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Witch Flounder Population Trends in NAFO Divisions 2J, 3K and 3L

by

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Abstract

Canadian fall surveys since the late 1970s indicated that witch flounder were widely distributed throughout the shelf area in deeper channels around the fishing banks primarily in Division 3K. By the mid-1980s they were rapidly disappearing and by the early 1990s had virtually disappeared from the area entirely except for some very small catches along the slope in Div. 3L. The fall 1998-2004 surveys indicate no change in this distribution pattern. For the three Divisions combined, the biomass index declined from about 65 000 tons in 1984 to 1 100 tons in 1995, by far the lowest in the time series. Mean weight per tow decreased from a maximum of near 6 kg/tow in 1984 to a low of 0.23 kg/tow in 1995. The small increase in biomass index and mean weight per tow observed between 1995 and 1996 was almost exclusively a result of inclusion of the deeper strata surveyed in Div. 3L. The estimates have remained the same since then. The stock size remains extremely low.

Fisheries and Management

The fishery for witch in this area began in the early 1960's and increased steadily from about 1 000 tons in 1963 to a peak of over 24 000 tons in 1973 (Table 1; Fig. 1). Catches declined rapidly to 2 800 tons by 1980 and subsequently fluctuated between 3 000 and 4 500 tons to 1991. The catch in 1992 declined to about 2 700 tons, the lowest since 1964, and further declined to around 400 tons by 1993 (Table 1). Until the late 1980s, the fishery was conducted by Poland, USSR and Canada (Table 1) mainly in Div. 3K (Fig. 1). More recently, the regulated fishery has been mainly Canadian although EU (Portugal and Spain) has taken increased catches in the NAFO Regulatory area of Div. 3L since the mid-1980s. Although only 12 t were reported for 1994, a catch of 491 t was indicated for Spain in the Spanish Research Report (SCS Doc. 95/15) for the Regulatory Area of Div. 3L. In 1995 and 1996 total catches were estimated to be about 780 and 1370 tons, respectively. However, it is believed, that these catches could be overestimated by 15-20% because of misreported Greenland halibut. The catches in 1997 and 1998 were estimated to be about 850 and 1100 tons, respectively most of which was reported from the NAFO Regulatory Area of Div. 3L. The 1999 and 2000 catches were estimated to be about 300 and 700 tons, respectively. The catch in 2001 was nearly 800 tons of which more than 300 tons was from Div. 3M. In 2002, an estimated 440 tons of witch were caught primarily in Div. 3L. The catches in 2003 and 2004 were estimated to be about 750 tons and 350 tons respectively.

During 1988-92, the Canadian fishery was particularly successful by fishing on prespawning concentrations in the deep slopes of Div. 3K, especially in depths beyond 700 m. Between 1988 and 1993, however, the area fished had become increasingly smaller and substantially deeper as the resource became depleted. The fishery during the winter of 1993 was very poor with the best catch rates occurring in depths greater than 1 400 m. No directed fishing by Canada has been permitted since 1994 due to the poor state of the stock.

The stock has been regulated by TAC since 1974 (first introduced by ICNAF) and managed by Canada within its zone since the introduction of the 200 mile national limit and has been under moratorium from 1995 to the present (Fig. 1). Because of the poor state of the stock, the NAFO Fisheries Commission agreed to extend the moratorium to the NAFO Regulatory Area in 1998 and has continued to 2004.

Canadian Research Vessel Surveys

Distribution

Changes in spatial distribution patterns of witch flounder over the 20 year history of the surveys from 1978-97 were presented in a previous assessment as graphical distribution maps (SCR Doc. 98/64). Survey distribution data from the late 1970s and early 1980s indicated that witch flounder were widely distributed throughout the shelf area in deeper channels around the fishing banks primarily in Div. 3K. By the mid-1980s, however, they were rapidly disappearing and by the early 1990s had virtually disappeared from the area entirely except for some very small catches along the slope and more to the southern area. They now appear to be located only along the deep continental slope area, especially in Div. 3L both inside and outside the Canadian 200-mile fishery zone. The results from the fall surveys over the past several years (see Bowering 1998; 1999; 2000; 2001; 2002) confirm this distribution pattern remains as indicated by the 2003 and 2004 survey results in Fig. 2.

Biomass and Abundance Indices

Stratified-random research vessel surveys have been conducted in the fall in Div. 2J, 3K and 3L since 1977, 1978 and 1981, respectively. As indicated above, up until 1994, the surveys were conducted using an *Engel* 145' high-rise groundfish trawl whereas the 1995-2004 surveys were carried out with a much more efficient *Campelen 1800* shrimp trawl. All data presented here are now in *Campelen 1800* trawl catch equivalents for 1977-94 with the actual data for 1995-2004.

For Div. 2J, biomass estimates ranged from as high as 5 900 tONS in 1986 to a low of less than 200 t in 2003 with a marginal increase in 2004 (Tables 2 and 14; Fig. 3a). Mean weight per tow peaked at 1.82 kg/tow in 1986 and declined to 0.09 kg/tow in 1995 (Tables 11 and 15; Fig. 3b). Since then values have remained at low levels, reaching an all time low of 0.05 kg/tow in 2003.

In Div. 3K, during 1979-85, there was a period of relative stability where most annual biomass estimates were near 50 000 tons (Tables 3 and 14; Fig. 3a). Since that time estimates have declined considerably to around 400 t in 1995, the lowest in the time series. Estimates increased slightly after 1995 ranging from 500-1 400 tons from 1996-2002 and in 2003 was around 650 tons. In 2004 the estimate increased to over 2 600 tons, although half of this estimate is attributable to a high catch in one stratum (Table 3; Fig. 3a). Corresponding to the period of higher biomass estimates (1979-85), the mean weights per tow in Div. 3K ranged from 8 to 13 kg/tow (Tables 12 and 15; Fig. 3b) and declined to a low of 0.09 kg/tow in 1995. Mean weights per tow have remained low since then and in 2002 were again at an all time low of 0.09 kg/tow. In 2003 mean weight per tow increased slightly to 0.13 kg/tow and in 2004 increased to 0.52 kg/tow, still much lower than the maximum observed.

For Div. 3L, biomass estimates varied generally between 7 000 and 13 000 tons from 1984 to 1990 but declined rapidly since then to a low of around 400 tons in 1995 (Tables 4 and 14; Fig. 3a). The 1996 estimate increased to 1 800 tons, however, more than half this estimate was based on the inclusion of deep water strata (at depths of 732-1 097 m) that weren't surveyed previously (Table 4). The 1997 estimate then declined to 1 100 tons although there was equal coverage to that of 1996 with 70% of the estimate attributed to the deeper strata. The 1998 estimate was similar to 1996 with more than half being attributed also to the inclusion of the new deeper strata. The 1999 estimate of about 800 tons was the lowest since the extension of the survey coverage to deeper water in 1996 with about 30% of the estimate accounted for by the new deep strata (Table 4; Fig. 3a). Little change occurred in the 2000 and 2001 surveys, however, the biomass and abundance in the deeper strata appear to have been declining since 1996 and contributed little to the survey estimates in these years (Table 4). In 2002, the increase in the estimate from 2001 (from 1 000 to 2 400 tons) was due almost entirely to the biomass estimate in one stratum and for 2003 was estimated to be again around 1 000 tons (Table 4). In 2004, difficulties with the Canadian autumn survey resulted in incomplete coverage, particularly in the deeper strata of Div. 3L (SCR Doc. 05/34). Since 1996,

these deeper strata (>731 m) have accounted for an average of 40% of the biomass estimate. The biomass estimate for 2004 in 3L was the lowest in the time series at 451 tons.

Mean weights per tow in Div. 3L (Tables 13 and 15; Fig 3b) ranged from 2 to 2.5 kg/tow in the early part of the survey series (1984-1990). A rapid decline in mean weight per tow then resulted in the lowest observed at 0.08 kg/tow in 1995. The inclusion of deep water strata (previously not surveyed) in 1996 explains the over three-fold increase in mean weight per tow to 0.28 kg/tow. Mean weights per tow ranged from 0.14 to 0.38 kg/ tow from 1997-2003 and in 2004 was 0.10 kg/tow.

The abundance indices followed similar trends as the biomass indices and are shown in Tables 5-7 and Table 16 for Div. 2J, 3K and 3L, respectively and illustrated in Fig. 3a by Division and Fig. 4; Table 16 for the divisions combined. The mean numbers per tow by Division are given in Tables 8-10 and Table 17, and are shown in Fig. 3b. The exception is in the estimate of abundance and mean number per tow for Div. 3L, which both show an increase from 1999-2002 (Fig. 3b). The trend in these indices is questionable when the confidence limits are considered, however, and declined once more in 2003 and 2004.

For the three divisions combined, there has been a very steady and rather systematic decline in the biomass index from about 65 000 tons (nearly 6 kg/tow) in 1984 to 1 100 tons (0.23 kg/tow) in 1995, the lowest in the time series (Fig. 4; Table 14). Although there was a small increase between 1995 and 1996 there has been little change since then. The current level of stock size is extremely low.

Assessment Results

Surplus production model (ASPIC)

A non-equilibrium surplus production model incorporating covariates (ASPIC; Prager, 1994, 1995) was applied to catch and survey biomass indices in order to investigate the usefulness of this method in quantitative assessment of this stock. Several model formulations were explored using the biomass index series and mean weight per tow series for the Canadian autumn surveys from 1984-2004 (Campelen equivalents prior to 1995). None of the model formulations fit the data well. Indicators of poor model suitability included unreasonably high B/Bmsy ratio, low contrast index, poor observed to estimated CPUE relationship, and strong residual patterns. These results suggest that this data should not be modeled using ASPIC.

Precautionary limit reference points

In the absence of an analytical assessment for this stock, it was not possible to calculate precautionary limit reference points directly. As a proxy for B_{lim}, 15% of the highest observed biomass estimate may be used and is calculated to be approximately 9800 tons (Fig. 5). However, the highest observed biomass estimates are in the early part of the time series when the survey did not cover the entire stock area. As a result, B_{lim} may be underestimated using this method. The stock has been below this B_{lim} since 1992.

Current Status

The stock remains at an extremely low level with current indices of stock size based on survey trends at about 5% of the average of the early 1980s when the stock was considered at a reasonably healthy level.

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Table 1. Catch statistics by country of witch flounder in Divisions 2J, 3K and 3L during 1963-2004. In 1998-2001, small portions of the "Others" catch are from Division 3M.

Year	Canada	Fed. Rep. Germany	German Dem. Rep.	Poland	USSR/ Russia	UK	Others	Total
1963	17	3	0	259	89	7	570	945
1964	103	0	0	752	164	24	1	1044
1965	128	29	0	1876	2056	58	0	4147
1966	187	9	1045	559	1868	29	0	3697
1967	901	0	332	926	1933	9	0	4101
1968	446	0	358	1990	7834	33	5	10666
1969	1355	0	546	957	9726	1	0	12585
1970	4020	0	508	3566	9934	0	2	18030
1971	8030	75	508	5404	2018	9	9	16053
1972	5520	6	648	4013	7016	225	0	17428
1973	3761	1348	2327	11802	2834	258	2031	24361
1974	1868	1082	272	5302	6917	29	493	15963
1975	1352	446	374	4583	4763	0	687	12205
1976	2081	606	110	3828	3022	3	975	10625
1977	4371	300	203	3052	392	0	0	8318
1978	1979	23	58	3490	1345	1	8	6904
1979	1392	0	22	1855	150	22	656	4097
1980	1459	0	16	1235	45	0	68	2823
1981	2661	0	32	1385	85	0	31	4194
1982	1206	0	4	1151	552	0	68	2981
1983	1483	0	50	1005	516	0	34	3088
1984	2077	0	27	1617	1000	2	85	4808
1985	1305	26	33	565	1006	-	68	3003
1986	1199	2	7	3	21	-	2684[a]	3916
1987	854	-	56	765	1057	-	1743	4475
1988	3270	-	10	760	4	-	110	4154
1989	4059	-	4	691	5	-	147	4906
1990	3271	-	-	-	-	-	696	3967
1991	2805	-	-	-	-	1	1208	4014
1992	1736	5	-	-	-	2	954	2697
1993	343	-	-	-	-	-	59	402
1994	12	-	-	-	-	-	491[b]	503
1995	7	-	-	-	-	-	777	784
1996	11	-	-	-	-	-	1371	1382
1997	8	-	-	-	-	-	847	855
1998	-	-	-	-	2	-	1113	1115
1999	2	-	-	-	20	-	278	300
2000	85	-	-	-	6	-	578	669
2001	161	-	-	-	31	-	605	797
2002	166	-	-	-	15	-	258	439
2003	110	-	-	-	7	-	630	747
2004	26	-	-	-	16	-	787	829

[a]Since 1985 the "Others" category is mainly comprised of EU catches

[b]Spain (SCS Doc. 95/15)

Table 2. Estimated Biomass (tons) of Witch Flounder (M+F) in each stratum from surveys in Div. 2J during fall of 1977-2004. (Engel 145 data converted to Campelen Units for 1977-94).

				Year																												
Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04
101 - 200	1427	633	201	0	0	0	0	0	0	0	61	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
	1823	1594	205	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
	2582	1870	206	114	0	0	0	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2246	2264	207	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	733	237																	0	0	0	0	0	0	0	0	0	0	0	0
	.	778	238																		0		0	0	0	0	0	0	0	0	0
201 - 300	440	621	202	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1608	680	209	103	14	48	122	0	83	123	19	152	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	774	1035	210	133	45	121	338	24	129	0	286	0	0	38	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1725	1583	213	265	249	160	298	280	371	197	118	102	130	98	21	56	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0
	1171	1341	214	193	54	0	58	65	122	74	21	106	71	0	16	14	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1270	1302	215	193	33	11	0	82	67	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1428	2196	228	508	134	301	543	183	678	264	467	79	728	93	123	151	76	0	44	35	0	0	0	0	0	0	0	0	3	0	0
	508	530	234	0	35	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
301 - 400	480	487	203	0	0	0	0	0	54	112	0	0	19	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	448	588	208	178	36	75	367	91	638	80	95	608	91	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
	330	251	211	447	198	100	289	70	242	12	99	72	27	38	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	384	360	216	0	0	27	42	56	63	85	0	0	54	13	10	16	0	0	0	0	0	0	2	0	0	0	0	0	3	0	0
	441	450	222	197	99	29	103	155	285	69	26	45	0	0	173	46	0	10	0	0	0	0	6	0	17	10	0	0	0	0	0
	567	536	229	183	177	118	215	127	139	155	103	52	857	70	145	596	32	31	28	15	13	0	0	0	0	0	6	4	0	11	4
401 - 500	354	288	204	57	0	37		85	125	13	91	0	71	14	42	58	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	268	241	217	0	0	15	0	0	0	0		0	54	64	44	72	6	0	0	0	13	0	7	8	6	0	0	0	0	2	14
	180	158	223	13	0	0	0	37	0	0	31	0	139	116	59	64	18	18	8	8	14	0	7	5	5	0		4	1	3	0
	686	598	227	161	123	44	482	180	358	211	85	147	329	411	203	228	1837	207	125	132	0	0	0	86	84	125	0	26	4	0	41
	420	414	235	813	0	456	430	502	371	908	517	399	121	168	0	62	149	37	20	0	41	0	16	3	22	0	0	0	46	0	63
	.	133	240																	36	19	0	17	16	11	24	11	9	0	3	14
501 - 750	664	557	212	1564	105	640	193	630	1116	1390	822	1253	3139	834	392	588	639	111	272	44	52	71	96	90	184	261	125	8	38	52	193
	420	362	218	0	0		0	0	0	0		15	0	44	114	79	58	13	0	8	19	1	17	10	12	9	4	0	0	3	20
	270	228	224	0	0	0	0	0	0	0	0	0	32	48	120	125	17	49	32	0	23	1	18	23	16	1	15	13	1	0	0
	237	185	230	0	0		15	0	0	0	17	0	57	15	101	396	771	1711	346	85	105	69	126	176	26	161	36	21	2	48	60
	.	120	239																	0	0	0	0	0	0	0	0	0	0	0	0
751 -1000	213	283	219					0		0		0	0	0	0	0	0	0	0	15	8	3	13	9	14	0	3	4	6	12	11
	182	186	231	0	0		0		0	0	0	0	0	0	0		0	457	176	197	118	115	6	36	228	143	283	59	257	12	43
	122	193	236	0				14	0	0	0	0	0	0	9		23	25	51	51	37	3	28	3	11	16	13	38	27	29	0
1001 -1250	324	303	220		0																		10	0	0		0	0	6	0	0
	177	195	225	0																			0	0	0	2	1	1	0	0	0
	236	228	232	0	0																		0	0	0	0	0	23	0	4	0
1251 -1500	286	330	221																				0	0	0	0	0	0	3	0	0
	180	201	226		0																		0	0	0	0	0	0	0	0	0
	180	237	233																				0	0	6	0	0	0	6	0	0
Grand Total				5123	1302	2218	3494	2581	4909	3693	2903	3030	5920	2063	1571	2653	3672	2669	1102	627	462	263	370	465	649	752	498	209	404	178	476
Biomass >1000m				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	6	2	1	24	16	4	0
Percent >1000m				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.9	0.3	0.3	11.4	3.9	2.1	0.0

Table 3. Estimated Biomass (tons) of Witch Flounder (M+F) in each stratum from surveys in Div. 3K during fall of 1978-2004. (Engel 145 data converted to Campelen Units for 1978-94).

				Year																											
Depth Range (m)	Stratum Area	New Stratum Area	Stratum	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04
101 - 200	.	798	608																			0	0	0		0	0	0	0	0
	.	445	612																			0	0	0		0	0	0	0	0
	.	250	616																			0	0	0		0	0	0	0	0
	1455	1347	618							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1588	1753	619							0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
201 - 300	.	342	609																			0	0	0		0	0	0	0	0
	.	573	611																			0	0	0		0	0	0	0	0
	.	251	615																			0	0	0		1	0	0	0	0
	2709	2545	620	612	1410	509	152	227	133	126	64	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2859	2537	621	1051	3719	498	424	250	788	329	445	26	62	0	63	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	668	1105	624	356	145	105	378	446	121	367	90	66	19	0	0	7	0	0	12	0	0	0	9	0	6	5	24	0	0	9
	1618	1555	634	788	772	1075	536	981	177	860	388	256	209	373	131	0	0	25	4	0	0	0	0	0	0	0	0	0	0	0
	1274	1274	635	1635	1887	1443	1481	833	538	2211	775	15	136	338	166	21	0	31	0	0	1	0	46	17	0	6	0	0	0	0
	1455	1455	636	1482	1680	1845	1166	876	711	2898	848	314	520	824	355	63	0	0	0	0	2	2	37	0	0	0	5	0	0	0
	1132	1132	637	1116	2242	1430	1864	1905	3668	2724	2490	702	841	215	158	0	0	57	17	0	0	0	3	2	32		1	0	0	0
	447	.	632	395	591	230	524	408	447		210	89	34	38	82	0	3	8													
301 - 400	.	256	610																			1	0	3		1	1	3	0	0
	.	263	614																			0	0	0		1	1	0	0	0
	.	593	617																0	0	0	0	4	13	0	0	0	0	0	0
	1027	494	623	500	633	584	551	410	601	343	650	164	199	30	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	850	888	625	864	2238	988	1580	491	1588	1416	1101	50	165	104	12	0	0	0	0	0	3	4	0	7	2	0	2	0	0	2
	919	1113	626	3586	5737	5960	1149	4128	3477	1248	1110	57	174	32	56	0	0	22	0	0	0	0	1	0	9	8	5	0	0	2
	1085	1085	628	2454	6077	3512	1379	2431	4882	2070	2324	954	523	39	214	0	0	20	0	0	0	0	0	0	5	12	3	0	0	15
	499	495	629	1722	1617	2520	1745	958	2253	1016	998	225	510	196	63	66	0	10	2	6	4	2	2	8	18	14	1	0	0	24
	544	332	630	1048	730	850	981		727	549	363	168	182	155	28	0	0	11	18	0	0	7	1	0	3	5	8	0	0	0
	2179	2067	633	2190	2876	3722	1402	2399	2661	3092	2072	1599	1105	1931	1186	365	162	117	94	47	3	33	39	74	21	26	13	11	1	3
	2059	2059	638	3316	8711	4695	5840	3430	4381	8608	7033	8275	5506	7317	3393	327	340	91	81	4	4	5	17	79	60	79	75	14	11	59
	1463	1463	639	1415	1092	2077	1716	1127	3637	4062	2121	1744	779	2637	544	487	83	13	0	36	40	14	4	41	0	0	0	3	0	0
401 - 500	.	30	613																			0	0	0		3	0	0	0	0
	632	691	622	598	1228	1938	1010	600	946	640	1152	263	653	21	20	37	10	28	14	0	5	1	6	18	0	48	42	0	0	6
	1184	1255	627	2887	4140	8083	11621	8635	10560	7849	4541	1598	1378	1341	738	243	6	47	69	23	32	8	48	81	42	98	40	13	2	50
	1202	1321	631	2274	2264	2534	7736	1009	5887	6448	4570	2929	1553	598	358	73	338	313	63	280	77	7	85	80	16	66	18	17	3	150
	198	69	640	51		177	62	411		436	1074	1669	2280	1347	1145	176	184	18	0	0	0	8	3	10	0	12	14	0	0	30
	204	216	645	12		0	12	341	281	1519	238		3079	571	252	991	99	15	15	8	0	18	15	3	23	7	9	5	0	0
	.	134	650																21	4	2	9	17	20	25		15	9	9	51
501 - 750	584	230	641	0	0	39	82	72	171	0	813		1657			11071	937	0	12	8	9	45	36	108	114		162	25	61	595
	333	325	646	0	0	68	14	25	615	94	108		102			275	173	49	36	79	3	431	42	40	36	173	118	154	16	72
	.	359	651																25	23	19	52	202	127	179		447	134	17	1309
751 -1000	931	418	642	0		79	0	36		131	89		83			2496	1213	790	81	65	17	7	0	6	35	208	11	14	141	17
	409	360	647	0	0	0	0	0			26					390	724	198	67	108	30	50	118	103	193	0	280	9	102	232
	.	516	652																266	154	52	149	382	408	39	412	112	59	218	14
1001 -1250	1266	733	643	0	0																66	0	0	0	12	18	0	0	37	0
	232	228	648	0																		0	0	0	0	0	0	0	0	0
	.	531	653																429		66	0	0	0	12	0	18	0	33	0
1251 -1500	954	474	644	0	0																0	0	0	0	0	0	0	0	0	0
	263	212	649	0																		0	0	0	0	0	0	0	0	0
	.	479	654																		0	0	0	0	4	0	0	0	0	0
Grand Total				30353	49789	44962	43406	32429	49251	49038	35694	21359	21746	18110	8976	17088	4272	1863	1327	846	435	855	1116	1255	881	1200	1427	471	651	2641
Biomass >1000m				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	429	0	132	0	0	4	24	18	18	0	70	0
Percent >1000m				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.3	0.0	30.4	0.0	0.0	0.3	2.7	1.5	1.3	0.0	10.7	0.0

Table 4. Estimated Biomass (tons) of Witch Flounder (M+F) in each stratum from surveys in Div. 3L during fall of 1983-2004.
(Engel 145 data converted to Campelen Units for 1983-94).

				Year																				
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	04
30 - 56	.	268	784													0	0	0		1	0	0	0	0
57 - 92	2071	2071	350	136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1780	1780	363	85	0	50	0	0	0	264	33	41	0	0	0	0	0	0	0	0	0	0	0	0
	1121	1121	371	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2460	2460	372	144	0	0	0	16	0	38	8	0	0	0	27	0	0	0	0	0	0	0	0	0
	1120	1120	384	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	465	785													0	0	0		0	0	0	0	0
93 - 183	1519	1519	328	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1574	1574	341	230	0	0	34	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	585	585	342	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	525	525	343	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2120	2120	348	334	0	0	0	44	0	0	0	0		0	0	0	0	0	0	1	0	0	0	0
	2114	2114	349	306	0	155	0	36	0	145	0	0	0	0	0	0	0	0	0	2	0	0	17	0
	2817	2817	364	202	0	143	0	39	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1041	1041	365	100	0	68	29	18	0	0	36	0	0	0	0	0	0	0	0		0	0	0	
	1320	1320	370	190	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2356	2356	385	340	0	79	58	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1481	1481	390	159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	84	786													1	0	0		0	1	0	1	0
	.	613	787													0	0	0		0	0	0	0	0
	.	261	788													0	0	0		0	0	0	0	0
	.	89	790													0	0	1		0	1	0	0	0
	.	72	793													0	0	0		0	0	2	0	0
	.	216	794													0	0	0			0	0	0	0
	.	98	797													0	0	0		0	0	0	0	0
	.	72	799													0	0	0		0	0	0	0	0
184 - 274	1494	1582	344	159	37	29	127	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	3	2
	983	983	347	467	0	42	0	154	66	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
	1394	1394	366	186	355	307	171	110	187	27	0	7	0	0	0	0	0	0	0	0	0	0	6	
	961	961	369	374	570	706	320	1061	429	473	162	0	0	0	0	0	0	0	0	0	0	0	0	
	983	983	386	168	519	1082	1518	1750	442	218	307	875	0	0	0	0	0	0	0	0	0	0	0	
	821	821	389	196	133	760	250	138	21	79	0	27	0	0	38	0	0	0	0	11	0	0	0	0
	282	282	391	0	32	0	9	0	0	0	70	22	0	0	36	0	25	0	0	0	0	0	0	0
	.	164	795													0	0	0		0	0	0	0	0
184 - 366	.	72	789													0	0	0		0	0	0	0	0
	.	227	791													6	0	0		0	0	1	3	0
	.	100	798													0	2	21		3	23	0	0	3
275 - 366	1432	1432	345	4484	1227	617	3693	2099	2358	750	0	61	73	0	10	3	5	35	3	5	0	8	5	1
	865	865	346	1423	2240	3321	1201	1823	1287	1863	203	40	14	0	0	12	3	1	20	16	8	4	1	0
	334	334	368	47	29	386	23	64	144	106	39	14	0	0	22	0	0	0	0	6	0	0	0	
	718	718	387	169	404	276	572	1775	1546	3668	159	52	32	12	63	8	2	0	5	38	4	6	0	
	361	361	388	1229	48		589	92	126	0	125	173	0	14	0	0	0	12	0	5	17	6	4	0
	145	145	392	55	13	20	50	13	0	0	0	0	0	4	0	0	0	0	0	0	14	0	0	0
	.	175	796													0	1	2		0	4	1	0	0
	.	81	800														8	3		6	24	22	1	4
367 - 549	186	186	729	146	127	280				48	274	246	42	131	2	151	24	0	0	1	13	33	12	0
	216	216	731	498	248					465	178	356	38	79	19		0	7	19	16	4	3	13	22
	468	468	733	328	1164					1618	2110	610	183	60	23	12	0	41	54	62	50	106	8	248
	272	272	735	367	34	1714					222	216	40	12	3	20	23	18	12	3	3	12	0	
	.	50	792													55	37	11		29	54	49	45	49
550 - 731	170	170	730	104	16						130	6	140	88	83	0	21	11	10	59	274	113	0	14
	231	231	732	282	235					29	207	283	41	194	16	147	121	440	252	230	207	115	107	106
	228	228	734	30	184					168	100	11	106	49	37	127	15	149	95	47	17	79	4	
	175	175	736		268	709				355	913	90	70	20	10	261	41	135	93	415	185	1196	104	
732 - 914	.	227	737												19	130	104	438	151	11	124	502	68	
	.	223	741													115	164	313	7	0	3	159	15	
	.	348	745													154	212	123	65	0	0	0	7	
	.	159	748													87	0	0	40	0	0	0	37	
915 -1097	.	221	738												10	331	127	24	0	0	7	6	423	
	.	206	742													31	3	9	0	0	0	0	117	
	.	392	746													120	126	0	0	0	0	0	7	
	.	126	749													33	29	0		0	0	0	0	
1098 -1280	.	254	739													0	0	0	0	0	0	0	0	
	.	211	743													0	0	0	0	0	0	0	0	
	.	724	747													0	0	107	0	0	0	0	0	
	.	556	750													0	0	0	0	0	0	0	0	
1281 -1463	.	264	740													0	0	0	0	0	0	0	0	
	.	280	744													0	0	0		0	0	0	0	
	.	229	751													0	0	0		0	0	0	0	
Grand Total				13210	7881	10743	8679	9294	6606	10341	5274	3131	778	663	418	1806	1095	1906	826	968	1042	2428	1010	451
Biomass >731m				0	0	0	0	0	0	0	0	0	0	0	29	1002	765	1014	262	12	134	667	674	0
Percent >731m				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	55.4	69.8	53.2	31.8	1.2	12.9	27.5	66.8	0.0

Table 5. Abundance (000s) per stratum of Witch Flounder (M+F) from surveys in Div. 2J during fall of 1977-2004. Engel 145 data converted to Campelen Units for 1977-94.

				Year																											
Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	
101 - 200	1427	633	201	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	
	1823	1594	205	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	
	2582	1870	206	129	0	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2246	2264	207	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	.	733	237																	0	0	0	0	0	0	0	0	0	0	0	
	.	778	238																		0		0	0	0	0	0	0	0	0	
201 - 300	440	621	202	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1608	680	209	158	37	32	147	0	80	158	32	147	0	0	0	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	
	774	1035	210	142	46	106	405	35	124	0	373	0	0	53	0	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1725	1583	213	386	271	203	326	435	475	308	190	185	185	158	30	53	0	0	0	0	0	0	0	0	36	0	0	0	0	0	
	1171	1341	214	268	69	0	97	64	141	101	40	134	81	0	27	54	32	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1270	1302	215	218	22	29	0	35	78	0	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1428	2196	228	565	262	393	746	196	825	295	421	56	1080	112	196	393	229	0	79	101	0	0	0	0	0	0	0	0	38	0	
	508	530	234	0	42	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	
301 - 400	480	487	203	0	0	0	0	0	66	154	0	0	33	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	448	588	208	339	62	139	508	154	924	123	144	965	123	0	0	123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	330	251	211	545	306	148	390	91	340	23	136	106	23	45	0	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	384	360	216	0	0	40	40	106	106	123	0	0	79	26	26	26	0	0	0	0	0	0	25	0	0	0	0	0	25	0	
	441	450	222	303	182	45	152	212	465	101	40	61	0	0	394	61	0	20	0	0	0	0	58	0	62	62	0	0	0	0	
	567	536	229	312	292	175	331	117	195	214	130	52	1846	260	364	1664	78	26	130	221	25	0	0	0	0	0	37	33	0	37	
401 - 500	354	288	204	73	0	73		97	130	16	122	0	97	24	73	97	24	0	0	0	0	0	0	0	0	0	0	0	0	0	
	268	241	217	0	0	18	0	0	0	0		0	74	92	74	92	18	0	0	0	155	0	33	66	31	0	0	0	0	19	
	180	158	223	12	0	0	0	37	0	0	50	0	248	161	124	111	37	66	33	76	145	0	75	43	19	0		43	12	22	
	686	598	227	165	189	47	566	189	396	283	126	212	409	684	220	354	4404	661	330	329	0	0	0	206	329	535	0	206	47	0	
	420	414	235	1343	0	664	549	664	578	1358	770	520	376	289	0	202	173	96	19	0	304	0	51	28	85	0	0	0	65	0	
	.	133	240																	348	140	0	146	55	45	137	37	76	0	18	
501 - 750	664	557	212	2147	183	868	228	731	1461	1705	1127	1621	4658	1302	685	891	1218	411	365	77	281	306	217	268	690	536	460	68	115	115	
	420	362	218	0	0		0	0	0	0		29	0	58	173	144	87	29	0	100	199	17	199	75	50	47	50	0	0	22	
	270	228	224	0	0	0	0	0	0	0	0	0	56	56	204	186	19	111	74	0	146	31	78	141	84	16	94	72	16	0	
	237	185	230	0	0		16	0	0	0	16	0	65	16	147	782	1695	4548	880	471	382	827	582	865	102	674	165	130	29	216	
	.	120	239																	0	0	0	0	0	0	0	0	0	0	0	
751 -1000	213	283	219					0		0		0	0	0	0	0	0	0	0	156	58	39	58	39	78	0	17	16	62	71	
	182	186	231	0	0		0		0	0	0	0	0	0	0		0	939	401	512	375	563	26	90	832	461	1011	205	951	44	
	122	193	236	0				25	0	0	0	0	0	0	8		59	34	151	199	159	25	133	13	38	66	80	173	80	133	
1001 -1250	324	303	220		0																		42	0	0		0	0	19	0	
	177	195	225	0																			0	0	0	13	13	12	0	0	
	236	228	232	0	0																		0	0	0	0	0	63	0	18	
1251 -1500	286	330	221																				0	0	0	0	0	0	23	0	
	180	201	226		0																		0	0	0	0	0	0	0	0	
	180	237	233																				0	0	23	0	0	0	16	0	
Grand Total				7106	1962	3016	4503	3190	6486	4963	3840	4089	9432	3337	2746	5377	8110	6941	2463	2588	2369	1808	1724	1890	2505	2548	1964	1096	1497	715	1
Biomass >1000m				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	23	13	13	75	58	18	
Percent >1000m				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.9	0.5	0.7	6.8	3.8	2.5	

Table 6. Abundance (000s) per stratum of Witch Flounder (M+F) from surveys in Div. 3K during fall of 1978-2004. Engel 145 data converted to Campelen Units for 1978-94.

				Year																									
Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
101 - 200	.	798	608																			0	0	0		0	0	0	0
	.	445	612																			0	0	0		31	0	0	0
	.	250	616																			0	0	0		0	0	0	0
	1455	1347	618							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1588	1753	619							0	0	0	0	0	0	0	0	0	0	0	54	0	0	0	0	0	0	0	0
201 - 300	.	342	609																			0	0	0		0	0	0	0
	.	573	611																			0	0	0		0	0	0	0
	.	251	615																			0	0	0		17	0	0	0
	2709	2545	620	963	1975	621	149	166	112	115	80	124	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2859	2537	621	1999	5148	696	286	169	688	253	393	28	66	0	486	0	0	0	0	0	0	0	0	187	0	0	0	0	0
	668	1105	624	525	230	161	597	459	184	368	161	92	31	0	0	23	0	0	22	0	0	0	30	0	57	30	30	0	0
	1618	1555	634	841	835	1272	668	911	223	890	544	267	283	482	254	0	0	240	13	0	0	0	0	0	0	0	0	0	0
	1274	1274	635	1694	1906	1782	1577	876	584	2432	1127	29	146	456	175	29	0	58	0	0	29	0	70	105	0	80	0	0	0
	1455	1455	636	1716	1716	1887	1168	961	634	2927	976	400	486	767	240	29	0	0	0	0	29	33	67	0	0	0	71	0	0
	1132	1132	637	1609	3292	1972	2362	2380	4765	3530	3315	740	960	195	156	0	0	52	52	0	0	0	31	62	145		31	0	0
	447	.	632	553	769	261	646	512	492		225	92	31	31	61	0	6	57											
301 - 400	.	256	610																			104	18	53		35	55	106	16
	.	263	614																			36	18	0		163	36	0	0
	.	593	617																0	0	41	0	27	51	0	0	0	0	0
	1027	494	623	871	989	871	742	480	871	565	918	283	537	311	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	850	888	625	1579	3976	1462	2572	585	2222	2081	1684	78	322	292	88	0	0	0	0	0	41	24	0	31	31	0	35	0	0
	919	1113	626	8849	11251	10644	1593	6928	4867	2865	1618	63	582	126	329	0	0	42	0	0	0	0	122	0	575	364	306	0	0
	1085	1085	628	3603	8358	5249	1841	3433	6567	2708	4229	1692	896	269	634	0	0	149	0	0	27	0	30	0	179	269	114	0	30
	499	495	629	3032	3672	4915	2791	1476	3638	1373	2094	526	732	755	412	103	0	46	182	136	306	34	34	68	375	280	45	0	0
	544	332	630	2769	1347	1122	1310		898	798	917	299	274	249	125	0	0	25	30	0	0	46	46	23	114	101	15	20	0
	2179	2067	633	2964	3897	4526	2098	2955	3047	3627	2848	3559	1853	3485	3687	1063	360	552	600	57	67	221	284	348	63	190	135	72	32
	2059	2059	638	6833	15200	9725	9559	5910	6849	14417	12385	11330	7534	11400	5047	535	612	317	368	13	78	150	157	661	602	1020	617	252	328
	1463	1463	639	2013	1157	2650	2013	1429	4025	5459	2792	2381	1236	3321	503	489	67	24	0	226	115	34	101	168	0	0	0	93	0
401 - 500	.	30	613																			2	4	14		220	14	9	6
	632	691	622	2652	1942	3347	1608	1130	2260	978	1934	696	1478	203	290	130	58	261	238	0	28	23	32	95	0	63	158	0	0
	1184	1255	627	6026	11618	12948	22938	18544	22232	18690	17311	7753	3882	7199	6271	1954	434	271	3625	367	792	127	1343	2244	660	2012	773	362	134
	1202	1321	631	8515	5677	6338	13261	1819	8863	12666	11433	8019	3417	2563	1819	276	2563	2260	727	2453	537	178	569	485	84	628	314	212	121
	198	69	640	109		232	82	463		572	1716	2465	4017	2274	1648	245	245	91	0	0	0	38	19	62	5	47	138	9	5
	204	216	645	14		0	14	412	295	2020	393		5837	1108	463	2357	196	47	188	119	0	149	45	13	104	74	110	74	0
	.	134	650																25	5	37	28	147	313	179		166	99	166
501 - 750	584	230	641	0	0	80	161	60	241	0	1004		2437			17031	1366	0	53	74	79	253	190	506	378		791	156	301
	333	325	646	0	0	46	23	46	710	92	122		115			527	366	290	209	462	22	2209	156	156	156	797	536	786	89
	.	359	651																49	111	247	444	771	444	571		1552	1242	222
751 -1000	931	418	642	0		64	0	43		128	128		128			4013	2177	1089	383	173	86	29	0	29	173	597	33	58	316
	409	360	647	0	0	0	0	0			38					534	1594	506	281	264	50	173	198	272	743	0	867	25	347
	.	516	652																899	355	390	745	1207	1526	177	887	238	177	1278
1001 -1250	1266	733	643	0	0																235	0	0	0	34	45	0	0	123
	232	228	648	0																		0	0	0	0	0	0	0	0
	.	531	653																974		256	0	0	0	37	0	37	0	146
1251 -1500	954	474	644	0	0																0	0	0	0	0	0	0	0	0
	263	212	649	0																		0	0	0	0	0	0	0	0
	.	479	654																		0	0	0	0	38	0	0	0	0
Grand Total				59729	84955	72872	70058	52146	75267	79553	70384	40917	37279	35486	22734	29338	10045	6377	8918	4815	3546	5081	5716	7955	5441	7952	7220	3752	3659
Biomass >1000m				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	974	0	491	0	0	38	70	45	37	0	269
Percent >1000m				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	13.8	0.0	0.0	0.5	1.3	0.6	0.5	0.0	7.4

Table 7. Abundance (000s) per stratum of Witch Flounder (M+F) from surveys in Div. 3L during fall of 1983-2004. (Engel 145 data converted to Campelen Units for 1983-94).

				Year																				
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	04
30 - 56	.	268	784													0	0	0		74	0	0	0	0
57 - 92	2071	2071	350	166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1780	1780	363	92	0	35	0	0	0	306	43	39	0	0	0	0	0	0	0	0	0	0	0	0
	1121	1121	371	44	0	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0
	2460	2460	372	182	0	0	0	26	0	34	13	0	0	0	34	0	0	0	0	0	0	0	0	0
	1120	1120	384	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	465	785													0	0	0		0	32	0	0	0
93 - 183	1519	1519	328	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1574	1574	341	217	0	0	24	27	0	0	0	0	0	0	0	0	0	43	0	0	0	0	0	0
	585	585	342	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	40	0	0
	525	525	343	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2120	2120	348	292	0	0	0	58	0	0	0	0		0	0	0	0	49	0	73	0	0	0	48
	2114	2114	349	291	0	162	0	32	0	166	0	0	0	0	0	0	42	0	0	42	0	0	125	42
	2817	2817	364	271	0	155	0	55	0	32	0	0	0	0	0	0	0	43	43	0	43	0	0	0
	1041	1041	365	143	0	57	48	29	0	0	48	0	0	0	0	0	0	0	0		0	0	0	
	1320	1320	370	233	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2356	2356	385	324	0	122	36	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1481	1481	390	136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	.	84	786													90	36	23		40	164	29	64	40
	.	613	787													0	0	0		0	0	0	0	0
	.	261	788													0	0	18		18	0	0	0	0
	.	89	790													6	18	55		0	37	6	0	0
	.	72	793													0	0	0		0	0	50	0	7
	.	216	794													0	0	0			0	0	0	0
	.	98	797													7	0	0		0	0	0	0	0
	.	72	799													0	0	0		0	0	6	0	0
184 - 274	1494	1582	344	206	46	117	154	0	0	0	0	0	0	0	0	0	0	0	0	64	0	87	131	50
	983	983	347	586	0	34	0	135	108	0	0	0	0	0	0	0	0	0	0	0	45	0	0	0
	1394	1394	366	157	362	431	219	110	164	32	0	8	0	0	0	0	38	0	38	0	0	0	77	
	961	961	369	359	507	661	330	1348	529	463	162	0	0	0	39	0	0	0	0	0	0	0	0	
	983	983	386	186	568	1082	1792	1974	352	237	270	1262	0	0	0	0	0	0	0	0	0	80	0	
	821	821	389	169	158	875	226	169	28	75	0	38	0	0	33	0	0	0	0	301	0	0	0	38
	282	282	391	0	39	0	19	0	0	0	91	26	0	0	34	0	19	0	0	0	0	0	0	0
	.	164	795													0	0	0		56	0	0	0	0
184 - 366	.	72	789													0	5	5		22	5	24	5	20
	.	227	791													42	62	0		0	28	10	16	0
	.	100	798													7	7	172		135	530	21	0	123
275 - 366	1432	1432	345	6895	1488	739	4531	2589	3180	2088	0	345	394	0	113	70	223	439	149	117	79	468	184	105
	865	865	346	2380	3498	3927	1487	2427	1606	2340	389	170	76	0	0	35	317	178	282	119	278	326	59	40
	334	334	368	46	46	459	23	69	207	115	69	14	0	0	23	0	23	0	20	23	0	0	23	
	718	718	387	165	444	247	691	2025	1679	4971	198	66	33	77	99	49	44	0	44	593	44	93	0	
	361	361	388	1440	50		819	149	149	0	116	199	0	14	0	0	0	149	0	124	309	44	94	0
	145	145	392	80	20	20	70	20	0	0	0	0	0	7	0	0	0	0	0	0	16	0	0	0
	.	175	796													0	107	24		21	638	96	0	0
	.	81	800														156	178		136	953	574	28	166
367 - 549	186	186	729	217	192	409				64	341	422	51	290	34	375	115	0	0	34	13	80	26	0
	216	216	731	877	371					520	248	604	99	200	45		0	74	56	59	15	40	116	187
	468	468	733	338	1609					2221	2983	665	258	136	32	19	0	114	129	170	109	433	61	1506
	272	272	735	661	37	2320					349	249	37	14	75	58	75	168	50	17	19	17	0	
	.	50	792													901	423	279		915	1829	2887	2298	1331
550 - 731	170	170	730	105	23						117	12	195	171	108	0	47	19	21	58	509	222	10	42
	231	231	732	365	302					32	270	397	48	339	78	280	413	969	508	524	565	233	229	249
	228	228	734	21	267					251	110	16	141	146	44	467	70	380	173	125	28	265	25	
	175	175	736		373	987				506	1613	217	241	34	75	782	277	1037	433	1432	681	3295	631	
732 - 914	.	227	737												78	468	297	1109	390	16	281	1028	390	
	.	223	741													291	460	892	14	0	31	291	70	
	.	348	745													311	479	168	202	24	24	0	48	
	.	159	748													186	0	0	50	0	0	0	55	
915 -1097	.	221	738												61	532	347	56	0	0	14	30	1049	
	.	206	742													43	14	14	13	0	0	0	264	
	.	392	746													216	168	0	0	27	0	0	13	
	.	126	749													61	43	0		0	0	0	0	
1098 -1280	.	254	739													0	0	0	0	0	0	0	0	
	.	211	743													0	0	0	0	0	0	0	0	
	.	724	747													0	0	100	0	0	0	0	0	
	.	556	750													0	0	0	0	0	0	0	0	
1281 -1463	.	264	740													0	0	0	0	0	0	0	0	
	.	280	744													0	0	0		0	0	0	0	
	.	229	751													0	14	0		0	0	0	0	
Grand Total				17914	10401	12839	10500	11269	8002	14453	7428	4748	1572	1428	1004	5297	4383	6755	2655	5361	7316	10776	6090	3990
Biomass >731m				0	0	0	0	0	0	0	0	0	0	0	139	2108	1821	2337	669	67	349	1350	1890	0
Percent >731m				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.8	39.8	41.6	34.6	25.2	1.2	4.8	12.5	31.0	0.0

Table 8.Mean Numbers per Tow of Witch Flounder (M+F) in each stratum from surveys in Div. 2J during fall of 1977-2004. Engel 145 data converted to Campelen Units for 1977-94.

				Year																										
Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	0
101 - 200	1427	633	201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	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	0.0
	1823	1594	205	0.00	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	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	2582	1870	206	0.36	0.00	0.00	0.00	0.00	0.17	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	0.0
	2246	2264	207	0.00	0.00	0.00	0.00	0.00	0.07	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	0.0
	.	733	237																	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	.	778	238																		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
201 - 300	440	621	202	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	0.0
	1608	680	209	0.71	0.17	0.14	0.67	0.00	0.36	0.71	0.14	0.67	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	774	1035	210	1.33	0.43	1.00	3.80	0.33	1.17	0.00	3.50	0.00	0.00	0.50	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	0.0
	1725	1583	213	1.63	1.14	0.86	1.38	1.83	2.00	1.30	0.80	0.78	0.78	0.67	0.13	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.0
	1171	1341	214	1.67	0.43	0.00	0.60	0.40	0.88	0.63	0.25	0.83	0.50	0.00	0.17	0.33	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	1270	1302	215	1.25	0.13	0.17	0.00	0.20	0.44	0.00	0.33	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	0.0
	1428	2196	228	2.88	1.33	2.00	3.80	1.00	4.20	1.50	2.14	0.29	5.50	0.57	1.00	2.00	1.17	0.00	0.40	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.0
	508	530	234	0.00	0.60	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	0.0
301 - 400	480	487	203	0.00	0.00	0.00	0.00	0.00	1.00	2.33	0.00	0.00	0.50	0.00	0.00	0.33	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	0.0
	448	588	208	5.50	1.00	2.25	8.25	2.50	15.00	2.00	2.33	15.67	2.00	0.00	0.00	2.00	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	0.0
	330	251	211	12.00	6.75	3.25	8.60	2.00	7.50	0.50	3.00	2.33	0.50	1.00	0.00	1.50	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	0.0
	384	360	216	0.00	0.00	0.75	0.75	2.00	2.00	2.33	0.00	0.00	1.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.0
	441	450	222	5.00	3.00	0.75	2.50	3.50	7.67	1.67	0.67	1.00	0.00	0.00	6.50	1.00	0.00	0.33	0.00	0.00	0.00	0.00	0.94	0.00	1.00	1.00	0.00	0.00	0.00	0.0
	567	536	229	4.00	3.75	2.25	4.25	1.50	2.50	2.75	1.67	0.67	23.67	3.33	4.67	21.33	1.00	0.33	1.67	3.00	0.33	0.00	0.00	0.00	0.00	0.00	0.50	0.44	0.00	0.5
401 - 500	354	288	204	1.50	0.00	1.50		2.00	2.67	0.33	2.50	0.00	2.00	0.50	1.50	2.00	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	0.0
	268	241	217	0.00	0.00	0.50	0.00	0.00	0.00	0.00		0.00	2.00	2.50	2.00	2.50	0.50	0.00	0.00	0.00	4.67	0.00	1.00	2.00	0.94	0.00	0.00	0.00	0.00	0.5
	180	158	223	0.50	0.00	0.00	0.00	1.50	0.00	0.00	2.00	0.00	10.00	6.50	5.00	4.50	1.50	2.67	1.33	3.50	6.67	0.00	3.44	2.00	0.89	0.00		2.00	0.57	1.0
	686	598	227	1.75	2.00	0.50	6.00	2.00	4.20	3.00	1.33	2.25	4.33	7.25	2.33	3.75	46.67	7.00	3.50	4.00	0.00	0.00	0.00	2.50	4.00	6.50	0.00	2.50	0.57	0.0
	420	414	235	23.25	0.00	11.50	9.50	11.50	10.00	23.50	13.33	9.00	6.50	5.00	0.00	3.50	3.00	1.67	0.33	0.00	5.33	0.00	0.89	0.50	1.50	0.00	0.00	0.00	1.14	0.0
	.	133	240																	19.00	7.67	0.00	8.00	3.00	2.46	7.50	2.00	4.17	0.00	1.0
501 - 750	664	557	212	23.50	2.00	9.50	2.50	8.00	16.00	18.67	12.33	17.75	51.00	14.25	7.50	9.75	13.33	4.50	4.00	1.00	3.67	4.00	2.83	3.50	9.00	7.00	6.00	0.89	1.50	1.5
	420	362	218	0.00	0.00		0.00	0.00	0.00	0.00		0.50	0.00	1.00	3.00	2.50	1.50	0.50	0.00	2.00	4.00	0.33	4.00	1.50	1.00	0.94	1.00	0.00	0.00	0.4
	270	228	224	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.50	5.50	5.00	0.50	3.00	2.00	0.00	4.67	1.00	2.50	4.50	2.67	0.50	3.00	2.30	0.50	0.0
	237	185	230	0.00	0.00		0.50	0.00	0.00	0.00	0.50	0.00	2.00	0.50	4.50	24.00	52.00	139.50	27.00	18.50	15.00	32.50	22.89	34.00	4.00	26.50	6.50	5.11	1.14	8.5
		120	239																	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
751 -1000	213	283	219					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	1.50	1.00	1.50	1.00	2.00	0.00	0.44	0.40	1.59	1.8
	182	186	231	0.00	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	37.50	16.00	20.00	14.67	22.00	1.00	3.50	32.53	18.00	39.50	8.00	37.17	1.7
	122	193	236	0.00				1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50		3.50	2.00	9.00	7.50	6.00	0.94	5.00	0.50	1.44	2.50	3.00	6.50	3.00	5.0
1001 -1250	324	303	220		0.00																		1.00	0.00	0.00		0.00	0.00	0.44	0.0
	177	195	225	0.00																			0.00	0.00	0.00	0.50	0.50	0.44	0.00	0.0
	236	228	232	0.00	0.00																		0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.5
1251 -1500	286	330	221																				0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.0
	180	201	226		0.00																		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	180	237	233																				0.00	0.00	0.71	0.00	0.00	0.00	0.50	0.0
All strata				2.16	0.59	0.97	1.42	0.99	2.01	1.52	1.23	1.26	2.90	1.03	0.86	1.67	2.49	2.13	0.76	0.82	0.72	0.65	0.50	0.54	0.72	0.74	0.57	0.32	0.43	0.2

Table 9. Mean Numbers per Tow of Witch Flounder (M+F) in each stratum from surveys in Div. 3K during fall of 1978-2004. Engel 145 data converted to Campelen Units for 1978-94.

				Year																								
Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
101 - 200	.	798	608																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	.	445	612																			0.00	0.00	0.00		0.50	0.00	0.00	0.00
	.	250	616																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	1455	1347	618							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
	1588	1753	619							0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201 - 300	.	342	609																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	.	573	611																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	.	251	615																			0.00	0.00	0.00		0.50	0.00	0.00	0.00
	2709	2545	620	2.58	5.30	1.67	0.40	0.44	0.30	0.31	0.21	0.33	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
	2859	2537	621	5.08	13.09	1.77	0.73	0.43	1.75	0.64	1.00	0.07	0.17	0.00	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.00
	668	1105	624	5.71	2.50	1.75	6.50	5.00	2.00	4.00	1.75	1.00	0.33	0.00	0.00	0.25	0.00	0.00	0.14	0.00	0.00	0.00	0.20	0.00	0.38	0.20	0.20	0.00	0.00
	1618	1555	634	3.78	3.75	5.71	3.00	4.09	1.00	4.00	2.44	1.20	1.27	2.17	1.14	0.00	0.00	1.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1274	1274	635	9.67	10.88	10.17	9.00	5.00	3.33	13.88	6.43	0.17	0.83	2.60	1.00	0.17	0.00	0.33	0.00	0.00	0.17	0.00	0.40	0.60	0.00	0.46	0.00	0.00	0.00
	1455	1455	636	8.57	8.57	9.43	5.83	4.80	3.17	14.63	4.88	2.00	2.43	3.83	1.20	0.14	0.00	0.00	0.00	0.00	0.14	0.17	0.33	0.00	0.00	0.00	0.36	0.00	0.00
	1132	1132	637	10.33	21.14	12.67	15.17	15.29	30.60	22.67	21.29	4.75	6.17	1.25	1.00	0.00	0.00	0.33	0.33	0.00	0.00	0.00	0.20	0.40	0.93		0.20	0.00	0.00
	447	.	632	9.00	12.50	4.25	10.50	8.33	8.00		3.67	1.50	0.50	0.50	1.00	0.00	0.10	0.92											
301 - 400	.	256	610																			2.94	0.50	1.50		1.00	1.57	3.00	0.44
	.	263	614																			1.00	0.50	0.00		4.50	1.00	0.00	0.00
	.	593	617																0.00	0.00	0.50	0.00	0.33	0.63	0.00	0.00	0.00	0.00	0.00
	1027	494	623	6.17	7.00	6.17	5.25	3.40	6.17	4.00	6.50	2.00	3.80	2.20	0.33	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
	850	888	625	13.50	34.00	12.50	22.00	5.00	19.00	17.80	14.40	0.67	2.75	2.50	0.75	0.00	0.00	0.00	0.00	0.00	0.33	0.20	0.00	0.25	0.25	0.00	0.29	0.00	0.00
	919	1113	626	70.00	89.00	84.20	12.60	54.80	38.50	22.67	12.80	0.50	4.60	1.00	2.60	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.80	0.00	3.76	2.38	2.00	0.00	0.00
	1085	1085	628	24.14	56.00	35.17	12.33	23.00	44.00	18.14	28.33	11.33	6.00	1.80	4.25	0.00	0.00	1.00	0.00	0.00	0.18	0.00	0.20	0.00	1.20	1.80	0.76	0.00	0.20
	499	495	629	44.17	53.50	71.60	40.67	21.50	53.00	20.00	30.50	7.67	10.67	11.00	6.00	1.50	0.00	0.67	2.67	2.00	4.50	0.50	0.50	1.00	5.50	4.11	0.67	0.00	0.00
	544	332	630	37.00	18.00	15.00	17.50		12.00	10.67	12.25	4.00	3.67	3.33	1.67	0.00	0.00	0.33	0.67	0.00	0.00	1.00	1.00	0.50	2.50	2.21	0.33	0.44	0.00
	2179	2067	633	9.89	13.00	15.10	7.00	9.86	10.17	12.10	9.50	11.88	6.18	11.63	12.30	3.55	1.20	1.84	2.11	0.20	0.24	0.78	1.00	1.22	0.22	0.67	0.48	0.25	0.11
	2059	2059	638	24.13	53.67	34.33	33.75	20.87	24.18	50.90	43.73	40.00	26.60	40.25	17.82	1.89	2.16	1.12	1.30	0.05	0.28	0.53	0.56	2.33	2.13	3.60	2.18	0.89	1.16
	1463	1463	639	10.00	5.75	13.17	10.00	7.10	20.00	27.13	13.88	11.83	6.14	16.50	2.50	2.43	0.33	0.12	0.00	1.13	0.57	0.17	0.50	0.83	0.00	0.00	0.00	0.46	0.00
401 - 500	.	30	613																			0.57	1.00	3.50		53.24	3.44	2.29	1.44
	632	691	622	30.50	22.33	38.50	18.50	13.00	26.00	11.25	22.25	8.00	17.00	2.33	3.33	1.50	0.67	3.00	2.50	0.00	0.30	0.24	0.33	1.00	0.00	0.67	1.67	0.00	0.00
	1184	1255	627	37.00	71.33	79.50	140.83	113.86	136.50	114.75	106.29	47.60	23.83	44.20	38.50	12.00	2.67	1.67	21.00	2.13	4.59	0.73	7.78	13.00	3.82	11.66	4.48	2.10	0.78
	1202	1321	631	51.50	34.33	38.33	80.20	11.00	53.60	76.60	69.14	48.50	20.67	15.50	11.00	1.67	15.50	13.67	4.00	13.50	2.96	0.98	3.13	2.67	0.46	3.46	1.73	1.17	0.67
	198	69	640	4.00		8.50	3.00	17.00		21.00	63.00	90.50	147.50	83.50	60.50	9.00	9.00	3.33	0.00	0.00	0.00	4.06	2.00	6.50	0.50	5.00	14.50	1.00	0.50
	204	216	645	0.50		0.00	0.50	14.67	10.50	72.00	14.00		208.00	39.50	16.50	84.00	7.00	1.67	6.33	4.00	0.00	5.00	1.50	0.44	3.50	2.50	3.71	2.50	0.00
	.	134	650																1.33	0.25	2.00	1.50	8.00	17.00	9.71		9.00	5.36	9.00
501 - 750	584	230	641	0.00	0.00	1.00	2.00	0.75	3.00	0.00	12.50		30.33			212.00	17.00	0.00	1.67	2.33	2.50	8.00	6.00	16.00	11.94		25.00	4.93	9.50
	333	325	646	0.00	0.00	1.00	0.50	1.00	15.50	2.00	2.67		2.50			11.50	8.00	6.33	4.67	10.33	0.50	49.41	3.50	3.50	3.50	17.83	12.00	17.57	2.00
	.	359	651																1.00	2.25	5.00	9.00	15.61	9.00	11.56		31.43	25.14	4.50
751 -1000	931	418	642	0.00		0.50	0.00	0.33		1.00	1.00		1.00			31.33	17.00	8.50	6.67	3.00	1.50	0.50	0.00	0.50	3.00	10.39	0.57	1.00	5.50
	409	360	647	0.00	0.00	0.00	0.00	0.00			0.67					9.50	28.33	9.00	5.67	5.33	1.00	3.50	4.00	5.50	15.00	0.00	17.50	0.50	7.00
	.	516	652																12.67	5.00	5.50	10.50	17.00	21.50	2.50	12.50	3.36	2.50	18.00
1001 -1250	1266	733	643	0.00	0.00																2.33	0.00	0.00	0.00	0.33	0.44	0.00	0.00	1.22
	232	228	648	0.00																		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	.	531	653																13.33		3.50	0.00	0.00	0.00	0.50	0.00	0.50	0.00	2.00
1251 -1500	954	474	644	0.00	0.00																0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	263	212	649	0.00																		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	.	479	654																		0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00
All strata				13.93	21.04	18.61	17.89	13.58	20.32	18.87	16.24	10.24	8.71	8.82	5.65	6.77	2.32	1.47	2.03	1.12	0.77	1.00	1.12	1.56	1.17	1.64	1.42	0.74	0.72

Table 10. Mean Numbers per Tow of Witch Flounder (M+F) in each stratum from surveys in Div. 3L during fall of 1983-2004. (Engel 145 data converted to Campelen Units for 1983-94).

				Year																				
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	04
30 - 56	.	268	784													0.00	0.00	0.00		2.00	0.00	0.00	0.00	0.00
57 - 92	2071	2071	350	0.58	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
	1780	1780	363	0.38	0.00	0.14	0.00	0.00	0.00	1.25	0.18	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1121	1121	371	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2460	2460	372	0.54	0.00	0.00	0.00	0.08	0.00	0.10	0.04	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1120	1120	384	0.83	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
	.	465	785													0.00	0.00	0.00		0.00	0.50	0.00	0.00	0.00
93 - 183	1519	1519	328	0.25	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
	1574	1574	341	1.00	0.00	0.00	0.11	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
	585	585	342	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	0.50	0.00	0.00	0.50	0.00	0.00
	525	525	343	1.25	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
	2120	2120	348	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.17	0.00	0.25	0.00	0.00	0.00	0.16
	2114	2114	349	1.00	0.00	0.56	0.00	0.11	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.14	0.00	0.00	0.43	0.14
	2817	2817	364	0.70	0.00	0.40	0.00	0.14	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.00	0.11	0.00	0.00	0.00
	1041	1041	365	1.00	0.00	0.40	0.33	0.20	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	
	1320	1320	370	1.29	0.00	0.00	0.17	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	
	2356	2356	385	1.00	0.00	0.38	0.11	0.08	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
	1481	1481	390	0.67	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
	.	84	786													7.79	3.14	2.00		3.50	14.22	2.50	5.50	3.43
	.	613	787													0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
	.	261	788													0.00	0.00	0.50		0.50	0.00	0.00	0.00	0.00
	.	89	790													0.50	1.50	4.50		0.00	3.00	0.50	0.00	0.00
	.	72	793													0.00	0.00	0.00		0.00	0.00	5.00	0.00	0.67
	.	216	794													0.00	0.00	0.00			0.00	0.00	0.00	0.00
	.	98	797													0.50	0.00	0.00		0.00	0.00	0.00	0.00	0.00
	.	72	799													0.00	0.00	0.00		0.00	0.00	0.57	0.00	0.00
184 - 274	1494	1582	344	1.00	0.22	0.57	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.40	0.60	0.23
	983	983	347	4.33	0.00	0.25	0.00	1.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00
	1394	1394	366	0.82	1.89	2.25	1.14	0.57	0.86	0.17	0.00	0.04	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.00	0.00	0.40	
	961	961	369	2.71	3.83	5.00	2.50	10.20	4.00	3.50	1.22	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	983	983	386	1.38	4.20	8.00	13.25	14.60	2.60	1.75	2.00	9.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	
	821	821	389	1.50	1.40	7.75	2.00	1.50	0.25	0.67	0.00	0.33	0.00	0.00	0.30	0.00	0.00	0.00	0.00	2.67	0.00	0.00	0.00	0.33
	282	282	391	0.00	1.00	0.00	0.50	0.00	0.00	0.00	2.33	0.67	0.00	0.00	0.89	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	.	164	795													0.00	0.00	0.00		2.50	0.00	0.00	0.00	0.00
184 - 366	.	72	789													0.00	0.50	0.50		2.22	0.50	2.44	0.50	2.00
	.	227	791													1.00	2.00	0.00		0.00	0.89	0.33	0.50	0.00
	.	100	798													0.50	0.50	12.50		9.78	38.50	1.50	0.00	8.94
275 - 366	1432	1432	345	35.00	7.56	3.75	23.00	13.14	16.14	10.60	0.00	1.75	2.00	0.00	0.57	0.36	1.13	2.23	0.76	0.59	0.40	2.38	0.93	0.53
	865	865	346	20.00	29.40	33.00	12.50	20.40	13.50	19.67	3.27	1.43	0.64	0.00	0.00	0.30	2.67	1.50	2.37	1.00	2.33	2.74	0.50	0.33
	334	334	368	1.00	1.00	10.00	0.50	1.50	4.50	2.50	1.50	0.30	0.00	0.00	0.50	0.00	0.50	0.00	0.44	0.50	0.00	0.00	0.50	
	718	718	387	1.67	4.50	2.50	7.00	20.50	17.00	50.33	2.00	0.67	0.33	0.78	1.00	0.50	0.44	0.00	0.44	6.00	0.44	0.94	0.00	
	361	361	388	29.00	1.00		16.50	3.00	3.00	0.00	2.33	4.00	0.00	0.29	0.00	0.00	0.00	3.00	0.00	2.50	6.22	0.89	1.89	0.00
	145	145	392	4.00	1.00	1.00	3.50	1.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00
	.	175	796													0.00	4.44	1.00		0.89	26.50	4.00	0.00	0.00
	.	81	800														14.00	16.00		12.22	85.50	51.56	2.50	14.89
367 - 549	186	186	729	8.50	7.50	16.00				2.50	13.33	16.50	2.00	11.33	1.33	14.67	4.50	0.00	0.00	1.33	0.50	3.11	1.00	0.00
	216	216	731	29.50	12.50					17.50	8.33	20.33	3.33	6.71	1.50		0.00	2.50	1.89	2.00	0.50	1.33	3.91	6.29
	468	468	733	5.25	25.00					34.50	46.33	10.33	4.00	2.11	0.50	0.30	0.00	1.78	2.00	2.64	1.70	6.72	0.94	23.39
	272	272	735	17.67	1.00	62.00					9.33	6.67	1.00	0.36	2.00	1.54	2.00	4.50	1.33	0.44	0.50	0.44	0.00	
	.	50	792													131.00	61.50	40.50		133.06	265.86	419.68	334.10	193.50
550 - 731	170	170	730	4.50	1.00						5.00	0.50	8.33	7.33	4.61	0.00	2.00	0.80	0.89	2.50	21.78	9.50	0.44	1.78
	231	231	732	11.50	9.50					1.00	8.50	12.50	1.50	10.67	2.44	8.80	13.00	30.50	16.00	16.50	17.78	7.33	7.20	7.83
	228	228	734	0.67	8.50					8.00	3.50	0.50	4.50	4.67	1.40	14.90	2.22	12.11	5.50	4.00	0.89	8.44	0.80	
	175	175	736		15.50	41.00				21.00	67.00	9.00	10.00	1.43	3.11	32.50	11.50	43.07	18.00	59.50	28.28	136.89	26.22	
732 - 914	.	227	737												2.50	15.00	9.50	35.50	12.50	0.50	9.00	32.93	12.50	
	.	223	741													9.50	15.00	29.07	0.44	0.00	1.00	9.50	2.29	
	.	348	745													6.50	10.00	3.50	4.22	0.50	0.50	0.00	1.00	
	.	159	748													8.50	0.00	0.00	2.28	0.00	0.00	0.00	2.50	
915 -1097	.	221	738												2.00	17.50	11.40	1.83	0.00	0.00	0.44	1.00	34.50	
	.	206	742													1.50	0.50	0.50	0.44	0.00	0.00	0.00	9.33	
	.	392	746													4.00	3.11	0.00	0.00	0.50	0.00	0.00	0.25	
	.	126	749													3.50	2.50	0.00		0.00	0.00	0.00	0.00	
1098 -1280	.	254	739													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	.	211	743													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	.	724	747													0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
	.	556	750													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1281 -1463	.	264	740													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	.	280	744													0.00	0.00	0.00		0.00	0.00	0.00	0.00	
	.	229	751													0.00	0.44	0.00		0.00	0.00	0.00	0.00	
All strata				3.38	1.95	2.52	2.08	2.23	1.58	2.74	1.39	0.89	0.31	0.27	0.19	0.83	0.69	1.06	0.45	0.86	1.15	1.69	0.96	0.84

Table 11. Mean Weight (kg) per Tow of Witch Flounder (M+F) in each stratum from surveys in Div. 2J during fall of 1977-2004. Engel 145 data converted to Campelen for 1977-94.

				Year																												
Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04
101 - 200	1427	633	201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	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	0.00	0.00	0.00	0.00	0.00
	1823	1594	205	0.00	0.00	0.00	0.00	0.00	0.04	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
	2582	1870	206	0.32	0.00	0.00	0.00	0.00	0.10	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
	2246	2264	207	0.00	0.00	0.00	0.00	0.00	0.07	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
	.	733	237																	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	.	778	238																		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201 - 300	440	621	202	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
	1608	680	209	0.47	0.06	0.22	0.55	0.00	0.38	0.55	0.08	0.69	0.00	0.00	0.00	0.00	0.06	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
	774	1035	210	1.25	0.42	1.14	3.18	0.23	1.22	0.00	2.69	0.00	0.00	0.35	0.00	0.20	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
	1725	1583	213	1.12	1.05	0.67	1.25	1.18	1.56	0.83	0.50	0.43	0.55	0.41	0.09	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	1171	1341	214	1.20	0.33	0.00	0.36	0.41	0.76	0.46	0.13	0.66	0.44	0.00	0.10	0.09	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
	1270	1302	215	1.10	0.19	0.06	0.00	0.47	0.38	0.00	0.26	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
	1428	2196	228	2.59	0.68	1.53	2.77	0.93	3.45	1.34	2.38	0.40	3.71	0.47	0.63	0.77	0.39	0.00	0.22	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
	508	530	234	0.00	0.50	0.51	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
301 - 400	480	487	203	0.00	0.00	0.00	0.00	0.00	0.82	1.70	0.00	0.00	0.30	0.00	0.00	0.31	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	0.00
	448	588	208	2.89	0.58	1.22	5.95	1.47	10.36	1.31	1.54	9.86	1.48	0.00	0.00	0.44	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
	330	251	211	9.84	4.36	2.20	6.37	1.54	5.32	0.26	2.18	1.58	0.61	0.84	0.00	0.75	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
	384	360	216	0.00	0.00	0.52	0.80	1.07	1.20	1.61	0.00	0.00	1.02	0.26	0.19	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
	441	450	222	3.26	1.64	0.47	1.70	2.56	4.70	1.13	0.43	0.75	0.00	0.00	2.85	0.76	0.00	0.17	0.00	0.00	0.00	0.00	0.10	0.00	0.28	0.16	0.00	0.00	0.00	0.00	0.00
	567	536	229	2.35	2.27	1.52	2.76	1.63	1.79	1.99	1.32	0.66	10.99	0.90	1.86	7.64	0.41	0.40	0.35	0.20	0.18	0.00	0.00	0.00	0.00	0.00	0.09	0.05	0.00	0.15	0.06
401 - 500	354	288	204	1.17	0.00	0.77		1.74	2.56	0.27	1.86	0.00	1.45	0.30	0.87	1.19	0.30	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
	268	241	217	0.00	0.00	0.41	0.00	0.00	0.00	0.00		0.00	1.47	1.73	1.20	1.97	0.16	0.00	0.00	0.00	0.39	0.00	0.23	0.24	0.17	0.00	0.00	0.00	0.00	0.07	0.42
	180	158	223	0.53	0.00	0.00	0.00	1.48	0.00	0.00	1.25	0.00	5.62	4.67	2.37	2.58	0.73	0.73	0.32	0.38	0.63	0.00	0.31	0.24	0.24	0.00		0.21	0.07	0.13	0.00
	686	598	227	1.71	1.31	0.47	5.11	1.91	3.79	2.24	0.90	1.56	3.48	4.36	2.15	2.42	19.47	2.19	1.32	1.60	0.00	0.00	0.00	1.05	1.03	1.52	0.00	0.31	0.05	0.00	0.50
	420	414	235	14.08	0.00	7.90	7.44	8.69	6.43	15.71	8.95	6.90	2.10	2.92	0.00	1.07	2.58	0.63	0.35	0.00	0.73	0.00	0.29	0.06	0.39	0.00	0.00	0.00	0.80	0.00	1.10
	.	133	240																	1.98	1.03	0.00	0.93	0.85	0.62	1.33	0.60	0.50	0.00	0.18	0.75
501 - 750	664	557	212	17.13	1.16	7.01	2.11	6.90	12.21	15.22	9.00	13.72	34.37	9.13	4.29	6.44	6.99	1.21	2.98	0.58	0.68	0.93	1.26	1.18	2.40	3.40	1.63	0.10	0.50	0.68	2.53
	420	362	218	0.00	0.00		0.00	0.00	0.00	0.00		0.26	0.00	0.76	1.98	1.36	1.01	0.23	0.00	0.17	0.39	0.02	0.34	0.20	0.23	0.19	0.09	0.00	0.00	0.05	0.40
	270	228	224	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	1.30	3.24	3.38	0.45	1.33	0.88	0.00	0.75	0.05	0.58	0.73	0.51	0.05	0.47	0.40	0.05	0.00	0.00
	237	185	230	0.00	0.00		0.47	0.00	0.00	0.00	0.53	0.00	1.75	0.47	3.09	12.14	23.66	52.49	10.62	3.33	4.14	2.71	4.94	6.93	1.04	6.33	1.43	0.84	0.09	1.88	2.35
	.	120	239																	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
751 -1000	213	283	219					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.21	0.07	0.33	0.23	0.35	0.00	0.09	0.11	0.15	0.31	0.28
	182	186	231	0.00	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	18.25	7.01	7.72	4.59	4.50	0.25	1.40	8.89	5.58	11.05	2.30	10.04	0.46	1.69
	122	193	236	0.00				0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.53		1.36	1.50	3.06	1.93	1.38	0.13	1.05	0.12	0.40	0.60	0.50	1.43	1.00	1.10	0.00
1001 -1250	324	303	220		0.00																		0.25	0.00	0.00		0.00	0.00	0.16	0.00	0.00
	177	195	225	0.00																			0.00	0.00	0.00	0.09	0.05	0.04	0.00	0.00	0.00
	236	228	232	0.00	0.00																		0.00	0.00	0.00	0.00	0.00	0.73	0.00	0.12	0.00
1251 -1500	286	330	221																				0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
	180	201	226		0.00																		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	180	237	233																				0.00	0.00	0.18	0.00	0.00	0.00	0.20	0.00	0.00
All strata				1.56	0.39	0.72	1.11	0.80	1.52	1.13	0.93	0.93	1.82	0.63	0.49	0.83	1.13	0.82	0.34	0.20	0.14	0.09	0.11	0.13	0.19	0.22	0.14	0.06	0.12	0.05	0.14

Table 12. Mean Weight (kg) per Tow of Witch Flounder (M+F) in each stratum from surveys in Div. 3K during fall of 1978-2004. Engel 145 data converted to Units for 1978-94.

				Year																								
Depth Range (m)	Old Stratum Area	New Stratum Area	Stratum	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03
101 - 200	.	798	608																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	.	445	612																			0.00	0.00	0.00		0.01	0.00	0.00	0.00
	.	250	616																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	1455	1347	618							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
	1588	1753	619							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
201 - 300	.	342	609																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	.	573	611																			0.00	0.00	0.00		0.00	0.00	0.00	0.00
	.	251	615																			0.00	0.00	0.00		0.02	0.00	0.00	0.00
	2709	2545	620	1.64	3.78	1.37	0.41	0.61	0.36	0.34	0.17	0.53	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
	2859	2537	621	2.67	9.46	1.27	1.08	0.64	2.00	0.84	1.13	0.07	0.16	0.00	0.16	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
	668	1105	624	3.88	1.58	1.14	4.11	4.85	1.32	4.00	0.98	0.72	0.20	0.00	0.00	0.08	0.00	0.00	0.08	0.00	0.00	0.00	0.06	0.00	0.04	0.03	0.16	0.00	0.00
	1618	1555	634	3.54	3.47	4.83	2.41	4.41	0.79	3.86	1.74	1.15	0.94	1.68	0.59	0.00	0.00	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1274	1274	635	9.33	10.77	8.24	8.45	4.75	3.07	12.62	4.42	0.09	0.78	1.93	0.95	0.12	0.00	0.18	0.00	0.00	0.01	0.00	0.26	0.10	0.00	0.03	0.00	0.00	0.00
	1455	1455	636	7.40	8.39	9.22	5.82	4.38	3.55	14.48	4.24	1.57	2.60	4.12	1.78	0.32	0.00	0.00	0.00	0.00	0.01	0.01	0.19	0.00	0.00	0.00	0.02	0.00	0.00
	1132	1132	637	7.16	14.40	9.18	11.97	12.24	23.55	17.49	15.99	4.51	5.40	1.38	1.02	0.00	0.00	0.36	0.11	0.00	0.00	0.00	0.02	0.01	0.21		0.00	0.00	0.00
	447	.	632	6.43	9.61	3.74	8.53	6.64	7.27		3.41	1.46	0.55	0.62	1.34	0.00	0.05	0.13											
301 - 400	.	256	610																			0.03	0.01	0.09		0.02	0.03	0.08	0.01
	.	263	614																			0.01	0.01	0.00		0.04	0.03	0.00	0.00
	.	593	617																0.00	0.00	0.01	0.00	0.05	0.16	0.00	0.00	0.00	0.00	0.00
	1027	494	623	3.54	4.48	4.13	3.90	2.90	4.25	2.43	4.60	1.16	1.41	0.21	0.07	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
	850	888	625	7.39	19.14	8.45	13.52	4.20	13.58	12.11	9.41	0.43	1.41	0.89	0.10	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.06	0.02	0.00	0.02	0.00	0.00
	919	1113	626	28.36	45.38	47.15	9.09	32.65	27.51	9.88	8.78	0.45	1.38	0.25	0.45	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.05	0.04	0.00	0.00
	1085	1085	628	16.44	40.72	23.53	9.24	16.29	32.71	13.87	15.57	6.39	3.50	0.26	1.43	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.02	0.00	0.00
	499	495	629	25.09	23.55	36.72	25.42	13.96	32.82	14.81	14.54	3.28	7.42	2.85	0.92	0.96	0.00	0.14	0.04	0.09	0.06	0.03	0.03	0.12	0.27	0.21	0.01	0.00	0.00
	544	332	630	14.01	9.76	11.35	13.12		9.72	7.34	4.85	2.24	2.43	2.07	0.38	0.00	0.00	0.15	0.40	0.00	0.00	0.15	0.03	0.01	0.07	0.10	0.17	0.00	0.00
	2179	2067	633	7.31	9.60	12.42	4.68	8.00	8.88	10.32	6.91	5.34	3.69	6.44	3.96	1.22	0.54	0.39	0.33	0.17	0.01	0.12	0.14	0.26	0.07	0.09	0.05	0.04	0.00
	2059	2059	638	11.71	30.76	16.58	20.62	12.11	15.47	30.39	24.83	29.22	19.44	25.84	11.98	1.16	1.20	0.32	0.29	0.02	0.02	0.02	0.06	0.28	0.21	0.28	0.27	0.05	0.04
	1463	1463	639	7.03	5.43	10.32	8.53	5.60	18.07	20.19	10.54	8.67	3.87	13.10	2.70	2.42	0.41	0.06	0.00	0.18	0.20	0.07	0.02	0.21	0.00	0.00	0.00	0.02	0.00
401 - 500	.	30	613																			0.02	0.01	0.04		0.79	0.07	0.03	0.06
	632	691	622	6.88	14.13	22.30	11.62	6.91	10.88	7.37	13.25	3.02	7.51	0.25	0.23	0.42	0.11	0.32	0.15	0.00	0.05	0.01	0.06	0.19	0.00	0.50	0.45	0.00	0.00
	1184	1255	627	17.73	25.42	49.63	71.35	53.01	64.84	48.19	27.88	9.81	8.46	8.24	4.53	1.49	0.04	0.29	0.40	0.14	0.19	0.05	0.28	0.47	0.24	0.57	0.23	0.07	0.01
	1202	1321	631	13.75	13.69	15.33	46.79	6.11	35.60	39.00	27.64	17.71	9.39	3.62	2.17	0.44	2.04	1.89	0.35	1.54	0.42	0.04	0.47	0.44	0.09	0.36	0.10	0.10	0.02
	198	69	640	1.89		6.49	2.27	15.08		16.00	39.42	61.26	83.72	49.47	42.05	6.47	6.77	0.65	0.00	0.00	0.00	0.88	0.29	1.11	0.05	1.30	1.45	0.03	0.01
	204	216	645	0.42		0.00	0.42	12.15	10.01	54.12	8.49		109.71	20.35	8.98	35.33	3.52	0.53	0.50	0.26	0.00	0.60	0.50	0.09	0.76	0.25	0.31	0.18	0.00
	.	134	650																1.15	0.21	0.09	0.52	0.90	1.08	1.37		0.84	0.51	0.48
501 - 750	584	230	641	0.00	0.00	0.49	1.03	0.90	2.13	0.00	10.13		20.62			137.81	11.67	0.00	0.38	0.25	0.29	1.43	1.13	3.40	3.60		5.13	0.80	1.92
	333	325	646	0.00	0.00	1.50	0.31	0.54	13.42	2.05	2.36		2.23			6.00	3.77	1.07	0.80	1.77	0.07	9.63	0.95	0.90	0.80	3.87	2.65	3.44	0.35
	.	359	651																0.50	0.47	0.38	1.05	4.09	2.58	3.62		9.06	2.71	0.34
751 -1000	931	418	642	0.00		0.62	0.00	0.28		1.02	0.70		0.65			19.49	9.47	6.17	1.42	1.14	0.30	0.12	0.00	0.11	0.60	3.61	0.19	0.25	2.45
	409	360	647	0.00	0.00	0.00	0.00	0.00			0.45					6.93	12.87	3.53	1.36	2.17	0.60	1.00	2.38	2.08	3.90	0.00	5.65	0.18	2.05
	.	516	652																3.74	2.17	0.73	2.10	5.38	5.75	0.55	5.80	1.58	0.83	3.08
1001 -1250	1266	733	643	0.00	0.00																0.66	0.00	0.00	0.00	0.12	0.18	0.00	0.00	0.37
	232	228	648	0.00																		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	.	531	653																5.88		0.91	0.00	0.00	0.00	0.17	0.00	0.25	0.00	0.45
1251 -1500	954	474	644	0.00	0.00																0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	263	212	649	0.00																		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	.	479	654																		0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
All strata				7.08	12.33	11.48	11.09	8.44	13.30	11.63	8.24	5.35	5.08	4.50	2.23	3.94	0.99	0.43	0.30	0.20	0.09	0.17	0.22	0.25	0.19	0.25	0.28	0.09	0.13

Table 13. Mean Weight (kg) per Tow of Witch Flounder (M+F) in each stratum from surveys in Div. 3L during fall of 1983-2004. (Engel 145 data converted to Campelen Units for 1983-94).

				Year																				
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	04
30 - 56	.	268	784													0.00	0.00	0.00		0.02	0.00	0.00	0.00	0.00
57 - 92	2071	2071	350	0.48	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
	1780	1780	363	0.35	0.00	0.20	0.00	0.00	0.00	1.08	0.13	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1121	1121	371	0.30	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
	2460	2460	372	0.43	0.00	0.00	0.00	0.05	0.00	0.11	0.02	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
	1120	1120	384	0.63	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
	.	465	785													0.00	0.00	0.00		0.00	0.01	0.00	0.00	0.00
93 - 183	1519	1519	328	0.22	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
	1574	1574	341	1.06	0.00	0.00	0.16	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	585	585	342	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	0.01	0.00	0.00	0.01	0.00	0.00
	525	525	343	1.16	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
	2120	2120	348	1.14	0.00	0.00	0.00	0.15	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
	2114	2114	349	1.05	0.00	0.53	0.00	0.12	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.00
	2817	2817	364	0.52	0.00	0.37	0.00	0.10	0.00	0.07	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
	1041	1041	365	0.70	0.00	0.47	0.21	0.13	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	
	1320	1320	370	1.05	0.00	0.00	0.19	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	
	2356	2356	385	1.05	0.00	0.24	0.18	0.09	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
	1481	1481	390	0.78	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
	.	84	786													0.05	0.02	0.03		0.03	0.11	0.01	0.05	0.02
	.	613	787													0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
	.	261	788													0.00	0.00	0.01		0.01	0.00	0.00	0.00	0.00
	.	89	790													0.02	0.01	0.11		0.00	0.10	0.01	0.00	0.00
	.	72	793													0.00	0.00	0.00		0.00	0.00	0.20	0.00	0.01
	.	216	794													0.00	0.00	0.00			0.00	0.00	0.00	0.00
	.	98	797													0.01	0.00	0.00		0.00	0.00	0.00	0.00	0.00
	.	72	799													0.00	0.00	0.00		0.00	0.00	0.01	0.00	0.00
184 - 274	1494	1582	344	0.77	0.18	0.14	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
	983	983	347	3.45	0.00	0.31	0.00	1.14	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
	1394	1394	366	0.97	1.85	1.60	0.89	0.57	0.97	0.14	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	
	961	961	369	2.83	4.31	5.34	2.42	8.02	3.25	3.58	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	983	983	386	1.24	3.84	8.00	11.23	12.94	3.27	1.61	2.27	6.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	821	821	389	1.74	1.17	6.73	2.22	1.22	0.19	0.70	0.00	0.24	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
	282	282	391	0.00	0.83	0.00	0.23	0.00	0.00	0.00	1.80	0.56	0.00	0.00	0.93	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	.	164	795													0.00	0.00	0.00		0.02	0.00	0.00	0.00	0.00
184 - 366	.	72	789													0.00	0.01	0.01		0.02	0.01	0.04	0.01	0.01
	.	227	791													0.14	0.02	0.00		0.00	0.01	0.02	0.10	0.00
	.	100	798													0.01	0.14	1.56		0.24	1.65	0.02	0.00	0.25
275 - 366	1432	1432	345	22.76	6.23	3.13	18.75	10.66	11.97	3.81	0.00	0.31	0.37	0.00	0.05	0.02	0.02	0.18	0.01	0.02	0.00	0.04	0.03	0.00
	865	865	346	11.96	18.82	27.91	10.09	15.32	10.81	15.66	1.70	0.34	0.12	0.00	0.00	0.10	0.03	0.01	0.17	0.14	0.06	0.03	0.01	0.00
	334	334	368	1.03	0.64	8.40	0.49	1.40	3.13	2.31	0.84	0.31	0.00	0.00	0.48	0.00	0.01	0.00	0.00	0.13	0.00	0.00	0.01	
	718	718	387	1.71	4.09	2.79	5.79	17.97	15.65	37.14	1.61	0.53	0.32	0.12	0.63	0.08	0.02	0.00	0.05	0.38	0.04	0.06	0.00	
	361	361	388	24.75	0.97		11.87	1.85	2.54	0.00	2.51	3.48	0.00	0.28	0.00	0.00	0.00	0.25	0.00	0.11	0.34	0.13	0.07	0.00
	145	145	392	2.74	0.64	0.99	2.50	0.63	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00
	.	175	796													0.00	0.04	0.08		0.01	0.18	0.05	0.00	0.00
	.	81	800														0.71	0.24		0.56	2.18	2.00	0.06	0.34
367 - 549	186	186	729	5.71	4.95	10.94				1.88	10.69	9.63	1.62	5.11	0.09	5.92	0.93	0.00	0.00	0.04	0.53	1.29	0.45	0.00
	216	216	731	16.75	8.34					15.66	5.98	11.98	1.28	2.67	0.63		0.00	0.25	0.62	0.55	0.13	0.09	0.45	0.74
	468	468	733	5.10	18.07					25.13	32.78	9.48	2.85	0.93	0.37	0.19	0.00	0.64	0.84	0.96	0.78	1.65	0.13	3.85
	272	272	735	9.82	0.92	45.82					5.93	5.76	1.06	0.32	0.09	0.54	0.63	0.48	0.31	0.08	0.08	0.33	0.00	
	.	50	792													8.05	5.35	1.65		4.19	7.80	7.07	6.59	7.15
550 - 731	170	170	730	4.43	0.67						5.54	0.27	5.99	3.77	3.54	0.00	0.90	0.46	0.44	2.53	11.71	4.85	0.01	0.58
	231	231	732	8.88	7.40					0.92	6.50	8.90	1.30	6.12	0.51	4.64	3.80	13.85	7.93	7.23	6.50	3.63	3.38	3.33
	228	228	734	0.96	5.86					5.36	3.20	0.37	3.37	1.57	1.17	4.04	0.47	4.76	3.03	1.48	0.53	2.51	0.14	
	175	175	736		11.15	29.44				14.73	37.94	3.74	2.92	0.82	0.43	10.86	1.72	5.60	3.88	17.22	7.70	49.70	4.34	
732 - 914	.	227	737												0.62	4.15	3.33	14.03	4.83	0.36	3.98	16.08	2.18	
	.	223	741													3.75	5.35	10.20	0.22	0.00	0.10	5.18	0.49	
	.	348	745													3.23	4.43	2.58	1.36	0.01	0.01	0.00	0.15	
	.	159	748													4.00	0.00	0.00	1.83	0.00	0.00	0.00	1.70	
915 -1097	.	221	738												0.32	10.88	4.19	0.78	0.00	0.00	0.22	0.19	13.90	
	.	206	742													1.10	0.11	0.33	0.00	0.00	0.00	0.00	4.13	
	.	392	746													2.23	2.34	0.00	0.00	0.01	0.00	0.00	0.14	
	.	126	749													1.93	1.65	0.00		0.00	0.00	0.00	0.00	
1098 -1280	.	254	739													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	.	211	743													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	.	724	747													0.00	0.00	1.08	0.00	0.00	0.00	0.00	0.00	
	.	556	750													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1281 -1463	.	264	740													0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	.	280	744													0.00	0.00	0.00		0.00	0.00	0.00	0.00	
	.	229	751													0.00	0.00	0.00		0.00	0.00	0.00	0.00	
All strata				2.49	1.48	2.11	1.72	1.84	1.31	1.96	0.99	0.59	0.15	0.12	0.08	0.28	0.17	0.30	0.14	0.16	0.16	0.38	0.16	0.10

Table 14. Estimates of biomass (tons) of witch flounder from Canadian fall surveys in Div. 2J, 3K and 3L during 1977-2004.

	div			
year	2J	3K	3L	Total
1977	5123			
1978	1302	30353		
1979	2218	49789		
1980	3494	44962		
1981	2581	43406		
1982	4909	32429		
1983	3693	49251		
1984	2903	49038	13210	65151
1985	3030	35694	7881	46605
1986	5920	21359	10743	38022
1987	2063	21746	8679	32488
1988	1571	18110	9294	28975
1989	2653	8976	6606	18234
1990	3672	17088	10341	31101
1991	2669	4272	5274	12215
1992	1102	1863	3131	6095
1993	627	1327	778	2733
1994	462	846	663	1971
1995	263	435	418	1117
1996	370	855	1806	3031
1997	465	1116	1095	2676
1998	649	1255	1906	3810
1999	752	881	826	2460
2000	498	1200	968	2667
2001	209	1427	1042	2678
2002	404	471	2428	3303
2003	178	651	1010	1839
2004	476	2641	451	3568

Table 15. Mean weights (kg) of witch flounder per tow from Canadian fall surveys in Div. 2J, 3K and 3L during 1977-2004.

	div			
year	2J	3K	3L	2J3KL
1977	1.56	4.38		
1978	0.39	7.08		
1979	0.72	12.33		
1980	1.11	11.48		
1981	0.80	11.09		
1982	1.52	8.44		
1983	1.13	13.30		
1984	0.93	11.63	2.49	5.15
1985	0.93	8.24	1.48	3.61
1986	1.82	5.35	2.11	3.08
1987	0.63	5.08	1.72	2.58
1988	0.49	4.50	1.84	2.36
1989	0.83	2.23	1.31	1.48
1990	1.13	3.94	1.96	2.42
1991	0.82	0.99	0.99	0.95
1992	0.34	0.43	0.59	0.47
1993	0.20	0.30	0.15	0.22
1994	0.14	0.20	0.12	0.15
1995	0.09	0.09	0.08	0.09
1996	0.11	0.17	0.28	0.20
1997	0.13	0.22	0.17	0.18
1998	0.19	0.25	0.30	0.25
1999	0.22	0.19	0.14	0.18
2000	0.14	0.25	0.16	0.18
2001	0.06	0.28	0.16	0.18
2002	0.12	0.09	0.38	0.22
2003	0.05	0.13	0.16	0.18
2004	0.14	0.52	0.10	0.27

Table 16. Estimates of abundance (000s) of witch flounder from Canadian fall surveys in Div. 2J, 3K and 3L during 1977-2004.

	div			
year	2J	3K	3L	Total
1977	7106			
1978	1962	59729		
1979	3016	84955		
1980	4503	72872		
1981	3190	70058		
1982	6486	52146		
1983	4963	75267		
1984	3840	79553	17914	101307
1985	4089	70384	10401	84874
1986	9432	40917	12839	63188
1987	3337	37279	10500	51117
1988	2746	35486	11269	49501
1989	5377	22734	8002	36114
1990	8110	29338	14453	51901
1991	6941	10045	7428	24414
1992	2463	6377	4748	13588
1993	2588	8918	1572	13078
1994	2369	4815	1428	8612
1995	1808	3546	1004	6358
1996	1724	5081	5297	12102
1997	1890	5716	4383	11989
1998	2505	7955	6755	17214
1999	2548	5441	2655	10644
2000	1964	7952	5361	15276
2001	1096	7220	7316	15631
2002	1497	3752	10776	16025
2003	715	3659	6090	10464
2004	1870	10424	3990	16284

Table 17. Mean numbers of witch flounder per tow from Canadian fall surveys in Div. 2J, 3K and 3L during 1977-2004.

	div			
year	2J	3K	3L	2J3KL
1977	2.16	10.35		
1978	0.59	13.93		
1979	0.97	21.04		
1980	1.42	18.61		
1981	0.99	17.89		
1982	2.01	13.58		
1983	1.52	20.32		
1984	1.23	18.87	3.38	8.01
1985	1.26	16.24	1.95	6.57
1986	2.90	10.24	2.52	5.12
1987	1.03	8.71	2.08	4.06
1988	0.86	8.82	2.23	4.03
1989	1.67	5.65	1.58	2.94
1990	2.49	6.77	2.74	4.04
1991	2.13	2.32	1.39	1.89
1992	0.76	1.47	0.89	1.05
1993	0.82	2.03	0.31	1.04
1994	0.72	1.12	0.27	0.67
1995	0.65	0.77	0.19	0.50
1996	0.50	1.00	0.83	0.81
1997	0.54	1.12	0.69	0.80
1998	0.72	1.56	1.06	1.15
1999	0.74	1.17	0.45	0.76
2000	0.57	1.64	0.86	1.05
2001	0.32	1.42	1.15	1.05
2002	0.43	0.74	1.69	1.07
2003	0.21	0.72	0.96	1.27
2004	0.54	2.05	0.84	1.22

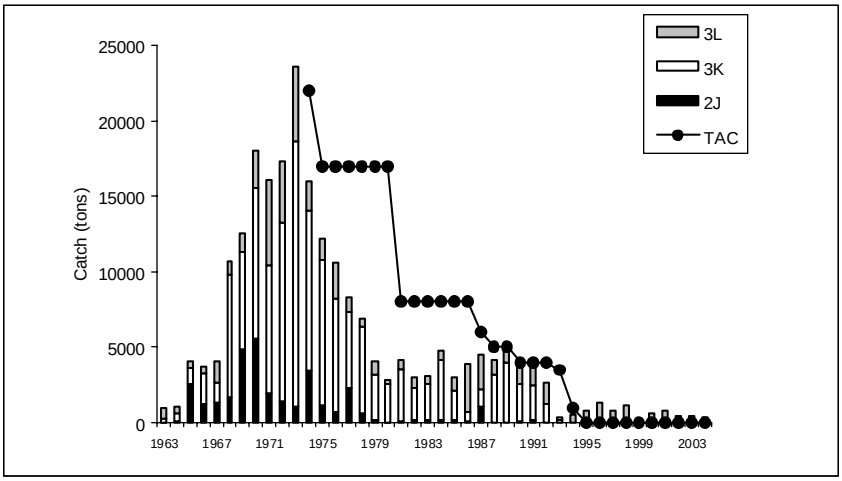

Fig. 1. Commercial carches and TACs of witch flounder in Divisions 2J, 3K and 3L during 1963-2004. Catches in Div. 3M are included for 1998-2000. Although not included, the estimated catches in Div 3M from 2001-2004 averaged 360 tons.

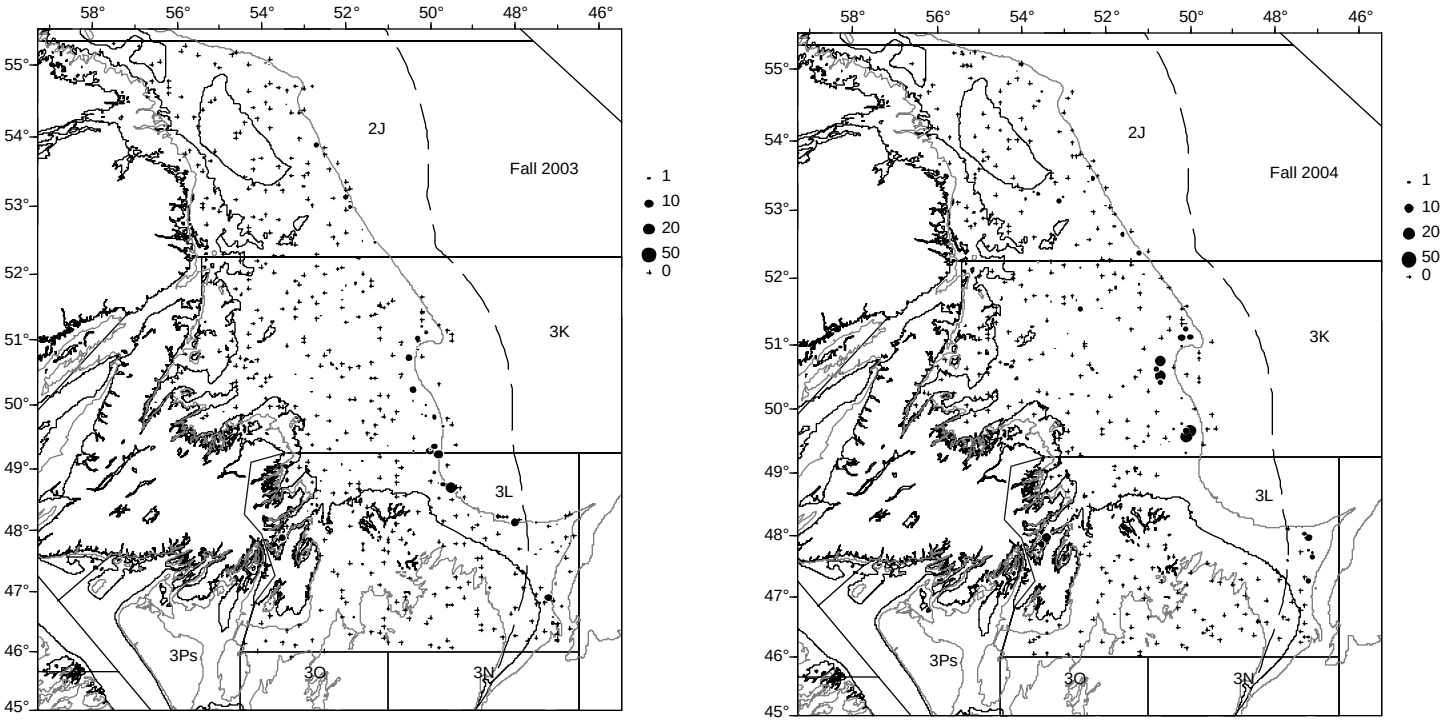

Fig. 2. Weight (kg) per set of witch flounder from Canadian surveys in NAFO Div. 2J, 3K, and 3L during autumn 2003 and 2004.

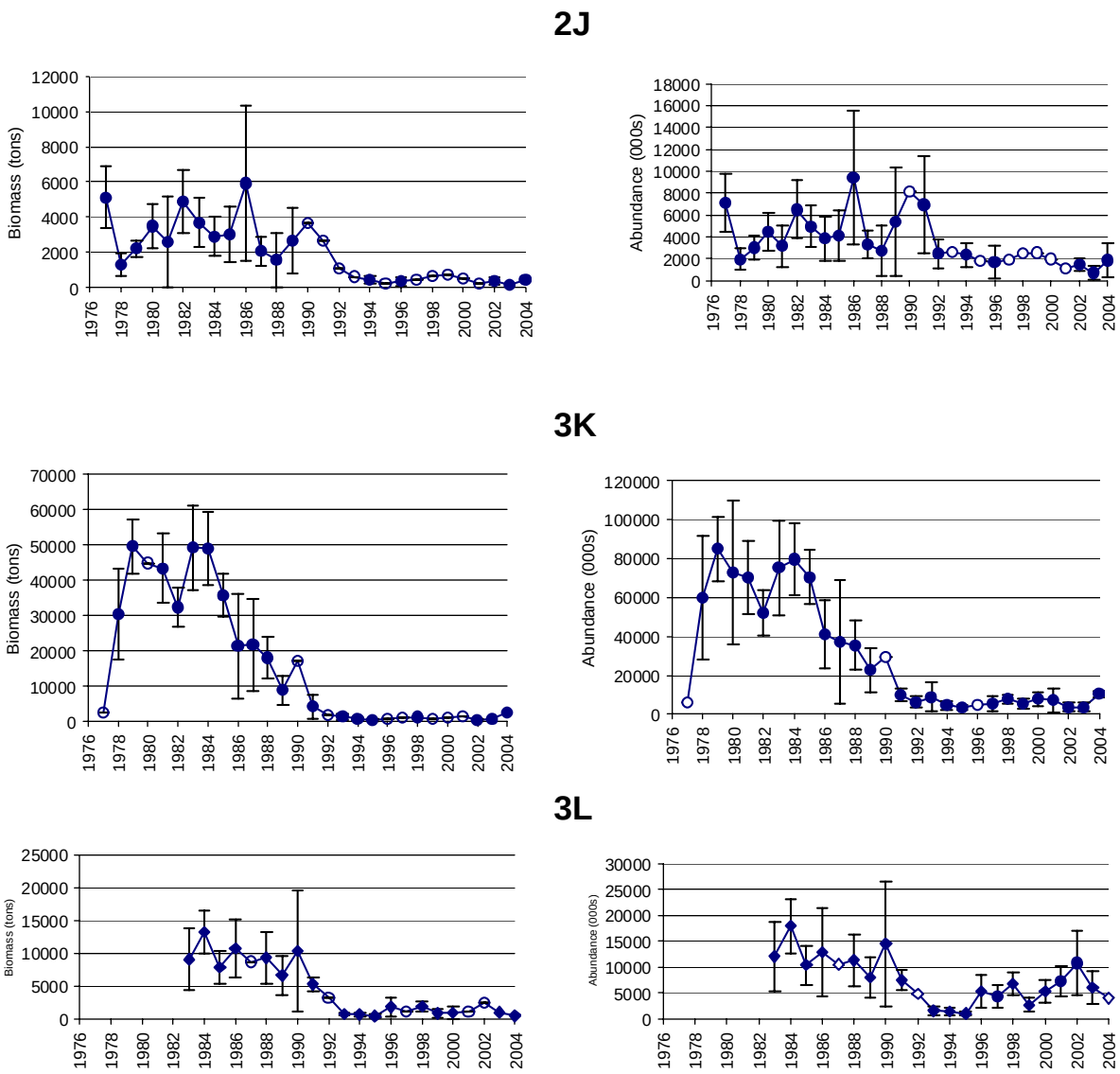

Figure 3a. Biomass (tons) and Abundance (000's) for 2J, 3K and 3L fall surveys.
Where lower confidence limit was negative, error bars were omitted (hollow symbol).

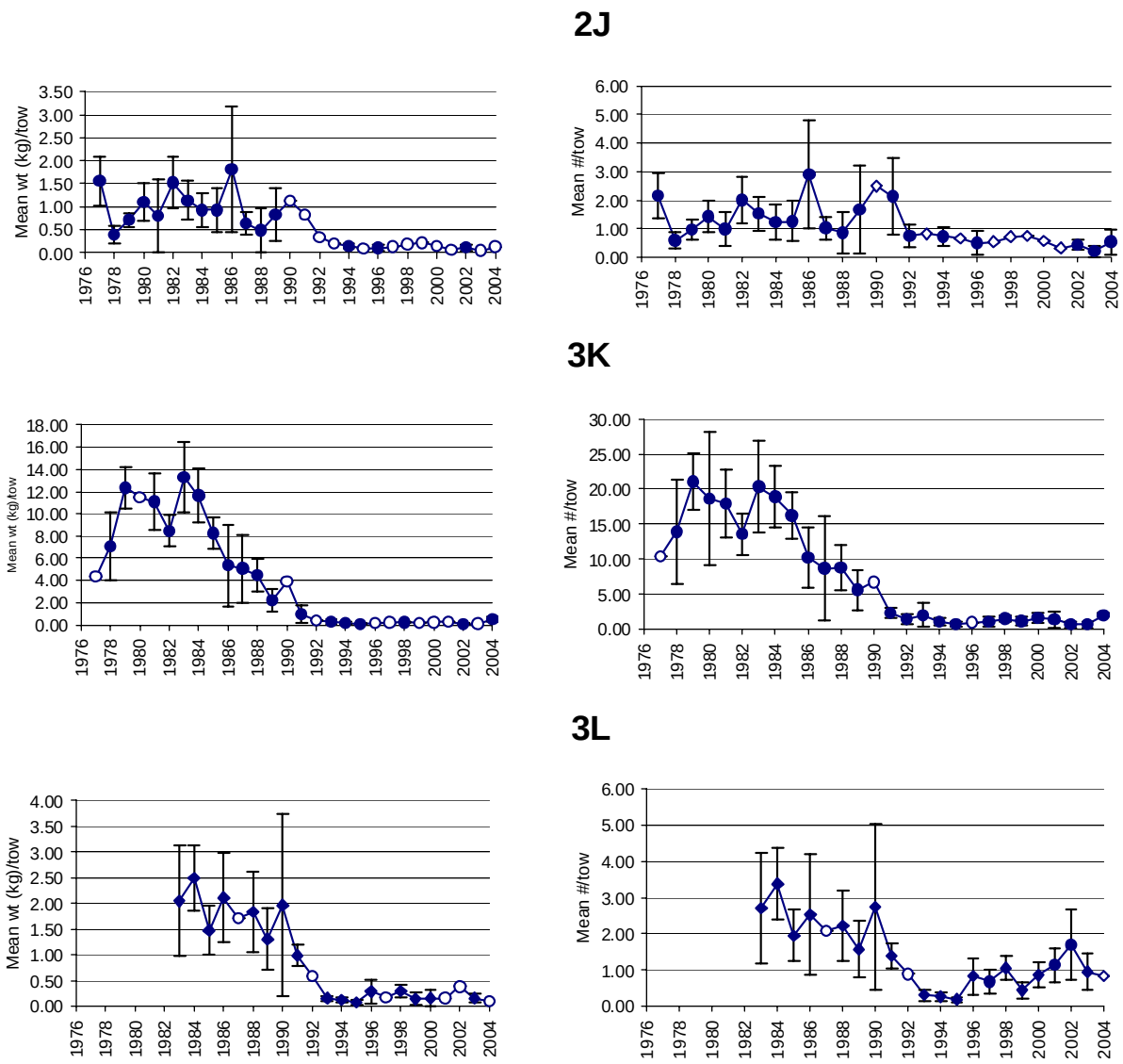

Figure 3b.Mean numbers and weights(kg) per tow for 2J, 3K and 3L fall surveys.
Where lower confidence limit was negative, error bars were omitted (hollow symbol).

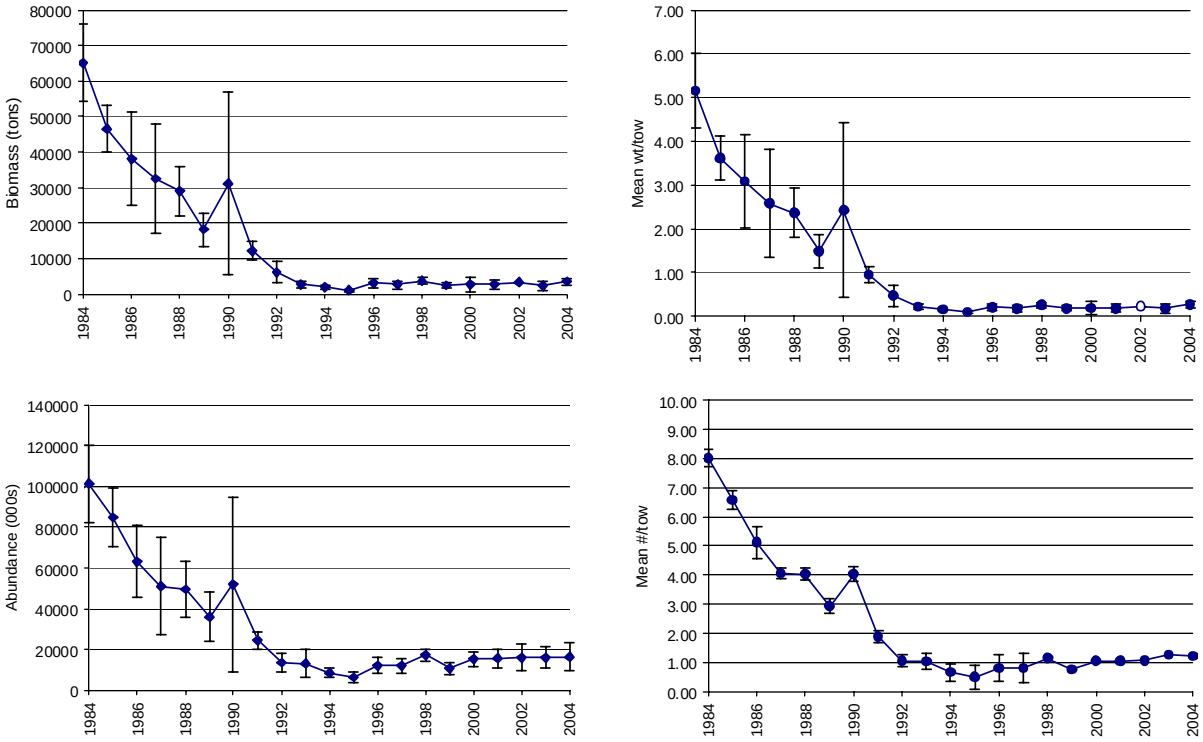

Fig. 4. Biomass (t) and abundance (000s) estimates, mean numbers and weights (kg) per tow, of witch flounder from Canadian fall surveys in 2J3KL based on Campelen trawl catch equivalents during 1984-2004.

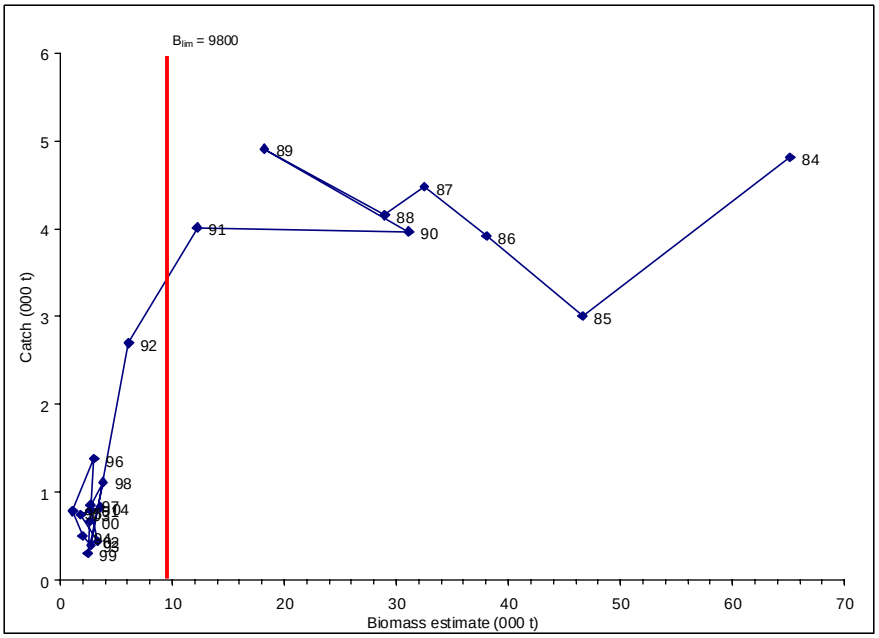

Figure 5. Catch (000 t) and biomass estimates (000 t) for 2J3KL witch flounder 1984-2004. Blim is given at 15% of the highest observed biomass estimate.