Chile Squat Lobsters and Nylon Shrimp Modified Trawl Fishery

MSC Certification Code: MSC-F-31264 (Previous F-BV-0424)



Picture: Yellow squat lobster (Cervimunida johni). Credits: José Ríos

3rd SURVEILLANCE REPORT

August 2020

Conformity Assessment Body: Bureau Veritas Certification Holding SAS



Conformity Assessment Body (CAB)	Bureau Veritas Certification Holding SAS
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Fishery client	Asociación de Armadores e Industriales Pesqueros Región IV (AIP)
Assessment Type	Third Surveillance

1 Contents

2	Gloss	ary	4
3	Execu	tive summary	5
4	Repor	t details	8
4	l.1 S	urveillance information	
4	.2 В	ackground	10
	4.2.1	Personnel involved in science, management or industry	
	4.2.2	Certified fleet and client group	
	4.2.3	Regulatory framework and fishery management	
	4.2.4	Compliance	
	4.2.5	Traceability issues	
	4.2.6	Scientific based information related to P1	
	4.2.6.1	Stock status	
	4.2.6.2	Uncertainties underlying the stock assessments	
	4.2.7	Scientific based information related to P2	
	4.2.7.1	Primary species	
	4.2.7.2	Species composition of the catches, including bycatch/non-target species (fauna acompañante)	
	4.2.7.3	Discarded fraction	
	4274	Incidental interactions with hirds, turtles and marine mammals	53
	4275	Interactions with habitats	59
	12 V	arcian datails	62
_		er stort de talls	
5.	Result	5	
5	5.1 S	urveillance results overview	63
	5.1.1	Summary of conditions	63
	5.1.2	Total Allowable Catch (TAC) and catch data	64
	5.1.3	Recommendations	65
5	5.2 C	onditions	67
	5.2.1	Condition 1 (UoAs 5 & 8)	67
	5.2.2	Condition 2 (All UoAs)	
	5.2.3	Condition 3 (UoA 1, 3 & 6)	
	5.2.4	Condition 4 (UoA 5 & 8)	
	5.2.5	Condition 5 (UoA 2)	80
	5.2.6	Condition 6 (UoAs 4 & 7)	83
	5.2.7	Condition 7 (UoAs 1 & 2)	85
	5.2.8	Condition 8 (All UoAs)	
	5.2.9	Condition 9 (All UoAs)	
	5.2.10	Condition 10 (All UoAs)	
	5.2.11	Condition 11 (All UoAs)	
	5.2.12	Condition 12 (All UoAs)	
	5.2.13	Condition 13 (UoAs 2, 4 & 7)	
	5.2.14	Condition 14 (All UoAs)	
5	.3 C	lient Action Plan	103
		a scoring Parformanco Indicators	104
5	5/11	e-scoring Table for PL 1 2 3 - Information	104
	54.1	Re-scoring table for DI 2 1 2 Drimary species information	104
	5/12	Re-scoring table for DI 2.2.2 - Secondary species information	100
	5.4.5	Re-scoring table for DI 2.2. The species information	114
	5.4.4	Ne-scotting lable 101 F1 2.3.3- ETF species Information	
6.	Refere	ences	123



7.	Арр	endices	126
	7.1	Evaluation processes and techniques	126
	7.1.1	Site visits	126
	7.1.2	Stakeholder participation	127
	7.2	Stakeholder input	127
	7.3	Revised surveillance program	. 129
	7.4	Harmonised fishery assessments	130
	7.4	Harmonised fishery assessments – delete if not applicableiError! Marcador no defi	inido.



2 Glossary

Below are presented the abbreviations and acronyms used in the report. The terms defined were check to not contradict terms used in the MSC-MSCI vocabulary.

Concepts and Terms:

Вым	Precautionary reference point. SSB below Blim indicate increase risk of impairment of										
BMSY	Spawning biomass (equilibrium) when fishing at FMSY										
CAB	Conformity Assessment Body (in this case the CAB is Bureau Veritas)										
CAP	Client Action Plan										
CoC	Chain of Custody										
DRI	Image Registrarion Device (Dispositivo de Registro de Imágenes)										
ETP	Endangered, Threatened and Protected										
FCR	(MSC) Fisheries Certification Requirements										
f/v	Fishing vessel										
Ешм	Fishing mortality which should be avoided with high probability because it is associated with										
11111	unknown population dynamics or stock collapse										
Fмsy	Fishing mortality at MSY										
HCRs	Harvest Control Rule(s)										
LGPA	Chilean General Fishing and Aquaculture Law (Ley General de Pesca y Acuicultura)										
MCS	Monitoring, Control and Surveillance										
MSC	Marine Stewardship Council										
MSY	Maximum Sustainable Yield										
NGO	Non-Governmental Organization										
PCR	Public Certification Report										
PI	(MSC) Performance Indicator										
PRI	Point where Recruitment would be Impaired										
SA	MSC surveillance audit										
SG	(MSC) Scoring Guidepost										
TAC	Total Allowable Catch										
UoA	Unit of Assessment										
UoC	Unit of Certification										
VMS	Vessel Monitoring System										

Organizations:

AID	Artisanal and Industrial Fisheries Association from the Coquimbo Region (Asociación de							
AIF	Industriales y Armadores Pesqueros de la Región de Coquimbo)							
ASIPES	Insdustrial Fishers Association (Asociación de Industriales Pesqueros A.G.)							
BV	Bureau Veritas							
ССТ	Scientific Technical Committee (Comité Científico Técnico)							
СМ	Management Committee (Comité de Manejo)							
CONAPACH	National confederation of artisanal fishers (Confederación Nacional de Pescadores							
	Artesanales de Chile)							
CONFEPACH	National confederation of Artisanal Fishers' Federations (Confederación Nacional de							
	Federaciones de Pescadores Artesanales de Chile)							
FAO	Food and Agriculture Organization of the United Nations							
IFOP	Fisheries Development Institute (Instituto de Fomento Pesquero)							
INPESCA	Instituto de Investigacion pesquera Region VIII							
MINECON	Ministry of Economy, Development, and Tourism (Ministerio de Economía, Fomento y							
	Turismo)							
MSC	Marine Stewardship Council							
PUCV	Pontifical Catholic University of Valparaíso (Pontificia Universidad Católica de Valparaíso)							
SERNAPESCA	National Fisheries Service (Servicio Nacional de Pesca)							
SUBPESCA	Undersecretariat for Fisheries (Subsecretaría de Pesca)							
WWF	World Wildlife Fund							
UCN	Catholic University of the North (Universidad Católica del Norte)							
UDEC	University of Concepcion (Universidad de Concepción)							



3 Executive summary

This fishery was assessed against MSC Fisheries Certification Requirements version 1.3, and it is certified since the 13th of September 2016. This report accounts for the results of the third surveillance audit. This audit covers activities developed during the second and third year after the certification.

Table ¡Error! No hay texto con el estilo especificado en el documento.-1 presents scores given to each MSC Principle as published at the PCR, while Table ¡Error! No hay texto con el estilo especificado en el documento.-2 presents scores for each Performance Indicator.

Six conditions were raised for all UoAs, dealing with PI 1.2.3 (target sp. information and monitoring), PI 2.1.3 (retained spp. information), PI 2.4.3 (habitats information), PI 3.2.1 (fishery-specific objectives), PI 3.2.2 (decision making), and PI 3.2.3 (compliance and enforcement). One condition was issued all artisanal UoAs (UoA2, UoA4 and UoA7) on PI 3.2.4 (research plan). One condition was established to the fleet targeting the red squat lobster South stock (UoA8) on PI 1.1.1 (stock status), and finally one condition was established on both fleets targeting nylon shrimp (UoA1 and UoA2) on PI 2.3.3 (ETP spp. information). Further, the PCR also established two non-binding recommendations: one for all UoAs on PI 1.2.4 (stock assessment) and PI 2.2.1 (discarded spp outcome), and one recommendation for UoA1 on PI 1.1.2 (red squat lobster stock rebuilding). During the first SA conditions on PI 3.2.1 and PI 3.2.4 were closed and those PIs were re-scored, while during the 2SA the condition on PI 1.1.1 was closed (UoA8, although a new recommendation related to this PI was opened) and PI 3.2.2 were close and those PIs were re-scored. However, a new condition on PI 1.2.4 was opened for all UoAs and this PI was re-scored. Finally, a new recommendation was opened on PI 1.1.1 for UoAs 6-8.

As a result of current surveillance audit, the condition on PI 1.2.3 is considered to be on target and one SI was re-scored but the condition remains open. Progress on the condition on PI 1.2.4 was considered to be behind target and so the milestones were revised. 6 conditions related to Principle 2 were considered ahead target and closed with the corresponding re-scoring. While condition against PI 2.3.3 was considered to be behind target. Finally, the only conditions against P3 (PI 3.2.3) was considered on target. In relation to the recommendations, Recommendation 2 (All UoAs) was addressed and withdrawn, whereas there was no progress on Recommendation 3 (UoAs 6-8). Progress made by the client in order to fulfil the conditions and recommendations established in the initial assessment are described in Section 5 (Results). Re-scoring tables are presented in **section 5.4**.

Finally, a request for variation to the MSC Certification Requirement v2.1 FCP - 7.18.1.5 for application of exceptional circumstances and extend the deadline for the condition against PI 1.2.3 was approved by the MSC on the 25th of August 2020. For more details check the information in the MSC website.

Table ¡Error! No hay texto con el estilo especificado en el documento.-1. Scores previous and after current surveillance audit (SA) for each MSC Principle and UoA (in red scores changed)

	UoA 1		UoA 1 UoA 2		UoA 3 UoA		A 4	UoA5		UoA6		UoA7		UoA8		
	SA	3SA	2SA	3SA	2SA	3SA	2SA	3SA	2SA	3SA	2SA	3SA	2SA	3SA	2SA	3SA
P1	85.6	83.1	85.6	83.1	81.9	83.1	81.9	83.1	81.9	83.1	81.9	83.1	81.9	83.1	81.9	83.1
P2	81.0	83.7	80.7	83.3	81.3	83.7	80.7	83.3	81.7	83.7	81.3	83.7	80.7	83.3	81.7	83.7
P3	88.0	=	87.0	=	88.0	=	87.0	=	88.0	=	88.0	=	87.0	=	88.0	=

Table ¡Error! No hay texto con el estilo especificado en el documento.-2. Pls scores of the certified fishery as published at the PCR and after surveillance audits (in orange scores below 80, meaning a condition was raised for that PI). In red scores changed.

Principle	Component	PI	UoA1	UoA2	UoA3	UoA4	UoA5	UoA6	UoA7	UoA8
		1.1.1	100	100	100	100	100	100	100	70
		(2SA)	=	=	90	90	90	90	90	90
1	Outcome	1.1.2	80	80	80	80	80	80	80	80
		1.1.3	N/A	80						
		(2SA)								N/A



		1.2.1	95	95	95	95	95	95	95	95
		1.2.2	90	90	90	90	90	90	90	90
	Managamant	1.2.3	75	75	65	65	65	65	65	65
	wanagement	(3SA)	75	75	75	75	75	75	75	75
		1.2.4	90	90	90	90	90	90	90	90
		1.2.1 1.2.2 1.2.3 (3SA) 1.2.4 (2SA) 2.1.1 2.1.2 2.1.3 (3SA) 2.1.1 2.1.2 2.1.3 (3SA) 2.2.1 2.2.3 (3SA) 2.2.1 2.2.3 (3SA) 2.2.1 2.2.3 (3SA) 2.3.1 2.3.2 2.3.3 (3SA) 2.4.1 2.3.2 2.3.3 (3SA) 2.4.1 2.5.2 2.5.3 3.1.1 3.1.2 3.1.3 2.1.4 3.2.1 (1SA) 3.2.3 3.2.4 (1SA) 3.2.5	65	65	65	65	65	65	65	65
		2.1.1	90	90	90	90	90	90	90	90
	Retained species	2.1.2	85	80	85	80	85	85	80	85
		2.1.3	70	65	70	65	75	70	65	75
		(3SA)	95	95	95	95	95	95	95	95
		2.2.1	80	80	80	80	80	80	80	80
	Bycatch	2.2.2	80	80	80	80	80	80	80	80
	species	2.2.3	75	75	80	80	80	80	80	80
		(3SA)	85	85	85	85	85	85	85	85
2		2.3.1	85	85	85	85	85	85	85	85
	ETP species	2.3.2	85	85	85	85	85	85	85	85
		2.3.3	75	75	75	75	75	75	75	75
		(3SA)	80	80	80	80	80	80	80	80
		2.4.1	80	80	80	80	80	80	80	80
	Habitats	2.4.2	80	80	80	80	80	80	80	80
		2.4.3	75	75	75	75	75	75	75	75
		2.5.1	80	80	80	80	80	80	80	80
	Ecosystem	2.5.2	85	85	85	85	85	85	85	85
		2.5.3	90	90	90	90	90	90	90	90
		3.1.1	95	95	95	95	95	95	95	95
	Governance	3.1.2	85	85	85	85	85	85	85	85
	and policy	3.1.3	100	100	100	100	100	100	100	100
		2.1.4	80	80	80	80	80	80	80	80
Governa and po		3.2.1	70	70	70	70	70	70	70	70
3		(1 SA)	100	100	100	100	100	100	100	100
	Fisherv	3.2.2	75	75	75	75	75	75	75	75
	specific	(2SA)	85	85	85	85	85	85	85	85
	management system	3.2.3	65	65	65	65	65	65	65	65
		3.2.4 (1 SA)	90	70 80	90	70 80	90	90	70 80	90
		3.2.5	90	90	90	90	90	90	90	90

Main findings from this surveillance audit are summarized below:

The status of all crustacean resources except red squat lobster in the northern area (UoAs 6 and 7) was assessed to be either fully-exploited or underexploited (nylon shrimp north) in 2019, with SB>80%SBMsy. Accordingly these UoAs were considered to be above or fluctuating around MSY in 2019 with a high degree of certainty that they are above the point of recruitment impairment. Fishing mortality (F) has remained below the FMsy level for these UoAs.



- The status of red squat lobster in the northern area (UoAs 6 and 7) improved slightly to be fully exploited in 2019 based on SB>80%SB_{MSY}. However, F remains above F_{MSY} despite a recommendation from the previous year that F be reduced to the F_{MSY} level.
- Common hake represents the most important fish bycatch species for all crustacean fisheries, at about 2-6% of total catches; this by-catch has declined since 2013. Hake by-catch highest in the nylon shrimp fishery and lowest in the yellow squat lobster fishery. The common hake stock is in recovery but its status is gradually improving and was considered to be fully exploited in 2019 based on two of three assessment scenarios.
- The Plan for the reduction of discards, reiterated by Res. 4523 of 2018, establishes a landing
 obligation for all target species subject to quota, while discarding of other species is only allowed
 after being identified and recorded. Notification of all discards is mandatory. However, this
 Regulation is still not implemented, since Sernapesca is still working on developing the means to
 enforce it. However, during the site visit substantial progress was observed.
- Several examples were found to support that the decision-making processes respond to serious matters and other important issues identified in the investigation, follow-up, evaluations and relevant consultations in a timely and flexible manner: the Management Plan for Demersal Crustacean Fisheries and the Discard Reduction Plan was established, in both cases with the participation of the management committee, a procedure was established by Sernapesca to correct the landing information, with plant information when necessary, a procedure was established by Sernapesca to correct the landing information, with plant information, with plant information, with plant information, when necessary, artisanal vessels were incorporated for direct assessment in the artisan reserve strip, A Workshop was developed by the Scientific and Technical Committee to evaluate the aspects identified as susceptible to improvement during 2016, participation of shipowners in the definition of protocols for the control of discarding and bycatch, the fishing law was modified to grant new powers to Sernapesca and sanctions for a better fight against illegal fishing, minutes of the meetings of the Management Committee and the Scientific and Technical Committee are published on time on the website of the Fisheries Subsecretariat. Consistent with all of the above, condition 11 was closed to PI 3.2.2 b) and PI 3.2.2 was re-scored for all of the UoAs.
- The integral traceability system is fully operational for dermesal fisheries
- IFOP sampling programs have been maintained after the research program on discards finished in 2015. IFOP annual reports provide a thoughtful account of all catches, bycatches, and incidental catches accounted by the demersal crustacean fisheries, including spatial-temporal patterns and detailed analyses on the discarded fraction.
- The effort on assessing the impact of these fisheries on birds and marine mammals has increased since 2016 (the hardening of the measures to export to US based on the Marine Mammal Protection Act is expected to trigger further efforts on behalf Chile for assessing the status of the marine mammals in the area and the fisheries impacts on those populations)
- A new regulation establishing conservation measures for the seabirds has already been discussed and approved at the Regional Advisory Councils (Consejos Zonales) and it is expected to be in issued and enforced this year (2019). This regulation will details a set of good practices on board to be undertaken by the different fleets, including the mandatory use of tori-lines for trawlers.
- Subpesca's thorough 2019 review of the applicable regulations and measures for these fisheries to minimise the discards resulting from the authority's measures is considered a strength of the demersal crustacean fisheries administration.
- Sernapesca's 2019 actions to finalise the required regulation to bring to force the use of image recording cameras on the industrial fleet from January 1st 2020, and create a new unit responsible for analysing and auditing that requirement using the collected images, is considered a strength.
- The delay in the requirement for image recording cameras on board the artisanal fleet in order to
 effectively monitor artisanal vessel discards is considered a weakness.

The assessment team concludes that the MSC Certificate for this fishery SHALL remain active



4 Report details

4.1 Surveillance information

1 Fishery name

CHILE SQUAT LOBSTERS AND NYLON SHRIMP MODIFIED TRAWL FISHERY

2	Unit of Asse	essment
	UoA 1	<u>Stock</u> : Nylon shrimp - <i>Heterocarpus reedi</i> <u>Fishing area</u> : Northern & Southern Zones (Regions II,III,IV,V,VI,VII, VIII). <u>Fishing method/gear</u> : Industrial modified trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans <u>Other Eligible fishers</u> : Vessels fishing against the quota hold by the 7 companies included in the client group (Table 4.2.1)
	UoA 2	<u>Stock</u> : Nylon shrimp - <i>Heterocarpus reedi</i> <u>Fishing area</u> : Northern Zone (Regions IV) <u>Fishing method/gear</u> : Artisanal Modified Trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans <u>Other Eligible fishers</u> : Vessels fishing against the quota hold by the 7 companies included in the client group (Table 4.2.1)
	UoA 3	<u>Stock</u> : Yellow squat lobster - <i>Cervimunida johni</i> <u>Fishing area</u> : Northern Zone (Regions III, IV) <u>Fishing method/gear</u> : Industrial Modified Trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans <u>Other Eligible fishers</u> : Vessels fishing against the quota hold by the 7 companies included in
		the client group (Table 4.2.1)
UoA	UoA 4	<u>Stock</u> : Yellow squat lobster- <i>Cervimunida johni</i> <u>Fishing area</u> : Northern Zone (Regions IV) <u>Fishing method/gear</u> : Artisanal Modified Trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans <u>Other Eligible fishers</u> : Vessels fishing against the quota hold by the 7 companies included in the client group (Table 4.2.1).
	UoA 5	<u>Stock</u> : Yellow squat lobster - <i>Cervimunida johni</i> <u>Fishing area</u> : Southern Zone (Regions V, VI, VII, VII) <u>Fishing method/gear</u> : Industrial Modified Trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans <u>Other Eligible fishers</u> : Vessels fishing against the quota hold by the 7 companies included in the client group (Table 4.2.1)
	UoA 6	<u>Stock</u> : Red squat Lobster - <i>Pleuroncodes monodon</i> <u>Fishing area</u> : Northern Zone (Regions II, III, IV) <u>Fishing method/gear</u> : Industrial Modified Trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans <u>Other Eligible fishers</u> : Vessels fishing against the quota hold by the 7 companies included in the client group (Table 4.2.1)
	UoA 7	<u>Stock</u> : Red squat Lobster - <i>Pleuroncodes monodon</i> <u>Fishing area</u> : Northern Zone (Region IV) <u>Fishing method/gear</u> : Artisanal Modified Trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans



			Other Eligible fishers: Vessels fishing against the quota hold by the 7 companies included in the client group (Table 4.2.1)							
	U	JoA 8	<u>Stock</u> : Red squat Lobster -Pleuroncodes monodon <u>Fishing area</u> : Southern Zone (Regions V, VI, VII, VIII) <u>Fishing method/gear</u> : Industrial Modified Trawl <u>Fishing operators</u> : Chilean fleet targeting the demersal crustaceans <u>Other Eligible fishers</u> : Vessels fishing against the quota hold by the 7 companies included in the client group (Table 4.2.1)							
3	Certif	icate d	letails							
Certificat code	te	F-BV-0)424							
Date cer	tified	13 Sep	Date of expiry 12 Sep 2021							
Due to th Consequ	he MS0 uently,	C Covie , the up	d-19 Derogation 27 March 2020, the certificate of the fishery has been extended 6 months odated date of expiry is now 12 March 2022.							
4	Surve	eillance	evel and type							
Level	The s adapt audits has no out in	urveilla ed to ve b). The ot been the see	nce level and the fishery surveillance program remains the same as in the PCR although it was ersion 2.1. The current surveillance level following version 2.1 is number 6 (4 on-site surveillance details of the surveillance program and the rationale is included in Appendix 7.3 , although it modified in relation to previous surveillances. The surveillance audit timing also remains as se cond surveillance report.							
Туре	Curre	nt surv	eillance audit was carried out as an on-site audit.							
5	Surve	eillance	e number							
1st Surve	eillance	Э								
2nd Surv	veillanc	e								
3rd Surv	eillance	e	X							
4th Surve	eillance	Ð								
Other (ex	xpedite	ed etc)								
6	Asses	ssmen	t team ¹							
Team lea	ader		José Ríos							
Team me	ember	1	Edith Saa							
Team me	ember	2	Earl Dawe							
7	Audit	/reviev	v time and location							

The on-site surveillance audit was performed in Valparaiso (Chile) between March 9-11, 2020. Before the on-site surveillance the team will review the new information and the documents developed by the client in respond to the conditions.

8 Assessment and review activities

During the site visit, the team conducted assessment activities in accordance with FCP 7.28.15-18. In the case of the current fishery the team concentrated in: (i) checking for any relevant modification affecting the fishery; (ii) assess progress against conditions set to the fishery. See **Appendix 7.1** for details on the people interviewed and for details on the stakeholder engagement strategy, and **Appendix 7.2** for details on topics discussed during the site visit and other stakeholder inputs. Harmonization activities with overlapping fisheries are described in **Appendix 7.4**

9 Conformity Assessment Body (CAB)

Name Bureau Veritas Certification Holding SAS

¹ See the Surveillance announcement at the MSC website for more details on how the team meets the competency criteria and the areas that they are responsible.



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4.2 Background

4.2.1 Personnel involved in science, management or industry

There were some changes in the people managing the public institutions involved with demersal crustacean fisheries management during 2019.

In the Ministry for the Economy, Mr Lucas Palacios replaced Mr José Ramón Valente as Minister for the Economy, Development, and Tourism from October 2019. Mr Román Zelaya Ríos replaced Mr Eduardo Riquelme Portilla as Undersecretary for Fisheries in July 2019. Additionally, Mr Mauro Urbina became Fisheries Administration Division Manager for Subpesca towards the end of 2018 and remains in that role. This division is directly responsible for managing the demersal crustacean fisheries being audited. In early 2019, Ms Aurora Guerrero Correa became the Crustacean Fisheries Unit Coordinator and remains in that role.

Ms Alicia Gallardo Lagno remains the National Director of Sernapesca, having assumed the role in 2018. During 2019, Mr Fernando Naranjo replaced Mr José Luis Castro as Fisheries Subdirector. This Subdirectorate is responsible for the national inspection activity and controlling catch quotas, among other matters.

The Fisheries Development Institute (IFOP) remains responsible for fisheries management research through the annual performance agreement agreed with the Subpesca. However, it is legally acceptable for the research to be outsourced should IFOP not have the capabilities to undertake it. (Art.156 bis, subparagraph three, LGPA).

Subpesca Resolution No. 4481 of 2018, establishes the research programme for regulating both fishing and aquaculture for 2019. Research involving demersal crustacean fisheries was undertaken in the following studies:

A monitoring and surveillance programme:

- A demersal fisheries discard and bycatch research programme. A monitoring and surveillance programme of the discard and bycatch reduction plans, 2018- 2019.
- Follow up of the main national fisheries, 2019. The demersal crustaceans fishery.

Direct stock assessment (swept area):

• Direct evaluation of yellow squat lobster, red squat lobster, and nylon shrimp across the Antofagasta and Bio Bio regions in 2019.

Stock status and indirect evaluations

• The status and fishing possibilities for the biologically sustainable exploitation of the main national fishing resources in 2019.

The following research was approved during 2019: The Catholic University of Valparaíso with the study, "Direct assessment of the yellow squat lobster, red squat lobster, and nylon shrimp across the Antofagasta and Bio Bio regions in 2019", authorised by Subpesca Resolution No. 1771 of 2019.



4.2.2 Certified fleet and client group

4.2.2.1 Client group

AIP is the owner of the certificate. No changes in the client group since the certification of the fishery.

Among AIP members those holding demersal crustaceans quotas are: Antarctic Seafood, S.A, Pesquera Quintero S.A, Bracpesca S.A., Soc Pesquera Isladamas S.A., Pesquera Sunrise S.A., Sociedad Pesquera Costa Brava Ltda, Exportadores De Mariscos Rymar. They all have vertically integrated operations, managing their own fleet and processing plants. However, they might also use their fleet to catch quota from other companies.

4.2.2.2 Certified fleet

The Units of Assessment include the entire Chilean fleet targeting the demersal crustaceans, while the Units of Certification are restricted to the vessels fishing against the quota hold by the 7 companies included in the client group (see above).

At the PCR an indicative list of 21 vessels owned by the fishing companies member of AIP was provided. Every year, before the fishing season starts, AIP sends to BV an updated list of the vessels they are expecting to use, see Table 4.2.1 for the list of the vessels authorised in 2019. However, as mentioned above any vessel approved by the client group could be eligible to enter in the UoC, as the quota is owned by the fishing companies included in the client group and they may fish for that quota with any designated vessel.

#	Vessel	Reg.№ Port	Administrator	Fishing Register	GTR (tons)	Length (m)	Fleet category
1	Isla Picton	2239 - Valparaiso	Antartic Seafoods	1496	79.8	21	Industrial
2	Gringo	1778 - Valparaiso	Antartic Seafoods	745	81.9	22	Industrial
3	Punta de Talca	2234 - Coquimbo	Antartctic Seafoods	68051	50.00	17.9	Artisanal
4	Oriente	1234 - Quintero	Pesquera Quintero	2631	49,7	17.9	Artisanal
5	Don Stefan	2945 – Valparaiso	Pesquera Quintero	1995	86.0	21.0	Industrial
6	Elbe	2891 – Valparaiso	Pesquera Quintero	1965	54.1	17.9	Industrial
7	Rauten	3088-Valparaiso	Pesquera Quintero	2513	79.0	18.3	Industrial
8	Isla Tabón	329-San Vicente	Pesquera Quintero	966378	40.4	17.88	Industrial
9	Nissin Maru III	2192 – Valparaiso	Bracpesca	865	97.8	20.5	Industrial
10	Foche	2111 – Valparaiso	Bracpesca	1065	84.1	22	Industrial
11	Chaffic I	2570 – Coquimbo	Rymar	68189	15.00	11.9	Artisanal
12	Maori	1854-Valparaiso	Pesquera Quintero	930	106	21.98	Industrial
13	Trauwung I	1913-Coquimbo	Eric Aravena	920731	46,1	17.5	Artisanal
14	Cocha	1826 – Valparaiso	Isla Damas	25	84.1	22	Industrial
15	Isla Orcas	1868 – Valparaiso	Sunrise	85	84.1	22	Industrial
16	Lonquimay	1840 – Valparaiso	Isla Damas	543	81.9	22	Industrial
17	Polux	2234 -Valparaíso	Guillermo Donoso	764	71.4	22	Industrial

Table 4.2.1. List of member vessels for 2019. Source: the client.



The list of vessels to be included in the UoC for the 2020 fishing season has already been sent to the CAB and published at the MSC website on April 3, 2020. The list of vessels for 2020 includes only 15 vessels.

4.2.3 Regulatory framework and fishery management

Both the Nylon shrimp fishery in Regions II-VIII (UoA1, UoA2), yellow squat lobster in Regions III-IV (UoA3, UoA4), yellow squat lobster in Regions V-VIII (UoA5), red squat lobster in Regions XV-II (UoA6, UoA7) and red squat lobster in Regions V-VIII (UoA8), are managed through Individual Quotas, but under different systems (in accordance with the LGPA):

- i. UoA1, UoA3, UoA6: Transferrable Fishing Licence System -Régimen de Licencias Transables de Pesca (LTP)-
- ii. UoA2, UoA4: Artisanal Fisheries System Régimen Artesanal de Extracción-
- iii. UoA5, UoA8: Rebuilding fisheries System Régimen de Pesquerías en Recuperación-

None of the Fisheries has had major modifications in its management system since the initial assessment. However, several Laws, Articles and Decrees have been issued to update and improve some elements of the management system. The list below provides a summary of the most significant modifications:

4.2.3.1 Amendments to Fishing Legislation

Law 21.132, which aims to modernise the conditions of National Fisheries Service employees and particularly those involved in auditing, to strengthen SERNAPESCA's responsibilities and functions, and to tackle illegal fishing with new infractions and offences, particularly when it comes to the onshore fishing resource business, with increased numbers to take on the new tasks. This law was ratified on January 31st, 2019. Point 4.2.4. summarises the main aspects involved.

4.2.3.2 Auctions for tradable fishing licences (Licencias transables de pesca, LTP) for the Chilean hake

In accordance with temporary article 3 of law 20.657, towards the end of 2019, 10% of the industrial quota for Chilean hake was auctioned as a class B tradable fishing licence –LTPs- (5% in 2018 and another 5% in 2019), which are valid for 20 years from 2019 onwards. Towards the end of 2020, the last auction will take place, and another 5% of the total quota will then be auctioned, deriving in a total of 15%. Many of the extraordinary fishing permits or tradable fishing licence holders for lobsters and nylon shrimp purchased these class B LTPs to cover the hake bycatches derived from their normal fishing operations.

In accordance with national fishing regulations, extraordinary fishing permit holders must register the vessels that they use for extractive activities beforehand, certifying with Sernapesca that they have a quota for associated species to which they can allocate the tonnes that they catch, in this case Chilean hake and nylon shrimp. (Resolution No. 3200 of 2013 and its subsequent amendments).

In accordance with the Chilean hake quota control data published in the National Fisheries Service website, in March 2019, the quotas for 2018, 2019 and 2020 for the companies that form part of the customer's group are as follows:

Table 4._iError! No hay texto con el estilo especificado en el documento.**.2**. Demersal crustacean quota holders included in the client group that purchased common hake quota (LTP) to account for their hake

Fishing companies	Quota for 2018 (t)	Quota for 2019 (t)	Quota for 2020 (t)
Antarctic Seafood, S.A.	35,05	192,06	55,05
Pesquera Quintero	44,43	140,34	72,80
Bracpesca, S.A.	47,23	322,12	122.23
Isla Damas, S.A.	40,53	46,58	97,04
Rubio y Mauad LTDA	0,44	205,85	0

bycatches

4.2.3.3 Catch quotas and allocation of rights

It is important to highlight that the Ministry for the Economy establishes the annual quota based on the proposal they are sent by the Scientific Technical Committee for Demersal Crustaceans (CCTCD). The



CCTCD does not propose a quota, rather a range with lower and upper limits, which should always direct the fishery towards the MSY or maintain it there.

All the relevant regulations establishing quotas for the **nylon shrimp, red and yellow squat lobsters** for **2019** are listed below:

- Ministerio de Economía, Decreto Nº 456 de 2018. This regulation established the red squat lobster quota in Regions V-VIII for 2019 in 4,798 tonnes. (Effective quota: 4.662 ton.)
- Ministerio de Economía, Decreto Nº 457 de 2018. This regulation established the yellow squat lobster quota in Regions V-VIII for 2019 in 2,027 tonnes. (Effective quota 1960 ton.)
- *Ministerio de Economia, Decreto No. 526 of 2018.* This regulation established the yellow squat lobster quota in Regions III and IV for 2019, in 1,567 tons; red squat lobster quota in Regions XV-IV in 797 ton. and 5,992 ton. for nylon shrimp in region II to VIII. (Target quota yellow squat lobster, 1,536 ton. red squat lobster, 781 ton. nylon shrimp, and 5,873 ton.)
- Subsecretaria de Pesca, Resolución 25 de 2019. This regulation established the artisanal quotas in regions. For 2019, it established the following quota for Region IV: 758 ton. of shrimp, 623 ton. of yellow prawn, and 670 ton. of red prawn.
- Subsecretaría de Pesca, Resolución Nº 4.549 de 2018 established a list of holders, lessees and simple holders of class A LTP, and established a quota for 2019 for each of them, for yellow squat lobster, red squat lobster, and nylon shrimp, among other fisheries.
- Subsecretaría de Pesca, Resolución Nº 32 de 2019 established the tonnes allocated to class B LTP, yellow squat lobster, red squat lobster, and nylon shrimp, among other fisheries for 2019.
- Subsecretaría de Pesca, Resolución Nº 59 de 2019 established the allocation of individual quota for 2019 to the artisanal owners of RAE in region IV, of yellow squat lobster, red squat lobster, and nylon shrimp.

All the relevant regulations establishing quotas for the target species of the UoAs for **2020** are listed below:

- Ministerio de Economía, Decreto N°241 de 2019 This regulation established the red squat lobster quota in Regions V-VIII for 2020 in 5.518 tonnes. (Effective quota: 5.348 ton.)
- Ministerio de Economía, Decreto Nº 240 de 2019. This regulation established the yellow squat lobster quota in Regions V-VIII for 2020 in 2.027 tonnes. (Effective quota: 1.960 ton.)
- Ministerio de Economía, Decreto N° 311 de 2019 established total quota for 2020 for yellow squat lobster in region III and IV in 1,567 ton.; red squat lobster in region XIV-XV, in 757 ton.; and nylon shrimp in region II and VIII in 5,992 ton. (Target quota yellow squat lobster, 1,536 ton.; red squat lobster, 743 ton.; nylon shrimp, 5,873 ton.
- Subsecretaría de Pesca, Resolución N° 3.961 de 2019 established the regional artisanal quota distribution for yellow squat lobster for 2020, in which 487 ton. were allocated to region IV of Coquimbo.
- Subsecretaría de Pesca, Resolución N° 4.053 de 2019 established the regional artisanal quota distribution for nylon shrimp for 2020, in which 557 ton. were allocated to region IV of Coquimbo.
- Subsecretaría de Pesca, Resolución N° 40 de 2020 established the regional artisanal quota distribution for red squat lobster for 2020, in which 671 ton. were allocated to region IV of Coquimbo.
- Subsecretaría de Pesca, Resolución N° 4.012 de 2019, established a list of holders, lessees, and simple holders of class A LTP, and established a quota for 2020 for each of them, for yellow squat lobster, red squat lobster, and nylon shrimp, among other fisheries.

Table 4.2.3 summarises the quota ranges proposed by the CCTCD to the fisheries authority so that they can set the catch quotas for 2020. It should be noted that the Fishing Authority always set the annual quota as the upper limit of the range advised by the CCTCD, with the only exception of the red squat lobster UPN. For this stock, Subpesca set the annual quota in accordance with the lower limit of the range (757 tonnes).

Table 4.2.3. Range of the quotas for yellow squat lobster UPS (langostino amarillo V-VIII), yellow squat lobter UPN (langostino amarillo III-IV), red squat lobster UPN (langostino Colorado XV-IV), red squat lobster UPN (langostino colorado V-VIII) and nylon shrimp (camarón nailon) for 2020 advised by the CCTCD (Recomendacion CCTCD) Vs the quota set by Subpesca (Cuota establecida). The advised quotas



were retrieved from the minutes of the CCTCD, while the set quotas are published at the Decrees detailed in the table. Table elaborated by the BV team.

	Cuota 202	20		
Pesquerías	Fuente	Recomendación CCTCD	Cuota Establecida	Decreto
Langostino amarillo V-VIII	ACTA Nº4-2019 de CCTCD	1.622 a 2.027	2.027	DS 240-2019
Langostino amarillo III-IV	ACTA Nº4-2019 de CCTCD	1.254 a 1.567	1.567	DS 311-2019
Langostino colorado XV-IV	ACTA Nº4-2019 de CCTCD	638 a 797	757	DS 311-2019
Langostino colorado V-VIII	ACTA Nº4-2019 de CCTCD	4.414 a 5.518	5.518	DS 241-2019
Camarón nailon	ACTA №5-2019 de CCTCD	4.793 a 5.992	5.992	DS 311-2019

4.2.3.4 Discards and image recording cameras

Several regulations were issued in 2019 to move forward in the implementation of the Electronic Surveillance Systen (ESM), based on the installation of cameras on board all industrial fishing fleets operating within the Chilean waters. The list below compiles all regulations related to this matter. For other details on how the ESM is being implemented see section 4.2.4.

- SERNAPESCA, Resolution No. 1449 of 2019, establishes the requisites and procedures for authorising image recording device suppliers, within the framework of implementing the discards detection and recording system.
- SERNAPESCA, Resolution No. 1685 of 2019, establishes the informative list of image recording device suppliers and the supplier approved authorised technical support services, within the framework of implementing the discards detection and recording system.
- SERNAPESCA, Resolution No. 2021 of 2019, re-establishes the requirements for the location, height, direction, and angle of the image recording cameras on board the demersal crustacean trawl fleet.
- SERNAPESCA, Resolution No. 2264 of 2019, establishes the method for certifying the installation and functionality of image recording cameras.
- SERNAPESCA, Resolution No. 2409 of 2019, establishes the procedure for checking the image recording camera system before embarking and reporting faults.
- SERNAPESCA, Resolution No. 3227 of 2019, amends Resolution No. 3885 of 2018, which establishes the technical standards for image recording devices based on the type of vessel.
- SERNAPESCA, Resolution No. 3926 of 2019, establishes the procedure for collecting the image recording device hard drives from industrial fishing vessels.
- SERNAPESCA, Resolution No. 5930 of 2019, establishes the date on which the SERNAPESCA discard auditing system comes into force.
- SERNAPESCA, Resolution No. 406 of 2020, establishes the procedure for changing the hard drive while at sea.

In line with the entry into force of image recording cameras on board all industrial fleets from January 1st 2020, with discard inspection as the main aim, and based on the research undertaken to determine the main causes of discard, it was possible to ascertain that a lot of discards derived from the authority's own administration and management measures, which prevented them from being brought on board for a range of reasons. In light of the above, Subpesca carried out a thorough review of every applicable regulation and enacted a series of amendments and adjustments in order to prevent discards. The main amendments to the regulations were as follows:

• Ministry for the Economy, Decree No. 170 of 2019, establishes the catch percentage of yellow and red squat lobster during their closed season (January and February each year) during nylon shrimp catches. Based on Technical Report R. Pesq. No. 159-2019.

This regulation will prevent discards of yellow and red squat lobster during the closed season, given that a certain percentage of those species will be permitted during the nylon shrimp catch, even with the lobsters in closed season.

• SUBPESCA, Resolution No. 3917 of 2019, amending Res No. 1700 of 2000, regulating the fishing gear and tackle that can be used to catch a range of fishes, with catches by trawling and purse seine fishing banned. Based on Technical Memo R. Pesq. No. 160-2019.



This regulation added new species that can only be caught using fishing gear or tackle with design and structural characteristics that classify them as hand line, long line, surrounding nets, entangling nets, harpoon or fixed line, and trolling.

- Ministry for the Economy, Decree No. 45 of 2020, establishes new catch percentages for bycatch for resources that cannot be caught by trawling and purse seine fishing, in accordance with the regulation established by Res No. 3917 of 2019. Technical Report R. Pesq. No. 08-2020. This regulation will permit that several species can only be caught and landed using fishing gear that is not classified as trawling and purse seine, thus avoiding that they are discarded.
- SUBPESCA, Resolution No. 3986 of 2019, Amends Res 3200 of 2013, which establishes the associated species for target industrial fisheries. Technical Report R. Pesq. No. 169-2019. This Regulation aims to adapt the species, which based on the discard research, are usually caught as bycatch and don't have restrictions when it comes to using trawling to catch them.
- SUBPESCA, Resolution No. 3044 of 2019, revokes the minimum extraction size for bigeye flounder throughout the country. Technical Memo R. Pesq. No. 156-2019. This regulation will avoid the discarding of this resource, given its catch size among demersal crustacean fisheries.
- SUBPESCA, Resolution No. 2820 of 2019, establishes the compulsory and immediate return of benthic crustaceans that are caught during bottom trawling or longline fishing. Technical Report R. Pesq. No. 159-2019.

This regulation prevents the discard of benthic crustaceans such as crabs, as they cannot be landed due to their catch restrictions during trawling.

4.2.3.5 Landing certification

The following regulations were issued in order to accommodate changes to the certification of the landings resulting from the implementation of Law 21.132 (see **section 4.2.3.1** for more details).

- SERNAPESCA, Resolution No. 2952 of 2019, establishes the requisites, conditions, and procedures for certifying landings, in accordance with article 64 E of the LGPA.
- SERNAPESCA, Resolution No. 5913 of 2019, establishes the start date for SERNAPESCA to certify landings in the central-south macro-zone and the Coquimbo region from January 1st 2020. Action supported through applying law 21,132.

4.2.3.6 Electronic logbook

The electronic logbook was updated in order to accommodate the necessary modifications to report discards in accordance with the new regulations and the implementation of the EMS

• SERNAPESCA, Resolution No. 267 of 2020, establishes an electronic logbook system for fishing, and determines the opportunity and conditions for providing catch information. It revokes Resolution 114 of 2015.

4.2.4 Compliance

In accordance with the modifications established by law 21,132, which established new inspection powers to SERNAPESCA, the following advances were made during 2019:

Certification

In terms of certifying catches and on the date of this site visit, Sernapesca carries out all certifications, which they are undertaking progressively in the different fishery areas. The southern macro-zone that covers the Los Ríos region to the Magallanes region from July 31st 2019, SERNAPESCA Resolution No. 3301 of 2019. The regions between the country's northern border and the Atacama region (region III) from September 1st 2019, Sernapesca Resolution No. 3924 of 2019. The eighth and fourth regions from January 1st 2020, Resolution No. 5913 of 2019, the entire area in which the demersal crustacean fisheries operate.

It is worth noting that in addition to certifying landings from all industrial vessels, Sernapesca certifies landings from artisanal vessels operating in pelagic fisheries that are at least 12 metres long (certification



undertaken in the port), along with the certification of processing plants for catches from vessels operating in pelagic fisheries.

Instruction from Sernapesca, contained in record No. 144926 of August 19th of 2019.

- Closure of processing plants due to non-payment of certification.
- Other Obligations and Powers

SERNAPESCA Resolution No. 267 of 2020:

- It makes it a requirement for transportation vessels to use an electronic logbook.
- SERNAPESCA must approve the entire weighing system.

Instruction from SERNAPESCA contained in record No. 147371 of December 27th 2019, about how to apply the following new requirements:

- To demand that companies manufacturing and selling products derived from hydrobiological resources register with a SERNAPESCA Registry.
- SERNAPESCA has the power to preventively close and suspend processing facilities in the absence of certification of a legal source for resources or products.
- The power to register enclosures for storing or distributing foodstuffs for hydrobiological species.

Resolution No. 4533 of 2019, and Resolution No. 4406 of 2019, both from SERNAPESCA:

- Establishes the ports or landing points by fishery.

Chile's agreement with Global Fishing Watch, detailed in section 4.2.7.5:

- Data from the satellite positioning system will no longer remain private and must be published by SERNAPESCA each month.

SERNAPESCA Resolution No. 5930 of 2019:

- Image recording cameras must also be used to detect illegal fishing situations (not just discards).
- Image recording for the landing pontoons is also a requirement.

Instruction from SERNAPESCA, record No. 143921 of September 17th of 2019:

- Establishes a 15-day period for providing the auditing process history.

In order to fulfil the above, SERNAPESCA hired and trained 320 new civil servants during 2019.

• Discards and image recording cameras

As indicated in point 4.2.3.4, January 1st 2020 saw the start of discard auditing on board industrial fishing vessels. This led to the Service creating a new unit with responsibility for analysing the collected data.

Collecting data

Using Resolution No. 3926 of 2019, the Sernapesca established the procedure for collecting the image recording system hard drives, and here are the main aspects:

Each industrial ship-owner must have at least three removable hard drives per vessel of the minimum capacity established by Resolution No. 3885 of 2018, amended by Resolution No. 3227 of 2019 based on the type of fishing, so that they can cover an average of 1 month's fishing.

The Service will collect the hard drives when storage capacity has either reached 75% or once every month.

The collectors have to arrange the date and location for removing and installing the new hard drive with the ship-owners, and follow the safety protocols for transporting and storing them. A regional



SERNAPESCA civil servant will remove and replace them, before sending them in a sealed package to head office for analysis.

<u>Data analysis</u>

Critical points requiring review have been decided based on the type of fishery. In the case of demersal crustacean fisheries with trawling, the critical points correspond to the period between the catch being brought onto the ship to the entire catch being boxed and stored in the hold.

The hard drive will show the catch corresponding to 1 months' fish hauls depending on the vessel's number of fish hauls. The image analysis involves the observation of 10 to 20% of fish hauls, reviewing every image for established critical points, with the hauls requiring observation chosen at random.

It is worth noting that demersal crustacean trawler vessels must have 3 image recording cameras in operation so that all potential forms of discards are covered.

Once all the hard drive has been analysed, the analyst must write a report on the matter.

It was possible to visit the image analysis centre during the visit to the SERNAPESCA site, where 3 analysts currently work full time. They have user friendly image analysis software and the collected images were very clear. It is possible to simultaneously observe the records from each camera and zoom can be used on the images when required. It was stated that each analyst takes 2 days to both analyse a hard drive containing data from one month's hauls and create a report.

Although legally speaking there isn't a trial phase, after analysing the images, the Service has decided to invite ship-owners to find out whether they need to make improvements to avoid committing infractions.

4.2.4.1 Inspection actions

With the aim of confirming that the established regulations for the demersal crustacean fishery are correctly fulfilled, SERNAPESCA reported (Standard No. 150217, dated March 19th 2020) that there were 197 inspection activities on these fisheries during 2019, which aimed to evaluate compliance with the different requirements and administrative measures:

-	Processing plant inspection Means of transportation inspection	: 22
-	Means of transportation inspection	: 8
-	Sanitary approval of the ship	: 4
_	Fishing zone inspection	: 1
	9	

As a result of inspection actions during 2019, SERNAPESCA carried out 5 infractions on the shrimp fishery, 3 of them carried out by means of transport, 1 in a processing plant and 1 in a trading company.

AIP requested to SERNAPESCA all sanctions issued to their captains and/or vessels included in the UoCs in 2019. Only one of the captains listed was found to have been issued a sanction. The only exception is the captain of the Fishing vessel 'Foche'. However, that sanction was imposed to this captain in 2014, when he was on board a different vessel called 'Cachagüa'.

4.2.5 Traceability issues

Resolution 2523/2017, based on a previous Decree (D.S.N.129/2913), regulates the development and implementation of the integral traceability system. The objective of this system is to ensure a very detailed control over allocated quotas and ensure traceability. At the same time, it also facilitates administrative procedures for the fishing and processing companies since all procedures (from landing until export) can be performed on-line. Recent Resolution 2205/2018 includes extends the obligation to be included in the traceability system to other stakeholders such as transporter boats and retailers, but this do not affect the assessed fishery. All procedures are done electronically through the same interface.

Sernapesca and all the stakeholders interviewed during the site visit confirmed that the integral traceability system is in place for all the different stakeholders (fishers, processing plants, etc.) and working normally



ince 2019. During the meeting held with the Sernapesca representatives, it was acknowledged that they are working on improving the system to cover all the different eventualities. For instance, they have recently connected the traceability system to the export system, so the mandatory document for exporting (AOL, Acreditacion de Origen Legal or Legal Origin Accreditation) can be requested using the traceability system. Further, they are working on including into the same traceability system the notification prior to port arrival (at this moment the system starts with the landing declaration).

Law 21132 reinforcing the role of SERNAPESCA is considered to reinforce the implementation of the traceability issues. All vessels ≥12m and/or fishing for a processing plant are subject to landing certification by Sernapesca (costs are funded by the buyers). Further, Sernapesca inspectors can raise infringements, while previous inspectors (from a private consultancy hired by Sernapesca) were not entitled to do so.

The integral traceability system allow adjusting the landing declaration in accordance with data obtained by the processing plants. This has implications in relation to Condition 2. The different documents generated by the traceability system are as follows:

- 1. <u>Declaracion de desembarque</u> (Landing declaration, called DI in the case of the industrial fisheries, DA in the case of the artisanalfisheries). This document can only be issued by the vessel once the landings were certified by Sernapesca.
- 2. <u>Declaracion de abastecimiento</u> (Supply declarations, issued by the processing plants). This declaration is created against the information contained in the landing declaration
- 3. <u>Certificado de produccion</u> (Production certificate, issued by the processing plant). This certificate is created against the information contained in the supply declaration
- 4. <u>Declaracion de destino</u> (Destiny declaration). In the case the product is for export, then the AOL (Acreditacion de Origen Legal or Legal Origin Accreditation) is triggered. All the information contained in the AOL is checked before issuing the AOL.

Although some improvements have been implemented in the traceability, no significant modifications were identified compared to previous surveillance audit.

4.2.6 Scientific based information related to P1

For yellow squat lobster there are two fishery units: i) the Northern Unit extends within the northern limit of Region III and the southern limit of Region IV, and ii) the Southern Unit extends within limits of Regions V and VIII. Units of certification for yellow squat lobster for the industrial fishery include the extent of each of the northern and the southern fishery units. The artisanal unit of certification includes only Region IV.

For red squat lobster there are also two fishery units: i) the Northern Unit extends from the northern limit of Region XV (boundary with Peru) to the southern limit of Region IV, and ii) the Southern Unit extends within the limits of Regions V and VIII (Figure 3). Units of certification for red squat lobster for the industrial fishery include Regions II to IV in the north (although fishing in the last six years has been conducted only in Region IV) and the whole extent of the southern fishery unit. The artisanal unit of certification includes only Region IV.

For nylon shrimp there is only one fishery unit defined between the northern boundary of Region II and the southern limit of Region VIII (21o26' to 38o28'). In the assessment, the unit of certification for the nylon shrimp industrial fishery includes the whole extent of the fishery unit area, although the fishery takes place mostly from Region IV to VIII. The unit of certification of the artisanal fishery includes only Region IV. The assessment of resource status is conducted separately for the central north zone (Regions II-IV) and the south central zone (Regions V-VIII).

4.2.6.1 Stock status

Nylon Shrimp

The Nylon Shrimp fishery is managed as a single resource throughout Regions II-VIII, although the overall quota is partitioned between the two zones. The overall landings decreased from about 5018 t in 2018 (Ibarra 2019b) to 4248 t in 2019, representing 71% of the quota of 5992 (Sernapesca 2019a). The overall quota for 2020 was unchanged, at 5992 t. (Ministerio de Economía, Decreto Nº 311 de 2019.



Nylon Shrimp (North Central Region II-IV)

Landings declined from 2009-2014, due primarily to quota reductions and have changed little since, despite quota changes (**Figure 4-2-1**). Quotas have not been fully subscribed in recent years due to small size of shrimp such that they are undesirable to markets and effort is diverted to more lucrative fisheries (Ibarra 2019b). Fishery landings increased from 877 t in 2018 (Ibarra 2019b) to 663 t in 2019 representing 42% of the target species quota (ie excluding allocations for bycatch and research) of 1582 t (Sernapesca 2019a).



Figure 4-2-1 Annual landings (t) and catch quota (t) for the nylon shrimp fishery in Region II-IV during 1993-2018 (partial). Source: Zilleruelo et al 2019 Fig. 7.

Mean size in the fishery increased sharply from 2013 to peak in 2015-2016 (females in particular) and then declined sharply to 2018 (**Figure 4-2-2**). Size of females decreased further to its smallest since 2004 while male size increased in 2019.



Figure 4-_iError! No hay texto con el estilo especificado en el documento.**-2.** Mean annual size of nylon shrimp from the north-central fishery by sex and in total during 1970-2019: Source: Ibarra 2019b. Fig.15.

The model provided a poor fit to the observed standardized catch per unit effort (CPUE) series (**Figure 4-2-3**), overestimating CPUE from about 1998-2006 and underestimating the highly variable empirical estimates in subsequent years. The observed biomass estimates increased from about 2003-2011 and have since varied greatly while remaining relatively high.



Captura por Unidad de Esfuerzo (CPUE)



Biomasa del crucero

Figure 4-2-3. Fit of the model for nylon shrimp in the north-central zone (Region II-IV) during 1961-2018 to the standardized CPUE estimates (left), and observed survey biomass estimates (right). The points represent the observed data with its observation error and the line represents the model estimate. Source Ibarra 2019b, Fig.27.

The model generally provides an adequate fit to the observed survey biomass estimates during the past decade. Both the model and the empirical means indicate little change in biomass in recent years (**Figure 4-2-3**), with the model predicting an increase in the short term.

The most recent assessment indicates that recruitment peaked during the 1990's and has varied since 2003, generally remaining around the average level, except for a strong peak in 2015 (**Figure 4-2-4**). Total, spawning, and exploitable biomass have all increased recently. The model indicates that both spawning and exploitable biomass increased from about 2002-2008 and then changed little until they increased steadily during 2016-2019. This increase may be related to the strong recruitment peak in 2015.



Figure 4-_iError! No hay texto con el estilo especificado en el documento.-4. Results of the north-central nylon shrimp assessment model showing (clockwise from upper left) trends in total biomass, spawning biomass, recruitment and exploitable biomass, 1945-2018. Shaded areas represent 95% confidence bands: Source: Ibarra 2019b, Fig. 38

The status of the fishery in 2019 is evaluated based on changes in fishing mortality and spawning biomass relative to a phase diagram (**Figure 4-2-5**). The current assessment indicates that the fishery has been in the under-exploited phase (SB/SB_{MSY} >1.5 SB_{MSY}) for more than a decade and it's status has continued to improve in recent years with F at its minimum and SB at its maximum in 2019.





Figure 4-_iError! No hay texto con el estilo especificado en el documento.-**5**. Phase diagram of north central nylon shrimp with stock trajectory based on fishing mortality and spawning biomass (relative to MSY levels) overlain. Dashed lines at values of 1.0 represent MSY levels with F/F_{MSY} representing the overfishing threshold. Fishery status or phases are defined relative to MSY levels. Red cross corresponds to the confidence intervals of the SB / SB_{MSY} and F / F_{MSY} ratio: Source: Ibarra 2019b, Fig. 40

Nylon Shrimp (South Central Region V-VIII)

Annual landings approximately tripled from 2004-2016 due to quota increases (**Figure 4-2-6**), although quotas were not fully subscribed during 2012-2016. Landings decreased slightly in 2017 due to quota reduction but increased in 2018 to 4141 t (Ibarra 2019b) its highest level since 1997. Quotas have not been fully subscribed in recent years, as in the central-north zone as effort is diverted to more lucrative fisheries (Ibarra 2019b). Fishery landings decreased to 3500 in 2019 representing 82% of the target species quota (ie excluding allocations for bycatch and research) of 4266 t (Sernapesca 2019a).



Figure 4-2-6. Annual landings (t) and catch quota (t) for the central-south nylon shrimp fishery in Region V-VIII during 1993-2018 (partial): Source: Zilleruelo et al 2019 Fig. 13.

Mean size in the fishery increased from 2013-2015 and then (as in the central-north zone) declined markedly to very small size in 2019 (**Figure 4-2-7**). In this case, mean size of both sexes continued to decline to smallest size since 2002, whereas male size increased to remain quite large in the central-north zone in 2019 **Figure 4-2-2**.





Figure 4-_iError! No hay texto con el estilo especificado en el documento.**-7.** Mean annual size of nylon shrimp from the central-south (Region V-VIII) fishery by sex and in total during 1970-2016: Source: Ibarra 2019b Fig. 15.

The model provided a poor fit to the observed standardized catch per unit effort (CPUE) series (**Figure 4-2-8**), overestimating CPUE in recent years and failing to represent the increase in the most recent 5-6 years. The empirical estimates indicate that fishery performance has recently improved.



Figure 4-2-8. Fit of the model for nylon shrimp in the south-central zone (Region V-VIII) during 1945-2019 to the standardized CPUE estimates (left), and observed survey biomass estimates (right). The points represent the observed data with its observation error and the line represents the model estimate. Source Ibarra 2019b, Fig. 41.

The model generally provides an adequate fit to the limited time series of observed survey biomass estimates (**Figure 4-2-8**). Despite high variability, both the model and the empirical means indicate a decline in biomass in recent years.

The most recent assessment indicates that recruitment has been highly variable, fluctuating about the historical average for almost two decades (**Figure 4-2-9**). The broad confidence intervals in recent years indicate especially high uncertainty. Total, spawning, and exploitable biomass have all increased from their lowest level around 2000. The model indicates that both spawning and exploitable biomass increased from about 1999-2013 and then declined to 2018, changing little in 2019.





Figure 4-_iError! No hay texto con el estilo especificado en el documento.**-9.** Results of the south-central nylon shrimp assessment model showing (clockwise from upper left) trends in total biomass, spawning biomass, recruitment and exploitable biomass, 1945-2017. Shaded areas represent 95% confidence bands: Source: Ibarra 2019b, Fig. 51

The stock trajectory and fishery status from the most recent assessment (**Figure 4-2-10**, Canales 2019) differs considerably from those presented in the previous assessment (Ibarra 2018) and in the report of the second annual surveillance audit (Saá et al 2019). In both assessments the resource in 2018 was considered to be within the fully exploited zone. However, in the previous assessment SB was estimated to exceed SB_{msy} while F exceeded F_{msy} . By contrast, in the current assessment both SB and F were estimated to be below their MSY levels.

The current assessment indicates that the stock status has improved slightly in 2019, with F decreasing further to be well-below its reference level and SB increasing slightly. However, SB remains well below SB_{msy} with confidence intervals indicating some risk that the stock may be over-exploited (Figure 4-2-10).



Figure 4-2-10. Phase diagram of south-central nylon shrimp with stock trajectory based on fishing mortality and spawning biomass (relative to MSY levels) overlain. Dashed lines at values of 1.0 represent MSY levels with F/F_{MSY} representing the overfishing threshold. Fishery status or phases are defined relative to MSY levels: Red cross corresponds to the confidence intervals of the SB / SB_{MSY} and F / F_{MSY} ratio; Source: Canales 2019, Fig. 24



Yellow squat lobster (Northern Area)

Landings declined gradually from 2010-2014 but increased in 2015 due to quota increase (**Figure 4-2-11**). They have since declined (due to quota reductions) to 1676 t in 2018. They decreased further to 1,532 t in 2019, representing 98% of the quota of 1,567 t (Sernapesca 2019b). The quota remained unchanged, at 1,567 t for 2020 (Ministerio de Economía, Decreto N^o 311 de 2019)



Figure 4-_iError! No hay texto con el estilo especificado en el documento.**-11.** Annual landings (t) and catch quota (t) for the yellow shrimp fishery in Regions III-IV during 1993-2018: Source: Zilleruelo et al 2019, Fig 34.

The model provided a poor fit to the observed standardized catch per unit effort (CPUE) series (**Figure 4-2-12**). It did not adjust well to the recent trend in observed values; It suggests a declining trend in abundance from 2014 to 2019, while the data shows some stability in the last three years.



Figure 4-¡Error! No hay texto con el estilo especificado en el documento.**-12.** Fit of the model to the standardized CPUE data for yellow squat lobster in Region III-IV during 1985-2019. The points represent the observed data with its error and the blue line represents the model estimate. (partial): Source: Yáñez 2019, Fig.2.

The model also provided a poor fit to the observed survey biomass estimates, generally over-estimating biomass since 2012 (**Figure 4-2-13**). The empirical estimates are highly variable and show no clear change in the past 5 years. However, the observed estimates decreased in the past two years, consistent with the model trend which shows a continuing decline.





Figure 4-2-13. Fit of the model to the observed survey biomass estimates for yellow squat lobster in Region III-IV during 1985-2019. The points represent the observed data with its observation error and the blue line represents the model estimate. Source Yáñez 2019, Fig.3.

The trajectories of the modelled total and spawning biomass are similar between the assessments conducted in March 2019 and October 2019 (**Figure 4-2-14**). The model indicates that both total and spawning biomass have been in steady decline for an expended period. Total biomass peaked in 2011 and has since declined by 53%. Spawning biomass peaked in 2014 and has since declined by 43%.



Figure 4-2-14. Total (a) and spawning (b) biomass of yellow squat lobster in Region III-IV during 1985-2019. The red and blue lines correspond to the expected value of the model estimates (October 2019 and March 2019). Source: Yáñez 2019, Fig.2.

Recruitment was relatively stable and slightly above the historical average until 2002 (**Figure 4-2-15**). It was subsequently more variable, peaking in 2011 at a historical high before dropping to its historical low in 2013. There appears to have been a slight recovery in the past three years, but there is high uncertainty, as the recent increase in recruitment is slight relative to that estimated in the assessment of the previous year (Yáñez and Bucarey 2018).





Figure 4-2-15 Recruitment (above) and logarithmic anomalies of northern yellow squat lobster recruitment (below). The red and blue lines correspond to the model-based estimates (2017 and October 2018) and the dotted line represents the historical average. Source Yáñez 2019 Fig. 11.

Fishing mortality was highly variable during 1985-2005 with high values, generally exceeding natural mortality and Fmsy (**Fig. 4-2-16**). F declined greatly from 2005-2010 and has since changed little, remaining well below M and Fmsy.



Figure 4-2-16. Annual fishing mortality (F year-1) of northern yellow shrimp. The red and blue lines correspond to the model-based estimates from the assessments of March 2019 and October 2018. The green line represents the value of natural mortality and the dotted line the value of the biological reference point Fmsy.

The status of the fishery in 2019 is evaluated based on changes in fishing mortality and spawning biomass relative to a phase diagram (**Figure 4-2-17**). The stock trajectory indicates that the fishery had remained in the under-exploited phase for about 10 years until 2018. Despite a decline in F since 2016 (**Fig.4-2-16**), projected SB / SB_{MSY} declined such that such that the status of the fishery moved from the under-exploited phase in 2016 to the fully-exploited phase in 2018. For the year 2019, if the catch quota is fully subscribed, F_{2019} / F_{MSY} = 0.34, while SB₂₀₁₉ / SB_{MSY} = 1.22 without risk of either being below its proxy MSY based biological referce point.





Figure 4-_iError! No hay texto con el estilo especificado en el documento.-17. Phase diagram of northern yellow squat lobster with stock trajectory based on fishing mortality and spawning biomass (relative to MSY levels) overlain. Dashed lines at values of 1.0 represent MSY levels with F/Fmsy representing the overfishing threshold. Fishery status or phases are defined relative to MSY levels. Blue cross corresponds to the confidence intervals of the SB / SBMSY and F / FMSY ratio. Source Yáñez 2019 Fig. 13.

Yellow squat lobster (Southern Area)

Landings declined from 2010-2013 and changed little in 2014 (**Figure 4-2-18**). They increased in 2015 and have since changed little. Landings increased from 1,878 t in 2018 to 1,930 t in 2019, representing 95% of the total quota of 2,027 t (Sernapesca 2019b). The quota for 2020 remains the same 2,027 t (Ministerio de Economía, Decreto Nº 240 de 2019).



Figure 4-2-18. Annual landings (t) and catch quota (t) for the yellow squat lobster fishery in the southern region during 1997-2018: Source: Zilleruelo et al 2019, Fig. 40

The model provided a poor fit to the observed standardized catch per unit effort (CPUE) series (Figure 4-2-9). It did not adjust well to the recent trend in observed estimates, suggesting a declining trend in abundance since 2007, while the data show an increasing trend over the past 4 years. The model underestimates the empirical estimates in the past two years.





Figure 4-_iError! No hay texto con el estilo especificado en el documento.-**19.** Fit of the model to the standardized CPUE data for yellow squat lobster in the southern region during 1985-2019. The points represent the observed data with its error and the blue line represents the model estimate. (partial): Source: Yáñez 2019, Fig.2.

The model also provided a poor fit to the observed survey biomass estimates, that are associated with high variability, especially during 2004-2009 (**Figure 4-2-20**). The model did not adjust to the recent trend in observed estimates, suggesting a declining trend in biomass since 2007, while the data show an increasing trend since 2012.



Figure 4-2-20. Fit of the model to the observed survey biomass estimates for yellow squat lobster in the southern region during 1979-2019. The points represent the observed data with its observation error and the blue line represents the model estimate. Source Yáñez 2019, Fig.16.

The trajectories of the modelled total and spawning biomass are similar between the assessments conducted in March 2019 and October 2019 (**Figure 4-2-21**). The total biomass and spawning biomass estimated by the model have both been in decline since 2006. This continued decline in total biomass in recent years is not consistent with the recent increase in the empirical values (**Figure 2-4-20**) and reflects high variability and uncertainty in the observed area-swept estimates as well as poor fit of the model. The modelled spawning biomass has declined by about 36% since 2006 (see Yáñez 2019, Table 4). This decline is less severe that that estimated in the previous assessment (75%, Saa et al 2019, Yáñez and Bucarey 2018), due to the model attempting to adjust to a continuing increase in empirical estimates.





Figure 4-2-21. Total (a) and spawning (b) biomass of yellow squat lobster in the southern region during 1979-2019. The red and blue lines correspond to the modelled estimates from each assessment (October 2019 and March 2019). Source: Yáñez 2019, Fig. 23.

The assessment model results indicate that recruitment was highly variable and above the long-term average during the 2000's (**Figure 4-2-22**). It dropped by almost an order of magnitude from a peak in 2008 to its historical low in 2017 but appears to be recently recovering, approaching the long-term average.





Figure 4-2-22 Recruitment (above) and logarithmic anomalies of southern yellow squat recruitment (below). The red and blue lines correspond to the model-based estimates from each assessment (2017 and October 2018) and the dotted line represents the historical average. Source Yáñez 2019 Fig. 24.

Fishing mortality increased from 2003-2006 and has since been variable, remaining well below the F_{MSY} level in 2019 (**Fig. 4-2-23**).



Figure 4-2-23. Annual fishing mortality (F year-1) of southern yellow squat lobster. The red and blue lines correspond to the model-based estimates from the assessments of March 2019 and October 2018. The green line represents the value of natural mortality and the dotted line the value of the biological reference point Fmsy. Source Yáñez 2019 Fig. 24.

The status of the fishery in 2019 is evaluated based on changes in fishing mortality and spawning biomass relative to a phase diagram (**Figure 4-2-24**). A continued decrease in spawning biomass in 2019 resulted in the fishery moving from the under-exploited phase (SB/SB_{MSY} >1.5 SB_{MSY}) to the fully-exploited phase ($0.8 \ge SB/SB_{MSY} \ge 1.5$). SB remained above SB_{MSY} and F remained well below the F_{MSY} level in 2019.



Figure 4-2-24. Phase diagram of southern yellow squat lobster with stock trajectory based on fishing mortality and spawning biomass (relative to MSY levels) overlain. Dashed lines at values of 1.0 represent MSY levels with F/F_{MSY} representing the overfishing threshold. Fishery status or phases are defined relative to MSY levels. Blue cross corresponds to the confidence intervals of the SB / SB_{MSY} and F / F_{MSY} ratio. Source Yáñez 2019, Fig. 26.

Red squat lobster

The most recent full assessment of stock status for 2019 is based on an assessment conducted after the fishery (Ibarra 2020). This is because there were insufficient fishery data available for the northern area at



the time of the regular annual assessment in August, such that the August 2019 assessment (Ibarra 2019a) represented an assessment for 2019 for the southern area only, while the northern area was re-assessed for 2018. The most recent assessment (Ibarra 2020) is considered preliminary, based on information provided by IFOP, but it represents an initial full assessment for 2019 for the northern area and a re-assessment for 2019 of the southern area.

Red squat lobster (Northern Area)

Landings declined greatly from a 2012 peak and to about the historical low in 2014-2015, before increasing to 2017. (**Figure 4-2-25**). They decreased from 769 t in 2018 to 624 t in 2019, representing 74% of the quota of 797 t (Sernapesca 2019c). The quota has been reduced to 757 t for 2020 (Ministerio de Economía, Decreto N^o 311 de 2019).



Figure 4-2-25. Annual landings (t) and catch quota (t) for the red squat lobster fishery in the northern area during 1993-2018 (partial): Source[:]: Zilleruelo et al 2019, Fig 34.

Standardized CPUE was relatively stable at a low level during 1998-2007 (**Figure 4-2-16**). It increased sharply in 2008 and has since been highly variable. The model provides a reasonable fit to the data, and indicates a decline from 2016-2018. Both the model and the empirical estimates indicate that CPUE was virtually unchanged in 2019.



Figure 4-2-26. Fit of the model for red squat lobster in the northern region during 1998-2018 to the standardized CPUE estimates (top), observed survey biomass estimates (middle) and landings (bottom) The points represent the observed data with its observation error and the line represents the model estimate. Source lbarra 2020, Fig.24.

The model provides a poor fit to the observed biomass due to high annual variability in the area-swept estimates (**Figure 4-2-26**). This variability has been especially severe in recent years with observed biomass decreasing sharply in 2018 before increasing significantly in 2019.



The model provides a poor fit to the mean size data from the fishery as well as from the survey (**Figure 4-2-27**), underestimating size from the fishery and overestimating size from the survey in most recent years. Mean size in the fishery increased to near its historical high during 2016-2018 before dropping greatly in 2019 (**Figure 4-2-27**). By contrast, mean size in the survey declined sharply during 2016-2018 before increasing greatly in 2019 due to growth of small lobsters that recruited to the population in 2018. (Ibarra 2020).



Figure 4-_iError! No hay texto con el estilo especificado en el documento.**-27**. Mean sizes estimated by the model (solid line) and those observed (points) in the fishery (above) and in the survey (below) for northern red squat lobster during 1998-2018: Source: Ibarra 2020 Fig. 27.

The assessment model results (**Figure 4-2-28**) indicate that total biomass declined from 2010-2017 before increasing to 2019, while spawning biomass declined from 2015-2018 before increasing in 2019. These recent increases are related to trends in size previously noted (**Figure 4-2-27**) and reflect increased recruitment to the total population in 2018 and to the spawning biomass in 2019.

Recruitment (to the total population) has been highly variable throughout most of the time series. It increased from 2015 to peak in 2018, accounting for the increase in spawning biomass in 2019 (**Figure 4-2-28**). However, the 2018 peak was much lower than that projected from the previous assessment (Ibarra 2019a) and recruitment dropped by half in 2019 to below the historical average.



B U R E A U

Figure 4-_iError! No hay texto con el estilo especificado en el documento.**-28.** Results of the northern red squat lobster assessment model showing (clockwise from upper left) trends in total biomass, recruitment, fishing mortality and spawning biomass, 1985-2018. Shaded areas represent 95% confidence bands; Source: lbarra 2020 Fig. 29

Fishing mortality declined from 2012 to its historical low in 2015 (**Figure 4-2-28**), slightly below the Fmsy level (**Figure 4-2-29**). It has since increased steadily to about double the Fmsy level in 2018 before decreasing slightly in 2019 to remain well above the proxy Fmsy level.



Figure 4-_iError! No hay texto con el estilo especificado en el documento.**-29.** Trend in northern red squat lobster fishing mortality in relation to Fmsy (red line) during 1996-2018; Source: Ibarra 2020 Fig. 31.

Stock status in 2019 is inferred from preliminary information provided by IFOP (Ibarra 2020), based on the most recent scientific assessment that is currently under review. The population trajectory produced from the most recent assessment model results (**Figure 4-2-30**) indicate some improvement in stock status in 2019, based on an increase in SB and decrease in F. The model results indicate that SB increased from the over-exploited phase (SB<0.8SB_{MSY}) in 2018 to be marginally within the fully-exploited phase ($0.8 \ge SB/SB_{MSY} \ge 1.5$) in 2019 while F decreased slightly. This increase in SB is consistent with the results of the 2019 survey, which indicated that the swept-area estimate of exploitable biomass more than doubled in 2019 (Ahumada et al 2019). This increase was likely due to strong recruitment to the exploitable and spawning biomass resulting from growth of small lobsters that recently recruited to the total population (**Figure 4-2-28**).



Figure 4-¡Error! No hay texto con el estilo especificado en el documento.-30. Phase diagram of northern red squat lobster with stock trajectory to 2018 based on fishing mortality and spawning biomass (relative to MSY



levels) overlain. Dashed lines at values of 1.0 represent MSY levels with F/F_{MSY} representing the overfishing threshold. Red cross corresponds to the confidence intervals of the SB / SB_{MSY} and F / F_{MSY} ratio.: Source Ibarra 2020 Fig. 33.

There is concern however that the broad confidence intervals about the SB₂₀₁₉ estimate (**Figure 4-2-20**) indicate considerable risk that the resource may actually remain over-exploited in 2019, as was found to be the case in the re-assessment of this resource in 2018 (Ibarra 2019a). There is also concern that F_{2019} is estimated to be well above the F_{MSY} level and it is expected that, if the 2020 quota of 757 t is taken, then F would increase to about double the MSY level. While the current management plan (SUBPESCA 2016) does not specify application of an HCR if SB exceeds 40%SB0 (ie. 80%SB_{msy}), the audit team is concerned that this resource may be over-exploited and that the recommendation to reduce F to the F_{msy} level has not been followed. Accordingly, it is strongly advised that this recommendation be implemented immediately.

Red squat lobster (Southern Area)

Landings and quotas increased substantially from 2011-2014, declined to 2016 and changed little since. (**Figure 4-2-31**). Landings increased marginally from 4,614 t in 2018 to 4,635 t in 2019 representing 97% of the total quota of 4,798 t (Sernapesca 2019c). The quota was increased by 15% to 5,518 t for 2020 (Ministerio de Economía, Decreto N°241 de 2019).



Figure 4-2-31. Annual landings (t) and catch quota (t) for the red squat lobster fishery in Regions V-VIII during 1993-2018: Source: Zilleruelo et al 2019, Fig. 68.

The model provides a reasonable fit to the standardized CPUE data in recent years (**Figure 4-2-22**). Generally, the model and the empirical data indicate that CPUE declined from 2012-2016 and has since changed little.





Figure 4-2-32. Fit of the model for red squat lobster in the southern region during 1968-2019 to the standardized CPUE estimates (top), observed survey biomass estimates (middle) and landings (bottom) The points represent the observed data with its observation error and the line represents the model estimate. Source Ibarra 2020, Fig.34.

The model provides a poor fit to the observed biomass (**Figure 4-2-32**) generally underestimating observed survey biomass estimates since 2010. However, the model and the empirical estimates agree that survey biomass declined from about 2011-2014 and has since changed little. This generally agrees with the recent trend in CPUE.

The model provides a poor fit to the mean size data from the fishery as well as from the survey (**Figure 4-2-33**), underestimating size from the fishery and overestimating size from the survey in most recent years. The empirical data indicate mean size decreased somewhat from 2016-2018 in the fishery but lobsters remained large relative to the historical trend. Mean size in the survey showed a very similar trend to that in the northern area (**Figure 4-2-27**).; mean size declined severely during 2014-2018, from the historical high to near the historical low (**Figure 4-2-33**), before increasing greatly in 2019. This great increase reflected progression of the single modal group in the 2019 survey (Ibarra 2020).



Figure 4-2-33. Mean sizes estimated by the model (red line) and those observed (points) in the fishery (above) and in the survey (below) for northern red squat lobster during 1998-2018: Source Ibarra 2020 Fig. 37

The assessment model results (**Figure 4-2-34**) indicate that total biomass and spawning biomass declined during 2008-2016 and 2009-2016 respectively. Both have since increased, with total biomass increasing in 2017 and since changing little whereas spawning biomass continued to increase slightly to 2019 (Ibarra 2020).





Figure 4-2-34. Results of the southern red squat lobster assessment model showing (clockwise from upper left) trends in total biomass, recruitment, fishing mortality and spawning biomass, 1968-2017. Shaded areas represent 95% confidence bands; Source Ibarra 2020 Fig. 39

Recruitment has been variable throughout the time series (**Figure 4-2-34**). It declined by more than an order of magnitude from 2005-2013 before increasing to a peak in 2017. It then decreased sharply to remain well below the historical average during the past two years.

Fishing mortality increased steadily from 2010-2017 (**Figure 4-2-34**) before decreasing slightly to 2019, remaining below the Fmsy level (Ibarra 2020). The status of the fishery in 2019 is evaluated based on changes in fishing mortality and spawning biomass relative to a phase diagram (**Figure 2-4-35**). Fishery status has improved recently with SB increasing since 2016 to the SB_{MSY} level in 2019. F declined slightly since 2017 to remain below the F_{MSY} level in 2019.



Figure ¡Error! No hay texto con el estilo especificado en el documento.-**4-35**. Phase diagram of southern red squat lobster with stock trajectory based on fishing mortality and spawning biomass (relative to MSY levels) overlain. Dashed lines at values of 1.0 represent MSY levels with F/F_{MSY} representing the overfishing threshold. Fishery status or phases are defined relative to MSY levels. Red cross corresponds to the confidence intervals of the SB / SB_{MSY} and F / F_{MSY} ratio. Source Ibarra 2020 Fig. 43.

4.2.6.2 Uncertainties underlying the stock assessments

The main sources of uncertainty have been previously noted (Addison & Adlerstein-Gonzalez 2016, Saa et al 2019). Of particular concern is that the assessment model generally does not provide an adequate


unbiased fit to the observed estimates of CPUE or survey biomass. The poor fit to the survey estimates is of particular concern with the model underestimating recent biomass estimates for red squat lobster and failing to adjust to the recent change in biomass trajectory for yellow squat lobster. These problems are likely (at least in part) related to high variability within the annual survey estimates, as indicated by broad confidence intervals, as well as year-to-year fluctuations in estimates that may reflect annual changes in survey catchability. Poor fit may also be related to the modelling approach, which places the least emphasis (weighting) on the survey series. There is additional uncertainty relating to poor fit of the modal analysis model to the size frequency data.

4.2.7 Scientific based information related to P2

4.2.7.1 Primary species

Common Hake (Merluccius gayi gayi)

The evaluation was carried out through three cases that corresponded to three alternative series of catches: official catches maintained by the National Fisheries Service (Case 0), the reconstruction of the catches proposed in 2019 by the Fisheries Management Committee (Case 1) and the series of captures issued by the FIP project 2015-45 (Case 2).

In all three cases, a positive trend of spawning biomass was observed in the last four years, with estimated values for the year 2019 of 205 thousand, 197 thousand and 270 thousand tons in cases 0, 1 and 2, respectively. Similarly, the value of spawning biomass reduction in 2019 was estimated at 0.32, 0.29 and 0.32 in cases 0 to 2 respectively.

If the area of full exploitation is considered as that comprised between 0.75 and 1.25 of the biomass that produces the Maximum Sustainable Yield (BRMS) and the relatively low levels of fishing mortality observed in recent years, the stock of Common hake would be over-exploited, but close to the area of full exploitation (Case 1), or in a state of full exploitation (Cases 0 and 2).

Stock Status

The common hake fishery has historically been prosecuted throughout Regions IV-VIII (Addison and Adlerstein-Gonzalez 2016). Most of the landings are derived from the industrial large-vessel offshore fishery using trawls (**Figure 4-2-36**), especially in Region VIII. An artisanal small-boat coastal fishery is conducted mostly throughout Regions IV-VII using longline and gillnets. Total landings declined from 121,000 t in 2001 to 47,400 t in 2005 and further declined to about 13,000 t in 2014 before increasing to 2017, and changing little in 2018. Preliminary landings for 2018 totalled 22136 t, with 13,836 t derived from the industrial fishery and 8,300 t derived from the artisanal fishery (Gálvez et al 2019). The industrial fishery landings represented 94% of the quota of 14,760 t for that fishing sector.



Figure 4-2-36. Landings by fishery and in total of common hake 1940-2018. Overall quota also shown for years when it was applied: Source: Tascheri 2019 Fig. 4

Fishery performance deteriorated in the early 2000's, as best reflected by a decline in catch per unit effort (CPUE) of the large-vessel sector of the industrial trawler fleet (**Figure 4-2-37**). There has been no clear change in relative abundance since the mid 2000's based on fishery data. The increase in CPUE and decrease in fishing effort since 2013 in the large-vessel trawler fleet is not believed to be due to an increase



in biomass but rather due to changes in fishing practices (Tascheri 2018). In the past 5 years the small vessel fleet showed high variability whereas the large vessel fleet showed a decline that was sharpest in 2018.



Figure 4-2-37. Catch per unit Effort (CPUE, t/ha) and associated effort (ha) from the small (above) and large (below) vessels of the industrial trawler fleet, 1997-2018: Source: Tascheri 2019, Fig. 7.

Annual size structure of the fishery catch has been represented by unimodal size compositions in recent years (Tascheri 2019). Mean size decreased substantially from 2003-2005 and, while since remaining small, has been increasing gradually since 2013 to be above a 37 cm reference level in 2018 (**Figure 4-2-38**).



Figure 4-2-38. Mean annual size, with 95% confidence intervals, of common hake from catches of the industrial trawler fishery in the south-central zone, for sexes combined, 2003-2017. Horizontal line is at 37 cm total length: Source¹ Tascheri 2019, Fig.12.

Biomass is estimated from an acoustic survey that incorporates biological sampling using a bottom trawl (Addison and Adlerstein-Gonzalez, 2016). Biomass dropped sharply from a level of about 800,000 t during 1999-2002, with the 2002 value considered anomalous (**Figure 4-2-39**) to a level of about 220,000-260,000 t from 2004-2016. Biomass has recently increased from about 240,000 t in 2016 to about 357,000 t in 2019.





Figure 4-2-39. Series of biomass estimates from acoustic surveys by survey area, 1995-2019. Source: Tascheri 2019, Fig. 2.

The assessment process is based on an age-structured assessment model that includes survey and fishery data. The greatest source of uncertainty in the assessment is related to estimates of fishery removals. Accordingly, the assessment was conducted through three scenarios (cases) that differed with respect to the series of catch data included (Tascheri 2019): official catches maintained by the National Fisheries Service (Case 0), the reconstruction of the catches proposed in 2019 by the Fisheries Management Committee (Case 1) and the series of catches developed by the FIP project 2015-45 (Case 2). Case 0 represents the base scenario being based on the catvch series used in historical assessments. All there cases used a common catch series for the years 1940 to 1979. Cases 1 and 2 used catches that included estimated discards sice 2016. Further details on these scenarios are provided by Tascheri (2019).

Age composition data from both the trawl fishery and the survey show that the mean age has declined greatly during the early 2000's (**Figure 4-2-40**). Mean age continued to decline gradually to 2015 in the trawl fishery, whereas it remained constant, at about 3 years of age, in the survey data. There has been a gradual increase in mean age in both series in recent years.



Figure 4-2-40. Observed mean age (points), with 95% confidence intervals, and predicted ages (continuous line) of two sets of age composition data included in the stock assessment model (Case 0); C) Trawl fishery; D) Survey. Source: Tascheri 2019, Fig. 4.

Spawning biomass dropped by a factor of 5 between 2000-2005 (**Figure 4-2-41**) and has since remained low, although it has increased gradually in recent years, doubling since 2013. This recent increase was associated with low fishing mortality; F declined sharply from 2011-2013 and has since remained low and





unchanged (**Figure 4-2-41**). Recruitment decreased greatly between 1999 to its historical low in 2010. It has since remained low and variable with some slight increase.



Figure 4-2-41. Annual trends in (A) spawning biomass, (B) fishing mortality and (C) recruitment, from the base model (Case 0).Source: Tascheri 2019 Fig. 9.

Phase diagrams (**Figure 4-2-42**) show the stock trajectory based on fishing mortality and spawning biomass in relation to biological reference points and phases of exploitation, based on three scenarios that differ with respect to the series of fishery catch data used (Tascheri 2019). Generally, these trajectories suggest some recent slight improvement is stock status (**Figure 4-2-42**). Two of these scenarios indicate that the stock is in a state of full exploitation (Cases 0 and 2) whereas one scenario indicates that it would be over-exploited, but close to the area of full exploitation (Case 1). This most recent assessment indicates considerable improvement above that of the previous year previous assessment, based on four catch-specific scenarios (Tascheri 2018) that indicated that the resource was either over-exploited (3 cases) or collapsed (1 case).





Figure 4-2-42. Phase diagrams showing the hake stock trajectory between 1940 and 2019 in relation to Biological reference points (left column) and rate of reduction of spawning potential of the common hake stock (right column) based on the three stock assessment scenarios. Red points correspond to the state of the stock in 2019 and the green point at the beginning of the series. Source: Tascheri 2019, Fig. 13.

Common Hake bycatch in demersal crustacean fisheries

Common hake is considered a retained species because it has commercial value but until recently it has not been possible to distinguish retained from discarded hake bycatch in the demersal crustacean fisheries. Several studies have indicated that bycatch and discarding of hake has been underestimated in the official fishery data (Rios et al. 2017). The official landings statistics indicate a sharp decline in hake bycatch from 2011-2014, with bycatch since remaining very low (Figure 4-2-43). This steady decline in the reported values is a result of regulations that limited the percentage of common hake that could be landed in relation to the landing of the target species and a subsequent requirement for shipowners to have hake catch quota in order to land it (Zilleruelo 2018). Since 2013 hake bycatches are allowed only against hake guota. However, between 2013 and 2015, during the implementation of the research programme on discards bycatches were allowed for the vessels participating in the programme (although they were thoughtfully recorded and reported by observers on board). However, until 2017 for most of the fishing companies targeting demersal crustaceans it was very difficult to have access to hake quota, since the existing hake quota was owned and consumed by the fishing companies targeting hake. This situation changed in 2018 when a new regulation established that 5% of the total hake guota shall be available to be purchased by fishing companies targeting demersal crustaceans, so they can cover their hake bycatches. During the first tender held in December 2018 all AIP members purchased enough hake quota to account for all their bycatches. These allocations will last





for 15 years. Stakeholders feel that hake quota allocation to demersal crustacean fishing companies helps to improve the reporting of hake bycatches.



Figure 4-2-43. Annual series of landing of common hake (t) as bycatch in the demersal crustacean fishery, by fleet during 2000-2017 based on official data from Control-quota SERNAPESCA Source: Zilleruelo 2019

A recent comparison of 2018 hake bycatch reported in the official data from the demersal crustacean industrial fishery (12 t) with that estimated from at-sea sampling (431 t) indicated that hake bycatch (mostly from the nylon shrimp fishery) was greatly underestimated in the official statistics (Zilleruelo 2019). The estimated hake bycatch (**Figure 4-2-44**) has exceeded that from the official statistics (**Figure 4-2-43**) by at least an order of magnitude since 2013. Estimated hake bycatch has declined from about 750-357 t during 2013-2017 (**Figure 4-2-44**) representing a decline from 6%-2%, as percentage of total catch from the directed hake fishery (**Figure 4-2-36**). This bycatch increased slightly, but not significantly in 2018 (**Figure 4-2-44**).

The CPUE fishery performance index does indicate a significant increase in hake abundance as bycatch from the demersal crustacean fisheries in 2018. This is consistent with the improvement in hake stock status in 2018 (**Figure 4-2-44**).



Figure 4-2-44. Estimated total catch of common hake (above) and CPUE (below), caught as bycatch in the demersal crustacean fisheries. Industrial fleet IV-VIII Region, period 2007-2018. Source: Zilleruelo 2019 Fig 105 and 106.

Some indication of the relative contribution of common hake to the catches from the directed crustacean fisheries may be inferred from the official catch statistics (**Figure 2-45**), although this is highly uncertain,



given the low level of reporting. The reported catch of common hake was highest from the nylon shrimp fishery and lowest from the yellow squat lobster fishery. Since 2010 this reported bycatch has been about three times as high from the nylon shrimp fishery as from the yellow squat lobster fishery. Meanwhile, reported bycatch from the red squat lobster fishery has been about twice as high as that from the yellow squat lobster fishery.



Figure 4-2-45. Reported percent by weight of common hake from the squat lobster fisheries, 2005-2017, from official IFOP ststistics. **N+S**: Data from both areas combined (IFOP); **N**: Data from Northern area (IFOP); **S**: Data from Southern area; Source: San Martin et al 2016, Zilleruelo et al 2017, Zilleruelo et al 2018, Zilleruelo et al 2019.

4.2.7.2 Species composition of the catches, including bycatch/non-target species (fauna acompañante)

Every year a report is prepared by IFOP on the monitoring of the demersal crustacean fisheries. The focus of these reports is on providing biological indicators for the target species, together with fishery indicators (yield and fishing effort). However, the final version of these reports also include indicators of the impact of these fisheries on accompanying fauna (bycatches) and the incidental capture of birds, mammals and turtles. Unfortunately, the final version of these reports is not released at the time the surveillance audit is being performed (April), and only preliminary versions are available at that moment. Preliminary versions do not



include the information on bycatches and incidental catches, since at that time of the year the priority is to have the information on the target species ready for the stock assessments.

Results on bycatches from 2018 are presented in Zilleruelo et al 2019. A brief summary is presented below. Data is consistent with previous years in terms of the percentage accounted by the target species. However, there is quite a lot of interannual variability in the species composition of the bycatches, as in previous years. The team considers that data series accumulated during this first certification cycle will provide a consistent trend for reconsidering the P2 species composition for this fishery when facing the re-certification process. The implications to the P2 conditions are discussed in **section 5.2**.

This data are essential to get a clear picture of the species composition of each of the certified fisheries (red squat lobster, yellow squat lobster and nylon shrimp). So far the information collected is consistent with the P2-species composition identified during the initial assessment and it does not merit that all P2 species are re-assigned to the MSC P2-species components (primary/secondary) and subcomponents (main/minor). However, this exercise will be done for the forthcoming re-certification process, and the historical data series accumulated at that time will be essential to perform this classification.

Nylon Shrimp

A total of 213 specific samplings for bycatches were carried out in the nylon shrimp fishery. Of these, 27 were carried out in the Central North Zone (ZCN) with the presence of 46 species; and 186 in the Central Zone South (ZCS) with a record of 52 species (**Figure 4.2.46**). The most important species caught as bycatch in both fishing areas were: the grenadier aconcagua (Coelorinchus aconcagua), the common hake (Merluccius gayi gayi) and the big-eye sole (Hippoglossina macrops). The target species in the ZCN reached 82% of the total caught and 79% in the ZCS.



a. Zona centro norte

b. Zona centro sur

Figure 4.2.46. Proportion of species by weight in the total catch, in sets targeting nylon shrimp in the ZCN (left panel) and the ZCS (right panel), year 2018. * The category "other species" is composed of species that individually do not reach 1% of the total catch. Source: Zilleruelo et al 2019

The common hake (M. gayi gayi) and the grenadier Aconcagua (C.aconcagua) are the species accounting for most of the non-target catches (in weight). In the ZCN, the common hake accounted for 39.5% of all bycatches, ollowed by the grenadier Aconcagua with 15% (**figure 4.2.46**). A similar scenario was observed in the ZCS, although, in this case, the grenadier was the species with the highest proportion (32.3%) followed by the common hake (M. gayi gayi), which registered 20%.





Figure 4.2.47. Species composition of the bycatches (in weight), in sets nylon shrimp in the ZCN (left panel) and ZCS (right panel) in 2018. Langostino Amarillo * The category "other 6 species" is composed of the 6 species that individually do not reach 1% of the total catch. Source: Zilleruelo et al 2019

Yellow squat lobster

At the Northern Fishery Unit (UPN), 43 specific samples of bycatch were carried out, where the capture of 22 species was recorded. The target species represented 88% of the total captured, the species that followed in importance were: the red prawn (P. monodon) with 3.8% and the large-eye sole (H. macrops) with 2.8% (**Figure 4.2.48**). In the Southern Fishery Unit (UPS), 40 samplings were carried out and 22 different species were recorded. The target species accounted for up to 85,4% of the total weight, followed by the red squat lobster (*P.monodon*) which accounted for 4,5%, the nylon shrimp (H.reedi) with 2,8% and the common hake (M.gayi gayi) with 2,5%. Confidence intervals for these estimations are provided in the report.

It is important to note that a new regulation set in 2019 (amending D.S. Nº442/1981 and D.S.Nº09/1990) prohibits the retention on board of all benthic crustaceans (jaibas included), so these species are being discarded alive since 2019, but that was not the case in 2018. At that time (2018) these species could be retained on board, although part of their catches were discarded, as shown in section 4.2.7.3 on discards.



Figure 4.2.48. Proportion of species by weight in the total catch, in sets targeting yellow shrimp UPN (left panel) and UPS (right panel), year 2018. * The category "other species" is composed of species that individually do not reach 1% of the total catch. Source: Zilleruelo et al 2019

In the sets targeting yellow shrimp at UPN, the species accounting for more of the non-target catches were: red squat lobster (P. monodon), large-eye sole (H. macrops) and nylon shrimp (H. reedi) with 31%, 23% and 16%, respectively. On the other hand, at UPS, the red squat lobster (P. monodon) accounted for 30% of the bycatches, followed by common hake (M. gayi gayi) with 17% and large-eye sole (H. macrops) with 14% (**figure 4.2.49**).





Figure 4.2.49. Species composition of the bycatches (in weight), in sets targeting yellow shrimp UPN (left panel) and UPS (right panel) in 2018. Langostino Amarillo * The category "other 6 species" is composed of the 6 species that individually do not reach 1% of the total catch. Source: Zilleruelo et al 2019

Red squat lobster

12 specific samples of bycatches were carried out at the red squat lobster in the Northern Fishery Unit (UPN), in which the capture of 11 species was recorded; in this unit, the target species represented 79.1% of the total captured, followed in importance by the yellow prawn (C. johni) with 14.5%, the common hake (M. gayi gayi) with 2.8% and the big-eye sole (H. macrops) with 1.7% (**Figure 4.2.50**). In the Southern Fishery Unit (UPS), 121 samplings were carried out, and a total of 26 different species were recorded. The target species reached 77,7% and the species that recorded the highest percentages were: yellow squat lobster (*P.monodon*) with 10,0%, lenguado de ojo grande (Hippoglossina macrops) with 2,0%, jaiba paco (*Mursia gaudichaudi*) and jaiba limon (*Cancer porteri*) with 1,3%.

It is important to note that a new regulation set in 2019 (amending D.S. Nº442/1981 and D.S.Nº09/1990) prohibits the retention on board of all benthic crustaceans (jaibas included), so these species are being discarded alive since 2019, but that was not the case in 2018. At that time (2018) these species could be retained on board, although part of their catches were discarded, as shown in **section 4.2.7.3** (discards).



Figure 4.2.50. Species composition by weight in the total catch, in sets targeting red shrimp in UPN (left panel) and UPN (right panel), year 2018. Source: Zilleruelo et al 2019

Yellow squat lobster accounted for 42% of the bycatches in the UPN, followed by common hake (13%) and large-eye sole (7%). In UPS the species were similar: the common hake with, 42%, followed by the yellow prawn with 29% and the large-eye sole with a 9% (**Figure 4.2.51**).





Figure 4.2.51 Species composition of the bycacthes (in weight), in sets targeting red shrimp UPN (left panel) and UPS (right panel) in 2018. Langostino Amarillo * The category "other 18 species" is composed of the 18 species that individually do not reach 1% of the total catch. Source: Zilleruelo et al 2019

4.2.7.3 Discarded fraction

Discards caused by these fisheries on target species, other retained species (such as common hake) and also on non-commercial species have been an issue of concern. In order to respond to these concerns, IFOP implemented a research program on discards and incidental catches on demersal crustacean fisheries between 2013 and 2015. The ultimate goal of the program was to compile the technical background to allow the design of the Plan for the reduction of discards which was finally approved in 2017 (Resolution $N^{\circ}1106/2017$).

The Final Report was published in 2017 as San Martin et al (2016) and it was discussed in the first surveillance audit report (Saa et al 2018). This report provided exhaustive and comprehensive information in relation to discards of target, bycatch and discarded species between 2013 and 2015. Monitoring continued during 2016 and 2017, and the results are presented in Bernal et al (2017) and Escobar et al (2018) respectively. These reports provide also detailed analyses on the spatio-temporal trends of the discards, size of the discarded individuals from target species, causes of the discards, and even on the places on board where the discards are taking place. All this information helped in the implementation of the monitoring system based on cameras on board.

The reasons for discarding are also recorded and reported. These reasons vary depending on whether the discarded species is the target species, non-target commercial species or non-commercial species (see **Figure 4.2.52**). The reasons for discarding target species are: (i) quality criteria, (ii) size. The reasons for discarding non-target commercial species (common hake, nylon shrimp and squat lobsters) are: (i) quota; (ii) Transable Fishing Licence (LTP); (iii) quality criteria. While for non-commercial species discarding is not prohibited (but since the EMS are in place these discards shall be shown to the cameras before being thrown to the sea).



Figure 4.2.52 Reasons for discarding. Source: Escobar et al 2019b



Table 4.2.7.1 list all species subject to the discard ban. This list includes all target and bycatch species regulated through an annual catch limit (either CGA or LTP), plus some other species subject to catch zero regulations (e.g. raya Espinosa), obligation to be returned to the sea (benthic crustaceans, such as jaibas, in this case since 2019)

 Table 4.2.7.1. Species subject the discard ban which shall be returned to the sea, according to Article 7A from the LGPA. Source: Escobar et al 2019b

Nombre común	Categoría	Estado Administrativo	Condición Plan Reducción
Camarón nailon		LTP - %ART	
Langostino amarillo	Especie objetivo	LTP - %ART / PEP	Prohibición de descarte (1)
Langostino colorado		LTP - %ART / PEP	
Jaiba limón			
Jaiba mármola			Dovelución obligatoria (2)
Jaiba mora		Degimen Coneral de	Devolución obligatoria (2)
Jaiba paco	Fauna Acompañante sin CGA	Regimen General de	
Blanquillo		Acceso	
Cojinoba			Prohibición de descarte (3)
Congrio negro			
Alfonsino			
Besugo	Found Acompoñente con CCA	Vada Extractiva	Drahibición do docearto (4 v 2)
Orange roughy	Fauna Acompanante con CGA	Veda Extractiva	Prohibición de descarte (4 y 2)
Raya volantin			
Bacalao de profundidad		CGA	
Congrio dorado	Fauna Acompañanto con CCA	CGA	Prohibición do docearto (4)
Jibia	Fauna Acompaniante con CGA	CGA	Prohibición de descarte (4)
Merluza común		LTP - %ART	
Raya espinosa	Fauna Acompañante sin CGA	Veda Extractiva	Prohibición de descarte (3)

During the surveillance audit performed in 2019, Subpesca handed to the team the latest report on the discards monitoring (Escobar et al 2019a) and IFOP handed a PowerPoint presentation summarising the results obtained (Escobar et al 2019b). The observer coverage in 2018 was consistent with previous year (see **table 4.2.7.2**).

Table 4.2.7.2. Annual observer coverage (in fishing trips 'cobertura de viajes' and hauls 'cobertura de lances') for thenylon shrimp (Camarón nailon), red squat lobster (langostino Colorado) and yellow squat lobster (langostino amarillo).Source: Escobar et al 2019b

	2014	2015	2016	2017	2018
Cobertura de viajes	25%	19%	14%	24%	16%
Cobertura de lances	6%	18%	17%	18% 📏	23%
Langostino colorado					
Cobe	ertura de v	viajes y lan	ces flota in	dustrial	
Cobe	ertura de v 2014	viajes y lano 2015	ces flota in 2016	dustrial 2017	2018
Cobe Cobertura de viajes	ertura de v 2014 25%	viajes y lano 2015 25%	ces flota in 2016 19%	dustrial <u> 2017</u> 19%	2018 14%

COD	ertura de v	viajes y ian	ces flota in	dustrial		
	2014	2015	2016	2017	2018	
Cobertura de viajes	13%	23%	19%	17% 🦯	11%	
Cobertura de lances	25%	24%	23%	22% 🗸	20%	



Red squat lobster fishery

In 2018, discards when targeting red squat lobster reached 13% of the catches (see **Figure 4.2.53**), showing an increase for the first time since the discard monitoring program was implemented in 2014. The reasons for this increasing are not fully understood, but it was observed that this year, the contribution of the target species to the discarded fraction increased significantly compared to previous year (**Figure 4.2.54**), accounting up to 6,7% (while in 2017 was 2%).

Figure 4.2.54 shows that almost the entire discarded fraction (97,7%) in the red squat lobster fishery is comprised by 6 species (including the target species): common hake (51,1%), lenguado de ojo grande (15,4%), jaiba paco (13,9%), jaiba limon (9,7%), red squat lobster (6,7%) and yellow squat lobster (0,9%). Total volumes of the discards per species are also presented in **Figure 4.2.54**.

According to data presented in Escobar et al 2019b, most of the common hake (90,8%) was discarded due to administrative reasons (i.e. not having quota). In 2018, most of the demersal crustacean quota holders had serious problems to purchase hake quota to cover their bycatches. However, this situation changed in 2019 since 15% of the industrial quota for Chilean hake will be auctioned between 2018 and 2020 as a class B tradable fishing licence (in accordance with temporary Article 3 of Law 20.667), so it can be purchased by the demersal crustacean quota holders to cover their hake bycatches. The first 5% was auctioned at the end of 2018 for its use during 2019, while another 5% was auctioned by the end on 2019, and the remaining 5% is expected to be auctioned in late 2020. As presented in previous surveillace audit report (Saa et al 2018) and previous section (xxxx), many of the quota holders for lobsters and shrimps have purchased class B LTPs for the Chilean hake in 2018 and 2019. The purchased quotas are thought to cover their hake bycatches, so the incentive to discard common hake will be diminished.

All the lenguado de ojo grande and jaibas was discarded due to commercial reasons, while the main reason to discard the yellow squat lobster was quality criteria, followed by administrative and commercial reasons. In the case of the target species, the red squat lobsted was mainly discarded (87,5%) due to quality criteria, followed by operational reasons.



Figure 4.2.53 Retained (green line) and discarded (red line) catch by the industrial fleet targeting red squat lobster in 2018. Pie graphs above show the retained catch (green) versus the main species comprising the discarded fraction. Source: Escobar et al 2019b





It It It Merluza común 6,6 788,8 78 Lenguado de ojo grande - 237,6 22 Camarón nailon 20,9 0,1 2 Langostino amarillo 900,9 13,6 91 Jabba paco 214,1 22 Jaiba jaco 214,1 21 Jaiba jaco 150,3 15 Otras especies - 34,0 3 10099 1543 11	O Capt. Descarate 5,4 51,1 7,6 15,4 0,9 0,0 4,5 0,9 74,9 6,7 4,1 13,9 0,2 9,7	6,8 2,0 0,0 0,1 0,9 1.8
Waruz contai 0,0 766,3 77 Lenguado de jo grande - 237,6 23 Camarón nailon 20,9 0,1 2 Langostino colorado 9170,8 104,1 92 Jaiba paco 214,1 21 Jaiba jamón 150,3 15 Otras especies - 34,0 3 10099 1543 11	0,4 0,1 7,6 15,4 0,9 0,0 4,5 0,9 74,9 6,7 4,1 13,9 0,2 9,7	0,0 2,0 0,0 0,1 0,9 1.8
Languato de ojo grande - 257,0 22 Camarón nalion 20,9 0,1 2 Langosino amarillo 900,9 13,6 9' Langosino colorado 9170,8 104,1 62 Jaiba paco 214,1 21 21 Jaiba imón 150,3 15 Otras especies - 34,0 3	7,0 13,4 0,9 0,0 4,5 0,9 74,9 6,7 4,1 13,9 0,2 9,7	2,0 0,0 0,1 0,9
Construction Construction<	4,5 0,9 74,9 6,7 4,1 13,9	0,0 0,1 0,9
Langostino colorado 9170,8 104,1 92 Jaiba paco 214,1 21 Jaiba limón 150,3 16 Otras especies - 34,0 3 10099 1543 11	74,9 6,7 4,1 13,9	0,9
Laboration 214,1 21 Jaiba paco 214,1 21 Jaiba paco 150,3 15 Otras especies - 34,0 3 10099 1543 11	4,1 13,9	1.8
Jaiba limón 150,3 15 Otras especies - 34,0 3 10099 1543 11	0.2 0.7	
Otras especies - 34,0 3 10099 1543 11	0.0 01	13
10099 1543 11	4.0 2.2	0.3
	642 100.0	13

Figure 4.2.54. Analysis of the discarded fraction in the industrial fleet targeting red squat lobster in 2018. Source: Escobar et al 2019b

Yellow squat lobster fishery

In 2018, discards when targeting yellow squat lobster reached 8% of the catches (see **figure 4.2.55.**), showing an also a slight increase for the first time since the discard monitoring program was implemented in 2014. The reasons for this increasing are not fully understood, but it was observed that this year, the contribution of the target species to the discarded fraction increased compared to previous year (**figure 4.2.56**), accounting up to 8,6% (while in 2017 was 0,5%).

Figure 4.2.56 shows that almost the entire discarded fraction (95,5%) in the yellow squat lobster fishery is comprised by 6 species (including the target species): common hake (25,6%), lenguado de ojo grande (25,7%), jaiba paco (14,4%), jaiba limon (12,3%), nylon shrimp (8,9%), and the target species: yellow squat lobster (8,6%). Total volumes of the discards per species are also presented in **Figure 4.2.56**.

According to data presented in Escobar et al 2019b, almost all the common hake (98,7%) was discarded due to administrative reasons (i.e. not having quota). In 2018, most of the demersal crustacean quota holders had serious problems to purchase hake quota to cover their bycatches. However, this situation changed in 2019 since 15% of the industrial quota for Chilean hake will be auctioned between 2018 and 2020 as a class B tradable fishing licence (in accordance with temporary Article 3 of Law 20.667), so it can be purchased by the demersal crustacean quota holders to cover their hake bycatches. The first 5% was auctioned at the end of 2018 for its use during 2019, while another 5% was auctioned by the end on 2019, and the remaining 5% is expected to be auctioned in late 2020. As presented in previous surveillance audit report (Saa et al 2018) and previous section (xxxx), many of the quota holders for lobsters and shrimps have purchased class B LTPs for the Chilean hake in 2018 and 2019. The purchased quotas are thought to cover their hake bycatches, so the incentive to discard common hake will be diminished.

Other species discarded because of administrative reasons are besugo (100%) and nylon shrimp (66,7%, while quality -16,7%- and operational -16,7%- reasons accounted for the remaining percentage). All the other species were discarded because of administrative reasons.





Figure 4.2.55.Retained (green line) and discarded (red line) catch by the industrial fleet targeting red squat lobster in 2018. Pie graphs above show the retained catch (green) versus the main species comprising the discarded fraction. Source: Escobar et al 2019b



Captura descartada en la pesquería de langostino amarillo

Figure 4.2.56. Analysis of the discarded fraction in the industrial fleet targeting red squat lobster in 2018. Source: Escobar et al 2019b

Nylon shrimp

In 2018, discards when targeting nylon shrimp reached 8% of the catches (see **Figure 4.2.57**), showing an increase for the first time since the discard monitoring program was implemented in 2014. The reasons for this increasing are not fully understood, but it was observed that this year, the contribution of the target species to the discarded fraction increased compared to previous year (**Figure 4.2.58**), accounting up to 1,4% (while in 2017 was 0,6%).

Figure 4.2.57 shows that almost three quarters of the total discarded fraction (74,9%) in the nylon shrimp fishery is comprised by 5 species (including the target species): Aconcagua grenadier (32,8%), common hake (22,1%), lenguado de ojo grande (8,5%), jaiba paco (6,6%), jaiba limon (4,9%). Total volumes of the discards per species are also presented in **Figure 4.2.58**.



According to data presented in Escobar et al 2019b, almost all the common hake (70,8%) was discarded due to administrative reasons (i.e. not having quota), and due to operational reasons (25,5%). In 2018, most of the demersal crustacean quota holders had serious problems to purchase hake quota to cover their bycatches. However, this situation changed in 2019 since 15% of the industrial quota for Chilean hake will be auctioned between 2018 and 2020 as a class B tradable fishing licence (in accordance with temporary Article 3 of Law 20.667), so it can be purchased by the demersal crustacean quota holders to cover their hake bycatches. The first 5% was auctioned at the end of 2018 for its use during 2019, while another 5% was auctioned by the end on 2019, and the remaining 5% is expected to be auctioned in late 2020. As presented in previous surveillance audit report (Saa et al 2018) and previous section 4.2.3), many of the quota holders for lobsters and shrimps have purchased class B LTPs for the Chilean hake in 2018 and 2019. The purchased quotas are thought to cover their hake bycatches, so the incentive to discard common hake will be diminished.

Other species mainly discarded because of administrative reasons are besugo (81,0%), red squat lobster (57,1%, while operational -28,5%- and quality -14,3%- reasons accounted for the remaining percentage), yellow squat lobster (40%), and congrio negro (42,9%, although quality reasons explain the remaining 57,1%). All the other species were discarded because of administrative reasons.



Figure 4.2.57.Retained (green line) and discarded (red line) catch by the industrial fleet targeting nylon shrimp in 2018. Pie graphs above show the retained catch (green) versus the main species comprising the discarded fraction. Source: Escobar et al 2019b





Figure 4.2.58. Analysis of the discarded fraction in the industrial fleet targeting nylon shrimp in 2018. Source: Escobar et al 2019b

4.2.7.4 Incidental interactions with birds, turtles and marine mammals

During the site visit it was confirmed by Subpesca that the new regulation establishing conservation measures for the seabirds was issue in August 28, 2019 (Res.Ex.№2941/2019), and entered into force 3 months later. This regulation details the technical characteristics of the mitigation measures (tori-lines or bird buffers) and good practices to be implemented on board (cleaning the net before setting, and specific instructions for discarding and for fishing at night) for different fleets, including trawlers targeting demersal crustaceans. However, Subpesca recognized that the regulation will be amended for the demersal crustacean fleet since the operations have some particularities (i.e. light fishing gear compared to other trawling gears, the net is hauled by the side of the vessel...) that were not taken into consideration at the time of designing the mitigation measures and good practices detailed in the regulation. Subpesca confirmed that they are collaborating with the NGO Albatros Task Force (ATF) to carry on a study on the feasibility of current measures and develop proposals to adapt them to the specific characteristics of this fleet.

More effort on quantifying incidental catches with birds, turtles and marine mammals has been placed since 2016 (initially the focus was on the discarded fraction of the catch). The occurrence of interactions and fatalities are low and restricted to the South America sea lion (*Otaria flavescens*) and 7 species of seabirds (see **table 4.2.7.4** below). Two reports are providing information on this issue:

Reports on the monitoring of the demersal crustacean fisheries

Zilleruelo et al 2019 presents data recorded by observers on board vessels targeting yellow and red squat lobster along the Chilean coast in 2018. **Table 4.2.3** shows the number of sampling for incidental catches of birds, marine mammals and turtles for each of the demersal crustacean fishery (nylon shrimp, yellow squat lobster and red squat lobster).

Table 4.2.3. Number of sets observed for incidental capture of birds, mammals and turtles for each target species in the fishery. Sources: Zilleruelo et al 2019

Target species	N samplings for incidental catches
Nylon shrimp	490
Yellow squat lobster	273
Red squat lobster	446
TOTAL	1209

Incidental mortality recorded while targeting yellow squat lobster amounted to 1 specimen of black-brown albatross (*Thalassarche melanophrys*) and 1 specimen of De Filippi's petrel (*Pterodroma defilippiana*).

Incidental mortality while targeting red squat lobster were restricted to one albatross (unidentified species).



Incidental mortality recorded while targeting nylon shrimp was restricted to 1 individual of white shearwater (*Ardenna creatopus*).

No interactions with sea lions, cetaceans or turtles were recorded during the observed hauls.

This report does not provide any spatial-temporal analysis of the results (that level of detailed is provided in the report on the research plan on discards and incidental catches, see bullet below).

Reports on the research plan on discards and incidental catches

The research plan on discards include among its objectives the need to quantify and analyze occurrence of interactions with seabirds, turtles and marine mammals. Escobar et al 2018 already detailed that observers were trained in order to improve their capacity to observe and identify these species (see previous surveillance audit report for more details), new support materials were distributed, and the protocols for the observers were reviewed. Also, in order to improve the evaluation of the available information of the incidental captures of birds and marine mammals and to improve the understanding in the matter, two studies were developed through expert external consultancies (birds and marine mammals) mainly oriented to:

- Evaluate catches and interactions;
- Describe the characteristics of the life history and distribution of the species and the operation of the fleet;
- Evaluate the interactions;
- Review and evaluate mitigation measures and assess knowledge gaps.

See Escobar et al 2018 for more details on these studies, and Saa et al 2018 for a summary in relation to assessed fleet.

Escobar et al 2019b compiles all incidental catches between 2015 and 2018 (a total of 3701 observed hauls) and estimates that incidental catch rate of seabirds for the entire Chilean fleet targeting demersal crustaceans is 0,006 seabirds/haul (SD±0,11), while mortality rate is 0,005 seabirds/haul (SD±0,10). A total of 7 different bird species are impacted (see **table 4.2.7.4**). In the case of marine mammals there is only one species impacted: the South American sea lion (*Otaria flavescens*). The incidental catch rate for the Chilean fleet targeting demersal crustacean between 2015-2018 (2836 observed hauls) ranged between a minimum of 0,0008 ind/haul (in 2018) and maximum of 0,007 ind/haul (in 2017). About half of the interactions result in fatalities.

 Table 4.2.7.4. List of all seabird species impacted by the Chilean fleet targeting demersal crustaceans between 2015 and 2018. Source: Escobar et al 2019b

#	Scientific name	English common name	Chilean common name
1	Thalassarche melanophrys	Black-brown albatross	Albatros de ceja negra
2	Thalassarche salvini	Grey-backed albatross	Albatros de Salvin
3	Ardenna creatopus	White shearwater	Fardela blanca
4	Procellaria aequinoctialis	White-chinned petrel	Fardela negra grande
5	Pterodroma defilippiana	De Filippi's petrel	Fardela blanca de Mas a Tierra
6	Pelacanus thagus	Peruvian pelican	Pelicano peruano
7	Phalacrocorax bougainvillii	Guanay cormorant	Guanay

a. <u>Seabirds</u>

Escobar et al 2019a indicates a low interaction between the UoA and the seabirds during the period 2015-2018 (**table 4.2.7.5**). 38% of the incidental catches with seabirds (and 40% of the mortality) corresponded to the white shearwater (considered Vulnerable by the IUCN). **Table 4.2.7.6** shows that incidental catch rate of seabirds for the entire Chilean fleet targeting demersal crustaceans is 0,006 seabirds/haul (SD±0,11), while mortality rate is 0,005 seabirds/haul (SD±0,10). Incidental catches and mortality of white shearwater was estimated at 0,002 individuals/hauls.

Table 4.2.7.5. Total incidental catches (CIT, total number of seabirds caught) and total mortality of seabirds (MORT,total number of dead seabirds) in the demersal crustacean fishery (CRU) between years 2015-2018 Source: Escobaret al 2019a



			CRU	
Especie	CIT	%	MORT	%
Albatros de ceja negra	4	17	2	11
Petrel moteado	-	-	-	-
Albatros de cabeza gris	-	-	-	-
Fardela blanca	9	38	8	44
Fardela negra grande	1	4	-	0
Albatros de Salvin	2	8	2	11
Petrel gigante subantártico	-	-	-	-
Petrel gigante antártico	-	-	-	-
Albatros de Buller	-	-	-	-
Albatros errante	-	-	-	-
Fardela negra	-	-	-	-
Albatros de frente blanca	-	-	-	-
Albatros real	-	-	-	-
Albatros de las islas Chatham	-	-	-	-
Albatros oscuro de manto blanco	-	-	-	-
Pelícano peruano	3	13	3	17
Fardela de Nueva Zelanda	-	-	-	-
Fardela blanca de Mas a Tierra	1	4	1	6
Gaviota dominicana	-	-	-	-
Guanay	1	4	1	6
Total	21		17	

Table 4.2.7.6. Descriptive incidental catches and mortality by fishing haul in the demersal crustacean fishery between the years 2015-2018. The range (min and max), total number of individuals ('Suma'), average rate per haul ('Tasa promedio'), standard error (EE), variance (Varianza), standard deviation (DE) and coefficient of variation (Coef.var) are shown for total catch of individuals (CIT), total mortality (MORT), white shearwater incidental catches (PISHC) and white shearwater mortality (PISHM) by fishing haul. Additionally, the confidence interval (L-lower range value; U-upper range value) for each value is shown after 1000 re-samples (bootstrap)

	CIT	L	U	MORT	L	U
N lances	3701			3701	,	
Min	0			0		
Max	5			5		
Suma	24	9	35	18	4	28
Tasa promedio	0.006	0.002	0.009	0.005	0.001	800.0
EE	0.002	0.000	0.002	0.002	0.000	0.002
Varianza	0.012	0.000	0.020	0.010	0.000	0.018
DE	0.109	0.000	0.142	0.101	0.000	0.135
Skewness	30.009	24.183	48.207	35.834	28.992	57.814
Coef. var	1678.66	1182.57	2168.28	2081.31	1318.66	2770.35
	PISHC	L	U	PISHM	L	U
N lances	3701			3701		
Min	0			0		
Max	5			5		
Suma	9	4	17	8	4	15
Tasa promedio	0.002	0.001	0.005	0.002	0.001	0.004
EE	0.001	0.000	0.002	0.001	0.000	0.002
Varianza	0.008	0.000	0.015	0.008	0.000	0.015
DE	0.088	0.000	0.124	0.087	0.000	0.122
Skewness	50.247	39.658	79.046	52.553	44.269	82.168
Coef. var	3639.24	1194.90	5129.65	4023.21	1962.84	5748.91



This report also provides a comprehensive account on the models used to expand the observed interactions to the overall activity developed by the hake fisheries, but this exercises was not performed for the demersal crustacean fisheries.

b. Marine mammals

Common sea lions

As observed with seabirds, the general results shown in Escobar et al (2019a) suggest a low interaction between marine mammals and the demersal crustacean fisheries. Actually, incidental catches are restricted to the common sea lion (*Otaria flavescens*). Since crustaceans are not part of the common sea lion's diet, low interactions between this species and the UoA were expected. However, interactions occurs because because sea lions feed on fish caught in the nets. Sea lions generally do not get into the nets, but rather feed from the outside, so the probability of being captured is very low.

A total of 12 sea lions were caught in 2836 observed hauls between 2016 and 2018 (see **table 4.2.7.7**), resulting in 4 fatalities (33%). Annual incidental catch rates per haul and incidental mortality rates per haul are also presented in the table below.

Table 4.2.7.7. N observed hauls (lances observados (n^o)) and N observed alive (vivos) and dead (muertos) sea lions (N^o mamíferos marinos) caught as incidental catches in the demersal crustacean fishery, period 2016-2018. Observed catch rates are presented in parentheses. Source: Escobar et al 2019a

		Lances	N° mamífero	-	
Pesquería	Año	observados (n°)	vivos	muertos	Total
Cructécocc	2016	810	3(0,004)	2(0,002)	5(0,006)
Crustaceos demersales	2017	817	4(0,005)	2(0,002)	6(0,007)
	2018	1209	1(0,0008)	0(0)	1(0,0008)

Of the few records of interactions with sea lion (12 individuals), most were concentrated between the southern Valparaíso region and the southern Maule region ($33 \circ S - 36 \circ S$) (**Figure 4.2.59**). All interactions were observed during the second semester with a peak in November 2017.





Figure 4.2.59 Spatial coverage of sets and bycatches (N °) of sea lions registered in the demersal crustacean fishery, 2016 – 2018. On the left panel: observed hauls per year; On the right panel: observed interactions with sea lions per year. Source: Escobar et al 2019a

This report also presents estimations of incidental catches and mortalities of sea lions for all the demersal crustacean fishing operations (not just the observed hauls). Estimates of the number of sea lions incidentally caught by the crustacean fishery in the period evaluated showed differences between the approaches used (**Table 4.2.7.8**). The years 2016 and 2017 recorded the highest estimated catches and these would have ranged from 70 to 105 sea lions in 2016, and from 49 to 94 individuals in 2017. In the case of 2018, the



estimates did not exceed 10 individuals caught. Regarding mortality estimates (**table 4.2.7.9**), vary between 29 and 42 individuals in 2016, and between 16 and 31 individuals in 2017. No incidental mortality was recorded in 2018. It is important to mention that for all the estimations the CVs were high, especially for the mortalities, a situation that could be attributed to the sampling coverage and the low frequency of these events.

Table 4.2.7.8. Estimate of the number of mammals captured in the demersal crustacean fishery, based on Simple
Random Sampling (Muestreo Aleatorio Simple) and on Clusters Sampling (Muestreo por conglomerado). CV
(Coefficient of Variation) and IC (confidence intervals) with lognormal approximation for the ratio estimator, period
2016-2018. Source: Escobar et al 2019a

	Muestreo Aleatorio Simple				Mues	treo por o	conglon	nerado
	Estimador de razón					Estimador	de media:	S
Año	Ν	CV(N)	Linf	Lsup	Ν	CV(N)	Linf	Lsup
2016	105	43	47	236	70	51	1	139
2017	94	39	44	197	49	44	7	92
2018	10	94	2	45	7	93	0	21

Table 4.2.7.9. Estimation of the number of dead mammals in the demersal crustacean fishery, based on Simple
Random Sampling (Muestreo Aleatorio Simple) and on Cluster Sampling (Muestreo por conglomerado). CV
(Coefficient of Variation) and IC (confidence intervals) with lognormal approximation for the ratio estimator, period
2016-2018. Source: Escobar et al 2019a

	Muestreo Aleatorio Simple				Muestreo por conglomerado				
	Estimador de razón					Estimador	de media:	S	
Año	N	CV(N)	Linf	Lsup	N	CV(N)	Linf	Lsup	
2016	42	68	13	141	29	69	0	67	
2017	31	68	9	105	16	67	0	36	
2018	0	-	-	-	0	-	-	-	

The spatial evaluation of the operation of the fleet operating on the demersal crustacean fishery, nylon shrimp, red prawn and yellow shrimp resources, indicated a wide distribution of the operation, between the north of the Coquimbo Region and the south of the Bio bio region. This distribution was closely overlapped with the areas of the main sea lions located on the coast, an overlap that generally covered over 90% of the distribution range of the CML population (Figure 60). Despite the close spatial relationship of the operation and the distribution of the CML population, bycatch can be considered low. This could be attributed to the characteristics of the fishing operation and fishing gear, allowing for its smaller size a greater ease of escape. Similarly, the least interaction could be related to the conformation of the catch, dominated by crustaceans, which do not generate as much interest in CML





Figure 4.2.60 Distribution of the operation of the fleets targeting demersal crustaceans (nylon shrimp on the left –green patches-; red squat lobster in the middle –black patches-; yellow squat lobster on the right –yellow patches-) in relation to the level of overlap with the spatial distribution of the sea lion populations, period 2016 - 2018. Source: Escobar et al 2019a

4.2.7.5 Interactions with habitats

<u>Updates on the regulation on fishing operations on VMEs and the historical footprint of the trawl</u> <u>fisheries</u>

During the previous site visit the team knew about two technical reports which were considered relevant to the conditions issued to this fishery in relation to impacts on habitats (see Saa et al 2018 for more details). They are summarised below, and updates collected during current surveillance audit are presented:

- INFORME TECNICO RPESQ Nº154-2016. This document issued in July 2016 makes a proposal for a regulation on fishing operations on VMEs, following Article 6B of the LGPA. The proposed regulation defines all the Vulnerable-habitat-forming species in Chilean waters (consist of a list of cold water corals and sponges). This regulation proposed a detailed protocol of measures to be adopted by these fisheries (prior notification of intend, 100% observer coverage, 5NM move-on-rule triggered by specific tresholds...). However, prior to this regulation the Ministry shall establish a list of marine resources which their fisheries are susceptible to impact on VMEs and this has never happened. During current site visit it was confirmed that Subpesca has made no progress on this matter. Zilleruelo et al 2019 includes a complete list of species present in the catch composition of the demersal crustacean fisheries, the only VME-forming species included in that list are the sponges (*Spongia sp.*) the Stone Corals (Escleractinas), but no quantitative indication is provided.
- INFORME TECNICO RPESQ Nº09-2018. This report first establishes the historical footprint of the trawl fisheries targeting both common hake and demersal crustaceans. In order to do so, the geographical information from all hauls targeting common hake between 2000-2015 (16 years), and targeting demersal crustaceans between 2001-20015 (15 years) were considered in the analysis (see Saa et al 2010 for more details). The footprint of the trawl fisheries was calculated outside of the area reserved for artisanal fisheries. The study recommended to restrict the trawling activities to the areas included in its historical footprint. During current site visit, Subpesca confirmed that the historical footprint was updated with recent data (up to 2018), but the addition of these new records did not result in a modification of the historical footprint. This report is still not publicly available, so it could not be used by the team during this surveillance report.



Agreement between Chile and Global Fishing Watch to publish vessel tracking data

The Chilean government signed on May 15, 2019, an agreement to make its vessel tracking data publicly available through the Global Fishing Watch (GFW) map, which tracks the movements of commercial fishing* vessels in near real-time (<u>https://globalfishingwatch.org/press-release/chile-to-publish-vessel-tracking-data-through-gfw/</u>).

The agreement, which was made between Chile's National Fisheries and Aquaculture Service (or SERNAPESCA) and GFW, demonstrates Chile's commitment to increase transparency of commercial fishing in Chilean waters. It follows the Chilean Senate's approval of Law 21.132 earlier in 2019 (see **section 4.2.3** and Saa et al 2018) that modernizes SERNAPESCA, and requires that national fishing vessel tracking information, known as Vessel Monitoring System (VMS), be publicly available.

GFW provides an unprecedented view of global fishing activity by using machine learning to interpret data from various vessel tracking sources, including automatic identification system (AIS) and VMS data. While AIS is required for the largest vessels that catch a disproportionately large amount of fish, adding VMS data, which is required by some governments, to the GFW map provides an even clearer picture of fishing vessel activity on our global ocean.

By publishing its VMS data to the GFW platform, Chile's fishing fleet, comprising more than 700 fishing vessels and more than 900 vessels that provide support for aquaculture, will be viewable by anyone accessing the public map, including governments, fishery managers, seafood buyers, researchers and non-profit organizations.

Public sharing of VMS data, including lists of authorized vessels, helps improve surveillance and encourages vessels to comply with regulations. Unauthorized vessels, and those with a history of non-compliance, can be identified more easily and prioritized for inspections, while vessels that turn off tracking devices can be held accountable when they come into port.

"Chile continues to demonstrate its position as a global leader in ocean protection and responsible fisheries management," said Tony Long, CEO, Global Fishing Watch. "With the latest commitment Chile remains at the forefront of progressive marine stewardship. They join a growing number of countries recognizing transparency is a cost effective and efficient way to enhance vessel monitoring."

In 2017, Indonesia became the first nation to make its proprietary VMS data available via GFW's platform – instantly putting 5,000 smaller commercial fishing vessels that do not use AIS on the map. Peru followed in October 2018 in sharing its VMS data, and Costa Rica, Panama and Namibia have made public commitments to join the GFW platform.

As of today, that data is published through the Global Fishing Watch (GFW) map (<u>https://globalfishingwatch.org/our-map/</u>), which tracks the movements of commercial fishing vessels in near real-time.

The Chilean government's fisheries and aquaculture regulator, SERNAPESCA, is also using the Global Fishing Watch viewer to visualize and track vessel positions for their fleet, including more than 900 vessels involved in aquaculture. <u>http://www.sernapesca.cl/informacion-utilidad/monitoreo-satelital-de-naves-y-embarcaciones-pesqueras</u>.

Report prepared by the UCN for AIP

In 2019, the UCN started providing technical assistance to AIP and a preliminary report was elaborated just before the site visit and handed to the team (Acuña et al 2020).

The objectives of the agreement signed between AIP an dthe UCN include:

a) Characterize the operation of the fleet associated to AIP, both industrial and artisanal, their catches, efforts and relative abundance (CPUE) for the target resources and their accompanying fauna.

b) Determine the spatial-temporal distribution of fishing activities in the Fishery Units where the fleet associated with the AIP operates, integrating the analysis of the VMS data from the vessels included in the UoCs.

c) Determine the size structure and reproductive condition of the target resources.

d) Qualitatively and quantitatively characterize the non-target species/bycatches of the certified fleet



e) Establish the interactions between the fisheries and some of the most relevant bycatch species.

f) Record the potential interactions of the fisheries with incidental species such as turtles, birds and marine mammals (Art. 2 - 21 bis LGPA).

In order to do so the team from the UCN analysed all VMS data from the certified fleet (they requested this data to Sernapesca, although now they are publicly available, but not at the time they started the study) and they also got on board in 3 occasions by the end of 2019. However, the preliminary report does not include any data on the species composition of the catches. The report is focused on objective (b), and hardly any other information is provided, apart from sizes frequencies obtained for nylon shrimp during the on-board samplings.

Acuña et al (2020) filtered the VMS data provided by Sernapesca based on the speed of the vessel: between 0 and 1,4kn the vessel was classified as 'stopped', between 1,5 and 3kn the vessel was classified as 'trawling', and \geq 3kn was classified as 'sailing'. The resulting maps are shown in **figure 4.2.61** below.



Figure 4.2.61. Total VMS data analysed (left panel), sailing records (panel in the middle) and trawling records (right panel) of the AIP fleet. Source: Acuña et al 2020.

Figure 4.2.62 tries to provide a spatial-temporal picture of the fishing effort exerted by the UoA. However, the results are confusing since there are many records at the UPS in January and February, despite the squat lobsters are closed during those months (only a few vessels are fishing at that time in the North, targeting nylon shrimp). On the contrary, the closure for all demersal crustaceans in September can be clearly identify in **Figure 4.2.62**.

Figure 4.2.63 shows the overlapping between the AIP fishing fleet and the historical footprint for trawl fisheries a defined in the INFORME TECNICO RPESQ Nº09-2018 (see **section 4.2.7.5.1** for more details). All positions classified as 'trawling' fall inside the historical footprint. However, this figure is focused on Region IV and the report does not provide any information on the overall results for the entire fishing area where the certified fleet is operating.

Acuña et al (2020) recognize that further work is necessary in order to improve this preliminary data. VMS data will be cross-checked with data from the electronic logbooks on order improve the analysis.





Figure 4.2.62. Monthly trawl records of the AIP fleet during 2019. Starts in January at the top left-hand corner and finishes in December at the lower right-hand corner. December on the Source: Acuña et al 2020.



Figure 4.2.63. In bright green are shown the trawl records of the AIP fleet during 2019 in Region IV (southern part on the left panel and Northern part in the right panel). In light brown the historical footprint of the Chilean trawl fisheries since 2001. Source: Acuña et al 2020.



4.3 Version details

Details on the version of the fisheries program documents used for this assessment are presented in table 2.4, as required in the 'MSC Surveillance Reporting Template v2.01'.

Version number, date of publication (and date effective)
Version 2.1, 31 August 2018 (28 February 2019)
Version 2.0, 1 October 2014 (1 April 2015)
Version 2.4.1, 7 May 2019 (28 September 2019)
Version 2.01, 28 March 2019 (28 March 2019)

 Table 4.3.1
 Fisheries program documents versions

5. Results

5.1 Surveillance results overview

5.1.1 Summary of conditions

Table 5.1.1. lists the conditions raised in the PCR of the fishery, and also presents their status after current surveillance audit.

Table 5.1.1 Summary of Assessment Conditions, detailing status after current surveillance audit

Condition #	Performance indicator (PI)	Status	PI original score & Re-scores	PI revised score in 3SA
1	1.1.1 (UoA 8)	CLOSED in 2 SA	Revised to 100 (UoC 1&2) 90 (UoC 3-8)	Not revised
2	1.2.3 (All UoAs)	ON TARGET	75 (UoC1&2) 65 (Other UoCs)	75 (All UoAs)
3	2.1.3 (UoAs 1, 3, 6)	AHEAD TARGET/CLOSED in 3SA	70	95 (All UoAs)
4	2.1.3 (UoAs 5, 8)	AHEAD TARGET/CLOSED in 3SA	75	95 (All UoAs)
5	2.1.3 (UoA 2)	AHEAD TARGET/CLOSED in 3SA	65	95 (All UoAs)
6	2.1.3 (UoAs 4, 7)	AHEAD TARGET/CLOSED in 3SA	65	95 (All UoAs)
7	2.2.3 (UoAs 1, 2)	AHEAD TARGET/CLOSED in 3SA	75	85 (All UoAs)
8	2.3.3 (All UoAs)	AHEAD TARGET/CLOSED in 3SA	75	80 (All UoAs)
9	2.4.3 (All UoAs)	BEHIND TARGET	75	Not revised
10	3.2.1 (All UoAs)	CLOSED in 1SA	70 (revised to 100)	Not revised
11	3.2.2 (All UoAs)	CLOSED in 2 SA	75 (revised to 85)	Not revised
12	3.2.3 (All UoAs)	ON TARGET	65	Not revised
13	3.2.4	CLOSED in 1SA	90 (UoAs 1,3, 5,6,8)	Not revised



Condition #	Performance indicator (PI)	Status	PI original score & Re-scores	PI revised score in 3SA	
	(UoAs 2, 4 & 7)		70 (UoAs2,4,&7) (revised to 80)		
14	1.2.4 (All UoAs)	BEHIND TARGET	65 Re-scored in 2SA	Not revised	

5.1.2 Total Allowable Catch (TAC) and catch data

There is a closed season for red and yellow squat lobster between from January 1st to March 31st, during the moulting and mating period. Therefore, the certified fishery is open 9 months per year.

The fishery got the MSC certificate on the 13th of September 2016, just before finish the 2016 fishing season. Thus, the certification only covered the last 3½ months of the 2016 fishing season. TACs issued between 2016 and 2018 for target stocks and fleets are shown in **table 5.1.2**., together with UoA and UoC quotas and catches.

In the case of UoA 1 and 2 shrimp nylon, UoA 3 and 4 of yellow shrimp and UoC 6 and 7 of red shrimp it was decided to present TAC, quotas and catches corresponding to the industrial and artisanal fleets together (corresponding to a single row), since artisanal fishers may transfer all or part of their quota to a tradable fishing license holder providing that it is the same stock (according to Article 55 of the LGPA). Similar situation establishes Article 55 T of the LGPA, which authorizes a holder of a transferable fishing license within the calendar year to assign all or part of its quota to one or more small-scale owners, provided it is the same stock. Actually, this is a common transaction for the 3 stocks targeted by artisanal fleet. **Table 5.1.2** shows that MSC certificated catches of nylon shrimp represented 65% of the target TAC in 2019, and between 46% and 78% of the North stocks of yellow and red squat lobsters. While in the case of the South stocks of red and yellow squat lobsters the percentage is lower (19%).

Target stock + UoAs	Year	Target TAC (t)	UoA landings(*) (t, green weight)	UoC Quotas(**) (t)	UoC Iandings(***) (t, green weight)	UoC landings Vs target TAC (%)
Nvlon	2016	5,794 ⁽ⁱ⁾	4,199	4,198	-	-
shrimp	2017	5,653 ⁽ⁱⁱ⁾	3,992	4,725	3,848	68.07%
UoA1(ind) + UoA2	2018	5.872 ^(xi)	4,887	4,633	4,103	69.87%
(art)	2019	5,873 ^(XVI)	4,389	4,533	3,819	65,03%
Yellow	2016	2,450 ⁽ⁱⁱⁱ⁾	2,213		-	-
SI North	2017	2,125 ^(iv)	1,985	1,693	1,670	78.59%
UA3 (ind)	2018	1.806 ^(xii)	1,674	1,347	1,320	73.09%
(art)	2019	1,536 ^(XVII)	1.451	1,492	1,199	78.06%
Yellow	2016	1,830 ^(v)	1,785		-	-
sl	2017	1,900 ^(vi)	1,877	989	622	32.74%
South UoA5	2018	1,890 ^(xiii)	1,869	622	607	32.12%
(ind)	2019	1,960 ^(XVIII)	1,894	989	894	45.61%
Red sl	2016	1,029 ^(vii)	887		-	-
UoA6	2017	1,081 ^(viii)	953	773	741	68.55%
(ind) + UoA7 (art)	2018	919 ^(xiv)	763	522	505	54.95%

Table 5.1.2	TACs, UoAs and UoCs quotas and UoC catches in 2016-2019. Source: Elaborated by the
	BV team based on data provided by Sernapesca



	2019	781 ^(XIX)	610	701	453	58.00%
	2016	4,618 ^(ix)	4,428		-	-
Red SI South	2017	4,673 ^(x)	4,589	1,099	1,078	23.07%
UoA8 (ind)	2018	4,662 ^(xv)	4,535	1,262	1,217	26.10%
(ind)	2019	4,662 ^(XX)	4,571	1,242	923	19,80%

(*) Total landings performed by the Chilean demersal trawl fleets targeting those stocks.

(**) Quotas allocated to the 7 fishing companies included in the MSC-fishery certificate

(*) Tonnes landed by the 7 companies included in the MSC-fishery certificate. Data from 2016 should correspond to landings since certification data but this information was not available at the time of the audit, while data for 2017 and 2018 correspond to the entire fishing season. (i) Global total quota 2016: 5,904t. Target quota 2016: 5,794t. excluding quota for research and by-catch and research, Target quota for the industrial fleet in Regions II-VIII was 4,405t, while target quota for the artisanal fleet in Region IV was 730t; (ii) Global total quota 2017 for Nylon shrimp: 5,768t. Target quota 2017: 5,653t. excluding quota for research and by-catch and research. Target quota for industrial fleet in Regions II- VIII was 4,292t, while target quota for artisanal fleet in Regin IV was 730t; (iii) Global total quota 2016: 2,500 t. Target quota 2016: 2,450 t. excluding quota for research and by-catch and research, Target quota for industrial fleet in Regions III-IV was 1,482t, while target quota for artisanal fleet in Region IV was 850t. (iv) Global total quota 2017 for Yellow squat lobster North: 2,168 t. Target quota 2017: 2,125 t. excluding quota for research and by-catch and research, Target quota for industrial fleet in Regions III-IV was 1,264t, while target quota for artisanal fleet in Region IV was 861t; (v) Global total quota 2016: 1,880 t. Target quota 2016: 1,830 t excluding quota for research and by-catch and research; (vi) Global total quota 2017 for Yellow squat lobster South: 1,954 t. Target quota 2017: 1,900 t excluding quota for research and by-catch and research; (vii) Global total quota 2016: 1,050 t. Target quota 2016: 1,029 t. excluding quota for research and by-catch. Target quota for industrial fleet in Regions II-IV was 169t, while target quota for industrial fleet in Region IV was 780t; (viii) Global total quota 2017 for red squat lobster North: 1,103 t. Target quota 2017: 1,081 t. excluding quota for research and by-catch. Target quota for industrial fleet in Regions II-IV was 221t, while target quota for artisanal fleet in Region IV was 860t; (ix) Global total quota 2016:4,750 t. Target quota 2016: 4,618 t., excluding quota for research and by-catch. Se encuentra asignado el 97,5% de la cuota objetivo; (x) Global total quota 2017 for red squat lobster South:4,798 t. Target quota: 4,673 t., excluding quota for research and by-catc; (xi) Global total quota 2018 for Nylon shrimp:5,992 t. Target quota: 5,872 t., excluding quota for research and by-catch; Target quota for the industrial fleet in Region II-VIII was 4,468t, while target quota for the artisanal fleet in Region IV was 775t; (xii) Global total guota 2018 for Yellow squat lobster North: 1.843 t. Target guota 2018: 1.806 t. excluding guota for research and by-catch and research, Target quota for the industrial fleet in Regions III-IV was 1,050t, while target quota for the artisanal fleet in Regio IV was 710t; (xiii) Global total quota 2018 for Yellow squat lobster South: 1,954 t. Target quota 2018: 1,890 t excluding quota for research and by-catch and research; (xiv) Global total quota 2018 for red squat lobster North: 938 t. Target quota 2018: 919 t. excluding quota for research and by-catch. Target quota for the industrial fleet in Regions III-IV was 59t, while target quota for the artisanal fleet in Regio IV was 810t; (xv) Global total quota 2018 for red squat lobster South:4,798 t. Target quota: 4,662 t., excluding quota for research and by-catch. (XVI) Cuota total para 2019 para camarón 5,992 t., cuota objetivo 5,873 excluyendo cuota de investigación y cuota secundaria. (XVII) cuota total para2019 de langostino amarillo norte 1.567 t, cuota objetivo1.536 t. excluyendo cuota de investigación y cuota secundaria. (XVIII) cuota total para 2019 de langostino amarillo, sur 2,027 t., cuota objetivo 1,960 t. excluyendo cuota de investigación. (XIX) Cuota total para 2019 de Langostino colorado norte 797 t., cuota objetivo 781 t. excluyendo cuota de investigación y cuota secundaria. (XX) cuota total para 2019 de Langostino colorado sur, 4,798 t., cuota objetivo 4,662 t. excluyendo cuota de investigación y cuota secundaria.

5.1.3 Recommendations

Table 5.1.3 Recommendation 1 (UoA1). Withdraw at 2SA.

Table 5.1.4 Recommendation 2 (All UoAs)

Performance	Insert relevant PI number(s) Insert relevant scoring issue/ scoring guidepost text		Score		
Indicator(s) & Score(s)	1.2.4	N/A	90		
Recommendation	A new modified trawl has become mandatory since November 2014, and this trawl has different selectivity properties to the previously used trawl. To date the change in catchability of the gear has not been incorporated in the stock assessment. The assessment team understands that there are a number of ongoing studies in relation to the catchability of the new gear, and recommends that any change in catchability is taken into account in future stock assessments.				
Milestones	N/A				
Client action plan	N/A				
Progress on Recommendation year at 1SA	There has been considerable progress on this recommendation. recent study has shown that the new modified trawl has different mes selectivity properties for nylon shrimp in comparison with the tradition				



	trawl and this selectivity has been accounted for in developing a conversion factor between trawls for the assessment of nylon shrimp. There is no significant difference is mesh-selectivity properties between the gear types for the squat lobster species. However, there are also differences in configuration between the two trawls that may affect degree of contact with the substrate and associated catchability, especially of squat lobsters. This issue has not yet affected the consistency of the survey series because the traditional trawl has been maintained as the standard survey trawl to date. However, this will likely soon change because of practical problems with maintaining old traditional trawls no longer used in the fishery. It is recommended that accurate conversion factors be developed before the new modified trawl is adopted as the standard survey trawl. This can be most reliably accomplished through comparative sampling experiments (ie. side-by-side trawling).
Progress on Recommendation at 2SA	There has been no further progress on this recommendation.
Progress on	There has been considerable progress on this recommendation. The problem of changes in trawl catchability in the fishery has been addressed in that different values of capture efficiency have been assigned to two time periods and these values for 'catchability blocks' have been incorporated into the assessment model.
Recommendation at 3SA	As for the survey, the survey trawl has not been changed, and it appears that the plan is to maintain the current survey trawl for the foreseeable future or until such time as when conversion factors are developed. However while there remains concern about possible year-to-year changes in trawl catchability in the survey, these concerns have been noted elsewhere and are not directly related to this recommendation. Therefore this recommendation is now withdrawn.

Table 5.1.5 Recommendation 3 (UoA 6-8)

Performance	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score			
Indicator(s) & Score(s)	1.1.1 N/A		90			
Recommendation	The team notes that the red squat lobster fishery is close to being overexploited with the possibility that it may actually be over-exploited, given the uncertainty about the predicted SB value for 2018 and about the assessment model in general, Fishing mortality is presently above the proxy Fmsy level. It is recommended that F be reduced and maintained below the Fmsy level to increase SB to above the proxy SBmsy level.					
Milestones	NA					
Client action plan	NA					
Progress on Recommendation	There has been considerable progress on this recommendation for the southern area but no progress for the northern area.					
year in o 'OA'	For the southern area (UoA 8);					



The current assessment indicates that the resource in the southern area is now not overexploited with SB exceeding SBmsy and F below Fmsy in 2019. Accordingly, this recommendation no longer applies for the southern area For the northern area (UoA 6-7); The reassessment of the resource in the northern area for 2018 (Ibarra 2019a) indicated that, although the resource was initially assessed as fully-exploited in 2018 (Ibarra 2018), it was actually over-exploited. The HCR was not applied as specified in the management plan (SERNAPESCA 2016), to reduce fishing mortality to the Fmsy level within a time period of one generation but, fortuitously, status improved in 2019 with SB increasing to marginally above 40%B0 (ie. 80%SB SB_{msv}), due to increased recruitment. There is concern however that there is considerable risk that the resource may actually remain overexploited in 2019, There is also concern that F₂₀₁₉ is estimated to be well above the F_{MSY} level and the 2020 guota was set near the upper end of the recommended range. It is expected that if the 2020 quota of 757 t is taken, then F would increase to about double the MSY level. Accordingly, it is strongly advised that this recommendation be implemented immediately.

5.2 Conditions

5.2.1 Condition 1 (UoAs 5 & 8)

Closed at 2SV.

5.2.2 Condition 2 (All UoAs)

Performance Indicator	1.2.3
Score	65
	PCR, 2017 "SIb) It is clear that there is significant discarding of individuals under the commercial size in all three crustacean species, and that the level of discarding is not full quantified."
Justification extracted from the PCR	SIc) Squat lobsters are also caught in other fisheries when they are not the target species. In the nylon shrimp fishery these landings will be recorded and included in the annual global quota. However small catches of yellow squat lobster occur in the fisheries targeting red squat lobsters and vice versa, and the assessment team were informed that landings recorded on behalf of SERNAPESCA through the dockside monitoring programme do not differentiate between the two species, and so some removals of both squat lobster species are not fully recorded."
Condition	By the third annual audit, the client should demonstrate that the stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule. It is will be also necessary to confirm that there is good information on all other fishery removals from the stock.
Milestones	At the first annual audit, the client should provide evidence to the CAB that options for quantifying the level of discarding of target species in both fisheries have been considered,

	and that a mechanism has been put in place for differentiating between landings of squat lobster species in the dockside monitoring programme. Expected score 65.
	(Revised at SA1) At the second annual audit , the client should provide evidence to the CAB that a mechanism has been put in place to quantify the level of discarding of target species in both fisheries in accordance with Resolution 1106/2017 and that the integral traceability system is being used to ensure that landings of squat lobster species are fully differentiated.
	(Revised at SA1) At the third annual audit, the client should provide evidence to the CAB that the level of discarding of target species is fully quantified in both fisheries, and that landings of squat lobster species are fully differentiated. Expected score 80.
	It has also (more recently) become apparent that, there are concerns with the reliability of the assessment approach such that it cannot be concluded that abundance is regularly monitored at a level of accuracy and coverage consistent with the harvest control rule. As a result new milestone to address SIb:
Revised milestones	Year 4 (2021): At the fourth annual audit the client shall provide evidence that the development of a more reliable approach for accurately monitoring stock abundance will be addressed through the review of the current assessment approach in line with condition 14. No re-scoring expected at this stage.
(3rd Surv audit)	Year 5 (2022): Before the certificate expires (12 th March 2022), the client shall provide evidence that methods for developing a more reliable assessment approach for accurately monitoring stock abundance have been identified in line with condition 14. No re-scoring expected at this stage.
	Year 6 (2023): At the first surveillance audit of the new cycle, the client should demonstrate that a more reliable assessment approach for accurately monitoring stock abundance has been developed in line with condition 14. SG80 should be met at this stage.
Consultation on condition	See letters from SUBPESCA, SERNAPESCA and IFOP (Appendix 6, PCR).
	The audit team approves of recent initiatives toward reducing the level of discarding of target species through implementation of the Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017). This Resolution establishes a landing obligation on target species (in this case on yellow and red squat lobsters). Discards will only be allowed if, previous to discarding, they are segregated by species, placed in boxes so they can be quantified by the cameras on board. Further, those discards shall be reported. Any discards of target species performed under non-compliance with the previous measures will be illegal and susceptible to be sanctioned in accordance to the National Fishing Law.
Progress on Condition (1SA)	measures to enforce it. During the site visit the assessment team checked that Sernapesca is working on the fishery-specific Resolutions to implement onboard surveillance systems using cameras (for more details see section 2.6 on Compliance). However, the Plan is still not enforced and the effectiveness of the surveillance system is currently uncertain. Accordingly there remains a requirement to quantify unreported catch due to discarding. A recent study resulted in estimates of discarding of the target species in the southern red squat lobster fishery of 6% and 7% in 2014 and 2015 respectively. Incorporation of those results in several modelling scenarios resulted in little effect of discards on predictions of F and SB3. However, discarding is likely to vary annually with changes in exploitable biomass, size composition, and patterns of fishing relative to resource distribution. Since regulations prohibit discarding, it will likely be difficult to routinely obtain reliable estimates from regular fishing operations.



	Sernape details s system declarat be adjus Nº11629 two spe lobster), Therefor reflect s not implithis is a process	esca is now f see section 2 (official dead ion (which is sted conside 92/2017 provectes of squa processors re, this new pecies catch lemented in as yet unce ing plant has	inishing the i 2.7 on Tracea dline is June taken from t ring data obt vides a five-o at lobsters a ensure tha procedure p composition most of the rtain. During s already imp	mplementat ability). Once a 2018) the o the dockside tained by the day period to are different are different to species a provides the n more accu plants proce o the site vi olemented th	ion of an inte all processi catch compo- sampling co processing o do so). As (boiling time re properly possibility to rately. Howe essing deme- sit it was co ne new trace	gral traceabi ing plants ha osition data sommissioned plants (Sern processing r sorted befor sorted befor to adjust lan ever, at prese ersal crustac onfirmed tha ability syster	lity system (ve implement stated at the by Sernape apesca offic requirement for the yello ding declarate ent the syste eans and the at the Caman.	for more nted this landing sca) will ial letter s for the w squat cessed. ations to m is still herefore anchaca
	Existing an accu explained the trace accurate of squat years (s	milestones urate estima ed above (an eability syste e estimations t lobsters). T ee below).	focus on the ation of the ad also in se em which is s of the spec hus, the auc	e adequacy landing of ction ¡Error! being imple ies composi dit team prop	of dockside each squat No se encu mented con tion of the la poses revise	sampling pro- lobster specientra el origi stitutes a po- undings (not el d milestones	ogram for a ecies. Howe en de la refe werful tool t only the two s for the sub	chieving ever, as erencia.) o obtain species sequent
Progress on Condition (2SA)	During the site visit, it came clear that the integral traceability system is now fully operative for demersal crustacean fisheries in Chile. This, coupled with the dockside sampling program ensures that accurate estimation of the landings corresponding to each squat lobster is ensure. None of the interested parties interviewed raised concerns regarding the possibility that the landed proportions of both squat lobster species are being miscalculated. Therefore, the team dismisses this problem raised during the initial assessment							
	The Pla (Resolut Sernape enforcer is some necessa consulta the dem Howeve been tur	an for the r tion 1106 iss esca is still ment. Despite what delaye ary steps are ation periods persal crusta er, a moratori ned.	reduction of sued on the working in te the impler ed in relation being taker (consult the cean fisherie ia in the enfo	discards ir 29th of Marc setting the mentation of n to what w for their im section 2.9 es the syster procement of s	n fisheries t ch 2017) is s e conditions the system vas planned plementation of the repor n is expecte sanctions wi	argeting der still not being to ensure based on the the team of the team of the team of the team of team o	mersal crus implemente its monitor e cameras o could verify enders and etails). In the ining in July- until the sys	taceans ed since ing and on board that the complex case of August. tem has
	In any c has bee estimate levels o were hig main sp	ase, the on an maintaine es on the dis f sampling c gh, which all ecies.	board obser d throughou cards occur overage rea lowed obtair	rver program t these year ring in the d ached in the ning accepta	a derived fro s. This has lifferent dem se fisheries ble levels of	m the resear allow keepin ersal crustac (close to 20 ⁶ uncertainty	rch plan on g providing ceans fisher %, see table associated	discards detailed ies. The below) with the
	Та	ble 5.2.2 . Sam	pling coverage	s performed or 2014	board as part	of the research	plan on discar	ds
		Bed equat	Trip	25%	25%	19%	19%	
		lobster	Haul	17%	22%	19%	17%	
		Yellow	Trip	13%	23%	19%	17%	
		squat lobster	Haul	25%	24%	23%	22%	



coverage

	This program has allowed to obtain reliable estimates of the discarded fraction corresponding to the target species in the different demersal crustacean fisheries as shown in Tables 2-5, 2-6 and 2-7. This sampling was also maintained in 2018 and 2019, ensuring the continuity of the data.
	collected with the cameras on board.
	Several regulations were issued in 2019 to move forward in the implementation of the Electronic Monitoring System (EMS), based on the installation of cameras on board in all industrial fishing fleets operating within the Chilean waters. Consequently, Subpesca's reviewed the applicable regulations and measures for these fisheries to minimise the discards resulting from the authority's measures. As a result, Subpesca carried out a thorough review of every applicable regulation and enacted a series of amendments and adjustments in order to prevent discards. (See Section 4.2.3.4 for more details).
Progress on Condition (3SA)	From January 1st 2020, the use of image recording cameras on the industrial fleet is in force. A new unit responsible for analysing and auditing that requirement using the collected images, was created. During the site visit, the team checked that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans. From the vessels corresponding to these UoAs, only 3 of them (Oriente, Chaffic I y Trauwung 1) classified as artisanal vessels, does not have operational image recording cameras. In relation the artisanal fleet, there is a delay in the requirement for image recording cameras on board this type of fleet. However, the artisanal fleet has 3 more years before the EMS being mandatory.
	In relation to the traceability, Sernapesca and all the stakeholders interviewed during the site visit confirmed that the integral traceability system is in place for all the different stakeholders (fishers, processing plants, etc.) and working normally since 2019 (See section 4.2.5).
Status	The integral traceability system is fully operational for demersal crustacean fisheries and, together with the dockside sampling provides reliable estimates of the different squat lobster species in the landings. The observer program derived from the research plan on discards has provided reliable estimates of the level of discards of the target species in the different demersal crustacean fisheries in recent years. Also, the EMS has been fully operational in the Industrial Fleet sector since January 1, 2020. Although the EMS has not yet been fully implemented in the Artisanal Fleet, only 3 vessels are affected and regulations now ensure that this will occur within 3 years. Meanwhile, all other measures now in place provide assurance that the level of discarding of target species is (for practical purposes) fully quantified in both fisheries. Based on the above, the progress on this condition was found to be ON TARGET , having met the milestone set out for year 3. However, the milestone did not address the concern regarding reliability of the assessment approach in Slb; as a result the condition cannot be closed.
	Bureau Veritas sent a variation request for application of exceptional circumstances and extend the deadline for this condition aligned with Condition 14. It was approved by the MSC on the 25 th of August 2020. As a result, updated milestones were drafted for years 4, 5 and 6 (new certification cycle). See above. An updated action plan was also prepared by the client (See Section 5.3).
	Although the condition was not closed, SIc of the PI was rescored (See Section 5.4.1).
Additional information	At the first annual audit we will provide evidence to the auditors that: (i) we have analysed the position from the point of view of the fishing companies and fishing skippers and the actions that would be required on-board the vessels to respond to the need to differentiate between yellow and red squat lobster; (ii) we will provide evidence that trials have commenced to implement the mechanisms to differentiate between the catches of red



squat lobster and yellow squat lobster; (iii) n the context of any regulations on discards, we will provide evidence to the auditors that we have designed a programme to quantify discards of all commercial species from the fishing operations for crustaceans. (iv) We will provide evidence that we have met with IFOP to discuss how observers may collect the data required to quantify the level of discards through sampling; (v) we will provide evidence that we have met with SERNAPESCA to determine the mechanisms for differentiating between red and yellow squat lobster on-boar, and on landing and in the processing facility. (vi) We will provide evidence that we have met with series in drafting related regulations and the FMP. At the second annual audit, we will provide the auditors with: (i) evidence that the squat lobsters are being classified on-board the vessel and at landing, with audit at the processing plant; (ii) the scheme that has been implemented to quantify catch discards.

At the third annual audit we will present the auditors with evidence of the successful implementation of the two schemes.

Performance Indicator	2.1.3
Score	70
Justification extracted from the PCR.	b.Questions are raised about amount of removals as IFOP reports indicate that SERNAPESCA underestimates catch. Additionally, IFOP data do not account for discards before catch is brought on deck. Further, for cardinal fish there is no current monitoring of the population as the collapsed fishery is closed. IFOP monitoring provides data on catch composition which suggests that removals in this fishery are larger than the non-target quota while SERNAPESCA statistics report almost no catch. Thus, data are not considered sufficient to estimate outcome status with respect to biologically based limits.
	d. Main retained species are Chilean hake and cardinal fish. Various surveys provide indicators on abundance and status of Chilean hake. There are no surveys for cardinal fish. Reporting from logbooks and SERNAPESCA dockside landing data for quota control provide information on fishery operations. Data are compromised by unreported discards. Routine IFOP catch monitoring provides information on composition. While logbooks and dockside information continue to be collected the sample size of IFOP monitoring of the fishery in the northern area is low and depending on nylon shrimp stock condition. The issue is that artisanal vessels have not accommodated observers on board and LGPA states for a global quota of up to 600 t the quota is allocated for the artisanal fishery; between 600 t and 4,000 t the artisanal quota is increased by 5.88% of global quota – 600 t and the remainder is for the industrial fishery. If artisanal vessels do not accommodate IFOP observers on board, data collection would be increasingly compromised with decreasing quotas.
Condition	By the third annual surveillance audit, the following SG80 SIs must be met: - Information should be sufficient to estimate outcome status with respect to biologically based limits of cardinal fish, in particular with respect to discards in the Nylon Shrimp Industrial, Yellow Squat North Unit and Red Squat North Unit Fisheries.

5.2.3 Condition 3 (UoA 1, 3 & 6)



	-Sufficient data should continue to be collected to detect any increase in risk level to cardinal fish in the Nylon Shrimp Industrial, Yellow Squat North Unit and Red Squat North Unit Fisheries.
Milestones	At the first annual audit, the client will present the CAB with evidence that there has been consideration of the options for collecting data to estimate outcome status of cardinal fish, and also to ensure that sufficient data continue to be collected. The score will not change on completion of this milestone.
	At the second annual audit, the client will present the CAB with evidence that a mechanism to collect data to estimate outcome status of cardinal fish has been established and there is assurance that sufficient data will continue to be collected. The score will not change on completion of this milestone.
	At the third annual audi t, the client will present the CAB with evidence to show that data to estimate outcome status of cardinal fish has been collected and analysed and also that a mechanism is in place to ensure that sufficient data continue to be collected. The score will not change on completion of this milestone.
	These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the third annual audit the required minimum score is 80.
Consultation condition	Letters from SUBPESCA, SERNAPESCA and IFOP. (Appendix 6, PCR)
Progress on Condition (1SA)	According to the initial assessment (Saá et al 2017) data were compromised by unreported discards. One of the specific objectives pursued by the research program on discards and incidental catches on demersal crustacean fisheries developed by the IFOP since 2013 was to implement and improve methodologies which allow to record and assess catch species composition, including the discarded fraction. The Final Report (San Martin et al 2016) accounts for the results obtained between 2013 and 2015 (although a new report is being prepared with data from 2016). This report provides exhaustive and comprehensive information in relation to discards of target, bycatch and discarded species. Data was collected on board fishing vessels between April 2013 and December 2015 by 15 different observers. A total of 526 fishing trips were sampled. No discarded cardinal fish was detected in the Red and Yellow squat lobsters industrial fisheries, while in the nylon shrimp industrial fishery it only accounted for 1.4% of the total volume in 2014 (total estimated discards of 17.4 tonnes), and 1% in 2015 (total estimated discards of 11.7 tonnes). Sex ratio and size sampling was also performed for the discarded fraction of this species. Two different approaches were used to estimate discards, but results were not significantly different.
	The cause of the discards was also investigated, in the case of the cardinal fish discards were due to administrative reasons, as extractive bans are in place since 2013 (Decree Nº167/2013, Decree Nº10/2014) which has been recently extended until 2021 (Decree Nº23/2016). A total of 12 tonnes were allowed to be caught annually during the period of validity of the ban (10 tonnes for the industrial fleet and 2 tonnes for the artisanal fleet. These regulations also establish that cardinal fish bycatch cannot exceed 0.5% of the target species catch volume per fishing trip. These limits are based on latest assessments performed by Subpesca before the stock was considered as collapsed in 2013.
	Results shown in San Martín et al (2016) indicate that discards of cardinal fish are restricted to UoC1 (targeting nylon shrimp). Data from 2015 (with the new gear) show a decrease in the discards of cardinal fish (both in volume and %).
The sampling effort has been maintained during 2016 and the report with the updated results is about to be published as confirmed by the IFOP and SUBPESCA representatives during the site visit. Further, since the adoption of the plan for discard reduction fishers are obliged to record all discards in their official logbooks which will then reported to Sernapesca.

The results of this research program have serve as the basis to design the Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017). This Resolution also regulates unwanted catches, establishing that all bycatch shall be identified and quantified before they can be returned to the sea (in the case of the common hake those catches will be quantified to be discounted against the hake quota, its discards are regulated as in the case of target species –see progress on condition 2-). Further, those discards shall be reported in the logbooks. Non-compliance with the previous measures will be illegal and susceptible to be sanctioned in accordance to the National Fishing Law. Apart from the above detailed management measures, the effectiveness of the reduction plan shall be monitored and adjusted in the case discards are not reduced. Therefore, it is mandatory for the industrial and artisanal fleet to allow the presence of scientific observers. The coverage will gradually increase until achieving a full coverage in 2019 (i.e. all vessels will get an observer on board at least once throughout the fishing season).

However this Regulation has not yet been implemented as Sernapesca has to adopt the measures to enforce it. During the site visit the assessment team checked that Sernapesca is working on the fishery-specific Resolutions to implement onboard surveillance systems using cameras (for more details see section 2.6 on Compliance). During the site visit the client provided evidence of their attendance to two meetings organized by Sernapesca in Valparaíso (23rd of March 2017) and Coquimbo (3rd of August of 2017) to explain details on the implementation of the system in demersal crustaceans fleet in the VIII Region. Also, during the site visit it was confirmed by different stakeholders (client, I Also, during the site visit different stakeholders (client, IFOP, Sernapesca) confirmed that fishers are already recording discards in their official logbooks, which are later reported to Sernapesca. However, no evidence was collected confirming that fishers are effectively providing a full account of common hake discards in their logbooks.

A report on the monitoring of the demersal crustacean fisheries is prepared by IFOP on an annual basis. The focus of these reports is on providing biological indicators of the target species, together with fishery indicators (yield and fishing effort). However, the final version of these reports also include indicators of the impact of these fisheries on accompanying fauna (bycatches) and the incidental capture of birds, mammals and turtles. **Figure 2-50** and **Figure 2-51** presented in the report (section 2.9) show the catch composition in 2017 for the nylon shrimp and the yellow squat lobster fisheries, respectively. For both fisheries cardinal fish was included in the category entitled 'other species' accounting for less that 1% of the total catches (Zilleruelo et al 2018). The specific contribution of the cardinal fish to the different fisheries (at stock level) can be consulted in Zilleruelo et al (2018). In 2017, cardinal fish contributed to 0.3% of the catches in the nylon shrimp fishery in the North, 0.5% in the nylon shrimp fishery in the South, 0.10% in the yellow squat lobster fishery in Region III-IV, and 0.003% in the yellow squat fishery in Region V-VIII.

Further, the sampling program on discards has allowed to obtain reliable estimates of the discarded fraction corresponding to bycatches in both the nylon shrimp and the yellow squat lobster fisheries. **Table 2-5** presented in section 2.9 shows the composition of the discards from the nylon shrimp fishery, while **Table 2-6** shows the composition of the discards from the yellow squat lobster fishery (Escobar et al 2018). In 2017, cardinal fish represented 0.03% and 0.01% of the discarded fractions



Progress

Condition (2SA)

happening in the nylon shrimp fishery and the yellow squat lobster fisheries, respectively.

IFOP annual report on the monitoring of the fisheries targeting demersal crustaceans provides a detailed account of the species composition of the catches (Zilleruelo et al 2019 accounts results for 2018), while the annual report on discards and incidental catches (Escobar et al 2019a) provides a thoughtful account of the discarded fraction, including the spatial-temporal patterns and the reasons for discarding.

The observer program has incorporated samplings on board the artisanal fleet since 2017, and the coverage of this fleet has increased sufficiently in recent years (see **table 5.2.3.1** for a detailed account of the observer coverage during 2018). Zilleruelo et al 2019 states that: "*During the 2018 fishing season, scientific observers embarked on 303 fishing trips, representing an increase of 15% over the previous year. Of the total trips, 35 correspond to the artisanal fleet, with an improvement in the general sampling coverage"*. Observer coverage for the discarded fraction in 2018 are presented in **Table 5.2.3.2.** Results on the catch composition in 2018 of the fleet targeting nylon shrimp were presented in **section 4.2.7.2.1**, while details on the discarded fraction of this fleet were presented in **section 4.2.7.3.2**.

Table 5.2.3.1. Observed fishing trips in 2018 (IFOP) against the total fishing trips targeting demersal crustaceans in 2018 (Control de Cuotas). Data are presented for ZCN (Zona Centro-Norte) and ZCS. Observer coverage (% cobertura) is presented at the bottom row. Source: Zilleruelo et al 2019

	Flota	Zona	Zona	Total
	TIOLA	Centro-Norte	Centro-Sur	TOtal
	Industrial	46	242	268
IFOP	Artesanal	35	0	35
	Total	81	242	303
Control	Industrial	208	858	969
Cuete	Artesanal	449	64	513
Cuola	Total	657	922	1482
	% Cobertura	12%	26%	20%

Table 5.2.3.2. % observer coverage for discards on board the fleet targeting nylon shrimp in 2018.Source. Escobar et al 2019a.

					1
ertura de v	viajes y lan	ces flota in	dustrial		l
2014	2015	2016	2017	2018	
25%	19%	14%	24% 🧹	16%	
6%	18%	17%	18%	23%	
	ertura de v 2014 25% 6%	ertura de viajes y lan 2014 2015 25% 19% 6% 18%	ertura de viajes y lances flota in 2014 2015 2016 25% 19% 14% 6% 18% 17%	ertura de viajes y lances flota industrial 2014 2015 2016 2017 25% 19% 14% 24% 6% 18% 17% 18%	ertura de viajes y lances flota industrial 2014 2015 2016 2017 2018 25% 19% 14% 24% 16% 6% 18% 17% 18% 23%

Further, the cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020. However, the artisanal fleet still has 3 years before it is also mandatory for them. The team could check that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans. The implementation of the EMS will help to ensure to compliance with recent regulations on the discarded fraction, and will improve quantification of the discards, even when the fishing trips without observers (all discards shall be shown to the cameras and shown before releasing them back to the sea and records taken at the electronic logbook).

The progress on this condition was found to be **AHEAD TARGET** since the on-board sampling programs has been maintained since 2016, so sufficient data on the industrial and artisanal fleets is being collected to detect any increase in risk level to main bycatch species in the industrial fleet targeting red and yellow squat lobsters at



Status

Progress on Condition (3SA)

	the UPN and nylon shrimp in ZCN & ZCS. Further, the implementation of the EMS will help to ensure enforcement with recent regulations on discarding. Thus, the condition is CLOSED and PI 2.1.3 was re-scored (see section 5.4) .
	This was the action plan prepared by the client:
Additional	At the first annual audit we will provide evidence to the auditors that we have we have reviewed with our members, SUBPESCA and IFOP the current approach to data collection and how accurate this is to reflect the quantities of cardinal fish taken in the fishery. On the basis of that review, we will have identified the options for improving data collection of all retained species, including cardinal fish
information	At the second annual audit, we will provide the auditors with evidence that data on the retained catch of cardinal fish are being collected and presented for analysis.
	At the third annual audit we will present the auditors with evidence that the data have been collected and continues to be collected on cardinal fish, and the data have been taken into account in any new stock assessments of cardinal fish and the setting of the annual allocated catch quota for that species in the crustaceans fishery.

Performance Indicator	2.1.3
Score	75
Justification extracted from the PCR.	b. Similar to the Nylon Shrimp Industrial fishery, information on main retained species from dockside monitoring by SERNAPESCA and logbooks provide the information for the fishery to meet SG60 SIb but is not adequate to meet SG80 SIb.
	By the third annual surveillance audit, the following SG80 SI must be met:
Condition	Information should be sufficient to estimate outcome status of Chilean hake with respect to biologically based limits, in particular with respect to discards in the Yellow Squat South Unit and Red Squat South Unit Fisheries.
	At the first annual audit, the client will present the CAB with evidence that there has been consideration of the options for collecting data to estimate outcome status of Chilean hake in the Yellow Squat South Unit and Red Squat South Unit Fisheries. The score will not change on completion of this milestone.
Milestones	At the second annual audit, the client will present the CAB with evidence that a mechanism to collect data to estimate outcome status of Chilean hake in the Yellow Squat South Unit and Red Squat South Unit Fisheries has been established and there is assurance that sufficient data will continue to be collected. The score will not change on completion of this milestone.
	At the third annual audit, the client will present the CAB with evidence to show that data to estimate outcome status of Chilean hake has been collected and analysed for the Yellow Squat South Unit and Red Squat South Unit Fisheries.
	These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the third annual audit the required minimum score is 80.

5.2.4 Condition 4 (UoA 5 & 8)



Consultation	In Lattors from SLIPPESCA, SERNARESCA and IEOP (Appandix 6, PCP)
condition	Letters nom SOBFESCA, SERINAFESCA and IFOF. (Appendix 0, FOR).

According to the initial assessment (Saá et al 2017) data were compromised by unreported discards. One of the specific objectives pursued by the research program on discards and incidental catches on demersal crustacean fisheries developed by the IFOP since 2013 was to implement and improve methodologies which allow to record and assess catch species composition, including the discarded fraction. The Final Report (San Martin et al 2016) accounts for the results obtained between 2013 and 2015 (although a new report is being prepared with data from 2016). This report provides exhaustive and comprehensive information in relation to discards of target, bycatch and discarded species. Data was collected on board fishing vessels between April 2013 and December 2015 by 15 different observers. A total of 526 fishing trips were sampled. Table 2.1.3.1 shows results obtained on common hake discards for fleets targeting southern stocks of red and yellow squat lobsters. Sex ratio and size sampling was also performed for the discarded fraction of this species. Two different approaches were used to estimate discards, but results were not significantly different.

				1 st Semester 2 nd Semester				
	Target stock (South)	Year	% of the discarded fraction Vs total catch	% of common hake among the discarded fraction	Estimated volume of discarded common hake (tonnes)	% of the discarded fraction Vs total catch	% of common hake among the discarded fraction	Estimated volume of discarded common hake (tonnes)
	Red	2013	14%	79.5%	337.2	16%	81.1	829.8
on	squat	2014	7%	65%	122.0	7%	46.1%	211.3
	lobster	2015	7%	56.1%	158.0	8%	51.2%	114.6
	Yellow	2013	3%	22.3%	6.9	-	-	-
	squat	2014	3%	28.2%	5.5	4%	60.7%	9.1
	lobster	2015	4%	40.3%	19.7	6%	32.6%	6.8

Table 2.1.3.1. Common hake discards on the fleets targeting southern stocks of red and
yellow squat lobster. Source: San Martin et al 2016.

The cause of the discards was also investigated, in the case of common hake discards were due to administrative reasons, mainly because of exceeding their bycatch quota for this species (since the introduction of the ITQs in 2013 fishers targeting demersal crustaceans shall have a certain percentage of hake quota -1% of their target species quota- at the beginning of the fishing season to impute their hake bycatches).

The sampling effort has been maintained during 2016 and the report with the updated results is about to be published as confirmed by the IFOP and SUBPESCA representatives during the site visit. Further, since the adoption of the plan for discard reduction fishers are obliged to record all discards in their official logbooks which will then reported to Sernapesca.

The results of this research program have serve as the basis to design the Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017). This Resolution also regulates unwanted catches, establishing that all bycatch shall be identified and quantified before they can be returned to the sea (in the case of the common hake those catches will be quantified to be discounted against the hake quota, its discards are regulated as in the case of target species –see progress on condition 2-). Further, those discards shall be reported in the logbooks. Non-compliance with the previous measures will be illegal and susceptible to be sanctioned in accordance to the National Fishing Law.



Progress

Condition (1SA)

	Apart from the above detailed management measures, the effectiveness of the reduction plan shall be monitored and adjusted in the case discards are not reduced. Therefore, it is mandatory for the industrial and artisanal fleet to allow the presence of scientific observers. The coverage will gradually increase until achieving a full coverage in 2019 (i.e. all vessels will get an observer on board at least once throughout the fishing season).
	However this Regulation has not yet been implemented as Sernapesca has to adopt the measures to enforce it. During the site visit the assessment team checked that Sernapesca is working on the fishery-specific Resolutions to implement onboard surveillance systems using cameras (for more details see section 2.6 on Compliance). During the site visit the client provided evidence of their attendance to two meetings organized by Sernapesca in Valparaíso (23 rd of March 2017) and Coquimbo (3 rd of August of 2017) to explain details on the implementation of the system in demersal crustaceans fleet in the VIII Region. Also, during the site visit different stakeholders (client, IFOP, Sernapesca) confirmed that fishers are already recording discards in their official logbooks, which are later reported to Sernapesca. However, no evidence was collected confirming that fishers are effectively providing a full account of common hake discards in their logbooks.
	Further, the administrative reasons for discarding common hake remain unsolved. during the site visit different stakeholders recognized that there is a conflict of interests between fishers targeting hake and those targeting demersal crustaceans, resulting in the last ones having problems purchasing enough hake quota to cover their bycathes (they don't find sellers). Subpesca explained they are planning to increase the percentage of common hake bycatch quota needed, from current 1% to 2%, and then progressively to 5% to accomodate it to results obtained in the discard program (see table 2.1.3.1). However, recent elections and the subsequent change in the Government have delayed the implementation of this modification.
Progress on Condition (2SA)	A report on the monitoring of the demersal crustacean fisheries is prepared by IFOP on an annual basis. The focus of these reports is on providing biological indicators of the target species, together with fishery indicators (yield and fishing effort). However, the final version of these reports also include indicators of the impact of these fisheries on accompanying fauna (bycatches) and the incidental capture of birds, mammals and turtles. Figure 2-51 and Figure 2-52 presented in the report (section 2.9) show the catch composition in 2017 for the yellow squat lobster and the red squat lobster fisheries, respectively. In Regions V-VIII common hake is the main bycatch after the target species, accounting 1.9% of the total catch in 2017 when targeting yellow squat lobster and 4.3% when targeting red squat lobster. In 2017, the CPUE for hake was estimated at 20 kg / trawled hour (IC95% [19; 22]), similar to the estimate in 2016 that was 20 kg / trawled hour (95% CI [18; 21]) (Zilleruelo et al 2018). CPUE estimates at region level are provided in Zilleruelo et al 2018, see table below.
	Table 2.1.3.2 . Indicators of total catch (t), total effort (hours of trawling) and yield (kg / trawled hour) [IC95%] for common hake caught as bycatch by the industrial fleet that operated on demersal crustaceans, by region, year 2017. Source: Zilleruelo et al 2018



	Region	IV	V	VI	VII	VIII	Z-CN	Z-CS	TOTAL
	viajes totales	252	322	90	316	180	254	728	982
≴.	viajes muestreados	67	89	29	90	60	67	217	284
ΞĪ	cap_media (t/viaje)	0,22	0,27	0,25	0,49	0,21	0,22	0,41	0,36
P D	captura total estimada (t) [CTE]	57	87	22	154	38	57	296	357
0 '	Lim_inf CTE	47,3	66,8	17,2	131,3	29,5	48	264	322
	Lim_sup CTE	65,9	106,6	27,8	177,4	45,8	66	328	393
1	CV	8%	12%	12%	8%	11%	8%	6%	5%
	DESEMBARQUE	5	1	0	3	0	5	3	8
	Region	IV	V	VI	VII	VIII	Z-CN	Z-CS	TOTAL
ΩZ ,	esfuerzo_medio (h.a./viaje)	16,1	13,9	14,2	18,1	11,4	16,1	18,3	17,8
₩₹	esfuerzo total estimado (ETE)	4053	4477	1281	5722	2051	4085	13328	17467
5 5	Lim_inf ETE	3563	3982	1014	5246	1753	3591	12556	16548
S.	Lim_sup ETE	4542	4972	1549	6198	2349	4579	14101	18385
	CV	6%	6%	11%	4%	7%	6%	3%	3%
. 0	Region	N	V	VI	VII	VIII	Z-CN	Z-CS	TOTAL
ΣĞ	rendimiento estimado (kg/h.a.)	14	19	18	27	18	14	22	20
₽ È	Lim_inf REND	12	17	14	25	16	12	21	19
ST R	Lim_sup REND	16	21	21	29	21	16	23	22
Ш	CV	6%	6%	11%	4%	7%	6%	3%	3%

Further, the sampling program on discards has allowed to obtain reliable estimates of the discarded fraction corresponding to bycatches in the different dermersal crustacean fisheries. **Table 2-5** presented in section 2.9 shows the composition of the discards from the nylon shrimp fishery, while **Table 2-6** shows the composition of the discards from the yellow squat lobster fishery (Escobar et al 2018). Common hake constitute the predominant species in the discarded fraction in squat lobster fisheries. In 2017, hake 52% of the discarded fractions in the red squat lobster fishery and 37% in the yellow squat lobster fishery.

Since 2013 hake bycatches are allowed only against hake quota. However, between 2013 and 2015, during the implementation of the research programme on discards bycatches were allowed for the vessels participating in the programme (although they were thoughtfully recorded and reported by the observers sampling on board). However, until 2017 for most of the fishing companies targeting demersal crustaceans it was very difficult to have access to hake guota, since the existing hake quota was owned and consumed by the fishing companies targeting hake. This situation changed in 2018 when a new regulation established that 15% of the total hake quota shall be available to be purchased by fishing companies targeting demersal crustaceans, so they can cover their hake bycatches. During the first tender held in December 2018 all AIP members purchased enough hake quota to account for all their bycatches (see section 2.5 and table 2-4). For those fishing companies that consider they still need more hake quota to account for their bycatches two more tenders will take place in December 2019 and 2020. These allocations will last for 15 years. All stakeholders interviewed during the site visit considered that hake guota allocation to demersal crustacean fishing companies helps to improve the reporting of hake bycatches.

IFOP annual report on the monitoring of the fisheries targeting demersal crustaceans provides a detailed account of the species composition of the catches (Zilleruelo et al 2019 accounts results for 2018), while the annual report on discards and incidental catches (Escobar et al 2019a) provides a thoughtful account of the discarded fraction, including the spatial-temporal patterns and the reasons for discarding.

Progress Condition (3SA) The observer program has incorporated samplings on board the artisanal fleet since 2017, and the coverage of this fleet has increased sufficiently in recent years (see table 5.2.4.1 for a detailed account of the observer coverage during 2018). Zilleruelo et al 2019 states that: "During the 2018 fishing season, scientific observers embarked on 303 fishing trips, representing an increase of 15% over the previous year. Of the total trips, 35 correspond to the artisanal fleet, with an improvement in the general sampling coverage". Observer coverage for the discarded fraction in 2018 are presented in Table 5.2.4.2. Results on the catch composition in 2018 of the fleet targeting nylon shrimp were presented in section 4.2.7.2.1, while details on the discarded fraction of this fleet were presented in section 4.2.7.3.2.



Table 5.2.4.1. Observed fishing trips in 2018 (IFOP) against the total fishing trips targeting demersal crustaceans in 2018 (Control de Cuotas). Data are presented for ZCN (Zona Centro-Norte) and ZCS. Observer coverage (% cobertura) is presented at the bottom row. Source: Zilleruelo et al 2019

	Flota	Zona	Zona	Total
	Tiota	Centro-Norte	Centro-Sur	TOtal
	Industrial	46	242	268
IFOP	Artesanal	35	0	35
	Total	81	242	303
Control	Industrial	208	858	969
Curcto	Artesanal	449	64	513
	Total	657	922	1482
	% Cobertura	12%	26%	20%

Table 5.2.4.2. % observer coverage for discards on board the fleet targeting nylon shrimp in 2018.Source. Escobar et al 2019a.

Camarón nailon						1
Cobe	ertura de v	viajes y lan	ces flota in	dustrial		1 M
	2014	2015	2016	2017	2018)
Cobertura de viajes	25%	19%	14%	24%	16%	
Cobertura de lances	6%	18%	17%	18%	23%	

Further, the cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020. However, the artisanal fleet still has 3 years before it is also mandatory for them. The team could check that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans. The implementation of the EMS will help to ensure to compliance with recent regulations on the discarded fraction, and will improve quantification of the discards, even when the fishing trips without observers (all discards shall be shown to the cameras and shown before releasing them back to the sea and records taken at the electronic logbook).

The progress on this condition was found to be **AHEAD TARGET** since the on-board sampling programs has been maintained since 2016, so sufficient data on the industrial and artisanal fleets is being collected to detect any increase in risk level to main bycatch species in the industrial fleet targeting red and yellow squat lobsters at the UPS. Further, the implementation of the EMS will help to ensure enforcement with recent regulations on discarding. Thus, the condition is **CLOSED** and **PI 2.1.3 was re-scored (see section 5.4)**.

This was the action plan prepared by the client:

At the first annual audit we will provide evidence to the auditors that we have we have reviewed with our members, SUBPESCA and IFOP the current approach to data collection and how accurate this is to reflect the quantities of Chilean hake taken in the fishery. On the basis of that review, we will have identified the options for improving the data collection.

At the second annual audit, we will provide the auditors with evidence that data on the retained catch of Chilean hake are being collected and presented for analysis.

At the third annual audit we will present the auditors with evidence that the data have been collected and continues to be collected on Chilean hake, and the data have been taken into account in any new stock assessments of Chilean hake fish and the



Status

Additional

information

5.2.5 Condition 5 (UoA 2)

Performance Indicator	2.1.3
Score	65
Justification extracted from the PCR	a. Data are not recorded by IFOP from the artisanal fishery. Although it can be assumed that catch is qualitatively similar to the industrial catch, the assumption does not hold for quantitative information.Other rationale for b and d are as for the industrial fishery.
Condition	By the fourth annual surveillance audit, the following SG80 SIs must be met: - Qualitative information and some quantitative information should be available on the amount of main retained species taken by the artisanal fishery. - Information should be sufficient to estimate outcome status with respect to biologically based limits, in particular with respect to discards.
	-Sufficient data should continue to be collected to detect any increase in risk level to main retained species.
	At the first annual audit, the client will present the CAB with evidence that there has been consideration of the options for collecting data on the amount of main retained species taken by the Nylon Shrimp Artisanal Fishery. The score will not change on completion of this milestone.
	At the second annual audit, the client will present the CAB with evidence that a mechanism to collect data on the amount of main retained species taken by the Nylon Shrimp Artisanal Fishery has been designed. The score will not change on completion of this milestone.
Milestones	At the third annual audit, the client will present the CAB with evidence that a mechanism to collect data on the amount of main retained species taken by the Nylon Shrimp Artisanal Fishery has been implemented. The score will not change on completion of this milestone.
	At the fourth annual audit, the client will present the CAB with evidence to show that data on main retained species in the Nylon Shrimp Artisanal Fishery has been collected and analysed.
	These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the fourth annual audit the required minimum score is 80.
Consultation on condition	Letters from SUBPESCA, SERNAPESCA and IFOP. (Appendix 6, PCR).
Progress on Condition (1SA)	Mainly because of habitability reasons the artisanal fleet targeting demersal crustaceans could not be included in the research program for discards implemented by IFOP between 2013 and 2015. Therefore, for demersal crustacean fisheries results shown in San Martin et al 2016 are referred exclusively to the industrial fleet. According to the stakeholders interviewed, this issue has been discussed in different



	occasions at the Management Committee. Different options have been discussed, but it was not until 2017 when the first observer from IFOP could get on board an artisanal vessel (Trauwung I). 8 fishing trips were observed during 2017, representing between 5 and 10% of all fishing trips performed by the whole artisanal fleet (6 vessels) that year.
	The Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017) applies to both industrial and artisanal fleet. This Resolution establishes that all bycatch shall be identified and quantified before they can be returned to the sea (in the case of the common hake those catches will be quantified to be discounted against the hake quota, its discards are regulated as in the case of target species –see progress on condition 2-). Further, those discards shall be reported in the logbooks. Non-compliance with the previous measures will be illegal and susceptible to be sanctioned in accordance to the National Fishing Law. Apart from the above detailed management measures, the effectiveness of the reduction plan shall be monitored and adjusted in the case discards are not reduced. Therefore, it is mandatory for the industrial and artisanal fleet to allow the presence of scientific observers. The coverage will gradually increase until achieving a full coverage in 2019 (i.e. all vessels will get an observer on board at least once throughout the fishing season). IFOP confirmed that negotiations with the artisanal fleet are still in place to achieve 50% coverage of the fishing fleet (i.e. 3 observed vessels).
	However this Plan for the reduction of discards has not yet been implemented as Sernapesca has to adopt the measures to enforce it. During the site visit the assessment team checked that Sernapesca is working on the fishery-specific Resolutions to implement onboard surveillance systems using cameras (for more details see section 2.6 on Compliance). During the site visit the client provided evidence of their attendance to two meetings organized by Sernapesca in Valparaíso (23rd of March 2017) and Coquimbo (3rd of August of 2017) to explain details on the implementation of the system in demersal crustaceans fleet in the VIII Region. Also, during the site visit different stakeholders (client, IFOP, Sernapesca) confirmed that fishers are already recording discards in their official logbooks, which are later reported to Sernapesca. However, no evidence was collected confirming that fishers are effectively providing a full account of common hake discards in their logbooks.
Progress on Condition (2SA)	Zilleruelo et al 2018 confirmed that 8 fishing trips were observed on board one artisanal vessel (the entire artisanal fleet is comprised by 6 vessels). This report also provides separate statitics of landings for industrial and artisanal fleets.
	In 2019, the observer coverage for the artisanal fleet is expected to increase
	IFOP annual report on the monitoring of the fisheries targeting demersal crustaceans provides a detailed account of the species composition of the catches (Zilleruelo et al 2019 accounts results for 2018), while the annual report on discards and incidental catches (Escobar et al 2019a) provides a thoughtful account of the discarded fraction, including the spatial-temporal patterns and the reasons for discarding.
Progress on Condition (3SA)	The observer program has incorporated samplings on board the artisanal fleet since 2017, and the coverage of this fleet has increased sufficiently in recent years (see table 5.2.5.1 for a detailed account of the observer coverage during 2018). Zilleruelo et al 2019 states that: " <i>During the 2018 fishing season, scientific observers embarked on 303 fishing trips, representing an increase of 15% over the previous year. Of the total trips, 35 correspond to the artisanal fleet, with an improvement in the general sampling coverage"</i> . Observer coverage for the discarded fraction in 2018 are presented in Table 5.2.5.2 . Results on the catch composition in 2018 of the fleet targeting nylon shrimp were presented in section 4.2.7.2.1 , while details on the discarded fraction of this fleet were presented in section 4.2.7.3.2 .



Table 5.2.5.1. Observed fishing trips in 2018 (IFOP) against the total fishing trips targeting demersal crustaceans in 2018 (Control de Cuotas). Data are presented for ZCN (Zona Centro-Norte) and ZCS. Observer coverage (% cobertura) is presented at the bottom row. Source: Zilleruelo et al 2019

	Flota	Zona	Zona	Total
	Tiota	Centro-Norte	Centro-Sur	TOtal
	Industrial	46	242	268
IFOP	Artesanal	35	0	35
	Total	81	242	303
Control	Industrial	208	858	969
Cueta	Artesanal	449	64	513
	Total	657	922	1482
	% Cobertura	12%	26%	20%

Table 5.2.5.2. % observer coverage for discards on board the fleet targeting nylon shrimp in 2018. Source. Escobar et al 2019a.

Camarón nailon						18
Cobe	ertura de v	viajes y lan	ces flota in	dustrial		[N
	2014	2015	2016	2017	2018	
Cobertura de viajes	25%	19%	14%	24%	16%	
Cobertura de lances	6%	18%	17%	18%	23%	

Further, the cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020. However, the artisanal fleet still has 3 years before it is also mandatory for them. The team could check that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans. The implementation of the EMS will help to ensure to compliance with recent regulations on the discarded fraction, and will improve quantification of the discards, even when the fishing trips without observers (all discards shall be shown to the cameras and shown before releasing them back to the sea and records taken at the electronic logbook).

The progress on this condition was found to be AHEAD TARGET since the on-board sampling programs has been maintained since 2016, so sufficient data on the industrial and artisanal fleets is being collected to detect any increase in risk level to main bycatch species in the artisanal fleet targeting nylon shrimp. Further, the implementation of the EMS will help to ensure enforcement with recent regulations on discarding. Thus, the condition is CLOSED and PI 2.1.3 was re-scored (see section 5.4).

The client action plan prepared by the client was:

At the first annual audit we will provide evidence to the auditors that we have reviewed with our members, SUBPESCA and IFOP the issue of data collection for the retained catch in the artisanal nylon shrimp fishery.

At the second annual audit, we will provide the auditors with evidence that mechanisms for collecting data on the retained catch in the Chilean artisanal nylon information shrimp fishery have been defined.

> At the third annual audit we will present the auditors with evidence that the data have been collected and continues to be collected for the retained catch in the Chilean artisanal nylon shrimp fishery.

> At the fourth annual audit we will provide evidence that the collected data has been used in up-dated stock assessments for some fish stocks.





Status

Additional

5.2.6 Condition 6 (UoAs 4 & 7)

Performance Indicator	2.1.3
Score	70
Justification extracted from the PCR	b. Data are not recorded by IFOP from the artisanal fishery. Although it can be assumed that catch is qualitatively similar to the industrial catch, the assumptiondoes not hold for quantitative information. Other rationale for b and d are as for the industrial fishery in the northern units.
Condition	By the fourth annual surveillance audit, the following SG80 SIs must be met: - Qualitative information and some quantitative information should be available on the amount of main retained species taken by the Yellow Squat Lobster and Red Squat Lobster Artisanal Fisheries. - Information should be sufficient to estimate outcome status with respect to biologically based limits, in particular with respect to discards in the Yellow Squat Lobster and Red Squat Lobster Artisanal Fisheries. -Sufficient data should continue to be collected to detect any increase in risk level to main retained species in the Yellow Squat Lobster and Red Squat Lobster Artisanal Fisheries
Milestones	At the first annual audit, the client will present the CAB with evidence that there has been consideration of the options for col lecting data on the amount of main retained species taken by the langostina Artisanal Fishery. The score will not change on completion of this milestone. At the second annual audit, the client will present the CAB with evidence that a mechanism to collect data on the amount of main retained species taken by the langostina Artisanal Fishery has been designed. The score will not change on completion of this milestone. At the third annual audit, the client will present the CAB with evidence that a mechanism to collect data on the amount of main retained species taken by the langostina Artisanal Fishery has been designed. The score will not change on completion of this milestone. At the third annual audit, the client will present the CAB with evidence that a mechanism to collect data on the amount of main retained species taken by the langostina Artisanal Fishery has been implemented. The score will not change on completion of this milestone. At the fourth annual audit, the client will present the CAB with evidence to show that data on main retained species in the langostina Artisanal Fishery has been collected and analysed. These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the fourth annual audit the required minimum score is 80.
Consultation on condition	Letters from SUBPESCA, SERNAPESCA and IFOP. (Appendix 6, PCR).
Progress on Condition (1SA)	Mainly because of habitability reasons the artisanal fleet targeting demersal crustaceans could not be included in the research program for discards implemented by IFOP between 2013 and 2015. Therefore, for demersal crustancean fisheries results shown in San Martin et al 2016 are referred exclusively to the industrial fleet. According to the stakeholders interviewed, this issue has been discussed in different occasions at the Management Committee. Different options have been discussed, but it was not until 2017 when the first observer from IFOP could get on board an artisanal vessel (Trauwung I). 8 fishing trips were observed during 2017, representing between 5 and 10% of all fishing trips performed by the whole artisanal fleet (6 vessels) that year. The Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017) applies to both industril and artisanal fleet. This Resolution establishes that all bycatch shall be identified and quantified before they can be returned to the sea (in the case of the common hake



		those catches will be quantified to be discounted against the hake quota, its discards are regulated as in the case of target species –see progress on condition 2-). Further, those discards shall be reported in the logbooks. Non-compliance with the previous measures will be illegal and susceptible to be sanctioned in accordance to the National Fishing Law. Apart from the above detailed management measures, the effectiveness of the reduction plan shall be monitored and adjusted in the case discards are not reduced. Therefore, it is mandatory for the industrial and artisanal fleet to allow the presence of scientific observers. The coverage will gradually increase until achieving a full coverage in 2019 (i.e. all vessels will get an observer on board at least once throughout the fishing season). IFOP confirmed that negotiations with the artisanal fleet are still in place to achieve 50% coverage of the fishing fleet (i.e. 3 observed vessels).
		However this Plan for the reduction of discards has not yet been implemented as Sernapesca has to adopt the measures to enforce it. During the site visit the assessment team checked that Sernapesca is working on the fishery-specific Resolutions to implement onboard surveillance systems using cameras (for more details see section 2.6 on Compliance). During the site visit the client provided evidence of their attendance to two meetings organized by Sernapesca in Valparaíso (23 rd of March 2017) and Coquimbo (3 rd of August of 2017) to explain details on the implementation of the system in demersal crustaceans fleet in the VIII Region. Also, during the site visit different stakeholders (client, IFOP, Sernapesca) confirmed that fishers are already recording discards in their official logbooks, which are later reported to Sernapesca. However, no evidence was collected confirming that fishers are effectively providing a full account of common hake discards in their logbooks.
Progress Condition (2SA)	on	Zilleruelo et al 2018 confirmed that 8 fishing trips were observed on board one artisanal vessel (the entire artisanal fleet is comprised by 6 vessels). This report also provides separate statitics of landings for industrial and artisanal fleets.
		IFOP annual report on the monitoring of the fisheries targeting demorsal crustaceans
		provides a detailed account of the species composition of the catches (Zilleruelo et al 2019 accounts results for 2018), while the annual report on discards and incidental catches (Escobar et al 2019a) provides a thoughtful account of the discarded fraction, including the spatial-temporal patterns and the reasons for discarding.
Progress Condition (3SA)	on	The observer program has incorporated samplings on board the artisanal fleet since 2017, and the coverage of this fleet has increased sufficiently in recent years (see table 5.2.6.1 for a detailed account of the observer coverage during 2018). Zilleruelo et al 2019 states that: " <i>During the 2018 fishing season, scientific observers embarked on 303 fishing trips, representing an increase of 15% over the previous year. Of the total trips, 35 correspond to the artisanal fleet, with an improvement in the general sampling coverage"</i> . Observer coverage for the discarded fraction in 2018 are presented in Table 5.2.6.2 . Results on the catch composition in 2018 of the fleet targeting nylon shrimp were presented in section 4.2.7.2.1 , while details on the discarded fraction of this fleet were presented in section 4.2.7.3.2 .
		Table 5.2.6.1 . Observed fishing trips in 2018 (IFOP) against the total fishing trips targeting demersal crustaceans in 2018 (Control de Cuotas). Data are presented for ZCN (Zona Centro-Norte) and ZCS. Observer coverage (% cobertura) is presented at the bottom row. Source: Zilleruelo et al 2019



			FI	lota	Zona Centro-Nor	te	Zona Centro-Sur	Тс	otal	
			Indu	ustrial	46		242	20	68	
		IFOP		sanal	35		0	3	5	
			Т	otal	81		242	30	03	
		Control	Indu	ustrial	208		858	96	69	
		Cuota	Arte	sanal	449		64	5	13	
		Cuola	Т	otal	657		922	14	.82	
			% <mark>Co</mark>	bertura	12%		26%	20)%	
	Table 5.	2.6.2. % observ	ver cove	rage for di Source	iscards on boa . Escobar et a	ard the	e fleet targeting 9a.	g nylon s	shrimp in 2	2018.
		Camarón nai	lon			G				
			Cobe	rtura de v	ajes y lances	flota	industrial	2018	- //	
		Cobertura de v	viajes	25%	19%	14%	24%	16%		
		Cobertura de la	ances	6%	18%	17%	18%	23%		
									1	
	Further, t performir 2020. Ho them. Th images implement on the dist the fishin shown bo logbook).	the cameras ng the site vi owever, the e team could recorded o ntation of the scarded frac ng trips withous efore releas	on bo sit. The artisan d checl on boa e EMS etion, an out obs ing the	ard the e regula al fleet k that Se ard the will help nd will in servers (em back	AIP industri tion on EMS still has 3 y rnapesca s fleet targ to ensure t nprove qua all discards to the sea	ial fle S is i years starte geting to co ntific s sha i and	eet was com in force sinc s before it is ed to review g demersal ompliance with ation of the all be shown I records tal	pleted e the fi and re and re crust ith rece discarc to the ken at	at the ti irst of Ja mandato port abo aceans. ent regul ds, even camera the elec	ime of inuary ory for out the The ations when is and ctronic
Status	The prog sampling industrial main byc Further, t regulation scored (ress on this programs and artisan atch species the impleme ns on disca see section	condition has be al fleet s in the ntation rding. 5.4) .	on was f een mai s is bein e artisar of the E Thus, th	ound to be ntained sin g collected al fleet targ EMS will he ne condition	AHE to de geting p to n is	AD TARGE 2016, so su etect any ind g red and y ensure enfo CLOSED and	T since ufficient crease ellow s orceme nd PI 2	e the on- t data c in risk le quat lob ent with r 2.1.3 wa	board on the evel to osters. recent as re-
Additional information	The clien At the firs our memb artisanal s At the sec collecting defined. At the thi been col artisanal At the fou up-dated s	t action plan t annual audit bers, SUBPES squat lobster f cond annual a data on the re rd annual au lected and c squat lobste rth annual au stock assessr	preser t we will SCA and ishery. audit, we etained dit we continu- er fisher dit we v nents fo	nted by the l provide d IFOP the e will pro- catch in will pres es to be ry. will provide pr some f	he client wa evidence to be issue of da vide the auc the Chilean ent the aud collected de evidence ish stocks.	ata co ditors artisa litors for th that t	auditors that ollection for th with evidenc anal squat lob with evidenc he retained the collected	we have ne retair se that n oster fish ce that catch i data ha	e reviewe ned catch nechanis hery have the data in the C as been u	ed with i in the ms for e been a have hilean used in

5.2.7 Condition 7 (UoAs 1 & 2)

Performance Indicator	2.2.3
Score	75
Justification extracted from the PCR	d Catch composition of the nylon shrimp fisheries is routinely monitored by IFOP annual surveys. Nevertheless it is known that discards occur before catch is taken on deck and information collected by IFOP underestimates bycatch. Thus, these data would not detect any increase in risk to main bycatch species Aconcagua and Chilean grenadiers.
Condition	By the fourth annual surveillance audit, the following SG80 SIs must be met: - Information should be sufficient to estimate outcome status with respect to biologically based limits, in particular with respect to discards in the Nylon Shrimp Industrial and Artisanal Fisheries.
	-Sufficient data should continue to be collected to detect any increase in risk level to main retained species in the Nylon Shrimp Industrial and Artisanal Fisheries.
	At the first annual audit, the client will present the CAB with evidence that there has been consideration of the options to ensure that sufficient data continue to be collected to detect any increase in risk to main bycatch species in the Nylon Shrimp Industrial and Artisanal Fisheries. The score will not change on completion of this milestone. At the second annual audit, the client will present the CAB with evidence that a mechanism to ensure that sufficient data continue to be collected to detect any increase in risk to main bycatch species in the Nylon Shrimp Industrial and Artisanal Fisheries has been designed. The score will not change on completion of this milestone.
Milestones	At the third annual audit, the client will present the CAB with evidence that a mechanism to ensure that sufficient data continue to be collected to detect any increase in risk to main bycatch species in the Nylon Shrimp Industrial and Artisanal Fisheries has been implemented. The score will not change on completion of this milestone. At the fourth annual audit, the client will present the CAB with evidence to show that sufficient data continue to be collected to detect any increase in risk to main bycatch species in the Nylon Shrimp Industrial and Artisanal Fisheries
	These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the fourth annual audit the required minimum score is 80.
Consultation on condition	Letters from SUBPESCA, SERNAPESCA and IFOP. (Appendix 6, PCR).
Progress on Condition (1SA)	One of the specific objectives pursued by the research program on discards and incidental catches on demersal crustacean fisheries developed by the IFOP since 2013 was to implement and improve methodologies which allow to record and assess catch species composition, including the discarded fraction. The Final Report (San Martin et al 2016) accounts for the results obtained between 2013 and 2015 (although a new report is being prepared with data from 2016). This report provides exhaustive and comprehensive information in relation to discards of target, bycatch and discarded species. Data was collected on board industrial fishing vessels between April 2013 and December 2015 by 15 different observers. A total of 526 fishing trips were sampled. The discarded fraction in the nylon shrimp industrial fishery varied from 25% in 2013 to 21% in 2015. Two different approaches were used to estimate discards, but results were not significantly different. The cause of the discards was also investigated, in the case of the grenadiers discards were due to economic reasons (no commercial value).



Mainly because of habitability reasons the artisanal fleet targeting demersal crustaceans could not be included in the research program for discards implemented by IFOP between 2013 and 2015. Therefore, for demersal crustancean fisheries results shown in San Martin et al 2016 are referred exclusively to the industrial fleet. According to the stakeholders interviewed, this issue has been discussed in different occasions at the Management Committee. Different options have been discussed, but it was not until 2017 when the first observer from IFOP could get on board an artisanal vessel (Trauwung I). 8 fishing trips were observed during 2017, representing between 5 and 10% of all fishing trips performed by the whole artisanal fleet (6 vessels) that year. IFOP confirmed that negotiations with the artisanal fleet are still in place to achieve 50% coverage of the fishing fleet (i.e. 3 observed vessels).

Aconcagua grenadier and common hake were the two most common species among the discarded fraction, comprising 62% and 17% respectively. Table 2.2.3.1 shows the estimated discarded volumes per species.

Table 2.2.3.1. Discarded species in trawlers targeting nylon shrimp. Columns: common name; sicientific name; estimated discards (t); % compared to the total discarded fraction; N^o hauls presenting that species; % of hauls presenting that species. Source: San Martin et al 2016

Nambra aamún	Nombro ciontífico	Estimación	Proporción	Lances con	Proporción
Nombre comun	Nombre científico	Descarte (t)	(%)	presencia	Lances (%)
Granadero aconcagua	Caelorinchus aconcagua	550.1	62.2	22	85
Merluza común	Merluccius gayi	149.3	16.9	26	100
Lenguado de ojo grande	Hippoglossina macrops	61.9	7.0	24	92
Pequen espinoso	Psammobatis scobina	18.2	2.1	20	77
Tollo negro raspa	Centroscyllium granulatum	17.1	1.9	14	54
Jaiba paco	Mursia gaudichaudi	13.1	1.5	26	100
Granadero chileno	Coelorinchus chilensis	11.7	1.3	7	27
Crustáceos		30.0	1.9	3 a 23	11 a 88
Condrictios		24.5	2.8	6 a 13	23 a 50
Peces óseos		16.8	1.9	1 a 14	4 a 54
Moluscos		4.0	0.4	1 a 16	4 a 61
Cnidarios		0.3	0.0	2 a 3	8 a 11
Equinodermos		0.2	0.0	1 a 5	4 a 19

The sampling effort has been maintained during 2016 and the report with the updated results is about to be published as confirmed by the IFOP and SUBPESCA representatives during the site visit.

The results of this research program have serve as the basis to design the Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017). This Resolution also regulates unwanted catches, establishing that all bycatch shall be identified and quantified before they can be returned to the sea (in the case of the common hake those catches will be quantified to be discounted against the hake quota, its discards are regulated as in the case of target species –see progress on condition 2-). Further, those discards shall be reported. Non-compliance with the previous measures will be illegal and susceptible to be sanctioned in accordance to the National Fishing Law. Apart from the above detailed management measures, the effectiveness of the reduction plan shall be monitored and adjusted in the case discards are not reduced. Therefore, it is mandatory for the industrial and artisanal fleet to allow the presence of scientific observers. The coverage will gradually increase until achieving a full coverage in 2019 (i.e. all vessels will get an observer on board at least once throughout the fishing season).

However this Regulation has not yet been implemented as Sernapesca has to adopt the measures to enforce it. During the site visit the assessment team checked that Sernapesca is working on the fishery-specific Resolutions to implement onboard surveillance systems using cameras (for more details see section 2.6 on Compliance). During the site visit the client provided evidence of their attendance to



two meetings organized by Sernapesca in Valparaíso (23rd of March 2017) and Coquimbo (3rd of August of 2017) to explain details on the implementation of the system in demersal crustaceans fleet in the VIII Region. Also, during the site visit different stakeholders (client, IFOP, Sernapesca) confirmed that fishers are already recording discards in their official logbooks, which are later reported to Sernapesca. However, no evidence was collected confirming that fishers are effectively providing a full account of their discards in the logbooks.

The Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017) has not been implemented, since Sernapesca is still working in setting the conditions to ensure its monitoring and enforcement. Despite the implementation of the system based on the cameras on board is somewhat delayed in relation to what was planned, the team could verify that the necessary steps are being taken for their implementation, including tenders and complex consultation periods (consult the **section 2.6** of the report for more details). In the case of the demersal crustacean fisheries the system is expected to start running in July-August. However, a moratoria in the enforcement of sanctions will be applied until the system has been tuned.

In any case, the on board observer program derived from the research plan on discards has been maintained throughout these years. This has allow keeping providing detailed estimates on the discards occurring in the different demersal crustaceans fisheries. The levels of sampling coverage reached in these fisheries (close to 20%, see table below) were high, which allowed obtaining acceptable levels of uncertainty associated with the main species.

		2014	2015	2016	2017
Nylon shrimp	Trip coverage	25%	19%	14%	24%
	Haul coverage	6%	18%	17%	18%
Red squat lobster	Trip coverage	25%	25%	19%	19%
	Haul coverage	17%	22%	19%	17%
Yellow squat lobster	Trip coverage	13%	23%	19%	17%
	Haul coverage	25%	24%	23%	22%

Table 1.2.3.1. Sampling coverages performed on board as part of the research plan on discards

This program has allowed to obtain reliable estimates of the discarded fraction corresponding to the target species in the nylon shrimp fishery. **Table 2-5** presented in section 2.9 shows the composition of the discards from the nylon shrimp fishery (Escobar et al 2018). Since 2017 the artisanal fleet is also included in this sampling program as explained in the progress on the previous year (see above).

The annual reports on discards prepared by IFOP provide also detailed analyses on the spatial-temporal trends of the discards, size of the discarded individuals from target species, causes of the discards, and even on the places on board where the discards are taking place

This sampling was also maintained in 2018 and 2019, ensuring the continuity of the data. From 2019 onwards, these estimations are expected to be based on the information collected with the cameras on board.

Progress Condition (3SA) on IFOP annual report on the monitoring of the fisheries targeting demersal crustaceans provides a detailed account of the species composition of the catches (Zilleruelo et al 2019 accounts results for 2018), while the annual report on discards and incidental



Progress

Condition (2SA)

on

catches (Escobar et al 2019a) provides a thoughtful account of the discarded fraction, including the spatial-temporal patterns and the reasons for discarding.

The observer program has incorporated samplings on board the artisanal fleet since 2017, and the coverage of this fleet has increased sufficiently in recent years (see **table 5.2.7.1** for a detailed account of the observer coverage during 2018). Zilleruelo et al 2019 states that: "*During the 2018 fishing season, scientific observers embarked on 303 fishing trips, representing an increase of 15% over the previous year. Of the total trips, 35 correspond to the artisanal fleet, with an improvement in the general sampling coverage"*. Observer coverage for the discarded fraction in 2018 are presented in **Table 5.2.7.2.** Results on the catch composition in 2018 of the fleet targeting nylon shrimp were presented in **section 4.2.7.2.1**, while details on the discarded fraction of this fleet were presented in **section 4.2.7.3.2**.

Table 5.2.7.1. Observed fishing trips in 2018 (IFOP) against the total fishing trips targeting demersal crustaceans in 2018 (Control de Cuotas). Data are presented for ZCN (Zona Centro-Norte) and ZCS. Observer coverage (% cobertura) is presented at the bottom row. Source: Zilleruelo et al 2019

	Flota	Zona Centro-Norte	Zona Centro-Sur	Total
	Industrial	46	242	268
IFOP	Artesanal	35	0	35
	Total	81	242	303
Control	Industrial	208	858	969
Curata	Artesanal	449	64	513
Cuola	Total	657	922	1482
	% Cobertura	12%	26%	20%

Table 5.2.7.2. % observer coverage for discards on board the fleet targeting nylon shrimp in 2018.Source. Escobar et al 2019a.

Camarón nailon						/ K
Cobe	ertura de v	viajes y lan	ces flota in	dustrial		(1)X
	2014	2015	2016	2017	2018	
Cobertura de viajes	25%	19%	14%	24% 🧹	16%	
Cobertura de lances	6%	18%	17%	18%	23%	

Further, the cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020 (artisanal vessels will also be subject to this regulation within the next 3 years). The team could check that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans. The implementation of the EMS will help to ensure to compliance with recent regulations on the discarded fraction, and will improve quantification of the discards, even when the fishing trips without observers (all discards shall be shown to the cameras and shown before releasing them back to the sea and records taken at the electronic logbook).

The progress on this condition was found to be **AHEAD TARGET** since the on-board sampling programs has been maintained since 2016, so sufficient data on the industrial and artisanal fleets is being collected to detect any increase in risk level to main bycatch species caught by the industrial and artisanal fleets targeting nylon shrimp. Further, the implementation of the EMS will help to ensure enforcement with recent regulations on discarding. Thus, the condition is **CLOSED** and **PI 2.2.3 was re-scored (see section 5.4)**.

Additional information The client action plan presented by the client was:



Status

At the first annual audit we will provide evidence to the auditors that we have reviewed with our members, SUBPESCA and IFOP the issue of data collection for the by catch in the Nylon Shrimp Industrial and Artisanal Fisheries

At the second annual audit, we will provide the auditors with evidence that mechanisms for collecting data on the by catch in the Nylon Shrimp Industrial and Artisanal Fisheries have been defined.

At the third annual audit we will present the auditors with evidence that the data have been collected and continues to be collected for the by catch in the Nylon Shrimp Industrial and Artisanal Fisheries.

At the fourth annual audit we will provide evidence that the collected data has been used in up-dated stock assessments for some fish stocks.

5.2.8 Condition 8 (All UoAs)

Performance Indicator	2.3.3
Score	75
Justification extracted from the PCR	c. The use of the new gear is only in place for one year and there is a need to evaluate performance to measure trends and support a full strategy to manage impacts on ETP species in particular for coral. The use of the new gear is also forcing changes in the areas of operation so information needs to be collected in these areas to support a strategy.
	By the fourth annual surveillance audit, the following SG80 SIs must be met:
Condition	-Sufficient data should be collected to measure trends and support a full strategy to manage impacts on ETP species in particular corals.
Milestones	At the first annual audit, the client will present the CAB with evidence that there has been consideration of the options to collect data to measure trends and support a full strategy to manage impacts on ETP species in particular corals. The score will not change on completion of this milestone. At the second annual audit, the client will present the CAB with evidence that a mechanism has been designed to collect data to measure trends and support a full strategy to manage impacts on ETP species in particular corals. The score will not change on completion of this milestone. At the third annual audit, the client will present the CAB with evidence to show that a mechanism has been designed to collect data to measure trends and support a full strategy to manage impacts on ETP species in particular corals. The score will not change on completion of this milestone. At the third annual audit, the client will present the CAB with evidence to show that a mechanism has been designed to collect data to measure trends and support a full strategy to manage impacts on ETP species in particular corals has been implemented. The score will not change on completion of this milestone. At the fourth annual audit, the client will present the CAB with evidence to show that data to measure trends and support a full strategy to manage impacts on ETP species in particular corals has been implemented. The score will not change on completion of this milestone. At the fourth annual audit, the client will present the CAB with evidence to show that data to measure trends and support a full strategy to manage impacts on ETP species in particular corals has been collected and analyzed. These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the fourth annual audit the required minimum score is 80.
Consultation on condition	Letters from SUBPESCA, SERNAPESCA and IFOP. (Appendix 6, PCR).
Progress on Condition (1SA)	One of the specific objectives pursued by the research program on discards and incidental catches developed by the IFOP since 2013 was to quantify and perform a temporal-spatial analysis of incidental catches (seabirds, marine mammals and



turtles) and their causes, together with designing, implementing and testing a protocol for collecting significant information on this issue in the demersal crustacean fisheries (San Martín et al 2016).

The Final Report (San Martin et al 2016) accounts for the results obtained between 2013 and 2015 (although a new report is being prepared with data from 2016). This report provides exhaustive and comprehensive information in relation to discards of target and bycatch species, however results on incidental catches is derived from only 32 validated hauls. It is argued that: (i) scientific observers on board did not have enough time available to be devoted to these tasks, and (ii) the operational protocol is still under development and therefore data collected could not always be standardised. The report states that 6 seabird species interacted with the gear, but no fatalities occurred. It also states that that warp strikes occur when the vessel is shooting, but observation at this stage is compromised because of safety reasons. No other quantitative data is presented.

The Team considers that the progress of this condition should assess the information on a broader ETPs scope including marine mammals, seabirds... as the SG(c) makes reference to the full strategy, corals being one more species component.

During the site visit the 3 IFOP observers interviewed at the IFOP station in Coquimbo confirmed that they devote 1 haul/day to observe interactions with seabirds and marine mammals. They also confirm that they only record those individuals hauled on board in the net, although the number of interactions with warps or parts of the vessel (eg. lightening) are registered as trip comments, but not in the 'catch form'. There are a total of 9 observers available for the fleet targeting demersal crustaceans.

San Martin et al 2016 also stress the initial need for training the observers on these subjects. The report details the implementation 2 courses for the IFOP observers on seabird identification and marine mammal identification between 2013 and 2015 in Punta Arenas and another 2 in Talcahuano. Further, during the site visit got evidence that IFOP observers were recently trained in recognizing porphyry, cnidarians and echinoderms. Further, a first proposal of a protocol for collecting information on incidental catches is also annexed to the report, together with 3 different identification guides specifically developed for helping the observers and researchers on this task (Zilleruelo et al 2014, Albatross Task Force 2014, Reyes & Hüne 2015). This protocol is focused on standardizing the collection of information on interactions and sightings of seabirds, marine mammals and turtles, but there is no mention on how to collect information on corals (the identification guides mentioned above do not include coral species neither).

During the site the IFOP representatives interviewed in Valparaíso during the site visit confirmed that during the Management Committee meetings the fishing companies demanded training on these issues from IFOP. Therefore, within the framework of the research program on discards they developed a poster to facilitate the identification of sharks, rays, and some fish species (see **Appendix 4**). These posters and the identification guide from Zilleruelo et al (2014) were distributed among the fleet targeting demersal crustaceans. The observers interviewed during the site visit confirmed these materials are on board and that some fishers are using them.

The audit team approves of recent initiatives toward reducing the level of discarding of target species through implementation of the Plan for the reduction of discards in fisheries targeting demersal crustaceans (Resolution 1106 issued on the 29th of March 2017). This Resolution also regulates incidental (unwanted) catches, establishing that all individuals incidentally caught (they will only be considered as such those individuals affected by the fishing gear and brought on board) shall be identified and quantified before they can be returned to the sea. Those individuals alive shall be released as soon as possible, but previous identification and quantification is still a requirement (in the case of marine mammals, turtles or seabirds individuals which are severe injured they shall be retained on board so they can be





	delivered to a wildlife recovery center). Further, those interactions shall be reported. Non-compliance with the previous measures will be illegal and susceptible to be sanctioned in accordance to the National Fishing Law. Apart from the above detailed management measures, the research programme shall develop and implement standardized methodologies to monitor incidental catches and interactions. Therefore, it is mandatory for the industrial and artisanal fleet to allow the presence of scientific observers. The coverage will gradually increase until achieving a full coverage in 2019 (i.e. all vessels will get an observer on board at least once throughout the fishing season).
	However this Regulation has not yet been implemented as Sernapesca has to adopt the measures to enforce it. During the site visit the assessment team checked that Sernapesca is working on the fishery-specific Resolutions to implement onboard surveillance systems using cameras (for more details see section 2.6 on Compliance). During the site visit the client provided evidence of their attendance to two meetings organized by Sernapesca in Valparaíso (23 rd of March 2017) and Coquimbo (3 rd of August of 2017) to explain details on the implementation of the system in demersal crustaceans fleet in the VIII Region.
	In summary, results on incidental catches are still too fragmentary and scarce: 32 hauls from the research program on discards performed by IFOP. However, data collected can be used to develop a management strategy (a validated standardised protocol for collecting info would constitute the first stage). Specific training has been provided to observers in these last years. However, the percentage of observed hauls for incidental catches is still reduced and current methodology is leaving behind warp and lightning strikes in the case of the seabirds. Although the implementation of the surveillance system based on cameras on board will allow to enforce the discard plan triggering a detailed collection on discards of target and bycatch species, in the case of incidental catches the work developed by the observers is essential as most of the times the individuals may not come on board.
	The reason to make a specific mention to corals in this PISG was the possibility that "() The use of the new gear is also forcing changes in the areas of operation so information needs to be collected in these areas to support a strategy". Due to the characteristics of the gear used it will be difficult that corals can be detected on board in the case of interactions happen. No mentions to corals can be found in San Martin et al 2016, despite during the site visit IFOP ensured that corals are recorded in the case of interaction, as it happened in 2016 (results still not available). Therefore, to assess the issue raised during the initial assessment would be necessary to use geographical information on the fishing activity of the certified fleet. The modification of the milestones on Condition 9 will force the client to present detailed spatial-temporal information on the fishing activity of the certified fleet. That information will also be considered to assess progress on this condition.
	The client has signed an agreement to collaborate with the Universidad Catolica del Norte (UCN). Among other objectives, mostly aimed to improve the biological monitoring of the fishery, it is stated that the agreement will allow to determine the potential interactions of fisheries with incidental species such as turtles, birds and marine mammals (Art. 2 - 21 bis LGPA)
Progress on Condition (2SA)	The client (and the entire Chilean demersal crustacean fleet) has collaborated implementation of the on-board cameras (1 meeting with Sernapesca was held at a regional level during 2018). The protocols are ready for this fishery and the system is expected to start operating during current year (2019). This system will provide evidence of any fatality occurring to turtles, marine mammals, seabirds or habitat forming species.
	Results included in latest reports on the research plan on discards and incidental catches (Bernal et al 2017 and Escobar et al 2018) clearly show that more effort on quantifying and analyzing incidental catches with birds, turtles and marine mammals



		has been placed since 2016. Observers have been specifically trained, more detailed records are being taken (including spatial-temporal trends), and historic trends are starting to be analyzed. Besides, in 2018 two studies were developed through expert external consultancies (birds and marine mammals) mainly oriented to: (i) evaluate catches and interactions; (ii) describe the characteristics of the life history and distribution of the species and the operation of the fleet; (iii) evaluate the interactions; (iv) review and evaluate mitigation measures and assess knowledge gaps. As part of these studies, the distribution and abundance of birds and marine mammals was studied, cartographied and compared against fishery data (i.e. spatio-temporal distribution of the fishing effort, interactions recorded). In the case of the common sea lion, the team was informed that a new aerial census has been recently performed (actually, it was finished while our site visit was taking place). This effort correspond to the fact, by 2022, all fisheries exporting to the US will have to meet the requirements stated in the US Marine Mammal Protection Act. Finally, during the site visit Subpesca confirmed that a new regulation establishing conservation measures for the seabirds has already been discussed and approved at the Regional Advisory Councils (Consejos Zonales) and it is expected to be in issued and enforced this year (2019). This regulation will details a set of good practices on board to be undertaken by the different fleets, including the mandatory use of taxing the site visit was taken by the different fleets, including the mandatory
		Finally, the team considers that corals are VME-forming species and therefore the impact of the UoA on corals shall be assessed as a habitat component better than as an ETP component.
		Results included in latest reports on the research plan on discards and incidental catches (Escobar et al 2019a), clearly show the commitment on behalf the Chilean authorities to keep quantifying and analyzing incidental catches with birds, turtles and marine mammals. The observers are recording detailed data, and IFOP is analyzing spatial-temporal trends of the interactions and starts to apply models to estimate the total impacts on seabirds and sea lions based on the observed samplings (Bernal et al 2017, Escobar et al 2018, Escobar et al 2019a).
		The cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020 (artisanal vessels will also be subject to this regulation within the next 3 years). The team could check that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans.
	Progress or Condition (3SA)	IFOP observers on board the fleet targeting demersal crustaceans have only identified Spongia sp and Escleractinas as habitat-foming species that might turn up in the catches of this fleet (Zilleruelo et al 2019). However, no quantities and/or frequency of encounters are provided. During the site visit Zilleruelo confirmed that this species appears on the deck very rarely on deck and always in small quantities. Further, the team considers that corals are VME-forming species and therefore the impact of the UoA on corals shall be assessed as a habitat component better than as an ETP component. The results compiled by Subpesca to elaborate the historical footprint of the Chilean trawl fisheries shows that all trawl fisheries operate in clearly demarked areas. As far as the fleet keeps operating within this area, it is clear that no interactions with corals will occur. In Chile, VMS system is mandatory for all fishing vessels above 12m length. The VMS data is regularly sent to Sernapesca, Subpesca and the Chilean Army. Further, Law 21.132/2019 determined that VMS data shall be publicly available, and the Chilean Government signed an agreement to make its vessel tracking data publicly available through the Global Fishing Watch (GFW) map, which tracks the movements of commercial fishing* vessels in near real-time.



Status	The progress on this condition is considered to be AHEAD TARGET since the client presented evidence that it is possible to measure trends and support a full strategy to manage ETP species and these data are being been analysed in annual final report on the monitoring of the fisheries targeting demersal crustaceans elaborated by IFOP. Thus, the condition is CLOSED and PI 2.3.3 re-scored (see section 5.4).
	The client action plan presented by the client was:
	At the first annual audit we will provide evidence to the auditors that we have met with relevant NGOs to gain their views on ETP issues related to the crustaceans fishery and we have held talks with SUBPESCA, IFOP and SERNAPESCA on the potential to develop a full strategy.
Additional information	At the second annual audit, we will provide the auditors with evidence that a mechanism to collect data on the interactions of the crustaceans fleet with ETP species has been designed. At the third annual audit we will present the auditors with evidence that a mechanism to collect data on the interactions of the crustaceans fleet with ETP species has been implemented.
	At the fourth annual audit we will present the auditors with an analysis of the data collected on the interactions of the crustaceans fleet with ETP species.

Performance Indicator	2.4.3
Score	75
Justification extracted from the PCR	Information on the spatial extent of interaction and the timing and location of use of the fishing gear is routinely collected by IFOP on industrial fisheries. But there is limited information on habitat structure and how it interacts with or be altered by the gear to identify the nature of the impacts. There is some information pointing out that there are negative effects from bottom trawl fisheries including the demersal crustacean fishery on benthic communities, but insufficient to make statements about the magnitude. Thus it is not considered that sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified. The fisheries do not meet SG80 Slb.
Condition	By the fourth annual surveillance audit, the following SG80 SIs must be met: Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.
Milestones	At the first annual audit, the client will present the CAB with evidence that there has been consideration of the options to collect data to allow the nature of the impacts of the fishery on habitat types to be identified. The score will not change on completion of this milestone. (REVISED AT 1SA) At the 2 nd annual audit, the client will present the CAB with evidence that spatial-temporal information on the fishing activity of the UoA is being collected to allow the scale of the impacts of the UoA on habitats to be identified. The score will not change on completion of this milestone. (REVISED AT 1SA) At the 3 rd annual audit, the client will present the CAB with evidence that the spatial and temporal scale of the impacts of the UoA on habitats can be identified. Score 80. At the fourth annual audit, the client will present the CAB with evidence to show that data to allow the nature of the impacts of the fishery on habitat types to be identified has been collected and analyzed.

5.2.9 Condition 9 (All UoAs)



	These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the fourth annual audit the required minimum score is 80.
	REVISED MILESTONE : At the 4 th annual audit, the client will present the CAB with evidence that the spatial and temporal scale of the impacts of the UoA on habitats can be identified. Score 80
Consultation on condition	Letters from SUBPESCA, SERNAPESCA and IFOP. (Appendix 6, PCR).
	Melo et al 2007 characterised the habitat types (and the communities associated to them) in areas between the III and X Regions where trawlers targeting common hake and demersal crustaceans operate. The study determined that 97.5% of the area where these fisheries take place correspond to sandy and muddy bottoms. The survey included trawl net, dredge, and dredger box corer and also video recording during trawls. Further, Yañez et al 2006 identified 118 seamounts and the relative fishing power (RFP) was evaluated for the seamounts close to the Juan Fernández Archipelago (orange roughy fishery). The data is restricted to a study area in which a range of fleets operate, however underwater photographs show characteristics attributable to the impact of bottom trawling methods. As far as the assessment team is concern no other similar studies have been performed more recently.
Progress on Condition (1SA)	The modified gear (introduced since 2014) is around 30% lighter and has a reduced door spread since bridles were reduced from 30m length (approximately since it was unregulated) to a maximum of 5m length (Queirolo pers. comm). However, as far as the assessment team is concern there are no specific studies determining the impact of this new gear on the habitats.
	The use of VMS is mandatory for the industrial fleet. These data are being systematically collected by Sernapesca and the Chilean Army as part of the MCS system. However, in the case of the certified fleet this information has not been mapped and analysed in order to provide a detailed spatial-temporal account of the fishing activity. This analysis would allow assessing the spatial extent of interaction, and the timing and location of use of the fishing gear. Further, in the case of the artisanal fleet the use of VMS is not mandatory, although in this case positions recorded at the logbooks are considered credible sources which would provide reliable spatial-temporal information on their fishing activities.
	During the audit no evidences were presented by the client regarding this condition.
	The client has signed an agreement to collaborate with the Universidad Catolica del Norte (UCN). Among other objectives, mostly aimed to improve the biological monitoring of the fishery, it is stated that the agreement will allow to determine the spatial-temporal distribution of the fishing activities of the certified fleet, integrating the VMS and logbook data available from this fleet.
Progress on Condition (2SA)	The recent analysis performed by Subpesca (Informe Tecnico RPESQ Nº09-2018, see above section 2.9 of current report) provides a detailed cartography of the joint footprint of the trawl fisheries targeting demersal resources between the Antofagasta Region and parallel 41º28,6'L.S (see Figure 2-53). Detailed cartography on the seamounts is also available in current regulation (DS687/2016).
	Articles 6A&B of the LGPA make provisions for further management requirements and protection measures to be afforded to VMEs (apart from existing protection measures on seamounts). There is evidence that Subpesca has been working on developing a proposal to regulate fishing operations on areas susceptible to VMEs (see section 2.9 for more details). The proposed regulation (Informe Tecnico RPESQ Nº154/2016) defines Vulnerable-habitat-forming species (see table 2-13), allowable thresholds, and a detailed protocol to operate on areas susceptible to VMEs (i.e. prior



	notification of the intent to operate in those areas, 100% observer coverage, 5NM move-on rule to be applied in those cases where more than 50kg of sponges or 30kg of corals come on board). However, prior to this regulation the Ministry shall establish a list of marine resources which their fisheries are susceptible to impact on VMEs, since those are fishing activities subject to the protocol. During the site visit it was confirmed that this list of marine resources susceptible to impact on VMEs is still to be developed. Zilleruelo et al 2018 lists all the species included in the catch composition of the demersal crustacean fisheries, and the only VME-forming species included in that list is the Stone Corals (Escleractinas). Mapping the spatial-temporal fishing activities of the certified fleet, together with the existing cartography on sea mounts and the footprint of the demersal trawl fisheries will help provide reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.
Progress on	Acuña et al (2020) attempts to account for the spatial-temporal pattern of the fishing effort exerted by the UoA. However, these preliminary results do not provide a full account of the UoA fishing effort against the historical footprint of the Chilean trawl fisheries. The authors recognize that further work is necessary in order to improve this preliminary data. VMS data will be cross-checked with data from the electronic logbooks on order improve the analysis.
Condition (3SA)	Recent Law 21.132/2019 determined that VMS data shall be publicly available, and the Chilean Government signed an agreement to make its vessel tracking data publicly available through the Global Fishing Watch (GFW) map, which tracks the movements of commercial fishing* vessels in near real-time. This transparency in relation to VMS data from Chilean fisheries should facilitate the task to be developed by the client.
Status	The progress on this condition is considered to be BEHIND TARGET since the report prepared by the UCN does not provide sufficient evidence that the spatial and temporal scale of the impacts of the UoA on habitats can be identified. A modified milestone is provided for the 4 th surveillance audit as a remedial action:
	evidence that the spatial and temporal scale of the impacts of the UoA on habitats can be identified. Score 80
Additional information	The client action plan prepared by the client was: At the first annual audit we will provide evidence to the auditors that we have met with relevant NGOs to gain their views on habitat issues related to the crustaceans fishery and we have held talks with SUBPESCA, IFOP and SERNAPESCA on the potential to develop better information. At the second annual audit, we will provide the auditors with evidence that a mechanism to collect data on the interactions of the crustaceans fleet with habitat has been designed. At the third annual audit we will present the auditors with evidence that a mechanism to collect data on the interactions of the crustaceans fleet with habitat has been designed.
	At the fourth annual audit we will present the auditors with an analysis of the data collected on the interactions of the crustaceans fleet on habitat.

5.2.10 Condition 10 (All UoAs)

Closed at the 1SA.

5.2.11 Condition 11 (All UoAs)

Closed at the 2SA.



5.2.12 Condition 12 (All UoAs)

Performance Indicator	3.2.3
Score	65
	a. IFOP conducts annual monitoring of the fisheries with observers on-board industrial operations, but they have no enforcement authority and there are no inspectors to implement monitoring, control and surveillance of fishing operations at sea. Thus, although landings are strictly monitored, illegal discards and under reporting are not monitored and compliance of management measures cannot be enforced. There have been no IFOP observers on board to monitor artisanal catch.
Justification extracted from the PCR	b. SUBPESCA confirms that sanctions for exceeding quotas have been applied in two cases recently. However in relation to discarding, it has been widely documented that discarding occurs in these fisheries, and because there is no inspection of fishing activity on board the vessels, there is no enforcement of the prohibition on discarding. So whilst in principle sanctions for non-compliance with discarding regulations exist, the lack of on board inspections means that such sanctions are not consistently applied and cannot be considered to provide effective deterrence.
	d. There is evidence of systematic discarding of target and non-target species in the demersal crustacean fisheries, which is illegal under current law.
	By the fourth annual surveillance audit, the following SG80 SIs must be met:
Condition	A monitoring, control and surveillance system should be implemented in the demersal crustacean fisheries on board of industrial and artisanal vessels and the system should demonstrate an ability to enforce relevant management measures and apply sanctions in particular in reference to unreported catch and discards.
Milestones	At the first annual audit, the client will present the CAB with evidence that there has been consideration of options for a monitoring, control and surveillance system to be implemented in the demersal crustacean fisheries on board of industrial and artisanal vessels and for the system to demonstrate an ability to enforce relevant management measures. The score will not change on completion of this milestone. At the second annual audit, the client will present the CAB with evidence that a mechanism has been designed for a monitoring, control and surveillance system to be implemented in the demersal crustacean fisheries on board of industrial and artisanal vessels and for the system to demonstrate an ability to enforce relevant management and apply sanctions. The score will not change on completion of this milestone. At the third annual audit, the client will present the CAB with evidence to show that a mechanism for a monitoring, control and surveillance system in the demersal crustacean fisheries on board of industrial and artisanal vessels has been implemented. The score will not change on completion of this milestone. At the fourth annual audit, the client will present the CAB with evidence to show that a mechanism for a monitoring, control and surveillance system in the demersal crustacean fisheries on board of industrial and artisanal vessels has been implemented. The score will not change on completion of this milestone. At the fourth annual audit, the client will present the CAB with evidence to show that a mechanism for a monitoring, control and surveillance system has been implemented in the demersal crustacean fisheries on board of industrial and artisanal vessels and that the system has demonstrate an ability to enforce relevant management measures and apply sanctions if required. These milestones provide incremental steps in achieving the conditions. Only when the final step is complete will the team be able to revise the score. By the fourth annual audit the required minimum score is 80.
Consultation on condition	Our inputs will be based on the on-going activities of the established Committees, IFOP and SUBPESCA. As such we do not need to consult on the implementation of this part of the client action plan, as this is based on internal actions (PCR).



	The auditors were able to check the publishing of the regulation regulating the compulsory use of on board image recording cameras in the Official Gazette on March 18th 2017, through Decree 76, 2015, which occurred after the fisheries certification.
Progress or Condition (1SA)	In accordance with the indications of Mr.Fernando Naranjo from the governmental body, Sernapesca, work is ongoing on several issues relating to the implementation of the fishing fleet's on board image recording system for auditing discards, which will come into force in November 2018, as explained in point 2.6 of this report.
	In addition to the above, Sernapesca gave presentations in Talcahuano on February 28th 2018 to communicate and educate on the implementation of the discard auditing system for the VIII Region bottom trawling demersal crustaceans fleet.
	The auditors were able to verify that despite the image recording cameras system not being operational to enable suitable discard auditing, substantial progress has been made towards their use, as indicated in point 2.6 of this report.
Progress or	With the aim of suitably implementing and operating image recording cameras, the ship-owners of fishing vessels used for catching demersal crustaceans provided SERNAPESCA with the requested information relating to the handling protocols for catches, discards, and bycatch for each of their vessels prior to the site visit,
Condition (2SA)	Additionally, SERNAPESCA provided training on the implementation of the discards auditing system in region IV on November 27th 2018 to representatives from the AIP and the companies that catch demersal crustaceans in the region.
	During a meeting with Mr. Fernando Naranjo, it was indicated that the image recording cameras were scheduled for implementation in the third quarter of 2019, which was confirmed by Undersecretariat for Fisheries staff at a meeting held during the site visit.
	In accordance with Sernapesca Resolution No. 5930 of 2019, the inspection of discards using an image recording system on board industrial vessels begins on January 1st 2020. The discard image recording system analysis centre was visited during the visit to the SERNAPESCA site, while attending the meeting to collect the background information required for this audit. It was found to be fully operational for all industrial fishery vessels, and it was possible to see the software that they were using to review the fishing hauls from a demersal crustacean trawler vessel during one month.
Progress or Condition (3SA)	Section 4.2.3.4 of this report indicates every regulation that SERNAPESCA needed to develop and publish to make this inspection tool a requirement. It also includes all the adaptations to administrative and management measures that SUBPESCA needed to apply to the prevent discards resulting from their own administrative measures.
	Lastly, in section 4.2.4, relating to compliance, there are details of the actions undertaken by SERNAPESCA to collect and analyse image data.
	As a result of the above, from the vessels corresponding to these UoAs, only 3 of them (Oriente, Chaffic I y Trauwung 1) does not have operational image recording cameras, given that in accordance with the national fishery regulation, it is classified as an artisanal ship, and in accordance with the law (Art. 6 of law 20657 point b), the requirement for image recording cameras for artisanal ships at least 15 metres long will be a requirement 3 years after the date the regulation regulating the activity is published.
	The regulation is contained in Decree No. 76 of 2015, published in the Official Gazette of March 18th 2017, which in its 1st temporary article repeats the legal regulation

	indicated earlier regarding the three years after publication in the official regulation gazette.
	Furthermore, the 2nd temporary article of the Regulation establishes that any Resolutions that SERNAPESCA needs to enact must be established within 6 months of the date of publication of the regulation.
	It is worth noting that SERNAPESCA and SUBPESCA both needed to enact a large number of regulations to bring this requirement into force on January 1st 2020 for industrial ships, and that SERNAPESCA indicated in a personal communication that the image recording cameras will be a requirement for artisanal vessels three years after January 2020.
Status	Based on the above, the team confirmed that the progress made in this condition is in line with what was proposed. The authorities, SERNAPESCA and SUBPESCA, have clearly made progress in defining and adapting the regulations required for suitably implementing the use of image recording cameras on demersal crustacean fishing boats classified as industrial vessels from January 1st 2020. They still need to implement this measure with artisanal fleet vessels at least 15 metres long and to find out the results of implementing this inspection tool on the industrial fleet. As a result of the above, progress on this condition is considered to be 'ON TARGET'.
	The client action plan prepared by the client was:
	We are confident that the design and implementation of the fishery management plan that will be prepared for the crustaceans fishery will fully respond to the need for effective MCS.
Additional	At the first annual audit we will provide evidence to the auditors that we have worked in full cooperation with the Committee and SUBPESCA to present our views on the needs of the FMP. We will also present the results of an internal review of the requirements for those vessels using the MSC certification.
information	At the second annual audit, we will provide the auditors with a draft of the FMP that indicates how the requirements have been incorporated. We will also provide the auditors with a copy of the internal regulations if these are found be required.
	At the third annual audit we will present the auditors with the completed FMP and a summary of the preliminary results from the application of the internal regulations.
	At the fourth annual audit, we will provide evidence to the auditors that the implemented MCS system and internal regulations are functioning correctly and they have demonstrated an ability to enforce relevant management measures and apply sanctions if required.

5.2.13 Condition 13 (UoAs 2, 4 &7)

Closed at the 1SA.

5.2.14 Condition 14 (All UoAs)

Performance Indicator	1.2.4
Score	65



Justification extracted from the 2 nd SV Report	2 nd SV Report "SG a) While this model is appropriate in principle, its application for these crustacean resources does not provide reliable evaluations of stock status in recent years or of predicted SB and F for the upcoming year (upon which to estimate acceptable biological catch (ABC)). As a result, the projected status may be found to be in error based on the model results of the following year. A consequence of this, is that management actions, including whether or not to implement the HCR could be unwarranted, as was the case for Red Squat Lobster South based on the 2017 assessment. Therefore, the assessment is not appropriate for the stock or (especially) for the HCR. SG c) There are many uncertainties with the fishery data and survey data that are not taken into account, including uncertainties associated with catchability of trawls used in the fishery and in the survey. There is also uncertainty regarding changes in trawl catchability over time and inconsistency in the application of assumptions regarding trawl catchability."
Condition	Despite efforts to improve the assessment being consistently undertaken by the Technical-Scientific Committee on Demersal Crustaceans (CTT-CD) (see below 'Consultation on the Condition'), the team considers that time required for relevant research to be undertaken may take longer than the remaining certification period at the time of raising this condition (less than 2 and half years). Therefore, in accordance with FCP 7.18.1.5, under this exceptional circumstance, the CAB determines that achieving a performance level of 80 may take longer than the period of certification.
	CONDITION 2023 : By 2022 the client should demonstrate that the reliability of the assessment has been improved such that it can be considered appropriate for the stock and for the harvest control rule, through accounting for uncertainties in the current model and/or an alternative approach. SG80 should be met at this stage
	The following elements can be verified during annual surveillance audit: <u>Year 3</u> (2020): By the third year the client shall provide the team evidence that a plan has been developed to review the current assessment approach (including external expertise) toward improving the current model or developing a more reliable alternative approach. No re-scoring expected at this stage
Milestones	Year 4 (2021): By the fourth year the client shall provide evidence that the plan is being implemented. No re-scoring expected at this stage
	Year 5 (2022): At the end of the certification period (February 2022) the client shall provide evidence that a plan to review the current assessment approach (including external expertise) toward improving the current model or developing a more reliable alternative approach is being implemented. No re-scoring expected at this stage
Revised	Year 4 (2021): By the fourth year the client shall provide evidence that the plan to review the current assessment approach with input from external experts toward providing a more reliable assessment approach that accounts for uncertainty in the current approach (SIc) and is appropriate for the stock and for the harvest control rule (SIa) has been developed. No re-scoring expected at this stage
milestones (3er Surv audit)	Year 5 (2022): Before the certificate expires (12 th March 2022), the client shall provide evidence that the plan to review the current assessment approach with input from external experts toward providing a more reliable assessment approach that accounts for uncertainty in the current approach (SIc) and is appropriate for the stock and for the harvest control rule (SIa) has been implemented and the review has identified methods for developing an improved or alternative assessment approach



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	that is expected to improve the assessment of stock status. No re-scoring expected at this stage.
	Year 6 (2023): At the first surveillance audit of the new cycle, the client should demonstrate that the reliability of the assessment has been improved such that it can be considered appropriate for the stock and for the harvest control rule, through accounting for uncertainties in the current approach and/or by developing an alternative approach. SG80 should be met at this stage.
Consultation or condition	2 nd SV Report "The Technical-Scientific Committee on Demersal Crustaceans (CCT- CD) is an active Advisory body of the Management Committee for Demersal Crustaceans (CM-CD). Several methodological recommendations to improve the assessment of demersal crustaceans were agreed during the 3rd meeting of the CCT in 2017. In December 2018 a 2-day workshop was organised by the CCT to follow- up progress made on those recommendations. The minutes of this workshop were handed to the team during the site visit (actually all minutes from CCT-CD and CM- CD meeting held during 2018 were handed to the team).Progress on all technical issues were reviewed and progress assessed for every stock. The issues raised by the team for scoring PI 1.2.4 below 80 are identified in this document are rated as 'high priority'. The track record indicates that the on-going activities of the CCT-CD are already consistent with the achievement of this Condition. Further, it demonstrates that necessary progress to achieve conditions does not require any of the following: (i) extra investment of time or money of the CCT-CD or the CM-CD; (ii) changes to management arrangements or regulations; (iii) rearrangements of research priorities by the CCT-CD or the CM-CD. Therefore, despite the condition is relying upon the involvement, funding and resources of the CM-CD and SUBPESCA, the CAB considers it achievable by the client and realistic in the period specified. Further, the client has presented evidence that an initial meeting to discuss these issues was held in May 30, 2019, with SUBPESCA and IFOP representatives. The list of participants can be consulted in Appendix 4, together with a letter from SUBPESCA acknowledging the condition raised to the certified fisheries and their
	forthcoming meetings of the CCT-CD."
Progress or Condition (3SA)	The audit team appreciates the ongoing efforts to improve the current model and feels that initiatives such as increasing the model weighting on the survey series and exploring a more reliable approach to modelling the size frequency data could provide improvement. However, concern remains that the model does not consistently fit the survey series without systematic bias, presently underestimating recent survey swept-area biomass estimates for red squat lobster and failing to adjust to the recent change in biomass trajectory for yellow squat lobster. It is possible that these issues may not be resolved by efforts to improve the model if they are related to high year-to-year variability in trawl catchability. The recent initiative to assign different survey trawl catchability values to two distinct time periods was an arbitrary effort to improve the model fit but it did not address the uncertainty due to annual changes in catchability.
Statua	The progress made in this condition is not in line with what was proposed. No plan has been proposed with the aim of improving the current model or developing a more reliable alternative approach. As a result the status of this condition is " BEHIND TARGET ".
Sidius	- It was noted during the site visit that the objectives of the upcoming annual meeting in May 2020 will include plans toward improving the current model but the objectives do not include exploration of other (additional or alternative) approaches and there is no plan for external participation.



	 While the audit team appreciates the ongoing efforts to improve the current model it feels that uncertainty due to the apparent great annual variability in survey catchability may remain a problem that is not directly related to the model itself. Meanwhile, it would not be precautionary to continue with annual assessments based on the current modelling approach alone. It is also felt that a review of the current methodology is timely because there has been no comprehensive review of the current assessment approach in recent years According to FCP 7.28.16.1.b.i the following remedial action was set: The review of the current assessment approach should focus on developing an improved or additional/alternative assessment approach that is reliable and appropriate to the stock and to the harvest control rule. This should be achieved by addressing the uncertainties associated with the apparent strong year-to-year changes in survey catchability as well as the uncertainties associated with the systematic bias in the fit of the current model to the survey data. Additionally, the milestones were revised. 				
	The client action plan prepared by the client was:				
	The action plan to be followed by our company contemplates obtaining commitments from public entities related to certified stocks. This process has already begun with a meeting held on Thursday, May 30, 2019, with representatives of SUBPESCA and IFOP (see Appendix 4). The detail on the commitments to be obtained from the different stakeholders are detailed below:				
	1 Obtaining SUBPESCA commitment in the following:				
	1.1. Analysis and review of the stock assessment models of certified stocks				
	1.2. Integration of scientific advisors from the companies to interact with those of IFOP.				
	1.3. Programming of scientific-technical seminars to share the state of the crustacean biomass and the assessment models used.				
	2 Obtaining IFOP commitment in the following:				
	2.1. Interaction with scientific groups to review the results of stock assessments.				
	2.2. Participation in seminars and scientific meetings related to certified stocks.				
Additional	3 Commitment of AIP				
	3.1. Keep performing fishery monitoring and assessment studies on annual basis with scientific support.				
	3.2. Share information obtained with other scientific-technical stakeholders.				
	3.3. Assistance of scientific advisers to the Scientific Committee for Demersal Crustaceans, CCT-CD.				
	In order to achieve it, during 2019 the client will hold meetings with the relevant institution (IFOP, UCN, UCV, UCC, INPESCA) to consider the issue of improving the current model or developing a more reliable alternative approach. The scientists in each of the Institutions will be requested to comment on the finding of the audit, the potential to improve or replace the current model and the related actions and time scale.				
	This will include consideration of the need for external peer review.				
	Subsequently, the client would request that the issue be included in the agenda of a meeting of the CCT-CD.				
	Subsequent actions would be dependent on the finding and recommendations of that meeting.				



The minutes of the various meetings would provide evidence that a plan has been developed to review the current assessment approach (including external expertise) toward improving the current model or developing a more reliable alternative approach.

At the fourth annual surveillance audit we will report on any actions that have taken place in 2020 that indicate progress made in reviewing the current model used and modifying them as required. We will report on any involvement of international experts.

It is anticipated that the recertification process that will start at the same time as the fourth annual surveillance audit will consider scoring of 1.2.4 and we will respond as required.

5.3 Client Action Plan

A common Client Action Plan to address conditions 2 and 14 was updated by the client:

	The action plan to be followed by our company contemplates obtaining commitments from public entities related to certified stocks. Consequently, the client action plan update has been prepared taking into account the results of the latest meetings that we attended:
	This process started with the Third meeting of the Science Technical Committee held on the 30 of June 2020. The session consisted of the Workshop on the Review of Data and Models of the Stock Assessment of Demersal Crustacean Fisheries, focusing on the progress of the recommendations made previously by the CCT-CD. The meeting was held on June 30, 2020 with representatives of SUBPESCA and IFOP.
	In addition, on July 8, 2020, an extraordinary meeting was held by the Chair(s) of the Demersal Crustacean Management Committee together with the Scientific and Technical Committee of the same fishery.
	The relevant milestones reached at both meetings have been included in the following action plan:
Action Plan updated for Conditions 2 and 8	 1 Obtaining IFOP commitment in the following: 1.1. Establishment of the working plan for 2020-2021. 1.2. At the next meeting in October 2020, IFOP will present the consolidated document that includes the status and total annual catches (CBA), taking into account a possible lack of fishing information during the current year due to the health contingency. In addition, it is proposed to analyze current and past information (retrospective) to project a scenario of the status of the stock (year 2020) and estimate the CBA based on projections of Recruitment and Fishing mortality (F). 1.3 Alternative modelling scenarios based on committee recommendations will be presented at the October 2020 committee meeting. In this meeting, some scenarios could be prioritized to analyse in greater depth in the data and models workshop next year (2021). This could allow a new model configuration to be adopted for the following year (2022). 1.4 Consider the separation into fishing units (FUs). Separate the information and carry out the analysis in the respective FUs instead of the areas currently assessed. Incorporate an alternative analysis of the stock assessment per FU 1.5 The Scientific and Technical Committee (CCT), with the support of the group assessing stock models belonging to the IFOP, commit to



 Review and analyze the Technical Terms of Reference (TTR) of the current models based on what was identified in the latest MSC fishery surveillance report; and Conduct an external peer review of the current models by October 2021.
 2 Obtaining SUBPESCA commitment in the following: 2.1. Analysis and review of the stock assessment models of certified stocks 2.2. Integration of scientific advisors from the companies to interact with those of IFOP. 2.3. Programming of scientific-technical seminars to share the state of the crustacean biomass and the assessment models used. 1.4 Support all the commitments made by the IFOP mentioned in section 1.

5.4 Re-scoring Performance Indicators

Since 7 conditions were closed as a result of current surveillance audit report, PI 1.2.3; PI 1.2.3; PI 2.3.3 and PI 2.3.3 were re-scored. The re-scoring tables for these to PIs are presented below. New text added to the original rationales is in blue font, while paragraphs removed from the original rationale are crossed-out.

Re-scoring was perform using scoring tables from MSC CR version 1.3, the version used during the initial assessment.

5.4.1 Re-scoring Table for PI 1.2.3 – Information

PI 1.3	2.3	Relevant information is collected to support the harvest strategy		
Scoring IssueSG 60SG 80SG 100				SG 100
а	Range of information			
	Guide post	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Y (All UoCs)	Y (All UoCs)	N (All UoCs)
	Justifi cation	All UoCs. A wide range of information on the stock structure, stock productivity, stock abundance and fishery removals is collected from both fishery-dependent and fishery-independent sources. Catch and effort data are recorded for each tow of the trawl in electronic log books and CPUE is standardised for year, month, fishing area and vessel. Landings are also monitored rigorously through a100% dockside monitoring programme. An observer programme covering approximately 25% of all fishing trips records species composition including bycatch, total catch composition, length frequency, sex and reproductive status of females for the target species and collects biological samples. In addition to the collection of fisheries-dependent data, the main indicator of stock biomass of red and yellow squat lobsters comes from annual fisheries-independent stock surveys, which use a swept area method for estimating total biomass and provide information on stock structure.		



PI 1.2.3		Relevant information is collected to support the harvest strategy			
		For all UoCs, a limited entry licensing scheme which differentiates between industrial and artisanal vessels, rigorous catch reporting procedures and the mandatory use of VMS means that fleet composition and behaviour are well known.			
		Based on the above, the assessment team considered that the SG80 is met. However it is not clear whether any additional non-fishery information, such as environmental information, is collected on a regular basis, and therefore the SG100 is not met.			
b	Monitori	ng			
	Guide post	Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	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.	
	Met?	Y (All UoCs)	N (All UoCs)	N (All UoCs)	
	cation	Y (All UoCs)N (All UoCs)N (All UoCs)All UoCsGeed Information about abundance and fishery removals is available for both squat lobster fisheries and is used in the assessment model to evaluate the status of the stock in relation to limit and target reference points, and to evaluate the short and medium term impact of various catch options. Stock abundance is measured through fishery dependent and fishery-independent methods. Recording of catches from each individual tow of the trawl is mandatory, and standardised CPUE data are available providing robust indices of stock abundance. In addition the direct assessments from the fishery-independent trawl surveys provide a time series of biomass estimates and stock structure information. However, there are concerns with the reliability of the assessment approach due to uncertainties in the model as well as the survey.UoA removals are closely monitored through electronic log book records of catches, observer sampling of total catch compositions, 100% dockside monitoring and processors' landings records. Cross-checking by SERNAPESCA of these various records provides evidence of the accuracy of the data. However, it is clear that there is significant discarding is not full quantified. Observers record total catch composition on board vessels, but because in theory discarding is not permitted, this catch composition is not disaggregated into landings and discards. An IFOP report from the projects. In addition to the discarding of the assessment team were made aware that some the solek of the boat, the assessment team were made aware that some tows of the trawl are not brought on deck and the whole contents of the tray are released back to the sea (so-called "failed" tows), and that also with the new the and easing of the target mesh-size net on hauling and are not therefore included in the fishery removals.<			



PI 1.2.3		Relevant information is collected to support the harvest strategy			
с	Compret	omprehensiveness of information			
	Guide post		There is good information on all other fishery removals from the stock.		
	Met?		N (both UoCs) Y (all UoCs)		
	Justifi cation	All UoCs. Squat lobsters are also caught in other fisheries when they are not the target species. As such if any vessels target nylon shrimp in regions V-VIII, then any bycatch of squat lobsters from the nylon shrimp fishery will be recorded and included in the annual global quota. However small catches of yellow squat lobster occur in the fisheries targeting red squat lobsters and vice versa, and the assessment team were informed that landings recorded on behalf of SERNAPESCA through the dockside monitoring programme do not differentiate between the two species, and so some removals of both squat lobster species are not fully recorded. The SG80 is not met therefore for either the red or yellow squat lobster fishery. The integral traceability system is now fully operational for demersal crustacean fisheries and, together with the dockside sampling provides reliable estimates of the different squat lobster species in the landings. The observer program derived from the research plan on discards has provided reliable estimates of the level of discards of the target species in the different demersal crustacean fisheries in recent years. Also, the EMS has been fully operational in the Industrial Fleet sector since January 1, 2020. Although the EMS has not yet been fully implemented in the Artisanal Fleet, only a single vessel is affected and regulations now ensure that this will occur within 3 years. Meanwhile, all other measures now in place provide assurance that the level of discards provide species is (for practical purposes) fully quantified in both			
		of discarding of target spe fisheries, and so the third m Although the condition was score of 80.	cies is (for practical purpos ilestone, and this aspect of th not closed, SIc of the PI wa	es) fully quantified the condition have be as rescored and aw	in both een met. varded a
References Zill 20 Zill De der Ec		Zilleruelo, M., D. Párraga and C. Bravo. 2015a. Informe de Avance 1. Convenio de Desempeño 2015. Programa de seguimiento de las pesquerias de crustáceos demersales, 2015 (Camarón nailon) Subsecretaría de Economia y EMT / Agosto 2015. 45 pp +Anexos.			
		Zilleruelo, M., D. Párraga and C. Bravo. 2015b. Informe de Avance 2. Convenio de Desempeño 2015. Programa de seguimiento de las pesquerias de crustáceos demersales, 2015 (Langostino amarillo y Langostino colorado) Subsecretaría de Economia y EMT / Octubre 2015. 38 pp +Anexos.			
OVER	ALL PER	FORMANCE INDICATOR SO	CORE:		65 -75
COND	CONDITION NUMBER (if relevant): 2–NA			<u>2–</u> NA	

5.4.2 Re-scoring table for PI 2.1.3 – Primary species information

PI 2.1.3	Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
Scoring Issue	SG 60	SG 80	SG 100



PI 2.	1.3 Information on the nature and extent of retained species is adequate to determine the posed by the fishery and the effectiveness of the strategy to manage retained species			adequate to determine the risk to manage retained species
а	Guidepost	Qualitative information is available on the amount of main retained species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.
	Met?	Y (All UoCs)	Y (All UoCs 1, 3, 5, 6 & 8) N (UoCs 2, 4 & 7)	Y-N (All UoCs)



All catches are being reported through electronic logbook and all landings are certified by Sernapesca. Further, the new traceability system in place since 2019 integrates the information provided at the notification prior to entrance and landing inspections.

IFOP annual report on the monitoring of the fisheries targeting demersal crustaceans provides a detailed account of the species composition of the catches from the different fleets targeting demersal crustaceans (Zilleruelo et al 2019 accounts results for 2018). The observer coverage is between 10 and 20% of the fishing trips (and even higher in relation to the N hauls) for most of the fleets and years. **SG60 and SG80 are met.**

UoC 1 Nylon Shrimp Industrial

Main retained species are Chilean hake and cardinal fish. There is substantial qualitative and quantitative information collected annually by IFOP on catch composition in the industrial nylon shrimp fishery unit including Regions III to VIII and readily available in annual reports. The amount of Chilean hake taken is reported and data can be used to estimate cardinal fish catch. Overall sample size is about 20% of trips in the fishery. Data from the new gear are available from the 2015 fishery and partially from 2013 and 2014. There are logbooks and SERNAPESCA maintains information on dockside landings. The fishery meets SG60 and SG80 SIa.

IFOP data for all retained species are of catch composition but discards are known to occur before (and after) the catch is brought on deck. Thus, IFOP data might underestimate removals by the fishery. IFOP catch estimates are higher than SERNAPESCA landings indicating discards after IFOP observers recorded catch composition. Thus, information is not accurate and verifiable on the amount taken by the fishery. The fishery does not meet SG100 SIa.

UoC 2 Nylon shrimp Artisanal

Main retained species are Chilean hake and cardinal fish. IFOP collects catch composition information of the nylon shrimp industrial fishery and it is reasonable to assume that these are qualitatively similar to artisanal catch. SERNAPESCA maintains dockside landing information. The fishery meets SG 60 SIa.

Data are not recorded by IFOP from the artisanal fishery. Although it can be assumed that catch is qualitatively similar to the industrial catch, the assumption does not hold for quantitative information. The fishery does not meet SG 80 SIa.

UoC 3 Yellow squat lobster Industrial North

Main retained species is Chilean hake. There is substantial qualitative and quantitative information collected annually by IFOP on catch composition in the industrial yellow squat lobster fishery North Unit in Region IV and readily available in annual reports. Overall sample size is about 20% of trips. Data from the new gear are available from the 2015 fishery and partially from 2013 and 2014. SERNAPESCA maintains dockside landing information. The fishery meets SG60 and SG80 SIa.

Similar as indicated for the nylon shrimp industrial fishery, the information on retained species is not accurate and verifiable. The fishery does not meet SG100 SIa **UoC 4** Yellow squat lobster Artisanal.

Main retained species is Chilean hake. Same argument applies on qualitative information available as for the nylon shrimp artisanal fishery. The fishery meets SG60 Sla.

Similar to the artisanal fishery of nylon shrimp there are no data collected for the yellow squat lobster artisanal fishery. The fishery does not meet SG 80 Sla.

UoC 5 Yellow squat lobster South.

Main retained species are Chilean hake and red squat lobster. There is substantial qualitative and quantitative information collected annually by IFOP on catch composition in the industrial yellow squat lobster fishery South Unit in Regions V-VIII and readily available in annual reports. Sample size is about 30% of the trips. Data from the new gear are available from the 2015 fishery and partially from 2013 and 2014. There are logbooks and SERNAPESCA maintains dockside landing information. The fishery meets SG60 and SG80-SIa.

Justification
PI 2 .1	1.3	Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species			
		Similar as indicated for the hylon shrimp industrial fishery, information is not accurate and verifiable. The fishery does not meet SG100 Sla. UoC 6 Red squat lobster North Industrial. Main retained species are Chilean hake and yellow squat lobster. There is qualitative and quantitative information collected annually by IFOP on catch composition in Region IV and readily available in annual reports. Data from the new gear are available partiall from 2013 and 2014 fisheries. IFOP did not collect information from the 2015 fisher because the quota was mostly assigned to the artisanal sector and vessels did not accommodate observers on board. SERNAPESCA maintains dockside informatio irrespective of quota allocations. The fishery meets SG60 and SG80 Sla.			
		As indicated for the other industrial fishery, information is not accurate and verifiable. The fishery does not meet SG100 Sla.			
		 fishery does not meet SG100 Sla. UoC 7 Red squat lobster Artisanal. Main retained species are Chilean hake and yellow squat lobster. Same argument are on qualitative information available as for the nylon shrimp and yellow squat lo artisanal fisheries. The fishery meets SG60 Sla. Similar to the nylon shrimp and yellow squat lobster artisanal fisheries there are not collected for the red squat lobster artisanal fishery. The fishery does not meet SG 80 UoC 8 Red squat lobster South. Main retained species is Chilean hake. There is substantial qualitative and quantit information collected annually by IFOP on catch composition in the industrial red to lobster fishery. South Unit in Regions V-VIII and readily available in annual rep Sample size of about 20% of the trips. Data are available since 2011 as the fishery closed for some years. Data from the new gear are available from the 2015 fishery partially from 2013 and 2014. There are logbooks and SERNAPESCA maintains doc landing information. The fishery meets SG60 and SG80 Sla. 		obster. Same argument applies rimp and yellow squat lobster anal fisheries there are not data thery does not meet SG 80 Sla. Itial qualitative and quantitative offician in the industrial red squat y available in annual reports. Since 2011 as the fishery was able from the 2015 fishery and NAPESCA maintains dockside Sla.	
b	Guidepost	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.	
	Met?	Y (All UoCs)	NY (All UoCs)	N (All UoCs)	



PI 2. 1	1.3	Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species			
		IFOP annual report o provides a detailed ac fleets targeting demer The observer coverag relation to the N hauls However, information i degree of certainty. So	n the monitoring of the fisheries ta count of the species composition o sal crustaceans (Zilleruelo et al 20 e is between 10 and 20% of the fi) for most of the fleets and years. S s not sufficient to quantitatively estir G100 is not met.	argeting demersal crustaceans f the catches from the different 019 accounts results for 2018). shing trips (and even higher in G60 and SG80 are met. nate outcome status with a high	
	lustification	UoC 1 Nylon Shrimp I Main retained specie composition on board SERNAPESCA (condu- provide the information Data used for main SERNAPESCA on law removals as IFOP Additionally, IFOP dar Further, for cardinal fits fishery is closed. IFOI that removals in this fishery to meet SG60. Data on catch comp assumption made that is adequate but not su based limits. The fisher UoCs 3, 5, 6 and 8 Y Red squat lobster Nor Similar to the Nylon S dockside monitoring I fishery to meet SG60. UoCs 4 & 7 Yellow sq Similar to the Nylon s	ndustrial s are Chilean hake and cardinal- industrial vessels by IFOP observe ucted by an accredited company), to n for the fishery to meet SG60 SIb. - retained species stock assessme ndings for quota control. Question reports indicate that SERNAPE ta do not account for discards bef sh there is no current monitoring of the P monitoring provides data on cate ishery are larger than the non-targ of no catch. Thus, data are not co espect to biologically based limits. The strisanal by SERNAPESCA and logbooks present to that fficient to estimate outcome status to eatch composition is similar to that fficient to estimate outcome status to ary does not meet SG80 SIb. ellow squat lobster North Industrial th Industrial - Red squat lobster Sou hrimp Industrial fishery, information by SERNAPESCA and logbooks p SIb but is not adequate to meet SG uat lobster Artisanal- Red squat lobster status to that fishery. The fishery	fish. Data collected on catch presented dockside monitoring by gether with abundance surveys nents are those recorded by s are raised about amount of ESCA underestimates catch. Fore catch is brought on deck. the population as the collapsed ch composition which suggests et quota while SERNAPESCA nsidered sufficient to estimate he fishery does not meet SG80 provide the information for the of industrial catch, information with respect to their biologically - Yellow squat lobster South uth on main retained species from provide the information for the 80 SIb. pster Artisanal <i>meets SG60 SIb but does not</i>	
C	Guidepost	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.	
	met?	Y (All UoCs)	Y (All UoCs)	Y (All UoCs)	



PI 2 .1	1.3	Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species				
	Justification	UoC 1 Nylon Shrimp I Data collected on catc dockside monitoring b for Chilean hake to su and SG80 SIc. For cardinal fish eva SERNAPESCA under industrial vessels by strategy but it is not u are also partially disca meet SG100c. UoC 2 Nylon shrimp A Similar to the industrial SG100 SIc. UoCs 3, 5, 6 & 8 Yello squat lobster North Inc Data collected on catc dockside monitoring b for main retained spec There is evidence that brought on deck. The UoCs 4 & 7 Yellow sq Similar to industrial monitoring by SERNA species for the fishery <i>Data are for industrial partially discarded be</i> <i>SG100c.</i>	ndustrial ch composition on board industrial w y SERNAPESCA and abundance support measures and partial strateg aluations were discontinued in 20 estimate catch and data collected of IFOP observers provide some in used in stock evaluations. There is arded before and after being brough artisanal I fishery. The fishery meets SG60 a ow squat lobster North Industrial - Y dustrial - Red squat lobster South ch composition on board industrial w y SERNAPESCA, and abundance s cies for the fisheries to meet SG60 a retained species are also partially d fisheries do not meet SG100 SIc. Juat lobster Artisanal- Red squat lob fisheries, IFOP monitoring of th APESCA and logbooks provide the to meet SG60 and SG80SIc. al fisheries and there is evidence fore and after being brought on de	vessels by IFOP observers and surveys provide the information by for the fishery to meet SG60 010 when the fishery closed. On catch composition on board formation to support a partial evidence that retained species t on deck. The fishery does not and SG80 SIc but does not meet fellow squat lobster South- Red vessels by IFOP observers and surveys provide the information and SG80 SIc. iscarded before and after being oster Artisanal e industrial fishery, dockside information for main retained that retained species are also eck. The fisheries do not meet		
d	Guidepost		Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)	Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.		
	WIEL?		Y (All UoCs 5&8) N (UoCs 1,2,3,4,6,& 7)	Y N (all UoCs)		



IFOP annual report on the monitoring of the fisheries targeting demersal crustaceans provides a detailed account of the species composition of the catches (Zilleruelo et al 2019 accounts results for 2018), while the annual report on discards and incidental catches (Escobar et al 2019a) provides a thoughtful account of the discarded fraction, including the spatial-temporal patterns and the reasons for discarding.

The observer program has incorporated samplings on board the artisanal fleet since 2017, and the coverage of this fleet has increased sufficiently in recent years (see **Table Pl2.1.3.1** for a detailed account of the observer coverage during 2018). Zilleruelo et al 2019 states that: "During the 2018 fishing season, scientific observers embarked on 303 fishing trips, representing an increase of 15% over the previous year. Of the total trips, 35 correspond to the artisanal fleet, with an improvement in the general sampling coverage". Observer coverage for the discarded fraction in 2018 are presented in **Table Pl2.1.3.2**. Results on the catch composition in 2018 of the fleet targeting nylon shrimp were presented in section 4.2.7.2.1, while details on the discarded fraction of this fleet were presented in section 4.2.7.3.2.

Table Pl2.1.3.1. Observed fishing trips in 2018 (IFOP) against the total fishing trips targeting demersal crustaceans in 2018 (Control de Cuotas). Data are presented for ZCN (Zona Centro-Norte) and ZCS. Observer coverage (% cobertura) is presented at the bottom row. Source: Zilleruelo et al 2019

	Flota	Zona Centro-Norte	Zona Centro-Sur	Total
	Industrial	46	242	268
IFOP	Artesanal	35	0	35
	Total	81	242	303
Control	Industrial	208	858	969
Curata	Artesanal	449	64	513
Cuola	Total	657	922	1482
	% Cobertura	12%	26%	20%

Table PI 2.1.3.2. % observer coverage for discards on board the fleet targeting nylon shrimp in 2018.Source. Escobar et al 2019a.

COD	ertura de v	viajes y lan	ces flota in	dustrial		`
	2014	2015	2016	2017	2018	
Cobertura de viajes	25%	19%	14%	24%	16%	
Cobertura de lances	6%	18%	17%	18%	23%	_
Langapting colorado						-
			G			
Cob	ertura de v	viajes y lan	ces flota in	dustrial		
	2014	2015	2016	2017	2018	
Cobertura de viajes	25%	25%	19%	19% 🧹	14%	
Cobertura de lances	17%	22%	19%	17%	18%	
Langostino amarillo						
Langustino amanno						
Cob	ertura de v	viajes y lan	ces flota in	dustrial		
Cob	ertura de v 2014	viajes y lan 2015	ces flota in 2016	dustrial 2017	2018	_

Further, the cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020. However, the artisanal fleet still has 3 years before it is also mandatory for them. The team could check that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans. The implementation of the EMS will help to ensure to compliance with recent regulations on the discarded fraction, and will improve quantification of the discards, even when the fishing trips without

24%

23%

22%

20%

25%

Chile squat lobster and nylon shrimp modified trawl fishery- 3rd Surveillance report

Cobertura de lances



observers (all discards shall be shown to the cameras and shown before releasing them back to the sea and records taken at the electronic logbook).

Based on the information presented above the team concludes that SG60, SG80 and SG100 are met for UoC1 and UoC2.

UoC 1 & 2 Nylon Shrimp Industrial & Artisanal

Main retained species are Chilean hake and cardinal fish. Various surveys provide indicators on abundance and status of Chilean hake. There are no surveys for cardinal fish. Reporting from logbooks and SERNAPESCA dockside landing data for quota control provide information on fishery operations. Data are compromised by unreported discards. Routine IFOP catch monitoring provides information on composition.

While logbooks and dockside information continue to be collected the sample size of IFOP monitoring of the fishery in the northern area is low and depending on nylon shrimp stock condition. The issue is that artisanal vessels have not accommodated observers onboard and LGPA states for a global quota of up to 600 t the quota is allocated for the artisanal fishery; between 600 t and 4,000 t the artisanal quota is increased by 5.88% of global quota - 600 t and the remainder is for the industrial fishery. If artisanal vessels do not accommodate IFOP observers on board, data collection would be increasingly compromised with decreasing quotas. The fisheries do not meet SG80 Sld.

UoCs 6 & 7 Red Squat Lobster North Industrial & Artisanal.

Various surveys provide indicators on the abundance of Chilean hake. Reporting from logbooks and SERNAPESCA dockside landing data for quota control provide information on the operation of the fisheries. Data are compromised by unreported discards. Routine IFOP catch monitoring provides information on catch composition.

Although logbooks and dockside information continue to be collected, IFOP monitoring of the fishery in the northern area is dependent on red squat stock condition and sample size is low. And it was the case that catch data from the fisheries in 2015 were not collected because stock condition was such that the quota was mostly assigned to the artisanal sector that has not accommodated observers on board. LGPA states that 2013 to 2032 catch allocation between artisanal and industrial fisheries is such that for a global quota of up to 700 t, the total is for the artisanal fishery; and between 700 and 2,100 t, the share is 700 t and the remainder for the industrial fishery. Thus, data do not continue to be collected when the red squat lobster stock condition in the north unit is poor and the fisheries do not meet SG80 SId.

UoCs 3 & 4 Yellow Squat Lobster North Industrial & Artisanal

Various surveys provide indicators on the abundance of Chilean hake. Reporting from logbooks and SERNAPESCA dockside landing data for quota control provide information on the operation of the fisheries. Data are compromised by unreported discards. Routine IFOP monitoring of the catch provides information on catch composition.

Although logbooks and dockside information continue to be collected, IFOP monitoring of the fishery in the northern area is dependent on yellow squat lobster stock condition. The issue is that artisanal vessels have not accommodated observers onboard and LGPA states that 2013 to 2032 catch allocation between artisanal and industrial fisheries is such that for a global quota of up to 350t, the total is for the artisanal fishery; and between 350 and 1,350t, the artisanal share is increased by 10% of the difference between the overall quota and 350t, the remainder is for the industrial fishery. Thus data will not be collected when the yellow squat lobster stock condition in the north unit is poor. The fisheries do not meet SG80 SId.

UoCs 5 & 8 Yellow Squat Lobster South - Red Squat Lobster South.

Various surveys provide indicators on the abundance of Chilean hake. Continued IFOP monitoring of the catch, catch reporting from logbooks and SERNAPESCA dockside landing records for quota control provide information on the operation of the fishery. There are no artisanal fisheries that would cause a situation when sufficient data will not be collected from the fisheries. The fisheries meet SG80 SId.



PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
		Data are compromised by unreported discards precluding assessment of ongoing mortalities to all retained species. The fisheries do not meet SG100 SId.		
References Zilleruelo et al 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2 Queirolo et al. 2011.			012, 2013, 2014, 2015, 2016.	
			95 (All UoCs)	
			75 (UoCs 5 & 8)	
OVER		FORMANCE INDICATOR SCORE:	70 (UoCs 1, 3 & 6)	
			65 (UoCs 2, 4 & 7)	
CONDITION NUMBER (if relevant):			N/A- 3, 4, 5 & 6	

5.4.3 Re-scoring table for PI 2.2.3 – Secondary species information

PI 2.2	2.3	Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch			
Scoring Issue		SG 60	SG 80	SG 100	
а	Guidepost	Qualitative information is available on the amount of main bycatch species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.	Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.	
	Met?	Y (All UoCs) Y (All UoCs)		N (All UoCs)	
		UoCs 1 & 2 Nylon sh	rimp Industrial & Artisana	ıl.	
		Main bycatch fisheries are Aconcagua and Chilean grenadier. Although dis illegal since 2001 and not recorded, catch composition recorded by IFC monitoring of the demersal crustacean fisheries provides qualitative a quantitative information that in combination with estimates of total landings of species recorded by SERNAPESCA allows an estimate of the amount of byo fisheries meet SG60 SIa and SG80 SIa			
		Because discards can of all bycatch species is not accurate and ve	n occur before the catch is ta from catch composition by I rifiable. The fisheries do not	aken on deck, the information provided FOP annual monitoring of the fisheries t meet SG100 SIa.	
	5	UoCs 3 to 8			
	Justificatio	There were no main b discards also occur b bycatch species from accurate and verifiable	ycatch species. Fisheries m refore the catch is taken or catch composition by IFOP a e. The fisheries do not meet	eet SG60 SIa and SG80 SIa. Because a deck, the information provided of all annual monitoring of the fisheries is not SG100 SIa.	



PI 2.2.3 Information on the nature and the amount of bycatch is adequate to determine t posed by the fishery and the effectiveness of the strategy to manage bycatch			ch is adequate to determine the risk trategy to manage bycatch			
b	Guidepost	Information is adequate to broadly understand outcome status with respect to biologically based limits	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.		
	Met?	Y (UoCs 3 to 8)	Y (UoCs 3 to 8)	N (UoCs 3 to 8)		
		Not scored UoCs 1 & 2 due to use of RBF	<i>Not scored UoCs 1 & 2 due to use of RBF</i>	<i>Not scored UoCs 1 & 2 due to use of RBF</i>		
		UoCs 1 & 2 Nylon Shrimp Industrial & Artisanal.				
		Data-deficient and sco	ored using RBF, so SIb is no	ot scored		
କ୍ଟ UoCs to 3 to 8						
Information available indicates that that were are no m				re no main bycatch species in these		
	Lack of information on bycatch species means that the fisheries do not meet SG					
с	ר					
C	Guidepost	Information is adequate to support measures to manage bycatch.	Information is adequate to support a partial strategy to manage main bycatch species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.		
	Met?	Y (All UoCs)	Y (All UoCs)	N (All UoCs)		
		UoCs 1 & 2 Nylon sh	hrimp Industrial & Artisanal			
		Information collected by IFOP on catch composition is adequate to support measures and a partial strategy to manage Aconcagua and Chilean grenadier. The fisheries meet SG60 and SG80 SIc.				
Discards are not monitored because they are illegal and info adequate to evaluate with a high degree of certainty if achieving the possibility of discarding before IFOP observers proces monitoring of discards is underway, information is not yet availa not meet SG100 SIc.			legal and information available is not nty if achieving its objective as there is ervers process the catch. Although s not yet available and the fisheries do			
		UoCs 3 to 8				
		There are no main by	catch species in these fisher	ries. The fisheries meet SG60 and		
	L	SG80 SIc.				
	Justificatic	There is uncertainty of possibility of discardir monitored it is conside strategy and the fisher	on the reliability of the data ng before IFOP observers pred that the information is n ries do not meet SG100 SIc.	for all bycatch species as there is the process the catch. Until discards are not adequate to support and evaluate a		



PI 2.2.3 Information on the nature a posed by the fishery and th			ure and the amount of bycate nd the effectiveness of the st	ch is adequate to determine the risk rategy to manage bycatch
d	Guidepost		Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?		N (UoCs 1 & 2) Y (All UoCs) (UoCs 3 to 8)	Y ₦ (All UoCs)



All UoCs

IFOP annual report on the monitoring of the fisheries targeting demersal crustaceans provides a detailed account of the species composition of the catches on board for each of the fisheries (Zilleruelo et al 2019 accounts results for 2018), while the annual report on discards and incidental catches (Escobar et al 2019a for results for 2018) provides a thoughtful account of the discarded fraction, including the spatial-temporal patterns and the reasons for discarding.

The observer program has incorporated samplings on board the artisanal fleet since 2017, and the coverage of this fleet has increased sufficiently in recent years (see **table Pl2.2.3.1** for a detailed account of the observer coverage during 2018). Zilleruelo et al 2019 states that: "*During the 2018 fishing season, scientific observers embarked on 303 fishing trips, representing an increase of 15% over the previous year. Of the total trips, 35 correspond to the artisanal fleet, with an improvement in the general sampling coverage"*. Observer coverage for the discarded fraction in 2018 is presented in **Table Pl2.2.3.2**. Results on the catch composition 2016 and 2017 for each of the fisheries targeting demersal crustaceans (red squat lobster fishery, yellow squat lobster fishery, and nylon shrimp fishery) were summarised in Saa et al 2018, while data for 2018 are presented in the current report (3rd surveillance audit report).

Table PI2.2.3.1. Observed fishing trips in 2018 (IFOP) against the total fishing trips targeting demersalcrustaceans in 2018 (Control de Cuotas). Data are presented for ZCN (Zona Centro-Norte) and ZCS.Observer coverage (% cobertura) is presented at the bottom row. Source: Zilleruelo et al 2019

	Flota	Zona	Zona	Total
	T IOLA	Centro-Norte	Centro-Sur	- Total
	Industrial	46	242	268
IFOP	Artesanal	35	0	35
	Total	81	242	303
Control	Industrial	208	858	969
Cuoto	Artesanal	449	64	513
	Total	657	922	1482
	% Cobertura	12%	26%	20%

Table PI 2.2.3.2. % observer coverage for discards on board the fleet targeting nylon shrimp in 2018.Source. Escobar et al 2019a.

	2014	2015	2016	2017	2018
Cobertura de viajes	25%	19%	14%	24%	16%
Cobertura de lances	6%	18%	17%	18%	23%
Langostino colorado					-
Cobe	ertura de v	viajes y lan	ces <mark>flo</mark> ta in	dustrial	-
	2014	2015	2016	2017	2018
Cobertura de viajes	25%	25%	19%	19%	14%
Cobertura de lances	17%	22%	19%	17%	18%
Langostino amarillo					
Cobe	ertura de v	viajes y lan	ces flota in	dustrial	
	2014	2015	2016	2017	2018 🥢
Cobertura de viajes	13%	23%	19%	17%	11%
Cobertura de lances	25%	24%	23%	22%	20%

Finally, the cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020 (artisanal vessels will also be subject to this regulation within the next 3 years). During

Chile squat lobster and nylon shrimp modified trawl fishery- 3rd Surveillance report



Justification

PI 2.2	2.3	Information on the nature and the amoun posed by the fishery and the effectivenes	t of bycatch is adequate to determine the risk ss of the strategy to manage bycatch		
		the 3 rd surveillance audit, the team courreport about the images recorded on boar implementation of the EMS will help to the discarded fraction, and will improve fishing trips without observers (all discarded before releasing them back to the sea a	Id check that Sernapesca started to review and ard the fleet targeting demersal crustaceans. The ensure to compliance with recent regulations on e quantification of the discards, even when the ards shall be shown to the cameras and shown nd records taken at the electronic logbook).		
		Based on the information presented above the team concludes that SG60, SG80 ar SG100 are met for UoC1 and UoC2.			
		UoCs 1 & 2 Nylon shrimp Industrial & Artisanal. Catch composition of the nylon shrimp fisheries is routinely monitored by IFOP ann surveys. Nevertheless it is known that discards occur before catch is taken on deck a information collected by IFOP underestimates bycatch. Thus, these data would not det any increase in risk to Aconcagua and Chilean grenadiers. The fisheries do not m SG80 SId.			
		UoCs 3 to 8			
		There are no main bycatch species. The	e fisheries meet SG80 SId.		
		It is known that discards can occur bei collected by IFOP underestimates byca data to assess ongoing mortalities for SG100 SId.	fore catch is taken on deck and that information tch. Thus there is uncertainty on the reliability of all bycatch species. The fisheries do not meet		
Refere	ences	LGPA Tittle II Paragraph Bis, MINECON No20.625 2012, LGPA, R.Ex.No882/2013, Acuña et al (2008), Zilleruelo et al (2006 -2016)			
		R. Ex. №762/2013 and R. Ex. №145/20	015.		
OVER	ALL PER	FORMANCE INDICATOR SCORE:	7 5 (UoCs 1 & 2) 80 (UoCs 3 to 8) 85 (All UoCs)		
COND		IMBER (if relevant):	7-N/A		

5.4.4 Re-scoring table for PI 2.3.3– ETP species information

PI 2.3.3 Relevant information is collected to support the management of fishery impacts on B species, including: Information for the development of the management strategy; Information to assess the effectiveness of the management strategy; and Information to determine the outcome status of ETP species. 				
Scoring Issue SG 60		SG 60	SG 80	SG 100
а	Informationis sufficientto qualitatively estimate the the fishery related mortalityto ethe the species.		Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP	Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.



PI 2.3.3 Relevant information is collected to support the management of fishery impact species, including: • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; • Information to determine the outcome status of ETP species.				e management of fishery impacts on ETP management strategy; of the management strategy; and tatus of ETP species.	
	Met?	Yes (All UoCs)	Yes (all UoCs)	No (All UoCs)	
All UoCs IFOP monitoring of the fisheries by IFOP observers and several studi to assess that there are no interactions with ETP species listed in turtles, birds, sharks and rays in the operational area of the fishery. conducted to characterize the seafloor on board demersal crustacea the general northern and southern areas of the fisheries indicate species of coral in the path of the bottom trawl gear. While there are interaction between the trawl gear and coral species because they a net, there may be the case that they are affected. Information on act to qualitatively determine that the fishery might impose mortality. The Sla. Data from IFOP observers on board industrial vessels are from abo			vers and several studies provide information ETP species listed in CITES of mammals, al area of the fishery. Nevertheless a study of demersal crustacean fishery operations in the fisheries indicate that there are CITES of gear. While there appears to be no direct pecies because they are not retained by the ed. Information on actual impact is sufficient t impose mortality. The fisheries meet SG60 I vessels are from about 20% of the trips in amples are representative of the catch		
	Justification	composition. The fisheries meet SG80 SIa. The use of video cameras that should provide better coverage to estimate outcome status with high certainty is still not mandatory. Further, sufficient information is not available to allow the impact of fishing on coral to be estimated with high certainty. The fisheries do not meet SG100 SIa.			
b	uidepost	Information is adequate to broadly understand the impact of the fishery on ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the	Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.	
	ق Met?				
			res (an oocs)	NO (all DOCS)	
		FOP monitoring of the fisheries and several studies provide information to assess that here are no interactions with ETP species listed in CITES of mammals, turtles, birds, sharks and rays in the operational area of the fishery and to broadly understand that there could be effects on coral species. The fisheries meet SG60 SIb.			
	ication	Information on the area fished and the location of corals is sufficient to determine whether the fishery may be a threat to protection for coral ETP species and support a full strategy to manage impacts. Other ETP species are not affected. The fisheries meet SG80 Slb.			
	Justif	Information is not available to evaluate the magnitude of the impacts and consequence on ETP corals species. The fisheries do not meet SG100 SIb.			
C	Guidepost	Information is adequate to support measures to manage the impacts on ETP species.	Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.	



PI 2.3	3.3	 Relevant information is collected to support the management of fishery impacts on ETP species, including: Information for the development of the management strategy; Information to assess the effectiveness of the management strategy; and Information to determine the outcome status of ETP species. 		
	Met?	Yes (all UoCs)	Yes No (All UoCs)	No (All UoCs)



	All UoCs
	IFOP monitoring of the fisheries and several studies provide information to assess that there are no interactions with ETP species listed in CITES of mammals, turtles, birds, sharks and rays. There is information on the areas fished by each of the UoC at sufficient detail that with information on the general area of the distribution where corals were found is adequate to support measures to manage the impacts on corals. There are no other interactions with ETP species. The fisheries meet SG60 SIc.
	Results included in latest reports on the research plan on discards and incidental catches (Escobar et al 2019a), clearly show the commitment on behalf the Chilean authorities to keep quantifying and analyzing incidental catches with birds, turtles and marine mammals. The observers are recording detailed data, and IFOP is analyzing spatial-temporal trends of the interactions and starts to apply models to estimate the total impacts on seabirds and sea lions based on the observed samplings (Bernal et al 2017, Escobar et al 2018, Escobar et al 2019a).
	The cameras on board the AIP industrial fleet was completed at the time of performing the site visit. The regulation on EMS is in force since the first of January 2020 (artisanal vessels will also be subject to this regulation within the next 3 years). During the third surveillance audit in 2020, the team could check that Sernapesca started to review and report about the images recorded on board the fleet targeting demersal crustaceans.
	IFOP observers on board the fleet targeting demersal crustaceans have only identified Spongia sp and Escleractinas as habitat-foming species that might turn up in the catches of this fleet (Zilleruelo et al 2019). However, no quantities and/or frequency of encounters are provided. During the site visit Zilleruelo confirmed that this species appears on the deck very rarely on deck and always in small quantities. Further, the team considers that corals are VME-forming species and therefore the impact of the UoA on corals shall be assessed as a habitat component better than as an ETP component. The results compiled by Subpesca to elaborate the historical footprint of the Chilean trawl fisheries shows that all trawl fisheries operate in clearly demarked areas. As far as the fleet keeps operating within this area, it is clear that no interactions with corals will occur. In Chile, VMS system is mandatory for all fishing vessels above 12m length. The VMS data is regularly sent to Sernapesca, Subpesca and the Chilean Army. Further, Law 21.132/2019 determined that VMS data shall be publicly available, and the Chilean Government signed an agreement to make its vessel tracking data publicly available through the Global Fishing Watch (GFW) map, which tracks the movements of commercial fishing* vessels in near real-time.
	If necessary, the information related to impacts on ETPs can be reviewed at the Technical Committee for Demersal Crustaceans (CCTCD), and then at the Management Committee for Demersal Crustaceans (CMCD). Both the CCTCD and the CMCD meet regularly throughout the year. The minutes of these meetings are available at the Subpesca website.
	Based on the information presented above the team considers that SG80 is met.
	However, IFOP is still working on estimate total impact on birds due to the demersal crustacean fisheries, while estimates made for sea lions have very high coefficients of variation due to the very low frequency of the interactions. Finally, the ESM has just started to operate in 2020 and the results in terms of monitoring the impact on ETPs still has to be assessed. SG100 is not met.
Justification	The use of the new gear is only in place for one year and there is a need to evaluate performance to measure trends and support a full strategy to manage impacts on ETP species in particular for coral. The use of the new gear is also forcing changes in the areas of operation so information needs to be collected in these areas to support a strategy. The fisheries do not meet SG80 SIc.
References	Melo et al (2007), Vianna et al (2014), Suazo et al (2016), Vilina et al (1995), Cheney (1998), Zilleruelo et al (2006 - 2016), Párraga et al (2012), Bustamante et al (2014) List



PI 2.3.3	 Relevant information is collected to support the management of fishery impacts on ETP species, including: Information for the development of the management strategy; Information to assess the effectiveness of the management strategy; and Information to determine the outcome status of ETP species. 		
	any references here, including hyperlinks to publicly-available documents, Zilleruelo 201 Bernal et al 2017, Escobar et al 2018, Escobar et al 2019a		
OVERALL PER	OVERALL PERFORMANCE INDICATOR SCORE: 75 80 (All UoCs)		
CONDITION NU	CONDITION NUMBER (if relevant): 8 N/A		



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Sernapesca, Resolución Nº 1.449 de 2019, establece los requisitos y procedimientos para la habilitación de proveedores de dispositivo de registro de imágenes, en el marco de implementación del sistema de detección y registro del descarte.

Sernapesca, Resolución N° 1.685 de 2019, establece nómina informativa de los proveedores del dispositivo de registro de imágenes y servicios técnicos autorizados por el proveedor en el marco de implementación del sistema de detección y registro del descarte.

Sernapesca, Resolución N° 2.021 de 2019, restablece requisitos de ubicación, altura, dirección, y ángulo de la instalación de cámaras de registro de imágenes a bordo de la flota de arrastre de crustáceos demersales.

Sernapesca, Resolución N° 2.264 de 2019, establece la forma de acreditar la instalación y funcionamiento de las cámaras de registro de imágenes.



Sernapesca, Resolución N° 2.409 de 2019, Establece procedimiento de comprobación del sistema de cámaras de registro de imágenes al zarpe y reporte de fallas.

Sernapesca, Resolución Nº 2.952 de 2019, Establece requisitos, condiciones y procedimientos de certificación de desembarque, de acuerdo al artículo 64 E de la LGPA

Sernapesca, Resolución N° 3.227 de 2019, modifica la Resolución N° 3.885 de 2018, que establece los estándares técnicos de los dispositivos de registro de imágenes según tipo de embarcación.

Sernapesca, Resolución Nº 3.926 de 2019, establece el procedimiento de recopilación los discos duros del dispositivo de registro de imágenes de las embarcaciones pesqueras industriales.

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Sernapesca, Resolución N° 5.913 de 2019, Establece fecha de inicio para la certificación de desembarque en la macrozona centro sur y región de Coquimbo, por parte del Sernapesca, a partir del 1° de enero de 2020.

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7. Appendices

7.1 Evaluation processes and techniques

7.1.1 Site visits

As for the previous surveillance audit, the site visit was moved forward to March in order to coordinate it with the site visit of the overlapping fishery (Chile squat lobsters Camanchaca demersal trawl fishery) since the agreement to join the two site visits was maintained. The performance of the surveillance activities were not affected by these arrangements.

The site visit was carried out between the 9th and the 11th of April 2020 in Valparaíso (Chile). The lead auditor (Jose Rios) and the P3 assessor (Edith Saa) were in Valparaiso and participated in all meetings, while Earl Dawe participated on remote and he joined (by calls) the meetings held with IFOP and PUCV, plus two internal meetings, as shown in **table 7.1.1**. Besides, Rodrigo Polanco from the MSC, participated as observer in all meetings.

The agenda of the site visit, including people met and main topics discussed are presented in **Table 7.2.1**. During the meeting held with the SERNAPESCA, the team had the opportunity to visit the Unit in charge of reviewing the images recorded by the cameras on board the different fishing fleets operating in Chile. This Unit is comprised by 3 people (Sernapesca officers) which is placed in a different building and occupies a room together with the people in charge of monitoring the VMS data. The team had the chance to witness how the review of the images is done: the software they are using, the sampling protocol, the type of reporting. The team could see images recorded on board a random vessel targeting demersal crustaceans and the officers explained how they perform their sampling. Since the VMS unit was also in the same room, the team could also check how the VMS data are being monitored at the Sernapesca (VMS data are also sent to the Chilean Army and Subpesca).

During the visit the team focused in checking any update affecting the fishery and assessing progress on the conditions established in the PCR. Information collected updates affecting the fishery is summarized in **section 4.2** of the current report, while the assessment made on the progress towards closing the conditions is presented in tables under **section 4**. In the case, new information collected justifies re-scoring any particular PI, re-scoring tables are presented in **section 5.4**.

Date	Place/Address	Time (CET)	Institution	Attendees
	Hotel Diego de Almagro, Valparaiso	09:00-11:30	Internal BV meeting	BV team, including Earl Dawe (on remote)
	Sernapesca HQ, Valparaiso	12:00-13:20	SERNAPESCA	Fernando Naranjo, Marcela Mendoza, Manuel Gonzalez
March 9	VMS and on-board camera image review Unit –Sernapesca offices-, Valparaiso	13:30-14:00	SERNAPESCA	Marcela Mendoza and colleagues
	IFOP HQ, Valparaiso	15:30-18:00	IFOP	Sergio Lillo, Victoria Escobar, Alejandro Yañez, Mauricio Ibarra, Diana Parraga, Maximiliano Zilleruelo, Claudio Bernal.
March 10	PUCV, Valparaiso	9:00-11:00	PUCV	Dante Queirolo, Mauricio Ahumada, Pedro Aplabaza
	SUBPESCA HQ, Valparaiso	11:30-13:30	SUBPESCA	Guisella Muñoz, Aurora Guerrero, Luis Cocas, Mauro Urbina

 Table 7.1.1. Details of the meetings held during the on-sitevisit for the 3SA audit of the AIP fishery. Rodrigo

 Polanco from the MSC, participated as observer in all meetings





	Hotel Diego de Almagro, Valparaiso	15:00-17:00	Internal BV meeting	Edith Saa, José Ríos
		09:00-10:00	Internal BV meeting	BV team, including Earl Dawe (on remote)
March 11	Hotel Diego de 10:15 Almagro, Valparaiso 12:30	10:15-12:15	AIP (overlapping fishery, not included in this report)	Claudio Velasquez (Bracpesca, S.A.) Leandro Sturla (AIP) Stephan Koper (Pesquera Quintero) Andres Quintanilla (Pesquera Quintero)
		12:30-14:30	CAMANCHACA (overlapping fishery, not included in this report)	

7.1.2 Stakeholder participation

The site visit for the surveillance audit was announced at the MSC website on the 6th of February 2020 and stakeholders could send their inputs until the 5th of March. In addition to the announcement of the site visit published at the MSC website, 84 different stakeholders were contacted via e-mail (including SUBPESCA, SERNAPESCA, IFOP, Armada de Chile, ASIPES, INPESCA, PUCV, UDEC, UCN, CONAPACH, CONFEPACH, and NGOS –WWF, CEDEPESCA, Oceana, Greenpeace, ISF, etc.).

Further, the team with the assistance of the client elaborated a list of key stakeholders to be interviewed and were contacted via email and telephone in order to ensure their participation and arrange the meetings. The list of institutions and people finally interviewed during the site visit is detailed above in **table 7.1.1**.

7.2 Stakeholder input

The stakeholder input was restricted to the information collected during the meetings held at the site visit and the documents sent by the stakeholders as a result of the requests made by the team during those meetings. In this particular case, most of the relevant documents (regulations, IFOP reports, minutes of the CCTCD and the CMCD) are shared with the team (under request) prior to the site visit.

Table 7.2.1 presents the main topics discussed with the different stakeholders during the different meetings. All relevant information collected on updates or modifications affecting the fishery is summarized in **sections 4.2 and 5** of the current report, while harmonisation activities with overlapping fisheries are presented in **Appendix 7.4**. All documents used for the assessment are listed in **Section 6** (References).

No other stakeholder inputs were received by email using the template provided by MSC.

 Table 7.2.1. Details of the main topics discussed during the remote visit carried out as part of the current surveillance audit

Stakeholder	Topics discussed
SERNAPESCA	 Update on the implementation of the Electronic Monitoring System (EMS) on board the industrial fishing fleets operating in Chilean waters, including a visit to the Unit in charge of reviewing the images recorded by the cameras on- board. Review of landing data of the assessed fleets Actions to implement Law 21.132 affecting the role performed by Sernapesca: landings audits being undertaken directly by the Sernapesca Updates on the functioning of the integral traceability system recently implemented Agreement signed with 'Global Fishing Watch' to upload all VMS data from the Chilean fishing fleet
IFOP	 Update on actions taken to review the approach used to assess the different stocks of demersal crustaceans Review of current status of the target stocks, in particular the Nylon Shrimp and the Red Squat Lobster North. Discussion on the timing of the scientific advice and the input data for the stock assessments



	 Implementation of the tori-lines (scary lines) for birds
	- Results of the observers monitoring programme on discards (still in place),
	including incidental interactions with MSC non-target species (seabirds and
	marine mammals)
	- Comments on the performance of the grids used by Pesquera Quintero to
	avoid hake bycatches while targeting nylon shrimp.
	- Update on actions taken to review the approach used to assess the different
	stocks of demersal crustaceans
	- Review of current status of the target stocks, in particular the Nylon Shrimp
	and the Red Squat Lobster North.
	- General overview and discussion on the population dynamics of the target
	Discussion on the timing of the direct surveys, the scientific advice and the
PUCV	- Discussion on the timing of the direct surveys, the scientific duvice and the input data for the stock assessments
	- Comments on the performance of the grids used by Pesquera Quintero to
	avoid bake bycatches while targeting pylon shrimp, and the possibility that they
	start considering how to reduce hake bycatches in the squat lobster fisheries
	(different approach needed, grids would not be useful for these species)
	- Discussion on the role of the CCTCD as a multi-stakeholder body which
	reviews the stock assessment and advice provided by IFOP.
	- The team requested the reports on the monitoring of the discards, which were
	not requested in advance to the site visit
	- Review of current status of the target stocks, in particular the Nylon Shrimp
	and the Red Squat Lobster North
	- Discussion on how the HCR established in the MPDC (recovery plan) was
	implemented for the red squat lobster North for the 2020.
	- Update on the implementation of the Electronic Monitoring System (EMS) on
	board the industrial fishing fleets operating in Chilean waters, including
	modifications to the existing regulations as a result of the first results from the
SUBPESCA	A new protocol on good prostices on board to return sharks and rows will be
	- A new protocor on good practices on board to return sharks and rays will be
	- Implementation of the tori-lines (scary lines) for hirds
	- Comments on the new version of the electronic logbook (adapted to report
	discards). The new version was implemented only 1 month before the site visit
	- Review of the MPDC
	- Update on the reporting to NOAA in relation to the US Marine Mammal
	Protection Act
	- Updates on the footprint of the trawling (data from recent years were updated,
	but the new data did make any difference in the final output)
AIP	Not relevant for this report
	 Review of the report prepared by the UCN for AIP
	- Review of the geographical footprint of the AIP fleet against the historical
	tootprint of the trawling fisheries.
	- Details about the implementation of the ESM
	- Discussion about the stock status of the red squat lobster UPN and potential
АГ	- Pesquera Quintero confirmed the good results of the gride decigned by the
	PLICV for avoiding bake discards when targeting pylon shrimp. They also
	confirmed that they are interested in developing together with the PLICV a new
	arid for avoiding hake bycatches when targeting squat lobsters, but this will
	take time.



7.3 Revised surveillance program

The surveillance level and the fishery surveillance program remains the same as in the PCR although it has been adapted to FCP v.2.1. The current surveillance level following FCP v.2.1 is number 6 (4 on-site surveillance audits). Considering that 3 conditions out of 14 remains open and 2 of them are related with publish scientific information it was decided to reduce the surveillance level to 5. Therefore, the 4th and last surveillance level will be done remotely.

At the time of writing this report, the MSC published a Derogation (click here) to automatically extend the validity of the current certificates by 6 months. As a result, the anniversary date has move forward 6 months. See tables below for details on the surveillance program, timing and level scheduled for the 4th surveillance audit. Initially the CAB will try to coordinate the site visit with the other overlapping fishery (Chile squat lobsters demersal trawl Camanchaca Fishery).

Table 7.3.1– Fishery surveillance program				
Surveillance level	Year 1	Year 2	Year 3	Year 4
Level 6	On-site SA	On-site SA	On-site SA	Off-site SA

Table 7.3.2 – Timing of surveillance audit			
Year	New Anniversary date of certificate after de Derogation	Proposed date of surveillance audit	Rationale
4	12 March 2021	June 2021	As a result of the updated milestones in conditions 2 and 14 the surveillance audit will be separated from the re- assessment. A remote audit is feasible because all the information needed to evaluate the progress of the remaining conditions can be requested by email and is publically available. In addition, the team already has a good knowledge of the fishery and the client so they are very familiar with the information on the fishery and where to search for it and who to contact. The audit date has been delayed 3 months to be aligned with the harmonised fishery Camanchaca. However, it is also expected, as set out in the FCP v2.1, to announce the re-assessment within 90 days after the 4 th anniversary date (12 th March 2021). Thus, the re-certification cannot be announce later than June 12, 2021. A 30-day period for stakeholder consultation will follow the announcement, so the site visit cannot be held before July 2021.

Table 7.3.3 – Surveillance level rationale			
Year	Surveillance activity	Number of auditors	Rationale
4	Off-site SA	2 auditors off-site	The remaining conditions can be audited remotely since the scientific information needed is publicly available and the communication between the scientist and client is straightforward. The P1 expert will be the same person as in the 3 previous years, therefore he is totally familiar





	with the information to close conditions 2 and 14. In he has always participated remotely.	ndeed,
	information transfer and consultation can b telephone.	be by

7.4 Harmonised fishery assessments

The other overlapping fishery (the Chile squat lobsters Camanchaca demersal trawl fishery) is assessed by the same CAB and assessment team. The same site visit is performed for assessing the two fisheries. The scores were harmonised during the initial assessments. Any change to the scores performed during the surveillance audits has been harmonised (e.g. a common variation request was prepared for 2 conditions). The progress on common certificate conditions were harmonised at this surveillance report.

