

## TABLES

Table B1. Maturity at age for female witch flounder based on Northeast Fisheries Science Center spring survey maturity data (using a 5 year moving window). 2015 is assumed to be equal to 2014.

Year	AGE										
	1	2	3	4	5	6	7	8	9	10	11+
1982	0.00	0.00	0.01	0.04	0.14	0.40	0.73	0.92	0.98	0.99	1.00
1983	0.00	0.00	0.01	0.06	0.20	0.51	0.82	0.95	0.99	1.00	1.00
1984	0.00	0.00	0.02	0.07	0.24	0.59	0.86	0.97	0.99	1.00	1.00
1985	0.00	0.00	0.01	0.05	0.24	0.68	0.93	0.99	1.00	1.00	1.00
1986	0.00	0.00	0.02	0.09	0.36	0.76	0.95	0.99	1.00	1.00	1.00
1987	0.00	0.02	0.08	0.30	0.68	0.91	0.98	1.00	1.00	1.00	1.00
1988	0.01	0.03	0.14	0.43	0.78	0.94	0.99	1.00	1.00	1.00	1.00
1989	0.00	0.02	0.09	0.32	0.68	0.91	0.98	1.00	1.00	1.00	1.00
1990	0.01	0.02	0.07	0.20	0.46	0.73	0.90	0.97	0.99	1.00	1.00
1991	0.01	0.02	0.07	0.17	0.38	0.64	0.84	0.94	0.98	0.99	1.00
1992	0.01	0.02	0.06	0.17	0.41	0.70	0.89	0.96	0.99	1.00	1.00
1993	0.00	0.01	0.04	0.13	0.35	0.65	0.87	0.96	0.99	1.00	1.00
1994	0.00	0.01	0.04	0.13	0.34	0.64	0.86	0.96	0.99	1.00	1.00
1995	0.00	0.01	0.03	0.13	0.42	0.78	0.95	0.99	1.00	1.00	1.00
1996	0.00	0.00	0.02	0.12	0.45	0.83	0.96	0.99	1.00	1.00	1.00
1997	0.00	0.00	0.01	0.07	0.37	0.81	0.97	1.00	1.00	1.00	1.00
1998	0.00	0.01	0.04	0.13	0.38	0.71	0.91	0.98	0.99	1.00	1.00
1999	0.00	0.01	0.04	0.14	0.36	0.67	0.88	0.96	0.99	1.00	1.00
2000	0.01	0.02	0.05	0.14	0.33	0.59	0.82	0.93	0.98	0.99	1.00
2001	0.01	0.02	0.06	0.15	0.33	0.58	0.79	0.91	0.97	0.99	1.00
2002	0.02	0.04	0.08	0.17	0.32	0.53	0.72	0.86	0.93	0.97	0.99
2003	0.02	0.04	0.09	0.17	0.31	0.49	0.68	0.82	0.91	0.96	0.98
2004	0.03	0.06	0.11	0.19	0.32	0.49	0.66	0.79	0.89	0.94	0.97
2005	0.04	0.07	0.12	0.22	0.35	0.52	0.68	0.80	0.89	0.94	0.97
2006	0.02	0.04	0.09	0.16	0.29	0.45	0.63	0.78	0.88	0.94	0.97
2007	0.02	0.04	0.08	0.17	0.32	0.52	0.71	0.85	0.93	0.97	0.98
2008	0.01	0.03	0.08	0.19	0.37	0.61	0.80	0.92	0.97	0.99	0.99
2009	0.02	0.04	0.11	0.25	0.47	0.71	0.87	0.95	0.98	0.99	1.00
2010	0.01	0.04	0.10	0.24	0.48	0.73	0.89	0.96	0.99	0.99	1.00
2011	0.02	0.05	0.13	0.29	0.53	0.75	0.89	0.96	0.98	0.99	1.00
2012	0.01	0.04	0.11	0.27	0.52	0.76	0.90	0.96	0.99	1.00	1.00
2013	0.01	0.04	0.11	0.27	0.52	0.76	0.91	0.97	0.99	1.00	1.00
2014	0.01	0.03	0.09	0.23	0.49	0.75	0.91	0.97	0.99	1.00	1.00
2015	0.01	0.03	0.09	0.23	0.49	0.75	0.91	0.97	0.99	1.00	1.00
TS mean	0.01	0.04	0.09	0.21	0.42	0.65	0.83	0.93	0.97	0.99	1.00

Table B2. Maturity at length (cm) for female witch flounder based on Northeast Fisheries Science Center spring survey maturity data; 2015 is assumed to be equal to 2014.

Year	Length (cm)																											
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.11	0.20	0.35	0.52	0.69	0.82	0.91	0.95	0.98	0.99	0.99	1.00	
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.08	0.16	0.28	0.44	0.62	0.77	0.88	0.94	0.97	0.98	0.99	1.00	1.00	
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.05	0.09	0.18	0.32	0.51	0.69	0.83	0.91	0.96	0.98	0.99	1.00	1.00	1.00	
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.09	0.19	0.37	0.58	0.77	0.89	0.95	0.98	0.99	1.00	1.00	1.00	1.00	
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.13	0.25	0.43	0.63	0.80	0.90	0.95	0.98	0.99	1.00	1.00	1.00	1.00	
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.13	0.24	0.41	0.60	0.76	0.87	0.94	0.97	0.99	0.99	1.00	1.00	1.00	1.00	1.00	
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.06	0.13	0.23	0.38	0.56	0.73	0.85	0.92	0.96	0.98	0.99	1.00	1.00	1.00	1.00	1.00	1.00	
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.07	0.13	0.21	0.33	0.47	0.62	0.75	0.85	0.91	0.95	0.97	0.98	0.99	1.00	1.00	1.00	1.00	
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.08	0.13	0.19	0.27	0.38	0.50	0.62	0.72	0.81	0.87	0.92	0.95	0.97	0.98	0.99	0.99	
1991	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.07	0.10	0.15	0.22	0.31	0.41	0.52	0.63	0.73	0.81	0.87	0.91	0.94	0.96	0.98	0.98	
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.09	0.14	0.22	0.31	0.42	0.54	0.66	0.76	0.84	0.89	0.93	0.96	0.97	0.98	0.99	
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.06	0.10	0.16	0.25	0.36	0.48	0.61	0.73	0.82	0.88	0.93	0.96	0.97	0.98	0.99	
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.06	0.09	0.15	0.24	0.35	0.48	0.62	0.74	0.83	0.89	0.94	0.96	0.98	0.99	0.99	
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.08	0.17	0.30	0.48	0.67	0.81	0.90	0.95	0.98	0.99	1.00	1.00	1.00	1.00	
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.07	0.17	0.35	0.59	0.79	0.91	0.96	0.99	0.99	1.00	1.00	1.00	1.00	1.00	
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.11	0.27	0.53	0.77	0.91	0.97	0.99	1.00	1.00	1.00	1.00	1.00	1.00	
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.11	0.21	0.36	0.54	0.71	0.84	0.92	0.96	0.98	0.99	1.00	1.00	1.00	1.00	
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.06	0.12	0.20	0.34	0.50	0.66	0.79	0.88	0.94	0.97	0.98	0.99	1.00	1.00	1.00	
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.06	0.11	0.19	0.30	0.45	0.60	0.74	0.84	0.91	0.95	0.97	0.98	0.99	1.00	1.00	
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.07	0.13	0.21	0.32	0.46	0.60	0.73	0.83	0.90	0.94	0.97	0.98	0.99	0.99	1.00	
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.06	0.09	0.14	0.22	0.33	0.45	0.58	0.70	0.80	0.87	0.92	0.95	0.97	0.98	0.99	0.99	
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.08	0.13	0.20	0.29	0.41	0.54	0.67	0.78	0.85	0.91	0.94	0.97	0.98	0.99	0.99	
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.10	0.15	0.22	0.31	0.42	0.54	0.66	0.76	0.83	0.89	0.93	0.96	0.97	0.98	0.99	
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.11	0.17	0.24	0.34	0.45	0.57	0.68	0.77	0.85	0.90	0.93	0.96	0.97	0.98	0.99	
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.07	0.12	0.18	0.27	0.38	0.50	0.62	0.73	0.82	0.88	0.93	0.95	0.97	0.98	0.99	
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.07	0.12	0.19	0.28	0.41	0.55	0.68	0.79	0.87	0.92	0.95	0.97	0.98	0.99	0.99	
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.07	0.12	0.21	0.33	0.47	0.63	0.76	0.85	0.91	0.95	0.97	0.99	0.99	1.00	1.00	
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.07	0.12	0.20	0.30	0.44	0.58	0.71	0.82	0.89	0.93	0.96	0.98	0.99	0.99	1.00	1.00	
2010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.06	0.11	0.18	0.29	0.44	0.59	0.73	0.83	0.90	0.94	0.97	0.98	0.99	1.00	1.00	1.00	
2011	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.09	0.14	0.23	0.35	0.49	0.63	0.75	0.84	0.91	0.95	0.97	0.98	0.99	0.99	1.00	1.00	
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.07	0.12	0.20	0.31	0.46	0.61	0.74	0.84	0.91	0.95	0.97	0.98	0.99	1.00	1.00	1.00	
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.06	0.11	0.19	0.31	0.45	0.60	0.74	0.84	0.91	0.95	0.97	0.98	0.99	1.00	1.00	1.00	
2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.06	0.11	0.18	0.30	0.44	0.60	0.74	0.84	0.91	0.95	0.97	0.99	0.99	1.00	1.00	1.00	
2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.06	0.11	0.18	0.30	0.44	0.60	0.74	0.84	0.91	0.95	0.97	0.99	0.99	1.00	1.00	1.00	
TS mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.09	0.16	0.25	0.37	0.51	0.65	0.77	0.86	0.91	0.95	0.97	0.98	0.99	0.99	1.00	

Table B2a. Alternative estimates of natural mortality (M) for witch flounder using:  $t_{\max} = 33$  years,  $L_{\inf} = 619.9$  mm.,  $K = 0.1482$  ( $L_{\inf}$  and  $K$  from Burnett et al. 1992);  $A_{50} = 5.3$ , mean water temperature = 7degrees C.

Estimators	M	Equation
Hoenig 1983 (rule-of-thumb) $P = 0.05$	0.09	
Hoenig 1983 (rule-of-thumb) $P = 0.015$	0.13	$M = -\ln(P)/t_{\max}$
<b>Hewitt and Hoenig 2005</b>	<b>0.13</b>	<b><math>M = 4.22/t_{\max}</math></b>
<b>Updated One Parameter <math>t_{\max}</math> estimator (Then et al. 2015)</b>	<b>0.15</b>	<b><math>M = 5.109/t_{\max}</math></b>
<b>Hoenig 1983 (regression)</b>	<b>0.14</b>	<b><math>M = \exp[1.44 - 0.982 \cdot \ln(t_{\max})]</math></b>
<b>Updated Hoenig 1983 (Then et al. 2015)</b>	<b>0.16</b>	<b><math>M = \exp[1.717 - 1.01 \cdot \ln(t_{\max})]</math></b>
<b>Updated Hoenig Non-linear Least Squares (Then et al. 2015)</b>	<b>0.20</b>	<b><math>M = 4.899 \cdot t_{\max}^{-0.916}</math></b>
Rikhter and Efanov 1977	0.30	$M = [1.521/(t_{\max}^{0.720})] - 0.155$
Charnov & Berrigan 1990	0.07	$M = 2.2/t_{\max}$
Jensen's 1st 1996	0.05	$M = 1.65/t_{\max}$
Average of all longevity-based estimators	0.14	
Average of estimators w/o Rikhter & Efanov	0.12	
Average of estimators w/o Rikhter & Efanov, P-based	0.13	
Average of estimators w/o estimates $>1$ or $<0.20$	0.16	
<b>Average of boldface estimators (age constant, longevity based)</b>	<b>0.16</b>	
<b>Pauly 1980</b>	<b>0.22</b>	<b><math>M = \exp[-0.0152 + 0.6543 \cdot \ln(K) - 0.279 \cdot \ln(L_{\inf}/10) + 0.4634 \cdot \ln(\text{Temp})]</math></b>
<b>Ralston 1987 (linear regression)</b>	<b>0.32</b>	<b><math>M = 0.0189 + 2.06 \cdot K</math></b>
<b>Jensen 1996 (theoretical)</b>	<b>0.22</b>	<b><math>M = 1.50 \cdot K</math></b>
<b>Jensen 1996 (derived from Pauly 1980)</b>	<b>0.24</b>	<b><math>M = 1.60 \cdot K</math></b>
Beverton	0.37	$M = 3 \cdot K / [\exp(a_{50} \cdot K) - 1]$
<b>Average of boldface estimators (age constant, Growth/life history based)</b>	<b>0.25</b>	
<b>Average All Age Constant preferred estimators</b>	<b>0.20</b>	

Table B3. Brief summary of 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	<b>Mesh size 5 1/8 inches (130 mm).</b>
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). <b>Witch flounder minimum size 33 cm.</b>
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	<b>Witch flounder minimum size increased to 36 cm.</b>
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	Amendment 5 implemented: expanded Area 2, Area 1 closure not in effect.
May	<b>6 inch (152 mm) mesh restriction implemented</b> (delayed from March 1). Square or diamond mesh allowed.
December	Area 1, Area 2 and Nantucket Lightship Area closed year-around.
1996 July	Amendment 7 implemented: <b>Days-at-sea (DAS) restrictions.</b> 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.**

Table B3 continued. 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).

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.

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.

2010 May                      **Sector management (vessels in sectors are subject to hard TACs).**

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<b>2001</b>
January 9 – March 17 April 16 – April 30 Northern Shrimp season (61 days)
November 6: Daily haddock possession limit removed (maximum 50,000 lbs.-trip).
<b>2002</b>
February 15-March 11: Northern Shrimp season (25 days with days off)
May 1: Interim rule as a result of FW 33 lawsuit settlement agreement. Continuation of most measures from previous frameworks. <u>DAS</u> : 15 hour minimum charged for all trips over 3 hours Vessels limited to 25 percent of allocation May 1 through July 31, 2002 (only) Prohibition on front-loading DAS <u>Minimum size</u> : Cod 22 in. <u>Gear</u> : GOM Regulated Mesh Area (RMA): 6.5 in. diamond or square codend minimum, 6.5 inch mesh for trip gillnets, 6.5 inch mesh standup (roundfish) or 7 inch mesh tiedown (flatfish) for day gillnets. All areas: day gillnets limited to 50 standup/100 tiedown nets. <u>Hook gear</u> : de-hooking devices with spacing of less than six inches prohibited. <u>Closures</u> : WGOM year round closure extended (was to sunset May 1); Cashes Ledge Closed Area (year round); year round Cashes Ledge East and West closure added; add blocks 124/125 May, blocks 132/133 June, <u>Recreational</u> : Cod minimum size 23 in., GOM party/charter limited to 10 fish combined cod/haddock, all areas private recreational limited to 10 cod <u>Possession limits</u> : Remain the same. Haddock possession limit of 3,000 lbs.-DAS/30,000 lbs.-trip through September 30.
June 1: Revised interim rule <u>Minimum size</u> : Cod 19 in. <u>Closures</u> : Year-round Cashes Ledge east and west closures removed <u>Gear</u> : <u>Hook</u> : Requirement for six-inch spacing for de-hooking gear removed
July 4: Haddock daily limit suspended. Possession limit of 30,000 lbs.-trip until September 30, 50,000 lbs.-trip thereafter.
August 1: Emergency rule implementing FW 33 lawsuit settlement agreement. <u>DAS</u> : DAS allocation for each permit reduced 20 percent from maximum used FY 1996-2000 (est 71,218 allocated, including carry-over). DAS counted by the minute, except for day gillnet vessels (15 hour minimum). (This change reverted to DAS counting in effect in FY 2001). Prohibition on front-loading DAS clock. <u>Minimum size</u> : Cod 22 in. <u>Gear</u> : <u>Trawl</u> : GOM/GB RMAs: 6.5 in. diamond or square codend minimum; Southern New England RMA changed to 70W to 74W (vice 72-30W). 6.5 in. square, 7 in. diamond codend in SNE RMA. <u>Gillnet</u> : GOM: Trip gillnets – 6.5 in. mesh/150 nets; Day – 6.5 in./50 standup nets, 7 in./100 tiedown nets (prohibited March-June); GB – 6.5 in./50 nets, SNE – 6.5 in./75 nets; Mid-Atlantic: Trip – 5.5 in. diamond/6 in. square, Day – 5.5 in. diamond/6 in. square. <u>Hook</u> : no de-hookers with less than 6 in/. spacing, 12/0 circle hooks or larger; GOM: 2,000 rigged hooks, GB: 3,600 rigged hooks <u>Closures</u> : Add GB seasonal closure areas, May – Blocks 80, 81, 118, 119, 120 (south of 42-20N) <u>Possession limits</u> : <u>Yellowtail flounder</u> : SNE/MA: landing/possession of yellowtail flounder prohibited south of 40N. Mar 1 – May 31: 250 lbs./trip, June 1 – February 28: 500 lbs.-DAS/4,000 lbs. – trip. <u>Cod</u> : GOM: 500 lbs.-DAS/4,000 lbs./trip. Open access commercial permits limited to 200 lbs. regulated groundfish. <u>Recreational</u> : Cod/haddock: 23 in. minimum size. Party/charter: GOM RMA: April-November, 10 cod/haddock combined per person, Dec-Mar – 10 cod/haddock combined, no more than 5 cod per person per trip. Private: GOM RMA: December-March – 10 cod/haddock combined, no more than 5 cod.

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<b>2003</b>
January 15-February 27: Northern Shrimp season (38 days with days off)
March 13: Haddock possession limit suspended until May 1.
May 1: Haddock possession limit of 3,000 lbs-DAS/30,000 lbs.-trip
May 1: Framework Adjustment 37 Modifications to whiting management measures: extension of Cultivator Shoal whiting fishery by one month (June 15-October 31), changes to default measures, minor changes to Cape Cod Bay Raised Footrope Trawl exemption area.
May 13: Haddock possession limit revised to 30,000 lbs./trip (no daily limit).
July 9: Framework Adjustment 38 Raised footrope trawl whiting fishery in the inshore GOM, July 1 – November 30 each year.
July 28: Final emergency rule implementing FW 33 lawsuit settlement agreement <u>Recreational</u> : Haddock, 21 in. minimum size. Party/charter: GOM: Apr-Nov, 10 cod per person, December-March, 5 cod per person. Private: GOM: December-March, 10 cod/haddock combined, no more than 5 cod. Other areas: 10 cod/haddock combined.
October 7: Haddock possession limit suspended for the remainder of the fishing year.
<b>2004</b>
January 19-March 12: Northern Shrimp season (40 days with days off)
May 1: Implementation of Amendment 13. Measures based on emergency rule and measures in effect prior to interim rule. <u>DAS</u> : DAS for each permit re-categorized. Category 1: 60% of maximum DAS used FY 1996-2001 in years that permit landed 5,000 pounds regulated groundfish (est. 43,000 allocated). Category B: 40% of maximum DAS used FY 1996-2001 in years that permit landed 5,000 pounds regulated groundfish; can only be used in specific programs. DAS leasing and transfer programs allow DAS exchanges between vessels under limited conditions. (200 lbs. of winter flounder can be retained by vessels fishing for fluke west of 72-30 W without using a DAS). <u>Minimum Size</u> : No change from emergency rule (commercial); 22 inch cod, 19 inch haddock (rec) <u>Gear</u> : <i>Trawl</i> : No change from emergency rule. <i>Gillnet</i> : GOM/GB: Day-6.5 in./50 standup nets, no seasonal restriction on tie-down nets; Trip: 6.5 in. mesh/150 nets. SNE/MA: 6.5 in. mesh/75 nets. <i>Hook</i> : GOM: 2,000 hooks. GB: 3,600 hooks <u>Closures</u> : Same as emergency rule, with addition of habitat closed areas; all except Jeffrey Bank and NLCA habitat closed area are within existing year-round closed areas. <u>Possession limits</u> : GOM cod: 800 lbs-DAS/4,000 lbs.-trip. GB cod: 1,000 lbs.-DAS/10,000 lbs.-trip. CC/GOM yellowtail flounder: April, May, October, November - 250 lbs. trip, other months 750 lbs.-DAS/3,000 lbs.-trip. SNE/MA yellowtail flounder: March –June, 250 lbs. trip, other months 750 lbs.-DAS/3,000 lbs.-trip. Haddock: 3,000 lbs.-DAS/30,000 lbs.-trip. <u>Special Management Programs</u> : <i>US/Canada Area</i> : hard TAC on cod, haddock (SAs 561, 562), yellowtail flounder (SAs 522, 525, 561, 562). Cod possession limit: 500 lbs-DAS/5,000 lbs-trip, not more than 5 percent of catch. No DAS charged to/from SAs 561, 562. <u>Exempted Fisheries</u> : Northern Shrimp fishery area restriction removed; General Category scallop fishery exemption in SAs 537, 538, 539, and 613.
May 14: Haddock possession limit suspended for remainder of the fishing year.
June 1: CAII Yellowtail Flounder Special Access Program Access to CAII south of 41-30N by trawl vessels targeting yellowtail flounder. Limited to 320 trips (total), two trips per vessel per month, yellowtail flounder limited to 30,000 lbs./trip. Authorized use of Category B DAS.
June 23: Amendment 10 to the Atlantic Sea Scallop FMP. 10-in. square mesh twine top required for all scallop dredge vessels in all areas.
September 3: CAII Yellowtail Flounder SAP ends (no trips can begin after this date)

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<p>November 2: Framework Adjustment 39 (Scallop Framework Adjustment 16)  Scallop dredge vessel access to portions of groundfish mortality CAII and NLCA in 2004, CAI and CAII in 2005, and CAI and NLCA in 2006.  Season: June 15 through January 31.  Possession limits: 1,000 lbs. regulated groundfish, no more than 100 lbs. cod. In NLCA, limited to 250 lbs.-trip yellowtail flounder in June. (Outside of access program, scallop vessels continue to be limited to 300 lbs. regulated groundfish per trip).  Yellowtail flounder catch capped at 10 percent of target TAC for the stock.</p>
<p>October 1: Closure of SAs 561 and 562 to all fishing on a multispecies DAS. Prohibition on the possession of yellowtail flounder from SAs 522, 525, 561, 562.</p>
<p>November 19: Framework Adjustment 40A  <i>Closed Area I Haddock SAP</i>  Access to small area of CAI to target haddock using longlines. Limited to 1,000 mt haddock TAC. Season ends December 31.  <i>Eastern US/CA Area Haddock SAP Pilot Program</i>  Access to northern corner of CAII and adjacent area to target haddock using separator trawl. Season: May 1 through December 31. Authorized use of Category B DAS.  <i>Category B (regular) DAS Pilot Program</i>  Vessels can use Category B (regular) DAS to target healthy stocks. Catch (kept and discarded) limited to 100 lbs. of cod, American plaice, white hake, witch flounder, ocean pout, SNE/MA winter flounder and windowpane flounder, 25 lbs.-DAS/250 lbs.-trip of yellowtail flounder. Maximum of 1,000 DAS can be used in each of four quarters from November 1, 2004 through October 31, 2005.</p>
<p><b>2005</b></p>
<p>January 14: Eastern US/CA reopened, yellowtail flounder daily poundage limit lifter (maximum remains 15,000 lbs./trip). Cod trip limit of 5,000 lbs./trip in Eastern US/CA area. Vessels fishing in Eastern US/CA area must use haddock separator trawl.</p>
<p>February 9: GB yellowtail flounder trip limit reduced to 5,000 lbs./trip in (entire) US/CA Management Area.</p>
<p>April 1: Eastern US/CA area closed until April 30, 2005, possession of GB yellowtail flounder prohibited in entire US/CA Management Area.</p>
<p>May 1: Eastern US/CA Area reopens at beginning of fishing year. Measures revert to those implemented May 1, 2004.</p>
<p>May 3: Haddock trip limit removed for remainder of the fishing year.</p>
<p>May 26: FW 40B implemented. Changes DAS leasing and transfer program, modifies GB Hook Sector provisions, adopts reporting requirements for herring vessels, modifies trip gillnet provisions.  <i>CAII Yellowtail Flounder SAP</i>  Changes starting date to July 1, reduces trip limit to 10,000 lbs, number of trips per vessel per month is one, process established for adjusting the total number of trips.</p>
<p>June 8: Emergency action to control bycatch of haddock in the herring fishery establishes trip limit and overall TAC.</p>
<p>June 15: Implementation of FW 16 to the Sea Scallop FMP authorizes General Category Scallop vessel participation in scallop access areas. Scallop access areas in CAI and CAII open for all vessels on this date.</p>
<p>June 27: Announcement that no trips will be allowed in the CAII Yellowtail Flounder SAP in FY 2005.</p>
<p>July 12: NE multispecies DAS vessels are limited to one trip per month in the Eastern US/CA area.</p>
<p>July 18: Multispecies DAS vessels are prohibited from fishing in the Category B (regular) DAS program in the GB cod stock area through July 31.</p>
<p>July 27: NE multispecies trawl vessels are required to use a haddock separator trawl when fishing in the Eastern US/CA area.</p>
<p>August 26: Eastern US/CA area is closed to all limited access multispecies DAS vessels because 90</p>



Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

percent of the GB cod TAC for the area is projected to be harvested.
September 6: CAI scallop access area is closed to General Category scallop vessels.
September 13: <i>CAI Hook Gear Haddock SAP</i> FW 41 to the Northeast Multispecies FMP implemented. This action allows non-sector longline vessels to participate in the CAI Hook Gear Haddock SAP. The October 1 – December 31 season is divided in half, with sector vessels fishing in the first half and non-sector vessels in the second.
October 6: Participation in the Category B (regular) DAS Pilot Program is prohibited because the quarterly allocation of 1,000 DAS is used. The program ends for FY 2005.
October 31: Boundaries of the sea scallop access areas within CAI and the NLCA access areas are adjusted.
December 12: Northern shrimp fishery opens and will remain open through April 30, 2006.
December 21: The trip limit for NE multispecies vessels fishing for GB yellowtail flounder is changed from unlimited to 15,000 lbs per trip. The quota for the second period of the CAI Hook Gear Haddock SAP is increased to 536.6 mt.
<b>2006</b>
January 12: The emergency rule allowing Atlantic herring vessels to possess haddock is extended for an additional 180 days.
January 31: Areas within groundfish closed areas that are open to scallop fishing through the scallop access area program close at midnight.
February 7: The trip limit for NE multispecies vessels fishing for GB yellowtail flounder is reduced to 1,500 lbs. per DAS up to a maximum of 15,000 lbs.
February 22: The trip limit for NE multispecies vessels fishing for GB yellowtail flounder is changed to 15,000 lbs. per trip regardless of trip length.
March 24: The trip limit for NE multispecies vessels fishing for GB yellowtail flounder is increased to an unlimited amount regardless of trip length.
April 30: Northern shrimp fishery season closes at midnight.
May 1: Implementation of an emergency rule to reduce fishing mortality on groundfish stocks while FW 42 is reviewed. Revised regulations are: <u>DAS</u> : DAS charged at the differential rate of 1.4:1 for all areas outside the US/CA area. <u>Minimum Size</u> : No changes for commercial vessels. <u>Gear</u> : No changes. <u>Closures</u> : No changes <u>Possession limits</u> : <i>GOM cod</i> : 600 lbs.-DAS/4,000 lbs.-trip. <i>GB cod</i> : 1,000 lbs.-DAS/10,000 lbs.-trip outside of eastern US/CA area. <i>CC/GOM yellowtail flounder</i> : May, June October, November - 250 lbs. trip, other months 500 lbs.-DAS/2,000 lbs-trip. <i>GB yellowtail flounder</i> : 10,000 lbs. per trip; <i>GB winter flounder</i> : 5,000 lbs. per trip; <i>SNE/MA yellowtail flounder</i> : March –June, 250 lbs. trip, other months 750 lbs.-DAS/3,000 lbs-trip. White hake: 1,000 lbs.-DAS/10,000 lbs.-trip. <i>Haddock</i> : Trip limit removed for duration of emergency action. <u>Special Management Programs</u> : <b><i>Eastern US/Canada haddock SAP</i></b> : Opening delayed until August 1. <u>Category B (regular) DAS Program</u> : Renewed, with vessels restricted to the US/CA Area, required to use a haddock separator trawl, limited to 500 days May-June, 1,000 days in other quarters, low trip limits on stocks of concern. <u>Recreational measures</u> : Possession of GOM cod prohibited from November 1 – March 31. Minimum size for GOM cod increased to 24 in. <u>Other</u> : Vessels allowed to fish inside and outside the eastern US/CA area on the same trip.
May 19: Announcement that CAII Yellowtail SAP will not open due to low TAC.
June 19: All trawl vessels fishing in the eastern US/CA area required to use a haddock separator trawl.
July 12: General category scallop vessel access to Nantucket Lightship Close area closed due to catching yellowtail flounder incidental catch TAC.

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

July 20: Limited access scallop vessel access to Nantucket Lightship Close area closed due to catching yellowtail flounder incidental catch TAC.
August 11: FW 43 implemented; addresses incidental catch of regulated multispecies by herring vessels. Haddock possession by midwater trawl vessels is allowed subject to a TAC.
September 6: Scallop vessel access to CAII closed due to yellowtail flounder bycatch.
October 1: CAI Hook Gear Haddock SAP opens.
November 22: Implementation of FW 42. Major regulatory changes: <u>DAS</u> : DAS charged at the differential rate of 2:1 for an area in the inshore GOM (for an entire trip if any part of the trip fished in the area) and an area in SNE (only time fishing in the area). <u>Minimum Size</u> : No changes for commercial vessels. <u>Gear</u> : No changes. <u>Closures</u> : No changes <u>Possession limits</u> : <i>GOM cod</i> : 800 lbs-DAS/4,000 lbs.-trip. <i>CC/GOM yellowtail flounder</i> : 250 lbs-DAS/1000 lbs. per trip. <i>SNE/MA yellowtail flounder</i> : 250 lbs-DAS/1000 lbs. per trip. Haddock trip limit unlimited. <b><i>GB Yellowtail flounder: 10,000 lbs/trip. White Hake: 500 lbs-DAS/5,000 lbs-trip (this was an error – FW 42 says 1,000/10,000 per trip).</i></b> <u>Special Management Programs</u> : <i>US/Canada Area</i> : Opening delayed until August 1. Prohibition on discarding legal sized fish. <u>Category B (regular) DAS Program</u> : Renewed for all areas. Trawl vessels required to use a haddock separator trawl, limited to 500 days May-June, 1,000 days in other quarters, low trip limits on stocks of concern. Prohibition on discarding legal sized fish. <u>Recreational measures</u> : (same as emergency rule) Possession of GOM cod prohibited from November 1 – March 31. Minimum size for GOM cod increased to 24 in. <u>Other</u> : (same as emergency rule) Vessels allowed to fish inside and outside the eastern US/CA area on the same trip.
December 1: Northern shrimp fishery opens: 151 days, seven days per week.
<b>2007</b>
March 5: Trawl vessels fishing in the eastern US/CA area allowed to use either a haddock separator trawl or a flounder net. GB yellowtail flounder trip limit reduced to 5,000 lbs.-trip for all vessels declaring into the eastern US/CA area.
April 5: Trip limit for GB yellowtail flounder increased to 25,000 lbs.-trip for the entire US/CA area for the remainder of the fishing year (through April 30).
April 25: Eastern U.S./Canada area closed to limited access multispecies vessels (through April 30, 2007).
April 30: Northern shrimp fishery closed at midnight.
May 1: Enforcement protocol for measuring nets changes. For mesh over 4.72 inches (120 mm), weight used with net spade increased to 8 kg (from 5 kg). Eastern U.S./Canada area reopens. No trips are authorized in the CAII yellowtail flounder SAP in 2007. Trip limit for GB yellowtail flounder reduced to 3,000 pounds per trip in the U.S./Canada area. Interim measures adopted for monkfish FMP restrict monkfish trip limits, reduce DAS that can be used in the SFMA, and does not allow carryover of monkfish DAS.
June 15: NLCA and CAI scallop access areas open.
June 20: Eastern US/CA area is closed to limited access multispecies DAS vessels due to cod catch.
July 8: The NLCA scallop access area is closed to General Category Scallop vessels.
July 15: The CAI scallop access area is closed to General Category Scallop vessels.
August 3: NMFS modifies permit renewal requirements for limited access multispecies vessels. Changes limit ability of vessels to fish in state waters outside of the FMP and retain eligibility for a federal limited access permit.
August 9: Minimum size for GB and GOM haddock caught by commercial vessels is reduced to 18

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

inches. Minimum size for all recreational vessels remains at 19 inches.
October 1: CAI Hook Gear Haddock SAP opens for GB Cod Hook Sector vessels.
October 20: The Eastern US/CA area is opened to limited access multispecies DAS vessels. The GB cod possession limit is 1,000 lb/trip for all vessels declared into the Eastern US/CA Area or the Eastern US/CA Area SAP.
November 15: CAI Hook Gear Haddock SAP opens for non-sector vessels.
November 27: GB yellowtail flounder trip limit for vessels fishing in the US/CA management area increased to 7,500 lb/trip.
November 30: Eastern US/CA area closes
December 1: Northern Shrimp fishery opens. Season scheduled for 152 days, seven days per week.
December 11: CAI Hook Gear haddock SAP second period haddock quota increased to 4,789 mt.
<b>2008</b>
January 10: GB yellowtail flounder tip limit in the U.S./Canada management area set at 1,500 lbs./trip
January 24: Harvesting, possessing, and landing GB yellowtail flounder from the entire U.S./Canada management area is prohibited through April 30, 2008 (applies to trips that have not begun prior to announcement).
February 6: Minimum size for both GB and GOM haddock remains at 18 inches total length; extended through August 10, 2008.
March 12: Scallop elephant trunk access area closed to General Category scallop vessels.
April 30: Northern shrimp fishery closes.
May 1: GB yellowtail flounder trip limit set at 5,000 lbs./trip Eastern U.S./Canada area opening delayed until August 1, 2008 for vessels fishing with trawl gear. Eastern U.S./Canada area opened to longline gear but with a cod cap of 33.4 mt.
May 30: CAII yellowtail SAP remains closed (no trips authorized for FY 2008).
August 1: GOM and GB haddock minimum size reverts to 19 inches. Eastern U.S./Canada management area opens to all vessels. U.S./Canada Haddock SAP opens.
August 4: Happy Birthday, U.S. Coast Guard. The Nantucket Lightship Closed Area closed to scallop vessels to prevent exceeding the yellowtail flounder incidental catch cap.
August 13: Haddock rope trawl (later called the Ruhle trawl, previously called the eliminator trawl) approved for use in the Category B (regular) DAS program and the U.S./Canada Haddock SAP.
September 15: Ruhle trawl authorized for use in the Eastern U.S./Canada management area.
October 1: CAI Hook Gear Haddock SAP opens for non-sector vessels.
October 23: GB yellowtail flounder trip limit reduced from 5,000 lbs./trip to 2,500 lbs./trip for vessels fishing in the U.S./Canada management area.
November 15: CAI Hook Gear Haddock SAP opens for GB cod hook sector vessels.
December 1: Northern shrimp fishery opens for 180 days, seven days per week. Closure scheduled for May 29, 2009.
December 23: Landing limit for Eastern GB cod increased to 1,000 lbs./DAS up to a maximum of 10,000 lbs./trip (applies to cod caught in the Eastern U.S./Canada management area).
December 30: Limited access General Category scallop fishery closed.
<b>2009</b>
January 26: NE Multispecies regulations adopted by FW 42 suspended as a result of a court order. No clear explanation of what measures are affected.
February 13: NMFS identifies following measures as NOT impacted by the court order to suspend measures adopted by FW 42: <ul style="list-style-type: none"> <li>• Recordkeeping and reporting requirements</li> <li>• Gear restrictions</li> <li>• DAS allocations</li> <li>• Time and area closures</li> </ul>

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<ul style="list-style-type: none"> <li>• Minimum fish sizes</li> <li>• SAPs</li> <li>• Recreational measures</li> <li>• Cape Cod Hook Sector</li> <li>• Some possession limits (GOM cod 800 lbs DAS-4,000 lbs/trip., GB cod 1,000 lbs./DAS – 10,000 lbs./trip, US/CA area trip limits)</li> </ul> <p>Confusion continues on what regulations are not in effect.</p>
February 17: Federal court rescinds decision to suspend FW 42 measures and limits suspension to differential DAS counting areas in the GOM and SNE/MA areas, and authorizes submission of DAS leasing requests through March 31, 2009 (vice normal March 1 deadline for such requests).
March 9: Eastern GB cod landing limit reduced to 500 lbs./DAS – 5,000 lbs./trip. GB yellowtail flounder trip limit increased to 5,000 lbs/trip.
April 1: DELMARVA scallop access area closed to General Category scallop vessels.
April 16: Eastern US/CA area closed until May 1.
<p>May 1: Interim rules in effect to reduce overfishing on multispecies stocks until Amendment 16 implemented. Major changes:</p> <p><u>DAS</u>: DAS allocations reduced according to Amendment 13 schedule. Category A DAS are reduced to 45 percent of the permit's DAS baseline, an 18 percent reduction from the previous year's allocations. Differential DAS area increased in SNE/MA.</p> <p><u>Minimum Size</u>: Haddock 18 inch minimum size.</p> <p><u>Gear</u>: No changes.</p> <p><u>Closures</u>: No changes</p> <p><u>Possession limits</u>: <i>GOM cod</i>: 800 lbs-DAS/4,000 lbs.-trip. <i>GB cod</i>: 1,000 lbs./DAS-10,000 lbs./trip (eastern US/CA area 500 lbs./DAS-5,000 lbs./trip). <i>CC/GOM yellowtail flounder</i>: 250 lbs-DAS/1000 lbs. per trip. <i>SNE/MA yellowtail flounder</i>: 250 lbs-DAS/1000 lbs. per trip. Haddock trip limit unlimited. <i>GB Yellowtail flounder</i>: 5,000 lbs/trip. <i>White Hake</i>: 1000 lbs-DAS/10,000 per trip). <i>GB winter flounder</i>: 5,000 lbs./trip. <i>Witch flounder</i>: 1,000 lbs./DAS-5,000 lbs./trip. <i>Possession of ocean pout, northern windowpane flounder, and SNE/MA winter flounder prohibited.</i></p> <p><u>Special Management Programs</u>: <i>US/Canada Area</i>: Opening delayed until August 1 for trawl vessels. <i>SNE/MA winter flounder SAP</i> suspended. State waters winter flounder exemption eliminated. <i>CAI Hook Gear Haddock SAP</i> expanded to May 1 to January 31, area increased, no separation between common pool and sector participants.</p> <p><u>Recreational Measures</u>: GB cod bag limit of n10 cod per person per day for party/charter vessels; retention of GOM cod prohibited from November through April 15; retention of SNE/MA winter flounder prohibited; haddock minimum size reduced to 18 inches.</p> <p><u>Other</u>: Conservation tax removed from DAS transfers.</p>
May 6: Limited access general category scallop fishery closed to IFQ vessels until June 1.
May 29: Northern shrimp fishery closes.
June 5: GB yellowtail flounder trip limit reduced to 2,500 lbs./trip
June 26: eastern US/CA Area closed to all vessels until August 1 (including fixed gear vessels) to prevent exceeding first quarter GB cod TAC.
June 29: CAII Scallop Access Area closed to prevent exceeding GB yellowtail flounder cap.
July 6: <i>GB winter flounder</i> trip limit removed. <i>White hake</i> trip limit increased to 2,000 lbs./DAS-10,000 lbs./trip.
July 19: Limited access general category scallop fishery closed to IFQ vessels until September 1.
September 15: Limited access general category scallop fishery closed to IFQ vessels until December 1.
September 17: Use of flounder trawl net prohibited when fishing in the Eastern US/CA area.
November 2: Mid-water trawl vessels fishing in CAI subject to 100 percent observer coverage, prohibition on releasing catch before sampling by observer.

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

November 20: In the US/CA management area, trawl vessels required to use a haddock separator trawl or Ruhle trawl south of 41-40N latitude. Any vessel fishing in this area and other areas cannot use any other gear on the same trip. Vessels fishing north of 41-40N for the entire trip can use any legal gear.
December 1: Northern shrimp fishery opens for 180 days; scheduled to close May 29, 2010.
<b>2010</b>
January 12: Limited access general category scallop fishery closed to IFQ scallop vessels
March 1: Limited access general category scallop IFQ program opens. Scallop fishery Elephant Trunk and DELMARVA Access Areas open.
March 11: All multispecies vessels fishing on a Category A DAS allowed to use any legal trawl gear in the Western US/CA Area (statistical areas 522, 525) (lifts restrictions adopted November 20, 2009).
April 13: All multispecies vessels fishing on a Category A DAS allowed to use a flounder trawl net in the Eastern US/CA area.
April 20: Eastern US/CA area (statistical areas 561, 562) closed to multispecies vessels and harvest, possession, and landing of GB yellowtail flounder from entire US/CA area (statistical areas 522, 525, 561, 562) prohibited.
May 1: Implementation of Amendment 16 and Framework 44. Expansion of sector management program to majority of the fishery. Major revisions to common pool measures for permitted vessels not in sectors. Adoption of additional at-sea and dockside monitoring requirements for sector vessels, and new reporting requirements for other vessels. Adoption of new US/CA area TACs. Adoption of annual catch limit (ACL) and accountability measures (AM) for most stocks. No retention of SNE/MA winter flounder, ocean pout, windowpane flounder, Atlantic wolffish. Specific allocations of GOM cod and GOM haddock made to the recreational and commercial groundfish fisheries. Key elements: <i>Sector Management:</i> Vessels in sectors subject to hard TACs for most stocks, increased at-sea monitoring (targeting 38 percent of trips), dockside monitoring; not subject to trip limits, some GOM rolling closures, groundfish DAS limits. Permits committed to sectors account for 94 percent or more of available catch except for GOM WFL (84 pct) and SNE/MA YTF (76 pct), and SNE/MA WFL (0%). Total permits committed to sectors: 762. Sector vessels required to retain all legal-sized fish (except limited to one Atlantic halibut, and the five species prohibited). Sectors required to stop fishing in a stock area when a quota (Annual Catch Entitlement, or ACE) for a stock in the area is caught. <i>Common pool:</i> Only a small portion of the ACL available to common pool vessels. Major elements of common pool regulations: <u>DAS:</u> Category A DAS allocations reduced to 27.5 percent of the Amendment 13 baseline allocation. All DAS charged in 24 hour increments. <u>Minimum Size:</u> Haddock 18 inch minimum size. Halibut size increased to 41 inches. <u>Gear:</u> No changes. <u>Closures:</u> No changes <u>Possession limits:</u> <i>GOM cod:</i> 800 lbs-DAS/4,000 lbs.-trip. <i>GB cod:</i> 2,000 lbs./DAS-20,000 lbs./trip (eastern US/CA area 500 lbs./DAS-5,000 lbs./trip). <i>Pollock:</i> 1,000 lbs./DAS – 10,000 lbs/trip; <i>CC/GOM yellowtail flounder:</i> 250 lbs-DAS/1500 lbs. per trip. <i>SNE/MA yellowtail flounder:</i> 250 lbs-DAS/1500 lbs. per trip. Haddock trip limit unlimited. <i>GB Yellowtail flounder:</i> 2,5000 lbs/trip offshore; 250 lbs./DAS-1,500 lbs./trip inshore. <i>White Hake:</i> 2,000 lbs-DAS/10,000 per trip). <i>GB winter flounder:</i> 5,000 lbs./trip. <i>Witch flounder:</i> 1,000 lbs./DAS-10,000 lbs./trip. <i>GB winter flounder:</i> Offshore 5,000 lb./trip. Possession of <i>ocean pout, windowpane flounder, Atlantic wolffish, and SNE/MA winter flounder</i> prohibited. <u>Restricted Gear Areas:</u> Areas near CAI and off SNE created to reduce flatfish catches; limited to separator/Ruhle trawls, rope trawl, certain gillnets in these areas. Limited to 500 lbs. of flatfish combined in these areas. <u>Special Management Programs:</u> <i>US/Canada Area:</i> Opening delayed until August 1 for trawl vessels. Prohibition on discarding legal sized fish. <i>SNE/MA winter flounder SAP</i> suspended. State waters winter flounder exemption eliminated. <i>CAI Hook Gear Haddock SAP</i> expanded to January 31, area increased, no separation between common pool and sector participants.

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<p><i>CAII yellowtail flounder –haddock SAP</i>: SAP opening authorized to target haddock (not GB yellowtail flounder_ subject to specific gear requirements. Opening date August 1.</p> <p><u>Adjustments</u>: RA authorized to make in-season adjustments to trip limits and DAS counting rates.</p> <p><u>DAS Leasing and Transfers</u>: Permits in CPH category allowed to participate in these programs. No conservation tax on transfers.</p> <p><u>Recreational Measures</u>: GOM cod bag limit of 10 cod per person per day for party/charter vessels; 10 fish bag limit on all cod for private vessels; retention of GOM cod prohibited from November through April 15; retention of SNE/MA winter flounder prohibited; Atlantic wolffish retention prohibited; haddock minimum size reduced to 18 inches. Halibut size increased to 41 inches. No limit on hooks (two hook limit removed).</p>
May 5: Northern shrimp fishery season closes
<p>May 27: Changes to common pool trip limits:</p> <p>GOM haddock: 1,000 lbs./trip</p> <p>GB haddock: 10,000 lbs./trip</p> <p>GOM winter flounder: 250 lbs./trip</p> <p>GB winter flounder: 1,000 lbs./trip (offshore)</p> <p>GB yellowtail flounder: 1,000 lbs./trip (offshore)</p>
June 28: NLCA scallop access area opens
July 15: Pollock ACL revised; increased to 16,553 mt.
<p>July 30: Changes to common pool measures:</p> <p>GB yellowtail flounder: Selective trawl gear required in Eastern US/CA area and Western US/CA area south of 41-40N.</p> <p>GOM cod: 200 lbs./DAS-1,000 lbs./trip</p>
<p>August 6: Changes to common pool measures:</p> <p>Pollock trip limit removed</p> <p>Witch flounder: 130 lbs./trip</p>
August 31: Common pool DAS counting rate set to 2:1 for GOM and GB differential DAS areas.
<p>September 22: Changes to common pool measures:</p> <p>GOM cod: 100 lbs./DAS-1,000 lbs./trip</p> <p>GB yellowtail flounder: 100 lbs./trip</p> <p>White hake: 100 lbs./DAS – 500 lbs./trip</p> <p>US/CA area: Selective trawl gear required to entire US/CA management area</p>
October 18: Handgear A cod trip limit reduced to 50 lbs/trip.
December 1: Northern shrimp season opens
<b>2011</b>
January 24: DELMARVA scallop access area closes to LAGC vessels
February 28: Northern shrimp season closes
<p>March 31: Groundfish common pool trip limit changes.</p> <p>Increase:</p> <p>GB cod 3,000 lbs/DAS, 30,000 lbs/trip</p> <p>SNE/MA yellowtail flounder 750 lbs/DAS, 3,000 lbs/trip</p> <p>CC/GOM yellowtail flounder 750 lbs/DAS, 3,000 lbs/trip.</p> <p>Decrease:</p> <p>GOM cod 100 lb/trip</p> <p>GOM winter flounder 100 lb/trip</p>
<p>May 1: Start of groundfish fishing year. Common pool trip limits revert to chart (see attached for May 2011). Differential DAS counting areas in GOM and GB.</p> <p>GOM cod spawning area closure adopted off NH, April – June; prohibits all rec and commercial groundfish fishing.</p>

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

CAII SAP modified to allow targeting haddock, August 1 – January 31. Gen Cat scallop fishing GSC spawning closure eliminated
August 1: CAI, CAII, and Hudson Canyon scallop access areas open
August 30: Groundfish common pool trip limit reductions. GOM cod: 350 lb/DAS, 1,000 lb/trip GB cod: 300 lb/DAS, 600 lb/trip
September 8: Differential DAS rates reduced for common pool vessels in the offshore GOM and inshore GB differential DAS areas
September 14: Haddock catch cap regulations for herring fishery change. Cap increased to 1% of GB haddock ABC and 1% of GOM haddock ABC. Applies to MIWT gear. Based on catch estimate.
September 19: Dockside monitoring program suspended.
October 1 and 3: Herring Management Areas 1B (Oct 1) and 3 (Oct 3) closed to directed herring fishing due to herring quota being caught
October 3: Handgear B trip limits reduced ot GOM cod 50 lb/trip, GB cod 25 lb/trip
October 27: Herring Management Areas 1A closed to directed herring fishing due to herring quota being caught
November 7-10: Directed herring fishery reopens in Area 3 for 3 days.
November 12: Hudson Canyon scallop access area closes to LAGC vessels

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

May, 2011 trip limits:

Species	Stock Area <sup>1</sup>	A DAS	Handgear A	Handgear B	Eastern US/Canada Haddock SAP <sup>3</sup>	Regular B DAS Program		
						Separator or Ruhle Trawl <sup>3</sup>	Non-Trawl Gear	
Cod	GOM	500 lb/DAS, up to 2,000 lb/trip	300 lb/trip	75 lb/trip	1,000 lb/trip	100 lb/DAS, up to 1,000 lb/trip		
	OFF GB, IN GB, and SNE	3,000 lb/DAS, up to 30,000 lb/trip (outside of the Eastern U.S./Canada Area) <sup>2</sup>	300 lb/trip	75 lb/trip				
		500 lb/DAS, up to 5,000 lb/trip (E. U.S./Canada Area)						
		1,000 lb/trip Closed Area I Hook Gear Haddock SAP -or- Closed Area II Yellowtail Flounder/Haddock SAP (for targeting haddock)						
Haddock	GOM	1,000 lb/trip						
	OFF GB, IN GB, and SNE	10,000 lb/trip						
Pollock	All Areas	Unlimited				100 lb/DAS to 1,000 lb/trip		
Redfish	All Areas	Unlimited						
White hake	All Areas	1,500 lb/trip				100 lb/DAS to 1,000 lb/trip		
Atlantic halibut	All Areas	1 fish/trip						
Yellowtail flounder	GOM, IN GB	500 lb/DAS, up to 2,000 lb/trip			NA	25 lb/DAS to 250 lb/trip		
	SNE	500 lb/DAS, up to 2,000 lb/trip						
		OFF GB	2,500 lb/trip			100 lb/DAS, up to 500 lb/trip of all flatfish combined	100 lb/DAS, to 1,000 lb/trip	
American plaice (dabs)	All Areas	Unlimited			500 lb/trip of all flatfish combined	100 lb/DAS for each stock, up to 500 lb/trip of all flatfish combined	100 lb/DAS, to 1,000 lb/trip	
Witch flounder (gray sole)	All Areas	250 lb/trip					100 lb/DAS, to 250 lb/trip	
Winter flounder	OFF GB	1,000 lb/trip			100 lb/trip		100 lb/DAS, to 1,000 lb/trip	
	GOM	250 lb/trip			NA		250 lb/trip	
	SNE	Zero – possession prohibited <sup>4</sup>						
Windowpane Flounder	All Areas	Zero – possession prohibited						
Ocean Pout								
Atlantic Wolffish								

<sup>1</sup> Broad Stock Areas: Gulf of Maine (GOM), Inshore Georges Bank (IN GB), Offshore Georges Bank (OFF GB), and Southern New England (SNE)

<sup>2</sup> Vessel must submit GOM Cod Trip Limit Exemption Form via VMS

<sup>3</sup> Gear performance trip limits of 500 lb all flatfish combined, 500 lb whole monkfish (unless otherwise restricted by trip limits of the monkfish FMP), 500 lb whole skate, and zero lobsters also apply

<sup>4</sup> A vessel may transit the IN GB and SNE areas with GOM or OFF GB winter flounder on board, provided that fishing gear is properly stowed



Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<b>2012</b>
January 6: Recreational fishery for GOM haddock changes: Decrease: 9 fish possession limit (reduced from unlimited) Increase: Minimum fish size to 19 inches total length (up from 18 inches)
February 7: Commercial groundfish GOM Winter Flounder catch limits change for remainder of the FY 2011 through Emergency Action: Increase: 524 mt (up from 231 mt)
February 20: Directed herring fishery in Area 2 closes due to herring quota being caught
March 8: Groundfish common pool trip limit changes for the remainder of FY 2011. Increase: GB cod: ADAS: 1,500 lbs/DAS up to 4,500 lbs/trip (up from 300 lb/DAS up to 600 lb/trip) GB cod: HB 75 lb/trip (up from 25 lb/trip) SNE/MA yellowtail flounder: ADAS: 1,500 lb/DAS up to 4,500 lb/trip (up from 500 lb/DAS up to 2,000 lb/trip)
April 20: Recreational fishery for GOM haddock changes: Increase: Unlimited fish possession limit (up from 9 fish) Decrease: Minimum fish size to 18 inches total length (down from 19 inches)
May 1: Start of groundfish fishing year. Sectors: Exemptions: <ul style="list-style-type: none"> <li>- Universal- exempt from trip limits for allocated stocks; exempt from the GB Seasonal Closure Area; exempt from the requirement to use DAS to land GF; can use 6-inch mesh on cod end on haddock separator trawls, rope trawls, and Rhule trawls when on GB; exempt from portions of the GOM Rolling Closure Areas</li> <li>- 20 additional sector by sector exemptions approved for FY 2012 (see table)</li> </ul> Common Pool: <ul style="list-style-type: none"> <li>-Common pool trip limits revert to chart (see attached for May 2012).</li> <li>-DAS counting rate is 1 for common pool on Category A DAS</li> <li>-Common pool trimester TAC</li> <li>-Trawl gear allowed in Eastern US/Canada management area (rather than 8/1 in the past) but still with</li> </ul>

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<p>haddock separator trawl, Rhule trawl, or flounder trawl</p> <p>- FW 47 removed the common pool restricted gear areas in SNE and GB (in place since 5/1/2010)</p> <p>Common Pool and Sectors</p> <ul style="list-style-type: none"> <li>- FW 47 established AMs for windowpane flounder, ocean pout and Atlantic halibut</li> <li>- FW 47 – by Jan 15<sup>th</sup> of each FY – re-estimate the expected catch of GB YTF by the scallop fishery – if less than 90% of scallop fishery sub-ACL, then increase the commercial GF fishery sub- ACL for GB YTF</li> </ul> <p>Recreational fishery for GOM cod changes:</p> <p>Decrease:</p> <p>Minimum fish size to 19 inches total length (down from 24 inches)</p> <p>9 fish possession limit (reduced from 10 fish)</p> <p>Small-mesh multispecies (whiting) fishery:</p> <p>ACLs and AMs created for silver hake, red hake, and offshore hake through a Secretarial Amendment</p>
May 7: Sea Scallop Framework 23 implemented, revises the AM closure schedules to better target months with the highest yellowtail flounder catch rates for both Southern New England/Mid-Atlantic and Georges Bank stocks.
June 13: Delmarva closed to scallop fishing for the remained of the fishing year
<p>July 13: Revised catch limits for GB YTF for FY 2012</p> <p>Increased GF sub-ACL by 150.6 mt and decreased scallop sub-ACL by same amount</p> <p>Scallop revised sub-ACL is 156.9 mt (down from 307.5 mt)</p> <p>Groundfish revised sub-ACL is 368.3 mt (up from 217.7 mt)</p>
August 15: White hake trimester area closed for common pool fishery through August 31
<p>September 20: Northern red hake possession limit through April 30, 2013</p> <p>Decrease:</p> <p>400 lb possession limit in the GOM/GB Exemption Area (northern hake stock area)</p>
September 26: Common pool fishery – adjustment to DAS counting rate – differential DAS counting in GOM, GB and SNE/MA due to overages of northern window pane flounder. Atlantic halibut, and southern windowpane flounder
October 7: Directed herring fishery closed in Area 3 due to herring catches, closed through December 31
October 24: Delmarva closed to scallop fishing extended through May 13, 2013
November 5: Directed herring fishery closed in 1A due to herring catches, closed through December 31
December 5: Common pool - Area closed for remainder of trimester 2 to white hake fishing, through December 31

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

December 12: Closure of Elephant Trunk Area for sea scallop vessel through June 10, 2013

Beginning May 1, 2012, common pool vessels are subject to the trip limits listed below. Under FW 44, the Regional Administrator has the authority to revise trip limits for common pool vessels to ensure that ACLs allocated to the common pool are not exceeded.

Species	Minimum Size	Stock Area <sup>1</sup>	A DAS	Handgear A	Handgear B	Regular B DAS Program	
						Separator or Rulle Trawl <sup>4</sup>	Non-Trawl Gear
Cod	22"	GOM	650 lb/DAS, up to 2,000 lb/trip	300 lb/trip <sup>3</sup>	75 lb/trip <sup>3</sup>	100 lb/DAS, up to 1,000 lb/trip	
		OFF GB, IN GB, and SNE	2,000 lb/DAS, up to 20,000 lb/trip (outside of the Eastern U.S./Canada Area) <sup>2</sup>	300 lb/trip <sup>3</sup>	75 lb/trip <sup>3</sup>		
			500 lb/DAS, up to 5,000 lb/trip (E. U.S./Canada Area)				
			1,000 lb/trip Closed Area I Hook Gear Haddock SAP -or- Closed Area II Yellowtail Flounder/Haddock SAP (for targeting haddock)				
Haddock	18"	GOM	1,000 lb/trip				
		OFF GB, IN GB, and SNE	10,000 lb/trip				
Pollock	19"	All Areas	Unlimited		100 lb/DAS to 1,000 lb/trip		
Redfish	9"	All Areas	Unlimited		100 lb/DAS to 1,000 lb/trip		
White hake	none	All Areas	1,500 lb/trip		100 lb/DAS to 1,000 lb/trip		
Atlantic halibut	41"	All Areas	1 fish/trip				
Yellowtail flounder	13"	GOM, IN GB	500 lb/DAS, up to 2,000 lb/trip		25 lb/DAS to 250 lb/trip		
		SNE	1,500 lb/DAS, up to 4,500 lb/trip				
		OFF GB	500 lb/trip				
American plaice (dabs)	14"	All Areas	Unlimited		100 lb/DAS for each stock up to 500 lb/trip of all flatfish combined		
Witch flounder (gray sole)	14"	All Areas	250 lb/trip				
Winter flounder	12"	OFF GB	1,000 lb/trip				
		GOM	250 lb/trip				
		IN GB, SNE	Zero – possession prohibited <sup>5</sup>				
Windowpane Flounder		All Areas	Zero – possession prohibited				
Ocean Pout							
Atlantic Wolffish							

<sup>1</sup> Broad Stock Areas: Gulf of Maine (GOM), Inshore Georges Bank (IN GB), Offshore Georges Bank (OFF GB), and Southern New England (SNE)

<sup>2</sup> Vessel must submit GOM Cod Trip Limit Exemption Form via VMS

<sup>3</sup> Unless otherwise revised by the Regional Administrator

<sup>4</sup> Gear performance trip limits of 500 lb all flatfish combined, 500 lb whole monkfish (unless restricted by the monkfish FMP), 500 lb whole skate, and zero lobsters also apply

<sup>5</sup> A vessel may transit the INGB and SNE areas with GOM or OffGB winter flounder on board, provided that fishing gear is properly stowed.

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

	Exemption	FGS	NCCS	NEFS II	NEFS III	NEFS IV	NEFS V	NEFS VI	NEFS VII	NEFS VIII	NEFS IX	NEFS X	NEFS XI	NEFS XII	NEFS XIII	PCS	SHS1	SHS 3	TSS
1	120-Day Gillnet Block out of the Fishery	X	X		X			X	X			X	X	X	X	X	X	X	X
2	20-Day Spawning Block	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
3	Limits on the Number of Gillnets for Day Gillnet Vessels	X			X			X	X			X	X	X	X	X	X	X	X
4	Prohibition on a Vessel Hauling Another Vessel's Gillnet Gear	X		X	X			X	X			X	X	X	X	X	X	X	X
5	Limits on the Number of Gillnets that May be Hauled on GB when Fishing on a Groundfish/Monkfish DAS	X			X			X	X			X	X	X	X	X	X	X	X
6	Limits on the Number of Hooks that May be Fished	X	X		X			X	X			X	X	X			X	X	X
7	DAS Leasing Program Length and Horsepower Restrictions	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	GOM Sink Gillnet Mesh Exemption January Through April	X			X			X	X			X	X	X	X	X	X	X	X
9	Extension of the GOM Haddock Sink Gillnet Program Through May	X			X			X	X			X	X	X	X	X	X	X	X
10	Prohibition on Discarding	X											X	X			X	X	
11	Daily Catch Reporting by Sector Managers for Sector Vessels that Fish in the CA I Hook Gear Haddock SAP	X	X		X			X	X			X	X	X	X		X	X	X
12	Gear Requirements in the US/CA Management Area	X		X	X		X	X	X	X	X	X	X	X	X		X	X	X
13	Powering VMS While at the Dock*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	DSM Requirements for Vessels Fishing West of 72°30' W. Long.	X		X	X		X	X	X	X	X	X	X	X	X		X	X	X
15	DSM Requirements for Handgear A-permitted Sector Vessels	X		X	X			X	X	X		X	X	X	X		X	X	X
16	DSM Requirements for Monkfish Trips in the Monkfish SFMA	X		X	X		X	X	X	X	X	X	X	X	X		X	X	X
17	Prohibition on Fishing Inside and Outside the CA I Hook Gear Haddock SAP While on the Same Trip	X						X	X			X	X	X	X		X	X	X
18	6.5-Inch Minimum Mesh Size Requirement to Allow 6-Inch Mesh for Targeted Redfish Trips	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
19	Prohibition on a Vessel Hauling Another Vessel's Hook Gear	X			X			X	X			X	X	X	X		X	X	
20	Requirement to Declare Intent to Fish in the Eastern US/CA SAP and CA II YT/haddock SAP from the Dock	X		X			X	X	X	X	X	X	X	X	X		X	X	X

\* The sector vessel may only powerdown its VMS if the vessel does not hold other permits requiring continuous VMS operation, and must send the VMS powerdown declaration before turning off power to the VMS unit.

## 2013

February 1: Implementation of the Coastal GOM Consequence Closure Area – due to harbor porpoise bycatch for the Northeast sink gillnet fisheries (shifted from original date of October and November, 2012); to be in place for February and March 2013

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<p>February 11: Common pool trip limits adjustment for five stocks through April 30</p> <p>Increase:</p> <p>GOM Cod: A DAS- 2,000 lb/DAS up to 6,000 lb/trip (up from 650lb/DAS up to 2,000 lb/trip)</p> <p>GOM Cod: HB- 200 lb/trip (up from 75 lb/trip)</p> <p>GB Cod: A DAS- 3,000 lb/DAS up to 30,000 lb/trip (up from 2,000 lb/DAS up to 20,000 lb/trip)</p> <p>GB Cod: HB – 125 lb/trip (up from 75 lb/trip)</p> <p>SNE/MA YTF – A DAS- 5,000 lb/DAS up to 15,000 lb/trip (up from 1,500 lb/DAS up to 4,500 lb/trip)</p> <p>Decrease:</p> <p>White Hake: A DAS: 500 lb/trip (down from 1,500 lb/trip)</p> <p>Pollock: A DAS: 10,000 lb/trip (down from unlimited)</p>
February 28: Sector exemption to target redfish with 4.5 inch codend mesh for remainder of FY 2012
April 7: Directed herring fishery closed in Area 2 due to herring catches, through the end of the year
<p>May 1: Start of groundfish fishing year</p> <p>FW 48- Management measures AND FW 50- Specifications for many groundfish stocks for FY 2013-FY 2015</p> <ul style="list-style-type: none"> <li>- Catch limits for FYs 2013-2015 for many of the groundfish stocks, including FY 2013 total allowable catches (TACs) for U.S./Canada stocks of Eastern Georges Bank (GB) cod and haddock</li> <li>- revised Southern New England/Mid-Atlantic (SNE/MA) winter flounder rebuilding program and allowance of SNE/MA winter flounder landings</li> <li>- Reductions in the minimum fish size for some species- implemented in July</li> <li>- Scallop fishery allocated a sub-ACL of SNE/MA windowpane flounder beginning in FY 2013 (AMs under development in the Scallop plan)</li> <li>- Scallop sub-ACL for GB YTF will be 16% of the US ABC starting in FY 2014</li> <li>- Small-mesh fisheries allocated 2% of the US ABC for GB YTF starting in FY 2013; (AMs are under development)</li> <li>- AMs revised/developed for non-allocated stocks of groundfish including Atlantic halibut, wolffish, northern windowpane flounder, southern windowpane flounder, and ocean pout</li> <li>- Changes to sector carryover, this new mechanism specifies that an automatic de minimus amount of carryover will not be counted against ACEs or ACLs in order to provide some incentive for vessels not to risk safety at sea in the last part of the fishing year.</li> <li>- Elimination of dockside monitoring requirements for the groundfish fishery</li> <li>- Changes to reporting in the US/CA area – later changed back and applied retroactively (see below)</li> </ul> <p>Also, emergency action to implement FY 2013 catch limits for white hake and GB yellowtail flounder and to reduce FY 2012 Gulf of Maine (GOM) cod carryover</p> <p>Sector Exemptions:</p> <p>Universal ones and 23 additional (see table below)</p> <p>Common Pool</p> <p>GOM cod: Handgear A- 100 lb /trip</p>

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<p>GOM cod: Handgear B- 25 lb / trip  GB cod: Handgear A- 300 lb/trip  GB cod: Handgear B – 75 lb / trip  Small vessel category- 100 lb each of cod, haddock, and yellowtail per trip. (combined total of 300 lb per trip), and up to the trip limit of the remaining groundfish stocks  Common pool trip limits revert to chart (see attached for May 2013).  No differential DAS</p> <p>Recreational Fishery changes:  -Vessels are allowed to retain and land SNE/MA winter flounder from Federal waters  -GOM haddock minimum size has increased to 21 inches; no bag limit.</p> <p>Changes to Eastern US/ Canada Area Quota Monitoring Catch Apportioned by Areas Fished (issued 7-9-2013 and applied retroactively to May 1, 2013)</p> <ul style="list-style-type: none"> <li>- Changes to how catches for cod, haddock, and yellowtail flounder in the Eastern U.S./Canada Area are tracked. The statistical areas reported on vessel monitoring system (VMS) catch reports and vessel trip reports (VTRs) will be used to apportion catch to specific stock allocations. This change reinstates the practice that was followed by NMFS since the implementation of Amendment 16 in May 2010</li> </ul>
<p>May 6: Implementation of A19 to GF FMP that applies to the small-mesh multispecies (whiting fishery)</p> <ul style="list-style-type: none"> <li>- The specifications for the 2013 and 2014 fishing years</li> <li>- That the red hake trip limit will be 5,000 lb for all areas and all gear types</li> <li>- That the southern whiting trip limit will be 40,000 lb for vessels using 3-inch mesh, or larger, in the Southern New England and Mid-Atlantic Exemption Areas</li> <li>- Changes to the accountability measures for small-mesh multispecies</li> <li>- Changes to the quota structure for the southern area, if landings increase rapidly and</li> <li>- Administrative changes to the specifications and framework adjustment processes for the whiting fishery</li> </ul>
<p>May 20: Scallop FW 24</p> <ul style="list-style-type: none"> <li>- Changes to YTF AMs in SNE/MA--- seasonal closures based on the percentage of the overage in the year following the overage</li> <li>- SNE/MA windowpane sub-ACLs in the scallop fishery --- allocated in GF FW 50- AM to be developed in the next Scallop FW</li> </ul>
<p>July 1: Change in Minimum Fish Sizes for the Commercial Fishery</p>

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

Species	Minimum Size as of May 1, 2013	New Minimum Size as of July 1, 2013
Cod	22	19
Haddock	18	16
Pollock	19	19
Witch flounder (gray sole)	14	13
Yellowtail flounder	13	12
American plaice (dab)	14	12
Atlantic halibut	41	41
Winter flounder (blackback)	12	12
Redfish	9	7
<p>July 16: Common Pool Changes  Decrease in trip limit  SNE/MA winter flounder – 1,000 lb/trip</p>		
<p>Trimester Closure for Remainder of Trimester 1 (July 16, 2013-August 31, 2013) for GOM haddock</p>		
<p>July 30: Common Pool Closure for remainder of trimester 1 (July 30- August 31, 2013) for GB cod</p>		
<p>August 26: Northern red hake possession limit reduced to 400 lb (August 26 – April 30, 2014)</p>		
<p>August 28: Changes to Common Pool Trip Limits (August 28 – April 30, 2014)  Decrease  SNE/MA winter flounder – to 300 lb/trip  GOM haddock – to zero lb/trip</p>		
<p>October 15: Directed herring fishery closes in herring area 1A until the end of 2013</p>		
<p>October 24: Directed herring fishery closed in herring area 3 until the end of 2013</p>		
<p>October 30: Common Pool Trip Limit Changes</p>		



Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

Stock	Permit	Old Possession Limit	New Possession Limit
GOM Cod	A DAS	100 lb/DAS up to 300 lb/trip	<b>650 lb/DAS up to 2,000 lb/trip</b>
	Handgear A	100 lb/trip	<b>300 lb/trip</b>
	Handgear B	25 lb/trip	<b>75 lb/trip</b>
	Category C	100 lb cod within the 300-lb combined trip limit of cod/yellowtail flounder	<b>300 lb/trip within the 300-lb combined trip limit of cod/yellowtail flounder</b>
CC/GOM Yellowtail Flounder	A DAS	500 lb /DAS up to 2,000 lb/trip	<b>2,000 lb/trip</b>
GOM Winter Flounder	A DAS	500 lb/trip	<b>2,000 lb/trip</b>
White Hake	A DAS	500 lb/trip	<b>1,000 lb /DAS up to 3,000 lb/trip</b>
Pollock	A DAS	10,000 lb/trip	<b>Unlimited</b>
<p>December 31: Sector Exemption allowing vessels into portions of the Nantucket Lightship year-round closed area (until the end of FY 2013)</p> <p>Sector vessels can fish in the Eastern and Western Exemption Areas of the Nantucket Lightship Closed Area under standard at-sea monitoring requirements. Sectors with vessels interested in utilizing this exemption must notify NOAA Fisheries. Prior to fishing in these areas, vessels will need a revised Letter of Authorization (LOA) from their sector manager. Vessels can only fish in these areas if they have a valid LOA on board that includes this exemption. Vessels must call into the Pre-Trip Notification System (PTNS) 48 hours in advance of departure. Vessels that intend to fish in the Eastern or Western Exemption Areas must indicate their intent by writing "N4" in the "Comments" field of their trip start hail and submit the trip start hail prior to departure for each trip into these areas.</p> <p>When fishing in the Eastern or Western Exemption Areas, gillnet vessels must fish with extra-large mesh gillnets (10" or greater). Pingers must be attached to gillnets when fishing in the Western Exemption Area. Trawl vessels must fish with selective trawl gear, such as the Ruhle or haddock separator trawl. Standard otter trawls and flounder nets are prohibited in these areas.</p>			



Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

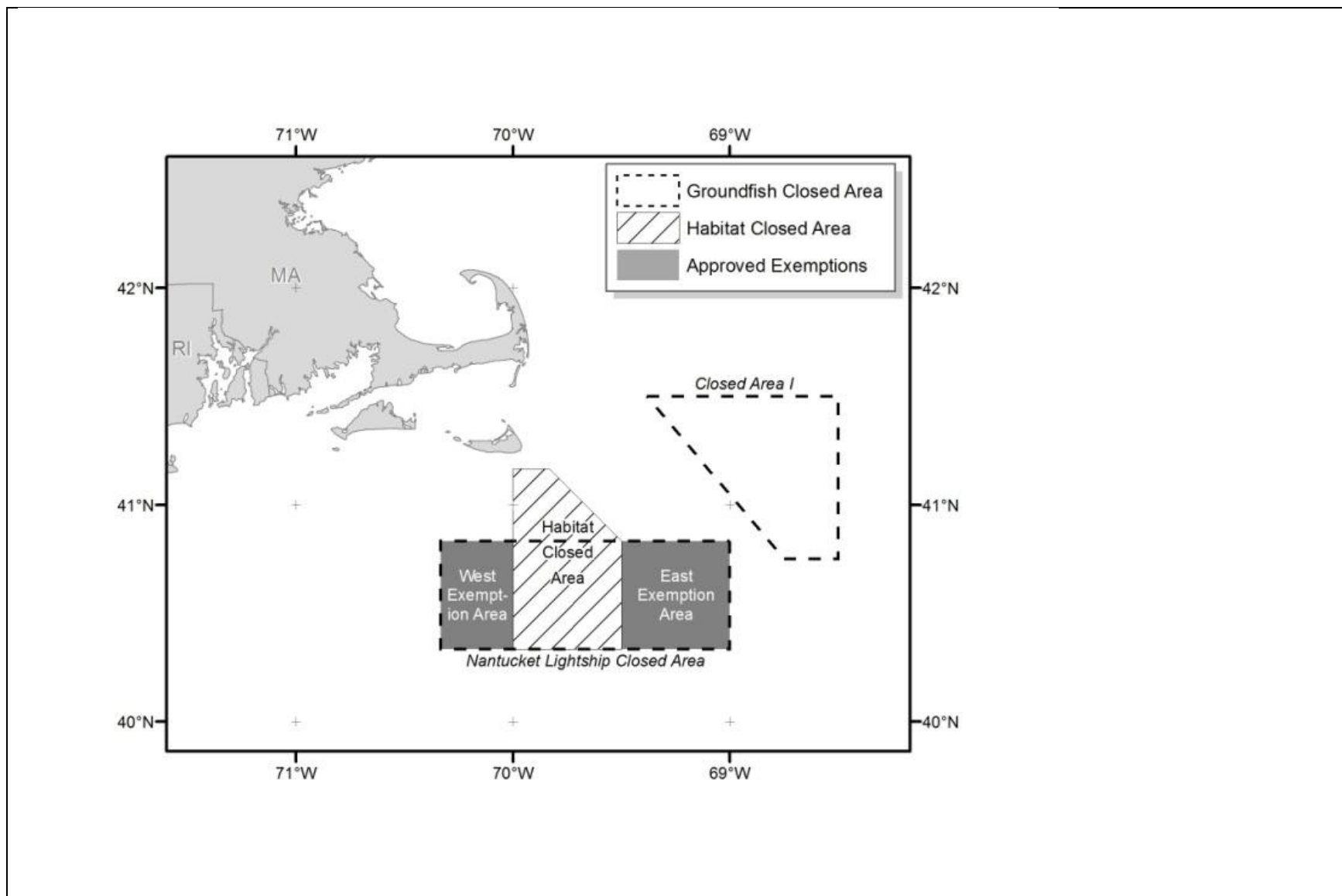


Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

What do the exemptions mean?	Exemptions are briefly explained below:
The 120-day gillnet block out of the fishery	A gillnet vessel granted this exemption is not required to declare and take 120 days out of the gillnet fishery in 2013.
The 20-day spawning block	A vessel granted this exemption is not required to stop fishing for groundfish for a 20-day period between March 1 and May 31 of 2013.
The prohibition on hauling another vessel's gillnet gear	This exemption allows multiple vessels participating in the same sector to haul each other's gillnet gear. Each vessel using this exemption must tag each gillnet it intends to haul with one tag.
The number of gillnets that may be hauled on GB when fishing on a groundfish/monkfish DAS	This exemption allows a vessel issued both a groundfish permit and a monkfish permit to haul all of their gillnets on a single GB trip.
The number of hooks that may be fished	A vessel granted this exemption has no limit on the number of hooks they may fish within any of the Regulated Mesh Areas.
The DAS Leasing Program length and horsepower restrictions	Any sector vessel granted this exemption may lease DAS to any other sector vessel also granted this exemption, regardless of a vessel's leasing length and horsepower baseline restrictions.
The prohibition on discarding	A vessel granted this exemption <u>must</u> discard <u>all</u> legal-sized unmarketable fish at sea (not on selected trips), and cannot land unmarketable fish.
Daily catch reporting by sector managers for sectors vessels fishing in the Closed Area (CA) I Hook Gear Haddock Special Access Program (SAP)	This exemption is specific to sector managers, and not to sector vessels. A sector vessel fishing in the CA I Hook Gear Haddock SAP must complete a daily vessel monitoring system (VMS) catch report and submit it directly to us.
Powering a VMS while at the dock	This exemption allows a sector vessel to power down its VMS unit at the dock, after sending a power-down code to us. A vessel with multiple permits requiring VMS (i.e., monkfish, scallop, etc.) must continue to comply with reporting requirements for other fisheries, and may not be able to take advantage of this exemption.
Prohibition on fishing inside and outside the CA I Hook Gear Haddock SAP while on the same trip	A vessel may fish both inside and outside the CA I Hook Gear Haddock SAP on the same trip, but is prohibited from setting or hauling fixed gear across the border of the SAP. The vessel will be required to report via VMS catch from inside the SAP daily either to the sector manager or to us if the sector manager is also exempt from daily reporting requirements for the CA I Hook Gear Haddock SAP. Vessels declared into the CA I Hook Gear Haddock SAP may possess only demersal longline gear or tub trawl gear on the vessel during the trip.
The 6.5-inch minimum mesh size requirement on targeted redfish trips	This exemption allows a vessel to use codends with mesh size as small as 4.5 inches to target redfish, provided an industry-funded monitor is onboard. Sectors wishing to use this exemption must develop an industry-funded monitoring program. NMFS will monitor monthly catch thresholds of 80-percent redfish and a 5-percent groundfish discard limit.
The prohibition on a vessel hauling another vessel's hook gear	This exemption allows multiple vessels participating in the same sector to haul each other's hook gear. Each vessel intending to haul the hook gear must tag the gear consistent with §§ 648.14(k)(6)(ii)(B) and 648.84(a).
The requirement to declare intent to fish in the Eastern U.S./Canada SAP and the CA II Yellowtail flounder/Haddock SAP	This exemption allows a sector vessel to declare its intent to fish in these SAPs while at sea using VMS.

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<b>The limits on the number of gillnets for Day gillnet vessels*</b>	A sector Day gillnet vessel is allowed to fish up to a maximum of 150 nets (any combination of flatfish or roundfish nets), except in: May: Blocks 124 and 125 June: Blocks 132 and 133 <u>Vessels granted this exemption must tag each gillnet with one gillnet tag.</u>
<b>Gear requirements in the U.S./Canada Management Area</b>	This exemption allows for the use of any trawl gear in the U.S./Canada Management Area.
<b>Seasonal restrictions for the Eastern U.S./Canada Haddock SAP</b>	This exemption allows a sector vessel to access the Eastern U.S./Canada Haddock SAP from May 1 to December 31 with any gear approved for use in the Eastern U.S./Canada Area, including the standard otter trawl.
<b>Seasonal restrictions for the CA II Yellowtail Flounder/Haddock SAP</b>	This exemption allows a sector vessel to access the CA II Yellowtail Flounder/Haddock SAP from May 1 to January 31 when using selective gear approved for use in the SAP, or the standard otter trawl.
<b>Sampling Exemption</b>	A vessel participating in a sector granted this exemption may temporarily retain fish for sampling purposes.
<b>Additional Sector Provisions</b>	A sector may include additional provisions in its operations plan. Please consult your sector manager for information on any additional provisions.

\*Please note that this exemption has been modified from previous years.

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

Species	Minimum Size	Stock Area <sup>1</sup>	A DAS	Handgear A	Handgear B	Regular B DAS Program		
						Separator or Rulle Trawl <sup>4</sup>	Non-Trawl Gear	
Cod	22"	GOM	100 lb/DAS, up to 300 lb/trip	100 lb/trip <sup>3</sup>	25 lb/trip <sup>3</sup>	100 lb/DAS, up to 300 lb/trip		
		OFF GB, IN GB, and SNE	2,000 lb/DAS, up to 20,000 lb/trip (outside of the Eastern U.S./Canada Area) <sup>2</sup>	300 lb/trip <sup>3</sup>	75 lb/trip <sup>3</sup>	100 lb/DAS to 1,000 lb/trip		
			500 lb/DAS, up to 5,000 lb/trip (E. U.S./Canada Area)					
			1,000 lb/trip Closed Area I Hook Gear Haddock SAP -or- Closed Area II Yellowtail Flounder/Haddock SAP (for targeting haddock)					
Haddock	18"	GOM	100 lb/trip					
		OFF GB, IN GB, and SNE	10,000 lb/trip					
Pollock	19"	All Areas	10,000 lb/trip			100 lb/DAS to 1,000 lb/trip		
Redfish	9"	All Areas	Unlimited					
White hake	none	All Areas	500 lb/trip			100 lb/DAS to 500 lb/trip		
Atlantic halibut	41"	All Areas	1 fish/trip					
Yellowtail flounder	13"	GOM, IN GB	500 lb/DAS, up to 2,000 lb/trip			25 lb/DAS to 250 lb/trip		
		SNE	2,000 lb/DAS, up to 6,000 lb/trip					
		OFF GB	100 lb/trip			500 lb/trip of all flatfish combined. However, may not exceed A-DAS limit for any stock	100 lb/trip	
American plaice (dabs)	14"	All Areas	Unlimited				100 lb/DAS, to 1,000 lb/trip	
Witch flounder (gray sole)	14"	All Areas	500 lb/trip				100 lb/DAS, to 250 lb/trip	
Winter flounder	12"	OFF GB	1,000 lb/trip				100 lb/DAS, to 1,000 lb/trip	
		IN GB, SNE	5,000 lb/DAS, up to 15,000 lb/trip				100 lb/DAS, to 1,000 lb/trip	
		GOM	500 lb/trip				100 lb/DAS, to 250 lb/trip	
Windowpane Flounder		All Areas	Zero – possession prohibited					
Ocean Pout								
Atlantic Wolffish								

<sup>1</sup> Broad Stock Areas: Gulf of Maine (GOM), Inshore Georges Bank (IN GB), Offshore Georges Bank (OFF GB), and Southern New England (SNE)

<sup>2</sup> Vessel must submit GOM Cod Trip Limit Exemption Form via VMS

<sup>3</sup> Unless otherwise revised by the Regional Administrator

<sup>4</sup> Gear performance trip limits of 500 lb all flatfish combined, 500 lb whole monkfish (unless restricted by the monkfish FMP), 500 lb whole skate, and zero lobsters also apply

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

2014	Bulletin Location
January 1: Common Pool Trimester 3 Closed for GOM haddock through the end of FY 2013	
April 9: Common Pool GB cod trimester TAC area closed for trimester 3 through end of FY 2013 Decrease: Possession limit and trip limit of GB cod reduced to zero Increase: Possession and trip limit for SNE/MA winter flounder 1,000 lb/DAS and 2,000 lb/trip (from 300/trip)	
May 1- Start of the Groundfishing year Changes in Recreational Measures GOM Cod: - The minimum fish size increases to 21 inches. - The daily per angler bag limit is not changing and remains 9 fish per day. - Possession prohibited (closed season) increases by 2 months: now September 1, 2014 -April 14, 2015. Possession of cod in the GOM regulated mesh area is permitted May 1-August 31, 2014, and April 15-30, 2015.  GOM Haddock: - The minimum fish size is not changing and remains 21 inches. - The daily per angler bag limit is decreasing from an unlimited amount to 3 fish per day. - Possession prohibited (closed season) increases by 4 months: September 1-November 30, 2014, and March 1- April 30, 2015. Possession of haddock in the GOM regulated mesh area is permitted May 1-August 31, 2014, and December 1, 2014-February 28, 2015.  Common pool Cod Trip Limits-	

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

Permit	Initial FY 2014 GOM Cod Possession/Trip Limit	Initial FY 2014 GB Cod Possession/Trip Limit
Handgear A	200 lb per trip	300 lb per trip
Handgear B	25 lb per trip	75 lb per trip
Small Vessel Category	300 lb of cod, haddock, and yellowtail flounder combined; Maximum of 200 lb of GOM cod and 25 lb per trip of GOM haddock within the 300-lb combined possession limit	

DAS Possession and Landings Limits

Stock	FY 2014 Possession and Landing Limits
GB Cod	2,000 lb per DAS, up to 20,000 lb per trip
GOM Cod	200 lb per DAS, up to 600 lb per trip
GB Haddock	10,000 lb per trip
GOM Haddock	25 lb per trip
GB Yellowtail Flounder	100 lb per trip
SNE/MA Yellowtail Flounder	2,000 lb per DAS, up to 6,000 lb per trip
CC/GOM Yellowtail Flounder	1,000 lb per trip
American plaice	Unlimited
Witch Flounder	500 lb per trip
GB Winter Flounder	1,000 lb per trip
GOM Winter Flounder	1,000 lb per trip
SNE/MA Winter Flounder	1,500 lb per DAS up to 2,000 lb per trip
Redfish	Unlimited
White hake	1,000 lb per trip
Pollock	10,000 lb per trip
Atlantic Halibut	1 fish per trip
Windowpane Flounder	Possession Prohibited
Ocean Pout	
Atlantic Wolffish	

Large AMs implemented for GF fishery (sector and common pool) due to overage in FY 2012 for northern and southern windowpane flounder – requires the use of selective gears to fish in the areas

Sectors  
Universal exemptions plus 20 additional

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

FW 51 -Sectors can convert EGB haddock into WGB allocation -FY 2014 catch limits for several stocks - AMs developed for small-mesh fishery for GB YTF – gear-based -rebuilding programs for GOM cod and American plaice extended 10 years until 2024  Also, common pool vessels can fish in the Closed Area II Yellowtail Flounder/Haddock Special Access Program (SAP) to target haddock using a haddock separator trawl, a Ruhle trawl, or hook gear. Vessels may not fish in this SAP using flounder nets. The SAP will close on January 31, 2015. Common pool vessels using trawl gear may fish in the Eastern U.S./Canada Area. Common pool vessels must use a haddock separator trawl, a Ruhle trawl, or a flounder trawl in this area.	
May 24: Directed herring fishery closed in 1B due to herring catches; through December 2014	
Jun16: Scallop FW 25 AMs established for SNE/MA windowpane flounder – gear modification areas for seasons based on the percentage of the overage	
June 30: Sector vessels declared to fish in the Eastern U.S./Canada Area, including the two Eastern U.S./Canada Special Access Programs (SAPs) (the Closed Area II Yellowtail Flounder/Haddock SAP and the Eastern U.S./Canada Haddock SAP) will need to submit daily VMS catch reports.	
July 23: Common pool trip limit adjustment for one stock through April 30, 2015 (end of FY) Increase: SNE/MA winter flounder: A DAS- 3,000 lb/DAS and 6,000 lb/trip (up from 1,500 lb/DAS and 2,000 lb/trip)	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulsnemawinterfladadjustmentgomcodtrimesterclosurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulsnemawinterfladadjustmentgomcodtrimesterclosurephl.pdf</a>
July 23: Common pool closure through August 31 (Trimester I) Due to GOM Cod catches exceeding Trimester I TAC- no fishing in SRA 513 and 514 ( <i>bulletin was a correction from 7/18/2014</i> )	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulinseason1gomcodtrimesterclosurephlcorrected.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulinseason1gomcodtrimesterclosurephlcorrected.pdf</a>
August 5: Northern red hake possession limit reduced to 400 lb. (down from 5,000 lb.) for all vessels	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulnrhpossessionlimitreduction.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulnrhpossessionlimitreduction.pdf</a>
August 6: Common pool trip limit adjustment for one stock through August 31 (Trimester I) Decrease: American plaice: no possession (down from unlimited)	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulinseason2plaiceclosurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/July/14mulinseason2plaiceclosurephl.pdf</a>
August 18: Common pool closure through August 31 (Trimester I) Due to GB cod catches projected to exceed Trimester I TAC- no fishing in SRA 521,522,525, and 561	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/August/140818_inseason_3_trimester_1_gb_cod_closure_phl_final.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/August/140818_inseason_3_trimester_1_gb_cod_closure_phl_final.pdf</a>
August 27: Common pool closure through August 31 (Trimester I) Due to SNE/MA yellowtail flounder catches exceeding Trimester I TAC- no fishing in SRA 537,538,539, and 613	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/August/14mulcommonpoolinseason4and5closurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/August/14mulcommonpoolinseason4and5closurephl.pdf</a>
August 26: Common poll closure through April 30, 2015 (end of FY) Due to EBG cod catches exceeding the common pool TAC – no fishing in US/Canada area including Special Access Programs	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/August/14mulcommonpoolinseason4and5closurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/August/14mulcommonpoolinseason4and5closurephl.pdf</a>
September 23: Directed herring fishery closed in Area 3 due to herring catches, through December 2014	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/September/14herarea3closurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/September/14herarea3closurephl.pdf</a>



Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

October 26: Directed herring fishery closed in Area 1A due to herring catches, through December 2014	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/October/14herarea1aclosurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/October/14herarea1aclosurephl.pdf</a>
November 15: Temporary GOM cod and haddock management measures, through May 12, 2015 GOM cod- Temporary Actions: <ol style="list-style-type: none"> <li>1) GOM rolling closures replaced with seasonal 30-minute block closures – fishing closed to certain commercial and recreational gear – capable of catching groundfish (gear other than “exempted gear” or gear exempt from current groundfish closed areas)</li> <li>2) Commercial trip limits- 200-lb trip limit for GOM cod for all sector and common pool in the open areas of the GOM Broad stock area</li> <li>3) Zero recreational possession – all recreational vessels</li> <li>4) Commercial fishery declaration change- LA groundfish vessels that declare into GOM BSA can only fish there for that trip</li> <li>5) Gillnet exemption change- Sector exemption on higher number of gillnets is revoked</li> </ol> GOM haddock Increase in catch limit of GOM haddock for the remainder of the FY (April 30, 2015) ACL increases to 641 mt from 323 mt	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/November/14gomhaddockcodphl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/November/14gomhaddockcodphl.pdf</a>
December 29: Clarification of temporary GOM cod and haddock measures, through May 12, 2015 <ul style="list-style-type: none"> <li>• Gillnet vessels allowed one-time opportunity to change category designation (day versus trip) for the FY</li> <li>• 200-lb trip limit applies to entire GOM BSA</li> </ul>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2014/December/14mulgomcodcorrectionrulephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2014/December/14mulgomcodcorrectionrulephl.pdf</a>
<b>2015</b>	
January 14: FW 52 implemented Southern windowpane flounder gear restricted area reduced in size –meets FW 52 criteria- to the small AM area (from large AM area) through April 30, 2015 (remainder of FY)	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/January/15mulfw52phl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/January/15mulfw52phl.pdf</a>
January 20: Common pool trip limit adjustment for one stock through April 30, 2015 (end of FY) Decrease: SNE/MA yellowtail flounder: 250 lb/DAS and 500 lb/trip (down from 2,000 lb/DAS and 6,000 lb/trip)	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/January/15mulsnemayfttriplimitadjustphl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/January/15mulsnemayfttriplimitadjustphl.pdf</a>
February 26: Clarification of temporary GOM cod and haddock measures, though May 12, 2015 Small mesh Area 1 And 2 exemption areas should have been included on the list of areas exempted from the GOM cod seasonal interim closure areas; vessel fishing a raised footrope trawl with small mesh nets continue to be exempt	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/February/15mulgomcodcorrectionrulephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/February/15mulgomcodcorrectionrulephl.pdf</a>
May 1- Start of the Groundfish Fishing Year FW 53 Implemented- Measures for All Vessels ( <i>replaces temporary measures for GOM cod as well</i> ) <ul style="list-style-type: none"> <li>• FY 2015 catch limits are most groundfish stocks are the same as in FY2014</li> <li>• GOM haddock catch limit increased, while there were large reductions in GOM cod, GB winter flounder, and GOM winter flounder catch limits</li> <li>• US/CA quotas set for EGB cod and haddock and GB yellowtail flounder for FY 2015</li> <li>• GOM cod protection measures replace the GOM rolling closures for the commercial groundfish fishery to help protect GOM cod – new areas in winter, modified areas in the spring, opening of some areas</li> <li>• No possession of GOM cod for the recreational fishery to help reduce the incentive to target GOM cod</li> </ul>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/April/15mulfw53phl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/April/15mulfw53phl.pdf</a>



Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<ul style="list-style-type: none"> <li>• Daily Reporting via VMS required when fishing in the GOM BSA and another BSA on the same trip</li> <li>• Sector carryover provision finalized, in an effort to prevent vessels from misreporting where cod is caught</li> <li>• Default specifications process established in the event of a future management action being delayed</li> </ul> <p>Windowpane Flounder AM</p> <ul style="list-style-type: none"> <li>• Due to the overage of the total catch limit in FY 2014</li> <li>• Northern windowpane flounder gear restricted area – large in place for FY 2015 – commercial groundfish vessels fishing on a groundfish trip are required to use approved selective trawl gear (haddock separator trawl, Ruhle trawl, mini-Ruhle trawl or rope separator trawl)</li> </ul> <p>Sector Measures- change to two year plan (first time)</p> <ul style="list-style-type: none"> <li>• 17 sectors approved to operate in FY 2015 and FY 2016</li> <li>• All have “universal” exemptions from various regulations</li> <li>• Additional 19 exemptions approved</li> <li>• No trip allocated to CAII Yellowtail Flounder/Haddock SAP for FY 2015 for the purposes of targeting yellowtail flounder. Vessels may fish in the SAP to catch haddock when using a haddock separator trawl, a Ruhle trawl, or hook gear. Vessels may not fish in the SAP using flounder nets. The SAP closes on 1/31/2016</li> <li>• Eastern US/CA area opens on May 1 for sectors vessels fishing with trawl gear</li> </ul> <p>Common Pool Measures</p> <ul style="list-style-type: none"> <li>• Tables provided with trip limits for FY 2015, trimester TACs, and TAC are closures in the event of closure</li> </ul>	
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Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

**Table 5. Initial Fishing Year 2015 Common Pool Possession and Trip Limits**

Stock	Possession and Trip Limits
GB Cod (outside Eastern U.S./Canada Area)	2,000 lb/DAS, up to 20,000 lb/trip
GB Cod (inside Eastern U.S./Canada Area)	100 lb/DAS, up to 500 lb/trip
GOM Cod	50 lb/DAS, up to 200 lb/trip
GB Haddock	25,000 lb/trip
GOM Haddock	50 lb/DAS, up to 200 lb/trip
GB Yellowtail Flounder	100 lb/trip
SNE/MA Yellowtail Flounder	2,000 lb/DAS, up to 6,000 lb/trip
CC/GOM Yellowtail Flounder	1,500 lb/DAS up to 3,000 lb/trip
American plaice	Unlimited
Witch Flounder	1,000 lb/trip
GB Winter Flounder	1,000 lb/trip
GOM Winter Flounder	1,000 lb/trip
SNE/MA Winter Flounder	3,000 lb/DAS, up to 6,000 lb/trip
Redfish	Unlimited
White hake	1,500 lb/trip
Pollock	10,000 lb/trip
Atlantic Halibut	1 fish/trip
Windowpane Flounder	Possession Prohibited
Ocean Pout	Possession Prohibited
Atlantic Wolffish	Possession Prohibited

**Table 6. Fishing Year 2015 Trip Limits for Handgear and Small Vessel Category Permits**

Permit	Initial FY 2015 GOM Cod Possession/Trip Limit	Initial FY 2015 GB Cod Possession/Trip Limit
Handgear A	50 lb per trip	300 lb per trip
Handgear B	25 lb per trip	75 lb per trip
Small Vessel Category	300 lb of cod, haddock, and yellowtail flounder combined; Maximum of 50 lb of GOM cod and 50 lb per trip of GOM haddock within the 300-lb combined possession limit	

- Eastern US/CA Area- common pool vessel can fish in area starting on May 1, must use a haddock separator trawl, a Ruhle trawl, or a flounder trawl in the area
- Common pool can only land cod at a higher possession limit by declaring outside of the GOM BSA and fishing only in the other BSAs, LOA required without a VMS unit

#### Recreational Fishery Measures

- Within the GOM regulated mesh area:
  - GOM cod – zero retention for entire year
  - GOM haddock- 3 fish/angler daily bag limit, 17 in minimum fish size, and season closed September 1-October 31, 2015 and March 1-April 30, 2016

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

<ul style="list-style-type: none"> <li>Measures outside of the GOM regulated mesh area remain unchanged</li> <li>Recreational fishery may fish in GOM cod protection areas, federally-permitted charter/party vessel must have a LOA to fish those areas</li> </ul>	
<p>May 1: Scallop Fishery- Implementation of FW 26</p> <ul style="list-style-type: none"> <li>Catch limits and allocations set for FY 2015 and other management measures</li> <li>Access areas: <ul style="list-style-type: none"> <li>CAI, CAII, and NLCA Access Areas closed to scallop fishing for FY 2015 <ul style="list-style-type: none"> <li>Also, NLCA expanded by 158 square miles</li> </ul> </li> <li>549 sq mile are in the northwest corner of Elephant Trunk Access Area is closed to scallop fishing</li> </ul> </li> </ul>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/April/15scalla2015specsphl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/April/15scalla2015specsphl.pdf</a>
<p>May 28: Whiting fishery quotas and management measure for 2015-2017, sets quota for northern silver hake, northern red hake, southern whiting, and southern red hake</p> <p>Also, northern red hake possession limit going forward is 3,000 lb/trip (reduced from 5,000 lb/trip)</p>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/May/15mulsmallneshspecsphl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/May/15mulsmallneshspecsphl.pdf</a>
<p>June 23: Common pool closures through August 31 (Trimester I)</p> <p>Due to catches of:</p> <ul style="list-style-type: none"> <li>GOM cod- no fishing in SRAs: 513 and 514 (trawl, gillnet, and longline/hook prohibited),</li> <li>CC/GOM yellowtail flounder – no fishing in SRAs 514 and 521 (trawl and gillnet prohibited), and</li> <li>American plaice – no fishing in SRAs 512, 513, 514, 515, 522, 525 (trawl prohibited)</li> </ul> <p>Also,</p> <p>Common pool trip limit adjustments for two stocks through August 31 (Trimester I)</p> <p>No possession of CC/GOM yellowtail flounder and American plaice for all common pool vessels in all areas (down from 1,500 lb/DAS 3,000lb/trip for CC/GOM yellowtail flounder and unlimited for American plaice)</p>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/June/15mulinseasonclosuresgomgbgfp hl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/June/15mulinseasonclosuresgomgbgfp hl.pdf</a>
<p>July 15: Common pool trip limit adjustment for one stock through April 30, 2016 (end of FY)</p> <p>Decrease:</p> <p>GOM cod: no possession for all common pool vessels</p>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/June/150615_inseason_1_gom_cod_limit_adjustment_phl_final.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/June/150615_inseason_1_gom_cod_limit_adjustment_phl_final.pdf</a>
<p>July 29: Common pool closure through August 31 (Trimester I)</p> <p>Due to SNE/MA yellowtail flounder catches for Trimester I TAC – no fishing in SRAs 537,538,539, 613</p>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/July/15mulsnemaytcommonpoolclosurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/July/15mulsnemaytcommonpoolclosurephl.pdf</a>
<p>August 4: Closure of Mid-Atlantic Scallop Area Access Area for the LA General Category IFQ fleet</p>	<a href="http://www.greateratlantic.fisheries.noaa.gov/nr/2015/July/15scallagcmaaclosurephl.pdf">http://www.greateratlantic.fisheries.noaa.gov/nr/2015/July/15scallagcmaaclosurephl.pdf</a>
<p>August 12: Northern red hake possession limit reduced to 1,500 lb. (down from 3,000 lb.) for all vessels for the remainder of FY</p>	<a href="https://www.greateratlantic.fisheries.noaa.gov/nr/2015/August/15mulnrhlimitphl.pdf">https://www.greateratlantic.fisheries.noaa.gov/nr/2015/August/15mulnrhlimitphl.pdf</a>
<p>August 17: Updated Annual Catch Limits for Sectors and Common Pool Vessels for Fishing Year 2015 – includes carryover from FY 2014 for sectors (increasing certain sub-ACLs) and reductions to common pool catch limit for Eastern Georges Bank cod, due to overages in FY 2014 (reducing some sub-ACLs), and adjustments to final trimester quotas for the common pool after accounting for sector rosters</p>	<a href="https://www.greateratlantic.fisheries.noaa.gov/nr/2015/August/15mulfw53revphl.pdf">https://www.greateratlantic.fisheries.noaa.gov/nr/2015/August/15mulfw53revphl.pdf</a>
<p>August 24: Northern red hake possession limit reduced to 400 lb. (down from 1,500 lb.) for all vessels for the remainder of FY</p>	<a href="https://www.greateratlantic.fisheries.noaa.gov/nr/2015/August/15mulrh62reductriggerphl.pdf">https://www.greateratlantic.fisheries.noaa.gov/nr/2015/August/15mulrh62reductriggerphl.pdf</a>
<p>September 16: Common Pool Gulf of Maine cod trip and possession limit increased to 25 lb per trip (increasing from no</p>	<a href="https://www.greateratlantic.fisheries.noaa.gov">https://www.greateratlantic.fisheries.noaa.gov</a>

Table B4, continued. Detailed changes in management regulations governing groundfish in the USA commercial fishery between January 2001 and August 2015 (compiled by NEFMC staff- T Nies through March 23, 2012 and J Cournane through December 31, 2015).

possession) for remainder of FY	<a href="/nr/2015/September/15mulcommonpoolfisherytriplimitadjustmentphl.pdf">/nr/2015/September/15mulcommonpoolfisherytriplimitadjustmentphl.pdf</a>
October 22: Atlantic herring fishery herring possession limit reduced to 2,000 lb/day in the Herring Georges Bank haddock Accountability Measure area, due to projected overage of the GB haddock catch cap by the mid-water trawl Atlantic herring fishery. Additionally, the haddock possession limit is reduced to 0 lb in the Herring GB Haddock AM Area for federally permitted Atlantic herring vessels fishing with midwater trawl gear.	<a href="https://www.greateratlantic.fisheries.noaa.gov/nr/2015/October/15sfherhadcapcplphl.pdf">https://www.greateratlantic.fisheries.noaa.gov/nr/2015/October/15sfherhadcapcplphl.pdf</a>
November 2: Atlantic Herring Management Area 1A Sub-ACL harvested. Atlantic herring catch limited to 2,000 lb per trip/day	<a href="https://www.greateratlantic.fisheries.noaa.gov/nr/2015/October/15herarea1aclosurephl.pdf">https://www.greateratlantic.fisheries.noaa.gov/nr/2015/October/15herarea1aclosurephl.pdf</a>

Table B5. Significant changes in management regulations governing the northern shrimp fishery in the Gulf of Maine.

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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	<b>Minimum mesh regulations increased to 1.75 inches (44 mm).</b> 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	<b>Closure of fishery.</b>
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	<b>Nordmore grate regulation</b> (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)
2004	Open season: Jan 19 - March 12, no weekend fishing (40 day season)
2005	Open season: Dec 19-23, 26-30, 2004; Jan 3 - Mar 25, 2005 no weekend fishing (70 days)
2006	Open season: Dec 12, 2005 through April 30, 2006 (140 day season)
2007	Open season: Dec 1, 2006 through April 30, 2007 (151 days season)
2008	Open season: Dec 1, 2007 through April 30, 2008 (152 day season)
2009	Open season: Dec 1 2008 through May 29, 2009 (180 day season)
2010	Open season: Dec 1, 2009 – May 5, 2010 (156 day season)
2011	Open season: Dec 1 - Feb 28, 2011 (90 day season)
2012	Open season: Jan 2, 2012 – Feb 17 (21 days); Trap fishery Feb 1-17, 2012 (17 days)

Table B5, continued. Significant changes in management regulations governing the northern shrimp fishery in the Gulf of Maine.

2013	Open season: Jan 22-Apr 12, 2013 (54 days); Trap fishery Feb 5–Apr 12, 2013 (62 days)
2014	Moratorium for 2014 fishing season (Dec 2013– Spring 2014) 0 days
2015	Moratorium for 205 fishing season (Dec 2014 – Spring 2015) 0 days

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Table B6. Witch flounder landings, discards, and catch (metric tons, live) by country, 1937-2015 [1937-1959 provisional landings reported in Lange and Lux, 1978; 1960-1963 reported to ICNAF/NAFO (Burnett and Clark, 1983)].

Year	LANDINGS					
	USA	USA	USA	CAN	Other	Total
	Subarea 4, 5 & 6	Subarea 3				
1937			5,000			5,000
1938			3,600			3,600
1939			3,100			3,100
1940			3,000			3,000
1941			2,000			2,000
1942			1,800			1,800
1943			1,000			1,000
1944			1,000			1,000
1945			1,000			1,000
1946			1,500			1,500
1947			1,500			1,500
1948			1,000			1,000
1949			3,600			3,600
1950			3,000			3,000
1951			2,600			2,600
1952			3,700			3,700
1953			4,200			4,200
1954			4,000			4,000
1955			2,400			2,400
1956			2,000			2,000
1957			1,000			1,000
1958			1,000			1,000
1959			1,000			1,000
1960	1,255		1,255			1,255
1961	1,022		1,022	2		1,024
1962	976		976	1		977
1963	1,226		1,226	27	121	1,374
1964	1,381		1,381	37		1,418
1965	2,140		2,140	22	502	2,664
1966	2,935		2,935	68	311	3,314
1967	3,370		3,370	63	249	3,682
1968	2,807		2,807	56	191	3,054
1969	2,542		2,542		1,310	3,852
1970	3,112		3,112	19	130	3,261
1971	3,220		3,220	35	2,860	6,115
1972	2,934		2,934	13	2,568	5,515
1973	2,523		2,523	10	629	3,162
1974	1,839		1,839	9	292	2,140
1975	2,127		2,127	13	217	2,357
1976	1,871		1,871	5	6	1,882
1977	2,469		2,469	11	13	2,493
1978	3,501		3,501	18	6	3,525
1979	2,878		2,878	17		2,895
1980	3,128		3,128	18	1	3,147
1981	3,442		3,442	7		3,449

continued.

Table B6, continued. Witch flounder landings, discards, and catch (metric tons, live).  
Catch used in assessment models.

Year	LANDINGS					DISCARDS	CATCH
	USA Subarea 4, 5 & 6	USA Subarea 3	USA Total	CAN	Other	USA Subarea 4, 5 & 6	USA Subarea 4, 5 & 6
1982	4,909		4,909	9		400	5,309
1983	5,998		5,998	45		411	6,409
1984	6,658		6,658	15		279	6,937
1985	6,130	255	6,385	46		210	6,339
1986	4,609	539	5,148	67		179	4,788
1987	3,451	346	3,798	23		193	3,644
1988	3,261	358	3,619	45		190	3,451
1989	2,074	296	2,370	13		351	2,425
1990	1,476	2	1,479	12		267	1,744
1991	1,797		1,797	7		774	2,571
1992	2,245		2,245	7		507	2,752
1993	2,593	12	2,605	10		212	2,806
1994	2,659	9	2,668	34		457	3,115
1995	2,209		2,209	11		509	2,718
1996	2,086		2,086	10		306	2,392
1997	1,772		1,772	7		482	2,254
1998	1,848		1,848	10		458	2,306
1999	2,121		2,121	19		370	2,490
2000	2,439		2,439	53		310	2,749
2001	3,020		3,020	32		387	3,406
2002	3,188		3,188	39		282	3,470
2003	3,124		3,124	38		427	3,551
2004	2,924		2,924	18		446	3,370
2005	2,652		2,652	10		264	2,917
2006	1,863		1,863	8		211	2,075
2007	1,076		1,076	11		135	1,210
2008	1,009		1,009	3		127	1,136
2009	954		954	9		203	1,157
2010	759		759	5		153	912
2011	870		870	3		201	1,071
2012	1,038		1,038	2		219	1,258
2013	686		686	1		124	811
2014	570		570	1		105	675
2015	492		492	1		93	585



Table B7. Proportion of witch flounder landings (metric tons, live) by statistical area or statistical area group, 1982-2015.

	Statistical Area																
												523	524				
Year	464	465	511	512	513	514	515	521	522	525	526	561	562	53	54	6	Total
1982	0.00	0.01	0.03	0.15	0.29	0.09	0.15	0.11	0.06	0.01	0.02	0.02	0.01	0.01	0.00	0.01	1.00
1983	0.00	0.02	0.04	0.21	0.24	0.08	0.17	0.09	0.05	0.01	0.02	0.02	0.01	0.02	0.00	0.01	1.00
1984	0.00	0.02	0.02	0.11	0.23	0.12	0.20	0.12	0.06	0.02	0.03	0.02	0.01	0.02	0.00	0.01	1.00
1985	0.00	0.01	0.04	0.12	0.24	0.11	0.21	0.12	0.08	0.02	0.02	0.02	0.01	0.01	0.00	0.01	1.00
1986	0.00	0.01	0.04	0.17	0.26	0.10	0.17	0.10	0.06	0.01	0.02	0.02	0.00	0.01	0.00	0.01	1.00
1987	0.00	0.00	0.03	0.13	0.30	0.11	0.21	0.10	0.06	0.01	0.01	0.02	0.01	0.00	0.00	0.01	1.00
1988	0.00	0.00	0.03	0.09	0.29	0.11	0.19	0.14	0.06	0.03	0.01	0.02	0.01	0.00	0.00	0.01	1.00
1989	0.00	0.00	0.02	0.08	0.25	0.11	0.18	0.15	0.07	0.03	0.06	0.02	0.01	0.01	0.00	0.02	1.00
1990	0.00	0.00	0.02	0.09	0.29	0.12	0.13	0.11	0.06	0.04	0.05	0.02	0.02	0.03	0.00	0.02	1.00
1991	0.00	0.00	0.01	0.09	0.26	0.11	0.16	0.08	0.08	0.02	0.05	0.02	0.03	0.05	0.00	0.04	1.00
1992	0.00	0.00	0.01	0.10	0.23	0.10	0.15	0.07	0.08	0.03	0.10	0.02	0.02	0.07	0.00	0.03	1.00
1993	0.00	0.00	0.01	0.07	0.22	0.16	0.16	0.07	0.10	0.04	0.05	0.03	0.03	0.04	0.00	0.02	1.00
1994	0.00	0.00	0.01	0.07	0.22	0.16	0.18	0.11	0.13	0.01	0.02	0.02	0.01	0.03	0.00	0.04	1.00
1995	0.00	0.01	0.01	0.05	0.17	0.16	0.20	0.17	0.15	0.01	0.00	0.02	0.01	0.02	0.00	0.02	1.00
1996	0.00	0.00	0.01	0.06	0.20	0.16	0.20	0.16	0.11	0.02	0.00	0.02	0.00	0.02	0.00	0.01	1.00
1997	0.00	0.00	0.01	0.07	0.15	0.15	0.24	0.13	0.15	0.03	0.00	0.03	0.00	0.02	0.00	0.01	1.00
1998	0.00	0.00	0.00	0.08	0.11	0.12	0.25	0.20	0.14	0.02	0.01	0.03	0.00	0.02	0.00	0.01	1.00
1999	0.01	0.00	0.01	0.05	0.11	0.12	0.17	0.22	0.18	0.03	0.01	0.04	0.01	0.02	0.00	0.01	1.00
2000	0.00	0.00	0.01	0.04	0.14	0.18	0.12	0.24	0.17	0.03	0.00	0.02	0.01	0.02	0.00	0.02	1.00
2001	0.00	0.00	0.01	0.04	0.14	0.17	0.12	0.25	0.15	0.02	0.01	0.05	0.00	0.02	0.00	0.01	1.00
2002	0.00	0.00	0.01	0.03	0.16	0.24	0.10	0.21	0.14	0.03	0.00	0.03	0.02	0.01	0.00	0.01	1.00
2003	0.00	0.00	0.00	0.04	0.12	0.31	0.08	0.21	0.13	0.03	0.00	0.03	0.02	0.01	0.00	0.01	1.00
2004	0.00	0.00	0.00	0.07	0.13	0.20	0.11	0.23	0.14	0.02	0.00	0.02	0.04	0.01	0.00	0.01	1.00
2005	0.00	0.00	0.00	0.05	0.14	0.19	0.13	0.23	0.14	0.05	0.00	0.02	0.01	0.01	0.00	0.02	1.00
2006	0.00	0.00	0.00	0.03	0.09	0.17	0.13	0.27	0.16	0.06	0.01	0.02	0.01	0.02	0.00	0.01	1.00
2007	0.00	0.00	0.00	0.05	0.13	0.15	0.12	0.24	0.13	0.09	0.01	0.03	0.02	0.02	0.00	0.02	1.00
2008	0.01	0.00	0.00	0.06	0.13	0.16	0.11	0.23	0.16	0.05	0.00	0.06	0.01	0.01	0.00	0.01	1.00
2009	0.00	0.01	0.01	0.04	0.13	0.19	0.15	0.15	0.19	0.05	0.00	0.05	0.01	0.01	0.00	0.02	1.00
2010	0.01	0.00	0.00	0.02	0.15	0.24	0.14	0.21	0.14	0.04	0.00	0.03	0.01	0.01	0.00	0.00	1.00
2011	0.00	0.00	0.00	0.03	0.09	0.26	0.09	0.26	0.19	0.02	0.00	0.04	0.01	0.00	0.00	0.00	1.00
2012	0.01	0.00	0.00	0.02	0.13	0.30	0.11	0.21	0.18	0.00	0.00	0.03	0.01	0.00	0.00	0.00	1.00
2013	0.01	0.00	0.00	0.03	0.14	0.28	0.16	0.22	0.12	0.01	0.00	0.02	0.00	0.01	0.00	0.00	1.00
2014	0.01	0.00	0.00	0.01	0.10	0.31	0.18	0.21	0.14	0.00	0.00	0.02	0.00	0.01	0.00	0.00	1.00
2015	0.01	0.00	0.00	0.02	0.12	0.35	0.15	0.15	0.16	0.00	0.00	0.03	0.00	0.00	0.00	0.00	1.00

Table B8. Proportion of witch flounder landings (metric tons, live) by month, 1982-2015.

Year	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
1982	0.06	0.06	0.11	0.09	0.10	0.09	0.09	0.08	0.07	0.08	0.08	0.08	1.00
1983	0.09	0.09	0.11	0.12	0.10	0.10	0.07	0.08	0.06	0.06	0.05	0.07	1.00
1984	0.10	0.09	0.11	0.11	0.11	0.09	0.07	0.07	0.06	0.08	0.06	0.06	1.00
1985	0.08	0.08	0.09	0.13	0.12	0.08	0.08	0.07	0.07	0.07	0.05	0.06	1.00
1986	0.08	0.08	0.09	0.14	0.14	0.10	0.09	0.06	0.06	0.06	0.05	0.06	1.00
1987	0.07	0.07	0.10	0.10	0.12	0.11	0.08	0.07	0.07	0.06	0.06	0.08	1.00
1988	0.10	0.09	0.13	0.13	0.15	0.10	0.07	0.05	0.06	0.04	0.04	0.04	1.00
1989	0.08	0.09	0.12	0.13	0.15	0.10	0.08	0.07	0.05	0.05	0.05	0.05	1.00
1990	0.09	0.07	0.08	0.09	0.13	0.11	0.09	0.09	0.06	0.06	0.06	0.06	1.00
1991	0.05	0.04	0.03	0.08	0.13	0.11	0.10	0.09	0.10	0.10	0.07	0.08	1.00
1992	0.06	0.07	0.07	0.14	0.14	0.10	0.07	0.07	0.06	0.07	0.08	0.05	1.00
1993	0.08	0.06	0.10	0.08	0.15	0.11	0.07	0.07	0.06	0.08	0.07	0.06	1.00
1994	0.09	0.08	0.08	0.11	0.10	0.11	0.08	0.08	0.08	0.09	0.06	0.06	1.00
1995	0.07	0.06	0.10	0.11	0.12	0.13	0.09	0.08	0.07	0.08	0.05	0.05	1.00
1996	0.06	0.06	0.07	0.08	0.13	0.12	0.10	0.10	0.07	0.08	0.06	0.07	1.00
1997	0.06	0.08	0.08	0.09	0.10	0.14	0.10	0.08	0.09	0.06	0.05	0.07	1.00
1998	0.05	0.07	0.11	0.12	0.13	0.13	0.09	0.08	0.07	0.06	0.04	0.05	1.00
1999	0.06	0.07	0.09	0.08	0.10	0.16	0.10	0.10	0.05	0.06	0.06	0.07	1.00
2000	0.05	0.08	0.09	0.08	0.07	0.14	0.11	0.10	0.07	0.08	0.07	0.06	1.00
2001	0.09	0.05	0.08	0.11	0.07	0.14	0.11	0.09	0.08	0.06	0.06	0.08	1.00
2002	0.08	0.09	0.09	0.13	0.05	0.10	0.14	0.10	0.08	0.05	0.05	0.04	1.00
2003	0.05	0.08	0.10	0.06	0.07	0.14	0.15	0.09	0.09	0.07	0.06	0.05	1.00
2004	0.06	0.10	0.09	0.08	0.04	0.12	0.11	0.09	0.10	0.06	0.08	0.07	1.00
2005	0.08	0.08	0.11	0.09	0.07	0.12	0.11	0.09	0.07	0.06	0.07	0.05	1.00
2006	0.10	0.14	0.14	0.09	0.06	0.11	0.11	0.06	0.06	0.05	0.04	0.05	1.00
2007	0.08	0.07	0.13	0.08	0.06	0.14	0.12	0.07	0.07	0.07	0.05	0.07	1.00
2008	0.12	0.11	0.09	0.11	0.05	0.11	0.10	0.09	0.06	0.07	0.05	0.06	1.00
2009	0.10	0.09	0.13	0.09	0.04	0.12	0.10	0.08	0.09	0.06	0.04	0.05	1.00
2010	0.12	0.12	0.14	0.10	0.03	0.09	0.07	0.07	0.07	0.07	0.05	0.06	1.00
2011	0.08	0.09	0.09	0.07	0.07	0.12	0.07	0.06	0.10	0.09	0.09	0.08	1.00
2012	0.09	0.10	0.11	0.07	0.06	0.09	0.08	0.08	0.10	0.09	0.06	0.07	1.00
2013	0.13	0.08	0.09	0.12	0.05	0.09	0.09	0.08	0.08	0.09	0.05	0.06	1.00
2014	0.08	0.11	0.13	0.10	0.06	0.09	0.07	0.07	0.09	0.07	0.05	0.07	1.00
2015	0.06	0.04	0.11	0.14	0.06	0.09	0.11	0.08	0.09	0.07	0.06	0.08	1.00

Table B9. Proportion of witch flounder landings (metric tons, live) by gear type, 1982-2015.

Year	Gear Type							Total
	Otterl Trawl	Haddock Separator Trawl	Shrimp Trawl	Gillnet	Scallop Dredge	Unknown	Other	
1982	0.97	0.00	0.01	0.00	0.00	0.00	0.02	1.0
1983	0.96	0.00	0.01	0.00	0.00	0.00	0.03	1.0
1984	0.96	0.00	0.00	0.00	0.00	0.00	0.03	1.0
1985	0.95	0.00	0.01	0.00	0.00	0.00	0.04	1.0
1986	0.95	0.00	0.01	0.00	0.00	0.00	0.04	1.0
1987	0.95	0.00	0.01	0.01	0.00	0.00	0.03	1.0
1988	0.96	0.00	0.01	0.01	0.01	0.00	0.02	1.0
1989	0.95	0.00	0.00	0.02	0.01	0.00	0.03	1.0
1990	0.93	0.00	0.01	0.03	0.02	0.00	0.02	1.0
1991	0.95	0.00	0.00	0.01	0.02	0.00	0.02	1.0
1992	0.96	0.00	0.00	0.01	0.02	0.00	0.01	1.0
1993	0.94	0.00	0.00	0.03	0.02	0.00	0.01	1.0
1994	0.96	0.00	0.00	0.03	0.01	0.00	0.00	1.0
1995	0.97	0.00	0.00	0.02	0.00	0.00	0.01	1.0
1996	0.97	0.00	0.00	0.02	0.00	0.00	0.00	1.0
1997	0.97	0.00	0.00	0.01	0.00	0.00	0.01	1.0
1998	0.97	0.00	0.00	0.02	0.00	0.00	0.01	1.0
1999	0.97	0.00	0.00	0.02	0.00	0.00	0.00	1.0
2000	0.98	0.00	0.00	0.02	0.00	0.00	0.01	1.0
2001	0.98	0.00	0.00	0.01	0.00	0.00	0.00	1.0
2002	0.98	0.00	0.00	0.01	0.00	0.00	0.01	1.0
2003	0.98	0.00	0.00	0.01	0.00	0.00	0.01	1.0
2004	0.97	0.00	0.00	0.01	0.00	0.00	0.02	1.0
2005	0.96	0.00	0.00	0.01	0.00	0.00	0.03	1.0
2006	0.97	0.00	0.00	0.01	0.01	0.00	0.01	1.0
2007	0.98	0.00	0.00	0.01	0.00	0.00	0.00	1.0
2008	0.97	0.00	0.00	0.03	0.00	0.00	0.00	1.0
2009	0.96	0.00	0.00	0.04	0.00	0.00	0.00	1.0
2010	0.93	0.03	0.00	0.03	0.00	0.00	0.01	1.0
2011	0.91	0.05	0.00	0.02	0.00	0.00	0.02	1.0
2012	0.95	0.03	0.00	0.01	0.00	0.00	0.01	1.0
2013	0.94	0.03	0.00	0.02	0.00	0.00	0.02	1.0
2014	0.94	0.04	0.00	0.01	0.00	0.00	0.00	1.0
2015	0.92	0.06	0.00	0.01	0.00	0.00	0.02	1.0

*Dealer electronic report implemented in 2004.*

Table B10. Proportion of witch flounder landings (metric tons, live) by state, 1982-2015.

Year	State										Total
	CT	ME	MD	MA	NH	NJ	NY	NC	RI	VA	
1982	0.00	0.53	0.00	0.35	0.05	0.01	0.00	0.00	0.05	0.00	1.00
1983	0.00	0.59	0.00	0.34	0.03	0.00	0.00	0.00	0.04	0.00	1.00
1984	0.00	0.44	0.00	0.46	0.04	0.00	0.00	0.00	0.05	0.00	1.00
1985	0.00	0.40	0.00	0.51	0.02	0.00	0.00	0.00	0.06	0.00	1.00
1986	0.00	0.38	0.00	0.56	0.02	0.01	0.00	0.00	0.03	0.00	1.00
1987	0.00	0.56	0.00	0.37	0.03	0.00	0.00	0.00	0.03	0.00	1.00
1988	0.00	0.53	0.00	0.37	0.05	0.01	0.00	0.00	0.05	0.00	1.00
1989	0.00	0.45	0.00	0.43	0.04	0.01	0.00	0.00	0.06	0.00	1.00
1990	0.01	0.41	0.00	0.48	0.02	0.01	0.00	0.00	0.08	0.00	1.00
1991	0.01	0.43	0.00	0.44	0.02	0.01	0.01	0.00	0.08	0.00	1.00
1992	0.01	0.42	0.00	0.43	0.01	0.01	0.01	0.00	0.10	0.00	1.00
1993	0.00	0.48	0.00	0.43	0.01	0.01	0.01	0.00	0.06	0.00	1.00
1994	0.00	0.51	0.00	0.41	0.01	0.01	0.02	0.00	0.04	0.00	1.00
1995	0.00	0.46	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	1.00
1996	0.00	0.50	0.00	0.46	0.01	0.00	0.00	0.00	0.03	0.00	1.00
1997	0.00	0.51	0.00	0.43	0.01	0.00	0.00	0.00	0.05	0.00	1.00
1998	0.00	0.45	0.00	0.48	0.01	0.00	0.00	0.00	0.05	0.00	1.00
1999	0.00	0.42	0.00	0.50	0.01	0.00	0.01	0.00	0.06	0.00	1.00
2000	0.01	0.38	0.00	0.54	0.02	0.01	0.00	0.00	0.04	0.00	1.00
2001	0.00	0.36	0.00	0.58	0.02	0.00	0.00	0.00	0.03	0.00	1.00
2002	0.00	0.34	0.00	0.61	0.03	0.00	0.00	0.00	0.02	0.00	1.00
2003	0.00	0.27	0.00	0.66	0.02	0.01	0.00	0.00	0.03	0.00	1.00
2004	0.00	0.34	0.00	0.60	0.02	0.01	0.00	0.00	0.02	0.00	1.00
2005	0.00	0.32	0.00	0.61	0.02	0.01	0.00	0.00	0.02	0.00	1.00
2006	0.00	0.24	0.00	0.71	0.01	0.00	0.00	0.00	0.04	0.00	1.00
2007	0.00	0.26	0.00	0.66	0.01	0.01	0.00	0.00	0.05	0.00	1.00
2008	0.00	0.16	0.00	0.80	0.01	0.00	0.00	0.00	0.03	0.00	1.00
2009	0.00	0.14	0.00	0.80	0.01	0.00	0.00	0.00	0.04	0.00	1.00
2010	0.00	0.08	0.00	0.89	0.01	0.00	0.00	0.00	0.02	0.00	1.00
2011	0.00	0.07	0.00	0.90	0.01	0.00	0.00	0.00	0.02	0.00	1.00
2012	0.00	0.13	0.00	0.85	0.02	0.00	0.00	0.00	0.01	0.00	1.00
2013	0.00	0.17	0.00	0.82	0.01	0.00	0.00	0.00	0.01	0.00	1.00
2014	0.00	0.12	0.00	0.85	0.01	0.00	0.00	0.00	0.00	0.00	1.00
2015	0.00	0.11	0.00	0.85	0.02	0.00	0.00	0.00	0.01	0.00	1.00

Table B11. Proportion of witch flounder landings (metric tons, live) by market category, 1982-2015.

Year	Market Category						Total
	PeeWee	Small	Medium	Large	Jumbo	Unclass	
1982	0.00	0.26	0.06	0.63	0.00	0.05	1.00
1983	0.01	0.24	0.15	0.58	0.00	0.01	1.00
1984	0.03	0.25	0.20	0.51	0.00	0.01	1.00
1985	0.08	0.28	0.23	0.40	0.00	0.01	1.00
1986	0.05	0.33	0.25	0.34	0.00	0.02	1.00
1987	0.04	0.37	0.26	0.31	0.00	0.03	1.00
1988	0.03	0.34	0.29	0.30	0.01	0.04	1.00
1989	0.03	0.30	0.31	0.31	0.01	0.05	1.00
1990	0.05	0.26	0.30	0.31	0.01	0.06	1.00
1991	0.07	0.33	0.24	0.29	0.01	0.06	1.00
1992	0.12	0.40	0.19	0.23	0.00	0.05	1.00
1993	0.18	0.39	0.18	0.20	0.00	0.05	1.00
1994	0.19	0.44	0.16	0.17	0.00	0.04	1.00
1995	0.26	0.47	0.12	0.13	0.00	0.02	1.00
1996	0.27	0.53	0.10	0.08	0.00	0.02	1.00
1997	0.18	0.64	0.11	0.06	0.00	0.01	1.00
1998	0.13	0.72	0.09	0.05	0.00	0.01	1.00
1999	0.10	0.74	0.10	0.05	0.00	0.01	1.00
2000	0.08	0.77	0.10	0.04	0.00	0.02	1.00
2001	0.09	0.78	0.09	0.03	0.00	0.02	1.00
2002	0.08	0.78	0.10	0.03	0.00	0.01	1.00
2003	0.07	0.79	0.10	0.03	0.00	0.01	1.00
2004	0.09	0.77	0.10	0.03	0.00	0.01	1.00
2005	0.10	0.77	0.09	0.02	0.00	0.02	1.00
2006	0.07	0.81	0.09	0.02	0.00	0.01	1.00
2007	0.06	0.81	0.10	0.02	0.00	0.01	1.00
2008	0.03	0.84	0.10	0.02	0.00	0.01	1.00
2009	0.02	0.86	0.10	0.02	0.00	0.00	1.00
2010	0.00	0.87	0.10	0.02	0.00	0.00	1.00
2011	0.00	0.89	0.09	0.02	0.00	0.00	1.00
2012	0.00	0.90	0.08	0.01	0.00	0.00	1.00
2013	0.00	0.88	0.10	0.02	0.00	0.00	1.00
2014	0.00	0.84	0.12	0.02	0.00	0.00	1.00
2015	0.00	0.87	0.11	0.02	0.00	0.00	1.00

Table B12. Summary of discard estimation approaches used for witch flounder, by gear type, mesh group, and time period.  
*Abbreviations used: ASM = at-sea monitoring; DAA = numbers of discard fish at age; d/kall (discard/kept weight of all species based on observer data); Kall = kept weight of all species in Dealer data; NEFOP = Northeast Fisheries Observer Program; LF = length frequency of discarded fish.*

Gear Type	What's different from 2015 Update?	Method used for direct discard estimates	Method used for indirect (hindcast) discard estimates <sup>2</sup>	Discard Length Frequency	Age Data Used <sup>3</sup>	Discards-At-Age
Large mesh (≥5.5 inches) otter trawl (LMOT)	Change to spatial extent: using the stock area where "OTHER" region is added.	1989 onward: Combined ratio (d/kall) for two regions within the stock area	1982-1988: Survey filter method (no change from previous stock assessments); however, to account for discards outside the CORE region, the annual indirect discard estimates for the CORE region were multiplied by 0.385 (the 1989-2014 average of the ratio of the CORE region discarded weight to the OTHER region discarded weight) and added to the CORE region discard weight.-	Used NEFOP for 1989-2009; Used NEFOP and ASM from 2010 onward.	NEFSC Spring and Autumn survey	Rescaled existing LMOT DAA
Small mesh (<5.5 inches) otter trawl (SMOT)	Change to spatial extent: using the stock area where "OTHER" region is added.  Change to time series: added estimates for 1982-1988	1989 onward: Combined ratio (d/kall) for two region within the stock area.  Exception: for GB&GM 1994 and 1998, average of adjacent years was used due to insufficient sample size (1 trip) in those years	1982-1988: Average of 1989-2014 d/kall ratio multiplied by the annual Kall for each region and then summed over regions	Limited NEFOP LF not used		Rescaled revised LMOT DAA

<sup>2</sup> Time series used for average discard ratio will not change in subsequent years.

<sup>3</sup> As of July 2016, no observer-collected age data are available for witch flounder.

Table B12, continued. Summary of discard estimation approaches used for witch flounder, by gear type, mesh group, and time period. *Abbreviations used: ASM = at-sea monitoring; DAA = numbers of discard fish at age; d/kall (discard/kept weight of all species based on observer data); Kall = kept weight of all species in Dealer data; NEFOP = Northeast Fisheries Observer Program; LF = length frequency of discarded fish.*

Gear Type	What's different from 2015 Update?	Method used for direct discard estimates	Method used for indirect (hindcast) discard estimates <sup>2</sup>	Discard Length Frequency	Age Data Used <sup>3</sup>	Discards-At-Age
Shrimp trawl (SHR) in Gulf of Maine	Change to ratio estimator from d/df by fishing zone to d/k <sub>all</sub>  No change to spatial extent, CORE (GM&GB) only	1989-1997: Combined ratio (d/kall) for CORE (GM&GB area)  Notes: 1) Nordmore Grate implemented in April 1992 2) No northern shrimp fishery in 2014, 2015, and 2016; however, shrimp trawling is occurring small mesh exempted fisheries in the Gulf of Maine (separate from northern shrimp fishery); cannot use average ratio w/grate	1982-1988; 2014, 2015 (no grate) Average of 1989-1992 d/kall ratio multiplied by the annual Kall from the CORE region;  1998-2002 (grate): Average of 1993-2013 (excluding 2011) d/kall ratio multiplied by the annual Kall from the CORE region.	NEFOP LF used. Used average proportion at age and weighted average mean weights at age when NEFOP LF was not available	NEFSC Spring Survey	Rescaled existing GMSHR DAA;  For 2014-2015, rescaled revised LMOT DAA
Sea scallop dredge (SD)	NEW: gear type added	1992 onward: Combined ratio (d/kall) for two regions within the stock area.	1982-1991: Average of 1992-2014 d/kall ratio multiplied by the annual Kall for each region within the stock area and then summed over regions.	Annual NEFOP LF used. Used combined time series LF when little (<100 fish) or no LF data was available.	NEFSC Spring and Autumn Survey and Commercial	New DAA

Table B12, continued. Summary of discard estimation approaches used for witch flounder, by gear type, mesh group, and time period. *Abbreviations used: ASM = at-sea monitoring; DAA = numbers of discard fish at age; d/kall (discard/kept weight of all species based on observer data); Kall = kept weight of all species in Dealer data; NEFOP = Northeast Fisheries Observer Program; LF = length frequency of discarded fish.*

Gear Type	What's different from 2015 Update?	Method used for direct discard estimates	Method used for indirect (hindcast) discard estimates <sup>2</sup>	Discard Length Frequency	Age Data Used <sup>3</sup>	Discards-At-Age
Gillnet (GN)	NEW: gear type added	1989 onward: Combined ratio (d/kall) for two regions within the stock area.	1982-1988: Average of 1989-2014 d/kall ratio* annual Kall for each area and then sum	NEFOP and ASM, sparse in most years. Combined LF appeared similar to LMOT		Rescaled revised LMOT DAA
Haddock Separator Trawl (HS)	NEW: gear type added	2009 onward: Combined ratio (d/kall) for two regions within the stock area.	No hindcast needed	NEFOP and ASM sparse		Re-scaled LMOT DAA



Table B13. Number of observer trips by gear type, mesh group, and year used in witch flounder discard estimation for the stock area consisting of the CORE region (USA statistical areas: 464, 465, 511, 512, 513, 514, 515, 521-526, 561, 562);and OTHER [statistical areas: 533, 534, 537-543, 611-639]) region. At-Sea Monitoring trips are included for large mesh otter trawl, gillnet haddock separator trawl. Gray shade indicates cells not used.

Large Mesh Otter Trawl							
YEAR	CORE			OTHER			
	Q1&2	Q3&4	Total	Q1&2	Q3&4	Total	Total
1989	26	30	56	5	3	8	64
1990	22	24	46	10	7	17	63
1991	28	44	72	6	7	13	85
1992	48	14	62	17	5	22	84
1993	18	15	33	7	16	23	56
1994	20	6	26	18	8	26	52
1995	35	14	49	20	48	68	117
1996	19	5	24	13	23	36	60
1997	12	7	19	12	6	18	37
1998	6	2	8	12	3	15	23
1999	4	29	33	11	4	15	48
2000	55	39	94	21	11	32	126
2001	48	91	139	16	45	61	200
2002	39	168	207	8	42	50	257
2003	182	192	374	13	14	27	401
2004	145	281	426	76	128	204	630
2005	555	547	1102	124	224	348	1450
2006	329	190	519	85	80	165	684
2007	253	276	529	77	167	244	773
2008	311	368	679	114	115	229	908
2009	366	366	732	112	183	295	1027
2010	330	548	878	169	204	373	1251
2011	623	664	1287	232	250	482	1769
2012	716	606	1322	236	133	369	1691
2013	453	360	813	312	188	500	1313
2014	370	422	792	281	318	599	1391
2015	285	290	575	280	219	499	1074

Small Mesh Otter Trawl							
YEAR	CORE			OTHER			
	Q1&2	Q3&4	Total	Q1&2	Q3&4	Total	Total
1989	12	33	45	32	43	75	120
1990	4	18	22	36	25	61	83
1991	3	38	41	52	66	118	159
1992	6	22	28	37	31	68	96
1993	5	7	12	22	11	33	45
1994	1	1	2	9	16	25	27
1995	4	30	34	24	46	70	104
1996	3	40	43	32	54	86	129
1997	5	2	7	41	20	61	68
1998	1		1	14	23	37	38
1999	4	11	15	20	21	41	56
2000	3	3	6	24	24	48	54
2001	7	7	14	29	31	60	74
2002	3	46	49	25	24	49	98
2003	16	25	41	49	49	98	139
2004	20	76	96	112	198	310	406
2005	66	91	157	110	151	261	418
2006	28	19	47	90	90	180	227
2007	11	22	33	109	142	251	284
2008	4	16	20	93	85	178	198
2009	11	39	50	166	238	404	454
2010	18	51	69	266	220	486	555
2011	12	42	54	201	238	439	493
2012	11	36	47	155	152	307	354
2013	32	73	105	215	265	480	585
2014	9	79	88	286	334	620	708
2015	20	91	111	237	255	492	603

Shrimp trawl			
YEAR	CORE		
	Q1&2	Q3&4	Total
1989	31	9	40
1990	27	4	31
1991	46	7	53
1992	76	6	82
1993	78	4	82
1994	71	6	77
1995	64	9	73
1996	30	5	35
1997	17		17
1998			
1999			
2000			
2001	3		3
2002			
2003	15		15
2004	12		12
2005	17		17
2006	17	3	20
2007	14		14
2008	16	3	19
2009	7	5	12
2010	11	4	15
2011	1		1
2012	19		19
2013	24		24
2014			
2015			

Gillnet							
YEAR	CORE			OTHER			
	Q1&2	Q3&4	Total	Q1&2	Q3&4	Total	Total
1989	1	105	106		1	1	107
1990	74	75	149	1	5	6	155
1991	192	763	955	2	3	5	960
1992	403	629	1032	94	61	155	1187
1993	272	347	619	76	78	154	773
1994	69	53	122	120	163	283	405
1995	47	80	127	252	159	411	538
1996	29	45	74	226	125	351	425
1997	20	28	48	238	104	342	390
1998	39	83	122	228	53	281	403
1999	36	66	102	52	35	87	189
2000	59	65	124	59	44	103	227
2001	41	33	74	57	35	92	166
2002	33	67	100	34	40	74	174
2003	112	273	385	50	56	106	491
2004	220	728	948	75	74	149	1097
2005	155	662	817	99	80	179	996
2006	95	80	175	43	35	78	253
2007	43	190	233	58	44	102	335
2008	64	156	220	51	39	90	310
2009	131	195	326	60	31	91	417
2010	307	1364	1671	112	95	207	1878
2011	564	1244	1808	174	82	256	2064
2012	560	900	1460	201	32	233	1693
2013	180	567	747	52	34	86	833
2014	289	830	1119	123	131	254	1373
2015	97	475	572	220	273	493	1065

Scallop Dredge							
YEAR	CORE			OTHER			
	Q1&2	Q3&4	Total	Q1&2	Q3&4	Total	Total
1989							
1990							
1991		1	1		1	1	2
1992	4	6	10	4	4	8	18
1993	7	4	11	8	3	11	22
1994	2	5	7	10	9	19	26
1995	1	6	7	14	6	20	27
1996	8	7	15	14	11	25	40
1997	6	5	11	14	5	19	30
1998	2	8	10	7	9	16	26
1999	12	50	62	2	6	8	70
2000	25	203	228	13	15	28	256
2001	17		17	40	48	88	105
2002		13	13	34	53	87	100
2003	6	8	14	44	65	109	123
2004	3	57	60	82	154	236	296
2005	37	73	110	90	131	221	331
2006	35	96	131	10	87	97	228
2007	78	102	180	80	99	179	359
2008	89	123	212	297	135	432	644
2009	43	36	79	330	79	409	488
2010	17	82	99	129	110	239	338
2011	27	110	137	146	106	252	389
2012	67	152	219	167	34	201	420
2013	163	107	270	81	121	202	472
2014	80	111	191	147	134	281	472
2015	112	64	176	174	177	351	527

Haddock Separator Trawl			
YEAR	CORE		
	Q1&2	Q3&4	Total
1989			
1990			
1991			
1992			
1993			
1994			
1995			
1996			
1997			
1998			
1999			
2000			
2001			
2002			
2003			
2004			
2005			
2006			
2007			
2008			
2009	1	16	17
2010	40	61	101
2011	73	24	97
2012	13	12	25
2013	6	7	13
2014	23	32	55
2015	31	15	46

Table B14. The number of observed trips, witch flounder discards (in metric tons), and coefficient of variation (CV) by the large-mesh otter trawl, small-mesh otter trawl, gillnet, scallop dredge, haddock separator trawl, and Gulf of Maine shrimp trawl fleets, 1982 – 2015. Time series (TS) means are also given.

YEAR	Large Mesh Otter Trawl			Small Mesh Otter Trawl			Gillnet			Scallop Dredge			Haddock Separator Trawl			GM Shrimp Trawl			TOTAL	
	Trips	MT	CV	Trips	MT	CV	Trips	MT	CV	Trips	MT	CV	Trips	MT	CV	Trips	MT	CV	MT	CV
1982		58.8			279.4			1.1			44.9						15.9		400.1	
1983		206.4			144.8			0.9			41.3						17.4		410.9	
1984		123.0			95.4			1.1			34.5						24.8		278.9	
1985		67.5			76.0			1.0			30.6						34.3		209.5	
1986		16.6			79.6			1.1			39.5						41.7		178.6	
1987		35.6			60.5			1.1			56.7						38.8		192.7	
1988		36.6			63.5			1.2			64.5						24.6		190.3	
1989	64	100.4	0.32	120	150.2	0.40	213	0.3	0.59		73.5					40	26.6	0.25	351.0	0.19
1990	63	105.8	0.58	83	56.1	1.10	160	1.8	0.62		83.2					31	20.5	0.26	267.5	0.33
1991	85	496.2	0.42	159	154.3	0.66	963	2.3	0.15		79.6					53	41.3	0.23	773.7	0.30
1992	84	409.6	0.25	96	70.3	0.33	1187	1.1	0.22	18	12.7	0.70				82	12.9	0.21	506.6	0.20
1993	56	172.9	0.49	45	21.9	0.40	773	1.9	0.29	22	9.3	0.45				82	6.5	0.29	212.5	0.40
1994	52	349.1	0.45	29	26.8		405	1.8	0.54	31	44.5	0.58				77	34.3	0.36	456.6	0.37
1995	117	255.5	0.28	104	122.4	0.39	538	1.8	0.48	33	96.5	0.74				73	32.8	0.15	509.0	0.22
1996	60	158.6	0.53	129	70.8	0.50	425	1.1	0.32	40	31.7	0.67				35	43.8	0.42	306.0	0.31
1997	37	261.1	0.29	73	28.6	2.20	390	5.2	0.40	30	176.8	0.57				34	10.8	0.55	482.5	0.29
1998	29	297.6	0.33	39	81.3		403	1.1	0.50	34	71.2	0.27					7.3		458.4	0.22
1999	48	153.0	0.36	56	134.8	0.89	189	1.2	0.71	76	77.4	0.15					3.2		369.7	0.36
2000	126	128.5	0.22	54	50.8	0.72	227	3.1	0.46	256	122.6	0.12					4.7		309.8	0.16
2001	200	287.1	0.17	74	53.2	0.39	166	0.5	0.87	122	44.2	0.29					1.8		386.7	0.14
2002	257	210.3	0.18	98	33.2	0.48	174	0.5	0.46	113	37.5	0.23					0.7		282.1	0.15
2003	401	281.8	0.12	139	73.0	0.20	491	1.8	0.26	123	70.0	0.28				15	0.1	1.02	426.7	0.10
2004	630	359.5	0.11	406	49.0	0.22	1097	0.3	0.35	296	36.9	0.15				24	0.1	0.97	445.9	0.10
2005	1450	141.7	0.07	418	71.0	0.20	996	0.9	0.32	331	50.5	0.19				34	0.5	0.74	264.4	0.07
2006	684	138.5	0.33	227	57.4	0.57	253	0.2	0.48	228	13.4	0.22				20	1.6	1.26	211.2	0.27
2007	773	58.1	0.14	284	51.1	0.27	335	1.0	0.49	359	22.5	0.24				28	1.9	0.54	134.6	0.13
2008	908	92.1	0.12	198	9.7	0.39	310	0.8	0.32	644	20.4	0.26				19	4.1	0.52	127.2	0.10
2009	1027	118.7	0.12	454	31.1	0.30	417	0.7	0.33	488	51.4	0.15				12	1.3	0.56	203.2	0.09
2010	1251	102.0	0.13	555	27.6	0.27	1878	0.4	0.11	338	18.4	0.28	101	0.9	0.12	15	3.6	0.38	152.9	0.10
2011	1769	68.2	0.07	493	104.7	0.30	2064	0.4	0.13	389	17.1	0.18	97	1.6	0.08	2	8.5		200.6	0.16
2012	1691	78.1	0.07	354	102.5	0.40	1693	0.3	0.10	420	36.7	0.25	25	0.8	0.23	38	1.0	0.49	219.4	0.19
2013	1313	47.7	0.08	585	48.1	0.51	833	0.2	0.15	472	27.8	0.20	13	0.4	0.30	48	0.1	0.46	124.3	0.21
2014	1391	53.0	0.09	708	25.6	0.42	1373	0.1	0.14	472	25.0	0.16	55	1.6	0.34		0.1		105.5	0.12
2015	1074	39.5	0.10	603	24.3	0.35	1065	0.2	0.44	527	26.4	0.17	46	2.2	0.26		0.1		92.8	0.11
TS mean		183.9			75.9			1.1			49.7			1.3			13.8		301.2	

Table B15. 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 (small, medium, large) and calendar quarter for all gear types, 1981 - 2015. The sampling rate is also given.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Total	Sampling Rate (mt/100 lengths)
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	All	
1981 mt	270	14	536	282	45	704	248	13	617	236	3	475	3443	691
n	.	.	.	.	1	1	.	1	.	1	.	1	5	
len	.	.	.	.	101	103	.	89	.	105	.	100	498	
age	.	.	.	.	.	26	.	25	.	25	.	25	101	
1982 mt	357	30	745	366	97	904	292	182	754	284	210	687	4909	133
n	5	2	6	1	2	2	2	2	6	3	4	2	37	
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	489	296	965	486	328	1104	306	167	790	260	174	633	5998	107
n	5	2	3	5	1	5	8	3	8	6	3	.	49	
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	477	379	1100	544	440	1049	408	256	667	437	298	604	6658	103
n	5	9	4	7	1	7	8	1	2	4	2	1	51	
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	477	422	639	711	479	862	527	294	556	437	315	410	6130	83
n	12	1	2	5	4	7	7	7	6	8	2	4	65	
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	404	367	381	669	445	605	377	240	356	314	215	239	4611	94
n	6	3	5	5	4	5	4	3	4	5	3	2	49	
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	
1987 mt	356	243	232	442	333	390	299	204	248	300	205	203	3453	105
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	432	331	273	441	406	391	185	176	209	141	144	132	3261	71
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	235	197	149	260	275	252	99	146	156	87	109	103	2068	115
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	

Table B15, continued. Summary of commercial port sampling for witch flounder.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Total All	Sampling Rate (mt/100 lengths)
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large		
1990 mt	132	140	109	160	182	149	101	120	130	87	81	86	1476	57
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	83	78	59	238	188	169	201	144	185	200	128	124	1798	53
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	233	119	83	503	207	177	212	119	138	227	109	116	2245	92
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	377	141	111	494	216	163	266	124	150	340	104	107	2593	81
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	
1994 mt	408	143	98	504	183	153	382	122	116	383	86	80	2659	65
n	.	.	.	3	5	6	5	5	1	5	3	4	37	
len	.	.	.	560	532	749	356	648	105	342	368	407	4067	
age	.	.	.	59	104	134	44	113	26	56	60	82	678	
1995 mt	335	91	77	568	117	100	398	61	70	303	48	40	2209	86
n	3	3	3	6	3	5	.	.	.	2	.	1	26	
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	87	60	458	56	44	362	42	27	2086	51
n	5	2	3	5	2	1	5	4	4	5	3	3	42	
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	477	86	41	397	55	27	263	31	16	1772	38
n	6	3	3	9	4	3	9	3	1	9	1	1	52	
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	371	40	18	588	81	31	380	43	20	234	26	14	1848	97
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	615	79	31	436	66	30	353	39	17	2121	69
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	

Table B15, continued. Summary of commercial sampling port for witch flounder.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Total All	Sampling Rate (mt/100 lengths)
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large		
2000 mt	477	54	17	582	93	27	555	89	28	451	50	16	2439	35
n	31	2	.	47	.	.	17	1	.	5	5	2	110	
len	2253	91	.	2445	.	.	994	105	.	308	558	217	6971	
age	393	10	.	463	.	.	224	20	.	67	92	51	1320	
2001 mt	583	71	17	825	99	30	699	98	28	507	50	13	3020	84
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	64	42	48	48	64	126	34	46	61	49	.	707	
2002 mt	740	80	18	773	104	26	848	114	29	400	45	9	3188	111
n	5	1	2	3	5	3	5	2	3	3	2	2	36	
len	363	121	107	212	518	209	389	150	194	262	226	115	2866	
age	75	16	50	65	73	64	88	34	62	49	30	49	655	
2003 mt	603	70	17	684	109	30	865	125	36	533	43	10	3124	48
n	4	6	6	10	5	10	11	6	16	7	7	13	101	
len	324	423	162	881	482	433	943	531	552	654	632	525	6542	
age	57	93	60	131	64	174	172	91	246	99	120	191	1498	
2004 mt	613	77	16	599	91	25	757	114	30	545	46	13	2924	34
n	5	13	23	8	5	8	5	5	2	19	5	15	113	
len	480	1244	1813	675	549	576	541	356	48	1838	420	83	8623	
age	73	226	505	151	96	169	58	95	10	49	72	.	1504	
2005 mt	603	69	14	639	101	18	618	96	21	433	34	6	2652	46
n	15	8	11	10	7	9	8	8	12	9	8	15	120	
len	727	525	309	798	523	288	542	369	329	512	422	445	5789	
age	78	65	104	117	113	93	130	92	165	92	99	229	1377	
2006 mt	619	67	14	418	52	8	367	46	12	232	24	4	1863	31
n	9	6	14	11	5	16	11	5	26	11	5	29	148	
len	501	538	765	837	433	255	584	268	392	577	444	334	5928	
age	90	114	246	146	118	119	129	75	282	119	106	238	1782	
2007 mt	264	27	5	267	37	7	227	40	8	173	19	3	1076	23
n	10	6	40	12	2	12	11	15	24	10	5	19	166	
len	516	480	400	653	203	304	605	279	237	605	232	177	4691	
age	106	144	343	132	51	172	136	133	189	107	76	159	1748	

Table B15, continued. Summary of commercial port sampling for witch flounder.

Year	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Total All	Sampling Rate (mt/100 lengths)
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large		
2008 mt	275	34	7	233	28	5	217	33	7	148	18	4	1009	20
n	13	4	22	13	10	24	13	7	12	13	8	16	155	
len	649	243	410	819	329	237	578	417	104	749	459	166	5160	
age	152	83	229	155	190	236	130	69	95	153	178	159	1829	
2009 mt	271	31	5	208	23	4	225	32	8	127	16	4	954	22
n	12	8	15	14	10	20	10	4	18	10	5	4	130	
len	642	393	269	722	299	123	575	246	193	572	317	17	4368	
age	150	163	136	151	139	83	113	100	150	127	74	11	1397	
2010 mt	257	31	5	151	16	3	137	19	6	118	14	3	759	18
n	10	6	18	12	15	28	12	7	15	13	4	9	149	
len	537	355	147	656	376	197	685	221	129	672	200	132	4307	
age	114	106	119	147	178	157	146	134	117	147	77	105	1547	
2011 mt	199	23	3	199	22	5	174	18	4	204	17	3	870	20
n	13	4	34	13	7	40	10	4	7	18	5	18	173	
len	674	280	333	696	265	229	499	165	39	864	209	191	4444	
age	152	100	306	162	119	200	113	97	26	196	82	162	1715	
2012 mt	275	23	3	211	22	4	249	25	6	202	16	2	1038	24
n	9	8	35	8	8	17	9	9	15	8	12	20	158	
len	463	512	361	408	456	126	457	419	60	401	411	194	4268	
age	106	176	327	96	166	115	102	185	59	87	197	161	1777	
2013 mt	185	18	3	156	19	3	149	19	4	113	16	2	686	16
n	9	10	24	8	11	40	9	14	22	10	8	10	175	
len	439	315	188	405	539	301	471	454	200	516	429	131	4388	
age	97	170	173	87	242	282	112	314	200	115	190	130	2112	
2014 mt	147	20	4	123	20	4	130	17	4	83	15	3	570	13
n	6	8	37	13	6	28	7	5	8	10	10	6	144	
len	418	442	406	711	413	245	357	304	68	499	445	133	4441	
age	122	198	389	185	148	212	84	121	65	100	197	77	1898	
2015 mt	84	13	2	129	15	3	128	16	3	85	12	2	492	11
n	8	13	13	8	9	24	7	8	12	7	6	23	138	
len	404	453	244	406	682	242	403	438	134	403	274	237	4320	
age	81	216	174	80	199	202	77	153	124	81	89	206	1682	

Table B16. USA commercial landings at age (thousands of fish), of witch flounder, 1982 – 2015.

USA Commercial Landings in Numbers (1000's) at Age												
Year	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0.000	0.000	0.000	117.956	826.996	1120.437	1454.997	665.519	656.314	399.691	239.515	1579.156
1983	0.000	0.000	0.000	219.770	768.494	1033.558	1567.084	1589.981	977.665	737.599	510.330	1675.270
1984	0.000	0.000	0.000	90.560	1011.948	1807.892	1733.526	1485.836	1496.831	696.389	374.933	1718.033
1985	0.000	0.000	0.000	0.000	984.926	2026.442	1933.458	1524.630	1247.679	605.893	400.329	1358.960
1986	0.000	0.000	0.000	6.297	298.380	1441.019	2771.482	1566.268	834.563	412.534	222.710	757.894
1987	0.000	0.000	0.000	0.000	81.536	321.742	1276.563	1575.395	871.285	480.812	252.511	489.616
1988	0.000	0.000	0.000	0.000	50.782	175.937	654.465	1382.205	1153.687	401.356	266.604	597.286
1989	0.000	0.000	0.000	0.000	7.311	49.834	315.243	761.556	884.683	350.666	123.749	349.011
1990	0.000	0.000	0.000	0.000	182.989	578.808	257.608	276.000	474.751	336.540	81.986	178.877
1991	0.000	0.000	0.000	0.000	181.620	741.370	525.447	238.501	247.383	295.494	317.192	260.756
1992	0.000	0.000	0.000	0.000	513.307	846.017	942.831	722.606	203.222	179.276	120.982	379.969
1993	0.000	0.000	0.000	0.000	420.946	1019.925	915.000	595.459	583.863	218.136	277.723	389.348
1994	0.000	0.000	0.000	0.000	200.824	1426.042	1283.207	824.896	196.225	537.874	113.220	323.525
1995	0.000	0.000	0.000	0.000	23.690	763.005	1597.441	848.706	267.452	97.221	269.492	156.841
1996	0.000	0.000	0.000	0.000	45.789	467.714	1263.814	1430.462	263.227	215.477	57.049	113.619
1997	0.000	0.000	0.000	0.000	212.263	528.139	1049.873	1014.449	591.550	83.179	49.808	70.112
1998	0.000	0.000	0.000	0.000	18.088	487.900	1213.361	1582.816	370.465	141.333	15.538	70.291
1999	0.000	0.000	0.000	0.000	185.108	585.604	1391.457	1178.041	762.981	251.210	31.564	54.349
2000	0.000	0.000	0.000	0.000	75.399	261.545	1072.941	1671.380	1004.032	558.080	93.128	234.596
2001	0.000	0.000	0.000	0.000	18.818	379.952	931.284	1683.679	1455.521	632.495	427.485	309.590
2002	0.000	0.000	0.000	0.000	169.083	648.709	1233.334	2107.561	1270.087	640.069	94.107	201.165
2003	0.000	0.000	0.000	0.000	56.796	517.734	1222.677	1761.003	1535.660	741.087	433.635	347.046
2004	0.000	0.000	0.000	0.000	188.991	698.164	1224.088	1406.985	1125.257	786.921	314.157	285.748
2005	0.000	0.000	0.000	0.000	75.117	637.816	1702.215	1746.196	818.757	408.731	234.631	132.333
2006	0.000	0.000	0.000	0.000	36.203	177.423	571.714	1519.403	869.549	355.981	132.622	73.041
2007	0.000	0.000	0.000	0.000	15.081	48.657	220.164	851.914	594.807	167.459	96.928	42.698
2008	0.000	0.000	0.000	4.216	58.187	84.196	270.706	578.175	449.514	312.159	111.449	66.523
2009	0.000	0.000	0.000	0.000	35.437	223.560	246.841	476.831	436.592	320.986	73.893	77.017
2010	0.000	0.000	0.000	0.000	0.000	111.761	304.379	275.480	394.673	176.184	231.908	45.569
2011	0.000	0.000	0.000	0.000	21.849	65.402	420.504	535.733	428.548	149.948	80.441	34.307
2012	0.000	0.000	0.000	6.343	10.899	167.066	285.674	721.991	551.611	209.074	84.609	39.359
2013	0.000	0.000	0.000	0.000	25.467	97.572	224.527	411.846	317.429	178.050	81.169	37.055
2014	0.000	0.000	0.000	0.000	12.377	89.581	127.143	254.058	320.617	132.562	47.280	26.032
2015	0.000	0.000	0.000	0.000	10.005	71.521	191.318	242.159	275.114	114.573	34.484	22.997

Table B17. USA commercial landings mean weight (kg) at age of witch flounder, 1982 – 2015. Time series (TS) mean is also given.

USA Commercial Landings Mean Weight (kg) at Age												
Year	0	1	2	3	4	5	6	7	8	9	10	11+
1982				0.216	0.275	0.345	0.424	0.550	0.727	0.886	0.983	1.406
1983				0.195	0.257	0.322	0.410	0.518	0.613	0.795	0.977	1.357
1984				0.212	0.268	0.346	0.422	0.539	0.664	0.817	0.922	1.339
1985					0.253	0.311	0.429	0.565	0.691	0.842	0.964	1.326
1986				0.084	0.227	0.306	0.408	0.533	0.676	0.853	0.975	1.32
1987					0.272	0.342	0.434	0.561	0.686	0.828	0.980	1.303
1988					0.310	0.367	0.435	0.538	0.668	0.819	0.980	1.326
1989					0.260	0.344	0.425	0.574	0.682	0.818	0.968	1.358
1990					0.308	0.323	0.438	0.586	0.688	0.849	1.049	1.454
1991					0.286	0.371	0.443	0.578	0.702	0.836	0.974	1.420
1992					0.328	0.383	0.459	0.614	0.739	0.822	0.882	1.243
1993					0.292	0.364	0.432	0.535	0.666	0.882	1.023	1.335
1994					0.308	0.357	0.430	0.534	0.691	0.832	0.909	1.266
1995					0.284	0.367	0.448	0.561	0.690	0.911	0.974	1.243
1996					0.260	0.355	0.435	0.554	0.708	0.856	0.974	1.232
1997					0.318	0.357	0.407	0.495	0.628	0.871	1.037	1.293
1998					0.235	0.331	0.382	0.492	0.585	0.871	0.978	1.206
1999					0.325	0.355	0.406	0.516	0.584	0.628	0.917	0.872
2000					0.319	0.326	0.376	0.455	0.535	0.624	0.704	0.915
2001					0.291	0.325	0.384	0.468	0.550	0.645	0.647	0.840
2002					0.355	0.344	0.416	0.477	0.553	0.652	0.826	0.941
2003					0.275	0.315	0.355	0.433	0.507	0.567	0.621	0.810
2004					0.288	0.317	0.369	0.451	0.543	0.613	0.698	0.873
2005					0.291	0.327	0.371	0.449	0.558	0.634	0.725	0.909
2006					0.290	0.327	0.372	0.465	0.551	0.655	0.719	0.932
2007					0.292	0.323	0.394	0.480	0.564	0.679	0.742	0.906
2008				0.304	0.313	0.383	0.436	0.485	0.544	0.599	0.649	0.823
2009					0.284	0.330	0.402	0.462	0.562	0.622	0.727	0.677
2010						0.313	0.353	0.442	0.502	0.658	0.620	0.821
2011					0.320	0.338	0.401	0.459	0.552	0.670	0.736	0.891
2012				0.304	0.309	0.350	0.380	0.456	0.551	0.655	0.721	0.882
2013					0.314	0.341	0.381	0.460	0.531	0.632	0.698	0.876
2014					0.284	0.358	0.422	0.491	0.594	0.694	0.771	1.409
2015				0.000	0.267	0.342	0.393	0.477	0.557	0.658	0.767	0.839
TS mean					0.290	0.341	0.408	0.507	0.613	0.743	0.848	1.107



Table B18. USA commercial landings mean length (cm) at age of witch flounder, 1982 – 2015. Time series (TS) mean is also given.

USA Commercial Landings Mean Length (cm) at Age												
Year	0	1	2	3	4	5	6	7	8	9	10	11+
1982				32.3	35.0	37.5	39.8	42.9	46.5	49.3	50.9	56.3
1983				31.7	34.3	36.8	39.4	42.2	44.2	47.7	50.7	55.0
1984				32.6	34.9	37.6	39.8	42.7	45.3	48.2	49.9	55.5
1985					34.2	36.3	40.0	43.3	45.9	48.6	50.6	55.3
1986				25.0	33.2	36.2	39.4	42.5	45.6	48.8	50.7	55.3
1987					35.0	37.4	40.1	43.2	45.8	48.4	50.8	55.1
1988					36.4	38.2	40.1	42.7	45.4	48.2	50.8	55.3
1989					34.6	37.5	39.9	43.5	45.6	48.1	50.6	55.7
1990					36.2	36.8	40.2	43.7	45.8	48.7	51.8	56.8
1991					35.4	38.3	40.3	43.3	46.1	48.5	50.6	56.5
1992					37.0	38.7	40.7	44.3	46.8	48.3	49.2	54.2
1993					35.8	38.1	40.0	42.6	45.3	49.3	51.5	55.5
1994					36.0	37.6	39.7	42.3	45.6	48.0	49.1	54.1
1995					35.3	37.9	40.2	42.8	45.4	49.3	50.1	53.8
1996					34.4	37.5	39.8	42.7	45.8	48.4	50.1	53.6
1997					36.4	37.6	39.1	41.3	44.2	48.5	51.1	54.4
1998					33.4	36.8	38.4	41.2	43.3	48.7	50.5	53.4
1999					36.6	37.5	39.0	41.8	43.3	44.3	49.4	48.0
2000					36.4	36.6	38.2	40.3	42.2	44.0	45.7	48.9
2001					35.5	36.6	38.4	40.6	42.5	44.6	44.5	47.9
2002					37.5	37.2	39.3	40.9	42.6	44.6	48.0	49.7
2003					34.9	36.3	37.6	39.8	41.6	42.9	43.9	47.3
2004					35.4	36.4	38.0	40.2	42.4	43.8	45.5	48.5
2005					35.5	36.7	38.0	40.1	42.8	44.3	46.1	49.1
2006					35.4	36.7	38.1	40.6	42.6	44.7	45.9	49.5
2007					35.5	36.6	38.8	41.0	42.9	45.3	46.4	49.1
2008				36.0	36.3	38.3	39.7	41.0	42.4	43.5	44.3	47.8
2009					35.3	36.8	38.8	40.4	42.8	44.1	46.1	45.1
2010						36.2	37.5	39.9	41.4	44.8	44.1	47.7
2011					36.5	37.0	38.9	40.4	42.6	45.1	46.3	48.9
2012				36.0	36.1	37.4	38.3	40.3	42.6	44.8	46.0	48.8
2013					36.3	37.1	38.3	40.4	42.1	44.3	45.6	48.7
2014					35.2	37.6	39.5	41.2	43.6	45.5	46.9	54.0
2015					34.6	37.1	38.6	40.9	42.7	44.8	46.9	47.9
TS mean				32.3	35.5	37.2	39.2	41.7	44.0	46.5	48.3	51.8

Table B19. Coefficient of variation associated with the number of witch flounder landed at age for ages 4 to 11+ for 2003 - 2015.

Year	Age							
	4	5	6	7	8	9	10	11+
2003	0.704	0.286	0.225	0.164	0.131	0.179	0.258	0.166
2004	0.466	0.250	0.160	0.114	0.136	0.142	0.198	0.161
2005	0.495	0.205	0.128	0.087	0.133	0.163	0.181	0.131
2006	0.203	0.123	0.088	0.045	0.020	0.039	0.056	0.074
2007	0.349	0.241	0.142	0.064	0.083	0.129	0.146	0.148
2008	0.430	0.290	0.196	0.087	0.107	0.130	0.170	0.167
2009	0.409	0.195	0.197	0.129	0.101	0.119	0.247	0.419
2010		0.257	0.138	0.119	0.095	0.154	0.109	0.163
2011	0.195	0.125	0.051	0.035	0.025	0.049	0.063	0.063
2012	0.296	0.122	0.083	0.038	0.034	0.050	0.068	0.082
2013	0.226	0.158	0.096	0.049	0.030	0.063	0.059	0.065
2014	0.303	0.121	0.075	0.050	0.057	0.048	0.052	0.063
2015	0.290	0.160	0.103	0.041	0.038	0.067	0.061	0.066

Table B20. The number of witch flounder measured by observers on commercial fishing trips for 6 gear types/mesh groups, 1989 – 2015 from the stock area (except for Gulf of Maine shrimp trawl and haddock separator trawl data that are from the Gulf of Maine-Georges Bank region). No Northeast Fisheries Observer Program discarded length measurements are available prior to 1989.

Year	Large Mesh Otter Trawl	Small Mesh Otter Trawl	Haddock Separator Trawl	Gulf of Maine Shrimp Trawl	Gillnet	Scallop Dredge
1989	491	219	-	877	-	-
1990	64	79	-	171	8	-
1991	195	251	-	1,583	2	-
1992	31	33	-	595	4	-
1993	686	1	-	1,107	6	2
1994	223	176	-	2,208	18	52
1995	2,092	915	-	2,301	9	71
1996	349	12	-	1,096	12	128
1997	732	50	-	268	5	367
1998	204	-	-	-	7	37
1999	548	-	-	-	1	135
2000	191	223	-	-	39	273
2001	511	159	-	-	-	7
2002	3,745	459	-	-	9	2
2003	9,954	914	-	2	63	334
2004	8,067	1,775	-	3	29	630
2005	14,014	1,900	-	33	50	771
2006	5,936	426	-	165	2	126
2007	4,038	797	-	12	42	223
2008	7,690	132	-	66	8	339
2009	6,257	87	57	102	18	660
2010	2,722	228	97	8	140	121
2011	3,894	242	214	-	96	229
2012	3,173	273	39	10	33	467
2013	1,345	177	19	17	25	605
2014	1,698	207	50	-	23	401
2015	1,053	75	68	-	6	555

Table B21. Witch flounder discards at age (thousands of fish), 1982 - 2015.

Year	Discards in Numbers (1000's) at Age											
	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0.240	0.567	5.607	451.642	1812.486	662.967	175.679	14.465	10.673	2.924	1.320	2.592
1983	0.000	0.116	6.857	230.828	1339.408	1145.522	30.639	17.446	9.169	4.265	1.637	2.603
1984	0.000	0.838	2.185	132.071	1130.144	494.143	27.705	11.513	8.456	3.618	1.421	2.150
1985	0.000	1.016	9.966	365.701	571.703	284.877	24.180	11.743	6.683	2.390	1.034	1.909
1986	0.000	1.760	12.411	61.793	402.962	500.513	34.697	16.349	7.644	3.185	1.281	2.302
1987	3.718	33.867	143.655	55.777	252.627	491.324	41.942	27.386	10.157	3.871	1.939	2.968
1988	0.303	10.788	94.744	767.865	237.602	245.194	33.902	32.452	15.265	4.214	2.194	3.411
1989	1.036	17.726	90.404	192.082	1172.740	454.132	29.663	30.829	26.931	6.199	2.000	3.564
1990	0.852	4.058	138.835	367.025	421.474	580.142	26.939	19.383	19.036	10.558	2.973	3.357
1991	4.146	25.191	245.709	1152.467	1413.645	1260.688	487.478	17.705	13.117	7.814	6.618	3.393
1992	1.925	30.959	97.584	196.155	1010.941	685.473	328.930	34.171	1.094	1.141	0.571	0.953
1993	82.165	57.851	79.559	73.256	537.683	366.336	9.067	4.861	2.629	0.431	0.337	0.465
1994	17.200	2921.272	1061.518	100.679	538.078	782.708	88.747	157.062	6.283	10.920	1.473	12.048
1995	2.600	48.453	683.172	864.708	858.059	700.393	315.333	31.210	17.365	6.101	13.230	5.163
1996	16.593	104.175	163.177	390.335	632.735	694.630	120.128	14.489	3.332	2.535	0.685	1.267
1997	7.060	60.908	89.879	129.708	782.005	661.109	354.768	100.231	58.198	7.288	1.924	1.865
1998	20.147	161.403	152.613	347.476	847.700	797.546	272.703	70.044	17.141	10.536	1.017	4.159
1999	8.823	70.386	83.004	147.612	518.891	676.906	113.397	46.287	20.735	9.757	6.506	21.408
2000	12.956	101.892	78.758	132.662	421.838	447.313	150.417	86.883	47.926	27.685	7.656	22.097
2001	4.962	39.078	27.781	61.710	445.771	935.720	267.653	82.586	15.820	7.736	4.396	5.390
2002	1.933	16.311	14.570	37.143	483.675	561.882	158.846	59.586	18.542	9.925	2.987	5.200
2003	0.000	1.989	11.663	42.956	307.983	782.937	514.378	183.154	55.935	23.120	10.627	9.731
2004	0.000	0.760	16.012	48.583	259.672	709.885	571.612	182.926	54.095	26.099	21.773	14.200
2005	0.000	11.001	36.518	30.658	200.261	355.939	294.287	113.117	29.317	16.242	7.825	7.097
2006	0.000	6.972	53.351	126.189	98.257	167.112	375.258	105.261	31.729	13.137	7.446	7.174
2007	0.000	4.753	29.889	144.447	164.555	125.833	90.803	53.738	12.909	7.987	2.410	3.783
2008	0.000	1.200	22.313	51.227	235.041	158.720	81.504	39.118	17.235	4.860	1.778	2.186
2009	0.000	0.622	25.127	40.690	203.255	338.728	93.136	50.581	48.832	17.655	6.780	4.060
2010	0.000	29.170	370.017	80.710	110.939	202.875	239.029	32.885	12.668	6.585	2.328	2.233
2011	0.000	46.436	346.587	245.016	127.164	189.696	251.231	94.749	19.344	12.151	5.678	1.743
2012	0.000	6.487	57.335	161.431	259.412	188.432	194.922	98.803	42.699	12.115	4.256	2.477
2013	0.000	3.497	48.000	43.091	179.335	130.050	72.043	63.249	14.480	7.106	3.040	1.106
2014	0.000	1.778	19.496	134.517	91.653	131.248	54.475	25.966	17.254	4.406	1.308	1.435
2015	0.000	0.367	19.946	94.239	179.622	62.034	58.758	24.813	15.635	7.210	2.075	1.118

Table B22. Witch flounder discard mean weight (kg) at age, 1982 - 2015. Time series (TS) mean is also given.

Year	Discards Mean Weight (kg) at Age											
	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0.000	0.003	0.035	0.050	0.128	0.130	0.206	0.546	0.667	0.847	0.944	1.291
1983		0.008	0.038	0.071	0.132	0.160	0.346	0.535	0.619	0.765	0.966	1.252
1984		0.016	0.039	0.056	0.142	0.168	0.347	0.536	0.641	0.779	0.943	1.269
1985		0.016	0.023	0.128	0.154	0.173	0.361	0.541	0.665	0.808	0.947	1.263
1986		0.017	0.026	0.092	0.126	0.177	0.358	0.543	0.667	0.831	0.940	1.285
1987	0.006	0.015	0.033	0.087	0.131	0.209	0.380	0.543	0.674	0.851	0.989	1.295
1988	0.004	0.006	0.017	0.063	0.165	0.207	0.393	0.522	0.656	0.841	0.995	1.302
1989	0.010	0.012	0.031	0.058	0.151	0.228	0.417	0.529	0.601	0.812	0.941	1.322
1990	0.004	0.011	0.035	0.058	0.160	0.210	0.463	0.569	0.663	0.823	0.875	1.372
1991	0.004	0.014	0.039	0.063	0.161	0.240	0.256	0.563	0.669	0.785	0.895	1.321
1992	0.003	0.007	0.021	0.096	0.188	0.265	0.295	0.397	0.677	0.744	0.874	1.199
1993	0.003	0.009	0.023	0.101	0.200	0.236	0.373	0.450	0.665	0.859	1.016	1.334
1994	0.005	0.004	0.019	0.074	0.180	0.230	0.382	0.484	0.649	0.843	0.867	1.209
1995	0.005	0.007	0.027	0.065	0.154	0.227	0.285	0.561	0.713	0.860	0.927	1.090
1996	0.004	0.019	0.031	0.061	0.128	0.210	0.277	0.572	0.745	0.928	0.989	1.046
1997	0.004	0.023	0.035	0.073	0.163	0.213	0.290	0.521	0.625	0.748	0.854	0.790
1998	0.003	0.006	0.029	0.083	0.167	0.206	0.245	0.384	0.598	0.769	0.965	1.254
1999	0.003	0.006	0.029	0.093	0.167	0.221	0.295	0.481	0.681	0.744	1.053	1.548
2000	0.003	0.006	0.028	0.081	0.149	0.189	0.280	0.378	0.521	0.682	0.847	1.079
2001	0.003	0.006	0.024	0.109	0.167	0.208	0.235	0.308	0.550	0.625	0.718	1.009
2002	0.003	0.007	0.033	0.102	0.172	0.202	0.243	0.325	0.512	0.647	0.692	0.903
2003		0.007	0.032	0.070	0.137	0.196	0.242	0.289	0.408	0.526	0.626	0.868
2004		0.006	0.048	0.099	0.157	0.206	0.244	0.297	0.420	0.539	0.526	0.811
2005		0.019	0.051	0.109	0.170	0.212	0.258	0.329	0.481	0.590	0.704	0.998
2006		0.012	0.051	0.098	0.164	0.203	0.233	0.283	0.386	0.440	0.594	0.877
2007		0.015	0.041	0.115	0.179	0.221	0.251	0.342	0.543	0.663	0.871	1.012
2008		0.004	0.036	0.109	0.171	0.211	0.249	0.334	0.448	0.575	0.639	0.957
2009		0.040	0.044	0.104	0.189	0.222	0.273	0.366	0.420	0.625	0.715	0.931
2010		0.002	0.012	0.081	0.180	0.219	0.238	0.288	0.416	0.486	0.584	0.588
2011		0.002	0.026	0.093	0.183	0.216	0.246	0.281	0.372	0.380	0.493	0.770
2012		0.007	0.039	0.134	0.179	0.220	0.248	0.308	0.395	0.553	0.691	0.894
2013		0.025	0.094	0.147	0.185	0.211	0.252	0.310	0.516	0.613	0.676	0.862
2014		0.025	0.075	0.132	0.183	0.237	0.270	0.386	0.500	0.654	0.703	0.802
2015		0.026	0.062	0.105	0.155	0.198	0.296	0.383	0.494	0.631	0.566	0.917
TS mean	0.004	0.012	0.036	0.090	0.162	0.208	0.295	0.426	0.566	0.702	0.813	1.080

Table B23. Witch flounder discard mean length (cm) at age, 1982 - 2015. Time series (TS) mean is also given.

Year	Discards Mean Length (cm) at Age											
	0	1	2	3	4	5	6	7	8	9	10	11+
1982	5.0	8.4	19.2	21.4	28.3	28.5	32.3	42.5	45.0	48.3	49.9	54.4
1983		12.1	19.9	23.5	28.6	30.5	37.3	42.2	44.1	46.9	50.2	53.8
1984		15.4	19.8	21.8	29.3	30.8	37.4	42.3	44.6	47.2	49.9	54.1
1985		15.5	16.9	28.4	30.1	31.0	37.7	42.4	45.0	47.7	49.9	54.0
1986		15.5	17.3	25.3	28.3	31.3	37.6	42.4	45.1	48.1	49.8	54.3
1987	10.6	15.3	19.0	25.1	28.5	32.9	38.3	42.4	45.2	48.4	50.5	54.4
1988	10.2	10.9	15.6	22.6	30.4	32.7	38.7	41.9	44.8	48.2	50.7	54.5
1989	13.6	14.1	18.6	22.3	29.7	33.7	39.3	42.1	43.5	47.7	49.8	54.7
1990	10.5	13.7	19.3	22.1	30.2	32.7	40.6	43.1	45.0	47.8	48.3	55.3
1991	9.7	14.1	19.8	22.6	30.2	34.3	34.8	42.9	45.1	47.2	49.0	54.6
1992	9.3	10.8	16.6	25.3	31.8	35.3	36.2	39.5	45.2	46.4	48.7	53.2
1993	9.2	12.0	16.9	25.9	32.4	34.1	38.5	40.3	45.0	48.6	51.0	54.9
1994	10.7	9.8	15.9	23.2	31.4	33.8	38.8	42.0	45.2	48.4	48.5	54.7
1995	10.9	11.6	17.6	22.6	30.0	33.7	35.7	43.0	46.0	48.6	49.5	51.9
1996	10.0	15.3	18.5	22.6	28.2	32.9	35.5	43.0	46.4	49.6	50.6	51.4
1997	10.2	16.1	19.2	23.7	30.4	32.9	35.7	42.0	44.2	46.8	48.5	47.5
1998	9.4	10.4	17.9	24.9	30.8	32.7	34.2	38.0	43.6	46.7	50.3	53.9
1999	9.4	10.5	18.1	25.5	30.7	33.4	36.3	41.4	45.3	46.6	51.5	57.3
2000	9.4	10.4	17.6	24.5	29.7	31.9	35.5	38.0	41.8	45.2	48.0	51.5
2001	9.4	10.4	17.1	26.6	30.7	32.8	34.0	36.4	42.5	44.0	45.9	50.2
2002	9.4	10.8	18.5	26.1	31.0	32.6	34.2	36.7	41.9	44.5	45.8	46.4
2003		12.5	18.8	23.8	28.9	32.2	34.3	35.9	39.2	42.1	44.1	48.3
2004		12.2	21.3	26.4	30.1	32.7	34.4	36.3	40.1	43.1	42.7	48.0
2005		15.9	21.4	26.8	30.8	33.0	34.9	37.2	41.3	43.7	45.8	50.0
2006		14.0	21.3	26.2	30.5	32.6	34.0	35.7	38.8	39.9	44.0	49.0
2007		15.1	20.0	27.4	31.4	33.4	34.7	37.6	42.7	45.5	48.6	50.9
2008		10.0	19.0	27.0	30.9	33.0	34.5	37.3	40.5	43.0	44.1	49.0
2009		20.3	20.1	26.5	31.8	33.4	35.3	38.0	39.2	44.2	45.6	49.4
2010		13.4	16.0	23.2	31.4	33.3	34.1	35.8	39.6	41.3	43.6	43.7
2011		9.1	17.5	24.3	31.5	33.2	34.4	35.7	38.2	38.4	41.2	47.0
2012		10.2	19.0	28.6	31.3	33.3	34.5	36.5	38.7	42.6	45.5	49.1
2013		16.6	25.9	29.5	31.6	32.9	34.6	36.4	41.9	44.0	45.2	48.5
2014		16.8	24.2	28.6	31.5	34.0	35.1	38.7	41.6	44.9	41.8	38.7
2015		17.9	22.7	26.6	30.0	32.0	36.0	38.5	41.3	44.6	34.2	49.1
TS mean	9.8	13.1	19.0	25.0	30.4	32.7	35.9	39.5	42.9	45.6	47.1	51.1

Table B24. Total USA commercial catch (thousands of fish) at age of witch flounder, 1982 - 2015.

USA Commercial Catch in Numbers (1000's) at Age												
Year	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0.24	0.57	5.61	569.61	2639.52	1783.43	1630.70	679.99	667.00	402.62	240.84	1581.77
1983	0.00	0.12	6.86	450.60	2107.91	2179.09	1597.73	1607.43	986.84	741.87	511.97	1677.88
1984	0.00	0.84	2.19	222.63	2142.12	2302.06	1761.25	1497.37	1505.31	700.02	376.36	1720.20
1985	0.00	1.02	9.97	365.70	1556.64	2311.33	1957.65	1536.38	1254.37	608.29	401.37	1360.88
1986	0.00	1.76	12.41	68.09	701.33	1941.51	2806.15	1582.60	842.20	415.71	223.99	760.19
1987	3.72	33.87	143.66	55.78	334.16	813.07	1318.51	1602.78	881.44	484.68	254.45	492.58
1988	0.30	10.79	94.74	767.85	288.38	421.12	688.36	1414.64	1168.93	405.56	268.79	600.69
1989	1.04	17.73	90.40	192.08	1180.07	503.97	344.91	792.40	911.63	356.87	125.75	352.58
1990	0.85	4.06	138.84	367.03	604.48	1158.98	284.55	295.39	493.80	347.11	84.96	182.24
1991	4.15	25.19	245.71	1152.48	1595.28	2002.07	1012.93	256.21	260.50	303.31	323.81	264.15
1992	1.93	30.96	97.58	196.15	1524.22	1531.46	1271.74	756.76	204.31	180.41	121.55	380.91
1993	82.16	57.85	79.56	73.26	958.62	1386.25	924.06	600.32	586.49	218.57	278.06	389.81
1994	17.20	2921.32	1061.54	100.68	738.92	2208.79	1371.98	981.98	202.51	548.80	114.70	335.58
1995	2.60	48.45	683.18	864.72	881.76	1463.42	1912.80	879.93	284.82	103.32	282.73	162.01
1996	16.59	104.17	163.17	390.33	678.51	1162.32	1383.91	1444.92	266.55	218.01	57.73	114.88
1997	7.06	60.91	89.88	129.71	994.29	1189.27	1404.67	1114.70	649.76	90.47	51.73	71.98
1998	20.15	161.40	152.61	347.47	865.76	1285.41	1486.02	1652.81	387.59	151.86	16.55	74.45
1999	8.82	70.39	83.01	147.62	704.02	1262.55	1504.90	1224.36	783.74	260.98	38.07	75.76
2000	12.96	101.89	78.76	132.66	497.24	708.86	1223.36	1758.27	1051.96	585.77	100.78	256.69
2001	4.96	39.08	27.78	61.71	464.58	1315.66	1198.92	1766.25	1471.32	640.22	431.88	314.98
2002	1.93	16.31	14.57	37.14	652.75	1210.58	1392.17	2167.13	1288.62	649.99	97.09	206.36
2003	0.00	1.99	11.66	42.96	364.78	1300.67	1737.05	1944.15	1591.59	764.21	444.26	356.78
2004	0.00	0.76	16.01	48.58	448.67	1408.06	1795.72	1589.93	1179.36	813.03	335.93	299.95
2005	0.00	11.00	36.52	30.66	275.37	993.73	1996.46	1859.27	848.05	424.96	242.45	139.43
2006	0.00	6.97	53.35	126.19	134.46	344.54	947.00	1624.71	901.30	369.13	140.07	80.22
2007	0.00	4.75	29.89	144.45	179.64	174.49	310.97	905.67	607.73	175.45	99.34	46.48
2008	0.00	1.20	22.31	55.45	293.24	242.92	352.22	617.32	466.77	317.03	113.23	68.71
2009	0.00	0.62	25.13	40.69	238.70	562.30	339.98	527.42	485.43	338.65	80.67	81.08
2010	0.00	29.17	370.01	80.71	110.94	314.63	543.39	308.36	407.33	182.76	234.23	47.80
2011	0.00	46.44	346.60	245.02	149.02	255.11	671.76	630.50	447.91	162.10	86.12	36.05
2012	0.00	6.49	57.34	167.78	270.32	355.50	480.60	820.81	594.32	221.19	88.87	41.84
2013	0.00	3.50	48.00	43.10	204.82	227.64	296.60	475.14	331.94	185.17	84.22	38.17
2014	0.00	1.78	19.50	134.52	104.03	220.84	181.62	280.03	337.88	136.97	48.59	27.47
2015	0.00	0.37	19.95	94.25	189.64	133.57	250.10	266.99	290.77	121.79	36.56	24.12

Table B25. USA commercial catch mean weight (kg) at age of witch flounder, 1982 - 2015. Time series (TS) mean is also given.

USA Commerical Catch Mean Weight (kg) at Age												
Year	0	1	2	3	4	5	6	7	8	9	10	11+
1982	0.000	0.003	0.035	0.085	0.174	0.265	0.401	0.550	0.726	0.886	0.983	1.405
1983		0.008	0.038	0.132	0.178	0.237	0.409	0.518	0.613	0.795	0.977	1.357
1984		0.016	0.039	0.119	0.201	0.308	0.421	0.539	0.664	0.817	0.922	1.339
1985		0.016	0.023	0.128	0.218	0.295	0.428	0.565	0.691	0.842	0.964	1.325
1986		0.017	0.026	0.091	0.172	0.275	0.407	0.533	0.676	0.853	0.975	1.321
1987	0.006	0.015	0.033	0.087	0.168	0.265	0.432	0.561	0.686	0.828	0.980	1.303
1988	0.004	0.006	0.017	0.063	0.192	0.278	0.433	0.538	0.668	0.819	0.980	1.326
1989	0.010	0.012	0.031	0.058	0.151	0.241	0.424	0.572	0.680	0.818	0.968	1.357
1990	0.004	0.011	0.035	0.058	0.205	0.266	0.440	0.585	0.687	0.848	1.043	1.453
1991	0.004	0.014	0.039	0.063	0.176	0.289	0.353	0.577	0.700	0.835	0.972	1.419
1992	0.003	0.007	0.021	0.096	0.235	0.330	0.417	0.604	0.739	0.822	0.882	1.243
1993	0.003	0.009	0.023	0.101	0.240	0.330	0.431	0.534	0.666	0.882	1.023	1.335
1994	0.005	0.004	0.019	0.074	0.215	0.312	0.427	0.526	0.690	0.832	0.908	1.264
1995	0.005	0.007	0.027	0.065	0.158	0.300	0.421	0.561	0.691	0.908	0.972	1.238
1996	0.004	0.019	0.031	0.061	0.137	0.268	0.421	0.554	0.708	0.857	0.974	1.230
1997	0.004	0.023	0.035	0.073	0.196	0.277	0.377	0.497	0.628	0.861	1.030	1.280
1998	0.003	0.006	0.029	0.083	0.168	0.253	0.357	0.487	0.586	0.864	0.977	1.209
1999	0.003	0.006	0.029	0.093	0.208	0.283	0.398	0.515	0.587	0.632	0.940	1.063
2000	0.003	0.006	0.028	0.081	0.175	0.239	0.364	0.451	0.534	0.627	0.715	0.930
2001	0.003	0.006	0.024	0.109	0.172	0.241	0.351	0.461	0.550	0.645	0.648	0.843
2002	0.003	0.007	0.033	0.102	0.220	0.278	0.396	0.473	0.552	0.652	0.822	0.940
2003		0.007	0.032	0.070	0.158	0.244	0.321	0.419	0.504	0.566	0.621	0.811
2004			0.048	0.099	0.212	0.261	0.329	0.433	0.537	0.611	0.687	0.870
2005		0.019	0.051	0.109	0.203	0.286	0.354	0.442	0.555	0.632	0.724	0.914
2006		0.012	0.051	0.098	0.198	0.267	0.317	0.453	0.545	0.647	0.712	0.927
2007		0.015	0.041	0.115	0.188	0.250	0.352	0.472	0.564	0.678	0.745	0.915
2008		0.004	0.036	0.124	0.199	0.270	0.393	0.475	0.540	0.599	0.649	0.827
2009		0.040	0.044	0.104	0.203	0.265	0.367	0.453	0.548	0.622	0.726	0.690
2010		0.002	0.012	0.081	0.180	0.253	0.302	0.426	0.499	0.652	0.620	0.810
2011		0.002	0.026	0.093	0.203	0.247	0.343	0.432	0.544	0.648	0.720	0.885
2012		0.007	0.039	0.140	0.184	0.281	0.327	0.438	0.540	0.649	0.720	0.883
2013		0.025	0.094	0.147	0.201	0.267	0.350	0.440	0.530	0.631	0.697	0.876
2014		0.025	0.075	0.132	0.195	0.286	0.376	0.481	0.589	0.693	0.769	1.377
2015		0.026	0.062	0.105	0.161	0.275	0.370	0.468	0.554	0.656	0.756	0.843
TS mean	0.004	0.012	0.036	0.095	0.190	0.273	0.383	0.501	0.611	0.741	0.847	1.112



Table B26. USA commercial catch mean length (cm) at age of witch flounder, 1982 - 2015. Time series (TS) mean is also given.

USA Commercial Catch Mean Length (cm) at Age												
Year	0	1	2	3	4	5	6	7	8	9	10	11+
1982	5.0	8.4	19.2	23.6	30.4	34.1	39.0	42.9	46.5	49.3	50.9	56.3
1983		12.1	19.9	27.5	30.7	33.5	39.4	42.2	44.2	47.7	50.7	55.0
1984		15.4	19.8	26.2	31.9	36.1	39.7	42.7	45.3	48.2	49.9	55.5
1985		15.5	16.9	28.4	32.7	35.7	39.9	43.3	45.9	48.6	50.6	55.3
1986		15.5	17.3	25.3	30.4	35.0	39.3	42.5	45.5	48.8	50.7	55.3
1987	10.6	15.3	19.0	25.1	30.1	34.7	40.0	43.1	45.8	48.4	50.8	55.1
1988	10.2	10.9	15.6	22.6	31.5	35.0	40.0	42.7	45.4	48.2	50.8	55.3
1989	13.6	14.1	18.6	22.3	29.8	34.1	39.8	43.4	45.5	48.1	50.6	55.7
1990	10.5	13.7	19.3	22.1	32.0	34.7	40.2	43.7	45.8	48.6	51.6	56.8
1991	9.7	14.1	19.8	22.6	30.8	35.7	37.6	43.3	46.0	48.5	50.6	56.4
1992	9.3	10.8	16.6	25.3	33.5	37.1	39.6	44.1	46.8	48.2	49.2	54.2
1993	9.2	12.0	16.9	25.9	33.9	37.1	40.0	42.5	45.3	49.3	51.5	55.5
1994	10.7	9.8	15.9	23.2	32.7	36.3	39.6	42.2	45.6	48.0	49.1	54.1
1995	10.9	11.6	17.6	22.6	30.1	35.9	39.4	42.8	45.4	49.2	50.1	53.8
1996	10.0	15.3	18.5	22.6	28.6	34.8	39.4	42.7	45.8	48.4	50.1	53.6
1997	10.2	16.1	19.2	23.7	31.7	35.0	38.2	41.4	44.2	48.3	51.0	54.2
1998	9.4	10.4	17.9	24.9	30.9	34.3	37.6	41.1	43.3	48.5	50.4	53.4
1999	9.4	10.5	18.1	25.5	32.3	35.3	38.8	41.8	43.3	44.4	49.8	50.6
2000	9.4	10.4	17.6	24.5	30.7	33.6	37.9	40.2	42.2	44.1	45.8	49.1
2001	9.4	10.4	17.1	26.6	30.9	33.9	37.4	40.4	42.5	44.6	44.5	47.9
2002	9.4	10.8	18.5	26.1	32.7	35.0	38.7	40.8	42.6	44.6	47.9	49.6
2003		12.5	18.8	23.8	29.8	33.8	36.6	39.4	41.5	42.8	43.9	47.3
2004		12.2	21.3	26.4	32.3	34.5	36.8	39.8	42.3	43.8	45.3	48.5
2005		15.9	21.4	26.8	32.1	35.4	37.6	40.0	42.7	44.3	46.1	49.2
2006		14.0	21.3	26.2	31.8	34.7	36.4	40.3	42.4	44.6	45.8	49.4
2007		15.1	20.0	27.4	31.8	34.3	37.6	40.8	42.9	45.3	46.4	49.3
2008		10.0	19.0	27.7	32.0	34.8	38.5	40.8	42.3	43.5	44.3	47.8
2009		20.3	20.1	26.5	32.3	34.8	37.9	40.2	42.4	44.1	46.1	45.3
2010		13.4	16.0	23.2	31.4	34.3	36.0	39.5	41.3	44.6	44.1	47.6
2011		9.1	17.5	24.3	32.2	34.1	37.2	39.7	42.4	44.6	46.0	48.8
2012		10.2	19.0	28.8	31.5	35.3	36.7	39.9	42.3	44.6	46.0	48.8
2013		16.6	25.9	29.5	32.2	34.7	37.4	39.9	42.1	44.3	45.6	48.7
2014		16.8	24.2	28.6	32.0	35.4	38.2	41.0	43.4	45.5	46.8	53.2
2015		17.9	22.7	26.6	30.3	34.7	38.0	40.6	42.7	44.8	46.1	48.0
TS mean	9.8	13.1	19.0	25.4	31.5	34.9	38.4	41.5	43.9	46.4	48.2	51.9

Table B27. Summary of area (square nautical miles) of Northeast Fisheries Science Center survey strata (offshore strata 22-30; 36-40) used in the witch flounder stock assessment and the USA statistical areas associated with the witch flounder stock. The statistical areas that comprise approximately 96% of the landings are denoted with an asterisk (\*).

Survey		USA Stat	
Strata	Area	Areas	Area
22	454	464	208
23	1,016	465	258
24	2,569	467	75
25	390	511 *	1,313
26	1,014	512 *	3,652
27	720	513 *	3,567
28	2,249	514 *	2,573
29	3,245	515 *	4,603
30	619	521 *	3,853
36	4,069	522 *	3,663
37	2,108	525 *	7,461
38	2,560	526 *	4,029
39	730	533	1,547
40	578	534	2,320
Total	22,321	537	6,261
		538	800
		539	742
		541	2,320
		542	5,402
		543	2,281
		561 *	765
		562 *	3,562
		611	1,421
		612	1,893
		613	3,258
		614	1,131
		615	2,781
		616	3,707
		621	3,702
		622	2,820
		623	2,820
		624	5,638
		625	5,104
		626	2,858
		627	2,858
		628	2,858
		629	3,375
		631	3,115
		632	2,895
		633	2,895
		634	2,895
		635	3,485
		636	2,931
		637	2,931
		638	2,931
		639	3,508
		640	6,906
		Unit area	141,966
		* Areas	39,581

Table B28. Stratified mean number, weight (kg), length (cm), and individual weight (kg) per tow of witch flounder in Northeast Fisheries Science Center offshore spring and autumn bottom trawl surveys in Gulf of Maine-Georges Bank region (strata 22-30,36-40), 1963-2016. Time series means are also given.

Year	SPRING					Avg. wt. per tow	AUTUMN					Avg. wt. per tow
	Number per tow	CV	Weight per tow	CV	Length per tow		Number per tow	CV	Weight per tow	CV	Length per tow	
1963	-		-		-	-	5.52	18.6	3.46	17.2	39.7	0.627
1964	-		-		-	-	2.89	13.6	2.09	17.2	44.2	0.724
1965	-		-		-	-	3.94	14.8	2.29	17.0	40.6	0.580
1966	-		-		-	-	7.89	17.0	4.61	16.2	41.2	0.585
1967	-		-		-	-	3.00	18.0	1.99	27.4	43.7	0.666
1968	4.71	17.8	3.27	21.1	42.3	0.693	4.82	18.2	3.52	19.0	44.8	0.731
1969	3.73	22.1	2.59	22.5	45.3	0.695	5.81	29.2	4.21	19.7	43.5	0.725
1970	6.39	14.3	4.50	13.5	44.7	0.705	4.89	10.7	3.68	12.8	45.0	0.753
1971	2.74	22.0	2.04	26.6	46.5	0.747	4.32	14.6	2.96	14.7	42.1	0.686
1972	5.35	20.1	4.01	21.3	45.8	0.749	3.24	15.3	2.42	16.7	43.9	0.747
1973	8.20	11.8	6.21	14.5	44.8	0.758	3.18	23.4	2.05	23.7	43.6	0.646
1974	6.23	17.9	3.62	18.3	39.3	0.581	2.38	16.7	1.58	19.9	41.0	0.666
1975	3.72	26.2	2.75	32.8	43.9	0.739	1.66	19.1	1.03	25.8	39.8	0.621
1976	5.50	16.8	3.70	22.0	42.3	0.673	1.34	23.6	0.94	21.1	41.9	0.699
1977	4.20	25.6	1.96	20.8	37.2	0.467	5.05	21.3	3.38	15.3	42.0	0.669
1978	3.87	21.4	2.56	18.5	41.7	0.662	4.04	12.3	2.94	10.6	42.8	0.727
1979	3.01	19.5	1.71	16.3	38.2	0.594	1.94	10.3	1.62	11.4	45.2	0.838
1980	8.46	29.8	3.89	15.9	36.0	0.460	2.62	13.8	2.04	16.4	43.7	0.777
1981	8.14	14.5	4.05	19.3	38.0	0.497	3.66	28.5	2.19	20.9	40.4	0.600
1982	3.64	22.2	1.87	17.2	37.2	0.513	0.99	40.5	0.83	40.5	44.7	0.842
1983	6.41	27.0	2.74	22.0	36.3	0.427	4.72	14.2	2.12	13.4	36.7	0.448
1984	3.00	16.1	1.66	17.0	39.9	0.554	4.37	13.9	2.33	16.1	39.7	0.534
1985	5.18	19.3	2.75	19.2	40.3	0.531	2.76	19.7	1.59	23.1	41.9	0.577
1986	2.07	15.8	1.35	17.0	44.1	0.650	1.59	15.5	1.09	14.7	43.3	0.683
1987	1.01	23.2	0.65	25.1	43.4	0.646	0.48	33.0	0.37	27.3	43.9	0.774
1988	1.43	23.3	0.85	27.5	42.3	0.590	1.38	17.3	0.57	19.6	35.2	0.414
1989	1.95	21.7	0.74	20.0	35.8	0.382	0.89	19.6	0.38	26.6	31.4	0.423
1990	0.63	30.3	0.24	30.6	35.2	0.378	2.00	16.4	0.40	18.4	24.7	0.200
1991	1.68	25.0	0.57	21.9	31.5	0.341	2.08	27.6	0.54	27.3	29.2	0.258
1992	1.26	18.2	0.48	23.1	34.8	0.383	0.94	30.0	0.24	37.6	29.5	0.254
1993	1.47	17.7	0.36	20.9	30.3	0.245	5.15	25.0	0.54	22.8	17.0	0.105
1994	3.13	22.6	0.53	28.5	27.4	0.170	2.21	16.4	0.42	26.5	24.9	0.191
1995	1.88	16.9	0.47	19.9	30.6	0.248	4.74	19.6	0.62	20.7	25.7	0.132
1996	1.36	16.9	0.28	19.4	30.5	0.204	5.38	19.1	1.02	21.1	29.7	0.189
1997	2.22	26.7	0.43	28.1	31.0	0.195	5.10	19.6	0.77	21.9	24.9	0.150
1998	4.27	17.5	0.77	18.8	29.0	0.179	3.70	20.1	0.47	23.2	24.2	0.127
1999	3.15	20.5	0.48	20.0	28.1	0.153	5.91	21.9	0.88	21.3	26.3	0.148
2000	3.45	14.0	0.52	12.4	27.3	0.151	6.63	15.2	1.11	17.3	27.1	0.167
2001	4.41	16.3	0.75	13.0	29.5	0.170	7.94	16.2	1.71	16.5	32.3	0.216
2002	8.10	20.3	1.61	16.5	31.4	0.199	4.31	19.0	1.06	20.0	33.2	0.246
2003	5.20	16.1	1.30	14.5	34.2	0.250	2.66	19.0	0.79	18.8	35.4	0.298
2004	3.80	12.6	1.08	13.5	35.5	0.283	3.82	31.8	1.03	31.9	33.3	0.271
2005	3.36	20.3	0.89	22.1	34.6	0.265	1.93	18.5	0.38	16.7	27.8	0.197
2006	3.09	13.9	0.72	11.0	32.2	0.235	2.03	19.3	0.46	20.7	30.5	0.226
2007	2.37	16.5	0.58	14.9	32.9	0.245	2.74	22.8	0.57	23.2	31.6	0.208
2008	7.45	25.0	1.40	21.7	31.3	0.188	2.75	17.1	0.64	19.5	31.2	0.233
*2009	2.34	14.7	0.53	14.8	31.7	0.227	2.18	19.0	0.48	21.0	29.6	0.217
*2010	2.47	13.8	0.54	14.2	30.4	0.218	2.00	16.9	0.36	20.9	28.4	0.182
*2011	2.82	11.4	0.57	12.8	30.3	0.201	3.71	20.6	0.67	22.6	29.3	0.177
*2012	1.82	12.2	0.38	16.8	30.1	0.205	2.19	19.6	0.44	21.6	30.1	0.202
*2013	1.04	13.4	0.22	13.8	30.7	0.209	2.31	17.7	0.35	22.9	24.9	0.152
*2014	2.96	15.2	0.49	16.4	25.7	0.155	2.76	16.8	0.51	18.0	27.8	0.186
*2015	2.77	14.7	0.47	13.6	28.2	0.171	3.16	13.2	0.53	15.5	27.7	0.167
*2016	2.02	11.2	0.38	14.0	30.1	0.188						
TS mean	3.66		1.56		35.5	0.395	3.39		1.42		35.1	0.431

\* mean number and mean weight represent adjusted values using constnat conversion factors 3.257177 for numbers and 3.257201 for weight

Table B29. Summary of number of fish caught, age, percentage sampled and maximum age of witch flounder in the Northeast Fisheries Science Center spring and autumn survey (strata 22-30, 36-40), 1980- 2016.

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	17	64	53	82.8	24
1983	410	176	42.9	20	359	154	42.9	22
1984	171	124	72.5	20	293	204	69.6	21
1985	269	151	56.1	25	170	116	68.2	30
1986	119	118	99.2	22	129	109	84.5	22
1987	53	53	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	15	79	61	77.2	18
1993	88	81	92.0	19	414	166	40.1	16
1994	196	128	65.3	16	174	102	58.6	21
1995	142	106	74.6	12	352	174	49.4	14
1996	84	72	85.7	11	295	169	57.3	11
1997	129	79	61.2	8	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
2003	310	204	65.8	14	181	146	80.7	18
2004	247	205	83.0	23	191	121	63.4	15
2005	180	142	78.9	13	158	93	58.9	13
2006	209	168	80.4	11	143	115	80.4	11
2007	132	114	86.4	11	168	112	66.7	12
2008	394	202	51.3	10	191	124	64.9	13
2009	648	402	62.0	13	539	324	60.1	11
2010	683	387	56.7	14	434	283	65.2	12
2011	600	379	63.2	14	811	388	47.8	12
2012	514	385	74.9	13	543	331	61.0	12
2013	276	215	77.9	17	575	339	59.0	10
2014	856	486	56.8	9	748	415	55.5	16
2015	671	389	58.0	15	895	480	53.6	14
2016	635	385	60.6	12				

Table B30. Stratified mean number per tow at age of witch flounder in Northeast Fisheries Science Center bottom trawl spring and autumn surveys (strata 22-30, 36-40), 1980 – 2016. Survey conversion factors applied to 2009 onward.

SPRING	AGE															Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+	
1980	0.000	0.060	0.230	0.950	1.520	0.720	1.200	1.020	0.380	0.400	0.310	0.300	0.120	0.160	1.100	8.46
1981	0.000	0.000	0.050	0.820	0.930	2.000	1.020	0.760	0.670	0.420	0.130	0.200	0.240	0.220	0.900	8.40
1982	0.000	0.044	0.042	0.610	0.484	0.377	0.237	0.608	0.362	0.093	0.259	0.175	0.026	0.033	0.292	3.64
1983	0.000		0.071	0.531	1.262	1.293	0.541	0.716	0.632	0.475	0.214	0.166	0.075	0.054	0.376	6.41
1984	0.000		0.103	0.012	0.307	0.777	0.401	0.310	0.202	0.196	0.115	0.173	0.117	0.023	0.266	3.00
1985	0.000			0.017	0.459	1.057	1.199	0.908	0.412	0.148	0.149	0.044	0.072	0.027	0.691	5.18
1986	0.000				0.044	0.240	0.529	0.412	0.172	0.194	0.079	0.038	0.063	0.055	0.248	2.07
1987	0.000				0.059	0.114	0.133	0.260	0.186	0.010	0.061	0.023			0.163	1.01
1988	0.000	0.023	0.023	0.062		0.072	0.300	0.379	0.239	0.137	0.086	0.084	0.029		0.000	1.43
1989	0.000	0.023	0.013	0.036	1.004	0.106	0.073	0.081	0.328	0.081	0.015	0.056	0.056	0.019	0.056	1.95
1990	0.000	0.008		0.038	0.091	0.320		0.042	0.009	0.050	0.018	0.010	0.011		0.030	0.63
1991	0.000	0.042		0.780	0.108	0.087	0.209	0.033	0.101	0.083	0.138	0.018	0.022		0.064	1.68
1992	0.000	0.055	0.009	0.187	0.373	0.085	0.111	0.152	0.045	0.149	0.015	0.016	0.046		0.019	1.26
1993	0.000	0.149	0.112	0.137	0.472	0.320	0.058	0.085		0.016	0.016		0.068		0.037	1.47
1994	0.000	0.107	0.697	0.541	0.644	0.810	0.164	0.027	0.028	0.070	0.008			0.016	0.016	3.13
1995	0.000	0.041	0.120	0.581	0.316	0.179	0.312	0.116	0.110	0.042		0.038	0.028		0.000	1.88
1996	0.000	0.017	0.036	0.244	0.394	0.346	0.219	0.073				0.032			0.000	1.36
1997	0.000	0.072	0.066	0.152	0.693	0.617	0.438	0.084	0.083	0.014					0.000	2.22
1998	0.000	0.112	1.079	0.712	0.388	0.798	0.713	0.214	0.154	0.076				0.028	0.000	4.27
1999	0.000	0.106	0.376	0.974	0.797	0.483	0.164	0.182	0.031	0.014	0.023				0.000	3.15
2000	0.000	0.007	0.250	1.194	0.693	0.660	0.239	0.253	0.116		0.035				0.000	3.45
2001	0.000	0.105	0.099	0.713	1.476	1.020	0.401	0.293	0.163	0.113	0.028				0.000	4.41
2002	0.000	0.023	0.060	0.897	2.627	2.263	0.822	0.683	0.351	0.192	0.103	0.014		0.029	0.037	8.10
2003	0.000			0.150	0.808	1.646	1.017	0.869	0.387	0.197	0.046	0.060		0.016	0.009	5.20
2004	0.000	0.009	0.060	0.074	0.428	0.649	0.809	0.883	0.368	0.158	0.161	0.135			0.067	3.80
2005	0.000	0.011	0.160	0.146	0.220	0.738	0.760	0.574	0.383	0.245	0.087	0.018		0.021	0.000	3.36
2006	0.000	0.044	0.460	0.347	0.138	0.207	0.683	0.568	0.410	0.145	0.069	0.015			0.000	3.09
2007	0.000		0.178	0.571	0.263	0.241	0.228	0.546	0.154	0.158		0.031			0.000	2.37
2008	0.000	0.011	0.372	0.848	2.834	1.341	0.646	0.724	0.550	0.088	0.036				0.000	7.45
2009	0.000	0.135	0.140	0.290	0.428	0.575	0.206	0.155	0.221	0.120	0.057	0.009	0.004	0.004	0.000	2.34
2010	0.000	0.139	0.451	0.268	0.168	0.420	0.471	0.142	0.102	0.185	0.066	0.031	0.016	0.004	0.010	2.47
2011	0.000	0.035	0.365	0.701	0.268	0.305	0.470	0.283	0.118	0.088	0.115	0.042	0.012	0.010	0.011	2.82
2012	0.000	0.089	0.188	0.387	0.329	0.156	0.232	0.160	0.159	0.075	0.034	0.010		0.006	0.000	1.82
2013	0.000	0.036	0.124	0.139	0.279	0.144	0.087	0.109	0.066	0.031	0.019		0.004		0.002	1.04
2014	0.000	0.576	0.447	0.676	0.264	0.432	0.209	0.137	0.138	0.082					0.000	2.96
2015	0.000	0.032	0.582	0.755	0.461	0.235	0.320	0.152	0.151	0.053	0.020	0.008			0.005	2.77
2016	0.000	0.106	0.083	0.753	0.314	0.364	0.108	0.141	0.086	0.030	0.013	0.006	0.015			2.02

Table B30 continued. Stratified mean number per tow at age of witch flounder.

AUTUMN	AGE															Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+	
1980	0.040	0.000	0.020	0.000	0.200	0.260	0.280	0.360	0.170	0.150	0.270	0.040	0.160	0.120	0.570	2.62
1981	0.030	0.070	0.030	0.240	0.440	0.610	0.460	0.270	0.260	0.180	0.210	0.170	0.040	0.130	0.480	3.66
1982	0.020			0.058	0.013	0.027	0.076	0.241	0.132	0.015	0.027	0.032	0.010	0.040	0.302	0.99
1983		0.008	0.011	0.507	1.596	0.758	0.548	0.444	0.084	0.137	0.073	0.114	0.025		0.415	4.72
1984				0.093	0.944	0.991	0.605	0.535	0.310	0.149	0.126	0.073	0.041	0.132	0.375	4.37
1985			0.009	0.059	0.076	0.610	0.684	0.483	0.270	0.103	0.122	0.029	0.015	0.089	0.217	2.76
1986	0.009				0.051	0.267	0.353	0.309	0.160	0.112	0.009	0.010	0.021	0.052	0.238	1.59
1987			0.023		0.011	0.023	0.046	0.192	0.071		0.009			0.023	0.085	0.48
1988		0.007		0.725	0.055	0.012	0.036	0.215	0.048	0.046	0.045	0.079	0.011	0.043	0.055	1.38
1989	0.174	0.018	0.018	0.082	0.301	0.009	0.021	0.017	0.084	0.078	0.024		0.026		0.037	0.89
1990	0.481	0.088	0.137	0.380	0.538	0.188	0.024	0.023	0.023	0.025			0.009	0.055	0.034	2.00
1991	0.224	0.021	0.178	0.661	0.329	0.290	0.145	0.067	0.059	0.030	0.052	0.028			0.000	2.08
1992	0.097	0.029	0.109	0.259	0.224	0.054	0.060			0.019	0.009	0.019		0.019	0.042	0.94
1993	2.541	0.672	0.154	0.544	0.777	0.219	0.058	0.022	0.081		0.019	0.042		0.011	0.014	5.16
1994	0.432	0.156	0.287	0.531	0.165	0.395	0.037	0.106		0.043	0.009		0.005		0.043	2.21
1995	0.512	0.203	0.764	1.624	0.858	0.472	0.229			0.011	0.055				0.009	4.74
1996	0.232	0.091	0.261	0.785	1.988	1.386	0.441	0.066	0.065	0.037		0.033			0.000	5.38
1997	0.892	0.339	0.979	0.522	0.871	0.770	0.383	0.330					0.020		0.000	5.11
1998	0.639	0.082	0.520	1.363	0.465	0.303	0.165	0.110	0.043	0.012					0.000	3.70
1999	0.323	0.521	1.178	1.514	1.044	0.600	0.363	0.275	0.050	0.037	0.009				0.000	5.91
2000	0.943	0.096	0.719	1.408	1.746	0.674	0.589	0.229	0.152	0.050			0.026		0.000	6.63
2001		0.039	0.211	0.953	3.156	1.886	0.813	0.612	0.159	0.058	0.056				0.000	7.94
2002			0.275	0.431	1.475	0.997	0.532	0.331	0.149	0.071		0.046	0.005		0.000	4.31
2003	0.018		0.038	0.075	0.307	0.580	0.770	0.315	0.129	0.222	0.083	0.021	0.046	0.019	0.038	2.66
2004	0.275	0.072	0.014	0.086	0.453	0.987	0.826	0.498	0.355	0.054	0.105	0.072			0.018	3.82
2005	0.132	0.635	0.087	0.023	0.131	0.181	0.269	0.340	0.055	0.052	0.012			0.016	0.000	1.93
2006	0.066	0.103	0.540	0.322	0.046	0.104	0.298	0.286	0.138	0.071	0.042	0.014			0.000	2.03
2007		0.065	0.162	1.206	0.478	0.188	0.220	0.261	0.069	0.078			0.014		0.000	2.74
2008	0.275	0.021	0.095	0.422	0.794	0.273	0.254	0.235	0.302	0.014	0.057			0.008	0.000	2.75
2009	0.094	0.384	0.186	0.198	0.377	0.454	0.153	0.138	0.115	0.068	0.004	0.009			0.000	2.18
2010	0.043	0.402	0.469	0.183	0.212	0.168	0.251	0.051	0.116	0.063	0.019	0.021	0.003		0.000	2.00
2011	0.041	0.229	0.869	1.077	0.402	0.280	0.440	0.180	0.075	0.048	0.060	0.006	0.005		0.000	3.71
2012	0.015	0.261	0.308	0.644	0.315	0.141	0.216	0.135	0.057	0.059	0.032		0.011		0.000	2.19
2013	0.509	0.188	0.486	0.190	0.462	0.238	0.042	0.105	0.057	0.026	0.005				0.000	2.31
2014	0.116	0.683	0.326	0.535	0.236	0.379	0.142	0.140	0.140	0.038	0.008	0.007	0.009		0.005	2.76
2015	0.186	0.150	0.933	0.829	0.331	0.160	0.309	0.131	0.051	0.060	0.014				0.003	3.16

Table B31. Stratified mean weight (kg) per tow at age of witch flounder in Northeast Fisheries Science Center bottom trawl spring and autumn surveys (strata 22-30, 36-40), 1980 – 2016.

SPRING	AGE														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+
1982	-	0.002	0.016	0.048	0.122	0.235	0.317	0.494	0.640	0.864	1.023	1.052	1.595	1.171	1.615
1983	-	-	0.029	0.049	0.107	0.186	0.288	0.443	0.589	0.779	1.089	1.275	0.922	1.328	1.418
1984	-	-	0.026	0.034	0.154	0.223	0.354	0.532	0.565	0.714	1.040	0.998	1.261	1.253	1.543
1985	-	-	-	0.037	0.142	0.235	0.325	0.484	0.627	0.752	0.898	0.886	0.832	1.281	1.409
1986	-	-	-	-	0.112	0.260	0.359	0.474	0.648	0.830	0.988	1.021	1.160	1.305	1.463
1987	-	-	-	-	0.128	0.254	0.464	0.462	0.601	0.689	1.015	0.797	-	-	1.435
1988	-	0.003	0.014	0.036	-	0.218	0.388	0.534	0.669	0.900	1.169	0.977	1.500	-	-
1989	-	0.001	0.014	0.041	0.126	0.204	0.387	0.554	0.595	0.881	0.860	1.041	1.437	0.685	1.645
1990	-	0.003	-	0.039	0.133	0.215	-	0.471	0.872	0.924	1.037	1.069	1.141	-	1.289
1991	-	0.001	-	0.043	0.124	0.278	0.335	0.549	0.806	0.828	1.099	1.111	1.185	-	1.071
1992	-	0.002	0.005	0.052	0.145	0.264	0.364	0.522	0.662	0.877	0.669	0.954	1.431	-	1.314
1993	-	0.002	0.026	0.066	0.151	0.240	0.335	0.412	0.000	0.846	0.846	-	0.867	-	1.617
1994	-	0.005	0.027	0.052	0.148	0.235	0.357	0.468	0.675	0.794	0.781	-	-	1.408	1.408
1995	-	0.003	0.023	0.057	0.109	0.238	0.314	0.545	0.633	0.882	-	1.130	1.504	-	-
1996	-	0.004	0.035	0.056	0.125	0.202	0.317	0.430	-	-	-	1.323	-	-	-
1997	-	0.005	0.018	0.053	0.140	0.173	0.284	0.476	0.543	0.729	-	-	-	-	-
1998	-	0.005	0.040	0.078	0.151	0.218	0.277	0.384	0.507	0.636	-	-	-	0.975	-
1999	-	0.004	0.035	0.082	0.128	0.231	0.313	0.425	0.628	0.556	0.862	-	-	-	-
2000	-	0.003	0.028	0.046	0.116	0.181	0.308	0.379	0.475	-	0.938	-	-	-	-
2001	-	0.002	0.020	0.065	0.105	0.195	0.280	0.340	0.427	0.453	0.609	-	-	-	-
2002	-	0.005	0.025	0.039	0.130	0.186	0.240	0.323	0.462	0.548	0.590	0.454	-	0.592	1.131
2003	-	-	-	0.061	0.113	0.185	0.252	0.343	0.434	0.483	0.504	0.592	-	0.672	0.775
2004	-	0.011	0.023	0.058	0.126	0.190	0.233	0.309	0.387	0.473	0.476	0.568	-	-	0.920
2005	-	0.002	0.029	0.051	0.130	0.186	0.245	0.322	0.404	0.487	0.481	0.827	-	0.576	-
2006	-	0.002	0.032	0.060	0.124	0.197	0.253	0.324	0.407	0.458	0.458	0.630	-	-	-
2007	-	-	0.032	0.085	0.148	0.215	0.273	0.360	0.445	0.567	-	0.639	-	-	-
2008	-	0.001	0.035	0.081	0.133	0.196	0.242	0.316	0.408	0.555	0.603	-	-	-	-
2009	-	0.002	0.031	0.090	0.152	0.206	0.295	0.350	0.438	0.500	0.497	0.610	0.631	1.239	-
2010	-	0.003	0.035	0.068	0.150	0.216	0.271	0.334	0.436	0.510	0.578	0.548	0.757	0.966	0.761
2011	-	0.003	0.036	0.070	0.128	0.204	0.269	0.314	0.413	0.423	0.513	0.601	0.679	0.839	0.613
2012	-	0.003	0.029	0.088	0.143	0.222	0.282	0.357	0.418	0.510	0.541	0.634	-	0.668	-
2013	-	0.004	0.051	0.095	0.163	0.204	0.257	0.336	0.473	0.530	0.612	-	0.891	-	0.891
2014	-	0.005	0.040	0.108	0.172	0.251	0.305	0.388	0.506	0.660	-	-	-	-	-
2015	-	0.003	0.035	0.070	0.156	0.236	0.290	0.374	0.439	0.604	0.741	0.817	-	-	0.834
2016	-	0.009	0.055	0.106	0.145	0.242	0.293	0.363	0.433	0.582	0.641	0.755	0.737	-	-
TS mean		0.003	0.028	0.061	0.134	0.217	0.305	0.415	0.522	0.664	0.768	0.856	1.112	0.997	1.218

Table B31, continue. Stratified mean weight (kg) per tow at age of witch flounder

AUTUMN	AGE														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14+
1982	0.000	-	-	0.060	0.149	0.159	0.346	0.547	0.591	0.819	1.005	0.932	1.059	1.133	1.542
1983	-	0.012	0.035	0.088	0.173	0.279	0.427	0.544	0.676	0.876	1.112	1.050	1.034	-	1.701
1984	-	-	-	0.091	0.182	0.264	0.384	0.566	0.685	0.762	0.976	1.045	1.309	1.204	1.659
1985	-	-	0.039	0.097	0.154	0.259	0.388	0.534	0.726	0.855	0.958	1.125	1.254	1.121	1.585
1986	0.001	-	-	-	0.161	0.302	0.383	0.553	0.697	0.924	1.023	1.049	0.892	1.256	1.566
1987	-	-	0.020	-	0.133	0.314	0.417	0.518	0.626	-	0.904	-	-	1.343	1.913
1988	-	0.004	-	0.090	0.188	0.354	0.515	0.547	0.665	0.825	0.912	1.206	1.338	1.269	1.427
1989	0.001	0.016	0.033	0.079	0.189	0.311	0.619	0.669	0.765	0.971	1.097	-	1.310	-	2.266
1990	0.001	0.021	0.028	0.114	0.164	0.317	0.444	0.569	0.772	1.018	-	-	1.587	1.044	1.759
1991	0.001	0.016	0.050	0.108	0.179	0.339	0.526	0.747	0.815	0.766	1.227	1.342	-	-	-
1992	0.001	0.018	0.065	0.124	0.204	0.352	0.385	-	-	0.692	0.920	0.744	-	0.859	1.396
1993	0.001	0.013	0.059	0.142	0.210	0.315	0.523	0.587	0.708	-	1.282	0.990	-	2.043	1.449
1994	0.001	0.019	0.046	0.071	0.212	0.313	0.561	0.589	-	1.191	0.902	-	0.965	-	1.444
1995	0.001	0.021	0.053	0.100	0.150	0.270	0.379	-	-	1.126	0.910	-	-	-	1.275
1996	0.001	0.012	0.032	0.083	0.149	0.233	0.401	0.496	0.736	0.941	-	1.077	-	-	-
1997	0.001	0.020	0.040	0.095	0.170	0.270	0.353	0.503	-	-	-	-	0.742	-	-
1998	0.001	0.019	0.055	0.093	0.170	0.267	0.394	0.494	0.634	0.533	-	-	-	-	-
1999	0.001	0.018	0.045	0.102	0.167	0.267	0.371	0.493	0.498	0.658	0.641	-	-	-	-
2000	0.001	0.016	0.059	0.099	0.174	0.225	0.351	0.512	0.581	0.677	-	-	0.944	-	-
2001	-	0.013	0.035	0.123	0.168	0.218	0.313	0.413	0.488	0.447	0.694	-	-	-	-
2002	-	-	0.059	0.096	0.182	0.243	0.321	0.476	0.490	0.593	-	0.922	0.935	-	-
2003	0.001	-	0.044	0.075	0.147	0.218	0.275	0.344	0.366	0.491	0.562	0.516	0.604	0.989	0.931
2004	0.001	0.015	0.071	0.117	0.167	0.218	0.291	0.371	0.435	0.586	0.571	0.570	-	-	0.922
2005	0.001	0.019	0.070	0.148	0.190	0.230	0.307	0.405	0.468	0.629	0.642	-	-	0.433	-
2006	-	0.021	0.063	0.091	0.229	0.263	0.286	0.434	0.506	0.557	0.683	0.612	-	-	-
2007	-	0.018	0.060	0.126	0.187	0.246	0.310	0.391	0.597	0.584	-	-	0.996	-	-
2008	0.001	0.019	0.057	0.119	0.183	0.234	0.288	0.465	0.451	0.739	0.651	-	-	1.179	-
2009	0.001	0.023	0.063	0.112	0.213	0.266	0.383	0.487	0.512	0.596	1.014	0.758	-	-	-
2010	0.001	0.024	0.063	0.120	0.187	0.285	0.314	0.391	0.450	0.478	0.512	0.640	0.658	-	-
2011	0.001	0.018	0.070	0.130	0.189	0.270	0.310	0.372	0.503	0.529	0.561	0.978	0.606	-	-
2012	0.001	0.025	0.079	0.139	0.196	0.255	0.335	0.391	0.557	0.648	0.718	-	0.729	-	-
2013	0.001	0.023	0.101	0.151	0.217	0.263	0.370	0.379	0.567	0.614	0.544	-	-	-	-
2014	0.001	0.023	0.073	0.150	0.213	0.303	0.330	0.454	0.520	0.713	0.634	0.500	0.631	-	1.034
2015	0.001	0.030	0.074	0.113	0.206	0.269	0.357	0.431	0.564	0.669	0.622	-	-	-	0.850
TS mean	0.001	0.018	0.055	0.108	0.181	0.270	0.381	0.490	0.588	0.726	0.825	0.892	0.977	1.156	1.454



Table B32. Stratified mean length (cm) per tow at age of witch flounder in Northeast Fisheries Science Center bottom trawl spring and autumn surveys (strata 22-30, 36-40), 1980 – 2016.

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	-	-	-	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	-	-	-	22.8	27.7	32.1	35.2	38.3	41.2	42.5	43.1	45.3	-	47.0	49.0
2004	-	14.0	17.5	22.8	28.6	32.4	34.4	37.4	40.0	42.3	42.3	44.5	-	-	51.3
2005	-	9.0	18.7	22.0	29.1	32.2	35.0	37.9	40.5	42.7	42.6	50.0	-	45.0	-
2006	-	9.0	19.0	23.1	28.5	32.6	35.2	37.8	40.3	41.6	41.7	46.0	-	-	-
2007	-	-	19.0	25.5	30.0	33.4	35.9	38.9	41.4	44.4	-	45.9	-	-	-
2008	-	7.0	19.5	25.2	29.2	32.7	34.9	37.6	40.6	44.4	45.6	-	-	-	-
2009	-	8.9	18.8	25.9	30.2	33.0	36.6	38.5	41.0	42.9	42.7	45.5	46.0	56.0	-
2010	-	9.5	19.4	23.5	29.9	33.4	35.6	37.9	40.9	43.1	44.7	43.7	48.2	52.0	48.5
2011	-	9.5	19.4	24.0	28.5	32.8	35.7	37.4	40.5	40.8	43.1	45.0	47.0	50.0	45.3
2012	-	9.6	18.1	25.3	29.3	33.3	35.8	38.4	40.2	42.6	43.6	45.6	-	46.3	-
2013	-	9.9	21.4	25.8	30.2	32.3	34.7	37.5	41.5	42.9	44.7	-	50.0	-	50.0
2014	-	10.5	20.0	26.7	30.9	34.5	36.5	39.2	42.3	45.5	-	-	-	-	-
2015	-	9.4	19.2	23.5	29.7	33.6	35.9	38.5	40.3	44.4	47.2	48.7	-	-	49.0
2016	-	12.5	22.0	26.8	29.3	34.2	36.2	38.5	40.7	44.2	45.7	47.6	47.5	-	-
TS mean		9.5	17.9	22.6	28.7	33.1	36.5	39.9	42.9	45.8	47.7	49.1	52.5	51.6	54.5

Table B32, continued. Stratified mean length (cm) per tow at age of witch flounder in the Northeast Fisheries Science Center survey.

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	17.6	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	-	-	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	-	14.0	19.0	24.7	30.1	34.7	39.2	42.2	45.0	48.5	52.0	50.9	51.0	-	58.8
1984	-	-	-	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	-	-	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	-	-	-	29.7	35.5	38.2	42.4	45.4	49.4	51.0	51.3	49.0	53.9	57.7
1987	-	-	16.0	-	28.0	36.0	39.1	41.6	43.8	-	49.0	-	-	55.0	60.9
1988	-	10.0	-	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	-	54.8	-	64.2
1990	6.2	16.3	17.6	26.7	29.8	36.2	40.0	43.0	47.0	50.9	-	-	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	-	-	-
1992	5.9	15.8	23.1	27.7	32.1	37.7	37.9	-	-	46.0	50.0	47.0	-	49.0	56.5
1993	5.6	14.2	22.2	28.8	32.2	36.4	42.3	43.6	46.2	-	55.0	51.0	-	63.0	57.0
1994	5.7	16.0	20.9	23.5	32.7	36.6	43.5	44.0	-	54.2	50.0	-	51.0	-	57.2
1995	6.6	16.7	22.0	26.5	29.9	35.5	39.2	-	-	54.0	50.6	-	-	-	56.0
1996	5.5	14.2	18.7	25.0	29.6	33.8	39.6	42.1	47.4	50.5	-	53.0	-	-	-
1997	6.3	16.3	19.8	25.8	30.6	35.1	38.0	42.0	-	-	-	-	47.1	-	-
1998	5.9	15.7	22.0	25.7	30.7	35.0	39.3	41.9	44.9	43.0	-	-	-	-	-
1999	5.5	15.6	20.4	26.1	30.2	34.6	38.2	41.6	41.6	45.1	45.0	-	-	-	-
2000	6.1	15.6	22.6	26.3	31.0	33.4	38.0	42.3	44.1	46.3	-	-	51.0	-	-
2001	-	14.6	18.9	28.0	30.6	33.1	36.7	39.9	41.9	41.0	46.4	-	-	-	-
2002	-	-	22.7	26.0	31.3	34.3	37.2	41.7	41.9	44.6	-	50.5	51.0	-	-
2003	7.0	-	21.0	24.4	29.5	33.2	35.7	38.1	38.8	42.2	43.9	43.0	45.0	52.0	51.0
2004	5.9	15.2	24.0	27.7	30.8	33.3	36.3	38.9	40.7	44.5	43.7	44.0	-	-	50.5
2005	6.0	16.2	24.0	30.0	32.1	34.1	37.1	40.1	41.9	45.6	46.0	-	-	41.0	-
2006	5.0	16.7	23.1	25.6	33.7	35.1	35.9	40.6	42.5	43.5	46.5	45.0	-	-	-
2007	-	16.1	22.8	28.3	31.8	34.4	36.9	39.5	44.6	44.4	-	-	52.0	-	-
2008	6.3	16.2	22.6	28.0	31.8	34.3	36.3	41.6	41.5	48.0	46.2	-	-	55.0	-
2009	6.6	16.7	22.7	27.2	32.7	34.9	38.9	41.7	42.4	44.3	52.0	47.1	-	-	-
2010	6.2	17.3	23.0	27.7	31.7	35.9	36.6	39.3	41.0	41.8	42.7	45.6	46.0	-	-
2011	6.8	15.6	23.6	28.3	31.8	35.4	36.7	38.9	42.6	42.9	43.6	51.5	44.9	-	-
2012	5.7	17.1	24.4	28.9	32.0	34.5	37.5	39.2	43.5	45.3	46.9	-	47.1	-	-
2013	6.5	16.7	26.1	29.2	32.4	34.6	38.2	38.5	43.3	44.4	43.0	-	-	-	-
2014	6.2	16.7	23.6	29.3	32.6	36.0	37.1	40.7	42.2	46.4	45.0	42.0	44.8	-	51.6
2015	6.5	17.9	23.9	27.0	32.3	34.9	37.9	40.0	43.2	45.6	44.6	-	-	-	49.0
TS mean	6.0	15.6	21.5	26.5	30.9	34.8	38.4	41.4	43.8	46.5	48.3	49.4	50.7	53.0	56.5

Table B33. The sum of the 1963-2015 Northeast Fisheries Science Center autumn mean number per tow of witch flounder weighted by stratum area, by stratum, the percentage of annual stratum sampling which produced no catch (% Zero Catch), and the percentage of stratum contribution (all years) to the total (%Total).

Stratum	Mean number per tow * by stratum area	% Zero Catch	%Total
1	1078.3	96.2%	0.0%
2	5587.6	76.9%	0.1%
3	1364.1	90.4%	0.0%
4	5938.8	59.6%	0.1%
5	0.0	100.0%	0.0%
6	79295.7	40.4%	1.9%
7	413.0	92.3%	0.0%
8	13438.2	55.8%	0.3%
9	2435.2	94.2%	0.1%
10	29912.1	57.7%	0.7%
11	1650.5	86.5%	0.0%
12	5534.7	69.2%	0.1%
13	31040.8	50.0%	0.8%
14	984.0	90.4%	0.0%
15	3675.3	63.5%	0.1%
16	4970.1	76.9%	0.1%
17	777.6	86.5%	0.0%
18	5981.0	51.9%	0.1%
19	0.0	100.0%	0.0%
20	407.0	96.2%	0.0%
21	11949.1	80.8%	0.3%
22	93676.4	3.8%	2.3%
23	17295.3	67.3%	0.4%
24	394334.1	1.9%	9.6%
25	241.4	96.2%	0.0%
26	199469.1	5.8%	4.8%
27	193586.7	0.0%	4.7%
28	143283.3	5.8%	3.5%
29	142583.1	1.9%	3.5%
30	19641.4	38.5%	0.5%
36	421570.3	0.0%	10.2%
37	508560.2	0.0%	12.3%
38	1399696.1	0.0%	34.0%
39	174334.9	1.9%	4.2%
40	179513.0	3.8%	4.4%
61	0.0	100.0%	0.0%
62	0.0	100.0%	0.0%
63	473.0	96.2%	0.0%
64	2122.2	84.6%	0.1%
65	0.0	100.0%	0.0%
66	0.0	100.0%	0.0%
67	43.0	98.1%	0.0%
68	1745.0	57.7%	0.0%
69	405.5	98.1%	0.0%
70	251.5	94.2%	0.0%
71	226.8	94.2%	0.0%
72	15869.9	53.8%	0.4%
73	0.0	100.0%	0.0%
74	1112.6	90.4%	0.0%
75	97.9	94.2%	0.0%
76	2156.4	63.5%	0.1%
Total	4118722.2		100%

set 1: 22-30,36-40 **94.4%**  
set 2: 22,24,26-30,36-40 94.0%

Table B34. Stratified mean number, weight (kg), length (cm), and individual weight (kg) per tow of witch flounder in Massachusetts Division of Marine Fisheries inshore spring and autumn trawl surveys in the Cape Cod Bay and Mass. Bay region (Regions 4 and 5), 1978-2016. Time series mean is also given.

Year	SPRING						AUTUMN					
	Number		Weight		Length	Avg. wt.	Number		Weight		Length	Avg. wt.
	per tow	CV	per tow	CV			per tow	CV	per tow	CV		
1978	2.15	26.8	1.52	25.3	44.7	0.704	1.38	18.8	1.26	24.5	46.4	0.908
1979	1.26	25.4	1.32	31.0	48.3	1.046	1.52	48.8	1.08	45.6	42.9	0.708
1980	1.00	37.3	0.93	38.1	44.0	0.932	1.15	32.1	1.12	34.9	46.5	0.966
1981	2.44	36.7	1.83	44.7	40.2	0.747	0.40	71.7	0.23	67.9	41.2	0.589
1982	0.65	39.0	0.47	45.3	44.2	0.728	1.24	55.5	0.64	31.7	37.7	0.511
1983	1.97	34.4	1.02	21.3	36.8	0.519	2.22	30.3	1.46	28.7	44.6	0.658
1984	1.18	27.9	0.76	27.7	40.8	0.645	0.55	34.2	0.37	30.8	43.6	0.674
1985	1.01	21.9	0.73	23.4	43.4	0.720	0.76	44.7	0.50	40.1	43.6	0.655
1986	0.70	18.1	0.65	23.5	47.6	0.934	0.27	31.0	0.24	34.5	46.4	0.893
1987	0.88	42.5	0.73	36.8	45.1	0.821	0.19	34.1	0.13	35.8	44.6	0.713
1988	0.24	21.1	0.20	24.4	45.6	0.844	0.28	57.4	0.16	64.2	39.5	0.579
1989	0.13	40.8	0.05	42.7	34.9	0.369	0.13	49.1	0.06	45.3	38.1	0.491
1990	0.21	63.9	0.17	64.4	44.2	0.809	0.07	51.7	0.03	62.5	36.8	0.436
1991	0.11	52.2	0.04	67.9	34.1	0.393	0.32	34.7	0.19	35.6	41.1	0.604
1992	0.20	52.1	0.12	64.2	40.2	0.583	0.46	41.1	0.25	45.4	40.7	0.557
1993	0.03	82.9	0.01	82.9	33.0	0.200	0.30	40.0	0.15	45.1	40.9	0.500
1994	0.00		0.00				0.38	33.7	0.12	45.9	31.0	0.321
1995	0.10	29.5	0.06	53.9	36.0	0.613	2.41	56.6	0.41	39.5	26.7	0.172
1996	0.02	73.3	0.00	73.3	21.0	0.100	0.04	56.0	0.01	56.0	40.0	0.400
1997	0.05	0.0	0.01	70.3	31.5	0.250	0.51	59.9	0.15	64.1	36.0	0.300
1998	0.00		0.00				0.25	43.0	0.08	40.1	35.2	0.332
1999	0.02	80.4	0.00		11.0	0.000	0.67	34.3	0.17	40.4	33.7	0.251
2000	1.15	25.1	0.10	31.8	23.5	0.089	0.92	27.4	0.24	39.7	31.6	0.266
2001	0.07	41.1	0.02	56.9	33.0	0.250	0.43	20.7	0.12	29.9	33.2	0.275
2002	0.11	42.3	0.03	44.9	33.4	0.253	2.21	18.0	0.70	17.6	36.5	0.317
2003	0.19	11.4	0.04	19.2	30.2	0.217	1.19	26.3	0.53	27.2	39.8	0.445
2004	0.00		0.00	0.0		0.000	0.31	37.1	0.13	40.5	40.5	0.432
2005	0.05	51.7	0.03	54.2	45.5	0.675	0.51	28.2	0.19	28.1	37.8	0.369
2006	0.16	38.9	0.08	44.0	40.9	0.500	0.37	26.6	0.10	21.1	33.0	0.265
2007	0.46	37.5	0.13	43.8	34.6	0.286	0.51	35.0	0.15	28.9	36.8	0.295
2008	0.26	31.7	0.09	41.6	36.6	0.348	1.34	32.5	0.40	27.0	35.2	0.301
2009	0.44	48.0	0.08	43.2	31.1	0.185	1.27	25.5	0.40	40.1	33.4	0.311
2010	0.15	29.0	0.05	33.2	36.9	0.327	1.42	30.4	0.46	30.7	36.1	0.325
2011	0.35	55.0	0.12	53.5	34.9	0.348	3.51	24.9	0.97	25.7	35.1	0.277
2012	0.23	30.9	0.08	39.7	35.5	0.34	0.66	23.9	0.27	26.0	39.2	0.410
2013	0.08	37.2	0.04	38.0	40.7	0.442	0.54	31.0	0.16	38.5	37.0	0.288
2014	0.04	55.7	0.01	59.4	30.5	0.168	0.44	47.0	0.09	38.8	31.7	0.199
2015	0.10	69.1	0.00	69.1	22.5	0.047	1.35	35.91	0.40	34.8	35.3	0.297
2016	0.40	33.4	0.14	36.2	37.7	0.340						
TS mean	0.48	40.1	0.30	43.6	36.5	0.5	0.85	37.6	0.37	38.2	38.1	0.455

Table B35. Number of witch flounder caught, aged and percentage of sampled fish in the Massachusetts Division of Marine Fisheries inshore survey, spring and fall, 1978- 2015 for Regions 4 and 5 (strata 09250 – 09360;).

Year	Spring				Autumn			
	Caught	Aged	%sampled	max age	Caught	Aged	% sampled	max age
1978	73		0		72		0	
1979	66		0		87		0	
1980	57		0		70		0	
1981	132		0		24		0	
1982	38		0		89		0	
1983	102		0		110		0	
1984	71	25	35	14	23	12	52	21
1985	41	8	20	11	50	16	32	14
1986	28	2	7	10	15		0	
1987	50	2	4	8	10	2	20	10
1988	11		0		9		0	
1989	8		0		8		0	
1990	10	1	10	9	4	2	50	10
1991	9		0		21		0	
1992	8	6	75	7	23	13	57	14
1993	2		0		16		0	
1994					25		0	
1995	4		0		101		0	
1996	1		0		2		0	
1997	2		0		12		0	
1998					12		0	
1999	1		0		50		0	
2000	48		0		52		0	
2001	4		0		26		0	
2002	5		0		98		0	
2003	8		0		61		0	
2004					17		0	
2005	2		0		25		0	
2006	8		0		16		0	
2007	24		0		29		0	
2008	11		0		53		0	
2009	19		0		59		0	
2010	8		0		75		0	
2011	15		0		171		0	
2012	10		0		31		0	
2013	4		0		27		0	
2014	2		0		18		0	
2015	4		0		43		0	
2016	17		0					

Table B36. Stratified mean number, weight (kg), length (cm), and individual weight (kg) per tow of witch flounder in the Atlantic States Marine Fisheries Commission summer shrimp surveys in the Gulf of Maine (strata set 1, 3, 6, 8), 1984 - 2015. Time series means are also given.

Year	Number per tow	CV	Weight per tow	CV	Length per tow	Avg. wt. per tow
1984	25.30	10.5	8.12	8.8	33.9	0.341
1985	6.69	16.0	2.66	13.5	36.0	0.408
1986	2.63	20.8	0.92	24.1	35.9	0.362
1987	5.19	26.3	1.56	25.2	26.5	0.307
1988	2.58	22.7	0.61	24.7	25.8	0.238
1989	2.92	30.0	0.31	27.1	22.8	0.105
1990	6.66	26.0	1.02	32.3	24.5	0.154
1991	14.94	31.4	1.20	27.1	19.6	0.080
1992	24.28	41.1	1.91	29.8	20.5	0.079
1993	21.42	25.5	0.50	17.0	12.8	0.023
1994	36.36	38.6	2.20	59.1	19.1	0.061
1995	17.95	34.4	1.48	37.1	22.6	0.082
1996	15.45	19.6	1.95	25.6	25.2	0.126
1997	23.19	40.8	1.42	21.0	19.1	0.061
1998	7.35	21.5	0.52	18.3	21.9	0.071
1999	110.07	21.8	5.93	21.1	18.7	0.054
2000	32.43	23.2	3.09	25.1	24.2	0.095
2001	41.52	31.3	5.57	32.2	27.2	0.134
2002	45.25	23.7	7.05	23.3	28.8	0.156
2003	24.06	20.9	4.46	19.8	30.6	0.185
2004	8.75	23.5	1.79	23.4	31.3	0.205
2005	19.77	21.9	2.00	25.4	21.6	0.101
2006	29.98	18.6	2.72	18.3	22.6	0.091
2007	23.10	20.1	2.49	21.4	25.1	0.108
2008	15.19	19.5	2.02	18.0	27.2	0.133
2009	23.21	22.7	3.88	35.9	27.1	0.167
2010	18.13	17.2	1.79	17.2	23.2	0.099
2011	18.29	14.2	2.14	17.2	25.8	0.117
2012	18.62	20.2	2.16	26.7	25.3	0.116
2013	14.59	12.5	1.69	16.8	23.5	0.116
2014	38.27	20.7	2.29	19.2	18.9	0.060
2015	32.33	15.0	3.80	19.1	25.5	0.117
Mean	22.39	23.8	2.50	24.3	24.74	0.14

Table B37. Stratified mean number per tow at age of witch flounder in the Atlantic States Marine Fisheries Commission summer shrimp surveys in the Gulf of Maine (strata set 1, 3, 6, 8), 1984 - 2015. NEFSC spring and autumn age length keys used.

Year	Age												Total
	0	1	2	3	4	5	6	7	8	9	10	11+	
1984	0.00	0.33	1.09	2.61	10.15	5.31	1.82	0.91	0.96	0.76	0.40	0.99	25.3
1985	0.00	0.16	0.00	0.30	1.71	2.00	1.16	0.45	0.33	0.19	0.09	0.29	6.7
1986	0.00	0.10	0.08	0.03	0.58	0.43	0.73	0.46	0.12	0.02	0.01	0.07	2.6
1987	0.00	1.94	0.46	0.31	0.65	0.24	0.48	0.49	0.21	0.11	0.07	0.23	5.2
1988	0.17	0.17	0.19	1.35	0.20	0.07	0.05	0.10	0.11	0.06	0.04	0.08	2.6
1989	0.00	0.73	0.43	0.64	0.87	0.11	0.01	0.02	0.05	0.04	0.00	0.02	2.9
1990	0.05	1.95	0.62	1.27	1.66	0.88	0.09	0.01	0.02	0.03	0.03	0.05	6.7
1991	0.03	6.80	0.45	5.89	1.24	0.16	0.06	0.03	0.04	0.07	0.10	0.04	14.9
1992	0.00	8.86	4.91	7.55	2.65	0.05	0.12	0.05	0.00	0.00	0.00	0.07	24.3
1993	0.19	18.94	0.79	0.51	0.69	0.15	0.04	0.04	0.04	0.00	0.00	0.02	21.4
1994	0.04	14.51	8.40	6.54	4.14	2.36	0.22	0.07	0.00	0.00	0.00	0.00	36.3
1995	0.02	2.55	4.90	7.45	2.05	0.57	0.29	0.11	0.02	0.00	0.00	0.00	18.0
1996	0.00	2.97	1.28	3.58	4.23	2.29	0.77	0.25	0.02	0.02	0.00	0.03	15.4
1997	0.00	14.38	4.87	0.32	1.86	1.18	0.39	0.12	0.05	0.00	0.00	0.00	23.2
1998	0.00	1.15	3.15	2.28	0.36	0.23	0.16	0.01	0.00	0.00	0.00	0.00	7.3
1999	0.00	32.47	24.55	32.25	15.30	4.07	0.88	0.33	0.22	0.00	0.00	0.00	110.1
2000	0.00	3.66	6.61	12.45	5.45	2.53	0.94	0.55	0.13	0.03	0.00	0.00	32.4
2001	0.00	1.45	4.03	10.09	16.77	5.98	1.45	0.95	0.46	0.17	0.08	0.08	41.5
2002	0.00	0.77	3.94	9.23	16.65	8.91	2.90	1.81	0.59	0.32	0.05	0.09	45.2
2003	0.00	0.72	0.36	2.04	7.14	7.34	3.63	1.49	0.72	0.31	0.14	0.14	24.1
2004	0.00	0.37	0.63	0.44	1.86	2.07	1.71	1.01	0.40	0.13	0.07	0.04	8.7
2005	0.00	9.98	1.88	0.99	1.60	2.29	1.88	0.81	0.22	0.08	0.04	0.02	19.8
2006	0.00	5.58	13.49	4.59	1.29	1.50	1.68	1.17	0.51	0.15	0.06	0.03	30.0
2007	0.00	1.85	6.19	10.42	1.87	1.09	0.65	0.76	0.23	0.05	0.02	0.00	23.1
2008	0.05	0.84	2.60	3.62	5.64	0.97	0.56	0.43	0.32	0.15	0.03	0.02	15.2
2009	0.02	5.59	2.41	2.74	3.74	4.32	1.53	1.37	0.93	0.37	0.14	0.07	23.2
2010	0.00	4.68	5.62	2.45	1.36	1.56	1.56	0.36	0.31	0.16	0.07	0.02	18.1
2011	0.00	1.23	6.05	6.18	1.72	1.01	1.01	0.49	0.35	0.15	0.09	0.04	18.3
2012	0.00	3.35	4.19	4.95	2.49	1.06	1.15	0.86	0.41	0.11	0.04	0.00	18.6
2013	0.25	4.16	4.36	1.59	2.12	0.82	0.47	0.45	0.22	0.12	0.06	0.01	14.6
2014	0.04	21.16	8.69	4.59	1.22	1.11	0.54	0.42	0.31	0.08	0.04	0.04	38.2
2015	0.10	1.75	11.51	12.19	2.20	1.03	1.58	0.91	0.74	0.26	0.03	0.00	32.3

Table B38. Stratified mean weight (kg) per tow of witch flounder in the Atlantic States Marine Fisheries Commission summer shrimp survey in the Gulf of Maine, strata 1, 3, 6, 8), 1984 - 2015.

Summer Year	Age												Total
	0	1	2	3	4	5	6	7	8	9	10	11+	
1984		0.028	0.048	0.129	0.178	0.268	0.397	0.532	0.706	0.831	0.953	1.389	0.313
1985		0.010		0.066	0.188	0.269	0.377	0.532	0.708	0.838	0.935	2.167	0.398
1986		0.008	0.046	0.086	0.142	0.293	0.431	0.508	0.594	0.818	1.086	1.228	0.361
1987		0.007	0.031	0.059	0.156	0.267	0.439	0.552	0.690	0.894	1.066	1.421	0.258
1988		0.006	0.039	0.072	0.197	0.265	0.407	0.585	0.738	0.904	1.014	1.287	0.198
1989		0.011	0.010	0.061	0.158	0.265	0.447	0.567	0.806	0.872	0.831	1.530	0.116
1990	0.001	0.009	0.048	0.099	0.189	0.254	0.379	0.528	0.670	1.027	1.194	1.395	0.135
1991		0.008	0.060	0.080	0.132	0.292	0.381	0.611	0.800	0.913	1.056	1.150	0.072
1992		0.010	0.063	0.085	0.160	0.308	0.275	0.575	0.599	0.726	0.900	1.651	0.069
1993	0.002	0.006	0.048	0.115	0.182	0.270	0.466	0.565	0.693	0.821	1.058	1.155	0.022
1994	0.001	0.009	0.030	0.058	0.166	0.252	0.390	0.563	0.580	0.577	0.608		0.060
1995	0.002	0.009	0.050	0.076	0.131	0.274	0.410	0.556	0.657	0.657	0.657		0.081
1996		0.009	0.037	0.076	0.144	0.236	0.363	0.491	0.646	1.148	1.150	1.397	0.129
1997		0.013	0.064	0.121	0.180	0.232	0.305	0.511	0.654	0.631	0.709	0.657	0.059
1998		0.013	0.048	0.081	0.146	0.244	0.293	0.289	0.334				0.069
1999	0.001	0.010	0.050	0.088	0.151	0.232	0.325	0.497	0.641	0.685	0.657	1.232	0.075
2000		0.012	0.058	0.070	0.138	0.211	0.292	0.329	0.449	0.568	0.619	0.581	0.097
2001		0.007	0.030	0.094	0.134	0.211	0.306	0.421	0.464	0.514	0.533	0.407	0.140
2002		0.009	0.061	0.072	0.149	0.223	0.300	0.385	0.543	0.651	0.767	0.749	0.167
2003		0.010	0.033	0.069	0.126	0.212	0.277	0.363	0.471	0.514	0.550	0.972	0.203
2004		0.010	0.045	0.081	0.143	0.217	0.291	0.365	0.434	0.473	0.503	0.790	0.224
2005		0.010	0.053	0.067	0.168	0.232	0.297	0.388	0.517	0.582	0.654	0.699	0.108
2006		0.010	0.044	0.072	0.176	0.238	0.288	0.419	0.511	0.587	0.579	0.672	0.097
2007		0.009	0.044	0.105	0.181	0.205	0.338	0.423	0.497	0.579	0.595	0.624	0.114
2008	0.002	0.008	0.050	0.100	0.153	0.226	0.286	0.422	0.498	0.523	0.555	0.775	0.144
2009	0.002	0.012	0.050	0.103	0.192	0.254	0.334	0.384	0.469	0.611	0.661	0.907	0.178
2010		0.013	0.048	0.092	0.168	0.221	0.265	0.371	0.432	0.531	0.573	0.583	0.107
2011		0.017	0.060	0.097	0.155	0.213	0.311	0.431	0.542	0.584	0.611	0.676	0.128
2012		0.018	0.045	0.111	0.165	0.253	0.305	0.388	0.471	0.537	0.611	0.680	0.131
2013	0.001	0.017	0.068	0.094	0.163	0.245	0.306	0.394	0.513	0.637	0.699	0.819	0.111
2014	0.002	0.014	0.040	0.116	0.182	0.267	0.321	0.446	0.550	0.680	0.781	0.885	0.061
2015	0.005	0.028	0.062	0.083	0.157	0.260	0.335	0.438	0.525	0.592	0.613	0.461	0.120
TS mean	0.002	0.012	0.047	0.087	0.161	0.247	0.342	0.463	0.575	0.694	0.767	0.998	0.142



Table B39. Stratified mean length (cm) per tow of witch flounder in the Atlantic States Marine Fisheries Commission summer shrimp survey in the Gulf of Maine, strata 1, 3, 6, 8), 1984 - 2015.

Summer Year	Age												Total
	0	1	2	3	4	5	6	7	8	9	10	11+	
1984		18.0	20.9	27.7	30.5	34.4	38.7	42.3	45.8	48.1	50.0	55.5	33.9
1985		13.4		22.8	31.0	34.5	38.1	42.1	45.9	48.2	49.8	60.8	36.0
1986		12.3	20.3	25.0	28.7	35.4	39.7	41.7	43.6	47.8	51.9	53.9	35.8
1987		12.1	18.4	22.3	29.4	34.4	39.9	42.7	45.5	49.1	51.7	56.0	26.5
1988	5.1	11.2	19.6	23.6	31.5	34.5	38.9	43.3	46.4	49.2	51.0	54.5	26.0
1989		13.7	13.2	22.6	29.7	34.5	40.2	43.0	47.6	48.8	48.1	57.4	22.8
1990	7.0	12.8	20.9	25.7	31.0	33.9	38.2	42.0	45.2	51.0	53.1	55.9	24.5
1991	3.0	12.3	22.3	24.2	27.7	35.4	38.0	43.9	47.5	49.4	51.5	52.8	19.7
1992		13.0	22.2	24.2	29.5	35.8	33.9	43.2	43.8	45.7	48.8	58.7	20.5
1993	7.8	11.1	21.0	26.6	30.7	34.6	40.5	43.0	45.6	48.0	51.6	53.0	12.8
1994	7.0	12.5	17.9	22.0	30.0	33.9	38.5	43.0	43.4	43.3	44.0		19.1
1995	8.0	12.2	21.0	23.7	27.9	34.7	39.1	42.8	45.0	45.0	45.0		22.5
1996		12.8	19.4	23.8	28.8	33.3	37.7	41.2	44.7	52.4	52.4	56.0	25.2
1997		14.3	22.7	27.5	30.7	33.1	35.8	41.6	44.9	44.5	46.0	45.0	19.1
1998		14.3	20.6	24.3	29.0	33.6	35.5	35.3	37.0				21.9
1999	7.0	12.8	21.1	24.9	29.2	33.1	36.6	41.2	44.5	45.5	45.0	54.0	21.5
2000		14.1	22.1	23.2	28.2	32.2	35.5	36.5	40.0	43.0	44.2	43.3	24.2
2001		11.5	17.2	25.3	28.2	32.2	35.9	39.4	40.5	41.7	42.3	38.5	27.2
2002		13.0	22.4	23.2	28.9	32.7	35.6	38.3	42.3	44.6	47.0	46.7	28.8
2003		13.0	18.6	23.1	27.6	32.2	34.9	37.6	40.7	41.7	42.3	49.6	30.6
2004		13.1	20.6	24.0	28.6	32.3	35.4	37.8	39.8	40.7	41.2	46.8	31.3
2005		12.8	21.4	22.7	30.1	33.1	35.6	38.4	41.8	43.3	44.8	45.7	21.6
2006		12.7	20.3	23.5	30.3	33.3	35.2	39.2	41.6	43.3	43.1	45.1	22.6
2007		12.8	20.1	26.3	30.8	31.4	37.0	39.5	41.4	43.3	43.6	44.3	25.1
2008	8.5	12.2	21.2	25.7	29.3	32.9	35.0	39.3	41.3	41.7	42.3	47.2	27.2
2009	8.0	13.0	20.9	26.0	31.2	33.9	36.8	38.3	40.4	43.8	44.5	48.6	27.1
2010		13.8	20.3	24.9	30.0	32.5	34.1	37.9	39.6	42.2	43.2	43.2	23.2
2011		15.0	21.9	25.3	29.4	32.2	35.8	39.5	42.4	43.2	43.8	45.1	25.8
2012		15.2	19.4	26.5	29.8	33.9	35.8	38.5	40.7	42.2	44.0	45.4	25.3
2013	5.5	14.7	23.0	25.2	29.4	33.6	35.8	38.5	41.7	44.4	45.6	48.0	23.5
2014	8.2	14.2	19.4	26.8	30.8	34.4	36.3	40.0	42.6	45.2	47.0	48.7	18.9
2015	10.9	17.5	22.3	24.5	29.2	34.1	36.9	39.8	41.9	43.6	44.1	40.6	25.5
TS mean	7.2	13.3	20.4	24.6	29.6	33.6	36.9	40.3	43.0	45.3	46.5	49.7	24.9

Table B40. Stratified mean catch (in numbers and weight [kg]) per tow and associated standard error of witch flounder in the Maine-New Hampshire inshore trawl survey (strata set 1-4; regions 1-5), spring and fall, 2000 - 2015. Indices for 2000-2002 were re-stratified; fixed stations are excluded.

Year	SPRING				FALL			
	Number per tow	SE	Weight per tow	SE	Number per tow	SE	Weight per tow	SE
2000					3.89	0.56	0.22	0.03
2001	6.96	1.84	0.12	0.03	56.58	4.67	4.18	0.34
2002	4.58	0.86	0.41	0.15	6.29	0.93	0.65	0.13
2003	2.32	0.72	0.24	0.07	7.45	1.16	0.92	0.19
2004	1.42	0.21	0.10	0.02	11.73	1.94	1.41	0.20
2005	8.37	1.33	0.37	0.09	26.20	3.55	0.86	0.10
2006	5.17	1.11	0.24	0.06	12.83	1.37	0.83	0.07
2007	4.37	0.67	0.29	0.04	14.41	2.04	1.47	0.30
2008	4.25	0.60	0.38	0.08	14.78	1.79	1.31	0.23
2009	4.15	0.68	0.23	0.06	10.48	1.08	0.57	0.07
2010	5.17	0.91	0.31	0.06	16.22	1.74	0.81	0.10
2011	5.20	0.63	0.25	0.04	9.79	1.23	0.77	0.12
2012	6.41	1.11	0.36	0.07	3.26	0.40	0.20	0.04
2013	1.54	0.32	0.16	0.04	2.43	0.37	0.18	0.04
2014	28.59	3.45	0.41	0.05	15.62	1.67	0.48	0.05
2015	4.66	0.44	0.18	0.04	13.95	2.38	0.92	0.17
mean	6.21		0.27		14.12		0.99	

Survey indices have been provided by Sally Sherman, Maine Department of Marine Resources, pers comm. July 28, 2016. Annual reports and survey procedures and protocols of the Maine-New Hampshire Inshore Trawl Survey are available online at <http://www.maine.gov/dmr/rm/trawl/reports/index.htm>

Table B41. Stratified mean number per tow at age of witch flounder in the Maine-New Hampshire inshore trawl survey (strata set 1-4; regions 1-5), spring and fall, 2000 - 2015. Indices for 2000-2002 were re-stratified; fixed stations are excluded. Annual, season-specific Northeast Fisheries Science Center age/length keys used.

SPRING		Age												Total
Year	0	1	2	3	4	5	6	7	8	9	10	11+		
2000														
2001	0.000	4.003	2.611	0.223	0.077	0.000	0.007	0.000	0.014	0.014	0.014	0.000	6.96	
2002	0.000	1.073	0.206	1.233	0.995	0.628	0.257	0.174	0.009	0.005	0.005	0.005	4.59	
2003	0.000	0.364	0.072	0.410	0.786	0.475	0.127	0.067	0.019	0.000	0.000	0.000	2.32	
2004	0.000	0.692	0.231	0.131	0.131	0.118	0.056	0.031	0.013	0.004	0.006	0.011	1.42	
2005	0.000	5.246	1.615	0.636	0.117	0.226	0.268	0.117	0.050	0.059	0.033	0.000	8.37	
2006	0.000	1.117	2.901	0.703	0.212	0.052	0.062	0.047	0.041	0.021	0.000	0.010	5.17	
2007	0.000	1.149	1.560	1.250	0.118	0.083	0.017	0.079	0.035	0.044	0.000	0.031	4.37	
2008	0.000	0.917	1.499	0.488	0.675	0.204	0.102	0.221	0.132	0.000	0.000	0.008	4.25	
2009	0.000	1.839	1.295	0.452	0.232	0.203	0.037	0.017	0.037	0.025	0.012	0.000	4.15	
2010	0.000	1.959	1.581	0.863	0.217	0.264	0.207	0.041	0.010	0.010	0.005	0.005	5.16	
2011	0.000	0.608	2.801	1.346	0.146	0.104	0.114	0.047	0.016	0.010	0.005	0.000	5.20	
2012	0.000	0.853	3.046	1.738	0.507	0.090	0.083	0.038	0.032	0.013	0.006	0.000	6.41	
2013	0.000	0.315	0.498	0.216	0.245	0.089	0.048	0.085	0.022	0.015	0.002	0.011	1.55	
2014	0.000	25.274	2.459	0.572	0.114	0.114	0.057	0.029	0.029	0.000	0.000	0.000	28.65	
2015	0.000	0.903	2.379	1.220	0.084	0.019	0.028	0.014	0.014	0.000	0.000	0.000	4.66	

FALL		Age												Total
Year	0	1	2	3	4	5	6	7	8	9	10	11+		
2000	0.000	0.941	2.276	0.607	0.051	0.008	0.004	0.004	0.000	0.000	0.000	0.000	3.89	
2001	0.000	11.373	26.255	6.620	8.261	2.263	1.018	0.622	0.113	0.057	0.000	0.000	56.58	
2002	0.000	0.836	1.151	1.182	2.276	0.711	0.132	0.000	0.000	0.000	0.000	0.000	6.29	
2003	0.000	1.415	0.208	0.640	1.899	1.631	1.005	0.275	0.127	0.171	0.045	0.045	7.46	
2004	0.141	4.551	1.021	1.349	1.150	2.041	0.915	0.270	0.164	0.059	0.023	0.035	11.72	
2005	0.000	23.445	2.069	0.210	0.052	0.079	0.105	0.210	0.026	0.000	0.000	0.026	26.22	
2006	0.000	5.196	4.709	2.194	0.141	0.154	0.218	0.167	0.013	0.038	0.000	0.000	12.83	
2007	0.000	2.940	3.084	5.736	1.225	0.562	0.461	0.303	0.029	0.014	0.000	0.043	14.40	
2008	0.015	4.951	3.532	2.956	1.966	0.384	0.502	0.133	0.296	0.015	0.015	0.000	14.76	
2009	0.031	7.523	1.310	0.650	0.492	0.346	0.052	0.031	0.021	0.010	0.000	0.000	10.47	
2010	0.065	11.291	3.115	0.681	0.389	0.211	0.341	0.032	0.049	0.016	0.000	0.016	16.21	
2011	0.029	2.321	4.632	1.939	0.304	0.196	0.255	0.059	0.020	0.010	0.010	0.010	9.78	
2012	0.000	2.165	0.589	0.332	0.049	0.023	0.055	0.029	0.010	0.000	0.000	0.000	3.25	
2013	0.029	1.208	0.760	0.170	0.168	0.051	0.012	0.017	0.005	0.007	0.002	0.000	2.43	
2014	0.016	13.795	1.578	0.203	0.016	0.016	0.000	0.016	0.000	0.000	0.000	0.000	15.64	
2015	0.070	3.585	7.031	2.985	0.140	0.042	0.070	0.014	0.000	0.000	0.000	0.000	13.94	

Table B42. Stratified mean weight per tow at age of witch flounder in the Maine-New Hampshire inshore trawl survey in the Gulf of Maine (strata set 1-4; regions 1-5), spring and fall, 2000 - 2015. Indices for 2000-2002 were re-stratified; fixed stations are excluded. Northeast Fisheries Science Center seasonal age/length keys used.

Spring		Age											Total	
Year		0	1	2	3	4	5	6	7	8	9	10		11+
2000														
2001			0.005	0.008	0.051	0.105	0.128	0.367	0.367	0.657	0.657	0.608		0.013
2002			0.006	0.022	0.042	0.132	0.216	0.281	0.337	0.467	0.518	0.518	0.518	0.102
2003			0.012	0.047	0.053	0.104	0.176	0.269	0.331	0.437				0.112
2004			0.004	0.046	0.053	0.125	0.162	0.231	0.337	0.438	0.472	0.489	0.505	0.067
2005			0.006	0.029	0.057	0.122	0.219	0.279	0.353	0.452	0.548	0.654		0.044
2006			0.005	0.033	0.062	0.123	0.187	0.267	0.343	0.475	0.562	0.367	0.763	0.049
2007			0.007	0.038	0.087	0.162	0.22	0.294	0.395	0.555	0.617		0.862	0.074
2008			0.004	0.03	0.077	0.14	0.22	0.284	0.364	0.436			0.608	0.094
2009			0.004	0.036	0.073	0.153	0.213	0.302	0.382	0.496	0.545	0.571		0.054
2010			0.005	0.036	0.067	0.134	0.212	0.271	0.328	0.429	0.595	0.693	0.578	0.058
2011			0.005	0.024	0.056	0.14	0.213	0.289	0.356	0.383	0.38	0.418		0.048
2012			0.007	0.027	0.071	0.131	0.199	0.256	0.374	0.443	0.501	0.512	0.562	0.056
2013			0.009	0.048	0.096	0.15	0.213	0.276	0.355	0.448	0.542	0.476	0.821	0.112
2014			0.007	0.023	0.103	0.166	0.252	0.325	0.388	0.517	0.657			0.013
2015			0.005	0.031	0.053	0.109	0.23	0.294	0.384	0.418	0.46			0.038
TS mean			0.006	0.032	0.067	0.133	0.204	0.286	0.360	0.470	0.543	0.531	0.652	0.062
Fall		Age											Total	
Year		0	1	2	3	4	5	6	7	8	9	10		11+
2000			0.019	0.044	0.084	0.141	0.212	0.334	0.334					0.046
2001			0.013	0.026	0.108	0.15	0.228	0.331	0.406	0.474	0.46	0.562		0.07
2002			0.021	0.055	0.092	0.159	0.213	0.287	0.367	0.367				0.118
2003			0.017	0.047	0.075	0.141	0.215	0.269	0.359	0.403	0.517	0.613	0.637	0.169
2004	0.001		0.017	0.056	0.114	0.177	0.222	0.301	0.392	0.465	0.604	0.438	0.567	0.125
2005			0.02	0.061	0.173	0.207	0.261	0.312	0.471	0.476			0.476	0.031
2006			0.019	0.06	0.105	0.192	0.22	0.296	0.42	0.448	0.51			0.065
2007			0.02	0.058	0.114	0.209	0.209	0.334	0.392	0.547	0.518		0.858	0.111
2008			0.018	0.051	0.108	0.186	0.255	0.268	0.395	0.501	0.821	0.778		0.095
2009	0.001		0.025	0.047	0.107	0.199	0.241	0.351	0.465	0.52	0.605		0.562	0.053
2010	0.001		0.023	0.06	0.107	0.188	0.284	0.241	0.349	0.434	0.474	0.476	0.725	0.049
2011	0.001		0.024	0.059	0.1	0.206	0.264	0.3	0.371	0.556	0.44	0.575	0.681	0.078
2012			0.027	0.068	0.113	0.202	0.3	0.374	0.438	0.496	0.367			0.06
2013	0.001		0.023	0.089	0.111	0.182	0.27	0.411	0.37	0.493	0.562	0.562		0.074
2014	0.001		0.024	0.044	0.065	0.208	0.373	0.354	0.485	0.483	0.518		0.518	0.027
2015	0.001		0.025	0.068	0.093	0.18	0.283	0.351	0.394	0.398				0.066
TS mean		0.001	0.021	0.056	0.104	0.183	0.253	0.320	0.401	0.471	0.533	0.572	0.628	0.077

Table B43. Stratified mean length (cm) per tow at age of witch flounder in the Maine-New Hampshire inshore trawl surveys in the Gulf of Maine (strata set 1-4; regions 1-5), spring and fall, 2000 - 2015. Indices for 2000-2002 were re-stratified; fixed stations are excluded. Northeast Fisheries Science Center seasonal age/length keys used.

Spring Year	Age												Total
	0	1	2	3	4	5	6	7	8	9	10	11+	
2000													
2001		10.6	12.6	21.2	26.3	28.0	38.0	38.0	45.0	45.0	44.0		12.1
2002		11.4	16.7	20.0	28.0	32.4	35.1	37.0	40.7	42.0	42.0	42.0	22.9
2003		12.9	21.0	21.2	26.2	30.2	34.6	36.7	39.9				24.8
2004		10.5	20.7	21.3	27.6	29.7	33.2	36.8	40.0	40.8	41.3	41.7	18.5
2005		11.0	18.1	21.8	27.6	32.7	35.0	37.5	40.3	42.6	44.9		15.7
2006		10.8	18.8	22.6	27.6	31.2	34.5	37.2	40.8	42.8	38.0	47.0	18.8
2007		11.6	19.6	24.9	29.9	32.7	35.6	38.6	42.7	44.2		48.7	20.6
2008		10.4	18.2	23.9	28.6	32.7	35.2	37.9	39.9			44.0	21.7
2009		10.4	19.1	23.6	29.1	32.3	35.7	38.3	41.1	42.5	43.0		17.6
2010		10.8	18.8	23.0	28.0	32.1	34.6	36.6	39.5	43.5	45.7	43.0	18.5
2011		10.5	16.5	21.7	28.5	32.2	35.2	37.5	38.4	38.3	39.4	0.0	18.5
2012		11.8	17.0	23.3	28.0	31.6	34.0	38.0	40.0	41.5	41.8	43.0	19.6
2013		12.7	20.7	25.6	29.0	32.2	34.9	37.5	40.2	42.5	41.0	48.0	23.8
2014		11.7	16.5	25.9	30.0	33.9	36.5	38.6	41.7	45.0			12.7
2015		11.1	18.1	21.4	26.0	32.9	35.5	38.3	39.3	40.6			18.0
TS mean		11.2	18.2	22.8	28.0	31.8	35.2	37.6	40.6	42.4	42.1	39.7	18.9

Fall Year	Age												Total
	0	1	2	3	4	5	6	7	8	9	10	11+	
2000		15.9	20.3	24.8	28.7	32.1	37.0	37.0					20.1
2001		14.2	17.4	26.5	29.1	33.0	36.7	39.0	40.9	40.6	43.0		20.8
2002		16.2	21.7	25.0	29.6	32.3	35.3	38.0	38.0				25.9
2003		15.4	20.9	23.9	28.6	32.3	34.6	37.6	39.0	41.9	44.0	44.6	28.1
2004	6.4	15.3	21.9	27.0	30.7	32.8	35.9	38.7	40.6	43.9	40.0	43.0	24.4
2005		16.1	22.3	30.6	32.1	34.3	36.2	40.8	41.0			41.0	17.1
2006		15.7	22.3	26.2	31.5	32.6	35.5	39.4	40.3	41.8			21.0
2007		16.1	22.0	26.9	32.2	31.5	36.9	38.7	42.7	42.0		48.0	25.0
2008	5.0	15.6	21.2	26.4	31.0	34.2	34.3	38.7	41.5	48.0	47.2		23.1
2009	6.7	17.1	20.5	26.3	31.6	33.4	37.2	40.5	41.8	43.9		43.0	19.6
2010	7.0	16.8	22.2	26.3	31.1	35.1	32.7	37.2	39.7	40.8	41.0	46.3	19.3
2011	6.7	17.0	22.0	25.3	31.9	34.4	35.6	38.0	42.8	40.0	42.8	45.3	22.5
2012		17.8	23.0	26.7	31.7	35.6	38.1	39.9	41.4	38.0			20.6
2013	7.0	16.9	25.1	26.5	30.4	34.6	39.0	37.8	41.3	43.0	43.0		21.7
2014	7.0	17.0	20.4	22.6	32.0	37.8	37.4	41.2	41.1	42.0		42.0	17.4
2015	7.5	17.2	23.1	25.4	30.7	35.2	37.4	38.7	38.8				22.2
TS mean	6.7	16.3	21.6	26.0	30.8	33.8	36.2	38.8	40.7	42.1	43.0	44.1	21.8

Table B44. Trends in landings (lbs) for trips in which witch flounder comprise at least 40% or more of the total trip landings, number of trips, days fished, days fished per trip, LPUE of the 40% trips (nominal and scaled), 1969-2015.

Year	Trips 40		Days		Nominal 40%	Scaled 40%
	Landed Lbs	Trips	Fished	DF/Trip	LPUE	LPUE
1964	1,002,098	250	185	0.74	5,426	2.08
1965	202,850	8	43	5.15	4,685	1.80
1966	1,392,613	246	357	1.45	3,903	1.50
1967	1,782,883	279	443	1.59	4,024	1.54
1968	2,173,804	412	498	1.21	4,361	1.67
1969	1,473,227	280	323	1.15	4,557	1.75
1970	1,605,073	277	352	1.27	4,560	1.75
1971	2,340,797	393	596	1.51	3,928	1.51
1972	2,208,484	671	664	0.99	3,324	1.27
1973	1,747,907	615	555	0.90	3,148	1.21
1974	779,876	295	231	0.78	3,379	1.30
1975	1,024,094	442	317	0.72	3,236	1.24
1976	673,666	337	188	0.56	3,585	1.37
1977	432,512	220	123	0.56	3,519	1.35
1978	788,823	424	213	0.50	3,710	1.42
1979	383,701	172	120	0.70	3,203	1.23
1980	484,398	268	130	0.49	3,729	1.43
1981	617,158	183	131	0.71	4,729	1.81
1982	913,223	340	214	0.63	4,277	1.64
1983	1,187,732	301	323	1.07	3,678	1.41
1984	1,905,001	666	701	1.05	2,716	1.04
1985	1,620,062	749	803	1.07	2,019	0.77
1986	2,054,683	806	1,038	1.29	1,980	0.76
1987	1,061,519	557	546	0.98	1,945	0.75
1988	1,467,220	585	776	1.33	1,892	0.73
1989	639,629	199	255	1.28	2,504	0.96
1990	118,571	179	100	0.56	1,186	0.45
1991	90,385	105	87	0.82	1,045	0.40
1992	299,486	137	167	1.22	1,790	0.69
1993	329,964	268	271	1.01	1,218	0.47

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Table B44, continued.

Year	Trips 40		Days		Nominal 40%	Scaled 40%
	Landed Lbs	Trips	Fished	DF/Trip	LPUE	LPUE
1994	499,124	473	471	1.00	1,060	0.41
1995	450,002	302	437	1.45	1,030	0.39
1996	494,457	293	447	1.53	1,106	0.42
1997	313,016	178	248	1.39	1,265	0.48
1998	589,049	270	389	1.44	1,514	0.58
1999	714,463	474	479	1.01	1,492	0.57
2000	809,664	479	452	0.94	1,792	0.69
2001	1,085,273	418	435	1.04	2,496	0.96
2002	1,510,544	791	542	0.68	2,787	1.07
2003	1,890,138	965	728	0.75	2,596	1.00
2004	982,508	466	406	0.87	2,418	0.93
2005	782,709	550	370	0.67	2,114	0.81
2006	359,100	256	207	0.81	1,732	0.66
2007	227,559	155	112	0.72	2,030	0.78
2008	120,035	80	70	0.88	1,707	0.65
2009	80,864	71	71	1.00	1,142	0.44
2010	83,543	64	60	0.93	1,402	0.54
2011	155,711	116	76	0.66	2,049	0.79
2012	221,601	212	116	0.55	1,919	0.74
2013	160,057	223	95	0.43	1,690	0.65
2014	159,633	167	76	0.45	2,109	0.81
2015	147,234	186	76	0.41	1,940	0.74
Total	44,637,723	17,851	17,109	0.96	2,609	1

Table B45. Landings per unit of effort index (year effect estimates [annual indices of stock biomass] from the negative binomial model) for trips in which witch flounder comprise at least 40% or more of the total trip landings, and associated coefficient of variation (CV), lower and upper 95% confidence intervals of the index and scaled index, (L95CI, U95CI; Scaled L95CI, Scaled U95CI), respectively; 1964-2015.

Year	Trips 40		L95CI	U95CI	Scaled		
	Index	CV			Index	L95CI	U95CI
1964	1.593	0.07	1.383	1.835	1.54	1.34	1.78
1965	1.550	0.19	1.077	2.232	1.50	1.04	2.16
1966	1.654	0.07	1.430	1.913	1.60	1.39	1.85
1967	1.864	0.07	1.623	2.140	1.81	1.57	2.07
1968	2.121	0.07	1.859	2.421	2.06	1.80	2.35
1969	1.715	0.07	1.489	1.976	1.66	1.44	1.91
1970	1.812	0.07	1.572	2.090	1.76	1.52	2.03
1971	2.206	0.07	1.926	2.526	2.14	1.87	2.45
1972	1.426	0.07	1.247	1.631	1.38	1.21	1.58
1973	1.248	0.07	1.083	1.437	1.21	1.05	1.39
1974	1.154	0.08	0.991	1.345	1.12	0.96	1.30
1975	1.226	0.07	1.074	1.398	1.19	1.04	1.35
1976	1.381	0.07	1.201	1.588	1.34	1.16	1.54
1977	1.418	0.08	1.212	1.660	1.37	1.17	1.61
1978	1.350	0.08	1.154	1.581	1.31	1.12	1.53
1979	1.192	0.09	0.991	1.432	1.15	0.96	1.39
1980	1.282	0.10	1.059	1.551	1.24	1.03	1.50
1981	1.424	0.09	1.206	1.683	1.38	1.17	1.63
1982	1.515	0.08	1.303	1.762	1.47	1.26	1.71
1983	1.188	0.07	1.028	1.372	1.15	1.00	1.33
1984	0.938	0.06	0.834	1.056	0.91	0.81	1.02
1985	0.730	0.06	0.648	0.823	0.71	0.63	0.80
1986	0.616	0.06	0.545	0.696	0.60	0.53	0.67
1987	0.587	0.07	0.514	0.671	0.57	0.50	0.65
1988	0.509	0.07	0.447	0.580	0.49	0.43	0.56
1989	0.458	0.09	0.385	0.544	0.44	0.37	0.53
1990	0.460	0.11	0.371	0.569	0.45	0.36	0.55
1991	0.612	0.11	0.490	0.764	0.59	0.47	0.74
1992	1.371	0.10	1.126	1.670	1.33	1.09	1.62
1993	0.594	0.08	0.506	0.697	0.58	0.49	0.68

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Table B45, continued.

Year	Trips 40				Scaled	Scaled	Scaled
	Index	CV	L95CI	U95CI	Index	L95CI	U95CI
1994	0.412	0.06	0.365	0.465	0.40	0.35	0.45
1995	0.322	0.07	0.282	0.367	0.31	0.27	0.36
1996	0.440	0.07	0.385	0.502	0.43	0.37	0.49
1997	0.463	0.07	0.399	0.536	0.45	0.39	0.52
1998	0.432	0.07	0.378	0.494	0.42	0.37	0.48
1999	0.494	0.06	0.438	0.557	0.48	0.42	0.54
2000	0.662	0.06	0.587	0.747	0.64	0.57	0.72
2001	1.171	0.06	1.035	1.324	1.13	1.00	1.28
2002	1.083	0.06	0.968	1.213	1.05	0.94	1.18
2003	0.852	0.06	0.762	0.951	0.83	0.74	0.92
2004	0.889	0.06	0.788	1.002	0.86	0.76	0.97
2005	0.881	0.06	0.783	0.991	0.85	0.76	0.96
2006	0.648	0.07	0.568	0.740	0.63	0.55	0.72
2007	0.824	0.08	0.705	0.963	0.80	0.68	0.93
2008	0.717	0.09	0.597	0.861	0.69	0.58	0.83
2009	0.610	0.10	0.503	0.739	0.59	0.49	0.72
2010	0.951	0.10	0.779	1.161	0.92	0.75	1.12
2011	1.014	0.08	0.866	1.187	0.98	0.84	1.15
2012	0.809	0.07	0.705	0.929	0.78	0.68	0.90
2013	0.856	0.07	0.748	0.980	0.83	0.72	0.95
2014	0.930	0.07	0.805	1.075	0.90	0.78	1.04
2015	1.000				0.97		

Table B46. Trends in landings (lbs) for trips in which witch flounder comprise at least 25% or more of the total trip landings, number of trips, days fished, days fished per trip, LPUE of the 25% trips (nominal and scaled), 1969-2015.

Year	Trips 25		Days		Nominal 25%	Scaled 25%
	Landed Lbs	Trips	Fished	DF/Trip	LPUE	LPUE
1964	1,265,453	426	294	0.69	4,310	2.19
1965	263,515	17	71	4.24	3,722	1.89
1966	2,173,913	584	732	1.25	2,971	1.51
1967	2,571,807	566	794	1.40	3,239	1.65
1968	2,999,423	819	889	1.08	3,375	1.71
1969	2,345,290	569	642	1.13	3,655	1.86
1970	2,403,066	624	671	1.08	3,581	1.82
1971	3,399,044	938	1,083	1.15	3,139	1.59
1972	3,197,444	1,136	1,161	1.02	2,754	1.40
1973	2,665,563	1,270	1,034	0.81	2,577	1.31
1974	1,329,727	631	544	0.86	2,444	1.24
1975	1,591,721	868	638	0.74	2,494	1.27
1976	1,324,854	886	557	0.63	2,377	1.21
1977	1,231,156	746	415	0.56	2,970	1.51
1978	2,048,780	1,293	683	0.53	3,000	1.52
1979	1,031,879	679	417	0.61	2,473	1.26
1980	1,273,034	818	461	0.56	2,764	1.40
1981	1,598,012	792	476	0.60	3,360	1.71
1982	2,899,081	1,090	901	0.83	3,216	1.63
1983	4,179,643	1,326	1,424	1.07	2,936	1.49
1984	5,040,544	2,208	2,199	1.00	2,292	1.16
1985	4,641,865	2,441	2,671	1.09	1,738	0.88
1986	4,125,181	2,368	2,589	1.09	1,594	0.81
1987	2,604,508	1,642	1,802	1.10	1,445	0.73
1988	3,238,526	2,037	2,244	1.10	1,443	0.73
1989	1,336,265	783	856	1.09	1,561	0.79
1990	372,870	540	364	0.67	1,025	0.52
1991	401,925	422	378	0.90	1,063	0.54
1992	780,540	498	631	1.27	1,238	0.63
1993	1,138,998	832	1,087	1.31	1,048	0.53

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Table B46, continued.

Year	Trips 25		Days		Nominal 25%	Scaled 25%
	Landed Lbs	Trips	Fished	DF/Trip	LPUE	LPUE
1994	1,405,764	1,191	1,469	1.23	957	0.49
1995	1,067,270	833	1,213	1.46	880	0.45
1996	1,267,622	808	1,360	1.68	932	0.47
1997	893,228	617	886	1.44	1,008	0.51
1998	1,304,009	720	1,101	1.53	1,185	0.60
1999	1,466,550	1,163	1,290	1.11	1,137	0.58
2000	1,722,664	1,112	1,166	1.05	1,478	0.75
2001	2,128,965	1,031	1,179	1.14	1,805	0.92
2002	2,736,010	1,781	1,314	0.74	2,082	1.06
2003	3,084,705	1,874	1,486	0.79	2,076	1.05
2004	2,211,535	1,291	1,181	0.92	1,872	0.95
2005	1,769,039	1,255	1,022	0.81	1,731	0.88
2006	1,019,817	646	698	1.08	1,461	0.74
2007	468,385	389	307	0.79	1,527	0.78
2008	319,107	227	208	0.92	1,532	0.78
2009	282,447	221	226	1.03	1,248	0.63
2010	170,741	152	122	0.80	1,402	0.71
2011	277,894	253	171	0.68	1,625	0.83
2012	503,773	503	317	0.63	1,589	0.81
2013	302,886	406	200	0.49	1,514	0.77
2014	258,248	307	151	0.49	1,707	0.87
2015	251,472	327	140	0.43	1,803	0.92
Total	90,385,758	46,953	45,913	0.98	1,969	1

Table B47. Landings per unit of effort index (year effect estimates [annual indices of stock biomass] from the negative binomial model) for trips in which witch flounder comprise at least 25% or more of the total trip landings, and associated coefficient of variation (CV), lower and upper 95% confidence intervals of the index and scaled index, (L95CI, U95CI; Scaled L95CI, Scaled U95CI), respectively, 1964-2015.

Year	Trips 25		L95CI	U95CI	Scaled		
	Index	CV			Index	L95CI	U95CI
1964	1.459	0.05	1.313	1.621	1.6	1.44	1.78
1965	1.404	0.15	1.056	1.865	1.5	1.16	2.04
1966	1.366	0.05	1.233	1.513	1.5	1.35	1.66
1967	1.659	0.05	1.499	1.835	1.8	1.64	2.01
1968	1.824	0.05	1.653	2.012	2.0	1.81	2.21
1969	1.553	0.05	1.403	1.720	1.7	1.54	1.89
1970	1.670	0.05	1.508	1.850	1.8	1.65	2.03
1971	1.858	0.05	1.684	2.049	2.0	1.85	2.25
1972	1.266	0.05	1.150	1.393	1.4	1.26	1.53
1973	1.124	0.05	1.018	1.241	1.2	1.12	1.36
1974	1.029	0.06	0.924	1.147	1.1	1.01	1.26
1975	1.106	0.05	1.005	1.217	1.2	1.10	1.33
1976	1.207	0.05	1.094	1.331	1.3	1.20	1.46
1977	1.301	0.05	1.175	1.440	1.4	1.29	1.58
1978	1.182	0.05	1.071	1.305	1.3	1.17	1.43
1979	1.051	0.06	0.940	1.175	1.2	1.03	1.29
1980	0.998	0.06	0.891	1.117	1.1	0.98	1.23
1981	1.141	0.05	1.033	1.259	1.3	1.13	1.38
1982	1.193	0.05	1.087	1.309	1.3	1.19	1.44
1983	0.998	0.05	0.913	1.092	1.1	1.00	1.20
1984	0.842	0.04	0.776	0.914	0.9	0.85	1.00
1985	0.674	0.04	0.621	0.731	0.7	0.68	0.80
1986	0.582	0.04	0.535	0.634	0.6	0.59	0.69
1987	0.521	0.05	0.477	0.570	0.6	0.52	0.63
1988	0.481	0.05	0.440	0.526	0.5	0.48	0.58
1989	0.415	0.05	0.374	0.460	0.5	0.41	0.50
1990	0.476	0.06	0.420	0.541	0.5	0.46	0.59
1991	0.569	0.07	0.500	0.647	0.6	0.55	0.71
1992	0.794	0.06	0.707	0.891	0.9	0.78	0.98
1993	0.497	0.05	0.450	0.550	0.6	0.49	0.60

continued on next page.

Table B47, continued.

Year	Trips 25		L95CI	U95CI	Scaled	Scaled	Scaled
	Index	CV			Index	L95CI	U95CI
1994	0.362	0.04	0.332	0.394	0.4	0.36	0.43
1995	0.282	0.05	0.258	0.308	0.3	0.28	0.34
1996	0.362	0.05	0.331	0.395	0.4	0.36	0.43
1997	0.417	0.05	0.380	0.458	0.5	0.42	0.50
1998	0.387	0.05	0.353	0.424	0.4	0.39	0.46
1999	0.423	0.04	0.389	0.460	0.5	0.43	0.50
2000	0.580	0.04	0.533	0.631	0.6	0.58	0.69
2001	0.878	0.04	0.806	0.957	1.0	0.88	1.05
2002	0.901	0.04	0.831	0.977	1.0	0.91	1.07
2003	0.785	0.04	0.725	0.851	0.9	0.79	0.93
2004	0.734	0.04	0.675	0.798	0.8	0.74	0.87
2005	0.711	0.04	0.654	0.773	0.8	0.72	0.85
2006	0.600	0.05	0.548	0.658	0.7	0.60	0.72
2007	0.787	0.05	0.709	0.872	0.9	0.78	0.96
2008	0.921	0.06	0.820	1.034	1.0	0.90	1.13
2009	0.675	0.06	0.599	0.760	0.7	0.66	0.83
2010	0.931	0.07	0.815	1.063	1.0	0.89	1.17
2011	0.930	0.06	0.832	1.038	1.0	0.91	1.14
2012	0.785	0.05	0.714	0.864	0.9	0.78	0.95
2013	0.819	0.05	0.742	0.904	0.9	0.81	0.99
2014	0.914	0.05	0.824	1.015	1.0	0.90	1.11
2015	1.000				1.1		

Table B48. Trends in landings (lbs) for trips in which witch flounder comprise at least 10% or more of the total trip landings, number of trips, days fished, days fished per trip, LPUE of the 10% trips (nominal and scaled), 1969-2015.

Year	Trips 10		Days		Nominal 10%	Scaled 10%
	Landed Lbs	Trips	Fished	DF/Trip	LPUE	LPUE
1964	1,760,255	1,029	742	0.72	2,373	1.96
1965	513,324	84	274	3.25	1,871	1.55
1966	3,124,170	1,370	1,618	1.18	1,930	1.60
1967	3,617,111	1,285	1,684	1.31	2,148	1.78
1968	4,113,350	1,734	1,792	1.03	2,295	1.90
1969	3,382,957	1,520	1,435	0.94	2,358	1.95
1970	3,615,729	2,027	1,769	0.87	2,044	1.69
1971	4,921,749	2,838	2,486	0.88	1,980	1.64
1972	4,541,169	2,577	2,541	0.99	1,788	1.48
1973	3,701,759	2,520	2,073	0.82	1,786	1.48
1974	2,405,000	1,823	1,752	0.96	1,373	1.14
1975	2,868,158	2,153	2,003	0.93	1,432	1.19
1976	2,607,037	2,727	1,952	0.72	1,336	1.11
1977	3,272,216	3,233	1,763	0.55	1,856	1.54
1978	4,645,453	4,385	2,588	0.59	1,795	1.49
1979	3,255,044	3,601	2,198	0.61	1,481	1.23
1980	3,475,554	4,270	2,311	0.54	1,504	1.25
1981	4,291,706	3,833	2,216	0.58	1,936	1.60
1982	6,513,805	4,496	3,537	0.79	1,841	1.52
1983	8,486,977	5,136	4,630	0.90	1,833	1.52
1984	10,350,443	7,069	6,886	0.97	1,503	1.24
1985	9,936,390	7,293	8,229	1.13	1,207	1.00
1986	8,140,190	7,034	7,288	1.04	1,117	0.92
1987	5,713,273	5,321	5,876	1.10	972	0.81
1988	5,765,829	5,366	6,050	1.13	953	0.79
1989	3,024,428	3,053	3,571	1.17	847	0.70
1990	1,263,847	2,246	1,961	0.87	644	0.53
1991	1,544,638	2,019	2,373	1.18	651	0.54
1992	2,391,591	2,439	3,579	1.47	668	0.55
1993	3,234,831	3,476	4,972	1.43	651	0.54

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Table B48, continued.

Year	Trips 10		Days		Nominal 10%	Scaled 10%
	Landed Lbs	Trips	Fished	DF/Trip	LPUE	LPUE
1994	3,462,913	3,406	5,466	1.61	634	0.52
1995	2,809,450	3,057	5,206	1.70	540	0.45
1996	2,879,666	2,492	4,592	1.84	627	0.52
1997	2,320,480	2,209	3,414	1.55	680	0.56
1998	2,663,661	2,133	3,364	1.58	792	0.66
1999	3,093,569	2,979	4,172	1.40	742	0.61
2000	3,506,108	2,879	3,719	1.29	943	0.78
2001	4,421,423	2,772	3,795	1.37	1,165	0.96
2002	4,769,417	3,456	3,499	1.01	1,363	1.13
2003	4,700,446	3,453	3,192	0.92	1,472	1.22
2004	4,109,385	2,951	3,153	1.07	1,303	1.08
2005	3,576,863	2,772	2,946	1.06	1,214	1.01
2006	2,553,454	1,633	2,312	1.42	1,105	0.91
2007	1,107,789	1,036	1,099	1.06	1,008	0.84
2008	1,004,091	852	1,033	1.21	972	0.81
2009	939,577	804	986	1.23	953	0.79
2010	649,133	625	628	1.01	1,033	0.86
2011	781,026	803	631	0.79	1,238	1.02
2012	1,123,156	1,148	1,059	0.92	1,060	0.88
2013	619,166	737	604	0.82	1,025	0.85
2014	457,748	591	409	0.69	1,120	0.93
2015	438,232	578	351	0.61	1,249	1.03
Total	178,464,736	141,321	147,777	1.05	1,208	1

Table B49. Landings per unit of effort index (year effect estimates [annual indices of stock biomass] from the negative binomial model) for trips in which witch flounder comprise at least 10% or more of the total trip landings, and associated coefficient of variation (CV), lower and upper 95% confidence intervals of the index and scaled index, (L95CI, U95CI; Scaled L95CI, Scaled U95CI), respectively, 1964-2015.

Year	Trips 10		L95CI	U95CI	Scaled		
	Index	CV			Index	L95CI	U95CI
1964	1.204	0.04	1.113	1.303	1.54	1.43	1.67
1965	1.001	0.09	0.846	1.186	1.28	1.09	1.52
1966	1.069	0.04	0.992	1.153	1.37	1.27	1.48
1967	1.414	0.04	1.310	1.526	1.81	1.68	1.96
1968	1.588	0.04	1.471	1.715	2.04	1.89	2.20
1969	1.310	0.04	1.214	1.412	1.68	1.56	1.81
1970	1.345	0.04	1.247	1.451	1.73	1.60	1.86
1971	1.565	0.04	1.453	1.685	2.01	1.86	2.16
1972	1.046	0.04	0.973	1.125	1.34	1.25	1.44
1973	1.024	0.04	0.950	1.104	1.31	1.22	1.42
1974	0.862	0.04	0.797	0.932	1.11	1.02	1.20
1975	0.966	0.04	0.898	1.039	1.24	1.15	1.33
1976	1.007	0.04	0.936	1.084	1.29	1.20	1.39
1977	1.130	0.04	1.052	1.214	1.45	1.35	1.56
1978	0.986	0.04	0.919	1.057	1.26	1.18	1.36
1979	0.847	0.04	0.789	0.909	1.09	1.01	1.17
1980	0.771	0.04	0.718	0.828	0.99	0.92	1.06
1981	0.935	0.03	0.874	1.000	1.20	1.12	1.28
1982	0.936	0.03	0.877	1.000	1.20	1.12	1.28
1983	0.823	0.03	0.772	0.878	1.06	0.99	1.13
1984	0.747	0.03	0.702	0.794	0.96	0.90	1.02
1985	0.607	0.03	0.570	0.645	0.78	0.73	0.83
1986	0.539	0.03	0.506	0.575	0.69	0.65	0.74
1987	0.465	0.03	0.435	0.497	0.60	0.56	0.64
1988	0.441	0.03	0.413	0.472	0.57	0.53	0.60
1989	0.365	0.04	0.340	0.392	0.47	0.44	0.50
1990	0.384	0.04	0.355	0.416	0.49	0.46	0.53
1991	0.416	0.04	0.385	0.449	0.53	0.49	0.58
1992	0.457	0.04	0.425	0.491	0.59	0.54	0.63
1993	0.390	0.04	0.364	0.417	0.50	0.47	0.54

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Table B49, continued.

Year	Trips 10		L95CI	U95CI	Scaled	Scaled	Scaled
	Index	CV			Index	L95CI	U95CI
1994	0.311	0.03	0.292	0.332	0.40	0.37	0.43
1995	0.243	0.03	0.228	0.259	0.31	0.29	0.33
1996	0.302	0.03	0.283	0.322	0.39	0.36	0.41
1997	0.330	0.03	0.309	0.352	0.42	0.40	0.45
1998	0.339	0.03	0.317	0.362	0.43	0.41	0.46
1999	0.397	0.03	0.373	0.424	0.51	0.48	0.54
2000	0.503	0.03	0.472	0.536	0.65	0.61	0.69
2001	0.700	0.03	0.656	0.746	0.90	0.84	0.96
2002	0.843	0.03	0.792	0.898	1.08	1.02	1.15
2003	0.767	0.03	0.720	0.817	0.98	0.92	1.05
2004	0.665	0.03	0.624	0.709	0.85	0.80	0.91
2005	0.676	0.03	0.634	0.721	0.87	0.81	0.93
2006	0.582	0.03	0.544	0.623	0.75	0.70	0.80
2007	0.674	0.04	0.626	0.727	0.87	0.80	0.93
2008	0.853	0.04	0.790	0.921	1.09	1.01	1.18
2009	0.760	0.04	0.702	0.822	0.97	0.90	1.05
2010	0.808	0.04	0.743	0.878	1.04	0.95	1.13
2011	0.825	0.04	0.764	0.891	1.06	0.98	1.14
2012	0.696	0.04	0.648	0.748	0.89	0.83	0.96
2013	0.766	0.04	0.709	0.827	0.98	0.91	1.06
2014	0.853	0.04	0.787	0.924	1.09	1.01	1.18
2015	1				1.28		

Table B50. Ratio of witch flounder Northeast Fisheries Science Center (NEFSC) spring and fall survey proportions-at-age to fishery proportion-at-age for ages 6 to age 11<sup>+</sup>. Cells shaded grey indicates where the survey proportions-at-age were greater than the proportions observed in the fishery. Unshaded cells indicate where the fishery proportions-at-age were greater relative to the survey. Missing values indicate either where the survey index-at-age was zero.

Year	NEFSC spring/fishery						NEFSC fall/fishery					
	Age6	Age7	Age8	Age9	Age10	Age11+	Age6	Age7	Age8	Age9	Age10	Age11+
1982	0.36	2.23	1.35	0.58	2.68	0.83	0.28	2.11	1.18	0.22	0.68	1.44
1983	0.74	0.98	1.40	1.40	0.92	0.88	1.33	1.07	0.33	0.72	0.55	1.28
1984	0.96	0.87	0.56	1.18	1.28	1.41	1.11	1.15	0.66	0.69	1.08	1.16
1985	1.20	1.15	0.64	0.47	0.72	1.19	1.24	1.11	0.76	0.60	1.08	0.91
1986	0.70	0.96	0.76	1.73	1.31	1.97	0.66	1.02	0.99	1.41	0.22	2.22
1987	0.61	0.98	1.27	0.12	1.46	2.28	0.41	1.42	0.96		0.40	2.59
1988	1.58	0.97	0.74	1.23	1.16	0.68	0.41	1.19	0.33	0.90	1.33	2.46
1989	0.80	0.39	1.36	0.86	0.46	1.99	0.62	0.21	0.93	2.21	1.90	1.80
1990		1.42	0.17	1.44	2.06	2.79	0.74	0.68	0.41	0.63		4.71
1991	0.75	0.47	1.41	0.99	1.54	1.42	0.91	1.67	1.44	0.62	1.02	0.68
1992	0.46	1.06	1.16	4.35	0.66	1.12	0.82			1.81	1.31	3.64
1993	0.67	1.53		0.76	0.60	2.90	0.76	0.44	1.68		0.84	2.10
1994	1.29	0.30	1.49	1.38	0.78	1.03	0.40	1.59		1.14	1.16	2.08
1995	0.91	0.74	2.17	2.28		2.30	1.43			1.25	2.30	0.67
1996	1.70	0.54				3.01	1.73	0.25	1.32	0.93		1.56
1997	1.70	0.41	0.70	0.87			1.26	1.37				1.25
1998	1.53	0.41	1.26	1.59		1.21	1.27	0.76	1.25	0.92		
1999	1.02	1.40	0.37	0.52	5.62		1.28	1.19	0.34	0.75	1.31	
2000	1.51	1.11	0.85		2.72		2.29	0.62	0.69	0.40		0.48
2001	1.95	0.97	0.65	1.03	0.38		2.33	1.19	0.37	0.31	0.44	
2002	1.54	0.82	0.71	0.77	2.75	1.01	1.96	0.78	0.59	0.56		1.26
2003	1.54	1.17	0.64	0.68	0.27	0.63	1.85	0.67	0.34	1.21	0.78	1.44
2004	1.05	1.29	0.73	0.45	1.11	1.57	1.44	0.98	0.94	0.21	0.97	0.94
2005	1.00	0.82	1.19	1.52	0.94	0.74	1.00	1.35	0.48	0.91	0.36	0.86
2006	1.55	0.75	0.98	0.84	1.06	0.40	1.51	0.84	0.73	0.92	1.43	0.86
2007	1.41	1.16	0.49	1.73		1.26	2.36	0.96	0.38	1.48		1.04
2008	1.73	1.11	1.12	0.26	0.30		1.60	0.85	1.44	0.10	1.11	0.26
2009	1.45	0.70	1.09	0.85	1.68	0.51	1.72	0.99	0.90	0.76	0.20	0.40
2010	1.46	0.77	0.42	1.70	0.47	2.12	1.52	0.55	0.94	1.12	0.27	1.64
2011	1.24	0.79	0.47	0.97	2.37	3.66	1.64	0.71	0.42	0.73	1.75	0.78
2012	1.61	0.65	0.89	1.13	1.27	1.27	1.98	0.73	0.42	1.17	1.58	1.12
2013	1.31	1.02	0.88	0.75	0.98	0.64	0.85	1.33	1.04	0.84	0.32	
2014	2.06	0.87	0.73	1.07			1.62	1.03	0.86	0.57	0.32	1.58
2015	1.79	0.79	0.73	0.60	0.77	0.74	2.15	0.85	0.31	0.86	0.67	0.25
Cells ≥ 1	23	12	12	15	15	19	22	15	7	9	13	19
Total	33	34	32	32	28	28	34	32	30	31	27	30
Fraction ≥ 1	0.70	0.35	0.38	0.47	0.54	0.68	0.65	0.47	0.23	0.29	0.48	0.63

Table B51. Minimum spawning stock biomass estimates for the R/V Bigelow survey.  $A_s$  corresponds to the area ( $\text{km}^2$ ) of the survey and  $a_s$  to the area ( $\text{km}^2$ ) of a tow. Index and total area calculations are based on the use of Northeast Fisheries Science Center offshore trawl strata 22-30 and 36-40. All calculations are described in the text. Note that the index weights were calculated first using the stratified mean number per tow and then applying a length-weight conversion.

$A_s$  75,728 (area of survey associated with the witch flounder strata set using a GIS shapefile.

$a_s$  0.024 (taken from Hare et al. 2016 working paper)

	<b>Index Total Weight (kg Tow<sup>-1</sup>) Bigelow Units</b>	<b>Index Mature Weight (kg Tow<sup>-1</sup>) Bigelow Units</b>	<b>Catchability Mature Numbers</b>	<b>Minimum SSB (mt)</b>
2009	1.370	1.010	0.275 (0.248-0.303)	11,600 (10,500-12,800)
2010	1.070	0.731	0.272 (0.244-0.301)	8,500 (7,700-9,500)
2011	2.240	1.404	0.267 (0.241-0.291)	16,600 (15,200-18,400)
2012	1.435	0.937	0.264 (0.237-0.293)	11,200 (10,100-12,500)
2013	1.121	0.670	0.262 (0.236-0.285)	8,100 (7,400-8,900)
2014	1.672	1.160	0.274 (0.249-0.301)	13,300 (12,100-14,700)
2015	1.640	0.944	0.260 (0.232-0.286)	11,500 (10,400-12,800)

Table B52. The stratified mean weight (kg) per tow indices from the Northeast Fisheries Science Center autumn survey, the minimum swept area biomass (mt), the population biomass estimates assuming Bigelow  $q = 1$  and estimates accounting for the efficiency of the net. Factors used to derive swept area biomass and population biomass estimates are also given.

Year	kg/tow			2014.708 3189.954			5.157 3.257			0.291		
				minimum swept area biomass (mt)			apply B:A calibration to get population assuming Bigelow $q=1$			apply Chain sweep:rockhopper conversion to get population		
	Albatross	Bigelow	Big to ALB	Albatross	Bigelow	Big to ALB	Albatross	Bigelow	Big to ALB	Albatross	Bigelow	Big to ALB
1963	3.4605			6972			35956			123559		
1964	2.0943			4219			21760			74778		
1965	2.2862			4606			23754			81630		
1966	4.6133			9294			47934			164720		
1967	1.9940			4017			20718			71197		
1968	3.5223			7096			36598			125766		
1969	4.2110			8484			43754			150356		
1970	3.6782			7410			38218			131332		
1971	2.9638			5971			30795			105824		
1972	2.4177			4871			25121			86325		
1973	2.0541			4138			21343			73343		
1974	1.5820			3187			16437			56486		
1975	1.0303			2076			10705			36787		
1976	0.9361			1886			9726			33424		
1977	3.3825			6815			35145			120774		
1978	2.9371			5917			30517			104871		
1979	1.6230			3270			16863			57950		
1980	2.0358			4102			21153			72689		
1981	2.1933			4419			22789			78313		
1982	0.8343			1681			8669			29789		
1983	2.1160			4263			21986			75553		
1984	2.3350			4704			24261			83373		
1985	1.5934			3210			16556			56893		
1986	1.0857			2187			11281			38766		
1987	0.3732			752			3878			13325		
1988	0.5701			1149			5924			20356		
1989	0.3754			756			3901			13404		
1990	0.4004			807			4160			14297		
1991	0.5365			1081			5574			19156		
1992	0.2384			480			2477			8512		
1993	0.5394			1087			5605			19260		
1994	0.4209			848			4373			15028		
1995	0.6243			1258			6487			22291		
1996	1.0203			2056			10601			36430		
1997	0.7679			1547			7979			27418		
1998	0.4697			946			4880			16771		
1999	0.8776			1768			9119			31335		
2000	1.1104			2237			11537			39647		
2001	1.7129			3451			17798			61160		
2002	1.0587			2133			11000			37801		
2003	0.7936			1599			8246			28336		
2004	1.0323			2080			10726			36859		
2005	0.4005			807			4161			14300		
2006	0.4597			926			4776			16414		
2007	0.5699			1148			5921			20349		
2008	0.6400			1289			6650			22852		
2009		1.5572	0.4781		4967	963		4967	4967		17070	17070
2010		1.1610	0.3564		3703	718		3703	3703		12727	12727
2011		2.1818	0.6698		6960	1350		6960	6960		23917	23917
2012		1.4438	0.4433		4606	893		4606	4606		15827	15827
2013		1.1439	0.3512		3649	708		3649	3649		12539	12539
2014		1.6742	0.5140		5341	1036		5341	5341		18353	18353
2015		1.7143	0.5263		5469	1060		5469	5469		18792	18792

Table B53. The stratified mean weight (kg) per tow indices from the Northeast Fisheries Science Center spring survey, the minimum swept area biomass (mt), the population biomass estimates assuming Bigelow  $q = 1$  and estimates accounting for the efficiency of the net. Factors used to derive swept area biomass and population biomass estimates are also given.

				2014.708	3189.954				5.157	3.257				0.291	
	kg/tow			minimum swept area biomass (mt)			apply B:A calibration to get population assuming Bigelow q=1			apply Chain sweep:rockhopper conversion to get population					
Year	Albatross	Bigelow	Big to ALB	Albatross	Bigelow	Big to ALB	Albatross	Bigelow	Big to ALB	Albatross	Bigelow	Big to ALB	Albatross	Bigelow	Big to ALB
1963															
1964															
1965															
1966															
1967															
1968	3.2656			6579			33931						116600		
1969	2.5937			5226			26949						92610		
1970	4.5029			9072			46787						160779		
1971	2.0444			4119			21242						72996		
1972	4.0051			8069			41614						143004		
1973	6.2116			12515			64541						221789		
1974	3.6219			7297			37633						129322		
1975	2.7479			5536			28552						98115		
1976	3.7005			7455			38449						132128		
1977	1.9617			3952			20383						70044		
1978	2.5615			5161			26615						91460		
1979	1.7888			3604			18586						63870		
1980	3.8936			7844			40456						139023		
1981	4.0493			8158			42074						144583		
1982	1.8666			3761			19395						66648		
1983	2.7377			5516			28446						97751		
1984	1.6629			3350			17278						59375		
1985	2.7522			5545			28596						98269		
1986	1.3480			2716			14006						48131		
1987	0.6506			1311			6760						23230		
1988	0.8456			1704			8786						30193		
1989	0.7437			1498			7727						26554		
1990	0.2364			476			2456						8441		
1991	0.5741			1157			5965						20499		
1992	0.4820			971			5008						17210		
1993	0.3595			724			3735						12836		
1994	0.5314			1071			5521						18974		
1995	0.4667			940			4849						16664		
1996	0.2771			558			2879						9894		
1997	0.4332			873			4501						15468		
1998	0.7651			1541			7950						27318		
1999	0.4820			971			5008						17210		
2000	0.5191			1046			5394						18535		
2001	0.7508			1513			7801						26808		
2002	1.6112			3246			16741						57529		
2003	1.2995			2618			13502						46399		
2004	1.0756			2167			11176						38405		
2005	0.8907			1795			9255						31803		
2006	0.7249			1460			7532						25883		
2007	0.5814			1171			6041						20759		
2008	1.4006			2822			14553						50009		
2009		1.7175	0.5273		5479	1062		5479	5479				18828	18828	
2010		1.7633	0.5413		5625	1091		5625	5625				19329	19329	
2011		1.8462	0.5668		5889	1142		5889	5889				20238	20238	
2012		1.2273	0.3768		3915	759		3915	3915				13454	13454	
2013		0.7086	0.2175		2260	438		2260	2260				7767	7767	
2014		1.5900	0.4882		5072	983		5072	5072				17430	17430	
2015		1.5414	0.4732		4917	953		4917	4917				16896	16896	
2016		1.2379	0.3801		3949	766		3949	3949				13570	13570	

Table B54. Northeast Fisheries Science Center (NEFSC) autumn and spring estimated population biomass (mt), catch advice that includes: average population biomass (mt; representing biomass at the start of the year falling between t and t+1), exploitable biomass (mt), and estimates of the overfishing limit (OFL) and acceptable biological catch (ABC) using an assumed exploitation rate of 0.16. Actual catch, OLF and ABC are given as well as actual exploitation rate.

						0.9	0.16	0.75				
NEFSC AUTUMN year	AUTUMN mt	NEFSC SPRING year	SPRING mt	Catch Advice Year	Avg mt	Exploitable Biomass (mt)	Est. OFL (mt)	Est. ABC (mt)	Actual catch (mt)	Actual OFL (mt)	Actual ABC (mt)	Actual exploitation rate
1967	71,197	1968	116,600	1969	93,899	84,509	13,521	10,141				
1968	125,766	1969	92,610	1970	109,188	98,269	15,723	11,792				
1969	150,356	1970	160,779	1971	155,567	140,011	22,402	16,801				
1970	131,332	1971	72,996	1972	102,164	91,948	14,712	11,034				
1971	105,824	1972	143,004	1973	124,414	111,973	17,916	13,437				
1972	86,325	1973	221,789	1974	154,057	138,651	22,184	16,638				
1973	73,343	1974	129,322	1975	101,332	91,199	14,592	10,944				
1974	56,486	1975	98,115	1976	77,301	69,571	11,131	8,348				
1975	36,787	1976	132,128	1977	84,458	76,012	12,162	9,121				
1976	33,424	1977	70,044	1978	51,734	46,560	7,450	5,587				
1977	120,774	1978	91,460	1979	106,117	95,505	15,281	11,461				
1978	104,871	1979	63,870	1980	84,370	75,933	12,149	9,112				
1979	57,950	1980	139,023	1981	98,487	88,638	14,182	10,637				
1980	72,689	1981	144,583	1982	108,636	97,772	15,644	11,733	5,309			0.073
1981	78,313	1982	66,648	1983	72,481	65,232	10,437	7,828	6,409			0.101
1982	29,789	1983	97,751	1984	63,770	57,393	9,183	6,887	6,937			0.103
1983	75,553	1984	59,375	1985	67,464	60,717	9,715	7,286	6,339			0.070
1984	83,373	1985	98,269	1986	90,821	81,739	13,078	9,809	4,788			0.091
1985	56,893	1986	48,131	1987	52,512	47,261	7,562	5,671	3,644			0.118
1986	38,766	1987	23,230	1988	30,998	27,898	4,464	3,348	3,451			0.159
1987	13,325	1988	30,193	1989	21,759	19,583	3,133	2,350	2,425			0.103
1988	20,356	1989	26,554	1990	23,455	21,109	3,378	2,533	1,744			0.160
1989	13,404	1990	8,441	1991	10,922	9,830	1,573	1,180	2,571			0.148
1990	14,297	1991	20,499	1992	17,398	15,658	2,505	1,879	2,752			0.151
1991	19,156	1992	17,210	1993	18,183	16,365	2,618	1,964	2,806			0.263
1992	8,512	1993	12,836	1994	10,674	9,607	1,537	1,153	3,115			0.163
1993	19,260	1994	18,974	1995	19,117	17,205	2,753	2,065	2,718			0.172
1994	15,028	1995	16,664	1996	15,846	14,262	2,282	1,711	2,392			0.149
1995	22,291	1996	9,894	1997	16,092	14,483	2,317	1,738	2,254			0.087
1996	36,430	1997	15,468	1998	25,949	23,354	3,737	2,802	2,306			0.084
1997	27,418	1998	27,318	1999	27,368	24,631	3,941	2,956	2,490			0.147
1998	16,771	1999	17,210	2000	16,990	15,291	2,447	1,835	2,749			0.110
1999	31,335	2000	18,535	2001	24,935	22,441	3,591	2,693	3,406			0.103
2000	39,647	2001	26,808	2002	33,228	29,905	4,785	3,589	3,470			0.058
2001	61,160	2002	57,529	2003	59,344	53,410	8,546	6,409	3,551			0.084
2002	37,801	2003	46,399	2004	42,100	37,890	6,062	4,547	3,370			0.101
2003	28,336	2004	38,405	2005	33,370	30,033	4,805	3,604	2,917			0.085
2004	36,859	2005	31,803	2006	34,331	30,898	4,944	3,708	2,075			0.103
2005	14,300	2006	25,883	2007	20,092	18,082	2,893	2,170	1,210			0.065
2006	16,414	2007	20,759	2008	18,587	16,728	2,676	2,007	1,136			0.032
2007	20,349	2008	50,009	2009	35,179	31,661	5,066	3,799	1,157			0.056
2008	22,852	2009	18,828	2010	20,840	18,756	3,001	2,251	912	1,239	944	0.050
2009	17,070	2010	19,329	2011	18,199	16,380	2,621	1,966	1,071	1,792	1,369	0.065
2010	12,727	2011	20,238	2012	16,482	14,834	2,373	1,780	1,258	2,141	1,639	0.067
2011	23,917	2012	13,454	2013	18,685	16,817	2,691	2,018	811	1,196	783	0.069
2012	15,827	2013	7,767	2014	11,797	10,617	1,699	1,274	675	1,512	783	0.045
2013	12,539	2014	17,430	2015	14,985	13,486	2,158	1,618	585	1,846	783	0.033
2014	18,353	2015	16,896	2016	17,625	15,862	2,538	1,903		521	460	
2015	18,792	2016	13,570	2017	16,181	14,563	2,330	1,748		732	460	
2016		2017		2018						954	460	

Table B55. Northeast Fisheries Science Center (NEFSC) autumn and spring estimated population biomass (mt), catch advice that includes: average population biomass (mt; representing biomass at the start of the year), exploitable biomass (mt), and estimates of the overfishing limit (OFL) and acceptable biological catch (ABC) using an assumed exploitation rate of 0.05. Actual catch, OLF and ABC are given as well as actual exploitation rate.

						0.9	0.05	0.75				
NEFSC AUTUMN year	AUTUMN mt	NEFSC SPRING year	SPRING mt	Catch Advice Year	Avg mt	Exploitable Biomass (mt)	Est. OFL (mt)	Est. ABC (mt)	Actual catch (mt)	Actual OFL (mt)	Actual ABC (mt)	Actual exploitation rate
1967	71,197	1968	116,600	1969	93,899	84,509	4,225	3,169				
1968	125,766	1969	92,610	1970	109,188	98,269	4,913	3,685				
1969	150,356	1970	160,779	1971	155,567	140,011	7,001	5,250				
1970	131,332	1971	72,996	1972	102,164	91,948	4,597	3,448				
1971	105,824	1972	143,004	1973	124,414	111,973	5,599	4,199				
1972	86,325	1973	221,789	1974	154,057	138,651	6,933	5,199				
1973	73,343	1974	129,322	1975	101,332	91,199	4,560	3,420				
1974	56,486	1975	98,115	1976	77,301	69,571	3,479	2,609				
1975	36,787	1976	132,128	1977	84,458	76,012	3,801	2,850				
1976	33,424	1977	70,044	1978	51,734	46,560	2,328	1,746				
1977	120,774	1978	91,460	1979	106,117	95,505	4,775	3,581				
1978	104,871	1979	63,870	1980	84,370	75,933	3,797	2,848				
1979	57,950	1980	139,023	1981	98,487	88,638	4,432	3,324				
1980	72,689	1981	144,583	1982	108,636	97,772	4,889	3,666	5,309			0.073
1981	78,313	1982	66,648	1983	72,481	65,232	3,262	2,446	6,409			0.101
1982	29,789	1983	97,751	1984	63,770	57,393	2,870	2,152	6,937			0.103
1983	75,553	1984	59,375	1985	67,464	60,717	3,036	2,277	6,339			0.070
1984	83,373	1985	98,269	1986	90,821	81,739	4,087	3,065	4,788			0.091
1985	56,893	1986	48,131	1987	52,512	47,261	2,363	1,772	3,644			0.118
1986	38,766	1987	23,230	1988	30,998	27,898	1,395	1,046	3,451			0.159
1987	13,325	1988	30,193	1989	21,759	19,583	979	734	2,425			0.103
1988	20,356	1989	26,554	1990	23,455	21,109	1,055	792	1,744			0.160
1989	13,404	1990	8,441	1991	10,922	9,830	492	369	2,571			0.148
1990	14,297	1991	20,499	1992	17,398	15,658	783	587	2,752			0.151
1991	19,156	1992	17,210	1993	18,183	16,365	818	614	2,806			0.263
1992	8,512	1993	12,836	1994	10,674	9,607	480	360	3,115			0.163
1993	19,260	1994	18,974	1995	19,117	17,205	860	645	2,718			0.172
1994	15,028	1995	16,664	1996	15,846	14,262	713	535	2,392			0.149
1995	22,291	1996	9,894	1997	16,092	14,483	724	543	2,254			0.087
1996	36,430	1997	15,468	1998	25,949	23,354	1,168	876	2,306			0.084
1997	27,418	1998	27,318	1999	27,368	24,631	1,232	924	2,490			0.147
1998	16,771	1999	17,210	2000	16,990	15,291	765	573	2,749			0.110
1999	31,335	2000	18,535	2001	24,935	22,441	1,122	842	3,406			0.103
2000	39,647	2001	26,808	2002	33,228	29,905	1,495	1,121	3,470			0.058
2001	61,160	2002	57,529	2003	59,344	53,410	2,670	2,003	3,551			0.084
2002	37,801	2003	46,399	2004	42,100	37,890	1,895	1,421	3,370			0.101
2003	28,336	2004	38,405	2005	33,370	30,033	1,502	1,126	2,917			0.085
2004	36,859	2005	31,803	2006	34,331	30,898	1,545	1,159	2,075			0.103
2005	14,300	2006	25,883	2007	20,092	18,082	904	678	1,210			0.065
2006	16,414	2007	20,759	2008	18,587	16,728	836	627	1,136			0.032
2007	20,349	2008	50,009	2009	35,179	31,661	1,583	1,187	1,157			0.056
2008	22,852	2009	18,828	2010	20,840	18,756	938	703	912	1,239	944	0.050
2009	17,070	2010	19,329	2011	18,199	16,380	819	614	1,071	1,792	1,369	0.065
2010	12,727	2011	20,238	2012	16,482	14,834	742	556	1,258	2,141	1,639	0.067
2011	23,917	2012	13,454	2013	18,685	16,817	841	631	811	1,196	783	0.069
2012	15,827	2013	7,767	2014	11,797	10,617	531	398	675	1,512	783	0.045
2013	12,539	2014	17,430	2015	14,985	13,486	674	506	585	1,846	783	0.033
2014	18,353	2015	16,896	2016	17,625	15,862	793	595		521	460	
2015	18,792	2016	13,570	2017	16,181	14,563	728	546		732	460	
2016		2017		2018						954	460	

Table B56. Parameter estimates (with coefficient of variation [CV]), stock size (N) in '000 of fish, and estimates of terminal F from VPA formulations for witch flounder. *Note: split survey indices are: 1982-1994 and 1995- onward. OA = Operational Assessment; BM = benchmark assessment; CAA = catch at age; DAA = discards at age.*

RUN	F		F1		RUN	A1		A2	
	2015 OA SPLIT RUN		2015 OA SPLIT RUN			2016 BM SPLIT RUN		2016 BM SPLIT RUN	
Software	NFT VPA 3.4.5	CV	NFT VPA 3.4.5	CV	Software	NFT VPA 3.4.5	CV	NFT VPA 3.4.5	CV
Catch-At-Age	1982-2014 3-11+		1982-2014 3-11+		Catch-At-Age	1982-2015 3-11+		1982-2015 3-11+	
Est.Ages	3-10		3-10		Est.Ages	3-10		3-10	
NMFS-spring	3-11+		3-11+		NMFS-s	3-11+		3-11+	
NMFS-autumn	3-11+		3-11+		NMFS-a	3-11+		3-11+	
Residual Sum Sq.	388.609		387.911		Residual Sum Sq.	396.087		396.087	
Mean Sq.Residual	0.6842		0.6829		Mean Sq.Residual	0.6759		0.6759	
N3	10,991	0.60	12,029	0.60	N3	19,244	0.60	19,244	0.60
N4	8,699	0.43	9,443	0.43	N4	8,513	0.42	8,513	0.42
N5	2,816	0.35	3,008	0.36	N5	6,014	0.35	6,014	0.35
N6	4,684	0.31	4,900	0.32	N6	2,060	0.32	2,060	0.32
N7	2,596	0.29	2,589	0.30	N7	3,357	0.29	3,357	0.29
N8	870	0.34	854	0.36	N8	1,542	0.31	1,542	0.31
N9	509	0.39	498	0.40	N9	402	0.38	402	0.38
N10	257	0.41	252	0.42	N10	269	0.40	269	0.40
F 3	0.005		0.013		F 3	0.010		0.010	
F 4	0.015		0.032		F 4	0.029		0.029	
F 5	0.027		0.041		F 5	0.058		0.058	
F 6	0.051		0.063		F 6	0.067		0.067	
F 7	0.245		0.265		F 7	0.149		0.149	
F 8	0.463		0.486		F 8	0.511		0.511	
F 9	0.393		0.406		F 9	0.350		0.350	
F10	0.428		0.446		F10	0.430		0.430	
F11+	0.428		0.446		F11+	0.430		0.430	
2010 Avg F 8-9	0.671		0.661		2014 Avg F 8-9	0.643		0.643	
2010 SSB (mt)	2,363		2,439		2014 SSB (mt)	2,480		2,480	
2010 Age 3 in yr t	3,229		3,644		2014 Age 3 in yr t	8,500		8,500	
2014 Avg F 8-9	<b>0.428 (.19)</b>		<b>0.446</b>		2015 Avg F 8-9	<b>0.430</b>		<b>0.430 (.19)</b>	
2014 SSB (mt)	<b>3,129 (.12)</b>		<b>3,045</b>		2015 SSB (mt)	<b>3,044</b>		<b>3,044 (.11)</b>	
2014 Age 3 in yr t	<b>10,160</b>		<b>11,116</b>		2015 Age 3 in yr t	<b>9,992</b>		<b>9,992</b>	
					Mohn's rho F8-9			-0.377	
Mohn's rho F8-9	-0.377				Mohn's rho SSB			0.496	
Mohn's rho SSB	0.507				Mohn's rho Age 3			0.693	
Mohn's rho Age 3	1.137				Notes:	2015 CAA, updated maturity ogive, using SWEPT AREA (assumed q = 1)		2015 CAA, updated maturity ogive, using SWEPT AREA (q = 0.056)	
Notes:	Final run used in 2015 OA		re-run of Run F with revised CAA (revised DAA)						



Table B57. Summary of witch flounder spawning stock biomass (mt), fully recruited fishing mortality (F8-9), recruitment (Age 3, millions fish), and year class from VPA SPLIT RUN A2, 1982 to 2015, with Age 3 recruits predicted in 2016.

Year	Catch	SSB (mt)	Avg F8-9	Recruits Age 3	Year Class
1982	5,308	16,677	0.264	17.302	1979
1983	6,409	13,189	0.506	19.122	1980
1984	6,936	11,444	0.631	17.754	1981
1985	6,343	10,382	0.678	9.035	1982
1986	4,793	9,546	0.504	6.053	1983
1987	3,642	8,892	0.605	3.966	1984
1988	3,453	8,365	0.704	11.822	1985
1989	2,422	7,511	0.444	8.145	1986
1990	1,738	6,467	0.258	9.512	1987
1991	2,563	7,029	0.256	10.109	1988
1992	2,750	7,035	0.227	12.838	1989
1993	2,802	5,880	0.441	9.876	1990
1994	3,082	4,475	0.593	14.487	1991
1995	2,699	4,173	0.646	13.141	1992
1996	2,384	3,927	1.104	17.143	1993
1997	2,249	4,195	1.083	15.180	1994
1998	2,299	5,140	0.623	15.574	1995
1999	2,488	6,099	0.519	13.304	1996
2000	2,745	6,827	0.575	12.048	1997
2001	3,406	6,709	0.897	12.789	1998
2002	3,469	6,243	0.543	11.797	1999
2003	3,550	5,560	0.748	8.793	2000
2004	3,368	4,226	0.930	4.739	2001
2005	2,914	3,687	0.857	3.874	2002
2006	2,071	2,600	0.905	3.952	2003
2007	1,209	2,370	0.555	5.644	2004
2008	1,135	2,580	0.651	4.970	2005
2009	1,157	2,662	0.608	4.143	2006
2010	908	2,388	0.678	3.484	2007
2011	1,061	2,282	0.670	5.025	2008
2012	1,255	2,223	0.885	7.297	2009
2013	806	2,132	0.818	3.601	2010
2014	673	2,480	0.643	8.500	2011
2015	584	3,044	0.430	9.992	2012
2016				19.244	2013
1982 - 2015					
min	584	2,132	0.227	3.484	
max	6,936	16,677	1.104	19.122	
mean	2,784	5,836	0.632	9.853	
Geomean				8.679	
median				9.694	
Mean (1979 to 2011 year classes)				9.849	
2015 Retrospective Adjusted		2,035	0.690		

Table B58. Estimates of beginning year stock size ('000) of fish), instantaneous fishing mortality and spawning stock biomass (mt) for witch flounder estimated from the virtual population analysis, 1982-2015 VPA SPLIT Run A2.

**JAN-1 Population Numbers**

<b>AGE</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>
3	17302.	19122.	17754.	9035.	6053.
4	14769.	14364.	16041.	15075.	7438.
5	10249.	10272.	10414.	11825.	11534.
6	8038.	7173.	6828.	6837.	8042.
7	4325.	5411.	4698.	4251.	4078.
8	2772.	3094.	3175.	2663.	2243.
9	2106.	1770.	1753.	1350.	1139.
10	1099.	1441.	841.	865.	602.
11	7215.	4722.	3844.	2931.	2044.
=====					
Total	67876.	67370.	65348.	54831.	43174.
<b>AGE</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>
3	3966.	11822.	8145.	9512.	10109.
4	5147.	3361.	9464.	6833.	7847.
5	5752.	4121.	2626.	7054.	5321.
6	8133.	4199.	3157.	1795.	5000.
7	4336.	5781.	2978.	2398.	1282.
8	2053.	2256.	3669.	1832.	1791.
9	1155.	956.	869.	2316.	1121.
10	598.	548.	450.	419.	1673.
11	1157.	1226.	1262.	899.	1364.
=====					
Total	32296.	34270.	32620.	33059.	35508.
<b>AGE</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
3	12838.	9876.	14487.	13141.	17143.
4	7634.	10868.	8433.	12376.	10510.
5	5280.	5162.	8467.	6574.	9835.
6	2736.	3132.	3164.	5249.	4307.
7	3368.	1186.	1843.	1461.	2755.
8	866.	2200.	470.	686.	452.
9	1300.	557.	1352.	218.	328.
10	685.	952.	278.	658.	93.
11	2146.	1335.	814.	377.	185.
=====					
Total	36853.	35269.	39307.	40740.	45608.
<b>AGE</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
3	15180.	15574.	13304.	12048.	12789.
4	14393.	12945.	13083.	11314.	10247.
5	8418.	11468.	10341.	10608.	9278.
6	7390.	6145.	8681.	7732.	8474.
7	2431.	5062.	3917.	6080.	5524.
8	1046.	1067.	2833.	2242.	3611.
9	145.	306.	562.	1715.	963.
10	83.	42.	124.	244.	937.
11	116.	190.	246.	620.	683.
=====					
Total	49201.	52799.	53091.	52605.	52506.

Table B58, continued.

**JAN-1 Population Numbers, continued.**

<b>AGE</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
3	11796.	8793.	4739.	3874.	3952.
4	10951.	10119.	7528.	4034.	3306.
5	8389.	8821.	8371.	6064.	3217.
6	6769.	6101.	6389.	5904.	4301.
7	6185.	4539.	3648.	3842.	3241.
8	3126.	3326.	2119.	1678.	1599.
9	1754.	1505.	1401.	742.	666.
10	244.	911.	593.	461.	250.
11	519.	732.	530.	265.	143.
=====					
Total	49734.	44847.	35319.	26865.	20674.
=====					
<b>AGE</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
3	5644.	4970.	4143.	3484.	5025.
4	3284.	4724.	4226.	3529.	2924.
5	2721.	2660.	3794.	3417.	2934.
6	2450.	2180.	2065.	2746.	2649.
7	2827.	1821.	1551.	1463.	1861.
8	1298.	1598.	998.	849.	974.
9	550.	559.	945.	414.	356.
10	235.	312.	190.	501.	188.
11	110.	189.	191.	102.	79.
=====					
Total	19118.	19014.	18105.	16503.	16991.
=====					
<b>AGE</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
3	7297.	3601.	8500.	9992.	19244.
4	4098.	6125.	3059.	7191.	8513.
5	2378.	3277.	5082.	2537.	6014.
6	2289.	1718.	2610.	4170.	2060.
7	1660.	1526.	1205.	2078.	3357.
8	1021.	675.	876.	778.	1542.
9	427.	334.	276.	443.	402.
10	158.	164.	118.	112.	269.
11	74.	75.	67.	74.	104.
=====					
Total	19403.	17496.	21792.	27375.	41504.

Table B58, continued.

**Fishing Mortality Calculated**

<b>AGE</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>
3	0.0361	0.0257	0.0136	0.0445	0.0122
4	0.2131	0.1716	0.1549	0.1177	0.1069
5	0.2069	0.2584	0.2708	0.2356	0.1994
6	0.2456	0.2732	0.3239	0.3666	0.4677
7	0.1850	0.3832	0.4177	0.4891	0.5363
8	0.2986	0.4181	0.7055	0.6990	0.5137
9	0.2297	0.5942	0.5569	0.6567	0.4952
10	0.2683	0.4786	0.6501	0.6846	0.5074
11	0.2683	0.4786	0.6501	0.6846	0.5074

<b>AGE</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>
3	0.0153	0.0724	0.0257	0.0424	0.1308
4	0.0724	0.0968	0.1439	0.1000	0.2462
5	0.1648	0.1164	0.2307	0.1942	0.5151
6	0.1914	0.1937	0.1250	0.1867	0.2452
7	0.5035	0.3045	0.3360	0.1420	0.2416
8	0.6140	0.8042	0.3100	0.3412	0.1700
9	0.5951	0.6038	0.5785	0.1756	0.3428
10	0.6072	0.7403	0.3561	0.2454	0.2330
11	0.6072	0.7403	0.3561	0.2454	0.2330

<b>AGE</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
3	0.0166	0.0080	0.0075	0.0734	0.0248
4	0.2413	0.0997	0.0990	0.0797	0.0720
5	0.3724	0.3396	0.3282	0.2730	0.1359
6	0.6857	0.3801	0.6225	0.4944	0.4220
7	0.2760	0.7759	0.8390	1.0229	0.8188
8	0.2918	0.3368	0.6169	0.5872	0.9866
9	0.1615	0.5443	0.5693	0.7037	1.2215
10	0.2116	0.3754	0.5814	0.6141	1.0787
11	0.2116	0.3754	0.5814	0.6141	1.0787

<b>AGE</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
3	0.0092	0.0243	0.0120	0.0119	0.0052
4	0.0772	0.0747	0.0597	0.0485	0.0500
5	0.1647	0.1284	0.1407	0.0746	0.1653
6	0.2283	0.3003	0.2061	0.1863	0.1649
7	0.6729	0.4304	0.4078	0.3710	0.4194
8	1.0796	0.4920	0.3518	0.6949	0.5721
9	1.0864	0.7546	0.6854	0.4552	1.2215
10	1.0804	0.5448	0.3999	0.5839	0.6781
11	1.0804	0.5448	0.3999	0.5839	0.6781

Table B58, continued.

Fishing Mortality Calculated, continued.

<b>AGE</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
3	0.0034	0.0053	0.0111	0.0086	0.0350
4	0.0663	0.0396	0.0663	0.0763	0.0448
5	0.1685	0.1725	0.1993	0.1936	0.1223
6	0.2495	0.3642	0.3586	0.4496	0.2696
7	0.4702	0.6120	0.6267	0.7266	0.7652
8	0.5812	0.7148	0.8986	0.7746	0.9166
9	0.5051	0.7803	0.9614	0.9397	0.8932
10	0.5532	0.7348	0.9231	0.8224	0.9097
11	0.5532	0.7348	0.9231	0.8224	0.9097

<b>AGE</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
3	0.0279	0.0121	0.0106	0.0253	0.0539
4	0.0607	0.0691	0.0627	0.0344	0.0564
5	0.0715	0.1034	0.1735	0.1043	0.0982
6	0.1467	0.1906	0.1946	0.2389	0.3174
7	0.4204	0.4510	0.4528	0.2565	0.4506
8	0.6930	0.3756	0.7315	0.7178	0.6752
9	0.4178	0.9270	0.4840	0.6390	0.6650
10	0.6029	0.4919	0.6036	0.6913	0.6725
11	0.6029	0.4919	0.6036	0.6913	0.6725

<b>AGE</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
3	0.0251	0.0130	0.0172	0.0102
4	0.0736	0.0367	0.0373	0.0288
5	0.1751	0.0777	0.0479	0.0583
6	0.2553	0.2051	0.0778	0.0667
7	0.7497	0.4057	0.2869	0.1486
8	0.9665	0.7435	0.5324	0.5104
9	0.8041	0.8919	0.7526	0.3496
10	0.9158	0.7903	0.5810	0.4300
11	0.9158	0.7903	0.5810	0.4300

Table B58, continued.

**Average Fishing Mortality For Ages 8-9**

<b>Year</b>	<b>Average F</b>	<b>N Weighted</b>	<b>Biomass Wtd</b>	<b>Catch Wtd</b>
1982	0.2641	0.2688	0.2655	0.2727
1983	0.5061	0.4822	0.4935	0.4936
1984	0.6312	0.6526	0.6461	0.6583
1985	0.6779	0.6848	0.6828	0.6852
1986	0.5044	0.5075	0.5065	0.5076
1987	0.6045	0.6072	0.6062	0.6073
1988	0.7040	0.7446	0.7358	0.7526
1989	0.4442	0.3614	0.3702	0.3855
1990	0.2584	0.2487	0.2410	0.2728
1991	0.2564	0.2365	0.2435	0.2629
1992	0.2266	0.2136	0.2090	0.2307
1993	0.4406	0.3787	0.3874	0.3931
1994	0.5931	0.5816	0.5799	0.5822
1995	0.6455	0.6154	0.6216	0.6182
1996	1.1040	1.0854	1.0969	1.0923
1997	1.0830	1.0804	1.0807	1.0804
1998	0.6233	0.5505	0.5658	0.5659
1999	0.5186	0.4070	0.4132	0.4351
2000	0.5750	0.5910	0.5824	0.6092
2001	0.8968	0.7088	0.7274	0.7690
2002	0.5431	0.5538	0.5508	0.5557
2003	0.7476	0.7352	0.7372	0.7361
2004	0.9300	0.9236	0.9260	0.9242
2005	0.8572	0.8252	0.8315	0.8297
2006	0.9049	0.9098	0.9087	0.9098
2007	0.5554	0.6111	0.6001	0.6314
2008	0.6513	0.5184	0.5338	0.5986
2009	0.6078	0.6112	0.6033	0.6298
2010	0.6784	0.6920	0.6879	0.6934
2011	0.6701	0.6725	0.6721	0.6725
2012	0.8853	0.9186	0.9114	0.9225
2013	0.8177	0.7927	0.7992	0.7967
2014	0.6425	0.5852	0.5925	0.5959
2015	0.4300	0.4521	0.4451	0.4630

Table B58, continued.

**Spawning Stock Biomass**

<b>AGE</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>
3	10.	20.	30.	10.	8.
4	83.	100.	174.	116.	95.
5	288.	390.	545.	648.	959.
6	1062.	1122.	1176.	1549.	1911.
7	1556.	1851.	1726.	1733.	1650.
8	1642.	1552.	1566.	1397.	1229.
9	1635.	1176.	1092.	882.	785.
10	947.	1207.	630.	668.	489.
11	9455.	5770.	4505.	3380.	2420.
=====					
Total	16677.	13189.	11444.	10382.	9546.
=====					
<b>AGE</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>
3	18.	65.	22.	21.	22.
4	184.	179.	281.	143.	126.
5	792.	664.	361.	614.	441.
6	2410.	1262.	942.	403.	918.
7	1821.	2558.	1339.	1024.	508.
8	1093.	1178.	2055.	1026.	1021.
9	763.	632.	569.	1649.	766.
10	482.	426.	368.	363.	1410.
11	1329.	1401.	1574.	1223.	1816.
=====					
Total	8892.	8365.	7511.	6467.	7029.
=====					
<b>AGE</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
3	45.	27.	29.	17.	11.
4	148.	206.	155.	167.	115.
5	478.	464.	727.	654.	868.
6	578.	703.	668.	1333.	1155.
7	1289.	417.	640.	559.	1087.
8	505.	1235.	241.	362.	233.
9	927.	396.	884.	150.	201.
10	553.	800.	220.	521.	71.
11	2511.	1633.	911.	411.	185.
=====					
Total	7035.	5880.	4475.	4173.	3927.
=====					
<b>AGE</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
3	7.	32.	35.	33.	57.
4	106.	179.	232.	196.	175.
5	576.	926.	773.	752.	597.
6	1787.	1273.	1739.	1385.	1351.
7	940.	1792.	1347.	1937.	1626.
8	503.	507.	1338.	950.	1451.
9	92.	192.	294.	922.	436.
10	64.	34.	102.	143.	515.
11	121.	204.	239.	511.	502.
=====					
Total	4195.	5140.	6099.	6827.	6709.

Table B58, continued.

Spawning Stock Biomass, continued.

<b>AGE</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
3	75.	31.	35.	37.	24.
4	278.	212.	168.	121.	75.
5	557.	600.	513.	493.	208.
6	1037.	820.	815.	844.	543.
7	1636.	1107.	789.	861.	702.
8	1201.	1153.	667.	564.	512.
9	876.	655.	575.	321.	295.
10	154.	480.	291.	245.	132.
11	430.	502.	374.	200.	108.
=====					
Total	6243.	5560.	4226.	3687.	2600.
<b>AGE</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
3	38.	38.	35.	17.	42.
4	73.	131.	162.	112.	105.
5	187.	213.	388.	356.	315.
6	372.	394.	436.	531.	542.
7	706.	539.	515.	481.	541.
8	485.	680.	418.	335.	392.
9	283.	263.	483.	215.	173.
10	139.	184.	110.	268.	111.
11	87.	139.	116.	72.	61.
=====					
Total	2370.	2580.	2662.	2388.	2282.
<b>AGE</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	
3	91.	49.	89.	66.	
4	139.	269.	115.	234.	
5	280.	364.	578.	278.	
6	462.	386.	597.	981.	
7	499.	480.	418.	755.	
8	393.	272.	386.	349.	
9	214.	162.	143.	251.	
10	90.	95.	73.	74.	
11	55.	56.	81.	57.	
=====					
Total	2223.	2132.	2480.	3044.	



Table B59. Summary of the witch flounder 2015 point estimates and their 90% confidence interval, the retrospective Mohn's rho values, and the retrospectively adjusted estimates for the VPA SPLIT Run A2. The retrospectively adjusted estimates fall outside the confidence region, therefore a major retrospective pattern exists.

	Point Estimate	90% CI		Mohn's Rho value	Rho Adjusted Estimate
F 2015	0.43	0.33	0.59	-0.38	0.69
SSB 2015	3,044	2,601	3,740	0.50	2,035

Table B60. Summary diagnostics and results for the witch flounder ASAP Run 9\_5\_v2 and five sensitivity runs.

		Base Run	Sensitivity Run 1	Sensitivity Run 2	Sensitivity Run 3	Sensitivity Run 4	Sensitivity Run 5
		Run 9_5_v2	Run_9_5_v2 _FLEETDOME	Run_9_5_v2 _SVDOME	Run_9_5_v2 _LPUE40	Run_9_5_v2 _QFIXED	Run_9_5_v2 _FRANCIS
Objective Function Components	Parameters	Run 9_5_v2	Run_9_5_v2 _FLEETDOME	Run_9_5_v2 _SVDOME	Run_9_5_v2 _LPUE40	Run_9_5_v2 _QFIXED	Run_9_5_v2 _FRANCIS
	N	145	155	153	146	145	145
	total	12953.0	12945.7	12951.1	12985.4	13248.1	5188.4
	catch.total	-58.8	-59.4	-58.9	-50.6	-24.7	-67.8
	index.fit.total	35.4	35.1	35.1	39.9	161.4	23.8
	index.fit.ind01 (NEFSC SPR)	11.2	10.9	11.1	5.7	82.7	7.9
	index.fit.ind02 (NEFSC AUT)	-8.6	-8.4	-8.7	-10.3	48.2	-10.8
	index.fit.ind03 (ASMFC SUM)	10.2	10.0	10.1	7.2	3.9	9.1
	index.fit.ind04 (ME-NH SPR)	5.6	5.6	5.6	5.6	5.4	3.3
	index.fit.ind05 (ME-NH AUT)	17.0	17.0	17.0	18.2	21.2	14.4
	index.fit.ind06 (LPUE40)				13.6		
	catch.age.comp	4716.4	4710.3	4716.7	4720.4	4776.4	1765.3
	index.age.comp	8256.9	8256.7	8255.2	8272.8	8341.3	3467.4
	q.year1	0	0	0	0	-13.77	0
	Recruit.devs	3.1	2.9	3.1	2.8	7.4	-0.2
RMSE	catch.tot	1.07	1.06	1.07	1.28	1.78	0.79
	ind01 (NEFSC SPR)	1.82	1.82	1.82	1.73	2.74	1.77
	ind02 (NEFSC AUT)	1.30	1.31	1.30	1.26	2.24	1.25
	ind03 (ASMFC SUM)	1.40	1.39	1.40	1.33	1.25	1.38
	ind04 (MENH SPR)	1.61	1.61	1.61	1.60	1.60	1.51
	ind05 (MENH AUT)	1.89	1.90	1.89	1.93	2.03	1.81
	ind06 (LPUE40)				1.97		
	ind.total	1.59	1.58	1.58	1.64	2.11	1.53
	recruit.devs	1.30	1.29	1.30	1.29	1.39	1.22
	q.year1	0.00	0.00	0.00	0.00	4010.45	0.00
NEFSC SPR SV q		4.3	4.1	4.3	3.9	1.0	4.00
NEFSC AUT SV q		4.5	4.3	4.9	4.2	1.0	3.91
F in 2015		0.16	0.16	0.16	0.10	0.03	0.12
SSB in 2015		5,479	5,777	5,520	7,980	23,869	6,385
Mohn's Rho F		-0.46					
Mohn's Rho SSB		0.64					
Rho adjusted F in 2015		0.29					
Rho adjusted SSB in 2015		3,335					

Table B61. Comparison of fleet and index selectivity parameters and associated coefficients of variation (CV) for the witch flounder ASAP Run 9\_5\_v2 and 5 sensitivity runs. Bold values represent fixed values (not estimated). 2015 fishing mortality, spawning stock biomass and Age 1 recruitment is also given at bottom of this page.

Block/Index	Age	Base Run		Sensitivity Run 1		Sensitivity Run 2		Sensitivity Run 3		Sensitivity Run 4		Sensitivity Run 5	
		Run 9_5_v2		Run_9_5_v2		Run_9_5_v2		Run_9_5_v2		Run_9_5_v2		Run_9_5_v2	
		Selectivity	CV	FLEETDOME Selectivity	CV	SVDOME Selectivity	CV	LPUE40 Selectivity	CV	QFIXED Selectivity	CV	FRANCIS Selectivity	CV
Fleet block 1 (1982-1992)	1	0.003	0.86	0.003	0.86	0.003	0.86	0.003	0.86	0.004	0.86	0.003	1.40
	2	0.024	0.33	0.021	0.33	0.024	0.33	0.022	0.33	0.030	0.33	0.024	0.54
	3	0.110	0.17	0.095	0.17	0.110	0.17	0.104	0.17	0.136	0.17	0.111	0.27
	4	0.434	0.11	0.376	0.11	0.435	0.11	0.414	0.10	0.513	0.11	0.441	0.17
	5	0.686	0.10	0.593	0.11	0.687	0.10	0.659	0.10	0.792	0.10	0.689	0.16
	6	0.816	0.11	0.703	0.11	0.816	0.10	0.789	0.10	0.898	0.11	0.806	0.17
	7	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	8	<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	9	<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	10	<b>1.000</b>		0.877	0.23	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	11+	<b>1.000</b>		0.628	0.15	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
Fleet block 2 (1993-2004)	1	0.019	0.21	0.018	0.22	0.019	0.21	0.018	0.21	0.020	0.22	0.019	0.35
	2	0.018	0.24	0.017	0.24	0.018	0.24	0.017	0.23	0.019	0.24	0.018	0.38
	3	0.024	0.22	0.023	0.23	0.024	0.22	0.024	0.22	0.026	0.22	0.024	0.36
	4	0.103	0.13	0.098	0.14	0.104	0.13	0.103	0.13	0.106	0.14	0.105	0.21
	5	0.274	0.11	0.261	0.12	0.277	0.11	0.274	0.11	0.280	0.11	0.282	0.17
	6	0.510	0.10	0.485	0.11	0.514	0.10	0.512	0.10	0.510	0.11	0.522	0.17
	7	0.945	0.11	0.902	0.11	0.953	0.11	0.955	0.11	0.946	0.11	0.947	0.17
	8	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	9	<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	10	<b>1.000</b>		0.994	0.24	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	11+	<b>1.000</b>		0.728	0.28	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
Fleet block 3 (2005-2015)	1	0.001	0.64	0.001	0.64	0.001	0.64	0.002	0.64	0.003	0.64	0.002	1.05
	2	0.019	0.22	0.018	0.22	0.019	0.22	0.022	0.22	0.036	0.22	0.024	0.36
	3	0.036	0.20	0.035	0.20	0.036	0.20	0.040	0.20	0.066	0.20	0.044	0.32
	4	0.082	0.15	0.080	0.16	0.083	0.15	0.091	0.16	0.149	0.16	0.097	0.25
	5	0.153	0.13	0.150	0.14	0.155	0.13	0.171	0.13	0.281	0.13	0.176	0.22
	6	0.301	0.11	0.295	0.12	0.305	0.11	0.338	0.12	0.546	0.11	0.340	0.18
	7	0.666	0.10	0.653	0.11	0.675	0.10	0.741	0.10	1.000	0.00	0.729	0.17
	8	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	9	<b>1.000</b>		0.954	0.15	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	10	<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	11+	<b>1.000</b>		0.469	0.46	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
NEFSC SPR q		4.3	0.27	4.1	0.28	4.3	0.27	3.9	0.27	1.0	0.03	4.0	0.31
NEFSC AUT q		4.5	0.30	4.3	0.31	4.9	0.32	4.2	0.31	1.0	0.03	3.9	0.37
ASMFC SUM q		0.5	0.32	0.5	0.32	0.5	0.32	0.4	0.32	0.3	0.32	0.5	0.35
MENH SPR q		0.2	0.39	0.2	0.39	0.2	0.39	0.1	0.38	0.1	0.39	0.2	0.42
MENH AUT q		0.5	0.39	0.5	0.39	0.5	0.39	0.4	0.39	0.2	0.39	0.5	0.40
LPUE q								0.0	0.22				
Freport		0.16	0.16	0.16	0.16	0.16	0.16	0.10	0.15	0.03	0.13	0.12	0.19
SSB (mt)		5,479	0.09	5,777	0.10	5,520	0.09	7,980	0.08	23,869	0.07	6,385	0.12
Age 1 recruits (000s)		9,246	0.25	9,422	0.25	9,259	0.25	11,011	0.25	19,305	0.25	8,393	0.30

Table B61 continued. Comparison of fleet and index selectivity parameters and associated coefficients of variation (CV) for the witch flounder ASAP Run 9\_5\_v2 and 5 sensitivity runs. Bold values represent fixed values (not estimated).

Block/Index	Age	Base Run		Sensitivity Run 1		Sensitivity Run 2		Sensitivity Run 3		Sensitivity Run 4		Sensitivity Run 5	
		Run 9_5_v2		Run_9_5_v2 FLEETDOME		Run_9_5_v2 SVDOME		Run_9_5_v2 LPUE40		Run_9_5_v2 QFIXED		Run_9_5_v2 FRANCIS	
		Selectivity	CV	Selectivity	CV	Selectivity	CV	Selectivity	CV	Selectivity	CV	Selectivity	CV
NEFSC SPRING	1	0.038	0.17	0.039	0.17	0.038	0.17	0.037	0.17	0.072	0.16	0.041	0.25
	2	0.125	0.12	0.128	0.12	0.126	0.12	0.122	0.12	0.239	0.10	0.134	0.17
	3	0.338	0.09	0.344	0.09	0.340	0.09	0.331	0.09	0.655	0.07	0.356	0.13
	4	0.525	0.08	0.534	0.09	0.527	0.08	0.517	0.08	1.000	0.00	0.545	0.12
	5	0.681	0.08	0.692	0.09	0.684	0.08	0.672	0.08	1.000	0.00	0.717	0.12
	6	0.707	0.09	0.717	0.09	0.709	0.09	0.699	0.09	1.000	0.00	0.760	0.13
	7	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	8	<b>1.000</b>		<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	9	<b>1.000</b>		<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	10	<b>1.000</b>		<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	11+	<b>1.000</b>		<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
NEFSC AUTUMN	1	0.114	0.016	0.116	0.14	0.104	0.14	0.111	0.14	0.222	0.12	0.133	0.23
	2	0.221	0.12	0.226	0.12	0.203	0.13	0.215	0.12	0.435	0.10	0.258	0.20
	3	0.510	0.10	0.522	0.10	0.469	0.11	0.500	0.10	1.000	0.00	0.602	0.17
	4	0.646	0.10	0.660	0.10	0.593	0.11	0.635	0.10	1.000	0.00	0.759	0.17
	5	0.609	0.11	0.621	0.11	0.560	0.12	0.602	0.11	1.000	0.00	0.704	0.18
	6	0.663	0.12	0.675	0.12	0.610	0.12	0.656	0.11	1.000	0.00	0.742	0.20
	7	<b>1.000</b>		<b>1.000</b>		<b>1.00</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	8	<b>1.000</b>		<b>1.000</b>		0.853	0.16	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	9	<b>1.000</b>		<b>1.000</b>		0.763	0.21	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	10	<b>1.000</b>		<b>1.000</b>		0.688	0.27	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	11+	<b>1.000</b>		<b>1.000</b>		1.000	0.00	<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
ASMFC SUMMER	1	0.710	0.09	0.710	0.09	0.710	0.09	0.701	0.09	0.687	0.09	0.709	0.14
	2	0.662	0.10	0.662	0.10	0.662	0.10	0.655	0.10	0.645	0.10	0.674	0.16
	3	<b>1.000</b>		<b>1.000</b>		<b>1.00</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	4	<b>1.000</b>		<b>1.000</b>		<b>1.00</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	5	0.699	0.12	0.698	0.12	0.699	0.12	0.708	0.12	0.703	0.12	0.690	0.20
	6	0.579	0.15	0.576	0.15	0.578	0.15	0.589	0.15	0.565	0.15	0.568	0.24
	7	0.558	0.19	0.559	0.19	0.556	0.19	0.570	0.19	0.498	0.19	0.538	0.31
	8	0.520	0.25	0.537	0.25	0.517	0.25	0.527	0.25	0.397	0.25	0.476	0.42
	9	0.415	0.37	0.446	0.37	0.411	0.37	0.421	0.37	0.270	0.37	0.362	0.61
	10	0.333	0.53	0.368	0.53	0.328	0.53	0.343	0.53	0.194	0.53	0.283	0.88
	11+	0.304	0.39	0.236	0.40	0.302	0.39	0.350	0.39	0.166	0.39	0.247	0.65
MENH SPRING	1	<b>1.000</b>		<b>1.000</b>		<b>1.00</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	2	0.925	0.15	0.925	0.15	0.925	0.15	0.929	0.15	0.941	0.15	0.780	0.23
	3	0.613	0.18	0.614	0.18	0.613	0.18	0.623	0.18	0.648	0.18	0.545	0.28
	4	0.344	0.23	0.344	0.23	0.344	0.23	0.354	0.23	0.380	0.22	0.290	0.35
	5	0.225	0.29	0.226	0.29	0.225	0.29	0.235	0.29	0.260	0.28	0.193	0.45
	6	0.132	0.40	0.132	0.40	0.132	0.40	0.138	0.40	0.153	0.40	0.112	0.62
	7	0.160	0.45	0.160	0.45	0.160	0.45	0.167	0.45	0.174	0.45	0.137	0.70
	8	0.133	0.68	0.133	0.68	0.133	0.68	0.134	0.68	0.120	0.68	0.112	1.08
	9	0.125	1.02	0.127	1.02	0.124	1.02	0.119	1.02	0.085	1.02	0.098	1.61
	10	0.100	1.67	0.101	1.67	0.098	1.67	0.091	1.67	0.052	1.67	0.078	2.64
	11+	0.187	1.35	0.141	1.36	0.182	1.35	0.153	1.35	0.053	1.35	0.125	2.13
MENH AUTUMN	1	<b>1.000</b>		<b>1.000</b>		<b>1.00</b>		<b>1.000</b>		<b>1.000</b>		<b>1.000</b>	
	2	0.662	0.13	0.662	0.13	0.662	0.13	0.667	0.13	0.678	0.13	0.657	0.17
	3	0.415	0.16	0.416	0.16	0.415	0.16	0.423	0.16	0.440	0.16	0.413	0.21
	4	0.281	0.20	0.282	0.20	0.281	0.20	0.289	0.20	0.307	0.20	0.278	0.26
	5	0.194	0.26	0.194	0.26	0.194	0.26	0.200	0.26	0.216	0.26	0.193	0.33
	6	0.153	0.33	0.153	0.33	0.153	0.33	0.158	0.33	0.166	0.33	0.153	0.43
	7	0.096	0.53	0.096	0.53	0.096	0.53	0.097	0.53	0.092	0.53	0.093	0.70
	8	0.093	0.78	0.093	0.78	0.092	0.78	0.088	0.78	0.068	0.78	0.084	1.02
	9	0.117	1.03	0.117	1.03	0.115	1.03	0.104	1.03	0.064	1.03	0.100	1.34
	10	0.069	1.95	0.070	1.95	0.068	1.95	0.059	1.95	0.029	1.95	0.057	2.55
	11+	0.119	1.67	0.077	1.69	0.115	1.67	0.090	1.67	0.026	1.67	0.087	2.20
LPUE40	1							<b>0.01</b>					
	2							<b>0.03</b>					
	3							<b>0.09</b>					
	4							<b>0.42</b>					
	5							<b>0.56</b>					
	6							<b>1.00</b>					
	7							<b>1.00</b>					
	8							<b>1.00</b>					
	9							<b>1.00</b>					
	10							<b>1.00</b>					
	11+							<b>1.00</b>					

Table B62. Witch flounder January 1 numbers at age (000s) from 1982 to 2015 estimated from the ASAP Run 9\_5\_v2.

Year	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+
1982	15,151	21,792	20,229	14,059	9,765	7,296	6,007	4,263	1,983	1,865	9,856
1983	6,982	13,033	18,662	17,006	11,026	7,256	5,273	4,173	2,962	1,378	8,143
1984	3,951	6,004	11,136	15,530	12,810	7,686	4,860	3,338	2,642	1,875	6,027
1985	2,860	3,397	5,123	9,203	11,382	8,552	4,891	2,889	1,984	1,570	4,697
1986	12,927	2,459	2,896	4,219	6,650	7,431	5,299	2,814	1,662	1,142	3,606
1987	8,204	11,114	2,097	2,391	3,080	4,414	4,696	3,123	1,658	980	2,798
1988	8,001	7,054	9,488	1,739	1,774	2,096	2,873	2,870	1,909	1,014	2,309
1989	13,380	6,878	6,013	7,808	1,253	1,153	1,292	1,642	1,640	1,091	1,899
1990	14,857	11,505	5,870	4,978	5,763	846	743	780	992	991	1,806
1991	12,158	12,778	9,839	4,906	3,812	4,124	584	489	513	652	1,839
1992	16,213	10,452	10,886	8,079	3,504	2,444	2,500	327	274	288	1,396
1993	24,676	13,935	8,893	8,887	5,639	2,166	1,419	1,328	174	146	894
1994	21,964	20,930	11,828	7,510	7,050	3,908	1,246	579	519	68	406
1995	15,294	18,549	17,692	9,932	5,815	4,581	1,995	407	179	160	146
1996	21,013	12,933	15,699	14,881	7,747	3,853	2,425	697	135	59	102
1997	26,467	17,823	10,977	13,256	11,804	5,367	2,216	988	272	53	63
1998	26,937	22,497	15,159	9,296	10,642	8,443	3,276	1,008	433	119	51
1999	24,813	22,938	19,167	12,866	7,537	7,815	5,410	1,631	486	209	82
2000	16,490	21,178	19,585	16,318	10,569	5,729	5,340	3,035	893	266	159
2001	10,696	14,068	18,076	16,665	13,372	7,983	3,869	2,931	1,623	477	228
2002	5,313	9,112	11,991	15,351	13,547	9,888	5,183	1,974	1,451	803	349
2003	4,435	4,529	7,772	10,193	12,527	10,119	6,540	2,737	1,013	745	591
2004	6,018	3,769	3,852	6,580	8,175	8,937	6,146	2,948	1,189	440	580
2005	13,552	5,102	3,198	3,251	5,208	5,630	5,084	2,454	1,126	454	390
2006	8,097	11,646	4,303	2,647	2,559	3,794	3,489	2,112	708	325	243
2007	6,353	6,960	9,849	3,582	2,110	1,908	2,460	1,602	708	237	191
2008	6,043	5,463	5,927	8,306	2,941	1,663	1,381	1,443	775	343	207
2009	11,334	5,197	4,651	4,996	6,816	2,316	1,201	805	692	372	264
2010	14,651	9,745	4,415	3,905	4,062	5,272	1,615	648	344	296	272
2011	7,788	12,599	8,290	3,715	3,192	3,175	3,753	912	297	157	259
2012	13,916	6,697	10,717	6,975	3,036	2,493	2,257	2,113	415	135	190
2013	18,190	11,965	5,689	8,993	5,665	2,344	1,732	1,207	891	175	137
2014	46,435	15,648	10,222	4,827	7,491	4,587	1,789	1,141	696	514	180
2015	9,246	39,954	13,409	8,724	4,075	6,218	3,675	1,313	774	472	471
Min	2,860										
Max	46,435										
Mean	13,953										
Median	13,154										

Table B63. Witch flounder January 1 biomass (mt), spawning stock biomass (mt), and exploitable biomass (mt) from 1982 to 2015 from the ASAP Run 9\_5\_v2.

Year	Jan 1 Biomass (mt)	Spawning Stock Biomass (mt)	Exploitable Biomass (mt)
1982	31,689	22,253	29,270
1983	27,547	19,144	25,849
1984	24,644	16,293	23,649
1985	21,071	14,557	20,393
1986	16,489	12,665	16,076
1987	12,846	10,886	13,065
1988	10,418	8,811	10,364
1989	8,199	6,622	7,992
1990	7,701	5,567	7,317
1991	7,746	4,928	6,748
1992	7,133	4,139	6,536
1993	7,440	3,635	4,337
1994	7,194	3,096	3,676
1995	6,770	3,266	3,501
1996	7,378	3,469	3,708
1997	8,933	3,850	4,271
1998	9,975	4,815	5,134
1999	10,947	5,521	6,684
2000	12,282	5,877	6,900
2001	12,715	6,018	7,508
2002	14,030	6,515	8,756
2003	13,195	6,264	8,165
2004	10,424	5,192	7,876
2005	8,390	4,301	5,154
2006	6,147	2,862	3,655
2007	5,041	2,457	2,891
2008	5,139	2,548	2,558
2009	6,030	2,879	2,321
2010	4,988	2,918	2,117
2011	4,765	3,084	2,655
2012	5,488	3,173	2,872
2013	6,478	3,379	2,629
2014	8,975	4,336	3,366
2015	10,627	5,479	4,210
Min	4,765	2,457	2,117
Max	31,689	22,253	29,270
Mean	10,848	6,494	8,006

Table B64. Witch flounder fishing mortality at age and fully recruited fishing mortality (Ffull) from 1982 – 2015 from the ASAP Run 9\_5\_v2.

Year	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11+	Ffull
1982	0.00	0.01	0.02	0.09	0.15	0.17	0.21	0.21	0.21	0.21	0.21	0.21
1983	0.00	0.01	0.03	0.13	0.21	0.25	0.31	0.31	0.31	0.31	0.31	0.31
1984	0.00	0.01	0.04	0.16	0.25	0.30	0.37	0.37	0.37	0.37	0.37	0.37
1985	0.00	0.01	0.04	0.17	0.28	0.33	0.40	0.40	0.40	0.40	0.40	0.40
1986	0.00	0.01	0.04	0.16	0.26	0.31	0.38	0.38	0.38	0.38	0.38	0.38
1987	0.00	0.01	0.04	0.15	0.23	0.28	0.34	0.34	0.34	0.34	0.34	0.34
1988	0.00	0.01	0.04	0.18	0.28	0.33	0.41	0.41	0.41	0.41	0.41	0.41
1989	0.00	0.01	0.04	0.15	0.24	0.29	0.35	0.35	0.35	0.35	0.35	0.35
1990	0.00	0.01	0.03	0.12	0.18	0.22	0.27	0.27	0.27	0.27	0.27	0.27
1991	0.00	0.01	0.05	0.19	0.29	0.35	0.43	0.43	0.43	0.43	0.43	0.43
1992	0.00	0.01	0.05	0.21	0.33	0.39	0.48	0.48	0.48	0.48	0.48	0.48
1993	0.01	0.01	0.02	0.08	0.22	0.40	0.75	0.79	0.79	0.79	0.79	0.79
1994	0.02	0.02	0.02	0.11	0.28	0.52	0.97	1.02	1.02	1.02	1.02	1.02
1995	0.02	0.02	0.02	0.10	0.26	0.49	0.90	0.95	0.95	0.95	0.95	0.95
1996	0.01	0.01	0.02	0.08	0.22	0.40	0.75	0.79	0.79	0.79	0.79	0.79
1997	0.01	0.01	0.02	0.07	0.19	0.34	0.64	0.67	0.67	0.67	0.67	0.67
1998	0.01	0.01	0.01	0.06	0.16	0.30	0.55	0.58	0.58	0.58	0.58	0.58
1999	0.01	0.01	0.01	0.05	0.12	0.23	0.43	0.45	0.45	0.45	0.45	0.45
2000	0.01	0.01	0.01	0.05	0.13	0.24	0.45	0.48	0.48	0.48	0.48	0.48
2001	0.01	0.01	0.01	0.06	0.15	0.28	0.52	0.55	0.55	0.55	0.55	0.55
2002	0.01	0.01	0.01	0.05	0.14	0.26	0.49	0.52	0.52	0.52	0.52	0.52
2003	0.01	0.01	0.02	0.07	0.19	0.35	0.65	0.68	0.68	0.68	0.68	0.68
2004	0.02	0.01	0.02	0.08	0.22	0.41	0.77	0.81	0.81	0.81	0.81	0.81
2005	0.00	0.02	0.04	0.09	0.17	0.33	0.73	1.09	1.09	1.09	1.09	1.09
2006	0.00	0.02	0.03	0.08	0.14	0.28	0.63	0.94	0.94	0.94	0.94	0.94
2007	0.00	0.01	0.02	0.05	0.09	0.17	0.38	0.58	0.58	0.58	0.58	0.58
2008	0.00	0.01	0.02	0.05	0.09	0.18	0.39	0.59	0.59	0.59	0.59	0.59
2009	0.00	0.01	0.02	0.06	0.11	0.21	0.47	0.70	0.70	0.70	0.70	0.70
2010	0.00	0.01	0.02	0.05	0.10	0.19	0.42	0.63	0.63	0.63	0.63	0.63
2011	0.00	0.01	0.02	0.05	0.10	0.19	0.42	0.64	0.64	0.64	0.64	0.64
2012	0.00	0.01	0.03	0.06	0.11	0.21	0.48	0.71	0.71	0.71	0.71	0.71
2013	0.00	0.01	0.01	0.03	0.06	0.12	0.27	0.40	0.40	0.40	0.40	0.40
2014	0.00	0.00	0.01	0.02	0.04	0.07	0.16	0.24	0.24	0.24	0.24	0.24
2015	0.00	0.00	0.01	0.01	0.02	0.05	0.11	0.16	0.16	0.16	0.16	0.16
Min												0.16
Max												1.09
Mean												0.56

Table B65. Summary of witch flounder 2015 point estimates and their 90% confidence intervals the retrospective Mohn's rho values, and the retrospectively adjusted estimates for ASAP Run 9\_5\_v2. The retrospectively adjusted estimates fall outside the confidence region, therefore a major retrospective pattern exists.

	Point Estimate	90% CI		Mohn's Rho value	Rho Adjusted Estimate
F2015	0.16	0.12	0.20	-0.46	0.29
SSB 2015	5,479	4,812	6,511	0.64	3,335



Table B66. Witch flounder input vectors for biological reference points (yield and spawning biomass per recruit analyses and long-term stochastic projections) based on VPA SPLIT RUN A2. Average 2010-2015 partial recruitment, average 2011-2015 mean weights (kg), and maturation ogive representing 2012-2016 maturity data are given below. Note: Age 3 recruitment is used.

Age	Partial recruitment	Sel. on M	Mean Stock wts	Mean Catch wts	Mean SpStock wts	Maturity
3	0.030	1.000	0.074	0.124	0.074	0.09
4	0.066	1.000	0.148	0.189	0.148	0.23
5	0.124	1.000	0.229	0.271	0.229	0.49
6	0.233	1.000	0.307	0.353	0.307	0.75
7	0.541	1.000	0.392	0.452	0.392	0.91
8	1.000	1.000	0.494	0.551	0.494	0.97
9	1.000	1.000	0.595	0.656	0.595	0.99
10	1.000	1.000	0.692	0.732	0.692	1.00
11+	1.000	1.000	0.973	0.973	0.973	1.00

Year	Age 3 ('000 fish)	Year class
1982	17,302	1979
1983	19,122	1980
1984	17,754	1981
1985	9,035	1982
1986	6,053	1983
1987	3,966	1984
1988	11,822	1985
1989	8,145	1986
1990	9,512	1987
1991	10,109	1988
1992	12,838	1989
1993	9,876	1990
1994	14,487	1991
1995	13,141	1992
1996	17,143	1993
1997	15,180	1994
1998	15,574	1995
1999	13,304	1996
2000	12,048	1997
2001	12,789	1998
2002	11,797	1999
2003	8,793	2000
2004	4,739	2001
2005	3,874	2002
2006	3,952	2003
2007	5,644	2004
2008	4,970	2005
2009	4,143	2006
2010	3,484	2007
2011	5,025	2008
2012	7,297	2009
2013	3,601	2010
2014	8,500	2011
Mean	9,849	

Table B67. Witch flounder input vectors for biological reference points (yield and spawning biomass per recruit analyses and long-term stochastic projections) based on ASAP Run 9\_5\_v2. Partial recruitment is the fleet selectivity from time block 2005-2015. Average 2011-2015 mean weights (kg) and maturation ogive representing 2012-2016 maturity data are given below. Note Age 1 recruitment is used in ASAP model.

Age	Partial recruitment	Sel. on M	Mean Stock wts	Mean Catch wts	Mean SpStock wts	Maturity
1	0.001	1.000	0.010	0.017	0.010	0.01
2	0.019	1.000	0.025	0.059	0.025	0.03
3	0.036	1.000	0.074	0.124	0.074	0.09
4	0.082	1.000	0.148	0.189	0.148	0.23
5	0.153	1.000	0.229	0.271	0.229	0.49
6	0.301	1.000	0.307	0.353	0.307	0.75
7	0.666	1.000	0.392	0.452	0.392	0.91
8	1.000	1.000	0.494	0.551	0.494	0.97
9	1.000	1.000	0.595	0.656	0.595	0.99
10	1.000	1.000	0.692	0.732	0.692	1.00
11+	1.000	1.000	0.973	0.973	0.973	1.00

Age 1		Year class
Year	('000 fish)	
1982	15,151	1981
1983	6,982	1982
1984	3,951	1983
1985	2,860	1984
1986	12,927	1985
1987	8,204	1986
1988	8,001	1987
1989	13,380	1988
1990	14,857	1989
1991	12,158	1990
1992	16,213	1991
1993	24,676	1992
1994	21,964	1993
1995	15,294	1994
1996	21,013	1995
1997	26,467	1996
1998	26,937	1997
1999	24,813	1998
2000	16,490	1999
2001	10,696	2000
2002	5,313	2001
2003	4,435	2002
2004	6,018	2003
2005	13,552	2004
2006	8,097	2005
2007	6,353	2006
2008	6,043	2007
2009	11,334	2008
2010	14,651	2009
2011	7,788	2010
2012	13,916	2011
2013	18,190	2012
2014	46,435	2013
2015	9,246	2014
Mean	13,953	

Table B68. Proxy reference points from the witch flounder yield per recruit (YPR) analysis and the corresponding fishing mortality, spawning stock biomass per recruit (SSB/R), biomass per recruit (B/R) and mean age value for the VPA SPLIT Run A2 (top) and ASAP Run 9\_5\_v2 (bottom).

VPA SPLIT RUN A2

Reference Point	F	YPR (kg)	SSB/R (kg)	B/R (kg)	Mean Age
F-Zero	0.00	0.00	3.19	3.60	9.18
F-01	0.19	0.20	1.32	1.71	6.20
FMax	0.51	0.23	0.70	1.07	5.24
F at 40% MSP	0.20	0.20	1.28	1.67	6.14

ASAP Base Run 9\_5\_v2

Reference Point	F	YPR (kg)	SSB/R (kg)	B/R (kg)	Mean Age
F-Zero	0.00	0.00	2.37	2.70	7.18
F-01	0.19	0.15	0.96	1.28	4.60
FMax	0.46	0.17	0.51	0.81	3.80
F at 40% MSP	0.19	0.15	0.95	1.26	4.58

Table B69. Witch flounder fully recruited fishing mortality (F), spawning stock biomass (SSB, mt), yield and spawning stock biomass per recruit results and corresponding biological reference points estimated in 2008 GARM, 2012 Update, and 2015 Operational Assessment, and the current 2016 benchmark assessment (VPA SPLIT Run A2 and ASAP Run 9\_5\_v2). The Fmsy = F40% MSP is based on yield per recruit analyses, while the SSBmsy and MSY estimates are based on long-term stochastic projections. Retrospectively adjusted F and SSB are given for 2015 and 2016 assessments. (*Note: mean recruitment values [Age 3 for VPA and Age 1 for ASAP] are not used in the calculations of SSBmsy and MSY estimates*).

		Fully Recruited F	SSB	Fmsy F40%	Y/R (kg)	SSB/R (kg)	Mean Age 3 Recruitment (fish,millions)	Agepro Projections SSBmsy MSY (mt) (mt)	
2008 GARM									
	SPLIT RUN	0.29	3,434	0.20	0.1943	0.9346	11.1	11,447	2,352
2012 Update									
	SPLIT RUN D	0.47	4,099	0.27	0.2069	0.9970	10.0	10,051	2,075
2015 Operational Assessment									
	SPLIT RUN F	0.43	3,129	0.28	0.2181	1.1599	9.0	9,473	1,957
	Rho Adjusted	0.69	2,077						
2016 Benchmark									
	VPA SPLIT RUN A2	0.43	3,044	0.20	0.2044	1.2769	9.8	12,499	1,512
	Rho Adjusted	0.69	2,035						
	ASAP Run 9_5_v2	0.16	5,479	0.19	0.1485	0.9463	<u>Mean Age 1</u> 14.0	12,747	1,998
	Rho Adjusted	0.29	3,335						