Fourth Annual MSC Surveillance Audit Report

Gulf of California Mexican Sardine Fishery

Certificate Number: SCS-MF-0026

Prepared for:
Cámara Nacional de la Industria Pesquera,
Delegación Sonora

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General Information

Date of Issue	23 December 2015	
Prepared by	SCS	Sian Morgan, PhD Carlos Alvarez Flores, PhD
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Surveillance Team	SCS Oceanides	Sian Morgan, PhD (Lead, P2) Carlos Alvarez Flores, PhD (P1, P3)
Surveillance Stage	4th Annual Surveillance	
Methodologies	MSC Certification Requirements Version 1.3, January 2013	

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Preface

All facts in this report were provided to SCS Global Services, Inc. (SCS) by Camara Nacional de la Industria Pesquera, Delegacion Sonora, represented by Mr. Leon Tissot Plant. However, the interpretation, opinions and assertions made in this report as to the compliance of the fishery with MSC requirements are the sole responsibility of SCS.

Glossary of Acronyms

BAC	Biologically Acceptable Catch
BCS	Baja California Sur
Bmin	Minimum Biomass
CAB	Conformity Assessment Body
CNP	Carta Nacional Pesquera
COBI	Comunidad y Biodiversidad
COFEMER	Federal Commission for the Regulations Improvement
CONAPESCA	Comisión Nacional de Acuacultura y Pesca
CPUE	Catch Per Unit Effort
CRIP	Centros Regionales De Investigación Pesquera
CTIPM	Technical Committee for the Study of Pelagic Juveniles
ETP	Endangered, Threatened, or Protected
FMP	Fishery Management Plan
HCR	Harvest Control rule
INAPESCA	Instituto Nacional de Pesca
LRP	Limit Reference Point
MSC	marine Stewardship Council
MSY	Maximum Sustainable Yield
NOM	Norma Oficial Mexicana
OY	Optimum Yield
PI	Performance Indicator
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación
SCS	SCS Global Services
SG	Scoring Guidepost
SST	Sea Surface Temperature
TS	Target Strength

1 Executive Summary

The Gulf of California Mexican Sardine fishery was certified on 21 July, 2011 by SCS Global Services, Inc. (SCS). This 2015 report represents the findings of the fourth annual surveillance since the fishery was certified. SCS finds that the Fishery is still in general compliance with the MSC standard. SCS recommends the continued use of the MSC certificate.

For the 4th surveillance the fishery six open conditions were closed. Under Principle 1 outstanding conditions (1.1.1 and 1.2.4) were closed on basis of progress made on data presented of the status of the stock with hydroacustic surveys, assessment models and data from environmental factors that are affecting sardine availability. Under Principle 2 outstanding conditions (2.1.1, 2.1.2, 2.2.2, 2.3.2) were closed based on progress made on the assessment of main retained species, the onboard-observer program and management of retained species.

A total of three conditions remain open, two of which are found to be behind target (Table 1). Significant progress was made on ecosystem modeling, however, the team determined that there is not enough evidence to assure that the fishery is highly unlikely to disrupt the ecosystem structure or that an effective strategy is in place to restrain impacts of the fishery on ecosystem elements (2.5.1 and 2.5.2). In Principle 3, despite improvements in management and monitoring, evidence was still required that the Carta Nacional Pesquera and NOM-003 are successfully enforced (3.2.4).

No new conditions were opened for this surveillance.

Overall Principle scores for the fishery after the fourth surveillance audit are:

Principle 1 – 82.5

Principle 2 – 82.0

Principle 3 – 85.1

The Client is respectfully reminded that scores for all Principles need to individually remain above 80 in order to main the validity of the certificate. For Re-Assessment the client is expected to address the conditions that fail to meet SG 80.

Table 1. Summary of Performance Indicators with conditions.

Condition number	Performance indicator (PI)	Year Opened	Status	Condition original score	PI revised score 2015
1	1.1.1	2014, 3rd surveillance	Closed, 4th surveillance	75	80
2	1.2.4	2012, Full Assess.	Closed, 4th surveillance	75	80
3	2.1.1	2012, Full Assess.	Closed, 4th surveillance	75	80
4	2.1.2	2012, Full Assess.	Closed, 4th surveillance	70	80
5	2.2.2	2012, Full Assess.	Closed, 4th surveillance	70	80
6	2.2.3	2012, Full Assess.	Closed, 3rd surveillance	70	80
7	2.3.1	2012, Full Assess.	Closed, 4th surveillance	75	80
8	**2.5.1**	**2014, 3rd surveillance**	**Open, Behind Target**	**60**	**60**
9	**2.5.2**	**2012, Full Assess.**	**Open, On Target**	**75**	**75**
10	3.2.1	2012, Full Assess.	Closed, 3rd surveillance	75	80
11	3.2.2	2013, 2 surveillance	Closed, 4th surveillance	85	80
12	**3.2.3**	**2014, 3rd surveillance**	**Open, Behind Target**	**70**	**70**
13	3.2.4	2012, Full Assess.	Closed 3rd surveillance	70	90

2 Assessment Overview

2.1 Methodology

The surveillance audit was carried out in accordance with the Marine Stewardship Council (MSC) Certification Requirements Version 1.3, January 2013. Should a fishery fail the surveillance audit, and cannot address identified deficiencies in a reasonable period of time, then the use of the certificate and the MSC logo can be revoked by the conformity assessment body (CAB).

The issues for the CAB are whether the fishery has sufficiently acted on the required conditions set forth in the original certification report, is moving at an appropriate pace toward pending or new conditions and whether a random check on the performance of the fishery verifies continued compliance with the MSC standards and existing scores.

The annual surveillance audit process is comprised of four general stages:

1. The certification body provides questions around areas of inquiry to determine if the fishery is maintaining the level of management observed during the original certification. In addition, the surveillance team requires that the client provide evidence that the fishery management system has taken the necessary actions to meet all conditions placed on the fishery during the initial certification assessment or any previous surveillance audits.

2. The surveillance/assessment team meets with the client fishery to allow the client to present the information gathered in answer to the questions asked by the surveillance team The surveillance team can then ask questions about the information provided to ensure its full understanding of how well the fishery management system is functioning and if the fishery management system is continuing to meet the MSC standards.

3. The surveillance team presents its preliminary findings to the client fishery at the end of the site visit. The results outline the assessment team's understanding of the information presented and its conclusion regarding the fishery management system's continued compliance with MSC standards.

4. Where appropriate, the client fishery submits final information to the surveillance/assessment team for consideration in the surveillance findings and report. The surveillance team then reviews the final information and submits a final report to the client fishery and the MSC for posting on the MSC website within 60 days (GCR 2.1/FCR 2.0) (in this case more, due to delays in the stock assessment and associated variance requests made on behalf of the client fishery/INAPESCA by SCS). If there are continued compliance concerns, these are presented as non-conformities that require further action: changes in scores require clients to create an action plan against any new conditions.

2.2 Surveillance Team

Two assessment team members were involved in the 3rd annual surveillance audit. As outlined below and to fulfill the requirements in the MSC Certification Requirements, team members fulfill MSC expert requirements for at least one of Principle 1, 2 or 3 and the team contains a lead auditors, and there is continuity with the previous assessment team for the system.

Dr. Siân Morgan- Regional Director, SCS Global Services

Dr. Morgan has ten years of experience in the fields of marine ecology and fisheries science with particular expertise in markets-based fisheries reform, certification and quantitative methods for decision analysis. Dr. Morgan has worked in non-governmental, academic and consulting settings and brings to the team a strong background in multi-stakeholder consultation. Her doctoral research at the Fisheries Center, University of British Columbia/McGill examined the ecology, population dynamics and management of a small-scale, multi-species fishery in Asia. Sian participated in MSC's low trophic level workshops, which drafted the emerging standards for forage fisheries and has also drafted standards within the Aquaculture Dialogue standards related to responsible sourcing of forage fisheries and ecological consideration associated with habitat disturbance. Past projects managed by Siân include developing SeaChoice, a national seafood program for Canada, conceiving pragmatic trade tools for CITES and researching species

responses to area-based management for WWF. Sian is accredited to certify to the MSC standard, the ASC standard and SA 8000.

Dr. Carlos M. Alvarez Flores – Independent Consultant at Oceanides Conservación y Desarrollo Marino

Carlos Alvarez Flores gained a PhD in Fisheries from the University of Washington. He has devoted his professional career working in marine mammal and fish stock assessment and ecosystem impacts of fisheries. Some of his investigations involved the bycatch of dolphins in the pelagic purse seine tuna fisheries of the Eastern Tropical Pacific, the hunt of beluga whales in West Greenland, the hunt of bowhead whales in Canada, the bycatch of albatrosses in pelagic fisheries of the central Pacific and the modeling of factors that could further affect the fate of the albatross populations. More recently, Carlos has been involved with investigations examining the status and potential of different fisheries from crab, octopus, sand bass, red snappers and lobster from the Baja California Peninsula to the Caribbean. Some of these assessments were done in the context of their work towards certification by the Marine Stewardship Council. Presently his main interest is to build an alternative strategy for the assessment of fisheries that are extremely data poor.

2.3 Surveillance Meeting

The surveillance audit for 2015 comprised:

1. An Audit Plan was provided to the client, fisheries management and scientists before the meeting. The opening with the client included an exchange of information relevant to the surveillance audit.

2. A meeting took place on the May 19nd and May 20th 2015 with Leon Tissot Plant representing the Camara Nacional de la Industria Pesquera, Delegación Sonora (see Table 2). The discussions focused on the ongoing activities associated with the original Conditions placed on the fishery and any new conditions issues during previous surveillances as well as changes that have occurred since the fishery's last surveillance audit (May 2014).

3. Necessary documents were presented by the client to SCS prior to and during the meeting. Follow up emails were sent to request additional information after the meeting.

4. SCS submitted several variation requests to extend the publication of the 4th annual surveillance report 150 days beyond the original due date. This additional time was requested to review and incorporate the stock assessment and to evaluate the role of oceanographic conditions and a pending El Nino event on coast wide stock dynamics and population distributions.

Table 2. Second Annual Assessment Meeting Attendees and Organizations

Name	Role	Affiliation
Arnulfo Navarro Carillo	Management	Jefe de la Oficina de Pesca de Guaymas
Dr. Carlos Alvarez	Assessment Team member	Assessment Team Member
Dr. Dana Arizmendi	Biologist	INAPESCA – Crip Sonora
Dr. Enriqueta Velarde	Academia	University of Veracruz
Dr. Exequiel Ezcurra	Academic stakeholder	UC Davis, MEXUS
Dr. Jorge Torre.	ENGO stakeholder	Comunidad Y Biodiversidad A.C
Dr. Sian Morgan	Assessment Team Leader	SCS
Edna Maria Arambula	Management	CONAPESCA
Elías Ortega	Industry	Pesquería Costa Rock
Elvira Gonzalez Corona	Management	INAPESCA – Crip Sonora
Enrique Flores	Industry	Selecta
Gabriela García	ENGO stakeholder	Comunidad Y Biodiversidad
Gerardo Barnetche	Industry stakeholder	Industrias Barda
Jesús Padilla Serrato	Management	INAPESCA – Crip, Sonora
Juan Pedro Vela	Fisheries stakeholder	Alianza de Ribereños y Armadores
Leon Tissot Plant	Client Representative	Cámara Nacional de la Industria Pesquera, Delegación Sonora
Luis D. Andrade	Industry	Sardinas de Sonora
María Ángeles Martínez	Managment	INAPESCA-CRIP
María José Espinosa R.	ENGO stakeholder	Comunidad Y Biodiversidad A.C
Martin Hernandez	Academia	CICIMAR
Rogelio Sánchez de la Vega	Industry	Pescaharina de Guaymas

3 Results

3.1 General Discussion

This is the 4th Annual Surveillance Report prepared by SCS Global Services to meet the requirements of the MSC for annual audits of certified fisheries.

The section below provides the general information about the status of the stock, the ecosystem impacts from fishing, and management arrangements for this reporting period. According to the terms of the Action Plan, the client has provided the following information on the work undertaken since Certification in 2011.

3.2 Principle 1 - Stock Status and Harvest Strategy

3.2.1 Catch and effort

The total catch of small pelagics for the 2013/2014 season was 293,686 MT which is 171,800 MT smaller than the 2012/2013 season. Out this total, the Pacific sardine represented only 1% of the catch (3,571 MT), the lowest catch of Monterey sardine in the history of the fishery, which declined 95% from the last year's catch.

Table 3. Total landings (MT) of small pelagic species in the Gulf of California purse seine fishery. Data from Nevarez-Martinez et al (2015d).

	Small pelagic species English Common Name/Spanish Common Name (*Scientific Name*)										
Year	*Total – Small Pelagics*	Monterey Sardine/ Sardina Monterey (*Sardinops sagax)*	Thread Herring spp./ Sardina crinuda (*Opisthonema spp.)*	Chub Mackerel/ Macarela (*Scomber japonicas)*	Red-eye round herring/ Sardina japonesa (*Etrumeus teres)*	California Anchovy/ Anchoveta (*Engraulis mordax)*	Bigmouth sardine/ Sardina boconoa (*Cetengraulis mysticetus)*	Leatherjackets/ Sardina piña (*Oligoplites . Spp)*	Bycatch	Boats	Nominal effort (trips)
99/00	178,902	65,593	38,510	34,240	5,006	4,493	25,229	4,741	1,091	28	1,603
00/01	333,370	190,862	15,834	13,003	345		112,954	277	75	28	2,533
01/02	353,903	220,360	46,666	4,493	270	2,853	78,261	890	110	32	2,827
02/03	318,379	198,757	94,956	6,992	4,889	1,100	7,682	3,309	693	31	2,745
03/04	271,638	102,034	59,685	25,507	8,858	5,717	63,253	5,494	1,090	28	2,121
04/05	260,859	94,559	76,183	32,943	4,683	7,354	38,031	4,233	2,874	30	2,074
05/06	365,164	133,567	60,560	13,191	7,178	41,820	106,062	945	1,841	36	2,922
06/07	297,867	178,205	87,172	6,616	3,088	1,271	16,491	2,530	2,495	38	2,499
07/08	538,669	488,639	25,726	3,988	698	5,885	12,303	238	1,190	42	3,861
08/09	564,298	528,094	21,564	963	422	2,620	9,537	212	885	47	3,757
09/10	360,952	256,409	85,116	3,527	5,545	481	8,315	520	1,039	50	2,761
10/11	407,114	138,068	73,507	38,762	3,040	76,849	74,067	2,382	441	49	3,306
11/12	461,058	86,470	51,780	47,600	2,560	73,124	197,354	666	1,503	50	3,358
12/13	465,486	72,802	101,814	20,557	12,587	118,833	129,296	3,947	5,649	51	3,601
13/14	293,686	3,571	133,452	40,640	6,684	33,772	64,135	10,869	564	49	2,685

Table 4. Percentage of small pelagic species landed in the Gulf of California sardine purse seine fishery by weight since the 1999-2000 fishing season. From data in Table 3.

		Small pelagic species English Common Name/Spanish Common Name (*Scientific Name*)							
Year	*Total – Small Pelagics*	Monterey Sardine/ Sardina Monterey (*Sardinops sagax)*	Thread Herring spp./ Sardina crinuda (*Opisthonema spp.)*	Chub Mackerel/ Macarela (*Scomber japonicas)*	Red-eye round herring/ Sardina japonesa (*Etrumeus teres)*	California Anchovy/ Anchoveta (*Engraulis mordax)*	Bigmouth sardine/ Sardina boconoa (*Cetengraulis mysticetus)*	Leatherjackets/ Sardina piña (*Oligoplites. Spp)*	Bycatch
99/00	178,902	37	22	19	3	3	14	3	1
00/01	333,370	57	5	4	0	0	34	0	0
01/02	353,903	62	13	1	0	1	22	0	0
02/03	318,379	62	30	2	2	0	2	1	0
03/04	271,638	38	22	9	3	2	23	2	0
04/05	260,859	36	29	13	2	3	15	2	1
05/06	365,164	37	17	4	2	11	29	0	1
06/07	297,867	60	29	2	1	0	6	1	1
07/08	538,669	91	5	1	0	1	2	0	0
08/09	564,298	94	4	0	0	0	2	0	0
09/10	360,952	71	24	1	2	0	2	0	0
10/11	407,114	34	18	10	1	19	18	1	0
11/12	461,058	19	11	10	1	16	43	0	0
12/13	465,486	16	22	4	3	26	28	1	1
13/14	293,686	1	45	14	2	12	22	4	0

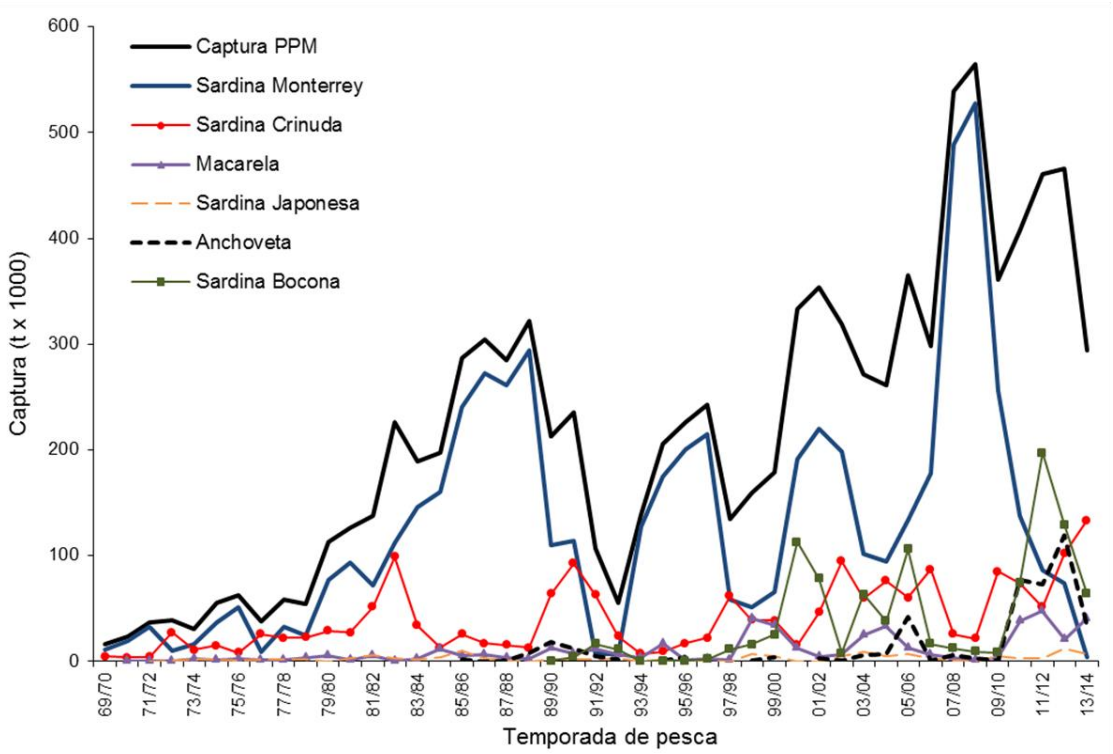

Figure 1. Landings in tonnes by fishing season since 1970. In 2014, overall landings show a clear declining trend from the 2007-2008 season, although the catch in the last season is about the average since 2000. Monterrey Sardines (Sardina Monterrey) continued to decline to a historic low, with Thread Herring (Sardina Crinuda), Anchoveta and Bocona (Sardina Bocona) making up a significant portion of the catch relative to previous seasons. Reproduced from 2015 onsite presentation by CRIP Guaymas, Program on Small Pelagics.

The time series of effort (Figure 2) on small pelagics shows two well-marked, similar periods that span from season 69/70 to 89/90 and from 92/93 to 12/13. In both cases, an overall increasing trend in CPUE of small pelagics is evident, with the first period ending with a sharp decline from 90/91 through 92/93 (Figure 2). The second period ends with the latest seasons 07/08 and 08/09 showing a sharp increase in effort, followed by a decline in 09/10. However, while CPUE drops, overall effort instead increases again in 12/13 to a level close to the high in 08/09 (Figure 3; Table 2Table 3). Despite the steady increase in overall effort on small pelagics, effort on the Pacific sardine apparently declined from season 09/10 to season 12/13, while during the same seasons, effort on Thread Herring remained approximately stable with a slight increase in season 12/13 (Figure 3). The opportunistic nature of the small pelagic fleet makes it difficult to interpret CPUE on a particular species, as the fleet prefers Pacific sardine, but will opportunistically capture any of the marketable small pelagic species it encounters.

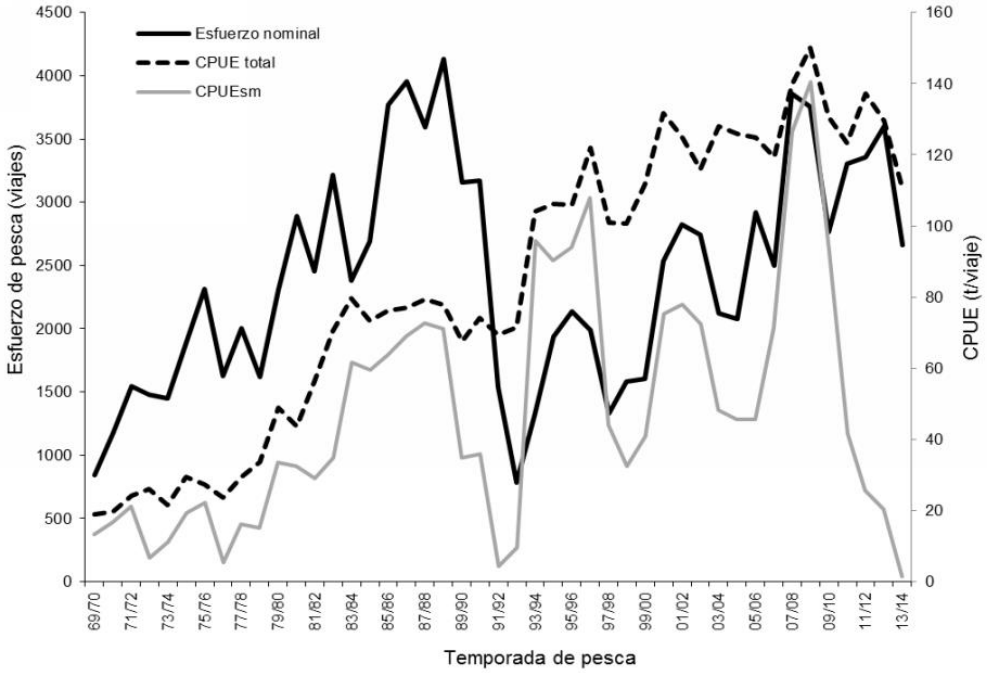

Figure 2. Nominal effort (trips), total CPUE (all small pelagics) and CPUE of Monterrey Sardine (CPUEsm) in fishing seasons 1969/70 through 2013/14. Reproduced from Nevárez-Martínez et al. (2015).

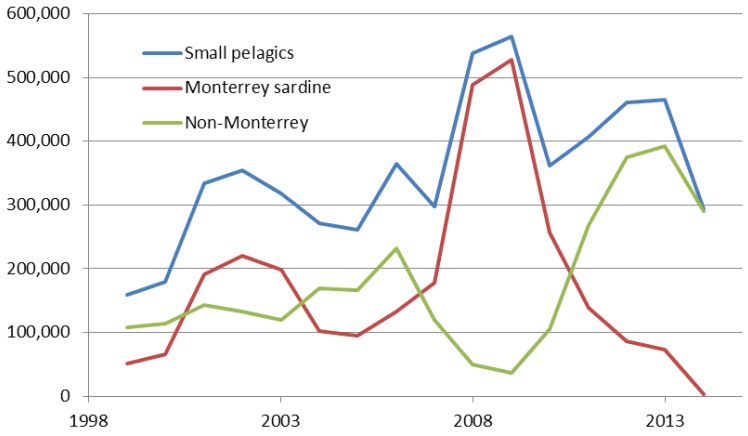

Figure 3. Comparison of trends in Monterrey sardine catch relative to the total of small pelagics and relative to species other than Monterrey sardine, in the Gulf of California small pelagics purse seine fishery. From data in Table 3.

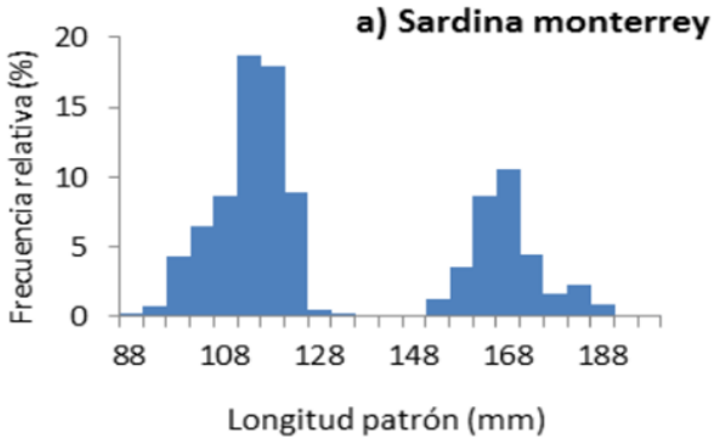

Figure 4. Size frequency distribution of Monterrey sardine during the fishing season 2013-14. Reproduced from Martínez-Zavala et al. (2015a).

Size frequency distributions of the catch indicate that in the last fishing season, fish under the official minimum size limit comprised a sizeable proportion of the catch (~ 50%). Data from a 2006 report on small pelagics (Martínez-Zavala et al. 2006) indicate that proportions above 30% of Monterrey sardine under 150 mm are quite common despite regulations and agreements regarding minimum size.

The separate length modes depicted in Figure 4, indicate that despite the low catch in the last years, there is a cohort of young fish that should be recruiting and vulnerable to the fishery in upcoming years (Martinez-Zavala et al 2015a).

3.2.2 Fisheries Management Plan

The Small Pelagics Management Plan was published in July 2011 (Nevarez-Martinez *et al*. 2011) and the final version was passed into law in November of 2012. A relevant insertion in the Plan is the definition of guidance to establish reference points. The language doesn't identify "limit" or "target" reference points, but the equivalent are as follows.

Limit Reference Point Analogue

A *Biologically Acceptable Catch* (BAC) (equivalent to a LRP) is computed as a fraction of the estimated MSY. The rationale behind this approach comes from results of a simulation study finding that, for the Pacific sardine, a fishing mortality rate that is 90% of the F_{msy} "would not only produce higher economic returns and be safer biologically, but will reduce intrinsic population oscillations" (Nevarez-Martinez *et al*. 1999). Under this principle, the Plan states that the BAC is a "prudent level of catch" that can vary between 5 and 25% of the estimated biomass. To support the assumption that the BAC is equivalent to the LRP, an additional definition in the Plan states that overfishing "occurs when fishing takes place at a rate that is high enough to risk the stock's ability to continuously produce MSY on the long term". The Plan further adds, operationally, "in the fishery of small pelagics, overfishing occurs if the catch exceeds the BAC". This

condition is "approximated" (i.e. met) if the predictive model projections indicate that the fishing mortality or the harvest rate will exceed the BAC over a period of two years.

Target Reference Point Analogue

In the language of the Plan, the equivalent of the Target Reference Point is called *Optimum Yield* (OY) and is defined as a "catch level that is equal or less than the BAC", but that in practice, "it *must* be smaller than the BAC as much as needed to avoid overfishing".

These reference points are required to be consistent with the MSY because the strategy is expected to be able to provide biomass levels, at least as high as the F_{msy} approach while the catch is "relatively high and consistent".

If overfishing occurs, the Plan defines "emergent actions" that are implemented "if pertinent and possible". These actions include: a) temporal or area closures applied to one or more species; b) change in the size limits o definition of new limits for one or more species in a single area or more; c) definition or change of allowable catch; d) restrictions on fishing effort.

The new FMP describes that some species are to be actively managed, while others will be passively managed. The purpose of these two categories of management is to use institutional resources as efficiently and effectively as possible to meet management goals. Species in each group are given in Table 5.

Table 5. Small pelagic species categorized for two main forms of management in the November 2012 Fisheries Management Plan for Small Pelagics in the Gulf of California Mexico.

Actively Managed	Passively Managed
Pacific sardine: *Sardinops sagax*	Japanese sardine: *Etrumeus teres*
Blue Thread Herring: *Opisthonema bulleri*	Bocona sardine: *Cetengraulis mysticetus*
Machelete Thread Herring: *Opisthonema medirastre*	Anchovy: *Engraulis mordax*
Thread herring: *Opisthonema libertate*	Charrito: *Trachurus symmetricus*
(Chub) Mackerel: *Scomber japonicus*	Pineapple sardine: *Oligoplites*. spp.

Harvest Control Rule

For species that are "actively managed" the Plan has added an MSY-based control rule that, based on the application of a harvest rate, forces the catch to be reduced if the biomass declines until eventually, if a biomass threshold is reached, the fishery stops operating.

The general formula is as follows:

$C = (B\text{-}B_{min}) * FRACTION$

Where: C is the target catch level, B_{min} is the lowest level of estimated biomass at which the directed harvest is allowed and FRACTION is the proportion of biomass above B_{min} that can be captured by the fishery. B is generally estimated biomass of fish age 1 and older. The purpose of B_{min} is to protect the stock when the biomass is low. The purpose of FRACTION is to specify how much of the stock becomes available to the fishery when B exceeds B_{min}.

The Small Pelagics Fisheries Management Plan indicates that to compute C, different sources of information can be used, including catch and fishery data (catch and effort, sizes, ages and weights) as well as fishery independent data (census of eggs and larvae, hydroacoustic data etc.).

After the 3d surveillance audit SCS was provided with a B_{min} value in the range of 22,000 to 126,000 mt that was computed based on an analysis of stock recruitment and the potential of allee effects in the sardine population (Morales-Bojorquez and Nevarez-Martinez 2005). Estimates of abundance obtained with hydroacoustic methods are in the range of 515,000 to 711,000 mt (Martinez-Zavala, et al., 2014) a BAC could be obtained using the control rule, but this quantity was not produced at the time, nor inserted in the decision making process.

At the 4th surveillance audit, we were presented with a different range of B_{min} values (9,500 to 52,000 mt) and an overall population estimate of 572,000 mt (possible estimate for 2014 from acoustic surveys) which would produce a range of BAC of 130,000 to 140,625 mt in 2014. However, in the INAPESCA presentation given during the onsite meeting, the slide indicated that the BAC for 2014 should have been in the range of 134,900 to 145,500 mt. It was estimated that the BAC for 2015 should be in the range of 87,000 to 90,000. The stock assessment on the other hand, did not present the numbers used in calculating the BAC, but it presented a range between 128,367 to 147,702 ton.

The provided estimates of Bmin were all computed under the definition that this quantity needs to provide a minimum biomass to protect recruitment. However, under the MSC requirements for key low trophic level species, minimum biomass levels must be determined based on ecosystem needs. This conceptual change is being processed by Dr. Francisco Arreguin and his team – SCS was informed in two letters dated June 12th 2015 (Appendix 3). It is therefore recommended that this work is completed and new B_{min} values are computed to obtain allowable catch levels that allow biomass to remain in the water for ecosystem requirements.

Table 6. Reference points for the Monterrey sardine in the Gulf of California Mexico. Table reproduced from document sent by M.A. Martinez-Zavala, complemented with data from CRIP (2015).

Reference Points	Reference Points	Monterrey Sardine (2014) Number for year 2013	Monterrey Sardine (2015) Numbers for year 2014
Minimum stock abundance, (individuals)	Tamaño mínimo del stock* (), en Número	269 X 10^6 a 1,569 X 10^6	-
Minimum stock abundance, biomass (t)	Tamaño mínimo del stock* (), en Biomasa (t)	22,000 – 126,000 t	9,500 – 52,000
Advisable exploitation rate (Carta Nacional Pesquera)	Tasa de explotación (**E**) recomendable Carta Nacional Pesquera (2012), 68-69 p.	0.25/año	0.25/año
Fishing mortality rate (**F**) Cohort Analysis 2011/12 (CRIP)	Tasa de mortalidad por pesca (**F**) Análisis de cohorte 2011/12 (CRIP)	0.189/año	-
Fishing mortality rate (**F**) Cohort Analysis 2012/2013 (CRIP)	Tasa de mortalidad por pesca (**F**) Análisis de cohorte 2012/13(CRIP)	0.218/año	-
Fishing mortality rate (**F**) ASAP 2013/2014 (CRIP, ppt onsite visit) ASAP 2013/2014 (CRIP,SAR)	Tasa de mortalidad por pesca (**F**) ASAP 2013/14 (CRIP, ppt at onsite)[1]; ASAP 2013/14 (CRIP, SAR)[2]	-	0.08[1] 0.003[2]
Exploitation rate (**E**) Cohort analysis (2011/2012) (CRIP)	Tasa de explotación (**E**) Análisis de cohorte (2011/12) (CRIP)	0.161/año	Not provided for 2013/14
Exploitation rate (**E**) Cohort analysis	Tasa de explotación (**E**) Análisis de cohorte (2012/13) (CRIP)	0.183/año	-
Actual biomass (t) (estimated by hydroacoustics) Actual biomass (t) (probably estimated by hydroacoustics) (estimated for ASAP)	Biomasa actual (toneladas) (estimado por acústica) Biomasa actual (toneladas) (probable estimado por acustica) (estimado por ASAP)	515,000 – 711,000 t -	- 572,000 t ~750,000 t

The new FMP also notes that supplemental measures have been proposed, and will be supported via official recognition of the Technical Committee for the Study of Pelagic Juveniles (CTIPM) and working Sub-committees. This involves giving legal recognition to CTIPM and the Sub-committees. Subcommittees shall have as one of their functions to develop and propose to the competent authority an *ad hoc* scheme for each stock, which must be incorporated into the Management Plan. This must include decision tables based on benchmarks chosen by consensus.

Table 7. Conceptual correspondence among different definitions of target and limit reference points.

Reference point	Definition	MSC	FMP	Value
Target	Desirable state	Similar in intent or outcome to maintain the stock at Bmsy or above. Can use proxy e.g. Fmsy. Consideration of S-R; Potential impacts on reproduction capacity; genetic capacity or sex composition.	Optimum yield (OY)	Fraction of BAC
Limit	Unacceptable state	Default: 0.5 Bmsy	Biologically acceptable catch (BAC)	HCR

3.2.3 Stock Status

Background: At the 3rd surveillance audit, the following facts were presented:

1. Catch of Monterrey sardine declining.
2. Overall catch of small pelagics is increasing.
3. Catch of other small pelagics increasing.
4. Effort in nominal trips and boats is increasing.
5. Monterrey sardine maybe following regular pattern.
6. Other small pelagics maybe following the regular pattern.
7. The possibility exists that Monterrey sardine may be reaching Bcrit, however this value has not been estimated right at a time when the fishery may need to stop fishing on the species.
8. Control rule not working despite being official in 2012.
9. No notification of any other alternative management action.

Evidence presented during the 2nd and 3rd surveillance audits showed that catch was in a sharp declining trend and concerns were raised about the abundance of the stock and the role of the fishery in this decline. The discussion pointed to the evidence from past El Niño events as the most likely explanation for the decline. However, Dr. Carlos Robinson (UNAM) presented data supporting the hypothesis that the change in oceanographic conditions causing the decline in the sardine catch was not related to El Niño. His analysis pointed to a change in wind patterns at a localized scale in key areas of the Gulf causing chlorophyll-a anomalies that match the trend in the catch. The hypothesis and data treatment

to support this model was questioned by Dr. Enriqueta Velarde based mainly on methodological discrepancies.

The decline in the catch led to two points of discussion. First: Is the decline in catch caused by a decline in biomass (whatever the cause)? Second: Has there been a shift in the behaviour of the fishery that resulted in intentional targeting of non-Monterrey sardine species, and is there evidence to demonstrate any such change? Data in Table 3 and Figure 3 show that if species other than Monterey sardine are pooled, there is a clear increase in the volume of the catch almost matching the decline in the catch of Monterey sardine. In order to resolve these issues, the team felt in 2013, that estimates of biomass abundance independent of the fishery were needed (e.g. based on acoustic methods). However, the 2013 synthesis on hydroacoustics indicated that methods were not currently sufficient to use this information to reliably estimate Monterrey sardine abundance (Nevárez-Martínez et al. 2013a; Villalobos et al. 2013).

The team considered that results of the 3rd surveillance audit were inconclusive and that the risk to the stock and the fishery was too large to not at least require additional evidence about the status of the sardine population and the environmental conditions that could better explain the current situation of the fishery. The assessment team elected in 2013 not to invoke re-scoring of PI 1.1.1, but declines continued and PI 1.1.1 was re-scored in 2014 with a new condition opened to present evidence that the stock is is at or fluctuating around its reference points such that recruitment is not impaired by overfishing. Re-scoring of P1 based on the uncertainty that the stock is fluctuating around its reference points lead to an inherent need to revise related Performance Indicators in Principle 2 and Principle 3.

Condition 1.2.4 stated that *By the 3rd annual surveillance audit the client shall provide evidence that the stock assessment has been modified to be more appropriate for the sardine stock. In doing so, the client shall consider the use of fishery independent data to assess the population biomass. The assessment shall continue to use adequate reference points and control rules, taking uncertainties into account and should be peer reviewed*. At the time of the third surveillance audit, the assessment methodology had not been fully implemented, but evidence was presented of the progress in producing a variety of data independent of the fishery and a workshop was scheduled to use the Stock Synthesis III platform under the supervision of an invited expert. The condition was therefore considered to be on target. However, it was stressed that in order to close the condition by the 4th surveillance audit, the stock assessment should: a) be appropriate for the stock and for the harvest control rule, b) be evaluating stock status relative to reference points, c) take uncertainty into account and d) be subject to peer review.

Hydroacoustic Surveys: Fisheries independent data is being collected via hydroacoustic surveys which began in 2008.

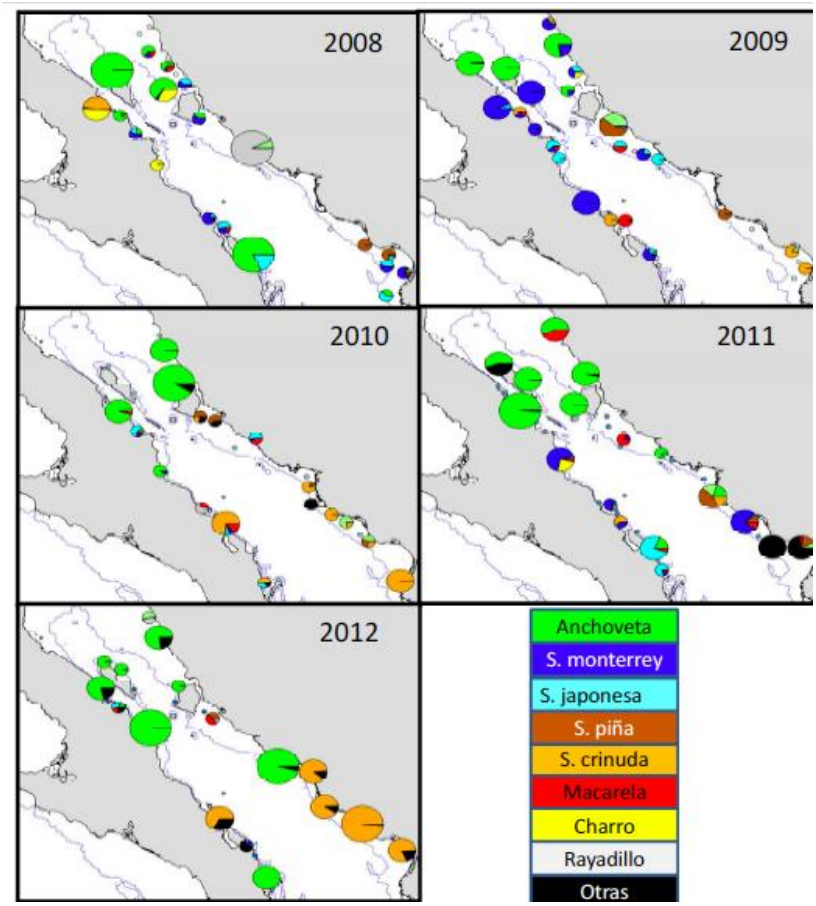

Table 8. Distribution of small pelagic species captured to ground-truth hydroacoustic surveys, from different locations around the Gulf of California, Mexico, by year (Nevárez-Martínez et al. 2013).

Findings were summarized for the period between 2008 and 2012 (Nevarez Martinez *et al.,* 2013a) and for the period 2008-2013 (Nevarez-Martinez et al 2015a). These works included acoustic surveys carried out in the Gulf of California during the month of May for the years of 2008-2013 aboard the research vessel "BIP XI". The survey itinerary was the same in all years, where on the coasts of Sonora (Bahia de Puerto Obos Agiobamp) perpendicular transects were made up to the 200 m isobath and every 10 nm (mn). In the western Gulf, zigzag transects were done from Isla Angel de la Guarda to Loreto, BCS. Results indicate that there is high variability in the biomass of Pacific (Monterrey) Sardine, but also that biomass estimates differed depending on how the target strength (TS) of the signal was interpreted: interpretation and selection of appropriate target strength models is known to be a sensitivity that needs attention in hydroacoustic surveys (Demer, 2004). Findings indicate that in a relative sense there was a general biomass decrease in Sardines from 2008 to 2010 and a slight increase in the last two years (Fig. 5).

As previously mentioned, reports of hydroacustic surveys conducted by INAPESCA identified that it would be necessary to continue working on ground-truthing methods to assign the overall acoustic energy to

the different species in order to generate more reliable estimates of abundance. This issue was raised again in the 4th surveillance audit, and although the issue was not satisfactorily resolved during the audit, a telephone conversation with Dr. Hector Villalobos, the acoustics expert working with INAPESCA, the team was informed that certainly the signal discrimination process needs to be improved, but that the improvement is not expected to modify the results significantly and that in the current condition of the index would be that of an under-estimate of the true abundance (Villalobos personal communication, 2015). Under this scenario, the approach is to consider the index as a relative abundance estimate that is below the true abundance.

Abundance estimated by acoustic methods shows a decline in sardines after 2009 and remains at relatively low levels compared to the pre-decline abundance (Figure 1). Biomass in 2013 and 2014 is estimated to be around 700,000 tons, although this may be an underestimate of actual abundance.

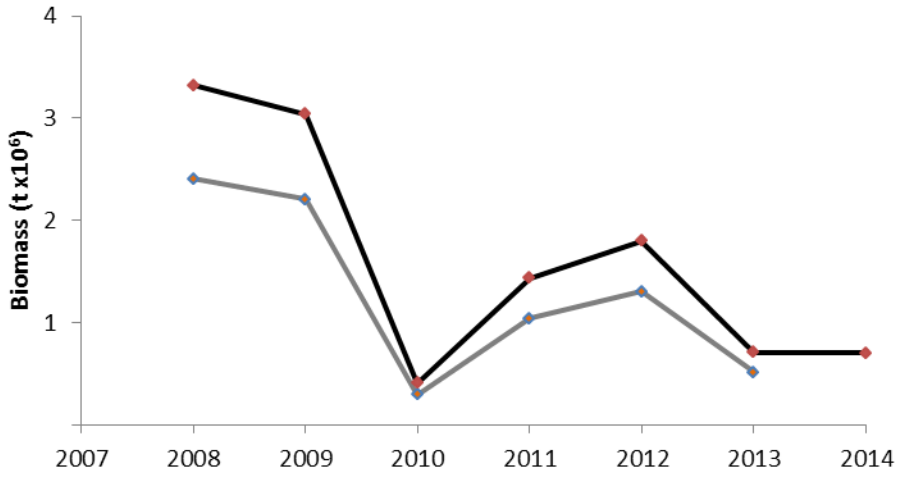

Figure 5. Estimates of Gulf of California Monterrey sardine biomass using hydroacoustics under alternative assumptions of target strength from 2008 to 2013. Data from Nevarez-Martinez et al (2015a). The data point for 2014 is approximated from Fig. 4 in Nevarez-Martinez et al (2015b).

Stock assessment: An evaluation of stock status was made (Nevarez-Martinez et al 2015b) using the ASAP model of Legault and Restrepo (1999). The analysis used catch and biological data from the fishery. Fishery independent data included the following indices of relative abundance: a) number of fish caught per squared km in tows, during prospective and acoustic surveys from 1990 to 2014; b) indices of biomass obtained by means of acoustic detection of fish from 2008 to 2014; c) abundance of eggs and larvae (number/10 m^2) from 1971 to 1988; d) an environmentally based index specifying the spawning probability from 1979 to 1996; and d) an index based on the proportion of sardine in the diet of sea birds.

The assessment obtained a time series of estimated abundance for different components of the sardine stock reconstructing the trajectory from 1972 to 2014. The analysis also computed a list of parameters of management and reference points, including the fishing mortality producing the MSY. A Beverton-Holt stock recruitment model was also fit to a plot of the estimated number of fish of age 0 against the total number of spawners.

Additionally, the BAC was computed for every year in the series and was compared with the recorded catch.

Total biomass was estimated to be near 1.5 million tons between 2012 and 2014. Vulnerable biomass was estimated to be around 750,000 tons in the same years (Figure 6).

Fishing mortality rate was estimated to be under the reference point value of 0.25 along the entire time series (Figure 7).

Figure 8 shows that catches have been for the most part under the estimated BAC computed using the control rule defined in the FMP.

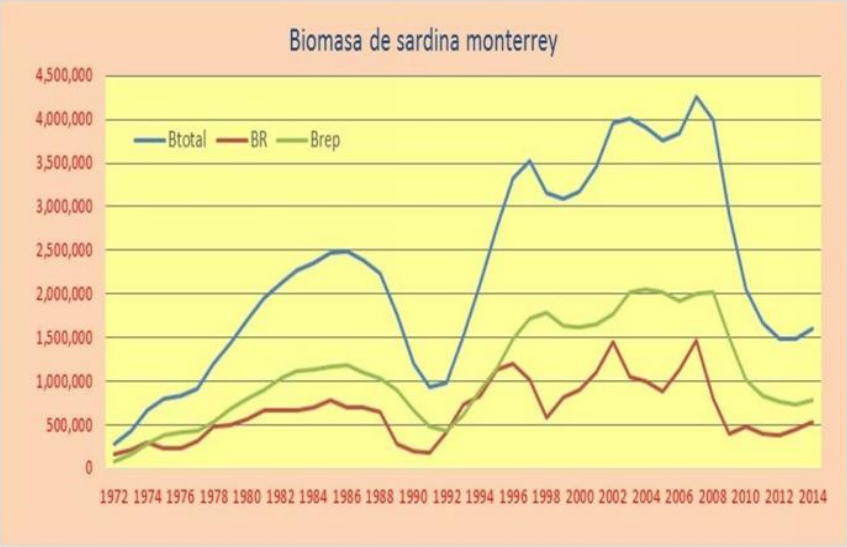

Figure 6. Estimated biomass of Monterrey sardine in the Gulf of California obtained from the ASAP analysis. Reproduced from Nevarez-Martinez et al (2015b). Btotal = total biomass, BR = recruit biomass, Brep = vulnerable biomass

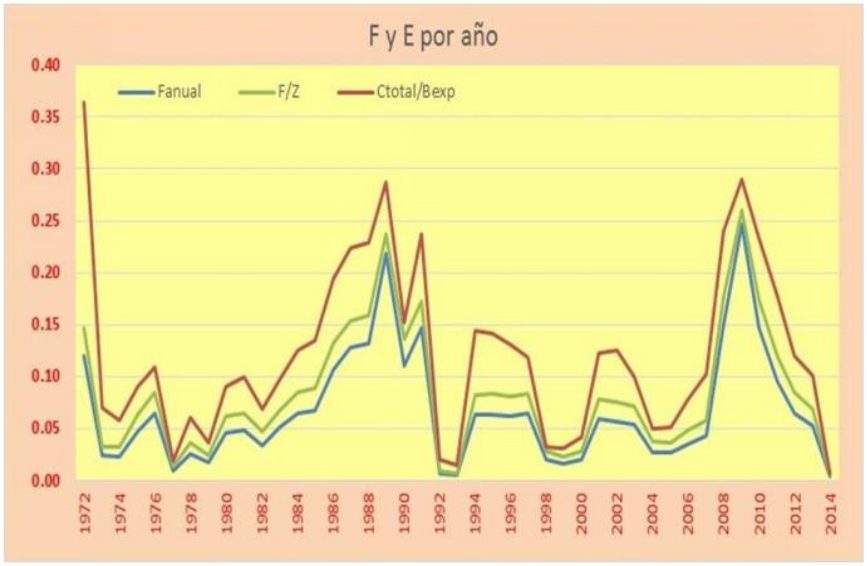

Figure 7. Estimated fishing mortality rate (Fanual in blue), contribution of fishing to total mortality (F/Z in green) and harvest rate (Ctotal/Bexp) of Monterrey sardine in the Gulf of California obtained from the ASAP analysis. Reproduced from Nevarez-Martinez et al (2015b).

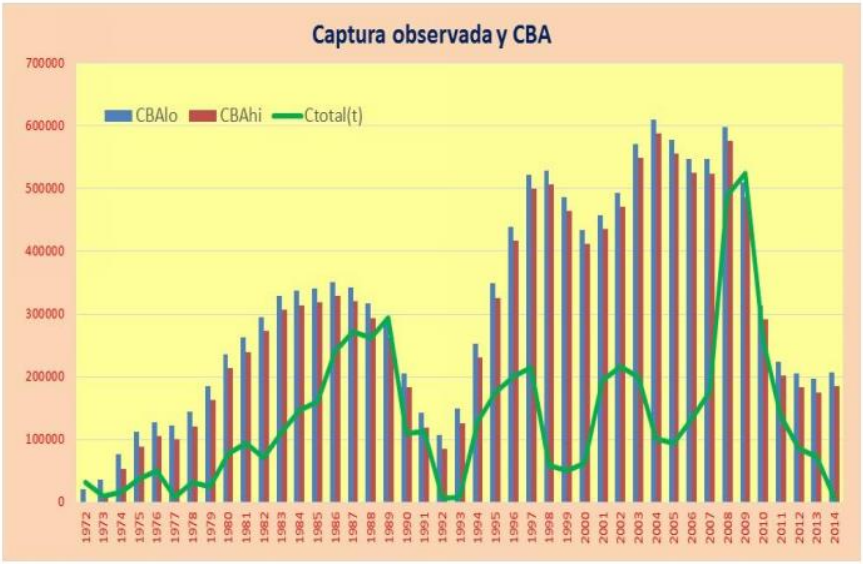

Figure 8. Comparison of catch records (green line) of Monterrey sardine in the Gulf of California with the estimated Biologically Acceptable Catch (bars) obtained with the control rule in the Management Plan. Alternative BACs (blue and red bars) were calculated using different Bmin values. Reproduced from Nevarez-Martinez et al (2015b).

Stock assessment peer review: Two processes of review of the stock assessment were conducted by the fishery. In the first case, a session of discussion was organized by INAPESCA on June 9 2015. Seven people attended the discussion which was intended to serve as part of the peer review process. However, the report and details of the assessment were not provided to the participants in advance for their careful review. Additionally, the process was expected to be conducted by experts independent of the

assessment process or assessment inputs. Out of the seven participants, only one (Viridiana Zepeda) was considered to have the expected technical expertise and independence to serve as peer reviewer. Ms. Zepeda submitted a report that led to several questions. Upon a subsequent interview she was unable to deliver a peer review because, she did not have access to all the material needed to provide a competent review based on a full understanding of the modelling approach and inputs. The INAPESCA staff did not provide further detail and this evaluation could not therefore, constitute scientific peer review.

On September 11th 2015, the team received a report by Dr. Kevin Hill who received access via INAPESCA to details about the assessment that had not been available to other reviewers. Given the expertise of Dr. Hill in sardine research and management, we accepted his review as sufficient fulfilment of the requirement for peer review. However, we are recommending that two additional *independent* reviewers are added for future evaluations. Dr. Hill had kindly participated in aspects of the original assessment with the main authors, which has the potential to present a conflict of interest. As per ISO 17065, this technically arises if individuals are requested to evaluate the quality of work in which they have been involved.

The main opinion of Dr. Hill is that the results in the stock assessment *are satisfactory to provide management advice for the Pacific sardine stock in the Gulf of California*. Several comments made by Dr. Hill are in alignment with previous issues that have been raised in past audits (See Appendix 5.2

Appendix 2: Team Response p 97)

3.2.3.1 Environmental considerations and the potential effect of El Niño on current sardine availability

Early descriptions about the behaviour of sardine populations indicated that the availability of sardines depends on wind patterns and inter-annual fluctuations in temperature in the central Gulf of California related to the El Nino Southern Oscillation (ENSO). In particular, the penetration of warm surface water will cause the spawning and nursery areas to be confined and compressed in the cooler northern areas of the Gulf (Hammann et al 1988). The process is also favoured by a particular water circulation pattern that keeps eggs and larvae in these highly productive waters (Hammann et al 1998). It was further observed that despite the fishery collapsing down to less than 3% of the production maximum, there was historical evidence of the stock's capacity to recover quickly in 1993-94 after two years (1989-90) of low catches (Lluch-Cota et al 1999). The authors proposed that the recovery was explained by processes of enrichment, retention and concentration in the sardine spawning habitat. It was also proposed that during periods of low sardine abundance, the fish concentrate around the large midriff islands of the Gulf of California, where cool water from tidal currents creates a region of high productivity called *Center of Biological Activity* (BAC), and although reproduction may be reduced, the BAC is serving as refuge in extremely adverse conditions (Nevarez-Martinez et al 2001). [Note that this acronym has no connection to the BAC in the Small Pelagics Fisheries Management Plan]. These authors also gathered evidence

indicating that sardines have the ability to extend their distribution vertically and can be found down to 200 m deep. This proposition was later supported by findings reported by Lluch-Belda et al (2003), suggesting that the central part of the Gulf of California, in particular the Canal de Ballenas, contrary to other regions, have high productivity throughout the year supporting large sardine biomass and serving as long term refuge during adverse environmental conditions. Additional evidence of the physical characteristics of the Gulf of California during extreme El Niño and la Niña was presented by Lluch-Cota et al (2010) observing in particular the presence of a cool area around the Midriff Islands (Fig. 10). The dynamics of sardine populations in terms of large temporal scale changes in abundance coupled to their spatial distribution was developed by Rodriguez-Sanchez et al (2001) and Rodriguez-Sanchez et al (2002). They found that regime shifts drive changes in population abundance at the same time with large redistributions of the bulk of sardine biomass. They concluded that these changes explain the disappearance and reappearance of sardines along the California Current. It was also concluded that smaller temporal scale changes in abundance such as those caused by the ENSO are embedded in the large scale process. An important observation that determines the distribution of spawning grounds was also made by Hammann et al (1998), who found that there was a probability of 5% or less of finding eggs in waters warmer than 24 °C.

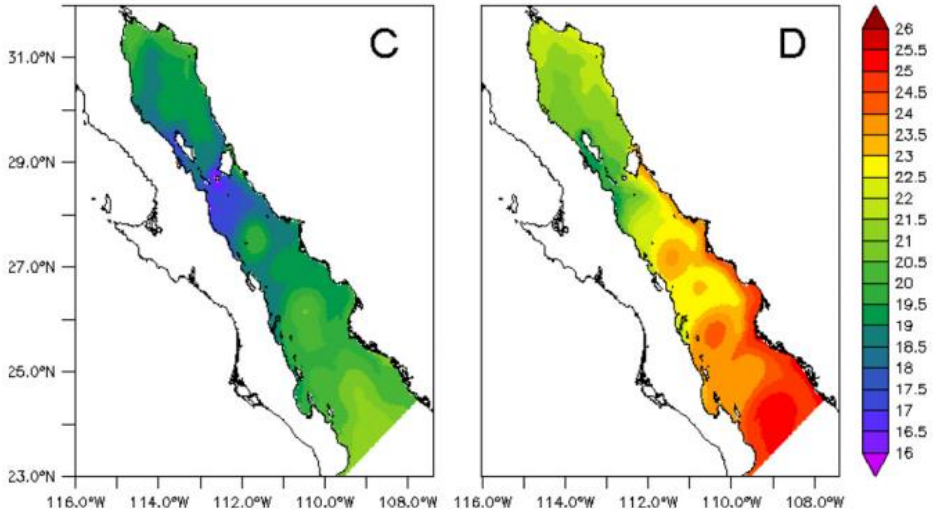

Figure 9. Oceanographic model results for extreme La Niña and El Niño Winter conditions of SST. From Lluch-Cota et al (2010).

Monterrey sardine catch records in the Gulf of California show a sharp declining trend from a record high of more than 500,000 tons in 2009 to a historic low of 3,571 in 2014. During the 4th surveillance audit, evidence from acoustic surveys and model predicted biomass, indicated that despite the drop in the catch, total abundance in 2013 and 2014 remained at levels of 700,000 tons to 900,000 (Nevarez-Martinez et al 2015a; Nevarez-Martinez et al 2015b). It is worth noting that abundance in 2010 is the lowest (410,000 tons) in the series of acoustics estimates reported by Nevarez-Martinez et al (2015a), however, the reported catch in the 2009/2010 season was the third highest (256,409) since the 1999/2000 season. With an estimated abundance of about 700,000 tons, the catch of 3,571 tons appears inconsistent.

The existence of strong El Niño events has been confirmed (Takahashi and Dewitte 2015). The NOAA El Niño/Southern Oscillation Diagnostic Discussion Web Site, as of November 12th reported that "A strong El Niño continued during October as indicated by the well above-average seas surface temperatures (SSTs) across the central and eastern equatorial Pacific Ocean" (Figure 9) (http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_disc_nov2015/ensodisc.html). Such atmospheric and oceanographic conditions reflect a strong and mature El Niño episode, adding that it could rank among the top three strongest episodes going back to 1950. Figure 10 shows the incursion of warm water into the Gulf of California with temperatures that are between 1 and 2 centigrade degrees above the base line of the series. Light to moderate positive anomalies started to develop inside the Gulf as early as February 2014 and by June the anomaly was already in the range of 2 to 3 centigrade degrees (Figure 11). The incursion of warm water into the Gulf is more evident in Figure 12, comparing surface temperatures between October and December in 2013 and 2014 respectively. The Figure shows that temperatures in 2014 were warmer but that waters around the midriff islands were cooler (Martinez-Zavala et al 2015b).

Under current oceanographic conditions and considering past sardine history in the Gulf and the associated theories about population response to climate variability at different scales, the INAPESCA Small Pelagics Program staff has proposed that the best possible explanation for the low catch is that the stock has shifted distribution to the north of the Gulf, and in deeper waters, as described in sections above, making the fish unavailable to the fishery. Fisheries independent cruises, with the ability to detect biomass to a depth of 250 m conducted by INAPESCA in 2014, showed that most small pelagic species, including the Monterrey sardine, were scattered and in low abundance which reflected the low availability to the fishery (Alvarez-Trasviña et al 2015), which operates between 40 and 100 m.

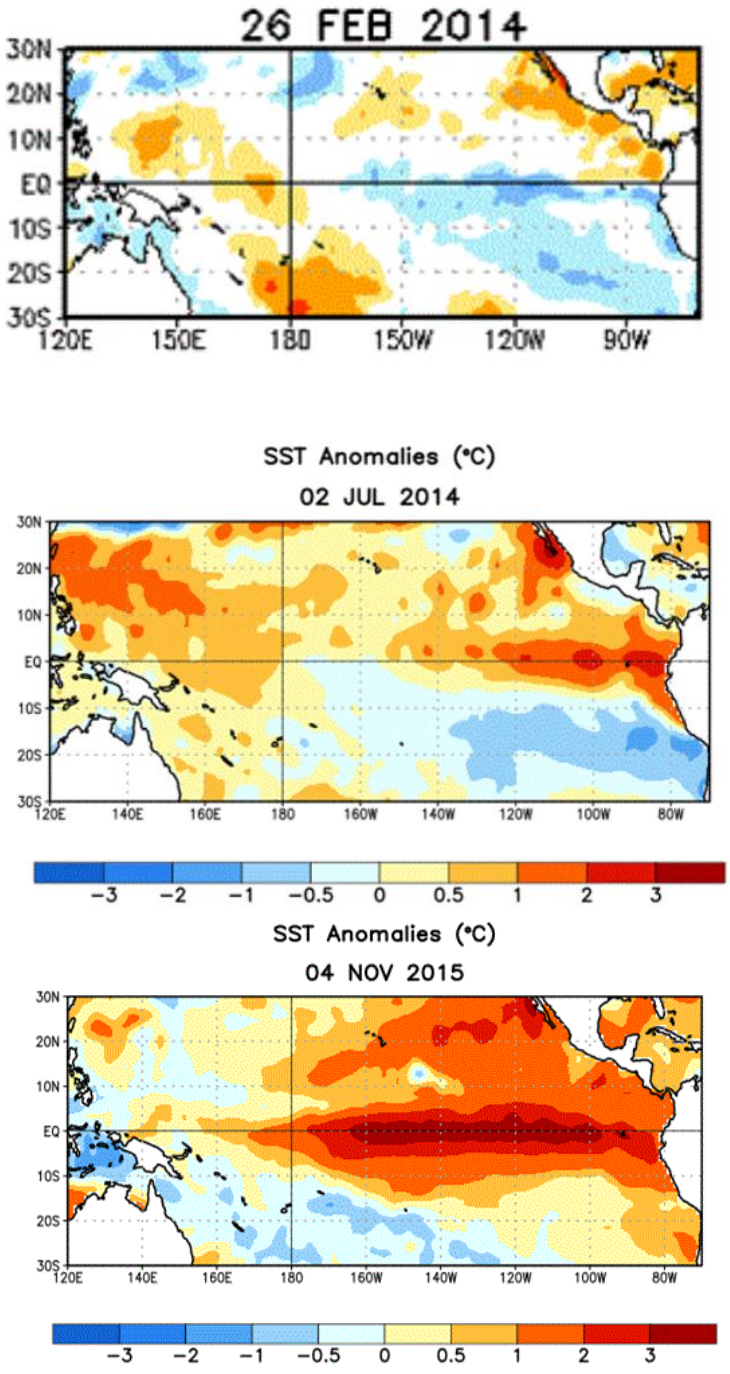

Figure 1. Average sea surface temperature (SST) anomalies (°C) for the week centered on 4 November 2015. Anomalies are computed with respect to the 1981-2010 base period weekly means.

Figure 10. From top to bottom, average sea surface anomalies in °C for weeks centred on February 26 2014, July 2nd 2014 and November 4th 2015. Reproduced from the NOAA El Niño/Southern Oscillation Diagnostic Discussion Web Site.

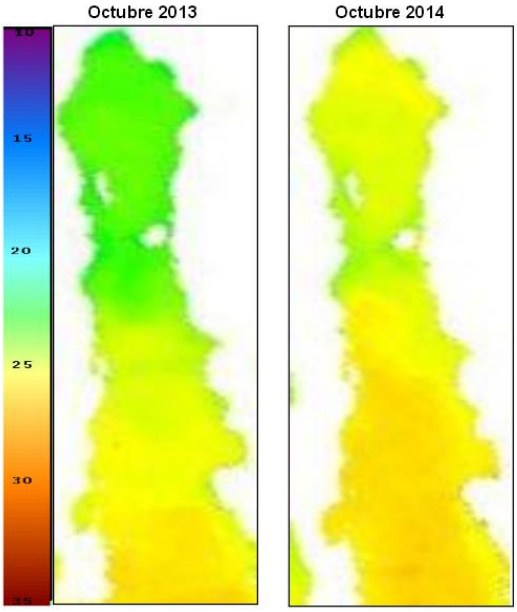

Figure 11. Satellite images comparing surface water temperatures in °C in the Gulf of California during October and December 2013 and 2014. Reproduced from Martinez-Zavala et al (2015b).

Short term fluctuations in CPUE of Monterrey sardine showed mild positive correlation with sea surface temperature (Zuñiga-Flores et al. 2015). Long term projections of abundance in the California current have been obtained after cyclical patterns in upwellings, sea surface temperature and the ocean-atmosphere dynamics were identified. It was concluded that the expectation is for the abundance of Monterrey sardine to continue at low levels until the 2020s. An increase is then expected to peak in the 2040s-50s to gradually decline again in the 2070s-80s (Saldivar-Lucio et al 2015).

3.2.3.2 Conclusions about stock status

During the 4th surveillance audit of the Gulf of California sardine fishery, we were presented with partial evidence indicating that although the fishing fleet was not finding enough Monterrey sardine and catches declined in the last five years to almost nothing, the acoustic surveys resulted in abundance estimates suggesting that the sardine stock was not collapsed but only beyond the depth accessible to the fishery.

After reviewing all available evidence, it is concluded that the sardine stock is reduced relative to abundances from 1995-2010, and unavailable to the fishery because of a severe El Niño event. Oceanographic features are likely to have affected sardine reproductive output, causing a reduction in abundance, but the species also shifts its distribution into refugia, particularly in the central Gulf of California and possibly occupies deeper layers in the water column. Although there still are unresolved issues in the stock assessment, it shows considerable improvement which includes the use of indices independent of the fishery, some formalization of uncertainty analysis, computes the status of the stock compared to reference points and therefore is appropriate for the stock and the control rule. Additionally, the stock assessment has been peer reviewed to a minimum acceptable even if additional review is

recommended. Critically important is that the estimated fishing mortality rate has been under 0.25 throughout the history of the fishery. Although this value is the limit reference point for the fishery, it is based on MSY and therefore can be considered precautionary[1]. Although the actual estimated abundance for the entire history of the fishery is not available, it appears that the stock is not at or under 25% of the average biomass, the lower threshold that caused half of the low trophic level stocks analysed by Essington et al (2015) to collapse.

Voluntary reductions or closures on Monterrey sardine are in effect. While effort in nominal trips on small pelagics is either increasing or stable, effort on Monterrey sardine has shown a steady decline since the 2008/2009 season (Figure 12). It's been established that for forage fish, such reductions have important consequences in protecting the stock and the ecosystem while the impact on average catch is minimal (Essington et al 2015).

[1] Certification requirements state in Section CB2.3.7 that: *The team should award scores between 80 and 100 to the second scoring issue in PI 1.2.2 if management chooses to set a limit reference point above the point that reproductive capacity starts to be appreciably impaired*. Further, the Guidance to the CR state in GCB2.3.3: *There may be situations where the limit reference point is set higher than the point at which there is an appreciable risk that recruitment is impaired. Where this results in more precautionary management, the SG100 statement about "following consideration of relevant precautionary issues" would apply*. And in GCB2.3.7: *Although it may generally be the case that limit reference points are set at the point that reproductive capacity starts to be appreciably impaired, for some fisheries, especially those for small pelagic species and annual species where there the stock recruit relationship is very steep, management may choose to set a limit reference point above this level. Such action should attract scores between 80 and 100 with the intent that the overall score reflects the very low likelihood of reproductive capacity ever being impaired if such a limit reference point was used*.

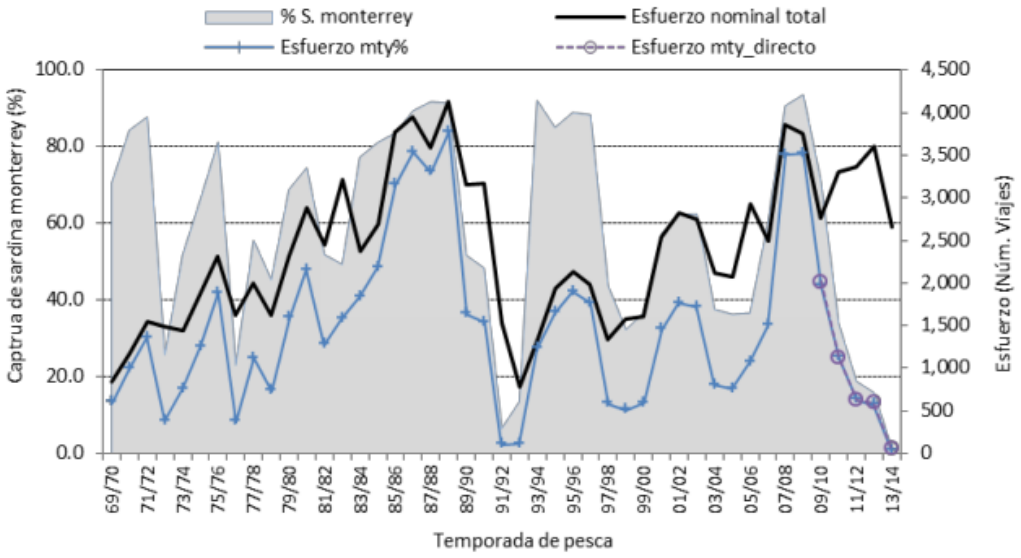

Figure 12. Comparison of proportional catch (shaded and left vertical axis) of Monterrey sardine in the Gulf of California to total nominal effort (thick continuous line) on small pelagics and effort on Monterrey sardine (thin blue line and right vertical axis). Horizontal axis represents fishing seasons. Reproduced from Nevarez-Martinez et al (2015c).

It is therefore concluded that the stock is being fished under the value represented by the fishing mortality limit reference point and although the target reference point has not been provided, the LRP is in this fishery considered to be defined as precautionary and accepted to meet the requirement under MSC definitions. Recruitment is also not considered to be compromised and data shows that in 2014 a two mode size distribution can be reflecting the presence of a new cohort that will be recruiting to the fishery (Fig. 4).

The conditions on 1.1.1 and 1.2.4 can be closed.

3.3 Principle 2 – Ecosystem Impacts from Fishing

Sardines in the Gulf of California are fished with purse seine nets. Compared to many other fishing methods purse seine gear is relatively selective, since it is done in the open water column and directed at schools of targeted species. Fishing vessels capture large aggregations of small pelagic species that shoal in mid-water by surrounding these concentrations with a curtain of netting which is supported by surface floats.

3.3.1 Retained Species

Other small pelagic species (*Opisthonema* spp. (Thread Herring) and *Cetengraulis mysticetus* (Bocona)) are retained and form a large proportion of the catch in some years. There are currently three species that, in addition to Monterey Sardine and Thread Herring – the latter also under assessment against the MSC standard - represent >5% of the catch. During full assessment, these were classified as main retained

species. During a surveillance cycle, there is no obligation to re-score performance indicators relative to fluctuations in the abundance of co-mingled species which alter the species proportions of the catch annually. The Client should be aware that this will be required in full re-assessment. Species comprising >5% of the catch in the fishing season (2012/2013) were Bocona sardine (28%), Anchoveta: *Engraulis mordax* (26%), Thread Herring: *Opisthonema* spp. (22%) and Mackerel: *Scomber japonicus* (4%). During the last available season of landings (2013/2014) there were slight variations in catch composition: Bocona sardine (22%), Anchoveta (11.5%), Thread Herring, (45%) and Mackerel (14%) (Martinez et al., 2014).

During the third onsite visit for Monterrey Sardines in 2014, SCS held an associated one-day onsite meeting focused on Principle 1 for Thread Herring, as both its own unit in an Expedited P1 full assessment and as a main retained species under performance indicator 2.1.1 in the sardine-targeting purse seine fishery. The Sonoran Thread Herring, Gulf of California unit entered into full assessment in November 2011[2], and catch landings since 1970 indicate that it has generally been the second main species captured by volume. In the last fishing season Thread Herring was the principal species captured in the small pelagics fleet operating in the northern Gulf of California.

In the 2011/2012 fishing season and again in 2012/2013 there were notable absolute and relative increases in the catch of Bocona sardine which is a main retained species in the sardine fishery. Since 2000, Bocona sardine landings have exceeded *Opisthonema* species landings in 50% of years. This did not occur in the period between 1990/1991-2000/2001: records appear to indicate that collection of landings data for Bocona started in the 1990/1991 fishing season. In the 2012/2013 fishing season, Bocona was the dominant species in the catch by weight (28%), whereas the following season and the most recent season for which data are available, (2013/2014), Bocona catch decreased to 21.8%, making Thread Herring the dominant species.

[2] Recent modifications of MSC policy now allow SCS to use an Expedited P1 process (CR V1.3, Annex CL, P 278) to assess Thread Herring.

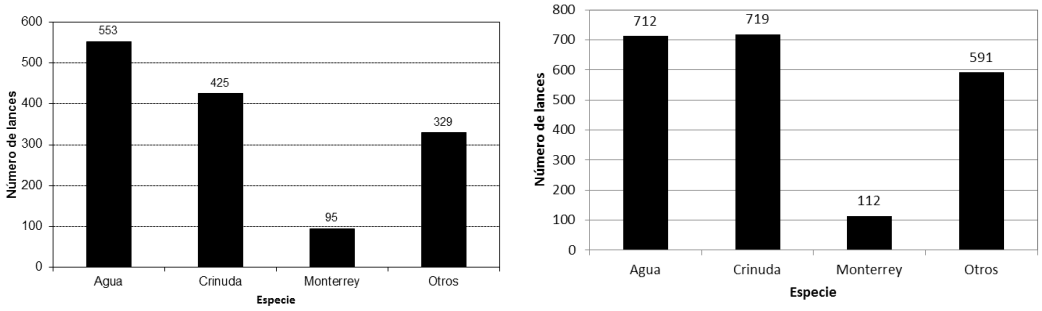

Figure 13. Frequency of main captures in all observed sets (Left Jan 2013-2014 n=1402; Right Jan 2013-Aug 2014 n=2134) (Nevárez-Martínez et al. 2014; Padilla-Serrato et al 2015). Number of sets on the y axis and species binned. Agua = water/set without landings, Crinuda = thread herring, Monterey = Monterey sardine, Otros = all other small pelagics

Stock status of Thread Herring and Bocona Sardine. Thread Herring status has been evaluated using VPA (Nevarez-Martinez et al 2012) and a surplus production model (SPM; Nevarez-Martinez et al 2015c). Results show that the stock has either been stable for a long time or has been increasing since the late 1990s. The trend for Bocona suggests the stock has remained stable throughout the history of the fishery. Despite limitations in both analytical approaches (VPA and SPM), estimates of fishing mortality rates for Thread Herring are below the 0.25 reference point suggested by the Small Pelagics Management Plan. The 2014 update for Thread Herring was conducted using ASAP (Legault and Restrepo 1999). This approach avoids some of the problematic assumptions in VPA by using statistical catch at age and providing greater flexibility (Legault and Restrepo 1998). Although catch at age models run forward, under some circumstances results from ASAP can be similar to those produced by VPA. For Thread Herring the trends between ASAP and VPA are comparable, however, estimates for total biomass are considerably higher in the ASAP model. Estimated values from ASAP for Fmsy (0.879) and Fopt (0.621) are probably more appropriate than a default or generic fishing mortality reference point such as the one used in the Management Plan (F=0.25) which is based on assumptions from a simulation of another species (Monterrey sardines). Estimated fishing mortality of Thread Herring from the early 90s to 2012 was between 0.05 to 0.25 and 0.11 in 2012 which is well below from all the available values of F as a reference point . No estimates of fishing mortality rates using ASAP are available for Bocona, but FishBase reports an intrinsic population growth rate that is many times higher than that of the Thread Herring. Therefore, given the high productivity of the species and the opportunistic nature of the catch, it is reasonable to assume the species is being harvested at levels that are highly likely to keep the stock within biologically based limits.

The biomass dynamics model approach produced for the Thread Herring an estimate of Fmsy = 0.575 and for Bocona Fmsy = 0.8. Kobe plots produced under this modeling approach indicate that for both species the biomass is far above the level producing MSY and that fishing mortality rate is far below the level producing MSY (Figure 14; Nevarez-Martinez et al 2015c).

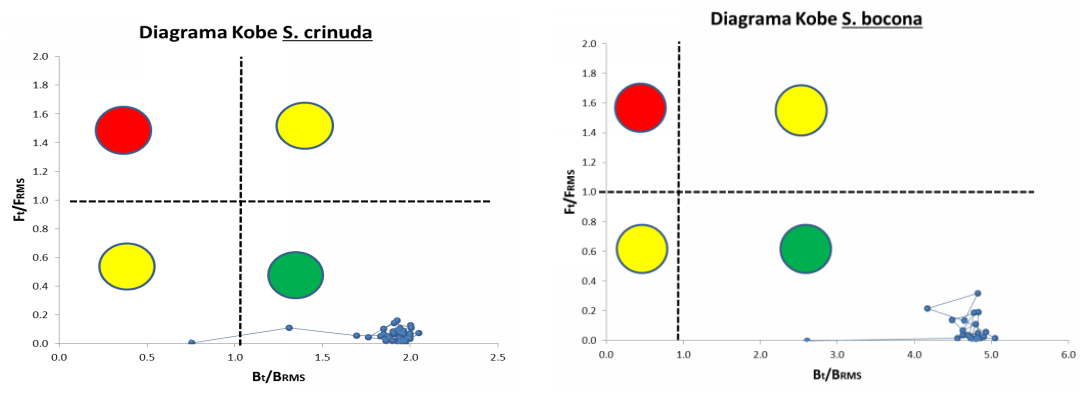

Figure 14. Kobe plots representing the status of the Thread Herring (left) and the Bocona Sardine (right) in the Gulf of California. Stock status is represented by the blue dots compared to the biomass relative to Biomass at MSY in the X axis and fishing mortality rate relative the level producing MSY in the Y axis. Reproduced from Nevarez-Martinez et al (2015c).

Observer Program In 2012-2013, funding was secured from Fundación Productor and the Walton Family Foundation to develop a collaborative, multi-sectoral observer program for the fishery. In November of 2012, training began for the nine observers. Trainings included courses on identification of marine birds, marine mammals, fish and turtles. Data collected by the observer program include fishing areas, size structure, reproductive index data, abundance and mortalities.

The observer program operated for two fishing seasons, the first season covered 9 months (January 2013 to August 2013) and the second season spanned 9 months (November 2013 to July 2014). The program did not operate for the 2014-2015 fishing season. The team raised concerns during the second and third surveillance audits regarding the long-term funding strategy for the observer program in terms the sufficiency of information and coverage to generate a comprehensive understanding of the fleet's interactions and in particular to ability to detect changes in risk of impacts.

Species accumulation curves for recorded species from the onboard observer program shows a curve that has not yet reached an asymptote: as noted by Garcia and Gastelum (2015) the continuation of the on-board observer program is therefore likely to record new bycatch species. These findings could indicate that a more intense or longer-term observer program monitoring may be required and as noted in the 3rd surveillance where it was indicated under at least 2.2.3 that it is unlikely that it will be possible to detect increases in risk to main bycatch species, or to evaluate the efficacy of mitigation, without ongoing observer coverage. During the workshop on bycatch mitigation strategies, held on the 29th of September, 2015, CANAINPES made a commitment to hiring on-board observers to evaluate the efficacy of the mitigation strategies. Personal communications with the representative from COBI confirmed the plans to hire two on-board observers by November 2015. However, during the 4th surveillance the team was unable to confirm whether this effort is part of a strategy to support the observer program beyond this upcoming fishing season. The proposed coverage also represents a significant decrease in coverage from previous years.

During the two fishing seasons, the observer program covered a total of 2,134 sets on 31 boats, on a monthly basis the coverage was of 20% of the whole fleet. Results showed that 33% of sets occurred without catch ("Agua"), 33% captured dominantly Thread Herring, 5% captured Pacific sardines and a remaining 24% captured dominantly "other small pelagics", including Anchoveta, Bocona sardine and Mackerel (Figure 15) (Garcia and Gastelum, 2015).

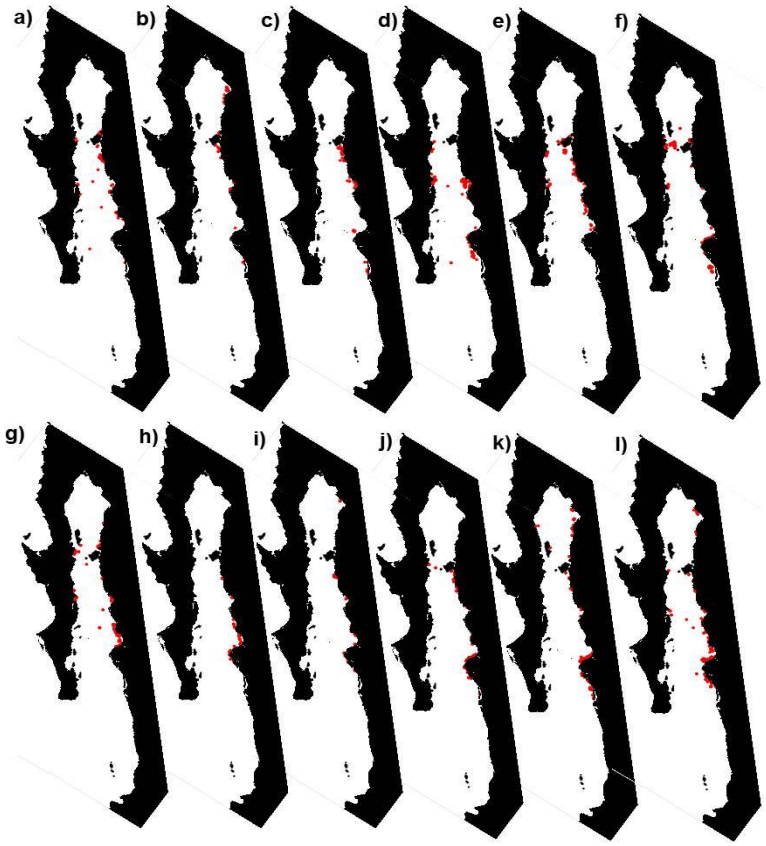

Figure 15. Spatial distribution of observed sets by month, analyzed by INAPESCA for 2014. Reproduced from Padilla-Serrato et al (2015).

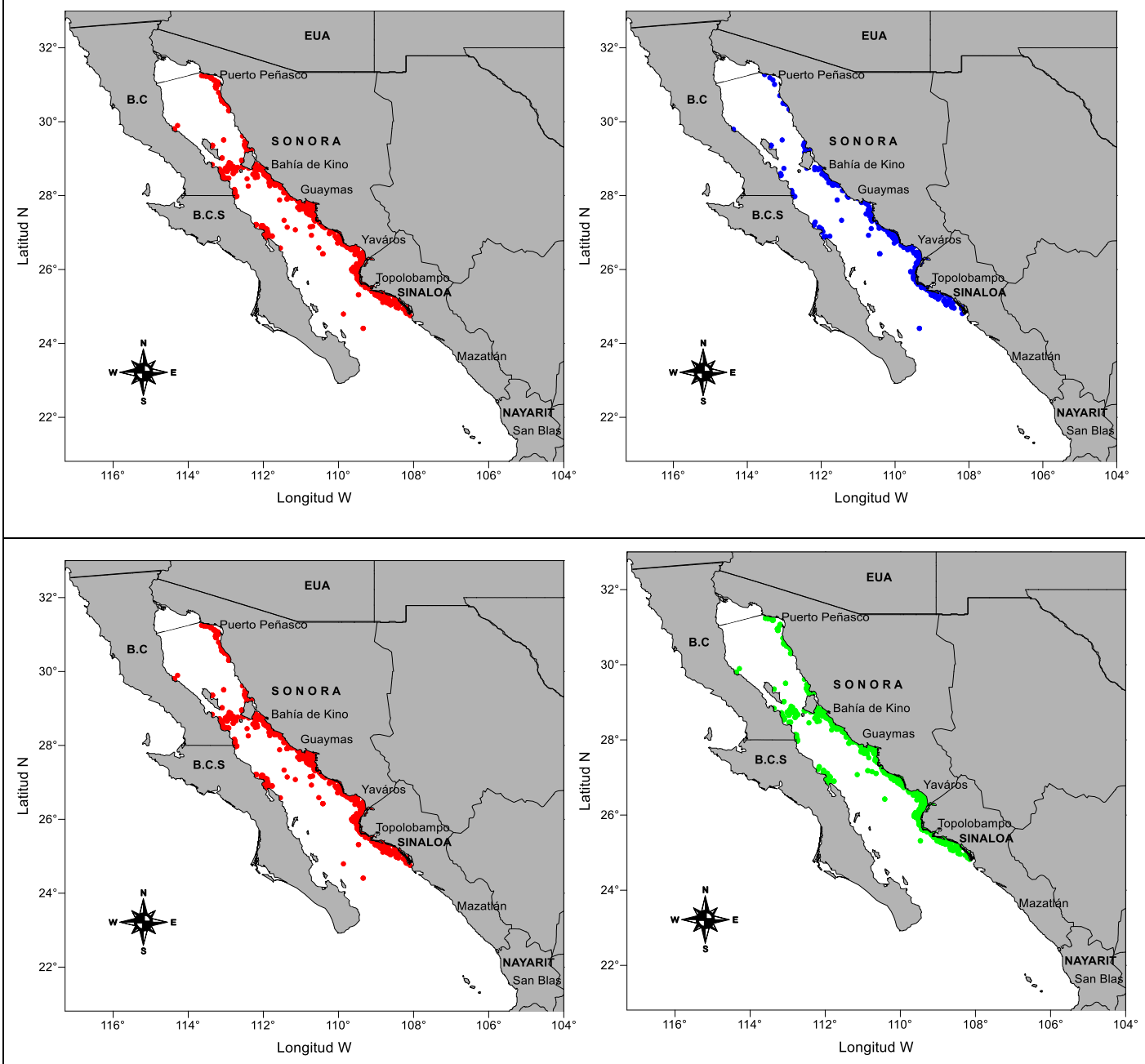

Figure 16. Frequency of observed sets versus sets with interactions from January 2013 to July 2014. Red areas show all observed sets, blue areas indicate areas of interaction with fishes, green areas indicate interactions with birds (Nevárez-Martínez et al. 2014).

3.3.2 Bycatch

Based on results from the two seasons of fishing data (2012-2013, 2013-2014), bycatch (of non-ETP species) in the Gulf of California, Sonoran small pelagic fishery comprised 113 fish species, 6 crustacean species, 4 mollusk species, 1 cnidarian species, 17 bird species, and a number of ETP species in different

taxa given in Table 8. The most abundant fish species encountered are given in Figure 16, the most abundant bird species encountered are given in the top half of Figure 18 and the greatest bird mortalities in the bottom half of Figure 18.

The 2012 Small Pelagics Fisheries Management Plan (SAGARPA 2012) cites the following species as comprising bycatch and/or discards in the small pelagic fishery: Rayadillo (*Orthopristis* spp.), Sierra (*Scomberomorus* spp.), Yellowtail (*Seriola* spp.), Skipjack (*Katsuwonus pelamis*), Giant squid (*Dosidicus gigas*) and Cochito (*Balistes polylepis*) but none are amongst species that are numerically common, as noted by observers (Figure 16):

Rayadillo (*Orthopristis* spp.)

Sierra (*Scomberomorus* spp.)

Yellowtail (*Seriola* spp.)

Skipjack (*Katsuwonus pelamis*)

Giant squid (*Dosidicus gigas*)

Cochito (*Balistes polylepis*). Estimates for the Biological Value Index (BVI) (Sanders, 1960) indicate that Rayadillo or Bronze-stripped Grunt (*Orthopristis reddingi*) *Balistes polylepis* and *Scomberomorus sierra* are the most important fish species (Figure 17), Bronze-stripped Grunt was the most abundant species of all fish captured as bycatch (Figure 17). There is currently no population information available for this species: the IUCN lists it as Least Concern, with a wide distribution along the Mexican coast and no major threats (Allen, G.R. & Robertson, R.D. 2010).

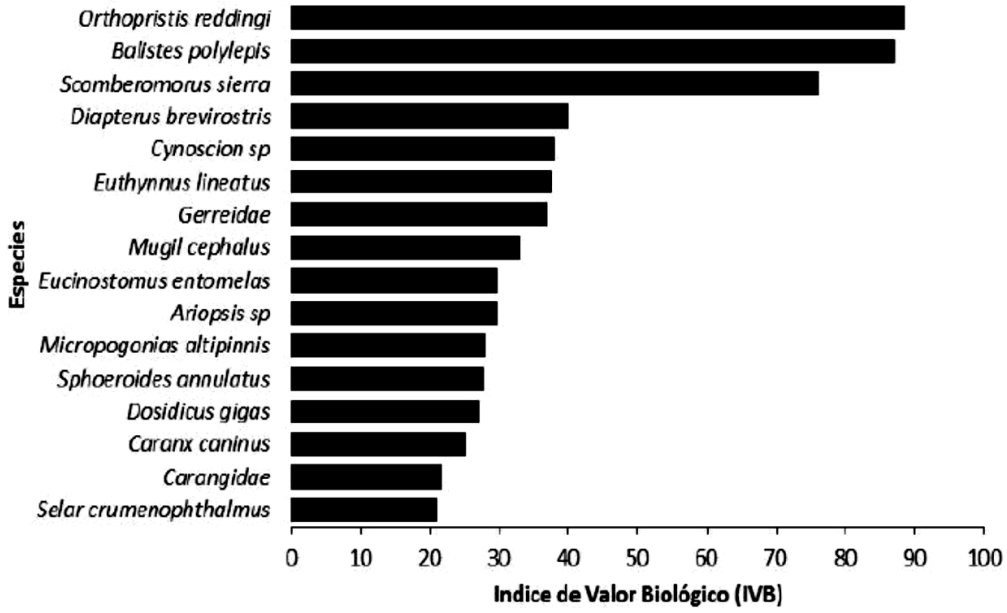

Figure 16. Species of fish and other groups of bycatch, by importance based on the Biological Value Index, from the small pelagic purse seine fishery January 2013 – August 2014 (Padilla Serrato et al. 2015).

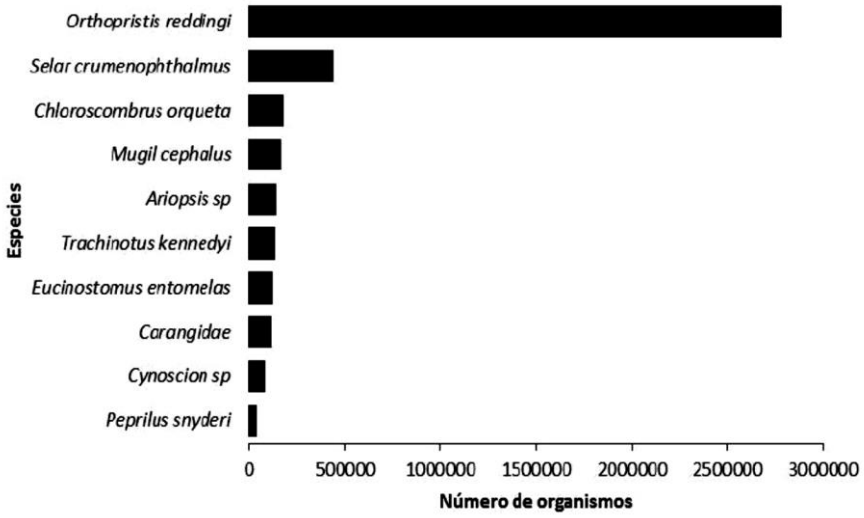

Figure 17. Captures of fish, by abundance, as bycatch in the small pelagic purse seine fishery January 2013 – August 2014 (Padilla Serrato et al. 2015).

The audit team did not receive any information in 2015 to explain whether captures represented a population level risk to any of the finfish bycatch species.

Of the 17 bird species captured, 10 represent bycatch species, while the remaining 7 are listed under NOM-059 and constitute ETP species under the MSC system (see Table 8). A total of 234 birds from eight species were reported dead in the 2,134 observed sets. Approximately 43% of organisms recorded as dead were blue footed boobies (*Sula nebouxii)*, followed by 35% brown pelicans (*Pelecanus occidentalis)* (Figure 19). Water spraying birds to keep them out of nets as they are being drawn in, has been proposed and implemented to some degree since July of 2013 (see Mitigation below). There are no data available on the efficacy of the mitigation measures.

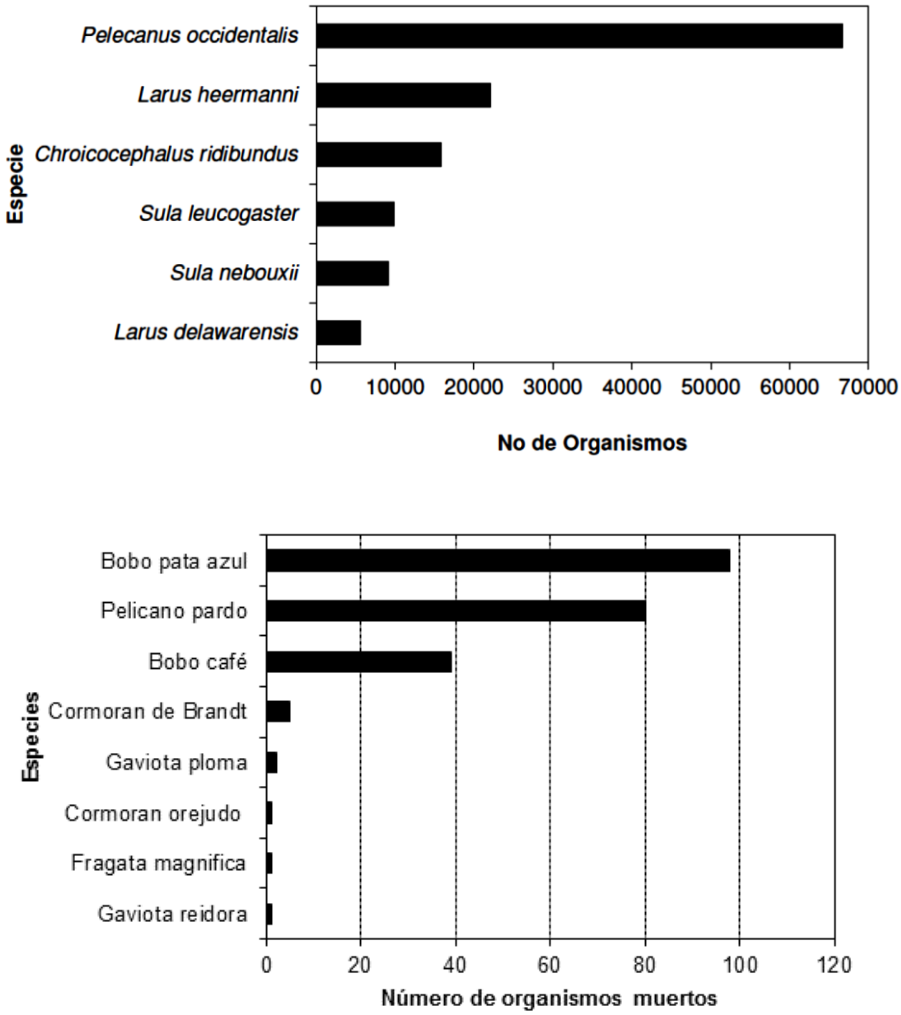

Figure 18. (Upper) Bird species that were observed interacting with purse seine vessels (not necessarily in nets) in the top figure, and (Lower) bird species that were mortalities in all observed sets (n=2,134) from January 2013 to July 2014 (Padilla Serrato et al. 2015).

3.3.3 Endangered, Threatened or Protected (ETP) Species

There was discussion between stakeholders, INAPESCA and the audit team about potential population level risk to California Brown Pelicans and Blue-footed Boobies, given the high rate of encounters: encounters given in Figure 18. Upper may over-represent rates, as these include sightings outside of nets as well as animals inside nets. Concern was expressed by Dr. Enriqueta Velarde that both direct and indirect mortality may cause population level threats to California Brown Pelicans and Blue-footed Boobies: both species are listed on NOM 059 and on the Migratory Species Act. The team was presented with total mortalities from observed sets (Figure 18, Lower) and population sizes for affected species, but there are no estimates of total mortalities by the fleet or data on indirect effects of the fishery on sea birds.

Seabirds are long-lived species with a high juvenile mortality rate and low adult mortality, late sexual maturation, low breeding rates and the capacity to skip breeding in years of poor food conditions, which confers relative stability on the size of adult populations. Any increase in the mortality of the adult population has the potential to alter the population structure and rate of population increase, which may alter the effective population size.

During the 4th surveillance audit Dr. E Velarde presented data relating impacts of the small pelagics fleet to the decline of seabird nesting populations in Sonora. The coast of Sonora is identified as an important area pelicans breeding colonies. The census excluding ENSO years for Brown pelican nests in the Midriff Region, shows a decreasing trend.

Unpublished analysis by Velarde and Gastelaum-Nava (2014) used data from the on-board observer program, and comments on the status of birds (dead, wounded, water-wet, oil-wet), to estimate the number of seabirds potentially affected by the fishery. Birds only found to be wet by water were excluded from the calculations. The results claim that the adult mortality in the fishing operations (including deaths, lethal injuries and lethal oiling) is three times that of natural mortality (known to be 5% of the population, annually?) of the wild population.

One sea lion mortality occurred and there were reports of 34 dolphin mortalities. Information was not available as to the number of sets or vessels associated with dolphin mortalities. Six sea turtles from two species captured were released alive and presumed to survive.

Other interactions that pertain to ETP scoring and were presented in the 2013-2014 are detailed in Table 9. Four non-fatal interactions with whale sharks were also observed.

Table 9. ETP species captured in observed purse seine sets (n=2,134) from January 2013 – August 2014. Columns give the species Spanish common name, Latin name, observed sets, percentage of all individuals within each species guild, total number of organisms observed and the number of organisms with lethal interactions (Padilla Serrato et al. 2015). Species guilds given as gray headings, grouping taxonomically related species together.

Spanish Common Name	Species	Status NOM-059	No. of observed sets	% of observed sets	No. Org. Encountered	No. Mortalities
Peces/Fishes						
Caballito de mar	*Hippocampus ingens*	Vulnerable	9	0.28	9	5
Ángel de Cortez	*Pomacanthus zonipectus*	Least Concern	2	0.093	2	2
Marlín rayado	*Kajikia audax*	Near Threatened	3	0.14	5	5
Gavilán dorado	*Rhinoptera steindachneri*	Near Threatened	5	0.23	43	43

Guitarra espinuda	*Platyrhinoidis triseriata*	Least Concern	1	0.04	1	1
Raya eléctrica ocelada	*Diplobatis ommata*	Vulnerable	1	0.093	1	1
Manta diabla	*Mobula munkiana*	Near Threatened	1	0.04	4	4
Tiburón arenero	*Carcharhinus obscurus*	Vulnerable	1	0.04	1	1
Tiburón martillo	*Sphyrna lewini*	Endangered	7	0.33	10	10
Tiburón ballena	*Rhincodon typus*	Vulnerable	2	0.09	1	-
Tortugas/Turtles						
Tortuga golfina	*Lepidochelys olivacea*	Vulnerable	3	0.14	3	-
Tortuga prieta	*Chelonia agassizii*	Endangered	3	0.14	3	-
Aves/Birds						
Pardela pata rosada	*Puffinus creatopus*	Vulnerable	14	0.99	34	-
Pardela mexicana	*Puffinus ophistomelas*	Endangered	23	1.6	43	-
Bobo pata azul	*Sula nebouxii*	Least Concern	261	12.23	9,236	101
Pelicano pardo	*Pelecanus occidentalis*	Least Concern	1305	61.15	67,357	83
Gaviota ploma	*Larus heermanni*	Near threatened	542	23.5	22,438	2
Gaviota pata amarilla	*Larus livens*	Least Concern	69	3.23	687	-
Charran elegante	*Thalasseus elegans*	Near Threatened	16	0.75	230	-
Mamíferos/Marine Mammals						
Delfín	*Delphinus* spp	Special Protection	94	4.4	1,085	34
Lobo marino	*Zalophus californianus*	Least Concern	984	46.11	9,375	1

Mitigation Measures

The On-board Observer Report (Padilla Serrato et al. 2015) proposes the following initial mitigation measures to minimize/reduce bycatch rates:

Birds:

- "*Scaring, by spraying water with a pressure hose to keep birds away from the buoy line of the net."* Pictures in the observer report were presented as evidence that this measure is already being partially implemented by the fleet (Padilla Serrato et al. 2015)
- *Reproduction of sounds that indicate a hazard. These could simply be loud noise blanks or sounds associated with natural predators in the area (osprey, falcons, hawks).*
- *A physical installation to prevent birds from standing on the cables and going through towards the power block. This modification has already been implemented in the Sinaloa Fleet*

Turtles and sharks

- *Avoid setting on turtle or shark aggregations*
- *Return to the sea alive, individuals that are captured incidentally*

Marine Mammals

- *Avoid setting on dolphins.*
- *Undertake backdown to release marine mammals (dolphins) that may be left inside the net. Backdown occurs when a boat starts moving backwards after loading about two thirds of the net, and tying off the net. The weight of the net weighs down the ship, depressing the buoyline near the hull and allowing the release of captured dolphins, but without losing fish."*

General

- *Undertake discussion each quarter with the crew of the purse seine fleet, with the following objectives: a) Crewmembers be able to identify species that are under some protection scheme. b) Explain mitigation measures for different groups, in order to reduce or eliminate involvement. c) Submit quarterly the Industrial Sector, the results obtained from the implementation of mitigation measures."*

A workshop on Mitigation Strategies for seabirds was held in September, 2015, run by COBI with the support of Dr. Martin Hall, from the IATTC bycatch program. The attendees included twelve captains, representatives from CANAINPES, IATTC and COBI. The main agreements reached during the workshop included the following:

- During October and November the fleet would attempt to assemble a hose structure to improve the area span of the water curtain to prevent seabird from entering the net

- Representatives from IATTC and COBI committed to finding a seabird specialist and to gather information on mitigation strategies used in other industries. At the moment of this surveillance it was unclear what the parameters and role of the "bird-specialist" would be.
- CANAINPES committed to hiring observers to evaluate the efficacy of the mitigation strategies
- COBI committed to creating informational material to distribute to all crew members of the fleet.

3.3.4 Habitats

The purse seine fleet in the Gulf of California small pelagics fishery operates in mid-water between 40 and 100 meter depths and generally avoids bottom contact. Contact is intentionally avoided as the small mesh nylon netting is easily damaged. Interviews with fishermen during the site visit indicate that in the rare event when gear is lost, it is retrieved due to its high monetary value. In addition, abandoned purse-seine gear has limited capacity to continue fishing because it achieves full functionality only when used at the surface. Gear drift due to bottom currents may occur, although displacement should be limited because of its weight. Therefore, some localized damage of benthic structure and communities may occur. However, gear loss occurrences are very rare. There is no documented evidence that this fishing activity or any purse seining has had irreversible effects on any marine habitat.

The Client has been transparent about bottom contact by gear which has occurred in isolated instances in the past. The assessment team notes that that there are appropriate sanctions in place and that these sanctions are regularly enforced by management.

In the 4th audit data from the onboard observer program revealed that 49% of the observed sets occurred in depths below ten fathoms (18.52 meters) leading to recommendations by COBI to adjust net structures in order to reduce interaction with the bottom (Garcia and Gastelum, 2015) (Table 10). The client should be aware that during Re-Assessment, potential impacts of fishing gear on habitat will be

revisited and evaluated, as well as implications relevant to appropriate management mechanisms for inshore waters.

Table 10. Minimum, Maximum and average depths (fathoms) for sets of the small pelagics fishery with characteristics from the nets (depth and longitude in fathoms) from data collected by the onboard observer program from January 2013 to August 2014. Reproduced from Garcia and Gastelum, 2015

Zona	Profundidad			Caída de la red (promedio)	Longitud de la red (promedio)
	Mínima	máxima	promedio		
s/d	-2	-38.6	-11.5	-35.7	312.4
I	-3.4	-20.6	-9.0	-36.1	310.6
II	-2	-49.5	-11.4	-38.6	301.8
III	-1	-99.5	-14.5	-37.2	286.0
IV	-1	-54	-11.4	-37.2	321.9
V	-1.3	-31	-8.3	-35.2	309.9
VI	-10.2	-43.6	-20.8	-36.7	288.3
VII	-1.4	-57	-14.4	-36.7	299.7
VIII	-0.6	-99	-15.3	-35.1	287.5
IX	-15	-15	-15	-55.0	305.0
X	-1.3	-80	-15.7	-34.0	291.5

3.3.5 Ecosystem Considerations

At the 2013 2nd annual surveillance audit, stakeholders indicated in their comments to the presentation by Dr. Robinson that "other ecosystem components, such as several seabird species, have had excellent breeding success and colony productivity during 2011 and 2012, in accordance with the lack of chlorophyll-a reduction for these last years." (Drs. Velarde, Ezcurra, Santamaria del Angel and Anderson). The assessment team understands that stakeholders are interested in preserving an important fraction of the sardine biomass because it is assumed that a decline in sardine abundance could disrupt the energy flow in the ecosystem and that this process would be reflected in low survival and/or fecundity in species such as sea birds. The relationship is assumed to be strong enough that a model was developed allowing prediction of the sardine catch based on the proportion of this fish in the diet of elegant terns, the reproductive success of Hermann's gulls and springtime SST (Velarde *et al.* 2004). The immediate conclusion would be that if researchers report "excellent breeding success and colony productivity", then there must be excellent conditions in the stock of sardines, at least in the area where the birds are feeding and the data are being collected.

There is evidence that there is an unexpected ecological process taking place in the Gulf of California. The advent of such events may be taken as normal components of the natural uncertainty of biological processes. It also raises the question as to whether the event is rare, or, whether previous observation systems have been insufficient to detect environmental fluctuations. It is also possible that research results that may be used to understand fluctuations are sufficiently disaggregated at present, that the necessary research capacity has not yet been aggregated for the coherence necessary to understand large scale ecosystem dynamics.

For these reasons, in 2013 the team **recommended** that the Client convene interested parties to a workshop specifically aimed at improving the monitoring system of the fishery, consolidating existing information relevant to population dynamics, and identifying key gaps in this knowledge. Results of the workshop were expected to be presented at the third annual audit surveillance in 2014 and to include realistic recommendations to improve the collection of fisheries data, to better synthesize information needed to understand ecosystem-wide parameters controlling Monterrey sardine dynamics, as well as mechanisms to incorporate results into the management system.

At the onsite visit of 2014, the Client presented the minutes of two workshops that took place in October 2013 and in January 2014. The first workshop aimed to discuss procedures to insert acoustic data and an egg and larvae based index of abundance into the SSIII analytical framework. During this workshop, Dr. Enriqueta Velarde proposed including a seabird-based index as well, and attendees convened in a January workshop to discuss how a bird index could be implemented to work in SSIII.

INAPESCA employed an Ecopath model for 2013 with a total of 23 functional groups (including one group for sea birds, five bony fish, two cartilaginous fish and one marine mammal group)(Arizmendi-Rodriguez et al., 2015). The aim of the work was to describe and understand in more detail the functional relationships of sardines and the effects of abundance in the ecosystem. The findings for this model conclude that Monterrey Sardines play an important ecological role in the ecosystem by participating in the energy flow from low to high trophic levels. Describing a “bottom up” system Arizmendi-Rodriguez et al. (2015) determined that Monterrey Sardines are an important component in the diet of seabirds, large pelagics and sharks and that changes in the abundance of small pelagics may influence the distribution of the populations of its predators.

During the onsite visit and in previous communications with COBI and Dr. Arreguín-Sánchez, the team confirmed that work is underway to better understand how much unfished Monterrey sardines biomass is necessary to support ecosystem functions. In unpublished work Arreguín-Sánchez et al. (2015) apply a method based on the theory of Ulanowicz (1986, 2009), which determines, by trophic level, the entropy gain generated in the ecosystem by the loss of biomass. Entropy gain is estimated by considering gradual increases in biomass extraction associated with the harvest rate. Once information of entropy gain is calculated, an isoline diagram of entropy gain is generated, where an isoline expresses the critical level of acceptable biomass removal in term of extraction rate and the trophic level of the species (Figure 12). This model only takes into account the existing biomass and is not an indicator sensitive to changes in environmental conditions. Reliable biomass estimates prior to the start of the fishing season are necessary to define the critical acceptable levels of ecosystem deterioration that they hope can then be used to establish a catch limit.

These preliminary results rely on previous models that consider all small pelagic species as a single group There is ongoing work to improve previous preliminary models to better understand the trophic functions of small pelagics in the Gulf ecosystem by disaggregating different small pelagic species in Ecopath and Ecosim models, the last considers factors of environmental variability on the biomass of the small pelagic species. Species disaggregation could be important as Ecopath work conducted by Hernandez-Padilla et

al., (2015) in the southern Gulf of Mexico show that different small pelagic species diverge in their roles in terms of ecosystem functions. The use of time series of abundance can be used to help identify which environmental variables have a significant effect on the resource which, if properly calibrated, may be used to determine the biomass of Monterrey sardine required to support ecosystem functions (Arreguín-Sánchez et al. 2015).

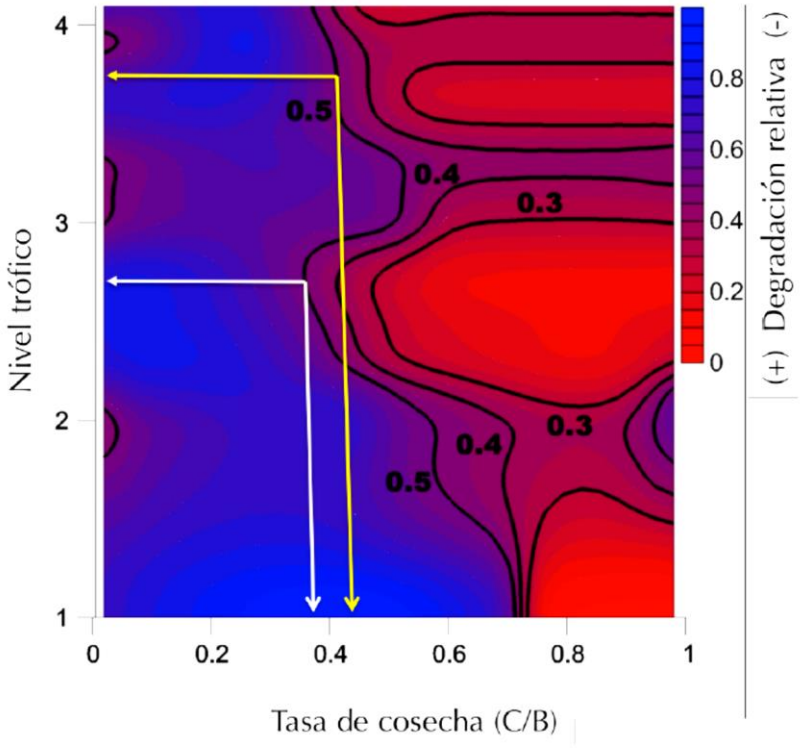

Figure 19. On the left y axis is trophic level, on the right y axis is relative degradation, and these variables are graphed relative to the harvest rate (tasa de cosecha) on the x axis. The isolines of relative degradations are marked by a color scale indicating changes in entropy at different levels of biomass extraction (harvest rate). The 0.5 isoline is assumed as "noxiclina"; the critical level acceptable of ecosystem deterioration. (Reproduced from Arreguín-Sánchez et al., 2015)

3.4 Principle 3 – Management and Regulation

This section of the report gives updates documenting how various management measures and regulations have progressed throughout various years of MSC Annual Surveillance audits associated with this certification cycle. Workshops and meetings held in the last calendar year (2014-2015) associated with baseline management or MSC conditions are also described.

3.4.1 Carta Nacional Pesquera

In 2011, it was identified that a new version of the Carta Nacional Pesquera including small pelagics was in the process of evaluation by the Federal Government for publication: in 2013 the estimated release

date of this overarching legislation for all fisheries in Mexico was 2014. In 2014 no updated information was available on the progress of the CNP revision. In 2015, at the time of the 4th surveillance audit, the revised CNP had also not been published yet.

3.4.2 Mexican National Standard for Small Pelagics Fisheries

A new version of NOM-0003-PESC-1993 the Mexican national standard for the small pelagic fishery is under revision at the COFEMER (Federal Commission for the Regulations Improvement), as indicated in the 1st annual surveillance report. The Client update at the 2nd annual surveillance indicated that release dates are not determined. In the 3rd surveillance audit the Client indicated the revised NOM may be published late in 2014. In the 4th annual surveillance audit, the NOM was drafted but not gazetted.

In the 2012 Management Plan, it is noted that content as follows has been proposed for the updated NOM:

- capture of pilchard, anchovy or Thread Herring below the minimum catch size does not exceed 30% of the number of organisms per fishing season by region. (less stringent than previous NOM)
- there will be no further authorization for the entry of more vessels, except for replacement of existing vessel and that existing vessels have good cooling systems and that existing vessels do not increase the current carrying capacity. (more stringent than previous NOM)
- that INAPESCA, based on scientific research carried out with a view to ensuring optimal resource utilization and conservation, undertake monthly reviews of the cumulative percentage of bycatch to determine when it has reached the allowable percentage (bycatch), at which point there will be the requirement to notify the National Commission of Aquaculture and Fisheries. (new measure not in previous NOM, method not yet determined)

Additionally, at the time of the 4th surveillance audit, the revised NOM-003 had not been published yet. SCS was informed that two of the most important changes involve zoning such that waters off the west coast of the Baja California Peninsula and the Gulf of California will be divided. Fleets based in Ensenada, Bahia Magdalena and Guaymas will be restricted to fish in designated fishing areas. This partition will also be linked to a change in the determination of minimum size for Monterrey sardines. Minimum size will not only be determined by the fishing area but will depend on results of prospective surveys conducted before the fishing season. This implies a shift from a static size limit rule to a dynamic one.

The changes above are currently provisional as they have not yet been gazetted in the Diario Official: scoring for the 4th annual surveillance proceeded using the 1993 version of the NOM which is currently active.

3.4.3 Workshops and Training

Captain trainings - In early June 2013, the Client held an educational outreach session with fishing vessel operators (vessel managers) to discuss the value of certification, the importance of good fishing practices and measures to limit the effects of the fleet on particular bycatch species. Evidence of attendance, presentation materials and diplomas issued to participants was received by SCS. In 2013-2014, one vessel captain who had twice set on dolphins was given additional instructions to avoid this practice. In December 2014 Pronatura, CONANP, CANAAP held a workshop in Guaymas Sonora to train 30 captains on management measures for the fishery and protection of the Bahia de los Angeles Reserve.

Industry management meetings - Parties involved in the sardine fishery meet ever quarter to report catches discuss technical aspects of the fishery and make decisions for the following period. Some of the decisions that have been proposed by the Small Pelagics Program of INAPESCA, which are recognized in the Management Plan are the closures in August and September and that the industry abides to the ruling. As a result of an analysis of size distribution and maturity of sardines in 2014, INAPESCA recommended that measures to protect recruitment should be taken and therefore additional closures should be adopted for Monterrey sardines from November 2014 to January 2015 (Martinez-Zavala et al 2015a). This closure was agreed by the fleet as well as a second closure that started May 2015 (Anonymous 2015).

Stock Synthesis training workshop - From September 8th to the 14th 2014 a technical workshop was organized by INAPESCA to train staff in the use of the Stock Synthesis platform.

Bycatch mitigation workshop - The team was formally informed that in September 2015, a workshop took place to discuss mitigation measures to reduce the impact of the fishery on sea birds. Dr. Martin Hall, a bycatch and mitigation expert from the Inter-American Tropical Tuna Commission and Dr. Enriqueta Velarde, sea bird expert from Universidad Veracruzana contributed to the workshop to find strategies to meet mitigation goals.

Meetings of the Technical Research Committee on small pelagic fishes

The surveillance 2015 Technical Research Committee meeting for small pelagic fisheries scheduled was held on July 14, 2015. With the participation of representatives from Canainpes, CRIP and COBI. Conclusions reached include cease of operations from August to September, 2015, commitment to avoid capturing under-sized fish and continuous support to research cruises.

SCS received an updated vessel list, as part of the requirements of the standard, which can be found in Appendix 2.

3.5 Conclusions and Recommendations

It is SCS's view that the Fishery continues to meet the standards of the MSC and to comply with the 'Requirements for Continued Certification'. SCS recommends the continued use of the MSC certificate through to the 4th surveillance audit. Seven scores were increased to reflect improved performance resulting in closed conditions (Table 1).

Two performance indicators were found behind target (2.5.1 and 3.2.3) and progress will need to be demonstrated throughout the next year for Re-Assessment. One additional performance indicator (2.5.2), originally closed during the third surveillance, was scored below 80 and the condition was re-opened. Progress on Condition 2.1.2 was considered sufficient and the Condition was closed. The Client should note that any conditions that remain behind target at re-assessment progress needs to be presented in order to score above SG80.

4 Status of Previously Raised Conditions

1.1.1		
The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
SG 60	**SG 80**	**SG 100**
It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired. The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired. There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.

Score 2014: 75 (Re-scored from 90)

Score 2015: 80

Condition 1.1.1: By the fourth surveillance audit, the client should provide evidence that the stock is at or fluctuating around its reference points such that recruitment is not imperiled by overfishing.

Action Plan	**By Who**	**Due**
1.1 La Información independiente de la pesquería (hidroacústica, área de barrida y otros) continuará siendo analizada para obtener los mejores índices.	Client Instituto Nacional de	1.1 By the fourth surveillance audit, It will

1.2 Se realizaran talleres para mejorar la metodología para la evaluación del stock: "Evaluación de poblaciones de pelágicos menores basados en modelos estructurados por edad" y "Evaluación de recursos pesqueros con la plataforma de modelado Stock Synthesis". 1.3 Se realizará la evaluación de la población de sardina, que incluirá índices independientes de la pesca (hidroacústica, área de barrida, huevos y larvas, y otros). Los índices permitirán afinar la evaluación de la población de sardina. 1.4 Se realizará una revisión por pares de los resultados de evaluación de la población de sardina. 1.5 Se revisará la condición PI 1.1.1 a la luz de los resultados de la evaluación de la población de sardina. 1.6 La estimación de biomasa de sardina obtenida se utilizará para aplicar la regla de control del RMS y la Captura Biológicamente Aceptable (CBA), acorde con el Plan de Manejo Pesquero. 1.7 Se evaluará la aplicación de la regla de control y la captura permisible (CBA), de ser necesario se implementarán medidas de manejo adicionales y/o emergentes. 1.8 A partir de información documentada de la sardina del golfo de California, se mostrará evidencia de que las variaciones de la captura (magnitud y distribución) están influenciadas por la variabilidad ambiental. Lo que también permitirá mostrar que el esfuerzo pesquero de la flota varía en relación a la accesibilidad/disponibilidad de la sardina, aunque las otras especies de pelágicos menores, influyen en esta variación.	Pesca (INAPESCA) Ángeles Martínez y Manuel Nevárez Technical Research Committee for Small Pelagic Fish	provide evidence to the CAB (in an research report). 1.2 We will provide evidence to the CAB, that Workshops were made August (1) y September (1) 2014. 1.3 By the fourth surveillance audit, the stock assessment estimate will be presented to the CAB. 1.4 By the fourth surveillance audit, We will provide evidence to the CAB. 1.5 By the fourth surveillance audit, We will provide evidence to the CAB. 1.6 By the fourth surveillance audit, We will provide evidence to the CAB. 1.7 By the fourth surveillance audit, We will provide evidence to the CAB. 1.8 By December 2014, We will provide evidence to the CAB (in a technical report)

Progress on Condition (2015): This PI was originally scored above the 80 level and therefore no condition was associated with it. At the second surveillance audit in 2013, it was noted that, should the

declining trend in catch continue, re-scoring would take place. Although the decline in the catch slowed down, landings were still smaller than in the previous season. In 2014, the team did not received any new evidence showing that despite the steep drop in the catch, the stock would be maintained above a level where recruitment would be impaired. Evidence provided in documentation, presentations and reports, led the team to conclude that:

- Effort on nominal trips and boats is increasing.
- Overall catch of small pelagics is increasing.
- Catch of Monterrey sardine is declining.
- Catch of Monterrey sardine may be following a regular pattern.
- Catch of other small pelagics is increasing and also following a regular pattern.
- Management is not applying the control rule when may be needed the most. This, despite the control rule has been in effect since 2012. The team has not been notified of any alternative action or measures to reduce effort based on reference points.

In 2014, the team re-scored PI 1.1.1 as the evidence suggested the stock was undergoing a change in status that may represent a risk to recruitment and the ecosystem. The Client Action Plan shown above was proposed to address this concern.

In 2015, the team felt that further discussion was needed in terms of whether, despite record low catches, biomass remained above the level of recruitment impairment. Most importantly**, it was suggested that lower catches were not necessarily related to low abundance but to low availability**, but sufficient evidence was not presented at the onsite audit to support this assumption. Additional information was therefore requested to verify that all points in the CAP were addressed and that this was satisfactory to close Condition 1.1.1. After the surveillance audit the client submitted evidence and an additional phone interview took place with Dr. Hector Villalobos, chief scientist in charge of conducting acoustic surveys.

Following the commitments placed against Condition 1.1.1 in the Client Action Plan of 2014, here we report for each item, on the evidence that the team received demonstrating fulfillment of the CAP and the final conclusion about Condition 1.1.1.

1.1 A report was received with results of progress in the development of the hydroacoustic surveys (Nevarez-Martinez et al 2015a). Furthermore, Dr. Villalobos described via telephone, that the current status of the estimated abundance using hydroacoustic methods is already reliable, and as long as it is taken as a relative index that underestimates total abundance, the trend is valid. Nevertheless, he indicated that improvements on the estimates may only be minor.

1.2 As planned, a workshop was held to train INAPESCA staff in the use of the Stock Synthesis platform (see section on Workshops and Training above).

1.3 A report was received with results of stock assessment conducted using the ASAP approach which used 5 indices of relative abundance independent of the fishery, including acoustic surveys and the seabird index (Nevarez-Martinez et al 2015b; see in-depth discussion in the stock assessment section of the background).

1.4 The stock assessment was internally reviewed by INAPESCA staff with assistance of external personal during a dedicated meeting on the 8th and 9th of June 2015, A reader of the stock assessment report independent of INAPESCA (Dr. Kevin Hill) also provided comments.

1.5 The updated stock assessment and other evidence provided related to Condition 1.1.1 has been used in this report to re-evaluate PI 1.1.1 and consider whether scoring issues are now met at the level of SG80 (see concluding paragraph below):

1.6 and 1.7. The stock assessment presented the results of computing the Biologically Acceptable Catch for the whole time series to demonstrate that the historic catch has been under the BAC, and that for the fishing season 2014-15 the allowable catch ranged between 87,000 to 90,000. As a precautionary reaction to the low availability of the species the fishery has declared a moratorium on Monterrey Sardine for this season, and no effort is supposed to be applied to fish on this species. It is however recognized that preventing the fleet to catch any Monterrey Sardine may be impossible and some catch will take place. Even if this catch is considerably lower than the BAC, the management mechanism to prevent harvesting a species that is closed to the fishery is of concern and will have to be discussed in further evaluations.1.8 As stated in 1.5 a), evidence was provided supporting the assumption that variations in the catch can be explained by relocations in the catch due to oceanographic processes (see section 3.2.3.1 on Environmental considerations and the potential effect of El Niño on current sardine availability).

In light of the evidence provided by the client, the assessment team concludes that the unit of assessment may be considered to meet SG80 requirements for the following PI1.1.1 scoring issues:

- SI a *It is highly likely that the stock is above the point where recruitment would be impaired*.
- SI b *The stock is at or fluctuating around its target reference point*.

Based on the evidence provided by the client, the assessment team has concluded that the decline in catch and other indicators bulleted at the beginning of this section more likely reflect low availability rather than low abundance. Evidence from the hydroacoustic surveys and evidence regarding potential effects of El Niño and other environmental considerations (outlined in Section 3.2.3.1) support this conclusion. The updated stock assessment further supports the conclusion that the fishing mortality is historically below BAC (As described in Section 3.2.3). **Together, evidence that the stock availability has shifted rather than declined and that catch has historically remained below BAC supports the conclusion that it is highly likely that the stock is above the point where recruitment would be impaired.**

The fishery for small pelagic fish in Mexico is managed using a control rule that is based on removing a fraction of the allowable biomass above a minimum threshold. Such fraction can oscillate between 5 and

25% and it is assumed that if "fraction is approximately equal to Fmsy, then the harvest rate in the control rule will not exceed Fmsy". The language in the Plan is interpreted such that this BAC (and the corresponding fraction) works as a LRP and therefore is acting as a precautionary approach in the management of the fishery because, although no actual value has been provided, the TRP in terms of fishing mortality will be lower than the level producing MSY. Additionally, Nevarez-Martinez et al (1999) estimated that F= 0.25 was a slightly lower value of Fmsy (0.9Fmsy) that "would not only produce higher economic returns, and be safer biologically, but will reduce intrinsic population oscillations, which for management purposes is a desirable characteristic of an exploitable resource". Fishing mortality rate was estimated to be under the reference point value of 0.25 along the entire time series created in the recent stock assessment. **A stock of small pelagic fish that has been harvested for more than 30 years with fishing mortalities lower than 0.9 Fmsy can be considered highly likely to be at or above the biomass producing MSY and the fishery meets the requirement at SG80.**

Based on the evidence provided to the team, it was concluded that the stock is at or fluctuating around its reference points such that recruitment is not imperiled by overfishing. Condition 1.1.1 is therefore closed.

Status of Condition 1.1.1: Closed

1.2.4		
There is an adequate assessment of the stock status.		
SG 60	**SG 80**	**SG 100**
The assessment estimates stock status relative to reference points. The major sources of uncertainty are identified.	The assessment is appropriate for the stock and for the harvest control rule, and is evaluating stock status relative to reference points. The assessment takes uncertainty into account. The stock assessment is subject to peer review.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery. The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way. The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. The assessment has been internally and externally peer reviewed.

Score 2014: 75

Score 2015: 80

Condition 1.2.4: By the second surveillance, the client should provide evidence that fishery – independent data has been collected. In addition, the client should provide some proof by the fourth surveillance audit, that this data has been incorporated into the stock assessment of the sardine fishery in addition to fishery-dependent data.

Action Plan	**By Who**	**Due**
Fishery-independent data of stock size, using hydro-acoustic measurements, has already been collected during the last three research cruises. The plan is to continue collecting fishery-independent data twice annually. These data will be used for fisheries management because it will be used for tuning the stock assessment analysis, which today use fishery-dependent data. Preliminary results for the biomass of sardine, obtained by hydroacoustic methods for the last	Technical Research Committee for Small Pelagic Fish, that will incorporate all stakeholders interested in the certification of the fishery, that will be chaired by a member of academia elected by the participants and its	At the second surveillance audit in 2012, this data will be presented to the CAB. By the fourth surveillance audit in 2014, proof will be provided that this data has been incorporated into the stock

three years were very similar to estimates obtained from virtual population analysis. In addition, the evaluation model will also include environmental indices. At the second surveillance audit this data will be presented to the CAB.	technical secretary will be a representative from INAPESCA Sardine fishery scientist (Manuel Nevárez, INAPESCA)	assessment. This data will be used to establish harvesting rules.

Progress on Condition: During the 3rd Surveillance Audit in 2014, the team reinforced that in order to close this condition, a) the assessment is appropriate for the stock and for the harvest control rule, b) is evaluating stock status relative to reference points, c) takes uncertainty into account and d) is subject to peer review.

During the 4th Surveillance Audit in 2015, a stock assessment report was presented to the team. Main features include fitting the predictions of an age structured model to 5 different indices of relative abundance, which included the acoustic survey indices, an egg production index and an index based on sardine consumption by seabirds. The assessment produced estimates of stock status and fishery performance in terms of biomass abundance and fishing mortality rate. These quantities are fundamental to support the harvest strategy and the control rule as required by the MSC certification requirements in PI 1.2.4 SI (a) at SG80. The assessment has been evaluated with an alternative modeling approach that represents a view of the effects of model choice compared to previous assessments. The results consider uncertainty, including confidence intervals for trends in recruitment and biomass, sufficiently to meet SG80 for SI (b). Details of how the stock assessment was conducted are found in the corresponding stock assessment section of the background.

A peer review process was documented with part of it made internally with participation of external observers and another part done by an independent external reviewer. Two issues are noted regarding the external peer review. First, a question is made regarding the complete independence of the scientist who made the review. If he was at any point involved in the work it has the potential to present a conflict of interest. Second, the reviewer made several relevant observations that are considered by the team as issues that are recommended to be addressed in the future certification cycle. The SG80 requirement for SI(c) that the stock assessment be subject to peer review is met.

All elements requested in the Client Action Plan regarding Condition 1.2.4 were sufficiently addressed, the assessment is considered to be appropriate to the stock and the harvest control rule, the assessment takes uncertainty into account and was subject to peer review. These considerations allow closing the condition and changing the score to 80. No higher score is possible for now because the assessment still needs work as noted by the external reviewer.

Score 2015: 80

Status of Condition 1.2.4: Closed

2.1.1		
The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.		
SG 60	**SG 80**	**SG 100**
Main retained species are likely to be within biologically based limits or if outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species. If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.	Main retained species are highly likely to be within biologically based limits, or if outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.	There is a high degree of certainty that retained species are within biologically based limits. Target reference points are defined and retained species are at or fluctuating around their target reference points.

Score 2014: 75

Score 2015: 80

***Condition* 2.1.1:**

By the third annual surveillance provide evidence to the CAB that the main retained species (*Opisthonema* spp. and *Cetengraulis mysticetus*) are highly likely to be within biologically based limits, or if outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.

Action Plan	By Who	Due
Annual Projects at INAPESCA have the objective, amongst others, to determine the effect of the fisheries on small pelagic populations, for which systematic biological sampling is conducted, and gathering of catch and fishing effort data. This information will make the stock assessment individually for the main small pelagic species. This will provide the fishing	Instituto Nacional de Pesca, Manuel Nevárez.	By the third surveillance audit, we will provide evidence to the CAB (in an annual research report) that the main retained species are highly likely to be within

mortality estimates specific to each size (Fsize), average fishing mortality (Fa) and abundance of size (Nsize). In addition, changes in future fish yields (Y) and average biomass of populations for the main small pelagic species that are retained as part of this fishery, will be explored individually with a predictive model, which will allow us to estimate the maximum sustainable yield (MSY), and mortality associated with that fishery yield (F_{MSY}). These results will be presented in an annual research report. The Fisheries Management Plan (FMP) for small pelagic fish, which is currently being developed, defined control rules for all species included in the FMP, including *Opisthonema* spp. and *Cetengraulis mysticetus*. It also includes emerging management actions, which are the management actions we can take, if one or more reference points are reached or exceeded. Any management option that we consider will aim to maintain (or return) the fishery resource and non-critical (sustainable).		biologically based limits, or if are outside the limits there are a partial strategy of demonstrably effective management measures in place, such that the fishery does not hinder recovery and rebuilding.

Progress on Condition:

During the 4th surveillance audit the team confirmed that INAPESCA is continuing to work with predictive models to obtain estimates of the maximum sustainable yield (MSY) for all main retained species and this work is being complimented by fisheries independent data collected through system hydroacoustic surveys. A formal report, describing the methods was produced in 2012, but does not indicate that hydroacoustic methods are sufficiently developed yet to provide robust species-based estimates of abundance. Informal results examining differences in biomass estimates using various different methods for transforming signal data were presented to the assessment team at the onsite meeting in 2014. During the 4th surveillance in 2015 the team received a surplus production model (Nevarez-Martinez et al., 2015c).

In the 4th surveillance the team confirmed previous findings that the status of the *Opistonema* stock is within biologically based limits. The estimated biomass trajectory shows an upward trend stabilizing during the last ten years, suggesting that the stock is healthy and producing a surplus large enough to allow for the increase in biomass. Additionally, the estimated history of fishing mortality is for the most part below the estimated level of fishing mortality that produces the optimal catch (F=0.621) and under the reference point declared in the FMP (F=0.25).

During the 3rd surveillance the team concluded that if Bocona sardine continues to be managed passively as per the current designation in the Fisheries Management Plan, the Client will need to develop evidence to demonstrate that either the stock is within biologically based limits, or if outside, demonstrate that measures that constitute at least a partial strategy have been defined, **are in use** and provide a high likelihood of maintaining the population within biologically based limits.

In 2015 the team evaluated the three available assessments (3.3.1 Retained Species p. 31) and concluded that the biomass trends for Thread Herring estimated from VPA and ASAP analyses are consistent, even if the total estimated biomasses are largely different. Fishing mortality rates for both Thread Herring and Bocona sardine appear to be below the limit Fmsy and Kobe plots for these species also show that the stocks are not overexploited and overharvesting is not occurring.

The evidence provided addressed the items in the Client Action Plan, indicating that both species are highly likely within biologically based limits, voiding the need to present evidence of emerging management actions. Condition 2.1.1 is closed.

Status of Condition 2.1.1: Closed

2.1.2

There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.

SG 60	SG 80	SG 100
There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is a partial strategy in place, if necessary that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved. There is some evidence that the partial strategy is being implemented successfully.	There is a strategy in place for managing retained species. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its overall objective.

Score 2014: 70

Score 2015: 80

Condition 2.1.2:

By the 3rd annual surveillance audit provide basis for confidence to the CAB that the partial strategy will work. In order to do so the client shall consider setting harvest rates and assessments for individual species and incorporate these into the management plan.

Action Plan	By Who	Due
The Fisheries Management Plan (FMP) for small pelagic fish, which is currently being developed, defined control rules for all species included in the FMP, including *Opisthonema* spp. and *Cetengraulis mysticetus*. It also includes emerging management actions, if one or more reference points reached or exceeded.	Instituto Nacional de Pesca, Manuel Nevárez.	By the 3rd annual surveillance audit provide basis for confidence to the CAB that the partial strategy will work.

Progress on Condition: A Fisheries Management Plan for Small Pelagics was formalized into law in November of 2012 that includes a harvest strategy and precautionary reference points. The current fisheries management plan does not include Bocona (*Cetengraulis mysticetus)* as an actively managed species, despite the fact that, when Monterrey Sardine availability is low, it comprises a significant proportion of catch and has become increasingly important alternative in catches since 2000.

During the 2nd surveillance the team determined that if Thread Herring and Bocona sardine continued to be managed passively, the Client would need to develop evidence to demonstrate that there is a **partial strategy in place**, if necessary, that is expected to maintain the species at levels that are highly likely to be within biologically based limits. The client was also required to demonstrate that there is some **objective basis for confidence** that the partial strategy works, based on some information directly about the fishery and/or species involved (scoring issue b). Finally it was required to present **some evidence** that the partial strategy is being **implemented successfully** (scoring issue c).

At the third annual surveillance audit there was evidence that, while there are elements in the Fisheries Management plan defining active management for Thread Herring, the partial strategy remains to be implemented into a **functional design through numerical definition**; however, all elements of the harvest control rule are already available and even if some of them are still preliminary, the rule can be computed and implemented. Similarly, for Bocona sardines the team did not see evidence that the partial strategy for passive management had any implementable measures in place to keep the species within biologically based limits.

In the fourth surveillance audit it was concluded that measures in the SPFMP, such as monitoring of landing, season closures and limited harvest rates added to assessments for Bocona sardine constitute a partial strategy to maintain catches within biologically based limits. In this audit the team received evidence that the status of the Bocona sardine is not overexploited and overharvesting is not taking place. The status of the Bocona is added to the high productivity of the species and the opportunistic nature of the catch to conclude that these elements provide objective basis for confidence that the partial strategy will work. The partial strategy has been demonstrated to be operational by means of continuing monitoring of landings and effort, estimation of fishing mortality rates, season closures and the recent evaluation of stock status. It is noted that the estimated fishing mortality rate producing MSY for Bocona differs from the default generic value in the Management Plan which is based on Monterrey Sardines. This opens the expectation of an update in the future for the Management Plan to present reference points that better represent the species specific dynamics and productivity of species that constitute higher proportions in the total catch of small pelagics fisheries. There's also an expectation that the status of the Main Retained species is frequently evaluated to monitor the status of the stock and the intensity of fishing compared to reference points. The discussed elements are sufficient to reach an overall score of 80 for this Performance Indicator and close the condition. A higher score is not possible at this moment because the strategy is considered to be partial, the strategy has not being tested to conclude with high confidence that the strategy will work, some measures have just started to being in place so the evidence that it is implemented successfully is not fully clear as required at SG100 and more time and data is required to conclude that the strategy is achieving its overall objective.

The team concludes that the client has demonstrated progress towards meeting this condition, and the partial strategy in place to manage Thread Herring is deemed as appropriate and in agreement of the three Scoring Issues of this Performance Indicator.

Status of Condition 2.1.2: Closed

2.2.2

There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.

SG 60	SG 80	SG 100
There are measures in place, if necessary, which are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is a partial strategy in place, if necessary, for managing bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. There is some evidence that the partial strategy is being implemented successfully.	There is a strategy in place for managing and minimizing bycatch. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.

Score: Closed (Re-scored to 80, 2015)

Condition 2.2.2:

By the 3rd annual surveillance audit, provide some evidence, if necessary, that the main bycatch species are highly likely to be within biologically based limits, or if outside such limits develop a partial strategy of demonstrably effective mitigation measures and provide some evidence to the CAB that the strategy has been implemented successfully.

Action Plan	By Who	Due
The study mentioned in 2.2.3 will provide baseline data on bycatch species of the Gulf of California Sardine	Technical Research Committee for Small	By the third surveillance audit, there will be provided some evidence, to the CAB, that main bycatch species are highly likely to be within

Fishery. Once the composition and biomass of bycatch species are known (by the second surveillance audit) we will have a very good idea as to the steps taken as to determine if they are within biological limit or if not to take the necessary mitigation measures. In others words, there should be sufficient information as to take the necessary steps to mitigate the effect of the fishery on other species, or if necessary to do more research to satisfy the CAB and achieve the required score for this indicator.	Pelagic Fish (as detailed under cond. 1.2.4)	biologically based limits, or if outside such limits development of a partial strategy of demonstrably effective mitigation measures will be presented to the CAB.

Progress on Condition: During the third surveillance the team noted that the client made progress on developing a scientifically defensible and comprehensive monitoring and reporting system for bycatch species, successfully addressing the Client Action Plan objective to present baseline data on bycatch species. Funding from Fundación Productor and the Walton Family Foundation was used to develop and implement a functional observer program for the fishery, with 9 new observers. Funding was administered by Community and Biodiversity, AC (COBI). In November 2012, a series of workshops were held to train observers in seabird, marine mammal and teleost identification, as well as vessel safety and protocols.

During the fourth surveillance the assessment team confirmed that the observer program operated only for two fishing seasons in 2013 and 2014. The 2015 report from the onboard observer program identified a total of 113 fish species (11 ETP species), 6 crustacean species, 4 mollusk species, 1 cnidarian species and 17 bird species (7 ETP species). In 13/14 fishing season bycatch represented less than 1% of total catch landed in the Gulf of California sardine fishery. These relatively low catch levels are highly unlikely to pose a risk to biologically based limits of any species. No known species that are depleted are being fished such that the fishery would hinder recovery. During the 4th annual surveillance the team further confirmed the implementation of several mitigation measures to reduce bird bycatch, including water curtains and educational workshops for captains.

The assessment team determined that through monitoring of bycatch species the on-board observer program operates as part of a partial strategy to ensure bycatch species remain within biologically based limits. Mitigation measures, further constituting a partial strategy, are only proposed for ETP and non-ETP bird species. The assessment team determined that this was appropriate, given the overall low proportion of bycatch, and that mitigation measures for non-ETP bycatch species (fish, crustaceans, mollusks) are not currently necessary.

The data collected from the observer program during 2013 and 2014 indicate that the monitoring element of this strategy can work and has already been implemented successfully. Considering that the onboard observer program did not operate for the 2014-2015 fishing season, the team is concerned on the successful implementation of the program in the long run. A long-term program is required to provide sufficient information to detect any significant changes of the impact of the fishery on bycatch species. Evidence from a workshop held in 2015 for bycatch mitigation strategies confirmed plans to continue the on-board observer plan. The assessment team was unable to confirm that this has been implemented for the 2015-16 fishing season.

To continue to meet SG80 in a Re-Assessment the team recommends that client presents evidence that the on-board observer program continues to be implemented successfully and that the mitigation measures are working appropriately.

Status of Condition 2.2.2: Closed (Re-scored to 80, 2015)

2.2.3

Information on the nature and amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch.

SG 60	SG 80	SG 100
Qualitative information is available on the amount of main bycatch species affected by the fishery. Information is adequate to broadly understand outcome status with respect to biologically based limits. Information is adequate to support measures to manage bycatch.	Qualitative information and some quantitative information are available on the amount of main bycatch species affected by the fishery. Information is sufficient to estimate outcome status with respect to biologically based limits. Information is adequate to support a partial strategy to manage main bycatch species. 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 effectiveness of the strategy).	Accurate and verifiable information is available on the amount of all bycatch and the consequences for the status of affected populations. Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty. Information is adequate to support a comprehensive strategy to manage bycatch, and evaluate with a high degree of certainty whether a strategy is achieving its objective. Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.

Score: 80 (Re-scored from 70,2014))

Condition 2.2.3:

By the third surveillance audit, assure that information is sufficient to estimate outcomes status with respect to biologically based limits and that 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 effectiveness of the strategy).

Action Plan	By Who	Due
We have planned two programs: ~~1) the first one a study that will be conducted by the post graduate student Sergio Macias, at CIBNOR La Paz Mexico, and will provide a base line and estimates on composition and biomass of bycatch species caught in the sardine fishery. According to the work plan raised the fishing trips will be performed three times during the fishing season (July, November/December, February/March), and the trips will last from one to one and a half weeks. The bycatch species will be collected, photographed and identified.~~ (Removed at 2nd surveillance audit. Student no longer working on project) 2) The second is an observer program that will be implemented from October of 2010, for one year, and will be done by three technical staff working full time. These technicians will be working onboard of the sardine fishery vessels, and at fishing landing sites. During these activities data of bycatch species will be obtained and interactions between the fishery and endangered, threatened and protected (ETP) species will be monitored and recorded. The work will continue if more information is required. This program will be important part of INAPESCA effort to gather sufficient information about the bycatch species and of the interaction with the ETP species, to further understand, identify and develop management measures oriented to mitigate potential issues of the bycatch and	Technical Research Committee for Small Pelagic Fish (as detailed under cond. 1.2.4) Industry, Cámara Nacional de la Industria Pesquera Instituto Nacional de Pesca. Supervised by Manuel Nevarez, INAPESCA	At the second surveillance audit, this data will be presented to the CAB. There will be sufficient information to take the necessary steps to treat in an informed way the bycatch situation.

about the ecosystem issues. The results will be presented to the CAB on the second surveillance.		

Progress on condition: There has been strong progress on developing a scientifically defensible and comprehensive monitoring and reporting system for bycatch species since the first annual surveillance audit. There is evidence that the Client and collaborators met the obligation of the 2012 condition to provide evidence that the observer program has been implemented successfully. Funding from Fundación Productor and the Walton Family Foundation was used to develop and implement a functional observer program for the fishery, with 9 new observers. Funding is being administered by Community and Biodiversity, AC (COBI). In November 2012 a series of workshops were held to train observers in seabird, marine mammal and teleost identification, as well as vessel safety and protocols. The observer program started to generate quantitative and qualitative information from January 2013 until August 2014. The analysis of data gathered during this time were published in INAPESCA on-board observer report.

The evidence collected from January 2013 to August 2014 spans over two full seasons, providing qualitative information and quantitative information available on the amount of main bycatch species affected by the fishery. This information will be is sufficient to estimate outcome status with respect to biologically based limits for retained, bycatch and ETP species.

Status of Condition 2.2.3: Closed, 2014

2.3.1		
The fishery meets national and international requirements for protection of ETP species. **The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.**		
SG 60	**SG 80**	**SG 100**
Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species. Known direct effects are unlikely to create unacceptable impacts to ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species. Direct effects are highly unlikely to create unacceptable impacts to ETP species. Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species. There is a high degree of confidence that there are no significant detrimental effects (direct and indirect) of the fishery on ETP species.

Score: Closed (Re-scored to 80, 2015)

Revised Condition 2.3.1:

By the third annual surveillance audit provide information to demonstrate that the effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species. There is evidence that both direct and impacts are highly unlikely to create unacceptable (serious or irreversible) impacts on populations of affected ETP species. The client will also need to specify definitions that they are following for ETP species under national law.

Action Plan	By Who	Due
The study mentioned in 2.2.3 will provide baseline data on the impact of the Gulf of California Sardine Fishery on ETP species. As was mentioned in 2.2.3., during these activities data of bycatch species will be obtained and interactions between the fishery and endangered, threatened and protected (ETP) species will be monitored and recorded. The work will continue if more information is required. This program will be important part of INAPESCA effort to gather sufficient information about the bycatch species and of the interaction with the ETP species, to further understand, identify and develop management measures oriented to mitigate potential issues of the bycatch and about the ecosystem issues.	Technical Research Committee for Small Pelagic Fish (as detailed under cond. 1.2.4) Industry, Cámara Nacional de la Industria Pesquera Instituto Nacional de Pesca. Supervised by Manuel Nevarez, INAPESCA	At the second surveillance audit, this data will be presented to the CAB. There will be sufficient information to take the necessary steps to treat in an informed way about the interaction between the fishery and the ETP species.

Progress on Condition: There has been strong progress on developing a scientifically defensible and comprehensive monitoring and reporting system for bycatch species since the first annual surveillance audit. There is evidence that the Client and collaborators met the obligation of the 2012 condition to provide evidence that the observer program has been implemented successfully. Funding from Fundación Productor and the Walton Family Foundation was used to develop and implement a functional observer program for the fishery, with 9 new observers. Funding is being administered by Community and Biodiversity, AC (COBI). In November 2012 a series of workshops were held to train observers in seabird, marine mammal and teleost identification, as well as vessel safety and protocols. The observer program started to generate quantitative and qualitative information in January 2013 and results analyzing data from January 2013-August 2014 were presented to the audit team at the 4th annual surveillance audit.

At the 4th annual surveillance in 2015 evidence was presented to the team that information from the observer program had been used to generate a basic understanding of direct impacts of the fishery on ETP species, including number of individuals captured/observed by species, status of ETP species directly impacted by the fishery and overall population size. Seabirds are the group most affected by the fishery, Blue Footed Boobies and Brown Pelicans have the highest recorded mortalities of all ETP species. There are no international or national requirements associated with these species relevant to the fishery.

However, indirect effects of the fishery on seabirds are not well understood, oiling impacts of the fishery on seabirds continue to be unknown and data on non-fatal interactions fails to make a clear distinction of seabirds observed inside vs outside the fishing nets. Effects of indirect effects for seabirds captured in the nets were discussed during the 3rd surveillance, raising concerns of population impacts that could cause gradual declines. Mortality caused by the GoC small pelagic fishery on the adult stage of seabird life history for species commonly captured in nets (e.g. Brown Pelicans and Blue Boobies), could impact populations in unacceptable ways, causing gradual declines.

The GOC is home to one of the largest breeding colonies of brown pelicans (43 350 ± 230; Anderson et al., 2013) and census in the northern islands of the Gulf of California (GOC) show an increasing in nesting colonies of brown pelican after the 2003 ENSO event (Godínez-Reyes et al., 2006). There appears to be empirical evidence that the fishery's impacts are not currently sufficient to cause population level impacts. Less is known about blue-footed boobies, but mortality of observed sets for this species (n= 101) appears to be minimal compared to the population estimated for this species (<10,0000; Padilla-Serrato et al 2015). Based on what is known about these populations and the direct impacts of the fishery, it is considered highly unlikely that the fishery is creating unacceptable impacts on these ETP species.

During the Seabird Mitigation workshop Dr. Valarde committed to seek funding to research the effect of oils from small pelagics on seabirds. There is evidence that some mitigation measures, the use of water curtains are being implemented – these should address adult-stage mortality of both brown pelican and blue boobies. There have also been at least two educational workshops targeting captains, one in December of 2014 and the second in September of 2015. These initiatives demonstrate that indirect effects have been considered, and with these mitigation efforts in place are thought to be unlikely to create unacceptable impacts.

The assessment team considers that the progress on this condition meets the goals set in the action plan to gather data on interactions with ETP species and to develop and implement mitigation measures. To continue to meet SG80 the onboard observer program will need to continue to collect data to demonstrate the efficacy of water curtains and how any remaining mortality, or impacts from oiling, may/may not impact on ETP birds. The team expects that mitigation measures outlined in the Seabird Mitigation Workshop and the On-board observer report will translated into formal management procedures. If this does not occur before re-assessment, the team will consider re-opening a condition against this performance indicator.

Status of Condition 2.3.1: Closed (re-scored 80, 2015)

2.5.1		
The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.		
SG 60	**SG 80**	**SG 100**
The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.

Score 2014: 60

Score 2015: 60

Condition 2.5.1:

By the fourth annual surveillance audit, the client should present evidence that the fishery is highly unlikely to disrupt the ecosystem structure to a point where there would be serious or irreversible harm.

Action Plan	By Who	Due
An ecosystem model will be built to understand what is the portion of biomass that the ecosystem requires to maintain its structure and functioning (Bmin-ecosystem). To do so, previous ecosystem models on small pelagics developed for the Gulf of California will be used and updated. This estimation will compared to current Bmin.	COBI Francisco Arreguín INAPESCA	May 2015

Progress on Condition: This PI was originally scored at the 80 level during the full assessment and therefore no condition was associated with it. At the second surveillance audit it was noted that, should the declining trend in catch continue, re-scoring of PI 1.1.1 and related indicators would take place. Special attention was given to the question of how the Bmin parameter in the harvest control rule would be obtained.

Pacific sardine is a low trophic level species, and has been described as an important component of the Gulf of California Ecosystem (Luch-Cota et al. 2007; Arizmendi-Rodriguez et al. 2015). As this fishery entered assessment contract before 14 of August 2011, determinations were not required to identify if this is a key Low Trophic Level (LTL) stock. This determination would be re-evaluated under a Re-Assessment of the fishery.

During the 4th surveillance the assessment team confirmed that progress is being made in the application and publication of ecosystem models that will help determine the required biomass of pacific sardine to support ecosystem functions. The report for advances of for this work indicate that improvements from previous models consider effects of fishing mortality, disaggregation of small pelagic species and factors of environmental variability on the biomass of the small pelagic species in terms of ecosystem function (Arreguín-Sánchez et al., 2015). The current output of the ecosystem model will help understand the portion of biomass that the ecosystem requires to maintain its structure and functioning (Bmin-ecosystem). Despite research advances, the assessment team was unable to verify that the fishery's estimates for Optimum Yield or Bmin consider an amount of biomass required to prevent damages to the ecosystem structure.

The team acknowledges the progress on the development of ecosystem models to inform Bmin. However, considering that traditionally the fishery captures large volumes of small pelagic species and that there is evidence that pacific sardines in the Gulf of California are an important component in the ecosystem, and could be key low trophic species, the team concludes that there is not enough evidence at the moment to assure that the fishery is highly unlikely to disrupt key ecosystem elements. The team expects that the results of ongoing work will help determine the required biomass to sustain key ecosystem components, resulting in future score improvements for this indicator.

Status of Condition 2.5.1: Open – Behind Target (Re-scored 60)

2.5.2

There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.

SG 60	SG 80	SG 100
There are measures in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem. The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).	There is a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems). There is some evidence that the measures comprising the partial strategy are being implemented successfully	There is a strategy that consists of a plan, containing measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm. The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved. There is evidence that the measures are being implemented successfully.

Score 2013: 75

Score 2014: 85

Score 2015: 75

Condition 2.5.2:

By the third annual surveillance audit, develop a strategy to restrain impacts of the Sardine fishery on the Gulf of California ecosystem and provide evidence to the CAB that the strategy has been implemented successfully.

Action Plan	By Who	Due
Because the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function, no strategy has been in place to restrain impacts of the fishery on the ecosystem. However, in the Fishery Management Plan (FMP), that is currently being developed, proper and formal consideration of the role of the resource on the maintenance of the ecosystem, particularly as food for other species shall be included. It also includes research requirements for determining ecosystem interactions with the aim of reducing fishery impacts. So from the FMP be developed and implemented the strategy for reducing the impacts of fishing on the ecosystem. We know that the INAPESCA in conjunction with other academic institutions have plans to develop ecosystem models for fisheries management, but we have no information about their status.	Technical Research Committee for Small Pelagic Fish (as detailed under cond. 1.2.4) Instituto Nacional de Pesca, Manuel Nevárez.	By the third surveillance audit, we will provide some evidence, to the CAB, that the strategy has been implemented successfully.

Progress on Condition: The Small Pelagics Management Plan published in November 2012 includes considerations of the resource on the maintenance of the ecosystem and specifies research priorities to inform ecosystem-based management. The management plan highlights the need to develop models taking into consideration the ecosystem approach. One approach will be the use of information produced by the on-board observer identifying and quantifying bycatch associated with fishing operations. During the second annual surveillance audit in 2013, there was discussion about the role that COBI may choose to play in facilitating the development of ecosystem models either directly, or indirectly.

In 2013, the fishery was informed that in order to fulfil scoring requirements at the SG 60 and SG 80 levels, it would be necessary to demonstrate to the assessment team in the third surveillance audit that existing knowledge has the ability to identify "**key elements**" of the ecosystem, has a partial strategy in place that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem, and some evidence that this partial strategy has been implemented. The team also cautioned that this will represent a significant amount of work over the next year, and we cautioned that this work should begin immediately in order to have the time to understand the key elements of the system and then implement any necessary strategy by the 3rd surveillance audit.

At the fourth surveillance audit in the report for the onboard observer program identified large pelagic predator species as of key species in the ecosystem based on an index of closeness estimated from node connections in a predator-prey matrix). Results from the 2013 Ecopath model indicate that Monterrey

Sardines are an important component in the diet of seabirds, large pelagics and sharks and that changes in its abundance may influence the distribution of the populations of its predators (Arizmendi-Rodriguez et al., 2015). Given that the condition required that the Client "develop a strategy to restrain impacts of the Sardine fishery on the Gulf of California ecosystem and provide evidence to the CAB that the strategy has been implemented successfully", and that this objective is addressed in the Fisheries Management Plan through the Harvest Control Rule, the team evaluated the current score based on progress towards developing a numeric value for Bmin and showing (Scoring Issue c at SG 80) "*that measures comprising the partial strategy are being implemented effectively*". This value was numerically defined for sardines based on a previous investigation on the stock-recruit relationship and the potential of an Allee effect that could place the recruitment at risk under low biomass levels.

The team considered that the fishery required utilization of the HCR accounting for the current state of the stock to adjust the catch, preventing the biomass to go under the level that would maintain the functional structure of the ecosystem. During the 3rd and 4th surveillance audit the team was presented with estimated ranges for Bmin which paralleled estimates of abundance from acoustic surveys. However, the Bmin ranges were calculated with considerations for spawning biomass and recruitment but are not considering biomass required for ecosystem functions. Ongoing work, expected to be published later this year, will help advance the goal in determining the amount of sardine biomass required to support ecosystem functions (Arreguín-Sánchez et al. 2015).

In the 3rd surveillance audit the team cautioned the Client that in order to maintain a score above 80, it will be necessary to show that the HCR has been computed and implemented as a functional element of the management system <u>for the purposes of ecosystem management</u>. This will be necessary to fulfill the requirement in the previous paragraph "that measures comprising the partial strategy are being implemented effectively".

The team acknowledges that some progress has been made on the implementation of different measures, onboard observer vessel, use of ecosystem models, and hydroacoustic surveys, to consider ecosystem impacts. However, as outlined in condition 2.5.1 the team was unable to verify that the strategy outlined in section 6.2 of the Small Pelagics Management Plant to define the Optimum Yield for the fishery taking into account the protection of the marine ecosystem is being implemented, Bmin is used only to manage stock health and cannot serve one of its primary purposes to prevent damages to the ecosystem structure. The partial strategy in place fails to meet requirements at SG80 and to restrain impacts of the fishery on the ecosystem leading to re-scoring of PI 2.5.2., the score drops to 75.

Status of Condition 2.5.2: Open on-target (Re-scored 75)

3.2.1		
The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.		
SG 60	**SG 80**	**SG 100**
Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery management system.	Short and long term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery management system.	Well defined and measurable short and long term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery management system.

Score: 80 (Maintained from 2014)

Condition 3.2.1:

By the 2nd annual surveillance audit evidence should be provided, that the short and long term objectives are explicit within the fishery's management system and consistent with achieving the outcomes expressed by MSC`s Principles 1 and 2. Therefore the specific Management Plan for the fishery shall be completed and shall include proper and formal consideration of the role of the resource on the maintenance of the ecosystem and these considerations shall be incorporated into the harvest control rules.

Action Plan	By Who	Due
A comprehensive Fishery Management Plan (FMP) is in its final draft stages as of June 2010 and shall be adopted by the second annual surveillance. The FMP is designed to cover most of the requirements stated in the specific conditions. There are two additional regulatory instruments used to control guidelines and management decisions about fisheries in Mexico. These are 1) the Carta Nacional Pesquera which by law is to be updated every two years, and 2) NOM-003-PESC-1993, currently under revision. These instruments will collectively determine fishing methods, gear types, open/closed fishing areas, TAC´s, size, ecosystem provisions etc. The comision Federal de Mejora Regulatoria (COFEMER) is a government body engaged in advisory oversight and advocacy	Technical Research Committee for Small Pelagic Fish (as detailed under cond. 1.2.4)	We expect this to be published by 2012 - 2013.

functions on regulatory reform maters with the objective to promote transparency in the design and implementation of regulations. The FMP will be put on COFEMER website for ample consultation by any interested party. The Instituto Nacional de Pesca (INAPESCA) whose decisions on fishery management are final holds yearly workshops for coordination of research by the various institutions involved in fishery research.	Instituto Nacional de Pesca.& Comisión Nacional de Acuacultura y Pesca (CONAPESCA) They are responsible for its publication	

Progress on Condition: The new version of the Small Pelagics Fishery Management Plan includes a Research Plan for small pelagics and was published in November 2012 and was open for public comments through several meeting at the different ports where this fishery is carried out (Guaymas March 16-18; Guaymas April 26-29; Ensenada May 26-27; and Guaymas June 21-24). The management plan invokes two main categories of management, a new harvest control with a Bmin terms to potentially reserve biomass for ecosystem function, and lists details on specific lines of research that include Populations Dynamics, Stock Assessments, Ecosystem Approach, Predicting Models, Habitat, Socio-economics, and Exploratory Fishing. There is evidence that the 2012 Fisheries Management Plan for Small Pelagics short and long-term objectives associated with the research plan and also contains proper and formal consideration of the role of the resource on the maintenance of the ecosystem and evidence that these considerations have been incorporated into the harvest control rules.

The latest meeting for the Technical Research Committee for small pelagic Fisheries was scheduled for June 5-7th, 2013. The surveillance team has seen evidence that invitations were sent to the stakeholder group and that members of the public sector and objector group attended and participated openly in the meeting.

The assessment team notes that the core commitment in the Client Action plan has been fulfilled, but would appreciate receiving the updated 1) the Carta Nacional Pesquera 2) NOM-003-PESC-1993 upon availability.

Status of Condition 3.2.1: Closed 2013

3.2.2

The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives and has an appropriate approach to actual disputes in the fishery under assessment.

SG 60	SG 80	SG 100
There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives. Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions. Some information on fishery performance and management action is generally available on request to stakeholders.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives. Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. Decision-making processes use the precautionary approach and are based on best available information. Information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. Formal reporting to all interested stakeholders provides comprehensive information on fishery performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.

Score 2014: 70

Score 2015: 80

Condition 3.2.2: By the fourth surveillance audit, the client should present evidence that the fishery management's decision-making process responds to serious and other important issues identified in relevant research, monitoring, evaluation and consultation in a transparent, timely and adaptive manner and takes some account of the wider implications of decisions. The decision-making process must also use

the precautionary approach and should be based on the best available information. Information should be available and explanations provided for any actions or lack of action.

Action Plan	By Who	Due
1.1 Se aplicará la regla de control del RMS y la captura permisible (CBA), obtenidas a partir de la estimación de biomasa de sardina. 1.2 Se evaluará la aplicación de la regla de control y la captura permisible (CBA), de ser necesario se implementarán medidas de manejo adicionales y/o emergentes. 1.3 Se revisará el proceso de toma de decisiones en relación con las acciones de la pesquería que podría afectar negativamente a la población. Se implementarán acciones conducentes a mitigar la afectación de la actividad pesquera.	Client Comisión Nacional de Acuacultura y Pesca (CONAPESCA) Instituto Nacional de Pesca (INAPESCA)	By the fourth surveillance audit, this evidence will be presented to the CAB.

Progress on Condition: This PI was originally scored at the 85 level and therefore no condition was associated with it. At the second surveillance audit it was noted that, should the declining trend in catch continue, re-scoring of PI 1.1.1 and related indicators would take place. In particular, as the catches plummeted, there appeared to be no response in the system to enforce the application of the HCR to adjust the catch to possible low biomass levels. This means the decision-making process is not responding in a timely manner to a serious issue that has been identified by research and monitoring, nor do a precautionary set of measures appear to be applied to prevent serious harm to the stock and the ecosystem. Additionally, explanations for lack of management action are based on the assumption that perception about the current state of the stock is reliable from abundance estimates based on acoustic surveys. This however is weak evidence based on the authors' own discussion about problems that need to be resolved to produce better estimates. On these grounds the team decided to re-score PI 3.2.2 to 70. The team highlights the nature of this PI in the sense that it pertains to the effectiveness of the decision making process, not the quality of the measures or the state of the stock.

After the 4th surveillance audit, the team received expert explanation that issues in acoustic signal processing led to underestimates of abundance but the trend in the indices were reliable. It is clear in the stock assessment trend of total abundance, that the index was a rescaled to reflect the true estimated population size.

The fishery produced a reconstruction of the Biologically Acceptable Catch that would result after using the control rule in the Management Plan and demonstrated that catch has been under the BAC for almost the whole history of the fishery (see background about the stock assessment). With this, all conditions and requirements in the Action Plan were met and the Condition on this PI is closed. It was recommended however that a different Bmin value should be produced to account for ecosystem needs and not only to

protect the sardine stock. It was also recommended to produce consistent Bmin values or to explain why different values are produced each year and which one is to be used for management.

Status of Condition 3.2.2: Closed (Rescored to 80, 2015)

3.2.3

Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with

SG 60	SG 80	SG 100
Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective. Sanctions to deal with non-compliance exist and there is some evidence that they are applied. Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules. Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence. Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery. There is no evidence of systematic non-compliance.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules. Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence. There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.

Score 2014: 70

Score 2015: 70

Condition 3.2.3: By the fourth surveillance audit, the client should present evidence that the fishery's management measures are enforced and complied with.

Action Plan	By Who	Due
1.1 Se mantendrá el monitoreo biológico de la flota pesquera. 1.2 Se vigilará el cumplimiento de las medidas de manejo vigentes emitidas en la Norma Oficial, Carta Nacional Pesquera y Plan de Manejo, principalmente en lo referente a la talla mínima de captura y proporción permisible. 1.3 Se mostrará que las medidas dirigidas a limitar el esfuerzo pesquero se están implementando. 1.4 Se solicitará a CONAPESCA la supervisión, control y vigilancia que se ha aplicado en la pesquería, así como la implementación de mejoras al respecto. 1.5 Se mostrará que no hay evidencia de incumplimiento sistemático, y que las sanciones para hacer frente a incumplimiento existen. 1.6 Se aplicarán las medidas de manejo derivadas de la estimación de biomasa (captura permisible), y de ser necesario se aplicarán medidas adicionales y/o emergentes. Se revisará el proceso de toma de decisiones en relación con las acciones de la pesquería que podría afectar negativamente a la población de sardina.	Client, CONAPESCA INAPESCA	By the fourth surveillance audit, this evidence will be presented to the CAB.

Progress on Condition: This PI was originally scored at the 80 level and therefore no condition was associated with it. At the time of the third surveillance audit, the team noted that the trend in effort continues to show a sustained increase in nominal trips. The proportion of fish in the catch at the end of the fishing year is still at levels that are in excess of the 30% established in regulatory documents and the team noted that this trend is persistent in several available reports. Both the increase in effort and proportions of juvenile fish in excess of a predetermined limited are prohibited in documents such as the Carta Nacional Pesquera, the NOM-03-PESC and the Fishery Management Plan. Lack of compliance and enforcement of these regulations led the team to re-score PI 3.2.3 to a level of 70.

The year 2014 was atypical in that little Monterrey sardine was caught and that overall effort on small pelagics declined considerably. However, at the time of the 4th Surveillance Audit, the team noted that the expected updates for both the CNP and the NOM had not been implemented and that no other emergent mechanism had been implemented to meet the elements of the Action Plan. The little catch that could be sampled was informative because it was bimodal with a peak around 113 mm, but it illustrates the presence of a large proportion of small sardine in the commercial catch. Systematic monitoring of the commercial activity continues and the management system has improved considerably in obtaining quantities required to compute the allowable catch as defined in the Management Plan. Evidence of definitive compliance of additional measures was not presented, however, the team recognizes that proposed modifications to the NOM are promising to achieve a better control of effort and proportion of undersized fish. Nevertheless, until those changes are implemented and enforced this Condition cannot be closed.

Status of Condition 3.2.3: Open – Behind Target

3.2.4		
The fishery has a research plan that addresses the information needs of management.		
SG 60	**SG 80**	**SG 100**
Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2. Research results are available to interested parties.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. Research results are disseminated to all interested parties in a timely fashion.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.

Score: 90 (Originally 70, re-scored to 80 when website went live Sept 2013)

Condition 3.2.4:

By the first annual surveillance audit, evidence shall be provided to the CAB that information from the fishery (including data, analysis and minutes from the technical bodies) have been disseminated in a timely fashion to all interested parties. In addition, a research plan shall be made available to the public that includes a strategic approach to research and reliable information that is sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.

Action Plan	By Who	Due
By the first surveillance audit evidence will be provided that the specific INAPESCA webpage, that was set up to facilitate access to all of the information regarding the fishery and its management, will be updated on a regular basis (http://www.inapesca.gob.mx/index.php?option=com_content&task=view&id=306&Itemid=306) This will include a draft master research plan for all the pelagic fisheries that will also be made available for consultation by interested parties prior to the 1st annual surveillance. In addition, minutes of quarterly meetings between fisheries administrators and industry with updated information on effort by researchers from INAPESCA will be made available on the website. These meetings are used to inform decisions on the maintenance and status of fisheries.	Instituto Nacional de Pesca & Comisión Nacional de Acuacultura y Pesca (CONAPESCA)	To be updated on regular basis.

In May of this year INAPESCA instituted a new organization, Red Nacional de Information e Investigacion en Pesca y Acuaclutura (RNIIPA), that will be responsible for centralizing information on and research in fisheries and aquaculture in Mexico in order to make it more readily available to all interested parties. RNIIPA will also facilitate procurement of research funding and establish research priorities with the objective of sustainability of marine resources.	They are responsible for its updating	

Progress on Condition: In 2013, there was evidence that information from the fishery was not being disseminated in a timely fashion to all interested parties. The industry website has not been updated since November 2011. In the 2012 first surveillance audit, the client had agreed that the information would be updated before July 2012. While this responsibility was ultimately the Client's, their ability to fulfill this commitment was hampered by management of the website by CONAPESCA and lack of government resources for staffing. In 2013, when the condition was upgraded to a Major, and carried with it the weight of potential certificate suspension or withdrawal if the condition was not met within 90 days (see Section 7.4 in the Certification Requirements V1.3, p. 32). COBI offered to host the relevant website and associated documents.

The team required that the site be functional, accessible to the public and contain a full suite of associated documents within 3 months (Sept 1st, 2013). INAPESCA was also reminded of their obligations in the Client Action Plan to provide quarterly updates for uploading: in this case providing these documents to COBI. The website was created and went live by the September 1st 2013 deadline and remains functional with stakeholder pleased by its implementation. The website can be found here: http://sardinagolfodecalifornia.org/.

During 2013 the Client submitted an updated vessel list that addressed this request and which can be found in Appendix 2.

In 2014, the score for PI 3.2.4 was adjusted to reflect significant progress in the execution of research and in the collaborative use of research results as various parties collaborate to include fisheries independent indices in an upcoming Stock Synthesis III model. This performance indicator was re-scored from a 70 (May 2014) to an 80 (Sept 2013) to a 90 (2014).

Status of Condition 3.2.4: Closed

Table 11. Scores for the Gulf of California Sonoran sardine fishery in 2015. Scores in red indicate performance indicators under SG 80 performance and with conditions.

Prin-ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in			FA Score	Y1	Y2	Y3 Score		Contribution to Principle Score	
						Either		Or							Either	Or
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	0.333	0.1667	90	90	90	75	80	20.00	12.50
				1.1.2	Reference points	0.5	0.25	0.333	0.1667	85	85	85	85	85	21.25	14.17
				1.1.3	Stock rebuilding			0.333	0.1667							0.00
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125			80	80	80	80	80	10.00	10.00
				1.2.	Harvest control rules & tools	0.25	0.125			80	80	80	80	80	10.00	10.00
				1.2.	Information & monitoring	0.25	0.125			90	90	90	90	90	11.25	11.25
				1.2.	Assessment of stock status	0.25	0.125			75	75	75	75	80	10.00	9.38
Two	1	Retained species	0.2	2.1.	Outcome	0.333	0.0667			75	75	75	75	80	5.33	5.00
				2.1.	Management	0.333	0.0667			70	70	70	70	80	5.33	4.67
				2.1.	Information	0.333	0.0667			90	90	90	90	90	6.00	6.00
		Bycatch species	0.2	2.2.	Outcome	0.333	0.0667			80	80	80	80	80	5.33	5.33
				2.2.	Management	0.333	0.0667			70	70	70	70	80	5.33	4.67
				2.2.	Information	0.333	0.0667			70	70	70	80	80	5.33	5.33
		ETP species	0.2	2.3.	Outcome	0.333	0.0667			75	75	75	75	80	5.00	5.00
				2.3.	Management	0.333	0.0667			80	80	80	80	80	5.33	5.33
				2.3.	Information	0.333	0.0667			80	80	80	80	80	5.33	5.33
		Habitats	0.2	2.4.	Outcome	0.333	0.0667			95	95	95	95	95	6.33	6.33
				2.4.	Management	0.333	0.0667			95	95	95	95	95	6.33	6.33
				2.4.	Information	0.333	0.0667			95	95	95	95	95	6.33	6.33
		Ecosystem	0.2	2.5.	Outcome	0.333	0.0667			80	80	80	60	**60**	4.00	4.00
				2.5.	Management	0.333	0.0667			75	75	75	85	**75**	5.00	5.67
				2.5.	Information	0.333	0.0667			85	85	85	85	85	5.67	5.67
Three	1	Governance and policy	0.5	3.1.1	Legal & customary framework	0.25	0.125			95	95	95	95	95	11.88	11.88
				3.1.2	Consultation, roles &	0.25	0.125			85	85	85	85	85	10.63	10.63
				3.1.3	Long term objectives	0.25	0.125			100	100	100	100	100	12.50	12.50
				3.1.4	Incentives for sustainable fishing	0.25	0.125			85	85	85	85	85	10.63	10.63
		Fishery specific management system	0.5	3.2.	Fishery specific objectives	0.2	0.1			75	75	80	80	80	8.00	8.00
				3.2.	Decision making processes	0.2	0.1			85	85	85	70	80	7.00	7.00
				3.2.	Compliance & enforcement	0.2	0.1			80	80	80	70	**70**	7.00	7.00
				3.2.4	Research plan	0.2	0.1			70	70	70(80)	90	90	9.00	9.00
				3.2.5	Management performance	0.2	0.1			85	85	85	85	85	8.50	8.50

Overall weighted Principle-level scores		Either	Or
Principle 1 - Target species	Stock rebuilding PI not scored	82.5	
	Stock rebuilding PI scored		67.3
Principle 2 - Ecosystem		82.0	
Principle 3 - Management		85.1	

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5 Appendices

5.1 Appendix 1: Stakeholder Submissions

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Siân Morgan, Ph.D.
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Dear Dr. Morgan

Thank you so much for your invitation to participate in this fourth surveillance meeting. This time of the year is the normal breeding season for the seabirds in the Midriff Island Region, where I have been doing fieldwork for almost 35 years, and I would normally be doing that now. However, I am able to attend this meeting due to the massive breeding failure of the seabirds in the whole region, apparently due to a generalized lack of food resources.

I would like to express that some progress has been made towards the objectives drawn in the agreement reached during the meeting between the industry and INAPESCA with the objection group in 28 June 2011. An initial observers program has been under way and some meetings have been held to determine a method to estimate the Pacific sardine stock of the region. COBI has been instrumental in this progress and all participants have been cooperating in this direction. Data have been provided by all the different research sectors (hydroacustic, egg and larvae and seabird studies) which will provide fisheries-independent data for the stock estimate in the future. Some of the initial concerns are still valid though, and I believe they need to be considered here for future work, in the view to continue in the path of common work towards achieving a sustainable fishery. In this sense, we want to express our concern regarding 'rational use' of this fish stock (see Holt and Talbot, *New Principles for the Conservation of Wild Living Resources*, J Wildl Manag 43, Supplement, 33 pp).

Here I follow the different points in accordance with the MSC evaluation tree:

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Principle 1

PI 1.1.3 Where the stock is depleted there is evidence of stock rebuilding.

Since the record catch of the fishing season 2008/9, the catches have been falling at a rate of about 50% per year. Even after the catch reached 83,600 MT, close to half the historic average of the fishery, fishing effort continued for two fishing seasons with no evidence of effort to reduce fishing effort or stock rebuilding, precipitating a collapse till catches reached less than 1% of the record catch 5 years before.

The lack of effective, dynamic, management has lead to drastic falls in catch volume repeatedly in the last decades (1992, 1998, 2003), the last of which was the mentioned above in 2008/9, when catches decreased drastically since the record catch of over 524,000 metric tons (MT) dropped to some 3,500 MT in the 2013/2014 fishing season. This decline of over 99% over a 5 year period did not lead to control measures in due time, well before this collapse occurred. On the contrary, the fleet continued to operate until sardines were not available and it was not until then that the management system finally adopted a moratorium to the fishery (http://sardinagolfodecalifornia.org/wp-content/uploads/2013/08/MINUTA-10DIC14-Y-PROPUESTA.pdf).

Gulf of California sardine fishery is far less precautionary than the management of the Pacific coastal sardine fishery. Experience has shown that the catch needs to be greatly reduced well before they are in danger of dropping to virtually zero (MacCall et al. 2012. Weak evidence for sardine collapse. *Proc Natl Acad Sci*, www.pnas.org/cgi/doi/10.1073/pnas.1203526109).

PI 1.2.1 There is a robust and precautionary harvest strategy in place.

There is no evidence of a robust and precautionary harvest strategy. During the collapses of the fishery, and particularly this last collapse, fishing effort did not decrease, precipitating the collapse of the fishery. Furthermore, there is now a proposal of a modification of the Official Norm for forage fish fishery NOM 003, which is proposing, among other things, the elimination of the legal size for the various species that it takes. This point is in total disagreement with a precautionary approach to the harvest strategy.

Another point that goes against a precautionary harvest of the sardine is the fact that there is a requirement for a 30% tolerance of sublegal catch, which refers to the catch of the whole fishing season. This allows for the catch of 100% sublegal size in most of the catches of boats operating in certain areas and times of the year. This is particularly negative when boats are operating in the recruitment area of the species, in the Midriff Island Area, during the late Spring and Summer months, when the juveniles are found in this northern area of their distribution.

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PI 1.2.4 There is an adequate assessment of the stock status.

The timeline of this condition was adjusted to be met by the 2nd. surveillance audit. Although several meetings in this relation have been held and several experts in the different fields have participated, there is no actual assessment of the stock until now.

Also, the condition states that fishery independent data should be used to assess the population biomass. The data available are hydroacustics, spawning biomass and seabird diet composition. Although fishery independent data have been provided and the information is available, no actual stock assessment has been reached to date.

The results of several seabird researchers have shown that the seabird diet composition is an accurate predictor of the commercial fleet total catch and catch per unit effort. This information can provide a threshold value under which the fishing effort could be reduced in order to prevent collapses. There will certainly be reductions of some smaller magnitude due to the intrinsic fluctuating nature of the populations of these small pelagic fishes, but the reductions would be minimal as they were in the past when overfishing had not yet started (e.g. 1982 and 1988). However, this valuable information has not been integrated into the management process.

Pacific sardine stocks are well known to fluctuate at a decadal scale, increasing when the overall oceanographic regime is warm and decreasing when it is cold, as it has been recently (e.g., Lindegren, M. et al. 2011. Climate, fishing, and fluctuations of sardine and anchovy in the California Current. Proc Natl Acad Sci. www.pnas.org/cgi/doi/10.1073/pnas.1305733110; Zwolinski & Demer. 2012. A cold oceanographic regime with high exploitation rates in the Northeast Pacific forecasts a collapse of the sardine stock. *Proc Natl Acad Sci*, www.pnas.org/cgi/doi/10.1073/pnas.1113806109). Given what has been learned of these fluctuations and the effect of increasing fishery mortality especially when the stock is in decline has led to a great deal of caution in the management of Pacific sardine fishery along the Pacific coast (Parrish, R.H. 2002. A Monterey Sardine Story. Unpubl. Report, Pacific Fisheries Enviromental Group, NMFS, Monterey; MacCall et al. 2012. Weak evidence for sardine collapse. *Proc Natl Acad Sci*, www.pnas.org/cgi/doi/10.1073/pnas.1203526109). In fact, because of the cold regime now underway, and the decrease of the Pacific stock of sardines, regardless that it still fluctuates from year to year, the Pacific Fisheries Management Council recently closed the fishery for the West Coast of Canada and the US (mortality (http://www.npr.org/blogs/thetwo-way/2015/04/16/400177895/feds-place-commercial-sardine-fishing-on-hold-for-more-than-a-year).

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Principle 2

2.1.1 The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.

There continues to be a disagreement with the definition of target and retained species for this fishery. Several species of forage or small pelagic fishes are normally caught by the certified fleet, such as threadfin herring, northern anchovy and deep-bodied anchovy. These species sometimes make up over 75% of the total catch of the fleet, so they should be considered target species and managed accordingly.

PI 2.2.2 There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.

In this case, a very high by-catch of California Brown Pelican and Blue-footed Booby (*Pelecanus occidenalis californicus* and *Sula nebouxii* (Figs. 1 and 2) both species listed in the Mexican protected species list: NOM-059-SEMARNAT-2010) has been demonstrated, through the analysis of over 1 year worth of data collected by the on-board observers program recently implemented. This information has been analyzed by seabird specialists with decades of experience in the region, and the results show that the mortality of these two species during fishing operations triples the natural mortality.

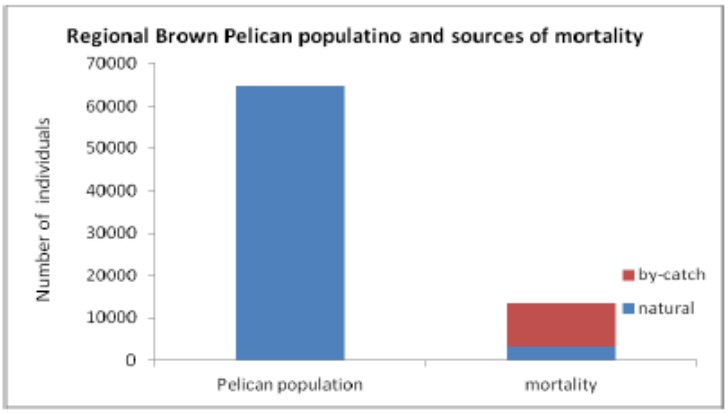

Figure 1. Regional population of California Brown Pelican (*Pelecanus occidentalis californicus*) in the area of influence of the sardine fishing fleet of Sonora, showing natural mortality and mortality estimated in by-catch during fishing operations in 2013/14.

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One of the most compelling and necessary strategies is the development and implementation of methods to prevent the incidental catch of non-target species such as seabirds, marine mammals, turtles, other fish and invertebrates, some of which are also commercially important in their own right and importantly contribute to the local economies of many coastal communities as well as being also involved in important regional (both national and international) economic systems involving the now growing economic activity of ecotourism, among others. We note that MSC did not certify, for example, fisheries for Patagonian toothfish (*Dissostichus eleginoides*) until the issue of by-catch was solved (i.e. the fisheries around South Georgia, Kerguelen Island etc).

One of the highest effects with the sardine fishing operations is through the oiling of the seabirds. Fish oils have been shown to be even more detrimental than petroleum oils for the health and recovery of seabirds (Morandin & O´Hara, 2014, *Science of the Total Environment* 496: 257-263), and in fact some species of seabirds regurgitate/squirt stomach oil (rendered from their prey) as a defense against predators (Warham, J. 1990. The petrels, their ecology and breeding systems. Academic Press, London). Fish oil disrupts seabird feather microstructure and waterproofing. Various studies show that seabirds that have been exposed to fish oil lose their ability to repel water, float, thermoregulate or fly; and as a result, they cannot feed or accomplish normal activities, almost always dying within a few hours or days. It will be much more efficient, both for economic and ecological reasons, to prevent by-catch than, as in the case of seabirds, to have to develop a rescue and rehabilitation program, which would be much more costly and not as efficient, since it has been shown that fish-oiled birds that have been rescued and deoiled in attempts at rehabilitation, exhibit very low rates of survival in the long term (Jaques, D. 2014, Brown Pelican Injury Prevention Project: Northern California Harbors. Pacific Eco Logic report to the Kure/Stuyvesant Trustee Council, pp. ii and 33.).

Both the California Brown Pelican and the Blue-footed Boobie are two species included in the Mexican official Norm for protected species (NOM-059-SEMARNAT-2010) under the categories of THREATENED and UNDER SPECIAL PROTECTION, respectively. These are also migratory species that move to the Pacific Northwest during their non-breeding season and are listed under the Migratory Species Act. It is of outmost importance to implement preventive measures that help greatly reduce the impact of the sardine by-catch of these and other species.

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PI 2.2.3 Information on the nature and amount of by-catch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage by-catch.

Information on the nature and amount of by-catch has allowed us to determine that there is a high risk mainly to California Brown Pelican and Blue-footed Booby, whose natural rate of mortality is tripled by the by-catch. However, there is at present no strategy to prevent, nor even reduce this by-catch. There has been a commitment by the industry and fisheries authorities to a "rigorous and transparent process where the observers' program may be peer reviewed by recognized experts in the field". It was also stipulated that "approximately 10% of the fishing fleet and about 10% of the fishing trips would be covered by observers", and that "if the peer review shows that the design of the program is not adequate, a revised program will need to be implemented in an appropriate timeframe, so that scientific rigor can be shown as required by the condition". At present, and although the data show a high by-catch of seabirds, the number of observers has been reduced from 9 to 2, which does not reach the 10% coverage to which both the fisheries authorities and the industry committed.

Also, there was a commitment for "the design of the observers' program to be peer reviewed, and results of the program made available publicly, as part of the MSC surveillance audit process. Stakeholders would be invited to comment and contribute to the annual surveillance audits to provide comments that shall be addressed by the team".

We believe that the above points need to be addressed and properly fulfilled.

PI 2.3.1 The fishery meets national and international requirements for protection of ETP species. The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.

Our primary concerns specifically relate to the California Brown Pelican and the Blue-footed Boobie (*Pelecanus occidenalis californicus* and *Sula nebouxii*). These are the major species observed suffering the highest negative sardine by-catch effects. Natural adult seabird survival is generally high (in Brown Pelicans, for example, from the Gulf of California, adult survival is high, ~95%/year once adulthood is reached in 3-5 years; D. W. Anderson, pers. comm.), while their breeding rate is normally very low, and highly variable. This makes them extremely susceptible to factors that may affect their adult survival, such as mortality in fishing operations. These and other life history characteristics confer seabirds a high susceptibility to factors that increase adult mortality.

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This increase in the mortality of the adult Brown Pelicans and Blue-footed Boobies could severely disrupt population structure and stability, causing a gradual decrease in the effective population size, which will only be evident until after some years have passed. Yet, the highest long-term impact of sardine fishing operations on seabird by-catch is not so much through the direct mortality or injuries, but through the oiling of the seabirds, which leads to mortality after a few days to weeks to months.

Both the California Brown Pelican and the Blue-footed Boobie are included in the Mexican Official Norm for protected species (NOM-059-SEMARNAT-2010) under the categories of THREATENED and UNDER SPECIAL PROTECTION, respectively. These are also migratory species, many breeding along the US West Coast and even from as far as the North American Arctic and they are included and protected internationally in the Migratory Bird Treaty Act between the U.S., Mexico, and Canada. It is of outmost importance to implement preventive measures that help greatly reduce the impact of the sardine by-catch of these and other migratory seabird species, as well as other resident Gulf of California species such as the Yellow-footed Gull (*Larus livens*), found commonly nowhere else in the world, other than the Gulf of California.

PI 2.5.2 There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.

It has become apparent that management of small pelagic fishes, and especially that of the Pacific sardine, should follow a precautionary approach (Cury, P.M. et al. 2000, Small pelagic in upwelling systems: patterns of interaction and structural changes in "wasp-waist" ecosystems. ICES J. Mar. Sci. 57: 603-618; Pikitch, E. et al. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program, Washington, D.C.; Pikitch, E. et al. 2014. The global contribution of forage fish to marine fisheries and ecosystems. Fish and Fisheries **15**:43-64).

This is a crucial step in the management of this **most important** forage fish species.

Such management can not be done using Catch Per Unit Effort (CPUE) of the fishery. Several studies have y demonstrated that many small pelagic fishes aggregate more agressively as their populations decline. Therefore, Total Catches will vary independent of CPUE, which will be extremely inconsistent, and uninformative of the state of the stock (Rose, G.A. and Kulka, D.W. 1999. Hyperaggregation of fish and fisheries: How catch-per-unit-effort increased as the northern cod (*Gadus morhua*) declined. Can. J. Fish. Aquat. Sci. 56: 118-127). This seems to be the case for the Pacific sardine fishery in the Gulf of California, and strongly suggests that there should be a quota fixed for the sardine fishery, and other small-pelagic fishes to prevent a future resource or ecosystem crisis, similar the conservative approach of the Pacific Fisheries Management Council.

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PI 2.5.3 There is adequate knowledge of the impacts of the fishery on the ecosystem.

Not much information exists on this topic for the Gulf of California.

However, in the last decade, several studies have demonstrated that heavy mortality from fisheries increases stock fluctuations (Anderson, C.N.K. et al. 2008. Why fishing magnifies fluctuations in fish abundance. Nature 452: 835-839; Hsieh, C. et al. 2006. Fishing elevates variability in the abundance of exploited species, Nature 443: 859-862; Essington, T.E. et al. 2015. Fishing amplifies forage fish population collapses. PNAS www.pnas.org/cgi/doi/10.1073/pnas.1422020112. And in a recent paper regarding this specific resource, Velarde et al. show that this is exactly what has been happening with the Pacific sardine catches in the Gulf of California. Furthermore, they show that the sardine also drops in the diet of three seabird species breeding in the region, 2-3 years **before** the drop in commercial sardine catches, rendering this parameter an excellent **indicator of future** declines in sardine catches by the fishing fleet (Velarde et al. 2013, Seabird diets provide early warning of sardine fishery declines in the Gulf of California. *Scientific Reports* **3**, doi:10.1038/srep01332; http://www.nature.com/srep/2013/130225/srep01332/full/srep01332.html) and (Velarde et al. 2014a, Seabirds diet predicts following-season commercial catch of Gulf of California Pacific Sardine and Northern Anchovy, J Mar Syst., doi:10.1016/j.jmarsys.2014.08.014).

In addition, Velarde et al. (2014b) in a seabird case study have further shown that the decline in the availability of their food will lead to an added stress factor for the seabird population, affecting their long term breeding success, leading to a steady population decline, evident only after some years (https://drive.google.com/folderview?id=0BwIN_m2EHKsyVDB1eEt5SHlzeXc&usp=sharing). This added stress could be the reduction in food availability, the increased adult mortality in fishing operations or, even worse, both factors simultaneously.

Furthermore, in another most recent study, Velarde et al. 2015 (Too hot for confort: warm oceanographic anomalies drive seabirds nesting north, in press in Science Advances - a new open-access Science journal) show, using a path analysis, that the compound effects of oceanographic anomalies, Pacific sardine fishing effort and Pacific sardine catches by the commercial fleet induces reduced or zero breeding success in seabirds in the following year, as well as their change in breeding distribution, demonstrating that the added effects of fishing effort and catch are almost as high as that of the effect of the oceanographic anomaly.

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Finally, recent studies demonstrate that the Pacific sardine is particularly valuable in the maintenance of the condition and health of its predators, such as in maintaining high reproductive success in the California Sealion (*Zalophus californianus*) (D. Aurioles, pers.com.). Because these pelagic fish are known to be ecologically key species in the stability of upwelling-based, coastal food webs (Ainley et al., 2015. California current system — Predators and the preyscape J Mar Syst, http://dx.doi.org/10.1016/j.jmarsys.2014.10.011), negatively affecting their population-levels will create severe imbalances. Furthermore, studies have shown that sardines maintain their nutritional value after they have spawned, a unique ability of the species, making it an essential nutrient source for its predators (Rodríguez V.M.T. 2009. Contenido energético y ácidos grasos biomarcadores en dos rutas tróficas que llegan al lobo marino, M.S. Thesis, CICIMAR-IPN).

A final recommendation that I would like to make is that the Technical Research Committee is incorporated to the review of the management plan for small pelagic fishes. At present, there is a total lack of ecosystem considerations in the existing plan and it is my belief this aspect now needs to be considered and included in the reviewed version, just as the ecosystem perspective is now generally integrated and used in the most recent and advanced management strategies around the world, if a sustainable use of a resource and the whole ecosystem is the goal.

Again, I thank you for your attention of these observations and considerations.

Best,

Enriqueta Velarde
Researcher

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5.2 Appendix 2: Team Response

Dear Drs. Ezcurra & Velarde,

At the May 22nd 2014 meeting the content of your letter was discussed with the attending Client, INAPESCA staff and other stakeholders (both ENGO and academics) by the audit team attending.

The first main item of concern related to coverage of the observer program, which you would like to see increased to 100%. While this would be ideal, the team considers the current 20% coverage a meaningful improvement that is providing valuable documentation of encounters, mortalities, temporal and spatial encounters that will allow INAPESCA to consider whether encounter rates pose population level threats and suitable mitigation strategies. Whether these are considered sufficient will be examined at next year's fourth annual surveillance audit meeting.

Your second main point relates to the importance of Monterrey sardine (and other small pelagics) in the Gulf of California ecosystem. Last year we **recommended** that the Client convene interested parties to a workshop specifically aimed at improving the monitoring system of the fishery, consolidating existing information relevant to population dynamics, and identifying key gaps in this knowledge. Two such workshops were held in 2013 and different sources of data are being incorporated into upcoming work to build a Stock Synthesis III model for management, as noted in Dr. Velarde's letter. While this may not satisfy all of your aspirations, the team is comfortable that genuine efforts and meaningful progress has been accomplished and that further work is to come. The team has considered some of the ecosystem considerations, which you allude to from a research perspective, from an outcome perspective by decreasing scores on PI 2.5.1, ecosystem outcomes. This score has been decreased from an 80 to 60, based on the fact that the fishery has not defined and implemented a Bmin value for the harvest control rule, designed to reserve biomass for ecosystem needs in the Gulf of California.

As per our response last year, we reiterate that with respect to participation in revision of the fisheries management plan, that while the MSC process supports inclusion, it also respects the governance processes of nation states relevant to management of sovereign resources. Revisions of Fisheries Management Plans for example, falls within the mandate of staff at INAPESCA/CONAPESCA, and the process includes a comment period for public participation that was respected in the revision process. The assessment team received evidence of invitations and meetings that occurred at different ports where this fishery is carried out in 2011 (Guaymas March 16-18; Guaymas April 26-29; Ensenada May 26-27; and Guaymas June 21-24).

In terms of "the information generated", we invite you to explain further to both COBI and Mr. Tissot over the upcoming year, which information specifically you would like shared. Where this is relevant to aspects of the standard, the team will confirm whether such information has been posted to the small pelagics public website. Thank you for the acknowledgement of the website and its functionality in your letter.

In terms of a research plan, the team is satisfied that the existing research plan in the 2012 Fisheries Management Plan represents a strong step forward for the department, and we are pleased by the activity

on a number of fronts demonstrated by INAPESCA (observer program, ongoing work to model reference points, attempts to quantify values for the harvest control rule, development of a stock synthesis III model, ongoing hydroacoustic surveys to quantify fisheries independent measures of biomass). We agree that some of these initiatives are proceeding more slowly than anticipated, and for these reasons, the team has issued a number of behind targets in this year's surveillance audit.

We agree with your concerns related to declining catch of sardines, in the absence of measures to control effort. For this reason, we have adjusted a number of scores and the fishery is behind target on a number of performance indicators. The client has been informed that unless these issues are resolved, including definition and implementation of the harvest control rule, the fishery faces suspension and withdrawal of the certificate in 2015.

In terms of declines associated with predatory fishes and potential population level threats presented by indirect mortalities to oiled birds: we issued a behind target to the client based on the fact that the take of bycatch species (fishes, birds and mammals as well as ETP species) had not been analyzed to consider whether the sardine fishery may have population level impacts. INAPESCA has confirmed that they will move forward with this work over 2014-2015.

The assessment team has seen meaningful progress achieved through the collaborative efforts between the Client, INAPESCA and the objectors, particularly related to the observer program given the original resourcing challenges that underpinned timelines. We recognize that while work is behind timelines (and hence behind target), a commendable amount of work has occurred in the past year and there is sufficient information to begin quantitative exploration of fundamental bycatch issues and how to best mitigate any population-level threats (bearing in mind that the MSC standard considers only these types of concerns related to retained/bycatch and ETP species).

We remain concerned about the unprecedented decline in sardines, in the absence of an ENSO event, without sufficient confirmation of methods to know whether hydroacoustic work indicating the presence of sardines in deep waters is, or is not, reliable. For these reasons we have taken strong measures through scoring, to encourage all parties to assure that appropriate analysis, regulations and sanctions are put into practice to control effort, and to assure that effective sanctions are in place, by next year's audit.

We hope you will agree that the parties involved (yourselves included) should be congratulated for the significant progress over the past year which represents meaningful progress on a number of different fronts. We thank you for the effort involved in engaging in the process and invite you to continue submitting comments for future surveillance audits.

Sincerely, Dr. S. Morgan

Dr. C. Alvarez Flores

5.3 Appendix 3: Supporting Documentation

H. Guaymas, Sonora a 12 de junio de 2015.

Asunto: Estado del avance del modelo ecosistémico

Dr. Sian Morgan
Dr. Carlos Alvarez Flores
Auditores de la certificación de la pesquería
de sardina Monterrey del Golfo de California.

Estimados Sian y Carlos.

Por este medio hacemos de su conocimiento el estado actual del trabajo titulado: *"Pesca y estimación de biomasa remanente de sardina en el mar para sostener la demanda trófica del ecosistema: región central del Golfo de California"* que actualmente está elaborando el Dr. Francisco Arreguín Sánchez y colaboradores.

El trabajo se desarrolla bajo el enfoque holístico del manejo basado en el ecosistema, considerado como estrategia clave por la FAO (Código de Conducta de Pesca Responsable y en la Declaración de Reykjavik), así como en la Cumbre Mundial sobre Desarrollo Sostenible de Johannesburgo. En el caso particular, la investigación se orienta a responder la pregunta científica: ¿qué cantidad de biomasa remanente de sardina monterrey debe quedar en el mar, después de la explotación, para sostener las funciones tróficas del ecosistema?

Para responder a esta pregunta se ha seguido una estrategia en dos etapas; la primera, empleando un modelo trófico del ecosistema donde las diferentes especies de sardina se encuentran agregadas en un grupo funcional; y la segunda, donde se buscará responder la misma pregunta desagregando este grupo funcional a nivel de especie. Para las estimaciones se emplea un modelo trófico del ecosistema construido con base en la plataforma de modelación "Ecopath with Ecosim", así como la determinación de límites máximos de pesca para los diferentes recursos, estimados a partir del deterioro del ecosistema causado por la extracción de biomasa (expresado como ganancia de entropía), y la resiliencia del mismo. Estas estimaciones consideran el análisis de la evolución del ecosistema en las últimas 4-6 décadas.

La primer etapa ya fue concluida, y esta en proceso la escritura del reporte, el cual será sometido a publicación a una revista científica de alto nivel. El resultado clave indica que el límite máximo de extracción de biomasa de sardina es de 36% de la biomasa existente en el mar.

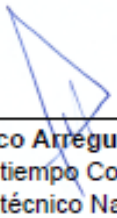
Sobre la segunda etapa, se está en proceso de completar los datos de entrada al modelo trófico del ecosistema. Se dispone de la información de las diferentes especies de sardina, y se está intentando definir con mayor precisión la información sobre las principales especies capturadas por la flota ribereña. Así mismo, se esta reuniendo la

información sobre series de tiempo de abundancia, esfuerzo de pesca de las especies explotadas (lo que haya disponible), y variables ambientales significativas para su incorporación al modelo. La colecta de esta información de entrada al modelo se estima en un 80%, y posteriormente se procederá a la calibración del modelo, y a las estimaciones que permitan responder a la pregunta inicial para cada especie de sardina. Globalmente se estima un avance de esta segunda etapa de 65%.

Sin más por el momento esperamos que esta información les sea de utilidad para la evaluación que se está llevando a cabo sobre la certificación de la pesquería de sardina del Golfo de California.

Sin más por el momento, reciban un cordial saludo.

ATENTAMENTE



Dr. Francisco Arreguín Sanchez
Profesor de tiempo Completo
Instituto Politécnico Nacional
Centro Interdisciplinario de Ciencias Marinas

M. en C. Gabriela García Alberto
Comunidad y Biodiversidad, A.C.

Asunto: Estatus del modelo ecosistémico.

Dr. Sian Morgan
Dr. Carlos Alvarez Flores
Auditores de la certificación de la pesquería
de sardina Monterrey del Golfo de California.

Estimados Sian y Carlos.

Por este medio hacemos de su conocimiento el estatus actual del trabajo titulado: *"Pesca y estimación de biomasa remanente de sardina en el mar para sostener la demanda trófica del ecosistema: región central del Golfo de California"* que actualmente está elaborando el Dr. Francisco Arreguín Sánchez y colaboradores.

Este trabajo tendrá un enfoque considerado bajo el esquema de Manejo Ecosistémico considerado como una de las estrategias novedosas propuesta por la FAO, consiste en la determinación de tasas de cosecha límite (proporción de biomasa extraída por la pesca) que permite mantener el balance entre la extracción de biomasa y la producción de las poblaciones en el ecosistema.

El estudio comprende varias etapas, de las cuales ya se ha cubierto la primera etapa la cual consiste en la reconstrucción del modelo trófico desagregando las especies de interés, quedando pendientes las etapas de determinación de índices representativos de la función y organización del ecosistema; así como la cuantificación de la contribución de las especies en estudio con dichos aspectos mediante los índices mencionados.

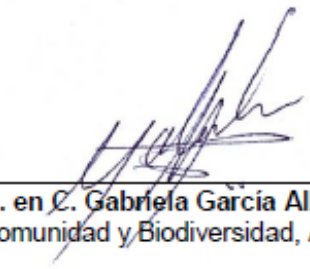
De acuerdo con los resultados arrojados en esta primera etapa, el grupo funcional de sardinas (sin desagregar las especies) tiene un nivel trófico de 3.1; de acuerdo al diagrama de isonoxas (ver documento y presentación anexo) este nivel correspondería a una HR (Harvesting Rate) de 0.36 para que el impacto de extracción en el ecosistema no afecte la biomasa mínima para la renovación del stock, por lo tanto, el máximo de extracción del stock es hasta el 36% de la biomasa original del stock del golfo de California. Con esto, se garantiza el sustento de los depredadores de este grupo funcional; así como la auto renovación del stock. Así mismo se anexarán indicadores que nos permitan determinar el estado de salud del ecosistema y el estado de los grupos funcionales explotados.

Con todo lo anterior podemos determinar un avance del trabajo de aproximadamente el 70% y consideramos que podría estar terminado alrededor del mes de noviembre de este año.

Esperamos que esta información les sea de utilidad para la evaluación que se está llevando a cabo de la certificación de la pesquería de sardina del golfo de California.

Sin más por el momento, reciban un cordial saludo.

ATENTAMENTE



Dr. Francisco Arreguín Sanchez
Profesor Investigador de tiempo Completo
del CICIMAR-IPN

M. en C. Gabriela García Alberto
Comunidad y Biodiversidad, A.C.

5.4 Appendix 4: Updated Vessel List

Cámara Nacional de la Industria Pesquera

Canainpesca DELEGACION SONORA

Guaymas, Sonora, México., 22 Noviembre, 2013.

Sian Morgan
Scientific Certification Systems.

Dear Sian:

This letter is to formally request that the vessel PORTOLA I, PORTOLA II, and PORTOLA III be included in the certification unit for the Monterey sardine in the Gulf of California.

In the attached list you will find more information for this vessels.

This vessels belong to a well-established and respected company that has been in the tuna fishery for over 30 years and now they are investing in the sardine fishery I order to eventually can the Monterey sardine.

Thanking you in advance.

Leon Tissot Plant.

canainpesca
DELEGACION SONORA

AVE. SERDAN #75, EDIFICIO LUEBBERT, INT. 2 ALTOS, COL. CENTRO.
TEL. Y FAX 222 05 22 Y 222 18 09, GUAYMAS, SONORA.

Cámara Nacional de la Industria Pesquera

Canainpesca **DELEGACION SONORA**

LIST OF VESSELS THAT ARE COVERED UNDER THE UNIT OF CERTIFICATION FOR SARDINOPS

NOVIEMBRE, 2013

OWNER	BOAT NAME	PERMIT No.	CONCESIÓN 20 YEAR
*PESQUERA SANTA MONICA S.A. DE C.V.	B.M SARDINA VI	12604779334	
	B.M PROPEMEX PM 2-S	12604779351	
*HERNANDEZ Y PTANIK SA DE CV	BM DON ISAAC	10203079307	
*PESQUERA PRODESA S.A. DE C.V.	BM PRODESA I	10203079308	
PESQUERA SIGLO S.A. DE C.V.	COZAR III	12604779355	
	CHUYITO XXX	12604779357	
	COZAR XI	12604779356	
	KORE	12604779002	
	JUAN PABLO I	12604779377	
	MANOLO	12604779325	
PESQUERA COSTA ROCA S.A. DE C.V.	PESCADOR II	12604779358	
	NENE CONDE	12604779363	
	LAZARO CARDENAS III	12604779322	
	SANDOKAN	12609679314	
	SALGARI	10203079320	
	DELTA YAQUI	12604779337	
	ONTAGOTA	10203004520	
	BAKATETE	12604779360	
*SARDINEROS LA PITAHAYOSA S.A. DE C.V.	SELECTA	12604779361	
	SELECTA I		CP-409/2000
	SELECTA II	12604779332	
	SELECTA III	12604779328	
	PP-1-S		CP-296/2000
*SELECTA DE GUAYMAS S.A. DE C.V.	SELECTA V	12604779001	
	PP-2-S		CP-292/2000
	SARDINA IX		CP-293/2000
NAVIERA Y PESQUERA DEL PACIFICO S.A. DE C.V.	PESCADOR IV	12609679311	
	PESCADOR V	12647793012	
	DON ELIAS	10305379301	
INDUSTRIAS BARDA S.A. DE C.V.	BARDA I	12604779366	
	BARDA III	12604779319	
	ISLA DE CEDROS	12604779320	
	ZENIT II	12609679315	
*PESCA E INDUSTRIALIZACION DEL PACIFICO S.A. DE C.V.	PISA I	12604779329	
	PISA II	12604779364	
*PESQUERA CABRALES S.A. DE C.V.	AZTECA	10203079316	
MAZ SARDINA S.A. DE C.V.	PORTOLA I	125080793082	
	PORTOLA II	125080793081	
	PORTOLA III	[illegible]	

ING. LEON TISSOT PLANT.

canainpesca DELEGACIÓN SONORA

AVE. SERDAN #75, EDIFICIO LUEBBERT, INT. 2 ALTOS, COL. CENTRO.
TEL. Y FAX 222 05 22 Y 222 18 09, GUAYMAS, SONORA.

6 Surveillance Audit Frequency

The surveillance audit frequency is “normal” for this fishery, meaning annual. This is in accordance with Tables C3 and C4 in the MSC Certification Requirements. The fishery scores >2 in table C3 and therefore does not qualify for reduced or remote surveillance audits.

--End Report--