



## **Supplementary material**

Supporting information for MSC's evidence requirements: technical considerations for evaluating at-sea observer and electronic monitoring programmes

A report produced for the MSC

October 2023

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## **Supplementary material to the report:**

Supporting information for MSC's evidence requirements:  
technical considerations for evaluating at-sea observer and  
electronic monitoring programmes

## **Case studies of detailed scoring against the ERF requirements**

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J.P. Pierre\*, J.W. Andrews+ and R. Blyth-Skyrme#

\*Johanna Pierre Environmental Consulting Ltd, Wellington, New Zealand; [johanna@jpec.co.nz](mailto:johanna@jpec.co.nz)

+AWJ Marine Ltd, Windermere, UK; [jim@awjmarine.co.uk](mailto:jim@awjmarine.co.uk)

#Ichthys Marine Ecological Consulting Ltd, Lymington, UK; [rob@ichthysmarine.com](mailto:rob@ichthysmarine.com)



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# 1. Cedar Lake walleye (*Sander vitreus*) and northern pike (*Esox lucius*) fishery

## Evaluations

### Trueness criteria

#### Objectivity and consistency

<p><b>Objectivity</b></p>	<p>Is the information independent from the UoA?</p>	<p>Landed catch composition information is recorded by the packing shed staff member who is from the local community, trained by Presteve (the packing station owner), but employed by the Cedar Lake Fisheries Association. Landed catch records are provided to the fisher, Government, shipper and buyer.</p> <p>From the packing shed, catch is delivered to Presteve Foods Ltd's out-of-province packing station with supporting documentation describing catch weights by species that is checked on arrival. This two-step arrangement provides for verification of the quantities of landed catch taken, but not by a third party. The Fisheries Association comprises fishers from the UoA. Presteve is a separate commercial entity which pays the fishers.</p> <p>The index netting programme provides fishery-independent information on the fish community and for stock monitoring. The index nets are set by a commercial fisher with government technicians, and the catch is processed jointly.</p> <p>Habitat information is collected through an ongoing monitoring programme that is independent of the UoA. There is general information on UoA fishing locations, while detailed information is not routinely collected.</p> <p>Compliance is undertaken by the Manitoba Department of Conservation and Climate Change. Fishery participants may provide information on potential non-compliance events to these officers.</p>
	<p>Is the veracity affected by a Conflict of Interest?</p>	<p>Landed catch is initially recorded by someone closely linked to the UoA, as an employee of the Fisheries Association. Presteve, who receive landed catch deliveries and check them on arrival, are a separate commercial entity from the UoA. Presteve would be in a position to challenge the recorded catch quantities delivered (e.g. to reduce purchase prices). However, it is expected that this potential would be mitigated by Presteve having trained the packing shed staff member.</p> <p>The index netting programme is undertaken by management agencies with fisher involvement. It is well documented and has been running for more than a decade. It is considered unlikely to be affected by a conflict of interest.</p> <p>The habitat sampling programme is undertaken by a government agency and a provincial Crown corporation. These entities are independent from the UoA and no conflict of interest is anticipated.</p> <p>Compliance agents are government officials. Information on alleged non-compliance may be provided by fishery participants, which could be influenced by a conflict of interest. However, only Officers can take enforcement action. The government agency provided information on compliance and therefore the veracity of information is not expected to be affected by a conflict of interest.</p>
<p><b>Consistency</b></p>	<p>To what extent is the information accordant with itself or other comparable sources?</p>	<p>There are no other sources of comparable information on commercial catch. The index netting programme has significant differences to the commercial fishery operation (e.g. location, season and gear used) and is indicative of community composition while not directly comparable to commercial fishery catch.</p> <p>The habitat sampling programme has operated for more than a decade, with no indication of inconsistency over time among the available information.</p>

## Relevance and completeness

Relevance	Item	To what extent is the information directly applicable to the UoA / scoring element?	To what extent is the monitoring programme appropriate for gathering relevant information?
	Shark finning	N/A. Sharks are not present where the fishery occurs.	N/A
	Main and minor in-scope species	<p>Commercial catch records represent landed catch only. Total catch cannot be quantified.</p> <p>Index netting provides some information on species present and abundance, while gear and catch profiles differ from commercial fishing.</p> <p>There are stock assessments available on two of three main in-scope species, but not for one main and minor in-scope species.</p>	Partially; scope requires expansion to include discarded catch.
	ETP/OOS	There is no information collected from the UoA. Index netting records provide some information which could contribute to verification, noting gear differences with the UoA.	Partially; it may contribute to verification but not independent observation.
	Habitats	Fishery independent information is available. This is broadly relevant in that it monitoring overlaps with fishing areas.	Partially; there is no detailed information on fishing locations.
	Compliance	Shore-based and on-water patrols in summer, skidoo-based patrols in winter, and monitoring fish production records for quota violations provide information relevant to the UoAs.	Partially; scale of monitoring relative to UoA effort is unclear as yet.
Completeness	Item	To what extent is the information representative of the UoA or scoring element in space and time?	To what extent does the information provide an up- to-date description of the UoA or scoring element?
	Shark finning	N/A. Sharks are not present where the fishery occurs.	N/A
	Main and minor in-scope species	<p>Landed catch records encompass the entire fishery.</p> <p>Stock status of one main and all minor species is unknown and UoA impacts have not been assessed.</p> <p>Index netting information from 2022 includes records of catch that is retained and catch that would not be retained by commercial fishers. While gear specifications differ, index net data can provide some information on catch that may be discarded.</p>	<p>Partially; landed catch information is up-to-date while total catch cannot be quantified as no information is available for consideration of discarded catch.</p> <p>However, index netting could provide some information to estimate discard composition.</p> <p>Stock status of one main and all minor species is unknown.</p>

	ETP/OOS	There is no empirical information available on ETP catch from the commercial fishery. Index netting provides a time series of information from gear with different specifications however. Index netting shows a zero-catch record for birds 2008-2022, and this may be useful for considering risks of commercial gear.	Limited; based on piecemeal anecdotal information on the UoA catches and potential to infer from index netting.
	Habitats	A habitat monitoring programme is carried out in the lake. This is independent of the UoA and there is no detailed information on fishing locations.	Limited; inferred by broad overlap.
	Compliance	Cannot be determined based on current information.	Limited; based on one logged year of compliance monitoring and qualitative descriptions of activities.

#### Evaluation used to determine whether PG1 is met

Considerations	
<b>A catch monitoring system is in place that facilitates:</b>	
<b>Estimation of catches</b>	UoA reporting encompasses landed catch of commercial species. It does not include any discarded catch or ETP/OOS.
<b>Reporting catch information to management</b>	Information on landed catch is provided to management from the packing shed.
<b>Independent verification of catches that is representative</b>	Landed catch volumes recorded by species at the packing shed are checked by the purchasing company when received at the packing station. Verification is representative of landed catch (not total catch). This is unlikely to be affected by COI but cannot be considered independent of the UoA.

#### Precision criteria used to structure the evaluation used to determine whether PG2 is met

Criterion	Component	Considerations
		<p><b>To what extent is variability accounted for by the catch monitoring system:</b></p> <ul style="list-style-type: none"> <li><b>In the physical characteristics of the fleet?</b></li> <li><b>In where, when and how the species is caught?</b></li> <li><b>In species distribution?</b></li> <li><b>In productivity dynamics?</b></li> </ul> <p><b>To what extent are the observations statistically distinct from each other?</b></p>
<b>Fishing operations</b>	Main In-scope species	The system supports quantification of landed catches sold. For landed catch, variation in both physical characteristics of the fleet and species catch patterns are accounted for, and the effects of random error are expected to be minimal. Statistical approaches are not applied to generate catch estimates; delivery records cover all landed catch sold.
<b>Ecological characteristics</b>	ETP/OOS	
<b>Monitoring design</b>	Habitats	

		General information is available on the spatial and temporal distribution of UoA fishing effort. This can be overlaid with habitat maps developed independently from the fishery.
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**Sharks**

There are no sharks present in Cedar Lake. Therefore, shark finning PIs are not applicable.

**In-scope species**

**Main and minor in-scope species**

**Trueness Evaluation: PI 2.1.3 SIa, b**

TG1	<p>There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.</p>	<p>Landed catch composition information is available from FPRs (and Trade Records if direct sales are undertaken by fishers). FPRs are completed by a staff member employed by the Fisheries Association (which comprises UoA fishers), with catch shipments checked on arrival by the packing station (owned by a different commercial entity). Landed catch records are provided to management from the packing shed, prior to being checked at the packing station. The involvement of the two separate commercial entities provides a level of mitigation of conflicts of interest, while neither is a third-party. Fishers are paid by the company that owns the packing station.</p> <p>In the past, the packing station provided feedback on misalignment of incoming delivery reports and their own determinations (and commensurate charge-backs occurred). In such cases, the packing shed operators notified the government enabling records to be updated. It is uncertain if this practice continues.</p> <p>Trade Records are provided to the Government by the fisher and cannot be verified. However direct sales have been minimal/non-existent from the Cedar Lake fishery to date. In other locations, Conservation Officers have intercepted the supply chain to follow up where there is a perceived risk of direct sales not being reported.</p> <p>Quantitative information on discards from commercial fishing operators is not available; this is not collected. For main species the extent of discarding is expected to be limited. While smaller fish are reported to carry less value than larger fish (e.g. 73% for walleye), all catch of main in-scope species is reported to carry sufficient economic value to be worth landing, rather than discarding. Therefore, the effect of bias on trueness resulting from a lack of discard sampling can be anticipated.</p> <p>Unobserved mortality due to loss of catch from commercial gillnets has not been estimated, though this is thought to be minimal based on the mesh sizes used.</p> <p>Catch composition differs between commercial and index nets given the gear types and fishing regimes. Nonetheless, the two information streams can be compared with each other, and through time. There is fisher involvement in the index netting programme. However, technicians are present during index net fishing.</p> <p>Stock status information is available for two of three main species, but not for one main and all minor species.</p> <p>There are some elements which contribute evidence to meeting TG1, but overall this is not met.</p>
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TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	Sources of bias have been identified, though there is insufficient information to conclude that the effect of bias on trueness is broadly understood for this fishery.  TG2 is not met.
TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	TG3 is not met.
<b>References</b>	Knapman, P., Casselman, J., Blyth-Skyrme, R. and Pawar, R. 2022. Cedar Lake walleye and northern pike fisheries. Public Certification Report. LRQA, Edinburgh.	

**Precision Evaluation: PI 2.1.3 SIa**

PG1	A catch monitoring system is in place that is able to collect and provide catch information	<p>FPRs are completed at the packing shed in Easterville the staffer weighing in the catch. Copies of the FRP are provided to the management agency. Any direct sales are reported by the selling fisher to the agency. This information reflects landed saleable catch from all commercial fishing operations.</p> <p>These components of the catch monitoring system facilitate estimation of landed catches and reporting of catch information to management authorities.</p> <p>There is an opportunity for verification when landed catch shipments reach the packing station in Ontario, (noting that the packing station receiver is not a third party; fishers are paid by the packing station).</p> <p>In the past, any misalignment of fish delivered with delivery records was charged back to fishers, and the government notified. It is uncertain if this continues, and this could be usefully clarified as it adds an important element to the checks and balances in place.</p> <p>Currently, PG1 is not met.</p>
PG2	The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates	<p>A programme of independent observation is not in place.</p> <p>PG2 is not met.</p>
PG3	The catch monitoring system in place enables a census of catches using independent observation	PG3 is not met.
<b>References</b>	Knapman, P., Casselman, J., Blyth-Skyrme, R. and Pawar, R. 2022. Cedar Lake walleye and northern pike fisheries. Public Certification Report. LRQA, Edinburgh.	

**ETP/OOS species**

**Trueness Evaluation: PI 2.2.3, SIa**

<p>TG1</p>	<p>There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.</p>	<p>Fishers provided anecdotal information on the extent of aquatic bird interactions; these were reported to be rare. Captures are not recorded or reported during commercial fishing but would be recorded from index netting (noting the differences in specifications between commercial and index netting gear).</p> <p>Catch of lake sturgeon is not recorded or reported and is estimated. Mark-recapture work provides some information to estimate abundance.</p> <p>General trend information is out of date for double-crested cormorant and horned grebe.</p> <p>While it is unknown whether this is the case in the UoA, fisher reporting of ETP captures in other fisheries generally underestimate the extent of ETP catch. There is potential for bias to exist. The anticipated effect of this on trueness based on other fisheries can be anticipated (i.e. underestimation of ETP catch). However, whether that situation applies in the focal fishery is unknown, and a determination cannot be made on whether the effect of bias on trueness is consequential.</p> <p>TG1 is not met.</p>
<p>TG2</p>	<p>There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.</p>	<p>TG2 is not met.</p>
<p>TG3</p>	<p>Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.</p>	<p>TG3 is not met.</p>
<p><b>References</b></p>	<p>Knapman, P., Casselman, J., Blyth-Skyrme, R. and Pawar, R. 2022. Cedar Lake walleye and northern pike fisheries. Public Certification Report. LRQA, Edinburgh.</p>	

**Precision Evaluation: PI 2.2.3, SIa**

<p>PG1</p>	<p>A catch monitoring system is in place that is able to collect and provide catch information</p>	<p>A system is not in place that facilitates estimation of ETP catches, reporting of catch information to management authorities, and verification of catch with representative coverage.</p> <p>PG1 is not met.</p>
<p>PG2</p>	<p>The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates</p>	<p>PG2 is not met.</p>

PG3	The catch monitoring system in place enables a census of catches using independent observation	PG3 is not met.
<b>References</b>	Knapman, P., Casselman, J., Blyth-Skyrme, R. and Pawar, R. 2022. Cedar Lake walleye and northern pike fisheries. Public Certification Report. LRQA, Edinburgh.	

**Habitat Management**

**Sensitive Habitats – Compliance**

**Trueness Evaluation: PI 2.3.2 SIc**

Not assessed; there are no sensitive habitats, or management requirements or other measures to protect them.

**Habitats**

**Trueness Evaluation: PI 2.3.3 SIb**

TG1	There is potential for bias to exist in the information but its effect on trueness can be <b>anticipated</b> and is not considered to be consequential.	<p>There is general information available on the location of fishing effort. This is reported to be concentrated in the southeast basin of the lake, and the eastern portion towards the end of the summer season.</p> <p>Nets are reported to be set away from the nearshore area in summer (on clay and/or silty loam substrates), and along the shoreline near Easterville in the winter.</p> <p>Habitats have been characterised in Cedar Lake, by a monitoring programme independent from the UoA.</p> <p>More detailed information on fishing locations is required to anticipate the effect of bias on trueness, and to determine whether this is consequential.</p> <p>TG1 is not currently met.</p>
TG2	There is <b>limited</b> potential for bias to exist in the information but where it might exist its effect on trueness is <b>broadly understood</b> and is not considered to be consequential.	TG2 is not met.
TG3	<b>Most potential sources of bias have been mitigated,</b> and where bias might exist its effect on trueness is <b>well understood</b> and is not considered to be consequential.	TG3 is not met.
<b>References</b>	Knapman, P., Casselman, J., Blyth-Skyrme, R. and Pawar, R. 2022. Cedar Lake walleye and northern pike fisheries. Public Certification Report. LRQA, Edinburgh.	

**Precision Evaluation: PI 2.3.3 SIb**

Not assessed; there are no habitat-forming species associated with more sensitive habitats.

## Compliance

### Trueness Evaluation: PI 3.2.3 SIc

TG1	There is potential for bias to exist in the information but its effect on trueness can be <b>anticipated</b> and is not considered to be consequential.	<p>Conservation Officers undertake compliance monitoring through boat and land-based patrols conducted during the year. They step up activity when notified of potential non-compliance. Patrol logs were recently introduced and will provide critical information supporting the evaluation of trueness in future.</p> <p>Currently the effect of potential bias on trueness cannot be anticipated. Based on currently available information, an assessment of whether or not bias is consequential is not possible.</p> <p>TG1 is not met.</p>
TG2	There is <b>limited</b> potential for bias to exist in the information but where it might exist its effect on trueness is <b>broadly understood</b> and is not considered to be consequential.	TG2 is not met.
TG3	<b>Most potential sources of bias have been mitigated,</b> and where bias might exist its effect on trueness is <b>well understood</b> and is not considered to be consequential.	TG3 is not met.
<b>References</b>	Knapman, P., Casselman, J., Blyth-Skyrme, R. and Pawar, R. 2022. Cedar Lake walleye and northern pike fisheries. Public Certification Report. LRQA, Edinburgh.	

### Precision Evaluation: PI 3.2.3 SIc

Not assessed.

## 2. Western and Central Pacific Ocean tuna longline fishery

### Evaluations

#### Trueness criteria

#### Objectivity and consistency

<p><b>Objectivity</b></p>	<p>Is the information independent from the UoA?</p>	<p>Information on catch composition and vessel operations (including potential non-compliance) is collected by fishery observers deployed by the national management agency. Observers may include coastal state nationals and other nationalities. Observers are trained by an authorized body independent of the fishery. It is considered that this information is independent of the UoA.</p> <p>Fishers submit logbook information on catch composition and fishing locations. Logbook records do not comprise independent information.</p> <p>Information on habitat impacts could be inferred from VMS locations. VMS information is UoA-dependent, but systems are difficult to tamper with and information is received directly by the management agency.</p> <p>Compliance information is derived from observer and VMS data, and information conducted by government agency personnel involved with port inspections and at-sea patrols.</p>
	<p>Is the veracity affected by a Conflict of Interest?</p>	<p>Observer and VMS information is not expected to be affected by a conflict of interest.</p> <p>Logbook information is provided by fishers and could be affected; no specific mitigation measures are in place for this.</p> <p>It is considered unlikely that the veracity of compliance information available from government officials conducting port inspections and patrols is affected by conflict of interest.</p>
<p><b>Consistency</b></p>	<p>To what extent is the information accordant with itself or other comparable sources?</p>	<p>In the WCPFC Convention Area, VMS locations are required to be generated from systems accurate to within 100 sq m Distance Root Mean Squared (CMM 2014-02).</p> <p>Comparisons of observer and logbook reporting found that logbook reporting includes significantly fewer species than observer reporting.</p> <p>Logbook records of setting locations and VMS information are overlaid by management for validation purposes. Findings of such analyses are not described in the fishery assessment report.</p>

## Relevance and completeness

Relevance	Item	To what extent is the information directly applicable to the UoA / scoring element?	To what extent is the monitoring programme appropriate for gathering relevant information?
	<p>Main and minor in-scope species</p> <p>ETP/OOS</p>	<p>Observer information is directly applicable to the UoA and scoring elements.</p> <p>Fisher logbooks provide some directly applicable indicative information on catch. This information is less (or not) applicable to minor species and ETP/OOS; comparison of observer and logbook data shows these species are not captured effectively in logbook reports.</p> <p>Chondrichthyans are ETP in this fishery. Sharks (and their parts) cannot legally be landed. Observers documenting the fate of catch species record shark finning as part of routine data collection. These records are directly applicable to the UoA and scoring elements.</p> <p>Port-based and at-sea inspections may also detect shark fins among the catch; additional information on data collected and data collection methods is required to confirm relevance.</p>	<p>Observer monitoring (with effective protocols in place) is appropriate for gathering relevant information.</p> <p>Fisher logbook records provide some indicative information.</p> <p>While monitoring methods are appropriate, analyses are constrained based on available information on observer coverage levels (i.e. effort metrics).</p>
	<p>Habitats</p>	<p>VMS is not designed to collect information on habitat impacts but does provide robust information on vessel positions. VMS locations will provide a UoA-specific indication of habitats fishing gear interacts with.</p> <p>Logbook records include UoA-specific set location information.</p> <p>Information characterizing habitats is available for the EEZ in which fishing occurs.</p> <p>Overall, information available to assess habitat impacts is directly relevant to the UoA.</p>	<p>Overlaying VMS and logbook information on set and haul location is moderately appropriate for gathering relevant information on UoA impacts. VMS reporting interval is a determinant of appropriateness; this is unstated in the assessment report.</p>
	<p>Compliance</p>	<p>Information collected from UoA vessels using VMS, observers on vessels, port-based inspections and at-sea boardings are directly relevant to UoA compliance with the management regime.</p>	<p>The monitoring methods are appropriate for gathering relevant information.</p>
Completeness	Item	To what extent is the information representative of the UoA or scoring element in space and time?	To what extent does the information provide an up-to-date description of the UoA or scoring element?

	<p>Main and minor in-scope species</p> <p>ETP/OOS</p>	<p>The information available is extremely unlikely to be representative of the UoA in space and time. Observer monitoring levels were very low when evaluated as the proportion of albacore catch observed (and could not be calculated using effort metrics).</p>	<p>Observer deployments are undertaken annually which supports the collection of up-to-date information. Observer information provides a limited description of the UoA/scoring element. Logbook information provides a limited description, with fewer species recorded in the catch than by observers and no finning information.</p>
	<p>Habitats</p>	<p>As a monitoring method, VMS effectively represents vessel positions in space and time. However, the CAB fishery assessors noted in the Public Certification Report that some UoA vessels transitioned from Inmarsat C VMS to CLS ARGOS units to address VMS functionality issues. Manual reporting requirements would apply when VMs units were not operational. However, any effects of this on representativeness of vessel position data are unknown.</p> <p>Logbook set and haul locations provide required information for all sets.</p> <p>Habitat information is available in detail for the EEZ where fishing occurs, supporting the assessment of impacts.</p>	<p>Information should provide an up-to-date description of vessel positions and the locations of fishing activity, as well as habitat types where the UoA operates.</p>
	<p>Compliance</p>	<p>The information available on potential non-compliance that is collected by observers cannot be considered representative of the UoA in space and time. Observer monitoring levels are very low.</p> <p>Additional information is required to ascertain the representativeness of port-based and at-sea inspections.</p> <p>If implemented as required, VMS provides robust information to assess compliance with area closures to fishing.</p>	<p>Very limited, except for information to assess compliance with closed areas.</p>



**Evaluation used to determine whether PG1 is met**

<b>A catch monitoring system is in place that facilitates:</b>	
<b>Estimation of catches</b>	Logbook reporting and a low level of observer monitoring are in place.
<b>Reporting catch information to management</b>	Information from both logbooks and observers is provided to management.
<b>Independent verification of catches that is representative</b>	<p>Verification of logbook-reported catch information can be achieved where observers are in place. Observer coverage is extremely unlikely to be representative, while VMS is expected to provide representative information on vessel locations. VMS data can be used to verify fisher logbook reports of set and haul locations.</p> <p>Some verification information may also be available from dockside inspections and at-sea boardings. However, the scope and amount of information from these sources is unknown.</p>

**Precision criteria used to structure the evaluation used to determine whether PG2 is met**

<b>Criterion</b>	<b>Component</b>	<b>Considerations</b>
		<p><b>To what extent is variability accounted for by the catch monitoring system:</b></p> <ul style="list-style-type: none"> <li><b>In the physical characteristics of the fleet?</b></li> <li><b>In where, when and how the species is caught?</b></li> <li><b>In species distribution?</b></li> <li><b>In productivity dynamics?</b></li> </ul> <p><b>To what extent are the observations statistically distinct from each other?</b></p>
<b>Fishing operations</b>	Main in-scope species ETP/OOS	There is insufficient information available on observer deployments on UoA vessels to evaluate the extent to which variability is accounted for by the catch monitoring system, or, the extent to which observations are statistically distinct. There is insufficient information available to evaluate representativeness.
<b>Ecological characteristics</b>	Habitats	VMS is required on all vessels in the UoA. VMS reports position information from all vessels directly to management authorities. Precision criteria are effectively met by the application of VMS across the UoA, in accordance with documented standards.
<b>Monitoring design</b>		Logbook reporting includes set and haul locations. In principle, logbook data should provide a census dataset. However, the information currently available is not sufficient to evaluate this.

**Main and minor in-scope species, ETP/OOS**

**Trueness Evaluation: PI 2.1.3 SIa, b, 2.2.3 SIa**

TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	<p>The low level of observer coverage when considered as proportion of albacore catch observed, and inability to determine observer coverage using effort metrics, are significant impediments to the determination of trueness. It is expected that there is bias in this information. Its effects can be anticipated (catch composition is not well understood) and effects may be consequential (e.g. species not detected for recording in the catch, estimated proportions that catch species comprise are erroneous).</p> <p>For bait species, bias may be introduced in records of the amount used and reporting of the amount landed from the source population. However, this is not expected to be consequential based on the extremely small proportion of the source population that UoA bait comprises (even if bait consumption by the UoA is considered, e.g., an order of magnitude greater than reported).</p>
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		<p>Stock status information is relatively up-to-date for some in-scope species (e.g. WCPO bigeye) but patchy and/or very out of date for ETP/OOS (e.g. olive ridley turtles). When stock status is known, effects of bias on trueness can be anticipated. When stock status is unknown, this is not the case.</p> <p>Overall, TG1 is not met for any element.</p>
TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	TG2 is not met.
TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	TG3 is not met.
References	<p>Note: The fishery's Public Certification Report was a critical reference for this case study. At the request of the fishery client, the fishery has been anonymised (including removing this reference).</p> <p>Fu, D., Roux, M.-J., Clarke, S., Francis, M, Dunn, A. and Hoyle, S. 2016. Pacific-wide sustainability risk assessment of bigeye thresher shark (<i>Alopias superciliosus</i>). Available at: <a href="https://www.fao.org/fileadmin/user_upload/common_oceans/docs/Tuna/WCPFCStockStatusAssessmentReport.pdf">https://www.fao.org/fileadmin/user_upload/common_oceans/docs/Tuna/WCPFCStockStatusAssessmentReport.pdf</a> [Accessed 1 May 2023]</p> <p>Fisheries Stock Assessment Center. 2020. Stock Assessment of Japanese Sardine Pacific Stock in 2020. FRA-SA2020-SC01-1. Japan Fisheries Research and Education Agency, Tokyo.</p> <p>Hsu, J., Chang, Y.-J., Hsieh, C.H., Huang, W.B. and Chiang, T.H. 2020. Stock assessment of Pacific saury (<i>Cololabis saira</i>) in the Western North Pacific Ocean through 2019. NPFC-2020-SSC PS06-WP17. North Pacific Fisheries Commission.</p> <p>Kyne, P.M., Barreto, R., Carlson, J., Fernando, D., Francis, M.P., Fordham, S., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. &amp; Winker, H. 2019. <i>Pteroplatytrygon violacea</i>. The IUCN Red List of Threatened Species 2019: e.T161731A896169. <a href="https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T161731A896169.en">https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T161731A896169.en</a>. [Accessed 6 May 2023].</p> <p>Large, K., Brouwer, S. and Neubauer, P. 2022. Stock assessment of Southwest Pacific Shortfin Mako shark. WCPFC-SC18-2022/SA-WP-02-Rev1. Report to the WCPFC Scientific Committee. Eighteenth Regular Session, 10–18 August 2022. Pohnpei, Federated States of Micronesia</p> <p>Neubauer, P., Large, K. and Brouwer, S. 2021. Stock assessment of Southwest Pacific blue shark. WCPFC-SC17-2021/SA-WP-03. Report to the WCPFC Scientific Committee. Seventeenth Regular Session, 13–20 August 2021. Pohnpei, Federated States of Micronesia.</p> <p>Piontkovski, S.A., Al-Oufi, H.S. and Al-Jufaili, S. 2021. Marine Fisheries Review 76:48-58. doi: <a href="https://dx.doi.org/10.7755/MFR.76.3.3">dx.doi.org/10.7755/MFR.76.3.3</a></p> <p>Tremblay-Boyer, L. and Berkenbusch, K. 2020. Data review and potential assessment approaches for mobulids in the Western and Central Pacific Ocean. WCPFC-SC16-SA-IP-12. Report to the Western and Central Pacific Fisheries Commission Scientific Committee. Sixteenth Regular Session, 2020, Pohnpei, Federated States of Micronesia.</p> <p>Tremblay-Boyer, L., Carvalho, F., Neubauer, P., and Pilling, G. 2019. Stock assessment for oceanic whitetip shark in the Western and Central Pacific Ocean. WCPFC-SC15-2019/SA-WP-06. Report to the Western</p>	

**Precision Evaluation: PI 2.1.3 SIa, 2.2.3 SIa**

PG1	A catch monitoring system is in place that is able to collect and provide catch information	<p>The catch monitoring system comprises observer monitoring and VMS, and to an unknown extent for the UoA, dockside inspections and at-sea boardings. Logbook information is also collected.</p> <p>Information is reported to management authorities by observers, automatically by VMS, and by fishers for logbook data.</p> <p>The catch monitoring system provides some ability to independently verify catches. However, there is no evidence that this is adequate to support independent verification of catches with coverage that is representative of the UoA's operations.</p> <p>There is no evidence that the level of observer monitoring in place is supported by an analysis, or designed to achieve a specified level of precision in catch estimates for ETP/OOS (i.e. considering B.1.3.3.3).</p> <p>PG1 is not met.</p>
PG2	The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates	PG2 is not met.
PG3	The catch monitoring system in place enables a census of catches using independent observation	PG3 is not met.
<b>References</b>	The fishery's Public Certification Report was a critical reference for this case study. At the request of the fishery client, the fishery has been anonymised (including removing this reference).	

**Habitat Management**

**Sensitive Habitats – Compliance**

**Trueness Evaluation: PI 2.3.2 SIc**

TG1	There is potential for bias to exist in the information but its effect on trueness can be <b>anticipated</b> and is not considered to be consequential.	<p>VMS is the primary source of information relevant to assessing compliance with area closures in place for habitat protection. Observer information provides another (albeit piecemeal) source.</p> <p>VMS is in place on all vessels and locations are required to be generated from systems accurate to within 100 sq m Distance Root Mean Squared (WCPFC CMM 2014-02). Manual reporting requirements are in place in case of system failure (CMM 2014-02). The CAB fishery assessors described in the Public Certification Report that some technical issues had occurred with VMS in the UoA in the past, but that these had been resolved by a change of systems.</p> <p>Bias may exist in the information, though effects on trueness can be anticipated (the perceived level of compliance with area closures would be erroneous). Based on the information available (e.g. system</p>
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		requirements and back-up systems in place), it is not considered to be consequential.  TG1 is met.
TG2	There is <b>limited</b> potential for bias to exist in the information but where it might exist its effect on trueness is <b>broadly understood</b> and is not considered to be consequential.	When VMS is implemented as required and appropriate analyses are in place, there is limited potential for bias. Where it might exist, effects on trueness can be broadly understood – that is, fishing activity may not be detectable, or detected, inside closed areas and the perceived level of compliance with area closures could be erroneously high.  To assess TG2, additional information is required on any gaps in VMS transmission and systems and processes used by the management agency to detect non-compliance. The CAB fishery assessors stated in the Public Certification Report that area closures are well respected, suggesting that TG2 could be met.
TG3	<b>Most potential sources of bias have been mitigated</b> , and where bias might exist its effect on trueness is <b>well understood</b> and is not considered to be consequential.	Implementation on all vessels, manual reporting requirements in case of system failure, and accuracy requirements for location reports from approved systems support the conclusion that most potential sources of bias have been mitigated.  The effects of bias on trueness cannot be said to be well understood based on currently available information and TG3 is not met.
<b>References</b>	The fishery’s Public Certification Report was a critical reference for this case study. At the request of the fishery client, the fishery has been anonymised (including removing this reference).	

## Habitats

### Trueness Evaluation: PI 2.3.3 S1b

TG1	There is potential for bias to exist in the information but its effect on trueness can be <b>anticipated</b> and is not considered to be consequential.	VMS is the primary source of information relevant to vessel locations, from which the potential for habitat impacts can be inferred. Analysis of vessel movement pattern shown by VMS also provides fishing activity information. Observer and logbook information are other sources, providing information on set and haul locations. The corroboration of VMS and logbook set and haul records provides fishing activity information.  WCPFC specifies system and process requirements for the use of VMS. VMS is in place on all vessels and locations are required to be generated from systems accurate to within 100 sq m Distance Root Mean Squared (WCPFC CMM 2014-02). Manual reporting requirements are in place in case of system failure (WCPFC CMM 2014-02).  The effects of any bias on trueness can be anticipated (vessel locations would be misrepresented). However, bias is not considered to be consequential given the characteristics of VMS, requirements for systems and processes set out by WCPFC and reported compliance with those. Use of VMS data contributes to the identification of bias in fisher reports.  Considered as a whole, there is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential. TG1 is met.
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TG2	There is <b>limited</b> potential for bias to exist in the information but where it might exist its effect on trueness is <b>broadly understood</b> and is not considered to be consequential.	<p>VMS is the primary source of information relevant to vessel locations, from which the potential for habitat impacts can be inferred. Analysis of vessel movement pattern shown by VMS also provides fishing activity information. Observer and logbook information are other sources, providing information on set and haul locations. The corroboration of VMS and logbook set and haul records provides fishing activity information.</p> <p>WCPFC specifies system and process requirements for the use of VMS. VMS is in place on all vessels and locations are required to be generated from systems accurate to within 100 sq m Distance Root Mean Squared (CMM 2014-02). Manual reporting requirements are in place in case of system failure (CMM 2014-02).</p> <p>There is limited potential for bias to extent in VMS locations. Fisher set and haul information may include some bias. However, the effects on trueness are broadly understood (fishing locations would be misrepresented). Bias is not considered to be consequential given the characteristics of VMS, requirements for systems and processes set out by WCPFC and reported compliance with those. Use of VMS data contributes to the understanding of bias in fisher reports, and its effect on trueness.</p> <p>Any effect of bias on trueness is not considered to be consequential. TG2 is met.</p>
TG3	<b>Most potential sources of bias have been mitigated</b> , and where bias might exist its effect on trueness is <b>well understood</b> and is not considered to be consequential.	<p>Implementation on all vessels, manual reporting requirements in case of system failure, and accuracy requirements for location reports from approved systems support the conclusion that most potential sources of bias have been mitigated.</p> <p>However, the effects of bias on trueness cannot be said to be well understood based on currently available information and TG3 is not met.</p>
<b>References</b>	WCPFC CMM 2014-02	

**Precision Evaluation: PI 2.3.3 SIb**

Not assessed; there are no habitat-forming species associated with more sensitive habitats.

**Compliance**

**Trueness Evaluation: PI 3.2.3 SIc**

<p>TG1</p>	<p>There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.</p>	<p>The amount of coverage in place cannot be evaluated with respect to fishing effort. Low levels of observer monitoring coverage create significant potential for bias in information on compliance. The “observer effect” is well known, involving changes to fishing operations when observers are present. The effect of this on trueness can be anticipated (an inaccurate understanding of normal vessel operations, and therefore non-compliance), but it is not possible to determine if it is consequential.</p> <p>VMS data are unlikely to be affected by significant bias, and this is not considered to be consequential given the characteristics of VMS, requirements for systems and processes set out by WCPFC and reported compliance with those.</p> <p>Overall however, TG1 is not met.</p>
<p>TG2</p>	<p>There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.</p>	<p>TG2 is not met.</p>
<p>TG3</p>	<p>Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.</p>	<p>TG3 is not met.</p>
<p><b>References</b></p>	<p>The fishery’s Public Certification Report was a critical reference for this case study. At the request of the fishery client, the fishery has been anonymised (including removing this reference).</p> <p>Moore, J.E., Heinemann, D., Francis, T.B., Hammond, P.S., Long, K.J., Punt, A.E., Reeves, R.R., Sepúlveda, M., Sigurðsson, G.M., Siple, M.C., Vikingsson, G.A., Wade, P.R., Williams, R. and Zerbini, A.N. 2021. Estimating bycatch mortality for marine mammals: concepts and best practices. <i>Frontiers in Marine Science</i> 8:752356. <a href="https://doi.org/10.3389/fmars.2021.752356">https://doi.org/10.3389/fmars.2021.752356</a></p>	

**Precision Evaluation: PI 3.2.3 SIc**

Not assessed.

### 3. South Georgia Patagonian toothfish (*Dissostichus eleginoides*) longline fishery

#### Evaluations

#### Trueness criteria

#### Objectivity and consistency

<b>Objectivity</b>	Is the information independent from the UoA?	<p>Observers follow a protocol to collection data in accordance with information requirements set by CCAMLR. This is reported directly to CCAMLR.</p> <p>The observer contract is between the company employing the observers and the client for the fishery (the management authority).</p> <p>The reporting and contractual procedures in place ensure that there is no possibility that the commercial interests of the fishery could prejudice the collection of information.</p>
	Is the veracity affected by a Conflict of Interest?	<p>The MSC client is the management authority for the fishery, which gains significant revenue from the operation of the fishery and the licence fees paid by operators. However, the client is also a statutory body that is subject to independent scrutiny.</p> <p>There are numerous checks and balances in place that would detect and prevent any CoI from arising.</p>
<b>Consistency</b>	To what extent is the information accordant with itself or other comparable sources?	Daily catch declarations by UoA vessels are compared with inspections of unloaded catch by the client. All records are comparable with one another.

#### Relevance and completeness

<b>Relevance</b>	Item	To what extent is the information directly applicable to the UoA / scoring element?	To what extent is the monitoring program appropriate for gathering relevant information?
	Shark finning	The information on catches from the UoA and the fate of shark species caught is directly applicable to these elements.	<p>The information is gathered directly from UoA vessels, with 100% coverage of all vessels on all trips. Observers are independently trained to identify major catch components and interactions with ETP species.</p> <p>In the only recorded incident involving a shark (<i>sensu</i> SA2.4.3.1) the information was complete.</p> <p>Given the limited number of “shark” species identified by the MSC in the region,</p>

			observers would be able to identify and report them accordingly.
	Main in-scope species	There are no main in-scope species within the UoA.	Observers sample between 20-33% of hooks hauled, selecting line segments at random. Catch of most non-target species is recorded to the family level (e.g. Macrouridae).
	Bait as main in-scope species	Information is available on the quantity of Humboldt squid used in the fishery annually.	The quantity of bait used is reported by vessels, and the quantity aboard vessels is recorded by management during inspections carried out before and after fishing trips. The information is therefore relevant to bait use in the fishery.
	Minor in-scope species	The information available on minor in-scope species is capable of identifying one scoring element to species level and all other catch components to the family level (e.g. Macrouridae).	
	Bait as minor in-scope species	Information is available on the quantity of the minor bait species used.	The quantity of bait used is reported by vessels, and the quantity aboard vessels is recorded by management during inspections carried out before and after fishing trips. The information is therefore relevant to bait use in the fishery.
	ETP/OOS	Observers are tasked to record any and all interactions with ETP marine mammal and seabird species, identifying the species involved in the interaction and its outcome (killed / injured / uninjured).  Vessels are required to report ETP interactions in their daily logs.	Observers identify all seabirds and sea mammals that they observe interacting with fishing gear and vessels. ID is to the species level.  Deployment of bycatch mitigation measures is recorded



			by observer and logged by onboard EM.
	Habitats	<p>Observers are required to sample 30% of line segments at random and to retain and identify / photograph all VME indicator species retained in the gear.</p> <p>Cameras attached to longlines have been used to quantify impact and will be routinely deployed in accordance with a "Camera protocol" during 2023 that will provide better information about interactions with VME habitats and fill in data gaps.</p>	<p>The gear used (longlines) does not retain VME species effectively. Monitoring provides an indication of interactions, but does not quantify impacts.</p> <p>The use of cameras attached to longlines has been shown to provide as accurate and direct measures of interactions between the gear and marine habitats, including VMEs.</p>
	Compliance	Observers record compliance with key management measures (type of gear used; quota uptake; deployment of ETP mitigation measures; compliance with spatial and temporal controls). Compliance monitoring by fishery officer and remote monitoring (VMS / AIS) validated compliance.	Compliance monitoring is undertaken by fishery officers, VMS / AIS.
Completeness	Item	To what extent does the information provide an up- to-date description of the UoA or scoring element?	To what extent is the information representative of the UoA or scoring element in space and time?
	Shark finning	<p>In the only recorded incident involving a shark (<i>sensu</i> SA2.4.3.1) the information was complete.</p> <p>Given the limited number of "shark" species as identified by the MSC found in the region, CCAMLR observers would detect all of the "shark" species and report them accordingly.</p> <p>The fishery is subject to 100% observer coverage, fishery reports are submitted at the end of the season and provide an up-to-date summary of interactions.</p>	The information is gathered directly from UoA vessels, with 100% coverage of all vessels on all trips. Observers are independently trained to identify major catch components and interactions with ETP species.
	Main in-scope species	<p>There are no main in-scope species in the catch.</p> <p>Catches of the most abundant in-scope species are subject to a catch limit that constraints catch composition to <math>\leq 5\%</math> of total catch. Weekly analysis of catch reports prevent this threshold from being exceeded.</p>	Observers are present on 100% of trips. Observers sample between 20-33% of hooks hauled, selecting line segments at random. Catch of most non-

		Vessels monitor catches of non-target species and are required to move away from fishing an area if more than 1t of any non-target species is caught on a line.	target species is recorded to the family level (e.g. Macrouridae).
	Bait as main in-scope species	A recent stock assessment is available for the Humboldt squid.	The stock assessment uses a model that uses fishery-dependent catch data and is likely to be representative of the scoring element in space and time.
	Minor in-scope species	Up-to-date information is limited, but minor species composition can be inferred from historic taxonomic and genetic studies. Up-to-date / real time data are not available.	
	Bait as minor in-scope species	Up-to-date descriptions of Ilex squid, herring, saithe and mackerel stock status are available; noting that herring and saithe were only used in bait trials and are no longer used.	ICES stocks are based on the best available information over a long time series and are likely to be representative of the abundance of the bait elements in space and time.  FI stock assessment for Ilex squid takes account of the complex life history of this species and its spatial and temporal variability.
	ETP/OOS	Up-to-date information is gathered and reported, and can trigger management responses.	Observers identify all seabirds and marine mammals that they observe interacting with fishing gear and vessels. ID is to the species level.  Deployment of bycatch mitigation measures is recorded by observer and logged by onboard EM (data provided for the former, not the latter).

	Habitats	Up-to-date information is gathered and reported.	<p>There is 100% observer coverage in the fleet. Observers are required to sample 30% of line segments at random and to retain and identify / photograph all VME indicator species retained in the gear.</p> <p>Cameras attached to longlines will be routinely deployed in accordance with a "Camera protocol" during 2023 that will provide better information about interactions with VME habitats and fill in data gaps.</p> <p>Observations are representative of the UoA in space and time.</p>
	Compliance	Up-to-date information is gathered and reported, and can trigger management responses.	<p>There is 100% observer coverage in the fleet. Observations of compliance with management measures are representative of the UoA in space &amp; time.</p> <p>Compliance monitoring is carried out by FPV and fishery officers at sea, all vessel movements are monitored by VMS &amp; AIS, and all vessels are inspected before and after fishing trips.</p> <p>Compliance observations are representative of the UoA in space and time.</p>

**Precision criteria: PI 2.1.3 SIa; 2.2.3 SIa; and 2.3.3 SIb**

Criteria		2.1.3 SIa Main in-scope species - Information	2.2.3 SIa ETP/OOS - Information	2.3.3 SIb Only for species that are habitat forming & associated with more sensitive habitats
<b>Catch information:</b>  Is a catch monitoring system in place that facilitates:	The estimation of catches	Catch data are provided by vessel operators and gathered by independent CCAMLR observers.  There are no catches of main in-scope species.  The only main bait species is purchased outside the UoA.	ETP species interactions are monitored and recorded by independent CCAMLR observers.  A low level of seabird mortality is documented and quantified.	VME indicator species caught in the fishing gear and recovered to the fishing vessel are documented by independent observers.
	Reporting to management authorities	Interactions with in-scope species are recorded and reported to both the GSGSSI and to CCAMLR.	Interactions with ETP species are recorded and reported to both the GSGSSI and to CCAMLR.	Interactions with VME indicator species are recorded and reported to GSGSSI.
	Independent verification of catches with coverage that is representative of the UoA's fishing operations.	There is 100% independent observer coverage of UoA fishing vessels, covering around 80% of all fishing events and between 20-30% of all hooks hauled, through a random sampling programme.		
<b>PG1: Scoring</b>	A catch monitoring system is in place that is able to collect and provide catch information	There are no catches of main in-scope species.	Yes – the observer programme provides an estimate of ETP impacts.	Yes – there is a monitoring system in place that collects information about catches of VME indicator species.
<b>Catch estimates:</b>	Variability of the physical characteristics of the fleet?	Yes - there is 100% independent observer coverage of UoA fishing vessels, covering around 80% of all fishing events and between 20-30% of all hooks hauled, through a random sampling programme.		NA

Is the <b>catch monitoring system</b> expected to account for the main sources of random error including:	Variability in how the species is caught	Yes – observers monitor all species caught (including a porbeagle shark that was entangled in gear rather than hooked).	Yes – observers monitor direct interactions with gear (capture on hooks). Vessel operators monitor bird strikes (collision with the vessel) during fishing, as well as at all other times whilst in the SGSSI Maritime Zone.	NA
	Variability in species distribution?	No – observer coverage / sampling design does not take account the productivity schedule or spatial distribution of this component.	No – observer coverage / sampling design does not take account of the spatial distribution of this component.	NA
	Variability in productivity dynamics?	No – observer coverage / sampling design does not take account of the productivity schedule of this component.	No – observer coverage / sampling design does not take account of the productivity schedule of this component.	NA
	Independent observation of catches?	An independent observer programme is in place, operated in accordance with CCAMLR and GSGSSI requirements for scientific observers.		NA
	Representative coverage of UoA operations?	There is 100% independent observer coverage of UoA fishing vessels, covering around 80% of all fishing events and between 20-30% of all hooks hauled, through a random sampling programme.		NA
	Representative coverage (High Seas, RFMOs)	NA	N/A – the fishery is managed by an international commission (CCAMLR) which fulfils the same role as an RFMO, but does not take place on the High Seas.	NA
<b>PG2: Scoring</b>	The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates	Yes.  Although the monitoring system does not take account of the characteristics of this component, the high level of coverage in the UoA fleet by independent observers provides an accurate estimate of main in-scope species catches.	Yes.  Although the monitoring system does not take account of the characteristics of this component, the high level of coverage in the UoA fleet by independent observers provides an accurate estimate of ETP / out of scope species catches.	NA

<b>Census of catches:</b>	Are all catch events independently observed?	No. There is 100% observer coverage in the fleet, but only 20-30% of hooks are sampled.	No. There is 100% observer coverage in the fleet, but only ~80% of fishing operations are observed.	NA
<b>PG3: Scoring</b>	The catch monitoring system in place enables a census of catches using independent observation	No Although all hauling events are monitored using EM, these data are not presently analysed to provide a census.	No Although all hauling events are monitored using EM, these data are not presently analysed to provide a census.	NA

**Trueness Evaluation: PI 2.1.2 SIId, 2.2.2 SIId**

Subject			Shark finning	
Information to be considered	Relevant Information	Question	Information confirms the adoption of a FNA / non retention policy in the UoA.	Information confirms the enforcement of an FNA / non retention policy in the UoA.
		Evidence	Neither the client nor CCAMLR have a FNA / non retention policy.	The observer programme in place for the fishery is shown to detect catches of sharks, and in the one instance of an interaction (capture of a single porbeagle shark) it confirmed that the shark was retained whole, for scientific and educational use.
Scoring	TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	NA	
	TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	NA	
	TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	Sampling of longline hooks is randomised and determined prior to hauling of gear commencing. This addresses the risk of observation and confirmation bias from affecting the results.  Observers detect interactions with sharks and the fate of individuals. They would detect shark finning if it was taking place aboard UoA vessels. The evidence from the fishery is that shark interactions are always recorded and are very unusual, so this source of bias is not considered to be consequential.	
References	CCAMLR Secretariat. 2023. Scheme of International Scientific Observation - Scientific Observer's Manual - Finfish Fisheries - Version 2023. CCAMLR, Hobart. Available at: <a href="https://www.ccamlr.org/en/document/science/scientific-observers-manual-%E2%80%93-fish-fisheries-%E2%80%93-version-2023">https://www.ccamlr.org/en/document/science/scientific-observers-manual-%E2%80%93-fish-fisheries-%E2%80%93-version-2023</a> [Accessed 15 June 2023]			

**Precision Evaluation:**

Not applicable.

**Main and minor in-scope species, ETP/OOS**

**Trueness Evaluation: PI 2.1.3 SIa**

Subject			In-scope main species	
Information to be considered	Relevant Information	Question	Information describes catches in the UoA, including in relation to unobserved mortalities.	Information describes the status of the impacted stock / population
		Evidence	<p>There is an observer programme in place that samples 20-30% of all hooks at random and describes catches in the UoA.</p> <p>Unobserved mortalities could arise from post-capture mortality of released catch elements. The mortality rate of these elements can be inferred from the post-capture monitoring of specimens selected for tagging.</p>	<p>The information available from observer data describing the catch of non-target species enables mortality to be estimated.</p> <p>The status of the most abundant in-scope species has been assessed.</p>
Scoring	TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	NA – there are no main in-scope species or main bait species purchased within the UoA.	
	TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	NA – there are no main in-scope species or main bait species purchased within the UoA.	
	TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	NA – there are no main in-scope species or main bait species purchased within the UoA.	



**Precision Evaluation: PI 2.1.3 SIa**

Subject			In-scope main species
Scoring	PG1	A catch monitoring system is in place that is able to collect and provide catch information	NA – there are no main in-scope species or main bait species purchased within the UoA.
	PG2	The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates	NA – there are no main in-scope species or main bait species purchased within the UoA.
	PG3	The catch monitoring system in place enables a census of catches using independent observation	NA – there are no main in-scope species or main bait species purchased within the UoA.

**Minor in-scope species**

**Trueness Evaluation: PI 2.1.3 SIb**

Subject			In-scope minor species	
Information to be considered	Relevant Information	Question	Information describes catches in the UoA, including in relation to unobserved mortalities/	Information describes the status of the impacted stock / population
		Evidence	<p>There is an observer programme in place that samples 20-30% of all hooks at random and describes catches in the UoA.</p> <p>Unobserved mortalities could arise from post-capture mortality of released catch elements. The mortality rate of these elements can be inferred from the post-capture monitoring of specimens selected for tagging.</p>	<p>The information available from observer data describing the catch of non-target species enables mortality to be estimated.</p> <p>The status of the most abundant in-scope species has been assessed.</p>

Scoring	TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	NA
	TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	<p>Sampling of longline hooks is randomised and determined prior to hauling of gear commencing. This addresses the risk of observation and confirmation bias from affecting the results.</p> <p>Response bias could arise from observers failing to identify minor species accurately (the differences between taxa can be very subtle).</p> <p>The strength of response bias cannot be determined; this has not been measured. It is not possible to conclude whether impacts on the accuracy of the information are consequential.</p>
	TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	NA

**Precision Evaluation:**

Not applicable.

**ETP/OOS species**

**Trueness Evaluation: PI 2.2.3, SIa**

Subject		ETP / Out of Scope species		
Information to be considered	Relevant Information	Question	Information describes catches in the UoA, including in relation to unobserved mortalities/	Information describes the status of the impacted stock / population
		Evidence	<p>Observers are tasked to record any and all interactions with ETP sea mammal and seabird species, identifying the species involved in the interaction and its outcome (killed / injured / uninjured).</p> <p>Vessels are required to report ETP interactions in their daily logs.</p>	<p>The impacted ETP seabird populations are monitored by GSGSSI.</p> <p>Porbeagle sharks – limited understanding of population status. Most recent known assessment was in 2017. However information on level of interaction is considered to be very good.</p>

Scoring	TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	<p>Yes.</p> <p>Sampling of longline hooks is randomised and determined prior to hauling of gear commencing. This reduces the risk of observation and confirmation bias from affecting data about ETP species capture in the gear.</p> <p>Response bias is addressed by ensuring that all observers are trained to identify ETP species accurately.</p>
	TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	<p>Yes.</p> <p>The main sources of observation, confirmation and response bias have been addressed.</p> <p>There is evidence of bias in observer reports: although all ETP interactions are recorded, some observers provide more detailed reports of ETP species interactions than others. This effect is understood by the UoA management authority, and is not considered to be consequential because the numbers of ETP individuals impacted are low, and observation of deployment of management measures is not subject to the same bias.</p>
	TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	<p>No.</p> <p>There is some evidence of bias in observer reports: although all ETP interactions are recorded, some observers provide more detailed reports of ETP species interactions than others. Although this may not significantly affect the overall estimate of interactions (which are at a very low level), the effect of this bias is not well understood and has not been mitigated.</p>
<b>References</b>		<p>NIWA. 2017. Southern Hemisphere porbeagle shark stock status assessment. NIWA, Wellington. Available at: <a href="http://www.fao.org/fileadmin/user_upload/common_oceans/docs/Tuna/PorbeagleAssessmentReport.pdf">http://www.fao.org/fileadmin/user_upload/common_oceans/docs/Tuna/PorbeagleAssessmentReport.pdf</a> [Accessed 15 May 2023]</p>	

**Precision Evaluation: PI 2.2.3, SIa**

Subject			ETP / Out of Scope species
Scoring	PG1	A catch monitoring system is in place that is able to collect and provide catch information	Yes. The observer programme provides an estimate of ETP impacts.
	PG2	The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates	Yes. Although the monitoring system does not take account of the characteristics of this component, the high level of coverage in the UoA fleet by independent observers provides an accurate estimate of ETP/OOS species catches.
	PG3	The catch monitoring system in place enables a census of catches using independent observation	No. Not all catch events are observed,

**Habitat Management**

**Sensitive Habitats – Compliance**

**Trueness Evaluation: PI 2.3.2 SIc**

Subject			Habitat management	
Information to be considered	Relevant Information	Question	Information confirms the adoption of management measures and other measures to protect more sensitive habitats in the UoA.	Information confirms the enforcement of these measures.
		Evidence	The UoA has spatial measures (NTZs and Benthic Closed Areas as well as depth limits on the fishery) in place to protect sensitive habitats. The location of these areas and associated management measures is well known.	Observers record the location of all fishing activity relative to protected areas and water depths, and all vessel movements are monitored using AIS & VMS.
Scoring	TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	Yes. The key mechanism for verifying compliance with measures to protect sensitive habitats is the use of AIS / VMS equipment to determine the location of fishing activity relative to protected areas. The accuracy of this equipment is well known, and all vessels are required to carry 2 VMS transponders as well as tamper-proof AIS equipment. There is little or no risk of observation, response or confirmation bias.	

	TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	<p>Yes.</p> <p>The key mechanism for verifying compliance with measures to protect sensitive habitats is the use of AIS / VMS equipment to determine the location of fishing activity relative to protected areas. The accuracy of this equipment is well known, and all vessels are required to carry 2 VMS transponders as well as tamper-proof AIS equipment. There is little or no risk of observation, response or confirmation bias.</p>
	TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	<p>Yes.</p> <p>The key mechanism for verifying compliance with measures to protect sensitive habitats is the use of AIS / VMS equipment to determine the location of fishing activity relative to protected areas. The accuracy of this equipment is well known, and all vessels are required to carry 2 VMS transponders as well as tamper-proof AIS equipment. There is little or no risk of observation, response or confirmation bias.</p>

**Precision Evaluation:**

Not applicable.

**Habitats**

**Trueness Evaluation: PI 2.3.3 S1b**

Subject			Habitat management		
Information to be considered	Relevant Information	Question	Information describes the spatial and temporal distribution of fishing effort in the UoA in relation to habitats.	If applicable: information describes the catches of habitat-forming species associated with more sensitive habitats.	Information describes the impact of the gear used in the UoA on habitats.
		Evidence	Spatial and temporal information is provided by VMS & AIS monitoring of all fishing operations.	Catches of habitat forming species are recorded by observers in accordance with a random sampling protocol.	Generic information is available about the impact of the gear on habitats. The use of cameras attached to longlines has shown that any impacts are very localised, and enables the extent of impacts relative to habitat extent to be estimated.
Scoring	TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	<p>Yes.</p> <p>The key mechanism for verifying compliance with measures to protect sensitive habitats is the use of AIS / VMS equipment to determine the location of fishing activity relative to protected areas. The accuracy of this equipment is well known, and all vessels are required to carry 2 VMS transponders as well as tamper-proof AIS equipment. There is little or no risk of observation, response or confirmation bias.</p>		
	TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	<p>Yes.</p> <p>The key mechanism for verifying compliance with measures to protect sensitive habitats is the use of AIS / VMS equipment to determine the location of fishing activity relative to protected areas. The accuracy of this equipment is well known, and all vessels are required to carry 2 VMS transponders as well as tamper-proof AIS equipment. There is little or no risk of observation, response or confirmation bias.</p>		
	TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	<p>Yes.</p> <p>The key mechanism for verifying compliance with measures to protect sensitive habitats is the use of AIS / VMS equipment to determine the location of fishing activity relative to protected areas. The accuracy of this equipment is well known, and all vessels are required to carry 2 VMS transponders as well as tamper-proof AIS equipment. There is little or no risk of observation, response or confirmation bias.</p>		

**Precision Evaluation: PI 2.3.3 S1b**

Subject			Habitat management
Scoring	PG1	A catch monitoring system is in place that is able to collect and provide catch information	Yes. There is a monitoring system in place that collects information about catches of VME indicator species, as well as monitoring of gear interactions with habitats on the seabed.
	PG2	The catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates	NA
	PG3	The catch monitoring system in place enables a census of catches using independent observation	NA

**Compliance**

**Trueness Evaluation: PI 3.2.3 S1c**

Subject			Compliance with management regulations	
Information to be considered	Relevant Information	Question	Information confirms the adoption of management regulations in the UoA.	Information confirms the enforcement of management requirements in the UoA.
		Evidence	Observers record compliance with key management measures (type of gear used; quota uptake; deployment of ETP mitigation measures; compliance with spatial and temporal controls). Compliance monitoring by fishery officer and remote monitoring (VMS / AIS) validated compliance.	In addition to 100% observer coverage, the management authority inspects vessel before, during and after fishing commences, conducts FPV patrols throughout the UoA, fishery officers inspect vessels. Compliance is good, only minor issues detected.
Scoring	TG1	There is potential for bias to exist in the information but its effect on trueness can be anticipated and is not considered to be consequential.	Yes. The fishery is subject to 100% observer coverage, with observers able to monitor compliance as well as gather scientific information. Vessels are inspected prior to starting to fish in the UoA and after fishing operations are completed, and are subject to electronic monitoring and inspection by fishing officers during operations. These multiple systems of monitoring and verification minimise the risk of observation, response and confirmation bias to levels that are not considered to be consequential.	

	TG2	There is limited potential for bias to exist in the information but where it might exist its effect on trueness is broadly understood and is not considered to be consequential.	<p>Yes.</p> <p>The fishery is subject to 100% observer coverage, with observers able to monitor compliance as well as gather scientific information. Vessels are inspected prior to starting to fish in the UoA and after fishing operations are completed, and are subject to electronic monitoring and inspection by fishing officers during operations.</p> <p>These multiple systems of monitoring and verification minimise the risk of observation, response and confirmation bias to levels that are not considered to be consequential.</p>
	TG3	Most potential sources of bias have been mitigated, and where bias might exist its effect on trueness is well understood and is not considered to be consequential.	<p>Yes.</p> <p>The fishery is subject to 100% observer coverage, with observers able to monitor compliance as well as gather scientific information. Vessels are inspected prior to starting to fish in the UoA and after fishing operations are completed, and are subject to electronic monitoring and inspection by fishing officers during operations.</p> <p>These multiple systems of monitoring and verification minimise the risk of observation, response and confirmation bias to levels that are not considered to be consequential.</p>

**Precision Evaluation:**

Not applicable.