PRE-ASSESSMENT AGAINST THE MSC STANDARD FOR THE GIANT SQUID (Dosidicus gigas) ARTISANAL FISHERY IN PERUVIAN WATERS

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Glossary

SPRFMO: South Pacific Regional Fisheries Organization
MSY: Maximum Yield
EEZ: Economic Exclusive Zone
PRODUCE: Peru’s Ministry for Production
IMARPE: Instituto del Mar del Perú
MSC: Marine Stewardship Council
UoA: Unit of Assessment
UoC: Unit of Certification
FIP: Fisheries Improvement Project
HCR: Harvest Control Rules
ITP: Instituto Tecnológico de la Producción
FONDEPES: Fondo Nacional de Desarrollo Pesquero
ROP: Reglamento de Ordenamiento Pesquero
DVPA: Despacho Viceministerial de Pesca y Acuicultura
PSA: Productivity/Susceptibility Analysis
SICA: Scale/Consequence Analysis
RBF: Risk Based Framework
FAO: Food and Agriculture Organization of United Nations
PI: Performance Indicator
TAC: Total Allowable Catch
CPUE: Catch per Unit of Effort
IUCN: International Union for Conservation of Nature
ETP: Endangered Threatened and Protected species
FMSY: Fishing Mortality at Maximum Sustainable Yield
BMSY: Biomass at Maximum Sustainable Yield
PRI: Point of Recruitment Impairment
CITES: Convention on International Trade in Endangered Species
MARPOL: International Convention for the Prevention of Pollution from Ships
LGP: Ley General de Pesca
DICAPI: Dirección General de Capitanías y Guardacostas
SERFOR: Servicio Forestal y de Fauna Silvestre
Executive summary

This document reviews the Unit of Assessment (UoA) defined as the Peruvian artisanal fleet (Peru’s national legislation establishes precise terms of reference on which vessels are considered artisanal) using manual squid jiggers in the giant squid fishery (*Dosidicus gigas*), against the MSC sustainable fishing standard.

A pre-assessment is a quick and approximate exercise, in which the fishery it is not analyzed with the same level of scrutiny as during a full assessment process. The pre-assessment is designed to identify how likely it is for a fishery to achieve MSC’s standard while identifying those elements that could represent the most obvious obstacles for a fishery to proceed towards an eventual certification and providing guidance.

The pre-assessment for the aforementioned UoA has concluded that the fishery would probably not achieve the minimum level required by the MSC standard should it proceed to a full assessment in its current state.

More details are provided below on the different obstacles identified for each of the 3 principles of the MSC standard.

**Principle 1- Target species**

Although there are significant uncertainties related to this principle, the status of the stock of giant squid seems to be above sustainable reference levels. However, it is vital to progress in the knowledge of key aspects of biology and distribution of the species so that it can be managed with all the relevant information available.

Management strategy: The management strategy must be able to respond to fluctuations in the state of the population, in addition, this strategy must be consistent with the distribution of the stock.

Harvest control rules: The MSC standard requires for stocks to implement well defined harvest control rules in such a way as to ensure that the exploitation rate is reduced as the risk on the stock being fished beyond the point of recruitment impairment increases.

Information and monitoring: The information collected on the activity and catches of the fleet should be appropriate to support and inform the management strategy as well as provide appropriate information to determine the status of the stock.

Stock assessment: Stock assessment must take into account and incorporate the most important sources of uncertainty.

**Principle 2 – Ecosystem impacts**

The manual squid jig is a highly selective fishing gear, its impact on non-target species, as well as on ETP, is probably minimal or practically nil; although there is no solid and systematic monitoring information to provide estimations for fishery impacts on principle 2 or eventually manage them if necessary by supporting an effective strategy.

Information: The information is not considered sufficient to characterize and quantify the impacts on the main secondary species and on the ETP species. The information available indicates that these are minor, although this is not sufficient to confirm with a high degree of certainty that the impacts do not exist or species under principle 2 can be affected.
Management: While more detailed information needs to be collect to confirm no impacts on ETP species exist, it has been observed that in case these occurred, the available management instruments for the fishery would not be sufficient to stop them from happening.

Principle 3 – Governance and Fishery specific management

Principle 3 reviews the broader governance framework for the fishery. Consultation and participation tools for all stakeholders should be in place, together with long-term objectives guiding the management strategy which should explicitly incorporate ecosystem and precautionary approach. Many of this elements, yet formally available within the national management system, fail to be implemented explicitly. Also, the lack of appropriate information and monitoring for the fishery is again impairing proper specific management.

Legal framework: Mechanisms are required to ensure legal rights are respected and to solve disputes, within a framework of transparency.

Consultation roles and responsibility: Although the management and decision making process appears to be consultative and inclusive, these are not fully developed and implemented.

Management objectives: There are no clear specific objectives for the giant squid fishery management consistent with principles 1 and 2 of the MSC. The management system is not precautionary, nor does it take into account the ecosystem approach beyond a formal level.

Specific objectives of the fishery: The objectives are not consistent with the harvest strategy, as the quota is not effectively implemented.

Decision-making processes: The ability to solve fisheries problems and the effectivity of decision making processes is limited by the lack of information and widespread informality.

Monitoring: The monitoring applied to the squid fishery is insufficient to support all stages of fishery management. Scientific monitoring, management, compliance.

Management evaluation: There should be a system to monitor and evaluate the performance of the specific management system for every fishery according to its objectives. The management system specific must be reviewed effectively and in a timely manner.
Background

Objectives / scope of the pre-assessment

This pre-assessment has as objective the evaluation for the Peruvian giant squid (*Dosidicus gigas*) artisanal fishery against the MSC principles under 2.0 version of the standard

The results of this evaluation will consist of:

- Conclude in an approximate way about the possibility that the fishery complies with the principles and criteria required by the MSC standard to ensure good and sustainable management.
- Identify if the unit of assessment could proceed towards a complete evaluation with possibilities of success and the existence of alternative UoA within the one under study.
- Identify the main obstacles to proceed towards a full MSC evaluation.
- Identify the information that might be necessary in case of proceeding towards a full assessment and areas in which further research or supplementary studies may be required.
- Draft a list of potential stakeholders involved in the fishery that should be consulted during a full evaluation process.

Each of these topics was explored during the pre-assessment. This allowed the evaluators to examine:

- Information on the target population, environmental considerations, the fishery and its management system for analysis against the requirements of the MSC standard.
- Key stakeholders and any possible obstacles or conflicts that may affect the certification process.

It is important to note that the pre-assessment of a fishery is not intended to duplicate a full assessment of the MSC and can only provide guidance. A full evaluation includes a team of experts and public consultation stages not considered during a pre-assessment. This provides an interim assessment of a fishery based on the information provided by the client.

Limitations for the pre-assessment of the fishery

The certification scheme of the MSC requires information at a significant level of detail to allow for an accurate evaluation of a large number of elements. Due to the limited availability of information and monitoring of the fishing operations of the fleet analyzed, added to important questions about the target species, it is likely that some of the hypotheses assumed for this pre-assessment may divert from the actual reality of the fishery, which could result in significant differences in the outcome on some of the performance indicators and principles in the event the fishery proceeds towards a full evaluation.

Taking into account these uncertainties, the scoring has not been carried out with the same level of detail as for a full evaluation; and it has not been precisely identified which elements of a certain performance indicator are met or fail, however in each case it has been clearly indicated whether if each PI (i) it does not comply with the minimum acceptable standard, (ii) it complies with conditions or (iii) it complies unconditionally.

Unit(s) of assessment

According to the MSC certification guidelines, the unit of assessment is defined as "The fishery or fish population" (biologically differentiated unit) combined with the method / gear of
fishing and operation (group of vessels) and / or individuals fishing the stock under a certain management scheme.

Based on this, the following evaluation unit is proposed:

<table>
<thead>
<tr>
<th>Target species</th>
<th>Giant squid, jumbo squid, potón, lura (<em>Dosidicus gigas</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock</td>
<td>Eastern South Pacific</td>
</tr>
<tr>
<td>Area</td>
<td>Peru’s jurisdictional waters (FAO 87)</td>
</tr>
<tr>
<td>Flota</td>
<td>Peru’s artisanal squid jig fleet</td>
</tr>
<tr>
<td>Gear</td>
<td>Manual squid jig</td>
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</table>

The MSC is currently in the process of reviewing how Units of Assessment are defined in fisheries certified by MSC and how its definition is applied within MSC assessments.

This revision process aims to modify the MSC criteria to prevent a given fishery from being able to fish simultaneously in certified and non-certified UoA during a single fishing trip. This circumstance could potentially be occurring in the Peruvian artisanal fleet, which carries out fishing operations to a number of different species with different strategies and gears that are not certified. This should be verified through appropriate monitoring.

In the context of this pre-assessment it has not been possible to determine with certainty if this circumstance takes place during the fishing operations, it is necessary to note that if that was to be the case it would be very likely that a new UoA would have to defined within the fishery and it should adhere to whatever course of action is agreed by MSC mid-2018.

Three lines of action are currently being considered for these situations and are:

- Develop Fishing Improvement Projects (FIP) for these non-certified UoA, proceeding to a full evaluation within 5 years.
- All the fishing done during a single trip must be MSC certified
- Improve the information and reporting schemes.

These considerations of potential supplementary UoAs is a purely precautionary clarification until it can be determined through appropriate monitoring how it applies to the fishery under analysis.

**Principle 1: Target species background**

**Scope of the fishery in relation to the MSC program**

The scope of the MSC excludes fishing operations that imply the following:

- Target species (Principle 1) that are amphibians, reptiles, birds or mammals
- Fishing methods that use explosives or poison
- Operations that are carried out under controversy due to unilateral exemptions of international agreements, or under conditions of conflict, creating a situation that hinders or impedes the effective management of the resource

None of these conditions is applicable to the fishery under evaluation thus it is considered to be within the scope of MSC standards and eligible for certification.
Biology

The giant squid (*Dosidicus gigas*), jumbo squid, (pota, potón, or lura in Perú), is the largest member of the Ommastrephidae and one of the most abundant nektonic squid in the world (Nigmatullin et al., 2001). Its distribution spans from neritic to oceanic areas reaching depths of up to 1000 m. The species is endemic to the eastern Pacific, distributed both in the northern hemisphere and in the southern hemisphere. Studies point out to the existence of two subpopulations of *D. gigas* in Peruvian waters, one made up of individuals of early maturity and small size and another of medium-large size with a later maturity (Tafur et al., 2001).

From the reproductive point of view, the species is monocyclic and experiences semelparity so individuals undergo a single reproductive stage during their life cycle, after which they die. The potential fecundity of adult females is the highest of all cephalopods with productions of up to 32 million oocytes (Nigmatulin et al., 2001).

Giant squid is an extremely fast growing species, especially in its early stages of life. Reaching sizes of one meter during their first year (Nigmatullin et al., 2001, Keyl et al., 2011).

At the trophic level, it exhibits an extremely opportunistic strategy, with changes in distribution, abundance, growth rates, maturity and longevity based on food availability and oceanographic conditions (Arguelles et al., 2008). The squid is an active predator, with a diet composed mainly of copepods, myctophids, amphipods, larvae of other fish and molluscs. As its development and growth progresses so do increase the rates of cannibalism on individuals of smaller sizes (Alegre et al., 2014).

Description of the fishery

*Regional production trends of giant squid*

The giant squid supports important coastal fisheries and in international waters of the Southeast Pacific (FAO Area 87) as well as in the jurisdictional waters of coastal states in the area. In Peru and Chile there are particularly important coastal fisheries that have developed over the last few years. In recent years, these fisheries are more oceanic in nature.
The earliest fishing surveys for giant squid in the Southeastern Pacific were carried out by Japan in the 1980s and commercial operations began in the 1990s, mainly in Peru. After an initial period with catch limits close to 300,000 t in the mid-1990s, catches have been increasing progressively since 1999 to a record high in the region of 1,078,000 t, with 86% of this amount corresponding to territorial waters off Peru and Chile, mainly by local artisanal fleets.

Formally, the giant squid fishery in Peruvian waters has been developing since 1991 by foreign industrial fleets through access agreements. However, in Peru there is evidence of landings of squid by the artisanal fleets since 1964.

Until the end of the 1990s, the fishery was exploited mainly by a combination of Asian industrial fleets that operated under a licensing regime and the Peruvian artisanal fleet. Since 1999, the development of an artisanal fishing fleet that reached its highest peak since 2006 to the present has been observed, with catches exceeding 400 thousand tons and maximums of 533 thousand and 556 thousand tons in 2008 and 2014 respectively. In the years 1996 to 1998, landings decreased drastically which is associated with the events La Niña 1996 and the extraordinary El Niño 1997-1998, which affected the availability and abundance of the resource off the Peruvian coast (IMARPE, 2015). From 2011 on, there was a decline in the industrial fishery for the benefit of the artisanal fleet. Since then and until now it is a fishery conducted exclusively by the artisanal fleet.

The giant squid has historically been the third most captured species among the different species of squid, becoming the main species of cephalopod landed worldwide since 2000, accounting for 24% of all landings of squid (Paredes & de la Puente. 2014). The catches of the Peruvian fleet, practically all within the national waters, are by far the highest in the entire region and have remained well above 150,000 t since the beginning of the 21st century, progressively increasing to a maximum of 615,000 t in 2014.

![Figure 2](image)  
**Figure 2** Annual catches of giant squid in the EEZs and international waters of the Southeastern Pacific for the period 1990-2014 (Source: SPRFMO)
Table 1 Giant squid catches in the Southeastern Pacific region by country (source: SPRFMO).

**Total allowable catch (TAC) and artisanal fleet catches**

At present, the fishery is managed through the “Reglamento de Ordenamiento Pesquero” (ROP) for Giant Squid, which establishes, among others, a total quota for the capture of giant squid in the Peruvian waters. A quota of 500,000 was set for 2012 based on IMARPE recommendations on available biomass. No new quota has been established since then.

![Figure 3 Annual landings of squid in Peru by type of fleet 1991-2015. (Source: PRODUCE 2016)](image)

**Table 2 Catches of giant squid (t) by the artisanal fleet for the period 2011-2015. (Source: PRODUCE 2017)**
Fleets

Although from the regulations standpoint the squid fishery is open to all types of fleet, both industrial and artisanal, in practicality it is carried out exclusively by the artisanal fleet.

Access to the giant squid fishery is available to these vessels which are dedicated to the squid only in a seasonal or opportunistic manner at periods of availability or particular abundance of the resource, with a number of some more specialized vessels that fish for squid throughout the entire year. During the rest of the year these boats are directed to other species of greater commercial value as in the case of Dorado (*Coryphaena hippurus*). It is therefore difficult to estimate the precise number of the size of the fleet since its number may fluctuate, although as indicated above, all active artisanal vessels could potentially participate in the fishery, although there are logistic limitations to overcome for a fishing boat to be able to pursue fishing directed to the giant squid. For example, of the 16,000 boats of the 300 census are "caballitos de totora" which are boats made with reed stems in a traditional way, there are also very small and coastal boats (barges) that would not have the minimum characteristics to fish for giant squid. Taking this into account, it is possible that a further definition of the vessels engaged in the fishery is required to define more precisely the UoA.

According to the definition established by the National Fisheries regulation, artisanal vessels are all those with hold capacities of less than 32.6 m³, 15 meters or less in length, holding a valid fishing permit and using the appropriate gear with predominance of deck manual work.

At the national level, 16 045 artisanal vessels are reported, of which 15 576 are operative (97.08%) and of these, 18.80% (2,928 vessels) claim to use fishing lines during their fishing operations (PRODUCE 2012). These are mostly wooden hull vessels, of relatively recent construction (<15 years) and poorly technically equipped (Paredes & de la Puente, 2014).

Gear and fishing operations

Fishing trips last between 4-6 days. Vessels tend to carry from 4 to 9 crew. The giant squid fishing operation is carried out exclusively with a manual squid jig, known as "muestra potera". It’s been reported that giant squid may be also captured as a bycatch by other gears in use by the artisanal fleet such (cortina, cerco and others), although catches by these gears are considered insignificant (Mariategui *et al.*, 1997). The squid jig is not baited and can be made up from one to up to four crowns depending on the size of the specimen to be fished; it also has a body of plastic fluorescent usually being useful in night fishing as animals are attracted by the light, being easily captured (Lucio *et al.*, 2013).
Normally the fishing is done at night with lamps projecting light from the boat on the water surface, although it seems that nowadays the fishing of the artisanal fleet is also carried out in a diurnal manner (Mariategui, pers.comm). The power of the bulbs used in the artisanal fleet does not reach the 1.5 kW power usually used by industrial fleets.

Areas and fishing seasons

With regards to the spatial-temporal distribution of the fishery, landings do not occur with the same intensity along the littoral ports, nor are they stable throughout the year, so that 98% of the registered catches are landed in only 6 of the 65 landing points where catches of giant squid are reported at national level (Paredes & de la Puente, 2014). The artisanal squid fishery is carried out along the entire Peruvian coast with a greater concentration in two main areas one to the north, between Máncona and Bayovar (4°S and 6°S) and the second in the south, between Atico and Ilo (16 ° S and 17 ° S). The central zone of the coast exhibits less activity of the squid fishery and is carried out mainly by fleets coming from the north (IMARPE 2016). Piura is the region where this fishery is predominant with Paita as the main port of landing (Sueiro & de la Puente 2013), when the fleet operates in the central area of the coast landings take place predominantly in the port of Salaverry.
The monthly analysis of landings for the period 2010-2015 reveals that the highest catches are made during the first half of the year, to decrease in winter and spring (austral), probably due to a combination of resource dispersion and poor weather conditions which restrain fleet the operation (IMARPE 2016) rather than a decrease in abundance.

**Fishing effort trends**

According to PRODUCE, the number of artisanal vessels has increased in recent years, although the number of trips has decreased since 2008 (Sueiro & de la Puente, 2013) and the catch per unit of effort has also increased.
These fluctuations could be related to factors related to the resource distribution, which is found progressively further from the coast, resulting in longer tides trips with greater capture, and also commercial factors, as a result of price improvements in other species caught by the same fleet. In any case, the CPUE data should be interpreted with caution it has not not been standardized to incorporate relative variations in the fishing capacity for different vessels (Mariátegui pers. Com.)

Abundance fluctuations and environmental variability

The functioning of the ecosystem in the Southeast Pacific region and in particular in Peru’s national waters is particularly influenced by "el Niño" and "la Niña" phenomena, which correspond, among other things, with positive and negative sea surface temperature anomalies.

In the case of the giant squid, observations on the catches and availability of the resource suggest that at least the negative temperature anomalies have had a strong impact on the population and on food availability, which would have affected the levels of recruitment and subsequent to its availability, with periods of relocation of fishing effort to other areas (Mariátegui et al. 1997).

There seems to be a positive correlation between the CPUE of the squid fishery and moderate values of thermal anomaly, and on the contrary in the case of severe anomalies (IMARPE 2016). Based on this, it seems relevant that environmental factors would play a determining factor to incorporate into the management system.

Harvest strategy and stock status for the target species (s) under Principle 1.

Principle 1 of the MSC standard is evaluated through 2 components:

Stock status of giant squid exploited by the UoA:

Two stock assessments have been reviewed during the pre-assessment, one of them only considering the catches within Peru’s national waters, carried out by IMARPE (IMARPE 2015) and a second one with a more regional approach taking into account catches in the whole area of the Southeastern Pacific, including catches in international waters, as well as in territorial waters of coastal States (SPRFMO 2017). The results of both assessments suggest that the squid population in the region is not overfished or overexploited and that exploitation rates are well below the productive potential of the species. However, there are many unknowns to be solved about the structure of the stock and its biology in order to assure with a sufficient level of certainty that the hypotheses assumed for the models are correct and if the structure of the stock requires a regional or national approach for its evaluation and management. In addition, scarce information on other relevant factors of the species and the fishery, are limiting factors and would prevent to appropriately characterize the uncertainty about the state of the population.

Harvest strategy:

The UoA is being defined within the national waters of Peru, although the structure of the stock is unknown and it is uncertain whether the management unit should be considered at the regional level. The SPRFMO has general management objectives, but does not currently have an effective management strategy for the species. The available information suggests that the exploitation rates are well below the limit reference points, the capture strategy implemented by Peru in its territorial waters cannot be considered precautionary because it is not designed to adjust according to fluctuations in the state of the stock or fishery. The instruments and the harvest strategy, although defined in the regulations, are not enforced
or are limited in its scope (quota, access procedures to the fishery, limitation of capacity increase). The harvest strategy is not being monitored nor its operation evaluated. The MSC requires the existence of established and well-defined HCRs, which would reduce exploitation rates if there is evidence of an increase in the risk levels of impacts from the fishery. These are implemented neither through Peru’s management nor in the SPRFMO.

Monitoring is not considered sufficient to support the capture strategy: The available information on the target species is limited and uncertain, abundance and fluctuations of the resource are greatly influenced by environmental factors which are not incorporated into the management system; the informality levels of the artisanal fleet impede the availability of information to exercise proper management. The unknowns about the structure of the stock and which methodologies and models would be most appropriate to evaluate the species (SPRFMO 2017) prevent ensuring that the evaluations carried out by IMARPE and SPRFMO provide an adequate representation of the stock status for management purposes.

**Principle 2: Impacts of the fishery on the greater ecosystem and its different components.**

**Main, primary and secondary species**

Main species are all those that are not the target species and account for more than 5% of the catch (up to 2% if it’s a low resilience species). These determine the score for a pre-assessment when evaluated up to level SG80. Primary and secondary, are defined as those species that are captured together with the target species and not evaluated as part of principle 1. This includes the species used as bait.

The gear used during the fishing operation, the manual squid jig, is an extremely selective gear and is used only for the catch of the giant squid. The gear is not baited, further reducing the possibility of bycatch. All the references reviewed during the pre-assessment confirm this high selectivity and the non-existence of non-target species. Adequate monitoring will be required to confirm this beyond reasonable doubt. However, the information available on the fishery, poorly monitored, is considered insufficient for assessing the risk it poses to other non-target species and implementation of measures for primary or secondary species.

**ETP Species**

The Peruvian fisheries law has specific provisions for ETP species that implicitly establish limitations on impacts, incorporating those species listed by IUCN. The Peruvian Legislation endorses international agreements for the protection of migratory species.

The incidence on ETP species seems to be negligible; due to the highly selective nature of the art and that the operation is manual. However, more information will be required to confirm it based on monitoring data since there is ample information that points to the presence of seabirds and mammals during fishing operations, which is a risk factor to consider.

As previously indicated, it is estimated that the information available on the fishery, poorly monitored, is insufficient to evaluate the risk posed by the fishery and the implementation of measures for primary or secondary species. In addition, the fishery is required to review measures that can mitigate the impact on ETP species if necessary.

**Hábitats**

Fishing gear does not come into contact with the bottom during fishing operations and its impact is considered null, although the considerable size of the fleet implies that the impacts
could be significant in case of frequent loss of fishing gear, which are not currently monitored and quantified.

**Ecosystem**

Interactions between fisheries and the ecosystem operate in two directions: fisheries can induce important and persistent changes in ecosystems, including the harmful effects of fishing gear, bycatch of threatened and protected species, overexploitation of target species and the impact on fisheries, predators, as well as in the prey of the species in question. On the other hand, climate change and anthropogenic factors in turn induce changes in ecosystems, in turn affecting the fisheries that take place in them.

In addition to assessing the impact of the fishery on non-target species and ETP, the MSC standard requires assessment of the direct impact of the fishery on habitats and the indirect impact on the ecosystem.

In the case of the fishery under assessment, the large volume of catches suggests that a better understanding of the role of the species in the ecosystem is necessary and that currently available information is not sufficient to evaluate the potential impact of the fishery on it. Likewise, the scarce information makes it unlikely that the existing measures to manage any impacts from the fishery in it would be effective.

**Principle 3: Fisheries management system**

**Governance and Management System**

The MSC requires that fishery governance and the fishery-specific management system have long-term precautionary objectives, include the ecosystem approach and be consistent with the MSC’s principles 1 and 2. Likewise, governance must incorporate systems for conflict resolution, decision making and revisions of the management system, among others.

In Peru, there is a fisheries legislation established and fundamentally created around the anchoveta fishery (*Engraulis ringens*), due to its greater economic importance and the significant volume of the fishery.

The general legal instrument of reference is The Fishing Law in Peru Decree Law No. 259771, which aims to regulate fisheries and aquaculture, promoting and ensuring sustainable development and the responsible use of resources.

The general fishery management and policy in Peru depends upon the Ministry of Production PRODUCE2 and falls more specifically under the Vice Ministry of Fisheries and Aquaculture (DVPA), which is responsible for fisheries management, issuing legal decisions, and monitoring and control activities.

In addition to that, the role of PRODUCE is assisted by three public agencies in charge of different aspects of research, food quality and fisheries health:

- Institute of the Sea of Peru, IMARPE3
- National Fisheries Development Fund, FONDEPES4
- Technological Institute of Production, ITP5

1 [http://www2.produce.gob.pe/pesqueria/publicaciones/otros/dl25977.pdf](http://www2.produce.gob.pe/pesqueria/publicaciones/otros/dl25977.pdf)
2 [http://www.produce.gob.pe/](http://www.produce.gob.pe/)
3 [http://www.imarpe.gob.pe/imarpe/](http://www.imarpe.gob.pe/imarpe/)
4 [https://www.fondepes.gob.pe/](https://www.fondepes.gob.pe/)
5 [http://www.itp.gob.pe/](http://www.itp.gob.pe/)
Of these three, IMARPE is the main fisheries research agency in the country and is responsible for advising the authorities and ministries interested in stock assessments, advising on sustainable exploitation rates, quotas, and investigating the specific impacts of each of the different fisheries.

Fishery-specific management system

This section reviews, at a more particular fishery level, the management instruments that correspond specifically to the species and fleets analyzed, with the legal and management provisions that are specific to the activity.

Within the framework of international cooperation, Peru is a member of the SPRFMO. This organization includes the giant squid among the species under its management, although its competencies do not extend within the respective EEZs of the coastal countries, except in cases in which there is an explicit agreement from the country to transpose them. The work of the SPRFMO is the establishment, adoption and implementation of conservation and management measures for the fishing resources of the area by its Members, as well as monitoring compliance the implementation of conservation and management regulations.

The objective of the Convention is to ensure, through the implementation of the ecosystem and precautionary approach, the conservation and sustainable management of fisheries resources and the safeguarding of their ecosystems in the long term. These objectives are general and are not explicitly implemented for giant squid, for which the SPRFMO does not currently has measures of any kind.

These considerations are relevant under the hypothesis that the stock of giant squid should be considered at the regional level, although the UoA includes only activities in the waters of Peru.

At the fishery specific level, the applicable regulation is the ROP. In Peru, the Supreme Decree 014-2011 for the giant squid resource articulates the management objectives related to the giant squid fishery, which are constituted by:

1- Regulate access to the fishing operations of national and foreign fishing vessels to the giant squid resource.

2- Set the basis for a giant squid fishery through the development of a specialized national fleet and the corresponding optimization of the industry for direct human consumption.

3- The rational and sustainable use of the giant squid resource, by virtue of the analysis of the biological and population characteristics of the resource and the social-economic impact on the stakeholders involved in the resource fishery.

Other legal provisions with implications for this fishery are the 2014\(^{6}\) RM for the formalization of small-scale fishing and the successive temporary derogations for increases in artisanal fleet of sizes greater than 10m\(^{7}\).

Preassessment


Pre-assessment methodologies

This report was produced using the MSC certification requirements v2.0 and the MSC’s pre-assessment report template.

Summary of site visits and meetings held during the pre-evaluation

Several meetings were held with various fishery stakeholders. These were organized and facilitated by WWF Peru during a two-day visit to complete the information gaps and explore and discuss the areas where there were information gaps. Nicolas Rovegno, head of the WWF Peru Marine Program facilitated each of the meetings described in the Table.

The following meetings were held:

<table>
<thead>
<tr>
<th>October 30th</th>
<th>October 30st</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reunión de coordinación en WWF - Trinidad Morán 853, Lince</td>
<td>Henry Quiroz en WWF</td>
</tr>
<tr>
<td>Alfonso Miranda en Balthazar de Canaval y Moreyra 308</td>
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<tr>
<td>Visita puerto de Ancon</td>
<td>Juan Carlos Sueiro</td>
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<td>Av. Canaval Moreyra 425, San Isidro 15047, Perú</td>
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<tr>
<td>Javier Gaviola (Mariategui, Yamashiro, Arguelles) En IMARPE</td>
<td>Jorge Castillo, Aaron Canepa y Veronica Caballero</td>
</tr>
<tr>
<td></td>
<td>en 10mo piso - sede Barlovento - PRODUCE</td>
</tr>
<tr>
<td></td>
<td>José Romero Glenny</td>
</tr>
<tr>
<td></td>
<td>en Pablo Carríqury 222 - San Isidro - PRODUCE</td>
</tr>
</tbody>
</table>

Table 3 Site visit

Stakeholders to be consulted during a full assessment

Should the fishery proceed towards a full MSC assessment, a more extensive consultation including a more complete list of interested parties will be necessary. In addition, the process shall ensure that all parties have the opportunity to share their contributions and observations to the process and all concerns and legitimate interests are taken into account in the preparation for a final report.

A tentative list of potentially interested parties whose contribution is considered relevant at during a full evaluation is provided below. This list is only meant to provide guidance and the client must identify any other entity or groups whose participation may be relevant in the process. Likewise, the client shall inform all the parties identified within the fishery and encourage their participation.

<table>
<thead>
<tr>
<th>Fishery sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collectives of fishermen and industry professional organizations.</td>
</tr>
<tr>
<td>Ship-owners. Retailers</td>
</tr>
</tbody>
</table>
Representatives from PRODUCE and from various regional and local administrations linked with the management of the fishery.

Scientists

IMARPE

NGOs

Oceana, WWF, others

Traceability (issues relevant to the Chain of Custody certification)

Eligibility of fishery products to enter into other Chain of Custody

It should be noted that there is a risk that giant squid landed in Peru by industrial vessels operating outside the framework of the UoA could be incorporated as a product certified by MSC.

In the same way, although in very small volumes, there is squid that is captured by other gears employed by the same artisanal fleet. A subsequent evaluation of the Chain of Custody would have to analyze these risks in detail.

Fishery pre-assessment

Applicability of the default assessment tree

The default assessment tree, detailed in FCR v2, has been used to evaluate and score the fishery. No review of the evaluation tree is required by default.

Expectations regarding the use of the risk-based assessment framework (RBF)

The level of risk associated with the ecosystem as a result of the fishery under analysis, as well as its potential indirect effects, could be estimated through a SICA (Scale Intensity Consequence Analysis) analysis. SICA is an expert analysis that should be conducted in collaboration and consultations with the extractive sector. The score is estimated through the collection of qualitative information and, therefore, the participation of a wide range of stakeholders is of particular relevance in the evaluation of SICA.

Preassessment results

Summary of likely scores by IC

<table>
<thead>
<tr>
<th>Principle</th>
<th>Component</th>
<th>Performance Indicator</th>
<th>Likely Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outcome</td>
<td>1.1.1 Stock status</td>
<td>≥80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.1.2 Stock rebuilding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>1.2.1 Harvest Strategy</td>
<td>60-79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.2.2 Harvest control rules and tools</td>
<td>&lt;60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.2.3 Information and monitoring</td>
<td>&lt;60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.2.4 Assessment of stock status</td>
<td>60-79</td>
</tr>
<tr>
<td>2</td>
<td>Primary species</td>
<td>2.1.1 Outcome</td>
<td>≥80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1.2 Management</td>
<td>≥80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1.3 Information</td>
<td>≥80</td>
</tr>
<tr>
<td></td>
<td>Secondary species</td>
<td>2.2.1 Outcome</td>
<td>≥80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2.2 Management</td>
<td>≥80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2.3 Information</td>
<td>&lt;60</td>
</tr>
<tr>
<td></td>
<td>ETP species</td>
<td>2.3.1 Outcome</td>
<td>≥80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3.2 Management</td>
<td>&lt;60</td>
</tr>
<tr>
<td>Section</td>
<td>Outcome</td>
<td>Management</td>
<td>Information</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------</td>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Habitats</td>
<td>≥80</td>
<td>≥80</td>
<td>60-79</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>60-79</td>
<td>60-79</td>
<td>60-79</td>
</tr>
<tr>
<td>Governance and Policy</td>
<td>60-79</td>
<td>60-79</td>
<td>60-79</td>
</tr>
<tr>
<td>Fishery specific system</td>
<td>&lt;60</td>
<td>&lt;60</td>
<td>&lt;60</td>
</tr>
</tbody>
</table>

| Total number of PIs equal to or greater than 80 | 9 |
| Total number of PIs 60-79              | 10 |
| Total number of PIs less than 60        | 8 |

References


trophic ecology in the northern Humboldt Current System. PloS one, 9(1), e85919.


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Argüelles, J., Csirke,J., Mariategui, L., Castillo, R., (2017). Distribution, size composition, possible stock structure and the assessment of jumbo flying squid (Dosidicus gigas) off Peru. SPRFMO.


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Mariátegui, L & Taipe, A. 1996. Distribución y abundancia relativa del calamar gigante (Dosidicus gigas) en el Perú. Informe Progresivo Instituto del Mar del Perú, 34:3-28


**Detailed preassessment tables**

**Principle 1**

<table>
<thead>
<tr>
<th>Component</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 1.1.1- Stock status</td>
<td>The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing.</td>
</tr>
</tbody>
</table>
Scoring
issues

(a) Stock status relative to recruitment impairment

SG60 SG80 SG100

It is likely that the stock is above the point where recruitment would be impaired (PRI).

It is highly likely that the stock is above the PRI.

There is a high degree of certainty that the stock is above PRI.

(b) Stock status in relation to achievement of Maximum Sustainable Yield (MSY).

The stock is at or fluctuating around a level consistent with MSY.

There is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.

Justification/Rationale

The UoA has been defined as the artisanal (as defined by the Peruvian regulations) giant squid fishery employing manual squid jiggers, within the waters off Peru. Although there is an assessment carried out for this species based on the resource population in Peruvian waters (IMARPE 2015), there is still uncertainty about the structure of the stock (Sánchez, 2016) and whether it is composed of a single Southeast Pacific unit or whether the populations is divided into a series of genetically similar subunits, although independent at the level of their population dynamics and thus for management. In summary, it is necessary to determine if the biological unit of the species overlaps in distribution with the administrative unit of management as defined by the UoA.

Under the hypothesis that the giant squid stock distribution extends beyond Peru’s exclusive economic zone to international waters and into the EEZs of other countries in the region, a stock assessment at the regional level that incorporates the international context of the fishery is required. The SPRFMO (www.spfrmo.int) is the organization that manages the squid resource in the international waters of the Southeast Pacific Ocean, including the giant squid (Dosidicus gigas). During the SPRFMOs scientific committee in 2017, an assessment for the giant squid in the Southeast Pacific Ocean was presented under the hypothesis of a single stock. The results suggest that the squid population in the region is not overfished nor overexploited, with a BMSY of 5.19 * 10^6, an MSY of 3.37 * 10^6 and an FMSY of 0.65. The evaluation estimates that the probability of exceeding the MSY in 2018 is approximately 0.036. On the other hand, results for the assessment of the stock carried out by IMARPE in 2015, using data for the 200 jurisdictional miles of Peru; provide an estimated MSY of 1.4 million tons, with an annual FMSY of 0.663. The relative values estimated with respect to reference levels of both biomass and fishing mortality are B/B0 = 0.812 (the stock is considered not overexploited with values above B / B0 = 0.5) and F/FMSY = 0.525.

In view of the results of these two assessments, it is considered that there is a high level of certainty that the population is above the levels at which the recruitment would be impaired and the stock has fluctuated well above the estimated MSYs in recent years.

However, it should be taken into account that due to the biological characteristics (the spawning stock is composed by a single age class), the dynamics of the squid population can be significantly influenced by environmental variability, even to a greater degree than by fishing mortality itself.

RBF Required? (✓/✗) NO Likely Scoring Level (pass/pass with condition/fail) >80
<table>
<thead>
<tr>
<th>Component</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 1.1.2 Stock Rebuilding</td>
<td>Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe.</td>
</tr>
</tbody>
</table>

**Scoring issues**

<table>
<thead>
<tr>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
</table>

(a) Rebuilding timeframes

A rebuilding timeframe is specified for the stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.  

There is evidence that the rebuilding strategies are rebuilding stocks, or it is likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.  

There is strong evidence that the rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.

(b) Rebuilding evaluation

Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.

Justification/Rationale

Under the giant squid population current it is not considered that the stock requires rebuilding and therefore this indicator is not scored.

<table>
<thead>
<tr>
<th>RBF Required? (✓/✗/✗)</th>
<th>NO</th>
<th>Likely Scoring Level (pass/pass with condition/fail)</th>
<th>N/A</th>
</tr>
</thead>
</table>

**Component**

<table>
<thead>
<tr>
<th>Harvest strategy (management)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 1.2.1 Harvest strategy</td>
</tr>
</tbody>
</table>

There is a robust and precautionary harvest strategy in place

Scoring issues

<table>
<thead>
<tr>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
</table>

(a) Harvest strategy design

The harvest strategy is expected to achieve stock management objectives reflected in PI 1.1.1 SG80.  

The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives reflected in PI 1.1.1 SG80.  

The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in PI 1.1.1 SG80.

(b) Harvest strategy

The harvest strategy is likely to work based on  

The harvest strategy may not have been fully tested  

The performance of the harvest strategy has been
<table>
<thead>
<tr>
<th>Component</th>
<th>Harvest strategy (management)</th>
</tr>
</thead>
<tbody>
<tr>
<td>evaluation</td>
<td>prior experience or plausible argument. but evidence exists that it is achieving its objectives. fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.</td>
</tr>
<tr>
<td>(c) Harvest strategy monitoring</td>
<td>Monitoring is in place that is expected to determine whether the harvest strategy is working.</td>
</tr>
<tr>
<td>(d) Harvest strategy review</td>
<td>The harvest strategy is periodically reviewed and improved as necessary.</td>
</tr>
<tr>
<td>(e) Shark finning</td>
<td>It is likely that shark finning is not taking place. It is highly likely that shark finning is not taking place. There is a high degree of certainty that shark finning is not taking place.</td>
</tr>
<tr>
<td>(f) Review of alternative measures</td>
<td>There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock. There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate. There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.</td>
</tr>
</tbody>
</table>

**Justification/Rationale**

The South Pacific Regional Fisheries Organization (SPRFMO), is the body in charge for the management and conservation of fishery resources in the region, including among them the giant squid fishery that takes place in international waters. This inclUoAs monitoring compliance and monitoring the implementation of conservation and management regulations.

Currently, the SPRFMO does not implement management measures for the giant squid fishery in international waters; however some management measures exist for countries in the region, which are applicable in their respective EEZ. For Peru, the management provisions applicable to the squid resource are contained in the ROP DS-014-2011-PRODUCE. The management measures provided for the national fleet by the management scheme consists on a total allowable catch (TAC), although no quota has been established since 2012. Requirements exist to access the fishery through fishing permits schemes for artisanal and industrial fleets, as well as for domestic and foreign. There is a regime of fishing permits for all vessels and a procedure to access the fishery. There is also the possibility for fleet capacity increases for industrial Peruvian and foreign fleet’s from which the artisanal fleets are exempted. In 2012, all increases in capacity were derogated The 80-mile strip from the coast is restricted to operations of the artisanal fleet. For foreign vessels, the rule establishes that in order to access the fishery there should surplus from the TAC not exploited by the national fleets TAC is determined annually by IMARPE based on scientific considerations of the stock. Although all these elements exist formally, it cannot be considered that this harvest strategy is effectively implemented as such since a TAC has not been enforced since 2012.

With the limited information available on the structure and biology of the giant squid stock, it is not possible to determine if the available harvest strategy based on Peruvian legislation covers the entire biological unit or should be implemented taking into account the international context of the fishery.
Currently, SPRFMO does not have any harvest strategy for the giant squid. Due to the fact that exploitation levels are well below the limit reference points, Peru’s harvest strategy in its territorial waters seems to be sufficient to meet the objectives of IC 1.1.1 up to SG80 levels; however, it cannot be considered that this strategy is responsive to the state of the stock.

The harvest strategy applied in Peruvian national waters is expected to work based on previous experience, assuming that fishing mortality levels are much lower than the species biological limits, although taking into account that the TAC is not implemented, it is very unlikely that this strategy can achieve its objectives or if measures taking into account the international context of the fishery are required.

Appropriate monitoring of the harvest strategy is not taking place nor is it being reviewed periodically since its adoption in 2011.

| Likely Scoring Level (pass/pass with condition/fail) | 60-79 |

### Component | Harvest strategy (management)
--- | ---
Currently, SPRFMO does not have any harvest strategy for the giant squid. Due to the fact that exploitation levels are well below the limit reference points, Peru’s harvest strategy in its territorial waters seems to be sufficient to meet the objectives of IC 1.1.1 up to SG80 levels; however, it cannot be considered that this strategy is responsive to the state of the stock.

The harvest strategy applied in Peruvian national waters is expected to work based on previous experience, assuming that fishing mortality levels are much lower than the species biological limits, although taking into account that the TAC is not implemented, it is very unlikely that this strategy can achieve its objectives or if measures taking into account the international context of the fishery are required.

Appropriate monitoring of the harvest strategy is not taking place nor is it being reviewed periodically since its adoption in 2011.

### Component | Harvest strategy
--- | ---
PI 1.2.2 Harvest control rules and tools | There are well defined and effective harvest control rules (HCRs) in place.

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) HCRs design and application</td>
<td>Generally understood HCRs are in place or available that is expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.</td>
<td>Well defined HCRs are in place that ensure that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.</td>
<td>The HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time.</td>
</tr>
<tr>
<td>(b) HCRs robustness to uncertainty</td>
<td>The HCRs are likely to be robust to the main uncertainties.</td>
<td>The HCRs take account of a wide range of uncertainties including the ecological role of the stock, and there is evidence that the HCRs are robust to the main uncertainties.</td>
<td></td>
</tr>
<tr>
<td>(c) HCRs evaluation</td>
<td>There is some evidence that tools used or available to implement HCRs are appropriate and effective in controlling exploitation.</td>
<td>Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.</td>
<td>Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs.</td>
</tr>
</tbody>
</table>

### Justification/Rationale
Currently, the fishery management scheme does not incorporate a set of harvest control rules (HCR)
which can reduce exploitation levels on the resource and adopt actions in the event that the stock approaches limit reference points or there exists increased risk for overexploitation or overfishing. For species that the stock has never been seen reduced below the MSY, which is the case for the giant squid, the MSC standard consider these as a special case and can be assumed that HCRs are available but not implemented (MSC SA 2.5.2), however this requires a robust stock assessment and projections, which are not available. This possibility could be explored in case of proceeding towards a full evaluation.

The only existing measure is the total quota adopted by IMARPE in 2012 for Peruvian waters. This measure is not reviewed annually and there are no mechanisms to monitor whether the quota is reached or exceeded by the fishery participating vessels. On the other hand, it is not considered that there are examples of HCR in other fisheries that may be available for the squid fishery if necessary, so this indicator would not reach the minimum level required by MSC.

### Likely Scoring Level (pass/pass with condition/fail)

<table>
<thead>
<tr>
<th>Component</th>
<th>Harvest strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 1.2.3 Information / monitoring</td>
<td>Relevant information is collected to support the harvest strategy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Range of information</td>
<td>Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.</td>
<td>Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy.</td>
<td>A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly relevant to the current harvest strategy, is available.</td>
</tr>
<tr>
<td>(b) Monitoring</td>
<td>Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.</td>
<td>Stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.</td>
<td>All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.</td>
</tr>
<tr>
<td>(c) Comprehensiveness of information</td>
<td>There is good information on all other fishery removals from the stock.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Some relevant information on the biology of the stock and on the composition of the fleet is available; however, it is incomplete and is not considered sufficient to support the harvest strategy.

The information available on fleet composition is deficient and there are important uncertainties and gaps about the number of artisanal vessels in operation. It is estimated that 83.4% of artisanal vessels have valid registration certificates and only 49.1% of vessels hold fishing permits. Up to 16.6% of the artisanal fleet for giant squid is composed of unregistered vessels and 50.9% of the fleet catches that are not taken into account and incorporated to the statistics (Carlos E. Paredes, 2014).

The biology of the species remains with significant unknowns. The stock structure is not defined, therefore unclear if management of the stock should be subject an international framework (under a scenario of management of a single stock in the Southeast Pacific region) or if stock subunits exist that allow for separate management units (e.g. the waters off Peru).

The abundance of the resource is greatly influenced by environmental factors, even to a greater extent than fishing mortality. The relationship between these factors and the population dynamics of giant squid are not sufficiently known to support a robust and precautionary management strategy.

Lastly monitoring for the artisanal fishery in the waters of Peru is insufficient. A large number of artisanal fleets are operating without proper registration and their landings not being properly monitored. It also cannot be assumed that good information exists on catches by other fisheries (in the international context).

### Likely Scoring Level (pass/pass with condition/fail)

<table>
<thead>
<tr>
<th>Component</th>
<th>Harvest strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 1.2.4 Assessment of stock status</td>
<td>There is an adequate assessment of the stock status.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Appropriateness of assessment to stock under consideration</td>
<td>The assessment is appropriate for the stock and for the harvest control rule.</td>
<td></td>
<td>The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.</td>
</tr>
<tr>
<td>(b) Assessment approach</td>
<td>The assessment estimates stock status relative to generic reference points appropriate to the species category.</td>
<td>The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.</td>
<td></td>
</tr>
<tr>
<td>(c) Uncertainty in the assessment</td>
<td>The assessment identifies major sources of uncertainty.</td>
<td>The assessment takes uncertainty into account.</td>
<td>The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.</td>
</tr>
</tbody>
</table>
### Harvest Strategy

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(d) Evaluation of assessment</strong></td>
<td>The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.</td>
</tr>
<tr>
<td><strong>(e) Peer review of assessment</strong></td>
<td>The assessment of stock status is subject to peer review.</td>
</tr>
<tr>
<td></td>
<td>The assessment has been <strong>internally and externally</strong> peer reviewed.</td>
</tr>
</tbody>
</table>

### Justification/Rationale

MSC requirements for stock assessment of target species establish that these should be MSY based, including management reference and limit points (below which recruitment would be impaired).


Setting aside any reservations on whether the models and methodology employed are the most appropriate (SPRFMO 2017) it can be considered that production models are appropriate to assess the giant squid stock and inform the harvest strategy. The models employed provide reference points that can be estimated and are appropriate. However, it is not apparent that the uncertainty related to the input data is properly taken into account (CPUE, total catches, biology, etc.).

In 2014 FAO carried out a technical audit on IMARPEs work, it was concluded that the methodologies used for the assessment are appropriate. The audit also provides a series of recommendations which are relevant and that should be applied to all species for which IMARPE develops management recommendations, in this case, the giant squid.

An analysis of the uncertainty associated with the model input data and assumptions (including these related to direct estimates of biomass for abundance index) and the incorporation of this uncertainty into the assessment process would be required to meet the unconditional pass in this indicator.

| Likely Scoring Level (pass/pass with condition/fail) | 60-79 |

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.1.1 Outcome Status</td>
<td>The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI.</td>
</tr>
<tr>
<td>Scoring issues</td>
<td></td>
</tr>
<tr>
<td>(a) Main primary species stock status</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Main primary species are <strong>likely</strong> to be above the PRI</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>If the species is below the PRI, the UoA has measures in place that are <strong>expected</strong> to ensure that the UoA does not hinder recovery and rebuilding</td>
</tr>
<tr>
<td></td>
<td>Main primary species are <strong>highly likely</strong> to be above the PRI</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>If the species is below the PRI, there is either <strong>evidence of recovery</strong> or a demonstrably effective strategy in place between all MSC UoAs which categorise this species as main, to ensure that they collectively do not hinder recovery and rebuilding.</td>
</tr>
<tr>
<td></td>
<td>There is a <strong>high degree of certainty</strong> that main primary species are above PRI and are fluctuating around a level consistent with MSY.</td>
</tr>
<tr>
<td>(b) Minor primary species stock status</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor primary species are highly likely to be above the PRI.</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species.</td>
</tr>
<tr>
<td>Justification/Rationale</td>
<td></td>
</tr>
</tbody>
</table>
Based on available information, the UoA does not include primary, main or minor species.

Information based on catch composition for the industrial fleet, with better historical monitoring levels, was used as a reference. The only incidental species caught in association with the giant squid fishery is the common squid (*Loligo gahi*), with catches below 1%. There are no management measures based on reference points for this species. Based on information collected during giant squid research cruises on the artisanal fleet (IMARPE 1995, IMARPE 1998, Valles-Meza, 2013), fishing operations using manual squid jigs are virtually monospecific, very small percentages, of approximately 0.7% of squid (*Loligo gahi*) were caught in association with the giant squid. During the technical visit, it was confirmed that catches of common squid are due to the use of manual squid jiggers of sizes much lower than these currently used, which are much bigger and only catch giant squid of significantly larger size than the common squid (Mariategui pers.)

It can be assumed that the artisanal giant squid fishery using manual squid jiggers does not contain primary, main or minor species (IMARPE 1998, 1999, 2000, 2015). Reports from observers on board industrial fishing vessels (SPRFMO 2017) report incidental catches due to entanglement with the lines, although the incidence is scarce. The possibility of something similar happening in the artisanal fishery is practically null due to the manual nature of the operation.

However, there is a lack of detailed information on the specific composition of catches for the UoA so it cannot be confirmed with a high degree of probability the absence of primary species, main or minor, among the catches. Specific monitoring data and detailed catch composition for the fleet under analysis will be required to confirm the levels of selectivity and the existence and eventual composition of species under principle 2 in case of proceeding towards a complete evaluation.

According to the MSC standard, if the fishery does not capture primary species, its impact is considered null on these. If verified, this IC it would reach SG100. On the other hand, it is necessary to take into account that the artisanal fleet is also catching giant squid while fishing for other species with a different gear (driftnets, purse seines and others). These gears might exhibit a significant impact on other species (IMARPE 1995). However, these catches are considered incidental and negligible. During the visit technique it was explained that such gears are not used simultaneously. It is important to verify if both fishing gears coexist during the same trip in order to differentiate the two fishing modes as two independent UoA and take into account the implications of the upcoming MSC standard updates regarding the definition of the UoA and the traceability implications for the product.

<table>
<thead>
<tr>
<th>RBF required? (✓/×)</th>
<th>NO</th>
<th>Likely Scoring Level (pass/pass with condition/fail)</th>
<th>≥80</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.1.2 Management strategy</td>
<td>There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species; and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.</td>
</tr>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
<tr>
<td>(a) Management strategy in place</td>
<td>There are measures in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to be above the PRI.</td>
</tr>
<tr>
<td>Component</td>
<td>Primary Species</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>(b) Management strategy evaluation</strong></td>
<td>The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/species). There is some <strong>objective basis for confidence</strong> that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.</td>
</tr>
<tr>
<td><strong>(c) Management strategy implementation</strong></td>
<td>There is some <strong>evidence</strong> that the measures/partial strategy is being <strong>implemented successfully</strong>.</td>
</tr>
<tr>
<td><strong>(d) Shark finning</strong></td>
<td>It is likely that shark finning is not taking place.</td>
</tr>
<tr>
<td></td>
<td>It is highly likely that shark finning is not taking place.</td>
</tr>
<tr>
<td><strong>(e) Review of alternative measures</strong></td>
<td>There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species</td>
</tr>
<tr>
<td></td>
<td>There is a <strong>regular review</strong> of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.</td>
</tr>
<tr>
<td></td>
<td>There is a <strong>biennial review</strong> of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.</td>
</tr>
</tbody>
</table>

**Justification/Rationale**

The MSC standard requires this indicator to be evaluated even when there are no primary species among the UoA catches. For the artisanal squid fishery, aspects a, b and c are only evaluated at the SG100 level since the lower levels are only evaluated "if necessary" (when there are primary species among the catches).

The artisanal squid fishery is not considered to have a strategy for the management of species under principle 2. The regulatory provisions for the artisanal fleet are minimal and only include requirements for obtaining a license to access the fishery and a global quota for giant squid in Peruvian waters. However, the use of the manual squid jig as the sole gear can be considered as an operational measure in itself due to the high specificity and selectivity of the art. In the event of proceeding towards a complete evaluation, a traceability analysis of the fishery might determine the potential risk that product from vessels not using the right gear could be mistaken as part of the UoA. The measure is reasonably expected to be effective, based on the general experience of the high selectivity and characteristics of the fishing gear. However, under the current situation, this is not considered sufficient or appropriate to constitute a partial strategy to manage the impacts on the components of principle 2, as there is no appropriate information to support it or modify it if necessary.

Due to the lack of specific UoA monitoring, there is not enough quantitative and qualitative information on the level of fisher impact upon which to make considerations for supporting of a partial strategy, to evaluate alternative strategies if needed, or to evaluate compliance levels against the current regulations.

The squid fishery does not catch sharks, so the "d" aspect is not evaluated. The artisanal squid fishery does not include primary species, nor does it discard, so there are no unwanted catches of primary
species and "e" aspect does not require evaluation. This indicator would therefore meet the unconditional pass.

**Likely Scoring Level (pass/pass with condition/fail)** ≥80

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.1.3 Information</td>
<td>Information on the nature and amount of primary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species.</td>
</tr>
</tbody>
</table>

### Scoring issues

<table>
<thead>
<tr>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qualitative information is adequate to estimate the impact of the UoA on the main primary species with respect to status.</td>
<td>Some quantitative information is available and is adequate to assess the impact of the UoA on the main primary species with respect to status.</td>
</tr>
<tr>
<td>Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.</td>
<td>If RBF is used to score PI 2.1.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.</td>
<td>OR</td>
</tr>
<tr>
<td>OR</td>
<td>OR</td>
<td>OR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(b) Information adequacy for assessment of impact on minor primary species</th>
<th>Information is adequate to support measures to manage main primary species.</th>
<th>Information is adequate to support a partial strategy to manage main primary species.</th>
<th>Information is adequate to support a strategy to manage all primary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.</td>
<td>Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.</td>
<td>Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.</td>
<td></td>
</tr>
</tbody>
</table>

### Justification/Rationale

Some qualitative and quantitative information related to the species under P2 is available for the fishery (IMARPE 1995, IMARPE 1998, Valles-Meza, 2013) although taking into account the volume of the fishery and the size of the fleet; available information should be more systematic and robust.

The squid fishery does not include main species (those that exceed 5% of the total catch), so this
indicator is only evaluated at the SG100 level. On the other hand, the MSC standard requires the existence of quantitative and qualitative information that would eventually allow determining the impact of the fishery on species under P2 and respect to their biological levels. The current levels of monitoring on the UoA are insufficient to comply with the SG100 level of this aspect since there is no fleet operational information, fishing logs are not completed, landings are not systematically monitored and sampled, fleet register to keep track of the number of vessels that are operating in a given moment and their levels of effort is nonexistent.

Current levels of monitoring on the UoA are insufficient to support measures for management of main secondary species. Fleet operations are not monitored, fishing logs are not completed, landings are not systematically monitored and sampled and fleet register to keep track of the number of vessels that are operating in a given moment and their levels of effort is nonexistent.

In the same way, the information is insufficient to support measures or a management strategy for the species under P2.

| Likely Scoring Level (pass/pass with condition/fail) | ≥80 |

### Secondary Species

<table>
<thead>
<tr>
<th>PI 2.2.1 Outcome Status</th>
<th>Secondary Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biologically based limit.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Main secondary species stock status</td>
<td>Main secondary species are likely to be above biologically based limits. OR If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding.</td>
<td>Main secondary species are highly likely to be above biologically based limits. OR If below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are considerable, there is either evidence of recovery or a demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species, to ensure that they collectively do not hinder recovery and rebuilding.</td>
<td>There is a high degree of certainty that main secondary species are above biologically based limits.</td>
</tr>
<tr>
<td>Component</td>
<td>Secondary Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Minor secondary species stock status</td>
<td>Minor secondary species are highly likely to be above biologically based limits. OR If below biologically based limits there is evidence that the UoA does not hinder the recovery and rebuilding of minor secondary species.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Justification/Rationale**

Based on the available information, the UoA does not include secondary, main or minor species.

Information based on catch composition for the industrial fleet, with better historical monitoring levels, was used as a reference. The only incidental species caught in association with the giant squid fishery is the common squid (*Loligo gahi*), with catches below 1%. There are no management measures based on reference points for this species. Based on information collected during giant squid research cruises on the artisanal fleet (IMARPE 1995, IMARPE 1998, Valles-Meza, 2013), fishing operations using manual squid jigs are virtually monospecific; very small percentages, of approximately 0.7% of *squid* (*Loligo gahi*) were caught in association with the giant squid. During the technical visit, it was confirmed that catches of common squid are due to the use of manual squid jiggers of sizes much lower than these currently used, which are much bigger and only catch giant squid of significantly larger size than the common squid (Mariategui pers.).

It can be assumed that the artisanal giant squid fishery using manual squid jiggers does not contain secondary, main or minor species (IMARPE 1998, 1999, 2000, 2015). Reports from observers on board industrial fishing vessels (SPRFMO 2017) report incidental catches due to entanglement with the lines, although the incidence is scarce. The possibility of something similar happening in the artisanal fishery is practically null due to the manual nature of the operation.

However, there is information¹⁰ pointing out to the existence of some indirect mortality of seabirds (*Oceanodroma spp*) as a consequence of the use of lamps to attract squid. Mortality would occur as a result to birds colliding against the vessel. Due to the large scale of squid fishing and the high degree of spatial overlap between the distributions of seabird feeding and fishing fleets, more information is needed based on monitoring fishing operations to better understand its nature and the degree of impact of seabird's interactions with the artisanal squid fishery in Peru. If confirmed, these species would be classified as "main secondary" since they fall outside the scope of the MSC and are not ETPs. At present the state of their populations is not known.

A PSA analysis in relation to the artisanal fishery is available for these species (Rovegno, 2017). Results reveal that the risk represented by the fishery for these species is low, and the associated score according to the MSC would be unconditional pass (Annex 1).

However, there is a lack of detailed information on the specific composition of catches for the UoA so it cannot be confirmed with a high degree of probability the absence of other secondary species, main or minor, among the catches. Specific monitoring data and detailed catch composition for the fleet under analysis will be required to confirm the levels of selectivity and the existence and eventual composition of species under principle 2 in case of proceeding towards a complete evaluation.

Because the impacts from fishery on main secondary species determined by the PSA appear as low, the "a" aspect of this indicator would reach SG80. In the absence of minor secondary species the indicator would probably reach an unconditional pass equal to or greater than SG80.

<table>
<thead>
<tr>
<th>RBF required? (✓/x)</th>
<th>SI</th>
<th>Likely Scoring Level (pass/pass with condition/fail)</th>
<th>≥80</th>
</tr>
</thead>
</table>

## Component: PI 2.2.2 Management Strategy

There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species; and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Management strategy in place</td>
<td>There are measures in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.</td>
<td>There is a partial strategy in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.</td>
<td>There is a strategy in place for the UoA for managing main and minor secondary species.</td>
</tr>
<tr>
<td>(b) Management strategy evaluation</td>
<td>The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ species).</td>
<td>There is some objective basis for confidence that the measures/ partial strategy will work, based on some information directly about the UoA and/or species involved.</td>
<td>Testing supports high confidence that the partial strategy/ strategy will work, based on information directly about the UoA and/or species involved.</td>
</tr>
<tr>
<td>(c) Management strategy implementation</td>
<td>There is some evidence that the measures/ partial strategy is being implemented successfully.</td>
<td>Testing is likely that shark finning is not taking place.</td>
<td>There is a high degree of certainty that shark finning is not taking place.</td>
</tr>
<tr>
<td>(d) Shark finning</td>
<td>It is likely that shark finning is not taking place.</td>
<td>It is highly likely that shark finning is not taking place.</td>
<td>There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species, and they are implemented, as appropriate.</td>
</tr>
<tr>
<td>(e) Review of alternative measures to minimise mortality of unwanted catch</td>
<td>There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species.</td>
<td>There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species and they are implemented as appropriate.</td>
<td>Testing is likely that shark finning is not taking place.</td>
</tr>
</tbody>
</table>

### Justification/Rationale

- **SG60**: Minimum level of performance required.
- **SG80**: Standard level of performance expected.
- **SG100**: Highest level of performance achieved.
As for the primary species MSC standard requires this indicator to be evaluated even when there are no secondary species among the UoA catches. For the artisanal squid fishery, aspects a, b and c are only evaluated at the SG100 level since the lower levels are only evaluated "if necessary" (when there are secondary species among the catches).

The artisanal squid fishery is not considered to have a strategy for the management of species under principle 2. The regulatory provisions for the artisanal fleet are minimal and only include requirements for obtaining a license to access the fishery and a global quota for giant squid in Peruvian waters. However, the use of the manual squid jig as the sole gear can be considered as an operational measure in itself due to the high specificity and selectivity of the art. In the event of proceeding towards a complete evaluation, a traceability analysis of the fishery might determine the potential risk that product from vessels not using the right gear could be mistaken as part of the UoA. The measure is reasonably expected to be effective, based on the general experience of the high selectivity and characteristics of the fishing gear. However, under the current situation, this is not considered sufficient or appropriate to constitute a partial strategy to manage the impacts on the components of principle 2 (particularly if birds were confirmed as a main secondary species) as there is no appropriate information to support it or modify it if necessary.

Due to the lack of specific UoA monitoring, there is not enough quantitative and qualitative information on the level of fisher impact upon which to make considerations for supporting of a partial strategy, to evaluate alternative strategies if needed, or to evaluate compliance levels against the current regulations.

The squid fishery does not catch sharks, so the "d" aspect is not evaluated. The artisanal squid fishery does not include primary species, nor does it discard, so there are no unwanted catches of primary species and "e" aspect does not require evaluation. This indicator would therefore meet the unconditional pass.

It must be taken into account that if as references suggest, the interactions with birds are confirmed, this indicator should be re-evaluated and probably would not reach the minimum level of 60 since in such case the use of the manual jig could not be considered an operational measure to prevent mortality of birds and the fishery should then review and implement mitigation measures accordingly.

### Likely Scoring Level (pass/pass with condition/fail)

≥80

<table>
<thead>
<tr>
<th>Component</th>
<th>Secondary Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.2.3 Information</td>
<td>Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effective-ness of the strategy to manage secondary species.</td>
</tr>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
<tr>
<td>(a) Information adequacy for assessment of impact on main secondary species</td>
<td>Qualitative information is adequate to estimate the impact of the UoA on the main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA:</td>
</tr>
</tbody>
</table>
Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species. Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.

Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.

Information is adequate to support measures to manage main secondary species. Information is adequate to support a partial strategy to manage main secondary species. Information is adequate to support a strategy to manage all secondary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.

Some qualitative and quantitative information related to the species under P2 is available for the fishery (IMARPE 1995, IMARPE 1998, Valles-Meza, 2013). In relation with scoring this IC, the PSA analysis has been used to estimate the impact of the fishery on the main secondary species, and it is estimated that the information is sufficient to evaluate the attributes of susceptibility and productivity in these aspects thus it would exceed the SG60 level but not SG80.

Current levels of monitoring on the UoA are insufficient to support measures for management of main secondary species. Fleet operations are not monitored, fishing logs are not completed, landings are not systematically monitored and sampled, a fleet register to keep track of the number of vessels that are operating in a given moment and their levels of effort is nonexistent.

Likely Scoring Level (pass/pass with condition/fail) <60

The UoA meets national and international requirements for protection of PAP species.

The UoA does not hinder recovery of PAP species.

Where national and/or international requirements set limits for PAP species, the effects of the UoA on the population/stock are known and likely to be within these limits.

Where national and/or international requirements set limits for PAP species, the combined effects of the MSC UoAs on the population/stock are known and highly likely to be within these limits.

Where national and/or international requirements set limits for PAP species, there is a high degree of certainty that the combined effects of the MSC UoAs are within these limits.
<table>
<thead>
<tr>
<th>Component</th>
<th>PAP Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) Direct effects</td>
<td>Known direct effects of the UoA are likely to not hinder recovery of PAP species.</td>
</tr>
<tr>
<td></td>
<td>Direct effects of the UoA are <strong>highly likely</strong> to not hinder recovery of PAP species.</td>
</tr>
<tr>
<td></td>
<td>There is a <strong>high degree of confidence</strong> that there are no <strong>significant detrimental direct effects</strong> of the UoA on PAP species.</td>
</tr>
<tr>
<td>(c) Indirect effects</td>
<td>Indirect effects have been considered for the UoA and are thought to be <strong>highly likely</strong> to not create unacceptable impacts.</td>
</tr>
<tr>
<td></td>
<td>There is a <strong>high degree of confidence</strong> that there are no <strong>significant detrimental indirect effects</strong> of the UoA on PAP species.</td>
</tr>
</tbody>
</table>

**Justification/Rationale**

In Peru, national legislation sets binding limits on a number of species classified as threatened or endangered according IUCN criteria (DSN °-034-2004-AG). Likewise, there are a number of species included in international CITES agreements that are known to be impacted or receive significant interactions by artisanal and small-scale fisheries in Peru (Alfaro-Shigueto, 2010).

In addition, national legislation prohibits the capture of marine mammals (DSN ° 002-96-PE) and therefore for the purposes of this pre-assessment these are considered PAP species.

Manual jigging is very selective and practically does not capture accompanying species of fish, birds or marine mammals (Gonzalez and Rodhouse, 1998 and Laptikhovsky et al., 2006 in Arkhipkin et al., 2010). No references have been found regarding interactions with sea turtles in the artisanal squid fishery.

The fishing gear is designed specifically to entangle with the tentacles of the squid, not being easy to catch other species. Also, it is not primed avoiding attracting seabird species. The

Information on bycatches and interactions with other species collected by observers in industrial fleets for giant squid in waters adjacent to the Peruvian EEZ (IMARPE 1998, 1999, 2015, SPRFMO 2017) suggest that the incidence is low (0.003% of the total catch) during the fishing operations of giant squid with mechanical jiggers and does not include species classified as PAP.

Assuming the high selectivity of the manual jig used by the artisanal fleet and taking into account that the operations are conducted manually on its entirety and the small scale at which the fishing operation is taking place, it is expected that incidental catches with protected species or the interactions with these, are rare or almost nil. Reports of observers on board industrial fishing vessels (SPRFMO 2017) report incidental catches due to entanglement with the lines, although the incidence is low. The possibility of something similar happening in the artisanal fishery is very low due to the manual nature of the operation.

The artisanal fleets fishing for squid in Peru alternate different seasonal gears whose interaction with protected species is well known and documented (IMARPE 1997, Alfaro-Shigueto 2010), however there are no reports of specific interactions of protected species associated with giant squid fishing operations by the same artisanal fleets.

In conclusion, although the available information points to the fact that the incidence of UoA is minimal or nil on PAP species, the fishery is of a considerable scale in both the volume of catches and fleet numbers and cannot be assured with a high degree of certainty that direct and indirect effects of the fishery are acceptable and within the limits of the regulations. In case of proceeding to a complete evaluation, monitoring and detailed additional information will be necessary to confirm if such impacts do not exist, characterize them and quantify them if necessary. On the other hand, it is convenient to know more in detail how fishing operations overlap with different gears during a single trip, so that the impacts of each one can be assessed independently and accurately. New guidelines are being
**PI 2.3.2 Management strategy**

The UoA has in place precautionary management strategies designed to:
- meet national and international requirements; and
- ensure the UoA does not hinder recovery of PAP species.

Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of PAP species.

### Scoring issues

<table>
<thead>
<tr>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Management strategy in place (national and international requirements)</td>
<td>There are <strong>measures</strong> in place that minimise the UoA-related mortality of PAP species, and are expected to be <strong>highly likely to achieve</strong> national and international requirements for the protection of PAP species.</td>
<td>There is a <strong>strategy</strong> in place for managing the UoA’s impact on PAP species, including measures to minimise mortality, which is designed to be <strong>highly likely to achieve</strong> national and international requirements for the protection of PAP species.</td>
</tr>
<tr>
<td>(b) Management strategy in place (alternative)</td>
<td>There are <strong>measures</strong> in place that are expected to ensure the UoA does not hinder the recovery of PAP species.</td>
<td>There is a <strong>strategy</strong> in place that is expected to ensure the UoA does not hinder the recovery of PAP species.</td>
</tr>
<tr>
<td>(c) Management strategy evaluation</td>
<td>The measures are <strong>considered likely</strong> to work, based on <strong>plausible argument</strong> (e.g., general experience, theory or comparison with similar UoAs/ species).</td>
<td>There is an <strong>objective basis for confidence</strong> that the partial strategy/ strategy will work, based on <strong>information</strong> directly about the UoA and/or the species involved.</td>
</tr>
<tr>
<td>(d) Management strategy implementation</td>
<td>There is some <strong>evidence</strong> that the measures/strategy is being implemented successfully.</td>
<td></td>
</tr>
<tr>
<td>(e) Review of</td>
<td>There is a review of the</td>
<td>There is a <strong>regular review</strong></td>
</tr>
</tbody>
</table>
alternative measures to minimise mortality of PAP species | potential effectiveness and practicality of alternative measures to minimise UoA related mortality of PAP species. | of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of PAP species and they are implemented as appropriate. | of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality PAP species, and they are implemented, as appropriate.

Justification/Rationale

Although not quantified specifically, there is no information or a collection scheme for this type of interactions, the artisanal giant squid fishery in Peru seems to have no impact on the PAP species, or these are negligible. Despite that, IC 2.3.2 does not include the clause "if necessary" and therefore requires to be evaluated even when there are no known interactions. In this case, the MSC standard requires:

- The existence of measures that can guarantee that the fishery does not exceed national and international limits for the protection of PAP species or ensure that the fishery does not prevent its recovery in cases their populations are below limits.
- That the existing measures are likely to work based on plausible arguments.
- The existence of evidence of the implementation of the measures
- That the UoA reviews and implement mitigation measures.

The use of the manual jig be considered as an operational measure in itself due to the high specificity and selectivity of the art. It is expected to be a reasonably effective measure, based on previous experience of the high selectivity and characteristics of this fishing gear.

Due to the lack of specific UoA monitoring, not enough quantitative and qualitative information is available on the level of impact of fishery on which base considerations about an eventual strategy, develop and support alternative strategies or to evaluate compliance levels against current regulations.

Even in absence of interactions, if they were to occur the existing measures as part of the Peruvian Legislation would not be sufficient to prevent them, as it has been revealed with other Peruvian artisanal fleets (Hervás, 2012). An example, in the case of the squid fishery, interactions with threatened birds, if they occur, could not be mitigated by the use of the manual jig as an operational measure.

Finally, the UoA does not review alternative measures to minimize the possible mortality of PAP species. It there is confirmation that interactions with PAP species do not occur, alternative measures could consist in mandatory use of manual squid jigs and periodically monitor that there is no PAP interactions with PAP over time.

The score for this indicator would most likely fail, not reaching SG60 for any of its aspects.

Likely Scoring Level (pass/pass with condition/fail) | <60

<table>
<thead>
<tr>
<th>Component</th>
<th>PAP Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.3.3 Information</td>
<td>Relevant information is collected to support the management of UoA impacts on PAP species, including: - information for the development of the management strategy; - information to assess the effectiveness of the management strategy; and - information to determine the outcome status of PAP species</td>
</tr>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
</tbody>
</table>
(a) Information adequacy for assessment of impacts

<table>
<thead>
<tr>
<th>Qualitative information is adequate to estimate the UoA related mortality on PAP species.</th>
<th>Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the PAP species.</th>
<th>Quantitative information is available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of PAP species.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR If RBF is used to score PI 2.3.1 for the UoA</td>
<td>OR If RBF is used to score PI 2.3.1 for the UoA:</td>
<td></td>
</tr>
<tr>
<td>Qualitative information is adequate to estimate productivity and susceptibility attributes for PAP species.</td>
<td>Some quantitative information is adequate to assess productivity and susceptibility attributes for PAP species.</td>
<td></td>
</tr>
</tbody>
</table>

(b) Information adequacy for management strategy

<table>
<thead>
<tr>
<th>Information is adequate to support measures to manage the impacts on PAP species</th>
<th>Information is adequate to measure trends and support a strategy to manage impacts on PAP species</th>
<th>Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of PAP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.</th>
</tr>
</thead>
</table>

**Justification/Rationale**

The purpose of IC 2.3.3 "PAP information and monitoring" is to evaluate the collection and availability of relevant information to support management measures aimed at minimizing the impacts of fisheries on PAP species.

The elements required by this indicator include:
1. The availability of information to develop and support the management strategy
2. Information to evaluate its effectiveness
3. Information to determine the status of results of the species.

Mammals, turtles and seabirds are the species groups of potential PAP species interacting with artisanal fisheries in Peru.

**Birds**
The NGOs Prodelphinus and APECO carried out research to determine mortality levels of birds, in particular of Albatross, as a result of fishing activities by artisanal fleets. The information has been obtained through informative campaigns and interviews with fishermen together with quantitative estimates obtained directly by boarding observers.

However, quantitative information is not considered sufficient to understand the interaction of the fishery with bird species. The available information on seabirds would probably reach the minimum level of SG60, although a regular monitoring program should be put in place to estimate and characterize the interactions for UoA with seabirds as well as to quantify their mortality. This information should be used for the development of management strategies and conservation of bird PAP species as well as to check if the strategies developed are working.

**Sea turtles.**
There are research programs and projects for the conservation of sea turtles and it can be considered that the information is sufficient to determine the threats for the protection and recovery of sea turtle species.
However, despite the research initiatives and studies carried out to estimate mortality rates in artisanal fisheries, there is no monitoring program designed to determine levels of mortality for UoA in sea turtles that can support strategies for management, so SG60 would probably be exceeded but SG80 would not be met.

Mammals
There is some qualitative and quantitative information (Alfaro-Shingeto, 2010, Mangel et al., 2010) on interactions and mortality of marine mammals in artisanal fleets, enough to meet the minimum of SG60. But as mentioned before, it is necessary to implement a monitoring plan that estimates and characterizes the interactions for the UoA and provides quantitative estimates of mortality that can be used to design and support management measures for PAPs and to verify if these are being effective.

Likely Scoring Level (pass/pass with condition/fail) 60-79

<table>
<thead>
<tr>
<th>Component</th>
<th>Habitats</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.4.1</td>
<td>The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates</td>
</tr>
<tr>
<td>Outcome Status</td>
<td></td>
</tr>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
<tr>
<td>(a) Commonly encountered habitat status</td>
<td>The UoA is unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.</td>
</tr>
<tr>
<td>(b) VME habitat status</td>
<td>The UoA is unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.</td>
</tr>
<tr>
<td>(c) Minor habitat status</td>
<td></td>
</tr>
</tbody>
</table>

Justification/Rationale
Due to the characteristics of the gear and fishing operations in the artisanal fleet (shallow line setting) it can be stated that UoA is very unlikely to reduce the structure and function of the habitat to a point where serious or irreversible damage will be produced. The impacts are limited to the pelagic habitat, without coming into contact with the bottom or the benthic habitat (Arkhipkin et al., 2015). In addition, there are no vulnerable marine ecosystems identified in the area of operations of the UoA.

The fishery would most likely achieve an unconditional pass in this IC.

RBF required? | NO | Likely Scoring Level (pass/pass with condition/fail) | >80 |
**Component** | **Habitats**
--- | ---
PI 2.4.2 Management strategy | There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Management strategy in place</td>
<td>There are <strong>measures</strong> in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.</td>
<td>There is a <strong>partial strategy</strong> in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</td>
<td>There is a <strong>strategy</strong> in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.</td>
</tr>
<tr>
<td>(b) Management strategy evaluation</td>
<td>The measures are <strong>considered likely</strong> to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/habitats).</td>
<td>There is some <strong>objective basis for confidence</strong> that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved.</td>
<td><strong>Testing</strong> supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or habitats involved.</td>
</tr>
<tr>
<td>(c) Management strategy implementation</td>
<td></td>
<td>There is <strong>some quantitative evidence</strong> that the measures/partial strategy is being implemented successfully.</td>
<td>There is <strong>clear quantitative evidence</strong> that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).</td>
</tr>
<tr>
<td>(d) Compliance with management requirements and other MSC UoAs’/non-MSC fisheries’ measures to protect VMEs</td>
<td>There is <strong>qualitative evidence</strong> that the UoA complies with its management requirements to protect VMEs.</td>
<td>There is <strong>some quantitative evidence</strong> that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.</td>
<td>There is <strong>clear quantitative evidence</strong> that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.</td>
</tr>
</tbody>
</table>

**Justification/Rationale**

The existing strategy for the management of impacts on the habitat is implemented at operational level - the pelagic and shallow nature of fishing gear. The MARPOL agreement, which Peru is a signatory member, establishes provisions to prevent harmful and polluting activities resulting from vessels of all types in the marine environment.

On this basis the IC would probably reach an unconditional pass.

**Likely Scoring Level (pass/pass with condition/fail)** | >80
<table>
<thead>
<tr>
<th>Component</th>
<th>Habitats</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.4.3 Information</td>
<td>Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Information quality</td>
<td>The types and distribution of the main habitats are <strong>broadly understood</strong>. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the types and distribution of the main habitats.</td>
<td>The nature, distribution and <strong>vulnerability</strong> of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.</td>
<td>The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.</td>
</tr>
<tr>
<td>(b) Information adequacy for assessment of impacts</td>
<td>Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.</td>
<td>Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.</td>
<td>The physical impacts of the gear on all habitats have been quantified fully.</td>
</tr>
<tr>
<td>(c) Monitoring</td>
<td>Adequate information continues to be collected to detect any increase in risk to the main habitats.</td>
<td>Changes in all habitat distributions over time are measured.</td>
<td></td>
</tr>
</tbody>
</table>

**Justification/Rationale**

There is enough information on the gear operational characteristics allowing to identify in a general way the type and nature its impacts in the main habitats, including how gear and habitats overlap.

However, it can be considered that information is sufficient in relation with the risk of fishing gear loss and the consequent impacts that this could have on the habitat. Taking into account the scale and
number of vessels involved in the UoA, the impact of gear losses could be significant and cannot be quantified in the absence of more detailed information in this regard. In the case of proceeding towards a full evaluation, this type of incidents should be recorded as part of a monitoring plan or included as information to collect in the logbooks.

Likely Scoring Level (pass/pass with condition/fail) 60-79

<table>
<thead>
<tr>
<th>Component</th>
<th>Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.5.1 Outcome Status</td>
<td>The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.</td>
</tr>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
<tr>
<td>(a) Ecosystem status</td>
<td>The UoA is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.</td>
</tr>
</tbody>
</table>

Justification/Rationale

*D. gigas* diet in the ecosystem of the Humboldt current is dominated by fish, with *V. lucetia* being the main component and secondly the myctophid *Diogenichthys latur* (Rosas et al., 2011). Other species in the diet include copepods, amphipods, euphausiids, pelagic shrimps and crabs (*Pleuroncodes planipes*), mollusks and other squid. The food spectrum changes as a function of the growth of individuals, with *V. lutecia* being the dominant species even for the largest squid (Nigmatulin, 2001)

The predators of *D. gigas* are numerous and differ in size and ecological characteristics. The juveniles are prey to juveniles of large carnivorous fish, small tunas, squid (*Stenoteuthis oualaniensis*) and marine birds. The subadults (150-250 mm) by gold (*Coryphaena hippurus*), mackerel (*Gempylus serpens*), tunas (*Thunnus albacares, Thunnus alalunga*) and seals, and adults by large sharks, swordfish (*Xiphias gladius*), marlins (*Tetmpturus airdar*), sperm whales and pilot whales.

During its ontogenesis, *D. gigas* successfully occupies small niches of micronectonic planktophages Consumers of level II-III of the food chain and small and medium predators - consumers of level III-V (generally IV) of the food chain, in the pelagic ecosystem of the eastern Pacific. It is one of the species with an important role in the processes of energy transfer from the macroplankton and the fish that feed on plankton to the largest pelagic predators -consumers of level V-VII of the food chain (Shchetinnikov, 1988 cited in Nigmatulin 2001).

Among the potential impacts derived from the large-scale exploitation of the squid resource it should be first taken into account all those species that make this species as their main diet, which is the case of sperm whale populations. Their populations have been significantly reduced in recent years and their recovery process could be hindered without the proper availability of giant squid.

On the other hand, lights used for fishing could potentially be a source of light pollution whose consequences have not been evaluated. It has been proven that they can affect certain seabirds.

It is evident that *D. gigas* is present in multiple trophic levels of the ecosystem of the Humboldt current and that its presence and abundance are linked to its functioning, both in its role as predator and prey. Currently, the impact of the fishery on the ecosystem is not quantified, which is especially important considering the role of the species and the size of the fishery. On the other hand, although the indications are that the stock could be underexploited, the absence of information on the ecosystem
requirements in relation to the abundance of *D. gigas* together with his high variability related to environmental factors impedes assuring with a high probability that the UoA would not harm the key elements underlying the structure and function of the ecosystem to a point of causing serious or irreversible damage.

An assessment of the risk that the fishery can represent for the ecosystem can be determined roughly using the analysis SICA\(^\text{11}\) (RBF).

This indicator would probably meet SG60 but not SG80.

<table>
<thead>
<tr>
<th>RBF required? (✓/✗)</th>
<th>YES</th>
<th>Likely Scoring Level (pass/pass with condition/fail)</th>
<th>60-79</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 2.5.2 Management strategy</td>
<td>There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.</td>
</tr>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
<tr>
<td>(a) Management strategy in place</td>
<td>There are measures in place, if necessary which take into account the potential impacts of the UoA on key elements of the ecosystem.</td>
</tr>
<tr>
<td>(b) Management strategy evaluation</td>
<td>The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems).</td>
</tr>
<tr>
<td>(c) Management strategy implementation</td>
<td>There is some evidence that the measures/partial strategy is being implemented successfully.</td>
</tr>
</tbody>
</table>

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\(^{11}\) SICA is a qualitative analysis that identifies the activities that cause a significant impact on the species, habitats or ecosystems and produces an estimate of the risk associated with the fishing activity.
The risk of indirect impact on the ecosystem will probably be determined through a SICA analysis (PI 2.5.1), although based on the previous indicator it has been considered that the risk of impact on the ecosystem is unlikely, therefore “a” could meet SG80.

A management measure exists, which is designed to protect the population, through a catch limit (giant squid annual quota) which is sufficient to meet the minimum requirement of the UoA to take into account potential impacts in key elements of the ecosystem.

Existing measures could be considered as effective for these purposes, although it should not be forgotten that the quota has not been established again since 2012. Also, as there are important uncertainties about the biology, structure, productivity and other biological characteristics of the stock and a weak, almost non-existing monitoring and compliance with the existing measures, the measures are limited in their effectivity and potential to produce the desired outcome. Therefore, this IC would not meet the level of unconditional pass.

Likely Scoring Level (pass/pass with condition/fail) 60-79

<table>
<thead>
<tr>
<th>Component</th>
<th>Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI 2.5.3 Information / monitoring</strong></td>
<td>There is adequate knowledge of the impacts of the UoA on the ecosystem.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Scoring issues</strong></th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Information quality</td>
<td>Information is adequate to <strong>identify</strong> the key elements of the ecosystem.</td>
<td>Information is adequate to <strong>broadly understand</strong> the key elements of the ecosystem.</td>
<td></td>
</tr>
<tr>
<td>(b) Investigation of UoA impacts</td>
<td>Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but <strong>have not been investigated</strong> in detail.</td>
<td>Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and <strong>some have been investigated in detail</strong>.</td>
<td>Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and <strong>have been investigated in detail</strong>.</td>
</tr>
<tr>
<td>(c) Understanding of component functions</td>
<td>The main functions of the components (i.e., P1 target species, primary, secondary and PAP species and Habitats) in the ecosystem are <strong>known</strong>.</td>
<td>The impacts of the UoA on P1 target species, primary, secondary and PAP species and Habitats are identified and the main functions of these components in the ecosystem are <strong>understood</strong>.</td>
<td></td>
</tr>
<tr>
<td>(d) Information relevance</td>
<td>Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.</td>
<td>Adequate information is available on the impacts of the UoA on the components <strong>and elements</strong> to allow the main consequences for the ecosystem to be inferred.</td>
<td></td>
</tr>
<tr>
<td>(e) Monitoring</td>
<td>Adequate data continue to be collected to detect any increase in risk level.</td>
<td>Information is adequate to support the development of strategies to manage</td>
<td></td>
</tr>
</tbody>
</table>
In general terms, it can be considered that the marine ecosystem of the Humboldt current is reasonably known and its key elements are identified. The region and its associated ecosystem are linked to phenomena of great environmental variability, in particular "El Niño", which has a profound effect on the dynamics and functioning of the ecosystem. This particular phenomenon is well known and the modifications it produces in different populations depending on the variability of oceanographic parameters. Thus SG80 would be met for the "a" aspect.

Based on all the available information, it is possible to determine the potential impact of the fishery on the ecosystem and also the functions of its main components. However, the UoA is composed of a large number of vessels scarcely or not at all monitored and with uncertain levels of compliance, so their effects the ecosystem cannot be investigated in detail. The functions of the main components are also known, but it is not possible to quantitatively identify the impacts of the UoA on them. Aspects "b" and "c" would meet SG60, but not SG80.

There is not enough information available to quantitatively determine the impact of the fishery on the ecosystem, although the associated risk of these has been evaluated with RBF.

There is no adequate information, nor is it being currently being collected, allowing detecting increases on fishery risk levels on the ecosystem. There is no systematic monitoring program to collect information on fishing operations and interactions with species under the principle 2. The information on the number of vessels that operate is also uncertain and is probably underestimated, which is an extra source of uncertainty.

Based on the above, this IC would probably not reach the unconditional pass.

Likely Scoring Level (pass/pass with condition/fail) 60-79
management outcomes consistent with MSC Principles 1 and 2.

outcomes consistent with MSC Principles 1 and 2.

outcomes consistent with MSC Principles 1 and 2.

(b) Resolution of disputes

The management system incorporates or is subject by law to a **mechanism** for the resolution of legal disputes arising within the system.

The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the UoA.

The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes that is appropriate to the context of the fishery and has been **tested and proven to be effective**.

(c) Respect for rights

The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

**Justification/Rationale**

In Peru, the fisheries management system is well developed; however, in general terms, it is considered insufficient to comply with the MSC standard. The fishery management system is articulated as a priority around the anchoveta fishery, which is by far the most important fishery in socioeconomic terms.

The legal basis of fishing activity in Peru relies on the Constitution, articles 66 and 67 and the Organic Law of Sustainable Management of Resources, from these emanates the General Fishing Law of 1994 (Decree Law No. 25977) regulated by Supreme Decree No. 012-2001-PE. Within the framework of fisheries management, the so-called Fisheries Management Regulations (ROPs) are adopted; one of these ROPs is specific for the giant squid fishery. These ROPs have the objective of establishing the principles, standards and regulatory measures that allow fisheries management based on the knowledge of their biological, economic and social components.

On the other hand, Peru is a member of the Regional Organization of Fisheries Management of the South Pacific (SPRFMO). The SPRFMO is an intergovernmental organization which entered into force in 2012 with the objective of cooperation among states to address the existing gaps in the conservation and management of international fisheries and the protection of biodiversity in the marine environment in the South Pacific Ocean high seas. SPRFMO’s goal is to ensure the long-term conservation and sustainable use of resources, while safeguarding ecosystems through the application of the precautionary and ecosystem approach in fisheries management. The management of the SPRFMO is binding and includes under its mandate the management for giant squid resource in international waters. The legal system is effective and there are binding procedures within the framework of the SPRFMO for cooperation with other states to manage the fishery in a manner consistent with principles.
1 and 2 of the MSC. Cooperation among member states is explicitly stated in several of the numerals of Article 10 of the UNFSA. On these bases, the "a" aspect would probably meet SG100.

The Fisheries Law establishes infractions and sanctions, through Supreme Decree (D.S. N° 017-2017-PRODUCE), which also establishes a framework for the resolution of legal disputes. In addition, under the new production structure a conflict resolution section has been designated. The Fisheries Law provides mechanisms for resolving legal disputes that arise within the system. There has also been a process of decentralization, which competencies that have been transferred to the regional authorities, reinforcing the consideration towards explicit fishery rights and the joint management with the communities dependent on fishing. In general, the legal framework opens the door to public participation and in a transparent manner as provided by Supreme Decree No. 070-2013-PCM. In consideration of all this, the "b" aspect would probably reach the unconditional pass SG80.

However, although the formal framework is appropriate, it is not effective to ensure compliance with current regulations. Nor is it evident that the system is particularly effective for the nature and context of the UoA. This situation does not favor the effective management of fishing. Finally, although the LGP and its Regulations recognize subsistence fishing as a right, there is no defined legal mechanism that observes legal rights in a manner consistent with principles 1 and 2 of the MSC, so that aspect "c" would meet SG60, but not reach SG80.

The impressions gathered during the technical visit reflected in general that although the system is formally established to resolve legal disputes and recognize acquired rights in a transparent manner, the available instruments are not implemented satisfactorily or sufficiently for the giant squid fishery.

While there is a legal framework for fisheries management and an effective framework for international cooperation, the available instruments are not fully developed and/or tested up to the level required by the standard to the level for an unconditional for this performance indicator. The resolution of conflicts and the respect of the rights in the fishery would probably not be enough with the SG60 requirements.

**Likely Scoring Level (pass/pass with condition/fail)**

<table>
<thead>
<tr>
<th>Component</th>
<th>Governance and Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 3.1.2 Consultation, roles and responsibilities</td>
<td>The management system has effective consultation processes that are open to interested and affected parties.</td>
</tr>
<tr>
<td></td>
<td>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</td>
</tr>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
<tr>
<td>(a) Roles and responsibilities</td>
<td>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood.</td>
</tr>
</tbody>
</table>
## Governance and Policy

<table>
<thead>
<tr>
<th>Component</th>
<th>The management system has effective consultation processes that are open to interested and affected parties.</th>
<th>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) Consultation processes</td>
<td>The management system inclUoAs consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.</td>
<td>The management system inclUoAs consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.</td>
</tr>
<tr>
<td>(c) Participation</td>
<td>The consultation process provides opportunity for all interested and affected parties to be involved.</td>
<td>The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.</td>
</tr>
</tbody>
</table>

### Justification/Rationale

The UoA has been defined as the 200 jurisdictional miles of Peru, so the applicable management system is only the Peru’s national regulations.

The Peruvian State, through the Ministry of Production (PRODUCE) and within the Vice Ministry of Fisheries, assumes the roles and the responsibility in the decision making process. Organizations and individuals involved in the management are well identified and roles and responsibilities are explicitly defined and well understood.

The decision-making system is not explicitly inclusive and although there are administrative instruments that invite participation (measures and regulations are pre-published before adoption) they seem to be of more informative than advisory nature. There is no evidence that the management system regularly incorporates the contributions and concerns of interested parties.

Consultation procedures are scarce. For some measures a consultation process existed, but it is uncertain to what extent these are systematized and take place regularly. For the giant squid, a working group has been created recently, with the purpose of dealing and discussing of issues related to this fishery, although the scope of this group within the management system is not defined. Public consultation procedures and criteria for taking into account different stakeholders views and civil society may not be appropriate and / or sufficient taking into account the context of the UoA. It is not clear in what way or on based on what criteria these are taken into consideration or rejected. These consultation procedures, such as the giant squid working group, should be formalized and implemented on a regular basis. In summary, although the management system has tools for consultation and information, these require to be formalized and reinforced in order to allow for this IC to achieve the unconditional pass.

In the current state of the management system, this indicator is unlikely to exceed the level required for the unconditional pass.

### Likely Scoring Level (pass/pass with condition/fail)

| 60-79 |
## Component: Governance and Policy

### PI 3.1.3 Long term objectives

The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Fisheries Standard, and incorporates the precautionary approach.

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Objectives</td>
<td>Long term objectives to guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are implicit within management policy.</td>
<td>Clear long term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are explicit within management policy.</td>
<td>Clear long term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are explicit within and required by management policy.</td>
</tr>
</tbody>
</table>

### Justification/Rationale

Legal framework for fishing activities in Peru is set out in the so-called General Fisheries Law (Supreme Decree 012-2001-PE). This includes explicit objectives of sustainable development and the responsible use of fishery resources. On a practical level, the management is limited to the resource populations and does not incorporate a precautionary or ecosystem approach.

At the international level, Peru is a signatory to international agreements, SPRFMO and CITES, where long-term objectives are explicitly defined.

However, there are no explicit long-term objectives consistent with MSC principles 1 and 2 within the Peruvian management framework. Only ROPs developed for specific species could be implicitly considered to be consistent with principle 1 under the MSC criteria and not all of them include the required elements.

The lack of explicit long-term objectives within the Peruvian management to guide the decision-making processes in consistency with the MSC Principles and Criteria will probably not allow the unconditional pass for this PI to be achieved.

### Likely Scoring Level (pass/pass with condition/fail)

60-79

---

## Component: Fishery - specific management system

### PI 3.2.1 Fishery-specific objectives

The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC’s Principles 1 and 2.

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Objectives</td>
<td>Objectives, which are broadly consistent with achieving the outcomes expressed by MSC’s Principles 1 and 2, are implicit within the fishery-specific management system.</td>
<td>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-specific management system.</td>
<td>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-specific management system.</td>
</tr>
</tbody>
</table>
Supreme Decree 014-2011 for the giant squid articulates the management objectives related to the giant squid fishery, these are constituted in:

1- Regulate access to extractive activity and fishing operations for national and foreign fishing vessels for the giant squid resource.
2- Set the basis for a giant squid fishery through development of a specialized national fleet and the corresponding optimization of an industry for direct human consumption.
3- The rational and sustainable exploitation of the giant squid, by virtue taking into account the biological and stock characteristics of the resource and the social-economic impact on the stakeholders involved in the fishery,

The MSC standard requires these objectives to be consistent with the management strategy established in the corresponding indicators under P1 and P2. It can be considered that Pota ROP has implicit objectives consistent with Principle 1, although in practice a quota for giant squid has not been adopted, which is a crucial inconsistency between the objective and the management strategy. In relation to principle 2 of the MSC, the international conventions signed by Peru (IUCN / CITES) are binding and Peru is committed to take the necessary measures to minimize the risk of fishing poses in PAP species.

Giant squid fishery objectives are not explicitly arranged in terms of short or long term. They are not expressed in quantitative terms nor do they indicate reference points to serve as management guidance, so SG80 is not achieved. A management plan that incorporates explicit short and long term objectives for both principles is required to achieve an unconditional pass in this PI.

### Likely Scoring Level (pass/pass with condition/fail)

<60

### Component

<table>
<thead>
<tr>
<th>PI 3.2.2 Decision-making processes</th>
<th>Fishery-specific management system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoring issues</td>
<td>SG60</td>
</tr>
<tr>
<td>(a) Decision-making processes</td>
<td>There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.</td>
</tr>
<tr>
<td>(b) Responsiveness of decision-making processes</td>
<td>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.</td>
</tr>
<tr>
<td>decisions.</td>
<td>implications of decisions.</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td><strong>(c) Use of precautionary approach</strong></td>
<td>Decision-making processes use the precautionary approach and are based on best available information.</td>
</tr>
<tr>
<td><strong>(d) Accountability and transparency of management system and decision making process</strong></td>
<td>Information on the fishery’s performance and management action is available on request to stakeholders.</td>
</tr>
<tr>
<td><strong>(e) Approach to disputes</strong></td>
<td>Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.</td>
</tr>
</tbody>
</table>

**Justification/Rationale**

IMARPE is the national agency in Peru providing the scientific support for the Pota fishery management. Each year IMARPE carries out an stock assessment and produces recommendations based on the state of the resource which can be articulated by PRODUCE adopting a quota for the fishery. However, this procedure cannot be considered established, as since 2012 no quota for the fishery has been adopted.

Decision-making processes do not appear capable to be responsive if serious issues arise within the fishery in a timely manner. For the same reasons, these decision-making processes are not precautionary, which results in a management framework for the squid that would be more reactive than proactive. This would be mainly due to the lack of appropriate information at all levels (research, monitoring, management, etc) to support decision making.

Due to the large of fleet in operations, only very generally monitored, there is no sufficient information available. A very important part of the fleet seems to operate informally, which can be interpreted as a violation of the law, posing a threat to the sustainable management of the fishery. Legal provisions adopted in 2014 (RM-2014 PRODUCE) put in place a formalization process for the artisanal fleet that is expected to improve the information available for management purposes.

The minimum level required for this indicator would not be achieved.

<p>| Likely Scoring Level (pass/pass with condition/fail) | &lt;60 |</p>
<table>
<thead>
<tr>
<th>Component</th>
<th>Fishery- specific management system</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 3.2.3 Compliance and enforcement</td>
<td>Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scoring issues</th>
<th>SG60</th>
<th>SG80</th>
<th>SG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) MCS implementation</td>
<td>Monitoring, control and surveillance mechanisms exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.</td>
<td>A monitoring, control and surveillance system has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</td>
<td>A comprehensive monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.</td>
</tr>
<tr>
<td>(b) Sanctions</td>
<td>Sanctions to deal with non-compliance exist and there is some evidence that they are applied.</td>
<td>Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.</td>
<td>Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.</td>
</tr>
<tr>
<td>(c) Compliance</td>
<td>Fishers are generally thought to comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>(d) Systematic non-compliance</td>
<td>There is no evidence of systematic non-compliance.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Justification/Rationale**

Peru maintains a well-established and functional fleet monitoring system which is implemented by PRODUCE. Dirección General de Supervisión, Fiscalización y Supervisión is the body in charge of the monitoring scheme, together with the respective regional agencies.

For the fleet under the scope of this preassessement, monitoring duties and competencies are transferred to the respective regional authorities, where the availability of resources for proper enforcement is lower. There is a level of overlapping and coordination between the two authorities, however, regional agencies often lack of appropriate or sufficient means, thus monitoring of the substantial and dispersed giant squid fleets is insufficient and ineffective. In these events the competences fall at the national level.

Control duties for supervising derogations on new vessels for the squid fishery are managed by DICAPI SERFOR, PRODUCE, and the respective municipalities.

A sanctioning regime exists, which is applied consistently, although it does not seem to be sufficiently deterrent. In consideration of the high levels of non-conformity encountered within the artisanal giant squid fleets, and particularly construction of new vessels in violation of current derogations, it could be
interpreted as there is evidence of systematic non-compliance.

As identified in the FAO report, it is necessary to bear in mind that Peru’s artisanal fishery for giant squid is managed with limited financial and material means, together with important logistical complications. Despite this, it is also a fishery of a considerable scale in terms of volume at par with industrial fisheries, so that the artisanal or manual nature of the fishery should not be an reason to disregard the weaknesses in the fishery, management, monitoring or compliance.

Due to these reasons, the minimum level required for this indicator would not be achieved.

### Likely Scoring Level (pass/pass with condition/fail)

<table>
<thead>
<tr>
<th>Component</th>
<th>Fishery-specific management system</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 3.2.4 Monitoring and management performance evaluation</td>
<td>There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system.</td>
</tr>
<tr>
<td><strong>Scoring issues</strong></td>
<td><strong>SG60</strong></td>
</tr>
<tr>
<td>(a) Evaluation coverage</td>
<td>There are mechanisms in place to evaluate <strong>some</strong> parts of the fishery-specific management system.</td>
</tr>
<tr>
<td>(b) Internal and/or external review</td>
<td>The fishery-specific management system is subject to <strong>occasional internal</strong> review.</td>
</tr>
</tbody>
</table>

**Justification/Rationale**

A giant squid working group has been recently created, taking place for the first time in 2017. It provides a good opportunity and a platform where to evaluate or discuss various aspects of the management system, it is uncertain if this is the case, or what is the scope of the conclusions drawn during the group meetings.

When evaluating the effectiveness of the management system, under the new structure of PRODUCE (Article 68) new figures have been created to supervise the functioning of the management system. However procedures have not yet been established to evaluate of the specific management system for the giant squid. For the moment, although it seems that the instruments for a revision are established, the system is evaluated neither externally nor internally, for which reason it would not meet the minimum score of SG60.

### Likely Scoring Level (pass/pass with condition/fail)

<60
Annex 1 – SICA Analysis for *Oceanodroma* spp.

<table>
<thead>
<tr>
<th>Productividad</th>
<th>Rango</th>
<th>Puntuación</th>
<th>Justificación</th>
<th>Referencia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edad de primera madurez</td>
<td>&lt; 5 años</td>
<td>1</td>
<td>4-6 años</td>
<td>Department of the Environment (2016)</td>
</tr>
<tr>
<td>Edad máxima</td>
<td>10 - 25 años</td>
<td>2</td>
<td>10</td>
<td>Department of the Environment (2016)</td>
</tr>
<tr>
<td>Talla de primera madurez</td>
<td>&lt; 40 cm</td>
<td>1</td>
<td>La envergadura máxima de las alas puede llegar a alrededor de 40 cm, se asume que la madurez se alcanza antes</td>
<td>Department of the Environment (2016)</td>
</tr>
<tr>
<td>Talla máxima</td>
<td>&lt; 100 cm</td>
<td>1</td>
<td>La envergadura máxima de las alas puede llegar a alrededor de 40 cm</td>
<td>Department of the Environment (2016)</td>
</tr>
<tr>
<td>Fecundidad</td>
<td>&lt; 100 huevos por año</td>
<td>3</td>
<td>Es característico de los <em>Procellariiformes</em> poner entre 1 y 3 huevos por puesta, cada temporada de antidación</td>
<td>Bond &amp; Hobson (2015)</td>
</tr>
<tr>
<td>Estrategia reproductiva</td>
<td>Vivalprar</td>
<td>3</td>
<td>Las aves son ovíparas pero hay un periodo de incubación</td>
<td>Department of the Environment (2016)</td>
</tr>
<tr>
<td>Nivel trófico</td>
<td>2,75 - 3,25</td>
<td>2</td>
<td>Estimados entre 2,8 y 3,2</td>
<td>Hedd <em>et al.</em> (2009)</td>
</tr>
</tbody>
</table>

*Table 1 Productivity analysis*
### Tabla 2: Análisis de Susceptibilidad

<table>
<thead>
<tr>
<th>Susceptibilidad</th>
<th>Rango</th>
<th>Puntuación</th>
<th>Justificación</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superposición</td>
<td>10 - 30% de superposición</td>
<td>2</td>
<td>La flota se distribuye a lo largo del año en las zonas oceánicas como en zonas costeras, tanto del norte como el sur por lo que solo en ciertos momentos hay solapamiento de la flota con la zona de distribución de las aves.</td>
</tr>
<tr>
<td>Superposición vertical media con el arte de pesca</td>
<td></td>
<td>2</td>
<td>Durante las faenas nocturnas las aves pueden quedar desorientadas por las luces, sin embargo durante el día no se presenta este problema.</td>
</tr>
<tr>
<td>La selectividad del arte de pesca</td>
<td>a) Individuos &lt; talla de madurez son capturados regularmente</td>
<td>3</td>
<td>Se asume el máximo valor de manera precautoria</td>
</tr>
<tr>
<td>El potencial del arte de pesca para retener las especies</td>
<td>b) Individuos &lt; mitad de la talla de madurez pueden escapar o evitar el arte</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortalidad post captura</td>
<td>Hay evidencia de supervivencia de la mayoría de las especies liberadas</td>
<td>1</td>
<td>Las aves son liberadas en la mayoría de ocasiones por los tripulantes, ellos no tienen ningún interés en capturar estas aves.</td>
</tr>
</tbody>
</table>

### Tabla 3: Diagnóstico PSA

![PSA Diagnostics plot](image)

*Table 3 PSA Diagnostics plot*