

Table A.1. Significant changes in management regulations governing the USA commercial fishery for witch flounder (adapted from O'Brien and Brown, 1996), updated by Tom Nies, NEFMC (pers. comm., 2003).

<u>1953-1977</u>		<u>ICNAF era</u>
1953		Minimum mesh in body and codend 4 ½ inches.
1970		Areas 1(A) and 2(B) closed during haddock spawning, from March - April.
1972-1974		Areas 1(A) and 2(B) closure extended to March - May.
1975		Areas 1(A) and 2(B) closures extended to February - May.
<u>1977 - Present</u>		<u>Extended Jurisdiction and National Management</u>
1977		USA Fishery Conservation and Management Act of 1976 (FCMA) in effect.
1977-1982		Fishery Management Plan (FMP) for Atlantic groundfish: Seasonal spawning closures for haddock (Areas 1 and 2), quotas for haddock, etc
1982		Mesh size 5 1/8 inches (130 mm).
1982-1985		The 'Interim Plan' for Atlantic groundfish: Eliminated all catch controls, retained closed area and mesh size regulations, implemented minimum landing sizes.
1983		Mesh size increased to 5 ½ inches (140 mm). Witch flounder minimum size 33 cm.
1984	October	Hague Line separating USA and Canadian fishing zones in the Gulf of Maine and Georges Bank region.
1985		Fishery Management Plan for the Multispecies Fishery.
1987		Witch flounder minimum size increased to 36 cm.
1991		Amendment 4 established overfishing definitions for witch flounder in terms of Fmed (F20%) replacement levels.
1993		Area 2 closure is extended from January 1 - June 30.
1994	January May December	Amendment 5 implemented: expanded Area 2, Area 1 closure not in effect. 6 inch (152 mm) mesh restriction implemented (delayed from March 1). Square or diamond mesh allowed. Area 1, Area 2 and Nantucket Lightship Area closed year-around.
1996	July	Amendment 7 implemented: Days-at-sea (DAS) restrictions. Haddock trip limits Raised to 1000 pounds
1997	May	Additional scheduled DAS restrictions from Amendment 7 accelerated.
1998	May	Western Gulf of Maine Closure Area adopted: Jeffery's Ledge area closed to all groundfishing. Rolling closures in the western Gulf of Maine.
	October	Amendment 9: revised overfishing definitions as required by Sustainable Fisheries Act.
1999	May	Codend mesh regulations changed to 6-inch diamond mesh, 6 1/2-inch square mesh. Additional rolling closures adopted in the western Gulf of Maine Cashes Ledge seasonal closure adopted Roller gear limited to a maximum of 12 inches in an area of the western Gulf of Maine. Gulf of Maine cod trip limit ranged from 30 to 400 lbs. in this fishing year.

Table A.1 continued. Significant changes in management regulations.

2000	May	May closure implementation on northern Georges Bank. Changes to large mesh permit category, granting additional DAS to vessels using larger than 6-inch diamond / 6-inch square mesh.
2002	June 1	Additional restrictions adopted during this fishing year (result of lawsuit over FW33): Vessels limited to 25% of allocated DAS May to July; Increase in minimum mesh size for trawl vessel to 6 ½ inch diamond/ 6 ½ inch square; Reduced number of rolling closures in the western Gulf of Maine (effective in January 2003, with result there were additional rolling closures in calendar year 2002 compared to calendar year 2001); Cashes Ledge seasonal closure expanded to year-around closure; Increase in GOM cod trip limit to 500 lbs. per day/4,000 lbs per trip; Increase in mesh size for large mesh permit category.
2002	August 1	Reduction in allocated DAS based on past history of use for each permit; Front-loading of DAS clock prohibited; Additional restrictions on number and deployment of gillnets.

Table A.2. Significant changes in management regulations governing the USA northern shrimp fishery in the Gulf of Maine.

1972	Adoption of mesh regulations, Establishment of count/pound limits, Establishment of closed areas.
1973	Adoption of interim minimum mesh regulations; mesh size not less than 1.5 inches (38 mm).
1975	Minimum mesh regulations increased to 1.75 inches (44 mm). Harvest restricted to 4,200 mt (9.2 million pounds). Fishery closure from July - September.
1976	Harvest restricted to 2,300 mt (5 million pounds) by season closure and quota management. Open season: January 1 - April 15 1976.
1977	Harvest restricted to 1,600 mt (3.5 million pounds). Open season: January 1 - May 15 1977.
1978	Closure of fishery.
1979	Open season: February 1 - March 31, 1979
1980	Open season: February 15 - May 31, 1980
1981	Open season: February 15 - May 31, 1981
1982	Open season: January 1 - April 15, 1982
1983	Open season:
1984	Open season:
1985	Open season:
1986 - 1991	Open season: 183 days, by-catch limit of 10% by weight of groundfish allowed.
1992 April	Nordmore grate regulation (max 25 mm space); no bycatch of groundfish allowed, no Sunday fishing
1993	Open season: Dec 15 - May 15, no Sundays, separator gear Dec 15 - Mar 15; grate Apr-May15
1994	Open season: December 15 - April 15
1995	Open season: December 1 - May 31 with 1 day off per week.
1996	Open season: December 1 - May 31 with 1 week off.
1997	Open season: December 1 - May 27 with 4 or 5 day block off per month.
1998	Open season: December 8 - May 22 with 3 weekends of no fishing
1999	Open season: December 1 - May 30, no weekend fishing.
2000	Open season: (51 day season)
2001	Open season: Jan 9 - March17; April 16-30 and no days off (83 day season)
2002	Open season: February 15 - March 11 (25 day season)
2003	Open season: Jan 15 - Feb 27 no Friday fishing (38 day season)

Table A.3. Witch flounder landings, discards and catch (metric tons, live) by country, 1937-2002
 [1937-1959 provisional landings reported in Lange and Lux, 1978; 1960-1963 reported to
 ICNAF/NAFO (Burnett and Clark, 1983)].

Year	LANDINGS						USA Discards	USA Catch
	USA Subarea 4, 5 & 6	USA Subarea 3	USA Total	CAN	Other	Total		
1937			5000			5000		
1938			3600			3600		
1939			3100			3100		
1940			3000			3000		
1941			2000			2000		
1942			1800			1800		
1943			1000			1000		
1944			1000			1000		
1945			1000			1000		
1946			1500			1500		
1947			1500			1500		
1948			1000			1000		
1949			3600			3600		
1950			3000			3000		
1951			2600			2600		
1952			3700			3700		
1953			4200			4200		
1954			4000			4000		
1955			2400			2400		
1956			2000			2000		
1957			1000			1000		
1958			1000			1000		
1959			1000			1000		
1960	1255		1255			1255		
1961	1022		1022	2		1024		
1962	976		976	1		977		
1963	1226		1226	27	121	1374		
1964	1381		1381	37		1418		
1965	2140		2140	22	502	2664		
1966	2935		2935	68	311	3314		
1967	3370		3370	63	249	3682		
1968	2807		2807	56	191	3054		
1969	2542		2542		1310	3852		
1970	3112		3112	19	130	3261		
1971	3220		3220	35	2860	6115		
1972	2934		2934	13	2568	5515		
1973	2523		2523	10	629	3162		
1974	1839		1839	9	292	2140		
1975	2127		2127	13	217	2357		
1976	1871		1871	5	6	1882		
1977	2469		2469	11	13	2493		
1978	3501		3501	18	6	3525		
1979	2878		2878	17		2895		
1980	3128		3128	18	1	3147		
1981	3442		3442	7		3449		

continued

Table A.3 continued. Witch flounder landings, discards and catch (metric tons, live).

Year	LANDINGS							
	USA Subarea 4, 5 & 6	USA Subarea 3	USA Total	CAN	Other	Total	USA Discards	USA Catch
1982	4906		4906	9		4915	48	4954
1983	6000		6000	45		6045	162	6162
1984	6660		6660	15		6675	100	6760
1985	6130	255	6385	46		6431	61	6191
1986	4610	539	5149	67		5216	25	4635
1987	3450	346	3796	23		3819	47	3497
1988	3262	358	3620	45		3665	60	3322
1989	2068	297	2365	13		2378	133	2201
1990	1465	2	1467	12		1479	184	1649
1991	1777		1777	7		1784	95	1872
1992	2227		2227	7		2234	171	2398
1993	2601		2601	10		2611	376	2977
1994	2665		2665	34		2699	422	3087
1995	2209		2209	11		2220	193	2402
1996	2087		2087	10		2097	254	2341
1997	1771		1771	7		1778	300	2071
1998	1848		1848	10		1858	286	2134
1999	2121		2121	19		2140	213	2334
2000	2439		2439	53		2492	115	2554
2001	3019		3019	32		3051	224	3243
2002	3186		3186			3186	279	3465

Table A.4. Percentage of USA commercial witch flounder landings (mt) by Statistical Area, 1973 - 2002.

YEAR	Statistical Areas																							TOTAL		
	300	400	464	465	466	500	510	511	512	513	514	515	520	521	522	523	524	525	526	530	537	538	539		540	600
1973	-	1.1	-	0.8	-	-	-	4.0	9.4	18.6	13.8	1.5	-	10.5	16.3	0.8	2.9	7.6	10.7	-	1.0	0.0	0.2	-	0.6	100.0
1974	-	2.7	-	0.1	0.2	-	-	1.0	4.1	17.3	11.6	1.3	-	18.2	16.0	0.9	5.7	7.9	10.4	-	2.2	0.1	0.1	-	0.2	100.0
1975	-	0.7	-	0.8	0.0	-	-	0.8	7.1	16.9	13.6	4.3	-	17.4	11.2	0.5	7.5	13.2	4.9	-	0.6	0.0	0.1	-	0.2	100.0
1976	-	1.2	-	0.3	0.1	-	-	1.3	7.5	25.1	19.5	2.0	-	14.9	11.2	1.3	4.3	7.7	2.7	-	0.6	0.1	0.1	-	0.2	100.0
1977	-	0.2	-	0.2	0.1	-	-	0.6	7.8	30.6	27.6	4.1	-	10.4	10.1	0.8	2.5	2.9	1.2	-	0.5	0.1	0.2	-	0.1	100.0
1978	-	0.3	-	0.1	-	-	-	0.2	9.5	39.1	18.3	4.7	-	10.5	8.7	2.4	2.5	1.1	1.3	-	0.6	0.2	0.1	-	0.3	100.0
1979	-	0.2	-	0.0	-	-	-	2.3	9.4	35.6	14.5	4.2	-	12.8	13.7	3.4	1.2	0.5	1.0	-	0.7	0.0	0.1	-	0.5	100.0
1980	-	0.1	-	0.2	-	-	-	1.4	8.9	42.2	12.3	8.2	-	10.1	7.4	2.1	0.8	1.2	3.5	-	0.6	0.0	0.2	-	0.5	100.0
1981	-	0.2	-	1.0	-	-	-	1.9	9.2	41.0	12.2	9.4	-	11.3	5.3	2.0	1.8	1.4	1.2	-	1.1	0.0	0.3	-	0.8	100.0
1982	-	0.4	-	0.7	-	-	0.0	3.1	15.5	29.2	8.7	15.5	-	11.4	5.9	2.4	1.1	1.4	2.0	-	1.0	0.1	0.2	-	1.3	100.0
1983	-	0.5	-	2.4	-	-	-	4.2	20.6	24.3	8.0	17.4	-	9.3	5.4	2.0	0.8	1.1	1.7	-	1.5	0.0	0.2	-	0.7	100.0
1984	-	0.2	-	2.2	-	-	-	2.4	11.3	23.5	11.8	19.8	-	12.0	6.5	2.3	1.0	1.8	2.7	-	1.5	0.0	0.1	-	0.9	100.0
1985	4.0	0.1	-	1.1	-	-	-	3.7	11.8	23.1	10.3	19.8	-	11.5	7.3	2.0	1.0	1.6	1.7	-	0.5	0.0	0.0	-	0.6	100.0
1986	10.5	0.2	-	1.3	0.0	-	-	4.0	14.9	23.6	9.1	15.3	-	9.3	5.8	1.9	0.4	0.6	1.5	-	0.6	0.0	0.0	-	1.0	100.0
1987	9.1	0.1	-	0.4	-	-	-	2.7	11.6	27.4	9.6	19.0	-	9.1	5.6	1.4	0.5	0.7	1.2	-	0.4	0.0	0.0	-	1.1	100.0
1988	9.9	-	-	0.3	-	-	-	2.6	8.0	26.5	9.7	17.0	-	12.4	5.7	1.5	1.0	2.7	1.3	-	0.4	0.0	0.0	-	1.1	100.0
1989	12.5	0.0	-	0.1	-	-	-	1.3	7.4	21.8	9.4	16.1	-	12.8	5.7	1.6	1.2	2.2	5.4	-	0.9	0.1	0.0	-	1.3	100.0
1990	0.1	0.3	-	0.1	-	-	-	1.6	9.1	29.0	12.4	12.7	-	11.1	5.5	2.4	2.4	3.7	5.2	-	2.6	0.0	0.1	-	1.6	100.0
1991	-	0.1	-	0.1	-	-	-	1.1	9.3	26.1	11.0	15.6	-	8.1	7.7	2.4	3.0	2.0	4.8	-	4.7	0.1	0.1	-	3.7	100.0
1992	-	0.0	-	-	-	-	-	0.6	10.5	23.2	10.1	14.8	-	6.8	8.4	2.0	1.7	2.8	9.8	-	6.4	0.0	0.2	-	2.8	100.0
1993	-	0.5	-	-	-	-	-	0.5	6.7	22.3	16.1	16.2	-	6.9	10.4	3.1	2.5	3.6	5.1	-	3.8	0.0	0.1	-	2.2	100.0
1994*	-	-	0.1	-	-	0.4	0.3	1.7	13.1	15.5	15.5	13.5	0.1	14.3	12.2	2.6	1.5	2.1	1.6	0.1	2.7	0.4	0.1	0.2	1.8	100.0
1995*	-	-	0.5	0.5	-	0.6	0.2	1.1	6.8	14.1	15.2	20.6	0.3	17.3	15.0	1.9	0.7	1.5	0.6	0.2	1.1	0.2	0.0	0.1	1.6	100.0
1996*	-	-	0.1	0.1	-	0.8	1.2	1.7	6.3	18.1	13.8	20.9	1.2	13.7	14.1	2.1	0.4	2.2	0.3	0.0	1.3	0.4	0.1	0.1	1.0	100.0
1997*	-	-	-	0.1	-	1.1	0.7	0.7	9.3	16.5	12.6	21.9	0.6	11.0	16.1	2.7	0.5	3.2	0.7	-	1.2	0.3	0.1	-	0.8	100.0
1998*	-	-	-	0.1	-	1.2	0.1	0.7	8.3	14.5	11.1	21.8	0.2	15.1	16.2	3.5	1.3	2.5	0.5	0.1	1.1	0.6	0.3	0.1	0.5	100.0
1999*	-	-	-	0.1	-	0.4	0.1	0.7	8.2	12.0	11.9	15.8	1.5	17.7	20.9	2.9	1.3	3.0	0.5	-	1.8	-	0.1	-	1.1	100.0
2000*	-	-	-	0.1	-	0.3	0.1	1.0	5.6	12.4	14.5	12.9	0.2	22.8	20.6	2.5	1.0	2.4	0.3	-	0.8	0.2	0.3	0.1	2.0	100.0
2001*	-	-	0.1	0.1	-	-	0.1	1.7	5.2	14.1	15.6	11.2	-	24.8	18.0	4.8	0.5	1.5	0.4	-	0.8	0.1	0.2	-	0.8	100.0
2002*	-	-	-	0.1	-	-	-	1.5	5.5	15.3	23.0	10.5	-	18.4	16.9	3.2	1.6	2.2	0.5	-	0.2	0.3	0.2	0.1	0.5	100.0

¹Note: USA portions of SA 523 and 524 were renamed 561 and 562, respectively, in 1985.

* 1994-2002 spatial distribution based upon Vessel Trip Report data, considered provisional.

Table A.5. Percentage of annual USA commercial witch flounder landings by gear type, 1973-2002.

Year	Otter Trawl	Shrimp Trawl	Other	Total
1973	98.7	-	1.3	100.0
1974	99.7	-	0.3	100.0
1975	97.3	2.5	0.2	100.0
1976	98.8	0.9	0.3	100.0
1977	97.4	1.5	1.1	100.0
1978	98.1	-	1.9	100.0
1979	97.9	0.2	1.9	100.0
1980	96.6	0.6	2.8	100.0
1981	97.3	0.8	1.9	100.0
1982	96.8	0.9	2.3	100.0
1984	96.4	0.4	3.2	100.0
1985	95.1	1.0	3.9	100.0
1986	95.9	1.1	3.0	100.0
1987	95.5	1.1	3.4	100.0
1988	96.0	0.8	3.2	100.0
1989	95.3	0.4	4.3	100.0
1990	92.8	0.6	6.6	100.0
1991	95.1	0.5	4.4	100.0
1992	96.2	0.1	3.7	100.0
1993	94.2	0.0	5.8	100.0
1994	96.2	0.0	3.8	100.0
1995	96.1	0.0	3.9	100.0
1996	96.7	0.0	3.3	100.0
1997	96.9	0.0	3.1	100.0
1998	97.5	0.0	2.5	100.0
1999	97.4	0.0	2.6	100.0
2000	97.5	0.0	2.5	100.0
2001	97.5	0.0	2.5	100.0
2002	97.8	0.0	2.2	100.0

Table A.6. Percentage of annual USA commercial witch flounder landings by market category, 1973 - 2002.

Year	Pee wee	Small	Medium	Large	Jumbo	Uncl.	Total
1973	0.0	13.5	0.0	45.9	0.0	40.7	100.0
1974	0.0	26.2	0.0	73.8	0.0	0.0	100.0
1975	0.0	26.3	0.0	73.7	0.0	0.0	100.0
1976	0.0	21.5	0.0	78.4	0.0	0.1	100.0
1977	0.0	22.9	0.0	77.1	0.0	0.0	100.0
1978	0.0	30.2	0.0	69.8	0.0	0.0	100.0
1979	0.0	30.8	0.0	69.2	0.0	0.0	100.0
1980	0.0	23.4	0.0	76.0	0.0	0.6	100.0
1981	0.0	30.1	0.0	68.3	0.0	1.6	100.0
1982	0.3	26.3	5.4	64.0	0.0	4.0	100.0
1983	1.4	25.0	14.7	58.4	0.0	0.4	100.0
1984	3.4	25.2	19.1	51.7	0.0	0.6	100.0
1985	7.7	27.8	23.2	40.5	0.1	0.7	100.0
1986	5.1	33.7	25.3	34.6	0.0	1.2	100.0
1987	3.6	37.2	26.0	31.0	0.5	1.7	100.0
1988	2.8	34.3	29.0	30.7	0.6	2.7	100.0
1989	3.3	29.8	31.2	31.5	1.1	3.0	100.0
1990	5.5	26.2	30.6	32.6	0.7	4.4	100.0
1991	6.6	33.1	25.5	31.0	1.3	2.4	100.0
1992	13.2	39.0	20.3	25.0	0.1	2.4	100.0
1993	17.7	39.3	18.5	21.6	0.0	2.9	100.0
1994	19.3	43.7	16.0	16.8	0.0	4.1	100.0
1995	26.0	46.6	11.9	13.0	0.0	2.5	100.0
1996	27.4	53.1	9.9	8.0	0.0	1.7	100.0
1997	18.2	63.7	10.5	6.1	0.0	1.4	100.0
1998	13.2	72.1	9.4	4.6	0.0	0.7	100.0
1999	10.1	74.3	10.1	4.6	0.0	0.9	100.0
2000	8.1	76.6	9.7	3.6	0.0	2.0	100.0
2001	9.0	77.9	9.1	2.9	0.0	1.1	100.0
2002	8.2	78.5	9.7	2.6	0.0	0.9	100.0

Table A.7. Summary of USA commercial witch flounder landings (mt), number of length samples (n), number of fish measured (len) and number of age samples (age) by market category and quarter for all gear types, 1981 - 2002. The sampling ratio represents the amount of landings per length sample.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Sampling	
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	All	Ratio
1981 mt	260	7	517	269	32	694	242	13	607	230	0	453	3324	
n	.	.	.	.	1	1	.	1	.	1	.	1	5	
len	.	.	.	.	101	103	.	89	.	105	.	100	498	
age	.	.	.	.	.	26	.	25	.	25	.	25	101	
1982 mt	348	1	726	342	73	886	287	170	739	278	201	669	4720	
n	5	2	6	1	2	2	2	2	6	3	4	2	37	128
len	527	194	626	126	209	216	189	210	514	307	393	189	3700	
age	128	55	150	30	55	50	50	50	150	81	105	50	954	
1983 mt	475	250	910	471	286	1037	298	154	758	257	169	613	5678	
n	5	2	3	5	1	5	8	3	8	6	3	.	49	116
len	680	232	265	685	96	520	1008	123	981	677	344	.	5611	
age	135	30	55	131	16	125	152	0	159	180	75	.	1058	
1984 mt	462	322	1036	513	393	1000	403	248	653	429	286	586	6331	
n	5	9	4	7	1	7	8	1	2	4	2	1	51	124
len	804	1112	400	970	117	775	1045	106	191	615	243	91	6469	
age	154	250	76	186	25	180	210	28	53	105	44	25	1336	
1985 mt	465	377	613	697	453	850	526	291	553	433	310	408	5976	
n	12	1	2	5	4	7	7	7	6	8	2	4	65	92
len	1530	105	229	657	426	698	795	800	684	824	264	349	7361	
age	319	29	50	106	77	153	97	138	113	161	25	29	1297	
1986 mt	384	309	356	654	421	595	375	238	354	312	212	238	4448	
n	6	3	5	5	4	5	4	3	4	5	3	2	49	90
len	662	307	515	558	410	413	302	364	406	416	337	233	4923	
age	123	60	89	106	97	129	63	75	100	87	75	52	1056	

Table A.7 continued.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			All	Sampling Ratio
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large		
1987 mt	349	211	228	432	317	387	296	203	247	298	203	202	3373	69
n	1	1	2	4	2	3	5	5	4	2	3	2	34	
len	85	145	200	323	228	316	354	583	400	204	261	178	3277	
age	25	25	50	77	47	76	78	113	95	48	64	51	749	
1988 mt	424	304	271	436	393	389	184	176	208	140	140	131	3196	65
n	5	4	5	5	5	3	5	4	3	3	4	3	49	
len	335	407	465	344	544	429	396	359	295	229	402	356	4561	
age	70	89	106	71	110	77	70	100	75	61	95	69	993	
1989 mt	230	174	148	255	264	251	98	145	156	85	107	103	2016	112
n	1	2	2	2	2	1	2	2	1	1	2	.	18	
len	94	201	222	230	236	27	150	206	100	125	202	.	1793	
age	25	50	49	50	46	25	40	51	25	25	47	.	433	
1990 mt	113	125	107	147	168	147	100	119	129	84	79	85	1403	40
n	1	2	3	6	3	1	6	2	2	7	2	.	35	
len	134	199	199	335	296	100	349	247	145	381	201	.	2586	
age	15	40	45	81	70	25	69	41	50	103	48	.	587	
1991 mt	71	56	58	219	151	167	192	142	184	168	108	121	1637	40
n	5	2	3	7	2	1	4	2	3	5	4	3	41	
len	262	224	401	537	239	125	212	165	249	300	410	274	3398	
age	53	50	80	93	45	25	49	49	52	66	97	58	717	
1992 mt	180	86	82	466	163	174	205	115	138	212	97	116	2034	68
n	4	2	2	7	1	2	7	1	1	2	.	1	30	
len	259	241	185	501	125	235	477	121	117	129	.	46	2436	
age	42	46	52	78	25	25	86	25	25	27	.	23	454	
1993 mt	350	112	110	442	192	161	263	122	150	331	96	106	2435	76
n	7	1	.	7	1	1	9	1	5	.	.	.	32	
len	830	100	.	741	107	100	728	85	499	.	.	.	3190	
age	55	25	.	56	27	26	74	.	73	.	.	.	336	

Table A.7. continued.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Sampling	
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	All	Ratio
1994 mt	403	143	98	505	183	154	390	122	117	383	91	80	2670	
n	.	.	.	3	5	6	5	5	1	5	3	4	37	72
len	.	.	.	560	532	749	356	648	105	342	368	407	4067	
age	.	.	.	59	104	134	44	113	26	56	60	82	678	
1995 mt	336	91	77	586	117	100	399	61	70	304	48	40	2212	
n	3	3	3	6	3	5	.	.	.	2	.	1	26	85
len	208	348	347	459	367	517	.	.	.	217	.	94	2557	
age	53	84	89	81	75	135	.	.	.	27	.	25	569	
1996 mt	313	57	36	545	86	60	458	56	44	363	42	28	2088	
n	5	2	3	5	2	1	5	4	4	5	3	3	42	50
len	504	218	292	331	240	127	494	464	468	343	277	348	4106	
age	59	45	78	53	50	26	59	86	101	60	70	69	756	
1997 mt	313	40	25	478	86	41	398	55	27	265	31	16	1775	
n	6	3	3	9	4	3	9	3	1	9	1	1	52	34
len	557	350	351	812	418	309	783	308	107	505	128	50	4678	
age	77	68	70	108	73	77	98	81	20	73	18	23	786	
1998 mt	372	39	19	587	79	31	380	40	20	239	26	14	1849	80
n	5	2	1	4	1	1	5	3	1	.	.	.	23	
len	339	206	128	238	88	135	484	186	100	.	.	.	1904	
age	45	50	19	30	.	29	47	22	.	.	.	.	242	
1999 mt	386	48	19	616	79	31	436	67	30	353	38	18	2121	51
n	3	.	.	4	.	.	17	2	3	11	1	.	41	
len	282	.	.	308	.	.	1110	201	306	775	109	.	3091	
age	15	.	.	62	.	.	143	.	32	91	16	.	359	
2000 mt	477	53	17	583	93	27	555	89	28	451	50	16	2439	21
n	31	2	.	47	.	.	17	1	.	5	5	2	110	
len	2253	91	.	2445	.	.	994	105	.	308	558	217	6971	
age	390	10	.	460	.	.	224	20	.	67	92	51	1314	

Table A.7 continued.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Sampling	
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	All	Ratio
2001 mt	583	71	17	824	99	30	699	98	28	507	50	13	3019	70
n	8	4	2	3	3	2	8	2	3	5	3	.	43	
len	744	422	134	237	352	159	594	209	213	313	232	.	3609	
age	125	63	42	47	48	64	126	34	46	61	48	.	704	
2002 mt	740	79	18	774	103	26	849	114	29	400	45	9	3186	91
n	4	1	2	3	5	3	5	2	3	3	2	2	35	
len	312	121	107	212	518	209	389	150	194	262	226	115	2815	
age	73	14	44	65	68	63	86	32	62	49	30	49	635	

Table A.8. The data pooling to apply age and length frequency samples to landings by market category and quarter to estimate numbers at age of witch flounder from 1982-2002.

Year	Mkt. Cat.	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1982	Small	<=Pooled =>		X	X
	Med.	X	X	X	X
	Large	X	X	X	X
1983	Small	X	X	X	X
	Med.	<=Pooled =>		X	X
	Large	X	X	<=Pooled =>	
1984	Small	X	X	X	X
	Med.	<=Pooled =>		<=Pooled =>	
	Large	X	X	<=Pooled =>	
1985	Small	X	X	X	X
	Med.	X	X	X	X
	Large	X	X	X	X
1986	Small	X	X	X	X
	Med.	X	X	X	X
	Large	X	X	X	X
1987	Small	<=Pooled =>		X	X
	Med.	<=Pooled =>		X	X
	Large	X	X	X	X
1988	Small	X	X	X	X
	Med.	X	X	X	X
	Large	X	X	X	X
1989	Small	<=Pooled =>		<=Pooled =>	
	Med.	X	X	X	X
	Large	<====Pooled====>			
1990	Small	<=Pooled =>		X	X
	Med.	X	X	X	X
	Large	<=Pooled =>		<=Pooled =>	
1991	Small	X	X	X	X
	Med.	X	X	X	X
	Large	<=Pooled =>		X	X
1992	Small	X	X	X	X
	Med.	<====Pooled====>			
	Large	X	X	<=Pooled =>	

Table A.8. Continued.

Year	Mkt. Cat.	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1993	Small	X	X	<=Pooled =>	
	Med.	<===Pooled ===>			
	Large	<===Pooled ===>			
1994	Small	<=Pooled =>		X	X
	Med.	<=Pooled =>		X	X
	Large	<=Pooled =>		<=Pooled =>	
1995	Small	X	<=== Pooled ===>		
	Med.	X	<===Pooled ===>		
	Large	X	<===Pooled ===>		
1996	Small	X	X	X	X
	Med.	<=Pooled =>		X	X
	Large	<=Pooled =>		X	X
1997	Small	X	X	X	X
	Med.	X	X	<=Pooled =>	
	Large	X	X	<=Pooled =>	
1998	Small	X	X	<=Pooled =>	
	Med.	<=Pooled =>		<=Pooled =>	
	Large	<===Pooled ===>			
1999	Small	<=Pooled =>		X	X
	Med.	<===Pooled ===>			
	Large	<===Pooled ===>			
2000	Small	X	X	X	X
	Med.	<===Pooled ===>			
	Large	<===Pooled ===>			
2001	Small	X	X	X	X
	Med.	<=Pooled =>		<=Pooled =>	
	Large	<===Pooled ===>			
2002	Small	X	X	X	X
	Med.	<=Pooled =>		<=Pooled =>	
	Large	<=Pooled =>		<=Pooled =>	

Table A.9. USA commercial landings at age in numbers, weight (thousands of fish; mt) and mean weight (kg) and mean length (cm) at age of witch flounder, 1982 - 2002.

Year	Age															TOTAL	11+
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+		
USA Commercial Landings in Numbers (1000's) at Age																	
1982	0.0	0.0	0.0	117.9	826.6	1119.9	1454.3	665.2	656.0	399.5	239.4	201.0	356.3	183.7	837.4	7057.2	1578.4
1983	0.0	0.0	0.0	219.8	768.6	1033.7	1567.3	1590.2	977.8	737.7	510.4	366.0	287.3	289.1	733.1	9081.0	1675.5
1984	0.0	0.0	0.0	90.6	1012.4	1808.7	1734.3	1486.5	1497.5	696.7	375.1	279.5	356.4	261.3	821.6	10420.0	1718.8
1985	0.0	0.0	0.0	0.0	985.1	2026.8	1933.8	1524.9	1247.9	606.0	400.4	261.2	221.5	170.7	705.8	10084.0	1359.2
1986	0.0	0.0	0.0	6.3	298.5	1441.6	2772.6	1566.9	834.9	412.7	222.8	188.2	157.0	137.0	276.0	8314.5	758.2
1987	0.0	0.0	0.0	0.0	81.5	321.6	1276.0	1574.7	870.9	480.6	252.4	132.4	90.8	62.1	204.1	5347.1	489.4
1988	0.0	0.0	0.0	0.0	50.8	176.0	654.7	1382.7	1154.1	401.5	266.7	124.1	94.0	71.9	307.5	4684.0	597.5
1989	0.0	0.0	0.0	0.0	7.3	49.7	314.3	759.4	882.1	349.7	123.4	73.2	61.1	56.7	157.1	2833.8	349.0
1990	0.0	0.0	0.0	0.0	181.6	574.3	255.6	273.9	471.1	333.9	81.4	43.1	38.5	19.1	76.9	2349.2	179.1
1991	0.0	0.0	0.0	0.0	179.5	732.9	519.4	235.8	244.6	292.1	313.6	51.8	44.0	22.5	139.5	2775.6	260.8
1992	0.0	0.0	0.0	0.0	509.3	839.4	935.5	717.0	201.6	177.9	120.0	217.6	46.3	26.5	86.5	3877.7	380.2
1993	0.0	0.0	0.0	0.0	422.2	1022.8	917.7	597.2	585.6	218.8	278.5	113.9	32.6	103.6	140.4	4433.2	391.1
1994	0.0	0.0	0.0	0.0	201.3	1429.4	1286.2	826.9	196.7	539.2	113.5	71.4	40.2	132.3	80.4	4917.4	324.9
1995	0.0	0.0	0.0	0.0	23.7	763.0	1597.4	848.7	267.5	97.2	269.5	55.0	43.9	8.1	49.9	4023.8	157.1
1996	0.0	0.0	0.0	0.0	45.8	467.7	1263.8	1430.4	263.2	215.5	57.1	78.8	3.6	13.0	18.2	3857.2	113.7
1997	0.0	0.0	0.0	0.0	212.2	527.9	1049.4	1014.0	591.3	83.1	49.8	17.9	36.6	2.2	13.4	3597.8	70.2
1998	0.0	0.0	0.0	0.0	18.1	488.0	1213.5	1583.0	370.5	141.4	15.5	37.2	5.6	19.9	7.7	3900.2	70.3
1999	0.0	0.0	0.0	0.0	185.2	585.7	1391.7	1178.3	763.2	251.3	31.6	40.8	0.0	0.0	13.5	4441.3	54.4
2000	0.0	0.0	0.0	0.0	75.4	266.2	1062.1	1611.1	1027.6	623.7	94.8	174.3	6.2	5.0	27.4	4973.9	212.8
2001	0.0	0.0	0.0	0.0	18.8	382.2	940.5	1669.0	1459.4	634.3	425.4	95.8	163.5	8.6	38.8	5836.3	306.7
2002	0.0	0.0	0.0	0.0	173.2	644.9	1242.7	2098.3	1274.4	632.1	96.4	102.7	11.0	65.6	25.3	6366.6	202.6

Table A.9. continue. USA commercial landings.

Year	Age															TOTAL	11+
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+		
USA Commercial Landings Mean Weight (kg) at Age																	
1982	0.000	0.000	0.000	0.216	0.275	0.345	0.424	0.550	0.727	0.886	0.983	1.146	1.255	1.310	1.553	0.695	1.406
1983	0.000	0.000	0.000	0.195	0.257	0.322	0.410	0.518	0.613	0.795	0.977	1.116	1.208	1.321	1.551	0.661	1.357
1984	0.000	0.000	0.000	0.212	0.268	0.346	0.422	0.539	0.664	0.817	0.922	1.004	1.212	1.332	1.511	0.639	1.339
1985	0.000	0.000	0.000	0.000	0.253	0.311	0.429	0.565	0.691	0.842	0.964	1.057	1.193	1.311	1.470	0.608	1.326
1986	0.000	0.000	0.000	0.084	0.227	0.306	0.408	0.533	0.676	0.853	0.975	1.132	1.199	1.317	1.521	0.555	1.321
1987	0.000	0.000	0.000	0.000	0.272	0.342	0.434	0.561	0.686	0.828	0.980	1.067	1.222	1.386	1.467	0.645	1.303
1988	0.000	0.000	0.000	0.000	0.310	0.367	0.435	0.538	0.668	0.819	0.980	1.074	1.190	1.290	1.477	0.696	1.326
1989	0.000	0.000	0.000	0.000	0.260	0.344	0.425	0.574	0.682	0.818	0.968	1.128	1.258	1.315	1.519	0.730	1.358
1990	0.000	0.000	0.000	0.000	0.308	0.323	0.438	0.586	0.688	0.849	1.049	1.213	1.262	1.521	1.669	0.624	1.454
1991	0.000	0.000	0.000	0.000	0.286	0.371	0.443	0.578	0.702	0.836	0.974	1.099	1.369	1.537	1.536	0.640	1.420
1992	0.000	0.000	0.000	0.000	0.328	0.383	0.459	0.614	0.739	0.822	0.882	1.039	1.337	1.459	1.640	0.575	1.243
1993	0.000	0.000	0.000	0.000	0.292	0.364	0.432	0.535	0.666	0.882	1.023	1.118	1.199	1.368	1.519	0.587	1.335
1994	0.000	0.000	0.000	0.000	0.308	0.357	0.430	0.534	0.691	0.832	0.909	1.083	1.172	1.204	1.576	0.542	1.266
1995	0.000	0.000	0.000	0.000	0.284	0.367	0.448	0.561	0.690	0.911	0.974	1.101	1.203	1.411	1.406	0.549	1.243
1996	0.000	0.000	0.000	0.000	0.260	0.355	0.435	0.554	0.708	0.856	0.974	1.114	1.401	1.440	1.558	0.541	1.232
1997	0.000	0.000	0.000	0.000	0.318	0.357	0.407	0.495	0.628	0.871	1.037	1.168	1.196	1.687	1.659	0.492	1.293
1998	0.000	0.000	0.000	0.000	0.235	0.331	0.382	0.492	0.585	0.871	0.978	1.115	1.132	1.261	1.557	0.474	1.206
1999	0.000	0.000	0.000	0.000	0.325	0.355	0.406	0.516	0.584	0.628	0.917	0.683	-	-	1.442	0.477	0.872
2000	0.000	0.000	0.000	0.000	0.319	0.327	0.376	0.450	0.533	0.633	0.677	0.834	1.167	1.298	1.379	0.490	0.925
2001	0.000	0.000	0.000	0.000	0.291	0.325	0.384	0.469	0.550	0.646	0.647	0.718	0.816	1.016	1.206	0.517	0.840
2002	0.000	0.000	0.000	0.000	0.354	0.344	0.416	0.477	0.554	0.651	0.824	0.844	0.716	0.993	1.120	0.501	0.919
mean																	
1982-02	0.000	0.000	0.000	0.034	0.287	0.345	0.421	0.535	0.654	0.807	0.934						1.237
1999-02	0.000	0.000	0.000	0.000	0.322	0.338	0.396	0.478	0.555	0.640	0.766						0.889

Table A.9 continued. USA commercial landings.

Year	Age															TOTAL	11+
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+		
USA Commercial Landings Mean Length (cm) at Age																	
1982	0.0	0.0	0.0	32.3	35.0	37.5	39.8	42.9	46.5	49.3	50.9	53.2	54.6	55.2	58.0	44.3	56.3
1983	0.0	0.0	0.0	31.7	34.3	36.8	39.4	42.2	44.2	47.7	50.7	52.8	54.0	56.6	55.8	35.9	55.0
1984	0.0	0.0	0.0	32.6	34.9	37.6	39.8	42.7	45.3	48.2	49.9	51.2	54.1	55.6	57.6	43.6	55.5
1985	0.0	0.0	0.0	0.0	34.2	36.3	40.0	43.3	45.9	48.6	50.6	51.9	53.8	55.3	57.1	42.9	55.3
1986	0.0	0.0	0.0	25.0	33.2	36.2	39.4	42.5	45.6	48.8	50.7	53.0	53.9	55.4	57.7	42.0	55.3
1987	0.0	0.0	0.0	0.0	35.0	37.4	40.1	43.2	45.8	48.4	50.8	52.1	54.2	56.2	57.1	44.3	55.1
1988	0.0	0.0	0.0	0.0	36.4	38.2	40.1	42.7	45.4	48.2	50.8	52.1	53.7	55.0	57.1	45.3	55.3
1989	0.0	0.0	0.0	0.0	34.6	37.5	39.9	43.5	45.6	48.1	50.6	52.9	54.6	55.3	57.6	46.0	55.7
1990	0.0	0.0	0.0	0.0	36.2	36.8	40.2	43.7	45.8	48.7	51.8	54.1	54.6	57.8	59.2	43.5	56.8
1991	0.0	0.0	0.0	0.0	35.4	38.3	40.3	43.3	46.1	48.5	50.6	52.5	56.0	57.9	57.9	43.8	56.5
1992	0.0	0.0	0.0	0.0	37.0	38.7	40.7	44.3	46.8	48.3	49.2	51.7	55.5	57.0	58.9	42.7	54.2
1993	0.0	0.0	0.0	0.0	35.8	38.1	40.0	42.6	45.3	49.3	51.5	52.8	53.9	55.9	57.7	42.8	55.5
1994	0.0	0.0	0.0	0.0	36.0	37.6	39.7	42.3	45.6	48.0	49.1	51.8	53.1	53.4	57.8	41.7	54.1
1995	0.0	0.0	0.0	0.0	35.3	37.9	40.2	42.8	45.4	49.3	50.1	52.0	53.4	56.0	55.8	42.0	53.8
1996	0.0	0.0	0.0	0.0	34.4	37.5	39.8	42.7	45.8	48.4	50.1	52.2	55.8	56.2	57.6	42.0	53.6
1997	0.0	0.0	0.0	0.0	36.4	37.6	39.1	41.3	44.2	48.5	51.1	52.9	53.3	59.0	58.7	40.9	54.4
1998	0.0	0.0	0.0	0.0	33.4	36.8	38.4	41.2	43.3	48.7	50.5	52.3	52.7	54.1	57.6	40.5	53.4
1999	0.0	0.0	0.0	0.0	36.6	37.5	39.0	41.8	43.3	44.3	49.4	45.2	-	-	56.4	40.7	48.0
2000	0.0	0.0	0.0	0.0	36.4	36.7	38.2	40.2	42.2	44.2	45.2	47.7	53.0	54.6	55.3	40.9	49.0
2001	0.0	0.0	0.0	0.0	35.5	36.6	38.4	40.7	42.5	44.6	44.5	45.9	47.7	50.8	53.3	41.6	47.9
2002	0.0	0.0	0.0	0.0	37.4	37.2	39.3	40.9	42.7	44.6	47.9	48.2	45.8	50.5	52.2	41.6	49.3

Table A.10. Discard rates (kg/day fished) by fishing zone¹ obtained from a ratio estimator (kg of witch flounder discarded to days fished) using Fisheries Observer Program data collected from the northern shrimp fishery, number of days fished by the shrimp fishery, mean discard rates (kg/df) and estimated discard weight (kg) of witch flounder in the northern shrimp fishery, during the 1989 - 1997 shrimp seasons.

Shrimp Season	Fishing Zone	Sea Sample Data		Commercial days fished	Mean discard rate	Estimated discard weight (kg)	Estimated discard weight (mt)
		Trips	Discard Rate (kg/df)				
1989	1	5	0.0000	398.2	6.0626	17,215	17.2
	2	15	2.2032	1680.2			
	3	16	17.7543	761.1			
				2839.5			
1990	1	4	0.0000	416.9	8.7512	28,044	28.0
	2	23	7.0751	1610.9			
	3	20	14.1459	1176.8			
				3204.6			
1991	1	13	0.9770	528.0	12.6856	32,827	32.8
	2	25	4.4822	1154.8			
	3	24	29.9863	904.9			
				2587.7			
1992	1	30	2.7834	187.3	8.2343	19,048	19.0
	2	60	8.9270	1764.1			
	3	20	7.6787	361.9			
				2313.3			
1993	1	38	1.3559	526.9	4.4485	8,462	8.5
	2	53	3.7619	1094.2			
	3	13	12.9178	281.1			
				1902.2			
1994*	1	37	3.3021	498.7	5.6004	11,102	11.1
	2	56	5.8385	1334			
	3	5	11.1394	149.6			
				1982.3			
1995*	1	24	2.0007	2036.2	11.0492	37,299	37.3
	2	46	27.5162	1109			
	3	18	11.7543	230.5			
				3375.7			
1996*	1	8	0.3532	2079.4	4.3130	13,987	14.0
	2	31	7.6343	958.2			
	3	11	28.919	205.3			
				3242.9			
1997*	1	6	0.4065	1996.1	3.2915	12,051	12.1
	2	19	2.9403	1191.8			
	3	3	16.3461	473.2			
				3661.1			

¹ Fishing zones: 1 = 0-3 miles; 2 = 3 - 12 miles, and 3 = greater than 12 miles from shore.

* Commercial days fished have been estimated from Vessel Trip Report data.

Table A.11. Witch flounder discard rates (kg/df), days fished (df), discarded metric tons (mt), numbers of discarded fish (in thousands) in the northern shrimp fishery during 1982-2002.

Year	Shrimp Season Disc. Rate	Calendar Year			mt	Numbers (‘000)
		Days Fished				
		Jan-Apr	Dec.	Total		
1982	5.7025	970.1	35.6	1005.7	5.90	62.14
1983	10.4523	1121.3	141.7	1263	12.56	131.67
1984	5.9234	1612.3	237.6	1849.9	10.93	110.94
1985	5.8129	1843.8	272.8	2116.6	12.12	91.32
1986	5.1502	2122.3	428.9	2551.2	13.14	98.80
1987	5.1502	3279.3	380.4	3659.7	21.79	235.99
1988	12.8824	2434.8	426.9	2861.7	33.95	723.95
1989	6.0626	2412.6	491.9	2904.5	18.93	219.81
1990	8.7512	2712.7	377.6	3090.3	28.53	468.56
1991	12.6856	2210.1	172.3	2382.4	29.46	443.85
1992	8.2343	2141.0	113.2	2254.2	18.13	384.45
1993	4.4485	1789.0	161.7	1950.7	8.86	356.77
1994	5.6004	1820.6	530.8	2351.4	16.06	1891.71
1995	11.0492	2844.9	547.6	3392.5	33.80	1176.37
1996	4.3130	2695.3	645.2	3340.5	13.75	250.46
1997	3.2915	3016.0	361.4	3377.4	13.27	304.52
1998	9.2437	1842.6	96.9	1939.5	18.04	873.52
1999	10.3851	1120.5	0	1120.5	11.64	563.50
2000	9.8775	792.9	0	792.9	7.83	379.26
2001	6.6415	672.8	0	672.8	4.47	216.38
2002	3.5325	238	0	238	0.84	40.68

Note: 1982-1988 discard rates were derived from a linear regression using 1989-1993 discard rates and NEFSC autumn age 3 abundance indices.

1998-2002 discard rates were derived from a linear regression using 1989-1993 discard rates and NEFSC autumn age 3 abundance indices.

Table A.12. Witch flounder discards at age in numbers, weight (thousands of fish; mt) and mean weight (kg) and mean length (cm) at age in the shrimp fishery, 1982 - 2002.

Year	Age															TOTAL
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+	
Shrimp Fishery Discards in Numbers (1000's) at Age																
1982	0.00	0.00	1.59	25.24	21.12	11.27	2.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14
1983	0.00	0.00	3.62	53.11	44.65	23.81	6.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	131.67
1984	0.00	0.33	0.77	46.84	38.55	19.41	5.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	110.94
1985	0.00	0.34	3.37	11.72	47.06	26.39	2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.32
1986	0.00	0.53	3.86	15.07	49.83	27.04	2.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.80
1987	2.08	18.92	79.51	15.62	74.59	41.46	3.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	235.99
1988	0.42	14.62	130.29	495.50	42.57	37.70	2.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	723.95
1989	0.74	10.47	47.52	69.23	76.39	15.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	219.81
1990	1.19	5.18	92.78	239.97	97.13	32.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	468.56
1991	2.96	17.79	15.98	287.35	102.86	11.59	5.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	443.85
1992	2.71	43.41	136.92	118.76	82.06	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	384.45
1993	112.06	78.84	107.58	38.69	14.13	5.02	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	356.77
1994	8.06	1368.46	495.50	19.62	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1891.71
1995	2.68	49.95	630.10	480.83	12.25	0.20	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1176.37
1996	5.21	32.68	50.83	99.45	59.21	2.09	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	250.46
1997	8.68	74.91	102.92	86.49	23.71	7.30	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	304.52
1998	49.78	391.44	264.72	132.04	30.13	4.78	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	873.52
1999	32.11	252.51	170.76	85.18	19.44	3.09	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	563.50
2000	21.61	169.95	114.93	57.33	13.08	2.08	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	379.26
2001	12.33	96.96	65.57	32.71	7.46	1.19	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	216.38
2002	2.32	18.23	12.33	6.15	1.4	0.22	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.68

Note: 1998-2002 estimated using 1993-1997 Fisheries Observer Program data.

Table A.12 continued. Discards in the shrimp fishery.

Year	Age														TOTAL	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13		14+
Shrimp fishery Mean Weight (kg) at Age																
1982			0.040	0.043	0.101	0.165	0.256									0.095
1983			0.040	0.044	0.101	0.166	0.256									0.095
1984		0.017	0.044	0.050	0.105	0.165	0.256									0.099
1985		0.017	0.023	0.081	0.123	0.179	0.231									0.133
1986		0.017	0.026	0.089	0.125	0.180	0.231									0.133
1987	0.006	0.015	0.033	0.071	0.126	0.180	0.231									0.092
1988	0.004	0.006	0.017	0.036	0.121	0.206	0.282									0.047
1989	0.010	0.012	0.033	0.058	0.122	0.249										0.086
1990	0.004	0.010	0.029	0.043	0.107	0.155										0.061
1991	0.004	0.014	0.030	0.045	0.117	0.221	0.218									0.066
1992	0.003	0.007	0.021	0.043	0.119	0.225										0.047
1993	0.003	0.009	0.022	0.057	0.136	0.237	0.317									0.025
1994	0.005	0.004	0.019	0.032		0.282										0.009
1995	0.005	0.007	0.023	0.037	0.083	0.289	0.282									0.029
1996	0.004	0.019	0.031	0.056	0.090	0.184	0.289									0.055
1997	0.004	0.023	0.033	0.048	0.115	0.144	0.256									0.044
1998	0.003	0.006	0.023	0.042	0.100	0.184	0.286									0.021
1999	0.003	0.006	0.023	0.042	0.100	0.184	0.286									0.021
2000	0.003	0.006	0.023	0.042	0.100	0.184	0.286									0.021
2001	0.003	0.006	0.023	0.042	0.100	0.184	0.286									0.021
2002	0.003	0.006	0.023	0.042	0.100	0.184	0.286									0.021
Mean																
1982-02	0.004	0.011	0.027	0.050	0.110	0.197	0.267									0.058

Noe:1998-2002 estimated using 1993-1997 Fisheries Observer Program data.

Table A.12 continued. Discards in the shrimp fishery.

Year	Age														TOTAL	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13		14+
Shrimp fishery Mean Length (cm) at Age																
1982			20.3	20.6	26.5	30.7	34.9									25.1
1983			20.3	20.6	26.5	30.7	34.9									25.1
1984		15.7	20.7	21.2	26.7	30.7	34.9									25.4
1985		15.7	16.9	24.2	28.1	31.4	33.9									28.3
1986		15.7	17.3	24.9	28.2	31.4	33.9									28.3
1987	10.6	15.3	19.0	23.4	28.2	31.4	33.9									24.3
1988	10.2	10.9	15.6	19.4	27.9	32.8	36.0									19.8
1989	13.6	13.9	18.9	22.2	28.1	34.6										24.0
1990	10.5	13.6	17.9	20.4	27.0	30.2										21.9
1991	9.7	14.2	17.7	20.9	27.6	33.6	33.4									22.5
1992	9.3	10.8	16.6	20.5	27.9	33.7										19.5
1993	9.2	12.0	16.9	22.1	28.9	34.2	37.3									14.7
1994	10.7	9.8	15.9	18.5	-	36.0										11.5
1995	10.9	11.6	17.0	19.6	24.9	36.2	36.0									18.0
1996	10.0	15.3	18.4	22.1	25.6	31.7	36.2									21.2
1997	10.2	16.1	18.9	21.2	27.6	29.5	35.0									19.6
1998	9.4	10.4	16.8	20.3	26.4	31.5	36.1									14.9
1999	9.4	10.4	16.8	20.3	26.4	31.5	36.1									14.9
2000	9.4	10.4	16.8	20.3	26.4	31.5	36.1									14.9
2001	9.4	10.4	16.8	20.3	26.4	31.5	36.1									14.9
2002	9.4	10.4	16.8	20.3	26.4	31.5	36.1									14.9

Note: 1998-2002 estimated using 1993-1997 Fisheries Observer Program data.

Table A.13 . Summary of number of trips, tows, kept and discard pounds of witch flounder, discard: kept ratio observed in the large-mesh otter trawl fishery in the Georges Bank - Gulf of Maine area (observed tows only; excluding trips targeting loligo) from the Fisheries Observer Program, 1989 - 2002.

Year	January - June							July- December							Annual mt
	Trips	Tows	Fish in disc l-f	Pounds kept	discards	D/K ratio	metric tons Landing Disc.	Trips	Tows	fish in disc lf	Pounds kept Disc	D/K ratio	metric tons landings discard		
1989	3	17	68	850	14	0.016	1298.64 20.78	4	19	411	427 142	0.333	663.58 220.97	241.75	
1990	2	2	20	50	1	0.020	795.25 15.91	1	12	10	535 48	0.090	573.98 51.66	67.56	
1991	4	45	15	1655	49	0.030	757.7 22.73	6	52	148	1882 159	0.084	947.63 79.60	102.33	
1992	4	80	31	1896	222	0.117	1273.78 149.03	0	0	0	0 0	0.117	884.62 103.50	252.53	
1993	3	37	428	1607	806	0.502	1411.03 708.34	2	24	229	1665 125	0.075	1041.84 78.14	786.48	
1994	5	70	63	7298	332	0.045	1427.92 64.26	5	126	125	3794 157	0.041	1139.81 46.73	110.99	
1995	31	640	1500	35968	2561	0.071	1244.48 88.36	11	199	571	8240 669	0.081	878.28 71.14	159.50	
1996	17	267	272	14016	1387	0.099	1049.86 103.94	1	13	75	638 90	0.141	968.59 136.57	240.51	
1997	9	203	593	10907	1831	0.168	945.2 158.79	7	134	77	4518 750	0.166	772.52 128.24	287.03	
1998	7	93	200	3786	595	0.157	1095.59 172.01	2	14	3	277 37	0.134	705.15 94.49	266.50	
1999	3	46	5	3663	454	0.124	1149.74 142.57	15	148	225	10057 644	0.064	914.79 58.55	201.11	
2000	29	211	101	25343	666	0.026	1218.38 31.68	30	266	134	26149 1711	0.065	1159.65 75.38	107.06	
2001	34	332	48	36279	1864	0.051	1596.02 81.40	45	383	459	35016 3581	0.102	1356.47 138.36	219.76	
2002	27	298	795	36836	2439	0.066	1678.73 110.80	83	500	2361	44451 5268	0.119	1408.75 167.64	278.44	
average						0.107						0.115			

Note: in 1993, one 'dirty' trip' during Jan-June; if excluded, d/k ratio = 0.132.; dis mt = 186.3 mt

1999 and 1998 annual discard length frequencies were used due to low numbers of fish in each half year.

Table A.14. Number of trips, witch flounder kept and discarded weight (mt), discard:kept ratio from the Vessel Trip Reports, and commercial landings and estimated total discard weight.

Year	Qtr 1+2	Qtr 3+4	Total	Year	Qtr 1+2	Qtr 3+4	Total
1994 VTR trips	1228	2487		1999 VTR trips	1417	1655	
VTR kept (mt)	209.13	631.67		VTR kept (mt)	389.71	334.3	
VTR disc. (mt)	20.07	36.98		VTR disc. (mt)	18.75	17.11	
Ratio (d/k)	0.09597	0.05854		Ratio (d/k)	0.04811	0.05118	
Landings (mt)	1427.29	1139.81	2567.1	Landings (mt)	1149.74	914.79	2064.5
Discards (mt)	136.976	66.7282	203.7	Discards (mt)	55.3171	46.8204	102.1
1995 VTR trips	2674	1801		2000 VTR trips	1421	1608	
VTR kept (mt)	603.17	331.91		VTR kept (mt)	397.84	369.31	
VTR disc. (mt)	32.25	17.41		VTR disc. (mt)	21.84	19.76	
Ratio (d/k)	0.05347	0.05245		Ratio (d/k)	0.0549	0.05351	
Landings (mt)	1244.48	878.28	2122.8	Landings (mt)	1218.38	1159.65	2378.0
Discards (mt)	66.5393	46.0693	112.6	Discards (mt)	66.8847	62.0473	128.9
1996 VTR trips	2216	1662		2001 VTR trips	1327	1165	
VTR kept (mt)	469.79	411.2		VTR kept (mt)	531.92	410.55	
VTR disc. (mt)	21.62	22.93		VTR disc. (mt)	24.28	19.91	
Ratio (d/k)	0.04602	0.05576		Ratio (d/k)	0.04565	0.0485	
Landings (mt)	1049.86	968.59	2018.5	Landings (mt)	1596.02	1356.47	2952.5
Discards (mt)	48.3151	54.0121	102.3	Discards (mt)	72.8519	65.7833	138.6
1997 VTR trips	1906	1360		2002 VTR trips	791	1227	
VTR kept (mt)	355.61	302.67		VTR kept (mt)	494.02	388.52	
VTR disc. (mt)	16.39	17.22		VTR disc. (mt)	23.78	16.15	
Ratio (d/k)	0.04609	0.05689		Ratio (d/k)	0.04814	0.04157	
Landings (mt)	945.2	772.52	1717.7	Landings (mt)	1678.73	1408.75	3087.5
Discards (mt)	43.5641	43.9515	87.5	Discards (mt)	80.8068	58.5589	139.4
1998 VTR trips	1645	1129					
VTR kept (mt)	320.93	223.35					
VTR disc. (mt)	17.06	11.82					
Ratio (d/k)	0.05316	0.05292					
Landings (mt)	1095.59	705.15	1800.7				
Discards (mt)	58.2394	37.3175	95.6				

Table A.15. Numbers and weight (mt) of discarded witch flounder in the large-mesh otter trawl fishery derived by three scenarios: 1) Vessel trip reports (VTR), 2) Fisheries Observer Program (FOP), and 3) survey filter method.

Year	VTR	FOP	Survey filter method
Numbers (1000's)			
1982			359.01
1983			1062.39
1984			599.49
1985			320.94
1986			78.75
1987			136.47
1988			202.67
1989			733.52
1990			959.82
1991			455.22
1992			988.11
1993			2171.25
1994	832.65		2155.99
1995	639.95	906.50	1302.62
1996	543.51	1277.79	2432.13
1997	489.12	1604.49	2071.03
1998	549.41	1541.34	1722.55
1999	520.04	1024.35	1932.76
2000	668.38	555.11	3022.89
2001	695.16	1102.21	3820.86
2002	701.19	1400.56	3475.61
Weight (mt)			
1982			42.44
1983			149.04
1984			88.81
1985			48.75
1986			12.00
1987			25.68
1988			26.55
1989		241.8	113.86
1990		67.6	155.75
1991		102.3	65.41
1992		252.5	153.31
1993		786.45	367.77
1994	203.7	110.99	406.30
1995	112.6	159.50	231.23
1996	102.3	240.51	439.88
1997	87.5	287.03	379.83
1998	95.6	266.50	316.89
1999	102.1	201.11	342.33
2000	128.9	107.05	546.34
2001	138.6	219.76	700.93
2002	139.4	278.44	645.23

Table A.16. Large-mesh otter trawl discards at age in numbers (thousands of fish), mean weight (kg) and mean length (cm) at age of witch flounder, 1982 - 2002, estimated using a **survey filter method 1982-1994) and FOP data (1995-2002).**

Year	Age															TOTAL
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+	
Large-mesh Otter Trawl Fishery Discards in Numbers (1000's) at Age																
1982	0.03	0.06	0.13	47.35	216.75	76.50	18.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	359.01
1983	0.00	0.02	0.66	64.20	532.92	463.25	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1062.39
1984	0.00	0.00	0.11	9.17	415.36	174.59	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	599.49
1985	0.00	0.00	0.10	111.86	143.96	65.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	320.94
1986	0.00	0.00	0.00	1.58	28.74	48.15	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	78.75
1987	0.00	0.00	0.42	6.63	25.17	104.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	136.47
1988	0.00	0.04	0.00	104.77	46.54	50.60	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	202.67
1989	0.11	0.22	2.80	377.82	352.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	733.52
1990	0.27	1.11	2.52	103.96	355.44	496.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	959.82
1991	0.10	0.11	7.28	154.42	123.36	119.27	50.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	455.22
1992	0.13	0.94	22.51	280.70	664.19	19.17	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	988.11
1993	1.70	6.96	22.01	378.54	1371.00	391.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2171.25
1994	0.00	0.02	0.94	22.35	800.5	1330.43	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2155.99
1995	0.00	0.00	25.41	147.96	334.33	278.03	116.71	2.65	1.09	0.31	0.00	0.00	0.00	0.00	0.00	906.50
1996	0.00	0.00	0.00	22.43	419.44	737.88	98.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1277.79
1997	0.00	0.00	0.00	48.80	822.57	480.73	243.46	5.05	2.47	1.41	0.00	0.00	0.00	0.00	0.00	1604.49
1998	0.00	1.45	29.48	199.19	508.67	571.00	201.32	28.61	0.93	0.70	0.00	0.00	0.00	0.00	0.00	1541.34
1999	0.00	0.43	23.69	75.74	321.49	506.95	69.80	22.80	2.19	1.25	0.00	0.00	0.00	0.00	0.00	1024.35
2000	0.00	0.00	4.58	46.17	197.98	187.57	95.56	18.26	4.99	0.00	0.00	0.00	0.00	0.00	0.00	555.11
2001	0.00	0.00	0.85	37.22	316.95	557.06	157.64	32.29	0.09	0.09	0.00	0.00	0.00	0.00	0.00	1102.21
2002	0.00	2.01	5.09	34.81	574.48	577.81	161.64	33.89	6.61	2.47	1.04	0.00	0.00	0.00	0.00	1400.56

Table A.16 continued. Discards in the large-mesh otter trawl fishery (**survey filter method (1982-1994) and FOP data (1995-2002)**).

Year	Age														TOTAL	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13		14+
Large-mesh Otter Trawl Fishery Discards Mean Weight (kg) at Age																
1982	0.000	0.002	0.014	0.050	0.128	0.121	0.169									0.118
1983		0.009	0.029	0.081	0.132	0.158	0.209									0.140
1984			0.014	0.072	0.144	0.162	0.209									0.148
1985			0.031	0.133	0.163	0.160										0.152
1986				0.105	0.125	0.170	0.209									0.152
1987			0.014	0.105	0.122	0.210	0.256									0.188
1988		0.002		0.086	0.161	0.195	0.256									0.131
1989	0.001	0.013	0.044	0.134	0.179											0.155
1990	0.001	0.018	0.028	0.105	0.146	0.187										0.162
1991	0.001	0.010	0.048	0.093	0.140	0.191	0.210									0.144
1992	0.001	0.015	0.057	0.129	0.168	0.214	0.256									0.155
1993	0.001	0.014	0.050	0.129	0.175	0.199										0.169
1994		0.026	0.044	0.103	0.175	0.198	0.256									0.188
1995			0.059	0.095	0.152	0.221	0.252	0.473	0.595	0.702						0.176
1996				0.077	0.145	0.208	0.251									0.188
1997				0.108	0.157	0.185	0.242	0.495	0.471	0.702						0.179
1998		0.008	0.041	0.089	0.165	0.200	0.219	0.225	0.355	0.370						0.174
1999		0.021	0.037	0.097	0.162	0.218	0.281	0.406	0.447	0.505						0.196
2000			0.066	0.096	0.155	0.198	0.280	0.313	0.403							0.193
2001			0.070	0.130	0.171	0.208	0.230	0.258	0.309	0.309						0.199
2002		0.018	0.054	0.122	0.180	0.205	0.234	0.264	0.414	0.577	0.566					0.199
Mean 1982-02	0.001	0.009	0.037	0.102	0.155	0.180	0.236	0.264	0.428	0.528	0.566					

Table A.16 continued. Discard in the large-mesh otter trawl fishery (survey filter method (1982-1994) and FOP data (1995-2002) .

Year	Age														TOTAL	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13		14+
Large-mesh Otter Trawl Fishery Discards Mean Length (cm) at Age																
1982	5.0	7.8	15.0	21.4	28.3	28.1	31.0	-	-	-	-					27.5
1983		13.0	18.5	24.7	28.6	30.4	33.0	-	-	-	-					29.2
1984		-	15.0	23.6	29.5	30.6	33.0	-	-	-	-					29.7
1985		-	19.0	28.8	30.7	30.5	-	-	-	-	-					30.0
1986	5.0	-	-	27.0	28.3	31.1	33.0	-	-	-	-					30.0
1987		-	15.0	27.0	28.1	33.0	35.0	-	-	-	-					31.8
1988		9.0	-	25.4	30.4	32.3	35.0	-	-	-	-					28.3
1989	5.9	14.4	20.7	28.8	31.5	-	-	-	-	-	-					30.1
1990	6.1	16.0	18.1	26.8	29.6	31.8	-	-	-	-	-					30.4
1991	5.5	12.7	21.3	25.8	29.2	32.1	33.0	-	-	-	-					29.1
1992	5.7	15.0	22.5	28.4	30.8	33.2	35.0	-	-	-	-					30.0
1993	5.5	14.5	21.5	28.5	31.2	32.5	-	-	-	-	-					30.8
1994		17.9	20.7	26.5	31.2	32.4	35.0	-	-	-	-					31.9
1995			22.7	25.9	29.9	33.5	34.8	41.8	44.7	47.0						30.8
1996				24.6	29.5	32.9	34.8									31.7
1997				27.1	30.3	31.8	34.4	42.4	41.6	47.0						31.3
1998		12.3	20.3	25.6	30.7	32.5	33.3	33.4	38.5	39.0						30.9
1999		17.0	19.7	26.1	30.5	33.3	35.9	40.0	41.1	42.7						31.9
2000			23.5	26.1	30.0	32.3	35.8	36.7	39.7							31.7
2001			23.9	28.5	31.0	32.9	33.9	35.1	37.0	37.0						32.4
2002		16.0	21.9	27.7	31.4	32.7	34.0	35.1	40.1	44.2	44.0					32.3

Table A.17. **Total USA commercial catch** [landings + shrimp trawl discards + large-mesh otter trawl discards using survey filter and FOP] in numbers, (thousands of fish), mean weight (kg) and mean length (cm) at age of witch flounder, 1982 - 2002.

Year	Age															TOTAL	11+
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+		
USA Commercial Catch in Numbers (1000's) at Age																	
1982	0.03	0.06	1.72	190.5	1064.5	1207.7	1475.4	665.2	656.0	399.5	239.4	201.0	356.3	183.7	837.4	7478.4	1578.4
1983	0.00	0.02	4.28	337.1	1346.2	1520.8	1575.1	1590.2	977.8	737.7	510.4	366.0	287.3	289.1	733.1	10275.1	1675.5
1984	0.00	0.33	0.88	146.6	1466.3	2002.7	1739.6	1486.5	1497.5	696.7	375.1	279.5	356.4	261.3	821.6	11131.0	1718.8
1985	0.00	0.34	3.47	123.6	1176.1	2118.2	1936.2	1524.9	1247.9	606.0	400.4	261.2	221.5	170.7	705.8	10496.4	1359.2
1986	0.00	0.53	3.86	23.0	377.1	1516.8	2775.4	1566.9	834.9	412.7	222.8	188.2	157.0	137.0	276.0	8492.1	758.2
1987	2.08	18.92	79.93	22.3	181.3	467.1	1280.1	1574.7	870.9	480.6	252.4	132.4	90.8	62.1	204.1	5719.6	489.4
1988	0.42	14.66	130.29	600.3	139.9	264.3	658.3	1382.7	1154.1	401.5	266.7	124.1	94.0	71.9	307.5	5610.6	597.5
1989	0.85	10.69	50.32	447.1	436.3	65.2	314.3	759.4	882.1	349.7	123.4	73.2	61.1	56.7	157.1	3787.2	348.0
1990	1.46	6.29	95.30	343.9	634.1	1103.2	255.6	273.9	471.1	333.9	81.4	43.1	38.5	19.1	76.9	3777.6	177.5
1991	3.06	17.90	23.26	441.8	405.8	863.7	575.4	235.8	244.6	292.1	313.6	51.8	44.0	22.5	139.5	3674.7	257.8
1992	2.84	44.35	159.43	399.5	1255.6	859.2	936.0	717.0	201.6	177.9	120.0	217.6	46.3	26.5	86.5	5250.3	377.0
1993	113.76	85.80	129.59	417.2	1807.3	1419.0	918.1	597.2	585.6	218.8	278.5	113.9	32.6	103.6	140.4	6961.3	390.5
1994	8.06	1368.48	496.44	42.0	1001.8	2759.9	1288.0	826.9	196.7	539.2	113.5	71.4	40.2	132.3	80.4	8965.1	324.3
1995	2.68	49.95	655.51	628.8	370.3	1041.2	1714.5	851.4	268.5	97.5	269.5	55.0	43.9	8.1	49.9	6106.7	156.8
1996	5.21	32.68	50.83	121.9	524.4	1207.7	1362.9	1430.5	263.2	215.5	57.1	78.8	3.6	13.0	18.2	5385.5	113.6
1997	8.68	74.91	102.92	135.3	1058.5	1016.0	1293.4	1019.1	593.8	84.6	49.8	17.9	36.6	2.2	13.4	5506.9	70.1
1998	49.78	392.89	294.20	331.2	556.9	1063.7	1415.5	1611.6	371.4	142.1	15.5	37.2	5.6	19.9	7.7	6315.1	70.3
1999	32.11	252.94	194.45	160.9	526.1	1095.8	1462.0	1201.1	765.3	252.5	31.6	40.8	0.0	0.0	13.5	6029.2	54.4
2000	21.61	169.95	119.51	103.5	286.5	455.9	1158.0	1629.4	1032.6	623.7	94.8	174.3	6.2	5.0	27.4	5908.3	212.8
2001	12.33	96.96	66.42	69.9	343.2	940.4	1098.3	1701.3	1459.6	634.4	425.4	95.8	163.5	8.6	38.8	7154.9	306.7
2002	2.32	20.24	17.42	41.0	749.1	1222.9	1404.4	2132.2	1281.1	634.6	97.5	102.7	11.0	65.6	25.3	7807.9	205.2

Table A.17 continued. **Total USA commercial catch** (landings + shrimp trawl discards + LM otter trawl discards) .

Year	Age															TOTAL	11+
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+		
USA Commerical Mean Weight (kg) at Age																	
1982	0.000	0.002	0.038	0.152	0.242	0.329	0.421	0.550	0.727	0.886	0.983	1.146	1.255	1.310	1.553	0.662	1.406
1983		0.009	0.038	0.149	0.202	0.270	0.409	0.518	0.613	0.795	0.977	1.116	1.208	1.321	1.551	0.600	1.357
1984		0.017	0.040	0.151	0.229	0.328	0.421	0.539	0.664	0.817	0.922	1.004	1.212	1.332	1.511	0.607	1.339
1985		0.017	0.023	0.128	0.237	0.305	0.429	0.565	0.691	0.842	0.964	1.057	1.193	1.311	1.470	0.590	1.326
1986		0.017	0.026	0.089	0.206	0.299	0.408	0.533	0.676	0.853	0.975	1.132	1.199	1.317	1.521	0.546	1.321
1987	0.006	0.015	0.033	0.081	0.191	0.298	0.433	0.561	0.686	0.828	0.980	1.067	1.222	1.386	1.467	0.611	1.303
1988	0.004	0.006	0.017	0.045	0.203	0.311	0.434	0.538	0.668	0.819	0.980	1.074	1.190	1.290	1.477	0.592	1.326
1989	0.009	0.012	0.034	0.122	0.170	0.321	0.425	0.574	0.682	0.818	0.968	1.128	1.258	1.315	1.519	0.581	1.358
1990	0.004	0.012	0.029	0.062	0.186	0.257	0.438	0.586	0.688	0.849	1.049	1.213	1.262	1.521	1.669	0.437	1.454
1991	0.004	0.014	0.035	0.062	0.199	0.344	0.420	0.578	0.702	0.836	0.974	1.099	1.369	1.537	1.536	0.509	1.420
1992	0.003	0.007	0.026	0.103	0.230	0.379	0.459	0.614	0.739	0.822	0.882	1.039	1.337	1.459	1.640	0.457	1.243
1993	0.003	0.009	0.027	0.122	0.202	0.318	0.432	0.535	0.666	0.882	1.023	1.118	1.199	1.368	1.519	0.428	1.335
1994	0.005	0.004	0.019	0.070	0.202	0.280	0.430	0.534	0.691	0.832	0.909	1.083	1.172	1.204	1.576	0.344	1.266
1995	0.005	0.007	0.024	0.051	0.158	0.328	0.435	0.561	0.690	0.910	0.974	1.101	1.203	1.411	1.406	0.393	1.243
1996	0.004	0.019	0.031	0.060	0.149	0.265	0.422	0.554	0.708	0.856	0.974	1.114	1.401	1.440	1.558	0.435	1.232
1997	0.004	0.023	0.033	0.070	0.189	0.274	0.376	0.495	0.627	0.868	1.037	1.168	1.196	1.687	1.659	0.376	1.293
1998	0.003	0.006	0.024	0.070	0.163	0.260	0.359	0.487	0.584	0.869	0.978	1.115	1.132	1.261	1.557	0.338	1.206
1999	0.003	0.006	0.024	0.068	0.217	0.291	0.400	0.514	0.584	0.627	0.917	0.683			1.442	0.387	0.872
2000	0.003	0.006	0.024	0.066	0.196	0.273	0.368	0.448	0.532	0.633	0.677	0.834	1.167	1.298	1.379	0.432	0.925
2001	0.003	0.006	0.023	0.089	0.176	0.256	0.362	0.465	0.550	0.646	0.647	0.718	0.816	1.016	1.206	0.453	0.840
2002	0.003	0.007	0.032	0.110	0.220	0.278	0.395	0.474	0.553	0.651	0.821	0.844	0.716	0.993	1.120	0.444	0.918
Mean																	
1982-02	0.0040	0.0106	0.0287	0.0914	0.1984	0.2984	0.4131	0.5344	0.6534	0.8066	0.9339						1.2372
1999-02	0.0031	0.0063	0.0258	0.0830	0.2021	0.2746	0.3813	0.4752	0.5548	0.6393	0.7656						0.8887

Table A.17 continued. **Total USA commercial catch** (landings+ shrimp trawl discards + LM otter trawl discards) .

Year	Age															TOTAL	11+
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+		
USA Commerical Mean Length (cm) at Age																	
1982	5.0	7.8	19.9	28.1	33.5	36.8	39.7	42.9	46.5	49.3	50.9	53.2	54.6	55.2	58.0	43.3	56.3
1983		13.0	20.0	28.6	31.8	34.7	39.4	42.2	44.2	47.7	50.7	52.8	54.0	56.6	55.8	35.0	55.0
1984		15.7	20.0	28.4	33.1	36.9	39.7	42.7	45.3	48.2	49.9	51.2	54.1	55.6	57.6	42.7	55.5
1985		15.7	16.9	28.4	33.6	36.1	39.9	43.3	45.9	48.6	50.6	51.9	53.8	55.3	57.1	42.4	55.3
1986		15.7	17.3	25.1	32.2	36.0	39.3	42.5	45.6	48.8	50.7	53.0	53.9	55.4	57.7	41.8	55.3
1987	10.6	15.3	19.0	24.5	31.3	35.9	40.1	43.2	45.8	48.4	50.8	52.1	54.2	56.2	57.1	43.2	55.1
1988	10.2	10.9	15.6	20.4	31.8	36.3	40.1	42.7	45.4	48.2	50.8	52.1	53.7	55.0	57.1	41.4	55.3
1989	12.6	13.9	19.0	27.8	30.9	36.8	39.9	43.5	45.6	48.1	50.6	52.9	54.6	55.3	57.6	41.6	55.7
1990	9.7	14.0	18.0	22.3	31.1	34.3	40.2	43.7	45.8	48.7	51.8	54.1	54.6	57.8	59.2	37.5	56.8
1991	9.6	14.1	18.8	22.6	31.6	37.4	39.6	43.3	46.1	48.5	50.6	52.5	56.0	57.9	57.9	39.4	56.5
1992	9.1	10.9	17.4	26.1	33.1	38.5	40.7	44.3	46.8	48.3	49.2	51.7	55.5	57.0	58.9	38.6	54.2
1993	9.1	12.2	17.7	27.9	32.3	36.6	40.0	42.6	45.3	49.3	51.5	52.8	53.9	55.9	57.7	37.6	55.5
1994	10.7	9.8	15.9	22.8	32.2	35.1	39.7	42.3	45.6	48.0	49.1	51.8	53.1	53.4	57.8	33.0	54.1
1995	10.9	11.6	17.3	21.1	30.1	36.7	39.8	42.8	45.4	49.3	50.1	52.0	53.4	56.0	55.8	35.7	53.8
1996	10.0	15.3	18.4	22.5	29.5	34.7	39.4	42.7	45.8	48.4	50.1	52.2	55.8	56.2	57.6	38.6	53.6
1997	10.2	16.1	18.9	23.3	31.4	34.8	38.2	41.3	44.2	48.5	51.1	52.9	53.3	59.0	58.7	36.9	54.4
1998	9.4	10.4	17.1	23.5	30.5	34.5	37.6	41.1	43.3	48.6	50.5	52.3	52.7	54.1	57.6	34.6	53.4
1999	9.4	10.4	17.2	23.0	32.5	35.6	38.9	41.8	43.3	44.3	49.4	45.2			56.4	36.8	48.0
2000	9.4	10.4	17.1	22.9	31.5	34.8	38.0	40.1	42.1	44.2	45.2	47.7	53.0	54.6	55.3	38.4	49.0
2001	9.4	10.4	16.9	24.7	31.1	34.4	37.7	40.5	42.5	44.6	44.5	45.9	47.7	50.8	53.3	39.3	47.9
2002	9.4	11.0	18.3	26.6	32.8	35.1	38.7	40.8	42.6	44.6	47.9	48.2	45.8	50.5	52.2	39.7	49.3

Table A.18. Mean weights at age (kg) at the beginning of the year (January 1) for witch flounder, 1982-2002. Values derived from catch mean weight-at-age data using procedures described by Rivard (1980).

Year	Age										
	1	2	3	4	5	6	7	8	9	10	11+
1982	0.0005	0.0193	0.1316	0.2287	0.2951	0.3789	0.5210	0.6952	0.8437	0.9332	1.4056
1983	0.0042	0.0090	0.0755	0.1753	0.2552	0.3670	0.4667	0.5806	0.7602	0.9304	1.3575
1984	0.0143	0.0191	0.0763	0.1848	0.2577	0.3371	0.4696	0.5865	0.7077	0.8561	1.3393
1985	0.0137	0.0199	0.0719	0.1893	0.2639	0.3751	0.4880	0.6103	0.7477	0.8875	1.3255
1986	0.0121	0.0208	0.0456	0.1623	0.2663	0.3525	0.4781	0.6180	0.7677	0.9061	1.3209
1987	0.0142	0.0236	0.0456	0.1300	0.2477	0.3602	0.4783	0.6047	0.7481	0.9143	1.3031
1988	0.0027	0.0161	0.0384	0.1284	0.2438	0.3598	0.4829	0.6122	0.7496	0.9008	1.3256
1989	0.0076	0.0145	0.0457	0.0874	0.2554	0.3636	0.4992	0.6057	0.7392	0.8904	1.3577
1990	0.0066	0.0187	0.0457	0.1510	0.2092	0.3752	0.4990	0.6284	0.7609	0.9263	1.4542
1991	0.0103	0.0202	0.0426	0.1108	0.2533	0.3286	0.5032	0.6414	0.7584	0.9094	1.4198
1992	0.0033	0.0190	0.0604	0.1192	0.2745	0.3974	0.5081	0.6536	0.7596	0.8587	1.2431
1993	0.0062	0.0135	0.0563	0.1445	0.2703	0.4046	0.4955	0.6395	0.8073	0.9170	1.3353
1994	0.0019	0.0130	0.0434	0.1571	0.2380	0.3698	0.4802	0.6080	0.7444	0.8954	1.2656
1995	0.0036	0.0105	0.0308	0.1050	0.2572	0.3491	0.4909	0.6068	0.7931	0.9002	1.2426
1996	0.0142	0.0151	0.0382	0.0868	0.2048	0.3719	0.4907	0.6301	0.7683	0.9416	1.2316
1997	0.0229	0.0251	0.0465	0.1061	0.2021	0.3154	0.4569	0.5895	0.7840	0.9422	1.2930
1998	0.0030	0.0239	0.0483	0.1069	0.2215	0.3135	0.4279	0.5378	0.7381	0.9215	1.2061
1999	0.0030	0.0120	0.0406	0.1233	0.2180	0.3226	0.4293	0.5333	0.6055	0.8924	0.8721
2000	0.0031	0.0120	0.0399	0.1150	0.2436	0.3272	0.4236	0.5231	0.6078	0.6517	0.9247
2001	0.0026	0.0118	0.0463	0.1076	0.2237	0.3145	0.4137	0.4967	0.5864	0.6400	0.8403
2002	0.0038	0.0138	0.0504	0.1395	0.2213	0.3179	0.4140	0.5072	0.5982	0.7283	0.9179
mean											
1982-2002	0.0073	0.0167	0.0533	0.1361	0.2439	0.3525	0.4722	0.5956	0.7322	0.8735	1.2372
1999-2002	0.0031	0.0124	0.0443	0.1214	0.2267	0.3206	0.4202	0.5151	0.5995	0.7281	0.8888

Table A.19. USA commercial witch flounder landings (L), days fished (DF), and landings per day fished (L/DF), by vessel tonnage class, for otter trawl trips which any witch flounder were landed, and for otter trawl trips in which 40% or more of the total catch consisted of witch flounder, in the Gulf of Maine-Georges Bank region (SA 51, 52, 56), 1973 - 2002. *Note: in 1994-2002, Vessel Trip Report data were used.*

YEAR	CLASS 2			CLASS 3			CLASS 4			TOTAL		
	L	DF	L/DF	L	DF	L/DF	L	DF	L/DF	L	DF	L/DF
ALL TRIPS												
1973	802	2620	0.31	1284	6236	0.21	234	859	0.27	2320	9715	0.25
1974	497	2478	0.20	1029	7092	0.15	157	1004	0.16	1683	10574	0.16
1975	679	2354	0.29	1126	7728	0.15	153	1178	0.13	1957	11260	0.19
1976	756	2826	0.27	913	6373	0.14	97	860	0.11	1765	10059	0.19
1977	1074	3183	0.34	1070	6025	0.18	157	872	0.18	2302	10080	0.25
1978	1372	4033	0.34	1658	7053	0.24	277	1225	0.23	3307	12310	0.28
1979	946	4465	0.21	1467	6757	0.22	283	1570	0.18	2696	12792	0.21
1980	1062	4932	0.22	1428	7120	0.20	376	1997	0.19	2866	14049	0.20
1981	1069	3748	0.29	1637	7015	0.23	423	2595	0.16	3129	13358	0.24
1982	1162	4430	0.26	2346	8626	0.27	905	3559	0.25	4413	16615	0.27
1983	1203	3930	0.31	2796	9581	0.29	1308	4544	0.29	5307	18056	0.29
1984	1281	4069	0.31	3245	12157	0.27	1423	4769	0.30	5949	20994	0.28
1985	1195	3794	0.31	2765	12664	0.22	1600	5530	0.29	5560	21988	0.26
1986	806	3289	0.25	2031	10525	0.19	1177	5287	0.22	4015	19101	0.21
1987	647	2833	0.23	1623	9593	0.17	845	5035	0.17	3114	17461	0.18
1988	560	2986	0.19	1463	8948	0.16	951	4871	0.20	2973	16805	0.18
1989	283	2269	0.12	959	8538	0.11	618	4292	0.14	1860	15099	0.12
1990	265	2649	0.10	661	7736	0.09	347	4172	0.08	1274	14557	0.09
1991	316	3135	0.10	830	9076	0.09	383	4681	0.08	1529	16892	0.09
1992	352	3589	0.10	1148	10720	0.11	414	5005	0.08	1914	19314	0.10
1993	380	3321	0.11	1347	10872	0.12	530	4711	0.11	2257	18904	0.12
1994	261	2067	0.13	581	5126	0.11	302	2384	0.13	1143	9578	0.12
1995	291	2784	0.10	852	7328	0.12	462	3911	0.12	1605	14023	0.11
1996	369	2647	0.14	908	6992	0.13	399	3200	0.12	1677	12839	0.13
1997	371	2666	0.14	731	5084	0.14	277	2395	0.12	1379	10145	0.14
1998	393	2641	0.15	694	4697	0.15	255	1867	0.14	1342	9205	0.15
1999	407	2316	0.18	682	4387	0.16	288	1675	0.17	1378	8377	0.17
2000	555	2665	0.21	993	5431	0.18	398	2564	0.16	1946	10660	0.18
2001	321	1349	0.24	771	3750	0.21	396	2115	0.19	1488	7213	0.21
2002	320	875	0.37	446	1781	0.25	185	988	0.19	951	3644	0.28

Table A.19 continued.

YEAR	CLASS 2			CLASS 3			CLASS 4			TOTAL		
	L	DF	L\DF	L	DF	L\DF	L	DF	L\DF	L	DF	L\DF
40% TRIPS												
1973	306	208	1.47	392	271	1.45	96	58	1.66	793	536	1.48
1974	134	99	1.34	169	112	1.50	21	16	1.25	323	228	1.42
1975	292	171	1.71	208	168	1.24	4	4	1.09	504	343	1.51
1976	211	144	1.47	137	90	1.54	3	1	3.38	352	234	1.51
1977	151	93	1.62	129	84	1.53	1	4	0.26	281	182	1.57
1978	214	162	1.33	197	82	2.39	7	2	3.58	418	246	1.87
1979	93	79	1.17	103	69	1.49	7	2	3.45	203	151	1.41
1980	93	82	1.14	107	40	2.66	54	25	2.17	254	147	2.00
1981	101	54	1.87	239	108	2.21	22	13	1.69	362	175	2.08
1982	172	112	1.53	289	136	2.13	55	31	1.75	516	279	1.89
1983	183	140	1.30	519	279	1.86	48	30	1.59	750	450	1.70
1984	234	210	1.12	705	595	1.18	176	98	1.80	1115	903	1.27
1985	266	277	0.96	465	580	0.80	177	143	1.24	909	1000	0.93
1986	185	236	0.78	499	785	0.64	127	169	0.75	811	1190	0.69
1987	155	195	0.79	377	569	0.66	86	109	0.78	617	873	0.71
1988	137	176	0.78	517	905	0.57	202	254	0.79	856	1335	0.66
1989	45	67	0.67	128	256	0.50	77	112	0.69	250	435	0.59
1990	36	57	0.63	49	85	0.58	9	16	0.54	94	158	0.60
1991	35	76	0.46	55	106	0.52	1	1	0.83	92	183	0.50
1992	42	65	0.65	181	382	0.48	25	7	3.32	248	454	0.79
1993	76	140	0.54	266	538	0.49	30	42	0.71	372	720	0.52
1994	95	221	0.43	90	225	0.40	17	22	0.77	202	468	0.45
1995	90	237	0.38	155	323	0.48	28	53	0.54	274	613	0.45
1996	139	309	0.45	169	378	0.45	40	60	0.67	348	746	0.47
1997	98	238	0.41	158	311	0.51	17	36	0.48	273	585	0.47
1998	154	327	0.47	172	263	0.65	5	6	0.90	331	596	0.57
1999	164	370	0.44	140	240	0.59	17	14	1.18	321	624	0.54
2000	212	329	0.64	164	200	0.82	21	14	1.49	396	543	0.76
2001	97	117	0.83	138	143	0.96	8	7	1.28	244	267	0.92
2002	132	127	1.05	104	91	1.14	0	0	0.00	236	217	1.09

Table A.20. The sum of the 1963-2001 NEFSC autumn stratified mean number per tow by stratum (Stratum sum), the percentage of annual stratum sampling which produced no catch (% Zero Catch), and the percentage of stratum contribution (all years) to the total (% Total).

Strata	Stratum sum	% Zero Catch	% Total
1	0.00	100.0	0.0
2	0.70	84.6	0.1
3	0.22	92.3	0.0
4	2.88	76.9	0.3
5	0.23	97.4	0.0
6	19.30	48.7	1.8
7	0.43	94.9	0.0
8	2.51	64.1	0.2
9	0.53	92.3	0.0
10	8.54	56.4	0.8
11	1.23	92.3	0.1
12	2.01	86.8	0.2
13	7.80	43.6	0.7
14	0.68	89.7	0.1
15	4.26	69.2	0.4
16	0.98	74.4	0.1
17	1.12	92.3	0.1
18	7.40	74.4	0.7
19	0.00	100.0	0.0
20	0.02	97.4	0.0
21	1.43	89.7	0.1
22	73.23	5.1	6.8
23	5.75	66.7	0.5
24	85.01	2.6	7.9
25	0.61	94.9	0.1
26	73.21	5.1	6.8
27	94.59	0.0	8.8
28	22.08	15.4	2.1
29	18.72	7.7	1.7
30	8.93	56.4	0.8
33	6.88	61.5	0.6
34	55.51	2.6	5.2
351	93.13	8.3	8.7
36	48.86	0.0	4.5
37	109.01	0.0	10.2
38	185.36	0.0	17.3
39	38.84	5.1	3.6
40	85.47	10.3	8.0
61	0.00	100.0	0.0
62	0.00	100.0	0.0
63	0.10	97.1	0.0
64	0.60	90.6	0.1
65	0.00	100.0	0.0
66	0.00	100.0	0.0
67	0.05	97.1	0.0
68	1.10	75.8	0.1

Strata	Stratum sum	% Zero Catch	% Total
69	0.02	97.1	0.0
70	0.00	100.0	0.0
71	0.00	100.0	0.0
72	3.35	81.8	0.3
73	0.00	100.0	0.0
74	0.00	100.0	0.0
75	0.05	97.1	0.0
76	1.20	80.0	0.1
Total	1073.89		100.0

Strata set 22-30,36-40 92.5

Strata set 6,22-30,36-40 93.9

Strata set 22,24,26-30,36-40 91.8

Table A.21. Stratified mean number, weight (kg), length (cm), and individual weight (kg) per tow of witch flounder in NEFSC offshore spring and autumn bottom trawl surveys in Gulf of Maine-Georges Bank region (strata 22-30,36-40), 1963-2003.

Year	SPRING				AUTUMN			
	Number per tow	Weight per tow	Length per tow	Ave. wt. per tow	Number per tow	Weight per tow	Length per tow	Ave. wt. per tow
1963	-	-	-	-	5.52	3.46	39.7	0.627
1964	-	-	-	-	2.89	2.00	44.2	0.691
1965	-	-	-	-	3.94	2.27	40.6	0.577
1966	-	-	-	-	7.80	4.56	41.2	0.584
1967	-	-	-	-	3.01	2.02	43.7	0.673
1968	4.83	3.35	42.3	0.695	4.82	3.49	44.8	0.724
1969	3.74	2.53	45.3	0.676	5.81	4.40	43.5	0.757
1970	6.39	4.49	44.7	0.702	4.89	3.71	45.0	0.760
1971	2.70	2.04	46.5	0.756	4.32	2.95	42.1	0.683
1972	5.35	4.01	45.8	0.749	3.24	2.42	43.9	0.747
1973	8.20	6.21	44.8	0.758	3.18	2.05	43.6	0.646
1974	6.23	3.62	39.3	0.581	2.38	1.58	41.0	0.666
1975	3.72	2.75	43.9	0.739	1.66	1.03	39.8	0.621
1976	5.50	3.70	42.3	0.673	1.34	0.94	41.9	0.699
1977	4.20	1.96	37.2	0.467	5.06	3.38	42.0	0.669
1978	3.87	2.56	41.7	0.662	4.04	2.94	42.8	0.727
1979	2.91	1.71	38.2	0.587	1.94	1.62	45.2	0.838
1980	8.46	3.89	36.0	0.460	2.62	2.04	43.7	0.777
1981	8.14	4.05	38.0	0.497	3.66	2.19	40.4	0.600
1982	3.64	1.87	37.2	0.513	0.99	0.83	44.7	0.842
1983	6.41	2.74	36.3	0.427	4.72	2.12	36.7	0.448
1984	3.00	1.66	39.9	0.554	4.37	2.34	39.7	0.534
1985	5.18	2.75	40.3	0.531	2.76	1.59	41.9	0.577
1986	2.07	1.35	44.1	0.650	1.59	1.09	43.3	0.683
1987	1.01	0.65	43.4	0.646	0.48	0.37	43.9	0.774
1988	1.43	0.85	42.3	0.590	1.38	0.57	35.2	0.414
1989	1.95	0.74	35.8	0.382	0.89	0.38	31.4	0.423
1990	0.63	0.24	35.2	0.378	2.00	0.40	24.7	0.200
1991	1.68	0.57	31.5	0.341	2.08	0.54	29.2	0.258
1992	1.26	0.48	34.8	0.383	0.94	0.24	29.5	0.254
1993	1.47	0.36	30.3	0.245	5.15	0.54	17.0	0.105
1994	3.13	0.53	27.4	0.170	2.21	0.42	24.9	0.191
1995	1.88	0.47	30.6	0.248	4.74	0.62	25.7	0.132
1996	1.36	0.28	30.5	0.204	5.38	1.02	29.7	0.189
1997	2.22	0.43	31.0	0.195	5.11	0.77	24.9	0.150
1998	4.27	0.77	29.0	0.179	3.70	0.47	24.2	0.127
1999	3.15	0.48	28.1	0.153	5.92	0.88	26.3	0.148
2000	3.45	0.52	27.3	0.151	6.63	1.11	27.1	0.167
2001	4.41	0.75	29.5	0.171	7.94	1.71	32.3	0.216
2002	8.10	1.62	31.4	0.199	4.31	1.06	33.2	0.247
2003	5.20	1.30	34.2	0.250				

Note: During 1963-1984, BMV oval doors were used in the spring and autumn surveys; since 1985, Portuguese polyvalent doors have been used in both surveys. No significant differences in catchability were found for witch flounder, therefore no adjustments have been made (Byrne and Forrester, MS 1991). No significant differences were found between research vessels, and no adjustment have been made (Byrne and Forrester, MS 1991).

Spring surveys during 1973-1981 were accomplished with a 41 Yankee trawl; in all other years, a 36 Yankee trawl was used. No adjustments have been made.

Table A.22. Stratified mean number, weight (kg), length (cm) per tow of witch flounder in Massachusetts Division of Marine Fisheries inshore spring and autumn surveys in the Cape Cod Bay and Mass. Bay region (Regions 4 and 5), 1978-2002.

Year	SPRING			AUTUMN		
	Number per tow	Weight per tow	Length per tow	Number per tow	Weight per tow	Length per tow
1978	2.98	2.15	45.3	2.47	2.41	48.2
1979	1.36	1.41	47.9	1.39	1.09	44.4
1980	1.49	1.44	46.0	1.66	1.77	48.2
1981	3.74	3.18	43.7	0.36	0.23	42.3
1982	1.23	0.97	46.1	1.24	0.76	40.3
1983	2.15	1.29	38.9	3.79	2.68	45.9
1984	1.50	1.01	41.6	0.62	0.45	44.7
1985	1.12	0.82	43.9	0.83	0.57	44.2
1986	0.90	0.83	47.1	0.32	0.27	46.3
1987	1.45	1.10	44.7	0.26	0.20	45.7
1988	0.36	0.29	46.1	0.39	0.24	40.8
1989	0.17	0.07	35.9	0.21	0.13	42.2
1990	0.40	0.32	45.0	0.06	0.03	37.5
1991	0.17	0.08	37.4	0.37	0.22	41.5
1992	0.34	0.24	41.3	0.45	0.25	41.3
1993	0.03	0.01	33.0	0.39	0.19	40.2
1994	0.00	0.00	-	0.53	0.21	34.9
1995	0.08	0.05	36.6	2.17	0.46	28.7
1996	0.02	<0.01	21.0	0.05	0.02	40.0
1997	0.04	0.01	31.5	1.20	0.36	36.0
1998	0.00	0.00	-	0.44	0.15	35.7
1999	0.01	<0.01	11.0	1.38	0.38	34.9
2000	0.95	0.11	24.4	1.28	0.43	34.4
2001	0.16	0.04	33.0	0.66	0.20	34.8
2002	0.11	0.03	32.5	2.40	0.79	37.1

Table A.23. Stratified mean number, weight (kg), length (cm), and individual weight (kg) per tow of witch flounder in the ASMFC summer shrimp surveys in the Gulf of Maine (Strata set 1,3,6,8), 1984 - 2002.

Year	Number per tow	Weight per tow	Length per tow	Individual Weight per tow
1984	4.68	1.60	33.9	0.341
1985	6.19	2.52	36.2	0.408
1986	2.05	0.74	35.9	0.362
1987	4.87	1.50	26.5	0.307
1988	2.53	0.60	25.8	0.238
1989	2.92	0.31	22.8	0.105
1990	6.66	1.02	24.5	0.154
1991	14.94	1.20	19.6	0.080
1992	24.28	1.91	20.5	0.079
1993	21.42	0.50	12.8	0.023
1994	36.36	2.20	19.1	0.061
1995	17.95	1.48	22.6	0.082
1996	15.45	1.95	25.2	0.126
1997	23.20	1.42	19.1	0.061
1998	7.35	0.52	21.9	0.071
1999	110.07	5.93	18.7	0.054
2000	32.43	3.09	24.2	0.095
2001	41.52	5.57	27.2	0.134
2002	45.25	7.05	28.8	0.156

Table A.24. Number of witch flounder caught, aged, percent of fish sampled, and the maximum age observed in the NEFSC spring and autumn bottom trawl surveys (strata 22-30, 36-40), 1980 - 2002.

Year	Spring				Autumn			
	Caught	Aged	% Sampled	Max. Age	Caught	Aged	% Sampled	Max. Age
1980	593	361	60.9	24	189	146	77.2	24
1981	557	209	37.5	23	202	143	70.8	22
1982	245	69	28.2	18	64	53	82.8	24
1983	410	176	42.9	20	359	154	42.9	22
1984	171	145	84.8	26	293	204	69.6	21
1985	269	151	56.1	25	340	232	68.2	30
1986	119	118	99.2	22	258	218	84.5	22
1987	108	108	100.0	24	30	27	90.0	24
1988	74	67	90.5	12	93	82	88.2	20
1989	100	91	91.0	18	59	55	93.2	21
1990	33	27	81.8	16	131	118	90.1	18
1991	93	87	93.5	15	187	107	57.2	11
1992	86	75	87.2	17	79	67	84.8	18
1993	88	81	92.0	19	414	166	40.1	16
1994	196	127	64.8	16	174	102	58.6	21
1995	142	106	74.6	19	352	174	49.4	14
1996	84	72	85.7	13	295	169	57.3	11
1997	129	79	61.2	12	368	243	66.0	12
1998	367	281	76.6	13	359	217	60.4	13
1999	187	138	73.8	10	556	244	43.9	10
2000	231	141	61.0	10	411	224	54.5	12
2001	315	197	62.5	10	475	234	49.3	10
2002	568	289	50.9	21	339	201	59.3	12

Table A.25. Stratified mean number per tow at age of witch flounder in NEFSC bottom trawl spring and autumn surveys (Strata 22-30, 36-40), 1980-2002, preliminary spring 2003.

SPRING	Age															Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14 +	
1980	0.00	0.06	0.23	0.95	1.52	0.72	1.20	1.02	0.38	0.40	0.31	0.30	0.12	0.16	1.10	8.46
1981	0.00	0.00	0.05	0.82	0.93	2.00	1.02	0.76	0.67	0.42	0.13	0.20	0.24	0.22	0.99	8.40
1982	0.00	0.04	0.04	0.61	0.48	0.38	0.24	0.61	0.36	0.09	0.26	0.17	0.03	0.03	0.29	3.64
1983	0.00	0.00	0.07	0.53	1.26	1.29	0.54	0.72	0.63	0.48	0.21	0.17	0.08	0.05	0.38	6.41
1984	0.00	0.00	0.10	0.01	0.31	0.78	0.40	0.31	0.20	0.20	0.11	0.17	0.12	0.02	0.27	3.00
1985	0.00	0.00	0.00	0.02	0.46	1.06	1.20	0.91	0.41	0.15	0.15	0.04	0.07	0.03	0.69	5.18
1986	0.00	0.00	0.00	0.00	0.04	0.24	0.53	0.41	0.17	0.19	0.08	0.04	0.06	0.05	0.25	2.07
1987	0.00	0.00	0.00	0.00	0.06	0.11	0.13	0.26	0.19	0.01	0.06	0.02	0.00	0.00	0.16	1.01
1988	0.00	0.02	0.02	0.06	0.00	0.07	0.30	0.38	0.24	0.14	0.09	0.08	0.03	0.00	0.00	1.43
1989	0.00	0.02	0.01	0.04	1.00	0.11	0.07	0.08	0.33	0.08	0.02	0.06	0.06	0.02	0.06	1.95
1990	0.00	0.01	0.00	0.04	0.09	0.32	0.00	0.04	0.01	0.05	0.02	0.01	0.01	0.00	0.03	0.63
1991	0.00	0.04	0.00	0.78	0.11	0.09	0.21	0.03	0.10	0.08	0.14	0.02	0.02	0.00	0.06	1.68
1992	0.00	0.05	0.01	0.19	0.37	0.09	0.11	0.15	0.04	0.15	0.02	0.02	0.05	0.00	0.02	1.26
1993	0.00	0.15	0.11	0.14	0.47	0.32	0.06	0.09	0.00	0.02	0.02	0.00	0.07	0.00	0.04	1.47
1994	0.00	0.11	0.70	0.54	0.64	0.81	0.16	0.03	0.03	0.07	0.01	0.00	0.00	0.02	0.02	3.13
1995	0.00	0.04	0.12	0.58	0.32	0.18	0.31	0.12	0.11	0.04	0.00	0.04	0.03	0.00	0.00	1.88
1996	0.00	0.02	0.04	0.24	0.39	0.35	0.22	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00	1.36
1997	0.00	0.07	0.07	0.15	0.69	0.62	0.44	0.08	0.08	0.01	0.00	0.00	0.00	0.00	0.00	2.22
1998	0.00	0.11	1.08	0.71	0.39	0.80	0.71	0.21	0.15	0.08	0.00	0.00	0.00	0.03	0.00	4.27
1999	0.00	0.11	0.38	0.97	0.80	0.48	0.16	0.18	0.03	0.01	0.02	0.00	0.00	0.00	0.00	3.15
2000	0.00	0.01	0.25	1.19	0.69	0.66	0.24	0.25	0.12	0.00	0.04	0.00	0.00	0.00	0.00	3.45
2001	0.00	0.11	0.10	0.71	1.48	1.02	0.40	0.29	0.16	0.11	0.03	0.00	0.00	0.00	0.00	4.41
2002	0.00	0.02	0.06	0.90	2.63	2.26	0.82	0.68	0.35	0.19	0.10	0.01	0.00	0.03	0.04	8.10
2003	0.00	0.00	0.00	0.16	0.78	1.57	1.08	0.81	0.43	0.23	0.05	0.07	0.00	0.02	0.01	5.20

Table A.25 continued. Stratified mean number per tow at age of witch flounder in NEFSC bottom trawl spring and autumn surveys (Strata 22-30, 36-40), 1980-2002.

AUTUMN	Age															Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14 +	
1980	0.04	0.00	0.02	0.00	0.20	0.26	0.28	0.36	0.17	0.15	0.27	0.04	0.16	0.12	0.57	2.62
1981	0.03	0.07	0.03	0.24	0.44	0.61	0.46	0.27	0.26	0.18	0.21	0.17	0.04	0.13	0.48	3.66
1982	0.02	0.00	0.00	0.06	0.01	0.03	0.08	0.24	0.13	0.01	0.03	0.03	0.01	0.04	0.30	0.99
1983	0.00	0.01	0.01	0.51	1.60	0.76	0.55	0.44	0.08	0.14	0.07	0.11	0.02	0.00	0.41	4.72
1984	0.00	0.00	0.00	0.09	0.94	0.99	0.60	0.53	0.31	0.15	0.13	0.07	0.04	0.13	0.38	4.37
1985	0.00	0.00	0.01	0.06	0.08	0.61	0.68	0.48	0.27	0.10	0.12	0.03	0.01	0.09	0.22	2.76
1986	0.01	0.00	0.00	0.00	0.05	0.27	0.35	0.31	0.16	0.11	0.01	0.01	0.02	0.05	0.24	1.59
1987	0.00	0.00	0.02	0.00	0.01	0.02	0.05	0.19	0.07	0.00	0.01	0.00	0.00	0.02	0.08	0.48
1988	0.00	0.01	0.00	0.72	0.05	0.01	0.04	0.21	0.05	0.05	0.05	0.08	0.01	0.04	0.05	1.38
1989	0.17	0.02	0.02	0.08	0.30	0.01	0.02	0.02	0.08	0.08	0.02	0.00	0.03	0.00	0.04	0.89
1990	0.48	0.09	0.14	0.38	0.51	0.22	0.02	0.02	0.02	0.03	0.00	0.00	0.01	0.05	0.03	2.00
1991	0.22	0.02	0.18	0.66	0.33	0.29	0.14	0.07	0.06	0.03	0.05	0.03	0.00	0.00	0.00	2.08
1992	0.10	0.03	0.11	0.26	0.22	0.05	0.06	0.00	0.00	0.02	0.01	0.02	0.00	0.02	0.04	0.94
1993	2.54	0.67	0.15	0.54	0.78	0.22	0.06	0.02	0.08	0.00	0.02	0.04	0.00	0.01	0.01	5.15
1994	0.43	0.16	0.29	0.53	0.17	0.40	0.04	0.11	0.00	0.04	0.01	0.00	0.01	0.00	0.04	2.21
1995	0.51	0.20	0.76	1.62	0.86	0.47	0.23	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.01	4.74
1996	0.23	0.09	0.26	0.79	1.99	1.39	0.44	0.07	0.06	0.04	0.00	0.03	0.00	0.00	0.00	5.38
1997	0.89	0.34	0.98	0.52	0.87	0.77	0.38	0.33	0.00	0.00	0.00	0.00	0.02	0.00	0.00	5.10
1998	0.64	0.08	0.52	1.36	0.47	0.30	0.17	0.11	0.04	0.01	0.00	0.00	0.00	0.00	0.00	3.70
1999	0.32	0.52	1.18	1.51	1.04	0.60	0.36	0.28	0.05	0.04	0.01	0.00	0.00	0.00	0.00	5.91
2000	0.94	0.10	0.72	1.41	1.75	0.67	0.59	0.23	0.15	0.05	0.00	0.00	0.03	0.00	0.00	6.63
2001	0.00	0.04	0.21	0.95	3.16	1.89	0.81	0.61	0.16	0.06	0.06	0.00	0.00	0.00	0.00	7.94
2002	0.00	0.00	0.27	0.43	1.48	1.00	0.53	0.33	0.15	0.07	0.00	0.05	0.01	0.00	0.00	4.31

Table A.26. Witch flounder mean length (cm) at age in spring and autumn NEFSC bottom trawl surveys (Strata 22-30, 36-40), 1980-2002, preliminary 2003.

SPRING	Age														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14 +
1980	-	9.7	16.4	20.6	26.2	30.6	34.8	38.6	40.6	45.0	48.6	49.2	49.3	52.5	55.2
1981	-	-	13.4	20.2	28.5	32.4	35.4	39.7	44.4	49.4	52.4	49.9	54.5	54.1	57.6
1982	-	7.9	15.0	20.7	27.2	32.8	36.1	41.0	44.1	48.2	50.7	51.3	58.0	53.0	58.1
1983	-	-	17.9	20.9	26.5	31.2	35.5	40.2	43.7	47.4	52.5	54.9	50.0	55.6	56.1
1984	-	-	17.4	19.0	29.4	32.6	37.5	42.2	43.0	46.0	51.3	50.6	54.2	54.3	57.4
1985	-	-	-	19.5	28.8	33.5	36.6	41.2	44.4	46.9	49.3	49.3	48.5	55.0	56.3
1986	-	-	-	-	27.3	35.0	38.5	41.7	45.8	49.1	51.8	52.3	54.2	56.1	57.9
1987	-	-	-	-	28.0	34.4	40.9	40.8	44.1	46.0	51.5	48.0	-	-	56.7
1988	-	9.0	15.0	19.5	-	33.1	39.2	43.0	46.0	50.2	54.2	51.2	58.3	-	-
1989	-	7.0	15.0	20.6	28.5	33.0	39.8	44.0	44.9	50.5	50.2	53.1	58.3	47.0	60.7
1990	-	9.0	-	19.8	28.3	32.4	-	40.9	49.0	49.8	51.5	52.0	53.0	-	54.9
1991	-	7.5	-	20.4	27.4	35.3	37.2	43.1	48.2	48.2	52.7	53.0	54.0	-	52.4
1992	-	8.5	11.0	21.7	29.3	35.0	38.4	42.5	45.7	49.3	46.0	51.0	57.3	-	56.0
1993	-	7.9	17.9	23.5	30.0	34.5	38.1	40.5	-	50.0	50.0	-	50.3	-	60.1
1994	-	10.8	17.9	21.5	29.4	33.7	38.1	41.2	46.0	48.2	48.0	-	-	57.0	57.0
1995	-	9.7	17.3	22.4	27.1	34.3	37.2	43.7	45.7	50.3	-	54.0	58.7	-	-
1996	-	9.4	19.6	22.3	28.1	32.5	37.1	40.6	0.0	-	-	56.3	-	-	-
1997	-	10.8	15.9	22.2	29.5	31.4	36.3	42.3	43.9	48.0	-	-	-	-	-
1998	-	11.0	20.3	24.6	29.9	33.3	35.7	39.1	42.6	45.2	-	-	-	51.7	-
1999	-	10.0	19.5	25.0	28.5	34.0	37.2	40.6	45.5	44.0	50.0	-	-	-	-
2000	-	9.0	18.1	20.9	27.3	31.2	36.5	38.5	41.1	-	50.3	-	-	-	-
2001	-	7.4	15.9	23.5	27.0	32.4	36.0	38.2	40.8	41.5	45.3	-	-	-	-
2002	-	11.0	18.0	20.2	29.0	32.2	34.7	37.8	42.1	44.3	45.1	42.0	-	45.3	54.8
2003	-	-	-	22.4	27.7	31.9	34.9	38.1	40.8	42.7	43.6	45.4	-	47.5	49.5

Table A.26 continued. Witch flounder mean length (cm) at age in spring and autumn NEFSC bottom trawl surveys (Strata 22-30, 36-40), 1980-2002.

AUTUMN	Age														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+
1980	5.5	-	19.5	-	27.3	32.0	34.9	39.1	43.3	47.7	48.8	50.1	51.6	53.7	56.7
1981	5.5	12.6	17.4	23.3	30.6	33.1	38.3	41.4	44.8	47.0	51.4	53.6	52.7	55.0	56.4
1982	5.0	0.0	0.0	22.0	28.5	29.2	36.4	41.9	42.8	47.3	50.2	49.1	51.0	52.0	56.8
1983	0.0	14.0	19.0	24.7	30.1	34.7	39.2	42.2	45.0	48.5	52.0	50.9	51.0	0.0	58.8
1984	0.0	0.0	0.0	25.1	30.7	34.2	38.2	42.8	45.2	46.6	50.2	51.3	54.8	53.5	58.6
1985	0.0	0.0	20.0	26.0	29.7	34.6	38.8	42.7	46.8	49.1	50.8	53.3	55.0	53.1	58.7
1986	6.0	0.0	0.0	0.0	29.7	35.5	38.2	42.4	45.4	49.4	51.0	51.3	49.0	53.9	57.7
1987	0.0	0.0	16.0	0.0	28.0	36.0	39.1	41.6	43.8	0.0	49.0	0.0	0.0	55.0	60.9
1988	0.0	10.0	0.0	25.4	31.5	38.0	42.0	42.9	45.6	48.6	50.0	54.3	56.0	55.1	56.8
1989	5.7	15.0	18.5	24.1	31.1	36.0	44.0	45.0	46.7	49.9	52.0	0.0	54.8	0.0	64.2
1990	6.2	16.3	17.6	26.7	29.8	36.2	40.0	43.0	47.0	50.9	0.0	0.0	58.0	51.2	58.9
1991	5.7	14.9	20.8	26.3	30.5	36.8	41.9	46.4	47.6	46.6	53.5	55.0	0.0	0.0	0.0
1992	5.9	15.8	23.1	27.7	32.1	37.7	37.9	0.0	0.0	46.0	50.0	47.0	0.0	49.0	56.5
1993	5.6	14.2	22.2	28.8	32.2	36.4	42.3	43.6	46.2	0.0	55.0	51.0	0.0	63.0	57.0
1994	5.7	16.0	20.9	23.5	32.7	36.6	43.5	44.0	0.0	54.2	50.0	0.0	51.0	0.0	57.2
1995	6.6	16.7	22.0	26.5	29.9	35.5	39.2	0.0	0.0	54.0	50.6	0.0	0.0	0.0	56.0
1996	5.5	14.2	18.7	25.0	29.6	33.8	39.6	42.1	47.4	50.5	0.0	53.0	0.0	0.0	0.0
1997	6.3	16.3	19.8	25.8	30.6	35.1	38.0	42.0	0.0	0.0	0.0	0.0	47.1	0.0	0.0
1998	5.9	15.7	22.0	25.7	30.7	35.0	39.3	41.9	44.9	43.0	0.0	0.0	0.0	0.0	0.0
1999	5.5	15.6	20.4	26.1	30.2	34.6	38.2	41.6	41.6	45.1	45.0	0.0	0.0	0.0	0.0
2000	6.1	15.6	22.6	26.3	31.0	33.4	38.0	42.3	44.1	46.3	0.0	0.0	51.0	0.0	0.0
2001	0.0	14.6	18.9	28.0	30.6	33.1	36.7	39.9	41.9	41.0	46.4	0.0	0.0	0.0	0.0
2002	0.0	0.0	22.7	26.0	31.3	34.3	37.2	41.7	41.9	44.6	0.0	50.5	51.0	0.0	0.0

Table A.27. Mean weight (kg) at age of witch flounder from the Gulf of Maine-Georges Bank region, derived from NEFSC spring and autumn bottom trawl survey, (strata 22-30, 36-40), 1982 - 2002, and preliminary spring 2003.

SPRING	Age														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14 +
1982	0.0000	0.0018	0.0155	0.0479	0.1220	0.2350	0.3174	0.4939	0.6395	0.8643	1.0226	1.0519	1.5952	1.1711	1.6152
1983	0.0000	0.0000	0.0291	0.0494	0.1069	0.1861	0.2878	0.4433	0.5885	0.7790	1.0889	1.2747	0.9215	1.3281	1.4180
1984	0.0000	0.0000	0.0261	0.0342	0.1540	0.2234	0.3539	0.5318	0.5647	0.7143	1.0398	0.9979	1.2606	1.2534	1.5434
1985	0.0000	0.0000	0.0000	0.0368	0.1424	0.2349	0.3247	0.4841	0.6268	0.7516	0.8984	0.8858	0.8318	1.2805	1.4087
1986	0.0000	0.0000	0.0000	0.0000	0.1115	0.2604	0.3592	0.4737	0.6481	0.8299	0.9880	1.0206	1.1601	1.3053	1.4627
1987	0.0000	0.0000	0.0000	0.0000	0.1278	0.2542	0.4637	0.4615	0.6012	0.6891	1.0154	0.7974	0.0000	0.0000	1.4347
1988	0.0000	0.0025	0.0142	0.0364	0.0000	0.2177	0.3875	0.5340	0.6686	0.8996	1.1689	0.9765	1.5001	0.0000	0.0000
1989	0.0000	0.0010	0.0139	0.0408	0.1255	0.2039	0.3869	0.5537	0.5946	0.8807	0.8600	1.0413	1.4373	0.6851	1.6452
1990	0.0000	0.0026	0.0000	0.0392	0.1328	0.2150	0.0000	0.4708	0.8717	0.9235	1.0370	1.0687	1.1408	0.0000	1.2886
1991	0.0000	0.0014	0.0000	0.0429	0.1244	0.2784	0.3348	0.5487	0.8060	0.8278	1.0986	1.1110	1.1845	0.0000	1.0707
1992	0.0000	0.0024	0.0050	0.0519	0.1449	0.2641	0.3635	0.5224	0.6620	0.8765	0.6694	0.9535	1.4308	0.0000	1.3139
1993	0.0000	0.0016	0.0256	0.0661	0.1507	0.2395	0.3347	0.4116	0.0000	0.8459	0.8459	0.0000	0.8667	0.0000	1.6168
1994	0.0000	0.0051	0.0274	0.0524	0.1481	0.2352	0.3566	0.4681	0.6750	0.7940	0.7810	0.0000	0.0000	1.4078	1.4078
1995	0.0000	0.0032	0.0233	0.0572	0.1089	0.2378	0.3138	0.5452	0.6325	0.8816	0.0000	1.1302	1.5043	0.0000	0.0000
1996	0.0000	0.0037	0.0351	0.0563	0.1252	0.2024	0.3170	0.4300	0.0000	0.0000	0.0000	1.3229	0.0000	0.0000	0.0000
1997	0.0000	0.0046	0.0183	0.0532	0.1400	0.1733	0.2840	0.4763	0.5430	0.7288	0.0000	0.0000	0.0000	0.0000	0.0000
1998	0.0000	0.0053	0.0403	0.0777	0.1507	0.2179	0.2770	0.3836	0.5071	0.6355	0.0000	0.0000	0.0000	0.9754	0.0000
1999	0.0000	0.0040	0.0347	0.0816	0.1278	0.2311	0.3126	0.4251	0.6275	0.5562	0.8621	0.0000	0.0000	0.0000	0.0000
2000	0.0000	0.0025	0.0284	0.0464	0.1155	0.1806	0.3075	0.3789	0.4746	0.0000	0.9379	0.0000	0.0000	0.0000	0.0000
2001	0.0000	0.0015	0.0199	0.0654	0.1052	0.1957	0.2810	0.3412	0.4287	0.4549	0.6114	0.0000	0.0000	0.0000	0.0000
2002	0.0000	0.0046	0.0255	0.0388	0.1307	0.1867	0.2401	0.3232	0.4634	0.5493	0.5910	0.4552	0.0000	0.5938	1.1331
2003	0.0000	0.0000	0.0000	0.0588	0.1141	0.1833	0.2461	0.3324	0.4183	0.4860	0.5191	0.5881	0.0000	0.6712	0.7743

Table A.27 continued. Mean weight (kg) at age of witch flounder from the Gulf of Maine-Georges Bank region, derived from NEFSC spring and autumn bottom trawl survey, (strata 22-30, 36-40), 1982 - 2002.

AUTUMN	AGE														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+
1982	0.0004	0.0000	0.0000	0.0604	0.1486	0.1591	0.3462	0.5470	0.5905	0.8193	1.0054	0.9316	1.0589	1.1331	1.5423
1983	0.0000	0.0123	0.0350	0.0883	0.1728	0.2794	0.4271	0.5435	0.6757	0.8757	1.1119	1.0501	1.0340	0.0000	1.7009
1984	0.0000	0.0000	0.0000	0.0905	0.1817	0.2639	0.3836	0.5656	0.6852	0.7623	0.9759	1.0446	1.3091	1.2035	1.6588
1985	0.0000	0.0000	0.0391	0.0969	0.1536	0.2592	0.3875	0.5341	0.7256	0.8551	0.9579	1.1245	1.2535	1.1205	1.5848
1986	0.0007	0.0000	0.0000	0.0000	0.1614	0.3015	0.3832	0.5534	0.6969	0.9241	1.0232	1.0493	0.8921	1.2559	1.5656
1987	0.0000	0.0000	0.0195	0.0000	0.1327	0.3141	0.4168	0.5181	0.6258	0.0000	0.9040	0.0000	0.0000	1.3432	1.9129
1988	0.0000	0.0036	0.0000	0.0900	0.1876	0.3540	0.5152	0.5472	0.6645	0.8253	0.9117	1.2061	1.3376	1.2693	1.4267
1989	0.0007	0.0155	0.0326	0.0791	0.1893	0.3111	0.6190	0.6686	0.7652	0.9710	1.0973	0.0000	1.3101	0.0000	2.2664
1990	0.0008	0.0210	0.0275	0.1135	0.1642	0.3173	0.4439	0.5688	0.7716	1.0181	0.0000	0.0000	1.5867	1.0437	1.7592
1991	0.0006	0.0155	0.0502	0.1083	0.1791	0.3388	0.5257	0.7467	0.8148	0.7657	1.2266	1.3420	0.0000	0.0000	0.0000
1992	0.0006	0.0181	0.0651	0.1236	0.2044	0.3524	0.3850	0.0000	0.0000	0.6915	0.9203	0.7444	0.0000	0.8587	1.3961
1993	0.0006	0.0133	0.0591	0.1416	0.2104	0.3147	0.5233	0.5872	0.7075	0.0000	1.2822	0.9898	0.0000	2.0425	1.4493
1994	0.0006	0.0187	0.0459	0.0707	0.2116	0.3133	0.5605	0.5893	0.0000	1.1912	0.9017	0.0000	0.9650	0.0000	1.4443
1995	0.0008	0.0207	0.0533	0.1000	0.1503	0.2703	0.3794	0.0000	0.0000	1.1259	0.9099	0.0000	0.0000	0.0000	1.2754
1996	0.0005	0.0124	0.0315	0.0828	0.1488	0.2328	0.4005	0.4964	0.7359	0.9408	0.0000	1.0769	0.0000	0.0000	0.0000
1997	0.0008	0.0195	0.0402	0.0950	0.1704	0.2700	0.3529	0.5031	0.0000	0.0000	0.0000	0.0000	0.7415	0.0000	0.0000
1998	0.0006	0.0185	0.0552	0.0928	0.1695	0.2669	0.3936	0.4937	0.6344	0.5333	0.0000	0.0000	0.0000	0.0000	0.0000
1999	0.0005	0.0176	0.0452	0.1021	0.1671	0.2672	0.3707	0.4932	0.4978	0.6581	0.6407	0.0000	0.0000	0.0000	0.0000
2000	0.0007	0.0163	0.0591	0.0993	0.1743	0.2248	0.3510	0.5116	0.5813	0.6765	0.0000	0.0000	0.9435	0.0000	0.0000
2001	0.0000	0.0131	0.0347	0.1227	0.1673	0.2179	0.3122	0.4124	0.4878	0.4468	0.6933	0.0000	0.0000	0.0000	0.0000
2002	0.0000	0.0000	0.0587	0.0959	0.1831	0.2442	0.3225	0.4775	0.4920	0.5955	0.0000	0.9261	0.9391	0.0000	0.0000

Table A.28. Proportion mature at age for female witch flounder derived from logistic regression analysis using a 5-year moving average of NEFSC spring bottom trawl surveys, 1980 - 2003.

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
2	0.00	0.00	0.00	0.00	0.00	0.03	0.13	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03
3	0.01	0.01	0.02	0.01	0.02	0.12	0.32	0.12	0.08	0.07	0.06	0.04	0.04	0.03	0.02	0.01	0.04	0.05	0.06	0.07
4	0.04	0.06	0.07	0.05	0.09	0.37	0.60	0.36	0.22	0.18	0.18	0.14	0.13	0.13	0.13	0.07	0.14	0.15	0.15	0.16
5	0.14	0.20	0.24	0.24	0.37	0.71	0.83	0.70	0.47	0.39	0.42	0.35	0.34	0.42	0.45	0.37	0.39	0.37	0.33	0.35
6	0.40	0.51	0.59	0.68	0.76	0.91	0.94	0.91	0.74	0.64	0.70	0.65	0.64	0.78	0.82	0.81	0.71	0.67	0.59	0.59
7	0.73	0.82	0.86	0.93	0.95	0.98	0.98	0.98	0.90	0.84	0.88	0.86	0.86	0.95	0.96	0.97	0.91	0.87	0.81	0.79
8	0.92	0.95	0.97	0.99	0.99	0.99	0.99	0.99	0.97	0.94	0.96	0.95	0.95	0.99	0.99	1.00	0.97	0.96	0.93	0.91
9	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.99	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.97	0.97
10	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99
11+	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Number of fish																				
mature	108	153	204	203	186	177	145	111	104	89	80	85	76	81	132	123	127	148	186	191
immature	98	112	115	102	47	24	11	37	60	88	107	139	139	139	190	198	205	247	301	248
total	206	265	319	305	233	201	156	148	164	177	187	224	215	220	322	321	332	395	487	439

Long-term (non-averaged) proportion mature at age for female witch flounder from NEFSC spring bottom trawl surveys, 1980-2003.

Age	1980- 2003
1	0.00
2	0.00
3	0.01
4	0.04
5	0.14
6	0.40
7	0.73
8	0.92
9	0.98
10	0.99
11+	1.00

Table A.29. Stratified mean weight (kg) per tow of mature witch flounder (spawning stock biomass) in the NEFSC spring bottom trawl survey in Gulf of Maine-Georges Bank region (strata 22-30, 36-40), 1968-2002.

Year	Mature weight (kg) per tow
1968	2.930
1969	2.300
1970	4.073
1971	1.907
1972	3.772
1973	5.868
1974	3.289
1975	2.499
1976	3.248
1977	1.522
1978	2.278
1979	1.480
1980	2.964
1981	3.104
1982	1.519
1983	2.166
1984	1.383
1985	2.607
1986	1.329
1987	0.638
1988	0.836
1989	0.637
1990	0.200
1991	0.455
1992	0.356
1993	0.186
1994	0.323
1995	0.377
1996	0.174
1997	0.249
1998	0.498
1999	0.251
2000	0.228
2001	0.331
2002	0.782
2003	0.751

Note: 1977-1982, 1983-1984, 1985-1990, 1991-1993, 1994-1999, 2000-2002 ogives were used;
 No maturity at length data before 1977; the 1977-1982 period was applied to the 1963-1976 period.

Table A.30. Estimates of instantaneous total mortality (Z) for witch flounder in the Gulf of Maine-Georges Bank region, 1980-2002, derived from NEFSC spring and autumn bottom trawl survey data.

YEAR	3+	4+	5+	6+	7+	8+				Geometric mean
Spring							Times period	Spring	Autumn	
1980	8.18	7.23	5.71	4.99	3.79	2.77				
1981	8.31	7.49	6.56	4.56	3.54	2.78				
1982	3.56	2.95	2.46	2.09	1.85	1.24	1982-1985	0.48	0.23	0.34
1983	6.34	5.80	4.54	3.25	2.71	1.99	1986-1989	0.77	0.65	0.71
1984	2.90	2.89	2.58	1.80	1.40	1.09	1990-1993	0.59	0.61	0.60
1985	5.18	5.17	4.71	3.65	2.45	1.54	1994-1997	0.53	0.36	0.44
1986	2.07	2.07	2.03	1.79	1.26	0.85	1998-2001	0.52	0.60	0.56
1987	1.01	1.01	0.95	0.83	0.70	0.44				
1988	1.39	1.33	1.33	1.25	0.95	0.57				
1989	1.91	1.87	0.87	0.76	0.69	0.61				
1990	0.62	0.58	0.49	0.17	0.17	0.13				
1991	1.64	0.86	0.75	0.67	0.46	0.42				
1992	1.20	1.01	0.64	0.55	0.44	0.29				
1993	1.21	1.07	0.60	0.28	0.22	0.14				
1994	2.32	1.78	1.14	0.33	0.17	0.14				
1995	1.72	1.14	0.83	0.65	0.33	0.22				
1996	1.31	1.06	0.67	0.32	0.10	0.03				
1997	2.08	1.93	1.24	0.62	0.18	0.10				
1998	3.08	2.37	1.98	1.19	0.47	0.26				
1999	2.67	1.69	0.90	0.41	0.25	0.07				
2000	3.19	2.00	1.30	0.64	0.40	0.15				
2001	4.21	3.49	2.02	1.00	0.60	0.30				
2002	8.02	7.12	4.49	2.23	1.41	0.73				
Autumn										
1980	2.58	2.58	2.38	2.12	1.84	1.48				
1981	3.49	3.25	2.81	2.20	1.74	1.47				
1982	0.97	0.91	0.90	0.87	0.80	0.56				
1983	4.70	4.19	2.60	1.84	1.29	0.85				
1984	4.37	4.28	3.34	2.34	1.74	1.21				
1985	2.75	2.70	2.62	2.01	1.33	0.84				
1986	1.58	1.58	1.53	1.26	0.91	0.60				
1987	0.46	0.46	0.45	0.43	0.38	0.19				
1988	1.37	0.64	0.59	0.58	0.54	0.33				
1989	0.68	0.60	0.30	0.29	0.27	0.25				
1990	1.30	0.92	0.41	0.19	0.17	0.15				
1991	1.66	1.00	0.67	0.38	0.24	0.17				
1992	0.70	0.45	0.22	0.17	0.11	0.11				
1993	1.79	1.24	0.47	0.25	0.19	0.17				
1994	1.33	0.80	0.64	0.24	0.21	0.10				
1995	3.26	1.63	0.78	0.30	0.07	0.07				
1996	4.80	4.02	2.03	0.64	0.20	0.14				
1997	2.89	2.37	1.50	0.73	0.35	0.02				
1998	2.46	1.10	0.63	0.33	0.17	0.05				
1999	3.89	2.38	1.34	0.74	0.37	0.10				
2000	4.87	3.47	1.72	1.05	0.46	0.23				
2001	7.69	6.74	3.58	1.70	0.88	0.27				
2002	4.04	3.61	2.13	1.13	0.60	0.27				

Table A.31. Parameter estimates (with associated statistics) and estimates of terminal F from alternative ADAPT VPA formulations; stock sizes in '000s.

	Run 61-f	Run 61-f	Run 100	Run 200	Run 201	Run 300	Run 301-f	Run 301f-spr	Run 301f-aut
Software	FACT 1.5	NFTv2011	NFTv2011	NFTv2011	NFTv2011	NFTv2011	NFTv2011	NFTv2011	NFTv2011
CAA	1982-2001 1-11+	1982-2001 1-11+	1982-2002 1-11+	1982-2002 1-11+	1982-2002 1-11+	1982-2002 1-11+	1982-2002 3-11+	1982-2002 3-11+	1982-2002 3-11+
Est.Ages	4-10	4-10	4 - 10	4 - 10	3-10	3-10	3-10	3-10	3-10
NMFS-s	3-11+	3-11+	3 - 11+	3 - 11+	3-11+	3-11+	3-11+	3-11+	-
NMFS-a	3-11+	3-11+	3 - 11+	3 - 11+	3-11+	3-11+	3-11+	-	3-11+
Notes:	GARM VPA	Re-Run of GARM VPA	LM discards (sf method)	LM discards (sf & FOP)	LM discards (sf & FOP)	LM discards (sf & FOP)	LM discards (sf and FOP)	LM discards (sf and FOP)	LM discards (sf and FOP)
M.S.R.	.7673	.7289	.7469	.7485	.7459	.792	.791	.603	1.00
N3 (cv)					19.621 (.63)	19.703 (.64)	19.759 (.64)	11.429 (.79)	34.449 (1.03)
N4 (cv)	5.76e4 (.45)	57.321 (.44)	25.111 (.44)	24.755 (.44)	25.291 (.44)	25.373 (.45)	25.441 (.45)	36.289 (.56)	17.944 (.73)
N5 (cv)	6.08e4 (.38)	60.440 (.36)	41.902 (.37)	41.897 (.37)	42.456 (.37)	42.628 (.37)	42.739 (.37)	94.857 (.46)	40.928 (.60)
N6 (cv)	2.91e4 (.34)	28.936 (.33)	40.091 (.33)	41.003 (.32)	41.370 (.32)	41.550 (.33)	41.657 (.33)	36.267 (.41)	48.035 (.52)
N7 (cv)	1.67e4 (.32)	16.563 (.31)	19.965 (.31)	20.937 (.30)	21.063 (.30)	21.145 (.31)	21.203 (.31)	16.900 (.38)	26.672 (.48)
N8 (cv)	4.73e3 (.37)	3.844 (.35)	11.861 (.29)	12.420 (.28)	12.261 (.28)	10.122 (.32)	10.370 (.32)	8.067 (.41)	13.403 (.49)
N9 (cv)	1.56e3 (.44)	1.744 (.42)	2.547 (.38)	2.511 (.38)	2.283 (.40)	3.842 (.34)	3.903 (.33)	3.323 (.43)	4.742 (.51)
N10 (cv)	1.06e3 (.44)	1.197 (.42)	1.017 (.43)	972 (.44)	809 (.47)	754 (.47)	791 (.45)	795 (.57)	787 (.72)
Age 3 in T+1	22,643	23,362	6,268	8,026	19,620	19,707	19,760	11,429	34,449
F 1	0.00	0.0004	0.0000	0.0003	0.0004	0.0003	-	-	-
F 2	0.00	0.0026	0.0020	0.0002	0.0008	0.008	-	-	-
F 3	0.00	0.0026	0.0017	0.0015	0.0015	0.0015	0.0015	0.0010	0.0021
F 4	0.02	0.0205	0.0347	0.0164	0.0162	0.0162	0.0161	0.0154	0.0168
F 5	0.07	0.0725	0.0513	0.0273	0.0270	0.0269	0.0268	0.0308	0.0233
F 6	0.07	0.0725	0.0688	0.0603	0.0599	0.0597	0.0595	0.0741	0.0476
F 7	0.28	0.3375	0.1575	0.1474	0.1492	0.1780	0.1741	0.2186	0.1373
F 8	0.62	0.5716	0.3795	0.3857	0.4169	0.2685	0.2648	0.3045	0.2229
F 9	0.44	0.3985	0.4527	0.4706	0.5435	0.5734	0.5526	0.5508	0.5550
F10	0.45	0.4358	0.3299	0.3346	0.3699	0.3339	0.4087	0.4277	0.03890
F11+	0.45	0.4358	0.3299	0.3346	0.3699	0.3339	0.4087	0.4277	0.3890
Ave F 7-9	0.45	0.4358	0.3299	0.3346	0.3699	-	-	-	-
Ave F 8-9						0.3339	0.4087	0.4277	0.3890
SSB ('000 mt)	11,368	11,267	15,331	16,548	16,242	16,212	18,296	15,798	21,569

Table A.32. Estimates of beginning year stock size (thousands of fish), instantaneous fishing mortality and spawning stock biomass (mt) for witch flounder estimated from virtual population analysis, 1982-2002.

Stock Numbers (Jan 1) in thousands

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
3	15404	17700	16340	7650	5414	3001	9740	6214	6670	8831	14342
4	12174	13082	14922	13928	6470	4639	2562	7827	4934	5422	7192
5	9563	9493	10014	11486	10899	5220	3825	2076	6333	3660	4291
6	7830	7114	6765	6768	7929	7978	4060	3047	1726	4431	2353
7	4289	5375	4668	4216	4039	4267	5683	2886	2332	1249	3281
8	2752	3077	3160	2647	2224	2034	2222	3615	1783	1754	857
9	2102	1763	1746	1344	1132	1146	949	853	2297	1100	1283
10	1101	1440	839	862	599	594	544	448	413	1668	677
11+	7260	4728	3844	2926	2039	1151	1218	1263	900	1371	2127
Total	62476	63772	62297	51828	40746	30029	30804	28229	27388	29487	36404

Age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
3	9670	13610	12671	15878	20226	29659	42904	67651	58704	29603	19760
4	11974	7936	11675	10324	13554	17283	25221	36778	58131	50462	25441
5	5029	8635	5904	9706	8400	10686	14360	21220	31390	49716	42739
6	2900	3019	4887	4119	7237	6290	8213	11345	17842	26146	41658
7	1164	1649	1414	2627	2289	5033	4106	5717	8693	14340	21204
8	2162	453	660	438	949	1033	2846	2426	3417	5910	10370
9	552	1320	209	321	136	274	547	1743	1138	1599	3903
10	940	274	640	91	80	39	105	239	926	398	792
11+	1318	782	373	180	112	179	181	536	667	655	603
Total	35708	37679	38434	43683	52982	70476	98483	147655	180909	178829	166470

Table A.32. continued.

Fishing Mortality

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	
3	0.013	0.021	0.010	0.018	0.005	0.008	0.069	0.081	0.057	0.055	
4	0.099	0.117	0.112	0.095	0.065	0.043	0.061	0.062	0.149	0.084	
5	0.146	0.189	0.242	0.221	0.162	0.101	0.077	0.034	0.207	0.292	
6	0.226	0.271	0.323	0.366	0.470	0.189	0.191	0.118	0.173	0.150	
7	0.182	0.381	0.417	0.490	0.536	0.503	0.303	0.332	0.135	0.227	
8	0.295	0.416	0.705	0.700	0.514	0.612	0.807	0.304	0.333	0.162	
9	0.228	0.593	0.556	0.657	0.495	0.595	0.602	0.577	0.170	0.335	
10	0.266	0.477	0.650	0.685	0.507	0.606	0.741	0.350	0.238	0.226	
11+	0.266	0.477	0.650	0.685	0.507	0.606	0.741	0.350	0.238	0.226	
Age	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
3	0.030	0.048	0.003	0.055	0.008	0.007	0.012	0.004	0.002	0.001	0.002
4	0.208	0.177	0.146	0.035	0.056	0.088	0.035	0.023	0.008	0.006	0.016
5	0.242	0.360	0.419	0.210	0.144	0.139	0.113	0.086	0.023	0.033	0.027
6	0.554	0.414	0.609	0.471	0.438	0.213	0.276	0.212	0.116	0.069	0.060
7	0.267	0.793	0.766	1.023	0.868	0.646	0.420	0.376	0.365	0.236	0.174
8	0.291	0.343	0.623	0.571	1.021	1.093	0.486	0.340	0.607	0.610	0.265
9	0.161	0.552	0.574	0.688	1.244	1.085	0.805	0.679	0.483	0.900	0.553
10	0.211	0.382	0.586	0.598	1.109	1.092	0.545	0.388	0.553	0.675	0.409
11+	0.211	0.382	0.586	0.598	1.109	1.092	0.545	0.388	0.553	0.675	0.409

Table A.32. continued.

Spawning Stock Biomass (mt)

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
3	20	13	24	5	5	16	115	33	24	25
4	107	132	185	127	91	216	191	238	156	104
5	376	458	580	684	1019	880	745	360	587	336
6	1115	1241	1243	1584	1916	2471	1297	964	454	886
7	1543	1883	1715	1720	1636	1794	2494	1303	999	496
8	1634	1544	1559	1388	1218	1072	1148	2010	1003	1004
9	1632	1172	1088	878	780	757	628	559	1640	754
10	949	1207	628	665	487	479	422	367	358	1411
11+	9521	5781	4505	3374	2414	1323	1392	1577	1227	1829
Total	16897	13431	11528	10425	9567	9008	8433	7410	6447	6844

Age	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
3	50	21	23	11	12	9	56	85	158	186	102
4	145	229	154	155	113	97	251	453	618	975	1096
5	463	437	636	601	852	599	883	1114	1657	2384	3739
6	582	694	630	1200	1139	1740	1304	1671	2095	3192	4736
7	1369	424	585	542	1044	888	1782	1405	1800	2664	4443
8	500	1210	230	352	225	455	485	1343	1040	1361	2545
9	916	392	862	144	196	87	171	286	925	544	825
10	547	789	217	509	69	61	32	86	137	511	262
11+	2490	1610	875	409	180	118	192	145	441	489	548
Total	7063	5806	4212	3922	3828	4053	5156	6587	8871	12305	18296

Table A.33. Summary of witch flounder catch (mt), spawning stock biomass (mt), fully recruited fishing mortality, recruitment (age 3, thousands of fish) and the year class.

Year	Catch (mt)	SSB (mt)	Ave F 8-9	Recruits	
				Age 3 ('000)	Year class
1982	4954	16897	0.262	15.404	1979
1983	6159	13431	0.505	17.700	1980
1984	6759	11527	0.631	16.340	1981
1985	6192	10425	0.679	7.650	1982
1986	4636	9566	0.504	5.414	1983
1987	3494	9008	0.604	3.001	1984
1988	3320	8432	0.704	9.740	1985
1989	2199	7411	0.440	6.214	1986
1990	1645	6448	0.252	6.670	1987
1991	1870	6845	0.249	8.831	1988
1992	2395	7062	0.226	14.342	1989
1993	2973	5806	0.447	9.670	1990
1994	3073	4212	0.598	13.610	1991
1995	2386	3923	0.629	12.671	1992
1996	2338	3830	1.132	15.878	1993
1997	2065	4054	1.089	20.226	1994
1998	2124	5156	0.645	29.659	1995
1999	2327	6588	0.510	42.904	1996
2000	2551	8871	0.545	67.651	1997
2001	3241	12306	0.755	58.704	1998
2002	3466	18296	0.409	29.603	1999
2003				19.760	2000
min	1645	3830	0.226	3.001	
max	6759	18296	1.132	67.651	
mean	3341	8576	0.563	19.613	
geomean				14.448	
median				14.342	

Table A.34. Yield and Spawning Stock biomass per recruit results for witch flounder.

Yield per Recruit and Spawning Stock Biomass per Recruit
 ## YPR Version 2.0
 ## Date of Run: 19 May 2003 10:59
 ## Input Data File: H:\WITCHASS\YPR\YPR2003\RUN301-F.DAT

Model Title: Witch Flounder (run 301)
 Start Age = 3
 End Age = 20 (Does Not Include Plus Group)
 Fishing Mortality Upper Bound = 1.0000
 Fishing Mortality Calculation Increment = 0.0001
 Fishing Mortality Printing Increment = 0.05
 Natural Mortality = 0.1500
 Proportion Fishing Mortality Before Spawning = 0.1667
 Proportion Natural Mortality Before Spawning = 0.1667

Age	Selectivity F	Selectivity M	Stock Weight	Catch Weight	Maturity
3	0.0036	1.0000	0.0787	0.0830	0.0200
4	0.0229	1.0000	0.1459	0.2021	0.0800
5	0.0703	1.0000	0.2319	0.2746	0.3000
6	0.1931	1.0000	0.3328	0.3813	0.6200
7	0.5282	1.0000	0.4442	0.4752	0.8700
8	1.0000	1.0000	0.5615	0.5548	0.9700
9	1.0000	1.0000	0.6816	0.6393	1.0000
10	1.0000	1.0000	0.8006	0.7656	1.0000
11	1.0000	1.0000	0.9175	0.9175	1.0000
12	1.0000	1.0000	1.0399	1.0399	1.0000
13	1.0000	1.0000	1.1348	1.1348	1.0000
14	1.0000	1.0000	1.2335	1.2335	1.0000
15	1.0000	1.0000	1.3259	1.3259	1.0000
16	1.0000	1.0000	1.4097	1.4097	1.0000
17	1.0000	1.0000	1.4875	1.4875	1.0000
18	1.0000	1.0000	1.5575	1.5575	1.0000
19	1.0000	1.0000	1.6215	1.6215	1.0000
20	1.0000	1.0000	1.6787	1.6787	1.0000

Reference Point	F	YPR	SSBR	Mean Age	Mean GT	Exp Spawn
F Zero	0.00000	0.00000	3.22009	7.88231	12.35089	3.51035
F-01	0.19560	0.21504	1.42574	6.17333	9.86110	1.89110
F-Max	0.54470	0.23913	0.70920	5.25697	7.88807	1.10782
F at 40 %MSP	0.23030	0.22321	1.28817	6.01053	9.54415	1.75334

FMORT	CTHN	CTHW	STKN	STKW	SPNSTKN	SPNSTKW	MSP	MNAGE	MNGT	EXSP
0.00000	0.00000	0.00000	6.69668	3.73482	3.97773	3.22009	100.00000	7.88231	12.35089	3.51035
0.05000	0.12719	0.10688	6.09150	3.01110	3.36959	2.49680	77.53824	7.27308	11.60967	2.88137
0.10000	0.21103	0.16547	5.65531	2.51453	2.93327	2.00314	62.20754	6.79993	10.93332	2.43786
0.15000	0.26898	0.19799	5.33144	2.16433	2.61075	1.65669	51.44853	6.43444	10.33526	2.11483
0.20000	0.31092	0.21626	5.08406	1.91048	2.36545	1.40670	43.68521	6.15113	9.81886	1.87226
0.25000	0.34258	0.22661	4.89003	1.72147	2.17388	1.22138	37.93009	5.92942	9.38004	1.68494
0.30000	0.36738	0.23250	4.73412	1.57712	2.02062	1.08043	33.55283	5.75361	9.01047	1.53659
0.35000	0.38740	0.23583	4.60609	1.46422	1.89534	0.97064	30.14315	5.61208	8.70022	1.41647
0.40000	0.40401	0.23766	4.49893	1.37397	1.79097	0.88322	27.42858	5.49635	8.43945	1.31728
0.45000	0.41806	0.23861	4.40769	1.30039	1.70256	0.81225	25.22442	5.40025	8.21931	1.23399
0.50000	0.43018	0.23903	4.32886	1.23933	1.62656	0.75359	23.40289	5.31927	8.03229	1.16300
0.55000	0.44078	0.23913	4.25986	1.18785	1.56039	0.70436	21.87379	5.25012	7.87222	1.10172
0.60000	0.45016	0.23902	4.19878	1.14384	1.50214	0.66244	20.57223	5.19034	7.73411	1.04823
0.65000	0.45855	0.23880	4.14416	1.10574	1.45036	0.62633	19.45062	5.13808	7.61399	1.00106
0.70000	0.46613	0.23850	4.09490	1.07240	1.40393	0.59486	18.47345	5.09193	7.50869	0.95912
0.75000	0.47302	0.23815	4.05013	1.04293	1.36197	0.56718	17.61382	5.05081	7.41569	0.92152
0.80000	0.47934	0.23778	4.00915	1.01665	1.32381	0.54262	16.85101	5.01388	7.33296	0.88760
0.85000	0.48516	0.23740	3.97141	0.99303	1.28889	0.52065	16.16884	4.98047	7.25889	0.85680
0.90000	0.49055	0.23701	3.93647	0.97165	1.25675	0.50087	15.55453	4.95004	7.19216	0.82868
0.95000	0.49558	0.23662	3.90396	0.95218	1.22704	0.48294	14.99784	4.92216	7.13170	0.80287
1.00000	0.50028	0.23623	3.87358	0.93434	1.19945	0.46661	14.49050	4.89647	7.07662	0.77908

Table A.35. Summary of yield and spawning stock biomass per recruit results, corresponding biological reference points and differences between current and former analyses.

	Results			Age 3		
	F40%	Y/R	SSB/R	Mean Rec	Bmsy	MSY
RUN 0 BRP ages 3-11+	0.1643	0.2405	1.6023	12.42	19,901	2,987
RUN 1 BRP with ages 3-20	0.2033	0.2506	1.3692	12.42	17,006	3,113
RUN 2 with new pr	0.2666	0.2712	1.3694	19.6	26,840	5,316
RUN 3 with new wts	0.1918	0.2151	1.3321	19.6	26,108	4,217
RUN 4 with new maturity	0.1920	0.2473	1.3249	19.6	25,968	4,847
RUN 5 with new pr and wts	0.2478	0.2263	1.3322	19.6	26,111	4,435
RUN 6 with new wts and maturity	0.1807	0.2121	1.2883	19.6	25,251	4,158
RUN 7 with new pr and maturity	0.2485	0.2675	1.3246	19.6	25,963	5,244
RUN 8 with new pr, wts and maturity	0.2303	0.2232	1.2882	19.6	25,248	4,375

Differences between estimates from the current (RUN 8) and former (RUN 1) yield and spawning stock biomass per recruit analyses.

	F40%	Y/R	SSB/R	Bmsy (000's)
Total Effect = RUN 8 - RUN 1	0.07	-0.0173	-0.3142	8.242
P-R effect = RUN 2 - RUN 1	0.06	0.0206	0.0002	
Wt effect = RUN 3 - RUN 1	-0.01	-0.0355	-0.0372	
Mat effect = RUN 4 - RUN 1	-0.01	-0.0033	-0.0443	
2-way interaction				
PR and wt interaction effect	0.04	-0.0244	-0.0371	
Wt and mat interaction effect	-0.02	-0.0385	-0.0809	
PR and mat interaction effect	0.05	0.0169	-0.0446	
3-way interaction				
Total effect - all of the above effects	-0.04	0.0469	-0.0702	
SSB/R effect				-1.006
Recruit effect				9.830
interaction				-0.582

Table A.36. Summary of short-term projection results for witch flounder. Projected median estimates of landings (mt), discards (mt), and spawning stock biomass (mt) are provided: 1) status quo fishing mortality ($F_{2003} = F_{2002} = 0.41$); 2) fishing mortality at $F_{msy} = F_{40\%} = 0.23$; 3) fishing mortality at 75% of F_{MSY} ; and 4) status quo landings ($landings_{2003} = landings_{2002}$).

Projection input:

Age	Selectivity F	Selectivity M	Stock Weight	Land Weight	Maturity
3	0.0036	1.0000	0.0443	0.0000	0.0700
4	0.0229	1.0000	0.1214	0.3220	0.1600
5	0.0703	1.0000	0.2267	0.3380	0.3500
6	0.1931	1.0000	0.3206	0.3960	0.5900
7	0.5282	1.0000	0.4202	0.4780	0.7900
8	1.0000	1.0000	0.5151	0.5550	0.9100
9	1.0000	1.0000	0.5995	0.6400	0.9700
10	1.0000	1.0000	0.7281	0.7660	0.9900
11+	1.0000	1.0000	0.8888	0.8889	1.0000

Projection results (weight reported in '000 mt)

Scenario	Year	F	Median Landings	Median Discards	Median SSB
F status quo	2003	0.41	6.254	0.251	26.677
F status quo	2004	0.41	8.652	0.191	32.121
F status quo	2005	0.41	10.474	0.132	33.733
F status quo	2003	0.41	6.254	0.251	26.677
F_{MSY}	2004	0.23	5.174	0.109	32.705
F_{MSY}	2005	0.23	6.992	0.076	37.600
F status quo	2003	0.41	6.254	0.251	26.677
75% F_{MSY}	2004	0.17	3.908	0.081	32.902
75% F_{MSY}	2005	0.17	5.480	0.057	39.080
$Landings_{2003} = Landings_{2002}$	2003	0.199	3.186	0.121	27.241
F_{MSY}	2004	0.23	5.781	0.111	35.389
F_{MSY}	2005	0.23	7.519	0.077	40.160
$Landings_{2003} = Landings_{2002}$	2003	0.199	3.186	0.121	27.241
75% F_{MSY}	2004	0.17	4.366	0.083	35.613
75% F_{MSY}	2005	0.17	5.899	0.058	41.753