Jumbo flying squid

SE Pacific

Summary

IDENTIFICATION

Last updated on 19 July 2016

SCIENTIFIC NAME(s)

Dosidicus gigas

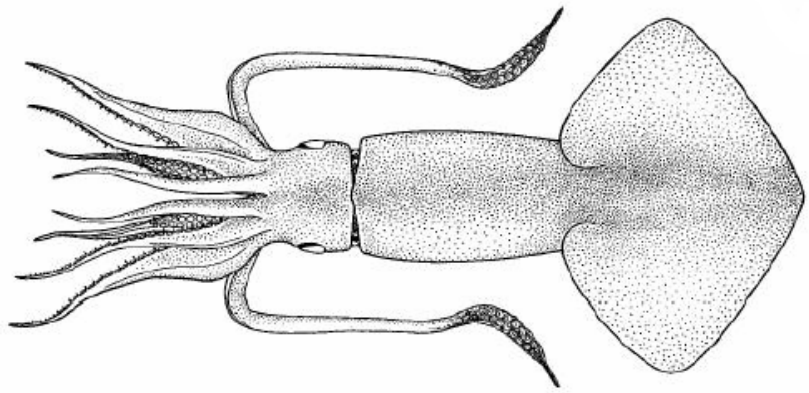
SPECIES NAME(s)

Jumbo flying squid

COMMON NAMES

Humboldt squid, jibia, pota, calamar rojo

Jumbo flying squid in the Eastern Pacific extends from the waters off Chile to the North American coast. The NE Pacific (https://www.fishsource.org/stock_page/2302) and SE Pacific represent genetically different stocks with some migration among them, in a genetic structure apparently influenced by oceanic currents *(Sandoval-Castellanos et al. 2010)*.
Three intraspecific groups have been identified for Giant or Jumbo flying squid (*Dosidicus gigas*) in the Southeast Pacific, based on size-at-maturity *(Nigmatullin et al. 2001)*, but as no genetic difference has been found between the three proposed sub-unit populations, thus it is still considered to constitute a single stock *(Xu et al. 2017)*.



RELATED LINKS:

- See this species on SeaLifeBase

- Management Entities: Ministry of Production - Peru (PRODUCE) (http://www.produce.gob.pe/)
- Assessment Entities: Marine Institute of Peru (IMARPE) (http://www.imarpe.pe/imarpe/)

ANALYSIS

Strengths

- Abundance is considered high, stock not overfished nor overfishing occurring, however input data should be improved with fishery-independent and dependent data from Peru and Chile.
- Catch levels are well below the recently estimated maximum sustainable yield (MSY), with catch trend not anticipated to be problematic within the next decade.
- There are efforts to increase knowledge about the stock and for defining the most suitable management alternatives to be applied at the regional level by the SPRFMO.

- The stock is considered healthy.
- Managers comply fully with scientific advice.
- In general, landings are below the set TACs.
- The management plan for this fishery has been reviewed recently (2010).
- Bycatch is considered null due to selectivity of jigs and the interaction with the seabed ecosystem is regarded as minimal.

Weaknesses

- No management exists at a whole-stock level, and there is thus scope for high-seas fleets to increase their catch levels at any time, potentially jeopardising stock health.
- Ongoing uncertainty regarding the stock structure (three functionally independent stocks or one semi-mixed stock) combined with high annual / environmental variability hampers efforts to forecast and manage the stock(s) across national boundaries and in the high seas.
- Assessment of the full stock needs improvement in fishery-independent and dependent data from Peru and Chile and the SPRFMO area.

- Stock assessment reports are generally not publicly available.
- No reference points are known to be defined for the stock.
- Scientific advice and catch limits for 2013 and 2014 are not known to exist.
- Interaction of the fishery with protected species is not known.

Options

- Improve stock assessment by incorporating population structure and CPUE data or any other survey data within the EEZ of Peru and Chile.
- The squid working group recommendations to the SPRFMO were: i) evaluate working hypotheses on stock structure using data combined from all fishing countries, ii) research on the distribution, migration routes and intermixing patterns, iii) promote research on the

reproductive process and the effect of environmental factors in determining the timing and the location and extension of spawning areas, iv) determine the most suitable stock assessment models and management alternatives, including research on methods for recruitment and escapement estimation, v) refine and develop data templates to address data gaps for informing a full stock assessment, as not all required information is contained within the templates, vi) encourage all fishing countries to share data and information necessary for stock assessment, vii) recover historical data and report the historical information to the extent possible.

- Scientific information should be publicly available.
- Impact on protected species should be studied.

FISHSOURCE SCORES

Management Quality:

Management Strategy:	Managers Compliance:	Fishers Compliance:
≥ 6	10	10

Stock Health:

Current Health:	Future Health:
≥ 8	≥ 8

RECOMMENDATIONS

CATCHERS & REGULATORS

- Start a fishery improvement project to address sustainability issues in this fishery. For advice on starting a FIP, see SFP's Seafood Industry Guide to FIPs here (http://www.sustainablefish.org/publications/2014/04/30/the-seafood-industry-guide-to-fips).
- Communicate to fishery managers that there are sustainability issues in this fishery that may be affecting the sale of products, and request that they comprehensively evaluate and address such issues.

RETAILERS & SUPPLY CHAIN

- Encourage your supply chain to start a fishery improvement project. For advice on starting a FIP see SFP's Seafood Industry Guide to FIPs here (http://www.sustainablefish.org/publications/2014/04/30/the-seafood-industry-guide-to-fips).
- Work with other suppliers and buyers on a pre-competitive basis to start a supplier roundtable to review improvement needs in this and other similar fisheries, catalyze fishery improvement projects, and monitor progress in improvement efforts.

FIPS

No related FIPs

CERTIFICATIONS

No related MSC fisheries

Fisheries

Within FishSource, the term "fishery" is used to indicate each unique combination of a flag country with a fishing gear, operating within a particular management unit, upon a resource. That resource may have a known biological stock structure and/or may be assessed at another level for practical or jurisdictional reasons. A fishery is the finest scale of resolution captured in FishSource profiles, as it is generally the scale at which sustainability can most fairly and practically be evaluated.

Fisheries

Fisheries

Analysis

OVERVIEW

Last updated on 18 January 2018

Strengths

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- Catch levels are well below the recently estimated maximum sustainable yield (MSY), with catch trend not anticipated to be problematic within the next decade.
- There are efforts to increase knowledge about the stock and for defining the most suitable management alternatives to be applied at the regional level by the SPRFMO.

Peruvian

Last updated on 18 January 2017

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Weaknesses

- No management exists at a whole-stock level, and there is thus scope for high-seas fleets to increase their catch levels at any time, potentially jeopardising stock health.
- Ongoing uncertainty regarding the stock structure (three functionally independent stocks or one semi-mixed stock) combined with high annual / environmental variability hampers efforts to forecast and manage the stock(s) across national boundaries and in the high seas.
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- The squid working group recommendations to the SPRFMO were: i) evaluate working hypotheses on stock structure using data combined from all fishing countries, ii) research on the distribution, migration routes and intermixing patterns, iii) promote research on the reproductive process and the effect of environmental factors in determining the timing and the location and extension of spawning areas, iv) determine the most suitable stock assessment models and management alternatives, including research on methods for recruitment and escapement estimation, v) refine and develop data templates to address data gaps for informing a full stock assessment, as not all required information is contained within the templates, vi) encourage all fishing countries to share data and information necessary for stock assessment, vii) recover historical data and report the historical information to the extent possible.

Peruvian

Last updated on 18 January 2018

- Scientific information should be publicly available.
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RECOMMENDATIONS

Peruvian

Last updated on 2 January 2017

Improvement Recommendations to Catchers & Regulators

- Start a fishery improvement project to address sustainability issues in this fishery. For advice on starting a FIP, see SFP's Seafood Industry Guide to FIPs here (http://www.sustainablefish.org/publications/2014/04/30/the-seafood-industry-guide-to-fips).
- Communicate to fishery managers that there are sustainability issues in this fishery that may be affecting the sale of products, and request that they comprehensively evaluate and address such issues.

Recommendations to Retailers & Supply Chain

- Encourage your supply chain to start a fishery improvement project. For advice on starting a FIP see SFP's Seafood Industry Guide to FIPs here (http://www.sustainablefish.org/publications/2014/04/30/the-seafood-industry-guide-to-fips).
- Work with other suppliers and buyers on a pre-competitive basis to start a supplier roundtable to review improvement needs in this and other similar fisheries, catalyze fishery improvement projects, and monitor progress in improvement efforts.

1.STOCK STATUS

STOCK ASSESSMENT

Last updated on 18 January 2018

A squid working group was created in the 4th Scientific Committee (SC) meeting of the South Pacific Regional Fisheries Management Organisation (SPRFMO). A 2017 stock assessment on the full stock of jumbo flying squid in the Southeast Pacific was published; CPUE data of Chinese vessels operating in the high seas were used as biomass abundance index in a state-space surplus production model *(Xu et al. 2017)*. Improvement needs on modelling approach used, research on stock structure, spawning grounds, and other basic biology (i.e. maturity) were identified. A workplan was agreed with participation of Chile, Peru and China, as well as a squid stock assessment workshop to be held in 2018 prior to, or in conjunction with the next SC meeting *(SPRFMO 2017)*.

Peruvian

Last updated on 19 July 2016

In Peru, assessments for jumbo flying squid are based on acoustic surveys conducted by the Marine Research Institute of Peru (Instituto del Mal del Perú, IMARPE). Scientific reports with stock assessments were generally publicly available in the last years but are not for both 2013 and 2014 fishing years.

Since jumbo flying squid is an annual species, population is assessed at the beginning of the season and probable catches are also estimated so that the recommended Total Allowable Catch (TAC) may ensure that 20% of the population (as assessed at the beginning of the season) remains in the water for reproduction (escapement criterion). In Southern Spring (September), an assessment of the intensity of the spawning is conducted and preliminary recommendations are issued regarding the TAC for the first half of the next year.

Jumbo squid, *Dosidicus gigas*, has a life span of little more than a year and it is a semelparous species, meaning it reproduces only once in its lifetime and shortly afterward dies. During their short life span, jumbo squids can reach a mantle length of around 1m (3 feet) and can reach weighs of up to 65kg (140 pounds). They are big, almost top-opportunistic predators and cannibalism is common.

In Peru, assessments for jumbo squid are based on acoustic surveys. IMARPE, the marine research institute of Peru, is in charge of the assessment of jumbo squid population. Research is oriented towards the assessment of abundance, distribution and availability of resources and their relationship with their environment.

Biomass abundance for this species is linked to El Niño/La Niña phenomena. It seems that moderate Niños encourage abundance, but strong Niños or Niñas are bad. Intermittent soft Niños have been characteristic during the last seven years, within what is generally considered a “cold decade”.

Since jumbo squid is an annual species, population is assessed at the beginning of the season and monthly projections for the cohort are calculated according to an exponential decay model (Pope 1972) with different mortalities for juveniles and adults. Specimens’ growth projections and probable catches are also estimated so that the recommended TAC may ensure that 20% of the population (as assessed at the beginning of the season) remains in the water for reproduction (escapement criterion).

In Southern Spring (September), an assessment of the intensity of the spawning is conducted and preliminary recommendations are issued regarding the TAC for the first half of the next year.

SCIENTIFIC ADVICE

No reference points are set at a whole-stock level. A recent formal assessment, published by the South Pacific Regional Fisheries Management Organisation (SPRFMO), provides an initial description of the dynamics of the stock *(Xu et al. 2017)*. A maximum sustainable yield of 337,619 tonnes was estimated.

The squid working group made several recommendations to the SPRFMO Scientific Committee: i) evaluate working hypotheses on stock structure using data combined from all fishing countries, ii) research on the distribution, migration routes and intermixing patterns, iii) promote research on the reproductive process and the effect of environmental factors in determining the timing and the location and extension of spawning areas, iv) determine the most suitable stock assessment models and management alternatives, including research on methods for recruitment and escapement estimation, v) refine and develop data templates to address data gaps for informing a full stock assessment, as not all required information is contained within the templates, vi) encourage all fishing countries to share data and information necessary for stock assessment, vii) recover historical data and report the historical information to the extent possible.

Reference Points

A formal stock assessment has derived MSY variants for the whole stock *(Xu et al. 2017)*. No management structure is in place at a stock-level.

Peruvian

Last updated on 13 July 2016

After assessment of the population, IMARPE issues a TAC recommendation. IMARPE's preliminary assessment recommended a provisional TAC of 500,000 t for 2012. The advice may be changed, based on the results from acoustic survey conducted during the year (PRODUCE 2012a).

Reference Points

Last updated on 13 Jul 2016
In Peru, the sustainability criterion for this species consists in letting 20% of the population (as assessed at the beginning of the year) escape for reproduction purposes.

CURRENT STATUS

A 2017 stock assessment on the full stock concludes the jumbo flying squid stock in the Southeast Pacific is not overfished and overfishing does not occur, that the current catch level is much lower than the estimated MSY, and is sustainable. The team intends to improve their existing analyses by incorporating population structure, in future work *(Xu et al. 2017)*.

Trends

Total catch levels have been gradually rising (p3,p5) but this does not appear likely to become problematic for a decade if such trends continue (p27a), and especially if Chile and Peru (representing 2/3rds catch) are increasingly actively managing their fisheries *(Xu et al. 2017)*.

Peruvian

Last updated on 18 January 2017

Estimated biomass for between 2001 and 2011 oscillated between 2.51 and 2.96 million tons. Based on this, Maximum Sustainable Yield B_{MSY} was estimated as 854,859 tons. The initial TAC for 2012 was set at 500,000 tons as recommended by IMARPE (PRODUCE 2012a).

Trends

Last updated on 18 Jan 2017
Catches (http://legacy.fishsource.org/system/resource/image_path/3187/large/Figure3.png) of jumbo squid have reached and surpassed the 250,000 tonnes mark in recent years. In 2010, reported catches were of 366,824 tonnes (IMARPE 2010). Fishing mortality (F) has been increasing since 1999 and remains below F_{MSY} (which value is not available) (PRODUCE 2011a, 2012a).

2.MANAGEMENT QUALITY

MANAGEMENT

No management exists at a whole-stock level. The SPRFMO is supporting the squid working group to improve knowledge on the stock and management alternatives to be applied for jumbo flying squid for use in the Convention area *(SPRFMO 2017)*.

Peruvian

Last updated on 18 January 2017

The fishery is managed by the Ministry of Production (Ministério de la Producción, PRODUCE). Managers set TACs following scientific advice. In 2012, a TAC of 500,000 tonnes was set for jumbo flying squid, which is in line with the TAC advised by IMARPE (PRODUCE 2012a). TACs for 2013 and 2014 fishing are not available.

Recovery Plans

Last updated on 18 Jan 2017
Peruvian jumbo squid needs not a recovery plan as the population is not compromised. Management of this fishery fully complies with IMARPE's scientific recommendations concerning annual TACs.

COMPLIANCE

No management exists at a whole-stock level.

Peruvian

Last updated on 18 January 2017

TACs follow scientific recommendations and catches normally do not surpass the set TAC. In 2012, reported catches at 497,462 tons were below the set TAC (IMARPE 2010; PRODUCE 2010).

There is some bycatch of jumbo flying squid during the purse seine operations, mostly anchovy, because this small pelagic is fished close to the coast, but outside the 5 miles protection zone. The bycatch is not quantified, but does not represent a danger for the population.

3.ENVIRONMENT AND BIODIVERSITY

BYCATCH

ETP Species

Peruvian

Last updated on 13 July 2016

There are no records on impacts over Protected, Endangered and Threatened (PET) species.

Other Species

Peruvian

Last updated on 18 January 2017

The fishery is driven by jiggers so bycatch in this fishery is null.

It used to be thought that the abundance of jumbo flying squid was affecting hake's numbers in both Peru and Chile. But, using an ecosystem approach, it was demonstrated (Arancibia et al. 2005) that growing numbers of jumbo flying squid is not the immediate cause to diminishing numbers of hake. Furthermore, even though hake is indeed one of the giant squid's preys, it is not the main one.

Jumbo flying squid's surge in numbers may be related to top predators' declination, particularly cachalot's depletion (Clarke et al. 1988, quoted by Icochea 2006). It was estimated that in the late 1950's the cachalot population consumed between 6 and 14 million tones each year.

HABITAT

Peruvian

Last updated on 30 August 2016

The impact of this fishery on the habitat is regarded as practically null.

Marine Reserves

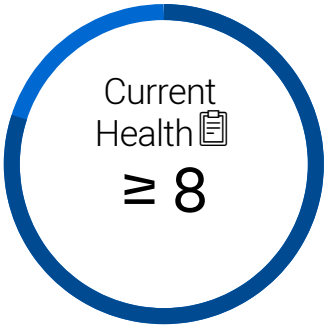
Last updated on 30 Aug 2016
Paracas Marine Reserve is the only marine reserve in Peru. It is located in the province of Pisco, department of Ica and it extends over 335,000 hectares (217,594 of which correspond to sea waters). Paracas Marine Reserve was created in 1975 to protect wildlife, especially seabirds such as the Humboldt penguin.

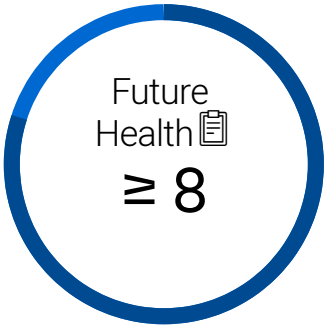
FishSource Scores

Last updated on 16 January 2018

MANAGEMENT QUALITY

STOCK HEALTH:





HUMAN RIGHTS ABUSE RISK

Medium

This indicates the potential risk of human rights abuses within this fishery.

BIOMASS

CATCH AND TAC

FISHING MORTALITY

RECRUITMENT

MANAGEMENT QUALITY

STOCK STATUS

To see data for biomass, please view this site on a desktop.

DATA NOTES

A formal fisheries stock assessment was carried out on the full stock *(Xu et al. 2017)*. B and F estimates were calculated using base scenario mean values for Bmsy (= 519011 tonnes) and Fmsy (=0.651). This full stock assessment lacks, however, fishery-independent and dependent data within the EEZ of Peru and Chile (e.g CPUE, CPUA, length frequency in landings and surveys), reported in national IMARPE and IFOP stock assessment reports.

Peruvian

Last updated on 18 January 2017

1. Neither spawning stock biomass nor fishing mortality estimates are available, so numerical scores 1, 4 and 5 could not be determined. Qualitative scores have been attributed instead and regard information and data from PRODUCE (2012a).

2. Landings for 2005-2010 from IMARPE (2010), for 2011 and 2012 from FAO (2014). Set and advised Total Allowable Catches are available until 2012. Data for both 2013 and 2014 fishing years are not available.

Download Source Data
Download (https://s3.amazonaws.com/fs4.fishsource.org/uploads/data_file/file/3551/Jumbo_flying_squid-SE_Pacific_MB_16-01-2018_20180719034330.xlsm) the XLSM data file that contains the data shown here. You will need Microsoft Excel 2010 or later or OpenOffice to read the file.

FishSource Scores

Fishery Improvement Projects (FIPs)

No related FIPs

Fishery Improvement Projects (FIPs)

Certifications

Marine Stewardship Council (MSC)

No related MSC certifications

Certifications

Sources

Credits

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