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Summary of Reported Atlantic Salmon (*Salmo salar*) Catches and Sightings in British Columbia and Adjacent Waters in 1993

A. J. Thomson and S. McKinnell

Biological Sciences Branch
Department of Fisheries and Oceans
Pacific Biological Station
Nanaimo, British Columbia
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SUMMARY OF REPORTED ATLANTIC SALMON (*Salmo salar*) CATCHES AND SIGHTINGS IN BRITISH COLUMBIA AND ADJACENT WATERS IN 1993

by

A. J. Thomson[1] and S. M[c]Kinnell[2]

Biological Sciences Branch

Department of Fisheries and Oceans

Pacific Biological Station

Nanaimo, British Columbia V9R 5K6

[1]3639 Place Road, Nanaimo, B.C., V9T 1M9

[2] Reprint requests.

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ABSTRACT

Thomson, A. J. and S. McKinnell. 1994. Summary of reported Atlantic salmon (*Salmo salar*) catches and sightings in British Columbia and adjacent waters in 1993. Can. Manuscr. Rep. Fish. Aquat. Sci. 2246: 35 p.

A program to monitor the abundance and distribution of Atlantic salmon (*Salmo salar*) in British Columbia was conducted jointly by the Canadian Department of Fisheries and Oceans and the British Columbia Ministry of Agriculture, Fisheries and Food in 1993, with the cooperation of the British Columbia Ministry of Environment, Lands and Parks. The study consisted of contacting over 300 individuals, primarily fisheries officers, conservation officers, community advisors, hatchery managers, hatchery volunteers, and major commercial fish buyers, advising them to return or report all encountered Atlantic salmon. Catches of Atlantic salmon in the Department of Fisheries and Oceans sales slip and mark recovery databases were reviewed. Over 4500 Atlantic salmon were either returned or reported, 21 of which were sighted or captured in freshwater. One hundred and forty seven fish were returned to the Pacific Biological Station for analysis and species verification. The majority of Atlantic salmon reported were caught in statistical areas 12 & 13 (upper and lower Johnstone Strait) during the net fishery of July 31 to August 7, 1994. Twenty-three Atlantic salmon were reported caught in Alaskan commercial fisheries in 1993 and 227 were caught or sighted in Washington State.

RÉSUMÉ

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En 1993, il y avait un programme pour étudier l'abondance et la répartition des saumons de l'atlantique (*Salmo salar*) dans les eaux de la Columbie Britannique. L'étude a été conduite conjointement par le ministère fédéral des Pêche at des Océans et le ministère de l'Agriculture, de la Pêche et de la Nourriture de la Columbie Britannique, avec la coopération du le ministère de l'Environnement, des Terre et Parc's de la Columbie Britannique. Pour cette étude, nous nous sommes mis en contact avec plus que 300 individus, en majorité des agents de la pêche et de la conservation, des répresentants de la communauté, des directeurs et volontaires des centres de pisciculture et des acheteurs commerciaux majeurs des poissons, et leur ont demandé de nous envoyer ou de nous signaler tous les saumaons de l'atlantique qu'ils rencontraient. Aussi, nous avons examiné les renseignements des saumons de l'atlantique dans la base des données du ministère des Pêches et des Océans qui recueille les reprises de poissons étiquetés et les bordereaux d'achat. Au total cela a fait 4500 saumons de l'atlantique rendus ou signalés, dont 21 ont été trouvés dans l'eau douce. 147 poissons étaient envoyés a la Station de biologie Pacifique ou nous les avons analysés et verifiés l'espèce. La vaste majorité des saumons de l'atlantique ont été pêchés dans le douzième et le treizième secteurs statistiques du haut et bas détroit de Johnstone. Pendant la même annee, on a aussi rapporté que vingt-trois saumons de l'atlantique ont été pris commercialement dans les eaux d'Alaska, et que 227 en été capturés par la pêche commerciale dans les eaux de Washington.

INTRODUCTION

In 1991, a joint federal / provincial program was initiated by the British Columbia Ministry of Agriculture, Fisheries and Food and the Canadian Department of Fisheries and Oceans to monitor the presence of Atlantic salmon (*Salmo salar*) in British Columbia (B.C.) coastal streams. In 1992, an expanded Atlantic Salmon Watch program was launched to monitor commercial and sport catches and observations of Atlantic salmon (Thomson and McKinnell, 1993). In 1993, the Atlantic Salmon Watch program was expanded to survey a greater number of fisheries officials and volunteers.

The monitoring program had four main objectives: increasing the general awareness of the presence of Atlantic salmon in B.C. waters, expanding the reporting of Atlantic salmon, maintaining a database of the number of Atlantic salmon reported and/or observed in B.C., and preparing annual reports of catches or sightings of Atlantic salmon. An Atlantic salmon biological database is also maintained.

METHODS

The program consisted of three main efforts: 1) contacting a large number of individuals working in fisheries related activities to alert them to the monitoring program, 2) collecting and analyzing as many of the captured Atlantic salmon as possible, and 3) retrieving catch data from several sources to provide information about the number of Atlantic salmon observed in B.C. in 1993.

Over 300 individuals and/or facilities were contacted, encompassing all Department of Fisheries and Oceans field offices, hatcheries, and Public Involvement Program Hatcheries, Ministry of Environment, Lands and Parks coastal offices, and all major salmon processors, to alert them to the presence of Atlantic salmon, to provide them with the necessary information to identify Atlantic salmon (Figure 1), and to request that they provide any information they receive or Atlantic salmon they encounter. The individuals contacted were primarily Department of Fisheries and Oceans fisheries officers, hatchery managers and community advisors as well as Ministry of Environment, Lands and Parks conservation officers, fisheries biologists and volunteers working in small public involvement hatcheries.

Fish sent to the Pacific Biological Station (PBS) were examined to verify species identification. Sex, fork-length, body weight, gonad weight, stomach contents, relative fat content and fin wear were recorded. Scales were sampled for age and/or scale growth determination.

Fat content of each fish was measured on a qualitative scale from 0 to 4: 0 indicated a dressed or greatly decomposed fish where no fat could be found, 1 indicated small globs of fat present, 2 indicated larger globs of fat on major organs, 3 indicated extensive fat throughout the pyloric caeca, and 4 indicated organs completely encased in fat.

Atlantic salmon catch data were obtained from two main sources: the Department of

Fisheries and Oceans sales slip database and the Mark Recovery Program database. Unpublished catch data for Washington State were also obtained from the Washington State Department of Fisheries.

RESULTS AND DISCUSSION

Escapes of Atlantic salmon

From June 1988 to 1993, 21200 Atlantic salmon have been reported escaped from B.C. aquaculture facilities in seven reported incidents. The actual number of escapes in unknown. All but one occurred in either statistical area 12 or 13. In 1993 there were two large escapes of Atlantic salmon in the Johnstone Strait region of British Columbia. On June 15th, 1993 a farm in the central region of statistical area 12 (Carrie Bay) had an escape of an estimated 4000 adult Atlantic salmon (Figure 2). On July 31, 1993 an estimated 5500 - 6000 adult Atlantic salmon were reported to have escaped from a fish farm in the northern region of statistical area 13 (Fredrick Arm).

Marine Recoveries and Sightings

Within B.C. waters, Atlantic salmon were reported from as far north as Area 3, Dundas Island, and as far south as Area 20, Jordan River. Several Atlantic salmon were reported off the west coast of Vancouver Island in Area 123. For a complete geographic distribution of reported Atlantic salmon see Figures 3 and 4.

The number of documented recoveries of Atlantic salmon caught in marine fisheries in 1993 was 4555 pieces. This total was obtained by summing the catches of Atlantic salmon in the D.F.O. sales slip database, the Mark Recovery database, and the reported landings received by the Atlantic Salmon Watch program. The real number of Atlantic salmon caught exceeds this by some unknown factor.

The Department of Fisheries and Oceans sales slip database for commercial fishing vessels lists 4529 Atlantic salmon landed. Information relayed to the Atlantic Salmon Watch program directly from fisherman indicates that a large percentage of the Atlantic salmon caught in Johnstone Strait during the week of 8-1 was sold as coho salmon. Therefore the Atlantic salmon catches reported in the D.F.O. sales slip database are an underestimation of the true catch. The total number of Coho salmon caught in area 12 during the week of 8-1 was 9251 fish, therefore even if all the reported coho catch was actually Atlantic salmon the maximum number of possible Atlantic salmon caught would be 13780 fish. The net fishery opening in statistical areas 12 and 13 (Johnstone Strait) for week 8-1 (July 31 to August 7) provided the vast majority of the Atlantic salmon caught in 1993. Of the 4529 reported caught in 1993, 4067 or 89.8% were caught in that one opening. This was the first opening in this area after the Carrie Bay escape. The Fisheries Branch of the Department of Fisheries and Oceans estimated the total

atlantic salmon catch of week 8-1 in Johnstone Strait to be 10260 pieces. This estimate is derived from hail counts of a percentage of commercial fishing vessels fishing in an area and then expanded to estimate the catch of all the vessels in the area. There is no data that can substantiate this estimate.

The Department of Fisheries and Oceans Mark Recovery database lists 278 Atlantic salmon reported in 1993. The reporting of Atlantic salmon by the Mark Recovery Program samplers is entirely voluntary. It is not part of their contract with D.F.O. to collect this information.

One hundred and forty-four marine recoveries of Atlantic salmon were returned to the Pacific Biological Station for biological sampling (Figure 5). Of these 118 were returned from either statistical areas 12 or 13 (Johnstone Strait). Of these, 107 were known to have been taken in the net fishery during the first week of August. The results of the biological sampling of the marine caught Atlantic salmon are summarized in Figures 6 and 7. The detailed data are reported in Table 1.

Fork lengths ranged from 412 to 950 mm with a mean of 600.4 mm. Round body weights ranged from 0.8 to 12.5 kg with a mean of 2.8 kg. Of 58 males recovered from marine landings the median gonad weight was 1.5 grams. Eleven males were at stage III or higher maturity level (Murza and Khristoforov 1991). The median gonad weight for 85 females returned from marine landings was 4.5 grams, 6 were at maturity level of III(late) or greater. Murza and Khristoforov have developed a scale of maturity for Atlantic salmon based on weights and external appearence of gonads. The scales range form I to VI, stages I - III are maturing fish, stage IV is a fully mature fish, and stages V and VI are post reproductive stages.

Two fish were found with a single herring in their stomachs, one had coagulated blood and one had a fish scale. Seven fish had partially digested commercial fish food pellets. The remaining 132 fish were found to have either completely empty stomachs or stomachs with a small amount of well digested, indistinguishable material. Of the 59 Atlantic salmon examined in 1992, only one had remnants of fish or any other food in the gut.

Age of the Atlantic salmon based on scale patterns was judged to be difficult to determine. This may be resolved in the future by collecting scales from known aged adults, or from examination of fin rays and/or otoliths. All of the sampled fish had some degree of fin wear, primarily on the dorsal and caudal fins. Fin wear is indicative of net-pen rearing and is an established procedure for the identification of farm raised fish.

A subsample of twenty one Atlantic salmon (Fish Numbers: 93092 - 93112) were analyzed by the Fish Pathology Laboratory at PBS on July 28th, 1993. These fish were checked for external and internal abnormalities, and bacterial pathogens. No bacterial pathogens, external or internal lesions, or unusual parasite loads were found.

In Washington State the commercial catch of Atlantic salmon is monitored through the

buyer reporting program administered by the Washington State Department of Fisheries. In 1993, the recorded catch of Atlantic salmon in Washington State commercial fisheries was 206 fish (Fig. 5). Thirteen fish were caught in ceremonial or subsistence tribal fisheries and one fish was caught in a test fishery. The majority of the catch occurred in lower Puget Sound with only 11 fish reported from north of Puget Sound.

As yet, the State of Alaska has no formal reporting program for Atlantic salmon. The National Marine Fisheries Service, Auke Bay Laboratory in Juneau has recorded recoveries of Atlantic salmon since they first appeared in 1990 (Wing et al. 1992). In 1993, 23 fish were reported. All were captured in the commercial seine fishery of Southeast Alaska, Dixon Entrance area (B. Wing, pers. comm.).

Fork lengths of the Alaskan recoveries ranged from 463 to 706 mm with a mean of 574.6 mm. Round body weights ranged from 1.1 to 4.3 kg with a mean of 2.26 kg. Of 11 males recovered from marine landings the median gonad weight was 1.0 gram. The median gonad weight for 12 females returned from marine landings was 5.7 grams. Of 22 fish stomachs examined, 15 were empty, 3 had digested matter and 4 had some evidence of fish or ichthyoplankton. There are no Atlantic salmon aquaculture facilities in Alaska.

Freshwater recoveries and sightings

In 1993, 21 Atlantic salmon were reported caught or sighted in freshwater through the Atlantic Salmon Watch program (Figure 9). Of these, 9 were caught in Fraser River gillnet fisheries below the Pitt River confluence.

Four freshwater recoveries of Atlantic salmon were returned to the Pacific Biological Station for analysis. Two were captured in a gillnet fishery in the lower Fraser River, one was taken from the Cluxsewe River on northern Vancouver Island and one from the neighbouring Quatse River. The results of the biological sampling of these fish are summarized in Table 2. The fish taken from the Quatse and Cluxsewe rivers showed increased gonad size and darkened coloration associated with maturation. The Quatse River fish had a pronounced kype on the lower jaw but the Cluxsewe River fish lacked a kype. The Cluxsewe River fish weighed considerably less at length than would be expected from recoveries taken to date.

Two reports of freshwater sightings of Atlantic salmon in Washington State were received. The U.S. Forest Service reported between 6-12 Atlantic salmon during *truck-in* efforts on the Skykomish river (Denise Hann, pers. com.). Truck-in is a program of collecting returning salmon from below an impassable barricade, transporting them above the blockade and releasing them. An Atlantic salmon was reported caught on sport gear in the lower Cedar R. at the south end of Lake Washington.

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Appendix A Corrections to the 1992 report of Atlantic salmon catches and sightings.

Citation:

Thomson, A. J. and S. McKinnell. 1993. Summary of reported Atlantic salmon (*Salmo salar*) catches and sightings in British Columbia in 1992. Can. Manuscr. Rep. Fish. Aquat. Sci. 2215: 15 p.

Two corrections to the report describing the recoveries of Atlantic salmon in 1992 were required. Following the publication of that report, the identification of 2 individuals collected in 1992 were changed. A single fish recovered at the Little Campbell River hatchery in 1992 was an Atlantic salmon. The 1992 report described this specimen as misidentified. A second fish, previously listed as an Atlantic salmon, was determined to be a steelhead after protein electrophoresis results were reviewed.

Table 1. Biological data of the marine caught Atlantic salmon that were returned to the Pacific Biological Station.

Fish No.	Collection Date	Statistical Area	Sex	Fork Length (mm)	Body Weight (kg)	Gonad Weight (g)	Stomach Contents	Fat Content
93001	02/08/93	12	FEMALE	635	3.572	5.5	GM	3
93002	02/08/93	12	FEMALE	615	3.12	4	GM	3
93003	02/08/93	12	FEMALE	549	2.226	4	GM	3
93004	02/08/93	12	FEMALE	580	1.998	4	E	2
93005	02/08/93	12	MALE	580	3.876	3	BLOOD	4
93006	02/08/93	12	MALE	678	3.578	1.5	GM	3
93007	02/08/93	12	FEMALE	639	2.995	6.5	E	3
93008	02/08/93	12	MALE	610	3.164	1	E	3
93009	02/08/93	12	MALE	646	3.576	1.5	GM	3
93010	02/08/93	12	MALE	641	2.889	1.5	E	3
93011	02/08/93	12	FEMALE	601	2.784	4	GM	3
93012	02/08/93	12	MALE	593	2.493	1	E	3
93013	02/08/93	12	FEMALE	627	3.31	6	GM	4
93014	02/08/93	12	FEMALE	631	3.504	10.5	GM	4
93015	02/08/93	12	FEMALE	642	2.989	6	NA	0
93016	02/08/93	12	FEMALE	585	2.531	4.5	E	4
93017	02/08/93	12	MALE	639	2.924	0.5	GM	3
93018	02/08/93	12	FEMALE	581	2.373	4.5	GM	3
93019	02/08/93	16	MALE	569	2.529	73.5	E	3
93020	02/08/93	12	FEMALE	717	4.29	8.5	E	3
93021	02/08/93	12	MALE	621	2.768	1.5	GM	3
93022	02/08/93	12	FEMALE	613	2.741	5.5	E	4
93023	02/08/93	12	FEMALE	681	2.265	4.5	E	3
93024	02/08/93	12	FEMALE	624	3.08	8	GM	3
93025	02/08/93	12	FEMALE	650	2.141	6.5	GM	3
93026	02/08/93	12	MALE	681	3.986	3.5	E	3
93027	02/08/93	12	MALE	600	2.629	1.5	GM	4
93028	02/08/93	12	FEMALE	620	3.15	4	GM	4
93029	02/08/93	12	FEMALE	624	3.126	7	GM	3
93030	02/08/93	12	FEMALE	623	3.428	5	E	4
93031	02/08/93	12	FEMALE	575	2.383	3.5	E	3
93032	02/08/93	12	FEMALE	626	3.068	4.5	GM	3
93033	02/08/93	12	MALE	690	3.604	1.5	GM	3
93034	02/08/93	12	MALE	588	2.447	1	E	3
93035	02/08/93	12	FEMALE	595	2.862	5.5	E	4
93036	02/08/93	12	FEMALE	555	2.011	3.5	GM	3
93037	02/08/93	12	MALE	621	3.274	1.5	E	3
93038	02/08/93	12	FEMALE	695	4.704	105.5	GM	3
93039	02/08/93	12	FEMALE	606	2.862	4	E	3
93040	02/08/93	12	FEMALE	679	3.654	6.5	GM	4
93041	02/08/93	12	MALE	619	3.194	1.5	GM	3
93042	02/08/93	12	FEMALE	661	3.646	6.5	GM	3
93043	02/08/93	12	FEMALE	666	3.61	4	GM	3
93044	02/08/93	12	FEMALE	530	2.328	4	GM	3

Fish No.	Collection Date	Statistical Area	Sex	Fork Length (mm)	Body Weight (kg)	Gonad Weight (g)	Stomach Contents	Fat Content
93045	02/08/93	12	MALE	592	2.567	0.5	GM	3
93046	02/08/93	12	MALE	647	2.934	1	GM	3
93047	02/08/93	12	FEMALE	670	4.416	9.5	GM	4
93048	02/08/93	12	FEMALE	550	2.245	4	GM	3
93049	02/08/93	12	FEMALE	625	3.248	8	GM	3
93050	02/08/93	12	FEMALE	560	2.24	4	GM	3
93051	02/08/93	12	FEMALE	574	1.97	4	GM	3
93052	02/08/93	12	MALE	609	3.01	1	GM	3
93053	02/08/93	12	MALE	637	3.142	1	GM	3
93054	02/08/93	12	FEMALE	569	2.704	7	GM	3
93055	02/08/93	12	FEMALE	657	3.438	5	GM	3
93056	02/08/93	12	FEMALE	564	2.874	7.5	GM	4
93057	02/08/93	12	FEMALE	619	2.732	7.5	GM	3
93058	02/08/93	12	FEMALE	651	3.688	5.5	GM	3
93059	02/08/93	12	MALE	484	1.782	1	GM	3
93060	02/08/93	12	FEMALE	592	2.393	4.5	GM	3
93061	02/08/93	12	MALE	589	2.274	1	GM	3
93062	02/08/93	12	MALE	721	4.194	2	GM	3
93063	02/08/93	12	FEMALE	547	2.347	3	GM	4
93064	02/08/93	12	FEMALE	618	2.807	4	GM	3
93065	02/08/93	12	MALE	597	2.455	1	GM	3
93066	02/08/93	12	FEMALE	638	3.266	7	E	3
93067	02/08/93	12	FEMALE	623	2.63	3.5	GM	3
93068	02/08/93	12	FEMALE	638	3.592	5	E	4
93069	02/08/93	12	FEMALE	520	1.962	58	E	4
93070	02/08/93	12	FEMALE	647	3.116	4	GM	3
93071	02/08/93	12	FEMALE	610	2.995	3	GM	3
93072	02/08/93	12	MALE	600	2.719	1	E	3
93073	02/08/93	12	FEMALE	596	2.745	4.5	GM	3
93074	02/08/93	12	FEMALE	682	3.866	6	GM	3
93075	02/08/93	12	FEMALE	646	3.114	4.5	GM	3
93076	02/08/93	12	MALE	655	3.182	1	GM	3
93077	02/08/93	12	FEMALE	595	2.824	4	GM	3
93078	02/08/93	12	FEMALE	635	2.708	4.5	GM	3
93079	02/08/93	12	FEMALE	650	3.142	5.5	GM	3
93080	02/08/93	12	FEMALE	630	3.43	7	GM	3
93081	02/08/93	12	FEMALE	660	3.244	4	E	3
93082	02/08/93	12	MALE	690	4.06	1.5	E	3
93085	11/08/93	20	FEMALE	630	2.79	6.5	E	2
93086	10/08/93	20	FEMALE	610	1.97	9.5	GM	2
93087	21/07/93	11	FEMALE	950	12.5	500	GM	3
93088	23/11/93	99	FEMALE	775	3.754	7.5	E	4
93089	29/07/93	12	FEMALE	500	1.471	2.5	E	3
93092	28/07/93	12	FEMALE	564	2.325	3	E	3

Fish No.	Collection Date	Statistical Area	Sex	Fork Length (mm)	Body Weight (kg)	Gonad Weight (g)	Stomach Contents	Fat Content
93093	28/07/93	12	MALE	540	1.923	1	FF	2
93094	28/07/93	12	FEMALE	545	2.147	4	fish scale	3
93095	28/07/93	12	FEMALE	482	1.697	3	FF	2
93096	28/07/93	12	FEMALE	590	2.566	2.5	FF	3
93097	28/07/93	12	MALE	469	1.42	2	E	3
93098	28/07/93	12	FEMALE	530	1.94	2.5	E	3
93099	28/07/93	12	FEMALE	604	2.368	2	E	3
93100	28/07/93	12	MALE	620	3.012	24	E	4
93101	28/07/93	12	MALE	512	1.57	1	E	3
93102	28/07/93	12	MALE	498	1.586	1.5	E	3
93103	28/07/93	12	FEMALE	555	2.114	2.5	1HERR	3
93104	28/07/93	12	MALE	560	1.867	0.5	E	3
93105	28/07/93	12	MALE	630	2.832	1	FF	4
93106	28/07/93	12	MALE	490	1.858	0.5	E	4
93107	28/07/93	12	MALE	557	1.975	1	E	3
93108	28/07/93	12	FEMALE	510	1.625	2	E	4
93109	28/07/93	12	MALE	559	2.012	NA	FF	3
93110	28/07/93	12	FEMALE	646	2.019	2	E	3
93111	28/07/93	12	FEMALE	510	1.59	4	FF	3
93112	28/07/93	12	MALE	510	1.883	39	FF	4
93113	27/07/93	12	MALE	550	2.207	109.5	E	4
93114	27/07/93	12	MALE	520	1.845	27	E	4
93115	27/07/93	12	MALE	575	2.112	1.5	E	3
93116	27/07/93	12	FEMALE	530	1.479	2	E	3
93117	27/07/93	12	MALE	541	2.079	38.5	E	3
93118	27/07/93	12	MALE	542	2.098	0.5	E	3
93119	24/09/93	13	FEMALE	680	3.28	6	GM	3
93120	24/09/93	13	MALE	610	2.857	1	1HERR	4
93121	?	99	MALE	475	1.098	1	E	2
93122	?	12.5	MALE	412	0.777	0.5	E	NA
93123	?	99	FEMALE	510	1.993	4.5	E	3
93124	17/08/93	12.5	FEMALE	648	3.13	5	E	4
93125	?	99	FEMALE	490	1.243	7	E	4
93126	?	99	MALE	535	1.927	1	E	3
93127	?	99	MALE	601	2.713	0.5	E	3
93128	?	99	MALE	NA	3.5	2	E	4
93129	?	99	FEMALE	669	3.492	10	E	3
93130	10/09/93	12.5	FEMALE	599	2.283	3.5	E	3
93131	?	99	FEMALE	580	2.358	7	E	3
93132	23/09/93	13	FEMALE	590	2.752	7	GM	4
93133	?	99	FEMALE	549	1.97	4	E	3
93134	?	99	MALE	592	2.426	1	GM	3
93135	10/09/93	12.5	MALE	475	1.428	1	E	3
93136	04/09/93	99	FEMALE	640	3.084	7	E	3

Fish No.	Collection Date	Statistical Area	Sex	Fork Length (mm)	Body Weight (kg)	Gonad Weight (g)	Stomach Contents	Fat Content
93137	02/09/93	12	MALE	625	3.502	176	E	4
93138	04/09/93	12.5	MALE	670	3.602	108.5	E	3
93139	04/09/93	12.5	MALE	571	2.23	2	E	3
93140	04/09/93	12.5	FEMALE	440	0.878	2	E	3
93141	03/09/93	12.5	MALE	560	2.546	118.5	E	3
93142	?	99	MALE	525	1.786	1.5	E	3
93143	03/09/93	12.5	MALE	540	1.947	1	GM	3
93144	13/08/93	20	MALE	675	2.805	3	E	3
93145	15/10/93	24	MALE	742	4.848	85	E	4
93146	15/10/93	24	MALE	648	3.394	163.5	E	3
93147	04/07/93	123	FEMALE	684	3.746	9.5	E	4
93148	06/08/93	23	FEMALE	528	2.016	49.5	E	3

STOMACH CONTENT CODE
E = EMPTY
GM = GREY MATTER or UNDISCERNABLE DIGESTED MATERIAL
1HERR = 1 HERRING
FF = COMERCIAL FISH FOOD

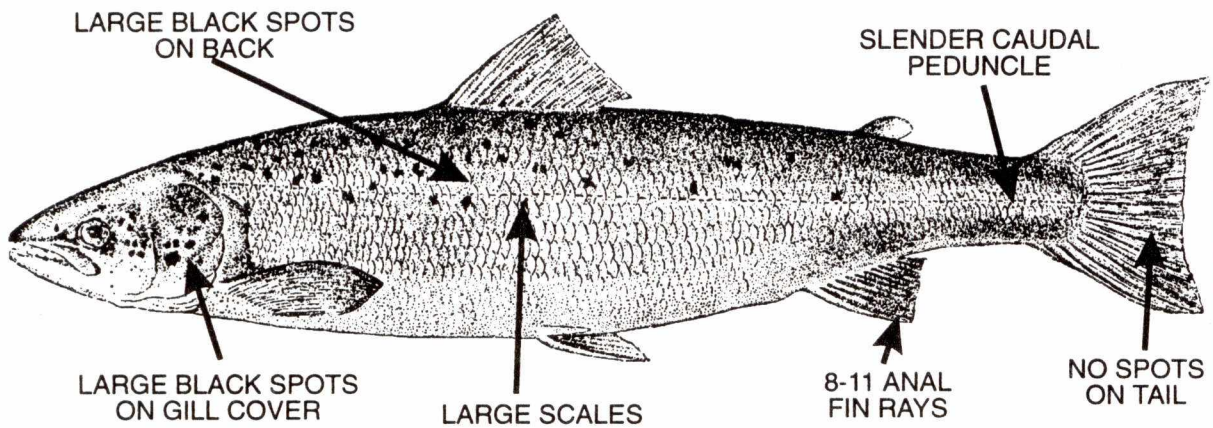
STATISTICAL AREA CODE
12.5 = AREA 12 OR 13
99 = UNKNOWN

Table 2: Biological data of the freshwater caught Atlantic salmon that were returned to the Pacific Biological Station.

Fish #	Collection Date	Location	Sex	Fork Length	Body Weight	Gonad Weight	Stomach Contents	Fat
93083	22/07/93	Fraser R.	M	592mm	2.78kg	9.0g	GM*	2
93084	22/07/93	Fraser R.	F	495mm	1.67kg	41.0g	empty	2
93090	27/09/93	Quatse R.	M	720mm	4.15kg	232.0g	empty	2
93091	30/09/93	Cluxsewe R.	M	520mm	0.85kg	30.0g	empty	2

*GM is code for Grey matter, meaning undiscernible digested material.

WANTED



ATLANTIC SALMON

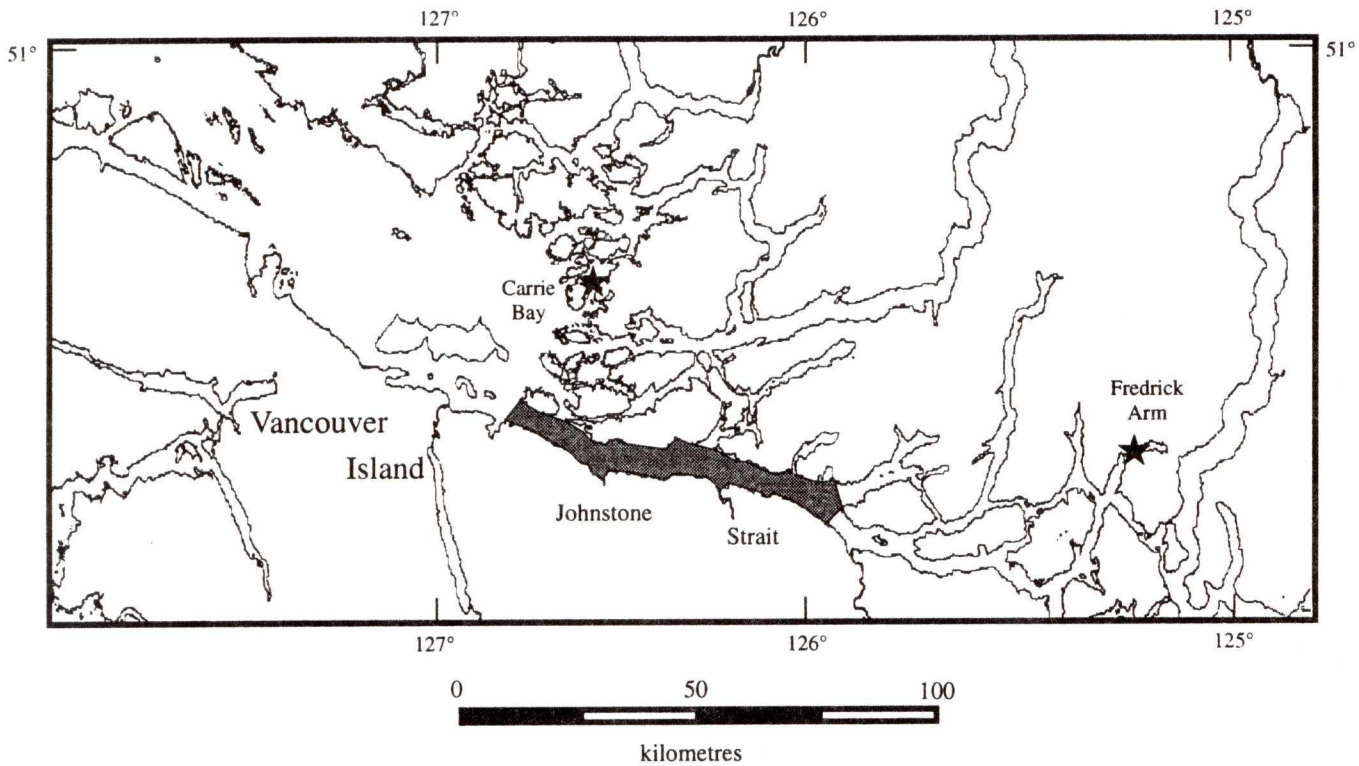
The Department of Fisheries and Oceans, in conjunction with, the Ministry of Agriculture, Fisheries and Food, is surveying the abundance of Atlantic salmon in British Columbia waters. These fish may have escaped from aquaculture facilities along the west coast.

Atlantic salmon resemble Pacific salmon and steelhead trout, but are distinguished from Pacific salmon by having 8-11 anal fin rays, and from steelhead trout by large black spots on the body only, mostly above the lateral line; several large black spots on the gill cover; and a slender caudal peduncle. Pacific salmon have more than 12 anal fin rays, and steelhead trout have numerous black spots on the tail.

Please report any captures of Atlantic salmon directly to the Pacific Biological Station in Nanaimo. Telephone collect to 756 - 7000, and ask for Andy Thomson, Skip McKinnell, Ted Carter, or Graham Gillespie.

The entire fish (including entrails) should be saved, preferably frozen, for positive identification and biological sampling, with as much information as possible as to the date, location and method of capture.

Figure 1. Information sheet mailed to government and volunteer contacts.



Area of highest catch rates for July 31, 1994 - Aug 07, 1994 net fishery.

★ Site of aquaculture facilities where escapes occured.

Figure 2. Johnstone Strait area and locations of Atlantic salmon escapes.

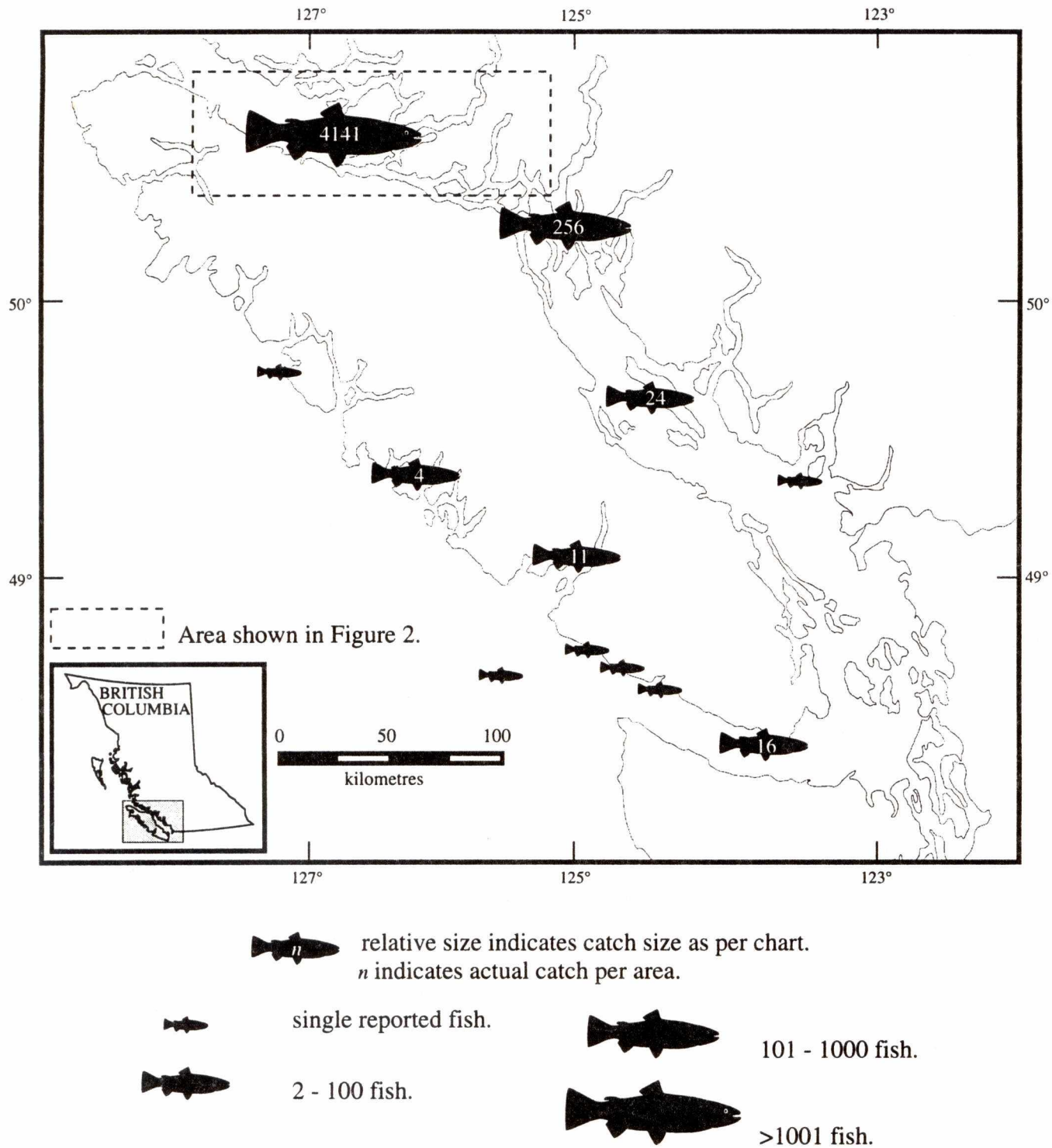


Figure 3. Atlantic salmon reported from marine waters in Southern British Columbia in 1993 by D.F.O. statistical area. Data compiled from Sales slip database, Mark Recovery Program and Atlantic Salmon Watch program.

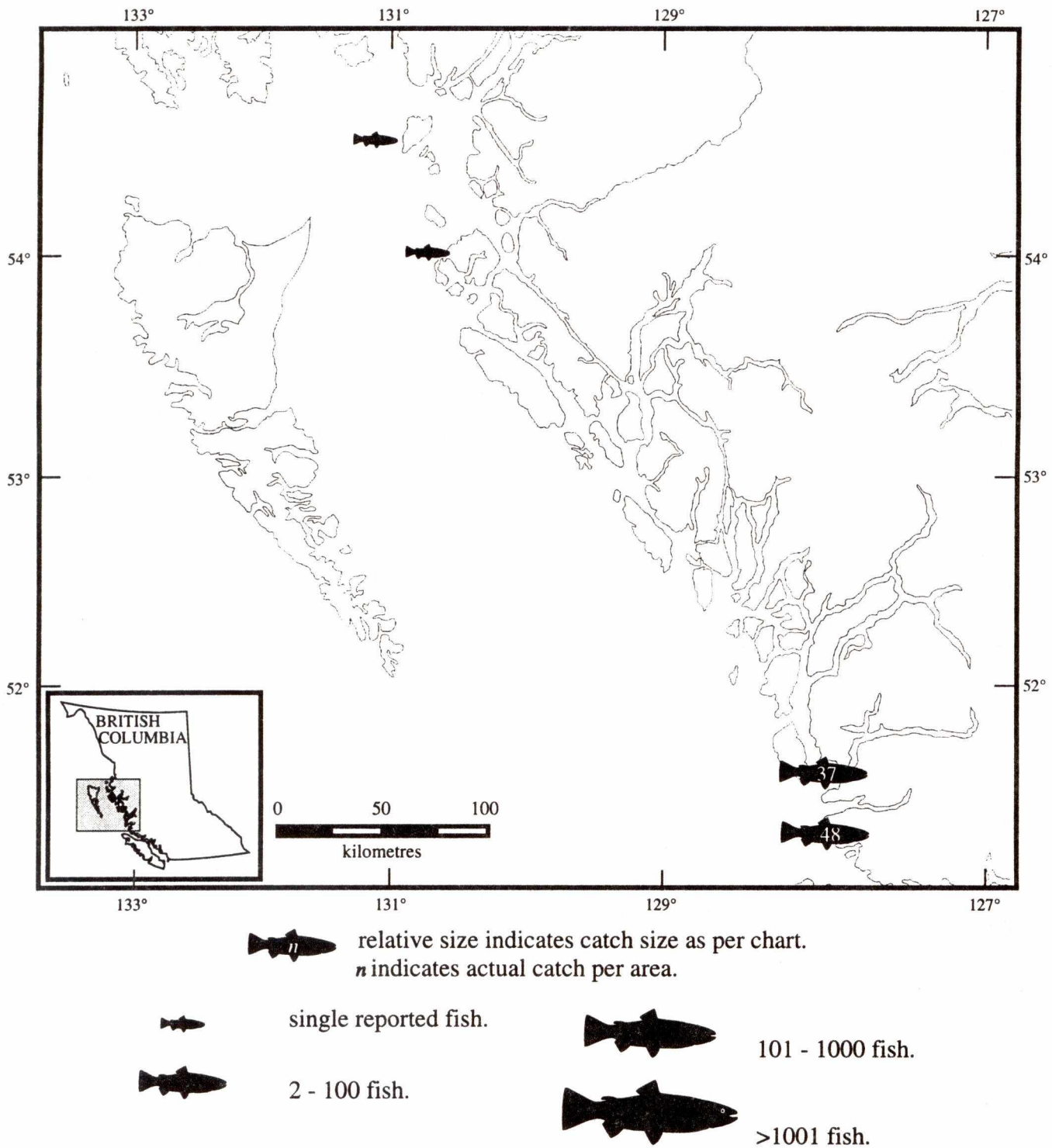
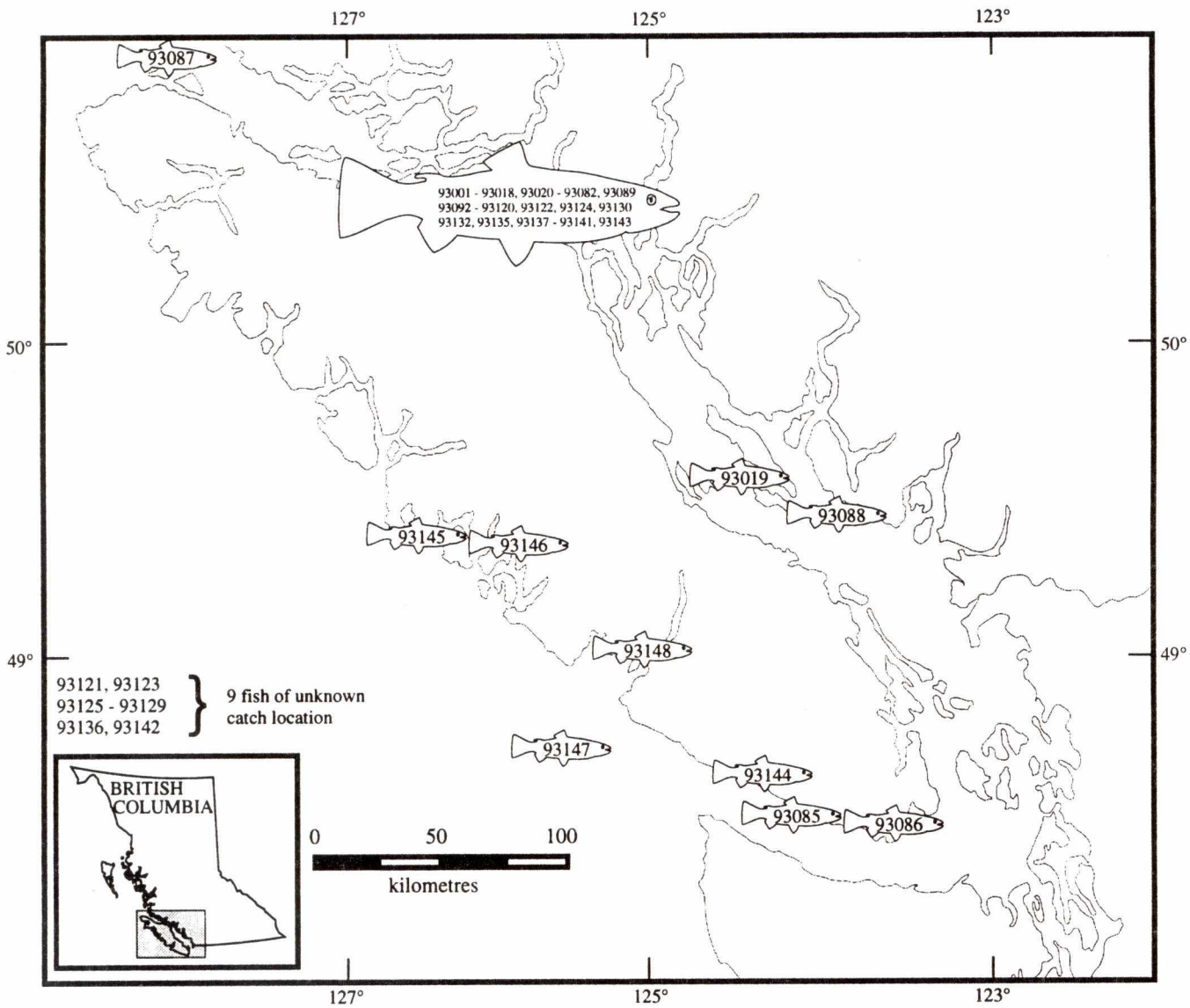


Figure 4. Atlantic salmon reported from marine waters in Northern British Columbia in 1993 by D.F.O. statistical area. Data compiled from Sales slip database, Mark Recovery Program and Atlantic Salmon Watch program.



93nnn single captured fish and assigned Fish No.

Figure 5: Atlantic salmon recovered from marine sites in British Columbia in 1993. Identified by Fish Number as listed in Table 1.

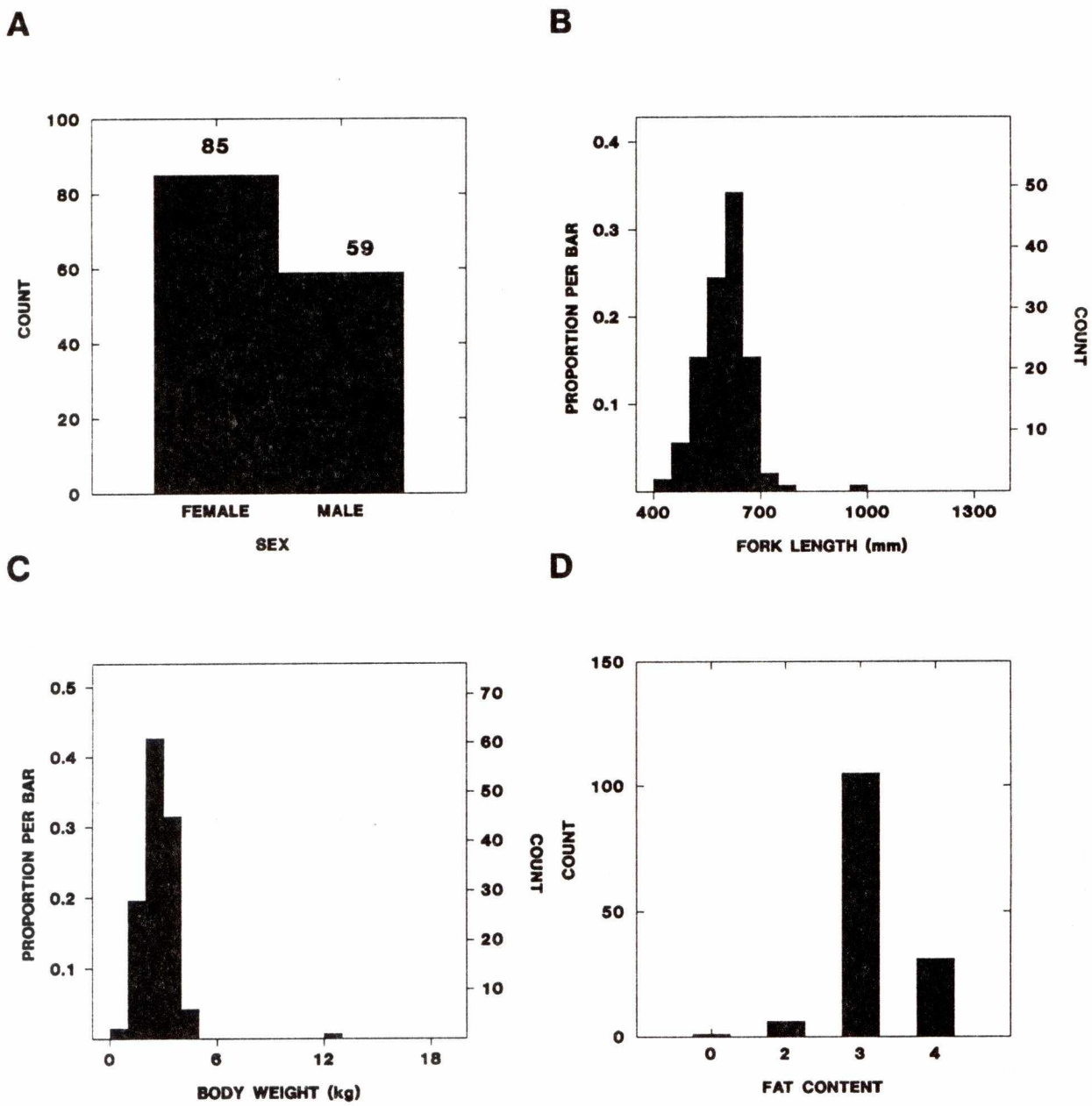


Figure 6. Biological data obtained from returned B.C. marine caught Atlantic salmon;(A) Sex ratio. (n=144) (B) fork lengths (n=144), (C) body weights (n=143),(D) Fat content (n=142).

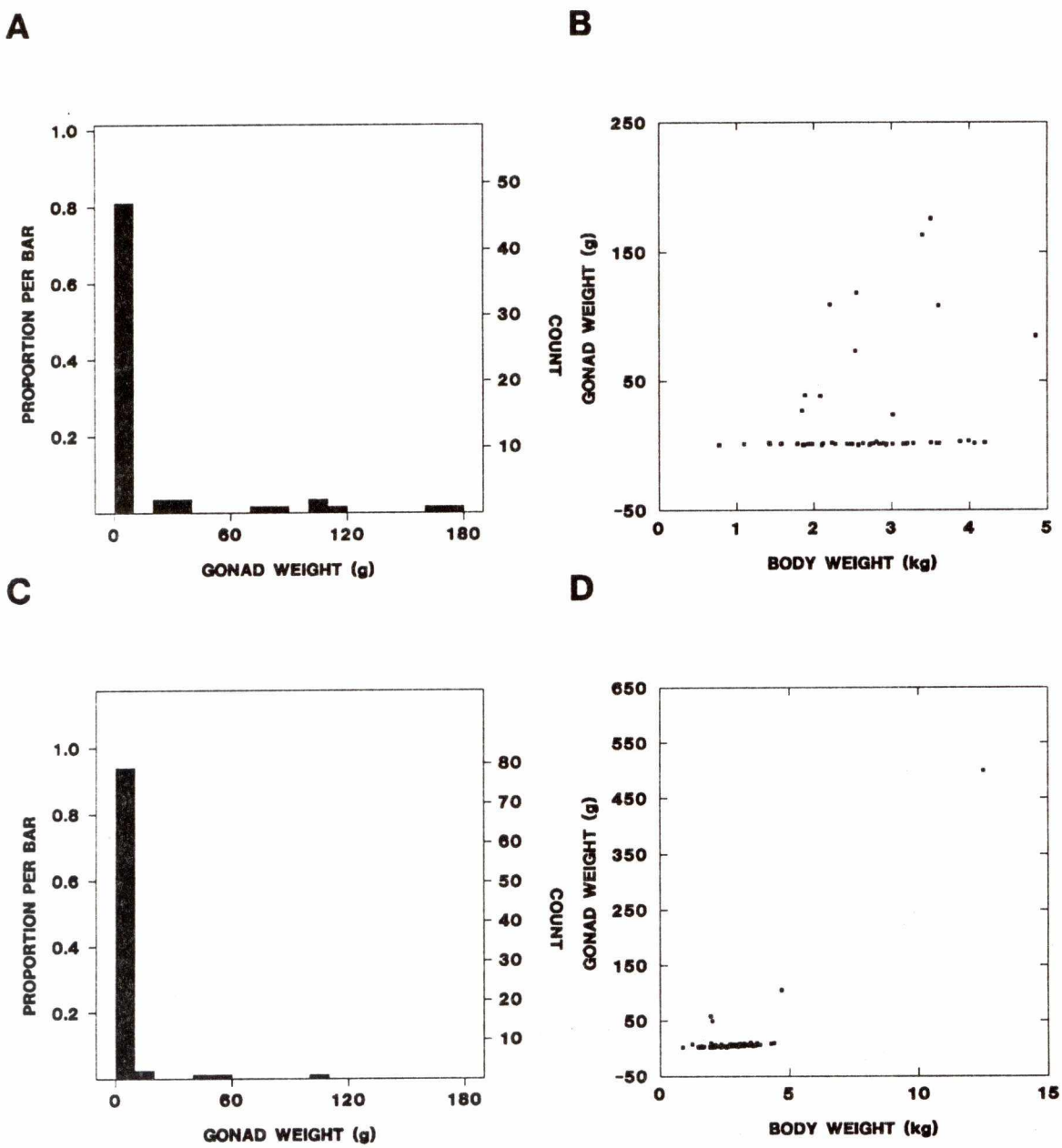


Figure 7. Biological data obtained from returned B.C. marine caught Atlantic salmon; (A) Male gonad weights (n=58), (B) Male gonad weight by body weight (n=58). (C) Female gonad weights (n=85), (D) Female gonad weight by body weight (n=85).

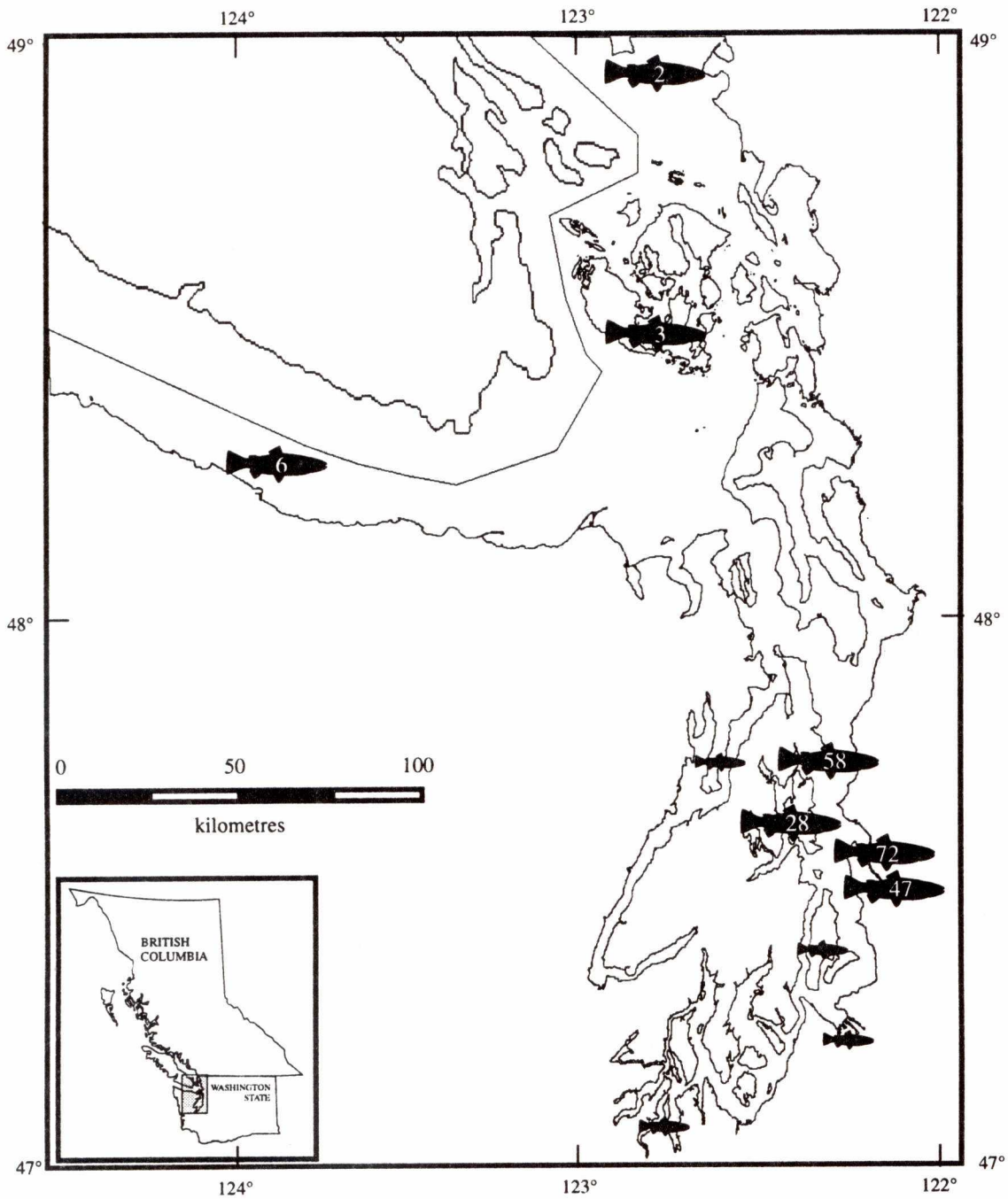
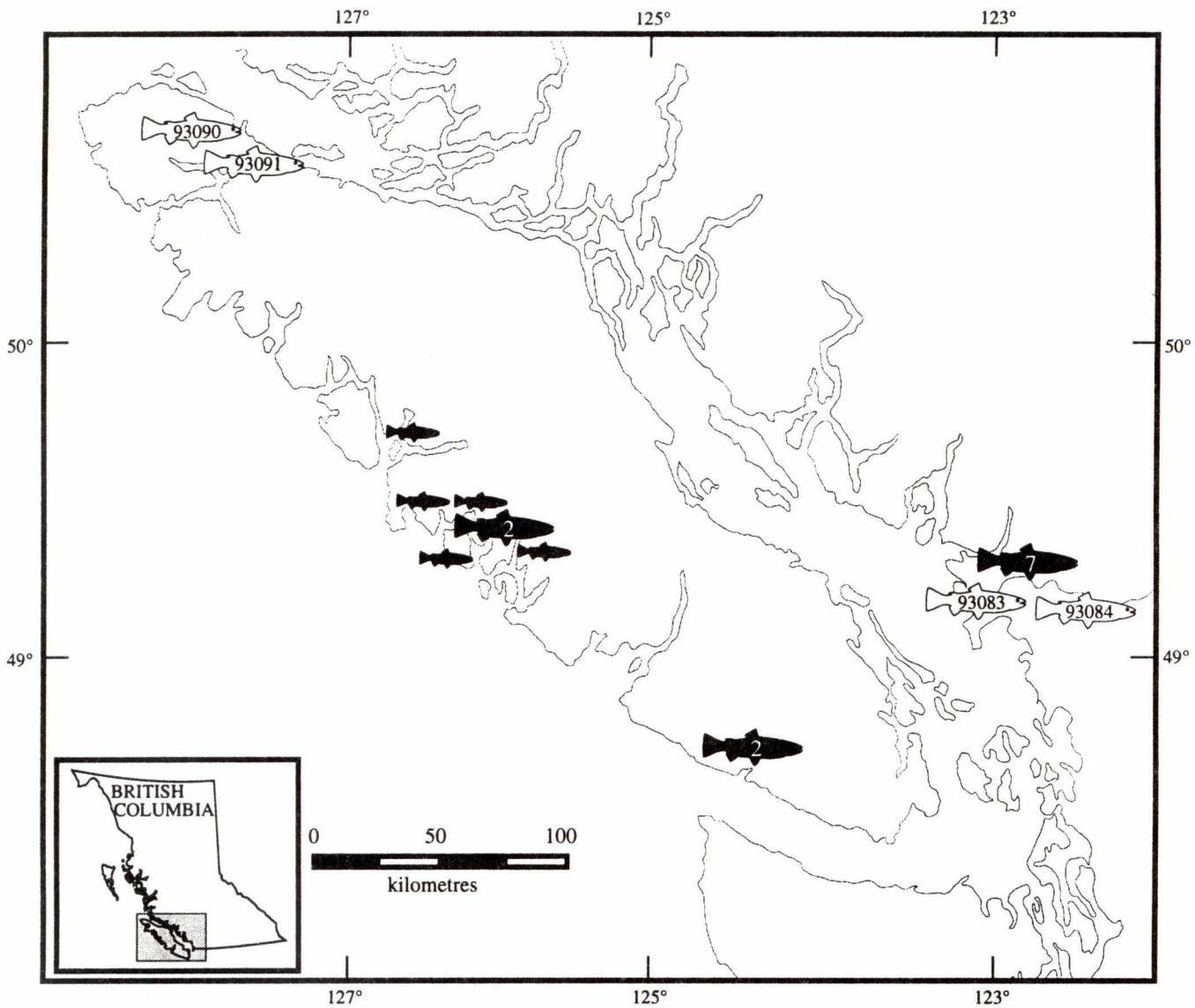


Figure 8. Commercial and Subsistence catch of Atlantic salmon in Washington State in 1993.



single reported fish.

n indicates more than one Atlantic salmon reported in a single river, where *n* is the number reported.

93nnn single recovered fish and assigned Fish No.

Figure 9. Atlantic salmon reported and recovered from freshwater sites in British Columbia in 1993. Recovered fish identified by Fish Number as listed in Table 2.