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Witch flounder in NAFO Divisions 3NO

by

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Abstract

Biomass and abundance indices from Canadian spring surveys in Div. 3N have been at very low levels since 1984. In most years the biomass index was estimated to be less than 1 000 tons or 2 million fish. Similarly mean weights and numbers per tow in the spring surveys have been very low since 1984, not exceeding 2 fish or 1 kg per tow. For Div. 3O, estimates of stock size exhibited considerable annual fluctuations on average between 3 000 and 24 000 tons or 6-44 million fish particularly in the late-1980s. Mean weight and number per tow in Div. 3O showed the same variability ranging from 3-18 fish per tow at 1-10 kg per tow. In 2003, an increase in the mean numbers and weights per tow (from 2.81 kg/tow and 7.55 fish/tow in 2002 to 6 kg/tow and 17.98 fish/tow in 2003) can be attributed to one large set. The data for Div. 3NO combined suggest an overall-declining trend in stock size with the estimates for the spring 1998 survey at the lowest level observed since 1984. Since then, all indices have generally increased but remain variable.

Indices from Canadian fall surveys for Div. 3N are similar to the spring in both stock size estimates, which are very low but lack trend. Indices are highly variable for Div. 3O in the fall surveys and also lack any overall trend. Nonetheless, the estimates for each seasonal series are generally within the same numeric range.

Fisheries and Management

Catches in the 1960s peaked at 11 000-12 000 tons in 1967-68 and remained relatively high during the next several years (Table 1; Fig. 1). During the period 1971-84 catches ranged from a low of about 2 400 tons in 1980 and 1981 to as high as 15 000 tons in 1971 which is the highest recorded catch in the history of the fishery, however, from 1975-84 annual catches rarely exceeded 6 000 tons. Species specific catch statistics for flatfish prior to 1973 were largely developed from breakdowns of unspecified flounders and therefore should be quoted with caution.

As a result of an increase in fishing effort in the NRA during 1985 and 1986, especially by EU-Spain and EU-Portugal, catches rose rapidly to levels of 8 800 and 9 100 tons, respectively. This increased effort was primarily concentrated on the "tail" of the Grand Bank in the NAFO Regulatory area of Div. 3N. Non-Contracting parties such as South Korea, USA, Cayman Islands and Panama also contributed to increased catch levels during this period. Catches remained relatively high in 1987 and 1988 at 7 600 and 7 300 tons, respectively. During 1990-93 estimated catches were in the range of 4 200-5 000 tons. The estimated catch for 1994 was still in the order of 1 100 tons despite a moratorium being introduced on fishing this stock (Table 1; Fig. 1). The catch dropped to 300 tons in 1995 likely as a result of a substantial reduction in fishing effort for Greenland halibut where witch flounder comprises a by-catch. Since then catches have increased steadily and by 1999 was about 800 tons although declined again to an estimated 450 tons in 2002 (Table 1; Fig. 1). In 2003 several sources of catch data were available and a single source could not be considered more valid. As a result, catches were estimated to range between 850 and 2 239 tons and the mean value of 1 544 tons was used for the purpose of this assessment (Table 1; Fig 1).

Historically, mostly Canada and the former Soviet Union conducted the fishery. Canadian catches fluctuated from between 1 200 and 3 000 tons from 1985-91 but increased to about 4 300 tons in 1992 and 4 200 in 1993 (Table 1). The increase in 1992 and 1993 was essentially the result of a quota transfer to Canada by the Russian Federation. Canada has taken very little catch since then due to the moratorium. Catches by the USSR/Russian vessels declined from between 1 000 and 2 000 tons in the period 1982-88 to less than 100 tons in 1989-90 and little or no catch since then until 1999-2003 when Russia caught between 50 and 112 tons (Table 1).

The first total allowable catch (TAC) for this resource was introduced by ICNAF in 1974 at a level of 10 000 tons largely based on average historical catches (Fig. 1). This level remained in effect until 1979 when it was reduced to 7 000 tons in consideration of declining commercial catch rates. It was further reduced to 5 000 tons in 1981 and remained at that level to 1993. The Scientific Council advised that for 1994 catches from this stock should not exceed 3 000 tons. A TAC of 3 000 tons was agreed by the NAFO Fisheries Commission, however, it was also agreed that no directed fishery would be conducted for witch flounder in 1994 due to the poor state of the stock and to allow for rebuilding. The NAFO Fisheries Commission introduced a complete moratorium for directed fishing in 1995 which has continued through 2003.

Research Vessel Surveys

Stratified-random research vessel surveys have been carried out by Canada on the Grand Bank (including Div. 3NO) during spring since 1971 although during the early period coverage was limited and, in fact, for most years only surveyed to 366 meters. Since 1990, on the other hand, depth coverage was extended to 720 meters, which should be more representative of the stock distribution. Nevertheless, this still may not cover the entire range of depth distribution of witch flounder when compared to its distribution observed in other stock areas during recent years. In addition to spring surveys, a time series of fall surveys was begun in 1990 to investigate seasonal variation in stock distribution and abundance of various groundfish species. In fall 1998 the survey depth range was further extended to 1 500 meters.

Beginning with the 1995 fall survey the survey gear was changed from an *Engel 145* groundfish trawl with steel bobbin footgear to a *Campelen 1800* shrimp trawl with rockhopper footgear. The data from these surveys have now been converted from Engel trawl catches to Campelen 1800 trawl catch equivalents. Only the converted survey data are presented here.

Survey Biomass and Abundance Indices

Biomass (Tables 2-5) and abundance (Tables 6-9) estimates by stratum are presented for the spring and fall surveys in NAFO Div. 3N and 3O, respectively. Mean numbers (Tables 10-13) and weights (Tables 14-17) per tow are also presented by stratum and division for the spring and fall surveys. Graphical plots to better illustrate the comparative trends in stock biomass and abundance by season are presented by NAFO Div. 3N and 3O separately and combined in Fig. 2-4, respectively.

All indices derived from spring surveys (which are the longer time series) in Div. 3N have been at very low levels throughout the period since 1984. In most years, trawlable stock size was estimated to be less than 1 000 tons or 2 million fish, and less than 1.5 fish (0.60 kg) per tow were caught in the surveys (Fig. 2; Tables 2, 6, 10 and 14). Estimates for recent years remain low. For Div. 3O, estimates of stock size showed considerable annual fluctuations on average between 8 000 and 24 000 tons or 6-44 million fish particularly in the late-1980s (Fig. 2; Tables 3 and 7). Mean weight and number per tow also varied annually, ranging from about 10 kg (18 fish) per tow in 1985 to a low of less than 1 kg or 3 fish per tow in 1998 (Fig. 2; Tables 11 and 15). The indices show overall declining trends from the mid-80s to lowest values in 1998 and 1999. Although wide fluctuations continue to occur since then, some improvement in the estimates are indicated (Fig. 4). Peaks in the indices in some years may be related to distribution changes or single large catches, considering the wide confidence limits (see Fig. 6-8 for illustration). In 2003 a single large set (684 fish) in one stratum increased the indices from 2002 with very wide confidence limits.

Indices derived from the fall surveys in Div. 3N are, similar to the spring series, very low and lack trend (Fig. 3; Tables 4, 8, 12, and 16). The data trends for Div. 3O in the fall surveys are quite different than in the spring series (Fig. 3; Tables 5, 9, 13 and 17). There is an increasing trend for 1991-96, however, when the higher value for 1990 and the lower values for 1997 and 1998 are included the trend is removed (Fig. 3). Confidence limits depicted in

Fig. 3 are wide for this time period as well, arguing against any significant trend in the indices. Nonetheless, the estimates for each seasonal series are generally within the same numeric range. With Div. 3NO combined, the most recent indices from the spring surveys, although variable, are improved since 1998 (Fig. 4). The fall survey series for Div. 3NO combined is less clear with no real trend in biomass, mean number or weight per tow. It should be emphasized as well that the more recent estimates are also based on more detailed survey coverage than in the earlier years.

Resource Status

The spring survey indices indicate that the resource was at its lowest levels in the mid to late-1990s, from higher levels in the 1980s. The general trend in this longer (spring) survey series suggests that the stock showed some slight improvement since then. No aging data have been available since 1994 and are not expected to be available in the foreseeable future. Therefore, it is difficult to comment on any recruitment prospects for the resource. Population abundance at length from true *Campelen 1800* surveys in the fall of 1995-2003 indicated a higher proportion of smaller fish in the 1998-2000 surveys (Fig. 5), which may be contributing to the apparent improvement in the stock in recent years. The peak of smaller fish seen in most years was absent from the 2001 and 2003 fall surveys, but 2002 showed a significant amount of fish at the smaller sizes.

Table 1. Catches and TACs (t) of Witch Flounder in Div. 3NO
from 1960-2003.

Year	USSR			Total	TAC
	Canada	(Russia)	Other		
1960	-	-	-	5799	
1961	-	-	-	4627	
1962	-	-	-	1228	
1963	895	485	803	2183	
1964	1055	-	11	1066	
1965	1324	849	4	2177	
1966	3644	3828	50	7522	
1967	2863	8565	75	11503	
1968	1503	9078	18	10599	
1969	479	4215	6	4700	
1970	723	6039	1	6763	
1971	178	14774	13	14965	
1972	3419	5738	20	9177	
1973	4943	1714	34	6691	
1974	2807	5235	3	8045	10000
1975	1137	5019	12	6168	10000
1976	3044	2991	-	6035	10000
1977	3013	2742	4	5759	10000
1978	1165	2275	33	3473	10000
1979	1193	1868	16	3077	7000
1980	425	1994	1	2420	7000
1981	381	2044	-	2425	5000
1982	1760	1969	3	3732	5000
1983	1674	1942	-	3616	5000
1984	834	1955	13	2802	5000
1985	2746	1908	4117	8771	5000
1986	2937	1724	4470	9131	5000
1987	2829	1425	3342	7596	5000
1988	1927	1037	4361	7325	5000
1989	1241	81	2366	3688	5000
1990	2654	9	1516	4179	5000
1991	2624	-	2223	4847	5000
1992	4328	-	632	4960	5000
1993	4337	3	250	4414	5000
1994	2	-	1117	1119	3000
1995	-	-	300	300	0
1996	64	-	294	358	0
1997	19	-	493	512	0
1998	2	5	605	612	0
1999	6	86	671	763	0
2000	12	50	483	545	0
2001	13	34	647	694	0
2002	26	112	312	450	0
2003	62	59	1423*	1544*	0

Note: Although a TAC of 3000 tons was agreed by the FC,
it was also agreed that no directed fishing be conducted
in 1994 due to the poor state of the stock.

*The catch for Other sources in 2003 is the mean of a range of catch
information.

Table 2. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2003. (Engel 145 data converted to Campelen Units for 1984-95).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
<=56	1593	1593	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1499	1499	376	0	0	0	19	0	0	0	0	0	0	0	0	0	0	8	18	0	0	0	0
57 - 92	2992	2992	360	1715	89	629	461	1519	175	0	0	29	165	0	0	115	33	120	266	0	0	0	19
	1853	1853	361	119	0	0	39	50	0	20	0	0	0	0	39	0	0	0	0	242	45	0	0
	2520	2520	362	0	82	23	18	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2520	2520	373	0	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	931	931	374	0	0	0	0	0	0	0	0	0	18	34	0	0	0	0	0	0	0	0	30
	674	674	383	0	57	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93 - 183	421	421	359	231	47	99	43	306	121	0	0	0	19	0	0	0	0	0	67	149	58	13	0
	100	100	377	8	0	0	72	3	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	647	647	382	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184 - 274	225	225	358	40	308	42	137	20	29	57	0	44	132	106	7	51	49	134	6	9	154	14	168
	139	139	378	22	19	32	155	31	42	0	0	29	0	0	0	0	3	0	0	0	0	5	8
	182	182	381	21	7	32	101	69	0	28	0	0	0	0	0	0	0	0	0	0	0	7	0
275 - 366	164	164	357	8	87	154	4	4	60	21	0	31	49	81	20	36	12	159	21	75	17	26	65
	106	106	379	36	12	23	173	44	20	35	3	18	0	4	0	0	9	2	26	4	4	0	4
	116	116	380	6	53	0	134	24	7	4	0	0	0	0	0	0	0	0	6	0	0	0	3
367 - 549	155	155	723	90	102	79	36	51	16	25	53	33	36	23	130	60							
	105	105	725	62			40	44	0	5	28	4	20	32	8	3	7						
	160	160	727	0	5	38	17	0	0	0	3	9	13	12	3	0	0						
550 - 731	124	124	724	327	181	218	51	36	29	157	53	105	106	127	96	101							
	72	72	726	81	25	22	28	3	12	42	96	59	65	84	18	50							
	156	156	728	92	19	82	22	152	21	15	32	45	98	43	53								
732 - 914	.	134	752										27										
	.	106	756										33										
	.	154	760										26										
Grand Total				2205	761	1078	1401	2218	485	164	655	484	862	510	308	170	443	566	525	1042	632	380	532

Table 3. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during spring of 1984-2003. (Engel 145 data converted to Campelen Units for 1984-95).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
57 - 92	2089	2089	330	0	0	0	0	22	0	0	0	0	0	0	0	0	0	21	121	111	0	0	0
	456	456	331	1912	302	36	18	444	0	0	0	0	0	0	0	74	0	36	537	28	375	102	0
	1898	1898	338	134	7806	1108	1184	3075	1827	434	0	109	295	0	228	870	0	357	780	183	1354	121	320
	1716	1716	340	40	146	0	21	0	0	15	0	147	0	0	0	0	0	0	0	83	0	0	0
	2520	2520	351	688	211	385	222	978	217	109	0	0	0	0	0	0	0	0	21	22	0	0	0
93 - 183	2580	2580	352	82	951	225	1275	1330	664	1426	40	105	60	40	63	59	100	53	1196	130	53	693	27
	1282	1282	353	4519	1122	1067	1609	7208	2486	1637	0	243	209	0	42	23	2	272	2209	1300	469	688	470
	1721	1721	329	0	0	0	0	789	48	27	494	0	0	5071	193	0	11	51	240	26	0	0	2209
	1047	1047	332	3779	8589	2485	3367	6829	1485	4599	2426	2182	359	58	1791	1180	235	460	981	407	3025	2458	10236
	948	948	337	50	4129	1415	1506	1061	1543	1627	1581	580	675	50	654	330	163	321	879	936	1823	752	715
184 - 274	585	585	339	335	0	16	223	136	0	0	0	0	0	0	0	1	0	0	0	1	0	5	2
	474	474	354	495	105	1231	233	345	47	240	144	149	841	0	0	36	0	226	1062	826	914	553	163
	151	147	333	10	48	10	0	67	16	129	498	79	80	5196	162	7	109	25	27	30	122	375	63
	121	121	336	12	7	43	25	63	0	53	492	1374	100	1057	62	180	293	23	47	27	163	598	211
	103	103	355	45	181	38	71	0	97	126	136	16	34	129	43	86	48	50	18	14	87	193	340
275 - 366	92	96	334	0	42	42	18	22	23	26	20	108	20	860	15	150	362	4	7	11	2	143	133
	58	58	335	0	98	18	2	51	22	92	42	1107	65	103	43	78	109	2	62	128	8	8	53
	61	61	356	5	83	17	23	18	29	55	39	129	77	75	62	40	11	29	23	14	34	38	49
	93	166	717	11	120	35	2375	53	465	4353	44	19	17	41	201	142							
	76	76	719	148	1024	49	14	18	137	601	15	16	25	12	95	39							
367 - 549	76	76	721	76	48	31	72	18	16	19	38	37	28	85	38	26							
	111	134	718	35	29	104	221	80	71	37	33	38	15	57	55	43							
	105	105	720	217	134	182	95	15	21	150	32	21	40	38	7	23							
	93	93	722	18	49	150	217	206	89	87	31	71	47	121	62	64							
	.	105	764	60																			
732 - 914	.	135	772	75																			
	Grand Total	12108	23820	8136	9799	22438	8503	10594	6415	7734	3364	15769	3748	3915	6691	2121	8411	4448	8786	7182	15323		

Table 4. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	90	91	92	93	94	95	96	97	98	99	00	01	02	03
<=56	1593	1593	375	0	73	0	0	0	0	0	0	0	0	0	0	35	0
	1499	1499	376	0	0	0	0	0	14	0	22	0	0	0	0	38	28
57 - 92	2992	2992	360	265	171	1297	173	75	888	23	427	431	177	535	326	520	586
	1853	1853	361	28	467	463	0	32	0	0	14	0	268	28	170	148	99
	2520	2520	362	400	221	87	0	0	0	0	0	0	32	0	0	0	136
	2520	2520	373	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	931	931	374	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	674	674	383	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93 - 183	421	421	359	0	0	278	0	0	22	0	0	1213	1	0	121	42	110
	100	100	377	0	0	0	0	8	0	0	0	0	0	0	0	0	0
	647	647	382	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184 - 274	225	225	358	0	20	66	24	0	74	0	11	30	19	40	45	0	145
	139	139	378	0	41	15	0	0	0	0	1	0	0	0	3	5	0
	182	182	381	0	0	0	0	0	0	0	1	0	0	0	7	0	0
275 - 366	164	164	357	0	234	9	187	43	85	0	27	0	0	52	18	21	41
	106	106	379	4	0	4	0	0	0	1	7	0	0	2	111	33	8
	116	116	380	0	0	0	0	0	0	0	0	1	2	5	0	0	0
367 - 549	155	155	723	0	41	0	163	180	57	15	28	74	27	28	66	16	123
	105	105	725	0	0	15	376	46	19	0	135	10	33	19	7	5	10
	160	160	727	0	0	0	38	0	0	0	29	7	4	0	10	0	0
550 - 731	124	124	724	0	172	0	414	180	104	60	197	72	181	87	70	90	0
	72	72	726	0	0	0	310	54	48	40	21	38	34	16	22	59	52
	156	156	728	0	0	0	0	153	35	21	76	78	106	153	103	286	178
732 - 914	.	134	752	0	0	0	0	0	0	0	0	120	0	23	0	1	0
	.	106	756	0	0	0	0	0	0	0	0	124	0	51	83	9	0
	.	154	760	0	0	0	0	0	0	0	0	88	0	41	78	173	0
915 -1097	.	138	753	0	0	0	0	0	0	0	0	0	0	0	0	3	0
	.	102	757	0	0	0	0	0	0	0	0	0	0	0	37	7	0
	.	171	761	0	0	0	0	0	0	0	0	46	0	147	42	10	0
1098 -128	.	180	754	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	99	758	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	212	762	0	0	0	0	0	0	0	0	0	0	0	109	0	0
1281 -146	.	385	755	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	127	759	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	.	261	763	0	0	0	0	0	0	0	0	0	0	19	5	10	0
Grand Total				696	1441	2235	1647	808	1346	160	993	2333	884	1244	1435	1511	1516

Table 5. Estimated Biomass (tons) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	90	91	92	93	94	95	96	97	98	99	00	01	02	03
57 - 92	2089	2089	330	122	67	79	0	0	247	0	72	168	208	48	284	342	438
	456	456	331	22	315	134	0	0	108	0	0	256	946	243	468	775	306
	1898	1898	338	2226	438	837	3966	2193	4684	503	1329	483	2736	375	943	976	2666
	1716	1716	340	173	280	63	0	0	204	0	22	0	415	104	172	123	57
	2520	2520	351	1690	284	72	0	0	0	0	0	37	205	0	172	0	25
	2580	2580	352	1415	896	1352	946	228	379	273	573	374	1491	920	430	789	964
	1282	1282	353	2405	343	477	0	732	538	789	168	1066	2996	2379	1360	1490	1204
93 - 183	1721	1721	329	99	85	0	18	0	417	0	173	305	0	0	282	732	97
	1047	1047	332	2102	155	1724	813	321	1114	4569	190	245	1664	544	343	1155	807
	948	948	337	1333	188	954	563	2132	421	492	322	479	978	344	67	211	352
	585	585	339	1132	224	651	119	742	1911	0	481	261		344	338	1927	457
	474	474	354	1291	23	316	75	210	191	4647	215	201	103	766	258	470	967
184 - 274	151	147	333	221	11	22	30	92	26		4	6	33	4	20	17	48
	121	121	336	82	151	76	298	13	35	32	19	19	67	31	37	23	10
	103	103	355		497	93	120	25	16	343	6	14	110	35	5	6	6
275 - 366	92	96	334	24	16	0	9	17	4		5	1	7	5	14	9	8
	58	58	335	194	25	25	30	18	1	23	0	1	23	8	3	9	1
	61	61	356		11	7	430	98	7	60	3	4	32	22	7	3	6
367 - 549	93	166	717	30			0	32	37		12	42	260	0	13	11	54
	76	76	719	110	2		65	6	1	226	19	9	10	14	29	6	15
	76	76	721		18		169	67	21	54	6	14	67	17	2	14	17
550 - 731	111	134	718				22	68	8		68	47	53	34	50	54	161
	105	105	720				73	0	13	68		2	17	4	83	26	31
	93	93	722		9		81	21	14	39	12	12	26	8	15	5	7
732 - 914	.	105	764									75		12	21	36	
	.	99	768									18		7	18	38	
	.	135	772									173		62	49	29	
915 -1097	.	124	765									24		3	20	55	
	.	138	769									17		5	28	59	
	.	128	773									4		13	32	89	12
1098 -128	.	144	766											24	2	37	
	.	128	770											4	23	67	
	.	135	774											4	31	15	27
1281 -146	.	158	767											15	0	0	
	.	175	771											0	17	0	
	.	155	775											0	0	0	28
Grand Total				14671	4036	6884	7827	7013	10397	12117	3698	4356	12446	6396	5586	9619	8798

Table 6. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2003. (Engel 145 data converted to Campelen Units for 1984-95).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	
<=56	1593	1593	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1499	1499	376	0	0	0	26	0	0	0	0	0	0	0	0	0	0	34	34	0	0	0	0	
57 - 92	2992	2992	360	2234	129	728	741	2641	220	0	0	59	224	0	0	0	132	65	224	613	0	0	82	
	1853	1853	361	153	0	0	32	36	0	28	0	0	0	0	36	0	0	0	0	212	85	0	0	
	2520	2520	362	0	95	25	27	173	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2520	2520	373	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	931	931	374	0	0	0	0	0	0	0	0	0	43	43	0	0	0	0	0	0	0	0	85	
674	674	383	0	62	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
93 - 183	421	421	359	405	58	232	58	985	203	0	0	0	29	0	0	0	0	0	0	203	405	58	29	0
	100	100	377	14	0	0	186	7	83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	647	647	382	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184 - 274	225	225	358	77	557	93	279	31	46	93	0	93	294	232	31	77	83	261	15	41	325	28	296	
	139	139	378	48	29	48	354	86	115	0	0	96	0	0	0	0	8	0	0	0	8	33	8	
	182	182	381	25	13	42	163	75	0	25	0	0	0	0	0	0	0	13	0	0	11	0	0	
275 - 366	164	164	357	23	180	553	11	237	56	0	90	124	102	23	40	30	373	259	293	63	55	150		
	106	106	379	66	36	68	423	102	44	109	7	44	0	22	0	0	18	6	102	28	13	0	16	
	116	116	380	8	88	0	247	32	8	8	0	0	0	0	0	0	0	0	8	0	0	0	8	
367 - 549	155	155	723	288	341	256	53	181	45	51	149	96	171	88	322	152								
	105	105	725	166	101	87	0	13	235	26	51	72	19	6	17									
	160	160	727	0	11	55	22	0	11	33	33	21	10	0	0									
550 - 731	124	124	724	1134	580	597	188	119	128	432	144	550	500	516	267	283								
	72	72	726	213	59	30	114	5	33	183	322	213	198	346	65	134								
	156	156	728	182	21	139	29	172	134	64	158	145	258	136	143									
732 - 914	.	134	752	3053	1246	1837	2595	4180	954	320	1991	1394	1892	1110	567	470	1184	1491	1947	2701	1799	1027	1289	
	.	106	756	87																				
	.	154	760	95																				
Grand Total				3053	1246	1837	2595	4180	954	320	1991	1394	1892	1110	567	470	1184	1491	1947	2701	1799	1027	1289	

Table 7. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during spring of 1984-2003. (Engel 145 data converted to Campelen Units for 1984-95).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
57 - 92	2089	2089	330	0	0	0	0	32	0	0	0	0	0	0	0	0	73	36	210	242	0	0	0
	456	456	331	3555	376	94	31	1004	0	0	0	0	0	0	0	63	0	94	1104	63	721	94	0
	1898	1898	338	209	11894	1509	1944	5418	2480	587	0	131	479	0	305	1417	0	671	1973	348	2263	305	609
	1716	1716	340	59	210	0	26	0	0	52	0	142	0	0	0	0	0	0	0	142	0	0	0
	2520	2520	351	924	231	495	267	1317	240	116	0	0	0	0	0	0	0	0	39	43	0	0	0
93 - 183	2580	2580	352	101	1807	431	2048	1839	928	1775	51	89	51	44	71	79	197	35	1814	197	44	1952	44
	1282	1282	353	9347	1234	1713	2146	13050	3880	2910	0	265	353	0	35	35	265	459	5055	2539	901	831	1102
	1721	1721	329	0	0	0	0	1454	53	34	763	0	0	12263	521	0	35	68	623	47	0	0	5303
	1047	1047	332	11018	16592	6529	7230	16023	2852	10572	4513	5761	504	432	3925	2927	5665	1085	5045	2232	8354	6769	32886
	948	948	337	130	9181	2634	3543	2641	2556	2608	3182	815	2087	87	1239	826	469	848	3709	3260	6738	1826	1565
184 - 274	585	585	339	443	0	80	268	134	0	0	0	0	0	0	0	161	36	80	36	80	282	241	0
	474	474	354	1174	239	3282	456	619	196	359	261	261	1663	0	0	98	33	563	3208	2739	2100	1467	359
	151	147	333	21	156	35	0	145	52	332	1361	187	301	13447	425	30	277	140	267	261	576	940	215
	121	121	336	25	17	175	67	208	0	158	1365	3287	266	3029	125	432	682	150	173	219	583	1273	524
	103	103	355	92	418	128	135	0	383	510	340	28	99	340	99	168	195	157	38	41	220	569	945
275 - 366	92	96	334	0	95	165	63	95	44	51	38	272	63	2238	40	462	880	7	161	167	30	376	533
	58	58	335	0	203	40	8	148	68	331	109	2340	223	215	108	192	243	12	169	368	60	47	131
	61	61	356	17	214	38	55	109	80	126	92	348	319	189	126	88	40	90	54	50	67	78	131
	367 - 549	93	166	717	32	371	166	5960	228	1362	11566	710	237	162	273	651	468						
		76	76	719	288	2535	267	37	42	364	1161	150	112	228	97	268	89						
76		76	721	235	209	94	193	42	42	63	214	152	112	204	139	84							
550 - 731		111	134	718	282	122	512	1161	535	518	507	517	324	138	525	1189	578						
		105	105	720	361	376	1026	498	43	101	518	186	104	351	309	50	104						
	93	93	722	45	166	512	518	601	274	819	177	364	207	361	198	210							
	732 - 914	.	105	764	217																		
		.	135	772	501																		
Grand Total																							
27114 42867 17347 18286 44236 13811 20520 13317 17705 8983 41372 8508 9639 23724 6449 24969 14238 24707 19265 45880																							

Table 8. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	90	91	92	93	94	95	96	97	98	99	00	01	02	03
<=56	1593	1593	375	0	55		0	0	0	0	0	0	0	0	0	55	0
	1499	1499	376	0	0	0	0	0	23	0	19	0	0	0	0	0	59
57 - 92	2992	2992	360	382	206	1646	320	103	1232	41	672	755	360	926	514	1080	1022
	1853	1853	361	32	425	701	0	42	0	0	23	0	306	51	204	255	102
	2520	2520	362	441	277	116	0	0	0	0	0	0	50	0	0	0	198
	2520	2520	373	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	931	931	374	0	0		0	0	0	0	0	0	0	0	0	0	0
	674	674	383	0	0		0	0	0	0	0	0	0	0	0	0	0
93 - 183	421	421	359	0	0	608	0	0	87	0	0	2722	29	0	405	116	232
	100	100	377	0		0	0	7	0	0	0	0	0	0	0	0	0
	647	647	382	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184 - 274	225	225	358	0	46	108	31	0	234	0	31	93	46	69	136	0	307
	139	139	378	0	105	19	0	0	0	0	8	10	0	0	8	10	0
	182	182	381		0		0	0	0	0	7	13	0	0	11	0	0
275 - 366	164	164	357	0	384	23	338	135	180	0	60	0		124	33	20	102
	106	106	379	7		15	0	0	0	19	22	0	0	6	296	91	26
	116	116	380		0		0	0	0	0	0	8	8	24	0	0	0
367 - 549	155	155	723		53		330	394	117	21	88	313	85	104	190	57	347
	105	105	725			36	701	173	49	0	237	29	101	71	22	14	29
	160	160	727				0	44	11	0	55	11	11	0	13	0	11
550 - 731	124	124	724		443		1126	512	223	178	571	326	640	337	264	270	
	72	72	726				669	114	119	99	40	92	125	40	37	176	129
	156	156	728					268	195	129	212	215	311	417	223	633	351
732 - 914	.	134	752									165		28	0	74	
	.	106	756									255		149	182	22	
	.	154	760									244		229	409	530	
915 - 1097	.	138	753									0		9	0	33	
	.	102	757									0		0	96	92	
	.	171	761									106		578	202	24	
1098 - 128	.	180	754									0		0	0	12	
	.	99	758									0		0	0	8	
	.	212	762											0	483	0	
1281 - 146	.	385	755									0		0	0	0	
	.	127	759									0		0	9	0	
	.	261	763											72	18	88	
Grand Total				863	1995	3272	3515	1793	2470	488	2046	5355	2073	3233	3756	3717	2912

Table 9. Abundance (000s) of Witch flounder (M+F) in each stratum from surveys in Div. 3O during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	90	91	92	93	94	95	96	97	98	99	00	01	02	03
57 - 92	2089	2089	330	131	144	72	0	0	517	0	96	335	383	192	575	588	766
	456	456	331	42	502	125	0	0	408	0	0	596	4799	533	1066	1850	1004
	1898	1898	338	3264	627	1436	6893	4700	8459	522	2872	1723	7572	609	1984	2245	6893
	1716	1716	340	262	330	118	0	0	295	0	47	0	1652	189	378	189	94
	2520	2520	351	1837	347	58	0	0	0	0	0	50	347	0	198	0	50
	2580	2580	352	1597	1242	2011	1115	355	371	355	1141	754	1825	1668	1065	1448	2296
	1282	1282	353	2822	485	941	0	1176	999	882	573	5467	5996	6172	2954	9523	3395
93 - 183	1721	1721	329	132	101	0	47	0	663	0	616	852	0	0	805	1989	379
	1047	1047	332	3625	396	5281	2064	960	5233	11954	1248	2544	7393	3249	1392	4342	3738
	948	948	337	2347	424	2347	1043	5216	1434	717	1130	1613	3738	1623	348	714	1434
	585	585	339	1556	241	724	121	966	2776	0	1086	356		3943	563	3822	684
	474	474	354	1891	33	685	359	424	489	8955	489	782	391	2478	630	1415	1989
184 - 274	151	147	333	582	52	83	62	312	187		192	147	152	27	118	90	243
	121	121	336	222	466	216	633	42	549	208	100	215	300	141	150	58	75
	103	103	355		1459	298	425	85	63	768	28	170	411	85	21	28	21
275 - 366	92	96	334	76	70	0	21	57	56		33	20	58	18	36	35	53
	58	58	335	371	100	112	68	52	64	64	4	40	48	37	8	39	12
	61	61	356		25	8	1254	252	40	113	13	34	75	55	19	17	34
367 - 549	93	166	717	122			0	96	703		46	833	2166	0	91	203	351
	76	76	719	209	42		277	10	52	612	183	178	99	75	183	37	96
	76	76	721		47		444	183	102	131	17	125	311	98	10	84	81
550 - 731	111	134	718				107	428	164		535	618	581	396	488	1432	1483
	105	105	720				339	0	105	316		29	202	39	762	298	302
	93	93	722		26		243	58	64	134	51	103	122	70	94	34	50
732 - 914	.	105	764									357		72	144	217	
	.	99	768									217		24	163	374	
	.	135	772									1514		669	383	190	
915 - 1097	.	124	765									165		31	119	289	
	.	138	769									180		38	237	380	
	.	128	773									35		136	346	708	94
1098 - 128	.	144	766											113	11	146	
	.	128	770											36	185	460	
	.	135	774											28	241	119	244
1281 - 146	.	158	767											65	0	0	
	.	175	771											0	132	0	
	.	155	775											0	0	0	213
Grand Total				21086	7158	14515	15517	15369	23795	25731	10499	20054	38620	22908	15520	33557	26262

Table 10. Mean numbers per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2003. (Engel 145 data converted to Campelen Units for 1984-95).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03					
<=56	1593 1499	1593 1499	375 376	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.13	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.17	0.00 0.17	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00					
57 - 92	2992 1853 2520 2520	2992 1853 2520 2520	360 361 362 373	5.43 0.60 0.00 0.00	0.31 0.00 0.27 0.00	1.77 0.00 0.07 0.14	1.80 0.13 0.08 0.00	6.42 0.14 0.50 0.00	0.53 0.00 0.00 0.00	0.00 0.11 0.00 0.00	0.00 0.00 0.00 0.00	0.14 0.00 0.00 0.00	0.55 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.14 0.00 0.00	0.00 0.00 0.00 0.00	0.32 0.00 0.00 0.00	0.16 0.00 0.00 0.00	0.55 0.00 0.00 0.00	1.49 0.83 0.00 0.00	0.00 0.33 0.00 0.00	0.00 0.00 0.00 0.00	0.20 0.00 0.00 0.00					
93 - 183	674 421 100 647	674 421 100 647	383 359 377 382	0.00 7.00 1.00 0.00	0.67 1.00 0.00 0.00	0.00 4.00 0.00 0.00	0.33 1.00 0.00 0.33	0.00 17.00 0.50 0.00	0.00 3.50 6.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.50 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00				
184 - 274	225 139 182	225 139 182	358 378 381	2.50 2.50 1.00	18.00 2.50 0.50	3.00 4.67 0.00	9.00 29.00 6.50	1.00 7.00 3.00	1.50 3.00 0.00	3.00 7.50 1.00	0.00 0.50 0.00	3.00 3.00 0.00	9.50 0.00 0.00	7.50 0.00 0.00	1.00 0.00 0.00	2.50 0.00 0.00	2.67 0.44 0.00	8.44 0.00 0.50	0.50 0.00 0.00	1.33 0.00 0.00	10.50 0.44 0.44	0.89 1.71 0.00	9.57 0.44 0.00	0.00 0.00 0.00				
275 - 366	164 106 116	164 106 116	357 379 380	1.00 4.50 0.50	8.00 2.50 5.50	24.50 4.67 0.00	29.00 29.00 15.50	2.00 7.00 2.00	0.50 3.00 0.50	2.50 7.50 0.50	0.00 0.50 0.00	4.00 3.00 0.00	5.50 0.00 0.00	4.50 1.50 0.00	1.00 0.00 0.00	1.78 0.00 0.00	1.33 1.24 0.00	16.56 0.44 0.00	11.50 7.00 0.50	4.50 3.50 1.50	8.00 5.00 0.94	4.11 1.33 0.44	15.11 2.44 0.00	7.11 6.67 0.50	0.00 0.00 0.00			
367 - 549	155 105 160	155 105 160	723 725 727	13.50 11.50 0.00	16.00 7.00 0.00	12.00 2.50 2.50	2.50 7.00 2.50	8.50 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	2.13 0.89 0.89	
550 - 731	124 72 156	124 72 156	724 726 728	66.50 21.50 8.50	34.00 6.00 1.00	35.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50	11.00 3.00 6.50
732 - 914	. . . 154	. . . 154	752 756 760	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50	2.00 6.00 4.50
GrandTotal				1.33	0.54	0.80	1.14	1.82	0.42	0.14	0.83	0.58	0.79	0.45	0.24	0.20	0.50	0.62	0.81	1.12	0.75	0.43	0.54					

Table 12. Mean numbers per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	90	91	92	93	94	95	96	97	98	99	00	01	02	03
<=56	1593	1593	375	0.00	0.25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00
	1499	1499	376	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.09	0.00	0.00	0.00	0.00	0.29	0.29
57 - 92	2992	2992	360	0.93	0.50	4.00	0.78	0.25	2.99	0.10	1.63	1.83	0.88	2.25	1.25	2.63	2.48
	1853	1853	361	0.13	1.67	2.75	0.00	0.17	0.00	0.00	0.09	0.00	1.20	0.20	0.80	1.00	0.40
	2520	2520	362	1.27	0.80	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.57
	2520	2520	373	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	931	931	374	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
674	674	383	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
93 - 183	421	421	359	0.00	0.00	10.50	0.00	0.00	1.50	0.00	0.00	47.00	0.50	0.00	7.00	2.00	4.00
	100	100	377	0.00		0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	647	647	382	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
184 - 274	225	225	358	0.00	1.50	3.50	1.00	0.00	7.56	0.00	1.00	3.00	1.50	2.22	4.39	0.00	9.91
	139	139	378	0.00	5.50	1.00	0.00	0.00	0.00	0.00	0.44	0.50	0.00	0.00	0.44	0.50	0.00
	182	182	381		0.00		0.00	0.00	0.00	0.00	0.30	0.50	0.00	0.00	0.44	0.00	0.00
275 - 366	164	164	357	0.00	17.00	1.00	15.00	6.00	8.00	0.00	2.67	0.00		5.50	1.44	0.89	4.50
	106	106	379	0.50		1.00	0.00	0.00	0.00	1.33	1.50	0.00	0.00	0.44	20.33	6.21	1.78
	116	116	380		0.00		0.00	0.00	0.00	0.00	0.00	0.50	0.50	1.50	0.00	0.00	0.00
367 - 549	155	155	723		2.50		15.50	18.50	5.50	1.00	4.12	14.67	4.00	4.89	8.93	2.67	16.28
	105	105	725			2.50	48.50	12.00	3.40	0.00	16.40	2.00	7.00	4.89	1.50	1.00	2.00
	160	160	727				0.00	2.00	0.50	0.00	2.50	0.50	0.50	0.00	0.57	0.00	0.50
550 - 731	124	124	724		26.00		66.00	30.00	13.07	10.44	33.50	19.11	37.50	19.73	15.50	15.82	
	72	72	726				67.50	11.50	12.00	10.00	4.00	9.33	12.67	4.00	3.71	17.78	13.00
	156	156	728					12.50	9.07	6.00	9.90	10.00	14.50	19.43	10.40	29.50	16.33
732 - 914	.	134	752									8.94		1.50	0.00	4.00	
	.	106	756									17.50		10.21	12.50	1.50	
	.	154	760									11.50		10.79	19.29	25.00	
915 - 1097	.	138	753									0.00		0.50	0.00	1.71	
	.	102	757									0.00		0.00	6.86	6.57	
	.	171	761									4.50		24.57	8.57	1.00	
1098 - 128	.	180	754									0.00		0.00	0.00	0.50	
	.	99	758									0.00		0.00	0.00	0.57	
	.	212	762											0.00	16.57	0.00	
1281 - 146	.	385	755									0.00		0.00	0.00	0.00	
	.	127	759									0.00		0.00	0.50	0.00	
	.	261	763											2.00	0.50	2.44	
Grand Total				0.38	0.87	1.79	1.48	0.75	1.03	0.20	0.85	2.04	0.87	1.20	1.40	1.38	1.22

Table 13. Mean numbers per tow for Witch flounder (M+F) in each stratum from surveys in Div. 30 during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	90	91	92	93	94	95	96	97	98	99	00	01	02	03
				57 - 92	2089	2089	330	0.46	0.50	0.25	0.00	0.00	1.80	0.00	0.33	1.17	1.33	0.67	2.00	2.05	2.67
	456	456	331	0.67	8.00	2.00	0.00	0.00	6.50	0.00	0.00	9.50	76.50	8.50	17.00	29.50	16.00
	1898	1898	338	12.50	2.40	5.50	26.40	18.00	32.40	2.00	11.00	6.60	29.00	2.33	7.60	8.60	26.40
	1716	1716	340	1.11	1.40	0.50	0.00	0.00	1.25	0.00	0.20	0.00	7.00	0.80	1.60	0.80	0.40
	2520	2520	351	5.30	1.00	0.17	0.00	0.00	0.00	0.00	0.00	0.14	1.00	0.00	0.57	0.00	0.14
	2580	2580	352	4.50	3.50	5.67	3.14	1.00	1.05	1.00	3.21	2.13	5.14	4.70	3.00	4.08	6.47
	1282	1282	353	16.00	2.75	5.33	0.00	6.67	5.67	5.00	3.25	31.00	34.00	35.00	16.75	54.00	19.25
93 - 183	1721	1721	329	0.56	0.43	0.00	0.20	0.00	2.80	0.00	2.60	3.60	0.00	0.00	3.40	8.40	1.60
	1047	1047	332	25.17	2.75	36.67	14.33	6.67	36.33	83.00	8.67	17.67	51.33	22.56	9.67	30.15	25.95
	948	948	337	18.00	3.25	18.00	8.00	40.00	11.00	5.50	8.67	12.37	28.67	12.44	2.67	5.48	11.00
	585	585	339	19.33	3.00	9.00	1.50	12.00	34.50	0.00	13.50	4.43		49.00	7.00	47.50	8.50
	474	474	354	29.00	0.50	10.50	5.50	6.50	7.50	137.33	7.50	12.00	6.00	38.00	9.67	21.70	30.50
184 - 274	151	147	333	28.00	2.50	4.00	3.00	15.00	9.00		9.50	7.28	7.50	1.33	5.83	4.44	12.00
	121	121	336	13.33	28.00	13.00	38.00	2.50	33.00	12.50	6.00	12.94	18.00	8.50	9.00	3.50	4.50
	103	103	355		103.00	21.00	30.00	6.00	4.44	54.20	2.00	12.00	29.00	6.00	1.50	2.00	1.50
275 - 366	92	96	334	6.00	5.50	0.00	1.67	4.50	4.43		2.50	1.50	4.43	1.33	2.72	2.67	4.00
	58	58	335	46.50	12.50	14.00	8.50	6.50	8.00	8.00	0.50	5.00	6.00	4.61	1.00	4.89	1.50
	61	61	356		3.00	1.00	149.50	30.00	4.78	13.50	1.50	4.00	8.89	6.50	2.28	2.00	4.00
367 - 549	93	166	717	9.50			0.00	7.50	54.95		2.00	36.50	94.83	0.00	4.00	8.89	15.39
	76	76	719	20.00	4.00		26.50	1.00	5.00	58.50	17.50	17.00	9.50	7.15	17.50	3.56	9.14
	76	76	721		4.50		42.50	17.50	9.80	12.50	1.60	12.00	29.71	9.33	1.00	8.00	7.72
550 - 731	111	134	718				7.00	28.00	10.72		29.00	33.50	31.50	21.50	26.50	77.67	80.44
	105	105	720				23.50	0.00	7.28	21.89		2.00	14.00	2.67	52.76	20.62	20.89
	93	93	722		2.00		19.00	4.50	5.00	10.50	4.00	8.06	9.50	5.50	7.33	2.67	3.89
732 - 914	.	105	764									24.71		5.00	10.00	15.00	
	.	99	768									15.94		1.78	12.00	27.43	
	.	135	772									81.50		36.00		20.63	10.22
915 - 1097	.	124	765									9.67		1.83	7.00	16.93	
	.	138	769									9.50		2.00	12.50	20.00	
	.	128	773									2.00		7.71	19.67	40.20	5.35
1098 - 128	.	144	766											5.71	0.57	7.39	
	.	128	770											2.07	10.50	26.14	
	.	135	774											1.50	13.00	6.43	13.14
1281 - 146	.	158	767											3.00	0.00	0.00	
	.	175	771											0.00	5.50	0.00	
	.	155	775											0.00	0.00	0.00	10.00
Grand Total				8.56	2.87	5.89	6.11	6.05	9.37	10.39	4.14	7.56	15.63	8.25	5.63	12.09	9.99

Table 14. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during spring of 1984-2003. (Engel 145 data converted to Campelen Units for 1984-95).

Depth Range (m)	Old Stratum		New Stratum		Stratum	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
	Area	Area	Area	Area																					
<=56	1593	1593	1593	1593	375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1499	1499	1499	1499	376	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.09	0.00	0.00	0.00	0.00
57 - 92	2992	2992	2992	2992	360	4.17	0.22	1.53	1.12	3.69	0.43	0.00	0.00	0.07	0.40	0.00	0.00	0.00	0.28	0.08	0.29	0.65	0.00	0.00	0.05
	1853	1853	1853	1853	361	0.47	0.00	0.00	0.15	0.20	0.00	0.08	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.95	0.18	0.00	0.00
	2520	2520	2520	2520	362	0.00	0.24	0.07	0.05	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2520	2520	2520	2520	373	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	931	931	931	931	374	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00
93 - 183	674	674	674	674	383	0.00	0.62	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	421	421	421	421	359	3.99	0.81	1.71	0.75	5.28	2.09	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	1.15	2.58	1.00	0.23	0.00
	100	100	100	100	377	0.58	0.00	0.00	5.25	0.21	2.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	647	647	647	647	382	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
184 - 274	225	225	225	225	358	1.29	9.94	1.37	4.42	0.64	0.95	1.86	0.00	1.44	4.26	3.42	0.24	1.65	1.58	4.33	0.21	0.29	4.98	0.47	5.43
	139	139	139	139	378	1.17	1.00	1.69	8.10	1.64	2.19	0.00	0.00	1.51	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.24	0.41	0.07
	182	182	182	182	381	0.82	0.28	1.27	4.04	2.77	0.00	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.27	0.00	0.00
275 - 366	164	164	164	164	357	0.35	3.85	6.83	0.18	2.65	0.91	0.00	0.00	1.36	2.16	3.61	0.89	1.58	0.53	7.04	0.95	3.33	0.77	1.14	2.87
	106	106	106	106	379	2.48	0.83	1.60	11.84	3.00	1.38	2.38	0.21	1.27	0.00	0.29	0.00	0.00	0.60	0.15	1.75	0.25	0.26	0.00	0.28
	116	116	116	116	380	0.40	3.34	0.00	8.38	1.52	0.43	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.20
	155	155	155	155	723								4.21	4.80	3.71	1.68	2.41	0.77	1.16	2.48	1.53	1.70	1.08	6.08	2.80
367 - 549	105	105	105	105	725								4.26	2.78	3.08	0.00	0.37	1.91	0.31	1.40	2.20	0.56	0.20	0.51	
	160	160	160	160	727								0.00	0.24	1.73	0.76	0.00	0.00	0.15	0.42	0.60	0.56	0.14	0.00	
	124	124	124	124	724								19.18	10.63	12.81	3.02	2.11	1.73	9.22	3.11	6.17	6.22	7.47	5.62	5.91
550 - 731	72	72	72	72	726								8.21	2.52	2.24	2.81	0.35	1.20	4.25	9.65	5.93	6.58	8.46	1.78	5.07
	156	156	156	156	728								4.31	0.88	3.84	1.02	7.07	0.97	0.70	1.51	2.08	4.56	2.01	2.49	
732 - 914	.	.	.	.	752											1.47									
	.	.	.	.	756											2.29									
	.	.	.	.	760											1.22									
Grand Total						0.96	0.33	0.47	0.62	0.97	0.21	0.07	0.27	0.20	0.36	0.21	0.13	0.07	0.19	0.24	0.22	0.43	0.26	0.16	0.23

Table 15. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 30 during spring of 1984-2003. (Engel 145 data converted to Campelen Units for 1984-95).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
57 - 92	2089	2089	330	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.42	0.39	0.00	0.00	0.00
	456	456	331	30.49	4.82	0.58	0.29	7.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.00	0.58	8.56	0.45	5.98	1.63	0.00
	1898	1898	338	0.51	29.90	4.24	4.53	11.78	7.00	1.66	0.00	0.42	1.13	0.00	0.88	3.33	0.00	1.37	2.99	0.70	5.19	0.46	1.23
	1716	1716	340	0.17	0.62	0.00	0.09	0.00	0.00	0.07	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00
	2520	2520	351	1.99	0.61	1.11	0.64	2.82	0.63	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00
93 - 183	2580	2580	352	0.23	2.68	0.63	3.59	3.75	1.87	4.02	0.11	0.30	0.17	0.11	0.18	0.17	0.28	0.15	3.37	0.37	0.15	1.95	0.08
	1282	1282	353	25.63	6.36	6.05	9.12	40.87	14.10	9.28	0.00	1.38	1.19	0.00	0.24	0.13	0.01	1.54	12.53	7.37	2.66	3.90	2.66
	1721	1721	329	0.00	0.00	0.00	0.00	3.33	0.20	0.11	2.09	0.00	0.00	21.42	0.82	0.00	0.05	0.21	1.01	0.11	0.00	0.00	9.33
	1047	1047	332	26.24	59.64	17.26	23.38	47.42	10.31	31.93	16.84	15.15	2.49	0.41	12.44	8.20	1.63	3.19	6.81	2.83	21.00	17.07	71.07
	948	948	337	0.39	31.66	10.85	11.55	8.13	11.83	12.48	12.12	4.45	5.18	0.38	5.01	2.53	1.25	2.46	6.74	7.18	13.98	5.77	5.48
184 - 274	585	585	339	4.17	0.00	0.20	2.78	1.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.01	0.06	0.02	0.00
	474	474	354	7.60	1.61	18.88	3.58	5.30	0.73	3.68	2.21	2.28	12.90	0.00	0.00	0.55	0.01	3.46	16.28	12.68	14.02	8.48	2.50
	151	147	333	0.50	2.30	0.48	0.00	3.23	0.75	6.20	23.96	3.83	3.83	256.95	8.00	0.33	5.38	1.22	1.32	1.47	6.03	18.55	3.12
	121	121	336	0.75	0.43	2.60	1.48	3.79	0.00	3.16	29.55	82.55	6.00	63.53	3.73	10.83	17.58	1.38	2.82	1.65	9.78	35.90	12.65
	103	103	355	3.19	12.77	2.69	5.05	0.00	6.82	8.89	9.58	1.14	2.38	9.12	3.03	6.09	3.40	3.56	1.27	1.01	6.18	13.63	23.99
275 - 366	92	96	334	0.00	3.32	3.31	1.44	1.74	1.80	2.07	1.59	8.51	1.58	65.16	1.17	11.36	27.44	0.33	0.54	0.83	0.16	10.87	10.07
	58	58	335	0.00	12.26	2.27	0.30	6.40	2.72	11.50	5.27	138.78	8.20	12.91	5.44	9.78	13.71	0.22	7.81	16.03	0.95	1.01	6.64
	61	61	356	0.59	9.84	2.09	2.78	2.13	3.51	6.56	4.61	15.34	9.23	9.00	7.34	4.75	1.28	3.44	2.75	1.68	4.01	4.58	5.84
	93	166	717							0.83	9.41	2.77	104.01	2.32	20.37	190.65	1.91	0.82	0.76	1.80	8.80	6.23	
	76	76	719							14.16	97.97	4.65	1.31	1.74	13.13	57.44	1.44	1.49	2.39	1.16	9.12	3.70	
367 - 549	76	76	721							7.24	4.64	2.93	6.91	1.76	1.55	1.80	3.65	3.50	2.64	8.17	3.60	2.47	
	111	134	718							2.27	1.89	6.80	11.97	4.34	3.88	1.99	1.79	2.08	0.82	3.10	3.00	2.34	
	105	105	720							15.00	9.28	12.60	6.56	1.03	1.48	10.41	2.19	1.42	2.79	2.60	0.51	1.57	
	93	93	722							1.42	3.86	11.72	16.93	16.11	6.94	6.78	2.42	5.54	3.69	9.42	4.84	4.97	
	732 - 914	.	105											4.17									
Grand Total	.	135	772											4.07									
				4.92	9.67	3.30	3.98	9.11	3.45	4.41	2.53	3.05	1.33	6.10	1.47	1.53	2.62	0.83	3.30	1.74	3.44	2.81	6.00

Table 16. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3N during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	90	91	92	93	94	95	96	97	98	99	00	01	02	03
<=56	1593	1593	375	0.00	0.33		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00
	1499	1499	376	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.11	0.00	0.00	0.00	0.00	0.19	0.13
57 - 92	2992	2992	360	0.64	0.42	3.15	0.42	0.18	2.16	0.06	1.04	1.05	0.43	1.30	0.79	1.26	1.42
	1853	1853	361	0.11	1.83	1.82	0.00	0.13	0.00	0.00	0.06	0.00	1.05	0.11	0.67	0.58	0.39
	2520	2520	362	1.15	0.64	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.39
	2520	2520	373	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	931	931	374	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
674	674	383	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
93 - 183	421	421	359	0.00	0.00	4.81	0.00	0.00	0.39	0.00	0.00	20.95	0.01	0.00	2.10	0.73	1.90
	100	100	377	0.00		0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	647	647	382	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
184 - 274	225	225	358	0.00	0.65	2.14	0.76	0.00	2.40	0.00	0.36	0.98	0.63	1.29	1.45	0.00	4.69
	139	139	378	0.00	2.17	0.81	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.14	0.27	0.00
	182	182	381		0.00		0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.27	0.00	0.00
275 - 366	164	164	357	0.00	10.39	0.42	8.27	1.91	3.76	0.00	1.18	0.00		2.33	0.82	0.91	1.80
	106	106	379	0.27		0.25	0.00	0.00	0.00	0.04	0.45	0.00	0.00	0.13	7.59	2.24	0.58
	116	116	380		0.00		0.00	0.00	0.00	0.00	0.00	0.05	0.14	0.30	0.00	0.00	
367 - 549	155	155	723		1.93		7.65	8.44	2.69	0.73	1.31	3.48	1.25	1.33	3.09	0.77	5.77
	105	105	725			1.01	26.05	3.20	1.31	0.00	9.32	0.68	2.28	1.29	0.48	0.38	0.68
	160	160	727				0.00	1.71	0.01	0.00	1.30	0.30	0.20	0.00	0.46	0.00	0.02
550 - 731	124	124	724		10.11		24.29	10.57	6.09	3.54	11.58	4.21	10.60	5.08	4.13	5.28	
	72	72	726				31.26	5.47	4.80	4.03	2.08	3.80	3.39	1.59	2.18	5.96	5.20
	156	156	728					7.11	1.62	1.00	3.53	3.65	4.95	7.11	4.80	13.33	8.31
732 - 914	.	134	752									6.54		1.23	0.00	0.03	
	.	106	756									8.53		3.47	5.67	0.60	
	.	154	760									4.18		1.93	3.67	8.18	
915 -1097	.	138	753									0.00		0.01	0.00	0.17	
	.	102	757									0.00		0.00	2.66	0.48	
	.	171	761									1.94		6.23	1.80	0.41	
1098 -128	.	180	754									0.00		0.00	0.00	0.01	
	.	99	758									0.00		0.00	0.00	0.01	
	.	212	762											0.00	3.74	0.00	
1281 -146	.	385	755									0.00		0.00	0.00	0.00	
	.	127	759									0.00		0.00	0.10	0.00	
	.	261	763											0.53	0.15	0.28	
Grand Total				0.31	0.63	1.22	0.69	0.34	0.56	0.07	0.41	0.89	0.37	0.46	0.53	0.56	0.64

Table 17. Mean weights (kg) per tow for Witch flounder (M+F) in each stratum from surveys in Div. 3O during fall of 1990-2003. (Engel 145 data converted to Campelen Units for 1990-94).

Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	Year													
				90	91	92	93	94	95	96	97	98	99	00	01	02	03
57 - 92	2089	2089	330	0.43	0.23	0.28	0.00	0.00	0.86	0.00	0.25	0.58	0.73	0.17	0.99	1.19	1.53
	456	456	331	0.35	5.02	2.14	0.00	0.00	1.73	0.00	0.00	4.08	15.08	3.88	7.46	12.35	4.88
	1898	1898	338	8.53	1.68	3.21	15.19	8.40	17.94	1.93	5.09	1.85	10.48	1.44	3.61	3.74	10.21
	1716	1716	340	0.73	1.19	0.27	0.00	0.00	0.86	0.00	0.09	0.00	1.76	0.44	0.73	0.52	0.24
	2520	2520	351	4.87	0.82	0.21	0.00	0.00	0.00	0.00	0.00	0.11	0.59	0.00	0.50	0.00	0.07
	2580	2580	352	3.99	2.52	3.81	2.66	0.64	1.07	0.77	1.62	1.06	4.20	2.59	1.21	2.22	2.72
1282	1282	353	13.64	1.94	2.70	0.00	4.15	3.05	4.48	0.95	6.04	16.99	13.49	7.71	8.45	6.83	
93 - 183	1721	1721	329	0.42	0.36	0.00	0.07	0.00	1.76	0.00	0.73	1.29	0.00	0.00	1.19	3.09	0.41
	1047	1047	332	14.59	1.08	11.97	5.65	2.23	7.74	31.73	1.32	1.70	11.55	3.77	2.38	8.02	5.60
	948	948	337	10.22	1.45	7.32	4.32	16.35	3.23	3.78	2.47	3.67	7.50	2.64	0.51	1.62	2.70
	585	585	339	14.07	2.78	8.10	1.48	9.22	23.75	0.00	5.98	3.25		4.27	4.20	23.95	5.68
	474	474	354	19.81	0.36	4.85	1.16	3.22	2.94	71.28	3.30	3.08	1.58	11.75	3.95	7.21	14.83
184 - 274	151	147	333	10.65	0.52	1.07	1.46	4.43	1.24		0.19	0.29	1.65	0.18	0.99	0.84	2.38
	121	121	336	4.92	9.10	4.57	17.93	0.78	2.08	1.93	1.13	1.14	4.03	1.88	2.20	1.36	0.58
	103	103	355		35.07	6.59	8.44	1.76	1.16	24.22	0.45	0.99	7.75	2.48	0.35	0.45	0.46
275 - 366	92	96	334	1.93	1.26	0.00	0.75	1.34	0.28		0.41	0.11	0.52	0.40	1.03	0.67	0.60
	58	58	335	24.31	3.09	3.20	3.76	2.23	0.10	2.89	0.01	0.17	2.92	1.00	0.37	1.07	0.09
	61	61	356		1.35	0.81	51.23	11.66	0.84	7.14	0.38	0.50	3.80	2.67	0.88	0.36	0.70
367 - 549	93	166	717	2.31			0.00	2.50	2.87		0.53	1.83	11.37	0.00	0.58	0.50	2.38
	76	76	719	10.53	0.23		6.24	0.58	0.13	21.58	1.78	0.85	0.93	1.29	2.80	0.56	1.46
	76	76	721		1.69		16.19	6.39	2.02	5.15	0.54	1.32	6.43	1.59	0.20	1.35	1.62
550 - 731	111	134	718				1.45	4.43	0.52		3.70	2.55	2.90	1.83	2.73	2.94	8.71
	105	105	720				5.02	0.00	0.91	4.68		0.12	1.15	0.24	5.72	1.78	2.16
	93	93	722		0.69		6.30	1.62	1.13	3.03	0.91	0.91	2.05	0.66	1.16	0.38	0.58
732 - 914	.	105	764									5.21		0.80	1.43	2.50	
	.	99	768									1.34		0.49	1.35	2.80	
	.	135	772									9.29		3.33	2.65	1.54	
915 -1097	.	124	765									1.40		0.21	1.18	3.25	
	.	138	769									0.92		0.26	1.45	3.13	
	.	128	773									0.23		0.73	1.80	5.08	0.71
1098 -128	.	144	766											1.21	0.13	1.85	
	.	128	770											0.23	1.29	3.79	
	.	135	774											0.22	1.65	0.83	1.46
1281 -146	.	158	767											0.68	0.00	0.00	
	.	175	771											0.00	0.73	0.00	
	.	155	775											0.00	0.00	0.00	1.29
Grand Total				5.96	1.62	2.80	3.08	2.76	4.10	4.89	1.46	1.64	5.04	2.30	2.03	3.47	3.35

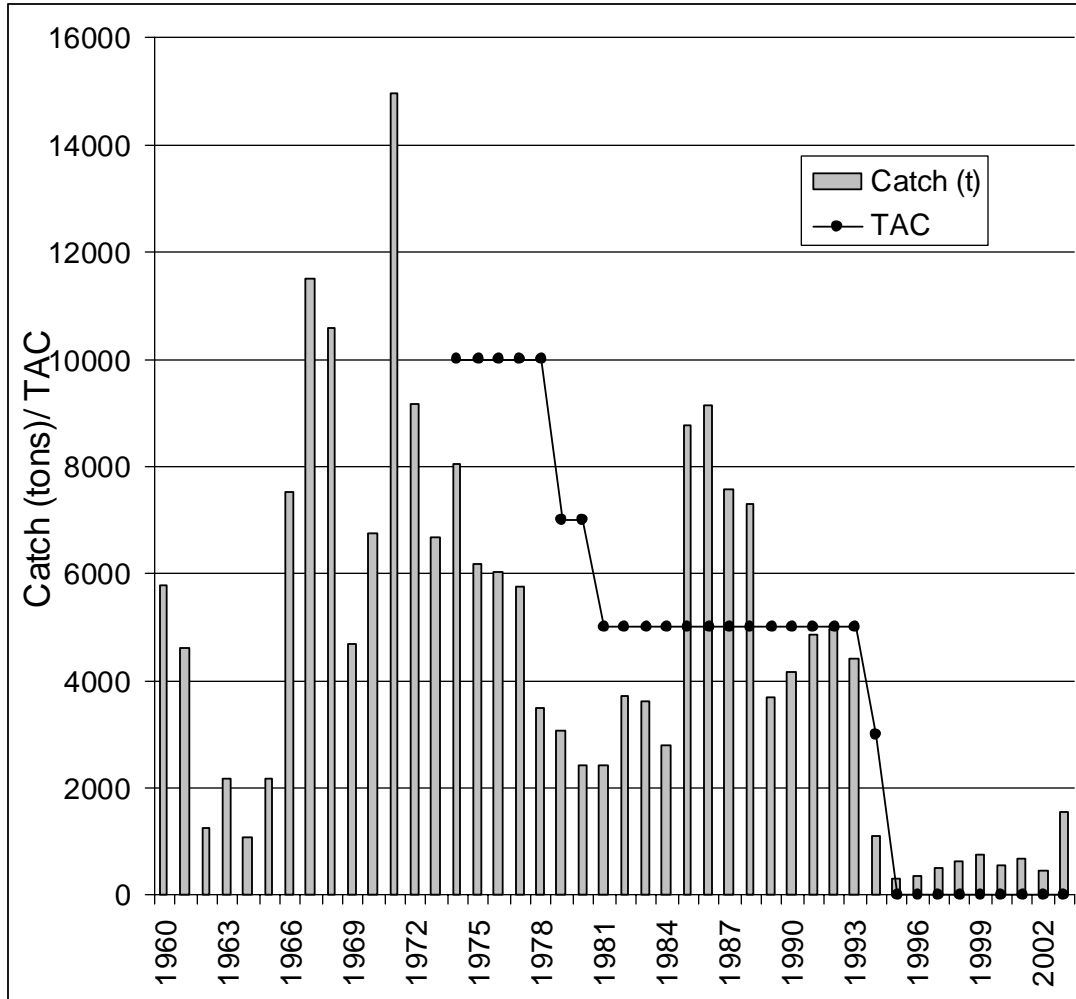


Fig. 1. Commercial catches of witch flounder in Div. 3NO from 1960-2003 and TACs from 1974-2003.
 * Note: Although a TAC of 3000 tons was agreed by the Fisheries Commission, it was also agreed that no directed fishing on witch flounder in Div. 3NO take place during 1994 due to the poor state of the stock. Estimated catch in 2003 is the mean of a range of catch from several sources.

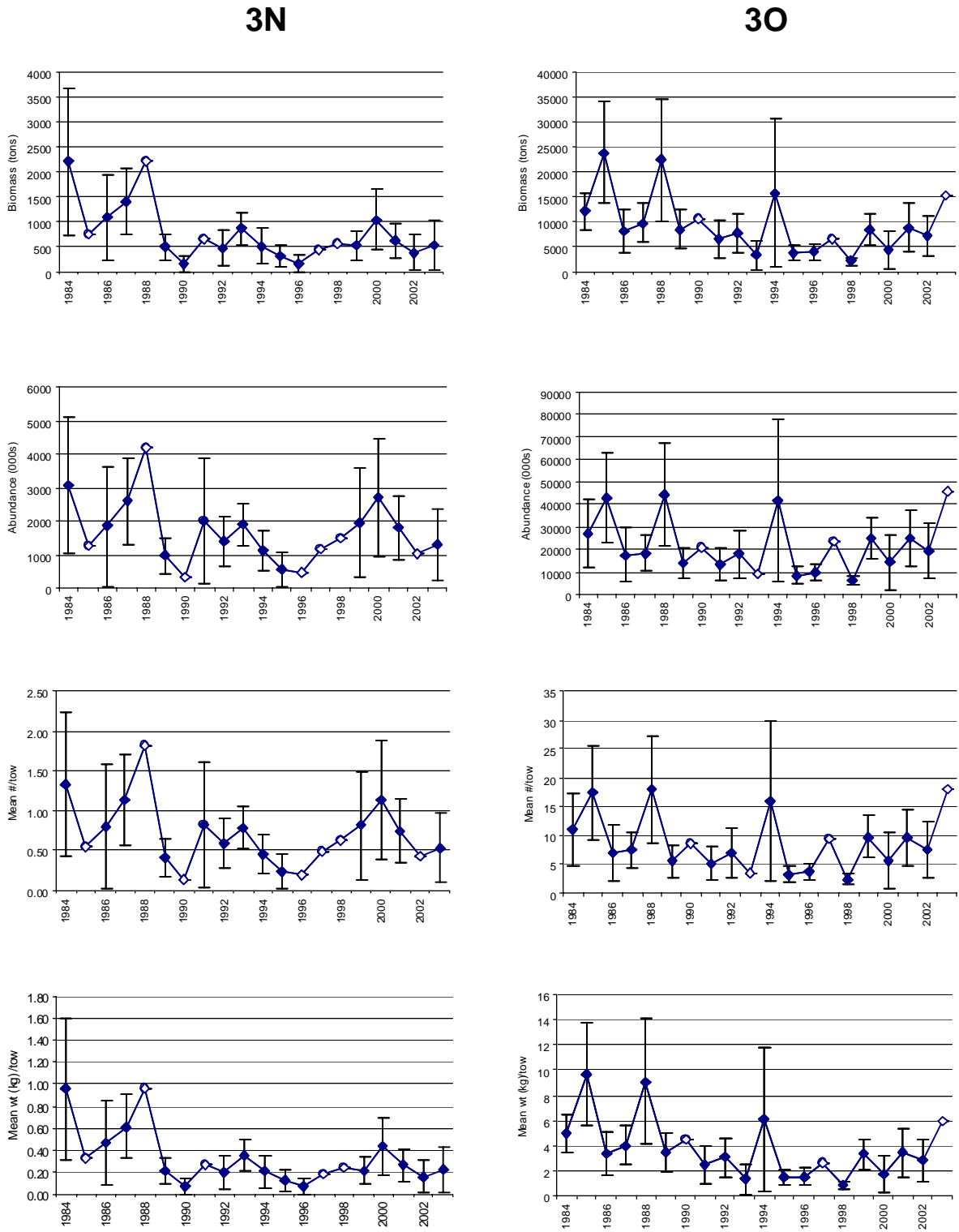


Figure 2. Biomass (tons), abundance (000s), and mean numbers and weights (kg) per tow for witch flounder from Canadian Spring surveys in Div. 3N and 30 during 1984-2003. Where lower confidence limits were negative error bars were omitted (hollow symbol).

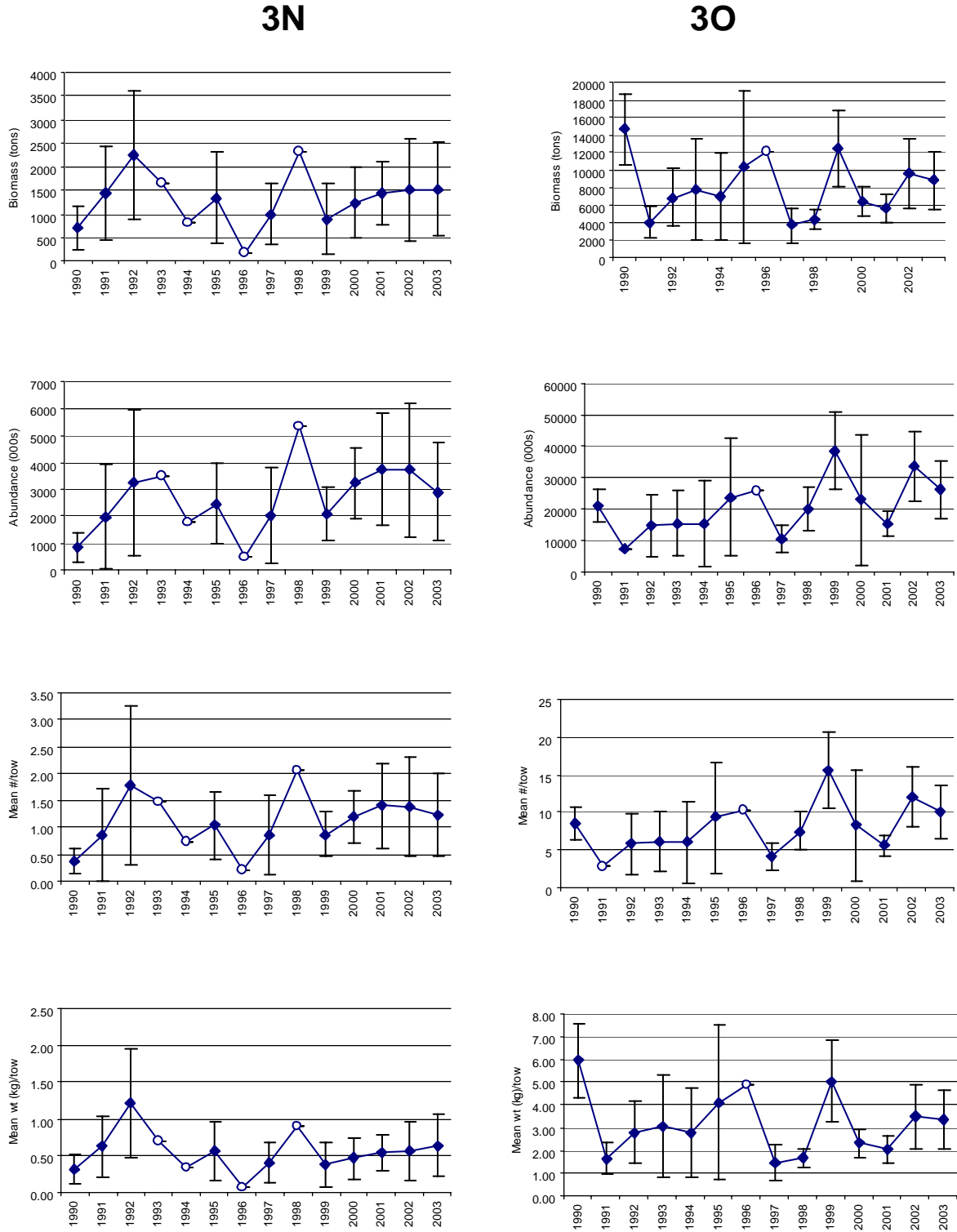


Figure 3. Biomass (tons), abundance (000s), and mean numbers and weights (kg) per tow for witch flounder from Canadian fall surveys in Div. 3N and 3O during 1990-2003. Where lower confidence limits were negative error bars were omitted (hollow symbol).

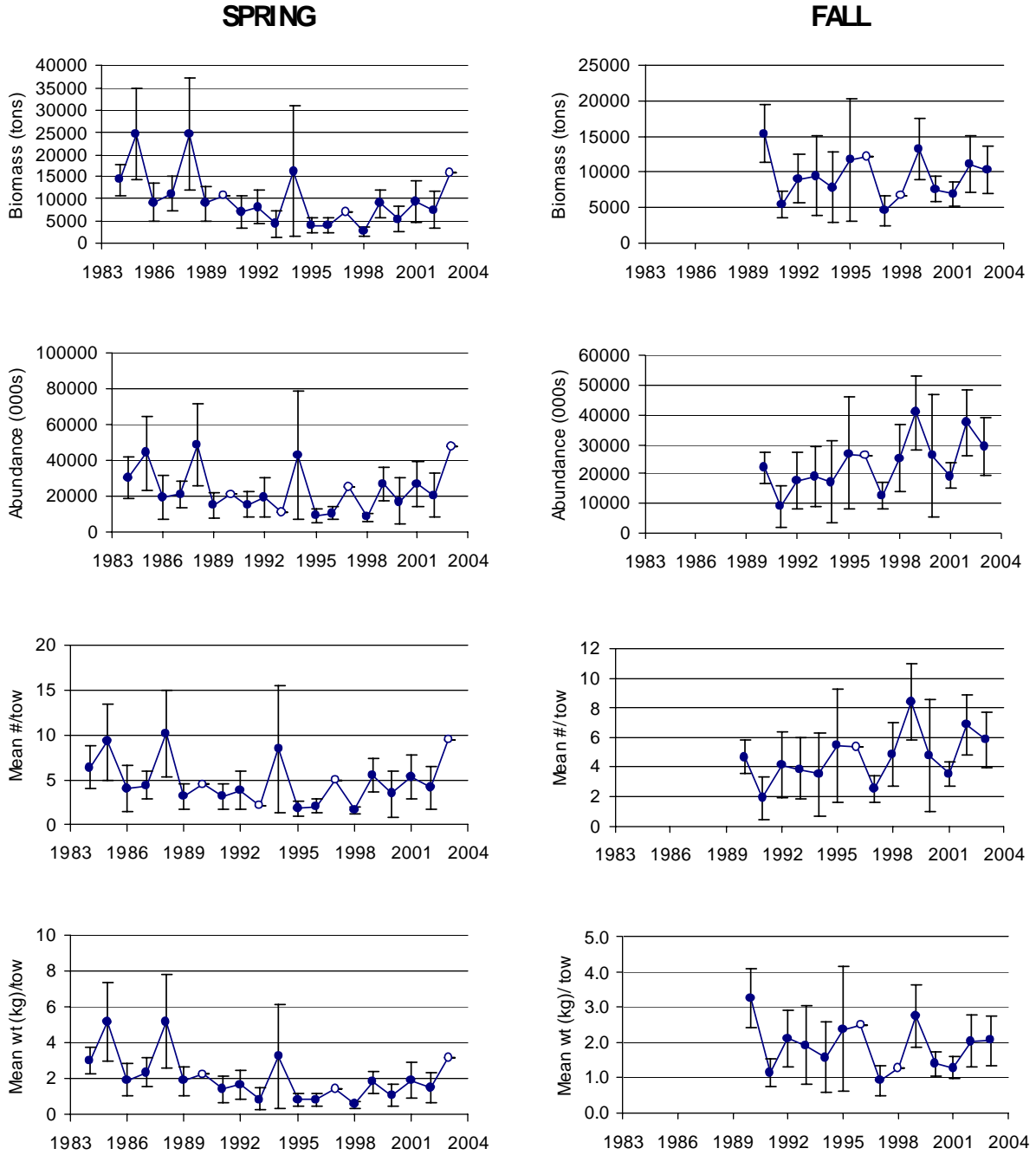


Figure 4. Biomass (tons), abundance (000s), and mean numbers and weights (kg) per tow for witch flounder in Divs. 3NO combined. Where lower confidence limits were negative error bars were omitted (hollow symbol).

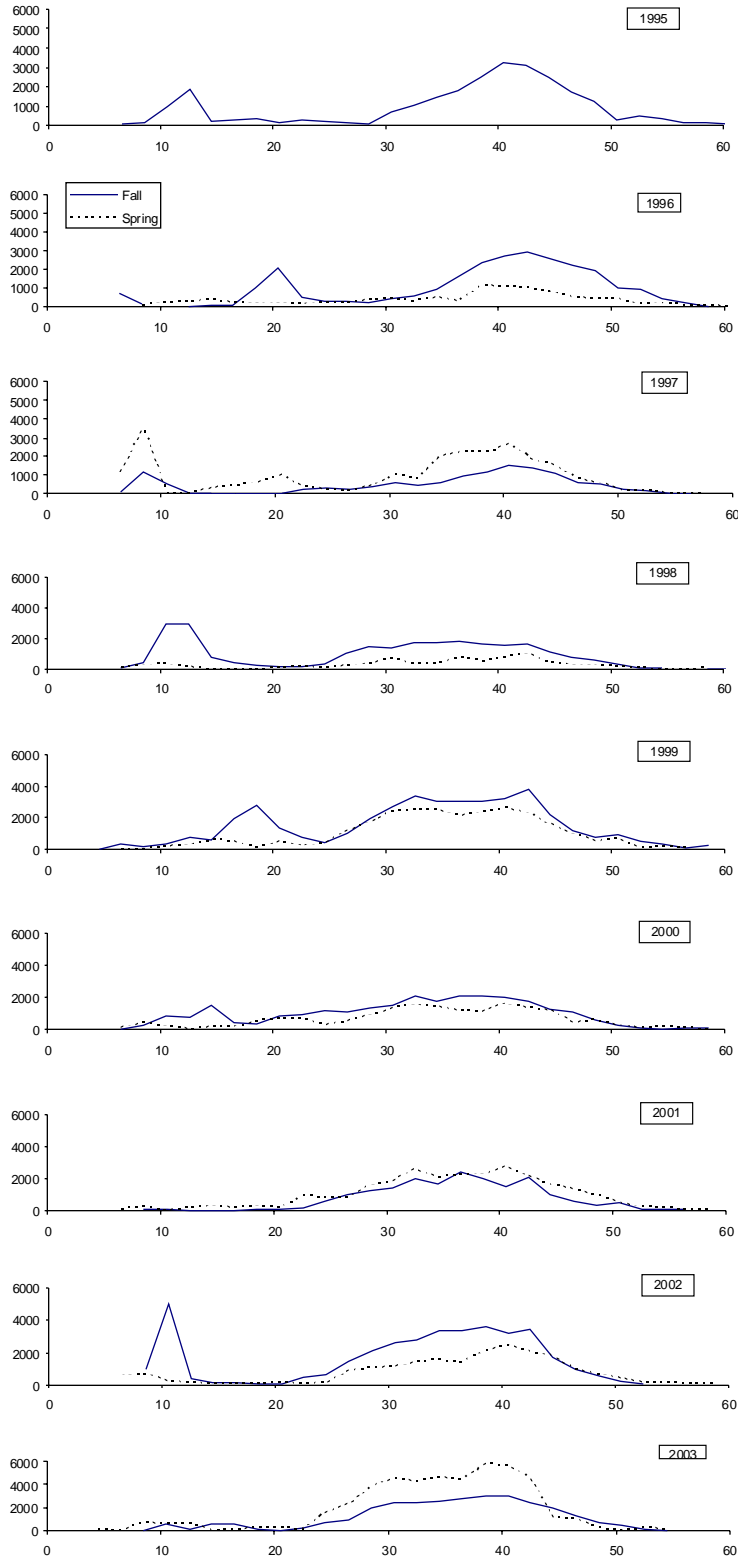


Figure 5. Length frequency distributions of witch flounder from both spring and fall surveys using the Campelen 1800 shrimp. Estimates represent abundance at length (cm) of the surveyed area. All distributions are for 3NO combined.

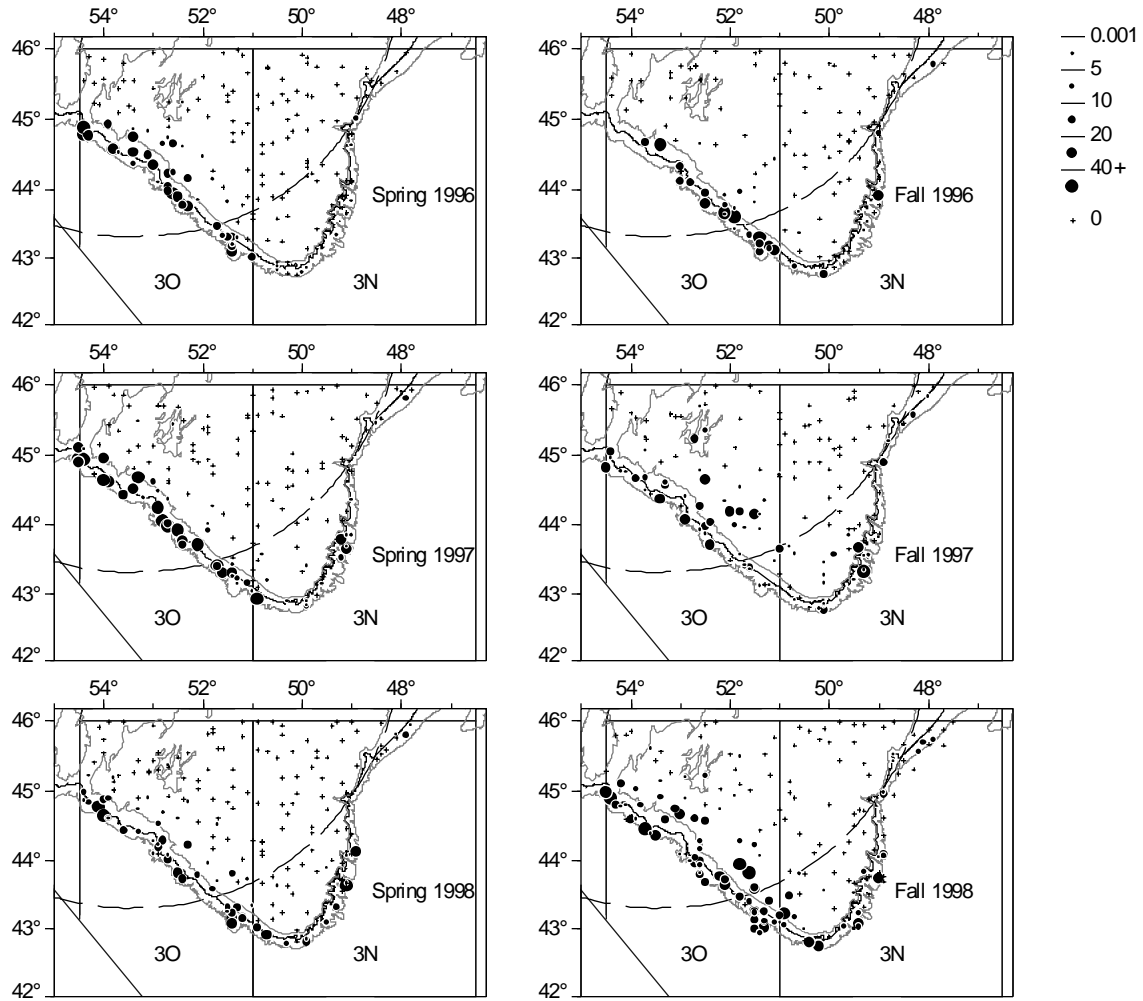


Fig. 6a: Distribution of witch flounder (number per set) from spring and fall Canadian surveys in NAFO divisions 30 and 3N during 1996-1998.

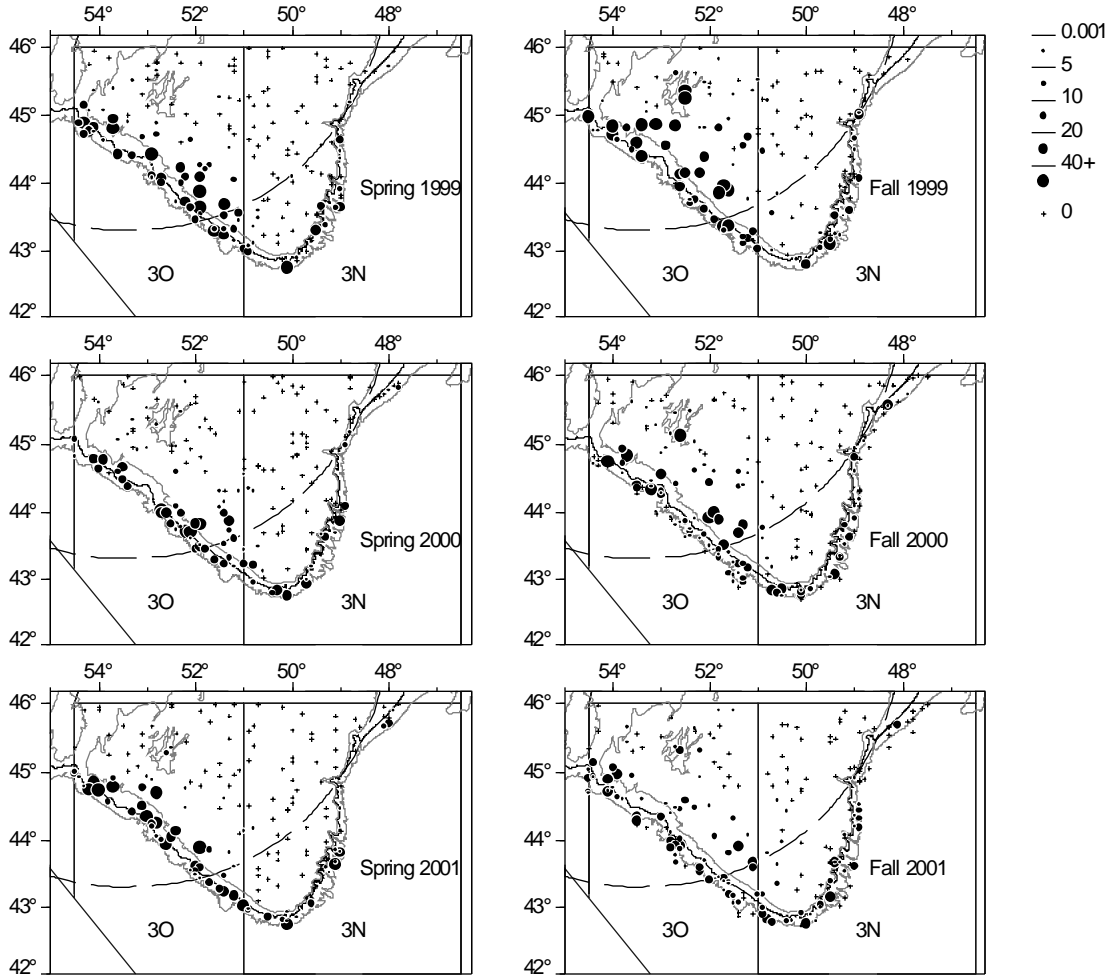


Fig. 6b: Distribution of witch flounder (number per set) from spring and fall Canadian surveys in NAFO divisions 3NO during 1999-2001.

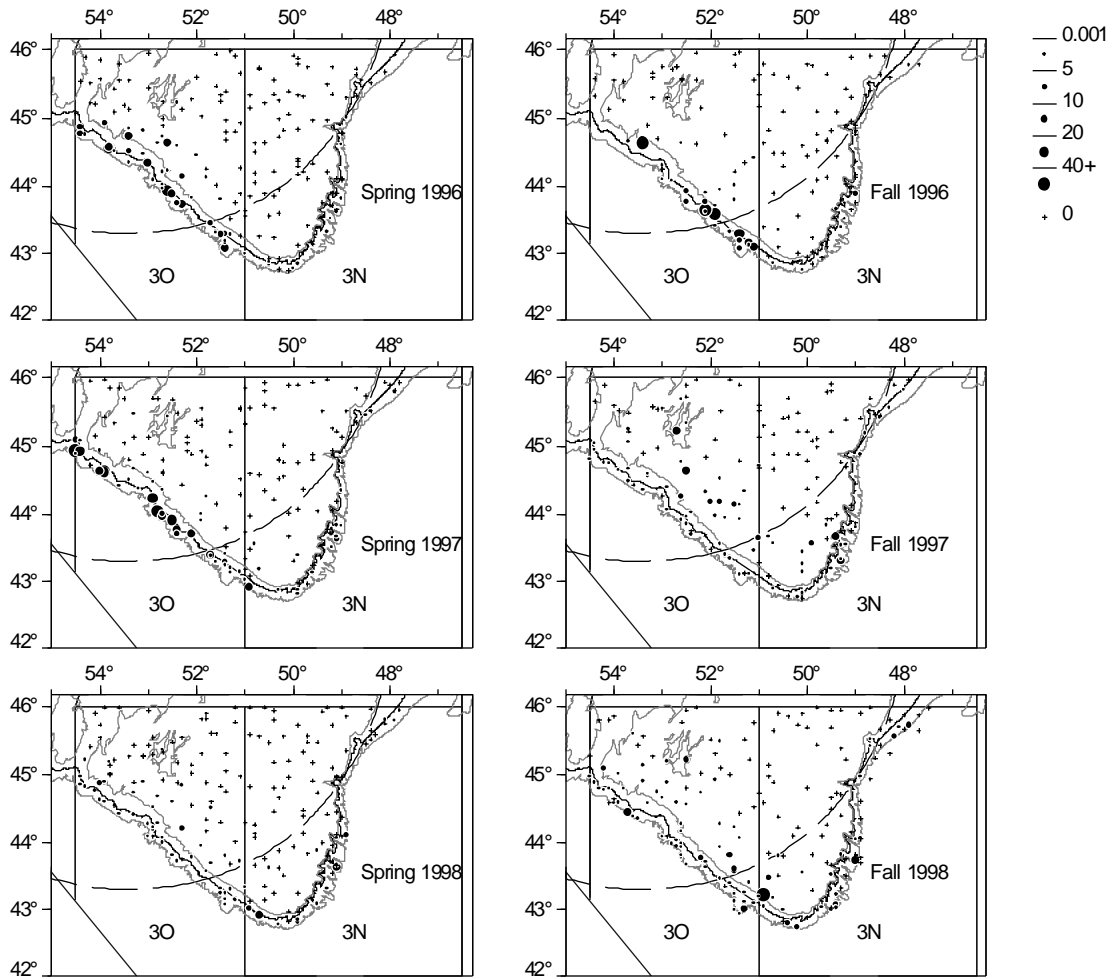


Figure 7a: Distribution of witch flounder (weight per tow) from spring and fall Canadian surveys in NAFO divisions 3NO during 1996-1998.

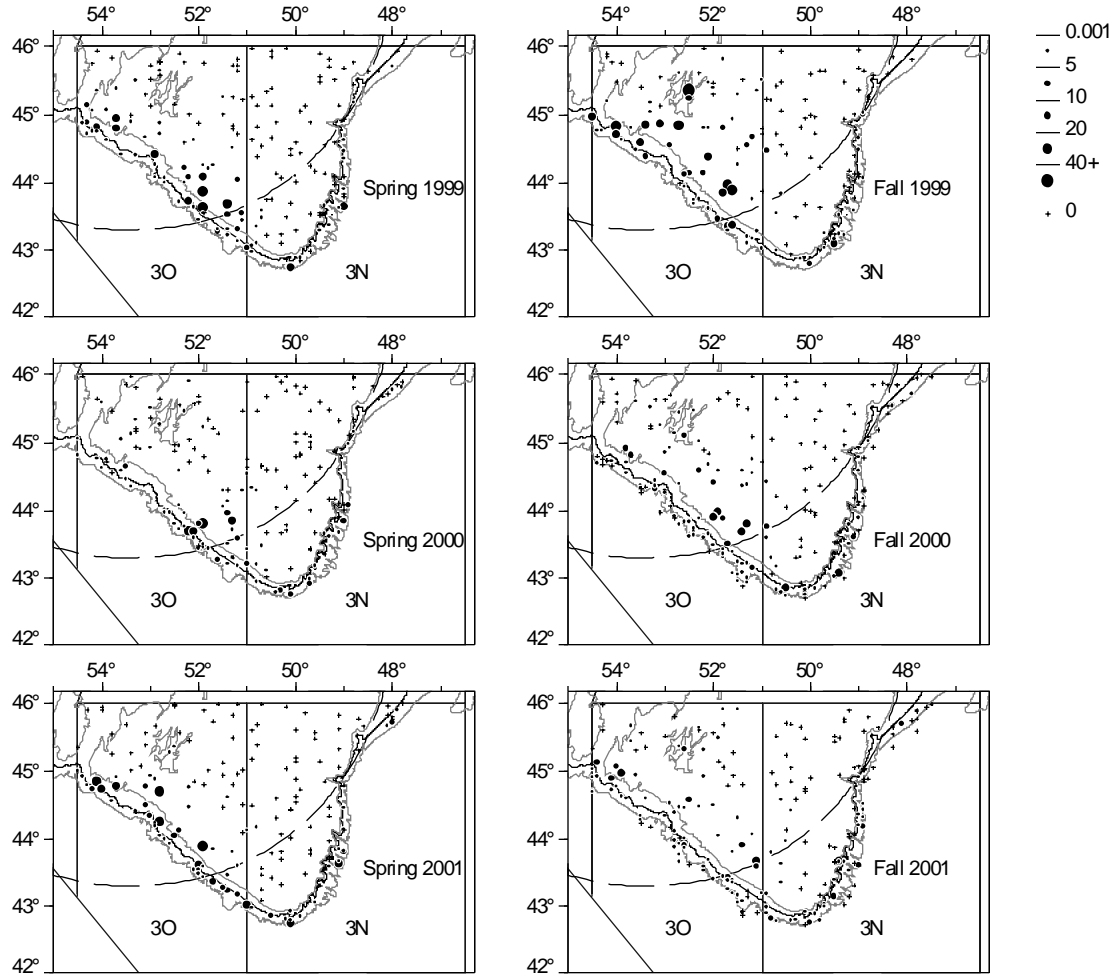


Figure 7b: Distribution of witch flounder (weight per tow) from spring and fall Canadian surveys in NAFO divisions 3NO during 1999-2001.

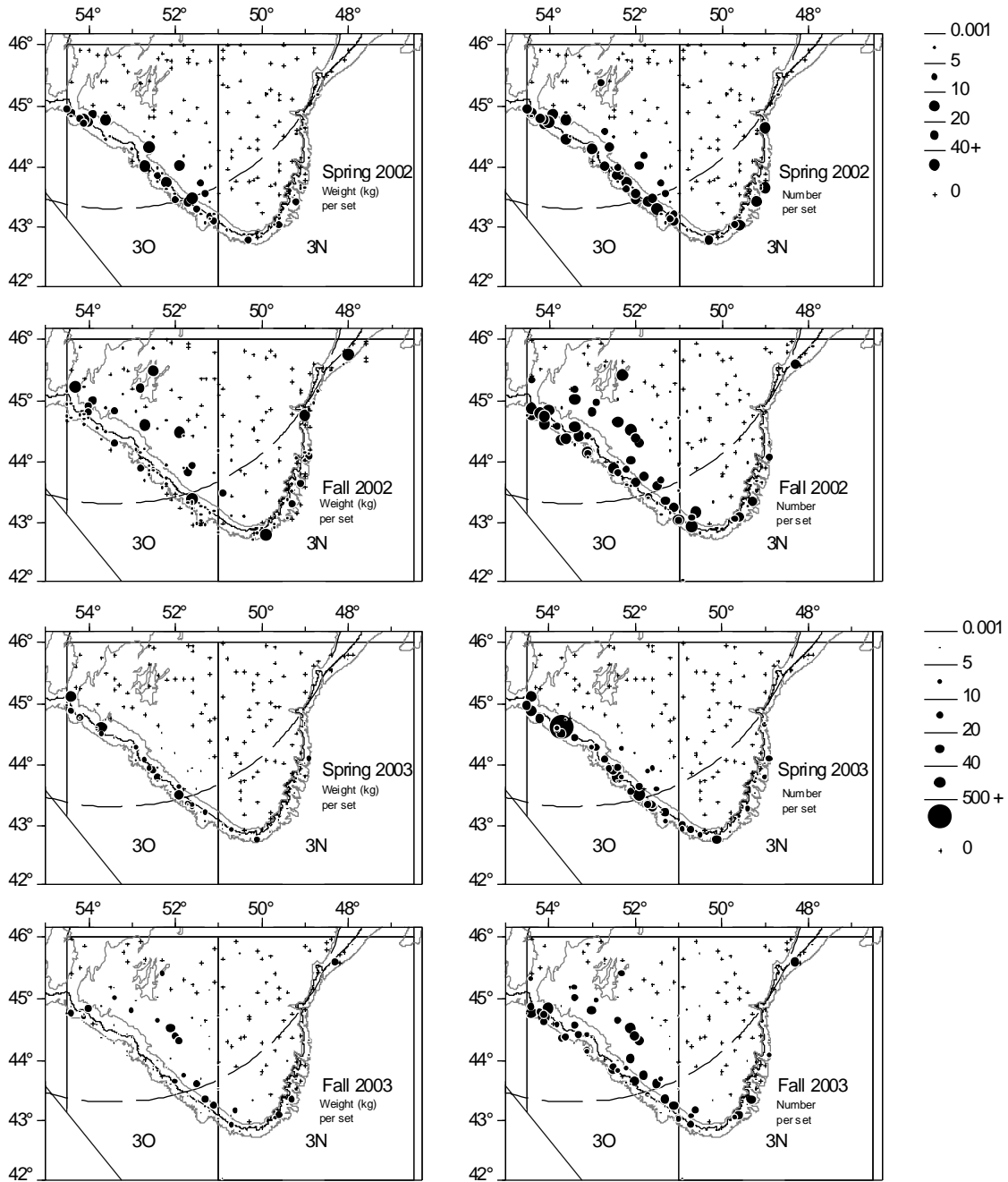


Fig. 8. Distributions of witch flounder from Canadian spring and fall surveys in NAFO divisions 3NO during 2002 and 2003.