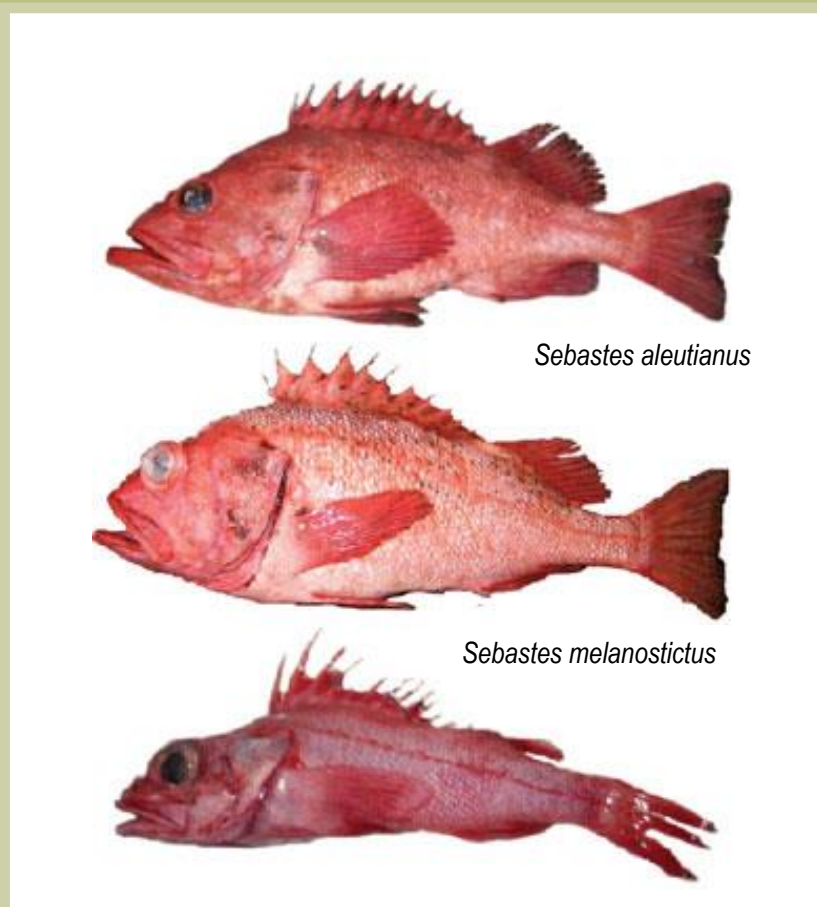


Report on the Progress of Management Plan Implementation for the Rougheye/Blackspotted Rockfish complex (*Sebastes aleutianus* and *S. melanostictus*) and Longspine Thornyhead (*Sebastolobus altivelis*) in Canada for the Period 2012 to 2020



2023

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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, recovery strategies, residence descriptions, action plans, 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 72 of the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the competent minister must monitor the implementation of the management plan and must assess its implementation 5 years after the plan is included in the public registry, and in every subsequent 5 year period until its objectives have been achieved.

Reporting on the progress of management plan implementation requires reporting on the collective efforts of the competent ministers, provincial and territorial governments, and all other parties involved in conducting activities that contribute to the species' conservation. Management plans set 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. Some of the identified broad 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 management plan implementation (progress report).

The Minister of Fisheries and Oceans, and the Minister responsible for Parks Canada (that is, the Minister of Environment and Climate Change) are the competent ministers under SARA for the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead and have prepared this progress report.

As stated in the preamble to SARA, success in the conservation of species at risk depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in the management plan and will not be achieved by Fisheries and Oceans Canada (DFO), Parks Canada (PC) or any other jurisdiction alone. The cost of recovering and conserving species at risk is shared amongst different constituencies. All Canadians are invited to join in supporting and implementing the management plan for the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead for the benefit of the species and Canadian society as a whole.

Acknowledgments

This progress report was prepared by Rhona Govender (DFO) with input from Heather Brekke (DFO), Rowan Haigh (DFO), Greg Workman (DFO), Paul Grant (DFO), Lindsay Gardner (DFO), Jessica Banning (DFO) and PC. DFO would like to express its appreciation to all individuals and organizations who have contributed to the conservation of the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead.

Executive summary

The Rougheye/Blackspotted Rockfish complex (*Sebastes aleutianus* and *Sebastes melanostictus*) and Longspine Thornyhead (*Sebastolobus altivelis*) were listed as species of special concern under the *Species at Risk Act* (SARA) in 2009. The “Management Plan for the Rougheye/Blackspotted Rockfish complex (*Sebastes aleutianus* and *S. melanostictus*) and Longspine Thornyhead (*Sebastolobus altivelis*) in Canada” (management plan)(DFO 2012a) was finalized and published on the [Species at Risk Public Registry](#) in 2012.

The primary threat identified for these species is commercial fishing, which is the largest known source of mortality. Other identified threats include recreational and Indigenous fisheries, research harvest, climate change, and pollution.

The management goal for the Rougheye Rockfish, Blackspotted Rockfish, and Longspine Thornyhead is to: “maintain sustainable populations within each species’ known range in Canadian Pacific waters.”

The management objectives for Rougheye Rockfish, Blackspotted Rockfish and Longspine Thornyhead are to:

1. maintain the Rougheye Rockfish, Blackspotted Rockfish, and Longspine Thornyhead population ranges in Canadian Pacific waters
2. continue management under the Commercial Groundfish Integration Program, employing management tools when necessary, as indicated by monitoring and assessment of the stocks
3. account for total catch (retained and released) of Rougheye Rockfish, Blackspotted Rockfish and Longspine Thornyhead, and examine species removal trends in commercial fisheries, Fisheries and Oceans Canada (DFO) surveys, recreational, and Indigenous Fisheries
4. enhance existing DFO research, where resources and funding are available, to gather more information on stock status, including relative abundance and distribution of each species
5. produce peer-reviewed stock assessments and harvest advice for the Rougheye Rockfish, Blackspotted Rockfish and Longspine Thornyhead
6. support and contribute to research that addresses knowledge gaps, as well as the effects of other identified and non-identified threats, on an ongoing basis

This “Report on the Progress of Management Plan Implementation for the Rougheye/Blackspotted complex and Longspine Thornyhead in Canada for the Period 2012 to 2020” (progress report) reports on the progress made by DFO and its partners towards implementing the management plan and achieving its goal and objectives. Due to delays in completing the report on a 5 year cycle, an extension to the reporting period was established in order to capture the most up to date information. During this time period, progress has been made in addressing knowledge gaps in the following ways:

- increasing the number of tows (sample size) in deep strata when vessel capability permitted
- obtaining and processing genetic samples from Rougheye and Blackspotted Rockfish in annual research surveys

- obtaining and processing over 1,400 otoliths from Rougheye and Blackspotted Rockfish from annual research surveys to improve aging capability
- assessing and implementing the applicability of tools (for example, Data-Limited Methods Toolkit [DLMTool]) used to evaluate data-limited species such as the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead, and incorporating these tools in the development of a Management Procedure Framework for Groundfish in British Columbia
- completing a stock assessment for Rougheye/Blackspotted Rockfish complex (North and South populations) focusing on the provision of harvest advice to groundfish managers

The 2020 Rougheye/Blackspotted Rockfish assessment showed that populations in both the North (predominantly Blackspotted) and South (predominantly Rougheye) are in decline, but are projected to stabilize at sustainable levels under the current management regime. Furthermore, both populations are estimated to be in the “healthy zone” (above provisional upper stock reference point) under the [Precautionary Approach \(PA\) Framework](#). Current status of Longspine Thornyhead is not known, however, and is managed through total allowable catch and monitoring of annual catch. Although DFO does not have a recent stock assessment for Longspine Thornyhead, the population is assumed to be stable based on consistent annual catch rates.

While progress has been made towards meeting the goal and objectives of the management plan, more work needs to be undertaken to better understand stock structure, and to complete regular stock assessments for Longspine Thornyhead, Rougheye Rockfish, and Blackspotted Rockfish to ensure conservation of the 3 species.

Table of contents

Preface	i
Acknowledgments.....	i
Executive summary.....	ii
1 Introduction	1
2 Background.....	1
2.1 COSEWIC assessment summary	1
2.2 Conservation.....	2
3 Progress towards conservation	2
3.1 Activities supporting conservation	3
3.2 Summary of progress towards conservation	14
3.2.1 Status of activities.....	14
4 Concluding statement.....	14
5. References.....	16

1 Introduction

This “Report on the Progress of Management Plan Implementation for the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead in Canada for the Period 2012 to 2020” (progress report) outlines the progress made towards meeting the goal and objectives listed in the “Management Plan for the Rougheye/Blackspotted Rockfish complex (*Sebastes aleutianus* and *Sebastes melanostictus*) and Longspine Thornyhead (*Sebastes altivelis*) in Canada” (management plan) ([DFO \[Fisheries and Oceans Canada\] 2012a](#)) during the indicated time period. The reporting period covers 8 years of management plan implementation in order to reflect the most up to date information and should be considered as 1 in a series of documents that should be taken into consideration with the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Assessment and Status Reports ([COSEWIC 2007a](#); [2007b](#)) and the management plan (DFO 2012a).

Rougheye Rockfish were believed to be a single species until genetic and morphological analyses showed that there are 2 distinct species (Orr and Hawkins 2008). Therefore, the COSEWIC assessment (COSEWIC 2007a) refers to Rougheye Rockfish Types I and II, whereas the *Species at Risk Act* (SARA) management plan (DFO 2012a) further distinguishes Rougheye Rockfish from Blackspotted Rockfish based on this more recent taxonomic review. Rougheye and Blackspotted Rockfish are managed as 1 complex due to their morphological similarities. The recent 2020 stock assessment clarified the delineation of the populations into North and South; the North (Area 5DE) primarily comprises Blackspotted Rockfish, whereas the South (3CD5AB) primarily comprises Rougheye Rockfish.

Section 2 of the progress report summarizes key information on the threats to the Rougheye/Blackspotted Rockfish complex and the Longspine Thornyhead, the management goal and objectives, and performance measures to assess and determine if the goal and objectives are being met. For more detail, readers should refer back to the management plan. Section 3 reports on the progress of activities identified in the management plan to support achieving the management goal and objectives. Section 4 summarizes the progress towards achieving those objectives.

2 Background

2.1 COSEWIC assessment summary

The listing of the Rougheye/Blackspotted complex and Longspine Thornyhead under SARA in 2009 as special concern led to the development and publication of the management plan. The management plan is consistent with the information provided in the COSEWIC Assessment and Status Report for the Rougheye/Blackspotted complex except that COSEWIC assessed Rougheye Rockfish (*Sebastes aleutianus*) as a pair of sympatric species within the known *Sebastes aleutianus* complex (COSEWIC 2007a). The management plan recognizes species-level variation in the Rougheye Rockfish and identifies ‘Type I’ as *Sebastes melanostictus* (common name Blackspotted Rockfish), and ‘Type II’ as *Sebastes aleutianus* (common name Rougheye Rockfish) (DFO 2012a). A COSEWIC reassessment is anticipated once the genetic analyses described in activities 7 and 12 in table 1 of this progress report have been completed.

The management plan is consistent with the information provided in the COSEWIC Assessment and Status Report for Longspine Thornyhead ([COSEWIC 2007b](#)). The COSEWIC summary information for all 3 species is included in Section 1.1 of the management plan.

The management plan identifies the threats to survival and conservation of the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead.

Section 1.7 of the management plan provides information on the threats to the species' survival and conservation.

2.2 Conservation

This section summarizes the information found in the management plan on the management goal and objectives that are necessary for the conservation of the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead.

Section 2 of the management plan identified the following management goal:

To maintain sustainable populations within each species' known range in Canadian Pacific waters.

In order to achieve this goal, the management plan identified 6 management objectives:

1. maintain the Rougheye Rockfish, Blackspotted Rockfish, and Longspine Thornyhead population ranges in Canadian Pacific waters. Maintain viable populations and prevent a decline to levels at which they would become threatened or endangered
2. continue management under the Commercial Groundfish Integrated Program, employing management tools when necessary, as indicated by monitoring and assessment of the stocks. Enhance communication and outreach regarding the biology, management, monitoring, research, and enforcement activities for these species
3. account for total catch (retained and released) of Rougheye Rockfish, Blackspotted Rockfish and Longspine Thornyhead, and examine species removal trends in commercial fisheries, DFO surveys, and recreational and Indigenous fisheries
4. enhance existing DFO research, where resources and funding are available, to gather more information on stock status, including relative abundance and distribution of each species
5. produce peer-reviewed stock assessments and harvest advice for the Rougheye Rockfish, Blackspotted Rockfish, and Longspine Thornyhead
6. support and contribute to research that addresses knowledge gaps, as well as the effects of other identified and non-identified threats, on an ongoing basis

The management plan did not include performance measures. Progress towards achieving the management goal and objectives will be informed by progress made on the twelve activities identified in the management plan and addressed in table 1 of this report.

3 Progress towards conservation

The management plan for the Rougheye Rockfish, Blackspotted Rockfish, and Longspine Thornyhead divides the management effort into 3 broad strategies: 1) management; 2) research; and 3) monitoring and assessment. Activities that support the management goal and objectives are detailed in the management plan. Progress in carrying out these activities is

reported in section 3.1. Section 3.2 summarizes the progress made toward undertaking these activities.

3.1 Activities supporting conservation

Table 1 provides information on the implementation of activities undertaken to address the broad strategies and actions identified in the management plan. The timelines indicated are based on the implementation schedule (table 5) of the management plan. Each activity has been assigned 1 of 4 statuses:

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

Table 1. Details of activities supporting the conservation of the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead from 2012 to 2020.

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
<p>Broad strategy: 1 Objectives: 1, 2</p> <p>Activity: 1. Continue current management regime in the commercial groundfish fisheries, while working to develop methods to obtain catch estimates for Rougheye and Blackspotted Rockfish</p>	<p>Ongoing</p>	<p>In progress</p>	<p>Fisheries and Oceans Canada’s (DFO) Pacific Region Groundfish Integrated Fisheries Management Plan (IFMP) (DFO 2020a) sets a total allowable catch (TAC) annually for Longspine Thornyhead and the Rougheye/Blackspotted complex. These TACs are divided and allocated to research (trawl, longline, and Sablefish surveys), recreational groundfish fisheries, and commercial groundfish fisheries (hook and line, and trawl).</p> <p>Bycatch information is collected from all groundfish fisheries in Canadian Pacific waters. Since 1996, all Pacific commercial groundfish fisheries have had 100 percent dockside monitoring and the commercial groundfish trawl fishery has had 100 percent independent monitoring by at-sea observers (ASOs).</p> <p>In 2006, an electronic monitoring (EM) system was implemented for the commercial groundfish hook and line fisheries, and for a small portion of trawl vessels that target several hake species.</p> <p>Since the implementation of the At-Sea Observer Program (ASOP) in the groundfish trawl fishery in 1996, the composition of the fleet has changed and now includes vessels requiring more than 1 observer to monitor all fishing activity. In 2019, in response to the change in fleet composition, the groundfish trawl industry, in collaboration with DFO,</p>	<p>DFO, Commercial fishing industry, PC, Council of the Haida Nation</p>

¹ Participants are listed in alphabetical order. Lead participant(s) is/are listed on top and in bold.

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
			<p>piloted the use of EM technology in addition to ASOs, to improve the accuracy of at-sea data collection on trawl vessels with receiving tanks (DFO 2020a). The EM pilot program validates both the vessel fishing logs and the ASO logs.</p> <p>The ASOP and EM pilot programs were temporarily suspended from April 2020 to August 2021, due to COVID-19 health restrictions (DFO 2022). During this time, an Emergency Electronic Monitoring Program was implemented for the commercial groundfish trawl vessels fishing under the Option A licence conditions. These vessels make up a large majority of the active groundfish trawl fleet (Tadey pers. Comm. 2021).</p> <p>In November 2018, Parks Canada and the Council of the Haida Nation implemented area-based fishery closures as part of the Gwaii Haanas Gina 'Waadluxan KilGulhGa Management Plan Land Sea People plan, which protected some habitat areas for the Longspine Thornyhead and the Rougheye/Blackspotted complex, although fishing activities that occur outside protected zones may continue to affect all 3 species.</p>	
<p>Broad strategy: 1 Objective: 3</p> <p>Activity: 2. Work with other commercial fishing sectors to develop methodologies to</p>	3 years	In progress	Bycatch of the Rougheye/Blackspotted complex and Longspine Thornyhead has not been identified as a conservation risk in commercial non-groundfish fisheries. As such, no specific methodologies have been developed to account for bycatch of these species in most commercial non-groundfish fisheries.	DFO, Commercial fishing industry

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
<p>account for bycatch of the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead in commercial non-groundfish fisheries</p>			<p>In 2002, a sampling program to estimate rockfish bycatch in the British Columbia (BC) commercial prawn by trap fishery was initiated, and results from 2002 to 2008 are described in “Rockfish Bycatch in the British Columbia Commercial Prawn Trap Fishery” (CSAS: Res Doc 2009/109) (Rutherford et al. 2009). Through this program, at-sea monitors sample a subset of traps and record rockfish encounters to the species level. Coastwide bycatch of rockfish could not be estimated at the species level due to the small sample size and low encounter rates. This sampling program is ongoing; work is ongoing to publish this data for 2002 to 2018, which is available upon request via Catch Stats. In the commercial prawn by trap fishery, training is given to improve the observers’ rockfish identification skills and to ensure that photographs and samples are taken for further identification when species confirmation is required.</p> <p>It is not mandatory to report bycatch in prawn by trap, crab by trap, and shrimp trawl fisheries; however, observers in all commercial prawn and shrimp fisheries are required to record bycatch of rockfish to the species level when onboard the vessel. Estimates of rockfish bycatch (and all other bycatch species) are reported in the Pacific Multispecies Small Mesh Bottom Trawl Survey. During the 2012 to 2020 reporting period, there were no records of Longspine Thornyhead, Rougheye, or Blackspotted Rockfish in the commercial prawn by trap fishery.</p>	

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
			<p>Bycatch of these 3 rockfish species has not been recorded and would not be expected in tuna fisheries. The tuna fishery is conducted a significant distance offshore using troll gear within 2 m of the surface. As such, it does not occur at depths where these 3 rockfish species would be found. Vessels are required to report all bycatch in a logbook, but are not required to report to the species level.</p> <p>Herring fisheries (roe, special use, food and bait) require dockside validation, which includes records of bycatch; however, bycatch estimates are visually difficult to assess, and the primary objective of herring dockside validation is on assessing herring landings. The accuracy of bycatch reporting is thus unknown; however, these herring fisheries are shallow-water nearshore fisheries that are not likely to have bycatch of any of these 3 rockfish species.</p> <p>Deepwater rockfish bycatch is not believed to be a concern in salmon net fisheries, as the gear is not especially selective to rockfishes. Only 2 instances of bycatch of Rougheye and none for Blackspotted Rockfish or Longspine Thornyhead were reported between 2012 and 2020. Restrictions to reduce rockfish retention within the salmon troll fisheries have been put in place, including reductions in rockfish catch limits (mainly for Bocaccio [<i>Sebastes paucispinis</i>] and Yelloweye Rockfish [<i>Sebastes ruberrimus</i>]), and improving catch reporting. There is no independent monitoring of bycatch at sea; bycatch is reported by fishers, and</p>	

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
			<p>the accuracy of species identification and level of reporting is unknown.</p> <p>Improvements in catch monitoring and reporting for these species are needed to meet the requirements of the Strategic Framework on Fishery Monitoring and Catch Reporting in the Pacific Fisheries (DFO 2012b), and are ongoing as risk assessments are conducted for each commercial fishery.</p>	
<p>Broad strategy: 1 Objective: 3</p> <p>Activity: 3. Incorporate all catch on research surveys into future DFO stock assessments of Rougheye/Blackspotted Rockfish and Longspine Thornyhead</p>	Ongoing	In progress	DFO conducts annual trawl, trap, and longline multispecies surveys. Catch from these surveys is incorporated into all DFO stock assessments for groundfish on an ongoing basis.	DFO
<p>Broad strategy: 1 Objective: 3</p> <p>Activity: 4. Continue existing work with DFO recreational fisheries management and stakeholders to improve catch monitoring and reporting methods, including species identification in BC recreational fisheries</p>	2 years	Complete	Longspine Thornyhead and the Rougheye/Blackspotted Rockfish complex have been included in the recreational creel survey. There have been 2 reports of Rougheye/Blackspotted complex caught in the recreational creel survey during the 2012 to 2020 reporting period off the south coast of BC (DFO unpublished data).	DFO, Recreational fishers

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
4a. Include Rougheye/ Blackspotted Rockfish complex in recreational creel survey				
4b. Include species identification tools for the Rougheye/Blackspotted Rockfish complex in DFO's Tidal Waters Fishing Guide	2 years	Complete	<p>A Rockfish Identification Guide was published in 2020 on the DFO Pacific Region, Recreational fishing "Identify your catch" webpage, to help fishers distinguish the Rougheye/Blackspotted complex from other species of rockfish.</p> <p>Misidentification of rockfishes continues to present challenges, and this is why Rougheye and Blackspotted Rockfish are managed as a complex. Studies have shown misidentification rates of up to 46% and 9% for field scientists and species experts, respectively (Shotwell et al. 2015). Another identification guide for Rougheye and Blackspotted Rockfish has been created, and is used by scientists in DFO and Alaska.</p>	DFO, Recreational fishers
<p>Broad strategy: 1 Objective: 3</p> <p>Activity: 5. Improve catch monitoring and reporting methods in Indigenous food, social and ceremonial fisheries</p>	Ongoing	Not started	Longspine Thornyhead and the Rougheye/Blackspotted Rockfish complex are currently included in the "other groundfish" category, and are therefore not reported to the species level.	DFO, Indigenous Groups

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
5a. Continue existing work with Aboriginal Fisheries Strategy managers to improve catch monitoring and reporting methods				
5b. Develop species identification tools to help Indigenous groups identify the Rougheye/Blackspotted Rockfish complex among other rockfish catches	2 years	Complete	As noted in 4b above, a Rockfish Identification Guide was developed by DFO in 2020, to help fishers distinguish the Rougheye/Blackspotted complex among other species of rockfish.	DFO, Indigenous Groups
Broad strategy: 2 Objectives: 4,5,6 6. Improve existing DFO Science research surveys for Longspine Thornyhead by increasing the number of tows in deep strata	Ongoing	In progress	Where practicable, additional tows were deployed in deep water in the 500 to 1,300 m (approximately 273 to 711 fathoms) range during chartered surveys off the west coast of Haida Gwaii; however, increasing the number of tows in deep strata was not possible elsewhere for the 2012 to 2020 period.	DFO
Broad strategy: 2 Objectives: 4,5,6 7. Take genetic samples (from all area-depth strata) of the Rougheye/Blackspotted Rockfish complex on all DFO Science surveys that	Ongoing	In progress	Genetic samples (tissue samples), otoliths (the 'ear bone' structure used to age many fish) and biological information for the Rougheye/Blackspotted Rockfish complex were collected from DFO surveys within the 2012 to 2020 reporting period. This work has been ongoing since 2010 and genetic samples for the Rougheye/Blackspotted complex have been processed up to 2019. (Workman pers. comm. 2021).	DFO

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
currently encounter these species				
<p>Broad strategy: 2 Objectives: 5,6</p> <p>Activity: 8. Develop protocols to acquire biological (incl. genetic) samples from commercial catch for the Rougheye/Blackspotted Rockfish complex</p>	3 years	Not started	This activity has not yet been initiated.	DFO , Commercial fishing industry
<p>Broad strategy: 2 Objective: 6</p> <p>Activity: 9. Investigate potential impacts of climate change to the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead populations and their habitat in Canadian Pacific waters</p>	5 years	In progress	<p>Work to investigate potential impacts of climate change is ongoing by various groups within DFO. However, potential impacts specific to the Rougheye/Blackspotted complex and Longspine Thornyhead have not been investigated (Haigh pers. comm. 2021).</p> <p>International research has examined the effects of climate change on fish species and how to incorporate that information into stock assessments (Bell et al. 2017; Johnson 2016). If needed, this information can be integrated into DFO analyses or reviews.</p>	DFO
<p>Broad strategy: 3 Objectives: 4,5,6</p> <p>Activity: 10. Conduct an analysis to identify gaps in data that are necessary to conduct stock</p>	3 years	Completed	Over the 2012 to 2020 reporting period, DFO has reviewed existing data and identified gaps that need to be filled in order to do a stock assessment. Key gaps identified include the need for a Longspine Thornyhead research survey and the collection of genetic samples from the commercial groundfish	DFO

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
<p>assessments and implement programs to rectify the data shortfalls</p>			<p>fishery for the Rougheye/Blackspotted Rockfish complex.</p> <p>In 2020, DFO scientists completed the “Rougheye/ Blackspotted Rockfish (<i>Sebastes aleutianus</i>/<i>Sebastes melanostictus</i>) Stock Assessment for British Columbia” (CSAS: SAR 2020/047) (DFO 2020b). The assessment focused on harvest advice for 2 populations: Rougheye/ Blackspotted North and Rougheye/Blackspotted South. Data gaps and research recommendations were identified in the assessment. Given the data available at the time of the stock assessment, the stocks could not be separated on the basis of genetics (DFO 2020b). For genetic differentiation of stocks, future work is needed to develop a method to delineate the species based on spatio-temporal data using samples from the commercial fisheries and research surveys (Haigh pers. comm. 2021).</p> <p>The lack of aging protocol for Longspine Thornyhead is identified as another gap. Deep-water rockfish cannot be aged reliably using conventional methods and protocols. Work on developing an aging protocol for Longspine Thornyhead has yet to be initiated (Workman pers. comm. 2021).</p>	
<p>Broad strategy: 3 Objective: 5</p> <p>Activity: 11. Ensure that the Rougheye, Blackspotted</p>	<p>5 years</p>	<p>In progress</p>	<p>A Rougheye/Blackspotted Rockfish stock assessment was conducted in 2020 (DFO 2020b). An assessment for Longspine Thornyhead has not yet been completed.</p>	<p>DFO</p>

Broad strategy, objective(s), and activity	Timeline	Status	Description and results	Participants ¹
<p>Rockfish and Longspine Thornyhead stocks are prioritized for DFO Science assessments</p>				
<p>Broad strategy: 3 Objective: 1</p> <p>Activity: 12. Review Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead abundance trends to monitor the status of these stocks on an annual basis</p>	<p>Ongoing</p>	<p>In progress</p>	<p>This work is ongoing for all rockfish species.</p> <p>Research began in 2016 to investigate the abundance trends of the Rougheye/ Blackspotted Rockfish complex (Carruthers 2016; Carruthers et al. 2017).</p> <p>As stated in activities 10 and 11, a stock assessment focusing on harvest advice for the Rougheye/ Blackspotted Rockfish complex was completed by DFO in 2020. The assessment showed that populations in both the North (predominantly Blackspotted) and South (predominantly Rougheye) are in decline, but are projected to stabilize at sustainable levels under the current management regime. In addition to a full re-assessment in approximately 2030 (subject to new information), it is recommended that, during the interim years, the trend in abundance be tracked by surveys to sample these species, and by commercial fishery catch per unit effort (CPUE; DFO 2020b).</p> <p>Review of Longspine Thornyhead abundance trends has not yet commenced.</p>	<p>DFO</p>

3.2 Summary of progress towards conservation

3.2.1 Status of activities

A total of 14 activities from the management plan are identified in table 1. Of these activities, 4 (29%) have been completed for the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead in Canadian waters. Another 8 activities (57%) are in progress, and 2(14%) have not yet started.

Of the conservation measures that are currently 'in progress', 5 are ongoing and have no projected end date. Work is underway to complete the remaining 3:

- Broad strategy 1), activity 2: work with other commercial fishing sectors to develop methodologies to account for bycatch of the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead in commercial non-groundfish fisheries
- Broad strategy 2), activity 9: investigate potential impacts of climate change to the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead populations and their habitat in Canadian Pacific waters
- Broad strategy 3), activity 11: initiate a groundfish survey involving deep water trawling in Longspine Thornyhead habitat

In addition to continuing support for 'in progress' conservation measures with ongoing timelines, further work is needed to: initiate an aging protocol for Longspine Thornyhead, and improve catch monitoring and reporting to meet the [Strategic Framework on Fishery Monitoring and Catch Reporting in the Pacific Fisheries](#) for all 3 species (DFO 2012b).

Work to address 2 of the conservation measures has not yet been initiated. The first conservation measure is to develop protocols to acquire biological (including genetic) samples from the commercial catch for the Rougheye /Blackspotted Rockfish complex. The second is to work with Aboriginal Fisheries Strategy managers to improve species identification among Indigenous food, social and ceremonial fisheries. Work on these measures will be reported on in the next 5 year progress report.

4 Concluding statement

Over the last 9 years, through the implementation of the activities identified in the management plan, moderate progress has been made in conserving the 3 species.

As of the most recent 2020 stock assessment, the management goal of maintaining sustainable populations of Rougheye Rockfish, Blackspotted Rockfish and Longspine Thornyhead in their known ranges has been met for the Rougheye/Blackspotted complex. Further work, including improving deep-water research surveys and completing a stock assessment, is necessary to determine whether the management goal is being met for the Longspine Thornyhead.

Steps have been taken towards meeting most of the conservation measures outlined in the management plan. Work has focused on identifying gaps in understanding for these species and data collection has improved by increasing the number of deep-water tows on research surveys off the West Coast of Haida Gwaii. An aging protocol using otoliths has been developed and aging of Rougheye/Blackspotted is ongoing. Due to capacity constraints, work on an aging protocol for Longspine Thornyhead has yet to be initiated.

A stock assessment was completed in 2020, focusing on harvest advice for 2 populations: Rougheye/Blackspotted North and Rougheye/Blackspotted South. In addition to the stock assessment, a data-limited tool kit was developed to support the assessment of data-limited species, including the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead, and was incorporated into the “Management Procedure Framework for Groundfish in British Columbia” published by DFO in 2021.

While some progress has been made in developing methodologies in commercial non-groundfish fisheries, more work is needed to be able to understand the full extent of bycatch in the shrimp by trawl, prawn by trap, herring, and salmon troll fisheries. Results from DFO’s Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries’ Risk Assessment Tool may be used to prioritize which fisheries are most concerning for bycatch of the Rougheye/Blackspotted Rockfish complex and Longspine Thornyhead. Protocols have not been developed to obtain biological samples for the Rougheye/Blackspotted Rockfish complex in commercial fisheries. Further work also needs to be done to investigate the impacts of climate change on Longspine Thornyhead and the Rougheye/Blackspotted complex and increase the number of deep-water tows more broadly along the British Columbia coast.

The Government of Canada remains committed to conserving the Rougheye/Blackspotted Rockfish complex, and Longspine Thornyhead. Efforts to date have built a strong foundation for continued research and sustainable management of these species over the next reporting period. The Government of Canada is looking forward to continuing work with all partners on closing knowledge gaps and improving monitoring, reporting and conservation of rockfish species in all fisheries.

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