Marine Resources of the Falklands' Shallow Marine Environment

A review of species, distributions, and sustainability

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Introduction

The shallow marine environment of the Falkland Islands holds nearly 300 documented animal species, with many more expected to be discovered. Species range from organisms as simple as sponges to those as highly evolved as dolphins. While all are valuable for their role in enhancing biodiversity, some of these animals are also known to be directly beneficial to humans through extraction for sale and consumption.

The harvest of marine resources has a history as old as humanity, with the earliest civilizations leaving evidence of shell middens and depictions of fishing in stone artwork. Today, over 30 million people worldwide are employed as fishermen, with an additional 13 million involved in aquaculture. In 2007, over 80,000,000 tonnes of marine animals were harvested internationally. The majority of this catch was marine fishes, but totals also include over 5,000,000 tonnes of crustaceans and 7,000,000 tonnes of molluscs (United Nations' Food and Agriculture Association).

The Falkland Islands are economically a fishing nation, with 60% of the nation’s GDP resulting from marine resource extraction, primarily in the form of squid and finfish. All commercial fishing is currently conducted offshore, with limits set at three nautical miles beyond the territorial baselines. However, provision for inshore fisheries exists through the Inshore Fishing Regulations of 1988.

Aside from some recreational harvest, little to no exploitation of inshore resources has occurred in the Falklands. But in an era of encouraged diversification and economic expansion, harvest of commercially viable species are likely to be considered.

Numerous species found within the shallow waters of the Falklands are harvested elsewhere in the world, particularly in southern Chile. In some instances this harvest has been shown to be sustainable, but in others it has led to local extinctions. Consideration of a species’ life history and analysis of fisheries management success elsewhere can help ensure that any extraction of species in Falklands’ waters is done in such a way that the resource continues to produce a viable population so as to avoid loss of biodiversity and to ensure future yields.

This report presents 20 species found between high tide and 20 meters in depth around the Falkland Islands that are known to be commercially harvested elsewhere in the world. Information on their life histories is presented when known, as is information about their known distribution within the Falklands (based on a relative abundance scale of 1 (rare) to 5 (abundant)), their harvests elsewhere, and suppositions about the viability of their extraction within the Falklands. If such exploitation for a species were to be proposed, then a full stock assessment and development of a management plan should be undertaken, but this report serves as a first step and guide towards environmentally sustainable use of available marine animal resources.
Gevers's Trophon
*Trophon geversianus*

**Species Characteristics:**

Four species of the genus *Trophon* occur in the waters of the Falkland Islands (*T. ohlini, T. pallidus, T. plicatus,* and *T. geversianus*). *T. geversianus* is the most abundant of these species in the shallow marine environment. Individuals can reach 10 cm in length, are grey to white, and have a thick shell with five whorls. The species is found as far north as southern Brazil and inhabits rocky substrates to a depth of 180 meters. The diet is primarily bivalves, though predation on the eggs of rays and skates also occurs.

**International Resource Use:**

*Trophon* spp. are harvested by South American artisanal fishermen (mariscadores) through intertidal collection and hookah diving. There are no catch statistics for this taxonomic group in Chile or Argentina.

**Viability in the Falklands:**

*Trophon geversianus* is reasonably common in the Falkland Islands but not to a level that could support commercial extraction. The species lays eggs on hard substrates, and this characteristic may make them suitable candidates for aquaculture.
Rough Thorn Drupe
*Acanthina monodon*

**Species Characteristics:**
*A. monodon* reaches a maximum size of 6 cm. A large downward-projecting tooth projects from the outer lip of the shell and is reflected in the Latin name of the species (*monodon* meaning “one tooth”). The species is found on rocky substrates from the intertidal to a depth of approximately 20 m. The species is carnivorous and feeds on other molluscs, particularly bivalves. It has separate sexes, reaches sexual maturity at a shell length of 3 cm, and lays its eggs on rocky substrates.

**International Resource Use:**
No information on commercial harvest of this species is available.

**Viability in the Falklands:**
This species is relatively common in the Falkland Islands, but densities and life history parameters would need to be determined before commercial extraction. It may have potential as an aquaculture species, though artificial feed may be required. The species’ flesh has been likened to Caribbean conch. However, *A. monodon* is not harvested in other parts of its range, and the lack of a consumer base may make this a difficult species to market.
Short-spired Volutid
*Odontocybiola magellanica*

Long-spired Volutid
*Adelomelon ancilla*

**Species Characteristics:**

Volutids are large carnivorous snails generally inhabiting sandy-bottomed intertidal and subtidal zones. The Magellanic region, including the Falklands, hosts two species of economic value: *Adelomelon ancilla* and *Odontocybiola magellanica*. The two species are distinguished by the size of the shell opening and the length of the spire. *O. magellanica* has a shorter spire and a larger opening. *A. ancilla* has a longer spire but a smaller opening that results in a smaller body mass.

Like other volutids, the local species have young that hatch directly from the egg case as miniature adults, thus reducing the possibility of wide dispersal. Both species are slow growing and late maturing.

**International Resource Use:**

*O. magellanica* and *A. ancilla* are sometimes marketed as organic conch from the Beagle Channel. Their large foot represents 60% of the total body mass, and it is this portion that is consumed. Chilean catch reports show a historic maximum harvest of 224 metric tonnes in the 2000 fishing season and a minimum of 3 tonnes in 2002.

**Viability in the Falklands:**

Both *O. magellanica* and *A. ancilla* are common in the Falkland Islands, but their densities and potential yields should be ascertained prior to exploitation.
Magellanic Copper Limpet

*Nacella magellanica*

**Species Characteristics:**
There are seven species of limpet in the genus *Nacella* within the Magellanic region, and all are reported in the Falkland Islands. Large-bodied and found in the intertidal and shallow subtidal regions, *Nacella magellanica* is the most conspicuous; the species is associated with bare rock and is also common in Chilean and Argentine Patagonia.

Information on life history is sparse, but the species exhibits separate sexes and external fertilization. Individuals release small eggs in early spring, and larvae are thought to be pelagic. Growth is slow; size increases about 7 mm in the first year, then decreases to 6.3, 5.4 and 4.7 mm in years 2, 3 and 4 respectively.

**International Resource Use:**
*Nacella* sp. and keyhole limpets (*Fissurella* sp.) are collectively known as the food item “lapas” in Chile. They have been commonly extracted and consumed in the southern part of the country for thousands of years.

**Viability in the Falklands:**
*Nacella magellanica* can be found on nearly all intertidal rocky shores in the Falklands; an exception is estuaries with low salinities. In some areas, densities can be quite high. Preliminary surveys of the species are recommended prior to any proposed extraction in order to ascertain their value as a fishery. Their reproductive strategy also makes aquaculture a venture worth investigating.
Keyhole Limpets

*Fissurella* spp.

**Species Characteristics:**

The genus *Fissurella* is composed of large limpets characterised by a hole in the top of their shell. They inhabit the intertidal zone to depths of 50 m. Five species have been identified in the Magellanic region (*F. crassa*, *F. picta*, *F. oriens*, *F. nigra*, *F. radiosae*).

Nothing is known about the biology of the Falklands’ populations, but the life histories of Chilean individuals have been documented. The species have separate sexes. *F. nigra* releases gametes in the spring in a mostly nocturnal and spontaneous spawning. *F. maxima* is relatively fast growing and has achieved 10 years of age in northern Chile. Higher latitude populations (including the Falkland Islands) are likely to have a slower growth rate due to lower temperatures.

**International Resource Use:**

Known as “lapas” or “chapes” in Chile, *Fissurella* individuals are frequently consumed by people in coastal regions. The product is generally eaten in empanadas but also included in stews or fried with garlic and herbs. *Fissurella* extraction in Chile was 3,400 metric tonnes in 2002, quadrupled to 12,800 tonnes in 2004, then decreased to 2,034 tonnes in 2008.

**Viability in the Falklands:**

*Fissurella* spp. are common in the Falkland Islands from low tide to 20 m. Although surveys could show sustainable small-scale extraction, preliminary research on the species’ biology would be necessary as local populations are likely to be slow-growing and late-maturing.

*Fissurella* spp. may be candidates for aquaculture. In Chile they have been maintained in the laboratory for long periods of time. They spawn under artificial conditions, have short larval development periods, and do not require external feeding in the larval stages. However, the conditions necessary to ensure complete larval development have yet to be determined, and the cost of feeding such slow-growing species may be prohibitive.
**Kelp Bivalve**

*Gaimardia trapesina*

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**Species Characteristics:**

*Gaimardia trapesina* is a small (no bigger than 5 cm) bivalve that attaches to the giant kelp *Macrocystis pyrifera*. It is a brooding species, and the young lack a planktonic larval stage.

Distribution records include the Straits of Magellan, Beagle Channel, southern Argentina, Falkland Islands, South Georgia, Crozet, Heard and Macquarie Islands.

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**International Resource Use:**

Anecdotal evidence suggests that *G. trapesina* is extracted and consumed in southern Chile. Recreational sampling in the Falklands has reported that the flesh drops out of the shell during the cooking process, and that the taste is sweet.

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**Viability in the Falklands:**

*G. trapesina* is common on kelp plants throughout the Falkland Islands. Abundance varies interannually and is likely due to recruitment variability.

Commercial extraction from kelp fronds in the wild would be difficult, but as a brooding species it could be a candidate for aquaculture.
Striped Clam

*Eurhomalea exalbida*

Species Characteristics:

*Eurhomalea exalbida* is a large (10+ cm) clam that is gray in colour and characterised by growth ridges on its shell. Individuals are slow-growing and have been known to attain ages up to 70 years. They are found in shallow waters in sheltered sandy bays. The species is distributed throughout southern South America, from the Beagle Channel to Chiloe on the Pacific coast and up to the province of Buenos Aires on the Atlantic coast.

International Resource Use:

*E. exalbida* is considered a commercial resource in the Beagle Channel with occasional densities of up to 83 individuals per m².

Research in the Beagle Channel has suggested that increased fishing pressure may shift populations to a more productive yet stable state with a greater share of young, small, faster growing animals. The process would require careful control to avoid over-exploitation, but fast growth during the first 20 years and relatively early maturity at 4 years of age make *E. exalbida* more robust than other species with a similar life span.

Viability in the Falklands:

*E. exalbida* in the Falkland Islands can be found in densities similar to those in the Beagle Channel. However, the reproductive, age, and growth processes of the Falklands population would require further study. Any commercial activity on the species warrants caution, and initial extraction should be experimental.
Ribbed Mussel
*Aulacomya ater*

Species Characteristics:
*Aulacomya ater* is a large black mussel (up to 20 cm) distinguishable by grooves running the length of the shell. The mantle is a cream colour in males and beige with purple dots in females. Individuals are dioecious (either male or female), and in southern Chile spawning occurs from late November to February. The minimum spawning length is 6.5 cm.

*A. ater* is found in enclosed bays, shallow waters, and rocky or muddy outcrops where it can form quite dense populations. It is tolerant of a wide range of salinities and temperatures and is distributed throughout southern Peru, Chile, Argentina, and the Falkland Islands. It has also been reported as an invasive species in Scotland.

International Resource Use:
*A. ater* is a commercial species in southern Peru and Chile normally collected by hand and grappling by artisanal fishermen. The growth of an aquaculture industry has offset overexploitation in some areas.

Viability in the Falklands:
*A. ater* is common in enclosed bays around the Falkland Islands. It forms a habitat for a community of species and would therefore not be suitable for extraction. However, it is now cultured successfully in Chile and could be cultured in the Falkland Islands. Market prices suggest that the flesh can fetch as high as US$8 per kg in some markets.
Blue Mussel  
*Mytilus edulis chilensis*

Species Characteristics:

*Mytilus edulis* is a cosmopolitan mussel inhabiting temperate and polar intertidal and subtidal waters around the world. Individuals are attached to the substrate with fine byssal threads and are filter-feeders. The subspecies *chilensis* thrives in waters between 5 and 25 m deep around southern South America. Individuals can live up to 11 years and reach 12 cm in length. Most adults in the Falklands are 5 – 6 years old and 4 – 5 cm in length. Spawning occurs from December to March with the release of small (70 – 80 μm) pelagic eggs. After three months as planktonic larvae, individuals settle on rocky grounds, preferring existing mussel beds (particularly those that have been commercially depleted) and bottoms covered by filamentous algae and the green algae *Ulva lactuca*.

International Resource Use:

*Mytilus edulis* is harvested from both wild and farmed populations throughout the world. Due to dense aggregation and high growth rates, annual meat production can reach 1 kg per m² of mussel bed. Harvest of wild *M. edulis chilensis* in Chile irregularly varied between 200 and 8,000 tonnes in 2000 – 2008; aquaculture contributed over 100,000 tonnes. In Argentina, the total annual harvest is up to 100 tonnes in Chubut and between 500 and 1,500 tonnes in the Buenos Aires and Rio Negro provinces. The majority of the vast Chilean harvest is exported to Spain, Portugal, Italy, and Argentina.

Viability in the Falklands:

There are many places around the Falklands where these mussels are readily available for collection. However, those near sandy beaches contain numerous tiny pearls within their flesh and some wild mussels are infected by the parasitic algae *Coccomyxa* that lowers meat quality. Other mussels contain the commensal isopod *Edotea* that uses wild mussels as a shelter and can cause gill damage and diminished meat weight, particularly in smaller mussels. Meat of farmed mussels is of excellent quality. The species has been cultivated at Goose Green, with approximately 20 tonnes of mussels farmed on ropes at any one time from naturally settling spat. The market is local only.
Giant Mussel
Choromytilus chorus

Species Characteristics:

*Choromytilus chorus* is a large bivalve (up to 26 cm) distributed from Peru to Brazil. It inhabits depths from 0 – 20 meters and is often found in estuarine areas with salinity from 24 – 30, but generally prefers the upper reaches of that range. It has slow growth, taking from 7 – 8 years to reach 12 cm, but is sexually mature at 1 year. Spawning occurs in spring and summer. Juveniles settle on rocky grounds in the presence of the robust filamentous red alga *Gymnogongrus furcellatus*, which forms an important refuge from gastropod predation.

International Resource Use:

*Choromytilus chorus* is the most valuable mussel in southern South America. In the past, the species was heavily exploited in Chile, and its stocks became depleted by the 1940s. Since then, many attempts at aquaculture have been conducted, but most have been unsuccessful. Growth of farmed individuals from rafts is more rapid than on natural banks, with individuals reaching up to 6 cm in 2 years. However, the coffee-coloured gonads of farmed females confuses customers and thus halves the possible sale from cultivated specimens. Commercial collection between 1985 and 1994 was 900 – 1,300 tonnes, but this decreased to 50 – 200 tonnes between 2000 and 2008.

Viability in the Falklands:

No stock assessment or commercial exploitation exists to date. Harvest of wild banks for a local market seems possible.
Patagonian Scallop

*Zygochlamys patagonica*

Species Characteristics:

*Zygochlamys patagonica* is distributed around the southern tip of South America from northern Chile to southern Brazil. It inhabits muddy and sandy bottoms between 10 and 200 m. Individuals can live for 18 years and attain shell lengths of 7.5 cm. They become reproductively mature after 2 years at a size of about 4.5 cm. The major spawning peak occurs in spring with a minor peak towards the end of summer. Individuals filter feed phytoplankton from the water column. Numerous simple eyes around the edges of the mantle can alert individuals to danger from which they can flee by clapping their shells together. Both live and dead shells represent a hard substrate in soft-bottom areas, providing an attachment point for a high diversity of sessile organisms.

International Resource Use:

*Zygochlamys patagonica* is harvested in both Uruguay and Argentina, mostly from offshore high-density scallop beds between 75 and 110 meters in depth. Following stock explorations between 1989 and 1995, a bottom trawl fishery in Argentina began in 1996 with a total catch of 37,000 tonnes. Between 2000 and 2009, three licensed vessels harvested between 41,000 and 80,000 tonnes annually. Most of this was exported to markets in France and the USA. Sustainable yields are estimated at 40% of the biomass of commercially-sized individuals. Protective measures include a minimum commercial size of 5.5 cm and no-take protected areas over some areas of high density.

Viability in the Falklands:

In December 2001, an experimental *Z. patagonica* fishery was established in the Falkland Islands. From then until 2006, the species was fished on beds located to the east and northeast of the Falkland Islands at approximately 100 – 150 m depth. From 2003 – 2006, between 685 and 1,358 tonnes were harvested annually. The fishery was interrupted when the only vessel sank in 2006 in shallow waters. Every year some minor amounts (5 to 15 tonnes) of scallops are taken as bycatch by squid trawlers and mostly released alive.
Patagonian Longfin Squid

*Doryteuthis gahi*

Species Characteristics:

*Doryteuthis gahi* (known within the industry as *Loligo*) inhabits the waters of southern South America between 5 and 700 m depth, with most individuals inhabiting the 100 – 400 meter isobaths. Individuals can attain mantle lengths of 42 cm and weigh more than 300 g, but most range from 12 – 18 cm and weigh 50 – 100 g. The squid feed mostly on planktonic crustaceans and live for one year. There are two spawning peaks, one in spring and one in autumn. Each female lays 1,000 – 20,000 eggs in numerous egg strings attached to kelp stalks. As they mature, juveniles gradually descend for foraging down the outer continental shelf and upper continental slope where they eventually mature before returning to shallow waters to reproduce.

International Resource Use:

*Doryteuthis gahi* is the most important fishery resource in Falkland Islands’ waters, with annual catches of 30,000 – 60,000 tons. The species is extracted by national trawlers in two seasons: February – April and July – September. Harvest occurs between 100 and 300 m depth to the southeast of the islands in the so-called “Loligo box.” Squid are frozen whole and sold mostly in Europe. Neither recreational nor jigging fisheries exist. In Argentina the squid is taken as a minor (200 – 1,000 tons annually) bycatch product, mostly from the shrimp fishery.

Viability in the Falklands:

The Falklands’ offshore squid bottom trawling fishery is regulated on an ITQ basis, and both annual stock assessment and historical practice show its sustainability. Stock assessment is done twice a year before fishing season and its exploitation is monitored using a depletion model. Fishing vessels target immature and maturing squid before the pre-spawning inshore migration, and spawning habitats in shallow waters around the islands are untouched.
Southern Red Octopus

Enteroctopus megalocyathus

Species Characteristics:
This large inshore octopus inhabits rocky grounds from 0 – 220 m depth. A close relative of the Giant Pacific Octopus (Enteroctopus dofleini), this southern species can reach 120 cm and weigh up to 6 kg. Reproduction occurs during a major spring spawning peak and a minor autumn peak. Eggs are about 1 cm in diameter, and the female broods them in sheltered shallow waters (6 – 14 m) for several months. The species feeds mostly on crabs and lobster krill, but cannibalism has also been documented.

International Resource Use:
Commercial harvest of Enteroctopus megalocyathus in southern South America usually occurs between April and November and is done by hand-picking at low tide and by harpoon and hook by divers between 15 – 25 meters. In Chile, the annual catch was historically around 500 tonnes, but has recently decreased to 200 tonnes. No official statistics exist for Argentina, but annual estimates are 10 – 15 tonnes around Puerto Madryn and 10 – 56 tonnes around Chubut. No stock assessments have been done and no management measures exist.

Viability in the Falklands:
To date the Falklands' octopus population is harvested only by sea lions, for which it is the most important prey item in the female diet, and by opportunistic human recreational catch from tidepools. The octopus is an occasional bycatch product in trawl fisheries and consumed on board. The species could be a source for an artisanal or recreational fishery targeting the local market.
Giant Barnacle

*Austromegabalanus psittacus*

**Species Characteristics:**

*Austromegabalanus psittacus* is a large (up to 30 cm) barnacle inhabiting 3 – 10 meter deep semi-exposed hard substrates from southern Peru to the Straits of Magellan, Juan Fernandez Islands, and Falkland Islands. As with other barnacles, a hard calcite covering surrounds the animal, which extends its legs in a rake-like way to capture food from the water column. The species is distinguished by its large size and by two pointed hooks that extend alongside the sweeping legs. Though occasionally found growing in isolation, this species can clump to form hummocks or large reef-like structures. The animals are simultaneous hermaphrodites that cross-fertilize. Individuals retain fertilized eggs for 3-4 weeks before releasing planktonic larvae that drift for about 45 days before settling onto the substrate.

**International Resource Use:**

*A. psittacus* is an economically important species in Chile where artisanal fishermen harvest 200 – 600 tonnes per year. The adductor muscles and the female gonads are consumed fresh and can fetch US$1.50 – 7.70 per kg (whole) in the domestic Chilean market. The species can also be frozen (up to US$ 10 per kg) or canned (US$12 per kg). Exports, mainly to Asian markets, are in the region of 5 to 10 tonnes per year.

**Viability in the Falklands:**

The nature of *A. psittacus* growth would require the use of SCUBA for extraction. The species is an important habitat builder, and any extraction would have a negative impact on these habitats.

However, individuals reach commercial harvest size (10 cm) 18-30 months after settlement. This rapid growth makes *A. psittacus* a potential aquaculture species, with culture from wild seed for canned and frozen meat potentially creating an annual profitability exceeding 10%.
Gregarious Lobster Krill

*Munida gregaria*

**Species Characteristics:**

*Munida gregaria*, one of two species of Falkland Islands’ lobster krill, is a galatheid shrimp (neither lobster nor krill) that occurs between 10 and 250 m depth around southern Chile, Argentinian shores, and the Falkland Islands. Adults are 3 to 3.5 cm in carapace length (max 3.7 cm). The species is distinguishable from its congener *Munida subrugosa* by longer eye stalks. Adult lobster krill feed on sediment and occasionally scavenge or hunt. Spawning occurs from June to October with a female laying and brooding a clutch of up to 8,500 eggs. Juveniles are pelagic and swarm near the surface across the shelf waters between November and May. Around the Falkland Islands, these juveniles are an important food source for sei whales, fur seals, cormorants, and penguins (particularly gentoos).

**International Resource Use:**

*Munida gregaria* stocks in some areas of the southwest Atlantic represent up to 50% of the biomass of bottom invertebrates. However, attempts to develop fisheries in both Argentina and Chile failed because of market problems. In New Zealand, there were attempts to harvest pelagic juveniles for use as a food stock for cultured salmon. Problems with harvest for human consumption include the animal’s hard carapace and small amount of meat.

**Viability in the Falklands:**

The meat of *Munida gregaria* is edible, often considered better than that of other shrimp species. However, the species can be extremely difficult to peel. Some individuals have a parasitic bopyrid isopod parasite under the carapace that impacts growth rates, but this does not diminish the meat quality or commercial value. Stocks around the Falklands have not been estimated, but aggregations at 40 to 70 m depth south-west of the Falklands have yielded catches of 600 – 800 (and up to 2500) kg/hr. If marketing issues could be resolved, these stocks would probably be sufficient for a viable large-scale fishery. However, caution is advised due to the ecological importance of the species in the food web.
Short-eyed Lobster Krill
*Munida subrugosa*

Species Characteristics:
*M. subrugosa* is distributed around southern South America between 5 and 1,000 m depth. It is thus found slightly deeper than its congener *Munida gregaria*, though even with this wider range it is generally less abundant. Biology of the two species is similar. *M. subrugosa* reproduces from May to October, brooding up to 10,750 eggs. The shrimp can reach 4 cm in carapace length. Though the two species exhibit different physical characteristics, with *M. subrugosa* having much shorter eye stalks, the genetic differentiability of these two species is still in debate.

International Resource Use:
As with *Munida gregaria*, no successful commercial extraction has been undertaken. This is again because of market issues regarding the ease of removing the small amount of meat from the hard-to-peel carapace.

Viability in the Falklands:
If a fishery for *Munida gregaria* were established, *Munida subrugosa* would likely be a bycatch species that may also be marketable.
King Crab/Snow Crab

*Paralomis granulosa*

Species Characteristics:

*Paralomis granulosa* is a lithodid crab inhabiting depths from 0 – 100 m, but most abundant between 10 and 40 m. The species occurs from Chile to southern Brazil. Juveniles live in dense kelp beds in the shallower end of the range while adults prefer bottoms with weak tidal currents and firm substrates. Individuals can reach 11.5 cm carapace length and weigh up to 1.5 kg. After molting in the spring, a female spawns and broods up to 10,000 eggs on her abdomen for 18-22 months. To minimize predation on early larval stages, the species has evolved an extended hatching period of about 7 weeks. The released planktonic larvae drift near the bottom for another 2 months before settling. The species feeds on algae, bryozoans, molluscs, and other crustaceans.

International Resource Use:

In the 1990s, after the collapse of the southern king crab (*Lithodes santolla*) stocks, *Paralomis granulosa* became a new target species in lithodid crab fisheries. In Argentina, 200 – 300 tonnes per year are caught, while in Chile the catch varied from 2,900 – 6,500 tonnes per year from 2000 to 2005 but decreased to 1,800 – 2,300 tonnes between 2006 and 2008. Restrictive measures have been put in place in both countries to protect the species. In Argentina, no females are allowed to be caught, males must be 8.2 cm or larger (equating to an age of about 15 years), and gear restrictions are in place. In Chile, the minimum male size is 8 cm, only trap fishing is allowed, and restrictions are put onto new Agncomers to the fishery.

Viability in the Falklands:

Since the late 1990s, there have been sporadic crab fishing efforts in Choseul Sound and around George Island. The crabs were processed locally for domestic sales of fresh, frozen, and tinned product. Between 8 and 15 tonnes of crab were collected annually between 2003 and 2006. Other harvest in the Falklands includes a minor recreational fishery via crab pots. Stocks around the Falkland Islands have not been estimated, and the species is highly vulnerable to intensive harvesting due to very low reproductive rates. However, a restricted artisanal fishery of a few dozen tonnes per annum could be sustainable for the Falkland Islands should experimental studies support it.
Chilean Sea Urchin
*Loxechinus albus*

**Species Characteristics:**
This shallow-water sea urchin is distributed around South America from Ecuador to Uruguay. It commonly inhabits depths from subtidal pools to 20 m, but has been recorded as deep as 340 m. The species prefers exposed bedrock and boulders covered with encrusting coralline algae and kelp. It lives up to 14 years and can attain a diameter of 11 cm. Spawning is intermittent and, around the Falkland Islands, occurs in summer. Larvae are pelagic. Adults feed on drift algae which is captured and manipulated with suction-cup tube feet.

**International Resource Use:**
The species is intensively harvested for its edible gonads by waders and divers in Chile. It represents one of the main artisanal fisheries in the Magellan Region, and is also harvested in small numbers in Argentina. Annual catches in Chile have declined from 43,000 – 60,000 tonnes annually between 2000 and 2004 to 35,000 – 39,000 tonnes annually between 2005 and 2008. Minimum legal size is 7 cm, and specimens with yellow-gold coloured gonads are highly sought after as they are most in demand by the international market. Overharvesting has caused the extinction of many Chilean populations.

**Viability in the Falklands:**
The species is not exploited around the Falklands, though its abundance can be locally very high. Stocks have not been assessed, but could presumably support a medium scale fishery by divers from a small boat with a sustainable annual catch of several hundred tonnes. The product could probably be canned and sold overseas with the development of relevant infrastructure.
Piure

*Pyura chilensis*

Species Characteristics:

*Pyura chilensis* is a solitary ascidian that inhabits intertidal to subtidal rocks around southern South America and the Falkland Islands. Individuals can reach up to 4 cm in width and weigh in excess of 100 g. Individuals occur either as stalked solitary specimens or as members of aggregations. The dark outer tunic covers pink inner tissues. The species forms a micro-habitat that other polychaetes, bivalves, gastropods, and crustaceans inhabit. *P. chilensis* is hermaphroditic with possible self-fertilisation. Spawning occurs year round but has a summer peak. Larvae are pelagic and tend to settle within existing colonies. *P. chilensis* is a filter-feeder that is itself preyed upon by predatory gastropods and starfish as well as occasionally by oystercatchers.

International Resource Use:

Over 30,000 authorised collectors in Chile harvested between 1,000 and 1,300 tons of *P. chilensis* annually between 2001 and 2008. Historic catches were much higher, with 2,000 – 4,500 tons caught annually between 1968 and 1996. Overfishing led to a decrease in the mean weight of individuals; adults in unexploited populations weigh about 15 g, but today’s commercial average is 2 to 3 g. *P. chilensis* has a very strong and specific taste due to a high content of iodine and vanadium. It is marketed frozen, canned, dried, and refrigerated. The Chilean fishery targets a local market, but products are also exported in minor amounts to Sweden, Japan, Paraguay, USA, Argentina, Switzerland, and Brazil.

Viability in the Falklands:

No attempt at harvest in the Falkland Islands has been made, and stocks have not been assessed. Viability within a local market would likely be restricted due to the specific taste of the product.
Further Reading

Gevers’s Tronpon

Rough Thorn Drupe

Volutid Snails

Magellanic Copper Limpet
Guzman, LF and CF Rios. 1987. Age and Growth of the Subantarctic Limpet *Nacella (Patinigeria) magellanica magellanica* (Gmelin, 1791) from the Strait of Magellan, Chile. *Veliger* 30:159-166.

Keyhole Limpets
Duarte, WE, G Asencio, and CA Moreno. 1996. Long-term changes in population density of *Fissurella picta* and *Fissurella limbatана* (Gastropoda) in the marine reserve of Mehuin, Chile. *Revista Chilena de Historia Natural* 69:45-56.

Kelp Bivalve
Striped Clam

Ribbed Mussel

Blue Mussel

Giant Mussel

Patagonian Scallop
Further Reading

Patagonian Longfin Squid
Arkhipkin, AI, VV Laptikhovsky, AM Sirota, and R Grzebielec. 2006. The role of the Falkland Current in the dispersal of the squid Loligo gahi along the Patagonian Shelf in the Southwest Atlantic. *Estuarine, Coastal and Shelf Science* 67:198-204.

Southern Red Octopus

Giant Barnacle

Gregarious Lobster Krill


Short-eyed Lobster Krill

King Crab/Snow Crab

Chilean Sea Urchin
Piure
Acknowledgements

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