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Methods for in-season evaluation of salmon abundance, Newfoundland Region, 1991

by

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Abstract

The methodology by which in-season evaluations were carried out in the Newfoundland Region in 1991 is presented. Tables were constructed which summarized cumulative commercial catches and cumulative percentages by standard week by Salmon Fishing Area (SFA), along with cumulative counts of fish from fish counting facilities. Data from the 1984-89 average catches or counts were construed as representing 'average' salmon abundance; should catches or counts to corresponding dates in 1991 be lower than those in the tables, then salmon abundance was considered to be below 'average'. Conversely, should catches or counts to date in 1991 be greater than those in the corresponding tables, then it may be concluded that salmon abundance is 'average' or above 'average'. In addition, tables for 1990 catches and counts were provided for comparison as this was the only other year in which fisheries were under quota control and that abundance was low in many rivers. Preliminary evaluations concluded that abundance would be low in 1991 and this was consistent with additional evaluations which were carried out as the season progressed.

Résumé

On présente ici la méthode ayant servi aux évaluations effectuées en cours de saison dans la région de Terre-Neuve en 1991. Des tableaux exposent les données cumulées relatives aux prises commerciales et aux pourcentages par semaine-type et par zone de pêche du saumon (ZPS), ainsi qu'au nombre de poissons recensés aux installations de dénombrement. Des données sur les prises ou les dénombrements moyens de 1984 à 1989 sont présentées à titre d'indication de l'abondance moyenne du saumon. Si les prises ou les dénombrements aux dates correspondantes de 1991 sont plus bas que ceux des tableaux, on considérerait que l'abondance du saumon était inférieure à la moyenne. De la même manière, si les prises ou les dénombrements cumulés à la date considérée de 1991 sont supérieurs à ceux des tableaux correspondants, on peut conclure que l'abondance du saumon est moyenne ou supérieure à la moyenne. En outre, on fournit aussi, à des fins de comparaison, les tableaux sur les prises et les dénombrements de 1990, puisque cette année est la seule autre durant laquelle la pêche était assujettie à des contingents et l'abondance du poisson dans les rivières était faible. Les évaluations préliminaires indiquaient que l'abondance serait faible en 1991, ce qu'ont confirmé les autres évaluations effectuées ultérieurement durant la saison.

Introduction

The 1991 Salmon Management Plan stated that salmon abundance in Newfoundland and Labrador would be evaluated in mid-season and if necessary for conservation, adjustments would be made to the fishing plan. This paper describes the methods which were used to evaluate 'in-season' salmon stock abundance in the Newfoundland Region.

Methods

Data in Tables 1a-b and 2a-b, were derived from two sources, viz. commercial salmon catches by standard week in SFAs 1-11 and daily numbers of fish counted at monitoring facilities from several key rivers around the island portion of the Newfoundland Region. Information presented in these tables reflect 'average' cumulative commercial salmon catch and percent by standard week, or cumulative counts of salmon and percent at fish monitoring facilities, for years 1984-89, which for this exercise was considered to represent 'average' abundance (Tables 1a, 2a). Information for 1987 was omitted from monitoring facility data because of the low water conditions in that year. In addition, we have also provided tables for 1990 catches and counts to compare with those of 1991 (Tables 1b, 2b). This was because 1990 was the only other year in which fisheries were under quota control and abundance was low in many rivers.

Should commercial catches, or counts of salmon at monitoring facilities in 1991 fall below those values in the Tables 1a and 2a respectively, then salmon abundance was deemed to be below 'average' in 1991. Conversely, should catches or counts to date in 1991 be greater than those in the corresponding tables, then it may be concluded that salmon abundance is 'average' or above 'average'. Similar arguments could be made in relation to comparisons with the 1990 year (Tables 1b and 2b). Also, a rough estimate of what the total 1991 count may be in a particular river could be derived by dividing the appropriate cumulative percent from Table 2a into the count for the same day in 1991.

Results and Discussion

Initial evaluations of 1991 salmon abundance were carried out in late June. For Conne River, it was clear that this was an anomalous year with respect to both environmental conditions and salmon returns. By early July, it was also apparent for a number of other rivers that salmon returns in 1991 could safely be considered to be well below 'average'. Figure 1 illustrates how counts of fish to a specific date, in this case July 21, were displayed in relation to counts in 'average' years, and with 1990. In all cases, salmon counts in 1991 were less than 50% of returns counted in either the 'average' years or in 1990. Several rivers had salmon counts which were less than 30% of past values. Evaluations carried out in late August were consistent with earlier conclusions.

Environmental conditions, such as low water levels and warm water temperatures, can influence daily movements of fish and subsequently forecasts. To date, the ability to understand how environmental conditions influence subsequent abundance, rather than just affect timing, is limited. As more information becomes available and counts and corresponding environmental conditions examined in more detail, it may at some point in time be possible to identify those years in which runs are 'late' from those years in which runs are both 'late' but also low in abundance.

In-season 'forecasts' based on the above techniques can change daily as the season progresses and thus the potential exists to provide premature conclusions that may be erroneous. Rather than using discrete numerical estimates of potential returns, qualitative statements of salmon abundance are advisable. Modifications to fisheries can still be made as additional information is accumulated as the season progresses. It is concluded that approaches of this nature can provide fisheries managers with potentially useful information from which to base management decisions on adjustments to fisheries to achieve conservation goals for individual rivers or SFAs.

Table 1a. The average cumulative commercial Atlantic salmon catch and percent by SFA and week, 1984-89. Catches of this magnitude are representative of average abundance.

	Salmon Fishing Area																					
Week	1		2		3		4		5		6		7		8		9		10		11	
Ending	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%
10 June	2	0	748	0	8070	4	7420	5	4560	8	4377	10	3513	18	4896	21	522	6	2841	8	7227	14
17 June	3	0	5513	2	24167	12	20542	15	12503	23	9816	23	7265	37	8873	38	1315	15	6224	18	17980	35
24 June	231	0	21177	8	53827	28	40540	29	21473	40	14894	35	10757	54	12168	52	2687	30	13613	39	27286	53
1 July	1056	1	61137	24	92411	47	62734	45	30070	56	20407	49	13850	70	15321	65	4091	46	21127	60	39347	76
8 July	6573	9	112775	44	134613	69	84314	60	37198	69	26004	62	15513	78	18161	78	5332	60	26165	74	43136	83
15 July	16204	23	163216	64	164520	85	100693	72	43186	80	30438	72	16629	84	20239	86	6384	71	30122	85	47750	92
22 July	27408	39	203664	80	177836	91	114594	82	46909	87	34104	81	17674	89	21865	93	7289	82	32170	91	49155	95
29 July	39250	56	220985	87	184021	95	126622	90	50014	93	36558	87	18904	96	22835	98	7992	89	33980	96	51213	99
5 Aug	49509	70	230951	91	188765	97	131088	93	52041	96	38221	91	19451	98	23129	99	8402	94	34754	98	51405	99
12 Aug	56116	79	238180	94	190718	98	133362	95	52831	98	39424	94	19571	99	23235	99	8582	96	34876	99	51431	99
19 Aug	60208	85	241944	95	191932	99	134905	96	53225	99	40464	96	19648	99	23276	99	8773	98	35033	99	51490	99
26 Aug	63718	90	244326	96	192430	99	136354	97	53539	99	41290	98	19717	100	23332	100	8868	99	35140	100	51516	99
2 Sept	65623	93	246378	97	192886	99	137629	98	53721	100	41660	99	19778	100	23353	100	8932	100	35237	100	51764	100
9 Sept	66996	95	248478	98	193132	99	138439	99	53782	100	41813	100	19780	100	23370	100	.	.	35279	100	51781	100
16 Sept	68250	97	250344	98	193409	99	138860	99	53854	100	41893	100	19786	100	23392	100	.	.	35282	100	51802	100
23 Sept	69352	98	252110	99	193747	100	139238	99	53857	100	41927	100	19787	100	23401	100	.	.	35284	100	.	.
30 Sept	69954	99	253660	100	193984	100	139526	100	53862	100	41947	100	19788	100	23408	100	.	.	35287	100	.	.
7 Oct	70463	100	254013	100	194348	100	139955	100	53930	100	41974	100	19789	100	.	.	.	.	35288	100	.	.
14 Oct	70664	100	254437	100	194645	100	140223	100	53964	100	41986	100	19790	100	.	.	.	.	35289	100	.	.

Table 1b. The cumulative commercial Atlantic salmon catch and percent by SFA and week, 1990. This is another year in which quotas applied to all SFAs except SFA 1.

	Salmon Fishing Area																					
Week	1		2		3		4		5		6		7		8		9		10		11	
Ending	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%
10 June	0	0	204	0	728	1	3259	4	1146	7	952	8	723	13	408	13	191	6	1644	7	4588	16
17 June	0	0	547	0	3312	2	9046	10	3577	23	2542	22	1437	26	784	26	497	17	6127	27	17342	59
24 June	4	0	1630	1	33411	25	21609	23	7872	51	4432	38	2426	43	1348	44	708	24	11814	52	27101	92
1 July	15	0	15278	10	89456	66	40844	44	10356	68	6747	58	3564	64	1862	61	1190	40	19172	84	28337	96
8 July	244	1	45525	30	112236	83	60488	66	13776	90	8927	77	4269	76	2141	70	1534	52	20463	90	29036	99
15 July	4895	16	87863	58	121082	89	76072	83	14305	93	10254	88	4751	85	2419	79	2100	71	21026	92	29292	99
22 July	14801	49	106583	71	126132	93	84447	92	14767	96	10912	94	5019	89	2698	88	2437	83	21566	95	29371	100
29 July	19191	63	118647	79	129309	96	91101	99	15210	99	11482	99	5287	94	2977	97	2774	94	22282	98	29450	100
5 Aug	22873	75	128635	85	131420	97	91931	100	15337	100	11585	100	5404	96	3056	100	2881	98	22697	100	29473	100
12 Aug	25607	84	135816	90	132255	98	92006	100	.	.	11633	100	5460	97	.	.	2896	99	22697	100	.	.
19 Aug	26929	89	138185	92	132949	98	92045	100	.	.	.	.	5516	98	.	.	2911	99	22709	100	.	.
26 Aug	27446	91	140253	93	133443	99	92084	100	.	.	.	.	5572	99	.	.	2927	100	22709	100	.	.
2 Sept	27886	92	142225	94	133816	99	92112	100	.	.	.	.	5612	100	.	.	2938	100	22712	100	.	.
9 Sept	28483	94	143494	95	134010	99	.	.	.	.	.	.	.	.	.	.	.	.	22721	100	.	.
16 Sept	29111	96	145849	97	134177	99	.	.	.	.	.	.	.	.	.	.	.	.	22755	100	.	.
23 Sept	29527	97	147655	98	134350	99	.	.	.	.	.	.	.	.	.	.	.	.	22764	100	.	.
30 Sept	30039	99	149480	99	134703	100	.	.	.	.	.	.	.	.	.	.	.	.	22773	100	.	.
7 Oct	30200	100	150023	100	135164	100	.	.	.	.	.	.	.	.	.	.	.	.	22778	100	.	.
14 Oct	30278	100	150510	100	135346	100	.	.	.	.	.	.	.	.	.	.	.	.	22782	100	.	.

Table 2a. Average cumulative count and percent of small salmon for various rivers, 1984-89 with 1987 omitted. The first digit of day is the month and next two digits are the day. For example, 601 is 1 June, 630 is 30 June, etc.

	River													
	Exploits		Gander		Middle Bk		Terra Nova		Biscay Bay		Northeast Placentia		Conne	
Day	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
601	.	.	.	.	.	.	.	.	.	.	.	.	1	0
602	.	.	.	.	.	.	.	.	.	.	.	.	3	0
603	.	.	.	.	.	.	.	.	0	0	.	.	.	.
604	.	.	.	.	.	.	.	.	.	.	.	.	3	0
605	.	.	.	.	.	.	.	.	.	.	.	.	6	0
606	.	.	.	.	.	.	.	.	2	0	.	.	9	0
607	.	.	.	.	.	.	.	.	2	0	.	.	19	0
608	.	.	.	.	.	.	.	.	3	0	.	.	24	0
609	.	.	.	.	.	.	.	.	5	0	.	.	51	1
610	.	.	.	.	.	.	.	.	7	0	.	.	55	1
611	0	0	.	.	.	.	.	.	11	0	.	.	68	1
612	.	.	.	.	.	.	.	.	15	1	.	.	148	2
613	1	0	.	.	.	.	.	.	20	1	.	.	203	3
614	.	.	1	0	.	.	.	.	25	1	.	.	240	4
615	1	0	.	.	.	.	.	.	26	1	.	.	292	5
616	1	0	.	.	0	0	.	.	41	2	.	.	624	10
617	3	0	.	.	1	0	.	.	51	2	1	0	878	14
618	7	0	.	.	.	.	.	.	72	3	.	.	1307	21
619	9	0	.	.	.	.	1	0	86	4	1	0	1594	25
620	11	0	.	.	.	.	1	0	105	5	2	0	1907	30
621	17	0	5	0	.	.	.	.	128	6	3	1	2342	37
622	21	0	8	0	1	0	2	0	145	7	3	1	2658	42
623	31	0	17	0	1	0	3	0	173	8	5	1	2849	45
624	46	1	27	0	2	0	4	0	222	10	7	1	3127	49
625	56	1	49	1	2	0	5	0	253	11	9	2	3263	51
626	65	1	60	1	3	0	7	1	278	13	12	2	3356	53
627	83	1	81	1	5	1	11	1	320	14	14	3	3485	55
628	93	1	129	2	5	1	13	1	370	17	19	3	3761	59
629	118	1	191	2	10	1	16	1	436	20	21	4	4416	69
630	166	2	371	5	16	2	21	2	496	22	24	4	4565	72
701	216	3	437	6	22	2	25	2	537	24	27	5	4798	75
702	255	3	627	8	30	3	31	2	573	26	33	6	4898	77
703	283	3	664	9	39	4	37	3	605	27	37	7	5031	79
704	326	4	774	10	48	5	45	3	627	28	42	8	5045	79
705	416	5	839	11	60	7	49	4	651	29	56	10	5103	80
706	595	7	969	13	74	8	64	5	695	31	77	14	5155	81
707	716	8	1203	16	91	10	75	6	729	33	100	18	5232	82
708	943	11	1699	22	110	12	86	6	785	35	114	20	5317	84
709	1173	14	1790	23	139	15	97	7	810	37	125	23	5447	86
710	1400	16	1963	25	165	18	124	9	831	38	147	26	5612	88
711	1637	19	2263	29	197	21	146	11	865	39	167	30	5743	90
712	1904	22	2689	35	217	24	185	14	889	40	187	34	5880	92

Table 2a cont'd

713	2197	26	2915	38	249	27	211	16	910	41	202	36	5900	93
714	2462	29	3070	40	271	30	238	18	939	42	219	40	5916	93
715	2775	33	3239	42	316	34	303	23	959	43	236	43	5939	93
716	3047	36	3551	46	340	37	361	27	970	44	251	45	5946	93
717	3307	39	3616	47	380	41	402	30	1005	45	270	49	5956	94
718	3717	44	3767	49	410	45	450	34	1056	48	294	53	5976	94
719	4009	47	4074	53	453	49	515	38	1090	49	313	56	6008	94
720	4284	50	4254	55	494	54	548	41	1234	56	328	59	6102	96
721	4577	54	4460	58	511	56	595	44	1253	57	341	61	6134	96
722	4842	57	4572	59	546	60	646	48	1312	59	357	64	6142	96
723	5117	60	4896	63	568	62	679	51	1341	61	370	67	6154	97
724	5389	63	4971	64	594	65	723	54	1349	61	388	70	6167	97
725	5742	68	5078	66	618	67	769	57	1375	62	400	72	6174	97
726	6036	71	5198	67	642	70	805	60	1404	63	408	73	6175	97
727	6280	74	5332	69	661	72	828	62	1411	64	418	75	6200	97
728	6499	76	5503	71	680	74	850	63	1417	64	427	77	6206	97
729	6724	79	5689	73	696	76	871	65	1539	70	440	79	6215	98
730	6909	81	5970	77	715	78	894	67	1634	74	445	80	6234	98
731	7011	83	6038	78	735	80	925	69	1661	75	453	82	6240	98
801	7107	84	6153	79	749	82	955	71	1685	76	460	83	6305	99
802	7215	85	6348	82	769	84	988	74	1702	77	470	85	6318	99
803	7281	86	6481	84	779	85	1022	76	1720	78	473	85	6321	99
804	7395	87	6638	86	786	86	1041	78	1731	78	479	86	6322	99
805	7514	88	6699	87	795	87	1054	78	1763	80	485	87	6324	99
806	7600	89	6754	87	801	87	1080	80	1767	80	490	88	6324	99
807	7684	90	6793	88	811	89	1114	83	1772	80	494	89	.	.
808	7754	91	6953	90	823	90	1158	86	1778	80	499	90	6328	99
809	7809	92	7031	91	832	91	1175	87	1781	80	504	91	6332	99
810	7873	93	7082	91	838	91	1191	89	1793	81	507	91	6333	99
811	7939	93	7123	92	846	92	1209	90	1795	81	509	92	.	.
812	7998	94	7154	92	854	93	1221	91	1803	81	522	94	6334	99
813	8053	95	7175	93	860	94	1234	92	1840	83	526	95	.	.
814	8101	95	7195	93	865	94	1244	93	1861	84	530	95	.	.
815	8138	96	7252	94	867	95	1251	93	1863	84	531	96	6334	99
816	8161	96	7273	94	871	95	1258	94	1865	84	532	96	6334	99
817	8187	96	7305	94	875	95	1270	95	1866	84	532	96	.	.
818	8221	97	7336	95	879	96	1286	96	1893	85	536	96	.	.
819	8259	97	7351	95	880	96	1292	96	1967	89	536	97	.	.
820	8284	97	7397	96	883	96	1299	97	2008	91	537	97	.	.
821	8306	98	7428	96	885	96	1303	97	2023	91	539	97	.	.
822	8320	98	7440	96	886	97	1310	98	2035	92	541	97	6353	100
823	8343	98	7472	97	887	97	1316	98	2039	92	544	98	6353	100
824	8365	98	7517	97	891	97	1327	99	2045	92	548	99	6357	100
825	8382	99	7533	97	894	98	1329	99	2061	93	550	99	6357	100
826	8388	99	7558	98	898	98	1332	99	2063	93	551	99	.	.
827	8395	99	7580	98	901	98	1332	99	2065	93	552	99	.	.
828	8411	99	7601	98	902	98	1333	99	2076	94	553	100	.	.
829	8422	99	7614	98	903	98	1334	99	2179	98	554	100	6367	100
830	8430	99	7643	99	904	99	1335	99	2183	99	554	100	.	.
831	8497	100	7743	100	917	100	1343	100	2185	100	554	100	.	.

Table 2b. Cumulative counts and percents by day of small salmon for various rivers, 1990. The first digit of day is the month and next two digits are the day. For example, 601 is 1 June, 630 is 30 June, etc.

	River													
	Exploits		Gander		Middle Bk		Terra Nova		Biscay Bay		Northeast Placentia		Conne	
Day	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
609	.	.	.	.	.	.	.	.	.	.	.	.	1	0
611	.	.	.	.	.	.	.	.	3	0	.	.	.	.
612	.	.	.	.	.	.	.	.	5	0	.	.	2	0
613	.	.	.	.	.	.	.	.	9	1	.	.	.	.
614	.	.	.	.	.	.	.	.	.	.	.	.	41	1
615	.	.	.	.	.	.	.	.	12	1	.	.	56	1
616	.	.	.	.	.	.	.	.	28	2	.	.	62	1
617	.	.	.	.	.	.	.	.	56	3	.	.	83	2
618	1	0	4	0	.	.	.	.	67	4	.	.	88	2
619	4	0	5	0	.	.	.	.	77	5	.	.	92	2
620	7	0	10	0	.	.	.	.	96	6	.	.	473	11
621	8	0	25	0	.	.	.	.	119	7	.	.	480	11
622	10	0	33	0	.	.	.	.	144	9	.	.	485	11
623	.	.	51	1	.	.	.	.	170	10	.	.	563	13
624	12	0	71	1	.	.	.	.	212	13	.	.	652	15
625	23	0	90	1	.	.	.	.	347	21	.	.	1222	28
626	44	1	115	2	.	.	.	.	406	25	.	.	1372	32
627	64	1	146	2	2	0	.	.	487	30	.	.	1530	35
628	86	1	219	3	8	1	.	.	575	35	.	.	1853	43
629	146	2	298	4	11	1	.	.	613	37	1	0	2010	47
630	264	4	367	5	.	.	2	0	685	42	2	0	2078	48
701	337	5	469	6	12	2	.	.	745	45	3	1	2358	55
702	409	6	635	8	17	2	.	.	787	48	4	1	2471	57
703	495	7	730	10	31	4	6	1	840	51	8	1	2554	59
704	615	9	904	12	49	7	8	1	871	53	14	3	2745	64
705	862	13	1036	14	65	9	10	1	901	55	18	3	3342	77
706	1021	15	1276	17	98	13	.	.	963	58	21	4	3440	80
707	1159	17	1445	19	113	15	15	1	1031	63	28	5	3451	80
708	1347	20	1513	20	133	18	16	1	1069	65	34	6	3473	80
709	1538	23	1720	23	147	20	35	3	1100	67	41	7	3506	81
710	1790	27	1925	26	177	24	61	5	1174	71	57	10	3507	81
711	2057	31	2091	28	205	28	66	6	1232	75	81	15	3747	87
712	2312	35	2274	30	222	30	75	7	1270	77	128	23	3880	90
713	2614	39	2435	32	234	31	106	9	1286	78	169	31	3931	91
714	2877	43	2610	35	257	34	130	11	1307	79	198	36	3994	92
715	3099	47	2908	39	268	36	201	17	1319	80	223	40	4061	94
716	3299	50	3009	40	308	41	247	21	1357	82	242	44	4076	94
717	3494	53	3126	42	334	45	289	25	1377	84	273	50	4097	95
718	3677	55	3254	43	361	48	295	26	1400	85	308	56	4114	95
719	3838	58	3411	45	394	53	358	31	1420	86	346	63	.	.
720	4034	61	3701	49	414	56	449	39	1431	87	379	69	4196	97
721	4169	63	3869	51	424	57	503	44	1433	87	400	73	4219	98

Table 2b cont'd

722	4389	66	4079	54	459	62	530	46	1437	87	410	74	4233	98
723	4493	68	4236	56	472	63	610	53	1454	88	416	75	4250	98
724	4707	71	4388	58	513	69	716	62	1469	89	437	79	4278	99
725	4896	74	4540	60	574	77	773	67	1490	90	441	80	4281	99
726	4980	75	4810	64	593	80	795	69	1504	91	447	81	4312	100
727	5125	77	5141	68	606	81	809	70	1507	91	459	83	4321	100
728	5248	79	5209	69	610	82	854	74	1509	92	461	84	.	.
729	5327	80	5326	71	613	82	895	78	1511	92	466	85	.	.
730	5446	82	5428	72	620	83	928	81	1514	92	471	85	.	.
731	5521	83	5522	73	623	84	956	83	1518	92	477	87	.	.
801	5576	84	5615	75	628	84	977	85	1519	92	483	88	.	.
802	5664	85	5706	76	640	86	1003	87	1520	92	495	90	.	.
803	5718	86	5781	77	645	87	1005	87	1522	92	497	90	.	.
804	5756	87	5853	78	646	87	1016	88	.	.	.	.	.	.
805	5795	87	5950	79	653	88	1030	90	.	.	499	91	.	.
806	5849	88	6083	81	662	89	1046	91	1525	93	505	92	.	.
807	5902	89	6246	83	673	90	1058	92	1599	97	507	92	.	.
808	5956	90	6396	85	676	91	1061	92	.	.	509	92	.	.
809	6009	91	6557	87	687	92	1067	93	1617	98	514	93	.	.
810	6068	92	6661	89	691	93	1083	94	1619	98	517	94	.	.
811	6107	92	6764	90	695	93	1089	95	.	.	.	.	.	.
812	6148	93	6919	92	699	94	1091	95	1621	98	520	94	.	.
813	6175	93	7009	93	702	94	1094	95	1622	98	521	95	.	.
814	6206	94	7048	94	703	94	1095	95	1627	99	.	.	.	.
815	6251	94	7079	94	710	95	1096	95	1630	99	522	95	.	.
816	6274	95	7134	95	712	96	1100	96	1631	99	524	95	.	.
817	6297	95	7172	95	713	96	.	.	1637	99	527	96	.	.
818	6337	96	7195	96	717	96	1130	98	1638	99	530	96	.	.
819	6374	96	7223	96	721	97	.	.	.	.	537	97	.	.
820	6399	97	7241	96	723	97	.	.	1642	100	541	98	.	.
821	6422	97	7260	97	724	97	1134	99	.	.	545	99	.	.
822	6446	97	7286	97	732	98	1136	99	.	.	.	.	.	.
823	6482	98	7312	97	734	99	.	.	1643	100	.	.	.	.
824	6499	98	7334	98	.	.	1137	99	.	.	546	99	.	.
825	6517	98	7350	98	.	.	.	.	.	.	547	99	.	.
826	6537	99	7367	98	735	99	1140	99	.	.	.	.	.	.
827	6555	99	7389	98	736	99	1144	100	.	.	549	100	.	.
828	6574	99	7403	98	.	.	.	.	1647	100	.	.	.	.
829	6589	99	7432	99	738	99	1145	100	.	.	550	100	.	.
830	6602	100	7461	99	740	99	.	.	.	.	.	.	.	.
831	6629	100	7520	100	745	100	1149	100	.	.	551	100	.	.

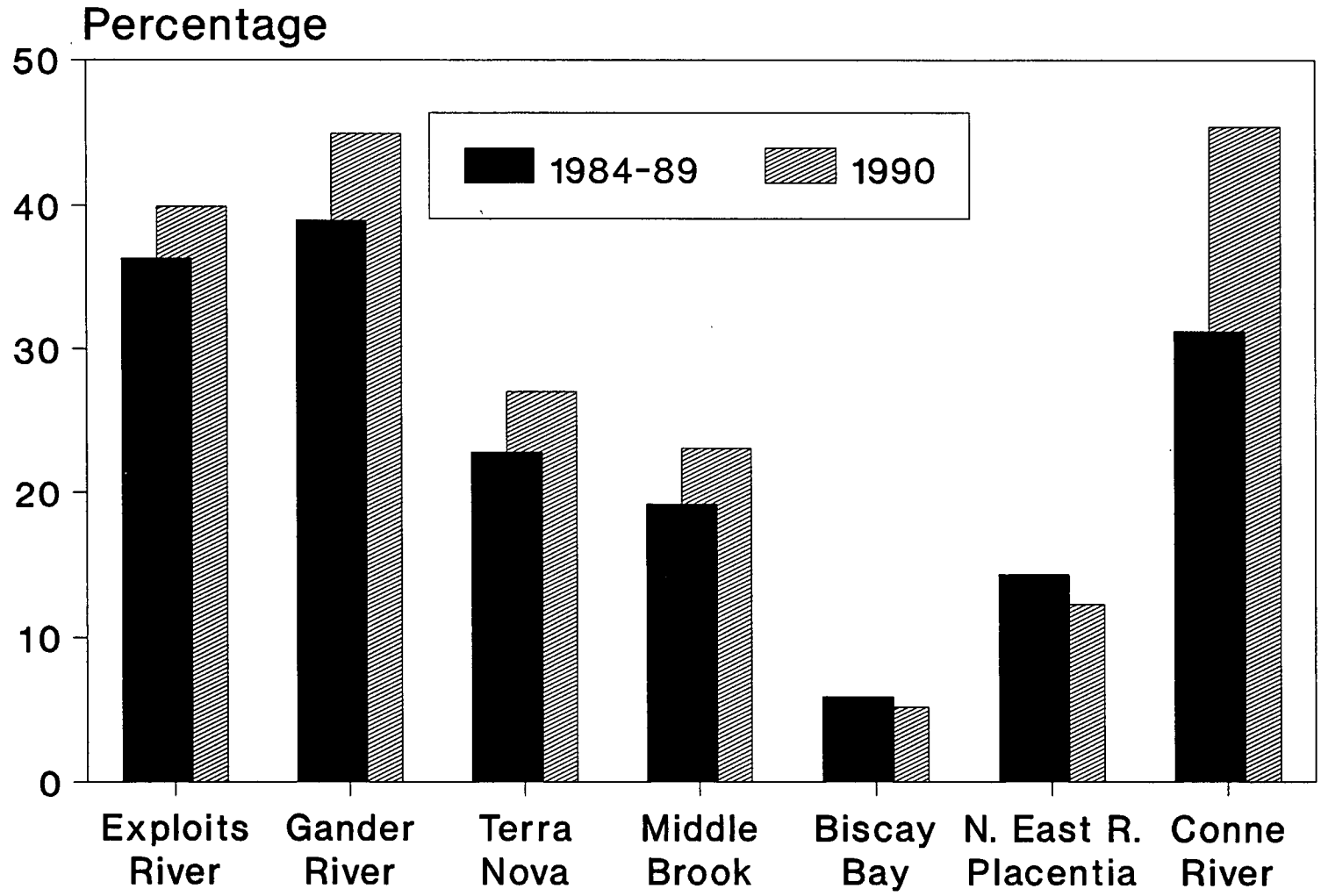

Fig. 1. Counts of small salmon to July 21, 1991, as a percentage of counts in 1984-89, or 1990, at seven monitoring facilities.