A Historical Perspective of Antarctic Fisheries.
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The heroic imagery of man's continued quest with nature for survival in the face of extreme adversity has been captured by all cultures, recorded through writing or spoken means. This image is seen no more clearly than in man's endurance to survive the unforgiving sea while on the hunt for food and other treasures from the deep. The famous nineteenth century book, *Moby Dick* written by Herman Melville portrays a deranged and obsessed captain brought to extremes on the hunt for the great White Whale which eludes him.

In reality, this great whale which appeared to hold so much power by way of its size and might may have been oversized by the extent of its myth. So much so that by the mid 1850’s the great whales were on the verge of extinction in the Northern Hemisphere and a mere century later were all but gone from the Southern Ocean. How did this process occur? What species were involved and why wasn’t anything learnt as slowly each species of whale, seal and fish were depleted?

This report is a study of literature relating to the exploitation of fishery resources. The study is limited to the Southern Ocean or Antarctic waters and will try to address the questions above. It was surprising when researching for this review the relative lack of verifiable information available. There seems few books available to the public which deal with Antarctic Fisheries. Also, while the books present hold a great deal of information on early exploitation and the industries associated with it, little is available on recent fisheries ventures and exploitation in Antarctic waters.

Only four books available to the public related to Antarctic Fisheries were generally used in this review. These books are referred to throughout the review and recorded in the reference section.

For the purposes of this review, the term fisheries must be defined. It is generally accepted that “Fisheries” is an all encompassing term and can mean anything that can be harvested from the sea. It includes mammals, fish, squid and in temperate waters, shellfish and seaweed’s (Davidson, personal correspondence, 1998).

When the Southern Ocean was first explored it was obvious of the tremendous potential for the fisheries industry. It was either during or slightly after Captain James Cook’s 1772-5, British Naval Expedition on HMS Resolution of the Southern Ocean that commercial interest in Antarctica increased (Knox, 1994). Intrigued by the tales brought back by Cook’s voyage of the unique marine environment, UK, USA, Russian and French commercial industries turned their sights to the Southern Hemisphere.

Initially, it was sealers that were attracted to the southern waters. Deacon’s book, *The Antarctic and Circumpolar Ocean* (1984) possessed the most information regarding sealing in the Southern Ocean. He reports that initial sealing activities were concentrated in the northern maritime regions. It was the Antarctic and Sub-Antarctic Fur seals which was most prized having the best fur quality. The Elephant Seal was only hunted later after the decline in numbers of the Fur Seals.

Due to the inaccessibility of the four other species of Antarctic seal, there was no substantial exploitation of them. These seals are known as “ice seals” as they live
amongst pack ice and it is due to this that prevented early sealers the opportunity to
harvest these species.

By 1791, no less than 102 ships averaging 200 tons and manned by 3000 seaman were
Fur and Elephant Sealing in the Southern Ocean. Beginning from the northern
Sub-Antarctic islands the sealers worked their way slowly south leading to the discovery
of new islands. It appears that the commercial sealing industry recognized this and wished
to capitalize on and sell this exploration and discovery image they were creating.
G. Deacon reports on Mr. Charles Enderby, owner of a London based whaling firm who
took great care to employ sealing captains with a lively interest in exploration and
charting. His captain, Abraham Bristowe in the Ocean, discovered the Auckland Islands.
Another captain, Fred Hasselborough, master of the Perseverance discovered Macquarie
Island while searching south of New Zealand. George Palmer and Nathaniel Palmer found
and chartered the South Orkney group in 1821-22. It appears as each new island was
found another opportunity for sealing was investigated and was usually inevitably
exploited.

However, there does seem that opposition existed to the uncontrolled harvesting of seals.
James Weddell, carried out population statistics and appears to have been a strong
advocate for harvesting control measures. He condemned the wholesale slaughter of seals
and suggested that the maternal seals should not be killed until the young were ready to
take to the water, and even then only older seals with a proportion of their males
(Deacon, 1984). In general, his views were ignored.

Weddell estimated by 1822, conservatively a figure of 1.2 million seals skins had been
taken, and 20,000 tones of oil had been produced at South Georgia alone and the seal
population was essentially extinct (Knox, 1994).

Sealing effectively came to an end around the turn of this century more for the fact that
seal numbers had dropped to a level that was commercially unsustainable. There was a
minor revival of the industry in the 1950's and 1970's centered on Elephant Seals and
their blubber (Knox, 1994).

In 1972, the International Convention for the Conservation of Antarctic Fur Seals was
signed and was ratified in 1978. It effectively prohibited the exploitation of the Fur Seals
which had been decimated early in the century, but not the ice seals.

Though sporadic sealing has occurred after the convention notable in 1982 and 1984,
with an expedition for Crab eater Seals taking 32,588 skins, the convention has been
relatively successful with Sub-Antarctic and Antarctic Fur Seal populations back to a
pre-exploitation level (Knox, 1994). Knox refers to this as the 'most spectacular
population increase recorded for any marine mammal'. A 16.8% increase was seen
between 1958 and 1972, and a 14.5% increase between 1972 and 1975 in Fur Seal
populations is evidence of this.

This recovery, I suggest may be due to the removal of the large Baleen Whales from the
Southern Ocean giving more prosperous food resources for seals allowing for such a
spectacular population increase.

With the decline in the sealing industry around the turn of the century, interest now
turned to an animal to fill employment and economic gap left by the seals. This
opportunity was seen in whaling, thus beginning the "last great whale gold rush" (Knox,
1994).
The History of Modern Whaling, by J.N Tønnessen and A.O Johnsen, provided the most concise historical review of whaling activities in the Southern Ocean and it appears most other reviews use this book for their reference source. An interesting theory on whaling activities in the Southern Ocean is put forward in this book and concerns the incentives for moving south. The commonly held belief that the northern hemisphere had become reliant on a need for whale oil and this was their sole purpose for coming south appears to be only partly why the hunters came to the Southern Ocean. It was difficult to find uses for whale oil and it is for this deep-rooted reason that prices between 1892-1905 were low. The whalers problem was how to make whaling profitable. This could be done by discovering whaling grounds with such ample access to raw material, that only the best portion of blubber would be used. This would ensure a higher percentage of ‘Number One’ oil, and a better price. This in turn depends on the extent of application of whale oil. Thus intense research was carried out on whale oil and this is seen in the patients reaching a climax in 1904.

The evidence of this theory put forward is based on economics and recorded patients and it appears to deflantly dispel the misonomer that it was merely a need for whale oil that caused the interest in the Southern Ocean.

Like sealing in the past, the whalers concentrated in the Sub-Antarctic waters. Realising the potential opportunity to profit in Antarctica, the United Kingdom using its sovereignty over a sector encapsulating the peninsula and most of the islands in that region announced on the 2nd October 1900, to grant “mining and general leases” on South Georgia. It later only permitting less than 500 acres (Tønnessen, 1982).

South Georgia presented the ideal site for a whaling base. The first base was established by a Norwegian whaler C.A.Larsen in 1904. The company he founded, Compania Argentina de Peso S.A set up at Grytviken in Cumberland Bay, South Georgia. On the 18th February 1905, the first boat with 990 barrels of oil set sail to Buenos Aires, 80% of the total oil from Humpback Whales. The whale stocks were so abundant that production was only slowed by the restriction of barrels and lack of boilers.

Tønnessen records that Humpback Whales were initially targeted due to the ease of catching them. A gunner reported that they could approach Humpback and merely drop the harpoon in. Humpback appears to be monogamous and for this reason, gunners called them a “pair of whales”; if one of the couple was caught, the other would refuse to leave it and prove easy prey. At this station alone between 1910 and 1911, 1,527 Humpbacks were caught; a record peak. After 1912, these intense yields of Humpbacks dropped to low uneconomic catches and a new species was targeted.

(From The History of Modern Whaling, Tønnessen (1984))
The success of the first whaling enterprise lead to an explosion of interest and the establishment of more whaling stations in South Georgia. In 1908, Britain instituted more licensing and restricted harvesting of female and calves. Between 1910 and 1925, 50% of the world's annual catch were from Antarctic waters (Knox, 1994).

In 1905, the Norwegians attempted setting up a ‘floating factories’, the *Admirale* which allow them to process whale oil on the ship avoiding the Britain monopoly. However it wasn’t until 1925, that the factory ship *Lancing* operated successfully in Antarctic waters. This technology thus freed the restriction of area on whaling and the opportunities for exploitation grew markedly. Between 1930-1931 season, 37,500 whales were processed by 41 factory ships. Since 1904, an estimated 1.5 million whales have been reported caught, helped in no small way by factory ships (Knox, 1994).

(From *The Biology of the Southern Ocean*, Knox (1994))

The repetition of finding a new species, boom harvesting for one to two years, followed by little or no levels of that species caught in ensuing years is seen for Humpback, Blue, Fin, and all other commercial fished species of whale. This market philosophy of "Boom/Bust" cycles was seen in the sealing industry and continued through to the whaling industry. From both examples of the cycle, it begins with the most highly prized and easiest caught species and slowly, as time progresses moves to the low priced and harder to catch species.

This cycle with regard to whaling continued until the late 1960's, when it became obvious that substantial damage had occurred to the whale population and the yield of whales caught was too low to sustain the industry. Alternative fisheries would have to be considered (Davidson, personal correspondence, 1998).

The question is raised, why did the whalers and sealer kill their industries by over exploiting and not using sustainable market policies. Knox (1994) goes some way to answer this by responding that the whalers were exploiting a common resource which nobody owns. Initially there were few fisherman, and a high number of whales; profit was high. This attracted more fisherman, which deplete the stock and cause the profits to eventually fall.

The long term effect on the Southern Ocean has been to drop the whale population from one million Baleen Whales coming to Antarctica during summer, to one sixth of this today (Deacon, 1984). This great loss of biomass from the Southern Ocean has had a major effect on the ecosystem. More food resources have giving the seals a chance to recover to
over pre-exploitation figures, and allowed the level of Minke and smaller whales to increase. In other words, exploitation has detrimentally altered the equilibrium of the Southern Ocean. It appears that we still don’t know the full implication of this effect as no scientific data is available on this.

The development of fishing activities in the Southern Ocean has been relatively slow commercial and didn’t commence until the late 1960’s with the decline of whaling. The information on fishing activities is sketchy to say the least. Only one book, *Antarctic Fish and Fisheries*, by Knox (1992) gave any substantial information on fishing. However there appears to be no reliable data in the last seven to ten years on information relating to species targeted, population statistics, and scientific articles on those fish targeted.

There appears no dispute over the first recorded fishing in Antarctic waters. Fanning (1833) records that in 1800, two American officers caught a large 18 inch fish, probably a *Notothenia rossii*. It also seems likely the sealers during the peak of sealing in the early 1800’s lived off the fish they caught.

Whalers from South Georgia reported large quantities of *N. rossii* off the north side of the island: "The sea was stocked with an incredible variety of succulent fish which there was such abundance that a couple hands fishing for two hours or so, could provide a dinner for the entire company ..." (Tonnessen and Johnsen, 1982).

In 1905 Compania Argentina de Pesca exported a large number of barrels of salted fish to Buenos Aires. However, after minimal interest in 1906, it was decided no future harvests would be carried out due to its potential interference with whaling.

During World War I, the British Government prepared a comprehensive study into the fishing resources. At the same time A/T Tonsbergs Hvalfangeri, a whaling company applied to set up a shore based fishing industry but was declined.

Thus by the end of the 1920, Mathews (1931) stated that despite the abundance of small fish close inshore that supplied the needs of the whaling station, and that further at sea large fish occurred in some number, "...the poor quality of fish and the great distance from the profitable markets make it very unlikely that profitable fisheries can be established..." (Knox, 1964).

In the 1950’s, with the initial decline in whaling, A/T Tonsbergs Hvalfangeri undertook a new venture to establish a Finfish fishery using old whale catchers, but the first season was unsuccessful.

Other attempts were made through the next twenty years to establish a shore based fishing industry, with the final attempt by the Japanese Nippon Suisan Kaisha (NSK) but was abandoned due to poor catches.

Offshore fish sizing activities commenced in 1962 and ran to 1969 in the Atlantic sector by Japanese and Soviet industries resulting in a number of scientific publication on the biology, geographical and bathymetric distribution of fish fauna. It is questionable whether these activities were carried out for purely academic interest or for commercial interest.

Initial activities were concentrated on the South Orkney group, and from here the Soviets moved south in the early and mid-1970’s towards the Antarctic Peninsula where interest centered on *N. rossii* and *Champsocephalus gunnari*. A reported catch of 28,732 tons of predominantly *N. rossii* and *C. gunnari* was recorded by Soviet fleets during the 1975/76 season. The following season saw a four fold increase in the total catch to
124,611 tons of which *C. gunnari* represented 93,400 tons. During this period German and Polish interests carried out explorative research in this region also.

Experimental longline fishing on Patagonian toothfish *Dissostichus eleginoides* was carried out by the Soviets in the 1985/86 season around the coast of South Georgia and Shag Rock and from 1988/89 onwards, was commercially exploited. By 1992 the exploitation had spread around to the bank west of Shag Rock.

Experimental fishing of myctophids has produced a yield of 14,868 tons to 29,763 tons in the 1987/88 to 1989/90.

Exploration in the Indian Ocean sector on the Southern Ocean commenced after the Soviet fish survey investigations from 1958–60. Japan and Poland also followed soon after with the advantage of newly fitted out vessels. The French also investigated in 1967/68, and in 1978 created a 200 mile Exclusive Economic Zone (EEZ) around Kerguelen Island.

Generally fishing in the Indian Ocean has only been partly successful. The former Soviet Union were only able to establish a commercial operation. For all other states it appears that commercial scale fishing is not lucrative enough and thus in the most part abandoned.

The Pacific Ocean sector, owing to its remoteness and almost permanent ice cover has been the least explored for fish concentrations. Small explorative investigations were carried out in 1979, focusing on *Pleuragramma antarcticum* and *Trematomus* species which appear to be the most abundant fish species. It however seems unlikely that the experimental fishing of these species will develop in the Pacific sector, although their may be a potential to fish *Dissostichus mawsoni* (a relative of the Patagonian toothfish).

All the above fishing information is from *Antarctic Fish and Fisheries* (1992).

A February 1999, experimental venture by Sea Lords in New Zealand fishing *Dissostichus* species proved to be successful and more catches are planned.

The data available on fishing trends indicates a minimally sized industry. It is for this reason that the figures may therefore not represent the true picture or scale of fishing activities in the Southern Ocean. Illegal fishing must makes up a very high level of what is caught but, purely by definition the catch data is not recorded. Therefore, when fishing data is evaluated, as above it does not give as a factual picture of fishing activities. Unlike the past fisheries industries where information was made relatively available and we can now assess the damage, due of restriction to avoid the exploitation seen in the past, the exploitation industries have been pushed underground. Thus we really have no idea at the present scale of exploitation and we will never be able to assess in the future, the damage which has happened.

It appears to be a major problem; either to leave the oceans of the world unprotected as in the past or to introduce environmental conventions to prevent exploitation and thus push the exploitation industries underground.

From the data available however it does appear the “Boom/Bust” industry which has been Antarctic Fisheries to date seen both in the sealing and whaling industries looks to be mid-boom for fishing at present. From the research it seems, while some species have been all but fished out like *N. rossii* and the Patagonian toothfish, many species still remain and may provide an opportunity for the fishing industry in the future. Measures to control the catches to a biologically sustainable level may still be possible. However there is a lack of present day scientific information on sustainability of the species which are hunted. There
is also lack of information on actual levels of fish harvesting in Antarctic waters. The ownership and control issues of the oceans highlighted above by Knox have still not been answered. Until all these problems are addressed there is a far greater chance of the repeating the over-exploitation of the past.

During the mid-nineteenth century concerns about the threat of over-fishing of natural stocks were expressed by critic like Weddell. However the overwhelming response to these fears is represented by Dr. Thomas H. Huxley, who lived between 1825 and 1895 and was a strong supporter of Darwinism. He viewed, 'nothing man did would seriously affect the numbers of fish', and '...the reproductive potential is so very high that any mortality caused by fishing is insignificant'. His solution was therefore: 'any attempt to regulate the fisheries would seem to be useless'.

These uninformed views are unfortunately shared by some today. It may end up being, as in the past, the theory of "supply and demand" and "providing an industry" that dictates the opportunity for fishing in Antarctic waters and the threat to the fish stocks living there. The "Boom/Bust" cycle still controls management in the oceans of the world.

References:

Deacon, George *The Antarctic Circumpolar Ocean* Cambridge University (1984)

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