INSTITUTO INVESTIGACIÓN PESQUERA

# MACKEREL

## GOOD PRACTICE MANUAL FOR THE INDUSTRIAL PURSE SEINE FISHERY FOR HORSE MACKEREL IN SOUTH-CENTRAL CHILE

ALIMENTOS MARINOS S.A. · BLUMAR SEAFOODS · Camanchaca · FoodCorp Austevoll Seafood Co. · ITORAL PESQUERA · LANDES · LotaProtein Part of TripleNine · ORIZON

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**Technical Development:** INPESCA (fisheries research institute) in collaboration with the companies Alimentos Marinos, Blumar, Camanchaca, Foodcorp, Pesquera Litoral, Landes, Lota Protein and Orizon.

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## 1. NATURE AND OBJECTIVE OF THE MANUAL OF GOOD PRACTICE

This manual has a voluntary nature for all industrial fishing companies in the Eighth Region, which will serve to disseminate good practice guidelines, generated within the framework of legal regulations to be used in the horse mackerel fishery conducted in the South Central zone of Chile in order to promote the sustainability of this fishery.

## 2. BOARD PRINCIPLES

This manual has been prepared within the framework of the recommendations established by the FAO and described in the Code of Responsible Fisheries (CCRF) (FAO, 1995), for which it is established that all participants in this fishery should tend towards the following elements in order to provide a long-term sustainable use of the fishery resources. For this reason, it is suggested that the different areas of selection set forth below be used as guidelines to determine the actions of the different users of the horse mackerel fishery:

## a) Sustainability

Fishing responsibly in order to ensure the conservation and effective management of living aquatic resources (CCRF Art 6.1).

To promote the maintenance of the quality of fishing and the diversity and availability of fishery resources in sufficient quantity for present and future generations, in the context of food security and sustainable development (CCRF Art 6.2).

Ensure that fishing effort is commensurate with the production capacity of the fishery resources and the sustainable use thereof (CCRF Art 6.3.) Minimize discards, catches by lost or abandoned fishing gear, catches of non-target species, both fish and non-fish species, and impacts on associated or dependent species (CCRF Art 7.2.2. g).

Continue to develop and apply, to the extent possible, selective and environmentally safe fishing gear and practices in order to maintain biodiversity and to conserve the population structure, aquatic ecosystems and quality of fish (CCRF Art 6.6).

Encourage the development and application of technologies and operational methods that reduce discards (CCRF Art 8.4.5).

## b) Safety of life at sea and hygiene

Ensure that fishing facilities and equipment, as well as all fishing activities, provide safe, healthy and fair working and living conditions and meet internationally agreed standards adopted by relevant international organizations (CCRF Art 6.17).

## c) Interaction with the environment

Use cost-effective and environmentally friendly selective fishing gear and techniques (CCRF Art 7.2.2.g).

The capture, handling, processing and distribution of fish and fishery products should be carried out in such a way as to maintain the nutritional value, quality and safety of the products, reduce waste and minimize negative effects on the environment (CCRF Art 6.7).

Adopt and enforce laws or regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) (CCRF Art 8.7.1).

Owners, charterers and operators of fishing vessels should minimize the amount of material on board that could be processed into garbage by applying proper sourcing practices (CCRF Art 8.7.3).

Government should encourage those involved in the processing, distribution and marketing of fish to: reduce post-harvest losses and waste (CCRF Art 11.1.8).

### d) Safeguarding of protected species, discarding and

Ensure the conservation not only of the target species, but also of those species belonging to the same ecosystem or dependent on them or associated with them (CCRF Art 6.2).

Waste of catch, both target and non-target species, bycatch of unused species and other living resources should be minimized (CCRF Art 6.6).

Reduce discards to a minimum (CCRF Art 7.2.2.g).

Encourage those involved in the processing, distribution and marketing of fish to: improve the use of bycatch, to the extent consistent with responsible fisheries management practices (CCRF Art 11.1.8 b).

### e) Data Collection

Compile data and make it available, respecting any applicable confidentiality requirements, in a timely manner and in an agreed format (CCRF Art 7.4.7).

Implement effective fisheries monitoring, control, surveillance and enforcement measures, including, where appropriate, an observer program, inspection mechanisms and vessel monitoring systems (CCRF Art 7.7.3).

Ensure that related documentation is collected on fishing operations, retained catches of fish and other species and, as regards discards, the information needed to evaluate stocks as established by the relevant management bodies and that it is sent systematically to these bodies (CCRF Art 8.4.3).

### f) Use and maintenance of catches

Promote the adoption of appropriate technology, considering economic conditions for the best possible use and treatment of retained catches (CCRF Art 8.4.4).

### g) Dissemination aspects

Recognizing that it is extremely important that fishers understand the issues related to the conservation and management of the fishery resources on which they depend, they should promote through education and training the awareness of fishers about responsible fisheries (CCRF Art 6.16).

Ensure, through training and capacity educational activities, that all those involved in fishing operations are informed about the most important provisions of this handbook of good practice.

# 3. 3. GENERAL ASPECTS OF THE HORSE MACKAREL FISHERY

## 3.1. Spatial distribution of horse mackerel

Horse mackerel (Trachurus murphy) is a highly migratory, straddling species, which inhabits the entire South Pacific, from the coast of Ecuador to Chile at one end and in oceanic waters along the Subtropical Convergence Zone to New Zealand's Exclusive Economic Zone (EEZ) at the other. Off the coast of Chile corresponding to the distribution area of the central-southern and northern fisheries (XV to X Regions) it has a distribution between the limit of 5 nautical miles (Art. 47 General Law on Fisheries and Aquaculture of Chile (LGPA)) and the Limit of the Exclusive Economic Zone (EEZ). In the oceanic region, it extends into the area of operation of the SPRFMO (South Pacific Regional Fisheries Management Organisation).

## 3.2. Current fisheries legislation

In Chile, the national fisheries policy is contained in the General Law on Fisheries and Aquaculture (LGPA) and aims at the sustainable use of hydrobiological resources, through the application of the precautionary approach, of an ecosystem approach to fisheries regulation and the safeguarding of marine ecosystems in which these resources exist, Article 1C establishes nine considerations when adopting conservation and management measures, in accordance with the guidelines established by FAO to generate measures for the long-term conservation and sustainable use of fishery resources (FAO, 1995).

**a)** Establish long-term objectives for the conservation and management of fisheries and the protection of their ecosystems as well as the periodic evaluation of the effectiveness of the measures adopted.

**b)** Apply the precautionary principle in the management and conservation of hydrobiological resources and the protection of their ecosystems.

Greater caution should be exercised in the management and conservation of resources when scientific information is uncertain, unreliable or incomplete; and ii) lack of sufficient, unreliable or incomplete scientific information should not be used as a reason for postponing or failing to take conservation and management measures.

**c)** Apply the ecosystem approach to the conservation and management of fishery

resources and the protection of their ecosystems, understood as an approach that considers the interrelation of the predominant species in a given area.

**d)** Manage fisheries resources in a transparent, responsable and inclusive manner.

**e)** Systematic, timely, accurate and publicly collected, verified, reported and shared data on hydrobiological resources and their ecosystems.

**f)** Consider the impact of fishing on associated or dependent species and the preservation of the aquatic environment.

**g)** Seek to prevent or eliminate overexploitation and excess fishing capacity.

**h)** To monitor effective compliance with conservation and management measures.

**i)** Minimize the discarding of both target species and accompanying fauna and the capture of bycatch.

### 3.2.1. Description of the main administration and management measures for horse mackerel

· **Minimum legal size:** In no case shall the minimum size be less than the smaller of the size at first sexual maturity or the critical size of the respective species. In this case, a minimum size of 10 inch fork length (FL) is considered throughout the country, with a percentage of tolerance for the extraction, transport, holding and processing of horse mackerel not exceeding 35% measured in number (Supreme Decree No. 458/81 and Exempt Resolution No. 1665/2012; Exempt Resolution No. 1663/1999).

· **Operation fishery area:** Geographic space defined as such by the authority for the purposes of exercising extractive fishing activities of a given hydrobiological species, in this case, it is established in the territorial sea, in the Exclusive Economic Zone, as well as in the High Sea (Supreme Decree No. 361/99).

· **Global quotas:** From 2001 to 2010, the formal establishment of the global quotas for horse mackerel fishing in Chile began, which were determined based on scientific information provided by the Fisheries Development Institute (IFOP) and finally agreed by the Consejo Nacional de Pesca (CNP).

Since it is a straddling species, this fishery from 2011 to date is managed jointly with a group of countries within the framework of a Regional Fisheries Management Organisation, the SPRFMO (South Pacific Regional Fisheries Management Organisation) and only from 2013 to the present, the SPRFMO quotas were established and split for each of the organisation's member countries. During the period 2018-2021, the global quota of South Pacific horse mackerel, (SPRFMO) allocated to Chile, corresponds to 64.6% of the global quota of South Pacific horse mackerel (Exempt Resolution No. 807/2017). Finally, any modification of the overall catch quota that implies an increase or decrease of the quota, shall be based on new scientific background, and shall be subject to the same procedure established for its determination.

· **Accompanying fauna:** It is described as being made up of hydro-biological species that temporarily or permanently occupy a common maritime space with the target species, and which, due to the technological effect of the fishing gear or equipment, are captured when the fishing vessels direct their fishing effort to the exploitation of the target species. In this case, the Exempt Resolution No. 2561/2019 identifies the following species as accompanying fauna for the horse mackerel fishery between the regions of Valparaiso to the Lakes and International Waters (see table 1).

**Table 1.** Accompanying fauna species in horse mackerel fishery V to X regions with or without annual global quota (AGQ), with purse seine and mid-water trawl

| Common name | Scientific name | Category |
|---|---|---|
| Anchovy | *Engraulis ringens* | Accompanying fauna with AGQ |
| Araucanian herring | *Strangomera bentincki* | Accompanying fauna with AGQ |
| Chilean hake | *Merluccius gayi gayi* | Accompanying fauna with AGQ |
| Hoki | *Macruronus magellanicus* | Accompanying fauna with AGQ |
| Jumbo Squid | *Dosidicus gigas* | Accompanying fauna with AGQ |
| Squat lobster | *Pleuroncodes monodon* | Accompanying fauna with AGQ |
| Cardinal fish | *Epigonus crassicaudus* | Accompanying fauna with close season |
| Atlantic saury | *Scomberesox saurus* | Accompanying fauna without AGQ |
| Swordfish | *Xiphias glaudius* | Accompanying fauna without AGQ |
| Skipjack tuna | *Katsuwonus pelamis* | Accompanying fauna without AGQ |
| Yellowfin tuna | *Thunnus albacares* | Accompanying fauna without AGQ |
| Albacare | *Thunnus alalunga* | Accompanying fauna without AGQ |
| Big eye tuna | *Thunnus obesus* | Accompanying fauna without AGQ |
| Pacific sandpech | *Prolatilus jugularis* | Accompanying fauna without AGQ |
| Eastern Pacific bonito | *Sarda chilensis* | Accompanying fauna without AGQ |
| Mackerel | *Scomber japonicus* | Accompanying fauna without AGQ |
| Silver warehou | *Seriollela punctata* | Accompanying fauna without AGQ |
| Palm ruff | *Seriollela violácea* | Accompanying fauna without AGQ |
| White warehou | *Seriollela caerulea* | Accompanying fauna without AGQ |
| Corvina | *Cilus gilberti* | Accompanying fauna without AGQ |
| Mahi mahi | *Coryphaena hippurus* | Accompanying fauna without AGQ |

### 3.2.2. Discard and bycatch reduction plan for horse mackerel

According to the Exempt Resolution No. 1626 of MINECON dated April 30th 2019, it was authorized the implementation of a plan for the reduction of discard and bycatch for the industrial fishery of horse mackerel and its accompanying fauna, for the regions of Valparaíso - Los Lagos and international waters. This plan, as stipulated by the LGPA in its article 7°A, paragraph 3°, letter A, contains the management and conservation measures and the technological means necessary to reduce the discard, of the target species, the accompanying fauna and bycatch.

### 3.2.3. Installation of image recording device (IRD) to detect and record discard

According to law No. 20,625, which incorporated Article 64 E, now Article 65 I, into the General Law on Fisheries and Aquaculture. It established the obligation to install on board, along with maintaining in operation throughout the fishing trip, an image recording device that allows the detection and recording of any discard action that may occur on board. Supreme Decree No. 76 of MINECON, dated 08 May 2015, approved an Image Registration Device Regulation (IRD) that allows to detect and record any discarding action that may occur on board fishing vessels as referred to in Article 65b of the General Law on Fisheries and Aquaculture. During 2019, the installation of IRDs on industrial purse-seine fishing vessels dedicated to the capture of horse mackerel was initiated, and during 2020 the registration process will begin in accordance with the provisions of Supreme Decree No. 76 of MINECON.

### 3.2.4. Delivery of catch and landing information

#### a) Declaration of unloading

Each industrial fishing owner must submit to the Chilean fisheries service (Sernapesca) information on their catches and unloading in electronic format or duly accredited paper format, at the time of reaching port or no later than the working day following the unloading.

#### b) Filling of Sernapesca fishing logs

The captain of each vessel must leave a record of the operational information of the fishing sets, for which Sernapesca has designed an electronic logbook. This

computer application allows the entry of information on board: the identification of the vessel owner, the vessel and its captain, as well as the holder of the tradable fishing license (Licencia Transable de Pesca (LTP)) the date of departure and reaching port, name of departure and unloading port, the fishing gear or equipment, date and time of setting and tacking of each fishing set, geographical position, estimated catches by species or group of species, and the quantities discarded by species or group of species and the bycatch, when applicable. Once the vessel has reached port, the information is sent by internet to Sernapesca with the necessary accreditations that do not allow adulteration.

**c) Filling in fishing logbooks in internal ORP format EEZ (voluntary agreement between companies)**

In parallel to the electronic logbook used by Sernapesca, the industrial fishing companies have agreed to use a similar system for entering information on a digital platform, based on an application that allows the entry of operational information on fishing sets, in addition to the information from the biological sampling of horse mackerel, carried out after each fishing set by the crew and/or scientific personnel of the Chilean institute of fishing research (Inpesca) that joins the vessel frequently. This information is sent to a server belonging to Inpesca, and entered to a database, once the application manages to connect to the Internet, either at sea or after the vessel has reached port. This application allows queries to be made to the database in order to obtain the fishing logs in the formats required by Sernapesca, Inpesca, Ifop (a Chilean institute of fishery enhancement) and also in the format that each of the companies uses to control the raw material on board, which allows support for the traceability of the fishing products produced and the programming of the unloading operation, determining, among other things, the best alternative for referral to the different facilities that exist for the processing of the raw material. The latter allows to improve the efficiency and effectiveness in the handling of the horse mackerel catches in order to obtain a better use of the captured resources.

The information entered includes the following fields: identification of the vessel owner, the vessel (flag HSF ISO Alpha-3 Code; Name; vessel hold capacity; Registration; IMO) and its captain, as well as the LTP holder, the date of departure and reaching port, name of departure and unloading port, fishing gear (length and height), date and time of beginning and end of each fishing set, set number, geographical position, estimated catches by species, discarded by species and bycatch (Number of: caught, caught alive, juveniles, adults, released, holding and release conditions) when applicable, sea surface temperature, wind strength direction, shoal direction, maximum and minimum of shoal depth, arrival time to

0°c of the vessel hold, proportion of catch by size per vessel hold, distribution of catches per vessel hold, size structure per vessel hold (mode, average, range). Some of these parameters are obtained from information processing carried out by the application.

### d) Unloanding certification

The certification, although it is carried out by an external company that is accredited by Sernapesca, is the responsibility of the vessel owner, which considers the costs and coordination with this company to carry out this activity. Thus, a vessel can not unload, if not certified by this body, in this case, unloading of horse mackerel must be estimated in a weighing system enabled by SERNAPESCA.

In order to carry out the certification, the vessel owners must inform the vessel arrival to SERNAPESCA before reaching to the authorized port. According to the regulations, this must be done two hours in advance, indicating the name of the vessel, time and port name quantity and type of resource per hold and the time at which unloading will begin.

# 4. GENERAL CONSIDERATIONS REGARDING CHONDRICHTHYANS AND INCIDENTAL FAUNA

## 4.1. CHONDRICHTHYANS

Although the presence of species associated with chondrichthyans (sharks, rajiformes and chimaeras) is not common in the purse-seine fishery for horse mackerel in the Centre-South zone (V to X regions), they represent a high vulnerability to the effects of this type of fishing, largely due to aspects of their biology, such as: a) slow growth rates; b) late maturity; c) long gestation periods; d) low fertility; e) and long life (ISSF, 2016).

In particular, there are two species of sharks that represent a fishery for the artisanal sector in central and northern Chile, these are the shortfin mako shark (Isurus oxyrinchus) and blue shark (Prionace glauca), which are sold as "albacorilla", having an impact on the diet of coastal communities mainly in northern Chile. Within other artisanal fisheries, common thresher (Alopias vulpinus), porbeagle (Lamna nasus) and smooth hammerhead (Sphyrna zygaena) are also caught occasionally, all of them and the two species described above are catalogued as vulnerable according to the International Union for Conservation of Nature (IUCN).

On 29 July 2011, Law No. 20.525 was passed prohibiting finning on board fishing vessels or their transshipment, which has had a positive impact on reducing the catch and discard of sharks.

On the other hand, there are studies that indicate for sharks that although they look healthy when released, only 50% survive, due largely to the intense stress or injuries suffered during the fishing and handling process. In this sense, this high mortality rate may be influenced by the fact that these animals do not possess a rigid skeleton of bone that protects their internal organs, once they are out of the water they are susceptible to the effects of gravity and blows that can crush or damage their organs, at the same time if taken from the head or tail they can suffer irreversible damage (ISSF, 2016).

## 4.2. SEA TURTLES

All sea turtle species are long-lived, slow-growing, complex and have a wide range of habitats in which they thrive (FAO 2011). They are also protected internationally, as they face a number of environmental threats (destruction of their breeding grounds, ship strikes, ingestion of marine debris, diseases linked to ocean pollution), including interactions with fishermen. In Chile there are 4 species that are under a national extractive ban until the year 2025, for which it is prohibited to capture, keep, possess, transport, unloading, production or any process of transformation, commercialization, storage of whole or part of them, these species are Caretta caretta, Chelonia mydas agassizi, Lepidochelys olivacea and Dermochelis coriácea (Exempt Decree No. 225/9 of 9 November 1995, Mod. No. 135 of 2005 and Exempt Decree No. 434 of 2007 of the Ministry of Economy, Development and Tourism). The holding, possession and transport of dead specimens, parts of an specimen is not prohibited, if it is provided that is done by higher education institutions or museums located in the national territory, for the purposes teaching, research, storage or exhibition, without prejudice to compliance with the respective health regulations.

On the other hand, Law 20.625, which establishes the discarding of hydro-biological species and establishes control measures and sanctions for those who incur in this practice in fishing operations, indicates in its article 7°C that it will be obligatory to return marine reptiles to the sea, unless they are severely damaged or injured, in which case they will be retained on board for the purpose of being sent to a rehabilitation centre for hydro-biological species.

## 4.3 SEABIRDS

Although the interaction between the presence of seabirds and the industrial purse-seine horse mackerel fishery is less frequent than that recorded in the purse-seine fishery for araucanian herring and peruvian anchoveta, they are still vulnerable to this type of fishing gear.

According to their biology, seabirds are characterized by late maturity and late starts to breed; many albatrosses do not start breeding until they are ten years old and thereafter produce a maximum of one egg each year, with many species only breeding every one and a half years. To compensate for this, seabirds are long-lived, with very low natural adult mortality. These characteristics make any increase in human-induced mortality potentially detrimental to the viability of populations, since even small increases in mortality can result in population declines. Bycatch in fisheries is the main threat facing seabird populations.

In the context of purse-seine fisheries, seabird bycatch in the horse mackerel fishery between 2015 and 2016 showed higher values during spring-summer, corresponding to periods in which the fishing fleet is distributed closer to the coast and overlaps with the return of migratory species, such as the Pink-footed shearwater Ardenna creatopus (Vega et al. (2017)). Indeed, among the species most affected, divers such as the Pink-footed shearwater (*Ardenna creatopus*), Sooty Shearwater (*Ardenna griseus*), Peruvian pelican (*Pelecanus thagus*), Kepl Gull (*Larus dominicanus*) were found, Black-browed albatross (*Thalassarche melanophrys*) and Humboldt penguin (*Spheniscus humboldti*), all of which represent 94% of the total birds captured and 97% of the total bird mortality recorded by observers.

Supreme Decree 272 of the Ministry of Foreign Affairs of Chile (November 3rd, 2011), promulgated the Agreement on the Conservation of Albatrosses and Petrels, ratifying Chile as part of this multilateral agreement since 2005 (www.acap.aq), dedicated to the protection of a list of 31 species of albatrosses, petrels and shearwaters.

At the same time, this international agreement was later ratified at the national level by Law 20.625 in its article 7°C which states that *"it will be obligatory to return penguins and other marine birds to the sea, unless they are severely damaged or injured, in which case they will be retained on board for the purpose of being sent to a rehabilitation center for hydro-biological species".*

## 4.4. MARINE MAMMALS

In general terms the level of marine mammal bycatch in the industrial purse seine fishery is low, however, bycatch is the main threat that marine mammal populations face. The Chilean national legislation mainly includes general environmental regulations (Ley de Bases del Medio Ambiente), the General Fisheries and Aquaculture Law (Law No. 18.892 and its amendments), and specifically Law No. 20.293 (protection of cetaceans) and Exempt Decree No. 225 of 1995.

The LGPA (Law No. 18.892 and its amendments), in its Title III, Paragraph 4 "On the protection, rescue, rehabilitation, reinsertion, observation and monitoring of hydro-biological mammals, reptiles and birds", in its Art. 13° notes ...*"The Undersecretariat for Fisheries and Aquaculture, by means of a resolution, shall establish the procedure and characteristics to which the rescue of individuals of a hydro-biological species that are in an evident and imminent threat of death or physical harm, or that are incapable of surviving in their environment..."*

The process of safeguarding or releasing one or more individuals from an obvious or imminent threat of death or physical harm, when this is the result of the effects of anthropogenic activities, contamination of their environment or adverse environmental factors, and reintegrating them into their natural environment when conditions permit.

Exempt Decree No. 225/9 of November 9th,1995, as amended by Exempt Decree No. 135 of 2005 and Exempt Decree No. 434 of 2007, all from the ministry of economy, development and reconstruction (now the Ministry of Economy, Development and Tourism), establishes for a group of 70 species of marine vertebrates, including marine mammal species, a national ban on extraction for a period of 30 years (until 2025). It prohibits the capture, possession, transport, unloading, processing or any process of transformation, commercialization, storage of whole specimens or parts of them.

On the other hand, Law 20.625, which establishes the discarding of hydro-biological species and establishes control measures and sanctions for those who incur in this practice in fishing operations, indicates in its article 7°C that it will be obligatory to return marine mammals to the sea, unless they are severely damaged or injured, in which case they will be retained on board for the purpose of being sent to a rehabilitation center for hydro-biological species.

**Table 2.** Protected species associated with bycatch (marine mammals, sea birds and sea turtles).

| Group | Common name | Scientific name |
|---|---|---|
| Cetaceans | Dwarf sperm whale | *Kogia sima* |
| | Pygmy sperm whale | *Kogia breviceps* |
| | Short-finned pilot whale | *Globicephala macrorhynchus* |
| | Long-finned pilot whale | *Globicephala melas* |
| | Pygmy killer whale | *Feresa attenuata* |
| Large Cetaceans | Blue whale or giant whale | *Balaenoptera musculus* |
| | Bryde's whale | *Balaenoptera edeni* |
| | Fin whale | *Balaenoptera physalus* |
| | Southern right whale | *Eubalaena Australis* |
| | Humpback whale | *Megaptera novaeangliae* |
| | Antarctic minke whale | *Balaenoptera bonaerensis* |
| | Minke whale | *Balaenoptera acutorostrata* |
| | Pygmy right whale | *Caperea marginata* |
| | Sei whale | *Balaenoptera borealis* |
| | Sperm whale | *Physeter macrocephalus* |
| | False killer whale | *Pseudorca crassidens* |
| | Killer whale | *Orcinus orca* |

| Group | Common name | Scientific name |
|---|---|---|
| Beaked whales | Southern bottlenose whale | *Kogia sima* |
| | Cuvier's beaked whale | *Kogia breviceps* |
| | Sherpherd beaked whale | *Globicephala macrorhynchus* |
| | Bahamondes's beaked whale | *Globicephala melas* |
| | Blainville's beaked whale | *Feresa attenuata* |
| | Gray's beaked whale | *Balaenoptera musculus* |
| | Hector's beaked whale | *Balaenoptera edeni* |
| | Strap-toothed whale | *Balaenoptera physalus* |
| | Pygmy beaked whale | *Eubalaena Australis* |
| | Arnoux's beaked whale | *Megaptera novaeangliae* |
| Dolphinidae | Peales dolphin | *Balaenoptera bonaerensis* |
| | Common dolphin | *Balaenoptera acutorostrata* |
| | Common dolphin | *Caperea marginata* |
| | Hourglass dolphin | *Balaenoptera borealis* |
| | Rough-toothed dolphin | *Physeter macrocephalus* |
| | Spinner dolphin | *Pseudorca crassidens* |
| | Risso's dolphin | *Orcinus orca* |
| | Southern right-whale dolphin | *Lissodelphis peronii* |
| | Striped dolphin, Blue-white dolphin | *Stenella coeruleoalba* |

| Group | Common name | Scientific name |
|---|---|---|
| Dolphinidae | Pantropical spotted dolphin | *Stenella attenuata* |
| | Bottle-nosed dolphin | *Tursiops truncatus* |
| | Dusky dolphin | *Lagenorhynchus obscurus* |
| | Chilean dolphin | *Cephalorhynchus eutropia* |
| | Commerson's dolphin | *Cephalorhynchus commersonii* |
| Porpoise | Spectacleddporpoise | *Phocoena dioptrica* |
| | Burmeister's porpoise | *Phocoena spinipinnis* |
| Mustelids | Marine otter | *Lontra felina* |
| | Chilean river otter | *Lontra provocax* |
| Pinniped | Crabeater seal | *Lobodon carcinophagus* |
| | Ross seal | *Ommatophoca rossii* |
| | Weddell seal | *Leptonychotes weddellii* |
| | Southern elephant seal | *Mirounga leonina* |
| | Leopard seal | *Hydrurga leptonyx* |
| | Antarctic fur seal | *Arctocephalus gazella* |
| | South American fur seal | *Arctocephalus australis* |
| | Juan Fernández fur seal | *Arctocephalus philippi* |
| | Subantartic fur seal | *Arctocephalus tropicalis* |

| Group | Common name | Scientific name |
|---|---|---|
| Sea turtles | Loggerhead sea turtle | *Caretta caretta* |
| | Leatherback sea turtle | *Dermochelys coriacea* |
| | Olive ridley sea turtle | *Lepidochelys olivacea* |
| | Green sea turtle | *Chelonia mydas* |
| Penguins | Adelie penguin | *Pygoscelis adeliae* |
| | Chinstrap penguin | *Pygoscelis antarctica* |
| | Humboldt penguin | *Spheniscus humboldti* |
| | Magellanic penguin | *Spheniscus magellanicus* |
| | Rockhopper penguin | *Eudyptes chrisocome* |
| | Emperor penguin | *Aptenodytes forsteri* |
| | Macaroni penguin | *Eudyptes chrisolophus* |
| | Gentoo penguin | *Pygoscelis papua* |
| | King penguin | *Aptenodytes patagonicus* |

**Table 3.** By-catch species in the horse mackerel fishery (Exempt Resolution No. 2561, 2019)

| Group | Common name | Scientific name |
|---|---|---|
| Birds | Gray headed albatross | *Thalassarche chrysostoma* |
| | Black-browed albatross | *Thalassarche melanophris* |
| | Wandering albatross | *Diomedea exulans* |
| | Unidentified albatross | *Thalassarche sp.* |
| | Pink-footed shearwater | *Ardenna creatopus* |
| | Sooty shearwater | *Ardenna griseus* |
| | White-chinned petrel | *Procellaria aequinoctialis* |
| | Kepl gull | *Larus dominicanus* |
| | Northern storm petrel | *Hydrobatidae* |
| | Wilson's storm petrel | *Oceanites oceanicus* |
| | Peruvian pelican | *Pelecanus thagus* |
| | Southern giant petrel | *Macronestes giganteus* |
| | Cape petrel | *Daption capense* |
| Pinnipeds | South American sea lion | *Otaria flavescens* |
| Penguins | Humboldt penguin | *Spheniscus humboldti* |
| | Unidentified penguin | *Spheniscus sp.* |
| Sea turtles | Leatherback sea turtle | *Dermochelys coriacea* |

# 5. GOOD PRACTICES (GP) TO MITIGATE HORSE MACKEREL DISCARDING

Unlike other fisheries, such as demersal fisheries, the purse-seine fishery for horse mackerel allows the fish to be kept alive in the purse-seine net under appropriate fishing conditions. Nevertheless, the discarding of horse mackerel also poses a threat to the sustainability of this fishery, under the assumption that there is physical and physiological damage to the fish that are released, even if they are alive in the net that contains them, and in view of the impossibility of being able to effectively quantify this discard. In this way, it is necessary to generate actions that allow the mitigation of the discarding of this resource.

## 5.1. Considerations in implementing GP to mitigate discard events

The industrial fishing company of the Eighth Region dedicated to the capture of horse mackerel, in this case, the companies Alimar, Pesquera Litoral, Blumar, Camanchaca Pesca Sur, Foodcorp, Landes, and Orizon, have made a commitment to the sustainability of the fishery of this resource, recognizing first how relevant it is to improve fishing practices and then establishing by consensus the actions that should be carried out, in which it has also assumed the recommendations generated for this fishery contained in the plan for reduction of discards, bycatch and accompanying fauna (PRDJ in Chile) (R. Pesq. No.106/2019). Thus, one of the most important objectives of this good practice manual focuses on the company's interest in reducing discards and mitigating bycatch. On the other hand, it is important to highlight that there are actions that need to be carried out at the regulatory level, to support the development of measures to mitigate the discarding of horse mackerel. In this sense, the PRDJ establishes the following in the first two administrative and conservation measures (M1 and M2) of the action plan for the reduction of the target species (horse mackerel):

**M1.** Review of the current regulations to evaluate the technical and legal feasibility of transferring excess catch from the codend to another fishing vessel to be carried out during 2019.

**M2.** Review of the current regulations regarding the current tolerance margin of the minimum legal size of horse mackerel to be carried out during 2019.

These elements open a space for significant improvement in scaling up the actions required to significantly reduce the discard of horse mackerel. **On the one hand, until before the existence of the PRDJ, the fleet has used and will continue to use the delivery of the existing fish in the net (codend) from one ves-**

**sel to the hold of another, as a good practice to reduce the discard of horse mackerel, as indicated in the Chilean National Fisheries Service's Exempt Resolution 2738, which approves the protocols for handling catch, discard and bycatch in industrial purse seine vessels.** And on the other hand, the possibility of making modifications to the current margin of tolerance for the minimum size of horse mackerel, if possible by emphasizing a change in the registration scale. For example, from a scale by fishing trip to a monthly or annual scale, which would allow the move-on to operate in an appropriate manner, because the captain of the vessel who reports the presence of catches with a high level of specimens under the minimum legal size would no longer be unprotected, as is currently the case, and which leaves him in the possibility to break the law by dis-boarding horse mackerel with a higher level of juveniles than that permitted by the regulations. Therefore, it is necessary for the authority to pronounce during the second half of 2019, on the revision of these regulations and then these modifications can be incorporated, which effectively aim to strengthen the actions that will reduce the discard of horse mackerel to minimum values.

## 5.2. Good practice actions to mitigate the horsemackerel discarding

In accordance with the provisions of the LGPA (Paragraph 1Bis), it is prohibited to discard specimens of the target species, and all catches must be landed and charged to the respective LTP's or quotas. The discards made will be subject to the sanctions established in the LGPA (Article 40° A, 111° B and 113°).

However, as stated in the PRDJ, in administration and conservation measure No. 3 As of the enactment of this plan, "*only discarding of the target species shall be authorized, for documented reasons of safety at sea, due to mechanical failure, risk of the vessel's crew or craft's.*"

**BP1.** Train crews on the biology and ecology of horse mackerel, in addition to the negative effects of discarding horse mackerel on the condition of the stock, as well as on the certification of this fishery and access to markets.

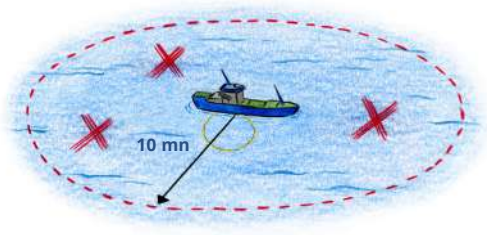
**BP2.** Provide everything for adequate inspection on board the vessel and ashore.

**BP3.** Have everything needed for embarking scientific observers, providing appropriate conditions for the performance of their work and obtaining quality information.

**BP4.** Carry out the filling out of fishermen's self-reporting logs in the electronic form designed by the company and Sernapesca, as a complementary tool for the collection of biological fishing information for management purposes.

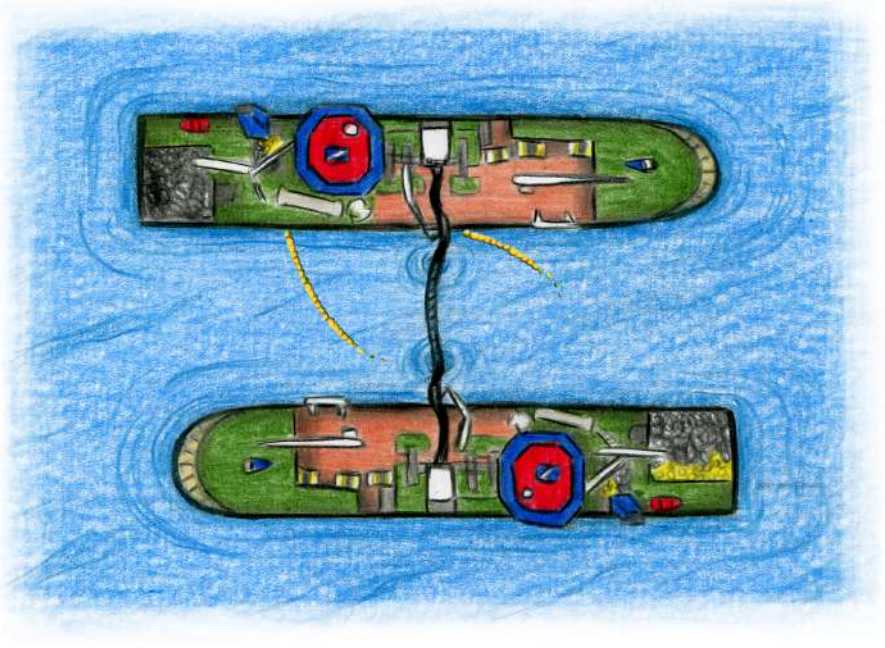
**BP5.** Encourage and recognize outstanding compliance with good fishing practices by users (crews) and maintain the horse mackerel fishery certified under the Marine Stewart Council (MSC) standard and/or the Global Standard for Responsible Supply (IFFO RS).

**BP6.** A fishing set should not be repeated if a percentage of undersized horse mackerel is detected above the legal minimum. In this case, the vessel that makes this finding must inform the rest of the fleet, the company's own fleet office and the maritime authority and Sernapesca. Once this action is done, it will proceed to activate a closure of the fishing área within a radius of 10 mn, being the centroid the position of the fishing set reported, this closure will be extended for a period of one week. This change of area will force a search for new fishing zones, in which this good practice will be applied again if a percentage of undersized horse mackerel is detected that is greater than the legal minimum.

**BP7.** In the event that successive fishing sets are made with a record of the percentage of undersized horse mackerel in excess of the legal minimum, at different points within the area of operation of the fishery, the fleet as a whole shall cease fishing activities for a period of one week, as in previous years. Surveys should be carried out throughout this area to find fishing areas in which changes in the size composition of this resource are established, allowing the resumption of fishing activity.


**BP8.** Deliver the fish in the net (codend) of one vessel to the hold of another vessel when the former has retained more fish than the planned catch for that fishing trip.



# 6. GOOD PRACTICES TO MITIGATE THE DISCARDING OF COMPANION ANIMAL SPECIES WITH OR WITHOUT AN ANNUAL GLOBAL QUOTA

In accordance with the provisions of the LGPA (Paragraph 1Bis), it is prohibited to discard fish of associated species or fauna accompanying horse mackerel managed with or without an annual global quota or subject to regulation (close season, prohibition of gears or equipment, etc.), with all catches being landed and charged to the respective LTPs or quotas, in the case of those with a quota, or with all catches simply being unloaded, in the case of those without a quota. Discards of accompanying fauna will be subject to the sanctions laid down in the LGPA (Articles 40° C, 111° A, 111° B and 113°).

## 6.1. Actions in the implementation of Good Practices to mitigate the discarding of the accompanying fauna

**BP1.** Train crews on the biology and ecology of companion animal species with or without a global quota, the effects of catching on vulnerable species, as well as on the certification of this fishery and access to markets.

**BP2.** Provide everything for adequate inspection on board the vessel and ashore.

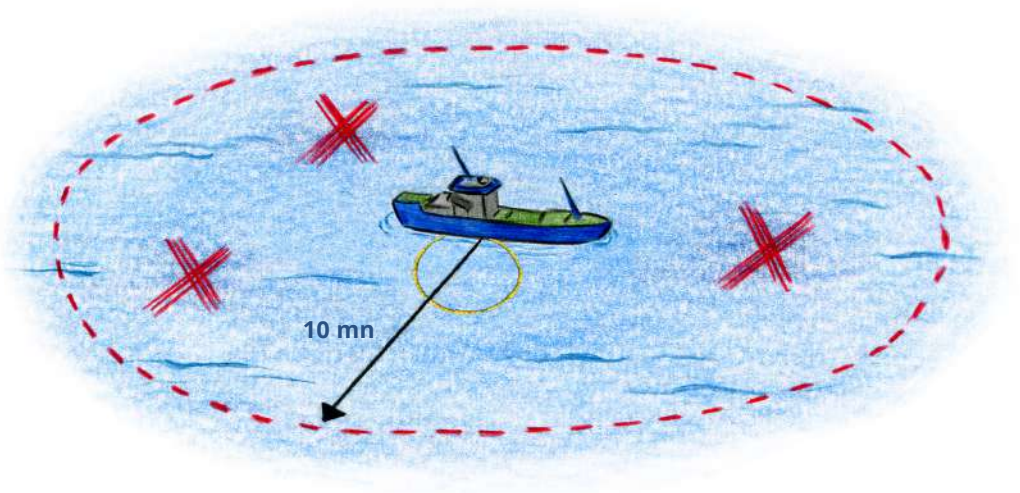
**BP3.** Have everything needed for embarking scientific observers, providing appropriate conditions for the performance of their work and obtaining quality information.

**BP4.** Carry out the filling out of fishermen's self-reporting logs in the format of an electronic form designed by the company and Sernapesca, as a complementary tool for the collection of fishing biological information for management.

**BP5.** Encourage and recognize outstanding compliance with good fishing practices by users and maintain the horse mackerel fishery certified under the Marine Stewart Council (MSC) standard and/or the Global Standard for Responsible Supply (IFFO RS).

**BP6.** From the operational point of view, the vessel that finds species of fauna with a quota above the defined limits or without a quota, must inform the rest of the fleet, the company's own fleet office and Sernapesca of this result. This information must contain the position of the fishing set, the name of the species and the proportion in which it was registered. Once this action has been taken, a closure of the fishing area within a radius of 10 nm, the center being the position of the reported fishing set, this closure shall be extended for a period of one week. The change of area will force a search for new fishing zones, in which this good practice will again be applied, if the result indicating a high presence of accompanying fauna with a quota above the defined limits or without a quota is repeated.

**BP7.** Refrain from setting in an area closed to capture due to the detection of accompanying fauna species with or without a quota over the defined limits.



# 7. GOOD PRACTICES FOR MITIGATING CHONDRICHTHYAN FISHERIES AND BYCATCH OF MAMMALS, SEA BIRDS AND SEA TURTLES, AND TO ALLOW THEIR RELEASE

Chondrichthyans play an important role as top predators in aquatic systems, affecting their structure and function within the other nodes of the food webs (Whetherbee et al., 1990). On the other hand, the increase in shark fisheries caused by the market for the fins of these hydrobiological resources and the use of their meat for human consumption, have resulted in some populations being depleted or endangered. Therefore, avoiding fishing for these resources is relevant, even though it is not very common in the horse mackerel fishery, and it also represents a threat to chondrichthyans.

## 7.1. Actions in the implementation of Good Practices to mitigate bycatch and chondrichthyans

**BP1.** Comply with existing precautionary protocols for the identification, safe handling on board and return to the sea of marine birds, mammals and reptiles (sea turtles), ensuring their survival. Likewise, it is proposed that it will be necessary to avoid setting sail in areas with a high abundance of incidental species.

**BP2.** Train crews on the effects of bycatch on affected populations, impacts on ecosystem functioning and the negative effect of bycatch on the image of the fishery, fishing certifications and access to markets.

**BP3.** Have everything needed for the embarkation of scientific observers, providing appropriate conditions for the performance of their work and obtaining quality information.

**BP4.** Encourage and recognize outstanding compliance with good fishing practices by users.

**BP5.** Maintain permanently filled in fishers' self-reporting logbooks, as a complementary tool for collecting information on the interaction of the fishery with the bycatch.

**BP6.** The provisions of Annex V MARPOL should be fully complied in order to reduce interaction with marine birds, mammals and reptiles (entangling or otherwise).

## 7.2. Protocol for the mitigation, handling and release of marine mammals

**1.** Reinforce and systematize in the short term, education activities, intensive and systematic dissemination to crews of high seas fishing vessels (HSF) dedicated to the capture of horse mackerel, on the biology, ecology, taxonomy and appropriate actions to produce mitigation of marine mammal bycatch and in addition to the procedures for release or maintenance on board.

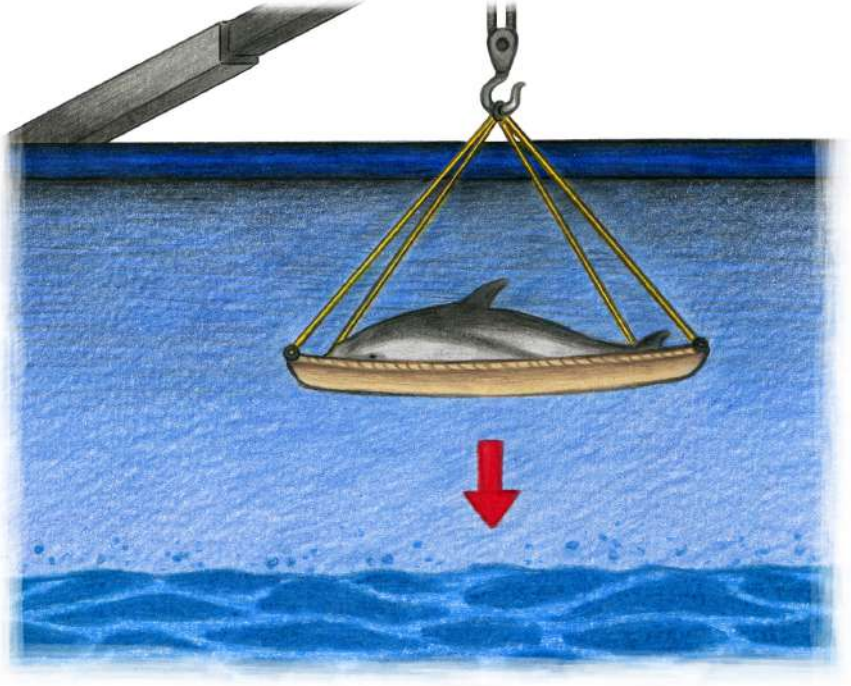
**2.** Avoid fishing activities in areas with abundant presence of dolphins or whales.

**3.** At present, initiatives are being developed in research and development of devices and strategies that will make it possible to prevent sea lions from entering the fishing net or, on the other hand, to drive them away once they have entered it. This is happening in parallel with the preparation of the current manual of good practices; however, it is proposed that once this strategy has been validated and handed over to the Undersecretariat for Fisheries and Aquaculture, its implementation should be sought in the purse-seine vessels dedicated to the capture of horse mackerel, to be used in the mitigation of incidental fishing of these mammals.

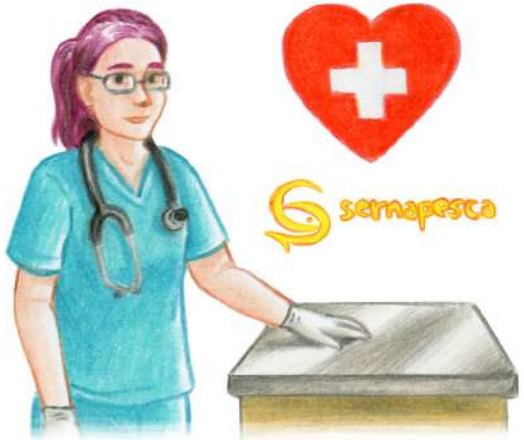
**4.** However, if a sea lion is trapped in the net, it is suggested that the maneuver be stopped and that an assessment be made as to whether the animal can be released from the net, either by cutting the netting with a knife or in some other way, depending on how the animal is trapped in the net, and without this posing a safety risk to the crew and the vessel. If the cetaceans have not been released, the catch must be discarded, cutting the vat to allow their release, as indicated in the plan to reduce discard and bycatch for the horse mackerel industry and its accompanying fauna (Exempt Resolution No. 1.626 of the Undersecretary for Fisheries and Aquaculture.

**5.** An identification of the mammal species captured and released (whale, dolphin or sea lion) must be made, based on a catalogue of species described for the Chilean coast and which each vessel must have on board.

**6.** In case that once released, this specimen is located in the main deck of the vessel, the fishing maneuver should be stopped to establish if the specimen is alive, if so, in the case of the sea lion, space should be given so that the specimen can leave by its own means towards the sea, from the sides of the vessel that allow its evacuation. This action should be carried out with the maximum care and without stimulating the wolf negatively, in order to avoid attacks on the crew. On the other hand, if any dolphin falls on the deck after being released from the net, its condition must be verified (alive/dead) verifying activity, if it registers signs of life, it will be necessary to keep it wet with fresh sea water, covering it with a wet blanket, if it is not badly injured it must be returned to the sea for which it will be deposited in a landing net or stretcher with which it will be gently moved to the sea, helped by the main crane. Before being returned to the sea it will be necessary to verify if the animal has tangled lines of hooks or pieces of nets, if so, they should be completely removed, not leaving any line that prevents it from swimming.

**7.** If sea lions or dolphins fall on the deck and are injured, as far as possible and without affecting the safety of the crew, an attempt will be made to place them on the side of the boat, and then they will be taken to port and referred to a veterinary care center in agreement with Sernapesca. For this it will be necessary to coordinate with Sernapesca when reaching port with these specimens, their unloading and transfer to that center. In the case that the specimens do not show signs of life at after a period of time, the death should be recorded on the electronic fishing form and the body should be discarded.




**8.** The bycatch of the marine mammal(s) caught should be rigorously recorded on the electronic fishing logbook, establishing the following items: Name of vessel, name of captain, target fishery, fishing gear, date/time of catch, geographical position of catch, depth of catch, species name of marine mammal caught, number of fish, general condition (alive or dead), conditions of release, condition of retention on board (if applicable).

**9.** The geographical position of these mammals (whales, dolphins or sea lions) and the number of specimens caught must be communicated to the other vessels participating in the horse mackerel fishery, as well as to the fleet offices of each fishing company, in order to establish critical catch sites for these species so that these areas can be avoided.

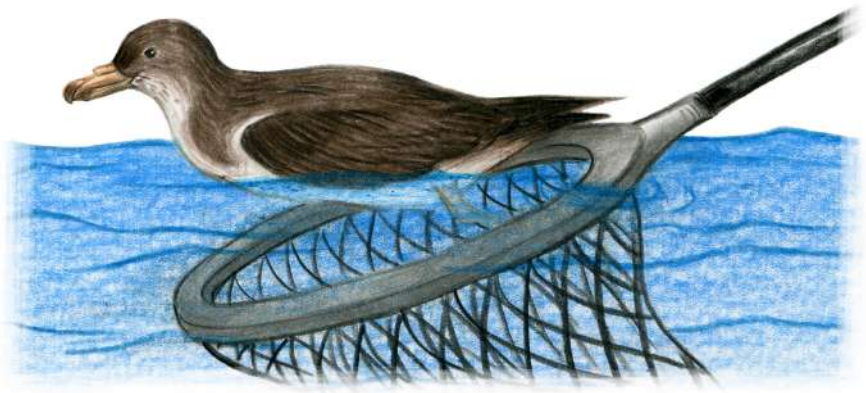
**10.** Encourage and recognize outstanding compliance with good fishing practices by users.

**11.** Facilitate the boarding of scientific observers, providing the appropriate conditions for their good performance.

### 7.3. Protocol for the mitigation, handling and release of seabirds.

**1.** Reinforce and systematize in the short term, educational activities, intensive and systematic dissemination to the crews of High Seas Fisheries vessels (HSF) dedicated to the capture of horse mackerel. These should include knowledge about the biology, ecology, identification of species and appropriate actions to comply with seabird bycatch mitigation measures, and also standardize the procedures for release or retention on board in order to refer the birds to medical-veterinary treatment on land.

**2.** If there is entanglement of seabirds in the fishing net, considering the variety of species that can be caught incidentally, it is suggested to stop the maneuver and according to the suggestion of ATF (Ortiz-Soazo & Suazo 2019), use a landing net to extract the seabirds without producing any damage to their physical integrity, avoiding lacerations or fractures. These actions are suggested considering not to generate risks in the physical and psychological integrity of the crew and in the integrity of the vessel in charge of these procedures.



**3.** The identification of the species of sea bird captured and released, based on the catalogue of species described for the Chilean coast, present on each vessel for consultation on board, must be carried out. For handling the birds once on board the vessel, the use of safety equipment is recommended, such as thick rubber gloves (e.g., cut resistant gloves), the use of goggles or safety glasses to avoid eye damage to the crew member handling the specimens.

**4.** In general terms, if rescued birds show no apparent injuries and also manifest normal activity (they are not soaked and stand on their own), they should be released. For the release procedure, the handler must hold the bird's bill without covering the nostrils and also hold the bird's body in order to immobilize the wings to prevent spreading them. Afterwards, it is necessary to position oneself on the side of the vessel opposite to the fishing maneuver (portside) and then lift and release the bird in the opposite direction of the wind (facing the wind) as close as possible to the water (Ortiz-Soazo & Suazo, 2019).

**5.** If birds rescued from the fishing net are injured or broken, they should be placed in suitable containers to be kept safe and ventilated for transfer to port. On the other hand, it will be necessary to avoid human contact with the birds as much as possible, in order to avoid infections, and then be taken to port and referred to a veterinary medical care center in agreement with Sernapesca. It will be necessary to coordinate the procedure for rescue and delivery on land with Sernapesca and thus ensure proper unloading and transfer to that center. In the event that the specimens do not show vital signs after a period of time, the death must be recorded on the electronic fishing log and the body must be discarded at sea.

**6.** The bycatch of the seabird(s) caught shall be rigorously recorded on the electronic fishing logbook, with the following items: **a)** name of vessel, **b)** name of captain, **c)** target fishery, **d)** fishing gear, date/time of fishing haul, **e)** geographic position of fishing haul, **f)** depth of fishing haul, **g)** name of seabird species caught, **h)** number of individuals by species in the given haul, **i)** general condition (alive or dead), **j)** conditions of release, **k)** condition of retention on board (if applicable).

**7.** Other vessels participating in the horse mackerel fishery in nearby areas should be informed of the geographic location of the presence of these bycatch events, the number of fish caught, as well as the fleet offices of each fishing company, in order to identify areas and critical catches of these species, so that these areas can be avoided.

**8.** Initiatives are currently underway in research and development of fishing gear and strategies to reduce the risk of seabirds becoming entangled in purse seine nets (e.g., sound deterrent devices) by chasing them away when they approach the net. The development of these initiatives takes place in parallel with the development of the current good practice manual. However, it is proposed that once this strategy is validated and submitted to the Undersecretariat for Fisheries and Aquaculture, its implementation should be sought in the purse-seine vessels dedicated to the capture of horse mackerel, to be used in the mitigation of incidental fishing of sea birds such as albatrosses, petrels and shearwaters.

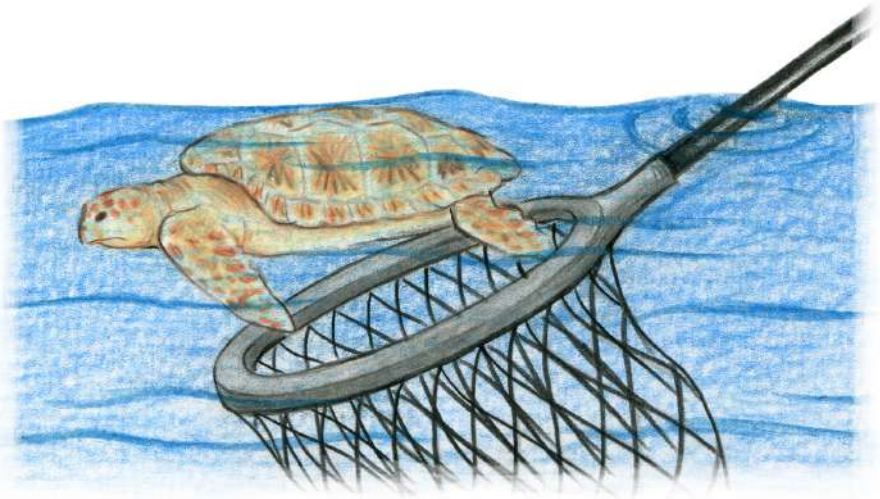
**9.** Encourage and recognize outstanding compliance with good fishing practices by users.

**10.** Facilitate the boarding of scientific observers, providing the appropriate conditions for their good performance.

### 7.4. Protocol for the mitigation, handling and release of sea turtles

**1.** Reinforce and systematize in the short term, education activities, intensive and systematic dissemination to the crews of high seas fisheries vessels (HSF) dedicated to the capture of horse mackerel, regarding the biology, ecology, taxonomy and appropriate actions to produce mitigation of sea turtle bycatch and in addition to the procedures for release or maintenance on board for subsequent medical treatment.

**2.** If a sea turtle is caught in the fishing net, it is suggested that the maneuver be halted in order to carry out actions that will allow its release. It should be noted that if the specimen or specimens are in a state of inactivity and are not capable of moving on their own, they will probably be in a state of shock. In this case, it will be necessary to rescue these specimens, for which a landing net can be used and, depending on the size, it should be lifted with the main crane of the vessel, avoiding, as far as possible, any damage to its physical integrity.



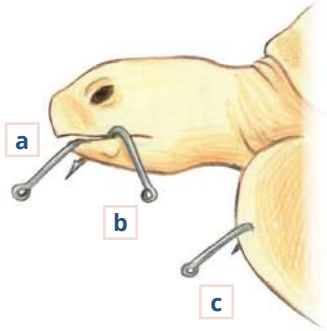
**3.** In some cases and due to the stress of being trapped in the net they may appear to be lifeless and only be in a state of shock or comatose, in this case it is necessary to keep them under observation, in general terms to keep them hydrated. If the sea turtles rescued from the net show no apparent injuries and after some time show normal activity, they should be released, allowing them to swim freely in the sea. In this case, the handling should aim at: not lifting the turtles from the flippers, but from the carapace, taking them from the edge near the head and the edge towards the tail; and then releasing them into the sea with care.

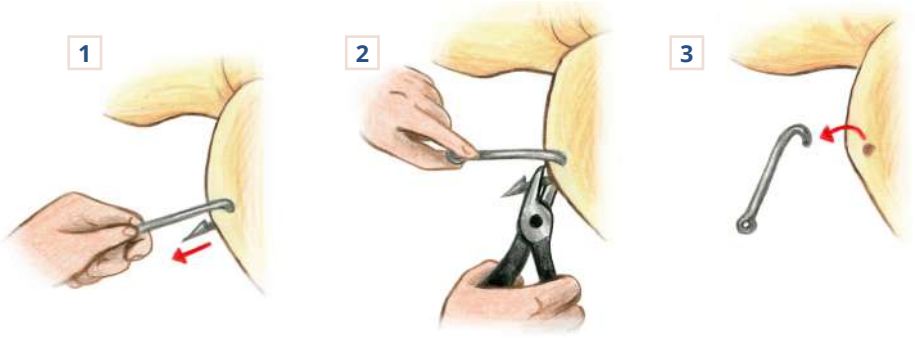
**4.** An identification of the species of sea turtle captured and released must be carried out, based on a catalogue of species described for the Chilean coast and which each vessel must have on board.

**5.** If the presence of hooks is detected on the body of the rescued turtle, the following procedure should be applied to remove them without damaging the turtle.

If the entire tip of the hook is sticking out, cut it off and remove the rest of the hook **(A).** If the tip does not protrude, use tweezers or pliers to remove the hook. **(B)**. If the tip pokes out **(C)**, follow the steps below:

**1.** Push or pull it all out. Never push against the skull, jaw or throat.
**2.** Cut it with pliers or tweezers.
**3.** Remove the hook. In this case, the handling should be careful: keep it wet and do not lift the turtle



**6.** Regarding the sea turtles left for observation on the vessel deck, it is necessary to indicate that they should be kept moist and under no circumstances should they be left face up. If there is any type of damage to the turtle, it will be necessary to take it to port to receive medical attention at a veterinary center that is under an agreement with Sernapesca. For this it will be necessary to coordinate with Sernapesca its unloading and transfer to that center. If the specimens do not show signs of life after a period of time, the death must be recorded on the electronic fishing form and the body must be discarded.


**7.** The bycatch of the sea turtle(s) caught shall be rigorously recorded on the electronic fishing logbook, establishing the following items: Vessel name, captain's name, target fishery, fishing gear, date/time of set, geographic location of set fishing gear, depth of fishing haul, name of seabird species caught, number of individuals, general condition (alive or not), conditions of release, condition of retention on board (if applicable).

**8.** The geographical position of these turtles and the number of fish caught should be communicated to the other vessels that participate in the horse mackerel fishery, as well as to the fleet offices of each fishing company, with the goal of establishing critical capture sites for these species, so that these areas can be avoided.

**9.** Encourage and recognize outstanding compliance with good fishing practices by users.

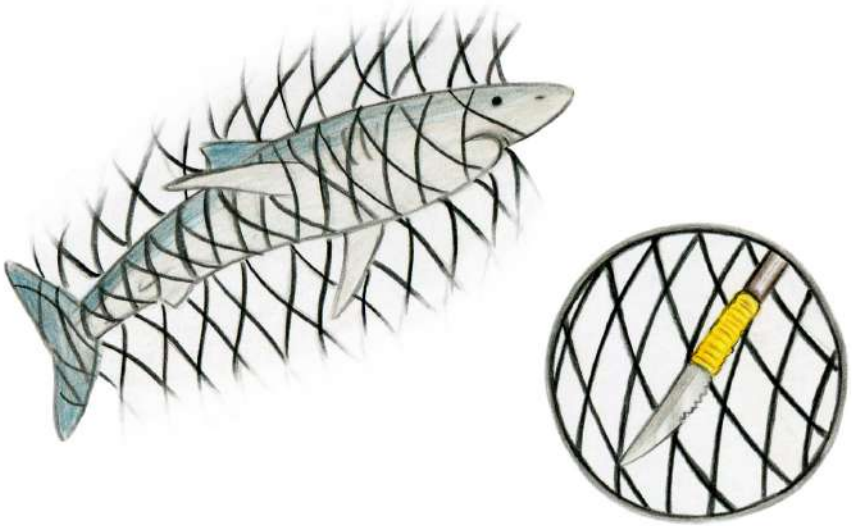
**10.** Facilitate the boarding of scientific observers, providing the appropriate conditions for their good performance.

## 7.5. Protocol for the mitigation, handling and release of chondrichthyans

**1.** Reinforce and systematize, in the short term, education activities, intensive and systematic dissemination to crews of high seas fisheries vessels (HSF) dedicated to the capture of horse mackerel, on the biology, ecology, taxonomy and appropriate actions to produce mitigation of chondrichthyan bycatch and in addition to release procedures.

**2.** Carry out mandatory release and/or return of regulated chondrichthyans, which must be returned under handling protocols that facilitate their survival.

**3.** During the lifting of the net, it is possible that some specimens may be noticed inside the cod-end, in this case, it is suggested to stop the manoeuvre in order to carry out actions to allow their release, which may be considered until the release of the catch. However, If the specimen or specimens are in a state of inactivity and are not able to move on their own, it will be necessary to rescue these specimens, for which, a landing net can be used and depending on the size, it must be lifted with the main crane of the vessel avoiding as far as possible to produce any damage to their physical integrity.



**4.** On the other hand, if a chondrichthyan specimen is trapped in the net, it is suggested to stop the manoeuvre and assess whether the specimen can be released from the net, either by cutting the trapping netting with a knife or in some other way, depending on how this specimen is trapped in the net and without this posing a safety risk to the crew and vessel.

**5.** An identification of the chondrichthyan species caught and released must be made, based on a catalogue of species described for the Chilean coast and which each vessel must have on board.

**6.** If juvenile chondrichthyans are caught and rescued, it is recommended that the crew wear cut resistant gloves when handling chondrichthyans on deck. It should be noted that the handling of these specimens should aim to: not lift the sharks from the tail or head, not throw them or hit them against the deck or other hard objects; not leave them under the sun; not pull or push the animal roughly, in the event that is trapped in the net, the net around the specimen must be cut, without pulling, or pulling the net around it. For the release of juvenile sharks into the sea, the crew may take them by the tail and the dorsal or ventral fin and then throw them overboard carefully. All these activities may be carried out as long as no physical risk is incurred by the crew.

**7.** If the fish do not show signs of life after a period of time, the death must be recorded on the electronic fishing log and the body must be discarded.

**8.** The bycatch of chondrichthyan fish(es) caught should be rigorously recorded on the electronic fishing log, with the following items established: Vessel name, captain's name, target fishery, fishing gear, date/time of fishing set, geographic location of fishing set, depth of fishing set, name of species of chondrichthyans caught, number of individuals, general condition (live or dead) and conditions of release.

**9.** The geographical position of these chondrichthyans and the number of fish caught should be communicated to other vessels participating in the horse mackerel fishery, as well as to the fleet offices of each fishing company, in order to establish critical catch locations for these species, so that these areas can be avoided.


**10.** Encourage and recognize outstanding compliance with good fishing practices by users.

**11.** Facilitate the boarding of scientific observers, providing the appropriate conditions for their good performance.

# 8.

# REVIEW OF CHONDRICHTHYANS AND INCIDENTAL FAUNA PRESENT IN THE HORSE MACKEREL FISHERY

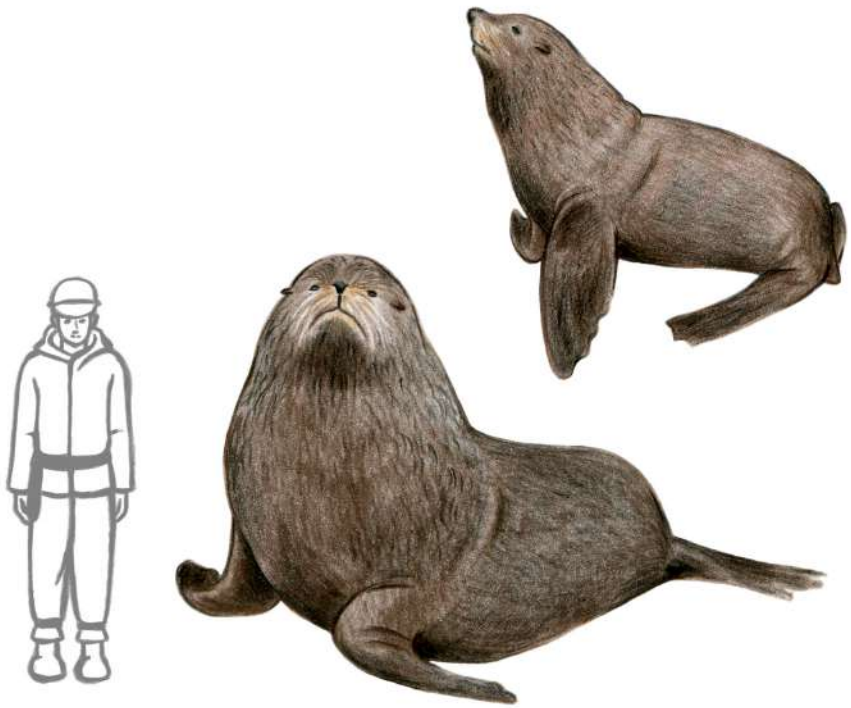
## 8.1. Common marine mammals that can be caught by purse seine in the industrial horse mackerel fishery.

### 8.1.1. SEA LIONS

Common name: **South American fur seal**
*Scientific name: Arctocephalus australis*

**Key features for identification:**

- They can measure between 26 to 75 inches and weigh 440 lb. Males reach larger sizes than females.
- General coloring of back and sides dark brown with greyish tints. Cubs initially black color, from the third month acquires typical fur of adults.
- Ventral region with brownish tints.
- Sharp, elongated, globular snout and forward facing nostrils.
- Rear fins with outer digits longer than the central three with nails.



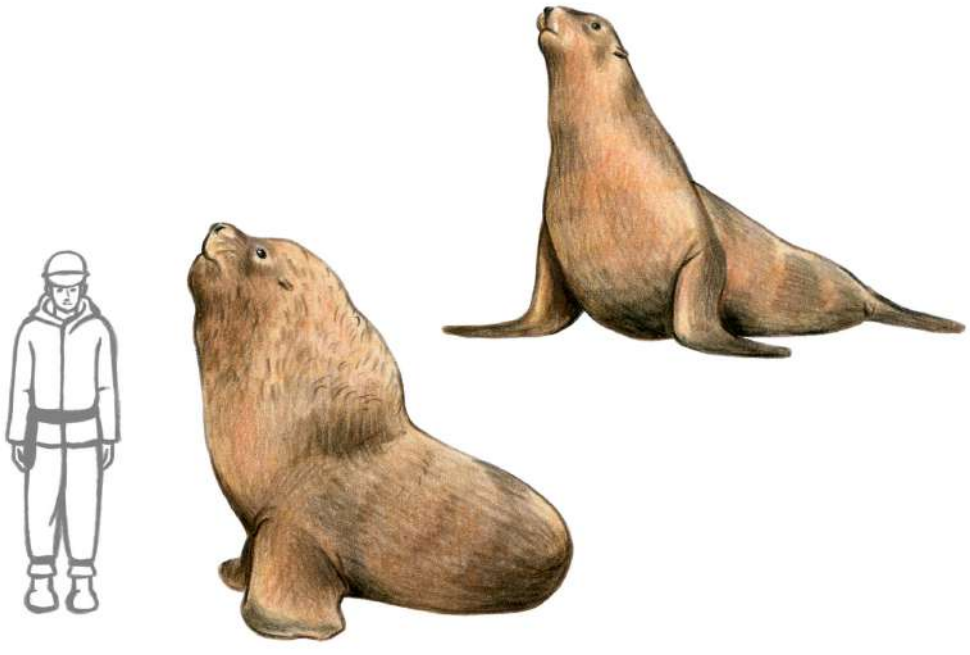
**Conservation Status: out of danger for XI and XII Regions.**
**Protected by Supreme Decree No. 182, 1978**

Common name: **South American sea lion**
*Scientific name: Otaria flavescens*

**Key features for identification:**

- They can measure up to 110 inches and weigh up to 770 lb. Males reach a larger size than females.
- Adult male: Large head, short and broad snout, turned in distally and over 78 inches long.
- Adult female: Sharp profile, thin neck, lacks mane and is less than 78 inches long.
- Relatively long front flippers and wide rear flippers with digits of similar length, with upper claws.

**Conservation Status: IUCN: Least Concern (LC)**

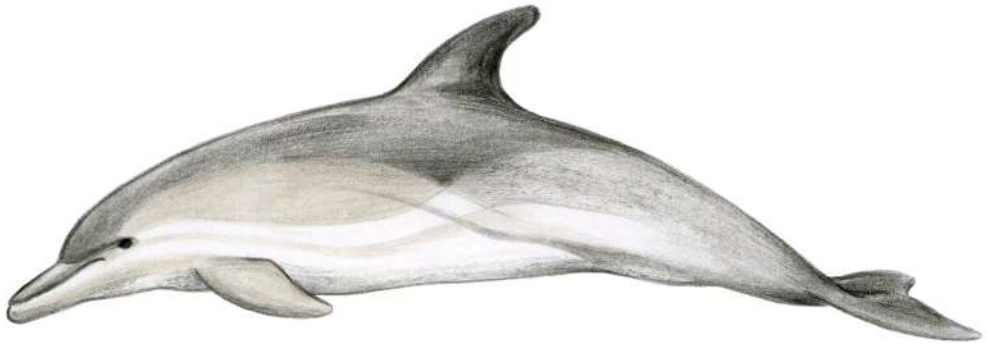


## 8.1.2. DOLPHINS

Common name: **Short-beaked common dolphin**
*Scientific name: Delphinus delphis*

**Key features for identification:**

- The male can be 67 to 80 inches long and the females 64 to 75 inches long, and a weight of about 440 lb is quantified.
- Its dorsal fin is high and moderately curved.
- It has a peculiar pattern of crossed colors that it shares with D. capensis, although of greater intensity and brightness, which is characterized by a dark gray to black area on the back, pale yellow to intense towards the front in the lateral area of the thorax, gray to light gray on the flank and white in the ventral abdominal area.
- A dark line from the pectoral fin to the anus, parallel to the dorsal layer, extends to the genital area, and previously wider to the lower beak.
- The dorsal and pectoral fins may be completely white or only in their centers, a feature not evident in juveniles.

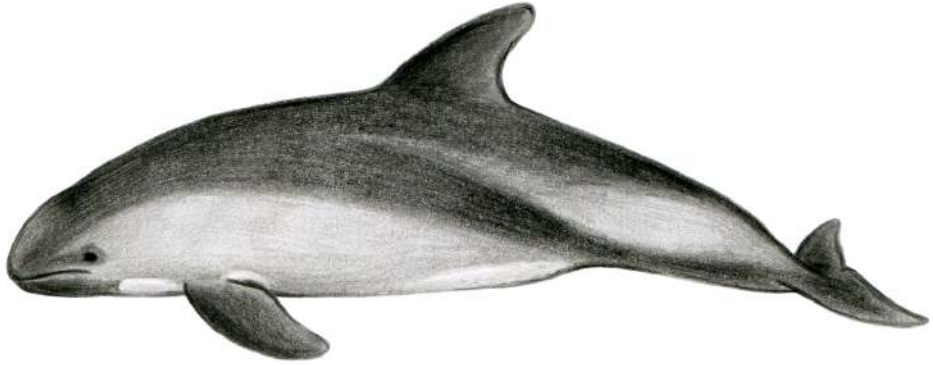


**Conservation Status: IUCN: Least Concern (LC)**

Common name: **Peale's dolphin**
*Scientific name: Lagenorhynchus australis*

**Key features for identification:**

- It is a robust dolphin that can weigh up to 253 lb and measure up to 110 inches. The males; 220 lb and 70 inches for the females.
- The dark grey head is blunt with a slightly marked beak.
- The dorsal fin is falcate, particularly large and greyish in color, the pectoral fins are dark and relatively small.
- It has light grey stripes on the sides of the caudal peduncle, which are separated from the ventral area by a thick, dark line. The ventral zone is white. It also has a bright white patch in the "armpits". Younger dolphins are lighter grey than adults.
- Peale's dolphin (Lagenorhynchus australis) and Dusky dolphin (Lagenorhynchus obscurus) are difficult to differentiate on the ground but, the Dolphin has a two-tone tail fin. Dolphin has no white spot in the "armpits".



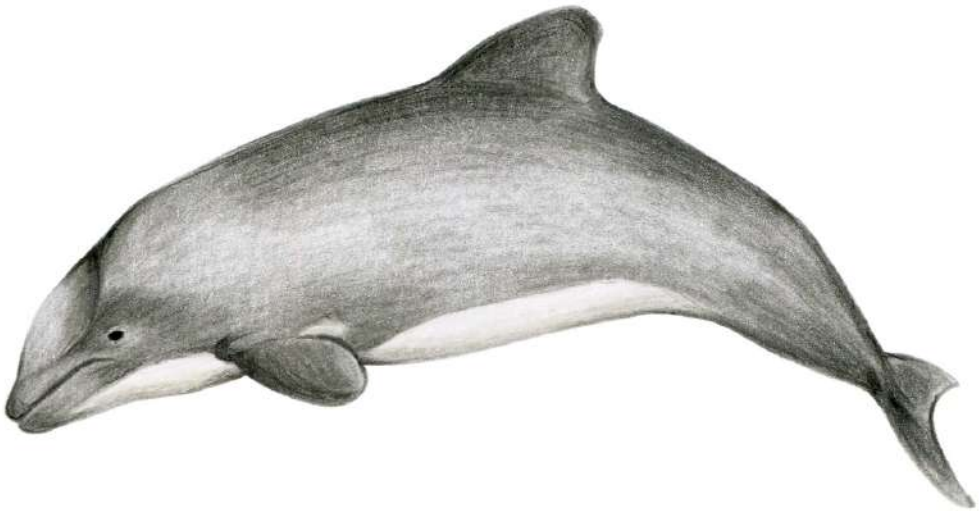
**Conservation Status: IUCN: Insufficient data**

Common name: **Chilean dolphin**
*Scientific name: Cephalorhynchus eutropia*

**Key features for identification:**

- It is a small (64 inches long) and robust (138 lb average weight) marine mammal.
- It has a conical head, a relatively short and wide face with a longer and thinner muzzle than that of Commerson's dolphin. The beak emerges from the face without a furrow separating it from the head.
- Small rounded pectoral fins at the ends and backward sloping triangular (falcate) dorsal fin with rounded end.
- It has a black or dark grey coloration in the dorsal part, the ventral region has a white area between the anus and the pectoral fins, another spot in the gular area (of the throat) and a third white semicircular spot behind and on the pectoral fins.

**Conservation Status: IUCN: Inadequately Known**



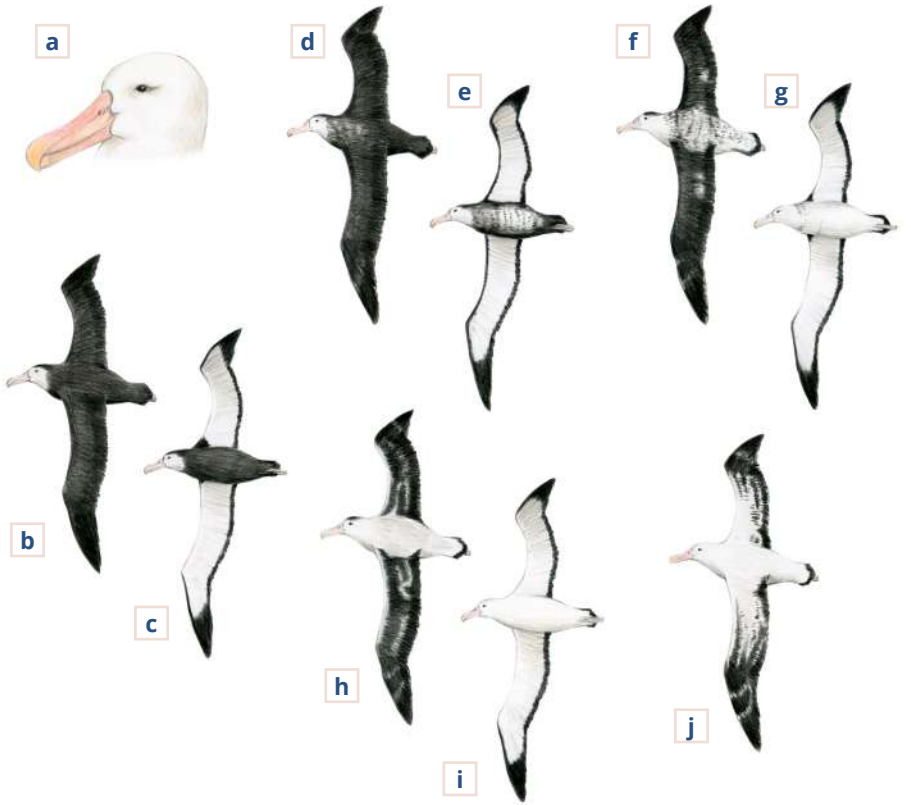
## 8.2. Common seabirds in interaction with purse seine fishing activities in Chile

Common name: **Wandering Albatross**
*Scientific name: Diomedea exulans*

**Key features for identification:**

Measures (inches): Spout 5.7 inches (5.1-6.2 inches), tail 7.5 inches (7-8.2 inches), span 100-138 inches. It is the largest albatross. Pink beak less than 6.1 inches long (A). The juvenile plumage is the most distinctive, the body and the upper part of the wings are completely brownish-black. The face, throat and underwings are white (B,C). It has a complex maturing plumage, but as the birds grow they become whiter, first the ventral area, then the rest of the underparts and the back, and finally the wings (D and J). An important characteristic for the species is that the dark feathers on the edge of the tail are maintained until late adults (individuals with very light general plumage).

**Conservation Status: according to International Union for Conservation of Nature IUCN: Vulnerable (VU)**

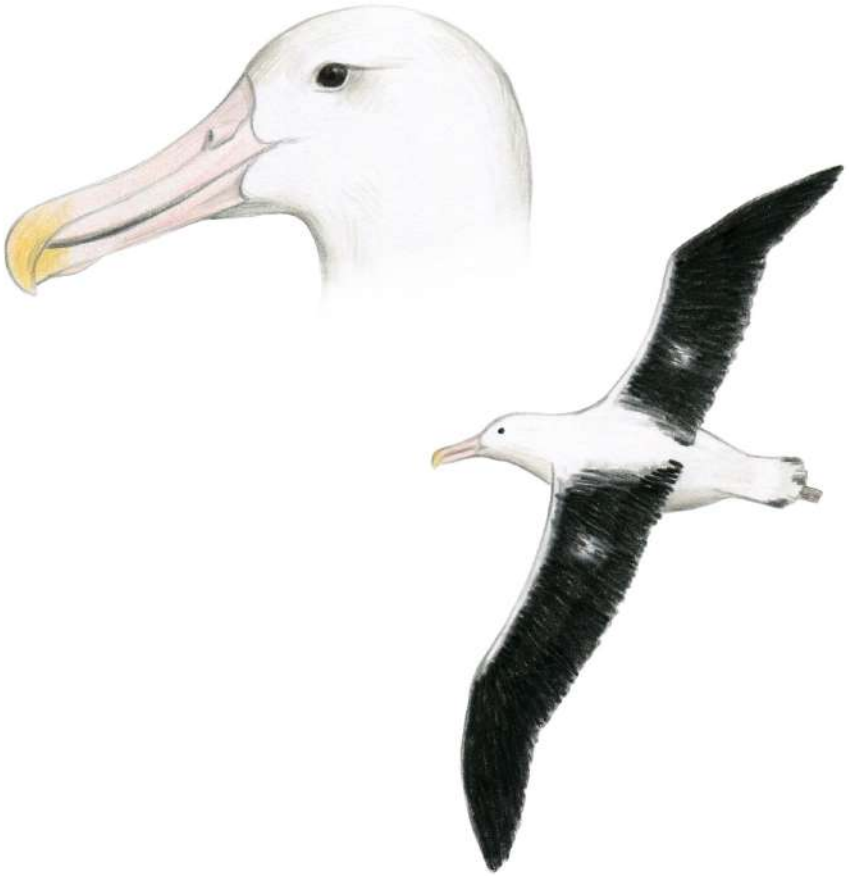


Common name: **Royal Albatross**
*Scientific name: Diomedea epomophora epomophora*

**Key features for identification:**

Measures (inches): Spout 6.8 inches (6.4-7.4 inches), tail 8.3 inches (7.7-8.8 inches), span 120-138 inches. The bill is very similar to that of D. e. sanfordi. As they grow the back becomes white and the blackish spots on the tail and crown decrease. Unlike D. e. sanfordi, the upper part of the wings becomes white (A). Juveniles (D, E, F) are very similar to those of D. e. sanfordi, although sometimes some white is already seen on the upper part of the wings. Although the wings look completely dark, a thin white line is usually seen on the front edge of the wings on the upper side. The body, head and tail are white with variable dark spots on the crown, back and edge of the tail (A, B, D).

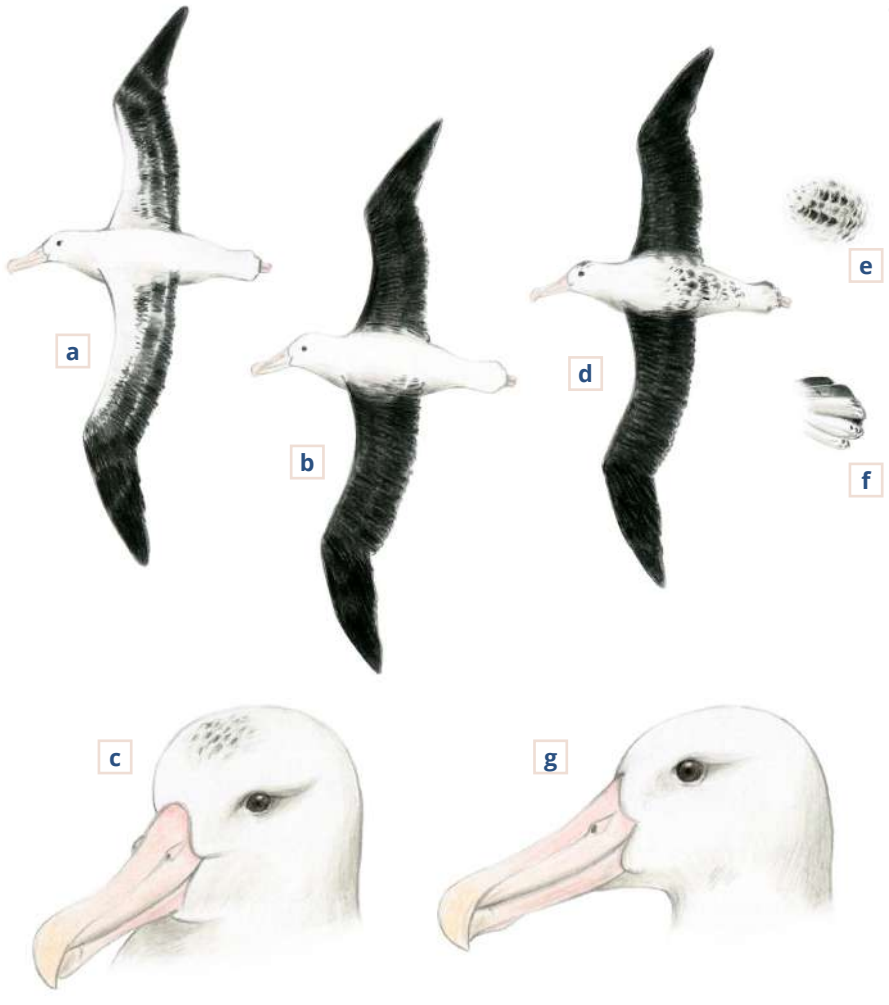
**Conservation Status: IUCN: Vulnerable (VU)**



Common name: **Northern royal Albatross**
*Scientific name: Diomedea epomophora sanfordi*

**Key features for identification:**

Measures (inches): Spout 6.4 inches (6.0-6.7 inches), tail 7.4 inches (6.8-7.7 inches), span 120-138 inches. The light pink beak has a black line along the cutting edge (C, G). Juveniles are similar to those of the southern species, but with dark spots on the crown (C, D) and more dark extension on the back (D, F). In this species, the white line on the upper leading edge of the wing (D) is not observed in the Southern Royal Albatross, even in the juvenile state. As they grow the body becomes whiter. The upper part of the wings remain completely dark (B), which differentiates them from the adult stage of the southern species. The coloring pattern of the wing is characteristic. Both species have a narrow black line on the leading edge of their primaries, which visibly widens in the northern royal albatross, differentiating it from the southern royal and wandering.

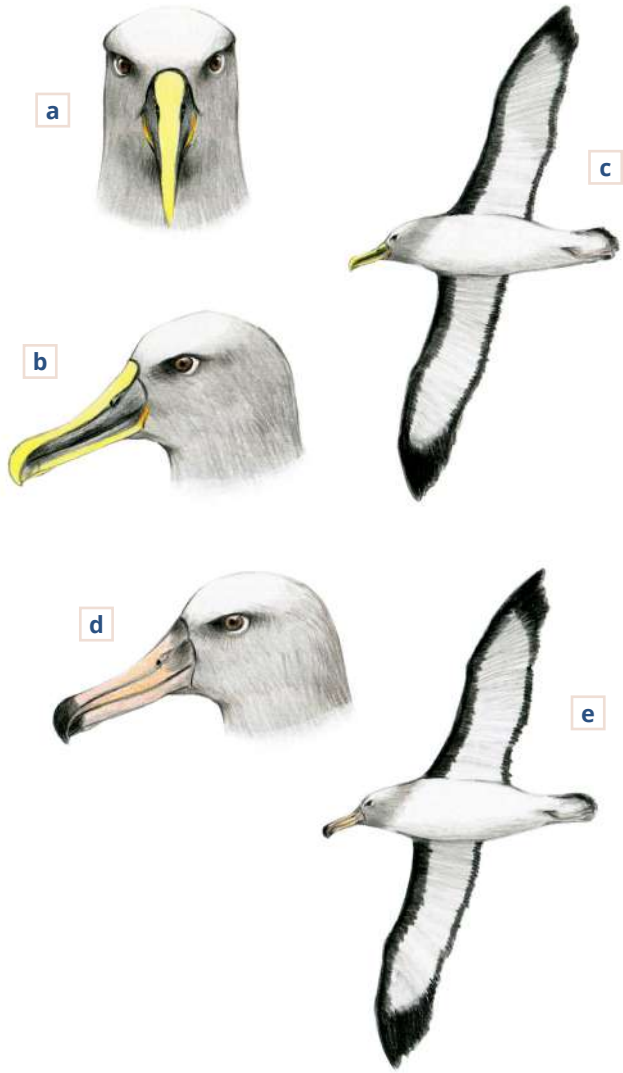


Common name: **Buller's Albatross**
*Scientific name: Thalassarche bulleri*

**Key features for identification:**

Measures (inches): Spout 4.7 inches (4.3-4.9 inches), tail 7.8 inches (7.6-8.1 inches), span 82 inches  Small, slender albatross with a thinner beak than those of the more Adults' beaks are dark with yellow stripes on top and bottom (B). The yellow stripe on the top of the bill is wide and rounded at the base (A). The head and neck are grey and the crown is noticeably whiter. This species is easily confused with the Grey-headed Albatross.  The Buller's wing has a moderately wide black leading edge underneath with a smooth margin parallel to the wing profile (C). The yellowish color extends to the tip of the bill. Juvenile and immature stages are like the juvenile stage of Salvin's albatross (D, E).

**Conservation Status: UICN: Near threatened (NT)**

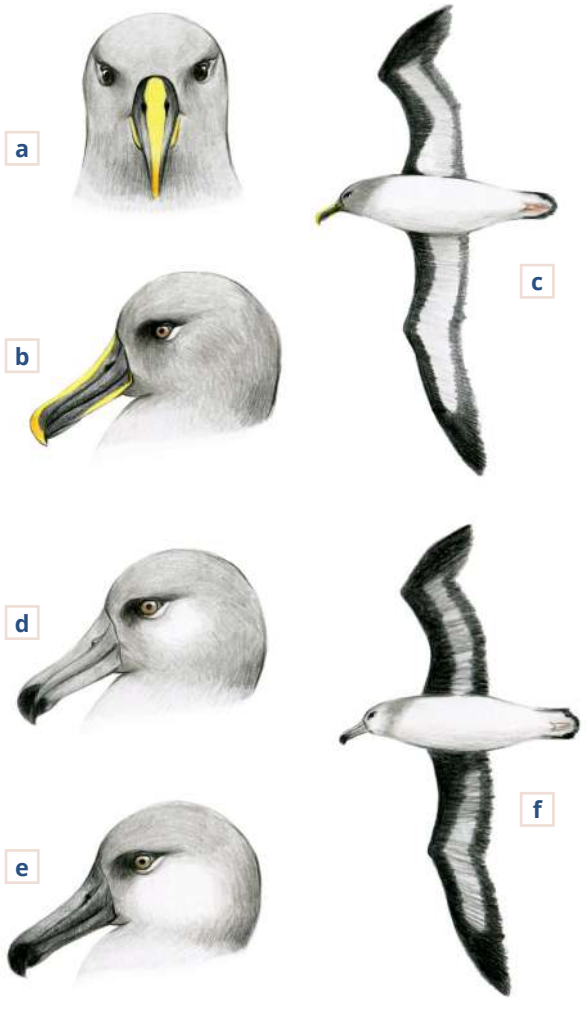


Common name: **Gray headed Albatross**
*Scientific name: Thalassarche chrysostoma*

**Key features for identification:**

Measures (inches): Spout 4.4 inches (4.0-4.7 inches), tail 8.3 inches (7.6-8.7 inches), span 86 inches. Medium sized albatross. Adults have dark beaks with yellow stripes on top and bottom (B). The upper yellow band gradually becomes thinner at the base of the bill (A) while towards the tip it turns orange (A). Head and neck are grey (B, C). The upper part of the wings, back and tail are blackish. The underside of the wings is white with a black and irregular front edge (C). Juveniles have black or grey beaks with dark tips (D), cheeks lighter than the rest of the head (, E): As the head lightens, the remaining grey feathers form a collar (F) and the underside of the wings is mostly dark (F).

**Conservation Status: UICN: Endangered (EN)**

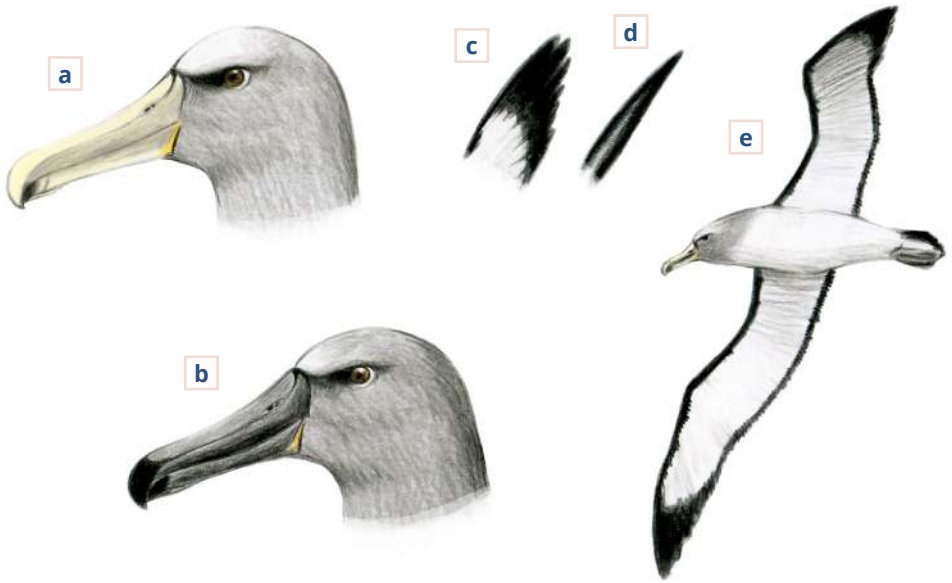


Common name: **White-capped albatross**
*Scientific name: Thalassarche salvini*

**Key features for identification:**

Measurements (inches): Spout 5.0 inches (4.8-5.3 inches), tail 8.7 inches (8.2-9.2 inches), span 98 inches. The beak is yellowish-boned, darker on the sides, and has a blackish mark on the lower jaw (A). In addition, the beak has fine black lines extending from the head to the nostrils. The ventral area of the bird and the lower parts of the wing are white (E). The dark line on the front edge (underside of the wing) is very thin (E). The upper part of the wing, back and tail are chestnut grey. The base of the primary t-shirts and the inner beards of the second t-shirt have a wide, dark edge that lightens until it is white near the canyon (C, D). Juveniles have a dark grey beak with a black tip (B), the head is grey and has a blurred grey collar that starts at the back of the neck and runs across the chest. Over time the head and bill become lighter and the collar disappears.

**Conservation Status: UICN: Vulnerable (VU)**

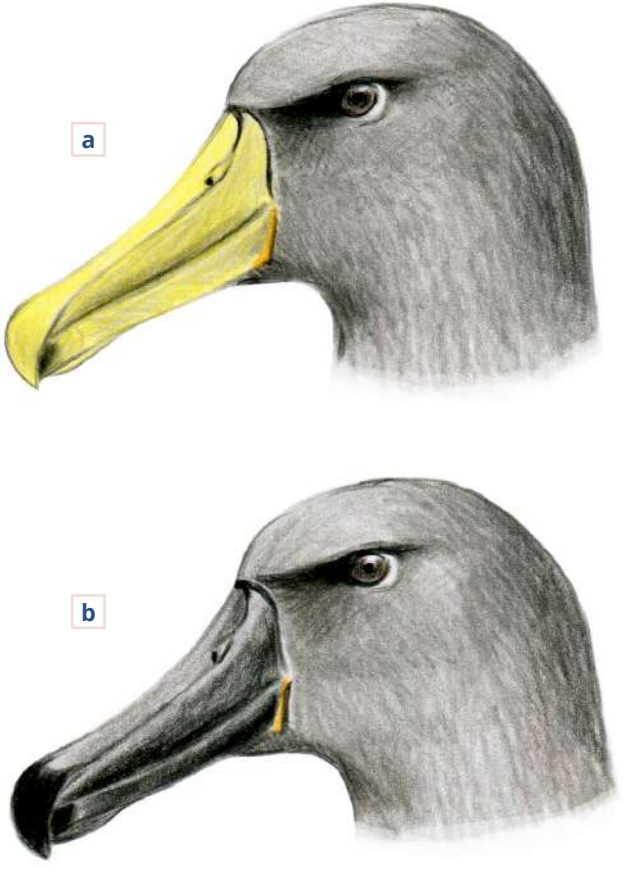


Common name: **Chatham Albatross**
*Scientific name: Thalassarche eremita*

**Key features for identification:**

Measures (inches): Spout 4.7 inches (4.4-5.1 inches), tail 9.0 inches (8.4-9.7 inches), span 86 inches. In adults the bill is bright yellow with a darker tip and a black mark on the lower jaw (A). Head and neck dark grey, slightly lighter at the crown. Wing underside white with thin dark edges. Juvenile very similar to T. salvini's juvenile with darker head (B) and in intermediate stages with a more yellowish beak.

**Conservation Status: UICN: VU (Vulnerable)**

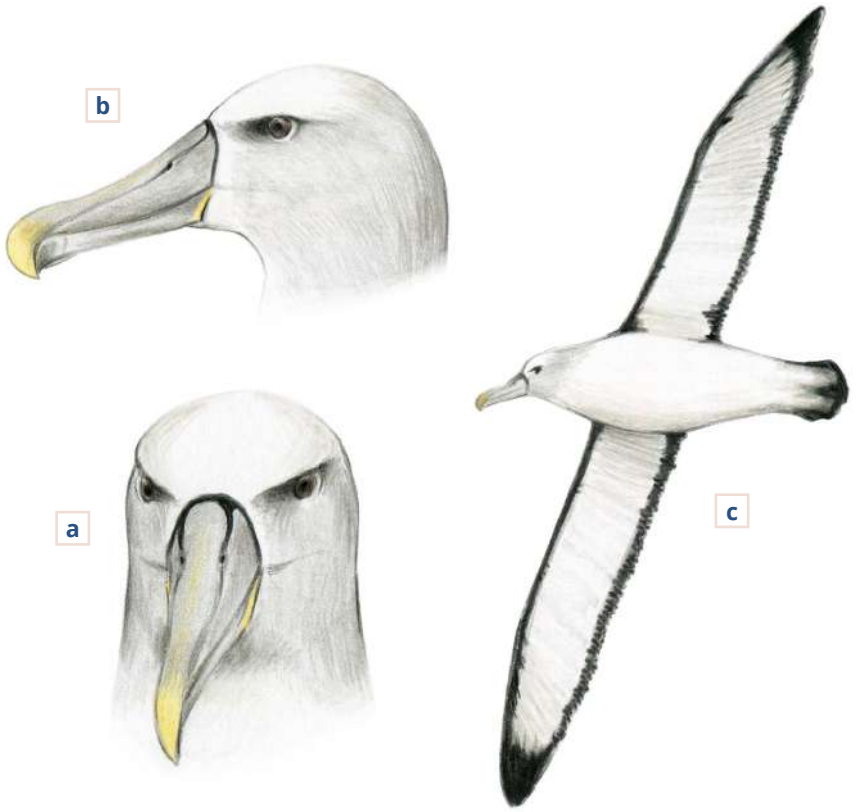


Common name: **Shy Albatross**
*Scientific name: Thalassarche cauta*

**Key features for identification:**

Measurements (inches): Spout 5.1 inches (4.8-5.1 inches), tail 8.8 inches (8.2-9.5 inches), span 96 inches. The bill is light grey with a light yellow tip (A). In some individuals a blackish spot is observed on the tip of the jaw (probably immature). Adults have a white head and neck with a greyish shade on the cheeks (B). The upper part of the wings and tail are grey, dark brown. Ventral parts and wings are white. The latter have a narrow dark edge (C). The underside of the Wing tips are white with black edges, because the base of the primary shirts is white (D). Juveniles have a grey bill with a blackish tip (C) and the head and neck are grey. On the neck they have a greyish collar with diffuse edges that crosses the breast.

**Conservation Status: UICN: Near Threatened (NT)**

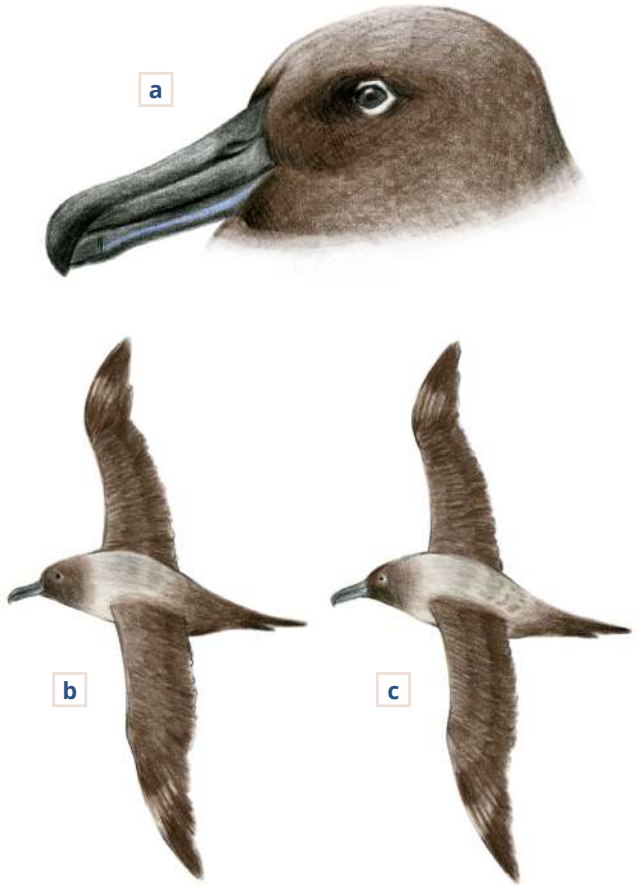


Common name: **Light-mantled Albatross**
*Scientific name: Phoebetria palpebrata*

**Key features for identification:**

Measurements (inches): Spout 4.1 inches (3.8-4.4 inches), tail 11.3 inches (10.2-12.1 inches), span 72-85 inches. Small albatross. Generally greyish brown with a lighter grey back and mantle. The strong contrast between the back and the darker head is useful for identification (B). The extent of the light grey on the back varies depending on the wear and tear of the feathers (C). It has a narrow crescent-shaped white patch behind the eye (A). Adult beak with a thin light blue line (A), or undefined gray if it's an immature bird. The tail is long and pointed, accentuating its characteristic body structure.

**Conservation Status: UICN: Near Threatened (NT)**

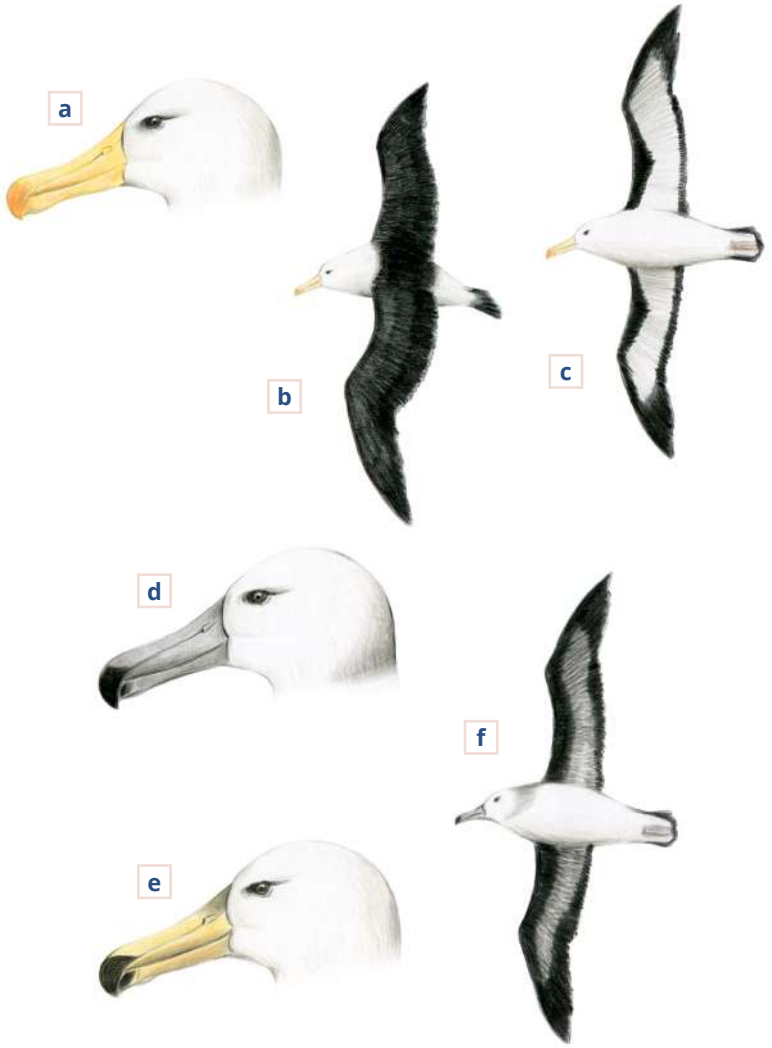


Common name: **Black browed albatross**
*Scientific name: Thalassarche melanophris*

**Key features for identification:**

Measurements (inches): Spout 4.6 inches (4.2-4.8 inches), tail 8.5 inches (7.9-9.2 inches), span 88 inches. Orange-yellow-billed albatross (A). Up close, it has a noticeable blackish brow in contrast to the white head (A). The underside of the wings is white with black edges (C). The front edge is wide and irregular (C). The back and upper part of the wings and tail are blackish (B). Eyes dark in color (A), distinguishing it from the northern black-browed albatross. Juveniles have grey beaks with blackish tips (D, E) and mostly dark underwings (F). As they grow, the beak lightens and takes on a brown or pinkish hue with the tip and edges darker (D, E).

**Conservation Status: UICN: Least Concern (LC)**

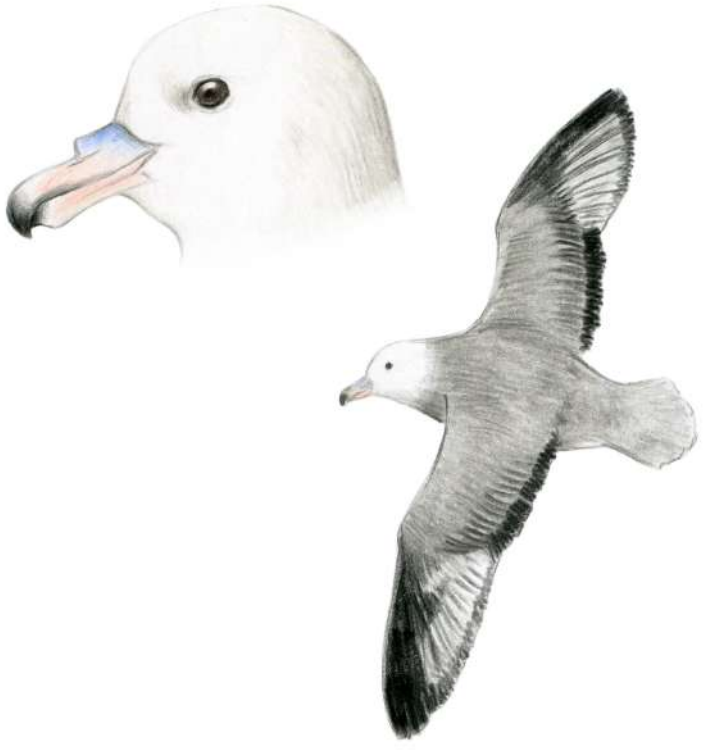


Common name: **Southern Fulmar**
*Scientific name: Fulmarus glacialoides*

**Key features for identification:**

Measurements (inches): Spout 1.7 inches (1.6-1.8 inches), tail 5.0 inches (4.5-5.4 inches), span 44-47 inches. Strong petrel with short and wide neck. General pattern of white coloring on head (A) and underparts. Upper parts grey (B). Relatively wide wings and rounded tips, primaries and secondaries are darker with a white patch on the inner primaries above the wing (B). Pink beak with dark tip (A).

**Conservation Status: UICN: Least Concern (LC)**

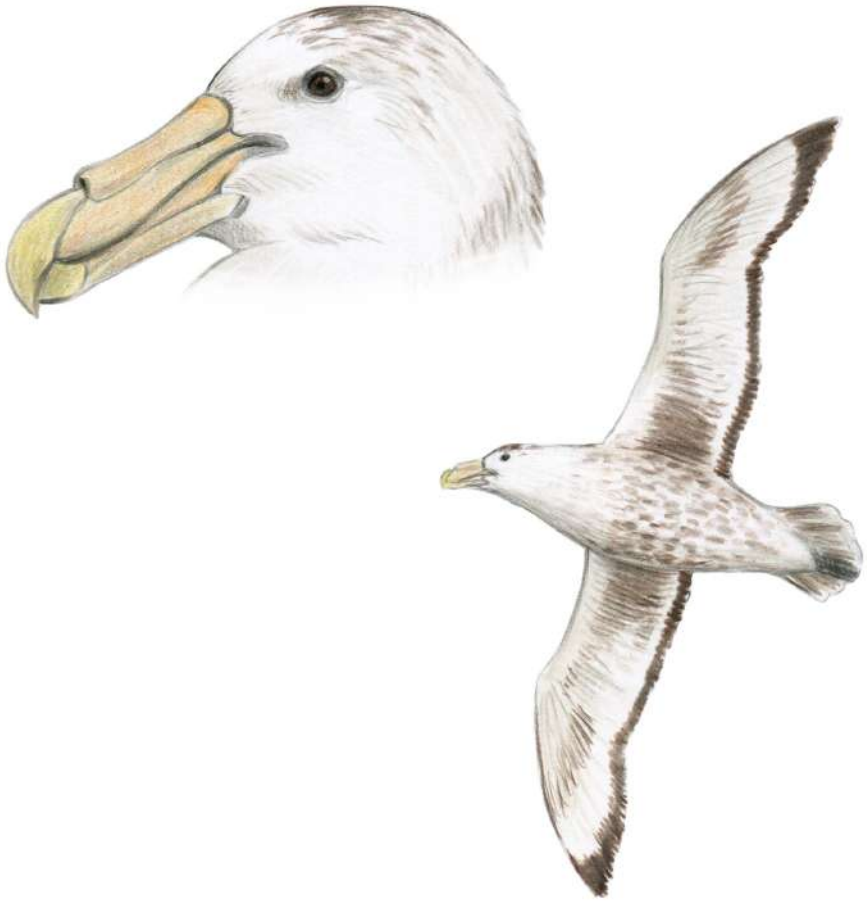


Common name: **Southern Giant Petrel**
*Scientific name: Macronectes giganteus*

**Key features for identification:**

Measures (inches): Spout 3.7 inches (3.3-4.0 inches), tail 7.7 inches (7.3-8.3 inches), span 72-80 inches. Greyish-brown bird with white head and breast (E). There is a white adult phase with only a few scattered dark feathers (F). The beak has tubular nostrils attached to the upper part and is a light yellowish color with a pale greenish tip (C). Juveniles are generally dark brown in color, acquiring a greyish-brown hue over time. The beak of juveniles is similar to that of adults but the tip coloration is less noticeable (D). The iris is brown at all ages.

**Conservation Status: UICN: Least Concern (LC)**

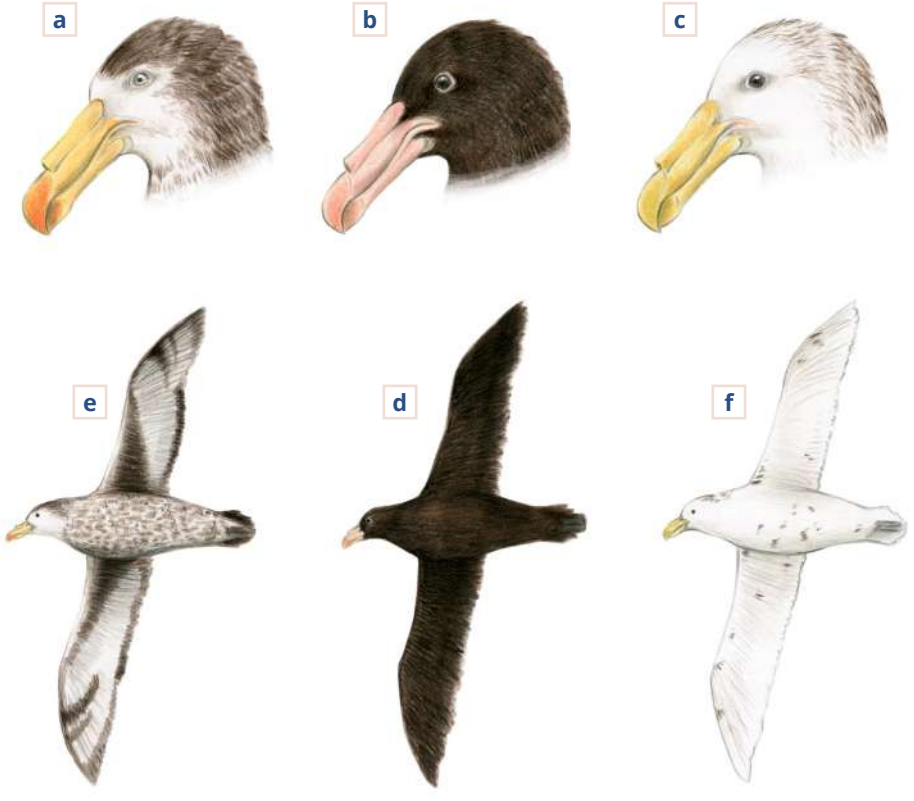


Common name: **Northern Giant Petrel**
*Scientific name: Macronectes halli*

**Key features for identification:**

Measures (inches): Peak 3.7 inches (3.3-4.3 inches), span 70-78 inches. Species very similar to M. giganteus. The beak is generally yellowish-pink with a reddish-brown tip (A) that makes it darker in the distance. In juveniles it is also possible to see this characteristic, but but it's less noticeable (B).

**Conservation Status: UICN: Least Concern (LC)**

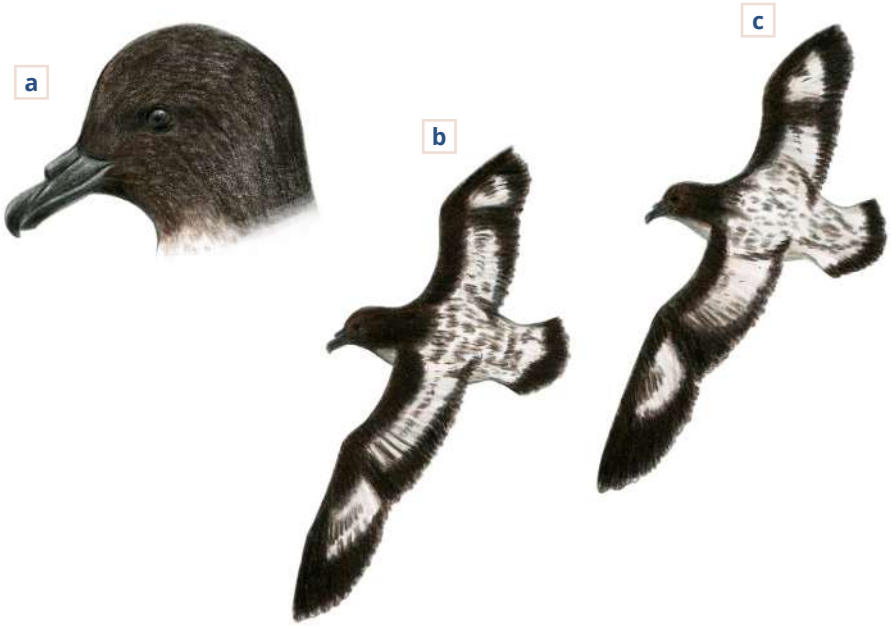


Common name: **Caped petrel**
*Scientific name: Daption capense*

**Key features for identification:**

Measures (inches): Spout 1.2 inches (1.1-1.3 inches), tail 4.0 inches (3.5-4.3 inches), span 31-35 inches. Bird easily identified by the black and white coloring pattern on the wings and tail. B (D. c. australe, northern subspecies) and C (D. c. capense, southern subspecies). White underparts contrasting with the black head and neck. The wing has dark edges. A dark bill with tubular nostrils attached to the upper part (A). White tail with black terminal band.

**Conservation Status: UICN: Least Concern (LC)**

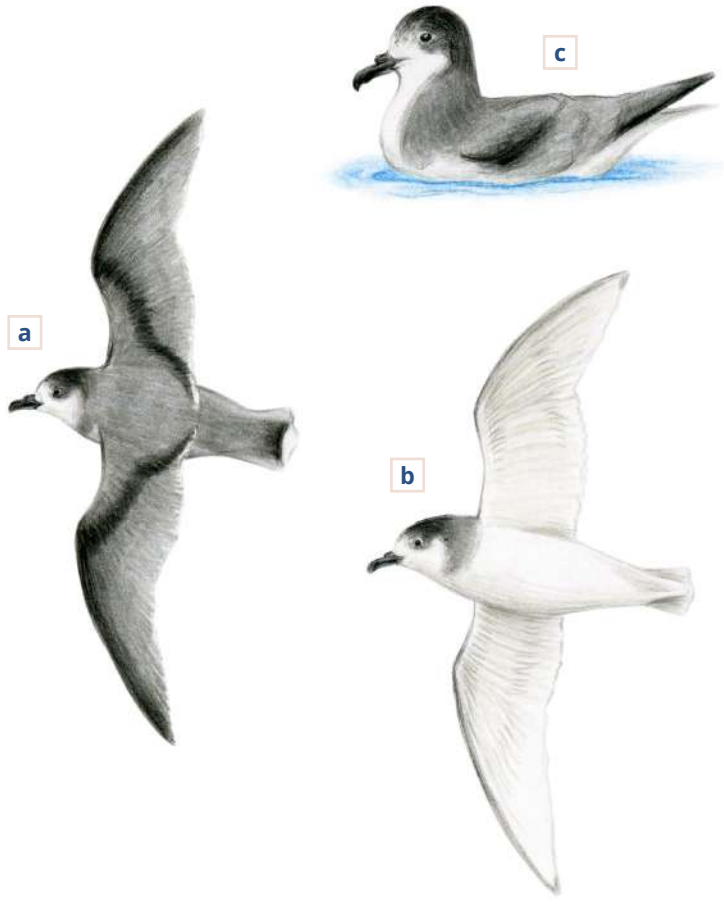


Common name: **Blue petrel**
*Scientific name: Halobaena caerulea*

**Key features for identification:**

Measures (inches): Total length 7.8 inches, span 24 inches. Small petrel. Upper-parts generally bluish grey (A and C) with an open M pattern on the wings (A). Dark crown and tail ending in a narrow white band (A, diagnostic character). The tail is square. Underparts of the body completely white (B), without black edges on the wings.

**Conservation Status: UICN: Least Concern (LC)**



Common name: **Antartic prion**
*Scientific name: Pachyptila desolata*

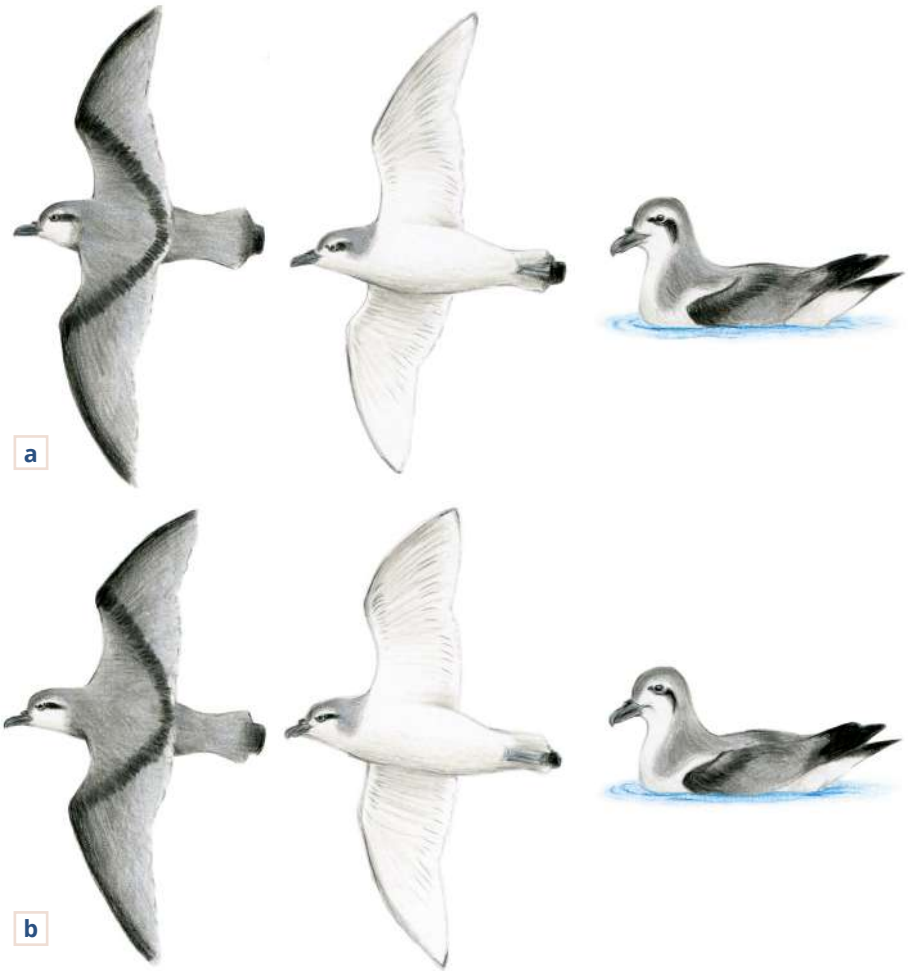
Common name: **Slender-billed prion**
*Scientific name: Pachyptila belcheri*

Pigeon petrels are very similar, making it almost impossible to identify them at the species level in the sea. All have blue-grey upperparts, with the characteristic dark M-shaped mark open along the wing. The tail is cradled and ends in a narrow black band. The underparts are completely white. A distinctive feature of the genus Pachyptila is the bluish-grey band under the eye and a thin white superciliary band, like an eyebrow. Blue beak, blue legs with lighter membranes. The shape of the beak and body proportions are diagnostic characteristics at the species level (difficult to appreciate at sea).

**Key features for identification:**

**(A)** P. desolata: Measures (inches): Total length 10.6 inches, span 24 inches.
**(B)** P. belcheri: Measures (inches): Total length 10.2 inches, span 22 inches.

**Conservation Status: UICN: Least Concern (LC)**
**Conservation Status: UICN: Least Concern (LC)**

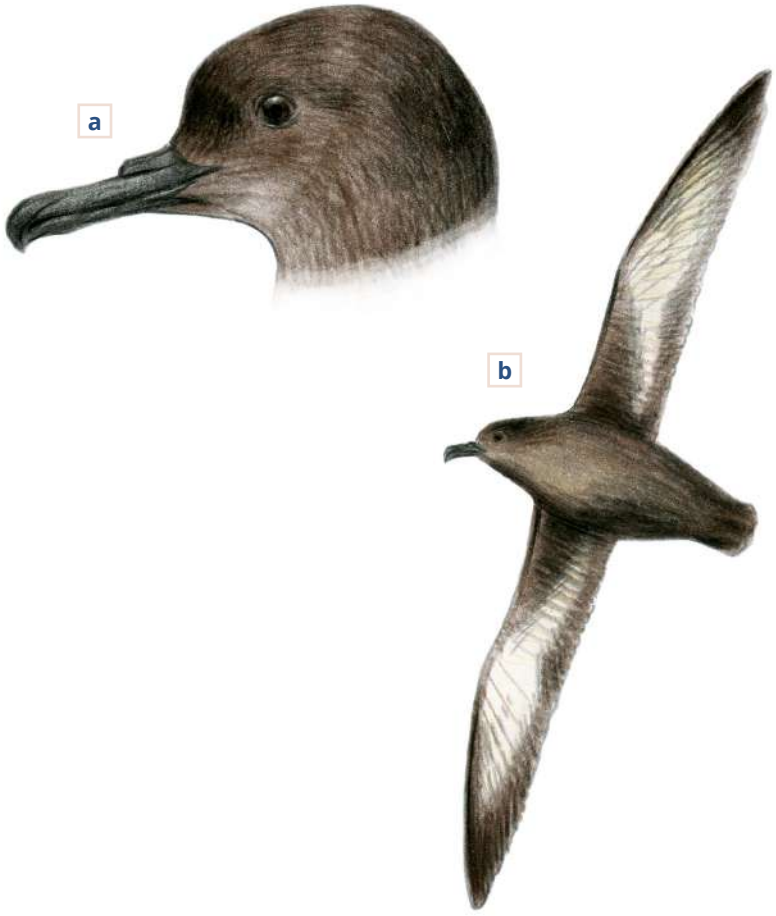


Common name: **Sooty shearwater**
*Scientific name: Puffinus griseus*

**Key features for identification:**

Measures (inches): Spout 1.6 inches (1.5-1.8 inches), tail 3.4 inches (3.2-3.9 inches), span 37-40.9 inches. Dark and narrow beak, measures more than 37 mm and has tubular nostrils attached at the top (A). Bird completely black or brown, except for the underside of the wings which has a large whitish area (B). This area is silvery in color on the wing. The legs and toes are black on the outside and pinker on the inside.

**Conservation Status: UICN: Vulnerable (VU)**

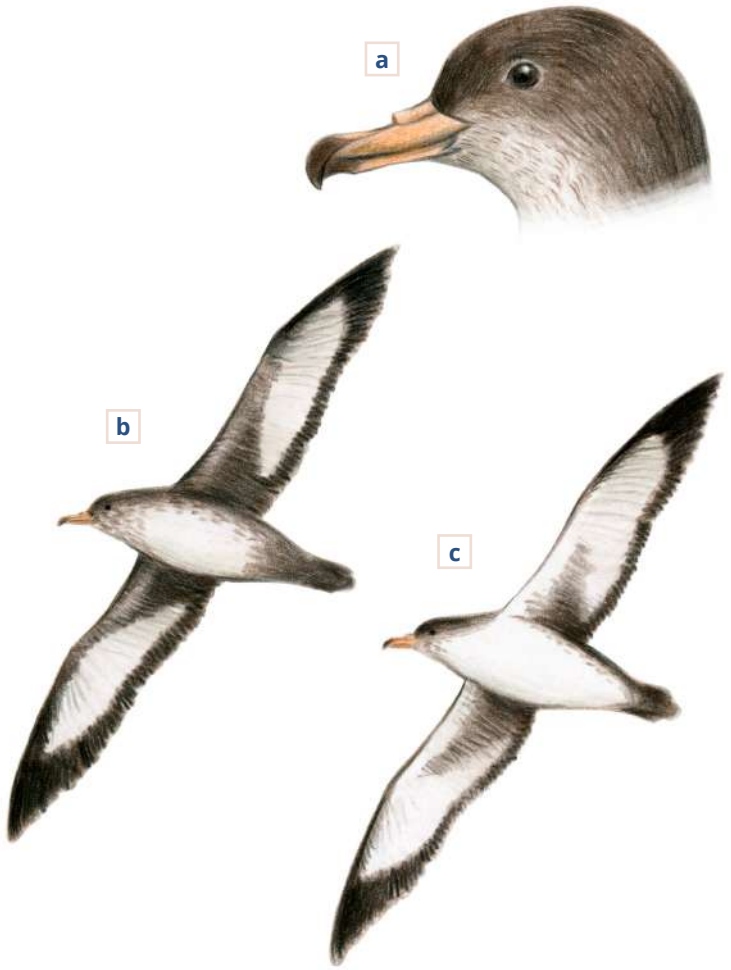


Common name: **Pink-footed shearwater**
*Scientific name: Puffinus creatopus*

**Key features for identification:**

Measurements (inches): Spout 1.7 inches (1.6-1.8 inches), tail 4.5 inches (4.4-4.8 inches), span 42.9 inches. The beak has the nares attached at the top and is yellowish pink with a dark tip (A). The upper body is greyish brown. The extent of the white coloration of the lower body and wings varies, but the underside of the tail and flanks is always dark (B, C). The wing edges also always have a dark border (B, C).

**Conservation Status: UICN: Vulnerable (VU).**
**Endangered (EN) (Supreme Decree 50/2008 MINSEGPRES)**

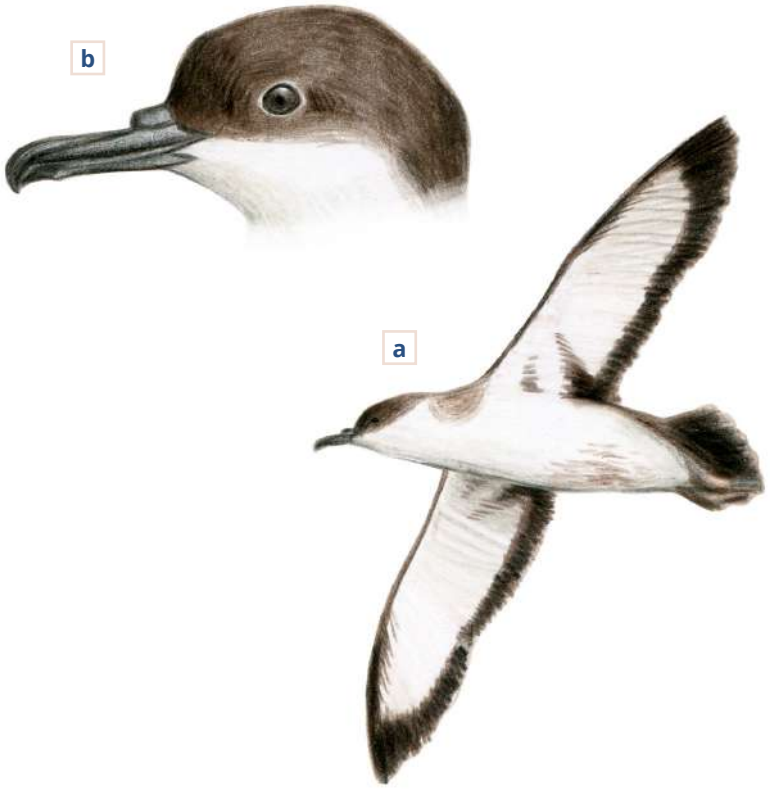


Common name: **Great shearwater**
*Scientific name: Puffinus gravis*

**Key features for identification:**

Measurements (inches): Spout 1.7 inches (1.6-1.8 inches), tail 4.5 inches (4.2-4.9 inches), span 39-43 inches. Large shearwater with dark grey bill (B). Has a cap on the dark brown head (B) separated by a white collar from the rest of the back which is generally greyish brown. White band at the base of the tail. Underparts white except for a brown spot on the abdomen. Wing underparts mostly white except for the edges and two irregular strips on the inside of the wings (A) which are darker.

**Conservation Status: UICN: Least Concern (LC)**

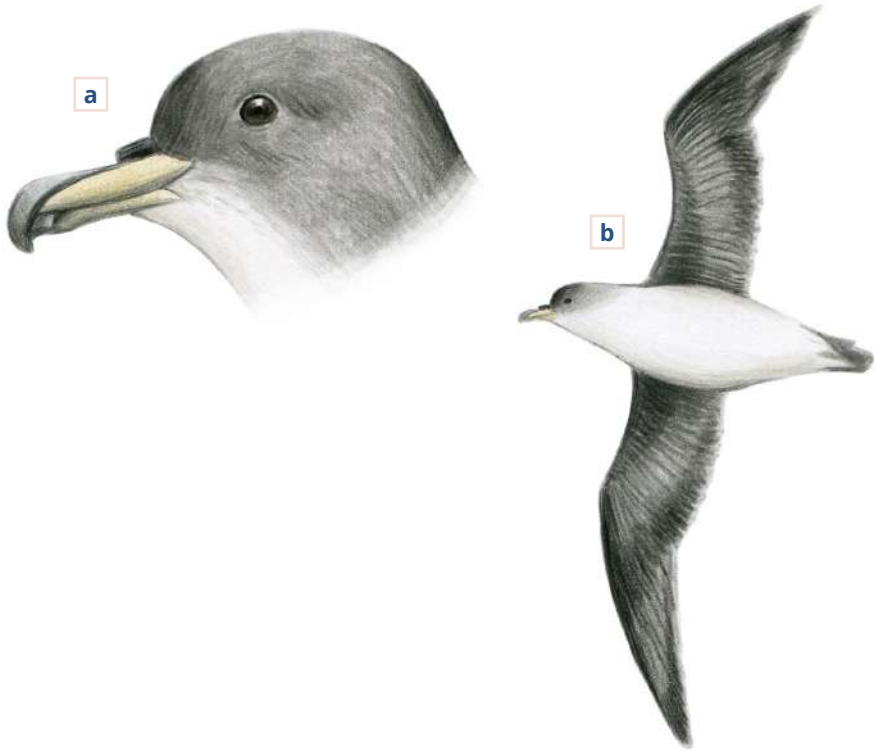


Common name: **Grey petrel**
*Scientific name: Procellaria cinerea*

**Key features for identification:**

Measures (inches): Spout 1.8 inches (1.6-1.9 inches), tail 4.6 inches (4.4-4.8 inches), span 46-50 inches. The beak has attached nares on top and is greyish yellow and dark grey on top and tip (A). Bird grey above. Ventral areas of the body whitish, contrasting with the dark wings (B). Grey legs and toes with lighter interdigital membrane.

**Conservation Status: UICN: Nearly Threatened (NT)**



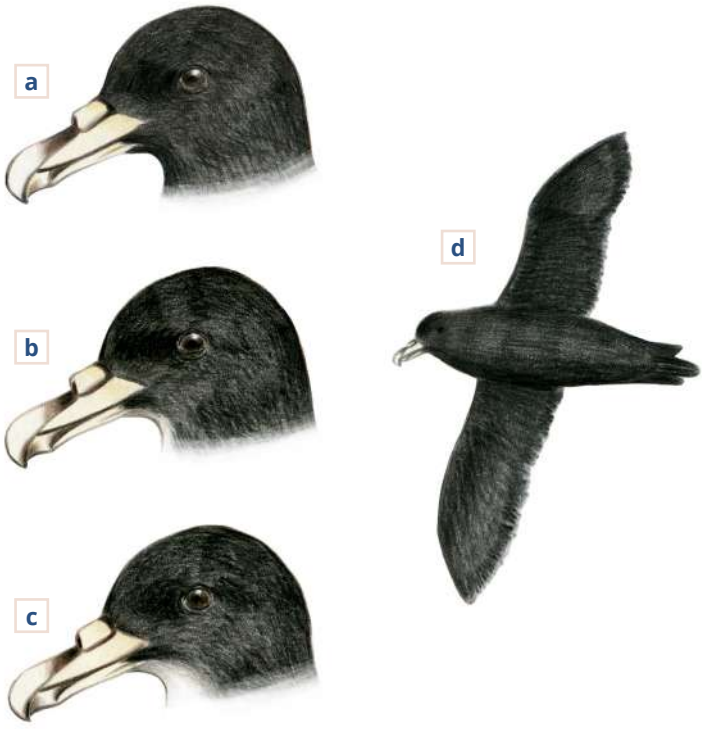
Common name: **White-chinned petrel**
*Scientific name: Procellaria aequinoctialis*

**Key features for identification:**

Measurements (inches): Spout 2.0 inches (1.8-2.2 inches), tail 4.8 inches (4.4-5.2 inches), span 52-57 inches. Belly-bellied, bulky Pink-footed Shearwater (D), with wings noticeably larger and wider than those of the Black-footed Shearwater. The beak is lighter in color and bone yellowish, with each plate outlined in dark, more visible on the flange (A). Its tip is pale. It generally has a small white spot on the chin, which is not very noticeable in the field (B, C). Some individuals lack it (A). The legs and toes are black.

May be confused with New Zealand Shearwater (less common). In the capo they differ because the latter has a dark beak tip contrasting with the rest, which is pale yellow.

**Conservation Status: UICN: Vulnerable (VU)**

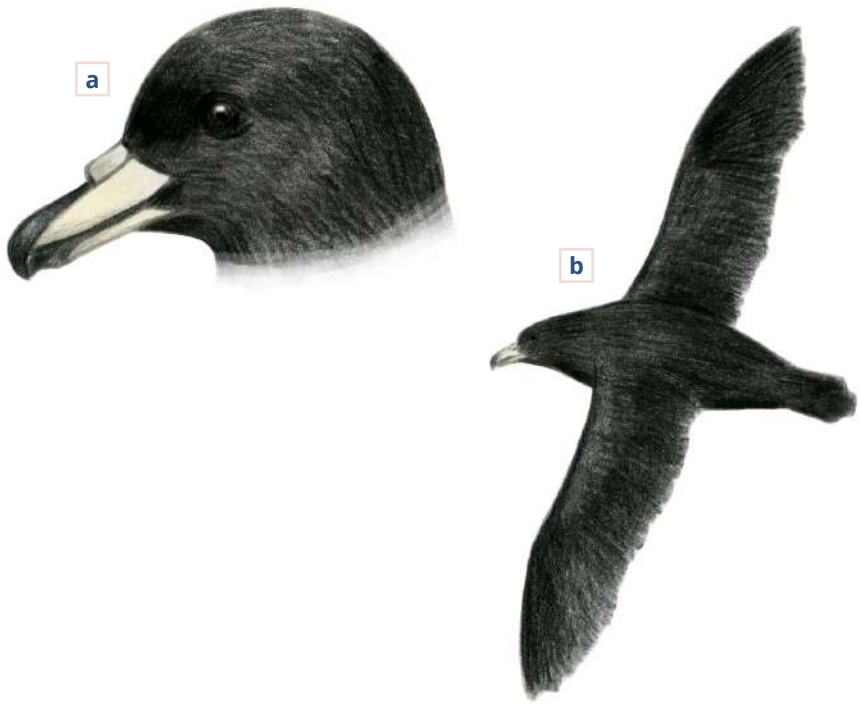


Common name: **Westland petrel**
*Scientific name: Procellaria westlandica*

**Key features for identification:**

Measurements (inches): Spout 1.8 inches (1.7-1.9 inches), tail 4.9 inches (4.8-5.0 inches), span 53 inches. It is completely black-brown (B). Legs and toes black. Light (pale yellowish) bill with black tip (A), this feature distinguishes it from the large black Pink-footed Shearwater. Its chin is always black.

**Conservation Status: UICN: Endangered (EN)**

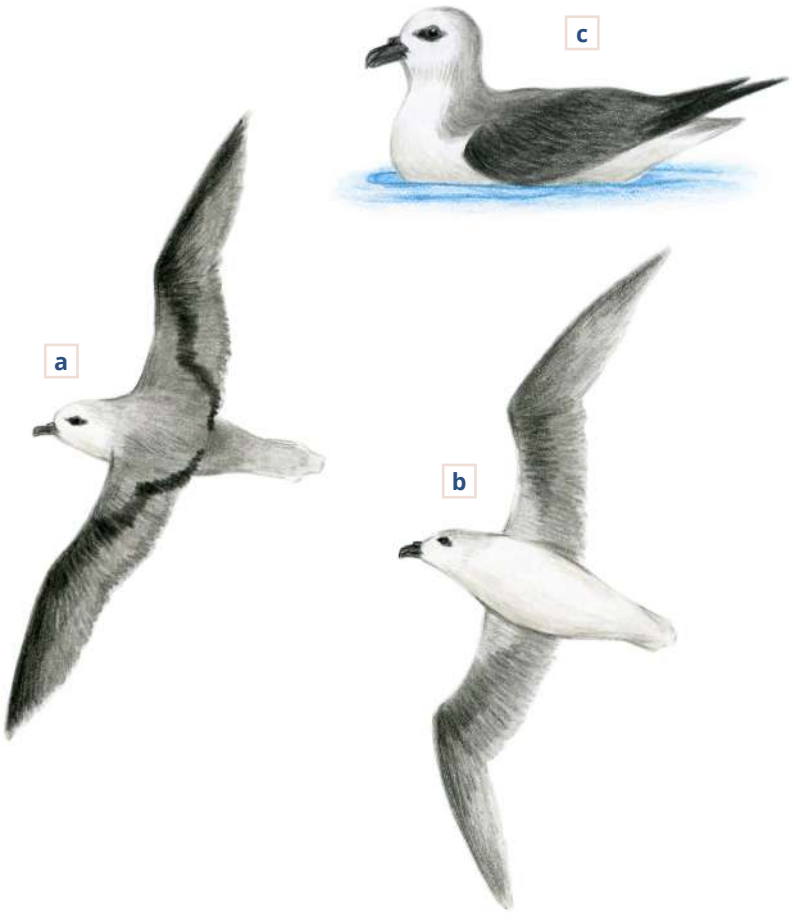


Common name: **White-headed petrel**
*Scientific name: Pterodroma lessonii*

**Key features for identification:**

Measurements (inches): Total length 15.7-18.1 inches, span 42.9 inches. Large shearwater with black beak, short and solid. Body and head white, the latter with black eye patch (A, B, C). Coat, back and tail pale grey (A). The wings on its upper side exhibit the pattern of open M, darker than the rest of the wing (A). On their lower side the wings are completely dark (B). Flesh-pink legs with the distal part darker.

**Conservation Status: UICN: Least Concern (LC)**

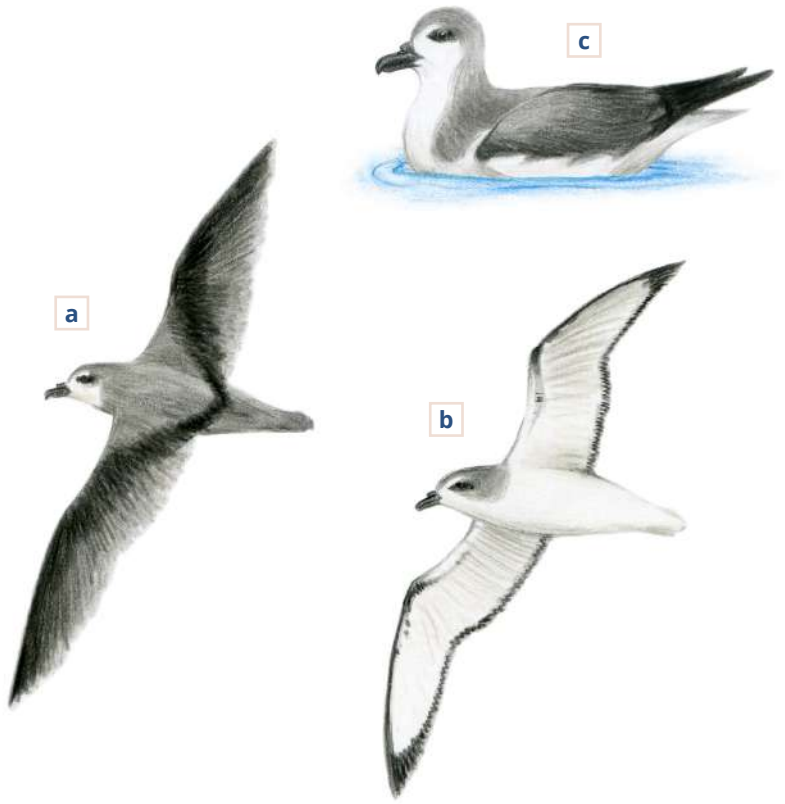


Common name: **De Filippi's petrel**
*Scientific name: Pterodoma delfilippiana*

**Key features for identification:**

Measures (inches): Total length 10.2 inches, span 25.9 inches. Small shearwater with white underparts, with black wing edges (B) mainly on the back. Grey upperparts with dark M-shaped marking pattern from wingtip to wingtip (A). Black bill. Distinctive feature is the presence of a grey semi-collar (incomplete collar) at chest level (A, B, C) which is accentuated by the white of the ear area behind the eyes. Elongated black patch in the eye area. Another diagnostic feature is the absence of a black terminal band on the tail (A), although this may occur in some cases.

**Conservation Status: UICN: Vulnerable (VU)**

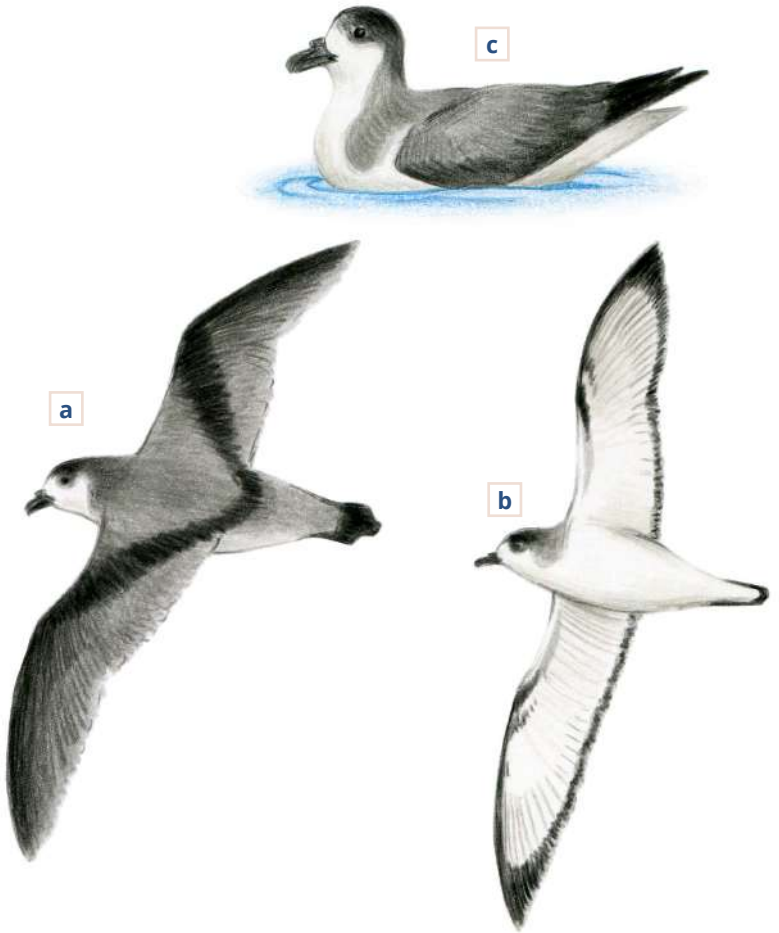


Common name: **Stejneger's petrel**
*Scientific name: Pterodoma longirostris*

**Key features for identification:**

Measures (inches): Total length 10.2 inches, wingspan 25.9 inches. Small shearwater with grey tops and M-shaped wing mark (A). White underparts, with black on wing edges, mainly on the back (B). Black beak, purple-blue legs. Tip of the tail black (A). Distinguished from Overland Shearwaters and Cook's Shearwaters by a darker crown (top of head) and a broader white forehead (A, B, C).

**Conservation Status: UICN: Endangered (EN)**

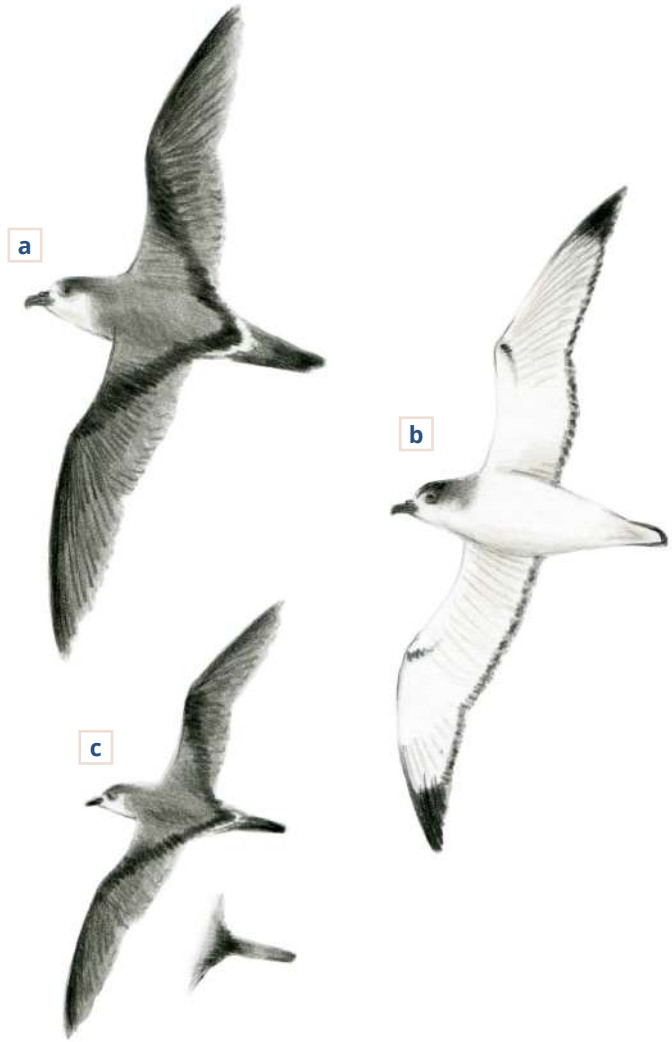


Common name: **Juan Fernández petrel**
*Scientific name: Pterodoma externa*

**Key features for identification:**

Measures (inches): Total length 16.9 inches, span 37.4 inches. Large, slender shearwater with grey tops (A) and white bottoms (B). Long black tail at end and thin white band at base (A, C), although the latter may vary (absence of white band). The wings are grey at the top and have a dark, open M-shaped mark running from wing tip to wing tip (A, C). Black bill, black crown, white forehead and face. The most distinctive diagnostic characters are the prominent white forehead and the white band at the base of the tail, which differentiates it from the More than Land Pink-footed Shearwater, which is also smaller.

**Conservation Status: UICN: Endangered (EN)**

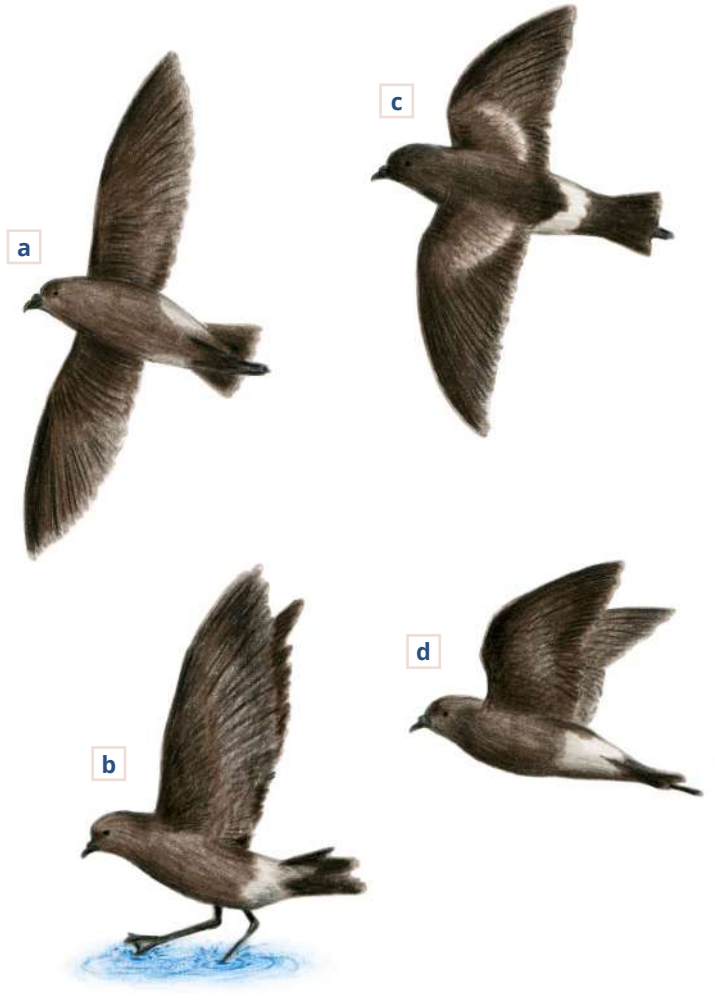


Common name: **Wilson's storm petrel**
*Scientific name: Oceanites oceanicus*

**Key features for identification:**

Measures (inches): Total length 5.9-7.4 inches, span 14.9-16.5 inches. Small petrel with general dark colouring. Square and slightly marginalised tail. In flight the legs exceed the tail (long legs) (A, C, D). Dark brown plumage with a pale bar on the winged supracorns (C). A white U-shaped patch on the rump extends to the flanks near the cloacal area (A, D). The rest of the dark underparts (A). It flies fast, erratically and often beats the surface of the sea with its legs, which seem to hang (B), searching for food in this way.

**Conservation Statud: UICN: Insufficiently Known**

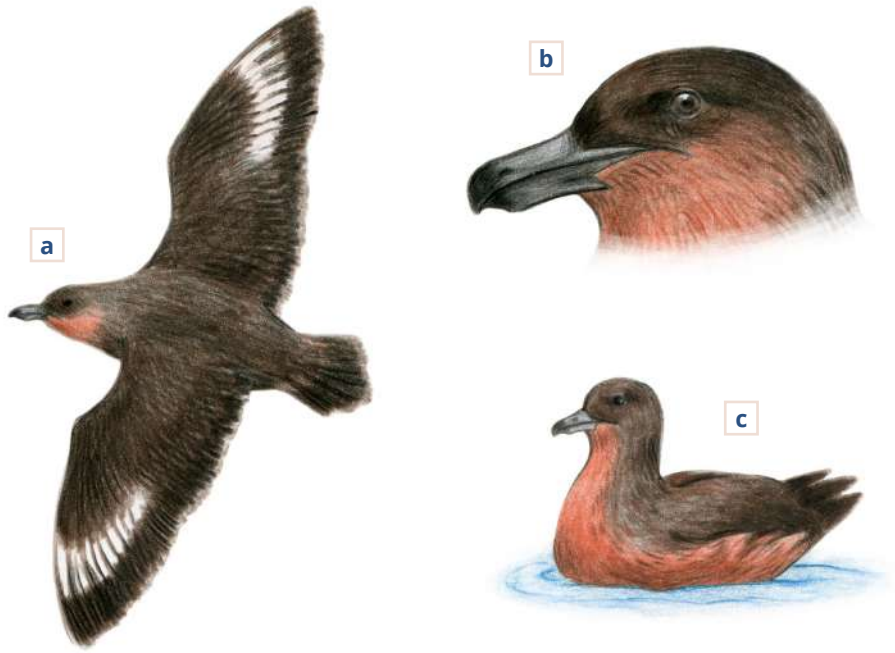


Common name: **Chilean skua**
*Scientific name: Stercorarius chilensis*

**Key features for identification:**

Measures (inches): Spout 1.8 inches (1.8-1.9 inches), tail 2.7 inches (2.6-2.7 inches), span 20.8-23.2 inches. Upper parts dark brown, mottled or veined with lighter brown or grey spots. Dark cap on the head (forehead and crown) contrasting with the reddish-brown colouring of the face. Lower parts of the body and wings reddish brown in adults (C), darker and brighter in juveniles. They have characteristic white patches on the wings, at the base of the primaries, notorious for the lower part as well as the upper part of the wings (A). This last feature distinguishes them from juvenile Dominican Gulls, which have similar brownish plumage. Bicoloured bill, bluish grey at the base and darker at the tip (B). It is the most common jumping species in Chile. In the central-northern zone its presence is more pelagic.

**Conservation Status: UICN: Least Concern (LC)**

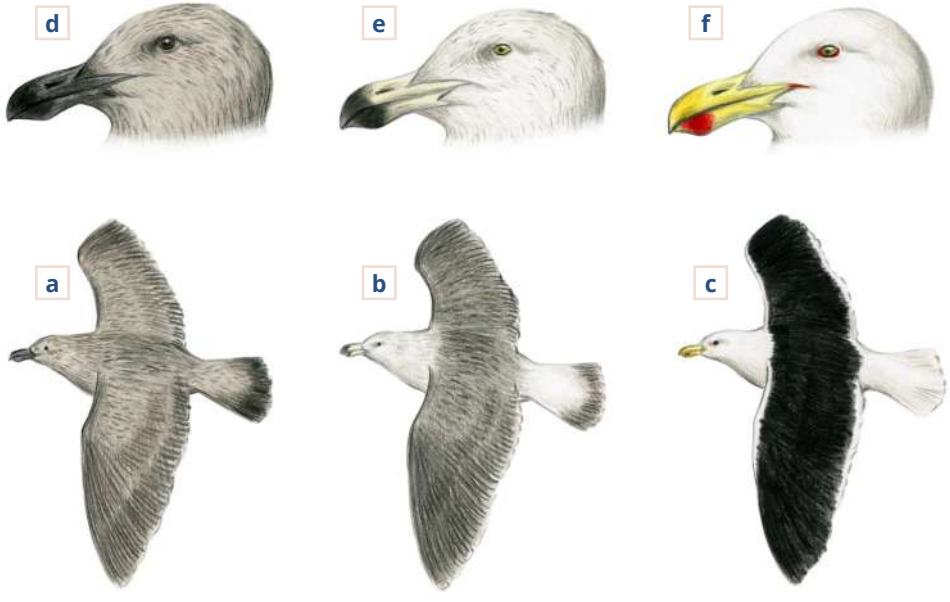


Common name: **Kelp gull**
*Scientific name: Larus dominicanus*

**Key features for identification:**

Measurements (inches): Spout 1.8 inches (1.6-2.1 inches), tail 6.0 inches (5.5-6.2 inches), span 50.3-55.9 inches. General colour white (C). Back and top of wings black, with thin white back edge. Head and tail white (C, F). Yellow bill with red spot near the tip of the jaw (lower). Legs yellow-green. Juveniles (A, D) are brownish grey, spotted with chestnut and brown in the primaries and on the tail, with a lighter rump. In the second winter (B, E) they are characterized by a white body with brown spots on the neck and head, a white tail with a dark tip, and brown and black upper wings.

**Conservation Status: UICN: Least Concern (LC)**

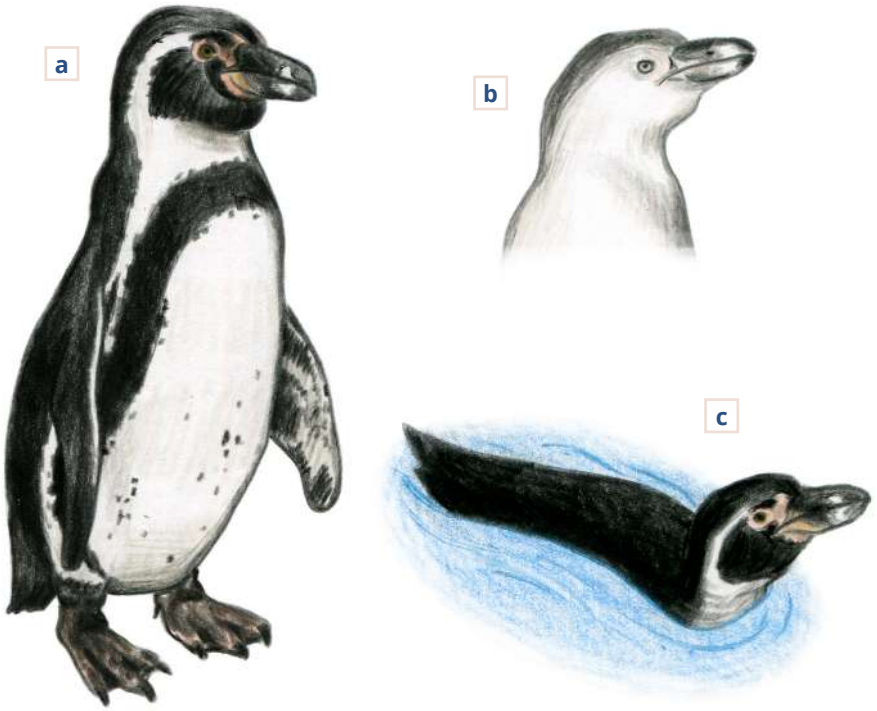


Common name: **Humboldt penguin**
*Scientific name: Spheniscus humboldti*

**Key features for identification:**

Measures (inches): Total length 25.5 inches. Medium sized penguin, blackish beak, robust and thick. Dorsal parts slate grey to black (A, C). White ventral part crossed on the upper chest by a dark horseshoe-shaped band that goes down both sides of the body which is separated from the back by another white whitish band (A). Black head with narrow white eyebrow, which surrounds the headphones and joins with the white underparts. Pink region at the base of the beak (up to the chin). Brownish black legs with white spots on the membranes. Juvenile (B) has pale grey cheeks, no white band and no dark band on chest.

**Conservation Statud: UICN: Vulnerable (VU)**

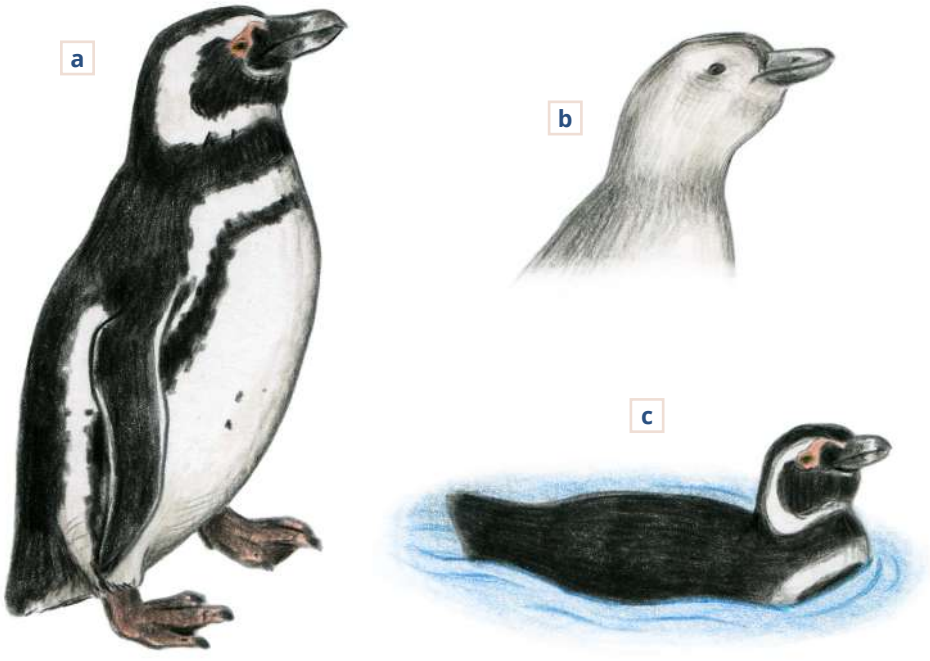


Common name: **Magellanic penguin**
*Scientific name: Spheniscus magellanicus*

**Key features for identification:**

Measures (inches): Total length 27.5 inches. Medium sized penguin with a thick beak, robust with a black base. The pink of the face more restricted to the orbital and supraorbital ring (A, B). Generally like Humboldt Penguin, black top and white bottom, two dark pectoral bands being the top wider and the bottom following the horseshoe pattern (A). The juvenile (B) is very similar to the Humboldt, but with a thinner beak. In the sea they are almost indistinguishable from the preceding species.

**Conservation Status: UICN: Nearly Threatened (NT)**



Common name: **Peruvian pelican**
*Scientific name: Pelecanus thagus*

**Key features for identification:**

Measures (inches): Total length 50 inches. Span 98.4 inches. White head with yellowish tones; white neck; black base of the beak and throat. Yellowish beak at its base with reddish sides and tip. Large bluish pouch. Dark body very stained with white. Dark wings streaked with white. Grey legs. In the immature specimens, brownish tones predominate, dark brown neck, whitish abdomen. Juveniles somewhat lighter*.

**Conservation Status: UICN: Nearly Threatened (NT)**

Common name: **Red-legged Cormoran**
*Scientific name: Phalacrocorax gaimardi*

**Key features for identification:**

Measures (inches): Total length 23.6 inches. Grey plumage, darker on the head and neck, on the back with whitish spots. Chest and abdomen lighter. Dark primaries. White patch on each side of the neck. Yellow bill with red-orange base. Red-orange legs*.

**Conservation Status: UICN: Nearly Threatened (NT)**

Common name: **Neotropic cormorant**
*Scientific name: Phalacrocorax brasilianus*

**Key features for identification:**

Measures (inches): Total length 27.5-29.5 inches. Wingspan 39.3 inches. Totally black glossy plumage. Brown beak, with hooked tip. Naked skin dark yellow around the beak. Black legs. In bridal plumage it has filamentous white feathers on the sides of its face, throat and around its beak. The immature specimens (juveniles) are brown and have whitish ventral plumage*.

**Conservation Status: UICN: Least Concern (LC)**

## 8.3. Sea turtles living in Chilean waters

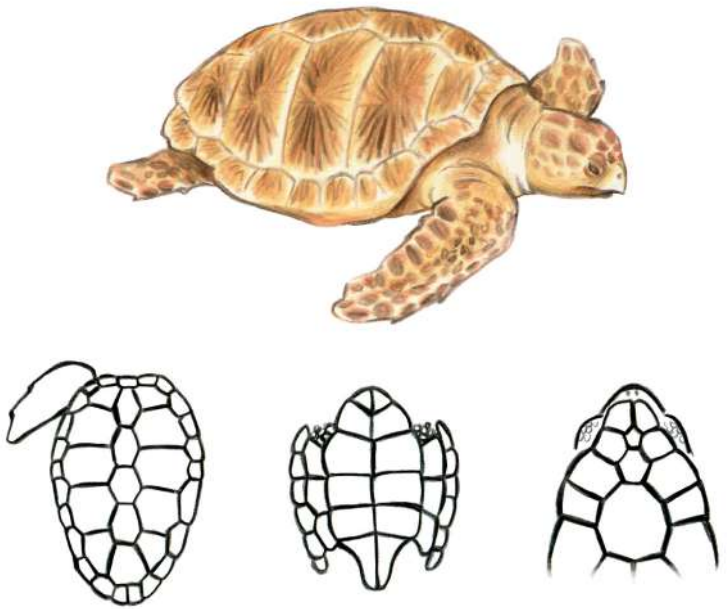
Common name: **Loggerhead sea turtle**
*Scientific name: Caretta caretta*

**Key features for identification:**

- The turtle is known as the "cabezona" or "boba", because its head is proportionally larger than those of the other species, measuring approximately 9.8 inches, with strong jaws.
- Carapace is heart-shaped, with five pairs of shields sacking and brown. The plastron is yellow-brown. It is the largest hard-shelled turtle in the world (approx. 39.1 inches and up to 330 lb).
- The limbs and tail are dark in the center and yellow at the edges and underneath. Front flippers are small but thicker than those of other species, and have two nails each. Hind flippers may have two or three claws.
- The adult male is distinguished by a long, thin tail that extends beyond the back of the carapace, where it narrows.
- Conservation Status: Endangered by IUCN In Chile, it is considered a hydrobiological species with a 30-year ban since 1995 (Supreme Decree No. 225/1995).

**a) Identification of loggerhead sea turtle (Caretta caretta)**

- Carapace (or shell): with 5 side shields.
- Plastron: with 3 inframarginal shields without pores.
- Fins: with 2 claws.
- Head: with 2 pairs of prefrontal scales.



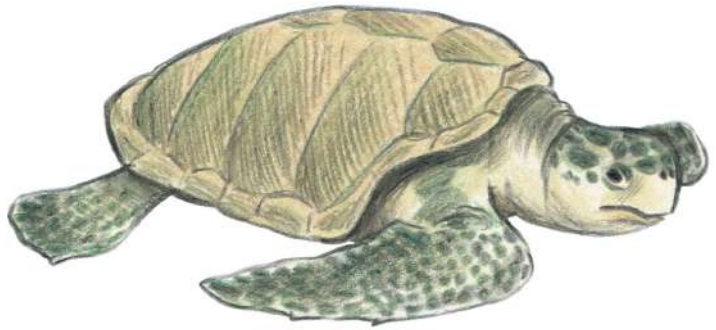
Common name: **Olive ridley sea turtle**
*Scientific name: Lepidochelys olivácea (Eschscholtz, 1829)*

**Key features for identification:**

- It is one of the smallest species of sea turtles, reaching 23.6 to 27.5 inches in length and weighing approximately 154 lb as an adult.
- Common name "parrot" because of the beak shape of its jaw. It has a short, wide carapace with smooth margins. The head is large, somewhat triangular, but is less massive than in Caretta caretta, (loggerhead sea turtle) and can measure up to 5.1 inches wide.
- The carapace, relatively thinner than that of other turtles, is convex. Plastron is cream-colored. The front and rear flippers may have one or two nails.
- The males have a long, thin tail that protrudes from the carapace. In females it's much shorter and doesn't stick out.
- It has 5 to 9 pairs of costal shields, is gray in immature, dark olive green in adults.
- Conservation Status: According to the IUCN Red List, this species is Vulnerable. In Chile it is considered a hydro-biological species with a 30-year ban (Supreme Decree No. 225/1995).

**a) Identification of Olive ridley sea turtle (Lepidochelys olivácea)**

- Carapace (or shell): with 5-9 side shields.
- Plastron: with 4 inframarginal shields with pores.
- Fins: with 2 claws (adults lose the secondary claw).
- Head: with 2 pairs of prefrontal scales.



Common name: **Leatherback sea turtle**
*Scientific name: Dermochelys coriacea*

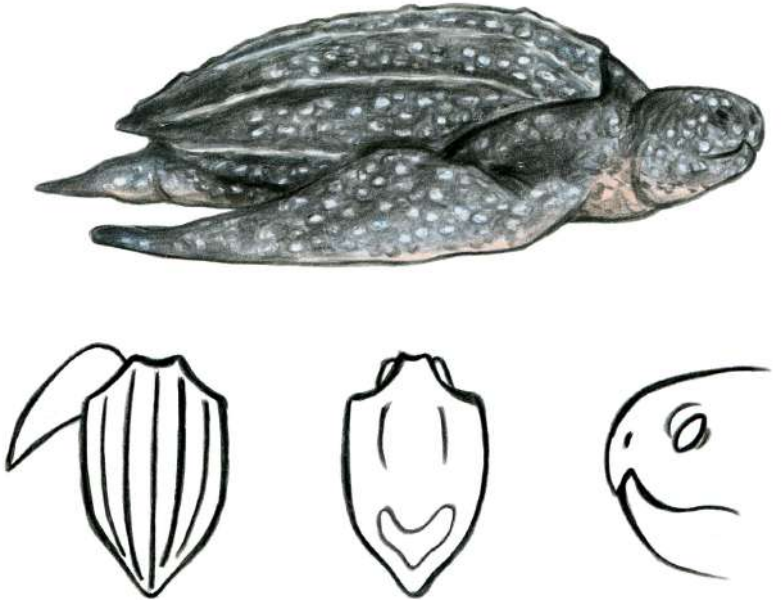
**Key features for identification:**

- The only sea turtle without a hard shell. Flexible, thick skinned carapace with seven longitudinal crests or keels; in contrast to other turtles that have bony plates.
- It is the largest (a female can weigh approximately 1102 lb). It is usually between 51.1-68.8 inches. The head is large and can represent about 20% of the carapace length. Its front flippers are very powerful and do not have nails.
- Dorsal coloration predominantly black, with variable amount of white spots; spots may be blue or pink at the neck and base of the fins. Similar ventral coloration, but with predominantly light areas. The back has rows of white scales on the longitudinal keels, giving them a striped appearance. Its fins, also black, have white edges.
- It is adapted to withstand colder waters than other turtles because it has an insulating layer of subepidermal fat, heat exchange in its fins and large adipose tissue, which allows it to thrive in oceanic regions.
- Dive deeper. A typical dive can last 15 minutes and be about 3.2 ff deep.

**Conservation Status: According to the IUCN Red List, this species is Critically Endangered. In Chile, it has been banned for 30 years since 1995 (Supreme Decree No. 225/1995).**

**b) Identification of Leatherback sea turtle (Dermochelys coriacea)**

- Carapace (or shell): with 5 keels, without shields.
- Plastron: small without shields.
- Fins: without claws.
- Head: without scales and with cusps on the jaw.



Common name: **Green-sea turle**
*Scientific name: Chelonia mydas*

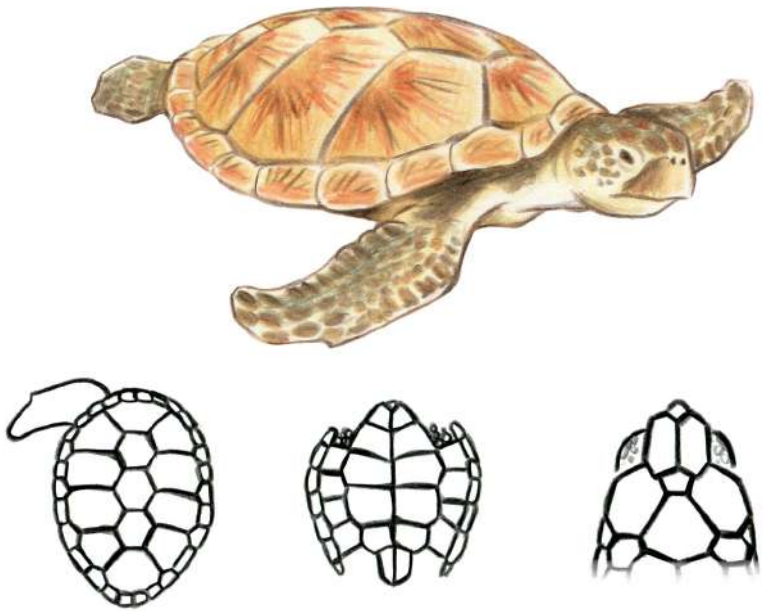
**Key features for identification:**

- Medium to large sized sea turtles, their carapace measures up to 49.2 inches and reaches approximately 330 lb.
- Its shell is oval with four pairs of costal shields per side, with yellowish edges and a pair of prefrontal shields. It is usually pale green to dark green or yellow, occasionally including bright stripes. The plastron has a yellow hue.
- Its head is round, about 5.9 inches. wide and is distinguished by having one pair of prefrontal scales (in front of its eyes), instead of two pairs like most sea turtles.
- It has four extremities transformed into fins, each of which has a nail.
- The green turtle is found in temperate, subtropical and tropical waters of the world. It is most common near the coast, in protected bays and shores, especially in areas with seagrass beds. They are rarely seen in the open ocean.

**Conservation Status: According to the IUCN Red List, this species is Endangered. In Chile it is considered a hydro-biological species with a 30-year ban (Supeme Decree No. 225/1995).**

**Identification of Green sea turle (Chelonia mydas)**

- Carapace (or shell): with 4 side shields.
- Plastron: with 4 inframarginal shields without pores.
- Fins: with 1 claw.
- Head: with 1 pair of prefrontal scales.



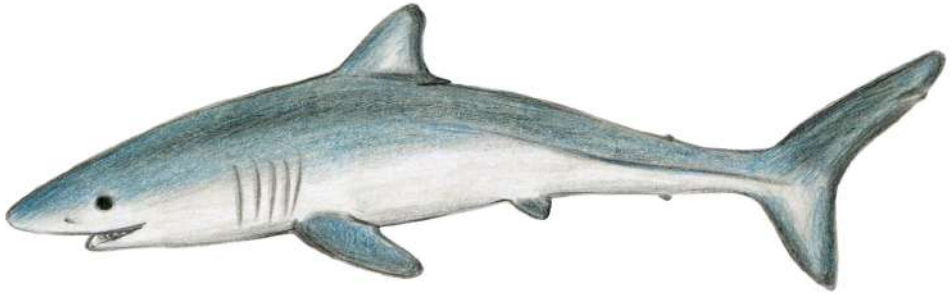
## 8.4. Sharks living in Chilean waters

Common name: **Shortfin mako shark**
*Scientific name: Isurus oxyrinchus*

**Key features for identification:**

- The typical length of a shortfin mako shark is 118 to 157 inches, weighing approximately 132 to 330 lb.
- The body is bluish at the top and white at the bottom. Although the shades described are variable according to the age of the shortfin mako shark.
- Youngsters are easily identified by the presence of a dark mark on the tip of the snout.
- The eyes are dark.

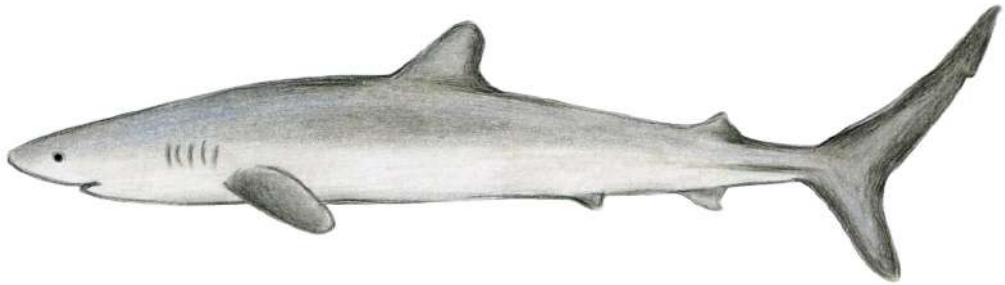
**Conservation Status: UICN: Vulnerable (VU)**



Common name: **Blue shark**
*Scientific name: Prionace glauca*

**Key features for identification:**

- It has an average length of 98 inches and a weight of 176 lb.
- With a slim and elongated body, with a long and conical muzzle.
- It has big eyes, five gill slits.
- The pectoral fins are long and thin, and the caudal fin has an upper lobe that is also very elongated.
- It has a white coloration in the ventral part, and a very intense metallic blue in the rest of the body.

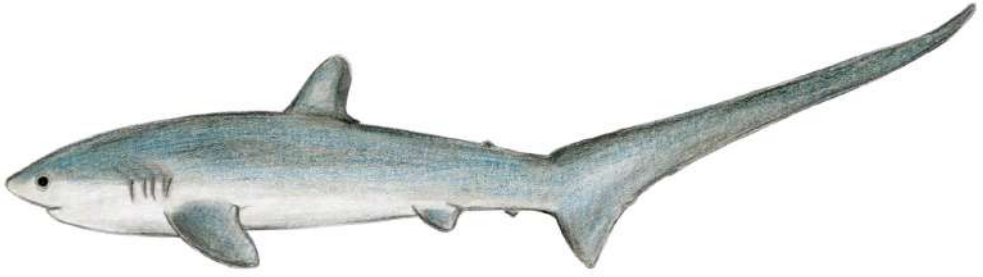


**Conservation Status: UICN: Nearly Threatened (NT)**

Common name: **Common thresher**
*Scientific name: Alopias vulpinus*

**Key features for identification:**

- It is the largest representative of the family Alopiidae, its size could reach approximately 236 inches long and weigh 767 lb, although a smaller size is usually normal.
- The body is robust, the head is small in relation to the body, its muzzle is short and tapered.
- It has 5 gill slits on each side. The crescent-shaped mouth is small with well-defined lip folds.
- It has a caudal fin, almost as long as the rest of its body, extremely asymmetric, the upper lobe is very developed
- The pectoral fins are long with a certain curvature and end in a narrow tip.
- The contrast in coloring is very evident between the dorsal part and the sides which are blue, or dark grey with respect to the ventral part which is white. The base of the pectoral fins is also white.



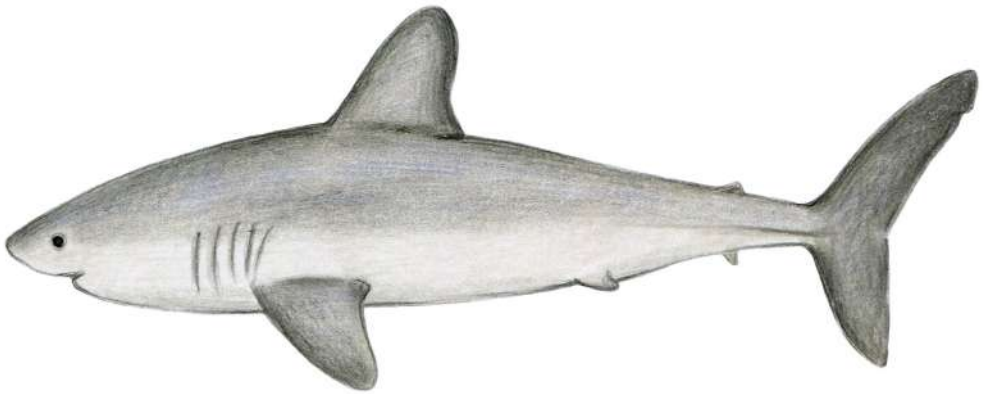
**Conservation Status: UICN: Vulnerable (VU)**

Common name: **Porbeagle**
*Scientific name: Lamna nasus*

**Key features for identification:**

- It is robust, massive, thick and very compact, with a pointed conical snout and a crescent-shaped tail fin.
- The first dorsal fin is large and triangular and has a white spot on the back of it, while the second dorsal fin is very small.
- The large pectoral fins it uses for balance and are located behind the long gill slits.
- It is bluish-gray or bluish-black on top and white underneath.

**Conservation Status: UICN: Vulnerable (VU)**



# 9. DATA LOGGING

## 9.1. Information filling logs

Electronic fishing form used for recording species associated with bycatch.

| HSF flag (ISO ALPHA-3 Code) | HSF name | CB | Registration | IMO | Date fishing set | Start time fishing set | Finish time fishing set | Latitude | Longitude | No. Fishing set | Finish gear | TSM | Wind strenght (knots) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHL | | | | | | | | | | | PURSE SEINE | | |
| CHL | | | | | | | | | | | PURSE SEINE | | |
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| CHL | | | | | | | | | | | PURSE SEINE | | |

| Wind direction | Shoal direction | Minimun fishing haul depth | Maximum fishing haul depth | Fishing net lenght | Fishing net height | Net draught time | Target species | Caught species code (FAO 3-alpha code) | Estimated catch weight (kg-lb) | Species discard (FAO 3-alpha code) | Discard estimated weight (kg-lb) | Specimen of bycatch fauna caught | No. specimens of bycatch fauna caught alive | No. specimens of bycatch fauna caught | No. specimens of bycatch fauna caught 1. Juveniles 2. Adults |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| No. Bycatch specimen released | Maintenance condition | Release conditions | Bycatch migration technique | Sighting technique | Observer name |
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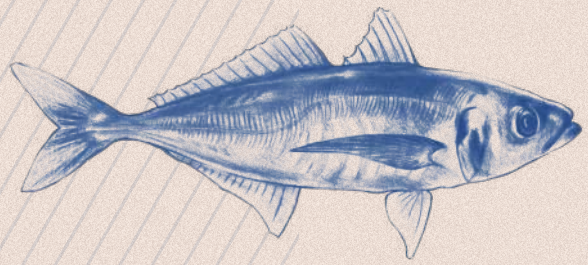
INSTITUTO DE INVESTIGACIÓN PESQUERA
PROGRAMA SINOPTICO DE PESCA
FISHING LOGBOCK

OBSERVATIONS

INSTITUTO INVESTIGACIÓN PESQUERA



# GOOD PRACTICE MANUAL FOR THE INDUSTRIAL PURSE SEINE FISHERY FOR HORSE MACKEREL IN SOUTH-CENTRAL CHILE

ALIMENTOS MARINOS S.A. BLUMAR SEAFOODS Camanchaca FoodCorp Austevoll Seafood Co. ITORAL PESQUERA LANDES LotaProtein Part of TripleNine ORIZON