



Collation of economic and biological time series data for Norwegian and Icelandic redfish fisheries

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Deliverable 23

Work Package 8: Economic models and policy advice

September 2010

*Authors are in alphabetical order. Authors would like to thank Benjamin Planque of Institute of Marine Research, Norway for his help in data collation.

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Introduction

One of the principal tasks in Work Package 8 of the CoralFISH project is to carry out applied bioeconomic modelling for one or two case studies. In order to model and analyze these cases, access to biological, economic and fisheries data is essential. In this deliverable we attempt to collate data for two case studies, namely redfish fisheries in Norway and Iceland. Two redfish species are of commercial importance in Norway and Iceland: *Sebastes mentella* and *Sebastes marinus*. In 2007, the redfish fishery in Norway yielded 13,722 tonnes in weight and 2005-EUR 12.15 million in value (2009), while figures for Iceland were 75,373 tonnes and 2005-EUR 86.74 million, respectively (Anon 2010a).¹ We consider these species as appropriate for the bioeconomic model, as there are identified interactions with cold water corals (Fosså, Mortensen et al. 2002; Freiwald, Fosså et al. 2004; Auster 2005). Both *S. mentella* and *S. marinus* gather in and around cold water coral (CWC) reefs (Fosså, Mortensen et al. 2002; Freiwald, Fosså et al. 2004). Moreover, a recent study has shown that CWC may function as an essential habitat for redfish (Foley, Kahui et al. 2010).

The main limitations of this data collation are 1) little knowledge of the extent of impacted coral areas, 2) limited knowledge of the abundance and types of coral coverage, 3) there is limited time series data, especially for the economic data, most notably for Iceland, and 4) the data for the two countries does not always come in the same format, i.e. not always directly comparable. Furthermore, there is little economic and effort data at a disaggregated level with regards to redfish, resulting in this data being estimated from more aggregated data sources. Finally, data on cold water coral distribution and coverage is highly limited, with few studies attempting to assess them (Fosså, Mortensen et al. 2002; Foley, Kahui et al. 2010). The entire data collation is presented in the Appendix.

¹ Exchange changes used in the text: 1 2005-EUR = 8.007 2005-NOK (Norges Bank, http://www.norgesbank.no/upload/import/stat/historiske_data/no/historisk_valutakurser/hktab_n.xls, retrieved on August 27th, 2010); 1 2005-EUR = 78.14056 2005-ISK (Central Bank of Iceland, <http://www.sedlabanki.is/?PageID=286>, retrieved on August 27th, 2010).

Norwegian data

Collected Norwegian redfish fishery data includes biological, economic and fisheries data from the ICES Sub Areas I and II, the Barents Sea and the Norwegian Sea. Table 1 gives an overview of the data collation.

Biological data

Figure 1 illustrates the fluctuations of the stock size of *S. mentella* in ICES Sub Areas I and II. The mature stock declined dramatically from 266 million to 23 million individuals between 1986 and 1987, reaching a historically low level. The dramatic decrease of mature *S. mentella* stock could partly due to the migration to international waters outside ICES sub-area I and II; however, we do not yet know how the migration affects mature *S. mentella* in Norwegian waters (Planque and Nedreaas 2010). In 2003, the mature *S. mentella* stock reached its peak level of 573 million individuals.

The immature stock followed quite a different path. In 1995, when the mature stock was at a low level of 128 million individuals, the immature stock reached its peak of 2,078 million individuals. Since then the immature stock declined, with the exception of 2002. In 2007, the immature *S. mentella* stock reached its historically low level of 32 million individuals.

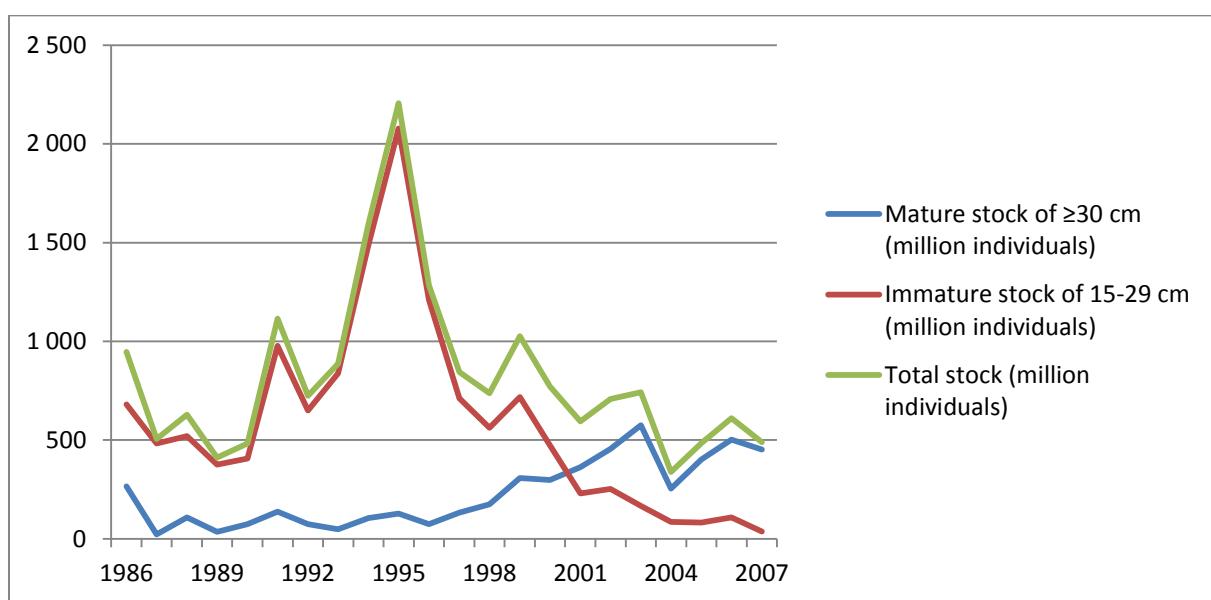


Figure 1 Stock level data of *S. mentella* from 1968 to 2007 in ICES Sub Area I and II (Gjøsæter, Dommasnes et al. 2009).

Table 1 Overview of collected Norwegian redfish fishery data.

Data category	Biological data		Economic data		Fishery data			
Species/Category	S. mentella	S. marinus	All redfish species		All redfish species	S. mentella	All redfish species	Effort
Data type	Surveyed	Surveyed and estimated	Observed; calculated; estimated.		Reported	Reported	Reported and estimated	Estimated
Area for biological and fishery data; sub-category for economic data.	ICES Sub Area I and II	ICES Sub Area I and II	a) Catch value in all areas; b) CPI-corrected catch value; c) Value per unit catch; d) Total redfish revenue; e) Redfish revenue by fleet type (conventional / industrial).	i) Total redfish cost; ii) Redfish cost by fleet group (conventional / industrial).	All areas	All areas except ICES Sub Area I and II	ICES Sub Area I and II	All areas
Source	IMR ² (Gjøsæter, Dommåsnes et al. 2009)	IMR (Gjøsæter, Dommåsnes et al. 2009)	(Anon 2000 – 2005)	(Anon 2000 – 2005)	(Anon 2009)	(Anon 2009)	(Anon 2009)	(Gjøsæter, Dommåsnes et al. 2009)
Time coverage	1986-2008	1986-2007	1908 – 2007 for a – c; 2000 – 2005 for d – f.	2000 – 2005	1908-2007	1990-2006	1980-2007	1980 – 2005

Figure 2 presents the changes in stock size of both mature and immature *S. marinus* and the fluctuations in recruitment. The overall stock levels and recruits of *S. marinus* showed a general decline over the years presented. While the immature stock has been declining every year, the mature stock recovered between 1986 and 1994, maintaining a level above 70,000 tonnes between 1993 and 1996. The number of *S. marinus* recruits reflects changes

² Norwegian Institute of Marine Research.

in the immature stock, but there are some years that the recruits increased while the immature stock declined. These periods are 1990 – 1991 and 2001 – 2007.

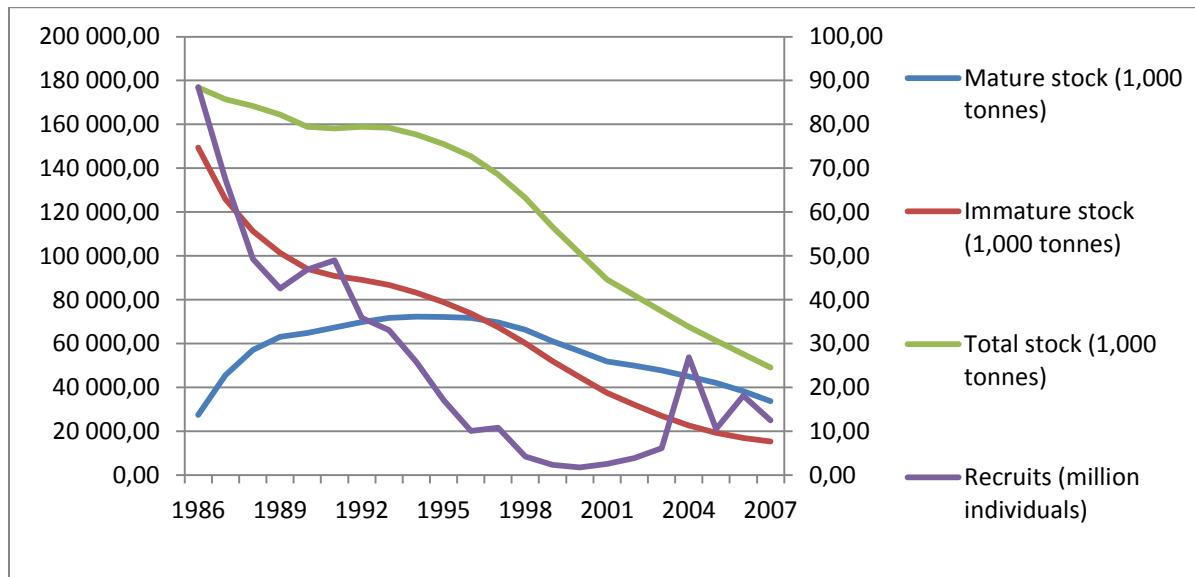


Figure 2 Stock level and recruits data of *S. marinus* from 1986 to 2007 in ICES Sub Area I and II (Gjøsæter, Dommasnes et al. 2009).

Figure 3 shows the catch of redfish between 1980 and 2007. While the redfish fishery in the ICES Sub Areas I and II reached its peak in 1991, landings from these areas surpassed other fishing grounds by a factor of seven. The catch from ICES Sub Areas I and II declined, though it fluctuated between 1993 and 2001, reaching its lowest point in 2004. Redfish landings from other fishing grounds peaked in 1992 and 1993. In 1998, the Norwegian fishermen caught only 1,139 tonnes in fishing grounds other than ICES Sub Areas I and II, which represented an all time low.

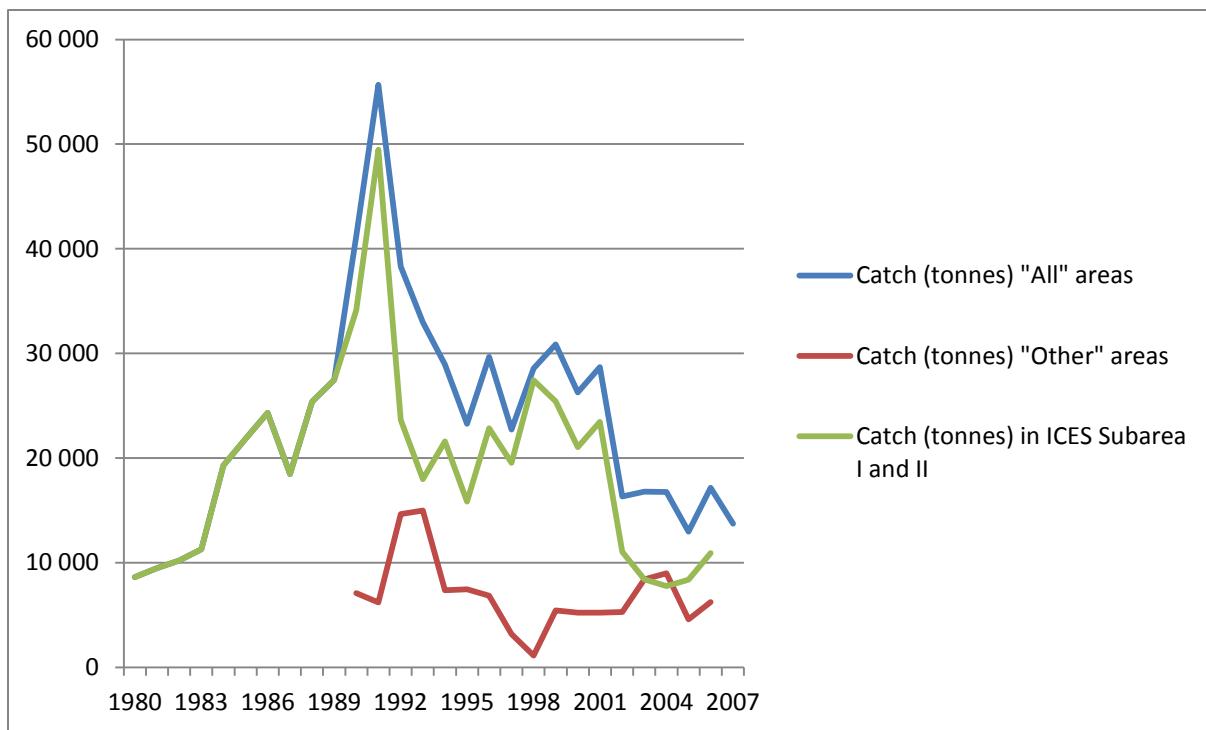


Figure 3 Norwegian catch of redfish from 1980 to 2007 by areas (live weight in tonnes) (Anon 2010b).

Fishery data

Figure 4 shows the total effort and harvest of the conventional and industrial redfish fisheries in Norway between 1980 and 2005. The harvest in this period fluctuated in accordance with the effort levels, with both effort and harvest reaching their maximum in 1991. CPUE of Norwegian redfish fishery, as shown in Figure 5, has generally been within the range of 40 – 60 tonnes per unit standardized effort from 1980 to 2005³.

³ Standardized fishing efforts were estimated by using Robson's (1966) standardization technique.

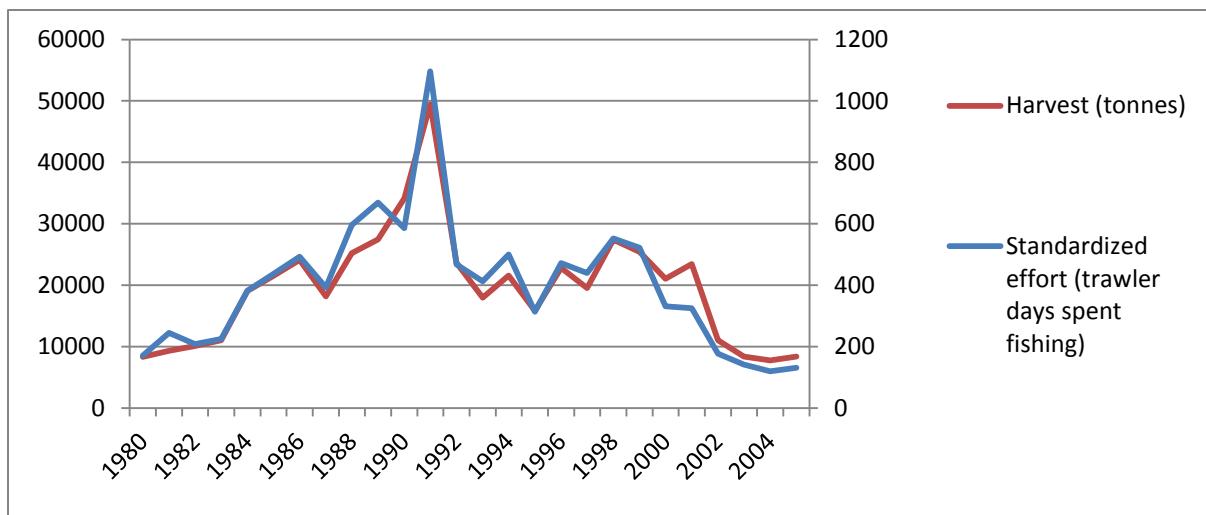


Figure 4 Standardized effort without technological development adjustment and harvest (tonnes) in the Norwegian redfish fishery (1980 - 2005) (Anon 2010b).

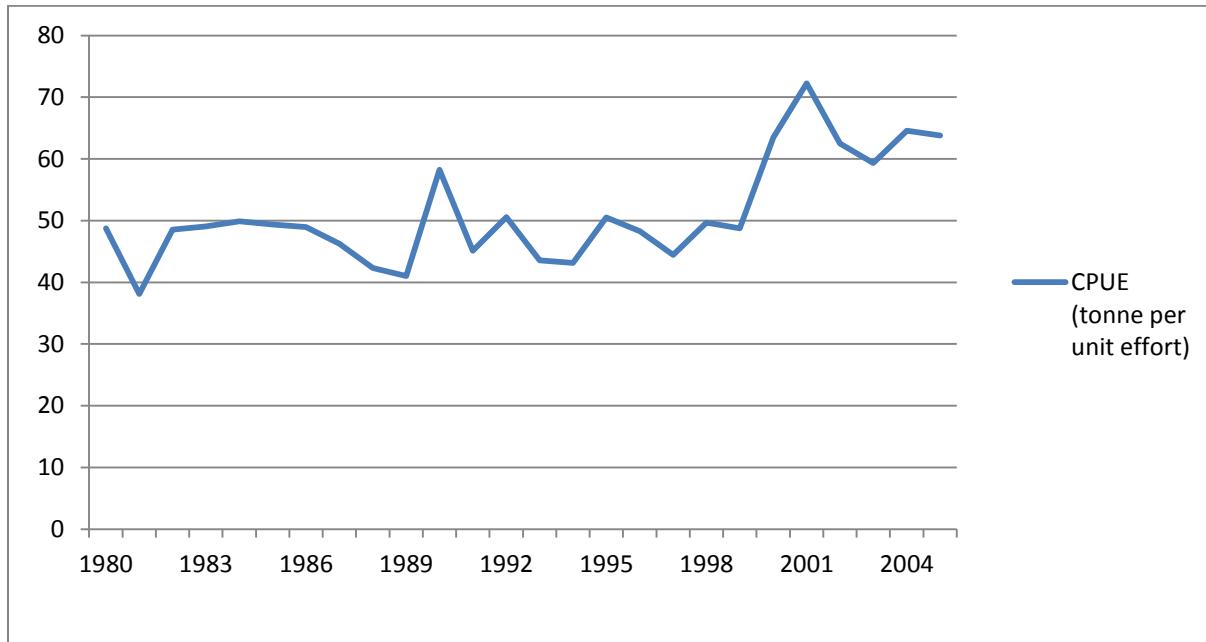


Figure 5 CPUE (standardized trawler days at sea, without technological development adjustment) of Norwegian redfish fishery (1980 – 2005) (Anon 2010b).

Economic data

Figure 6 presents time series data of the redfish landings and catch between 1908 and 2007. Consumer Price Index (CPI) corrected catch values are used. Figure 7 shows the catch value (CPI-corrected) per tonne from 1908 to 2007. Price per tonne has been more or less within

the interval of 2005-EUR 600 – 800 per tonne, with a peak of 2005-EUR 1527.7 per tonne in 1949 and a low point of 2005-EUR 437.4 per tonne in 1934. The total catches value, on the other side, generally fits the fluctuations of total catch from 1908 to 2005.

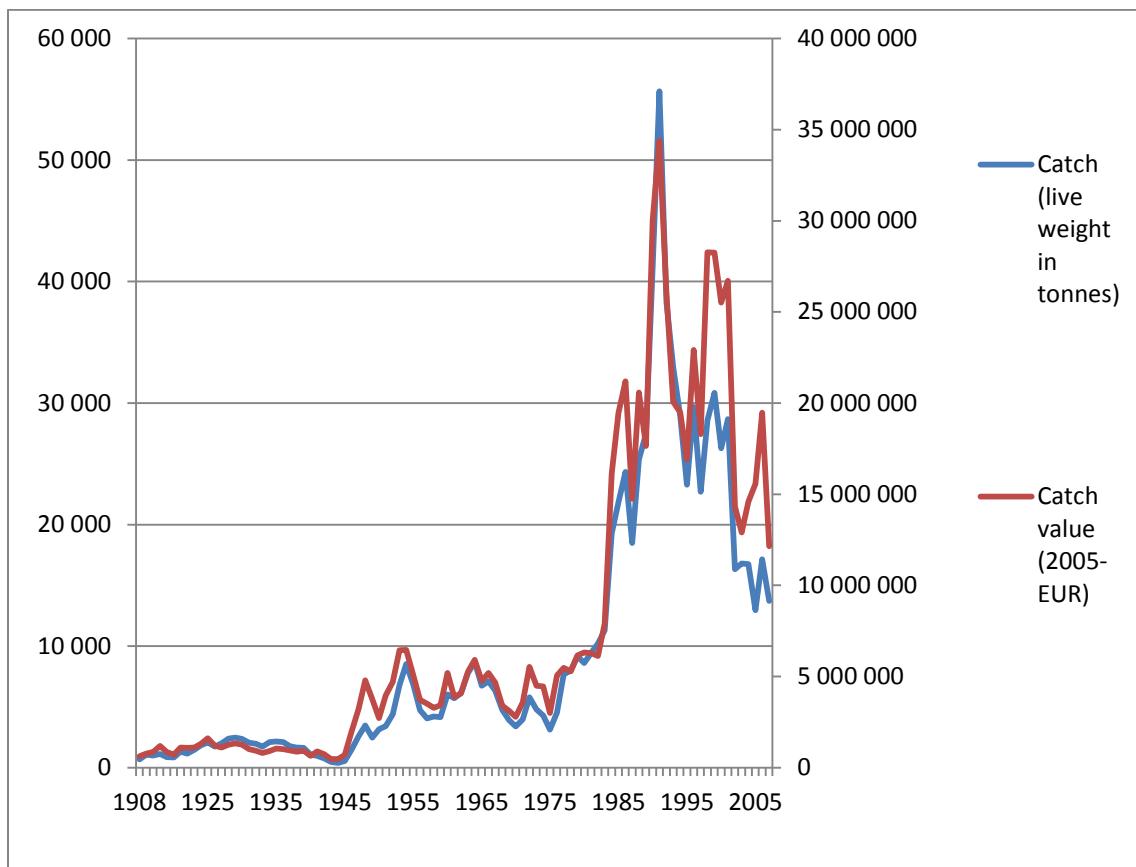


Figure 6 Catch and first hand value of Norwegian redfish fishery in all areas (1908 - 2007) (Anon, 2000 – 2005).

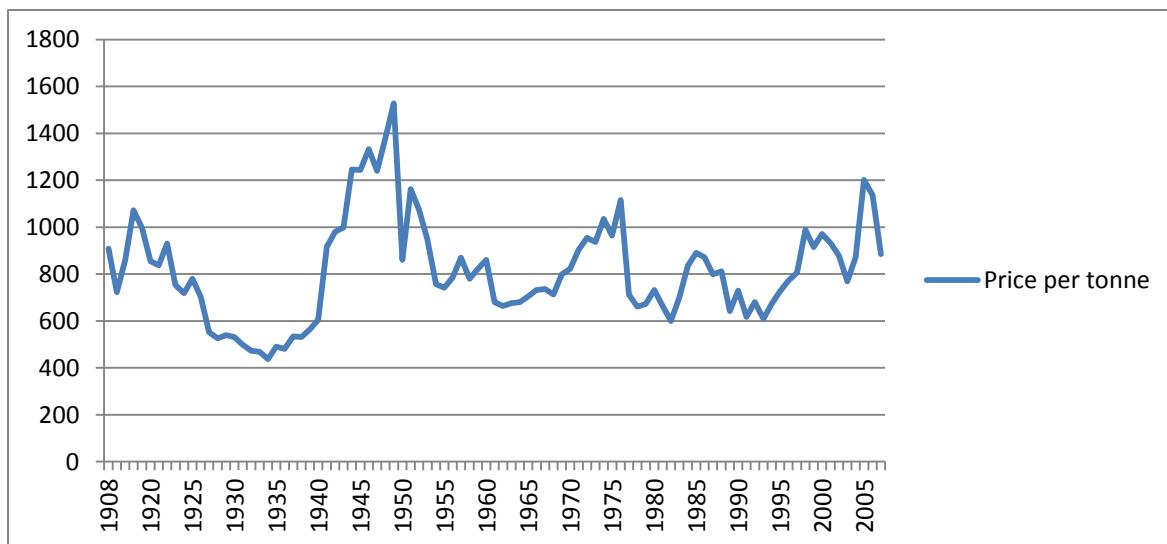


Figure 7 Price per tonne redfish catch in Norway (1908 – 2007; unit: 2005-EUR per tonne (live weight)) (Anon, 2000 – 2005).

The Norwegian redfish fishery can be divided into two main groups: conventional and industrial. The industrial fishery consists mainly of bottom trawling, while the conventional fishery is mainly carried out using gillnet, long-line and hand-line. Figure 8 displays total revenues and costs (CPI-corrected) of the two groups from 2000 to 2005⁴. It is interesting to note that both the conventional and the industrial redfish fishery had a year when estimated revenues were lower than the estimated costs (2001 for the conventional redfish fishery; 2003 for the industrial redfish fishery). From Figure 9 we can see clearly that the industrial redfish fishery has a stable cost per unit effort from 2000 to 2005, while the estimated cost

⁴ Total revenues and costs of redfish fishery fishing for conventional and industrial fleets were estimated by multiplying the cost and revenue figures of the whole Norwegian fishery for each fleet with their respective the proportion of redfish catch. I.e. we assume that redfish harvesting involves the same cost and revenue per tonne as the rest of the fishery. In the two previous figures, however, revenues are based on annual harvest of redfish and the average prices in the relevant years.

The costs of fishing consist of fuel, product tax, management tax, costs for bait, ice and salt, social security costs, insurance costs, maintenance costs and labor cost. All figures of this report have used the total cost data multiplied by the share of redfish harvested. I.e. we assume that redfish harvesting involves the same cost per ton as the rest of the fishery.

per unit effort in the conventional redfish fishery fluctuated annually. The estimated cost per unit effort is also far greater for the conventional fleet.

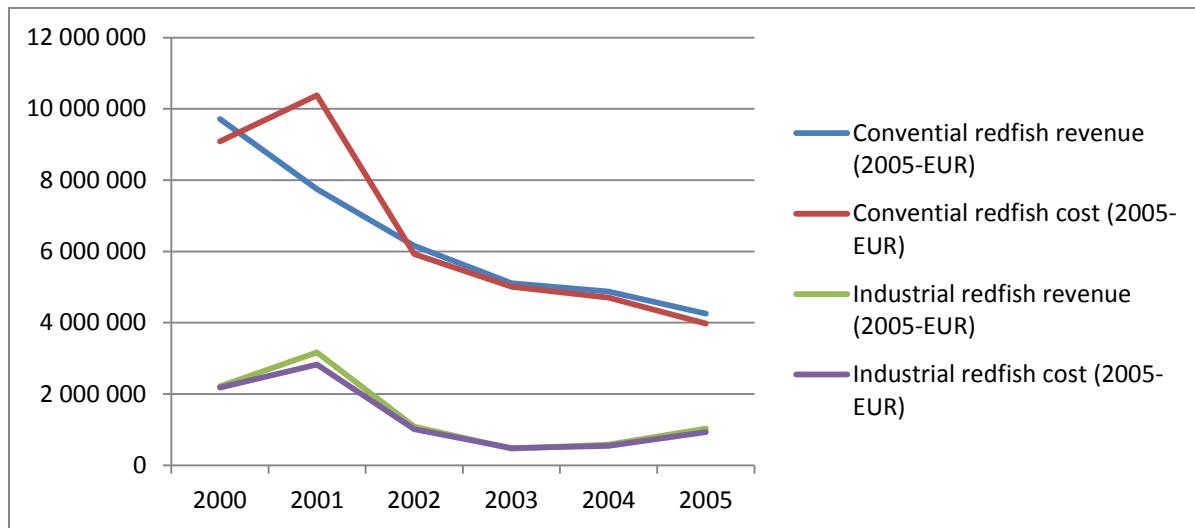


Figure 8 Revenues and costs in the conventional and industrial redfish fishery in Norway (2000 - 2005) (Anon, 2000 - 2005).

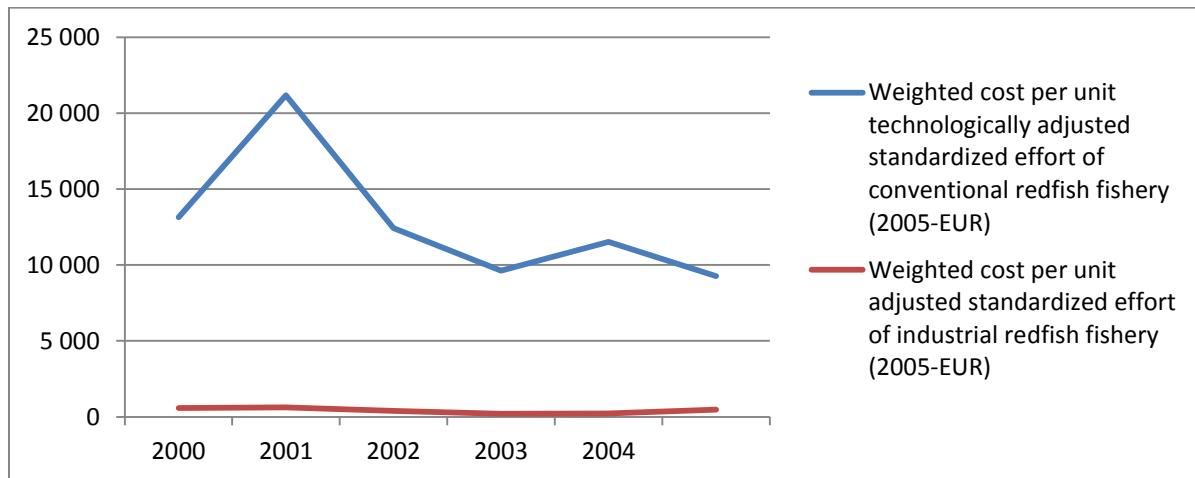


Figure 9 Weighted cost per unit technological development adjusted standardized effort of Norwegian redfish fishery (2000 – 2005) (Anon 2000 – 2005).⁵

⁵ The effort is standardized to trawling days at sea for the stationary gear, and adjusted for technological development of 7%.

Icelandic data

Here we present our data collation on Icelandic redfish fishery (*Table 2*). The time series data on the total catch of redfish in ICES Va area and all Icelandic waters covers long time horizons of 1906 – 2008 and 1945 – 2008, respectively. However, the economic data only spans from 1997 to 2007.

Biological data

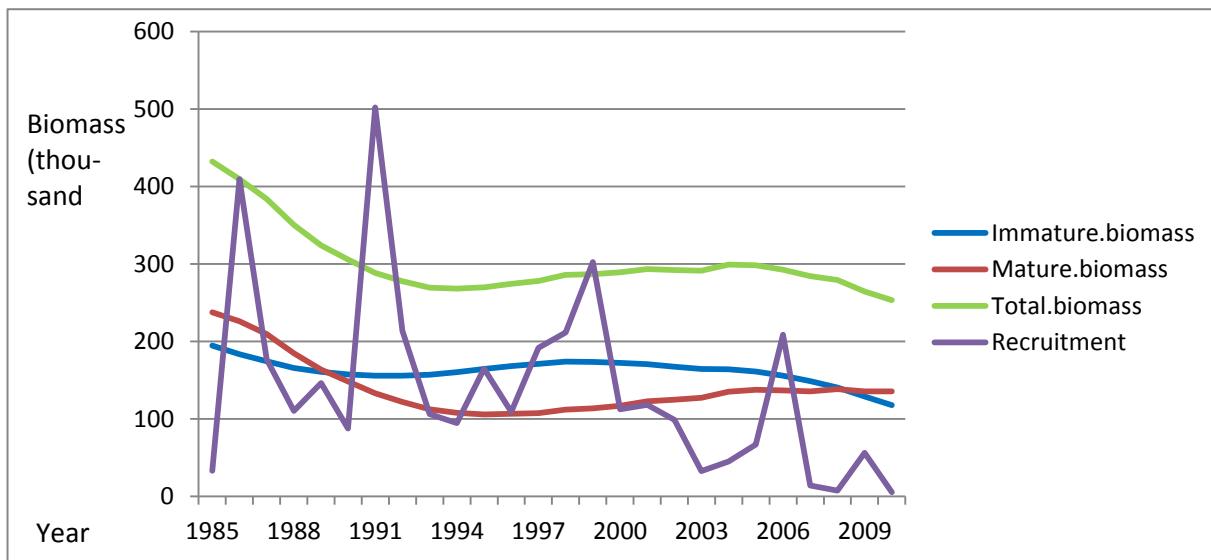
Figure 10 presents two estimations of the stock biomass of *S. marinus* in Icelandic waters. The estimation from the Gadget⁶ model has a smoother flow in the change of biomass than the estimation from the annual March survey. The trends in the two estimations are the same; the stock is declining, though the difference between the models is the extent of change. Furthermore, the Gadget model does not show the recovery of the stock as described by the estimations from the annual March survey.

Figure 11 is the projection of estimated *S. mentella* biomass. Currently, no data on the biomass of mature stock and immature stock is available. Though the data time span is relatively short, it is clear that the *S. mentella* stock size has been changing over time: declining from 2000 to 2003, then recovering until 2006. The stock reached its peak 2001 and was at its minimum in 2003, with the biomass of 164.03 and 64.62 thousand tonnes, respectively.

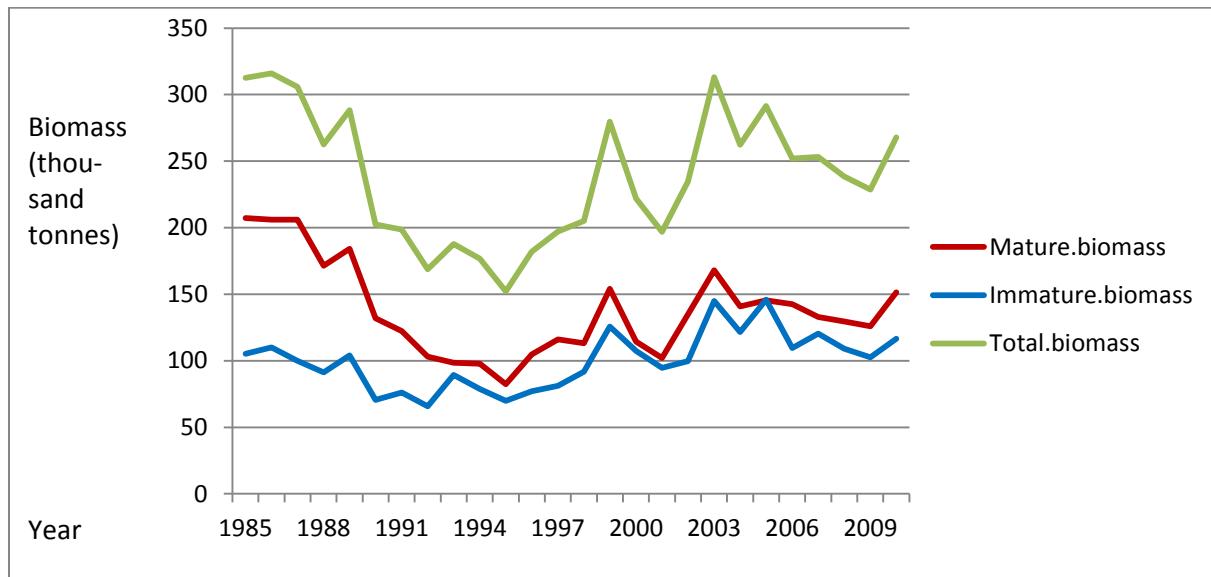
⁶ Gadget stands for "Globally applicable Area Disaggregated General Ecosystem Toolbox". It is a computer program developed by Marine Research Institute of Iceland to create ecosystem models to examine population dynamics of one or more species (Begley, J. and D. Howell (2004).

Table 2 Overview of collected Icelandic redfish fishery data.

Data category	Biological data		Economic data		Fishery data			
Species/Category	<i>S. mentella</i>	<i>S. marinus</i>	All redfish species		All redfish species	<i>S. mentella</i>	<i>S. marinus</i>	Efforts
Data type	Surveyed and estimated	Surveyed and estimated	Surveyed		Reported	Reported	Reported	Surveyed and estimated
Area for biological and fishery data; sub-category for economic data.	Icelandic waters	ICES Sub Area Va area and Icelandic waters	Operating revenues.	Operating costs	1) All Icelandic fishing areas 2) In ICES Va area	All Icelandic fishing areas	All Icelandic fishing areas	All Icelandic fishing areas
Source	(Burgos pers. comm.)	(Burgos pers. comm.)	(Anon 2010c)	(Anon 2010c)	(Anon 2010c)	(Burgos pers. comm.; Anon 2010c)	(Burgos pers. comm.; Anon 2010c)	(Burgos pers. comm.)
Time coverage	2000 - 2009	1985 - 2010	1997 – 2007	1997 – 2007	1) 1945-2008 2) 1905 – 2008	1991-2009	1991 - 2009	1991 – 2009



(a) .



(b)

Figure 10 Stock data of *S. marinus* in Icelandic waters: (a) estimated with the Gadget model; (b) estimated from the annual March Survey. 1985 - 2009. Unit: thousand tonnes (Burgos pers. comm.).^{7,8}

⁷ Please note that the Gadget model has not been officially approved as an assessment model for *S. marinus*.

⁸ The mature sub-stock is the spawning stock.

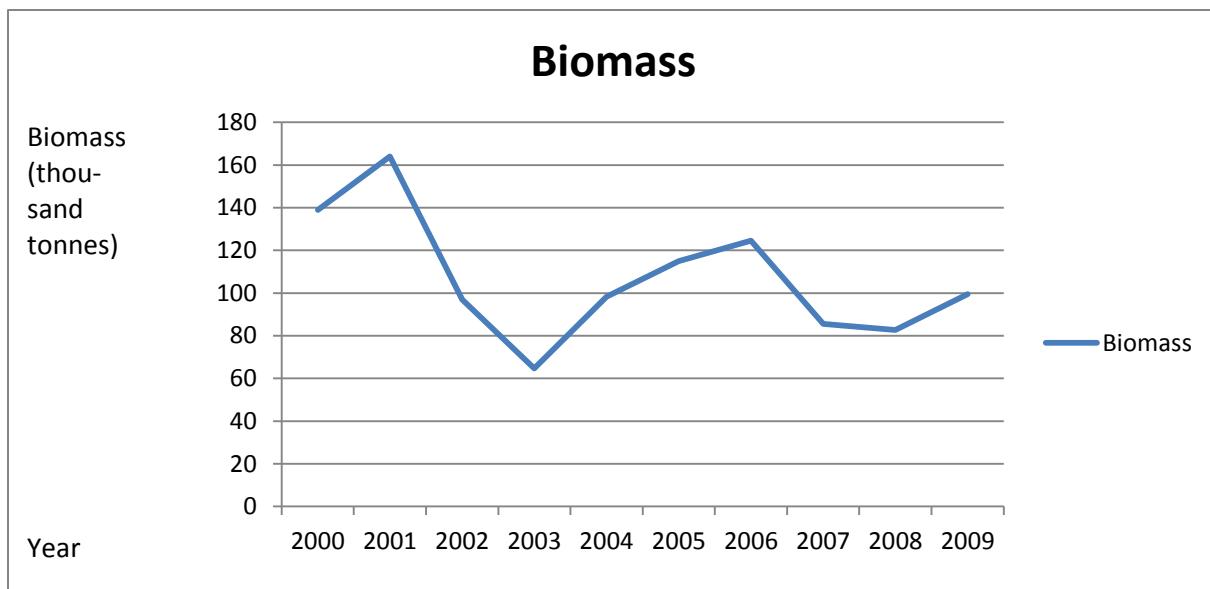


Figure 11 Stock data of *S. mentella* in Icelandic waters based on the October survey. 2000 - 2009. Unit: thousand tonnes (Burgos pers. comm.).

Fishery data

Figure 12 presents the Icelandic redfish catch in all areas between 1945 and 2008 (red) and redfish catch in Icelandic waters in the ICES Va area from 1906 to 2008 (blue). Both data sets were obtained from Statistics Iceland. It is shown in the illustration that the two curves fluctuate in a similar way. It is interesting to note that the redfish catch in Icelandic waters in ICES area Va reached its peak from 1950 to 1955, when technology was not as advanced as today; while the redfish catch of Icelandic vessels from all fishing areas reached the first

peak in 1958 and 1959 and the highest catch in 1994.

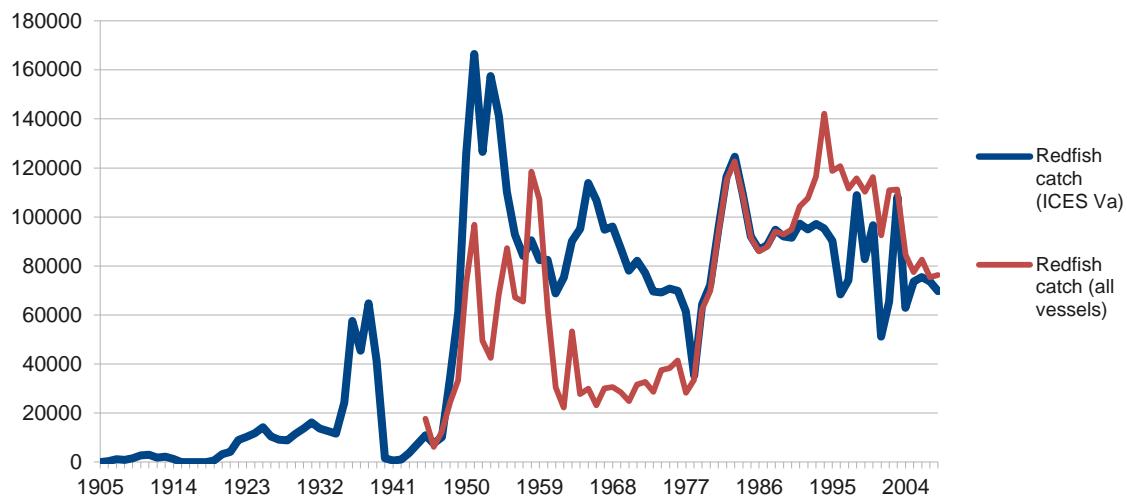


Figure 12 Catch data of Icelandic redfish fisheries in tonnes (1905-2008) (Anon 2010c).

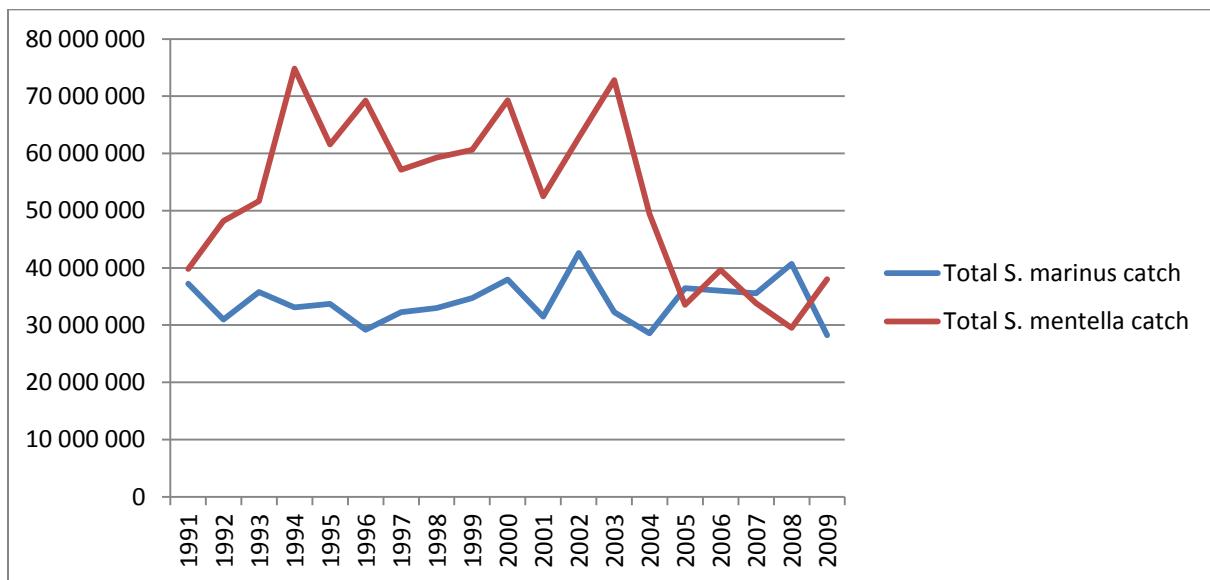


Figure 13 Catch data of all Icelandic redfish landings by species in tonnes (1991-2009) (Burgos 2010).

Figure 13 presents redfish landings by species from 1991 to 2009. The harvests of *S. mentella* and *S. marinus* were similar in 1991 whereupon *S. mentella* catches almost doubled for much of the next ten years.

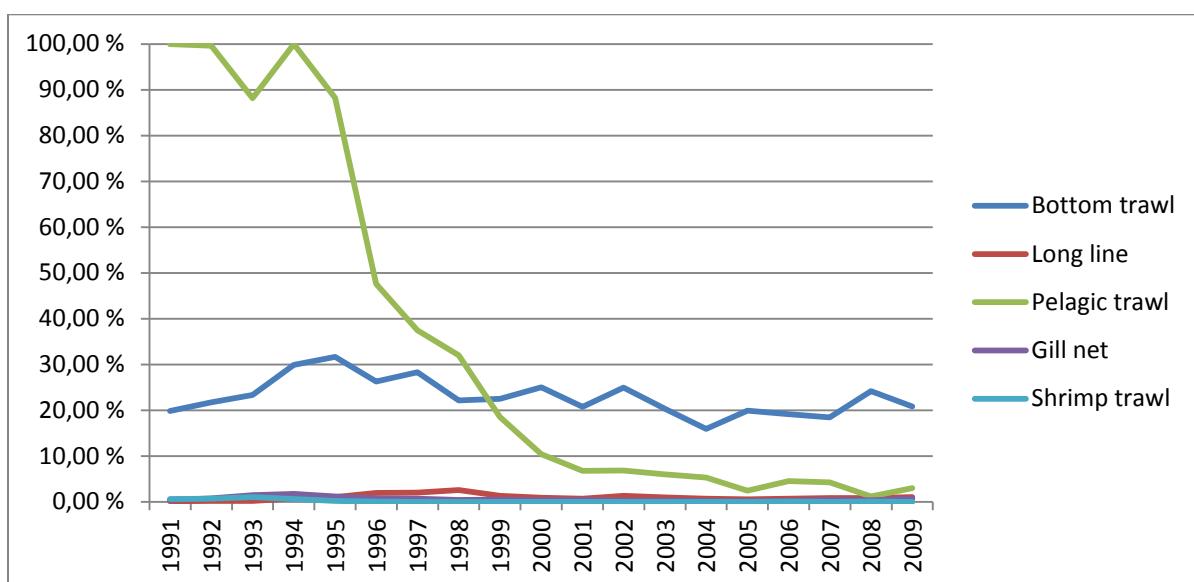


Figure 14 Proportion of redfish catch in all Icelandic landings by gear type (1991 – 2009) (Calculated by using data from Burgos (2010)).

Figure 14 presents two proportion of redfish catch in all Icelandic landings by gear type from 1991 to 2009, by calculating catch data from Burgos (2010). Pelagic trawls, which had a 99.9% percent catch of redfish in 1991, have changed target fish species over the time, resulting in a small redfish proportion (<10%) since 2001; other four types of gears have a stable redfish catch percentage from 1991 to 2009.

Bottom trawls are the most important gear type for the Icelandic *S. mentella* fishery, capturing on average 96% of the *S. mentella* harvest. Weighted fishing effort⁹ data from 1991 to 2009 indicate that bottom trawling effort has been decreasing since 1991; while

⁹ All types of gears in the Icelandic redfish fishery catch redfish along with other fish species. The following equation is used to compute weighted fishing effort for redfish for each type of gear:

Weighted fishing efforts for redfish = proportion of redfish catch among all catches * total fishing effort (for redfish and other species).

The unit of total fishing effort is boat * day.

long lining effort increased to a peak from 1991 to 2002, then began to stabilize from 2005 to 2009 (Figure 15). Please note that Icelandic redfish fishing effort is in a different unit compared to fishing effort in the Norwegian redfish fishery.

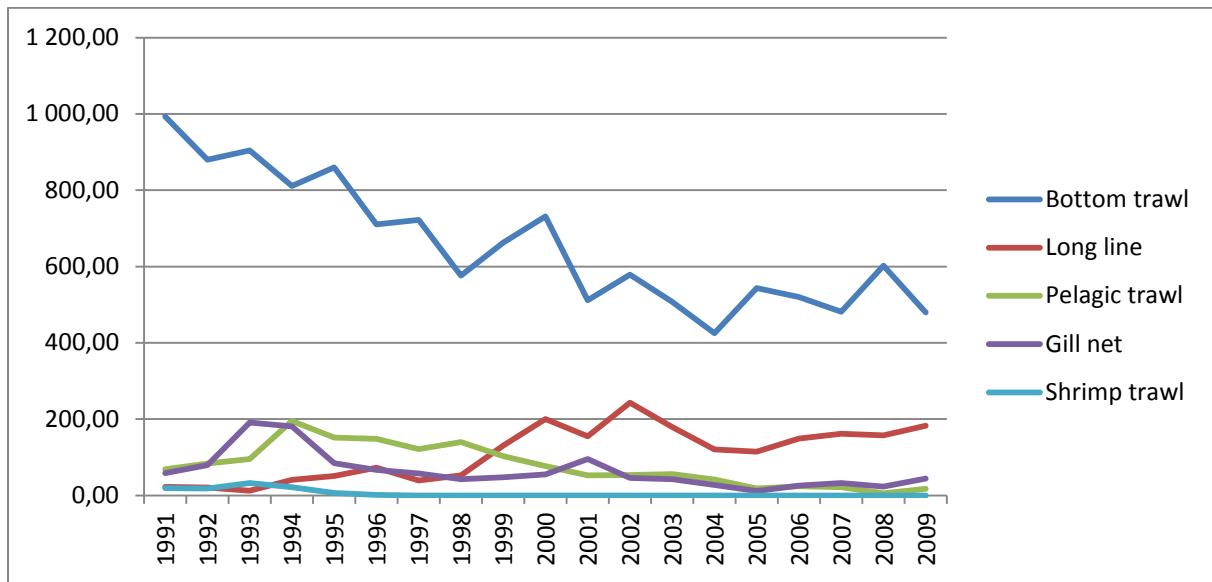


Figure 15 Icelandic redfish fishery – estimated total fishing effort for both redfish species for all Icelandic landings (1991 – 2009) (Burgos 2010).

Since bottom trawls take more than 90% in Icelandic redfish fishery, only CPUE of bottom trawls is presented in Figure 16. As for the CPUE of Norwegian redfish fishery (Figure 5), CPUE of Icelandic bottom trawls have been generally increasing from 1991 to 2008. One reason for the Norwegian CPUE being much lower than the Icelandic presumably is the different gear used. Also, it is interesting to see that CPUE in ICES Va is always higher than in all other fishing areas.

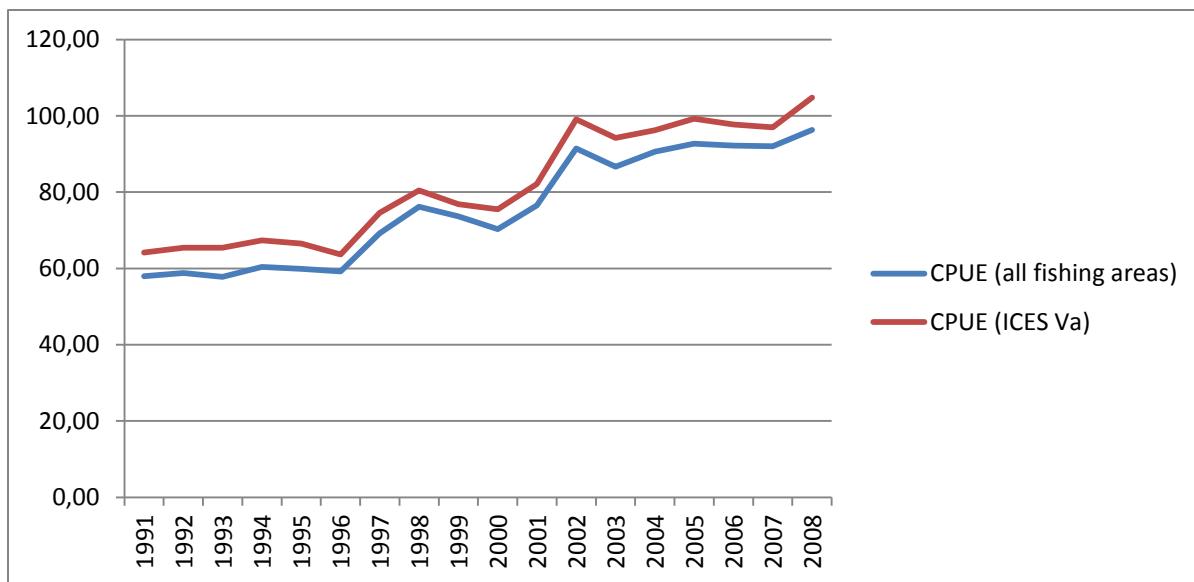


Figure 16 CPUE of bottom trawling in Icelandic redfish fishery (1991 – 2008; unit: tonne per vessel per day) (Computed by using data from Burgos (2010)).

Economic data

As opposed to Norwegian redfish economic data, which is estimated by assuming the proportion of economic value of redfish in the total fishery revenue is the same as the proportion of catches, Icelandic economic data is actual redfish data. Figure 17 demonstrates catch values of *S. mentella* and *S. marinus* in Icelandic grounds from 2003 to 2008. While the values of *S. mentella* catches are increasing, the value of *S. marinus* catches is declining.

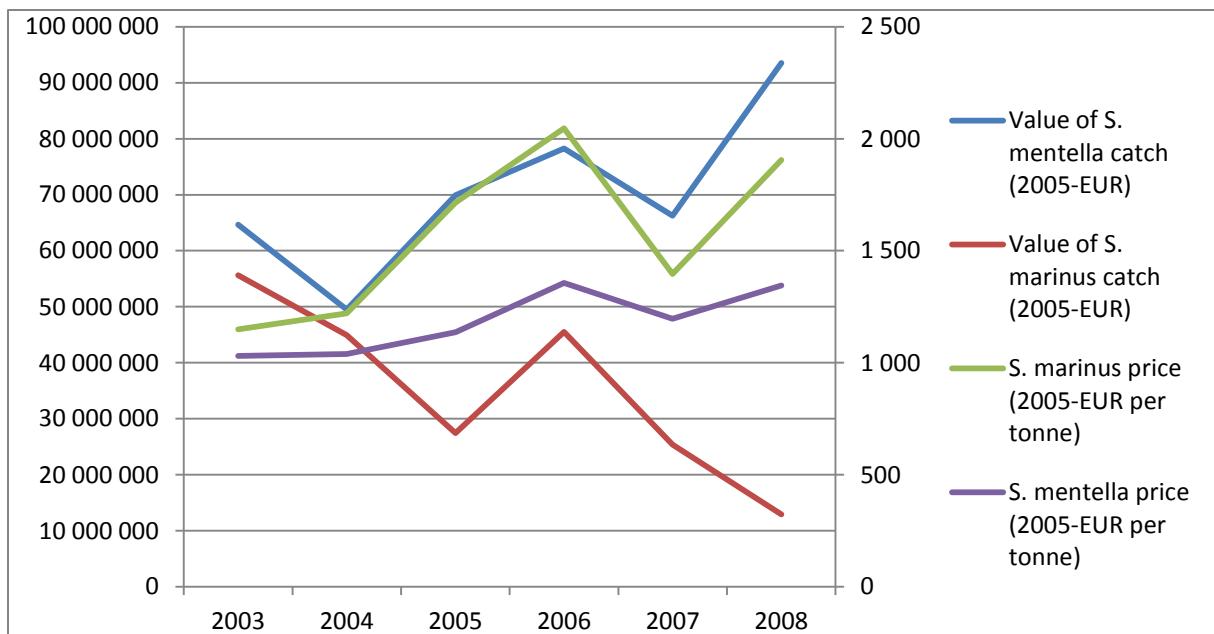


Figure 17 Revenues and prices of *S. mentella* and *S. marinus* in Icelandic grounds (2003 – 2008) (Anon 2010c).

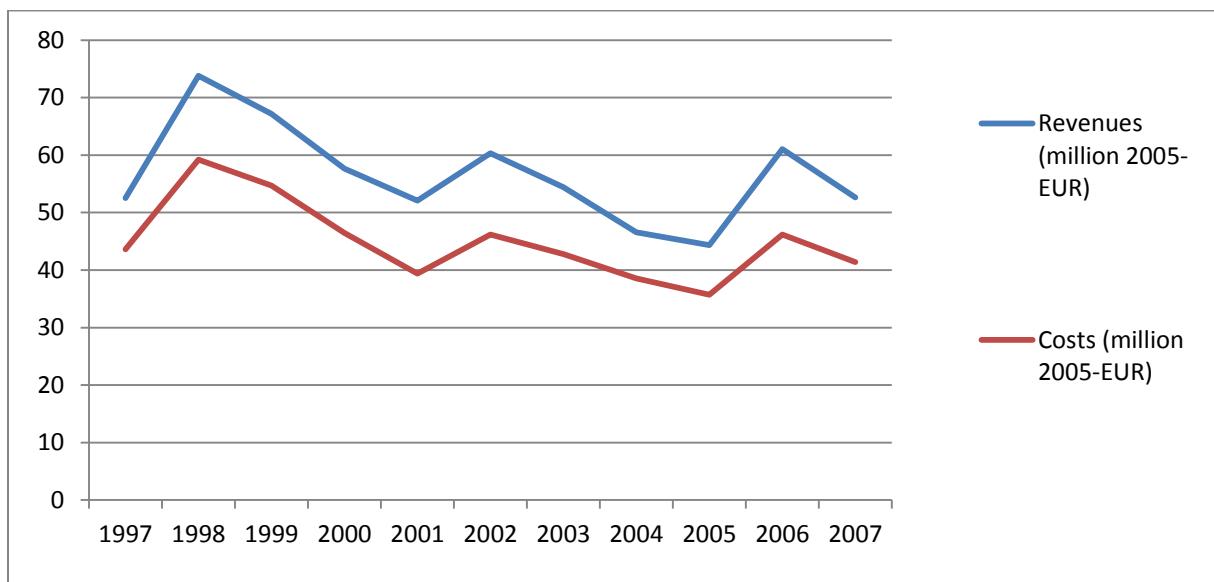


Figure 18 Total operating revenues and costs of Icelandic redfish fishery (1997 – 2007) (Anon 2010c).

If we then have a look at Figure 18, we can see that CPI-corrected revenues and costs have been stable from 1997 to 2007 in general. The cost per unit effort of Icelandic redfish fishery had a period of decreasing from 1998 to 2002, then a period of increasing till 2007 (Figure 19).

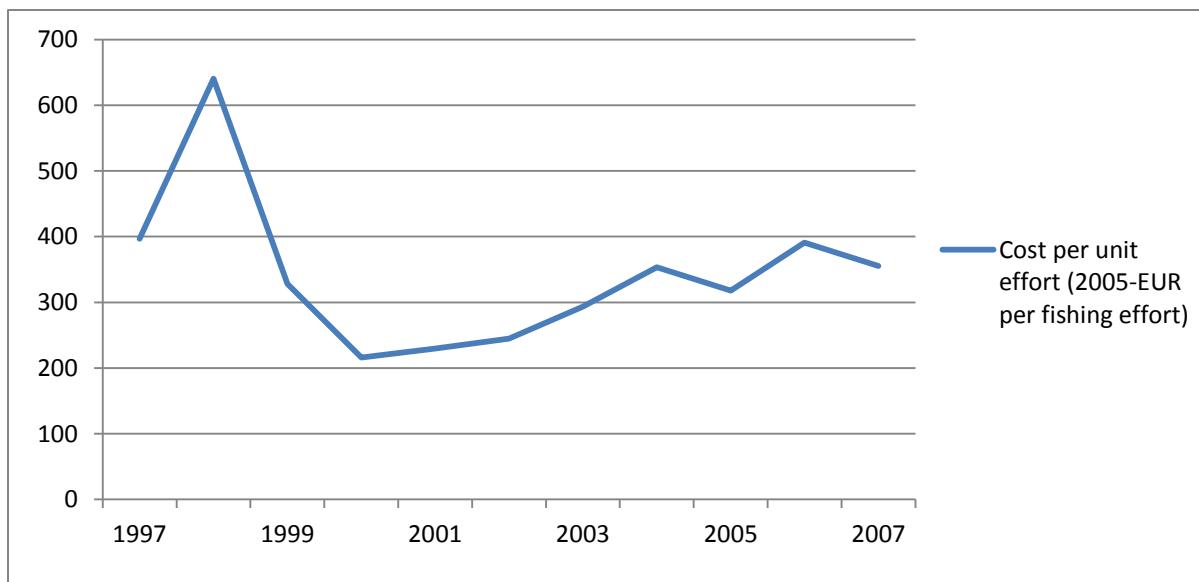


Figure 19 Cost per unit fishing effort of Icelandic fishery in all Icelandic waters (1997 – 2007) (Burgos 2010; Anon 2010c).

Conclusion

The collated data will be used as input to the bioeconomic modelling of redfish interactions with cold water coral. The data that we have succeeded in collating does however have its limitations. The fisheries data is relatively good, both for Iceland and Norway, though the data is fraught with problems regarding the disaggregation for the two *Sebastes* species in the harvest data. The economic data from Iceland is limited in the sense that long time series data on costs and revenues have not been readily available. For Norway the economic data is relatively good, though estimated from total cost and revenue data in the fisheries. The problem of lack of disaggregated data regarding redfish is a problem overall, resulting in for instance effort and cost data being estimated from overall fisheries costs and effort data.

One of the important limitations of our data is the lack of information about cold water coral distribution and destruction. In order to analyse the interactions between redfish and cold water coral, we will therefore have to attempt to simulate different scenarios for distribution and destruction over time.

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Appendix

A. Norwegian data

A1 Biological data (Norway)

A1.1 Stock data of *S. mentella* (Gjøsæter, Dommåsnes et al. 2009)

Year	Mature stock of ≥30 cm (million individuals)	Immature stock of 15-29 cm (million individuals)	Total stock (million individuals)	0-group index
1986	266	681	947	702
1987	23	483	506	631
1988	109	520	629	849
1989	36	377	412	698
1990	75	408	483	670
1991	138	977	1,115	200
1992	74	650	724	150
1993	49	838	887	162
1994	105	1,490	1,595	414
1995	128	2,078	2,206	220
1996	74	1,209	1,283	19
1997	132	712	844	50
1998	176	562	737	78
1999	308	718	1,026	27
2000	298	473	771	195
2001	364	231	594	11
2002	455	253	708	28
2003	576	167	743	57
2004	254	86	339	98
2005	401	83	484	247
2006	503	108	610	360
2007	452	37	489	562
2008	N/A	N/A	N/A	85

A1.2 Stock data of *S. marinus* (Norway) (Gjøsæter, Dommåsnes et al. 2009)¹⁰

Year	Mature stock (1000 tonnes)	Immature stock (1000 tonnes)	Total stock (1000 tonnes)	Recruits (thousand individuals)	Recruits (million individuals)
1986	27,399	149,402	176,801	88,528	89
1987	45,574	125,946	171,520	67,480	67
1988	57,055	111,260	168,315	49,270	49
1989	63,103	101,389	164,492	42,567	43
1990	64,838	94,013	158,851	46,910	47
1991	67,272	90,851	158,123	48,989	49
1992	69,860	89,022	158,882	35,878	36
1993	71,724	86,720	158,444	33,044	33
1994	72,242	83,197	155,439	25,835	26
1995	72,166	78,910	151,076	17,108	17
1996	71,658	73,821	145,479	10,088	10
1997	69,687	67,498	137,185	10,795	11
1998	66,290	60,218	126,508	4,243	4
1999	61,076	52,059	113,135	2,312	2
2000	56,568	44,651	101,219	1,742	2
2001	51,788	37,472	89,261	2,574	3
2002	49,943	32,111	82,054	3,889	4
2003	47,693	27,024	74,717	6,111	6
2004	44,913	22,676	67,589	26,841	27
2005	42,018	19,327	61,345	10,500	11
2006	38,319	16,898	55,217	18,142	18
2007	33,683	15,341	49,024	12,500	13

¹⁰ Unsure data is marked as italic.

A2 Fishery data (Norway)

A2.1 Norwegian redfish catch data (all areas from 1908 to 2007) (Anon 2010b)

Year	Catch (live weight in tonnes)	Year	Catch (live weight in tonnes)	Year	Catch (live weight in tonnes)
1908	691	1946	1,471	1977	7,690
1910	1,073	1947	2,589	1978	7,980
1915	999	1948	3,471	1979	9,173
1918	1,115	1949	2,461	1980	8,614
1919	853	1950	3,159	1981	9,461
1920	832	1951	3,410	1982	10,219
1921	1,322	1952	4,381	1983	11,285
1922	1,160	1953	6,787	1984	19,287
1923	1,470	1954	8,530	1985	21,843
1924	1,827	1955	6,836	1986	24,325
1925	2,065	1956	4,730	1987	18,478
1926	1,723	1957	4,040	1988	25,374
1927	2,002	1958	4,212	1989	27,468
1928	2,386	1959	4,169	1990	41,224
1929	2,469	1960	6,034	1991	55,661
1930	2,366	1961	5,713	1992	38,287
1931	2,048	1962	6,120	1993	32,974
1932	1,971	1963	7,797	1994	28,942
1933	1,729	1964	8,685	1995	23,282
1934	2,090	1965	6,744	1996	29,679
1935	2,149	1966	7,095	1997	22,709
1936	2,106	1967	6,341	1998	28,571
1937	1,770	1968	4,770	1999	30,856
1938	1,659	1969	3,914	2000	26,274
1939	1,629	1970	3,397	2001	28,680
1940	1,069	1971	3,963	2002	16,327
1941	969	1972	5,784	2003	16,792
1942	749	1973	4,794	2004	16,751
1943	473	1974	4,298	2005	12,960
1944	377	1975	3,120	2006	17,150
1945	558	1976	4,525		

*A2.2 Norwegian redfish catch data: quantity of pelagic S. mentella in ICES Div. Va,
Sub-Areas XII, XIV and NAFO Div. 1F, 2H and 2J, 1990 – 2007 (ICES 2007)*

Year	Nominal catch (tonnes)
1990	7,085
1991	6,197
1992	14,654
1993	14,990
1994	7,357
1995	7,457
1996	6,842
1997	3,179
1998	1,139
1999	5,435
2000	5,232
2001	5,222
2002	5,291
2003	8,399
2004	8,998
2005	4,574
2006	6,233

A2.3 Norwegian redfish catch data: quantity in ICES Sub-Area I and II (Barents and Norwegian Sea), 1980 – 2007 (ICES 2007)

Year	Catch (tonnes) "All" areas
1980	8,614
1981	9,461
1982	10,219
1983	11,285
1984	19,287
1985	21,843
1986	24,325
1987	18,478
1988	25,374
1989	27,468
1990	34,139
1991	49,464
1992	23,633
1993	17,984
1994	21,585
1995	15,825
1996	22,837
1997	19,530
1998	27,432
1999	25,421
2000	21,042
2001	23,458
2002	11,036
2003	8,393
2004	7,753
2005	8,386
2006	10,917

A2.4 Norwegian redfish effort data (in standardized trawler days at sea) and CPUE (1980 - 2005) (Gjøsæter, Dommasnes et al. 2009).

Year	Effort	CPUE (tonne per unit effort)
1980	170.00	48.77
1981	244.00	38.10
1982	208.00	48.52
1983	225.00	49.07
1984	382.00	49.91
1985	436.00	49.39
1986	493.00	48.96
1987	393.00	46.27
1988	596.00	42.31
1989	669.00	41.02
1990	586.00	58.22
1991	1,097.00	45.10
1992	467.00	50.55
1993	413.00	43.58
1994	500.00	43.16
1995	313.00	50.52
1996	472.00	48.27
1997	440.00	44.42
1998	552.00	49.67
1999	521.00	48.75
2000	331.00	63.49
2001	325.00	72.24
2002	177.00	62.47
2003	141.00	59.34
2004	120.00	64.55
2005	131.00	63.77

A3 Economic data (Norway)

A3.1 Catch value and value per unit catch of Norwegian redfish fishery in all fishing areas (1908 - 2007) (Anon 2010b)

Year	Catch value (2005-EUR)	Value per unit catch (2005-EUR per tonne live weight)
1908	627,269.32	907.77
1910	774,995.79	722.27
1915	857,703.68	858.56
1918	1,195,628.43	1,072.31
1919	849,622.25	996.04
1920	711,278.61	854.90
1921	1,106,070.38	836.66
1922	1,078,119.15	929.41
1923	1,106,355.60	752.62
1924	1,312,291.26	718.28
1925	1,610,903.95	780.10
1926	1,211,220.28	702.97
1927	1,105,072.12	551.98
1928	1,255,409.85	526.16
1929	1,333,859.04	540.24
1930	1,256,094.37	530.89
1931	1,020,619.46	498.35
1932	932,526.99	473.12
1933	809,535.08	468.21
1934	914,097.60	437.37
1935	1,054,160.94	490.54
1936	1,013,432.00	481.21
1937	946,070.44	534.50
1938	881,661.88	531.44
1939	919,995.00	564.76
1940	646,871.49	605.12
1941	887,999.21	916.41
1942	734,226.78	980.28
1943	472,012.36	997.91
1944	469,298.92	1,244.82
1945	693,746.23	1,243.27
1946	1,959,848.51	1,332.32
1947	3,211,074.11	1,240.28
1948	4,793,009.69	1,380.87
1949	3,759,750.71	1,527.73
1950	2,719,579.83	860.90
1951	3,961,461.05	1,161.72
1952	4,707,022.31	1,074.42
1953	6,434,274.96	948.03
1954	6,452,902.46	756.50
1955	5,069,650.69	741.61
1956	3,712,836.98	784.95
1957	3,515,200.82	870.10
1958	3,287,150.29	780.43
1959	3,425,196.92	821.59
1960	5,194,799.38	860.92

1961	3,886,060.83	680.21
1962	4,062,927.94	663.88
1963	5,273,799.49	676.39
1964	5,909,690.13	680.45
1965	4,756,977.72	705.36
1966	5,190,725.24	731.60
1967	4,668,066.76	736.17
1968	3,402,671.40	713.35
1969	3,128,763.88	799.38
1970	2,792,268.36	821.98
1971	3,583,946.51	904.35
1972	5,523,070.50	954.89
1973	4,490,856.30	936.77
1974	4,450,236.25	1,035.42
1975	3,008,006.05	964.10
1976	5,046,922.25	1,115.34
1977	5,472,353.10	711.62
1978	5,275,513.26	661.09
1979	6,164,141.25	671.99
1980	6,311,735.01	732.73
1981	6,280,516.88	663.83
1982	6,126,886.02	599.56
1983	7,893,423.56	699.46
1984	16,129,839.89	836.31
1985	19,461,182.69	890.96
1986	21,201,600.56	871.60
1987	14,756,724.66	798.61
1988	20,577,074.55	810.95
1989	17,647,898.57	642.49
1990	30,065,570.02	729.32
1991	34,393,079.70	617.90
1992	26,022,015.87	679.66
1993	20,078,878.28	608.93
1994	19,490,610.98	673.44
1995	16,910,676.49	726.34
1996	22,920,232.31	772.27
1997	18,289,075.02	805.37
1998	28,265,696.52	989.31
1999	28,253,255.67	915.65
2000	25,513,374.49	971.05
2001	26,713,550.90	931.43
2002	14,327,266.66	877.52
2003	12,910,158.18	768.83
2004	14,592,131.71	871.12
2005	15,567,253.65	1,201.18
2006	19,480,034.41	1,135.86
2007	12,148,869.53	885.36

A3.2 Revenue and revenue per unit catch by fleet type (2000 - 2005) (Norway)
(Anon 2000 - 2005)¹¹

Year		Revenue	Catch in tonnes)	Revenue per unit catch (NOK per tonne)	Weighted revenue per tonne (NOK/tonne)
2000	Conventional redfish	71,308,035.00	9,118.00	7,820.58	
2000	Industrial redfish	16,288,971.00	17,154.00	949.57	
2000	Total	87,597,006.00	26,272.00	3,334.23	3,637.63
2001	Conventional redfish	58,586,189.00	6,747.00	8,683.29	
2001	Industrial redfish	23,931,654.00	21,927.00	1,091.42	
2001	Total	82,517,843.00	28,674.00	2,877.79	3,047.23
2002	Conventional redfish	47,184,572.00	5,750.00	8,206.01	
2002	Industrial redfish	8,316,536.00	10,572.00	786.66	
2002	Total	55,501,108.00	16,322.00	3,400.39	3,554.81
2003	Conventional redfish	40,102,272.00	5,911.00	6,784.35	
2003	Industrial redfish	3,658,360.00	10,875.00	336.40	
2003	Total	43,760,632.00	16,786.00	2,606.97	2,660.13
2004	Conventional redfish	38,381,773.00	4,641.00	8,270.15	
2004	Industrial redfish	4,558,442.00	12,105.00	376.58	
2004	Total	42,940,215.00	16,746.00	2,564.21	2,604.94
2005	Conventional redfish	34,084,696.00	4,065.00	8,384.92	
2005	Industrial redfish	8,217,371.00	8,891.00	924.23	
2005	Total	42,302,067.00	12,956.00	3,265.06	3,265.06

¹¹ Monetary data in this table is nominal.

A3.3 Revenue by fleet groups (2000 – 2005) (Norway) (Anon 2000 – 2005)¹²

Year	Fleet type	Fleet group number	Average revenue	Number of vessels	Total revenue	Redfish factor (%)	Total revenue for redfish
2000	Conventional	1	465,984	513	239,049,792	2.86	6,836,824
2000		2	1,824,161	158	288,217,438	2.86	8,243,019
2000		3	834,550	7	5,841,850	2.86	167,077
2000		4	2,071,511	86	178,149,946	2.86	5,095,088
2000		5	582,929	163	95,017,427	2.86	2,717,498
2000		6	1,509,793	86	129,842,198	2.86	3,713,487
2000		7	534,061	409	218,430,949	2.86	6,247,125
2000		8	1,538,480	95	146,155,600	2.86	4,180,050
2000		9	4,022,719	22	88,499,818	2.86	2,531,095
2000		10	5,857,858	43	251,887,894	2.86	7,203,994
2000		11	16,388,366	52	852,195,032	2.86	24,372,778
2000		12	NA	5	NA	2.86	NA
2000	Industrial	13	14,960,456	31	463,774,136	1.09	5,055,138
2000		14	34,598,032	19	657,362,608	1.09	7,165,252
2000		15	12,040,783	31	373,264,273	1.09	4,068,581
2001	Conventional	1	535,724	439	235,182,836	2.11	4,962,358
2001		2	2,011,701	157	315,837,057	2.11	6,664,162
2001		3	1,024,055	6	6,144,330	2.11	129,645
2001		4	2,396,180	67	160,544,060	2.11	3,387,480
2001		5	658,574	235	154,764,890	2.11	3,265,539
2001		6	1,745,824	84	146,649,216	2.11	3,094,298
2001		7	534,794	413	220,869,922	2.11	4,660,355
2001		8	1,712,897	89	152,447,833	2.11	3,216,649
2001		9	5,599,414	23	128,786,522	2.11	2,717,396
2001		10	6,388,608	48	306,653,184	2.11	6,470,382
2001		11	17,104,125	53	906,518,625	2.11	19,127,543
2001		12	10,549,545	4	42,198,180	2.11	890,382
2001	Industrial	13	19,964,616	35	698,761,560	1.43	9,992,290
2001		14	36,211,585	16	579,385,360	1.43	8,285,211
2001		15	13,634,321	29	395,395,309	1.43	5,654,153
2002	Conventional	1	680,784	558	379,877,472	1.75	6,647,856
2002		2	1,902,803	206	391,977,418	1.75	6,859,605
2002		3	893,074	10	8,930,740	1.75	156,288
2002		4	1,922,795	86	165,360,370	1.75	2,893,806
2002		5	677,514	212	143,632,968	1.75	2,513,577
2002		6	1,761,268	100	176,126,800	1.75	3,082,219

¹² Monetary data in this table is nominal.

2002		7	716,071	281	201,215,951	1.75	3,521,279
2002		8	1,779,026	93	165,449,418	1.75	2,895,365
2002		9	4,264,997	22	93,829,934	1.75	1,642,024
2002		10	5,807,619	34	197,459,046	1.75	3,455,533
2002		11	15,763,289	49	772,401,161	1.75	13,517,020
2002	Industrial	13	20,278,657	34	689,474,338	0.45	3,102,635
2002		14	38,540,806	16	616,652,896	0.45	2,774,938
2002		15	14,648,428	37	541,991,836	0.45	2,438,963
2003	Conventional	1	370,063	408	150,985,704	1.94	2,929,123
2003		2	836,258	770	643,918,660	1.94	12,492,022
2003		3	1,721,671	215	370,159,265	1.94	7,181,090
2003		4	4,034,939	48	193,677,072	1.94	3,757,335
2003		5	15,741,927	45	708,386,715	1.94	13,742,702
2003	Industrial	6	36,771,854	16	588,349,664	0.2	1,176,699
2003		7	20,232,000	33	667,656,000	0.2	1,335,312
2003		8	18,361,932	22	403,962,504	0.2	807,925
2003		12	10,575,731	16	169,211,696	0.2	338,423
2004	Conventional	1	446,400	408	182,131,200	1.49	2,713,755
2004		2	1,039,700	770	800,569,000	1.49	11,928,478
2004		3	2,124,900	215	456,853,500	1.49	6,807,117
2004		4	4,791,400	48	229,987,200	1.49	3,426,809
2004		5	20,142,600	45	906,417,000	1.49	13,505,613
2004	Industrial	6	41,255,900	15	618,838,500	0.22	1,361,445
2004		7	27,386,800	31	848,990,800	0.22	1,867,780
2004		8	21,441,300	20	428,826,000	0.22	943,417
2004		12	12,526,000	14	175,364,000	0.22	385,801
2005	Conventional	1	577,200	294	169,696,800	1.37	2,324,846
2005		2	1,262,100	627	791,336,700	1.37	10,841,313
2005		3	2,709,000	176	476,784,000	1.37	6,531,941
2005		4	5,956,000	34	202,504,000	1.37	2,774,305
2005		5	24,217,500	35	847,612,500	1.37	11,612,291
2005	Industrial	6	50,989,100	15	764,836,500	0.37	2,829,895
2005		7	36,341,400	25	908,535,000	0.37	3,361,580
2005		8	29,442,500	13	382,752,500	0.37	1,416,184
2005		12	16,478,700	10	164,787,000	0.37	609,712

A3.4 Landing, revenue, first hand price and CPI-corrected first hand price (2000 – 2005) (Norway) (Anon 2000 – 2005)¹³

Year	Redfish Catch (round weight in tonnes)	Redfish value (first hand value in 1000 NOK)	Redfish first hand price per unit catch (NOK per tonne)	Weighted redfish price per unit catch (first hand price per tonne in 2005 NOK)
2000	26,274	187,247	7,127	7,775
2001	28,680	202,002	7,043	7,458
2002	16,327	109,735	6,721	7,026
2003	16,792	101,306	6,033	6,156
2004	16,751	115,012	6,866	6,975
2005	12,960	124,647	9,618	9,618

¹³ Monetary data in this table is nominal.

A3.5 Cost by fleet type (2000 - 2005) (Norway) (Anon 2000 - 2005)¹⁴

Year	Fleet type	Costs (NOK)	Standardized effort (SE) (trawl days)	Technologically adjusted SE (7%)	Cost per unit effort	Weighted cost per unit effort
2000	Conventional redfish cost	66,662,528	144	557	119,631	96,504
2000	Industrial redfish cost	15,975,931	188	728	21,960	4,245
2001	Conventional redfish cost	78,469,041	93	385	22,364	4,790
2001	Industrial redfish cost	21,390,296	231	956	111,379	95,173
2002	Conventional redfish cost	45,397,559	92	408	82,845	75,588
2002	Industrial redfish cost	7,729,967	85	377	18,938	1,659
2003	Conventional redfish cost	39,272,784	100	474	17,758	1,855
2003	Industrial redfish cost	3,770,598	42	199	91,659	74,238
2004	Conventional redfish cost	37,064,672	72	365	119,631	96,504
2004	Industrial redfish cost	4,323,706	48	243	21,960	4,245
2005	Conventional redfish cost	31,838,282	64	347	22,364	4,790
2005	Industrial redfish cost	7,471,202	68	369	111,379	95,173

¹⁴ Monetary data in this table is nominal.

*A3.6 Cost by fleet groups (2000 – 2005) (Norway; unit: NOK) (Anon 2000 – 2005)*¹⁵

Year	Fleet type	Fleet group number	Average cost	Number of vessels	Total cost	Red-fish factor (%)	Total cost for redfish
2000	Conventional	1	441,466	513	226,472,058	2.86	6,477,101
2000		2	1,608,210	158	254,097,180	2.86	7,267,179
2000		3	756,392	7	5,294,744	2.86	151,430
2000		4	1,948,715	86	167,589,490	2.86	4,793,059
2000		5	529,265	163	86,270,195	2.86	2,467,328
2000		6	1,411,968	86	121,429,248	2.86	3,472,876
2000		7	500,306	409	204,625,154	2.86	5,852,279
2000		8	1,299,010	95	123,405,950	2.86	3,529,410
2000		9	3,688,378	22	81,144,316	2.86	2,320,727
2000		10	5,561,943	43	239,163,549	2.86	6,840,078
2000		11	15,795,495	52	821,365,740	2.86	23,491,060
2000		12	NA	5	NA	2.86	NA
2000	Industrial	13	14,561,131	31	451,395,061	1.09	4,920,206
2000		14	33,445,533	19	635,465,127	1.09	6,926,570
2000		15	12,220,049	31	378,821,519	1.09	4,129,155
2001	Conventional	1	498,870	439	219,003,930	2.11	4,620,983
2001		2	1,832,190	157	287,653,830	2.11	6,069,496
2001		3	935,120	6	5,610,720	2.11	118,386
2001		4	2,080,065	67	139,364,355	2.11	2,940,588
2001		5	603,037	235	141,713,695	2.11	2,990,159
2001		6	15,422,499	84	1,295,489,916	2.11	27,334,837
2001		7	498,751	413	205,984,163	2.11	4,346,266
2001		8	1,516,693	89	134,985,677	2.11	2,848,198
2001		9	5,067,647	23	116,555,881	2.11	2,459,329
2001		10	5,780,885	48	277,482,480	2.11	5,854,880
2001		11	16,204,172	53	858,821,116	2.11	18,121,126
2001		12	9,061,538	4	36,246,152	2.11	764,794
2001	Industrial	13	17,188,449	35	601,595,715	1.43	8,602,819
2001		14	33,231,330	16	531,701,280	1.43	7,603,328
2001		15	12,500,962	29	362,527,898	1.43	5,184,149
2002	Conventional	1	636,963	558	355,425,354	1.75	6,219,944
2002		2	1,671,588	206	344,347,128	1.75	6,026,075
2002		3	765,394	10	7,653,940	1.75	133,944
2002		4	1,900,282	86	163,424,252	1.75	2,859,924
2002		5	627,399	212	133,008,588	1.75	2,327,650
2002		6	1,651,257	100	165,125,700	1.75	2,889,700
2002		7	679,913	281	191,055,553	1.75	3,343,472

¹⁵ Monetary data in this table is nominal.

2002		8	1,632,401	93	151,813,293	1.75	2,656,733
2002		9	4,235,558	22	93,182,276	1.75	1,630,690
2002		10	6,214,308	34	211,286,472	1.75	3,697,513
2002		11	15,873,953	49	777,823,697	1.75	13,611,915
2002	Industrial	13	17,414,531	34	592,094,054	0.45	2,664,423
2002		14	35,352,303	16	565,636,848	0.45	2,545,366
2002		15	15,136,205	37	560,039,585	0.45	2,520,178
2003	Conventional	1	359,331	408	146,607,048	1.94	2,844,177
2003		2	813,491	770	626,388,070	1.94	12,151,929
2003		3	1,623,856	215	349,129,040	1.94	6,773,103
2003		4	3,913,574	48	187,851,552	1.94	3,644,320
2003		5	15,875,436	45	714,394,620	1.94	13,859,256
2003	Industrial	6	37,991,518	16	607,864,288	0.2	1,215,729
2003		7	20,741,466	33	684,468,378	0.2	1,368,937
2003		8	17,968,786	22	395,313,292	0.2	790,627
2003		12	12,353,326	16	197,653,216	0.2	395,306
2004	Conventional	1	428,500	408	174,828,000	1.49	2,604,937
2004		2	985,300	770	758,681,000	1.49	11,304,347
2004		3	2,121,200	215	456,058,000	1.49	6,795,264
2004		4	4,634,800	48	222,470,400	1.49	3,314,809
2004		5	19,456,100	45	875,524,500	1.49	13,045,315
2004	Industrial	6	38,496,800	15	577,452,000	0.22	1,270,394
2004		7	25,381,600	31	786,829,600	0.22	1,731,025
2004		8	20,653,900	20	413,078,000	0.22	908,772
2004		12	13,425,800	14	187,961,200	0.22	413,515
2005	Conventional	1	529,800	294	155,761,200	1.37	2,133,928
2005		2	1,165,100	627	730,517,700	1.37	10,008,092
2005		3	2,508,300	176	441,460,800	1.37	6,048,013
2005		4	5,663,000	34	192,542,000	1.37	2,637,825
2005		5	22,962,300	35	803,680,500	1.37	11,010,423
2005	Industrial	6	47,839,300	15	717,589,500	0.37	2,655,081
2005		7	31,286,000	25	782,150,000	0.37	2,893,955
2005		8	27,555,800	13	358,225,400	0.37	1,325,434
2005		12	16,127,900	10	161,279,000	0.37	596,732

A3.7 The Norwegian Consumer Price Index (CPI) 1908 – 2008 (Anon 2010b)

Year	Average 2005=100	Year	Average 2005=100	Year	Average 2005=100
1908	1.9	1942	5.6	1976	25.5
1909	1.9	1943	5.8	1977	27.8
1910	2.0	1944	5.9	1978	30.1
1911	2.1	1945	6.0	1979	31.5
1912	2.2	1946	6.2	1980	34.9
1913	2.3	1947	6.2	1981	39.6
1914	2.3	1948	6.1	1982	44.1
1915	2.6	1949	6.2	1983	47.9
1916	3.1	1950	6.4	1984	50.9
1917	3.9	1951	7.5	1985	53.8
1918	5.5	1952	8.2	1986	57.6
1919	5.8	1953	8.3	1987	62.6
1920	6.7	1954	8.7	1988	66.8
1921	6.3	1955	8.8	1989	69.9
1922	5.2	1956	9.1	1990	72.7
1923	4.9	1957	9.4	1991	75.2
1924	5.4	1958	9.8	1992	77.0
1925	5.5	1959	10.1	1993	78.7
1926	4.7	1960	10.1	1994	79.8
1927	4.2	1961	10.3	1995	81.8
1928	3.9	1962	10.9	1996	82.8
1929	3.7	1963	11.1	1997	85.0
1930	3.6	1964	11.7	1998	86.9
1931	3.5	1965	12.3	1999	88.9
1932	3.4	1966	12.7	2000	91.7
1933	3.3	1967	13.2	2001	94.4
1934	3.4	1968	13.7	2002	95.7
1935	3.4	1969	14.1	2003	98.0
1936	3.5	1970	15.6	2004	98.4
1937	3.7	1971	16.6	2005	100.0
1938	3.9	1972	17.7	2006	102.3
1939	3.9	1973	19.1	2007	103.0
1940	4.5	1974	20.9	2008	107.0
1941	5.4	1975	23.3		

B Icelandic data

B1 Biological data (Iceland)

B1.1 Stock data of *S. mentella* and *S. marinus* (*Burgos pers. comm.*)

Year	S. marinus (Gagdet model)			Recruit- ment	S. marinus (annual March survey)			S. mentella (annual October survey)
	Im- mature biomass	Mature biomass	Total biomass		Mature biomass	Im- mature biomass	Total biomass	
1985	194,5	237,5	432	32,9	207,347	105,154	312,501	NA
1986	183,5	225,8	409,3	409,6	206,138	109,941	316,079	NA
1987	174,3	209,5	383,8	176,6	206,036	99,946	305,982	NA
1988	165,6	184,6	350,2	110,3	171,304	91,388	262,692	NA
1989	160,5	163,4	323,9	146,3	184,205	104,127	288,333	NA
1990	157,5	148,2	305,7	87,7	131,902	70,497	202,398	NA
1991	155,6	132,9	288,5	502,1	122,259	76,219	198,478	NA
1992	155,7	122	277,7	213,6	102,96	65,823	168,783	NA
1993	157	112,4	269,4	106,1	98,475	89,349	187,824	NA
1994	160,3	107,9	268,2	94,4	97,861	78,844	176,705	NA
1995	164,2	105,7	269,9	164,8	82,316	69,878	152,194	NA
1996	168,1	106,4	274,5	109	104,809	77,122	181,931	NA
1997	171	107,2	278,2	191,8	116,088	81,078	197,166	NA
1998	173,8	112,1	285,9	211,7	113,285	91,735	205,019	NA
1999	173,4	113,4	286,8	302,6	154,065	125,573	279,638	NA
2000	172,2	117	289,2	112,2	114,389	107,46	221,849	138,9244
2001	170,7	122,7	293,4	118,3	102,16	94,717	196,877	164,0298
2002	167,2	124,9	292,1	98,7	134,909	99,781	234,69	96,923
2003	164,4	127	291,4	32,5	168,138	144,89	313,028	64,6212
2004	164,1	135	299,1	45,1	140,901	121,484	262,385	98,3706
2005	161	137,4	298,4	66,8	145,538	145,969	291,507	115,0145
2006	155,8	136,8	292,6	208,6	142,592	109,472	252,064	124,5572
2007	148,6	135,6	284,2	14,1	132,956	120,32	253,275	85,5115
2008	140,6	138,5	279,1	7,4	129,438	108,987	238,425	82,7027
2009	129	135,6	264,6	56,1	125,864	102,714	228,578	99,4523
2010	117,7	135,6	253,3	5,4	151,434	116,513	267,947	NA

B2 Fishery data (Iceland)

B2.1 Catch of *S. mentella* and *S. marinus* (2003 – 2008; unit: tonne) (Anon 2010c)

	<i>S. mentella</i>	<i>S. marinus</i>
2003	62,728	48,402
2004	47,647	36,826
2005	61,513	16,005
2006	57,702	22,233
2007	55,362	18,168
2008	69,554	6,785

B2.2 Total catch and redfish catch by Icelandic vessels from all fishing areas (1945-2008; unit: tonne) (Anon 2010c)

Year	Total	Redfish	Year	Total	Redfish	Year	Total	Redfish
1945	366,201	17,694	1967	896,644	30,039	1989	1,488,84	92,918
1946	412,650	6,194	1968	599,292	30,571	1990	1,502,29	94,848
1947	506,412	12,299	1969	685,854	28,504	1991	1,044,32	104,324
1948	515,877	24,307	1970	730,744	24,819	1992	1,558,74	107,667
1949	436,459	33,382	1971	680,796	31,706	1993	1,712,25	116,455
1950	386,443	72,620	1972	722,640	32,759	1994	1,550,69	142,103
1951	440,088	96,866	1973	902,250	28,614	1995	1,605,12	118,750
1952	437,299	49,540	1974	941,379	37,576	1996	2,055,24	120,739
1953	458,054	42,475	1975	988,571	38,291	1997	2,199,11	111,652
1954	479,671	68,228	1976	978,740	41,440	1998	1,678,56	115,724
1955	517,543	87,277	1977	1,368,79	28,200	1999	1,732,69	110,345
1956	547,996	67,142	1978	1,562,06	33,469	2000	1,980,16	116,297
1957	516,852	65,475	1979	1,640,68	62,253	2001	1,986,58	92,527
1958	604,937	118,524	1980	1,508,07	69,868	2002	2,133,32	110,876
1959	654,845	107,117	1981	1,434,59	93,349	2003	1,979,54	111,143
1960	610,057	62,359	1982	785,603	115,069	2004	1,727,78	84,513
1961	716,137	30,444	1983	834,975	122,749	2005	1,668,92	77,540
1962	832,084	22,273	1984	1,525,11	108,270	2006	1,322,91	82,595
1963	781,969	53,373	1985	1,672,27	91,381	2007	1,395,71	75,373
1964	973,664	27,759	1986	1,650,88	85,997	2008	1,283,07	76,376
1965	1,198,30	29,910	1987	1,624,80	87,768			
1966	1,240,29	23,109	1988	1,752,25	94,039			

B2.3 Icelandic S. mentella catch by fishing gear (1992 – 2008; unit: tonne) (Anon 2010c)

	Total	Bott-om long-line	Bott-om gill-net	Hand-line	Dan-ish seine	Bott-om trawl	Pel-agic trawl	Neph-rops trawl	Purse seine	Shr-imp trawl	Other
1992	93,791	371	555	205	110	91,732	-	344	-	475	-
1993	96,740	388	1,405	246	114	93,369	-	489	-	730	-
1994	94,974	416	1,320	248	138	91,504	-	497	-	849	-
1995	89,468	560	879	254	245	86,554	-	683	-	293	-
1996	67,788	697	546	190	548	64,731	26	967	-	82	-
1997	73,036	748	481	205	462	70,003	2	1,132	-	3	-
1998	69,298	1,080	387	201	363	65,392	885	981	-	-	9
1999	67,372	962	333	168	314	64,432	15	1,149	-	-	-
2000	71,071	997	266	152	287	68,915	-	454	-	-	-
2001	50,087	625	365	191	338	47,820	76	672	-	-	-
2002	66,371	1,008	257	125	305	64,142	1	532	-	-	-
2003	62,741	897	191	195	311	60,593	33	515	-	6	-
2004	47,688	843	146	138	605	45,509	-	443	-	2	1
2005	61,535	777	88	105	1,029	59,168	13	353	2	0	0
2006	57,949	1,096	132	94	965	55,017	221	421	2	1	1
2007	55,454	1,150	212	53	552	53,107	20	361	-	-	-
2008	69,589	1,019	151	40	527	67,550	-	300	0	1	1

B2.4 Proportion of *S. mentella* catch by bottom trawls in total catches in Icelandic waters (1992 – 2008) (Calculated by using data from Anon 2010c)

	% of bottom trawling
1992	97.80%
1993	96.52%
1994	96.35%
1995	96.74%
1996	95.49%
1997	95.85%
1998	94.36%
1999	95.64%
2000	96.97%
2001	95.47%
2002	96.64%
2003	96.58%
2004	95.43%
2005	96.15%
2006	94.94%
2007	95.77%
2008	97.07%

B2.5 CPUE of bottom trawls in Icelandic redfish fishery (1991 – 2008; unit: tonne per vessel per fishing day) (Computed by using data from Burgos)

Year	CPUE (all fishing areas)	CPUE (ICES Va)
1991	57.97	64.17
1992	58.83	65.46
1993	57.75	65.44
1994	60.42	67.37
1995	59.90	66.50
1996	59.19	63.68
1997	69.16	74.53
1998	76.17	80.43
1999	73.67	76.80
2000	70.25	75.47
2001	76.47	82.15
2002	91.41	99.08
2003	86.66	94.18
2004	90.59	96.22
2005	92.68	99.26
2006	92.22	97.75
2007	92.01	96.94
2008	96.32	104.77

B2.6 Total fishing efforts for redfish and other fish in Icelandic fishery (1991 – 2009; unit: vessel * day at sea) (Burgos 2010)

Year	ICES Va Area					For all Icelandic landings				
	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimp trawl	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimp trawl
1991	4,913	15,085	42	14,714	3,145	5,011	15,104	69	14,720	3,162
1992	4,009	9,630	53	10,713	2,789	4,053	9,646	84	10,713	2,790
1993	3,840	7,452	73	13,271	3,133	3,876	7,456	108	13,271	3,136
1994	2,678	5,490	109	10,292	3,636	2,711	5,501	195	10,296	3,636
1995	2,661	4,976	103	7,418	2,989	2,718	5,006	172	7,423	2,990
1996	2,649	3,693	178	8,540	1,926	2,705	3,717	312	8,541	1,926
1997	2,515	1,926	213	8,495	1,862	2,552	1,973	324	8,497	1,862
1998	2,598	2,025	296	10,068	1,694	2,603	2,038	436	10,073	1,694
1999	2,923	10,009	415	10,878	1,342	2,946	10,021	558	10,878	1,342
2000	2,907	23,153	535	16,771	1,178	2,920	23,163	744	16,777	1,178
2001	2,445	23,326	603	22,078	1,066	2,468	23,339	782	22,084	1,066
2002	2,286	18,852	597	15,690	1,292	2,319	18,879	784	15,693	1,293
2003	2,438	18,847	646	15,258	982	2,493	18,872	930	15,260	982
2004	2,641	18,452	592	15,158	914	2,676	18,455	794	15,160	915
2005	2,706	20,915	419	12,224	222	2,734	20,923	724	12,224	222
2006	2,690	22,119	262	9,491	43	2,717	22,127	534	9,491	43
2007	2,585	20,311	276	7,763	111	2,614	20,319	511	7,763	111
2008	2,478	19,179	217	6,391	97	2,490	19,188	450	6,392	97
2009	2,294	17,864	357	6,617	398	2,307	17,869	593	6,617	399

B2.7 Number of Icelandic fishing boats (1991 - 2009) (Burgos 2010)

Year	ICES Va Area					For all Icelandic landings				
	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimp trawl	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimp trawl
1991	225	493	20	331	133	225	493	23	331	133
1992	189	313	18	221	148	190	313	21	221	148
1993	177	242	21	234	161	178	242	24	234	161
1994	145	177	35	182	156	146	177	41	182	156
1995	144	154	38	140	142	144	154	45	140	142
1996	138	126	39	143	105	138	126	61	143	105
1997	127	67	33	137	105	130	71	44	137	105
1998	128	72	42	153	103	130	72	52	153	103
1999	141	430	49	211	86	144	430	50	211	86
2000	130	492	38	305	64	131	492	53	306	64
2001	114	484	43	370	55	114	484	51	370	55
2002	106	449	45	331	61	106	449	53	331	61
2003	98	448	47	289	52	99	448	50	289	52
2004	104	449	30	287	50	106	449	49	287	50
2005	103	461	31	241	22	103	461	46	241	22
2006	93	430	42	175	4	93	430	42	175	4
2007	93	404	39	150	9	94	404	40	150	9
2008	83	358	23	126	5	83	358	34	126	5
2009	79	339	32	128	17	79	339	34	128	17

B2.8 Catch of *S. mentella* in Icelandic redfish fishery (1991 – 2009; unit: tonne)

(Burgos 2010)¹⁶

Year	ICES Va Area		For all Icelandic landings	
	Bottom trawl	Pelagic trawl	Bottom trawl	Pelagic trawl
1991	18,434.00	5,964.26	26,999.53	12,824.57
1992	20,882.39	8,961.55	27,334.12	20,880.45
1993	18,950.96	10,175.60	24,898.44	26,763.30
1994	17,398.52	12,273.00	23,061.17	51,741.20
1995	19,248.60	10,384.55	24,476.59	37,085.72
1996	14,977.01	5,219.13	17,345.07	51,915.77
1997	17,847.56	2,283.30	22,603.97	34,568.58
1998	11,409.55	2,290.24	14,433.07	44,850.77
1999	14,133.17	15,159.88	17,135.35	43,488.41
2000	12,492.72	945.20	18,095.63	51,177.87
2001	9,475.76	1,697.08	11,327.07	41,189.62
2002	12,470.11	2,559.51	15,792.21	46,954.84
2003	10,370.34	15,368.20	16,400.39	56,389.32
2004	9,091.05	58.75	13,032.61	36,389.68
2005	10,895.22	4.35	18,185.47	15,334.65
2006	10,296.02	4,406.13	15,733.03	23,916.03
2007	7,300.06	4,776.05	12,154.67	21,697.00
2008	15,784.61	1.00	23,354.52	6,136.44
2009	18,222.24	2,731.64	23,655.88	14,349.43

¹⁶ Long lines, gill nets and shrimp trawls had no *S. mentella* catch.

B2.9 Catch of *S. marinus* in Icelandic redfish fishery (1991 – 2009; unit: tonne)

(Burgos 2010)¹⁷

Year	ICES Va Area				For all Icelandic landings			
	Bottom trawl	Long line	Gill net	Shrimp trawl	Bottom trawl	Long line	Gill net	Shrimp trawl
1991	33,464	74	245	190	36,705	75	248	190
1992	28,422	85	372	249	30,269	88	373	249
1993	33,270	77	914	503	34,280	78	914	503
1994	31,292	253	913	378	31,560	256	921	378
1995	32,456	423	479	132	32,676	429	481	132
1996	27,674	559	348	39	27,916	867	348	39
1997	30,820	657	333	0	31,248	662	337	0
1998	31,744	828	217	0	31,920	846	217	0
1999	33,614	768	200	0	33,758	776	200	0
2000	36,787	675	177	0	37,096	678	177	0
2001	30,570	500	265	0	30,696	501	267	0
2002	41,485	903	139	0	41,533	914	141	0
2003	31,295	728	122	0	31,384	732	121,871	0
2004	27,703	599	79	0	27,903	607	79,534	0
2005	35,358	652	38	0	35,750	653	37,519	0
2006	34,845	838	84	0	35,108	838	85,189	170
2007	34,477	892	130	0	34,513	894	130,054	0
2008	39,479	865	103	1	39,722	870	103,302	666
2009	26,714	1,132	246	1	26,830	1,142	245,961	766

¹⁷ Pelagic trawls had no *S. marinus* catch.

B2.10 Total catch of redfish and other fish in Icelandic fishery (1991 – 2009; unit: tonne) (Burgos 2010)

Year	ICES Va Area					For all Icelandic landings				
	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimp trawl	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimp trawl
1991	284,827.78	50,940.88	5,971.08	62,735.81	30,813.03	321,544.0	51,341.6	12,832.2	62,884.0	31,275.4
1992	235,852.77	40,534.76	9,034.74	50,412.41	37,295.38	265,314.4	41,131.1	20,953.6	50,425.5	37,983.1
1993	221,761.76	47,373.86	13,770.25	63,375.43	46,814.90	253,657.9	47,525.2	30,358.0	63,375.4	48,389.8
1994	161,801.88	33,116.48	12,293.00	52,305.53	62,504.83	182,626.8	34,470.0	51,761.2	52,430.0	63,388.7
1995	159,402.82	40,092.92	15,339.31	42,344.78	63,489.63	180,743.0	42,327.7	42,040.5	42,467.3	63,711.7
1996	156,797.22	42,106.11	62,406.63	44,453.90	54,234.59	172,248.4	44,423.6	109,103.3	44,456.2	54,373.3
1997	173,931.94	30,158.84	59,642.30	49,528.30	60,557.28	190,190.3	33,469.0	92,237.6	49,540.9	61,349.9
1998	197,876.72	31,771.02	91,538.02	51,545.88	44,903.78	209,367.9	32,614.7	140,166.6	51,595.6	45,593.2
1999	215,330.88	58,471.03	140,655.41	46,144.55	25,158.19	226,261.1	59,578.3	235,053.1	46,144.6	25,401.7
2000	204,229.17	78,138.51	351,402.04	54,337.12	20,392.27	220,366.9	78,318.4	493,212.9	54,381.8	20,404.0
2001	186,965.23	75,140.01	426,047.03	61,545.24	22,371.78	202,740.7	75,414.2	607,796.4	61,635.2	22,371.9
2002	208,964.68	70,508.78	485,846.86	48,446.31	25,705.57	229,771.9	70,914.6	686,999.7	48,543.3	26,321.1
2003	211,279.87	76,591.17	512,800.33	43,305.20	21,420.48	234,801.6	76,978.0	941,387.5	43,350.3	21,733.7
2004	239,240.10	92,388.34	446,335.52	43,775.44	15,600.54	257,496.4	92,964.6	690,717.3	43,819.0	15,775.0
2005	250,795.17	119,238.02	295,784.29	39,772.65	3,863.69	271,384.5	119,323.5	623,785.9	39,772.6	3,863.7
2006	248,082.46	124,213.95	135,906.50	31,496.60	830.26	265,585.0	124,284.3	531,436.5	31,502.3	830.3
2007	237,852.82	111,848.91	162,922.48	31,252.43	1,957.15	253,398.7	112,088.8	507,643.4	31,252.4	1,957.2
2008	238,671.93	105,096.92	150,035.36	28,773.10	2,328.09	260,884.9	105,710.3	523,136.9	28,780.1	2,328.1
2009	222,801.85	111,335.45	207,531.04	36,755.07	6,266.35	242,837.7	111,660.5	479,774.6	36,755.1	6,267.8

B2.11 Icelandic redfish catch proportion by gear (1991 – 2009) (Computed by using data from Burgos (2010))

Year	ICES Va Area					For all Icelandic landings					
	Bottom trawl	Long line	Pelagic trawl	Gill net	Sh-rimp trawl	Bottom trawl	Long line	Pela-gic trawl	Gill net	Sh-rimp trawl	
1991	18.22%	0.15%	99.89%	0.39%	0.62%	19.81%	0.15%	99.94%	0.39%	0.61%	
1992	20.90%	0.21%	99.19%	0.74%	0.67%	21.71%	0.21%	99.65%	0.74%	0.66%	
1993	23.55%	0.16%	73.90%	1.44%	1.07%	23.33%	0.16%	88.16%	1.44%	1.04%	
1994	30.09%	0.76%	99.84%	1.74%	0.60%	29.91%	0.74%	99.96%	1.76%	0.60%	
1995	32.44%	1.06%	67.70%	1.13%	0.21%	31.62%	1.01%	88.21%	1.13%	0.21%	
1996	27.20%	1.33%	8.36%	0.78%	0.07%	26.28%	1.95%	47.58%	0.78%	0.07%	
1997	27.98%	2.18%	3.83%	0.67%	0.00%	28.31%	1.98%	37.48%	0.68%	0.00%	
1998	21.81%	2.61%	2.50%	0.42%	0.00%	22.14%	2.59%	32.00%	0.42%	0.00%	
1999	22.17%	1.31%	10.78%	0.43%	0.00%	22.49%	1.30%	18.50%	0.43%	0.00%	
2000	24.13%	0.86%	0.27%	0.33%	0.00%	25.05%	0.87%	10.38%	0.33%	0.00%	
2001	21.42%	0.67%	0.40%	0.43%	0.00%	20.73%	0.66%	6.78%	0.43%	0.00%	
2002	25.82%	1.28%	0.53%	0.29%	0.00%	24.95%	1.29%	6.83%	0.29%	0.00%	
2003	19.72%	0.95%	3.00%	0.28%	0.00%	20.35%	0.95%	5.99%	0.28%	0.00%	
2004	15.38%	0.65%	0.01%	0.18%	0.00%	15.90%	0.65%	5.27%	0.18%	0.00%	
2005	18.44%	0.55%	0.00%	0.09%	0.00%	19.87%	0.55%	2.46%	0.09%	0.00%	
2006	18.20%	0.68%	3.24%	0.27%	0.02%	19.14%	0.67%	4.50%	0.27%	0.02%	
2007	17.56%	0.80%	2.93%	0.42%	0.00%	18.42%	0.80%	4.27%	0.42%	0.00%	
2008	23.15%	0.82%	0.00%	0.36%	0.03%	24.18%	0.82%	1.17%	0.36%	0.03%	
2009	20.17%	1.02%	1.32%	0.67%	0.01%	20.79%	1.02%	2.99%	0.67%	0.01%	

B2.12 Total fishing efforts for Icelandic redfish fishery (1991 - 2009; unit: boat * day at sea) (Estimated by using data from Burgos (2010))

Year	ICES Va Area					For all Icelandic landings					
	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimps trawl	Bottom trawl	Long line	Pelagic trawl	Gill net	Shrimps trawl	
1991	201,419.08	10,839.53	839.04	19,008.07	2,579.40	223,375.48	10,870.72	1,586.05	19,218.95	2,555.67	
1992	158,393.78	6,330.54	946.27	17,478.53	2,759.60	167,192.11	6,488.06	1,757.84	17,497.46	2,710.60	
1993	160,054.09	2,945.78	1,132.82	44,783.42	5,418.44	160,959.47	2,958.86	2,285.08	44,783.42	5,247.11	
1994	116,853.40	7,417.21	3,808.79	32,684.59	3,429.99	118,380.79	7,224.36	7,991.91	32,913.61	3,382.17	
1995	124,291.18	8,092.36	2,649.74	11,740.96	882.11	123,762.67	7,820.59	6,827.79	11,777.38	880.13	
1996	99,438.30	6,176.83	580.57	9,551.22	143.80	98,087.45	9,137.28	9,056.20	9,560.09	143.43	
1997	89,371.23	2,812.24	269.09	7,815.71	0.00	93,936.38	2,769.97	5,342.83	7,909.56	0.00	
1998	72,521.38	3,798.90	311.04	6,471.74	0.00	74,917.33	3,807.35	7,254.63	6,468.71	0.00	
1999	91,388.39	56,566.15	2,191.71	9,960.56	0.00	95,422.19	56,152.78	5,161.92	9,960.56	0.00	
2000	91,188.43	98,453.76	54.68	16,628.52	0.00	95,802.81	98,703.63	4,091.63	16,750.83	0.00	
2001	59,700.81	75,143.61	103.28	35,218.67	0.00	58,317.27	74,994.49	2,702.75	35,345.17	0.00	
2002	62,566.90	108,433.08	141.53	14,853.26	0.00	61,327.54	109,305.21	2,839.98	15,057.54	0.00	
2003	47,116.59	80,306.20	909.92	12,409.54	0.00	50,227.60	80,402.94	2,785.36	12,398.27	0.00	
2004	42,241.68	53,744.35	2.34	7,864.23	0.00	45,094.43	54,109.80	2,049.72	7,897.18	0.00	
2005	51,403.21	52,743.48	0.19	2,779.06	0.00	55,966.50	52,790.52	818.72	2,779.06	0.00	
2006	45,521.24	64,202.68	356.75	4,450.12	0.04	48,371.24	64,189.54	1,009.32	4,491.50	0.04	
2007	42,225.78	65,413.16	315.55	4,845.75	0.00	45,253.21	65,487.09	873.62	4,845.75	0.00	
2008	47,622.87	56,501.35	0.03	2,891.09	0.14	49,968.20	56,529.99	179.47	2,890.83	0.14	
2009	36,550.59	61,587.51	150.37	5,667.87	0.83	37,890.24	61,965.77	603.02	5,667.87	0.83	

B2.13 S. marinus catch by fishing gear (1992 – 2008; unit: tonne) (Iceland) (Anon 2010c)

	Total	Bottom long-line	Bottom trawl	Pelagic trawl
1992	13,845	-	-	13,845
1993	19,747	-	-	19,747
1994	47,094	-	1	47,094
1995	29,275	49	-	29,226
1996	52,967	467	28	52,472
1997	38,616	-	-	38,616
1998	47,116	-	309	46,807
1999	42,990	-	-	42,990
2000	45,226	-	1,523	43,703
2001	42,440	-	-	42,440
2002	44,504	-	4,346	40,159
2003	48,402	-	1,399	47,003
2004	36,826	-	513	36,312
2005	16,005	-	-	16,005
2006	24,646	-	2	24,644
2007	19,919	-	37	19,882
2008	6,786	-	32	6,754

B2.14 Catch in Icelandic waters in the ICES Va area (1905-2008; unit: tonne) (Anon 2010c)

Year	Total	Redfish	Year	Total	Redfish	Year	Total	Redfish
1905	178,844	-	1,940	394,165	1,543	1,975	1,112,457	70,734
1906	190,516	412	1,941	300,051	662	1,976	1,081,837	69,833
1907	205,926	1,190	1,942	389,347	974	1,977	1,395,834	61,525
1908	218,002	925	1,943	433,671	3,703	1,978	1,452,141	35,202
1909	194,416	1,584	1,944	527,310	7,283	1,979	1,569,295	64,310
1910	213,427	2,729	1,945	346,155	11,005	1,980	1,423,895	72,249
1911	228,657	2,924	1,946	486,980	7,515	1,981	1,391,775	95,517
1912	233,556	1,833	1,947	605,828	10,215	1,982	812,039	116,391
1913	267,852	2,156	1,948	725,626	33,902	1,983	857,870	124,527
1914	273,971	1,331	1,949	697,997	61,108	1,984	1,544,424	109,259
1915	203,567	8	1,950	690,595	125,907	1,985	1,513,881	92,080
1916	161,579	12	1,951	792,040	166,501	1,986	1,563,012	86,561
1917	112,151	-	1,952	785,587	126,607	1,987	1,685,549	88,505
1918	123,438	-	1,953	965,448	157,488	1,988	1,695,752	94,762
1919	235,483	625	1,954	942,301	141,124	1,989	1,541,966	92,073
1920	330,928	3,252	1,955	894,514	110,269	1,990	1,592,945	91,585
1921	314,104	4,170	1,956	891,176	92,899	1,991	1,050,178	97,328
1922	424,853	8,955	1,957	887,301	84,122	1,992	1,604,069	94,878
1923	387,398	10,284	1,958	948,476	90,497	1,993	1,278,263	97,111
1924	473,904	11,677	1,959	949,070	82,344	1,994	1,307,315	95,389
1925	510,883	14,222	1,960	983,673	82,561	1,995	1,398,841	90,224
1926	447,452	10,491	1,691	1,141,398	68,822	1,996	1,539,262	68,433
1927	572,852	9,103	1,962	1,363,906	75,277	1,997	1,888,363	74,218
1928	610,824	8,823	1,963	1,244,947	90,132	1,998	1,427,667	108,944
1929	621,005	11,432	1,964	1,398,670	95,160	1,999	1,460,341	82,822
1930	724,289	13,678	1,965	1,417,892	113,826	2,000	1,806,781	96,648
1931	720,211	16,233	1,966	1,252,721	106,627	2,001	1,659,368	51,221
1932	707,069	13,721	1,967	882,188	94,742	2,002	1,794,152	65,434
1933	729,949	12,630	1,968	796,414	96,056	2,003	1,500,202	108,229
1934	669,118	11,621	1,969	935,989	87,080	2,004	1,576,515	62,947
1935	628,481	24,315	1,970	997,303	78,135	2,005	1,480,431	73,700
1936	618,136	57,634	1,971	995,375	82,132	2,006	1,019,137	75,463
1937	707,859	45,386	1,972	969,004	77,190	2,007	1,251,348	73,683
1938	670,534	64,795	1,973	1,136,441	69,650	2,008	1,084,659	69,758
1939	456,479	41,210	1,974	1,140,685	69,145	-	-	-

B3 Economic data (Iceland)

*B3.1 Catch values of *S. mentella* and *S. marinus* (2003 – 2008; unit: 2005-EUR) (Anon 2010c)*

	S. mentella	S. marinus
2003	64,651,336.86	55,608,082.53
2004	49,488,698.98	44,946,928.76
2005	69,930,801.62	27,449,829.72
2006	78,263,055.43	45,488,657.46
2007	66,237,541.78	25,355,989.24
2008	93,531,074.93	12,928,421.02

*B3.2 Unit prices of *S. mentella* and *S. marinus* (2003 – 2008; unit: 2005-EUR per tonne) (Anon 2010c)*

	S. mentella	S. marinus
2003	1,148.88	1,030.66
2004	1,220.52	1,038.65
2005	1,715.08	1,136.85
2006	2,046.00	1,356.33
2007	1,395.64	1,196.44
2008	1,905.44	1,344.73

B3.3 Operating revenues and costs of redfish fishery (1997 - 2007; unit: million 2005-EUR) (Anon 2010c)

	CPI-corrected revenue	CPI-corrected cost
1997	52.52	43.61
1998	73.77	59.21
1999	67.18	54.70
2000	57.64	46.47
2001	52.09	39.36
2002	60.34	46.17
2003	54.39	42.79
2004	46.56	38.58
2005	44.34	35.69
2006	61.02	46.17
2007	52.65	41.37

B3.4 Cost per unit effort of Icelandic redfish fishery (Burgos 2010; Anon 2010c)

	Cost per unit effort (2005-EUR per fishing effort)
1997	396.59
1998	640.43
1999	328.13
2000	215.78
2001	229.71
2002	244.91
2003	293.46
2004	353.41
2005	317.66
2006	391.06
2007	355.21

B3.5 CPI of Iceland (1997 - 2009) (Data in “Average 2005 = 100” column is calculated from “Base from 1988” column (Anon 2010c))

	Base from 1988	Average 2005 = 100
1997	180.30	73.86
1998	183.30	75.09
1999	189.60	77.67
2000	199.10	81.56
2001	212.40	87.01
2002	222.60	91.19
2003	227.30	93.12
2004	234.60	96.11
2005	244.10	100.00
2006	260.60	106.76
2007	273.70	112.13
2008	307.70	126.05
2009	344.60	141.17