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Some preliminary tables and graphs summarizing North American smolt tagging experiments, prepared for the March 1974 meeting of the ICES-ICNAF Joint Working Party on North Atlantic Salmon[1]

by

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[1] Presented to the ICES/ICNAF Joint Working Party on North Atlantic Salmon, ICES, Charlottenlund, March 1974.

TABLE 1. Recoveries of tagged fish in Greenland waters from 3 North American locations.

AREA	U.S.A.	QUEBEC + RESTIGOUCHE	N. N.B. MIRAMICHI	TOTAL	LANDINGS MET. TONS	RELATIVE PROPN. OF LANDINGS
I-II	8	7	8	23	357.15	.169
III, IV, V	48	27	41	116	1611.75	.7628
VI	14	6	30	50	144.03	.068
TOTAL	70	40	79	189	2112.93	

NOTE: Quebec fish are grouped with R.D.B. stocks tagged in the Restigouche R.

All stocks were originally tagged in 1971.

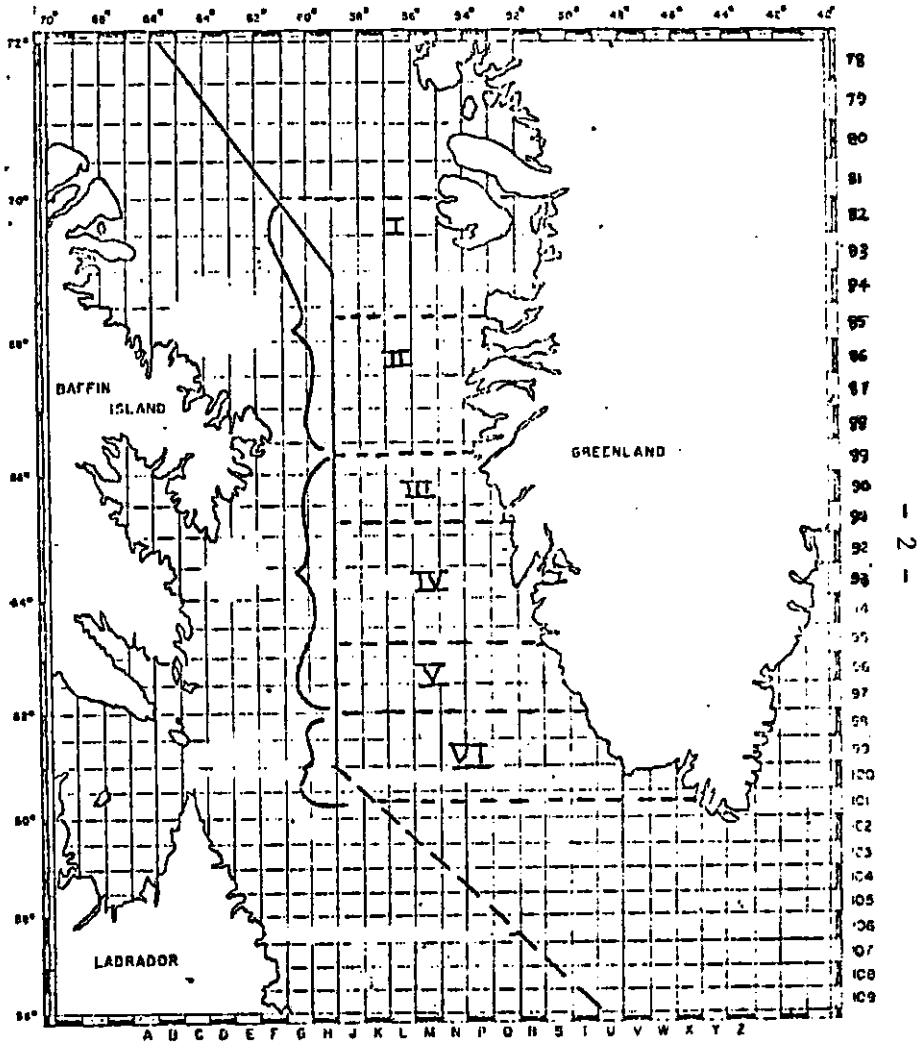

TABLE 3. CHI SQUARED ANALYSIS. Observed Frequency of North American Stocks taken over August, September and October, 1972, in the Greenland Fishery. Expected Frequencies calculated by reference to Monthly Landings made by Drift Net Fishery (Danes, Faroese and Norwegians) = 33% of Total Catch

MONTH	MONTHLY DRIFT NET CATCH # FISH	RELATIVE PROPORTION	U.S.A. OBS.	U.S.A. EXP.	X^2	D.F.	SIGNIF-ICANCE LEVEL	QUEBEC OBS.	QUEBEC EXP.	X^2	D.F.	SIGNIF. LEVEL
August	149430	.71	28	51.12	10.37	1	<.001	16	30.53	6.44	1	<.05>.01
September	52356	.249	32	17.92	10.88	1	<.001	23	10.70	13.01	1	<.001
October	7667	.036	12	2.54	27.00	1	<.001	4	1.54	2.44	1	N.S.
TOTAL	209453		72		48.25	2	<.001	43		21.94	2	<.001

MONTH	MONTHLY DRIFT NET CATCH # FISH	RELATIVE PROPORTION	NORTHERN N.B. (MIRAMICHI) OBS.	NORTHERN N.B. (MIRAMICHI) EXP.	X^2	D.F.	SIG. LEVEL	TOTAL OBS.	TOTAL EXP.	X^2	D.F.	SIG. LEVEL
Aug.	149430	.71	34	61.06	11.55	1	<.001	78	142.71	28.89	1	<.001
Sept.	52356	.249	38	21.41	12.09	1	<.001	93	50.04	36.02	1	<.001
Oct.	7667	.036	14	3.09	35.07	1	<.001	30	7.23	68.59	1	<.001
TOTAL	209453		86		58.71	2	<.001	201		133.5	2	<.001

	X^2	D.F.	Sig. Level
TOTAL	128.9	6	<.001
POOLED	133.5	2	<.001
HETEROGENEITY	4.6	4	N.S.

INTERPRETATION: North American stocks are being taken at lower than expected frequencies during August. During September all three stock groups are being taken at higher frequencies than would be expected by reference to landings made by the Drift Net fishery. The individual North American stock groupings do not differ among themselves significantly with respect to their departure from monthly Drift Net catch proportions. The October catches for U.S.A. and Northern New Brunswick are also higher than expected, Quebec is not significantly different.

TABLE 2. Chi Squared Analysis. For North American Stock Locations, Separate and Pooled. Expected Frequencies Calculated with Respect to Total Greenland Catches in Each Area.*

AREA	U.S.A. OBS.	EXP.	X^2	D.F.	SIGNIF-ICANCE LEVEL	QUEBEC + OBSERVED	EXP.	X^2	D.F.	SIGNIFICANCE LEVEL
I - II	6	11.3	.93	1	N.S.	7	6.76	.01	1	N.S.
III,IV,V	48	53.4	.44	1	N.S.	27	30.51	.29	1	N.S.
VI	14	4.76	16.04	1	$<.001$	6	2.72	2.84	1	N.S.
TOTAL	70		17.41	2	$<.001$	40		3.14	2	N.S.

AREA	N. N.B. OBS.	EXP.	X^2	D.F.	SIG. LEVEL	TOTAL OBSERVED	EXP.	X^2	D.F.	SIG. LEVEL
I - II	8	13.35	1.88	1	N.S.	23	31.94	2.23	1	N.S.
III,IV,V	41	60.26	5.84	1	$<.05 >.01$	116	144.16	5.30	1	$<.05 >.01$
VI	30	5.37	108.42	1	$<.001$	50	12.85	104.53	1	$<.001$
TOTAL	79		116.14	2	$<.001$	189		112.06	2	$<.001$

	X^2	D.F.	Sig. Level
TOTAL	136.64	6	$<.001$
Pooled	112.06	2	$<.001$
Heterogeniety	24.63	4	$<.001$

INTERPRETATION: When considered together, fish from all 3 N. American locations are being taken in greater frequencies in the Southern area (Area VI) than would be expected on the basis of catch figures alone.

This is true seperately for the U.S.A. stocks and for the North New Brunswick stocks. The Quebec-Restigouche stock however is being taken at the same frequency as overall landing with respect to fisheries areas.

Overall, significantly ($P<.05$) fewer N.American fish are being taken in Areas III,IV & V, than catch figures indicate should be expected.

There is a significant difference ($P<.01$) between the North New Brunswick and the U.S.A. stocks in terms of the degree to which they depart from the ratios established by catch from each of the fisheries areas with the N. New Brunswick fish departing the furthest, i.e. contributing to the fishery in Area VI at approximately twice the intensity of the U.S. stocks.

U.S.A. & N. N.B.	X^2	D.F.	SIG. LEVEL
TOTAL CONTRIBUTION	133.65	6	$<.001$
POOLED "	118.02	2	$<.001$
HETEROGENEITY	15.53	4	$<.01 >.001$

On the basis of this analysis, each stock differs significantly from the others. Separate heterogeneity analysis confirms this.

* Total Greenland catch figures calculated from:-

(1) Anonymous (1973), Annual Meeting ICNAF 1973, Nominal catches in convention area (Sub areas I - V & statistical area VI, 1972). Asst. Executive Secretary ICNAF, ICNAF summary document 73/17: Serial 3046.

(2) Ole Christensen (Jan. 1974): Private Communication.
Table of distribution by areas and time of effort, catch and catch per unit effort in the salmon fishery with drift nets at West Greenland in 1972.
The data comprise the fishery of 12 Danish, 4 Faroese and 6 Norwegian vessels, i.e. the total catch by vessels not registered in Greenland.

Table 4. Greenland tag recaptures of large salmon tagged as smolts from 12 selected North American stocks expressed as a percentage of total tags returned from all fisheries and present in river escapements.

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	197
Wild N.W. Miramichi R., N.B.				4	38	11	28	18	12	25	36	42	4
Wild Miramichi R., Estuary, N.B.	2									19	27	48	3
Hatchery Miramichi R., N.B., Early Run							23	10	8				
Hatchery Miramichi R., N.B., Late Run							16	20	10	21	23		2
Miramichi Average	2			4	38	11	22	16	10	22	29	45	3
Wild Sandhill R., Labrador, Nfld.											12	44	1
Hatchery New Mills, N.B.										24	41		
Hatchery, Restigouche R., N. B.									9	23	36	47	
Hatchery River Philip, N. S.										56	48	75	
Wild Margaree R., N.S.										25			
Hatchery Medway R., N.S.													42
Hatchery St. John R., N.B.									4		20	33	11
Hatchery Maine, U.S.A.								14		17	38	55	32

Table 4a. Summary of large salmon recaptures for selected groups of wild and hatchery-reared smolts from different native stocks tagged and released in North American rivers from 1959 to 1971. Under large salmon recaptures designated as "home" numbers in parentheses are estimates of unreported tags returning to the home river and are not included in "home" or "total" recapture figures. All grilse returns have been eliminated and those 1-sea-year recaptures in distant fisheries have been adjusted so as to reflect the percent of large salmon estimated to be present considering location and time of capture.

			LARGE SALMON RECAPTURES			
Year of Release	Stock Origin	Number Released	Greenland	Other	Home	Total
1969	Wild, Sandhill R., Labrador, Nfld.	6,741	6	36	7(0)[1]	49
1970		8,014	48	51	9(0)[1]	108
1971		10,320	7	28	10(0)[1]	45
1968	Hatchery, Cascapedia in Cascapedia R., P. Q.	5,000	23	14	8(?)[2]	45
1970		5,000	20	8	1(?)[2]	29
1971		10,000	12	9	2(?)[2]	23
1968	Hatchery, New Mills in S.W. Miramichi R., N. B.	5,000	13	24	16(2)[3]	53
1969	Hatchery, New Mills in Restigouche R., N.B.	9,990	60	34	3(?)[2]	97
1969	Hatchery, New Mills in S.W. Miramichi R., N.B.	10,000	40	32	13(12)[3]	85
1967	Hatchery, Restigouche in Restigouche R., N. B.	5,000	2	8	10 (2)[4]	22
1968	Hatchery, Restigouche in S.W. Miramichi R., N. B.	6,996	25	44	30 (10)[3]	99
1969	Hatchery, Restigouche, 11061 in N.W. Miramichi R., 8500 in S.W. Miramichi R., N.B.	19,561	76	91	33 (9)[1,3]	200
1970	Hatchery, Restigouche in Restigouche R., N.B.	10,300	19	10	1 (?)[2]	30
1970	Hatchery, Restigouche in S.W. Miramichi R., N. B.	10,300	23	9	6 (11)[3]	38
1971	Hatchery, Restigouche in N.W. Miramichi R., N. B.	7,899	16	5	2 (?)[2]	23
1959	Wild, Miramichi R. Estuary, N. B.	3,442	1	7	31 (8)[3]	39
1968		3,491	16	22	40 (7)[3]	78
1969		8,684	33	60	27 (1)[3]	120
1970		6,835	54	21	15 (23)[3]	90
1971		10,234	26	24	7 (17)[3]	57
1962	Wild, N.W. Miramichi R., N. B.	5,611	2	13	39 (0)[1]	54
1963		4,561	9	3	12 (0)[1]	24

Table 4a.

Year of Release	Stock Origin	Number Released	LARGE SALMON RECAPTURES			
			Greenland	Other	Home	Total
1964	Wild, N.W. Miramichi R., N. B.	12,834	9	17	58 (0)[1]	84
1965		15,361	73	25	166 (0)[1]	264
1966		8,450	25	55	61 (0)[1]	141
1967		11,299	17	30	97 (0)[1]	144
1968		28,043	110	65	261 (0)[1]	436
1969		8,916	40	32	38 (0)[1]	110
1970		11,722	62	28	56 (0)[1]	146
1971		11,417	65	45	46 (0)[1]	156
1965	Hatchery, Miramichi Early Run in N.W. Miramichi R., N.B.	10,020	34	57	53 (0)[1]	144
1966		13,802	10	30	58 (0)[1]	98
1967		15,517	6	17	54 (0)[1]	77
1965	Hatchery, Miramichi Late Run in N.W. Miramichi R., N.B.	4,797	10	21	32 (0)[1]	63
1966		18,295	47	89	97 (0)[1]	233
1967		14,440	9	36	45 (0)[1]	90
1968	Hatchery, Miramichi Late Run, 8074 in N.W. Miramichi R., 6752 in S.W. Miramichi R., N. B.	14,826	39	68	76 (7)[1,5]	183
1969	Hatchery, Miramichi Late Run in S.W. Miramichi R., N.B.	9,800	10	28	3 (2)[5]	43
1971		6,344	7	8	4 (16)[5]	19
1968	Hatchery, River Philip in River Philip, N.S.	4,983	44	18	16 (0)[1]	78
1969		4,949	24	23	1 (2)[6]	48
1970		19,988	18	5	0 (1)[6]	23
1968	Wild, Margaree R., N.S.	2,185	6	12	2 (4)[5]	20
1971	Hatchery, Medway, 9793 in Medway R., 4892 in LaHave R., N. S.	14,685	13	2	8 (8)[3]	23
1967	Hatchery, St. John in St. John R., N. B.	19,931	1	13	12 (0)[1]	26
1969		17,959	6	10	14 (0)[1]	30
1970		46,564	10	2	21 (0)[1]	33
1971		46,283	17	5	135 (0)[1]	157
1966	Hatchery, Maine in Maine Rivers, U.S.A.	80,015	40	84	163[7] (0)[1]	287
1968		24,195	3	2	13[7] (0)[1]	18

Table 4a.

Year of Release	Stock Origin	Number Released	LARGE SALMON RECAPTURES			
			Greenland	Other	Home	Total
1969	Hatchery, Maine in Maine Rivers, U.S.A.	74,530	65	44	64[7] (0)[1]	173
1970		47,835	404	65	261[7] (0)[1]	730
1971		29,900	87	21	163[7] (0)[1]	271

[1] Fence or trap count is included with home recaptures and assumed to be complete.

[2] Home recaptures do not include numbers of unreported tags returning to the home river as fence counts are not available nor is it possible to derive an estimate because of limited recapture data in the home river.

[3] Estimate of unreported tags is equal to 3x the number of bright large salmon angled minus those recaptured as kelts or black salmon. This is based on the assumption that the sport fishery harvests 25 per cent of those fish entering freshwater.

[4] Arbitrary estimate made necessary because of no recaptures in freshwater.

[5] Estimate of unreported tags is equal to 4x the number of bright large salmon angled minus those recaptured as kelts or black salmon. This is based on the assumption that the sport fishery harvests 20 per cent of those fish entering freshwater.

[6] Estimate of unreported tags taken by poachers.

[7] Because the actual breakdown of numbers of grilse and large salmon in home waters was not available but estimated to be 5 per cent, home water recaptures have been adjusted accordingly.

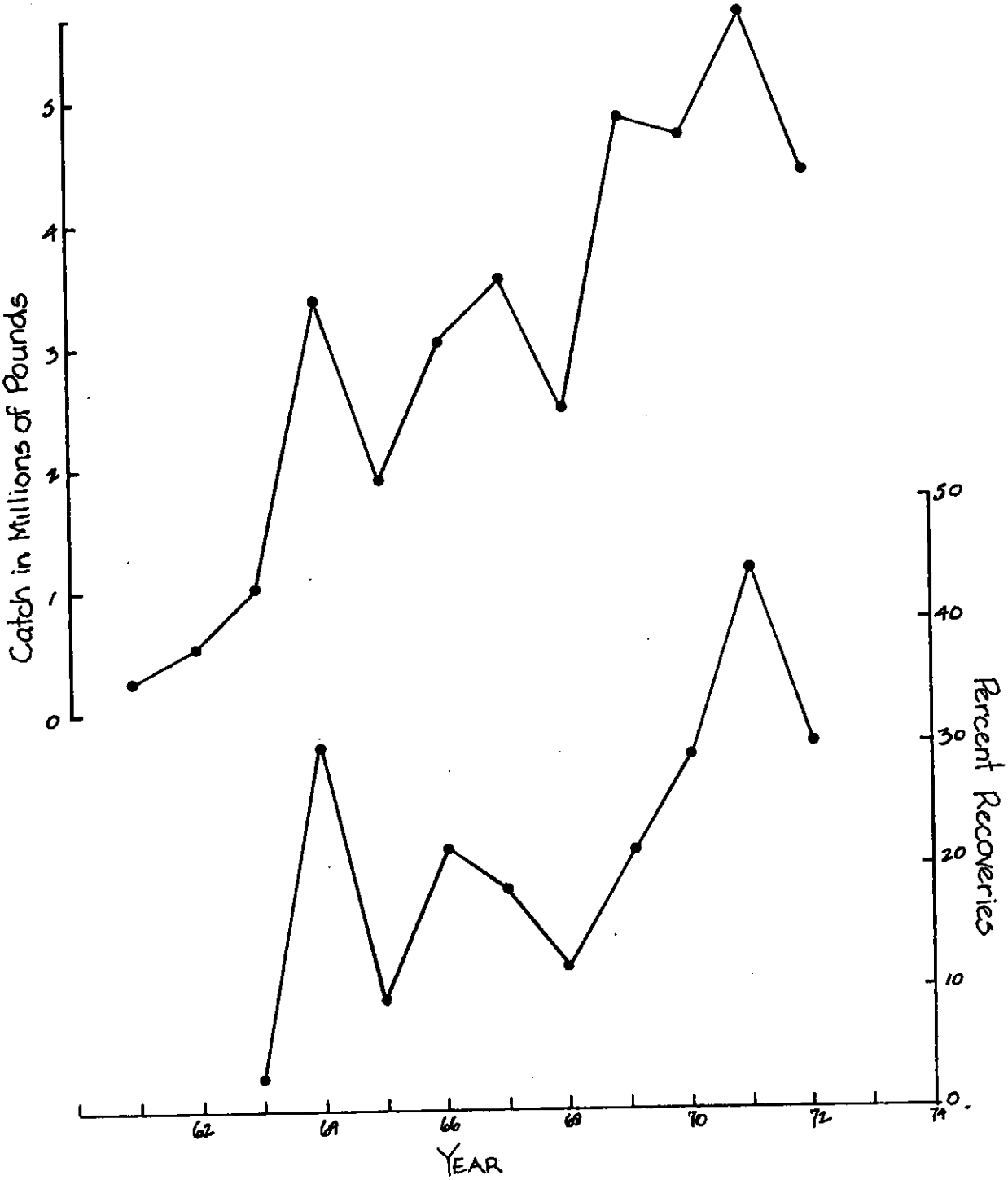

Fig. 1. Greenland catch and percent recoveries of Miramichi large salmon in Greenland for the period 1961-72.

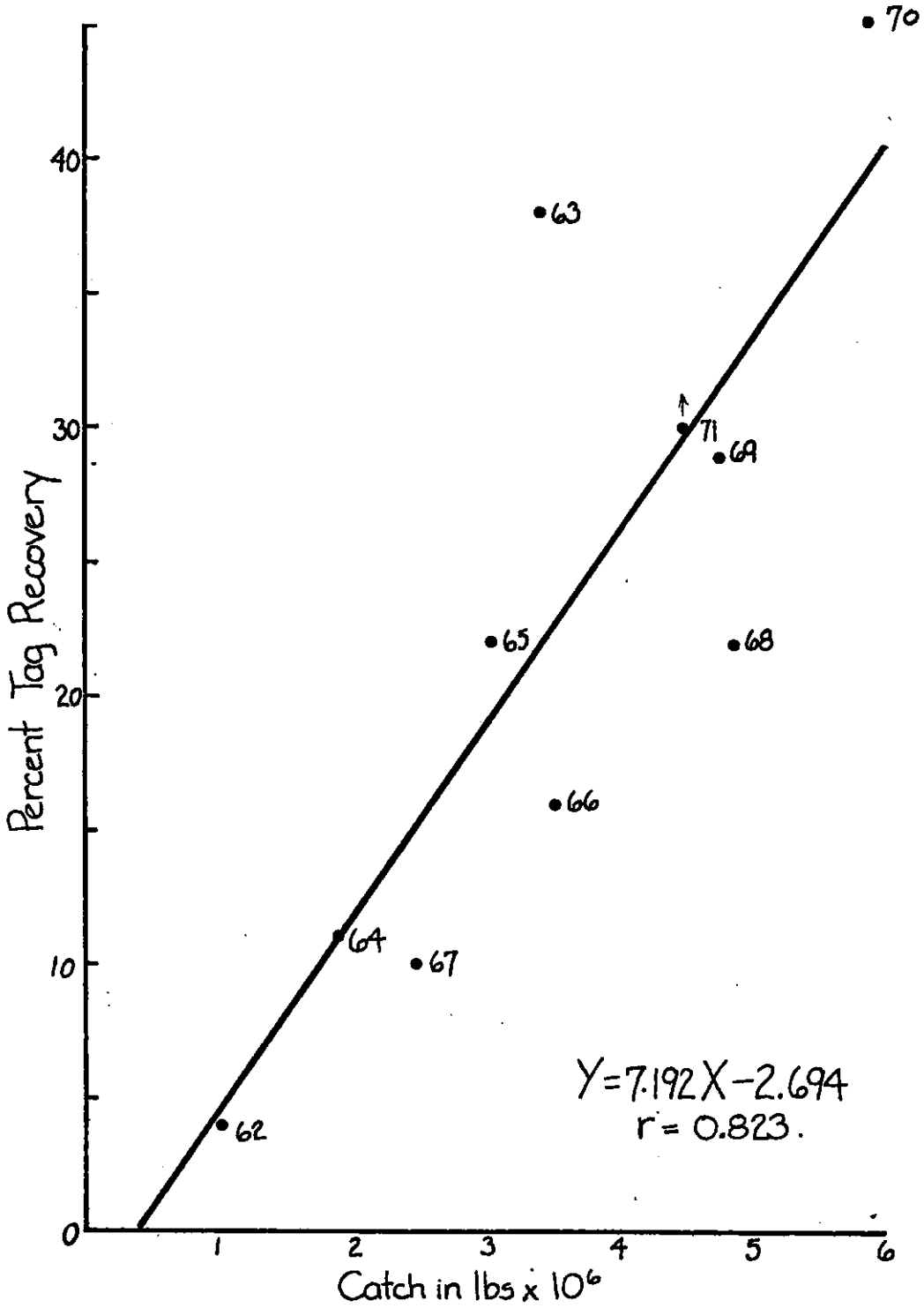

Fig. 2. Relation between Greenland catch and percent tag recaptures in Greenland of Miramichi large salmon tagged as smolts. The year of smolt tagging is shown.