

MSC SUSTAINABLE FISHERIES CERTIFICATION

On-Site Surveillance Visit - Report for Falkland Island Toothfish Fishery



3rd Surveillance Audit

June 2017

Certificate Code F-ACO-0033
Prepared for: **Consolidated Fisheries Ltd.**
Prepared by: **Acoura Marine**
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Assessment Data Sheet

Certified Fishery	Falkland Island Toothfish
Fishery Management Agency	Falkland Islands Government Fisheries Department
Species	Patagonian Toothfish (<i>Dissostichus eleginoides</i>)
Fishing Method	Longline
Certificate Code	F-ACO-0033
Certification Date	6 th March 2014
Certification Expiration Date	5 th March 2019
Certification Body	Acoura Marine Ltd 6 Redheughs Rigg Edinburgh EH12 9DQ, Scotland, UK
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Surveillance Stage:	3 rd Surveillance Audit
Surveillance Date:	26 th April 2017

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1 Introduction

The purpose of the annual Surveillance Report is fourfold:

1. to establish and report on whether or not there have been any material changes to the circumstances and practices affecting the original complying assessment of the fishery;
2. to monitor the progress made to improve those practices that have been scored as below “good practice” (a score of 80 or above) but above “minimum acceptable practice” (a score of 60 or above) – as captured in any “conditions” raised and described in the Public Report and in the corresponding Action Plan drawn up by the client;
3. to monitor any actions taken in response to any (non-binding) “recommendations” made in the Public Report;
4. to re-score any Performance Indicators (PIs) where practice or circumstances have materially changed during the intervening year, focusing on those PIs that form the basis of any “conditions” raised.

Please note: The primary focus of this surveillance audit is assess changes made in the previous year. For a complete picture, this report should be read in conjunction with the Public Certification Report for this fishery assessment.

2 General Information

2.1 Certificate Holder details

Fishery name	Falkland Island Toothfish		
Unit(s) of assessment	Patagonian Toothfish, Zones FICZ, FOCZ		
Date certified	6 th March 2014	Date of expiry	5 th March 2019
Surveillance level and type	Normal – Onsite.		
Date of surveillance audit	26 th April 2017		
Surveillance stage (tick one)	1st Surveillance		
	2nd Surveillance		
	3rd Surveillance		✓
	4th Surveillance		
	Other (expedited etc)		
Surveillance team	Lead assessor: Jim Andrews (P3) Assessor(s): Andy Hough (P2) & Ian Knuckey (P1)		
CAB name	Acoura Marine		
CAB contact details	Address	6 Redheughs Rigg Edinburgh EH12 9DQ	
	Phone/Fax	0131 335 6662	
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	Contact name(s)	Polly Burns	
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	Phone/Fax	+500 22277	
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	Contact name(s)	Janet Robertson	

3 Background

3.1 Description of fishery

The Falkland Islands Toothfish Longline Fishery takes place in the waters around the Falkland Islands in the Southern Atlantic Ocean. The target species for the fishery is the Patagonian toothfish, *Dissostichus eleginoides*. The area fished during 2015 is shown in Figure 3.1-1.

The fishery is managed by the Falkland Islands Government. There is a restrictive licensing scheme in place to manage fishing effort, and an annual TAC is set for the fishery based on an assessment of stock status carried out by the Falkland Islands Fisheries Department. There is a closed season for the fishery on the Burdwood Bank spawning grounds to the south of the Falklands between 1st June and 31st August of each year.

Only one company, Consolidated Fisheries Limited, is licensed to fish for toothfish with longlines around the Falkland Islands. CFL operate one vessel, the CFL Gambler ZDLC-2. This vessel is scheduled for replacement during 2017. During 2015 the vessel fished for a total of 216 days.

The longline fishery is the only fishery in the area that targets toothfish, and accounts for the majority of toothfish landings around the Falkland Islands. There are also some toothfish catches in the trawl fisheries for finfish and squid, which amounted to 105t in 2015. All removals are considered by the annual stock assessment and management proposals.

The fishery was assessed against the MSC Standard and certified in 2014.

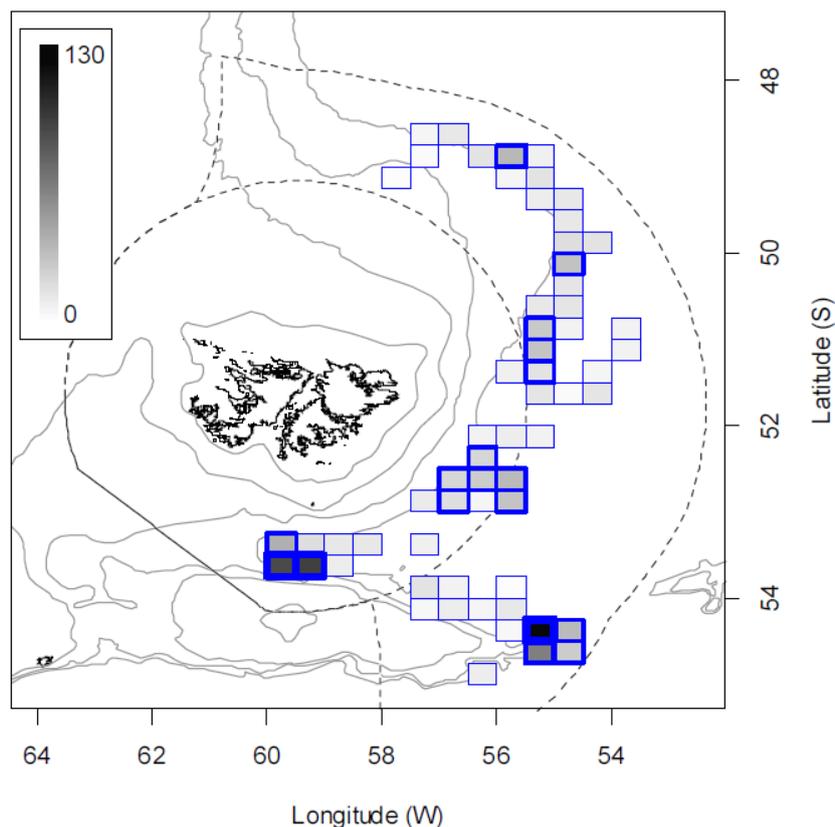


Figure 3.1-1: Distribution of toothfish (*Dissostichus eleginoides*) catches and longline fishing effort in 2015. The thickness of grid boxes is proportional to the number of vessel days in each grid square; the grey scale shading of the box is proportional to the toothfish catch biomass. The maximum effort was 26 vessel days in one grid and the maximum landings were 130t in one grid. [Source: Falkland Islands Fisheries Department, 2016a].

3.2 Changes in the management system

There have been no significant changes in the management system for the fishery since the last surveillance audit.

3.3 Changes in relevant regulations

There have been no significant changes in the regulations applying to the fishery since the last surveillance audit.

3.4 Changes to personnel involved in science, management or industry

It was reported at the last surveillance audit that the Fisheries Biologist from the Falkland Islands Government Fisheries Department (FIFD) who had been leading the work to develop new harvest control rules and tools for this fishery left his post to take up a position with the Government of South Georgia and the South Sandwich Islands. This had delayed progress with the development of the harvest control rules.

FIFD have subsequently appointed a new scientific officer, Haseeb Randhawa, who has been working on the stock assessment and associated harvest control rules during 2016 & 17. Consolidated Fisheries Limited (CFL) have also agreed to fund an additional new member of staff at FIFD who will be dedicated to working on the toothfish fishery in preparation for the upcoming re-assessment in the fourth year of certification. In addition to this, CFL have contracted in a benthic ecologist from the South Atlantic Environmental Research Institute (SAERI) to assist with the analysis of benthic survey information and the development of an appropriate management strategy to manage benthic impacts of the fishery.

The possibility of establishing an industry-science “MSC Steering Committee” was being considered at the time of the last surveillance audit. This Committee has now been established and meets approximately every 6 weeks. It is composed of 2 Fisheries Department Scientists and 2 CFL representatives, although others may attend on invitation when relevant.

3.5 Changes to scientific base of information including stock assessments

Several reports relating to the status of the target stock and the conditions of certification were submitted to the assessment team prior to the surveillance audit site visit. These are very briefly summarised below.

3.5.1 Stock status

The most recent stock assessment was an age-structured production model conducted by Winter (FIFD 2017a) using CASAL software. The most significant changes since the last assessment were: the inclusion of previously unreported catches and undetected whale depredation as separate factors; having the Spanish longline and umbrella longline as separate CPUE time series; and, weighting of the objective function of CPUE indices and at-age distributions. The model-estimated 2016 spawning stock biomass was 10,337 t, representing a depletion to 45.2% from SSB_0 . Under the current form of the harvest strategy, the recommended TAC for the toothfish longline fishery is 1040 t. Forward projections of the stock were conducted for the first time assuming a constant catch of 1040 t. The model projected that spawning stock biomass will decrease to 40.6% - 41.6% in 2022 before increasing back above the threshold of 45% by 2029 - 2034.

In comparison to the harvest strategy reference points (FIFD 2017e), the stock is currently slightly over the target SSB of 45% but is expected to reduce to only slightly above the trigger reference point of 40% before it increases again.

3.5.2 Non-target species

Data on bycatches continue to be recorded in detail (FIFD, 2017i)). Bycatch species represented were consistent with those reported in the main assessment, and in similar quantities. By-catches over the past few years are summarised in Table 3.5-1.

Table 3.5-1: Retained species catch for the Falkland Islands Toothfish Longline Fishery {Source: Blake, 2016, FIFD, 2017i}.

Species/Group	Catch (tonnes)			Range identified in Main Assessment	% total catch		
	2016	2015	2014		2016	2015	2014
Blue Antimora	23.8	23.6	13.7	10-22	2.1	1.88	1.0
Grenadiers	75.8	70.7	57.3	70-95	6.5	5.66	4.2
Ray	28.8	27.6	31.9	21-55	2.5	2.2	2.3
Porbeagle Shark	0.3	0.8	0.6	-	0.03	0.06	0.04
Sleeper Shark	2.1	3.4	3.8	-	0.18	0.27	0.27

It is noted that porbeagle were listed as CITES Appendix II species in 2014. This would not qualify as an ETP species on this basis (only Appendix I species are ETP) but indicates the vulnerability of the species. The catches shown above (0.03% of a relatively small overall catch) would not indicate a particular concern within the fishery. Some initial assessment work has been carried out on populations around New Zealand (Francis et al 2014) which suggests that porbeagle abundance may have declined rapidly in the late 1990s has since stabilised at a relatively low level, or is increasing.

Overall, no changes are apparent which would lead to rescoring of any PIs.

3.5.3 Habitat impacts

The invertebrate by-catch in the toothfish fishery has been recorded by independent fishery observers (FIFD, 2017j). The distribution of fishing effort and observed lines is shown below.

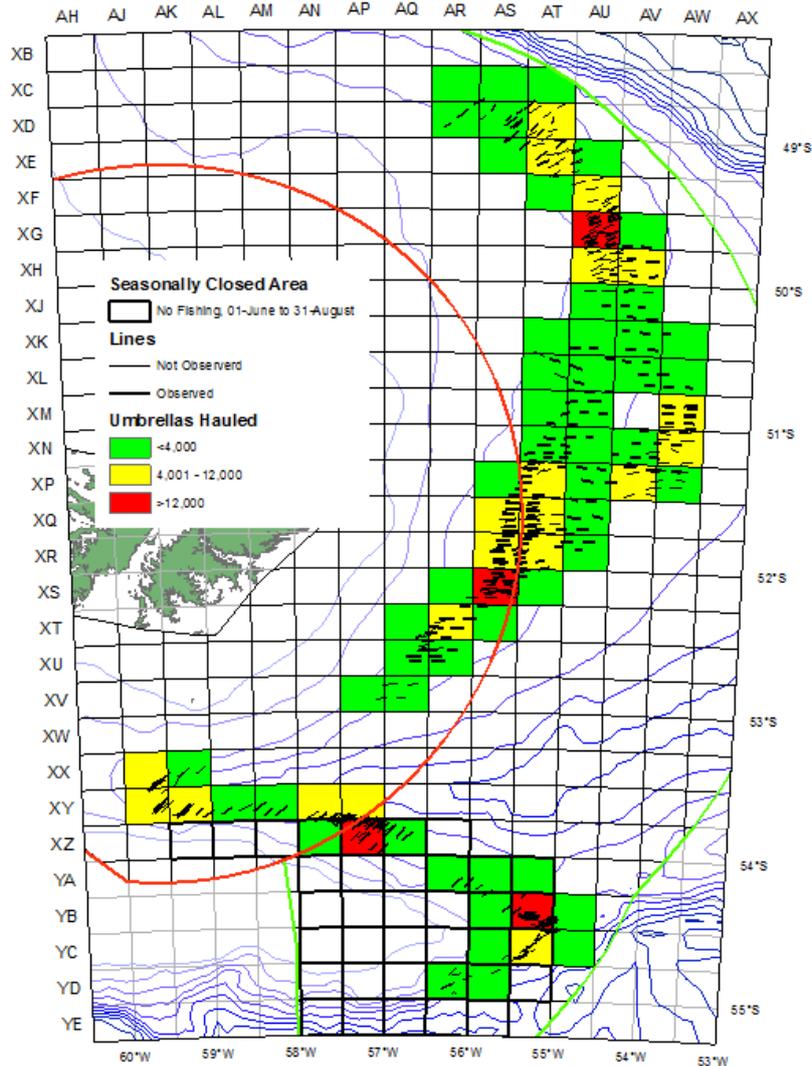


Figure 3.5-1. Footprint of intensity of the longline fishery, in terms of “high”, “medium”, and “low” intensity. Also shown are lines and observer stations for 2016 and the seasonally closed region.

Observers have updated the benthic species in the catch from the toothfish longline fishery during 2016. Particular attention has been given to VME indicator species with annual plots of the capture of the main susceptible species – hydrocorals, stony corals, soft corals, sea whips and sea fans and sponges.

3.6 Any developments or changes within the fishery which impact traceability or the ability to segregate between fish from the Unit of Certification (UoC) and fish from outside the UoC (non-certified fish)

There have been no changes in the fishery which may impact traceability.

3.7 TAC and catch data

The TAC and catch data for the 2016 fishery are summarised in the table below. The Assessment team noted that:-

- a) A TAC of 1040t was set for the longline fishery in 2016. This was the same as the 2015 TAC and a decrease from the 1200t TAC set in 2014. The TAC reduction was made in response to scientific advice.

- b) The TAC allocation was reduced to 1021t under the “banking and borrowing” harvest control rules, which allowed for 19t to be “borrowed” from the 2016 TAC during the 2015 season. This “borrowing” is limited to a maximum of 15% of the TAC. The “borrowing” in 2015 amounted to 1.8% of the 2016 TAC.

Table 3.7-1: TAC and Catch Data [Source: FIFD, 2016]

TAC	Year	2016	Amount	1040t allocated 1021t (reduced TAC due to borrowing of 19t in 2015)
UoA share of TAC	Year	2016	Amount	100%
UoC share of TAC	Year	2016	Amount	100%
Total green weight catch by UoC	Year (most recent)	2016	Amount	1020t
	Year (second most recent)	2015	Amount	1123t

3.8 Summary of Assessment Conditions

The fishery was certified in 2014 with four conditions of certification. The status of these conditions following this surveillance audit is summarised in Table 3.8-1 below.

Table 3.8-1 Summary of Assessment Conditions

Condition number	Performance indicator (PI)	Status	PI original score	PI revised score
1	1.1.2	Closed at first surveillance audit.	75	80 (Not revised at this surveillance)
2	1.2.2	On Target	65	75
3	2.4.3	On Target	75	Not revised
4	1.2.3	On Target	75	Not revised

4 Assessment Process

4.1 Details of 3rd Surveillance Audit Process

As a result of the assessment, four conditions of certification were raised by the assessment team, and maintenance of the MSC certificate is contingent on the Falkland Island Toothfish fishery moving to comply with these conditions within the time-scales set at the time the certificate was issued.

4.2 Scope & History of the Assessment

4.2.1 Surveillance team details

The MSC require that surveillance audits shall be carried out by a team of two or more individuals with expertise comparable to the members of the original team (that conducted the assessment of the fishery). If different from the original assessment team, the MSC also require that the selection of individuals to conduct audits shall be justified in writing and their relevant skills and/or expertise documented. This information is documented below.

The original assessment team for the fishery comprised Jim Andrews (Team Leader & Principle 3), Andrew Hough (Principle 2) and Paul Medley (Principle 1). This surveillance audit was carried out by Jim Andrews (Team Leader & Principle 3), Andrew Hough (Principle 2) and Ian Knuckey (Principle 1). Acoura Marine have reviewed the expertise of this surveillance team and have concluded that it is comparable with that of the original assessment team.

Brief resumes of the team's experience are set out below.

Jim Andrews

Jim is a marine biologist with over 20 years' experience working in marine fisheries and environmental management. He currently works as an independent fisheries and marine environmental consultant. His previous experience includes running the North Western and North Wales Sea Fisheries Committee as its Chief Executive from 2001 to 2005, and previously working as the SFC's Marine Environment Liaison Officer. During this time he was responsible for the regulation, management and assessment of inshore finfish and shellfish stocks along a 1,500km coastline. He has an extensive practical knowledge of both fisheries and environmental management and enforcement under UK and EC legislation. Jim has formal legal training & qualifications, with a special interest in the policy, governance and management of fisheries impacts on marine ecosystems. He has worked as an assessor and lead assessor on more than 20 MSC certifications within the UK, in Europe and in India since 2007. In 2008 he worked with the MSC and WWF on one of the pilot assessments using the new MSC Risk Based Assessment Framework. Jim has carried out numerous MSC Chain of Custody assessments within the UK.

Andrew Hough

Andrew has a PhD in marine ecology from the University of Wales, Bangor (1987-90). He has been involved in marine, coastal and freshwater environmental management since 1991, including management of fishery impacts on ecosystems and marine conservation biology, principally in European inshore waters. He was manager of Moody Marine operations within Moody International Certification from 1999 to 2011 with particular responsibility for the implementation of MSC Certification procedures and development of MSC methodologies. He has acted as lead assessor on a large proportion of MSC pre assessments and main assessments during this time, and subsequently as team member and/or lead auditor for various assessments. This has involved stock assessment analysis, evaluation of ecosystem effects and management effectiveness of groundfish, pelagic and shellfish fisheries in various administrations around the world. He now works as a freelance environmental/fishery management consultant and auditor, consultancy projects include certification-related policy advice to the Association of Sustainable Fisheries.

Ian Knuckey

Ian has a PhD in fishery population dynamics and 30 years involvement as a fisheries scientist in Australia and overseas working across coastal and offshore fisheries for teleosts, sharks and invertebrates in both temperate and tropical waters. Ian is the Chair and/or Scientific member of various Australian Resource Assessment Groups and Management Advisory Committees involving fish, sharks, lobster, scallops and squid. Ian has been instrumental in establishing fisheries monitoring and

observer programs around Australia. He has also been the driving force behind the design and implementation of fishery independent surveys in a range of fisheries and understands the scientific rigour required to provide sound advice on population structure and stock abundance. Ian is particularly experienced in working on the design of monitoring programs, assessments and harvest strategies for data-poor fisheries. Ian has run a number of projects on the development and review of harvest strategies and their application to commercial fisheries. He is experienced in the range of data collection and analysis techniques used for conducting surveys and as input into stock assessments. Ian also has had extensive experience in bycatch monitoring and analysis techniques, and fisheries bycatch mitigation.. Ian has worked as an MSC assessor and reviewer on both offshore and coastal fisheries.

4.2.2 Date & Location of surveillance audit

The surveillance audit took place in London, UK, on 26th April 2017. This location was chosen as it is more convenient for most stakeholders than Port Stanley in the Falkland Islands.

The client, representatives of the Falkland Islands Fisheries Department (FIFD), Jim Andrews and Andrew Hough participated in the surveillance audit on-site. Ian Knuckey participated off-site, using VOIP during an interview with the client and FIFD.

4.2.3 Stakeholder consultation & meetings

A total of 55 stakeholder organisations and individuals having relevant interest in the assessment were identified and notified, via e-mail, of surveillance process. This highlighted the potential process for engagement in the surveillance, if desired. In addition, the interest of others not appearing on this list was solicited through the postings on the MSC website. No stakeholders came forward requesting a meeting with members of the assessment team and no written submissions were received.

Meetings were conducted with the following individuals & organisations:-

- 1) Janet Robertson, Sales & Marketing Manager, Consolidated Fisheries Ltd, 26th April 2017, Falkland Islands Government Office, London.
- 2) Alexander Arkhipkin, Senior Fisheries Scientist, Falkland Islands Fisheries Department, 26th April 2017, Falkland Islands Government Office, London.
- 3) Andreas Winter, Stock Assessment Scientist, Falkland Islands Fisheries Department, 26th April 2017, Falkland Islands Government Office, London.

4.2.4 What was inspected

This audit concentrated on assessing whether and/or how the client has been addressing the conditions raised in the original assessment. In addition a review was carried out of operational and management changes in the past year. This was done by review of information provided by the client and the Falkland Islands Fisheries Department (see appendix 4 for references used), interviews and e-mail exchanges, as required.

4.3 Surveillance Standards

4.3.1 MSC Standards, Requirements and Guidance used

This surveillance audit was carried out according to the procedures set out in the MSC Fisheries Certification Requirements v2.0, and using the CRv1.3 Standard.

4.3.2 Confirmation of scope

The Falkland Islands toothfish longline fishery was considered to be “in scope” for MSC certification during its initial assessment (see MSC FCR at section 7.4). The surveillance team made enquiries during this audit to confirm that the fishery remains in scope. The findings are listed below.

4.3.2.1 Destructive fishing practices

The client confirmed that no destructive fishing practices (explosives or poisons) are used in this fishery.

4.3.2.2 Controversial unilateral exemptions

No indication was given during the site visit that the fishery is subject to any controversial unilateral exemptions.

4.3.3 Forced labour

The assessment team confirmed that fishery operators have not been prosecuted for any violations against forced labour laws.

4.3.4 Harmonisation

There are presently 5 MSC-certified fisheries for Patagonian Toothfish (*Dissostichus eleginoides*) in the southern hemisphere. The Falkland Islands Toothfish Longline fishery prosecutes a separate stock to the other toothfish fisheries in the MSC programme, there is no overlap in geographic area with these other fisheries, and they operate under slightly different management regimes (notably the other fisheries are all in the CCAMLR area, whilst the Falkland Islands are not).

At the time that the Falklands Islands Toothfish Longline Fishery was undergoing MSC assessment, the Argentine Patagonian Toothfish fishery also entered assessment. A public comment draft report for that fishery was published in July 2014, and the fishery was subsequently withdrawn from assessment in January 2015.

The assessment team therefore concludes that there are no new harmonisation requirements for this fishery at this surveillance audit.

5 Results

5.1 Condition 1

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	1.1.2	SG80 b) The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	75
Condition	Based upon available scientific evidence, including the stock assessment, as well as expert judgement, the management authority should identify a limit reference point above the level at which there is an appreciable risk of impairing reproductive capacity and incorporate it into their harvest strategy.		
Milestones	<p>Within Year 1:</p> <p>An appropriate limit reference point should be identified and be clearly linked to appropriate parts of the harvest strategy. (PI Score 80).</p>		
Client action plan	<p>Timeframe: 1 Year Plan</p> <p>A limit reference point will be established after completion of the next (2014) toothfish stock assessment. A soft limit is currently set at 0.45 SSB:SSBo, where a ratio below this, in conjunction with other observations of recruitment and B, will trigger a management response (FIFD 2013). Over the week of March 11-15, 2013, FIFD scientists took part in an intensive stock assessment course /workshop using CASAL (Bull et al 2012), run by Alistair Dunn (NIWA, New Zealand). Throughout this course, Falkland toothfish data was used as one of the example datasets to build a toothfish-specific CASAL model and carry out test model runs. Progress since the workshop has already improved the robustness of the model over the 2013 model run. Once the model has been parameterised using current data and knowledge, soft and hard limit reference points based on either fishing mortality estimates (F), biomass estimates (B) or ideally both will be established.</p> <p>Newly established limit reference points will be published in the upcoming “FIFD Vessel Units, Allowable Effort, and Allowable Catch 2014” in a summarised form, and a more detailed stock assessment document will be produced noting CASAL stock assessment model parameterisation. A “Toothfish Sustainability Measures 2014” document will be produced updating progress from 2013, and highlight future research plans.</p> <p>Who will address the condition?</p> <p>The Falkland Islands Fisheries Department will address this condition. (See attached FIFD letter of support)</p> <p>The time period for action</p> <p>This condition will be met within one year. Results will be reported back to IMM at the first MSC annual review.</p> <p>How the action will improve the fishery</p> <p>Meeting this condition will provide improved metrics of fishery health and improved means of avoiding irreversible or unacceptable outcomes of fishing pressure.</p>		

Progress on Condition [Year 1]

The findings of the first annual surveillance audit are reproduced below.

Client Progress

The Falkland Islands Fisheries Department (FIFD) has produced the document “Sustainability Measures 2014-2015” mentioned in the action plan. This document formalises the harvest strategy for the fishery. Target, Trigger and Limit Reference Points have all been identified, and are linked to management actions. These are summarised in the Figure below.

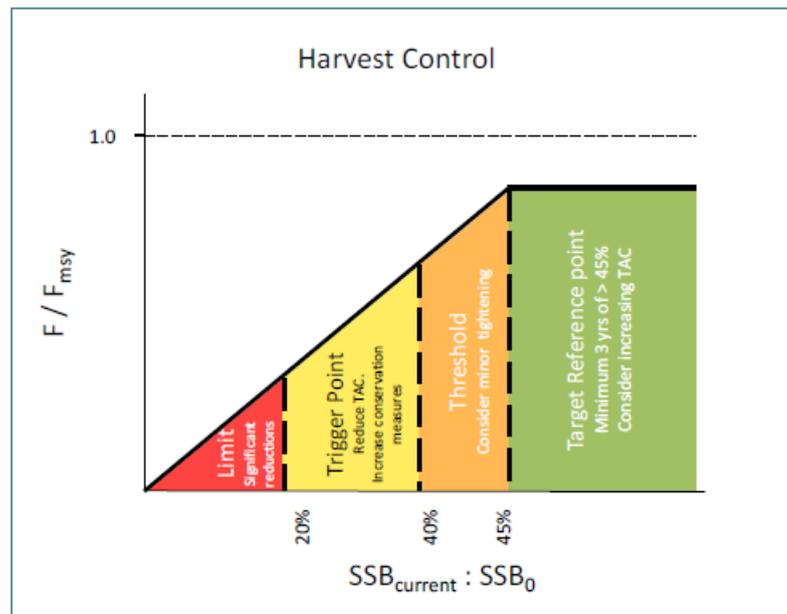


Figure 2: Diagram illustrating the harvest controls for the Falkland Islands Toothfish Longline Fishery.

The level of the LRP has been set after modelling of the fishery, by comparison to other fisheries, and by reference to the MSC CRv1.3. The value of 20% was considered to be compatible with other fisheries, compliant with the MSC standard, and appropriate for this fish stock.

Observations

There is evidence from the fishery that this harvest strategy is being implemented. The 2015 stock assessment (using two different models) indicated that the $SSB_{2013} : SSB_0$ ratio was between 38 and 41%. In response, the TAC was reduced by 13.3% and conservation measures strengthened. The duration of the seasonal closure on the Burdwood Bank spawning ground has been extended by a month and now extends from 1st June to 31st August (previously this had started on 1st July). The spatial extent of this closed area has also been increased. (See Figure below).

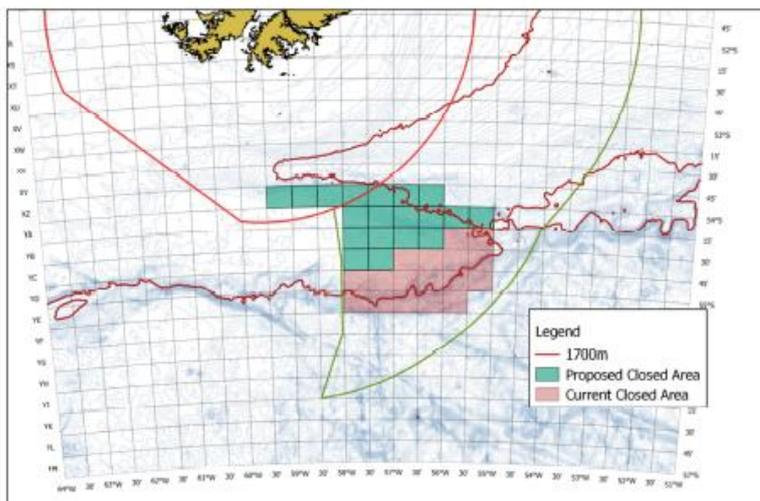


Figure 3: Chart showing the extension of the Burdwood Bank closed area introduced during 2014.

The actions taken by FIFD allow for the re-scoring of Performance Indicator 1.1.2 at SG80 Slb. The revised rationale is set out below:-

PI	1.1.2: Limit and target reference points are appropriate for the stock.	
SG80b	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	
	Original Rationale	
	N	There is no explicit limit reference point accepted by management.
	Revised Rationale	
	Y	An explicit limit reference point has been set and accepted by management. The LRP has been set at 20%B ₀ . This value has been determined to be above the point at which there is an appreciable risk of impairing reproductive capacity after modelling this stock, and by reference to other similar fisheries. This value of LRP is also consistent with the generic level set out in the MSC CR.
Resulting PI Score	80	

On this basis, all of the SG scoring issues are now met and the condition can be closed.

Conclusion

Progress with this condition is **on target**. The relevant Scoring Issue (PI 1.1.2 SG80b) has been re-scored. The fishery now attains the SG80 standard, and this condition has been **closed**.

<p>Progress on Condition [Year 2]</p>	<p>Evidence was presented to show that the limit reference point established in Year 1 is still being used in the harvest control rules (Falkland Islands Government, 2015a)..</p> <p>Conclusion</p> <p>The condition was closed on target at the first surveillance audit. No new information was presented at this audit to warrant any re-scoring of the relevant Performance Indicator. The condition can remain closed.</p>
<p>Progress on Condition [Year 3]</p>	<p>Discussions during this audit indicated that as a target, $SSB=0.45B_0$ is likely above B_{MSY}. The “Threshold Reference Point” of $SSB-0.40B_0$ is likely to be equivalent to B_{MSY}.</p> <p>Based on current projections, it is not expected that the biomass will increase to above 45% until 2029 – 2034. This is below the “Target Reference Point” currently proposed; but over the same period the stock is projected to remain above 40%B_0 (and hence above B_{MSY}).</p> <p>There might be merit in reconsidering either the target reference point or the controls rules in the Harvest Strategy to ensure that the nomenclature used in the Harvest Strategy is aligned with the nomenclature in the MSC Certification Requirements (and in particular to ensure that the “Target Reference Point” is equivalent to B_{MSY}). It is expected that a harvest strategy evaluation will occur to demonstrate that the control rules underpinning the harvest strategy are consistent with intent of the strategy.</p> <p>It was also noted that the diagram in the FIFD Toothfish fishery Harvest Control did not accurately reflect the revised management control rule as stated “If the ratio of $SSB_{current}:SSB_0$ is $\leq 20\%$, the longline fishery will be closed”.</p>
<p>Status of condition</p>	<p>The condition was closed on target at the first surveillance audit. No new information was presented at this audit to warrant any re-scoring of the relevant Performance Indicator. The condition can remain closed.</p>

5.2 Condition 2

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	1.2.2	<p>SG80</p> <p>a) Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.</p> <p>b) The selection of the harvest control rules takes into account the main uncertainties.</p> <p>c) Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.</p>	65
<p>Condition</p>	<p>Evidence is required, from for example computer simulation studies, that the harvest control rule is robust to the main uncertainties and will effect rebuilding</p>		

	<p>of the stock if necessary consistent with the requirements of PI 1.1.2 and PI 1.1.3.</p>
<p>Milestones</p>	<p>Within Year 1: A limit reference point defined suitable for guiding development of the harvest control rule (see Condition 1). (PI score 65).</p> <p>Within Year 2: Evidence for the robustness to uncertainty, consistency with management objectives, target and limit reference points and expected rebuild times is assembled for candidate harvest control rules for consideration by stakeholders and the management authority. (PI score 75).</p> <p>Before Year 4: Supported by the available scientific evidence, a robust harvest control rule demonstrably forms part of the harvest strategy. (A score of 80 will be awarded on completion of this milestone).</p>
<p>Client action plan</p>	<p>Timeframe: 4 Year Plan</p> <p>Year 1. In conjunction with Condition 1, a suitable harvest control rule will be developed that complements the new soft and hard limit reference points. This will be done in consultation between FIFD and CFL.</p> <p>Year 2. Using the CASAL model developed in Condition 1, stock rebuilding and areas of uncertainty will be explored. Model experimentation will be used to simulate stock rebuilding strategies under a systematic testing of harvesting scenarios.</p> <p>Simulations will ultimately test the appropriateness of limit and target reference points.</p> <p>Priority areas of uncertainty that need exploration include IUU fishing and depredation. IUU fishing will be explored through CASAL model simulation, where a “dummy” catch is estimated based on Fisheries Compliance Officer intelligence, reports of rogue longlines, etc. Depredation can be initially investigated by reviewing historic (post-2002) Observer collected whale sightings and frequency of observed fish parts on lines. An additional area of uncertainty is based on the relatively new implementation of the CASAL model framework and as such, it is expected that this area of uncertainty will dramatically decrease as the model is run under various fishing and management scenarios.</p> <p>A program for empirically estimating uncertainty related to depredation will be initiated. This will involve both Scientific Observer collected data, plus modifying fisher’s data recording practices. New data will come in the form of better examination of toothfish remains on hooks, morphometric analysis such that fish remains can be used to estimate biomass, and better use of observer and ship reported whale sightings (e.g. Roche et al 2007, Sigler et al 2008).</p> <p>Year 3. Continued observations and analysis of depredation studies, plus further experimentation with fishing and stock rebuilding scenarios.</p> <p>Year 4. A full stock assessment report will be produced. This will include full diagnostic results, clearly defined uncertainties, and results of simulation runs testing effectiveness of harvest controls and reference points under stock maintenance and rebuilding scenarios. This will be published in FIFD documentation for the fishing industry and in peer-reviewed scientific publication where novel results warrant.</p> <p>2 Who will address the condition</p>

	<p>The FIFD will carry out all stock assessment testing. FIFD and CFL will collaborate on collection of depredation data (See attached FIFD and CFL letters of support).</p> <p>3 The time period for action</p> <p>This condition covers a 4 year time period. Progress will be reported back to IMM at annual MSC reviews with the following milestones: Y1 – Harvest control rule in place. Y2 – Progress on model testing, simulation, and data from depredation studies. Y3 – Continued progress and summary of initial findings. Y4 – Full stock assessment, report of model testing, and well defined uncertainties in the model.</p> <p>4 How the action will improve the fishery</p> <p>Meeting this condition will result in a robust, well tested toothfish stock assessment model that will provide for meaningful stock projections under future fishing/management scenarios. This will then facilitate the better use of full feedback bio-economic simulation frameworks such as FLR (http://flrproject.org).</p>
<p>Progress on Condition [Year 1]</p>	<p>The findings of the first annual surveillance audit are reproduced below.</p> <p>Progress with this condition during the first year of certification is described in the FIFD in the document “Sustainability Measures 2014-15”. This document sets out reference points for the fishery, the management response that will be adopted in response to changes in stock status, and also the plans for developing the stock assessment along with comments on the observer programme and an outline of the research programme for the fishery.</p> <p>The harvest control measures in place for the fishery are:-</p> <ol style="list-style-type: none"> 1. Target Reference point. When $SSB_{current}:SSB_0$ remains at or near 45% then TAC shall remain the same. Fishing mortality (F) should be conservatively below FMSY. If there is a sustained (at least 3 years) trend in $SSB_{current}:SSB_0$ above 45% then an increase in TAC will be considered by the Director, guided by historic and projected biological and model trends. 2. Threshold. If the trend in $SSB_{current}:SSB_0$ is 40%-45%, the Director will consider minor tightening of harvest controls and/or additional conservation measures with the aim of avoiding a breach of the trigger point, guided by historic and projected biological model trends. Response in the fishery should be seen within 6 years. All data and decisions will be reviewed annually. 3. Trigger point. If the $SSB_{current}:SSB_0$ falls below 40% then the Director will impose strong tightening of harvest controls and additional conservation measures with the aim of rebuilding the stock, guided by historic and projected biological and model trends. Response in the fishery should be seen within 6 years and achieve an acceptable probability of success, based on model projections. All data and decisions will be reviewed annually. 4. Limit Reference Point. If $SSB_{current}:SSB_0$ falls to 20% or less, fishery will be significantly scaled down. This level has been suggested as being an indication of significant stock depletion, but with some likelihood of stock recovery (CCAMLR). <p>[Source: Sustainability Measures 2014-15]</p>

	<p>The stock assessment development plans described in the “Sustainability Measures 2014-15” are:-</p> <ul style="list-style-type: none"> • <i>Sensitivity of natural mortality (M) parameter. It has been previously set at 0.13, however there is a wide range of values that have been estimated for Patagonian toothfish elsewhere.</i> • <i>Examine the possibility of moving the assessment to one fishery in CASAL and use trawler catch/abundance as a recruitment index.</i> • <i>Examine model runs with different stock recruitment relationships and steepness parameters</i> • <i>Develop forward projections under stochastic recruitment.</i> • <i>Develop a two sexed age-based model given that the species is significantly dimorphic, demonstrated by different lengths at sexual maturity and growth parameters for males and females.</i> • <i>Explore the use of annual age-length keys, rather than pooling all years.</i> • <i>Develop methods for use of line-by-line catch and effort. FIFD have approximately 10 years of such data, however it is currently not well integrated in the primary Fisheries SQL database.</i> • <i>Establish limit and reference points, and a suitable harvest control rule (MSC Condition 1 & 2, Year 1 target).</i> <p>[Source: Sustainability Measures 2014-15]</p> <p>Observation</p> <p>The requirement in Year 1 was that a Limit Reference Point (LRP) should be defined. The FIFD has identified a LRP (see commentary for Condition 1 above). This requirement has been met. A LRP has been defined (20% of B₀) and formally adopted (and hence Condition 1 has been closed).</p> <p>The Year 2 requirement was that evidence should be assembled to support candidate harvest control rules for the fishery, with a further deadline for Year 4 that these should form part of the harvest strategy.</p> <p>The harvest control rules in place for the fishery have been clarified. There are still some areas where further action is required. However, there is evidence set out in the Sustainability Measures 2014-15 which shows that these areas are under investigation. The stock assessment and modelling work that will be required to develop and test harvest control rules for the fishery is underway and due to continue over the next year.</p> <p>Conclusion</p> <p>The Year 1 milestone has been met, and there is evidence that progress is already underway with the work scheduled for Year 2. Progress with this condition is on target. Progress will be reviewed at the next annual surveillance audit in 2016.</p>
<p>Progress on Condition [Year 2]</p>	<p>The findings of the second annual surveillance audit are reproduced below.</p> <p>As an overarching comment, it appears that the new CASAL model needs to be significantly refined before it can be considered to adequately represent the dynamics of the Falkland Islands Toothfish longline fishery to an extent where it can be used to estimate relative biomass or to be used as the operating model for a harvest strategy evaluation. This modelling work is critical to this Condition because it underpins the ability for the model to be used for testing of robustness through harvest strategy evaluation. The development of the model has been hampered by changes in staffing arrangements over the last year but</p>

needs to be a focus of work during Year 3. That being said, there is plenty of opportunity to further develop harvest control rules that accompany the newly developed limit and threshold reference points in parallel with (and regardless of) the continuing work on the development of the model.

The following comments are made specifically in relation to the stated Milestone and Action Plan.

1) **Areas of uncertainty**

The major areas of uncertainty highlighted in the client action plan relate to IUU fishing and whale depredation.

It is clear that the client has done a lot of good work towards understanding and analysing the information associated with toothfish depredation by whales. They looked at four methods of analysing the data, of which only the model-estimated impact of whale depredation using GLM analysis of sets with “whale interactions” and those with “no interactions” proved useful. The other methods were thwarted because of sparse data on whale interactions from a relatively small fishery. This groundwork will be an important foundation for subsequent analyses of the model’s robustness to uncertainty.

The 2015 model has been altered to be able to incorporate the “umbrella” longline method used to reduce toothfish depredation by whales since July 2007.

As yet, however, there was no evidence that the above GLM analysis of depredation had been included in the model. Nor does it appear that any work had been done on analysing and incorporating within the model the uncertainty of catches associated with IUU fishing.

2) **Harvest strategy evaluation**

The client action plan states that “Model experimentation will be used to simulate stock rebuilding strategies under a systematic testing of harvesting scenarios”. From the information provided by the client, it does not appear that this work has been done as yet.

One of the requirements in conducting harvest strategy evaluation is that you are able to test pre-defined control rules using an operational model. At present, the control rules associated with triggering the various reference points (set out in Falkland Islands Government (2016b)) are as follows:

- **Threshold (45-50%).** “...the Director will consider tightening of harvest controls and/or additional conservation measures guided by biological model trends.”
- **Trigger (<45%).** “...the Director will impose further tightening of harvest controls and additional conservation measures with the aim of rebuilding the stock, guided by biological and model trends”.
- **Limit (≤20%).** The fishery “...will be significantly scaled down”.

Harvest control rules should be properly defined for the various biomass or effort levels in the fishery, so they can be enacted as part of the total harvest strategy. At present, the control rules mentioned above are too ill-defined to enable any evaluation of the robustness of the harvest strategy. This needs to be a focus of Year 3.

3) **Rebuild timeframes**

The stock assessment provided (Falkland Islands Government, 2016a) indicates current spawning stock biomass, but there is no future projections that allow analysis of potential rebuilding timeframes.

	<p>Overall, it would appear that the work expected to be done on Condition 2 by the year two surveillance report is falling behind schedule, both with reference to the milestones and the client action plan.</p> <p>These observations were discussed with the client and the Falkland Islands Fisheries Department during the site visit. The audit finding was accepted by both parties. The slowing of progress was attributed to personnel changes, which have now been addressed through the recruitment of a replacement Fishery Scientist dedicated to the toothfish fishery, and also the plans to recruit a joint-funded stock assessment scientist.</p> <p>These findings indicate that the reason for progress falling behind target have been recognised and are being addressed by the client and FIFD.</p> <p>Conclusion</p> <p>Progress with this condition is currently Behind Target because the Year 2 milestones have not yet been attained. It is clear that progress with this condition has been hampered by personnel changes at FIFD. Evidence was presented at this audit to indicate that staff resources have now been committed to this work with the aim of restoring progress for completion within the specified timeframe.</p> <p>The score for the relevant PI remains unchanged.</p>
<p>Progress on Condition [Year 3]</p>	<p>There has been considerable progress on this condition since the Year 2 surveillance report where it was considered to be behind target.</p> <p>The structure of the model has been revised to enable the inclusion of previously unreported catches and undetected whale depredation as separate factors and to have the Spanish longline and umbrella longline as separate CPUE time series. This has allowed model exploration of these uncertainties and impact on the stock assessment.</p> <p>The precautionary model is used as the base case incorporating all reported catches in the Falkland Islands fishing zone. External data was used to obtain estimates of total toothfish catches in Falkland waters and estimated percentages of illegal / unreported fishing by region.</p> <p>Estimates of whale depredations included fish observed damaged or destroyed by bite-marks and an algorithm to predict the proportions of toothfish catches that are invisibly depredated. These proportions were extrapolated from observed longline sets to all commercial longlines. The estimated proportions of whale depredation were applied to both reported and estimated unreported catch totals.</p> <p>Various scenarios have now been run to explore the uncertainties highlighted in the client action plan relating to IUU fishing and whale depredation where levels of both were increased or decreased by 50% or 100%. Overall, the outcome of this work was that stock status did not change very much in any scenario and generally, increased estimates of both led to more optimistic estimates of current biomass.</p> <p>Forecasting of stock rebuilding timeframes has also now been implemented in the model in line with the client action plan. This now paves the way for full harvest strategy evaluation to be conducted over the next year. To date, the forecasting has only included scenarios predicted forward from the current stock status.</p> <p>The harvest strategy control rules have been modified and informally adopted since the previous surveillance report. It is understood that more robust testing of the harvest strategy from a range of levels of stock depletion will be undertaken during Year 4 in line with the target.</p> <p>Based on discussions, there may yet need to be clearer definition of the control rules – particularly relating to the Trigger Reference Point where the HCR states</p>

	<p>“If the ratio of SSB_{current}:SSB₀ is <40%, longline TAC will be decreased to a level that projects an increasing SSB trend under precautionary assumptions within 6 years of the last previous adjustment to the TAC”.</p> <p>It is not immediately apparent that stipulating TAC reduction to achieve “an increasing SSB trend” once the stock is below B₄₀ is a sufficiently well defined harvest control rule to “ensure that fishing mortality is reduced as the limit reference points are approached”.</p> <p>As noted previously, this issue is partly a consequence of the mismatch between the nomenclature used in the draft harvest strategy and the MSC Certification Requirements than a mismatch between the harvest strategy and the goal of attaining B_{MSY}.</p>
<p>Status of condition</p>	<p>It appears that the work that has been done over the past year has basically caught up from the of Year 2 assessment being “behind target”. Progress is now considered to be back “<u>on target</u>” and has set the foundation for achieving the Year 4 requirements of the Condition on time.</p> <p>The focus of the final surveillance audit will be to review whether there is a well defined harvest control rule in place that acts to ensure that the exploitation rate is reduced as the limit reference point is approached.</p> <p>The evidence presented at this surveillance audit relating to the robustness of the harvest control rules to uncertainty has enabled re-scoring of the Performance Indicator. The SG80 requirements are now met for SIb (see Appendix 1 of this report). The revised score for this PI is now 75.</p>

5.3 Condition 3

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	2.4.3	SG80 Sla. The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	75
Condition	The scale and intensity of the fishery is low, and the nature of the gear restricts impacts on benthos. The client should therefore determine where highly sensitive (i.e. main) habitats are present within the area fished. Should areas requiring management intervention be identified, relevant measures should be implemented (cf PI 2.4.2).		
Milestones	<p>Within Year 1: Develop a plan to allow identification of highly sensitive areas within the term of the current certification (PI score 75)</p> <p>Within Year 2: Ensure plan is implemented at level necessary (PI score 75)</p> <p>Within Year 3: Continue data collection at required level (PI score 75)</p> <p>Within Year 4: Initial assessment of data; identification of highly sensitive areas; identification of any management measures required and plan for implementation of these within following 12 months. (PI score 80+)</p>		
Client action plan	<p>Year 1. Collection of high-resolution taxonomic data by FIFD Scientific Observers has been underway since November 2011. Within the first year of this Action Plan, all accumulated benthic by-catch data will be analysed. Analysis will included production of GIS map layers of species' (or species group) distribution throughout the FICZ/FOCZ. This data will be compared to similar spatial maps of coincident contemporary and historic fishing effort. These analyses will form the basis for a risk-type assessment of benthic species as described for other CCAMLR fishing areas (e.g. Sharp et al, 2009, Williams et al 2011). This study will also provide a robust "gap analysis", that will drive on-going research initiatives. A review of environmental data (salinity, temperature) will also be completed, and summarised with respect to observed biological patterns.</p> <p>Year 2. On the basis of the review and gap analysis conducted in Year 1, a prioritised set of target areas will be identified for more detailed examination. We propose two prioritised sources of data collection. Highest priority data is in situ video monitoring of longline impact on the benthos and habitat. Video has been recently used for such monitoring of autoline systems in South Georgia (R. Benedet, PhD thesis In Progress). In addition to new video data collected, a review of extant video and stills image data will be collated and summarised. Such imagery has been collected by hydrocarbon exploration studies (2008, 2009, 2011), much of which are located over toothfish fishing grounds.</p> <p>Collection of oceanographic data is of secondary priority although, potentially very useful data for identifying sensitive species and habitats areas. Concomitant oceanographic data using a longline mounted TDs (temperature-depth logger) and a current meter will contribute greatly to predictive modelling of Vulnerable Marine Ecosystems (VMEs), and other biological/ecological</p>		

	<p>studies of toothfish. A plan for purchasing and deploying instrumentation will be produced, with implementation in Year 2.</p> <p>Year 3. Data accumulation will continue throughout Year 3. This will provide a valuable temporal component to the analysis. Where physical data are available, development of a predictive model for sensitive species and habitats will begin using modern modelling approaches (e.g. GAM, MAXENT, ENFA) (Tittensor et al 2009). Such analyses are currently under development in other longline fisheries (e.g. New Zealand, Australia), and collaborations between FIFD and other institutions will be sought.</p> <p>Year 4. The impact of umbrella system longline fishing on benthic species and habitats will be fully evaluated. Clearly identified areas of species and habitats sensitive to such impacts of will be identified. If data permits, a predictive model of VME's will be presented based on empirical biological and physical data collected during the previous 2 years. Management measures will be proposed on the basis of these analyses, and consultations with industry will begin. There is likely to be a great deal of scientific novelty, which will be published in the peer-reviewed scientific literature.</p>
<p>Progress on Condition [Year 1]</p>	<p>The findings of the first annual surveillance audit are reproduced below.</p> <p>FIFD have produced an 'Annual Review' of progress against this condition, entitled 'Invertebrate by-catch in the toothfish fishery 2012-14' (Falkland Islands Government, 2015b). This document presents a summary of information gathered from FIFD observer data on benthic invertebrates collected on fishing gear since 2011. Typical observer effort on 'invertebrate sampling' is around 1 day in every 4; this is considered appropriate given other duties required of observers.</p> <p>A total of 56 species groups have been recorded, of which 28 are classified as 'high risk' VME species. Fishing areas have also been classified as high, medium and low impact areas, using data from the start of the ITQ system in 2006. An initial analysis has been presented on the presence of specific geomorphological features (escarpment, canyons, troughs) and species groups (hydrocorals, stony corals, whips/fans, sponges, sea pens).</p> <p>This information has already allowed identification of the level of impact on these main habitat types (escarpment, canyons, troughs). Plans for future work include better taxonomy of samples and analysis of video taken by the hydrocarbon industry coincident with fishing areas to better determine the actual effects of fishing on VME taxa/habitats.</p> <p>Observations</p> <p>The requirements of the condition for Year 1 is to "Develop a plan to allow identification of highly sensitive areas within the term of the current certification (PI score 75)". Requirement for Year 2 is to "Ensure plan is implemented at level necessary".</p> <p>This has been achieved; a plan has been developed and implemented, and initial data analysis has been carried out within Year 1. The information being gathered – on intensity of fishing, distribution of main geomorphological features and presence of 'VME-indicative' taxa is considered entirely appropriate to the identification of vulnerable habitats and their importance relative to the surrounding area.</p>

	<p>Future work to include video from the hydrocarbon industry, and evaluation of the potential effects of 'line-drift' should allow this work to be satisfactorily concluded.</p> <p>It is also noted that the MSC CR v1.3 requires evaluation of impacts in relation to the full extent of a habitat, e.g. the bioregional area. Spalding et al 2007 categorise the 'Patagonian Shelf' as a bioregional area. The consideration of the total habitat range may therefore extend beyond the FOCZ.</p> <p>Conclusions Milestones for Year 1 and Year 2 have been achieved. The condition is therefore ahead of target for completion within the specified timescale.</p> <p>Year 3 requires ongoing data collection and analysis; this appears entirely on target.</p> <p>The score for this PI remains at 75.</p>
<p>Progress on Condition [Year 2]</p>	<p>As was reported in Year 1, FIFD had produced an 'Annual Review' of progress against this condition, entitled 'Invertebrate by-catch in the toothfish fishery 2012-14'. The presented a summary of information gathered from FIFD observer data on benthic invertebrates collected on fishing gear since 2011. Typical observer effort on 'invertebrate sampling' is around 1 day in every 4; this is considered appropriate given other duties required of observers. A total of 56 species groups have been recorded, of which 28 are classified as 'high risk' VME species. Fishing areas have also been classified as high, medium and low impact areas, using data from the start of the ITQ system in 2006. An initial analysis is presented on the presence of specific geomorphological features (escarpment, canyons, troughs) and species groups (hydrocorals, stony corals, whips/fans, sponges, sea pens).</p> <p>In the current year, recording of bycatch of benthic organisms has continued as planned (Blake (2016a)). In this year, 117 lines were observed – 19.7% of lines hauled.</p> <p>This information continues to add to the database available, providing plots of distribution of hydrocorals, stony corals, soft corals, sea-whips and fans and sponges. Taxa are being grouped according to their likely indication of VME habitats.</p> <p>The proposed use of video has not so far been developed, due in part to a reduction in hydrocarbon exploration and also the difficulties of obtaining cost-effective video equipment. This is not, however, seen as a fundamental problem in meeting this condition – the mapping of occurrences of VME-indicative taxa should suffice to provide the information required.</p> <p>The client is encouraged to explore suitable criteria for the identification of VME habitats and appropriate management options for these.</p> <p>Conclusion This condition is On Target for completion within the specified timeframe.</p> <p>The score for this PI remains at 75.</p>
<p>Progress on Condition [Year 3]</p>	<p>The observer recording of invertebrate catches on longlines continues (FIFD 2017i) with a further 110 lines observed in 2016, accounting for 20.7% of all the lines set. The intensity of data recording therefore continues at similar levels to previous years.</p>

	<p>CFL have also commissioned a proposal by SAERI/SMSG (CFL 2017b) to complete the data collection, analysis, and (where necessary) management plan development, with the aim of delivery of the Year 4 targets by April 2018. This is to include analysis of the catch, effort and benthic data currently collected by FIFD, alongside other sources of data, notably benthic imagery from hydrocarbon industry environmental baseline work. The expected research cruise by the new CFL vessel CFL Hunter is also planned to include underwater camera survey and direct observation of effects of longline gear. Ultimately, the plan is to lead to an analysis of available data, development of management options and plans for ongoing data collection and analysis.</p>
<p>Status of condition</p>	<p>The milestone for Year 3 has been achieved. The condition is therefore On Target for completion within the specified timescale.</p> <p>.</p> <p>The milestone for Year 4 requires an initial assessment of data; identification of highly sensitive areas; identification of any management measures required and a plan for the implementation of these within the following 12 months. The current proposals provided by the client would be expected to meet these final requirements.</p>

5.4 Condition 4

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	1.2.3	<p>SG60 a) Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.</p> <p>SG80 a) Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.</p> <p>SG100 a) A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available. b) All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.</p>	75
Condition	<p>NB: An objection was lodged to the determination to certify this fishery. This objection was resolved through agreement between the parties to implement a voluntary condition (Condition 4) requiring further research towards identifying the extent of interchange between different Patagonian Toothfish groups in the southwest Atlantic. The score for this PI was therefore lowered to 75 and an agreed condition put in place.</p> <p>A research plan should be developed and implemented within the term of this certification to investigate the extent of interchange between different Patagonian Toothfish groups in the southwest Atlantic. Results should be compared with, and interpreted in relation to, any similar results published or otherwise made directly available to FIFD. Implications of this research for ongoing management of the Falkland Islands fishery, particularly any necessary modifications to the Harvest Strategy, should be outlined prior to recertification of this fishery.</p>		
Milestones	<p>Within Year 1: Develop a research plan to allow determination of the extent of interchange between different Patagonian Toothfish groups in the southwest Atlantic (PI score 75)</p> <p>Within Year 2:</p>		

	<p>Ensure plan is implemented at level necessary (PI score 75)</p> <p>Within Year 3:</p> <p>Continue data collection at required level (PI score 75)</p> <p>Within Year 4:</p> <p>Initial assessment of data; identification of degree of mixing between toothfish populations. Publication of results and sharing with Argentine scientists through other mechanisms as appropriate. Evaluation of harvest strategy in light of results. (PI score 80+).</p>
<p>Client action plan</p>	<p>Year 1.</p> <p>A research plan will be developed investigating the extent and nature of stock discrimination of Patagonian Toothfish in the Patagonian Shelf region. This will involve 2 phases;</p> <ol style="list-style-type: none"> 1. An independent review of stock discrimination tools available for fisheries management and their application in the Falkland toothfish fishery situation. This review will take into account current stock discrimination science programs currently conducted by FIFD and will also include the applicability of other potential tools, specifically genetic techniques and tag-recapture programs. 2. To develop a 2 year research plan implementing those recommendations adopted from the independent review. <p>Year 2-3.</p> <p>To carry out research initiatives adopted from the independent review. Additionally, to continue with current stock discrimination investigations which include 1) otolith shape analysis, 2) otolith microchemistry, 3) fish morphology, 4) population size structure.</p> <p>Year 4.</p> <p>Results of stock discrimination research will be published in the peer reviewed literature, and reports will be made available through the FIFD website. A review of all data (from Falkland Islands and elsewhere) as it relates to stock identity will be carried out. These data will then be applied to stock assessment and management rules.</p>
<p>Progress on Condition [Year 1]</p>	<p>The findings of the first annual surveillance audit are reproduced below.</p> <p>Client Progress</p> <p>The first year requirement was to “Develop a research plan to allow determination of the extent of interchange between different Patagonian Toothfish groups in the southwest Atlantic (PI score 75)”. The client action plan was to commission “an independent review of stock discrimination tools available for fisheries management and their application in the Falkland toothfish fishery situation. This review will take into account current stock discrimination science programs currently conducted by FIFD and will also include the applicability of other potential tools, specifically genetic techniques and tag-recapture programs” and to “develop a 2 year research plan implementing those recommendations adopted from the independent review”.</p> <p>In accordance with the client action plan, CFL have commissioned an independent review (NIWA, 2015). This review has considered relevant stock discrimination techniques (genetics, parasitology, diet, demography, tagging, life history parameters, oceanography and otolith microchemistry) and current work undertaken by FIFD (otolith microchemistry, otolith shape analysis, morphometrics and growth function).</p>

	<p>Four main areas of research were recommended to aid characterisation of stock structure: additional demographic analysis of length and age, otolith microchemistry, a pulsed mark-recapture study and satellite-linked archival tags (PSAT). The problems of collaborative working with neighbouring territories, notably Argentina have, however, been highlighted by FIFD.</p> <p>The initial plan of FIFD is to carry out recommendations on ‘additional regional demographic studies on trends in length and age composition’ and to begin data gathering for otolith microchemistry line transects. The latter may provide evidence of individuals moving among different water masses.</p> <p>The remaining two recommendations, tag-recapture and PSAT tagging are to be reviewed, particularly in light of the level of fishing within Falklands waters (with a single vessel) and the degree of cooperation that may be attained with neighbouring states.</p> <p>Observations The requirement of year 1 was to “Develop a research plan to allow determination of the extent of interchange between different Patagonian Toothfish groups in the southwest Atlantic”. CFL have commissioned a comprehensive review of available techniques, have considered the recommendations put forward and begun implementation of the two techniques considered most appropriate to the Falklands situation. Other recommendations remain under review. Sample interchange with Chile and Uruguay has also been investigated.</p> <p>Year 2 requires implementation of the research plan; this appears on target.</p> <p>Conclusions The Year 1 requirements have been fully met. The condition is on target for completion within the specified timeframe.</p> <p>The score for this PI remains at 75.</p>
<p>Progress on Condition [Year 2]</p>	<p>The client has begun to carry out research initiatives adopted from the independent review. They are continuing with current stock discrimination investigations which include 1) otolith shape analysis, 2) otolith microchemistry, 3) fish morphology, 4) population size structure.</p> <p>It is important to note that the research being conducted in the Falkland Islands requires comparative samples and analysis to be completed in neighboring countries, including Argentina, before the implications of stock structure can be fully realized for the MSC assessment. The client has not control over whether this work is undertaken.</p> <p>Although there are no results to date from any of these projects, there has been appropriate progress against this condition.</p> <p><u>Otolith shape analysis</u></p> <p>440 otoliths from five areas have been collected. Digitized images have been obtained, smoothed and analysed. Classifiers for discrimination have been developed.</p> <p><u>Otolith microchemistry</u></p> <p>Laser ablation has been conducted on otolith samples collected across 10 years from fish aged between 1 to 6 years old.</p>

	<p><u>Fish morphology</u></p> <p>Good samples from fish between 95 and 110 cm have been collected from Chile, South Georgia, South Sandwich Islands, Falkland Islands and analysed. Additional samples have been acquired and frozen that meet prescribed criteria for analysis.</p> <p><u>Population size structure</u></p> <p>This project aims to develop regional catch-scaled length distributions and age distributions to examine movement patterns with age. Over 100,000 Patagonian toothfish have been sampled since 1988 from longliners and trawlers operating under different licenses in different parts of the shelf and slope fisheries in the Falkland Islands. Position, depth, catches by species and biological information including length, weight, sex and maturity are recorded. In addition, over 23,000 otoliths have been extracted and of these 5178 have been aged.</p> <p>All of the sampling and analysis under these different projects appears to be appropriate and progressing well. The only comment regarding the progress of this work is that it is not entirely clear how the results of these four different projects will be integrated to provide an overarching recommendation regarding stock structure. Weight of evidence methods?</p> <p>Conclusion</p> <p>This condition is On Target for completion within the specified timeframe.</p> <p>The score for this PI remains at 75.</p>
<p>Progress on Condition [Year 3]</p>	<p>All aspects of these investigations appear to be progressing well and are on target with the Client Action Plan. They are continuing with current stock discrimination investigations which include 1) otolith shape analysis, 2) otolith microchemistry, 3) fish morphology, 4) population size and structure. Progress reports were provided on each of these aspects of the fishery.</p> <p>Most of the progress report during the third surveillance audit related to the otolith microchemistry and the size and age structure as summarized below.</p> <p>Otolith microchemistry,</p> <p>This work by Randhawa is described in FIFD (2017c). Otoliths from 1028 juvenile and young toothfish caught in the trawl fishery, throughout the FICZ and north western parts of the FOCZ, have been collected from sampling over the past decade. They have been processed using laser ablation inductively coupled plasma mass spectrometry and the key elements have been analyzed using principal component analysis (PCA) and clustering analyses. The preliminary results support the hypothesis of two different nursery areas established from a single spawning population of South American toothfish. Once nursery area is consistent with cooler waters with higher productivity around Burdwood Bank and another on grounds south and east of the Falkland Shelf. These results are consistent with previous studies using different stock delineation techniques. Further work has been highlighted.</p> <p>Population size and age structure.</p> <p>This work undertaken by Lee is described in FIFD (2017b) based on samples collected during 2015 from a total of 11 256 fish (7798 from trawlers and 3458 from longliners) providing 2626 otoliths for ageing (365 trawl and 413 longline). This showed the trawl fishery captured mainly two cohorts of small fish two with modes at 24 and 44 cm TL representing 1+ and 2+ year old fish respectively. In contrast, the longline fishery caught larger fish 50 < 200 cm TL with a mode of 100 cm representing fish > 5 years old and up to 44 years old</p>

	<p>with a mode of age 10. The ageing information has been used to calculate separate von Bertalanffy growth parameters for males and females.</p> <p>The above work has been supported by Brendon Lee who started a PhD on the: “Spatial and temporal delineation in the population structure of Patagonian toothfish around the Falkland Islands: ontogenetic and environmental effects”</p> <p>Other stock discrimination studies involve both tag-recapture and satellite tagging studies are continuing as reported in work by <i>Randhawa and Lee (FIFD 2017f; 2017g and 2017h)</i>. An initial tagging trip was conducted in June 2016, in the eastern parts of the FICZ/FOCZ from Burdwood Bank to the northeastern edge of the FOCZ. A total of 407 fish were tagged and released in all three zones: 66 off the eastern edge of Burdwood Bank (south), 213 in the eastern region, and 128 in the northeast area. During subsequent commercial fishing, 14 were recaptured (3.44%) within 64 days of release on average and were generally within 30 km and \pm 65 m depth of the original tagging location.</p> <p>Studies to develop a “recruitment index” for better estimation of the shelf population are also underway. To this end, another survey of distribution of juvenile toothfish was undertaken in January 2017 revealing substantial nursery grounds of juvenile toothfish in shallow waters of the southern part of the Falkland Shelf.</p> <p>Significant work has been undertaken to date (albeit in the absence of comparative data from all neighbouring countries). We now look for a synthesis and evaluation of this information at the next surveillance audit.</p> <ul style="list-style-type: none"> •
<p>Status of condition</p>	<p>This condition is On Target for completion within the specified timeframe.</p> <p>The score for this PI remains at 75.</p>

5.5 New Conditions & Recommendations

No new conditions were generated at this audit.

6 Summary of findings

- 1) The client has presented evidence of ongoing stock assessment and management of the fishery.
- 2) It is evident that there has been an appropriate and sustained management response to the stock model outputs. These include a reduction of the TAC and introduction of conservation measures for Burdwood Bank.
- 3) Revised harvest control rules were presented for consideration at this surveillance audit. The new HCRs address some uncertainties seen in the original HCRs, and appear to be appropriate for the current stock status. The assessment team, client, and scientists from FIFD discussed how these HCRs would be further developed during Year 4 of certification.
- 4) Condition 3 remains open but is on target for completion within the specified timeframe. Current plans provided by the client also show a clear path to completing the final requirements of this condition.
- 5) There is good evidence that the certified fishery is compliant with all regulations in place for the fishery.
- 6) Four conditions of certification were set for the fishery when it was certified. The status of these conditions following this surveillance audit can be summarised as:-
 - a. Condition 1: This condition was closed at the first annual surveillance audit, and remains closed.
 - b. Condition 2: Progress with this condition is considered to be back **on target**.
 - c. Condition 3: Progress was found to be **on target**.
 - d. Condition 4: Progress was found to be **on target**.
- 7) Having reviewed all of the evidence presented at this audit, the surveillance team found no changes in the status or management of this fishery that would require re-scoring of any Performance Indicators.
- 8) We conclude that the fishery continues to meet the MSC Certification Requirements, and that **MSC Certification should continue with annual surveillance audits**.

Appendix 1 – Re-scoring evaluation tables (if necessary)

The progress with condition 2 at this audit required re-scoring of PI1.2.2. This was originally scored under the MSC Certification Requirements v1.3. The PI has been rescored at this audit using the Performance Indicator scoring guideposts from CRv1.3 and the table format from MSC Fisheries Certification Requirements v2.0.

Original scoring table (CR v1.3)

PI 1.2.2		There are well defined and effective harvest control rules in place	
SG	Issue	Met? (Y/N)	Justification/Rationale
60	a	Y	<p>Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.</p>
			<p>The well-defined parts of the HCR use estimates of the current spawning stock size as a proportion of the unexploited spawning stock size to determine whether the stock is above or below the proxy MSY level ($B_{trigger}$). If above the proxy MSY level, the TAC is set at 1200t (likely below the long-term MSY), but may be decreased or increased according to observed trends in the SSB. Otherwise, if the stock is below the MSY level the TAC should be reduced by 20%. The HCR explicitly requires that management measures be reviewed by all parties as new advice is provided by the Fisheries Department through stock assessment development.</p> <p>In addition, trends in indicators are used to back up the decision making and there are generally understood aspects to the harvest control rule that allows adaptation. The current stock assessment model is new and still under final development.</p> <p>Therefore, the harvest control can be described as generally understood and some is well-defined. Furthermore, the HCR indicates that the management will act to reduce the exploitation rate when the stock falls below the trigger point, which is the current proxy for MSY.</p>
	c	Y	<p>There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.</p> <p>See SG80</p>
80	a	N	<p>Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.</p>
			<p>The parts of the HCR referencing the TAC to achieve the target level (currently 1200t) and the 20% reduction in TAC if the stock is reduced below 45% of the unexploited state are well defined. However, further action which may or may not be necessary is only generally understood. Specifically, whether the 20% reduction described is sufficient to ensure rebuilding</p>

PI 1.2.2		There are well defined and effective harvest control rules in place	
SG	Issue	Met? (Y/N)	Justification/Rationale
			consistent with PI 1.1.2 and PI 1.1.3 is unclear. Should the stock be depleted too far below B_{MSY} , a 20% reduction in TAC will not achieve rebuilding at all. While it is clear that the management plan would intend to take further action should this occur, such action is not well-defined.
	b	N	<p>The selection of the harvest control rules takes into account the main uncertainties.</p> <p>In general terms, the harvest control rule does account for the main uncertainties. The HCR responds to results from the stock assessment but also explicitly takes into account trends in SSB and the abundance indices. The main abundance index, in particular, should be robust to the main uncertainties. The TAC is set at a precautionary level that accounts for uncertainty in the estimated MSY and projections have been used to develop a fixed quota which appears safe. Stock assessment projections have not been used to develop a safe dynamic harvest control rule, but have so far only focused on a fixed quota.</p> <p>However, the harvest control rule has not been tested to demonstrate how well it might deal with uncertainty. While the “generally understood” aspects of the harvest control allows for reductions in fishing quotas if indicators suggest the stock is at risk, it is unclear whether the well-defined aspects of the rule are sufficiently precautionary to cope with the main uncertainties. Specifically, the 20% reduction in TAC appears arbitrary and has not been tested through, for example, computer simulation, so that it is unclear to what level of depletion and uncertainty it will still bring about rebuilding consistent with PI 1.1.2 and PI 1.1.3.</p>
	c	Y	<p>Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.</p> <p>The available evidence indicates that the TAC is able to control fishing mortality produced from the trawl, pot and longline gears. The TAC may be ineffective if there is significant unrecorded mortality, which in this case would discarding, IUU or depredation. Discarding of toothfish does not take place. IUU appears from the surveillance information to be effectively controlled. Depredation, another potential source of unrecorded mortality, has been reduced through gear improvements (“umbrella” use), so this source of uncertainty is likely decreasing, so the current TAC would most likely be precautionary. The 50% observer coverage provides evidence for the effectiveness of the control.</p> <p>For operational reasons, up to 15% of the TAC may be carried forward to the following year or brought forward from the next year. Such adjustments can</p>

PI 1.2.2		There are well defined and effective harvest control rules in place	
SG	Issue	Met? (Y/N)	Justification/Rationale
			only operate from one year to the next and cannot accumulate over multiple years. This should not prevent TAC applying adequate limits on catches.
100	b	N	The design of the harvest control rules takes into account a wide range of uncertainties. See SG80b
	c	N	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules. The evidence does not yet clearly show that the TAC achieves exploitation levels required by the HCR. The fishery has only been operating during a period of population decrease by applying effort and landings limits on vessels licensed to operate in the fishery. An evaluation of the effectiveness of the HCR would require clear demonstration that the fishing mortality can be controlled to achieve the limit, and, where necessary, reduced to allow rebuilding. This has not yet been seen. A TAC was introduced in 2006, before which the fishery was limited to 2 vessels. Unobserved mortality such as IUU and depredation, while unlikely to result in the TAC being set too high, still adds to the uncertainty in setting the level of catch. More evidence is required that catch limits can be applied which will prevent population decrease or ensure the population can be rebuilt.
References		2013, 2009 Toothfish Fishery Sustainability Measures Monthly fishery reports FishOps Operations Manual and Surveillance summary. FIFD Fishing Licence Fisheries Advice 2009-12 Laptikhovsky V, Winter, A., Brickle P, Roux M-J, Arkhipkin A., Brewin, P. (2012). Vessel Units Allowable effort and allowable catch 2013. Falkland Islands Fisheries Department. 30pp. Payá, I., Brickle, P. (2008) Stock Assessment and Total Allowable Catch of Toothfish (<i>Dissostichus eleginoides</i>). Scientific report.	
OVERALL PERFORMANCE INDICATOR SCORE:			65
CONDITION NUMBER (if relevant):			2

Revised scoring table (FCR v2.0)

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guide post	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Y	N	
	Justification	<p>The harvest strategy control rules have been modified and informally adopted since the previous surveillance report. It is understood that more robust testing of the harvest strategy from a range of levels of stock depletion will be undertaken during Year 4 in line with the target.</p> <p>Based on discussions, there may yet need to be clearer definition of the control rules – particularly relating to the Trigger Reference Point which states “If the ratio of SSB_{current}:SSB₀ is <40%, longline TAC will be decreased to a level that projects an increasing SSB trend under precautionary assumptions within 6 years of the last previous adjustment to the TAC.</p> <p>It is not immediately apparent that stipulating TAC reduction to achieve “an increasing SSB trend” once the stock is below B₄₀ is a sufficiently well defined harvest control rule to meet the SG80 requirements for this SI (i.e. to “ensure that fishing mortality is reduced as the limit reference points are approached”).</p> <p>The SG60 level of performance continues to be met, but SG80 is not presently met, although progress is clearly being made to produce well defined harvest control rules that would meet the SG80 requirements. It is anticipated that this requirement will be met by the next surveillance audit.</p>		
b	HCRs robustness to uncertainty			
	Guide post		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	Met?		Y	N
	Justification	<p>The precautionary model is used as the base case incorporating all reported catches in the Falkland Islands fishing zone. External data was used to obtain estimates of total toothfish catches in Falkland waters and estimated percentages of illegal / unreported fishing by region.</p> <p>Estimates of whale depredations included fish observed damaged or destroyed by bite-marks and an algorithm to predict the proportions of toothfish catches that are invisibly depredated. These proportions were extrapolated from observed longline sets to all commercial longlines The estimated proportions of whale depredation were applied to both reported and estimated unreported catch totals.</p> <p>Various scenarios have now been run to explore the uncertainties highlighted in the client action plan relating to IUU fishing and whale depredation where levels of both were increased or decreased by 50% or 100%. Overall, the outcome of this work</p>		

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
		<p>was that stock status did not change very much in any scenario and generally, increased estimates of both led to more optimistic estimates of current biomass.</p> <p>Forecasting of stock rebuilding timeframes has also now been implemented in the model in line with the client action plan. This now paves the way for full harvest strategy evaluation to be conducted over the next year. To date, the forecasting has only included scenarios predicted forward from the current stock status.</p> <p>The information available indicates an improvement in performance for this scoring issue, meeting the SG80 requirements.</p>		
c	HCRs evaluation			
	Guide post	There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules..
	Met?	Y	Y	N
	Justification	<p>The available evidence indicates that the TAC is able to control fishing mortality produced from the trawl, pot and longline gears. The TAC may be ineffective if there is significant unrecorded mortality, which in this case would discarding, IUU or depredation. Discarding of toothfish does not take place. IUU appears from the surveillance information to be effectively controlled. Depredation, another potential source of unrecorded mortality, has been reduced through gear improvements (“umbrella” use), so this source of uncertainty is likely decreasing, so the current TAC would most likely be precautionary. The 50% observer coverage provides evidence for the effectiveness of the control.</p> <p>For operational reasons, up to 15% of the TAC may be carried forward to the following year or brought forward from the next year. Such adjustments can only operate from one year to the next and cannot accumulate over multiple years. This should not prevent TAC applying adequate limits on catches.</p> <p>The SG60 and 80 requirements continue to be met for this SI.</p>		
	References	<p>FIFD, 2017 (a)-(h).</p> <p>2013, 2009 Toothfish Fishery Sustainability Measures</p> <p>Monthly fishery reports</p> <p>FishOps Operations Manual and Surveillance summary.</p> <p>FIFD Fishing Licence</p> <p>Fisheries Advice 2009-12</p> <p>Laptikhovsky V, Winter, A., Brickle P, Roux M-J, Arkhipkin A., Brewin, P. (2012). Vessel Units Allowable effort and allowable catch 2013. Falkland Islands Fisheries Department. 30pp.</p> <p>Payá, I., Brickle, P. (2008) Stock Assessment and Total Allowable Catch of Toothfish (<i>Dissostichus eleginoides</i>). Scientific report.</p>		
OVERALL PERFORMANCE INDICATOR SCORE:				75
CONDITION NUMBER (if relevant):				2

Appendix 2 - Stakeholder submissions (if any)

[Only complete if stakeholder submissions, written or verbal, are received]

The report shall include all written and verbal submissions made by stakeholders during the annual surveillance audit process in full, together with the explicit responses of the team that identify:

- a. Specifically what (if any) changes to scoring, rationales, or conditions have been made as a result of the information submitted.
- b. Where the need for changes is suggested but no change is made, a substantiated justification.

[Reference: FCR 7.23.19]

Appendix 3 - Surveillance audit information (if necessary)

Not applicable.

Appendix 4 - References

- Blake, A. (2016a) Invertebrate by-catch in the Patagonian toothfish fishery in the Falkland Islands 2015-16. Directorate of Natural Resources – Fisheries
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- FIFD, 2017g. Toothfish tagging cruise, ZDLC2 – 06 – 2016, CFL Gambler. 4 – 18 June 2016.. Directorate of Natural Resources – Fisheries. (Author Rhandawa, H.S., & Lee, B.) 21pp.
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Appendix 5 - Revised Surveillance Program

When this fishery was certified, a Normal surveillance program was proposed (under CRv1.3), requiring annual on-site surveillance audits.

The assessment team considers that this surveillance program remains appropriate. The surveillance program that complies with the new CRv2.0 requirements is set out below.

Table A5-1: Surveillance program

Score from CR Table 5	Surveillance Category	Year 1	Year 2	Year 3	Year 4
5	Default Surveillance	On-site surveillance audit.	On-site surveillance audit.	On-site surveillance audit.	On-site surveillance audit. Reassessment.