data on depth and temperature are collected as part of this survey. In addition, DFO conducts inshore SCUBA (Self Contained Underwater Breathing Apparatus) surveys to identify wolffish nesting sites.	DFO
The physical, chemical and biological components of the ecosystem where wolffish occur.	In progress	DFO conducts multispecies RV surveys, which constitute the primary source of information regarding the physical and biological components of ecosystems where wolffish occur in the Atlantic and Arctic Oceans. Information on depth and temperature associations can be found in Collins et al. (2014) . In addition, DFO conducts inshore diving surveys to identify and collect relevant data on wolffish nesting sites, and employs acoustic tags in conjunction with a hydrophone network to monitor individual movements. Further information on this project can be found in Simpson et al. (2015) .	DFO

Study	Status	Descriptions and results	Participants
Spatial and temporal foraging and shelter/resting areas to determine habitat associations.	In progress	DFO conducts multispecies RV surveys, which constitute the primary source of information regarding the distribution of the three wolffish species in the Atlantic and Arctic Oceans (Collins et al. 2014). In addition, DFO conducts inshore dive surveys to identify and collect relevant data on wolffish nesting sites, and employs acoustic tags in conjunction with a hydrophone network to monitor movements. Further information on this project can be found in Simpson et al. (2015) .	DFO
Current and historical geographic range and stock size to determine spawning grounds, rearing areas, feeding grounds and the locations of important life history processes.	In progress	DFO conducts multispecies RV surveys, which permit estimates of minimum trawlable biomass/abundance of both Northern Wolffish and Spotted Wolffish (Collins et al. 2014). The most recent available indices can be found in Rideout et al. (2017) .	DFO
The definition of critical habitat, if possible, for wolffish in eastern Canadian waters in order to determine priority habitat sites.	In progress	Critical habitat for Northern and Spotted Wolffish has been identified in the proposed amended recovery strategy (DFO 2018a) which was posted on the Species at Risk Public Registry in July 2018. Please refer to section 6 of the abovementioned document for further information on critical habitat.	DFO

3.3. Summary of progress towards recovery

This section is included to report on the outcomes of general approaches as listed in section 2.2 of this document. As previously stated in section 2.2, performance indicators were not identified in the original recovery strategy. Progress in research and monitoring activities, critical habitat, management activities, and stewardship and education were discussed previously in section 3.2.

The proposed amended recovery strategy was posted on the Species at Risk Public Registry in July 2018 and finalized outside of the reporting period.

3.3.1. Completion of action plan

The proposed action plan was posted on the Species at Risk Public Registry in July 2018. The final version of the action plan was finalized outside of the reporting period, and its finalization will be reported on in the next progress report.

3.3.2. Critical habitat identification and protection

Critical habitat was not originally identified in the recovery strategy for Northern and Spotted Wolffish published in 2008. However, it has been identified in the proposed amended recovery strategy, which was posted on the Species at Risk Public Registry in July 2018 and posted as final outside of the reporting period. A critical habitat order for Northern and Spotted Wolffish was made in 2020, and will be reported on in the next progress report.

3.3.3. Recovery feasibility

Based on knowledge accumulated to date, the recovery of wolffish species as stated in the original recovery strategy is still considered feasible. The recovery strategy has been amended using the most up to date information and data available, and the updated document, along with an action plan for Northern and Spotted Wolffish, has been posted as proposed on the Species at Risk Public Registry. The amended recovery strategy was finalized outside of the reporting period, and will be reported on in the next reporting period. The most significant change in the amended recovery strategy is the identification of critical habitat. Although the document has been amended, the original recovery objectives are still relevant and realistic. Progress has been made on objectives 1 through 5, as set out in the recovery strategy, but further work is required to fully achieve all the objectives. At this time there is no need to shift priorities set for the various implementation activities.

4. Concluding statement

From 2013 to 2018, through the implementation of the activities identified in the recovery strategy, progress has been made towards fulfilling the recovery objectives set out in the strategy. In addition, management and stewardship activities have increased awareness of wolffish and their status.

DFO has conducted multispecies RV surveys, which constitute the primary source of information regarding the abundance/biomass, population structure, and distribution of all three wolffish species. There has also been SCUBA research on inshore populations of wolffish to

monitor movements of individuals, as well as studies of wolffish den habitats to enhance knowledge of the reproductive biology and life history of wolffish and their habitat.

The use of wolffish data as conservation priorities within the draft MPA network design will help identify areas of potential interaction between human activities and these species or their habitats. A risk analysis will be carried out as part of an action plan for the network implementation. The establishment of the Banc-des-Américains (American Bank) as a marine protected area will promote the recovery of the three wolffish species by preserving unique, rich, and productive habitat. The establishment of other protected areas, such as the St. Ann's Bank MPA and the Western/Emerald Banks Conservation Area, may provide some level of protection to wolffish and their habitat by preventing incidental catch and habitat degradation through fisheries closures.

Bycatch was identified as an important cause of human induced mortality of wolffish and, as such, commercial fishing licence holders are required to return individual Northern Wolffish and Spotted Wolffish to the place from which it was taken, and where it is alive, in a manner that causes the least harm. Licence holders are also required to report in their logbook any interaction with Northern Wolffish and Spotted Wolffish, which will help determine the impact of the fishery.

Stewardship activities via the Habitat Stewardship Program have been conducted by non-government organizations with a focus on implementing activities described in the recovery strategy for wolffish. A variety of educational materials have been developed and distributed by DFO through numerous outreach events targeting students, the fishing industry, and the general public.

In a national logbook analysis initiative, conducted by DFO, observer data was collected to enable evaluation of the reliability of bycatch data. The initiative provided data to support analysis of allowable harm and verified monitoring and educational needs.

The proposed amended recovery strategy as well as the proposed action plan were posted on the Species at Risk Public Registry in July 2018. The most significant portion of the amendment is the identification of critical habitat for Northern and Spotted Wolffish. The proposed action plan provides specific details for recovery implementation including measures to monitor and implement recovery, address threats, and achieve recovery objectives.

DFO remains committed to continuing the effort to recover the Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish. The progress made thus far has been achieved in part by the contribution from our partners. DFO is looking forward to continuing our successful collaborations and welcomes the participation of additional partners.

5. References

- Collins, R.K., Simpson, M.R., Miri, C.M., Mello, L.G.S., Chabot, D., Hedges, K., Benoît, H., McIntyre, T.M. 2014. [Assessment of Northern Wolffish, Spotted Wolffish, and Atlantic Wolffish in the Atlantic and Arctic Oceans](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2014/034. iv + 86 p.
- COSEWIC. 2000. [COSEWIC Assessment and Status Report on the Atlantic Wolffish *Anarhichas lupus* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa.
- COSEWIC. 2001a. [COSEWIC Assessment and Status Report on the Northern Wolffish *Anarhichas denticulatus* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 21 p.
- COSEWIC. 2001b. [COSEWIC Assessment and Status Report on the Spotted Wolffish *Anarhichas minor* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 22 pp.
- COSEWIC. 2012a. [COSEWIC Assessment and Status Report on the Northern Wolffish *Anarhichas denticulatus* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 41 p.
- COSEWIC. 2012b. [COSEWIC Assessment and Status Report on the Spotted Wolffish *Anarhichas minor* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 44 p.
- COSEWIC. 2012c. [COSEWIC Assessment and Status Report on the Atlantic Wolffish *Anarhichas lupus* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 56 p.
- DFO. 2013. [Report on the Progress of Implementation of the Recovery Strategy for Northern Wolffish \(*Anarhichas denticulatus*\) and Spotted Wolffish \(*Anarhichas minor*\), and Management Plan for Atlantic Wolffish \(*Anarhichas lupus*\) in Canada for the Period 2008-2013](#). *Species at Risk Act* Recovery Strategy Report Series. Fisheries and Oceans Canada, Ottawa. vi + 16 pp.
- DFO. 2018a. [Recovery Strategy for Northern Wolffish \(*Anarhichas denticulatus*\) and Spotted Wolffish \(*Anarhichas minor*\), and Management Plan for Atlantic Wolffish \(*Anarhichas lupus*\) in Canada \[proposed\]](#). Fisheries and Oceans Canada, Ottawa. vii + 82 p.
- DFO. 2018b. [Action Plan for the Northern Wolffish \(*Anarhichas denticulatus*\) and Spotted Wolffish \(*Anarhichas minor*\) in Canada \[Proposed\]](#). *Species at Risk Act* Action Plan Series. Fisheries and Oceans Canada, Ottawa. v + 23 p.
- Kulka, D., C. Hood and J. Huntington. 2008. [Recovery Strategy for Northern Wolffish \(*Anarhichas denticulatus*\) and Spotted Wolffish \(*Anarhichas minor*\), and Management Plan for Atlantic Wolffish \(*Anarhichas lupus*\) in Canada](#). Fisheries and Oceans Canada: Newfoundland and Labrador Region. St. John's, NL. x + 103 pp.

R.M. Rideout, D. Power, D.W. Ings, L. J. Wheeland, and B.P. Healey. 2017. [Canadian multi-species bottom trawl surveys in NAFO subarea 2 + Divisions 3KLNOPs: Vessel performance, catch distribution and survey biomass trends of key finfish resources with emphasis on 2016](#). NAFO SCR 17/044, Ser. No. N6700.

Simpson, M.R., L.G.S. Mello, C.M. Miri, R. Collins, C. Holloway, and T. Maddigan. 2015. [A Preliminary Analysis of Habitat Use and Movement Patterns of Wolffish \(*Anarhichas spp.*\) in Coastal Newfoundland Waters](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2014/033. v + 27 p.