State of Stock: Relative to the biological reference points proposed by the working group (WG) in the 2005 SARC, the bluefish stock is not overfished and overfishing is not occurring   ($\frac{1}{2}B_{MSY}$ =73,526 mt; $F_{MSY} = 0.19$). This conclusion is based on a 2008 biomass estimate of 163,727 MT and F=0.12 from the ASAP model results. Fishing mortality rates (F) estimated in ASAP using state and federal indices show a low F, an increasing trend in population biomass, and an increasing trend in population numbers. January 1 population abundance estimates show a general increase in overall abundance since 1997. Abundance estimates peaked in 1982 at 167 million fish, declined to 60 million in the mid-1990s and have since increased to 101 million fish.

Forecast for 2009: Forecast yield in 2010 at status quo F (0.12) was 13,098 mt, which includes recreational discards with 15% mortality. The forecast is based on a 2009 yield of 13,499 mt.

Catch and Status Table (weights in '000 mt): Bluefish

Year	2002	2003	2004	2005	2006	2007	2008	Max	Min	Mean
USA Commercial landings[1]	3.1	3.4	3.6	3.2	2.9	3.3	2.6	7.5	0.8	3.7
USA Recreational landings[2]	5.2	6.0	7.2	8.2	7.7	9.6	8.6	37.7	3.7	15.7
USA Recreational discards[2]	1.5	1.3	1.8	1.9	1.9	2.7	2.4	2.6	0.6	1.4
Total Catch[3]	9.8	10.7	12.6	13.3	12.5	15.6	13.6	48.8	8.2	20.7

[1] Min, max and mean since 1950.
[2] Min, max and mean landings and discard mortalities since 1982.
[3] Min, max, and mean total catch since 1982.

Stock Distribution and Identification: Bluefish are highly migratory, pelagic species found along the U.S. Atlantic coast from Maine to Florida, but generally are found inshore north of the Carolinas only in warmer months (Beaumariage 1969; Lund and Maltezos 1970; Shepherd et al. 2006). Bluefish in the western North Atlantic are managed as a single stock (NEFSC 1997; Fahay et al. 1999). Genetic data support a unit stock hypothesis (Graves et al. 1992; Goodbred and Graves 1996; Davidson 2002). For management purposes, the ASMFC and MAFMC define the management unit as the portion of the stock occurring along the Atlantic Coast from Maine to the east coast of Florida.

Catches: Bluefish are one of the most sought after species by recreational anglers along the Atlantic Coast. In 2008, recreational anglers along the Atlantic Coast harvested nearly 8.6 thousand metric tons (mt) of bluefish (Figure 1, Table 1). Recreational landings have ranged from a low of 3,744 mt in 1999 to a high of 43,222 mt in 1981. Landings from the commercial bluefish fishery have been consistently lower than the recreational catch (Figure 1, Table 1). Regional variations in commercial fishing activity are linked to the seasonal migration of bluefish. Commercial landings decreased from 7,500 mt in 1981 to 3,300 mt in 1999. Commercial landings have been regulated by quota since the implementation of Amendment 1 in 2000. In 2000 and 2001, landings increased to approximately 3,600 mt and 3,900 mt, respectively, but declined in 2002 and 2003 to 3,100 mt and 3,400 mt, respectively. Landing estimates for 2008 decreased to 2,600 mt (Figure 1, Table 1). Gill nets are the dominant commercial gear used to target bluefish and account for over 40% of the bluefish commercial landings from 1950 to 2003. Other commercial fishing gears including hook & line, pound nets, seines, and trawls, collectively account for approximately 50% of the commercial landings.

Data and Assessment: The ASMFC Bluefish Stock Assessment Sub-Committee compiled the commercial, recreational data, and ageing information for use in updating the assessment. The majority of commercial sampling since 1997 occurred in North Carolina and Virginia, where a large proportion of the landings are taken. Recreational landings data, length data, and discard estimates were collected from the

MRFSS survey. Age data were used from Virginia's cooperative ageing program and consisted of seasonal age data (spring and fall age keys). State agencies between Massachusetts and Florida conduct annual marine finfish surveys and the indices, partitioned by age, were used in a forward projecting catch at age model (ASAP). Indices included in the model were from the NMFS fall survey (ages 0-6+), CT trawl survey (ages 0-6+), NJ trawl survey (ages 0-2), DE trawl survey (ages 0-2), MRFSS recreational catch per angler (ages 0-6+), and SEAMAP survey (age-0). CT trawl survey indices were not estimated for 2008. A 15% mortality rate was applied to recreational discards and no commercial discards were estimated for inclusion in this assessment.

Biological Reference Points: The current biological reference points for Atlantic coast bluefish in the FMP (½B_{MSY} = 53,750 mt and F_{MSY} = 0.31) were based on a surplus production model that has since been rejected during the SAW 39 review. Biological reference points presented at SARC 41 were used in this assessment for comparison to current stock status (½B_{MSY} = 73,526 mt; F_{MSY} = 0.19) (Table 2). The rebuilding deadline for bluefish is 2010, at which point the stock is expected to meet or exceed biomass at B_{MSY} (147,051 mt). The biomass estimate for 2008 (163,727 mt) exceeds that level and therefore can be considered rebuilt. The current F of 0.12 is below the SARC 41 approved F_{MSY} of 0.19 (note: the F_{MSY} estimate from the recent updated ASAP model is 0.18). Therefore, it is concluded that bluefish is not experiencing overfishing. The current estimate of biomass (163,727 mt) would not be considered overfished under the FMP definition or the B_{MSY} value approved by SARC 41.

Fishing Mortality: Fishing mortality estimates in ASAP are based on a separability assumption. F_{MULT} is the product of F at age and selectivity. The 2008 F_{MULT} value equals 0.12. Fishing mortality steadily declined from 0.34 in 1987 to 0.12 in 1999. Since 1999, fishing mortality has remained steady with average F=0.14.

Total Stock Biomass: Recent biomass estimates peaked in 1982 at 390.9 thousand MT, then declined to 97.5 thousand MT by 1996 before increasing to the 2008 level of 163.7 thousand MT.

Recruitment: Recruitment estimated in the ASAP model has remained relatively constant since 2000 around 25.0 million age-0 bluefish, with the exception of a large 2006 cohort estimated as 47.3 million fish. The 2008 recruitment estimate was below average at 20.8 million fish.

Modeling: The subcommittee updated the ASAP model that was approved in the 41st SAW peer-review. The bluefish data were truncated to an age-6+ category to reduce the influence of ageing error and to reduce the bimodal nature of the catch-at-age distributions. The ASAP model allows error in the catch-at-age as well as the assumption of separability into year and age components making it better at handling the selectivity patterns and catch data from the bluefish fishery.

Special Comments: The highly migratory nature of bluefish populations and the recruitment dynamics of the species create a unique modeling situation. Migration creates seasonal fisheries with unique selectivity patterns resulting in a bimodal partial recruitment pattern. This pattern has been identified in previous assessments as a source of uncertainty in the results and has been held constant in the model. The migratory pattern in bluefish also results in several recruitment events. A spring cohort, originating south of Cape Hatteras, NC during spring migrations, and a summer cohort originating in the offshore Mid-Atlantic Bight result in a bimodal age-0 size distribution. It has been hypothesized that the success of the spring cohort controls the abundance of adult bluefish. The variable intra-annual recruitment pattern, limited ageing data and lack of commercial discards also contribute to the uncertainty in the assessment results.

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Bluefish landings and total catch (mt)
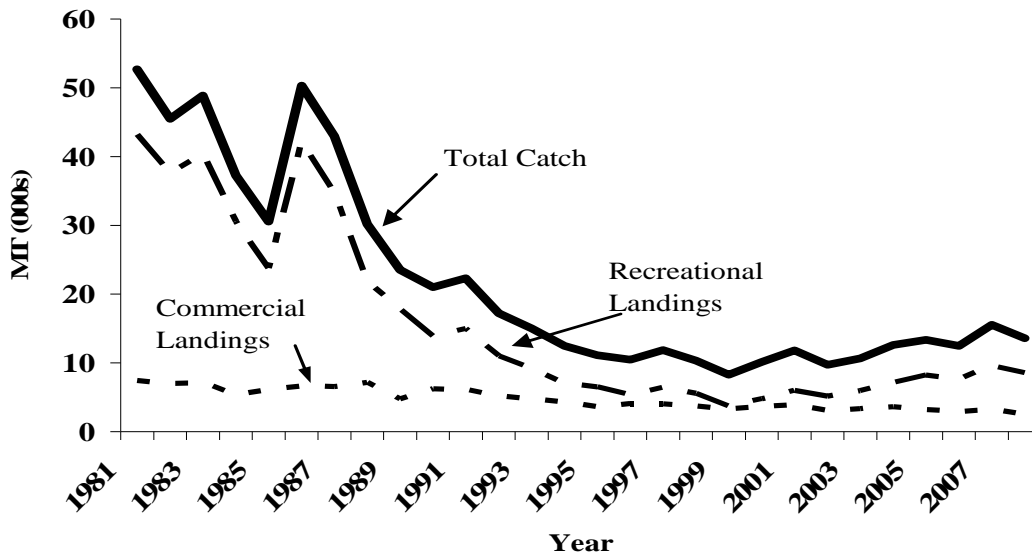
Figure 1. Total catch (landings plus recreational discards), recreational and commercial landings of bluefish, Maine to Florida, 1981-2007.
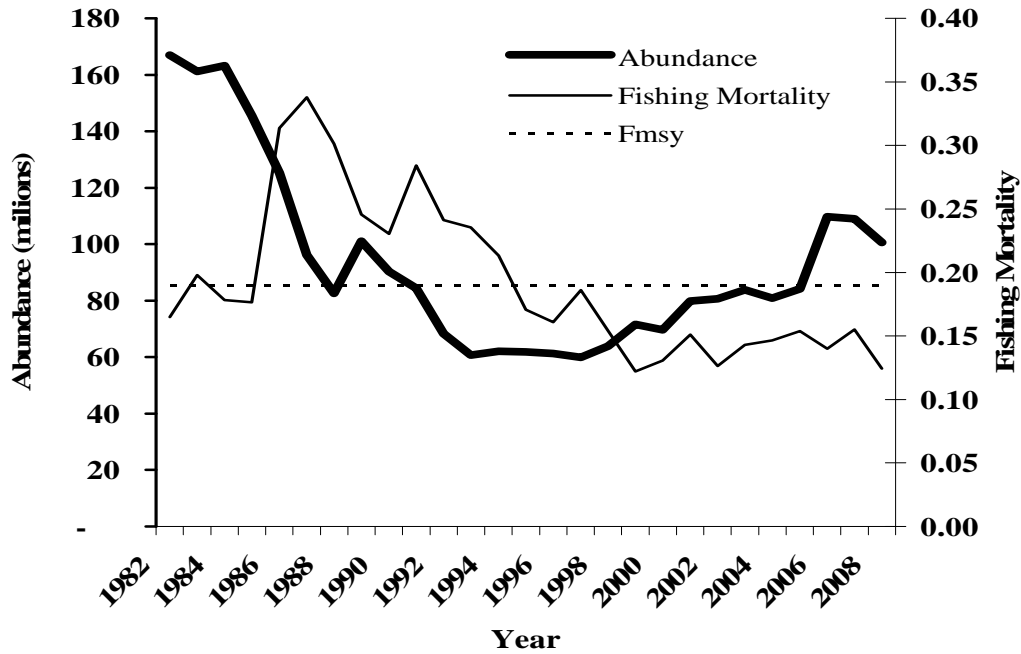
Figure 2. Fishing mortality and abundance estimates of bluefish along the Atlantic coast estimated from the ASAP model.
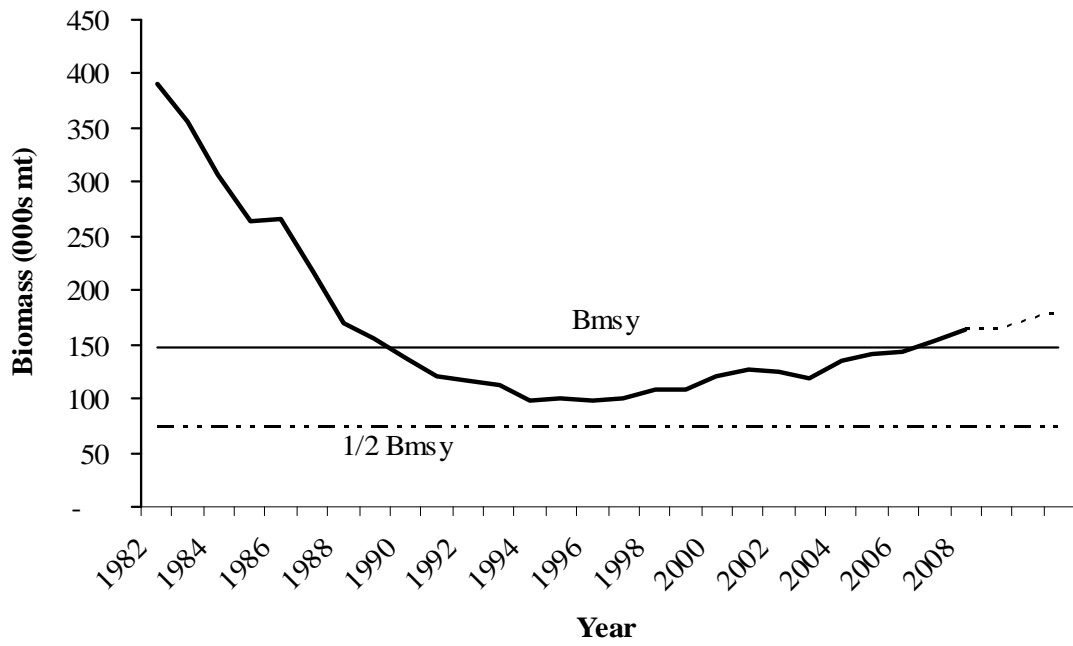
Figure 3. Atlantic coast bluefish biomass and biological reference points based on ASAP model results.
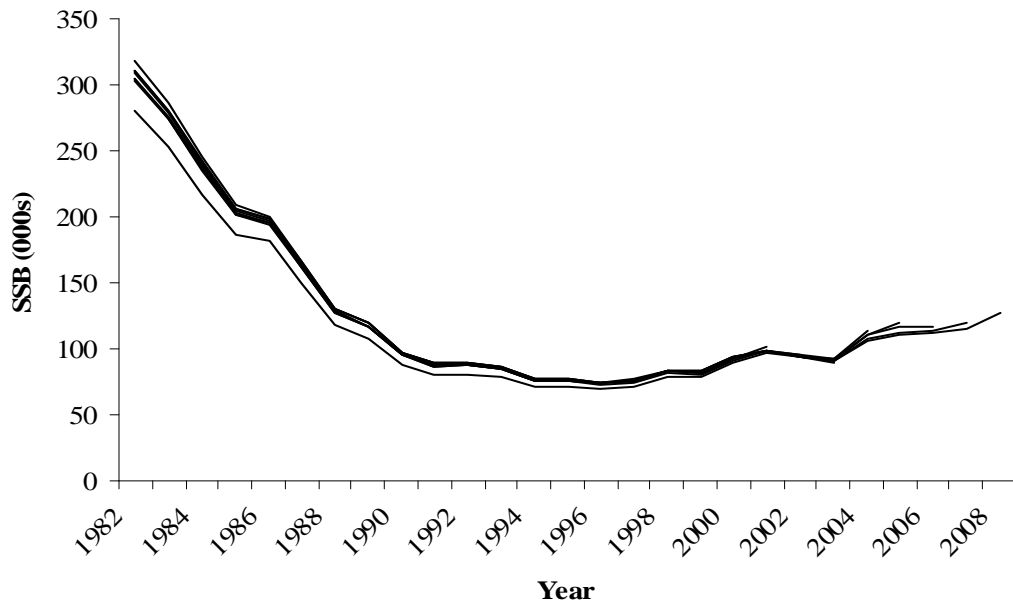
Figure 4. Retrospective pattern of spawning biomass from the ASAP model.

Figure 5. Retrospective pattern of Fmult (age 2) from the updated ASAP model.

Figure 6. Retrospective pattern of N from updated ASAP model.

Figure 7. Retrospective pattern of recruits from updated ASAP model.

Figure 8. Variability in ASAP 2008 estimates of F based on MCMC results.

Figure 9. Variability in ASAP 2007 estimate of SSB from MCMC results.

Table 1. Atlantic coast landings and discards of bluefish, 1974-2008.

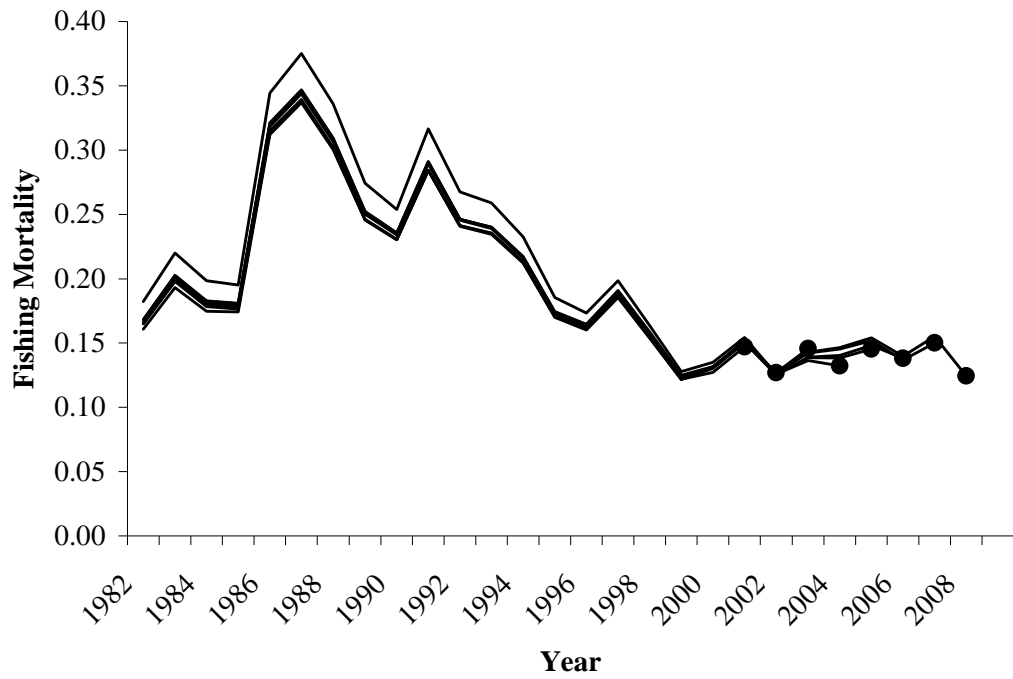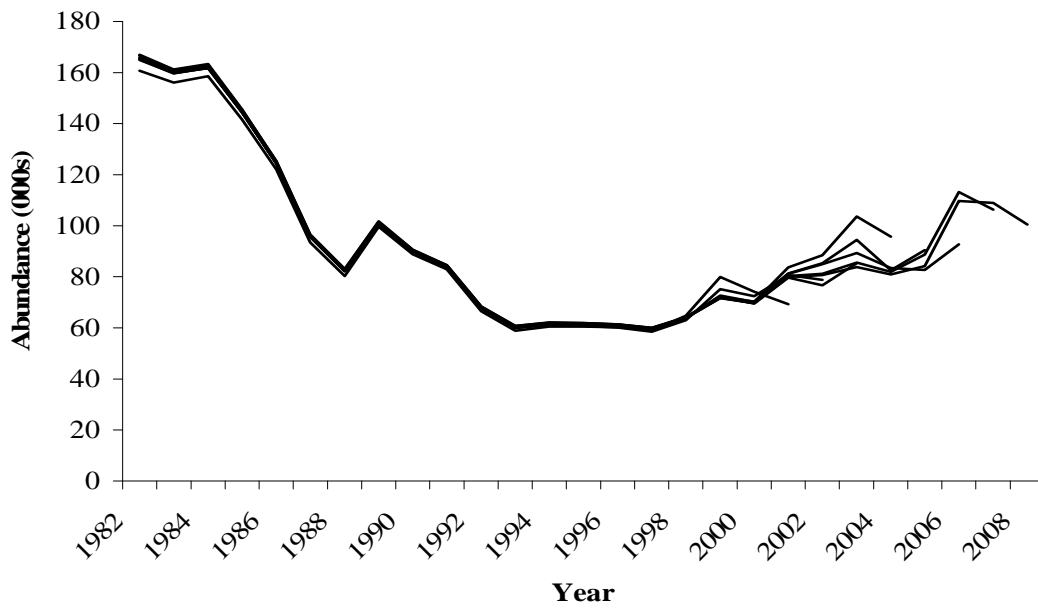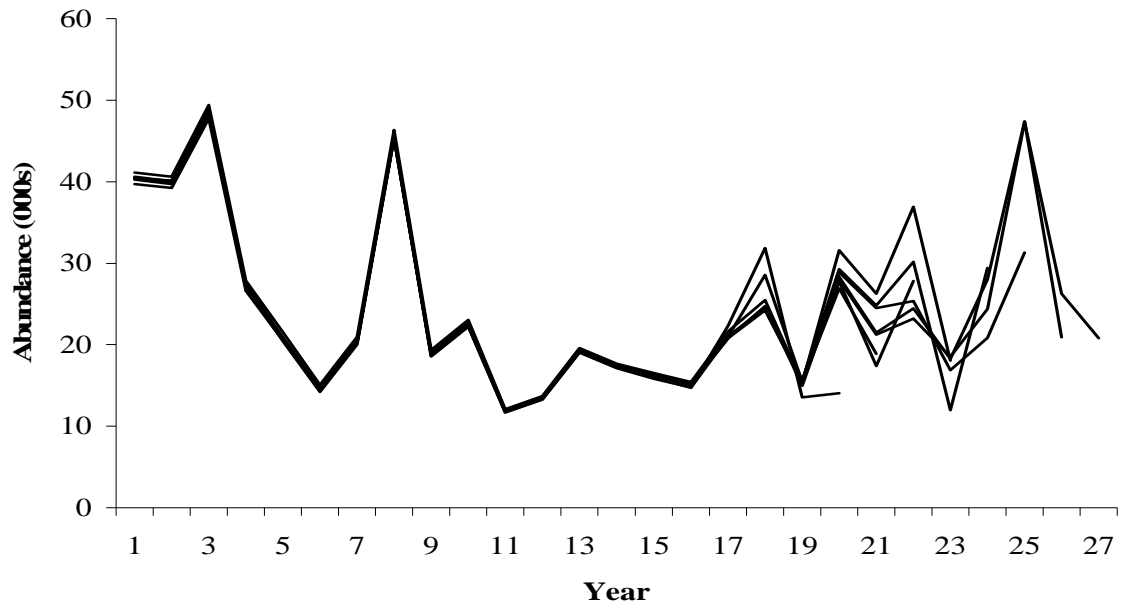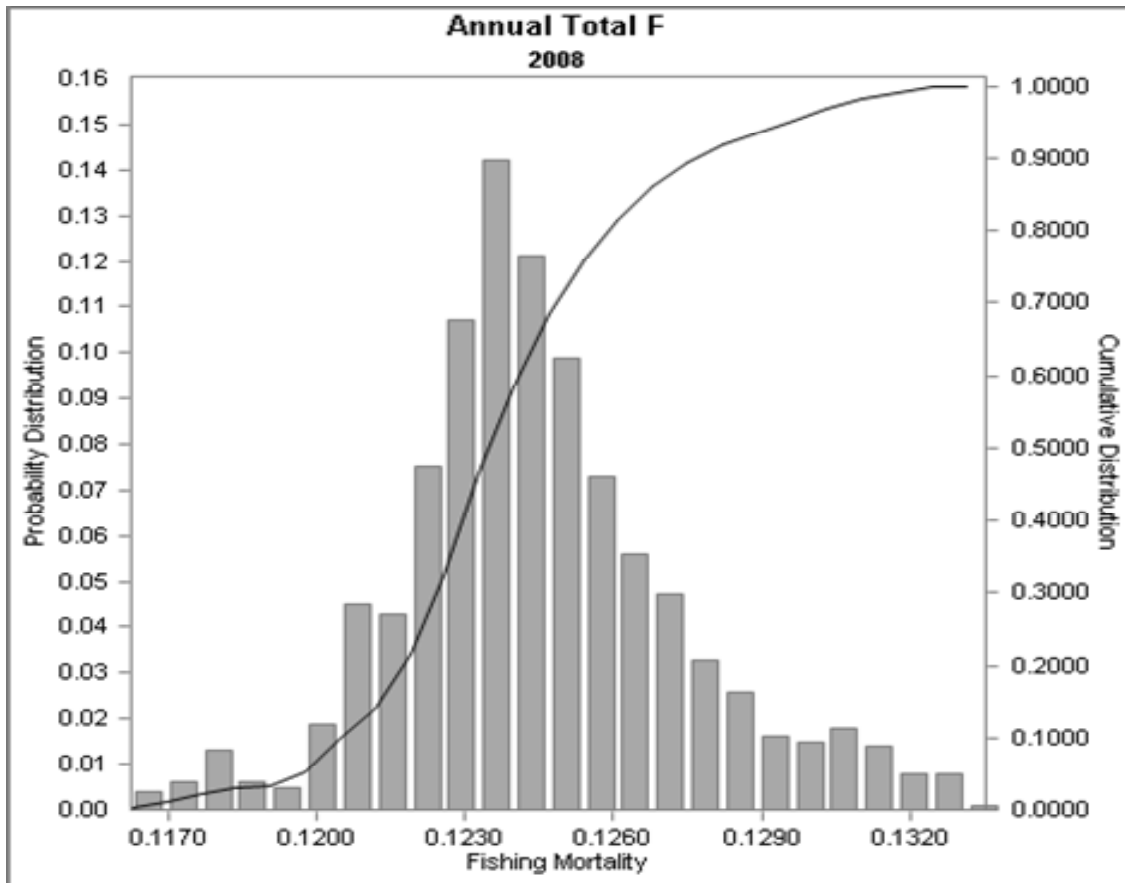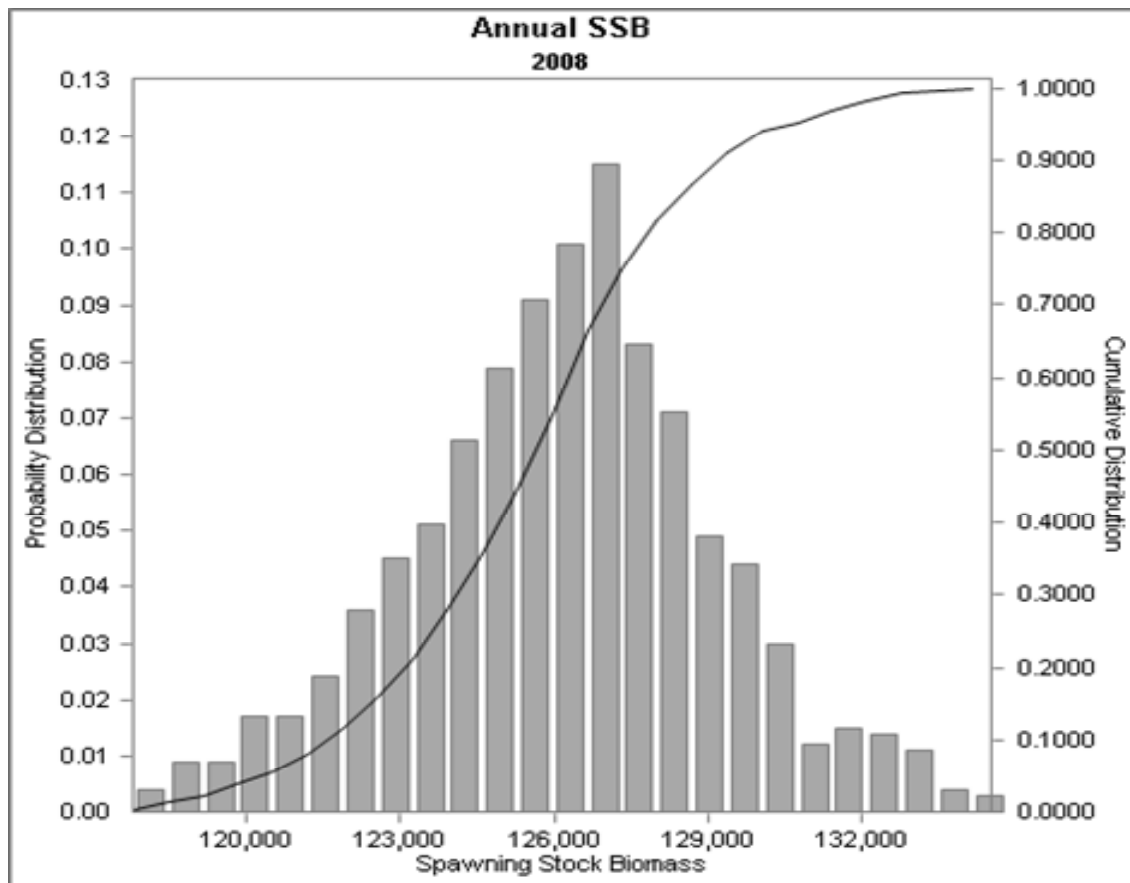| Year	Commercial Landings (mt)	Commercial Landings (000 lbs)	Recreational Landings (mt)	Recreational Discard (mt)	Recreational Catch (mt)	Total Landings (mt)	Total Catch (mt) (w/o commercial discards)
1974	4,538	10,005					
1975	4,402	9,705		assumes same			
1976	4,546	10,022		mean wt			
1977	4,802	10,587		as landings			
1978	4,986	10,992					
1979	5,693	12,551					
1980	6,857	15,117					
1981	7,465	16,457	43,222	2,001	45,223		52,688
1982	6,997	15,426	37,651	832	38,483	44,648	45,480
1983	7,166	15,798	40,425	1,280	41,705	47,591	48,871
1984	5,380	11,861	30,597	1,260	31,857	35,977	37,237
1985	6,122	13,497	23,821	599	24,420	29,943	30,542
1986	6,651	14,663	42,133	1,544	43,677	48,784	50,328
1987	6,578	14,502	34,769	1,615	36,384	41,347	42,962
1988	7,161	15,787	21,873	1,146	23,019	29,034	30,180
1989	4,740	10,450	17,808	989	18,797	22,548	23,537
1990	6,250	13,778	13,860	929	14,789	20,110	21,039
1991	6,160	13,580	14,967	1,194	16,161	21,127	22,320
1992	5,205	11,475	11,011	979	11,990	16,216	17,195
1993	4,808	10,600	9,204	1,013	10,217	14,012	15,025
1994	4,304	9,488	7,049	1,128	8,177	11,353	12,481
1995	3,628	7,998	6,489	1,003	7,492	10,117	11,120
1996	4,113	9,066	5,328	1,010	6,338	9,441	10,451
1997	4,064	8,960	6,487	1,287	7,774	10,551	11,838
1998	3,739	8,242	5,595	999	6,594	9,334	10,333
1999	3,330	7,341	3,744	1,191	4,935	7,074	8,264
2000	3,647	8,040	4,811	1,675	6,486	8,458	10,132
2001	3,945	8,697	6,001	1,857	7,858	9,946	11,803
2002	3,116	6,869	5,158	1,448	6,606	8,274	9,721
2003	3,358	7,403	5,958	1,331	7,289	9,316	10,647
2004	3,647	8,041	7,179	1,761	8,940	10,826	12,587
2005	3,187	7,026	8,225	1,915	10,140	11,412	13,327
2006	2,926	6,450	7,663	1,860	9,523	10,589	12,449
2007	3,258	7,182	9,608	2,653	12,261	12,865	15,518
2008	2,565	5,655	8,573	2,443	11,016	11,138	13,581

Table 2. Bluefish biological reference points and current status.

Assessment year	Catch year	Fmult	Fmsy	1/2 Bmsy	Bmsy	2008 Biomass	2008 reported landings	MSY
2008	2007	0.12	0.19	73,526	147,052	163,727	13,581	15,565

Table 3. Fishing mortality at age from 2008 ASAP model.

			Age				
	0	**1**	**2**	**3**	**4**	**5**	**6+**
1982	0.06	0.16	0.16	0.08	0.06	0.11	0.15
1983	0.07	0.20	0.19	0.09	0.07	0.14	0.18
1984	0.06	0.18	0.17	0.08	0.06	0.12	0.16
1985	0.06	0.18	0.17	0.08	0.06	0.12	0.16
1986	0.11	0.31	0.30	0.15	0.11	0.22	0.29
1987	0.11	0.34	0.32	0.16	0.12	0.23	0.31
1988	0.10	0.30	0.28	0.14	0.10	0.21	0.28
1989	0.08	0.25	0.23	0.12	0.08	0.17	0.22
1990	0.08	0.23	0.22	0.11	0.08	0.16	0.21
1991	0.10	0.28	0.27	0.14	0.10	0.20	0.26
1992	0.08	0.24	0.23	0.11	0.08	0.17	0.22
1993	0.08	0.24	0.22	0.11	0.08	0.16	0.22
1994	0.07	0.21	0.20	0.10	0.07	0.15	0.19
1995	0.06	0.17	0.16	0.08	0.06	0.12	0.16
1996	0.05	0.16	0.15	0.08	0.06	0.11	0.15
1997	0.06	0.19	0.18	0.09	0.06	0.13	0.17
1998	0.05	0.15	0.15	0.07	0.05	0.11	0.14
1999	0.04	0.12	0.11	0.06	0.04	0.08	0.11
2000	0.04	0.13	0.12	0.06	0.04	0.09	0.12
2001	0.05	0.15	0.14	0.07	0.05	0.10	0.14
2002	0.04	0.13	0.12	0.06	0.04	0.09	0.12
2003	0.05	0.14	0.13	0.07	0.05	0.10	0.13
2004	0.05	0.15	0.14	0.07	0.05	0.10	0.13
2005	0.05	0.15	0.14	0.07	0.05	0.11	0.14
2006	0.05	0.14	0.13	0.07	0.05	0.10	0.13
2007	0.05	0.16	0.15	0.07	0.05	0.11	0.14
2008	0.04	0.12	0.12	0.06	0.04	0.09	0.11

Table 4. Population abundance (000s) at age from updated ASAP model.

	Jan 1 abundance 000s							
	0	1	2	3	4	5	6+	total
1982	40,508	31,968	15,172	9,471	8,124	7,095	54,671	167,007
1983	39,915	31,368	22,195	10,635	7,169	6,285	43,681	161,248
1984	48,820	30,566	21,071	15,082	7,924	5,484	34,332	163,279
1985	27,078	37,634	20,941	14,586	11,344	6,103	27,852	145,538
1986	20,445	20,886	25,828	14,520	10,980	8,742	23,829	125,230
1987	14,197	15,055	12,495	15,736	10,239	8,073	20,403	96,197
1988	20,017	10,369	8,791	7,441	10,969	7,465	17,493	82,546
1989	45,328	14,802	6,281	5,419	5,278	8,099	15,833	101,040
1990	18,756	34,153	9,478	4,080	3,947	3,972	15,946	90,332
1991	22,457	14,206	22,209	6,246	2,993	2,986	13,349	84,446
1992	11,805	16,702	8,753	13,912	4,467	2,223	10,436	68,298
1993	13,428	8,908	10,745	5,710	10,155	3,367	8,394	60,708
1994	19,331	10,153	5,764	7,048	4,180	7,670	7,883	62,028
1995	17,432	14,727	6,717	3,861	5,213	3,181	10,728	61,858
1996	16,219	13,472	10,166	4,683	2,914	4,026	9,828	61,309
1997	15,064	12,577	9,392	7,153	3,552	2,258	9,895	59,890
1998	20,795	11,582	8,550	6,454	5,360	2,728	8,460	63,930
1999	24,195	16,162	8,129	6,055	4,910	4,163	8,024	71,638
2000	15,456	19,008	11,712	5,933	4,677	3,856	9,008	69,650
2001	27,972	12,108	13,656	8,478	4,564	3,662	9,428	79,868
2002	21,236	21,763	8,524	9,699	6,460	3,549	9,424	80,655
2003	23,203	16,659	15,701	6,195	7,477	5,065	9,534	83,835
2004	18,540	18,102	11,824	11,236	4,739	5,829	10,606	80,875
2005	24,354	14,445	12,800	8,432	8,579	3,690	11,905	84,205
2006	47,318	18,928	10,140	9,065	6,416	6,663	11,183	109,713
2007	26,265	36,952	13,474	7,277	6,944	5,007	13,008	108,926
2008	20,847	20,406	25,909	9,533	5,534	5,391	12,924	100,543

Table 5. Population biomass (MT) at age from updated ASAP model.

	biomass at age			mt				total
	0	**1**	**2**	**3**	**4**	**5**	**6+**	total
1982	5,671	15,664	23,061	19,415	25,996	30,025	271,058	390,891
1983	3,991	13,174	21,973	22,865	22,654	27,763	243,608	356,029
1984	4,882	12,532	19,596	27,600	23,060	24,586	193,975	306,231
1985	2,708	15,054	20,312	28,151	31,990	24,359	140,738	263,311
1986	2,453	10,234	30,994	33,685	34,587	37,617	115,521	265,092
1987	1,704	4,517	14,744	31,787	30,306	31,701	101,688	216,446
1988	3,403	4,147	8,791	15,254	31,153	26,606	80,870	170,224
1989	5,893	4,441	6,658	11,489	19,213	33,255	74,732	155,679
1990	3,939	17,077	8,341	7,058	12,788	16,591	71,344	137,137
1991	3,144	4,688	15,546	10,806	8,411	11,834	66,275	120,704
1992	1,889	6,514	9,104	26,294	12,508	7,343	53,296	116,946
1993	2,417	5,256	10,207	14,048	27,724	10,899	40,961	111,512
1994	2,320	4,061	5,188	13,250	12,707	28,815	32,266	98,605
1995	2,963	6,480	6,583	6,679	14,858	12,908	50,377	100,848
1996	2,757	5,928	9,963	8,102	8,306	16,337	46,154	97,546
1997	1,958	6,414	9,767	15,880	10,868	9,280	45,515	99,683
1998	3,951	6,949	8,037	15,167	18,226	10,967	45,515	108,812
1999	3,387	8,566	7,479	12,654	16,843	17,068	41,484	107,482
2000	2,628	8,744	11,712	16,137	16,418	13,918	50,803	120,359
2001	4,476	5,327	12,427	21,365	17,664	14,207	51,192	126,659
2002	3,610	11,969	9,973	22,211	18,735	13,413	43,915	123,827
2003	2,784	9,329	15,701	13,444	19,739	18,537	39,187	118,721
2004	1,483	8,146	15,607	24,045	15,496	21,858	49,211	135,846
2005	1,948	6,500	16,896	18,044	28,055	13,836	55,240	140,519
2006	3,785	8,518	13,385	19,400	20,980	24,986	51,888	142,941
2007	2,101	16,628	17,786	15,573	22,707	18,775	60,355	153,925
2008	1,668	9,183	34,199	20,400	18,096	20,215	59,966	163,727

Table 6. Catch at age (000s) for bluefish, Maine to Florida as used in the ASAP model.

CAA (000s)

	0	1	2	3	4	5	6+	total
1982	11157.8	9746.3	2847.8	2435.3	797.3	1216.7	3746.0	`
1983	4782.5	7661.1	8675.0	3024.1	971.7	1325.7	4787.5	31,228
1984	7139.9	6799.0	6686.3	2045.6	898.4	744.6	3189.8	27,504
1985	4680.2	6462.3	5776.5	2927.7	1325.2	520.0	2378.1	24,070
1986	5172.4	8044.7	8719.1	2813.4	1060.2	1705.1	4479.3	31,994
1987	3122.2	5418.7	5179.5	5750.5	2007.6	1085.3	3958.6	26,522
1988	1707.8	2080.8	2517.3	1590.7	1985.1	1599.4	2747.8	14,229
1989	3467.7	5671.1	3227.1	990.1	397.7	1172.6	2407.3	17,334
1990	2720.8	7197.9	1851.3	691.1	381.9	428.4	2461.0	15,732
1991	3709.6	5292.2	7331.9	1618.5	315.4	225.1	2149.3	20,642
1992	2117.6	9526.7	1738.7	2407.4	596.2	477.8	992.7	17,857
1993	1195.9	2072.9	1575.1	591.8	1036.5	665.4	1186.7	8,324
1994	1970.5	3144.3	1313.0	367.8	296.7	850.0	1073.5	9,016
1995	1903.6	3256.9	733.4	130.5	203.4	685.7	1121.6	8,035
1996	1712.6	2151.1	632.1	203.6	208.8	538.3	1397.6	6,844
1997	1636.3	4431.8	1528.4	571.0	210.5	96.3	1244.3	9,719
1998	665.1	2680.2	2711.3	838.1	254.0	299.8	446.5	7,895
1999	1569.8	1999.4	2106.9	614.4	190.8	384.6	481.2	7,347
2000	646.1	4255.9	2607.2	694.7	93.8	518.8	150.9	8,967
2001	1338.4	4227.0	3280.2	1090.1	187.6	575.3	230.4	10,929
2002	565.9	4959.5	1601.4	523.0	328.0	228.3	400.9	8,607
2003	815.6	2634.2	3957.2	771.1	376.2	318.3	641.2	9,514
2004	420.7	5149.3	2221.7	1225.6	425.3	460.8	643.9	10,547
2005	3262.8	2560.5	4179.2	1389.9	411.9	585.4	494.7	12,884
2006	2726.9	3498.7	2983.4	1092.4	302.3	284.1	664.7	11,553
2007	695	3067.2	5392.8	1549.2	853.7	582.7	759.3	12,900
2008	896.1	3792.8	4196.8	481.3	615.7	236.2	393.6	10,613

Table 7. Projections of abundance, biomass,SSB and yield for 2009-2010 from ASAP model. Assumed constant F=2008 and weight at age equivalent to 2008. Yield includes recreational discards with 15% mortality.

	F	Abundance (000s)	Biomass (000s mt)	SSB (000s mt)	Yield mt
2009	0.12	99,878	163.6	126.6	13,499
2010	0.12	95,444	171.8	138.3	12,865
2011	0.12	92,762	179.1	144.8	13,087