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Occurrence of tagged Icelandic salmon in the salmon fisheries at West Greenland and within the Faroese fishing zone 1967 through 1995 and its inference regarding the oceanic migration of salmon from different areas of Iceland.

by

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Abstract

The following summary is an update of the information presented by Gudjonsson 1989 on the recaptures of tagged salmon outside the Icelandic economic zone. The additional information presented covers the recaptures of microtagged salmon for the recapture years 1989 through 1995. Other Icelandic papers on the subject include Guðjónsson 1966, Ísaksson 1984, Þorsteinsson and Guðjónsson 1986 and Guðbergsson 1999.

The data presented seems to suggest that 2-SW Icelandic salmon from the south and west coasts tend to migrate west towards Greenland as a considerable number has been caught in the West Greenland fishery. Grilse fram the same areas are presumably migrating a shorter distance into the Irminger Sea. The 2-SW salmon from the north and east coasts of Iceland seem to migrate more into the Norwegian sea and have been caught to some degree in the Faroese fishery. Some 2-SW from that area have, however, shown up in West Greenland and some west coast salmon in the Faroese fishery suggesting that the migration is by no means uni-directional.

Based on distant recoveries of 2-SW salmon originating from the north and east coasts of Iceland it can be theorized that grilse from those areas migrate north and east into the Denmark Strait and the Norwegian Sea. The 2-SW salmon from that area probably have a more extensive migration into the same area.

Materials and Methods

External tagging of Icelandic salmon smolts started at Kollafjörður Experimental Fish Farm in the early 1960s (Gudjonsson 1973). Tagging with coded wire tags started in 1974 (Isaksson and Bergman 1978) and peaked in mid 1990s when a number of ranching operation were releasing microtagged salmon. Annual releases of microtagged smolts have decreased considerably after those operations closed down in the late 1990s and have averaged 150.000 smolts since 1997.

The additional Icelandic tagging information is presented as total annual releases of microtagged smolts from 1982 through 1994 (table 2) and resulting recaptures for the 1988-95 period both in homewater fisheries, which are primarily in rivers or ranching stations as well as the recaptures in outside areas. Although the exact contribution of Icelandic salmon from various areas in the distant fisheries at West Greenland and Faroes is difficult to estimate and probably variable between years, the homewater recaptures give an added significance to the numbers caught in the marine fisheries.

Results

Table 1 shows some vital statistics for the 55 salmon of Icelandic origin caught in distant areas from 1967 through 1995 as well as 4 tagged salmon from other areas being caught in Iceland. In addition to the area and date of recapture the table specifies the type of tag, year of release as well as sex, length and weight when available. Most of the recaptured salmon (44) were microtagged and thus found in systematic surveys in the marine fisheries. The remaining salmon mostly from the 1960s and 70s were either carrying Carlin tags or Floy ancor tags.

Out of the 55 salmon caught in distant areas 26 were recaptured in the Faroese fishery and 24 in Greenland, mostly in the west Greenland fishery. The date of recapture indicates thast most of these salmon were in their second year at sea and would have returned to Iceland as 2 SW salmon. Icelandic strayers from west-coast ranching stations have been recaptured in: Western Norway (1), a Faroese lake (1), a Faroese ranching operation (1), river Don in Scotland (1) and off the east coast of England (1). Strayers to Iceland from other areas include salmon tagged as smolt from R. Screeble, Ireland (1) and from a Faroese ranching station (1), adult salmon tagged at West Greenland (1), adult salmon tagged at Faroes (1) (Anon 1997) and a salmon possibly tagged in Russia.

As the salmon populations in south and southwestern Iceland have higher abundance of grilse than those in north and northeastern Iceland, which have higher fraction of 2-SW salmon, it was considered important to break the distant recaptures into two groups based on the area of origin in Iceland.

Table 2 shows the number of salmon microtagged and released in southern and western Iceland and in northern and eastern Iceland from 1982 through 1995 with subsequent recaptures in home-waters i.e. in ranching stations and rivers as well as in distant water fisheries for the recapture years 1988 through 1995. A more comprehensive evaluation of this data is presented by Isaksson et. al 1997.

During this period over 3 million smolts were microtagged and released in Iceland whereof 41 were recaptured in the West Greenland or Faroese fisheries. Out of 2,2 million smolts released in southern and western Iceland from 1987 through 1994 15 were caught in these distant fisheries, thereof 14 in the West-Greenland fishery (87%). Out of 0,8 million smolts released in northern and northeastern Iceland 26 were caught in the distant fisheries, thereof 22 in the Faroese fishery (85 %). It is interesting to note the high occurrence of north coast Icelandic salmon in the Faroese fishery in 1988, many of which were from the same river, which normally has a high composition of 2-SW salmon in the catches (table 1). As releases of microtagged smolts from this river have been comparable in many other years as well as the surveillance of microtags in the the Faroese fishery the data seems to suggest a more southerly migration of this stock in 1988 than in a normal year, probably in response to a changed marine hydrography. In total 1.4 microtags from Iceland have been caught in distant fisheries out of each batch of 100 thousand smolts released in the years 1982 to 1995.

In contrast to external tags the only external sign of a microtag is a missing adipose fin. Recovery of microtags from a sea-fishery is thus to a large extent dependent on extensive surveillance of salmon catches. As borne out in table 2 there has been a reduction in the returns of microtagged salmon from the West Greenland fishery as well as from the Faroese fishery after 1992, which can be attributed to several factors. Firstly there was a discontinuation of the Greenland fishery in 1993-94 and a greatly reduced quota in the area in the following years with limited microtag surveillance (Anon 1999). Similarly the Faroese fishery was bought out and has been very restricted since 1991 with limited or no microtag surveillance.

The total return-rate of salmon to Icelandic home areas for the the 1988-95 recapture years is approximately 1.7 %. This figure does not represent absolute return-rates as it is a composite of returns from angling in rivers and returns to ranching stations. A comparable figure is 1,9 % for the southern and western areas of Iceland and only 0,7 % for the northern and eastern areas. This difference in return-rate between areas is primarily due to the fact that return-rates in ranching experiments have as a rule been lower in the northern areas, which has led to limited ranching as indicated by lower numbers of tagged smolts released. Low return-rates in the northern and eastern areas are thus partly due to lower return-rates and partly from imperfect screening of angling in rivers. The northern areas have also historically had higher contribution of 2-SW salmon, which tends to decrease return- rates compared with the southern and western areas, which are dominated by grilse with relatively even sex ratios.

With fewer tagged salmon returning to northern and eastern Iceland and comparable returns from distant fisheries for those areas as in the southern areas, the ratio of microtagged salmon caught in distant fisheries is considerably higher in the northern areas (0,6 %) as compared with southern and western areas (0,04 %). This indicates that Icelandic northern and eastern stocks are potentially vulnerable to mixed stock fisheries operating in the Norwegian sea although their absolute contribution is low (Anon 1999, Guðbergsson 1999). Southern and western Icelandic stocks, on the other hand, would be little affected by that fishery and are, due to their high grilse contribution, less affected by mixed stock fisheries, which are targeting 2-SW salmon.

Figure 1 summarizes the recaptures of Icelandic salmon from the distant areas according to area of origin. It also shows a few strays which have occurred from other countries and areas to Iceland. From the figure and the previous discussion one can theorize that salmon from southern and western Iceland primarily migrate westward towards Greenland, where 2-SW salmon occur in the West Greenland fishery. Grilse probably migrate a shorter distance into the Irminger sea, where they mostly escape harvest except possibly as by-catches in non-salmonid fisheries. With respect to the northern and eastern salmon stocks it can be theorized that they migrate to a large extent into the Denmark strait and the Norwegian sea, where 2-SW salmon occur to a varying degree in the Faroese fishery, when it is operating. Grilse from these areas would have a less extensive migration into the same general area. This migration theory is more or less supported by the recaptures of salmon tagged in distant feeding areas where one salmon tagged off west Greenland in 1972 was caught in R. Laxá in Dalir on Icelands west coast and a salmon tagged in Faroese waters 1995 was caught in a trout net off the R. Laxá in Adaldal on Iceland´s north coast in 1996 (Hansen and Jacobsen 1997).

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Table 1. Individual recaptures of tags from Iceland in the Faroes and West Greenland salmon fisheries 1967 to 1994. Also shown are strayers to Iceland (X) and from Iceland to other countries (XX).

Fishing year	Area of recapture	Place of release	Year of release	Recapture day	Sex	Length	Weight	Geographical place of recapture	Type of tag
1967	WEST GREENLAND	KOLLAFJÖRÐUR	1966						External
1968	FAROES	SKAFTÁ	1966						External
XX 1970	WEST NORWAY	KOLLAFJÖRÐUR	1969						External
1972	FAROES	KOLLAFJÖRÐUR	1971						External
1972	WEST GREENLAND	KOLLAFJÖRÐUR	1971						External
X 1972	SVARTÁ	RUSSIA?	1970?	15.08.72			6,5		Hydro Cylinder
1973	WEST GREENLAND	KOLLAFJÖRÐUR	1972						CARLIN
X 1973	LAXÁ Í DÖLUM	WEST GREENLAND	1972	30.06.72	F	77,5	5		CARLIN
1975	FAROES	KOLLAFJÖRÐUR	1974						CARLIN
XX 1975	LAKE IN FAROES ISLANDS	KOLLAFJÖRÐUR	1974						CARLIN
1975	WEST GREENLAND	KOLLAFJÖRÐUR	1974						CARLIN
1976	WEST GREENLAND	KOLLAFJÖRÐUR	1974						CARLIN
1981	WEST GREENLAND	KOLLAFJÖRÐUR	1980						CARLIN
1984	FAROES	SELÁ VOPNAFJÖRÐUR	1983	13.12.84			1,7	64.38N,07.23W	Microtag
1985	EAST GREENLAND	VESTURDALSÁ	1984					Skjöldungsfjörður	Microtag
1985	FAROES	MIÐFJARÐARÁ	1984	03.03.85			0,6	64.00N, 05.56W	Microtag
1985	WEST GREENLAND	MIÐFJARÐARÁ	1984	20.08.85		64	2,4	GODTHAAB	Microtag
1986	WEST GREENLAND	SVARTÁ	1985	16.08.86		60	2,05	FREDERRIKSHAAB	Microtag
1986	WEST GREENLAND	LÁRÓS	1985	24.08.86				HOLSTEINSBORG	Microtag
1986	WEST GREENLAND	GRÍMSÁ	1985	25.08.86					T-BAR
1987	FAROES	SVARTÁ	1986	21.12.87		60	2,3	64,30N-6,00W	Microtag
1988	FAROES	HJALTADALSÁ	1986	15.12.88		77	3,4	62,40N-5,30W	Microtag
1988	FAROES	BLANDA	1987	25.11.88	F	70	2	62,50N-10,00W	T-BAR
1988	FAROES	LAXÁ Í AÐALDAL	1987	10.11.88		68	2,7	63,10N-7,44W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	10.11.88		64	2,5	63,10N-7,44W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	30.11.88		63	2,8	62,50N-9,30W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	29.11.88		72	03.jan	62,57N-10,01W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	08.12.88		68	2,8	63,00N-5,10W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	08.12.88		68	2,9	62,50N-6,00W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	19.12.88		71	3,2	62,40N-5,30W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	07.03.89		74	3	62,50N-5,30W	Microtag
1988	FAROES	LAXÁ Í AÐALDAL	1987	21.03.89		70	2,9	62,50N-5,30W	Microtag
1988	FAROES	NÚPSÁ	1987	30.11.88		59	2,3	62,50N-9,30W	Microtag
1988	FAROES	NÚPSÁ	1987	14.12.88		70	2,6	62,40N-5,30W	Microtag
1988	FAROES	SVARTÁ-FOSSÁ	1987	30.10.88		67	2,8	63,20N-8,09W	Microtag
1988	FAROES	SVARTÁ-FOSSÁ	1987	08.12.88		67	2,6	62,50N-6,00W	Microtag
1988	FAROES	SVARTÁ-FOSSÁ	1987	19.12.88		65	2,7	62,40N-5,30W	Microtag
1988	WEST GREENLAND	LAXÁ Í AÐALDAL	1987	06.09.88			2,4	1B	Microtag
1988	WEST GREENLAND	KOLLAFJÖRÐUR	1987	06.09.88			2,6	NUUK	Microtag
1988	WEST GREENLAND	KOLLAFJÖRÐUR	1987	29.08.88		65	2,6	NUUK	Microtag
X 1990	MIÐFJARÐARÁ	FAROESE ranching station	1989	11.08.90	M	62	2,7	MIÐFJARÐARÁ	Microtag
1990	WEST GREENLAND	HRAUNSFJÖRÐUR	1989	14.08.90		61	2,2	PAAMIUT(1E)	Microtag
1990	WEST GREENLAND	RANGÁR	1989	14.08.90		57	1,88	PAAMIUT(1E)	Microtag
1990	WEST GREENLAND	VOGALAX	1989	19.08.90		62	2,11	NUUK(1D)	Microtag
1991	FAROES	ÓSLAX	1989	16.04.91		69	2,6	65,35N-5,05W	Microtag
XX 1991	FAROESE ranching station	KOLLAFJÖRÐUR	1990	26.08.91		52	2	FAROESE ranching station	Microtag
1991	WEST GREENLAND	BRÚARÁ	1990	17.08.91		64	2,63	MANIITSOQ(1C)	Microtag
1991	WEST GREENLAND	HRAUNSFJÖRÐUR	1990	14.08.91		58	1,97	NUUK(1D)	Microtag
XX 1991	RIVER DON NE-SCOTTLAND	HRAUNSFJÖRÐUR	1990	31.10.91	M	60		DON HATCHERY	Microtag
1992	WEST GREENLAND	DYRHÓLAÓS	1991	26.08.92		69	2,66	KANGAAIMUT(1C)	Microtag
1992	WEST GREENLAND	HRAUNSFJÖRÐUR	1991	19.08.92		59	1,94	NARSSSAQ (1F)	Microtag
1992	WEST GREENLAND	HRAUNSFJÖRÐUR	1991	18.08.92		64	2,58	PAAIMUT (1E)	Microtag
1992	WEST GREENLAND	KOLLAFJÖRÐUR	1991	18.08.92		67	2,7	PAAIMUT (1E)	Microtag
1992	WEST GREENLAND	KOLLAFJÖRÐUR	1991	23.08.92		64	2,43	NARSSAQ (F)	Microtag
X 1992	VOGALAX ranching station	RIVER SCREEBE ÍRLAND	1991	21.08.92	F	70	3,1	VOGALAX ranching station	Microtag
1993	FAROES	HOFSÁ	1992	14.11.93		58	2	62,46N-8,00W	Microtag
1994	FAROES	LAXÁ Í AÐALDAL	1993	20.12.94		62			Microtag
1994	FAROES	KOLLAFJÖRÐUR	1993	11.11.94		65	1,9		Microtag
XX 1995	NORTH EAST COAST ENGLAND	KOLLAFJÖRÐUR	1994	22.08.95		69	2,72	NORTH SHIELDS	Microtag
X 1996?	HÚSAVÍK	FAROES (adult tagging)	1995?						External

Table 2. Number microtagged and subsequent recaptures in southwestern and northeastern areas of Iceland as well as in the Faroes and West Greenland salmon fisheries. Recapture data in Iceland prior to 1988 is available but not compiled.

	South- and western area of Iceland				North- and eastern area of Iceland				Total			
Year of relese and recapture	Number microtagged	Number recaptured in Iceland	Faroese fishery	West Greenland fishery	Number microtagged	Number recaptured in Iceland	Faroese fishery	West Greenland fishery	Number microtagged	Number recaptured in Iceland	Faroese fishery	West Greenland fishery
1982	68472				79785				148257		0	0
1983	59649				87175				146824		0	0
1984	81380				72352		1		153732		1	0
1985	36747				45402		1	2	82149		1	2
1986	37022			2	18226			1	55248		0	3
1987	89181				27978		1		117159		1	0
1988	182623	3207		2	55434	581	16	1	238057	3788	16	3
1989	326018	2421			81686	321			407704	2742	0	0
1990	332112	3981		3	75548	289			407660	4270	0	3
1991	226739	6949		2	75331	253	1		302070	7202	1	2
1992	278989	4474		5	73964	827			352953	5301	0	5
1993	264588	7191			49559	544	1		314147	7735	1	0
1994	242681	4877	1		51786	223	1		294467	5100	2	0
1995		4057				351				4408	0	0
Total:	2.226.201		1	14	794.226		22	4	3.020.427		23	18
Subtotal for releases in 1987 to 1994 and subtotal for recapture in 1988 to 1995:	1.942.931	37.157	1	12	491.286	3.389	19	1	2.434.217	40.546	20	13

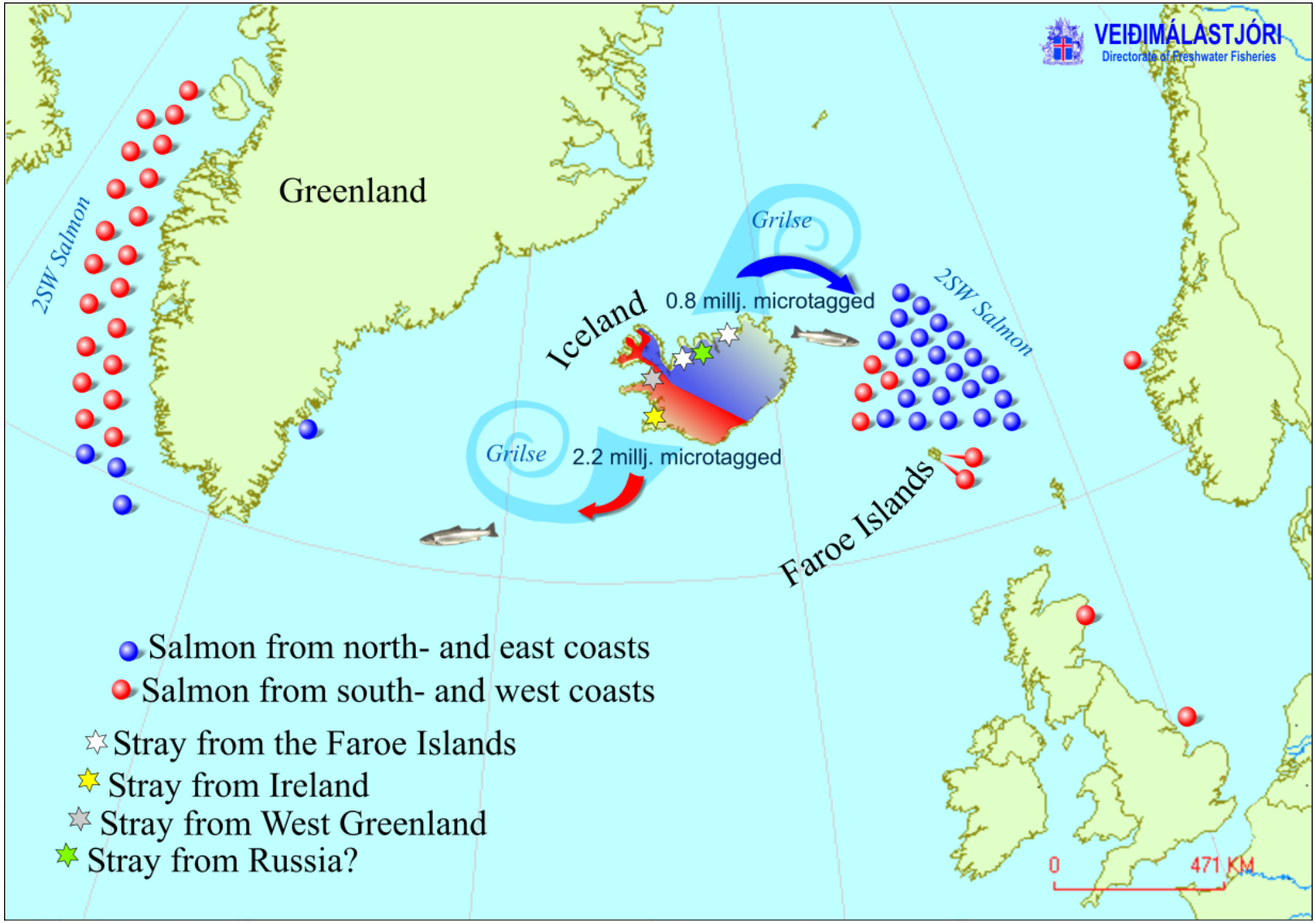

Figure 1. Returns of Icelandic external tags and microtags from the West-Greenland and Faroese salmon fisheries from 1967 to 1995. Also classified according to the area of release.