

The economic significance of the 19th century Antarctic sealing industry

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ABSTRACT. Sealing was the first exploitative industry in the Antarctic region. Throughout the 19th century it was characterised by large fluctuations in catches and shifts in hunting grounds as seals were almost exterminated in several locations. This paper reviews the historical literature on this industry. In particular it reviews sources and data that relate to its economic importance. So far, no one has succeeded in indicating the aggregate economic value of the industry. The main aim, therefore, is to investigate new data, especially on market prices that will enable a more accurate assessment of the significance of the industry.

Introduction

Following successive discoveries beginning in the late 18th century, several exploitative industries have operated in the Antarctic regions, notably sealing, whaling and in recent times, fishing. Sealing was characterised by large fluctuations in catches and shifts in sealing grounds as seals were almost exterminated in particular locations, in an era with no regulation. By the mid-19th century the industry had dwindled.

There is a substantial literature on the history of this industry specifically, and also as one aspect of the larger South Seas trades or the larger fur trade (Bonner 1982; Steven 1983; Deacon 1984; Busch 1985; Laws 1989; Jones 1992; Dickinson 2007; Burton 2006; Headland 2009; Richards 2010). The literature provides valuable details of many aspects of the economics of the industry. It contains a vast amount of data relating vessels, catches and market information. However, most of it is fragmentary and sporadic, making it difficult to acquire a good picture of long term economic development. Another problem is the incompleteness of the primary sources. Summing up her work on British records, Steven (1983: 100) concluded:

The dispersed nature of the trade, both at its collection and disposal points, helped to obscure activity and now makes regular estimates difficult to compile ... Even the comparatively formal regularity of the British Customs is interrupted by blank sections in records otherwise kept with some degree of faithfulness.

Her assessment may be followed by Jones (1992: 393), writing in the introduction to his study that:

[t]he comprehensive history of the southern whale and seal fisheries from Britain, from the 1770s to the 1850s still has to be written. When it is done it will be unsatisfactory as the material is so scrappy and scattered.

No analysis has yet succeeded in indicating the aggregate economic value of 19th century Antarctic sealing or the aggregate development throughout the years of operations, combining data on market prices and catches. This paper begins such assessment and aims to contribute to a more accurate appraisal of the significance of the industry, enabling a comparison of sealing with subsequent Antarctic exploitative industries, especially whaling and fisheries. Sugden (1982: 401) provided one such comparison, but it is a rather general model of the assumed pattern of development and without factual data. Laws (1989: 181) made a comparison of the catches of the main species of the exploitative industries (seals, whales, fish, krill) from 1784 to 1988.¹ This is instructive in showing how immense was the production of whaling, compared with the other industries. However, a comparison of quantities gives an incomplete concept of the economic significance of the industries. For such purposes, *prices* must be taken into account.

The geographical area included in the following study will be somewhat wider than what is often understood as the Antarctic. In addition to the coasts of Antarctica and off-lying islands, the main sub- or peri-Antarctic islands are also included. Some of these lie south of the Antarctic Convergence, some are located slightly to the north of it. Such a wider definition (in geographical terms) is necessary when the aim is to analyse the Antarctic as an economic region (Basberg, 2006).² The sealers operated throughout the Southern Ocean to find seals, but did not venture farther south than necessary. A cargo might consist of catches from several islands (Antarctic and elsewhere), without distinguishing between them in the records. This fact also poses problems regarding islands farther to the north such as the Falkland Islands, Tierra del Fuego, southern Australasian islands, and Tristan da Cunha that are obviously not located in the Antarctic. But

the sealing there may be difficult to distinguish from the trade farther south.

The main areas included are the following: The South Orkney Islands, South Shetland Islands and the Antarctic Peninsula; South Georgia, South Sandwich Islands and Bouvetøya; Prince Edward Islands, Iles Crozet, Heard Island and Iles Kerguelen; Campbell, Auckland and Macquarie Islands.³

19th century Antarctic sealing

We will not review the history of this industry in any detail. That has been done extensively elsewhere. We will, however, emphasise some factors of special relevance to the analysis of its economic importance.

The majority of the sealers were from Britain and the United States and the sealing companies or owners were predominantly located in a few areas. In the US, they were, like the whaling companies, in the northeast, in New England. Although the sealing and whaling trades were closely connected, the sealing industry had its centre in Connecticut rather than in the whaling capital of New Bedford, Massachusetts. In Britain, London was the business centre to which the majority of the companies and vessels belonged.

The sealers hunted two genera; fur seals (*Arctocephalus sp.*) for pelts, and elephant seals (*Mirounga leonina*) for oil. The most important markets for pelts were in Britain (London), the US (New York) and China (Canton) where they were used for fur, leather, and felt-making for hats and other clothing. The markets for oil were only the first two. Markets originated from the beginning of the industry in the 1780s and developed due to both supply and demand factors. On the supply side, the discovery of the new southern catching grounds was important. The increased demand was related to improvement in processing techniques that prepared finer furs and could put the pelts to new uses. Such developments took place in China from the mid 18th century and somewhat later in Europe (Steven 1983: 86, 95).

The London market was by far the most important during the 1780s, supplied mainly by British sealers. London then supplied the domestic market, but furs were also re-exported to Europe and China. The British Canton trade, in the charge of the East India Company, lasted only until about the start of the 19th century. The European trade, however, declined from the late 1820s.

United States sealers reached the Canton market in the 1790s and soon dominated that trade. Furs from seals also soon outnumbered those from otter and beaver imports that previously also had been dominated by US traders and the Hudson Bay Company. At the start of the 19th century the market there was glutted by fur seals, thus prices and imports declined (Richards 2003: 3; Gibson 1992: 202). By the early 1830s the US trade to Canton had ceased. Between the 1840s and the 1880s Antarctic fur sealing was dominated by US vessels, mainly supplying the domestic market and Europe to a lesser extent.

The elephant seal oil market was more stable. It yielded high quality oil used for lighting and lubrication, as well as leather, rope and textile treatment. However, as with whale oil, the market for lighting was supplanted in the latter part of the century by the new mineral oil and coal gas (Ryan 1994: 81). The contemporary observer J.H. Kidder (1876: 40) wrote:

The increasing scarcity of the sea-elephant, and consequent uncertainty in hunting it, together with the diminished demand for the oil since the introduction of coal-oil into general use, have caused a great falling-off in the business of elephant-hunting.

The sealing industry was part of larger industries and to some extent difficult to distinguish from them. The fur seal industry was part of the fur trades in the sense that the pelts went to the same markets and, to some extent, represented substitutes for those from other species. Elephant sealing or 'elephanting' was distinct. Vessels, equipment, skills and grounds were substantially different from those of the fur-sealers (Downes and Downes 2006: 186). Elephant sealing was instead closely connected with the whaling trade. The oils were similar and could be processed aboard the vessels using the same apparatus (the try-works). Indeed, many vessels were taking both whales and elephant seals (so called 'mixed voyages'), and the two industries were very much integrated. But, as Chatwin (1997: 3) has pointed out, '[m]ore complex technological requirements and higher capital costs of outfitting a whaling ship precluded sealers from going whaling, but not whalers from going sealing'.

Especially in the United States, 19th century whaling was a very significant industry, and the quantities of seal oil were small fractions of the total oil produced by the whaling trade of that country (see later).

Based on earlier studies and contemporary sources, Bush (1985) estimated the total number of fur seals killed in the southern trade as a total of 5.2 million in the period up to 1812. About 1.7 million were killed within what we have defined as the Antarctic region. More than one million fur seals may have been killed at South Georgia according to James Weddell's estimates (Burton 2006: 875). Busch realised, however, the vast uncertainties of the estimates, stressing that '[a]ny figure is but a guess' (Bush 1985: 36). Detailed studies of primary sources may, however, reduce such uncertainties.⁴ Richards (2003: Table 1, Appendix 1: 3, 9) has most recently compiled new figures for the fur seal markets in London and Canton based on various sources for the period 1788 to 1833. He has also critically reviewed some of the previous published figures of the total extent of fur sealing on the various southern grounds, indicating the imprecise nature of some of those estimates, and also emphasising the severe difficulties in obtaining accurate numbers from an industry that, at the time, was not much concerned with exact reporting. According to Richard's estimates, a minimum of seven million fur seals were killed and sent to the London and Canton markets before 1833; 20% more than previous estimates. This includes

Table 1. Prices for fur seal skins ('South seas skins') in London (£-s-d and £), 1798–1827

Year	Month	From		To	
		£ s d	(£)	£ s d	(£)
1798	19. January	0- 2- 6	(0.12)	0- 7- 0	(0.35)
	15. June	0- 2- 6	(0.12)	0- 7- 0	(0.35)
	14. December	0- 2- 6	(0.12)	0- 7- 0	(0.35)
1799	18. January	0- 2- 6	(0.12)	0- 7- 0	(0.35)
	14. June	0- 2- 6	(0.12)	0- 7- 0	(0.35)
	13. December	0- 2- 6	(0.12)	0- 8- 0	(0.4)
1800	11. April	0- 2- 6	(0.12)	0- 8- 0	(0.4)
1801–1811	n.d.				
1812	17. January	0- 2- 6	(0.12)	0-13-0	(0.65)
	12. June	0- 2- 6	(0.12)	0-13-0	(0.65)
	18. December	0- 2- 6	(0.12)	0-15-0	(0.75)
1813	15. January	0- 2- 6	(0.12)	0-15-0	(0.75)
	18. June	0- 2- 6	(0.12)	0-15-0	(0.75)
	17. December	0- 2- 6	(0.12)	0-13-0	(0.65)
1814	14. January	0- 2- 6	(0.12)	0-13-0	(0.65)
	17. June	0- 2- 6	(0.12)	0-15-0	(0.75)
	16. December	0- 2- 6	(0.12)	0-15-0	(0.75)
1815	13. January	0- 2- 6	(0.12)	0-15-0	(0.75)
	16. June	0- 2- 6	(0.12)	0-15-0	(0.75)
	15. December	0- 2- 6	(0.12)	0-15-0	(0.75)
1816	16. January	0- 5- 0	(0.25)	0-18-0	(0.90)
	18. June	0- 5- 0	(0.25)	0-18-0	(0.90)
	17. December	0- 5- 0	(0.25)	0-18-0	(0.90)
1817	17. January	0- 2- 6	(0.12)	0-12-0	(0.60)
	13. June	0- 2- 6	(0.12)	0-12-0	(0.60)
	12. December	0- 2- 6	(0.12)	0-12-0	(0.60)
1818	16. January	0- 2- 6	(0.12)	0-12-0	(0.60)
	12. June	0- 2- 6	(0.12)	0-12-0	(0.60)
	18. December	0- 2- 6	(0.12)	0-12-0	(0.60)
1819	12. January	0 -15- 0	(0.75)	0-30-0	(1.50)
	15. June	0 -15- 0	(0.75)	0-30-0	(1.50)
	14. December	0 -15- 0	(0.75)	0-30-0	(1.50)
1820	14. January	0- 2- 6	(0.12)	0-12-0	(0.60)
	16. June	0- 2- 6	(0.12)	0-12-0	(0.60)
	15. December	0- 2- 6	(0.12)	0-12-0	(0.60)
1821	16. January	0-10-0	(0.50)	0-15-0	(0.75)
	12. June	0-10-0	(0.50)	0-15-0	(0.75)
	18. December	0- 5- 0	(0.25)	0-6-0	(0.30)
1822	15. January	0- 1- 6	(0.07)	0-8-6	(0.42)
	18. June	0- 2- 6	(0.12)	0-8-6	(0.42)
	17. December	0- 2- 6	(0.12)	0-8-6	(0.42)
1823	14. January	0- 2- 6	(0.12)	0-8-6	(0.42)
	18. June	0- 2- 6	(0.12)	0-8-6	(0.42)
	17. December	0- 2- 6	(0.12)	0-8-6	(0.42)
1824	13. January	0- 2- 6	(0.12)	0-8-6	(0.42)
	15. June	0- 2- 6	(0.12)	0-8-6	(0.42)
	14. December	0- 2- 6	(0.12)	0-8-6	(0.42)
1825	18. January	0- 2- 6	(0.12)	0-8- 6	(0.42)
	14. June	0- 2- 6	(0.12)	0-8-6	(0.42)
	13. December	0- 15- 0	(0.75)	0-18-0	(0.9)
1826	17. January	1- 00- 0	(1.0)	1-05-0	(1.25)
	13. June	0- 10- 0	(0.5)	0-18-0	(0.9)
	12. December	0- 10- 0	(0.5)	0-18-0	(0.9)
1827	16. January	0- 10- 0	(0.5)	0-18-0	(0.9)
	12. June	0- 10- 0	(0.5)	0-18-0	(0.9)
	18. December	0- 10- 0	(0.5)	0- 18-0	(0.9)

Source. *Prince's London Price Current and London Mercantile Price Current* (1816, 1819, and 1821).

Note: The price currents were published twice a week. We have, when possible, extracted data for three dates per year, as close as possible to 15 January, 15 June and 15 December. The reliability of the data may be questioned. One indication is the significant differences between the price quotes in 1816, 1819 and 1821 and quotes in previous and following years.

the entire southern fur sealing, and he is not making estimates for the Antarctic region as such.⁵

From about 1840 the Antarctic fur sealing was very much about US sealers providing the US market. Nothing has been recorded systematically about the aggregate production in this period which lasted throughout the remainder of the century.

The number of elephant seals killed and the production of oil throughout the late 18th and 19th centuries are also rather obscure. The main reasons are that figures often were 'hidden', as they were included in whale oil production or in the larger South Seas trade. Busch (1985: 181) has also studied elephant sealing and again emphasising that his figures are estimates, calculated a catch of about 800,000 elephant seals during the 19th century at the main catching grounds of South Georgia, Kerguelen, Heard and Maquarie.⁶

The number of vessels employed in Antarctic sealing is also one important indicator of the extent of the industry. Data are found in logbooks and published sources (Jones 1992: 401). A problem with most sources is again the extent to which it is possible to identify specifically the Antarctic sealing. A sealing *and* whaling voyage may be listed as a whaling voyage. Quite often the only geographical identification is the 'South Seas' which of course could be much more than the Antarctic waters (Jones 1992: 360). In fact, it could mean anything south of Britain.

Several historians have compiled information on vessels. In an effort to obtain a comprehensive list based on primary as well as secondary sources Headland (2009: 59–64) has recorded about 1200 sealing voyages, distributed across years, on grounds and countries of origin of the expeditions.⁷

The size of the vessels is also of interest in an economic context. They varied considerably, making it difficult to talk of a 'standard' type. Based on several sources, Dickinson (2007: 11) estimated the average size of United States sealing vessels before 1800 to be about 240 tons. Throughout the 19th century there was a declining trend towards vessels below 200 tons.⁸ The sealing vessels were smaller than the average whaling vessels that typically were 300–350 tons barques and ships (Davis and others 1997: 220–221).⁹

Jones (1992: 398) revealed that a vast majority of the vessels were employed in only one or two voyages before they entered other trades.¹⁰ This may demonstrate the cyclical nature of this business. It also indicates that the sealers were not purpose built vessels that could not be used for other trades.

The crew obviously varied according to vessel size. The average 240 ton vessel had a estimated average crew of 17, again much less than the average whaling vessel in which the crew on a typical New Bedford ship was 29, or 26 for a typical barque (Davis and others 1996: 154).

Not much is known about the crew and the sealers' life and working conditions aboard and ashore. They were no doubt among the most unpleasant in the maritime

industries. Jones (1992: 400) put it this way: 'Socially, the South Sea trade was near the bottom of the hierarchy, and the seal fishery was lower still'. A contemporary observer of the Bass Strait sealers in the 1820s wrote: '... their general appearance is semi-barbarous, and they are people usually who are fit for no other employment' (Starke 1986: 15). The sealers farther south were doubtless better. Stackpole (1953: 181) called the sealers the 'nomads of the sea'. In a single voyage, they often visited several islands, moving when the beaches in one place had been cleared. However, gangs were also left ashore for extended periods.¹¹ As was the case in whaling, sealing was not attractive employment. Especially in the United States, hiring became increasingly difficult and both sealing and whaling expeditions had to rely on crew recruited from Azores and Cape Verde Islands.

The total employment in the industry in a single year, or for a longer period, is not known, but it is possible to estimate based on information on vessels and crew size. In the all time high year of 1820, 75 vessels are recorded. The average size of the vessels working in the South Shetlands in the early 1820s was about 195 tons (Dickinson 2007: 11). Anticipating an average crew of 15, the 75 vessels would altogether carry about 1125 men.¹² A typical season throughout the century saw fewer than 15 vessels annually (Headland 2009: 60). 10 vessels would indicate about 150 men. So, in a comparative perspective (to industries elsewhere, other maritime industries or later Antarctic industries) we are dealing with a very minor industry.

Prices and economic significance

In an analysis of the economic significance of industries, production is only part of the story. It is necessary to compare values and therefore, prices must be taken into account. This has been done to a very limited extent in the literature on Antarctic sealing.

There are several relevant price-series, corresponding to the different main products and main markets:

- Fur seal prices in the UK (London) per pelt (£)
- Fur seal prices in the US (New York) per pelt (\$)
- Fur seal prices in Canton per pelt (\$)
- Elephant seal oil prices in the UK (London) per ton (or barrel) (£)
- Elephant seal oil prices in the US (New York) per ton (or barrel) (\$)

When it comes to such series, the sources and data situation are also difficult and complex, as was the case concerning the quantity aspects of the trade (vessels, catches). There are primary sources reporting on the London, New York and Canton markets. The main problem is associated with the difficulty of identifying prices that pertain to a specific product for a specific period. A measure such as a 'unit fur seal price' in one year did not exist and will have to be calculated. There are multiple reasons for this problem: one was that prices differed according to sex and age of the fur seals

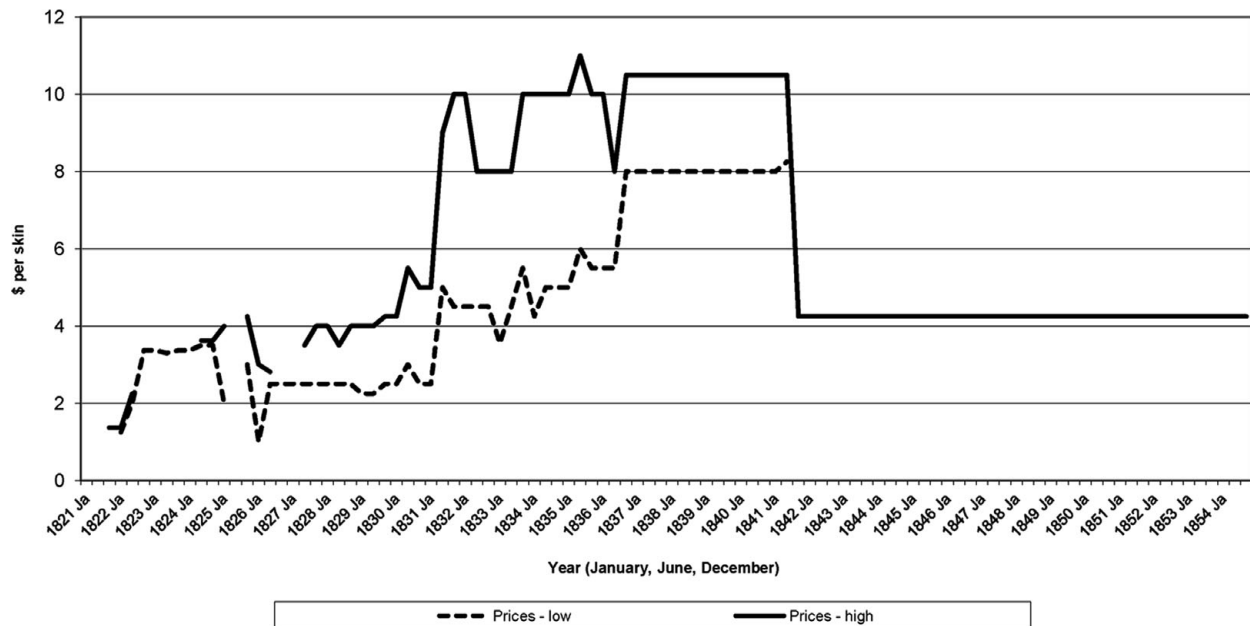


Fig. 1. Prices for salted fur seal skins in New York, 1821–1854. Sources: *New York Price Current* (*New York Shipping & Commercial List*). Note: *New York Shipping & Commercial List* was published twice a week. The data plotted here are from 15 January, 15 June, and 15 December every year or from publication dates as close as possible to these dates (typically 13 to 17).

(wigs, clapmatches, yearlings, pups) because such factors decisively influenced the size and quality of the furs.¹³ Another reason was that the quality of the furs when they reached the market varied substantially according to how they had been prepared and especially how, and for what period, they had been stowed aboard the vessel. There are examples of cargoes that were not saleable. Typically, the furs were auctioned, and prices varied significantly. Dickinson (1987: Appendix 3: 264–270) has compiled auction prices in New York for southern fur seals between 1824 and 1846, divided into various categories of skins. They show annual variations from typically \$5–10 maximum to \$0.50–0.25 minimum. Gibson (1992: 253) found that fur seals fetched from \$3–4 to \$0.35 at Canton, generally about \$1. This is not far from estimates by Busch (1985: 36) who wrote that the fur seals yielded an average price of about 90c each. It is, however, not obvious how such an average price should be calculated.

A further illustration may be found in the *New York Price Current* (bi-weekly in *New York Shipping & Commercial List*) that published fur seal prices between 1821 and 1854. Lowest and highest quotes are listed for salted fur seal skins (in most years clapmatches).¹⁴ In Fig. 1 three high and low quotes per year (about 15 January, 15 June, and 15 December) are plotted for the entire period.

The overall trend indicates an increase in prices from 1821 and throughout the 1830s, although most of this increase is associated with a sharp increase in prices during 1831. In 1841 the prices dropped severely (from \$10.50 to 4.25 as the maximum). At the same time the low quotes were no longer reported and the high quotes remained at \$4.25 until the reports ended in 1854. The sharp decline

from the early 1840s may indicate a declining demand and worsened market conditions in New York for fur seal pelts (Dickinson 1987: 77). However, there are also reasons to believe that the quotes in the *New York Price Current* for the period from 1842 until the quotes ended in 1854 are not entirely reliable.

Another feature displayed in the figure is the difference between maximum and minimum price quotes. They obviously varied from one year to the next, but were as much as \$5.50 at its greatest.

Prices for southern fur seal skins in London reveal the same pattern of large variations from high to low quotes, although it has not been possible to compile consistent series of prices for a very long period. Based on quotes in the *Prince's London Price Current*, which for the period published prices twice a week, Table 1 lists high and low prices from 1798 until 1827. Wherever possible, we have listed quotes for three selected dates every year (again about 15 January, 15 June and 15 December). Before 1798 fur seal prices are not quoted or they are just indicated as 'uncertain' reflecting a non-existent or poorly developed market. From 1798 the low quotes are quite stable at £0.12, but with some annual variation. The high quotes fluctuated much more, starting at £0.35, reaching £0.75 in 1812, declining to £0.42 and finally jumping to £0.9 in late 1825. Prices may at times have been much higher but this is not shown by the samples quoted in Table 1. Scattered observations between 1800 and 1821 from other sources indicate that prices at times may have been exceptionally high; £6–8s–0d (£6.4) in 1816, £3–17s–0d (£3.85) in 1819 and £1–10s–0d (£1.5) in 1821 (Jones 1992 294–307).

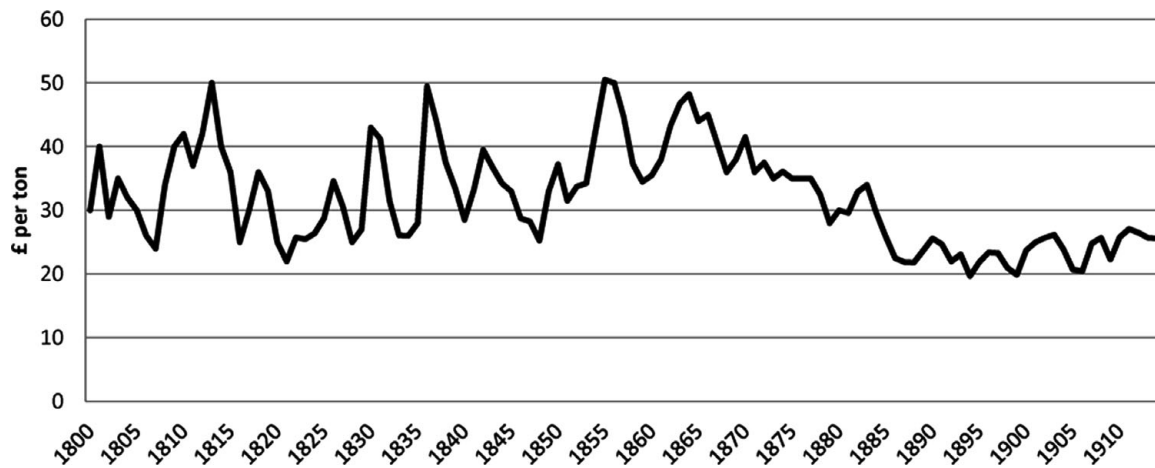


Fig. 2. Seal oil prices, London, 1800–1914. Sources: 1800–1821, 1828–1830, 1835: McCulloch 1852. 1822–1827. *London Price Current*, average January, June and December high and low quotes. 1831–1833. *The Merchantile Journal*, average January, June and December high and low quotes. 1834–1880. Ryan (1994), based on Mark Lane Express averages. 1874 and 1881–1914. *The Economist*, Weekly Price Current, averages from monthly quotes. Note: The data from McCulloch is for whale oil which closely followed the seal oil prices.

The price data for fur seal skins in London may be compared with similar data for New York. Using annual exchange rates, it is practicable to compare the differences between prices of the two markets.¹⁵ In a few instances the prices were identical, but in general there seems to be no clear pattern other than that both price series typically fluctuated lower than £1 per skin. In the first three to four years New York prices were systematically higher than London prices by as much as £0.6 (comparing low quotes). During late 1825 and early 1826 London prices increased dramatically (from £0.12 to 1.0 for low quotes), and in the remaining 1826 and 1827 London prices equalled or were even slightly higher than those of New York. At least from these few observations, it is difficult to identify an integrated market across the Atlantic for this particular commodity.

The market price fluctuations for elephant seal oil were very different from that of the fur seal market. It represented a much more clearly defined product, and the quality did not vary much (although there were, indeed, differences). As has been mentioned, it was a close substitute for whale oil, and consequently it tracked whale oil prices to a large extent. In fact, they were almost identical. Ryan (1994) extracted prices for seal oil, whale oil and sperm oil quoted on the London market for almost 50 years (1832–1880). As can be seen from his data, whale and seal oil prices both fluctuated the same way. The price of sperm whale oil was an entirely different matter. It fluctuated much more and was also much higher than whale- and seal oil prices, typically almost twice as high and even three times as high in some years.¹⁶

Using several sources (including Ryan's data), London seal oil prices between 1800 and 1914 have been compiled in Fig. 2. The graph shows that prices varied substantially from one year to the next. Throughout the first half of the 19th century there seems to have been no

long term trend up- or downwards. However, after about 1865 it was a downward trend until 1890 when prices were fairly stable. The annual variations were also much smaller than in the first half of the century.

Calculations of the economic importance of the Antarctic sealing industry are quite scarce and involve estimates and mere guesses. The reason is, as we have seen, the difficulties involved in obtaining reliable data both for the actual production (the catches) and prices. Busch (1985: 36), for example, calculated values of the US Canton fur seal sales between 1792 and 1812 based on various estimates of total production (about 3 million skins) multiplied by a calculated average price (about \$1) totalling about \$3 million. The sales figures are about the same as those used by Richards (2003: 3) (about 2.8 million skins for the same period). However, Richards' data cover the period 1788 to 1833, and he estimates the US sales in Canton as 3.6 million skins. Using the same average price, this gives a value of about \$3.5 million. The value of the British Canton trade, based on Richards' data (257,824 skins between 1788 and 1804) would total about \$250,000 or £50,000 (based on an exchange rate of 1/5).

Steven (1983 Appendix III: 131) estimated values of fur seals brought into the London market from the southern fisheries. She relied on data from British Customs ledgers between 1788 and 1820. However, the annual values indicated for the southern seal fisheries have been estimated using the same price per skin for every year; £0.04 (about 10 old pence or a little less than 1 shilling). This again exemplifies the difficulties in relying on some of the primary sources. From what we now know about sealskin prices in London (Table 1), this estimated price is highly unlikely during this period.¹⁷ The data available show that prices obviously varied and there were large differences between high

and low quotes. During the years before 1820 the quotes fluctuated between £0.12 and £0.75. Prices were never as low as £0.04. The calculated average price quote based on our data is £0.35 (1798–1820) and £0.40 (1798–1827). Consequently, Steven's calculated total value of the London fur trade for the period 1788 to 1820 of about £66,000 for about 1.6 million skins is probably much too low. Using a unit price of £0.35 would instead indicate the much higher value of about £575,000.

Richards (2003) has estimated the number of fur seal skins sold in the London market between 1788 and 1833, partly relying on Steven's data, to be about 2.2 million. We do not have systematic price quotes extending to 1827, but relying on the average calculated quote for the period 1798 to 1827 of £0.4 would generate a value of about £880,000.

As indicated earlier Busch estimated, based on various sources, the total number of elephant seals killed throughout the entire century to be 800,000. Using the seal oil prices displayed in Fig. 2, the annual average for the period 1800–1900 is £32.63 per ton. Assuming that one elephant seal yielded an average of one barrel of oil, the total estimated catch was about 800,000 barrels which is about 133,000 tons (based on 6 barrels per ton).¹⁸ This gives a total estimated value of a century of elephant sealing of £4,339,790 or about \$21.7 million. How this was distributed among different markets is not known, but the main one was probably the British.

Busch refers to Stevenson's calculations for South Georgia, where he estimated a production of 242,000 barrels worth \$5,420,000 for the entire century. That would equal roughly £1 million, indicating that South Georgia elephant sealing alone produced about 1/5 of the total economic output.

These figures indicate that the economic value of elephant sealing was much higher than fur sealing. However, we do not have fur seal data for the latter part of the century, and we do not have figures for the US import of fur-seal skins. Considering that fur sealing declined severely in the latter part of the century, we may, however, at this point anticipate that elephant sealing may have been more important than fur sealing in economic terms.

This analysis has been focussing on the economic importance of the industry as such, not on the individual owners and companies. To what extent sealing was a profitable business for those involved is obviously also an interesting question. However, it would require an entirely different approach in terms of data and analysis, and this is not the aim here. The evidence from existing literature suggests that sealing in the long run was not a very profitable business. In Britain, for example, few companies became large, and few stayed in business for very long (Jones 1992: 403). Even Messrs. Enderby, that indeed was a long lived and comparatively large company, seems to have had its most successful years in early whaling rather than sealing (Jackson 1978: 112, 141). In fact, many sealing companies, especially in Britain were part of the much larger shipping or maritime

Table 2. Prices for Furs and Skins, New York, 1823 (\$)

FURS	Low	High
Beaver, North	3.25	4.50
Beaver, S. & W.	1	3.25
Raccoon, N. & S.	0.10	0.40
Muskrat, N. & S.	0.30	0.40
Martin, Can.	0.15	0.25
Martin, N.W.	0.95	1.50
Bear, N. & S.	0.75	2.50
Red Fox	0.75	1
Mink, North	0.25	
Mink, South	0.12	0.25
Otter, North	3	4
Otter, South	2	3.50
Nutria Skins	0.12	0.17
SKINS		
Deer, in hair	0.18	0.25
Deer, shaved	0.3	0.35
Goat, Mogade	0.25	0.40
Goat, Curacao	0.25	0.37
Salted fur seal	3.35	
Dry fur seal	3.50	3.62
Seal, salted hair	0.95	1.12

Source. *New York Price Currant* 17 June 1823.

communities. In Jones' (1992: 294) words; 'the fur seal fishery was a drop in the ocean'.

Sealing in context: whale oil and fur trades

Antarctic sealing was, as we have mentioned, yielding products that had alternatives and were thus part of much larger markets where it had to compete. The fur seal skins were just one of a wide variety of furs on the world market.¹⁹ Oil from the elephant seals competed with whale oil. How important were the seal products in these larger markets?

Gibson (1992, Table 7: 315) compiled data for the aggregate fur imports to Canton between 1804 and 1837. In most years, fur seal skins were the single most important category, responsible for more than 50% of the total fur import. The other important categories were beaver, fox, land otter and sea otter; land otter and beaver being the most important. From around 1830 they were more important than fur seals, probably owing to scarcity.

How did fur seal prices compare with those of other furs and skins? Prices obviously varied a lot according to availability and size. It also varied over the years and between different markets. In the early 19th century, sea otter was by far the highest priced fur in Canton, followed by beaver. Fur seals were never really high priced there, and from the 1830s they sold for higher prices in the US than in Canton.²⁰

Taking New York prices in the 1820s as an example, we can see from Table 2 that the market for furs and skins (or peltries as they were called) was quite varied at the time.

This example gives a somewhat different impression than do the Canton prices from about the same period; fur seals being among the more expensive ones, together with beaver and otter, again indicating that there was no integrated market.

How important was the sealing industry compared with the whaling industry: the other main southern industry at the time? Again, this is a difficult question to answer because data are unreliable and whaling and sealing data to some extent may be mixed. Steven (1983 Appendix III: 131) also calculated the total value of the import to London (basically the British industry) in the period 1788 to 1820, again based on Customs Ledgers data. This was the period before the huge expansion following the discoveries of the South Shetlands, but the period when the industry was established and expanded at South Georgia. While the value of the whale oil import according to this source was typically between £50,000 and £120,000 annually, the value of the seal pelts were calculated in a range between less than £1000 and about £4000. In the most successful year for both industries in this period, 1793, whale oil generated £136,110 and seal pelts £15,079. Thus the sealing generated 11% of the value of whale oil that year. Taking the entire period together, seal skins generated, according to these data, about 2.5% of those of whale oil (total value of whale oil import in the period; £2.6 million, total value of seal pelts £66,900).²¹ Even the value of whalebone (baleen) imports, itself a fraction of that of the whale oil, for most years was many times higher than the value of sealskin imports. However, these figures have to be re-examined. As Steven emphasised, the prices used in the Custom Ledgers data are estimated. This applies both to the seal prices as well as the whale oil prices.

An alternative source of information is McCulloch's (1852: 738) dictionary of commerce, published in several editions from the 1830s, that contains data on the British southern whaling and sealing between 1800 and 1839. They have been used in several later publications, especially Jenkins (1921) and Brandt (1940). The exact origin of McCulloch's data is not known. His only reference is quite amusing: 'We are indebted for the above valuable table, the only one of its kind that has ever been published, to a gentleman connected with a house that has been largely engaged in the trade since its commencement. The details may, therefore, be safely depended upon' (McCulloch 1852: 738, also quoted by Brandt 1940: 210). Bearing this in mind, there is, however, no strong reason to challenge the reliability of his data.

McCulloch explicitly states that the whale fisheries, and the data 'consists of three distinct branches'; sperm whale, common black whale (that is southern right whale) and elephant seals. Prices and quantities of sperm and common oil are reported separately, sperm oil being a distinct product with much higher prices than other whale oil. Whale oil and seal oil were not separated, because of the similarity between the two.

Based on annual data on quantities and prices as well as for sperm oil *and* 'common oil', the total value of import to Britain between 1800 and 1839 according to McCulloch was about £14.4 million. This is a much higher estimate than Steven's. Her data on quantities for overlapping years correspond well with McCulloch's. However, she (relying on the Customs Ledgers estimates) used an average price per ton of about £17.2 which is much lower than McCulloch's and others observations. While whale oil typically fluctuated between £20 and 50 (as did seal oil; see Fig. 2), sperm oil fluctuated between £60 and 100. In many years sperm oil accounted for half of the total quantity. In fact, from the 1820s onwards, the import was predominantly sperm oil.

Jenkins (1921: 208 and Appendix III: 307) reported data on the British southern whale fisheries between 1800 and 1834, based mainly on data from McCulloch, to a value of about £10.9 million.²² Jenkins calculations are based on the quantities of sperm oil and baleen whale oil imported and average annual prices per ton separating sperm oil and whale oil. Thus they should give a better indication than the previous estimate.

Jackson (1978 Table 8: 112), in his work on the British whaling trade, estimated the real value of the import from the southern trade between 1791 and 1800 to about £2.2 million, based on prices and quantities of both whale oil and sperm oil.²³ Taking these estimates together, a likely total value of the British southern whaling trade from around 1790 to about 1840 could be in the order of £15 million.

How do these estimates on the value of the British whale oil import correspond to the value of the sealing trade? We have estimated the fur seal import to London in approximately the same period to about £880,000. When it comes to elephant sealing, the quantities may well be incorporated in the figures for whaling. The only aggregate data we have so far is Busch's very crude estimate of about 800,000 elephant seals killed throughout the entire century which we estimated would gain about £4.3 million. Sealing obviously represented only a small fraction of the value of the whaling trade.

The value of the US whaling products (including whale oil, sperm oil and whale bone) for the entire 19th century is estimated to about \$370 million.²⁴ It includes whaling worldwide, and the grounds were primarily outside what we would define as the Southern Ocean and the Antarctic.²⁵ However, the figure indicates the supreme dominance of this industry in the period. Converted to British currency, the value would roughly be £75 million.

Conclusions

The aim of this paper has been to analyse the economic significance of the 19th century Antarctic sealing industry. The historical literature on this industry has been reviewed and, more specifically, sources and data especially relating prices have been investigated. Such data enable estimates of the economic value or output of

the industry. We have been able to compile some consistent long-run time series, especially relating prices. The analysis is not complete and more studies are needed and encouraged. However, some observations and findings should be emphasised.

A substantial part of the data on most aspects of the industry reported in the existing historical literature is based on incomplete sources of very varying quality. This is also realised by most authors. Consequently, great caution should be applied in interpretations and analyses.

The investigations in this paper indicate that in particular, the calculations of values of the trade (economic importance) need re-examination. Based on revised price information both the values of fur and elephant seal import into the London market have been upgraded.

The analysis reveals that seal oil from elephant seals seems to have been more important economically relatively to furs and whale oil than has been anticipated.

There does not seem to have been an integrated or 'global' market for fur seal skins during the 19th century, although the industry had a global character.

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Notes

1. Laws does not refer to any sources, and it is consequently difficult to assess the reliability of his data and analyse them as anything other than estimates.
2. This definition corresponds to that adopted by the Scientific Committee on Antarctic Research and includes that covered by the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).
3. There are in addition a number of other smaller islands (like Peter I Øy, Balleny Islands and Scott Island) that were rarely, or never, visited by sealers and which have never had more than very minor populations of seals.
4. They range from the logbooks, customs records (for example the London Custom Ledgers, New London Customs Records, Abstracts of Imports, London, the China Trade Ledger) to market information relating sales and manufacturing (for example Canton Factory Records and London Price Currents).
5. The comparison Richard is making between his and the Busch data may be taken only as a very rough indication. The areas included are not identical. More importantly, while Richard's data covers 1788 to 1833, Busch's data seems to extend only into the first and second decades of the nineteenth century.
6. By comparison, the number of elephant seals reported killed during the licensed sealing there between 1904 and 1964 was about 260 000. (Dickinson 2007 Appendix 5: 179).
7. Nationalities: British, United States, Australian, New Zealand, Cape Colony and South African, French, and others (Brazil, Canada, Chile, Germany, Norway and Portugal). Catching grounds: Iles Kerguelen and Heard Island, South Georgia and South Sandwich Islands, Prince Edward Islands and Iles Crozet, Auckland, Campbell and Macquarie Islands, South Shetland and South Orkney Islands, Gough Island, and Iles Saint-Paul and Amsterdam.
8. One of Dickinson's sources was A. Howard Clark's (1887) review of the American 19th century sealing industry that included a systematic account of more than 200 voyages between 1840 and 1880. We have estimated several averages based on these voyages which confirm such numbers and trends. We can also clearly see that the declining trend in vessel size in this period had to do with a relative shift from large ships and barques to much smaller schooners. In the period 1870–1880, about 82% of the U.S. sealing vessels included in Clark's survey were schooners averaging 112 tons.
9. Although large sizes usually make economic sense, there were both practical and economic reasons for using smaller vessels in sealing. A large vessel would require a longer voyage to fill the hold. A large vessel was also difficult to navigate in the shallow and narrow bays where the sealers had to operate. Some sealers, in fact, employed smaller tenders (typically schooners of 70–100 tons) that accompanied the main vessels for navigation close to shore. See Downes and Downes (2006: 190). Several such vessels are also identified in Clark (1887).
10. This is confirmed by the Clark data. Based on the voyages of 86 vessels, 41 (47.6%) made one voyage, while 18 (20.9%) made two voyages. 10 (11.6%) made three voyages, while the remaining vessels made from four to as many as ten voyages.
11. For examples of early primitive accommodation; Pearson and Stehberg (2006). An early illustrative account of the life of sealers at Prince Edward Island is referred to by Cooper (2008: 334).
12. Jones (1992: 317) suggests that about 1000 men were employed in the South Shetlands, but not referring to a specific year.
13. *Pups* and *yearlings* were identified by age, *wigs* were young males, *bulls* older males and *clapmatches* was the term used for the adult females or cows; see Dickinson (2007: 15).
14. 'Dry' fur seal skins are listed between 1821 and 1825. The prices are typically slightly higher than for salted skins.

15. Annual exchange rates between British £ and US \$ from 1791 is published by MeasuringWorth, see www.measuringworth.org/exchangepond.
16. Some few annual observations on US prices from the early 1820s indicate approximately the same development. Elephant seal oil was priced slightly higher than whale oil (around 40 cents a gallon versus 30 cents). Sperm oil was typically almost twice the price of whale oil; *New York Price Current*, 1821–1825. Data from *Prince's London Price Current* confirm this impression of conformity between seal oil and whale oil prices.
17. Steven (1983: 130) seems to be aware of this problem, noting that the Customs estimates 'derived from arbitrary official values were unchanged during the century'.
18. The size of a 'barrel' has varied considerably over time and according to use. 19th century oil barrels could typically take about 40–42 gallons (about 160 litres). In whaling the rule-of-thumb was about six barrels to the ton, although this could also vary according to the quality and composition of the oil. The oil yield per barrel is also a rule-of-thumb, and could obviously also vary considerably.
19. For an illustrative indication of the great variety of furs and the extent of this trade worldwide, see Bachrach (1936).
20. Gibson (1992: 318), quoting prices from Morse (1926) and other sources. While sea otters in 1801–1802 fetched \$22, fur seals fetched \$0.80.
21. The calculations are based on Steven's (1983) data. Steven (in Appendix II) has also made a calculation based on detailed data for the season 1802 in which sealskins amount to 2.3% of the total (including whale oil, spermaceti oil and whale bone). See also Dickinson (1987 Appendix 1: 262).
22. Similar data are listed in Brandt (1940 Table V: 210) and Chatwin (1997 Table 2.3).
23. Jackson is also aware of the problems with the price estimates of the Customs men, and has made new estimates based on Board of Trade data.
24. One estimate is \$372,374,000 between 1804 and 1905; Brandt (1940 Table VII: 212). Brandt's figures rely on data from the contemporary secondary sources Starbuck (1878) and Tower (1907). Another estimate is \$365,398,000 between 1816 and 1905; Davis and others (1997 Table 1.2: 7). This is a calculation of real value of output based on a variety of sources.
25. The American whalers hunted primarily sperm whales and right whales. Sperm whaling (the most important species) took place in the entire Atlantic Ocean and the Pacific Ocean. Right whales were found in the north Pacific Ocean and in the southern part of the Atlantic and Pacific (south of Australia, around New Zealand), around southern South America and south of Africa. Within a latitudinal band between 45°S and 60°S (that covers the region from the southern tip of New Zealand and southern South America and well into the Southern Ocean) it is estimated that about 1300 sperm whales and about 5000 right whales were caught between 1825 and 1850. Unpublished estimates by T.D. Smith. See also Lund and others (2010, I: 670 and II: 349). This was

only a small fraction of whales taken by American whalers in the 19th century.

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