Fisheries

The seas around South Georgia are one of the most important commercial fishing areas in the Southern Ocean. Sustainability and conservation of the marine environment are of paramount importance, so fishing is tightly controlled by the South Georgia Government.

The current management of the South Georgia fishery is a success story and a model for other countries. By operating a strict regime and using good management practices the Government has virtually eliminated illegal and unregulated fishing and the accidental death of seabirds. The fisheries management regulations and catch limits proposed internationally by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) are fully implemented, together with additional South Georgia Government regulations where these are needed for local ecosystem protection. The Government funds a fisheries research programme and conducts regular fishery surveillance and enforcement patrols to prevent illegal fishing.

Each year, the Government issues licences to vessels to fish within the 200 nautical mile Maritime Zone. Currently there are three commercial fisheries:

- Patagonian toothfish; long-line fishery in winter
- Mackerel icefish; pelagic trawlers in summer/winter
- Antarctic krill; trawling in winter

In addition CCAMLR has agreed to two exploratory fisheries:

- Stone crabs and king crabs; potting
- Seven star flying squid

However, there is currently little interest in the exploratory fisheries. The Government remains keen to expand the diversity of fishing opportunities within the Maritime Zone.

Every fishing vessel must have a licence to fish within CCAMLR waters as well as a transponder that automatically reports its position every four hours to the country in which it is registered. The South Georgia Government then issues a specific licence for South Georgia waters. Government vessels patrol the South Georgia Maritime Zone and inspectors check licences in order to stop pirate fishing.

The South Georgia Government works closely with the fishing companies, who understand that good management of the fisheries is essential for long term sustainability. A substantial portion of the income generated by licences is spent on strict environmental management procedures and policing, and in some years the costs of managing the fishery have exceeded licence income.

The Convention for the Conservation of Antarctic Marine Living Resources

The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) was negotiated as part of the Antarctic Treaty System in the late 1970s. At that time marbled rockcod had been severely over-fished and krill were becoming the new target species. There was concern that a depletion in krill stocks would affect other species in Antarctic and sub-Antarctic ecosystems, particularly birds, seals and fish. CCAMLR came into force in 1982.

The aim of the CCAMLR is to conserve all the marine life of the Southern Ocean within the Polar Front, a natural boundary based on sea temperature, which includes most of the South Georgia Maritime Zone (see page 63). Fishing is allowed if carried out in a rational and sustainable manner, without impacting other ecosystem components. A precautionary approach is adopted to minimise risk when there is any uncertainty. This ecosystem approach to management is different from management systems in almost all other fisheries and is underpinned by considerable research and monitoring.

Conservation measures adopted by CCAMLR are based on scientific advice and require enforcement to be effective. The vast size and inhospitable conditions of the Southern Ocean make it extremely difficult for Member States to enforce or police CCAMLR measures to combat illegal, unregulated and unreported fishing.

For further information see www.ccamlr.org
Preventing the accidental death of seabirds

Longline fishing is an intensive, industrial-style fishing technique which was introduced to the South Georgia area in the late 1980s and early 1990s. It catches older, mature fish in areas where trawls cannot be used and is now the principal method for toothfish fishing around South Georgia.

Baited hooks are attached to lines, which are weighted and lowered into the sea behind the fishing vessel. Lines can be tens of kilometres long and carry thousands of baited hooks deep into the ocean. When the hooks and bait go overboard behind the trawler they are visible near the surface and attract crowds of seabirds that try to take the bait. Many, especially albatross, used to get caught on the hooks and were drowned.

Researchers have come up with many practical steps which can be used to reduce the number of seabirds killed by longlining. These are now CCAMLR Conservation Measures and include:

- Setting lines at night, as most albatross feed by day
- Weighting lines so they sink immediately on entering the water
- Not discharging offal during longline deployment;
- Discharging offal on the side of the fishing vessel opposite to the longline hauling position
- Using bird scaring devices such as streamers to frighten birds away from baited lines
- Use of thawed, rather than frozen bait as it sinks more quickly
- Closing the toothfish fishery during the albatross breeding season.

Due to the conscientious use of these measures by vessels licensed in the South Georgia fishery, almost no birds are now drowned on longline hooks in the fishery zone around the island.

Marine Stewardship Council

The Marine Stewardship Council (MSC) aims to reverse the continued decline in fish stocks around the world by using consumer purchasing power to promote environmentally responsible fishery management and practices. The MSC is an independent, non-profit making organisation taking into account the views of all those seeking to secure a sustainable future.

The MSC has developed an environmental standard for sustainable and well-managed fisheries and uses a product label to identify those fisheries which meet this standard. Consumers concerned about overfishing and issues such as the killing of seabirds by longlining will increasingly be able to choose seafood products which meet the MSC standard.

The MSC logo on South Georgia toothfish in the shops will show that the fish is caught by ‘environmentally friendly’ means.

For more information see www.msc.org
**Patagonian toothfish**

The Patagonian toothfish is found throughout the sub-Antarctic oceans generally near to the sea bottom. It is one of the largest fish species in the region, with an average length of around 90–100cm when mature. It grows slowly, reaching spawning condition at 10–12 years. Spawning takes place during July–September at around 1,000m depth and the eggs rise and hatch around 3 months later near to the surface. The young fish remain in the surface waters for around 6 months and then gradually go into deeper waters.

Patagonian toothfish feed mainly on smaller fish, squid and prawns. They have a potential lifespan of over 40 years. Patagonian toothfish were originally caught accidentally in the 1970s in a bottom trawl fishery for Antarctic cod. They have black skin and firm white flesh containing high levels of Omega 3 fatty acids, which have known health benefits. They are now caught by longline fishing and are very much in demand, the total allowable catch (TAC) being taken each year. This means that stock assessments must be conducted very carefully and catch rates continually monitored during the fishing season.

The South Georgia Government has invested considerable resources in managing its toothfish stock to ensure long-term sustainability. A very tough stance is taken on illegal fishing and pirate longliners are arrested and prosecuted. To counter pirate fishing CCAMLR now requires that trans-shipment or unloading of the toothfish catch may only be carried out after the issue of an authorization code entered into a catch document which then provides legal accreditation to market the fish.

The South Georgia fishery for toothfish has recently been certified by the Marine Stewardship Council (MSC) as an internationally recognised sustainable fishery. It is currently the only sub-Antarctic fishery with this accreditation.

**Mackerel icefish**

Mackerel icefish is found throughout the sub-Antarctic and the northern part of the Antarctic Peninsula ranging to depths up to around 500m. It feeds mainly on krill and amphipods, growing to a maximum length of around 40–60cm and living for up to 8–10 years. Icefish were initially caught in mid and bottom trawls and the first major catches were reported in the late 1970s. Stocks were severely depleted in the 1980s but have now partly recovered. The mackerel icefish fishery uses mid-water trawls, which means that large nets are towed behind the vessel, close to the sea bottom, but not dragging along it. The fish are white, with firm flesh. They are not headed or gutted on the trawlers, but are frozen whole. Icefish is not as valuable as toothfish.

The actual catch of mackerel icefish was low during 2004/05 season (see figure), much less than the TAC. Early indications during the 2005/06 season show that catches have improved significantly.
Life at sea
Life as an Observer on a commercial fishing vessel

The longlining season begins in May, and may run until August, depending on how well the fishing master finds and catches his quota. The longliners are out at sea for all that time, with no shelter – I saw walls of water 6–8m high, hurricane force winds and experienced intensely biting windchill at –10ºC. Without doubt this is one of the toughest working environments on earth.

The hours and conditions are exhausting – a full night’s sleep is a rare luxury. Most impressively, the ‘gaffers’ stood out in the weather, hour after hour, hooking and hauling 10–30 kg fish over the side. The food is good, but the fresh stuff only lasts a week or so, and you can get heartily sick of toothfish.

The reason for the winter fishing season, as well as setting lines at night, is to avoid South Georgia’s albatross and petrel nesting season. The boats also set ‘streamer lines’ – colorful lines of plastic ribbon – to either side of the longline to put off the birds. Two to four lines, consisting of a few miles of thick rope, weighted with an anchor at each end and bags of rocks every few metres, are shot each night. Attached to these is a lighter fishing line, with hooks every couple of metres.

Soon after the lines are shot, the crew start the slow hauling process. Catches are very ‘clean’ with very little in the way of unwanted species or undersized fish. My job as observer is to sample the catch, monitor unusable catch and observe the ship’s compliance with the fishing regulations. It can get incredibly cold in the freezers, and sampling, measuring and weighing these enormous fish on a rocking deck means an awful lot of slime, blood and guts.

The highs, though, can be incredible: South Georgia at sunrise; grey dwarf orcas erupting through 6m waves in a storm; penguins drifting by on a berg. For me, though, it was the albatross. Almost every day we would be accompanied by several wandering albatross, surfing on the air cushions between the waves, their wingtips seemingly brushing the water.

Jamie Watts
Observer, Marine Resources Assessment Group

Krill

Antarctic Krill are small, shrimp-like crustaceans, around 6cm long and weighing about 1g. They have a life span of 5–10 years. They congregate in large, dense masses and are very important in the food web as many Antarctic species feed on them. Krill come to the sea surface at night to eat phytoplankton, single-celled plants that float in near surface waters. When caught they are shelled to extract the flesh which is used for fish farming and cattle feed supplement.

Krill are fished using mid-water trawls during the winter around the north of South Georgia and around Shag Rocks. Catches have varied consider-
Research to support sustainable fisheries

To support the sustainable management of the commercial fisheries, applied research and computer modelling of the populations are necessary. Scientists from the British Antarctic Survey (BAS) carry out applied fisheries research at King Edward Point (KEP). They study the biology and ecology of commercial species and supply data to improve the computer models.

Stock assessments and population modelling which are used by CCAMLR (see page 59) to set catch limits are undertaken by the Marine Resources and Assessment Group (MRAG), based at Imperial College in London. MRAG also provides fisheries observers who travel on the fishing vessels to ensure compliance with CCAMLR conservation measures.

At South Georgia, collaboration with the CCAMLR scientific observer programme enables samples to be collected for analysis from the commercial fisheries. Local sampling is conducted from the BAS station’s workboat.

Stock levels are assessed every two years by a trawl survey organised by MRAG. The cruise evaluates the stock of icefish and juvenile toothfish so

Life on shore

Life as a research scientist at King Edward Point

King Edward Point (KEP) is a modern marine research station with spectacular views, comfortable living accommodation and laboratories.

We go out in the science fishing boat and set nets and longlines at different sites and depths every week in Cumberland Bay to catch Patagonian toothfish and mackerel icefish. In addition, we monitor the occurrence and development stages of other fish species. Weekly plankton trawls collect information on the seasonal occurrence of fish larvae to give a clearer picture of spawning patterns. We also use pots to catch fish and take monthly measurements of temperature and salinity in the bay. Samples of live fish and crabs are kept in the seawater tanks in the large controlled temperature room on the station, so that we can study their growth and development.

The BAS over-wintering staff consists of three scientists, a base commander, doctor, two boatmen, a mechanic and an electrician. Everyone does their fair share of routine base duties, including cooking and cleaning. During winter KEP is usually only visited by fishery patrol and Navy vessels. Commercial fishing vessels come into the bay for licencing and to trans-ship their catch. Military planes occasionally air drop packages of provisions by parachute into the bay – but the packages can get soggy!

Then suddenly it all changes: from November to March, KEP and the surrounding cove get much livelier welcoming cruise ship visitors, BAS ships, fishery patrol vessels, Navy vessels and yachts. Summer BAS staff, South Georgia Government staff and contractors arrive for longer periods on the base. At times it gets so busy that it hardly seems remote at all!

Sarah Clarke
Senior Fisheries Scientist, British Antarctic Survey
Fisheries

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The role of Fishery Officer within the South Georgia and South Sandwich Islands Maritime Zone (SGMZ) is challenging and diverse. This dynamic position is ultimately focused on the task of fishery protection, to ensure that all vessels fishing in the SGMZ are licenced and that all license conditions are adhered to. Throughout the year, Fishery Patrol Vessels patrol SGMZ waters accompanied by a Fishery Officer, who also acts as the charterer’s representative, coordinating the patrol.

The average patrol encounters long periods of what can often feel like eternal gales, bringing with them ferocious and uncomfortable sea conditions. Vessels authorised to fish in the zone are periodically inspected at sea. Officers board fishing vessels by inflatable boats in, more often than not, hostile and bitterly cold sea conditions. The harsh environment of South Georgia makes boarding and recovery the most dangerous part of any licensed vessel inspection, especially when sea temperatures in some areas can often be as low as 0.2°C. Inspections are used to ensure that licence conditions are adhered to and provide a valuable tool to assess the overall state of the fishery.

The Fishery Officer may also coordinate and assist in deliveries of stores and mail and transfer of personnel to and from South Georgia. Other more unusual tasks have included assisting in the live capture and transport of reindeer, and undertaking an island wide penguin blood sampling programme.

The tasks of a Fishery Officer in the waters around South Georgia are varied and interesting, sometimes fascinating, and always unique.

Kevin Macfarlane
Fisheries Officer, Government of South Georgia

Life at sea

Life as a Fisheries Officer on a Fishery Patrol Vessel

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Kevin Macfarlane
Fisheries Officer, Government of South Georgia

Researchers at KEP, Bird Island and on research ships are working on stock levels of key species in the marine ecosystem of South Georgia, as well as studying the diet and the volume of food consumed by birds and seals. Various techniques are used: marine acoustic surveys, putting satellite tags on seals, penguins and seabirds to see where they go and looking at stomach contents to investigate diet. Aerial photographs taken from helicopters can be used to estimate numbers of breeding penguins. The objective is to ensure that the fisheries do not deplete stocks so that there is sufficient to sustain the fisheries and the wildlife.
Fisheries Policies

Aims: To manage sustainable fisheries in the South Georgia Maritime Zone using an ecosystem approach and to conserve the marine environment.

South Georgia fisheries are managed and developed by the South Georgia Government Director of Fisheries within the framework of South Georgia Government legislation and CCAMLR Conservation Measures. The following general procedures apply:

- South Georgia Government legislation and CCAMLR Conservation Measures must be adhered to
- Annual Total Allowable Catch (TAC) for each species is decided by CCAMLR
- Applications for fishing licences are accepted from CCAMLR member states only
- Vessels require a licence from their flag state to fish in CCAMLR waters and a licence from the South Georgia Government to fish in the South Georgia Maritime Zone
- The South Georgia Government Director of Fisheries determines licence allocations; Falkland Islands Fisheries Department administrator of licences and collection of fees on behalf of the South Georgia Government
- Each licensed fishing vessel is required to have a Vessel Monitoring System (VMS) to report positions to its flag state. Continuous VMS positions for the complete year must be submitted as part of the licence application
- Daily reports including position and catch and effort data must be forwarded to the Government Officer at KEP. Detailed logbooks must be completed
- International observers are required on all fishing vessels licensed to catch toothfish and icefish. A second observer on icefish vessels is required to monitor bird by-catch
- The Government Officer will inspect all licensed fishing vessels at King Edward Cove
- All trans-shipments must be undertaken in Cumberland East Bay or the Falkland Islands
- Bottom trawling is prohibited in the South Georgia Maritime Zone
- Random checking on accuracy of toothfish catch may be undertaken

Additional procedures and Conservation Measures may apply for different fisheries. The Government produces an information pack for each fishery every year with details of the application procedure, costs and licence conditions.

Longliner Argos Helena in King Edward Cove
Pat Lurcock

For further information about South Georgia, please visit our website www.sgisland.org