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 (½B_{MSY} =73,526 MT; F_{MSY} = 0.19). This conclusion is based on a 2006 biomass estimate of 139,496 MT and *F*=0.15 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 175 million fish, declined to 57 million in the mid-1990s and has since increased to 88 million fish.

Forecast for 2008: Forecast yield in 2008 at status quo F (0.15) was 14,464 MT, which includes recreational discards with 15% mortality. The forecast is based on a 2007 yield of 13,697 MT.

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

Year	2000	2001	2002	2003	2004	2005	2006	Max	Min	Mean
USA Commercial landings[1]	3.6	3.9	3.1	3.4	3.6	3.2	2.9	7.5	0.8	3.7
USA Recreational landings[2]	4.8	6.0	5.2	6.0	7.2	8.2	7.7	43.6	3.7	16.2
USA Recreational discards[2]	1.7	1.9	1.5	1.3	1.8	1.9	1.9	2.3	0.6	1.3
Total Catch[3]	10.2	11.8	9.8	10.7	12.6	13.3	12.5	53.4	5.1	20.2

[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 fishers along the Atlantic Coast. In 2006, recreational anglers along the Atlantic Coast harvested nearly 7,663 metric tons (MT) of bluefish (Figure 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). 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 again in 2002 and 2003 to 3,100 MT and 3,400 MT, respectively. Preliminary landing estimates for 2006 decreased to 2,900 MT (Figure 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 model. 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. 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, data unavailable for 2006). 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 SARC41 were used in this assessment for comparison to current stock status (½B_{MSY} = 73.5 million lbs or 33,339 MT; F_{MSY} = 0.19) (Table 1). 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 projected biomass estimate exceeds that level in 2009 (147,925 MT). The current F of 0.15 is below the SARC 41 approved F_{MSY} of 0.19 (note: the F_{MSY} estimate from the recent updated ASAP model is 0.11). Therefore, it is concluded that bluefish is not experiencing overfishing. The current estimate of biomass equals 139,496 MT, which 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 2006 F_{MULT} value equals 0.15. The trend in F has steadily declined since 1987 when F reached 0.38.

Total Stock Biomass: Biomass estimates peaked in 1982 at 303.0 thousand MT, then declined to 84.2 thousand MT by 1996 before increasing to the 2006 level of 139.5 thousand MT.

Recruitment: Recruitment estimated in the ASAP model has remained relatively constant since 2000 around 21.8 million age-0 bluefish. The 2006 recruitment estimate increased to 29.9 million fish.

Modeling: The subcommittee updated the ASAP model that was approved in the 41^{st} 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. 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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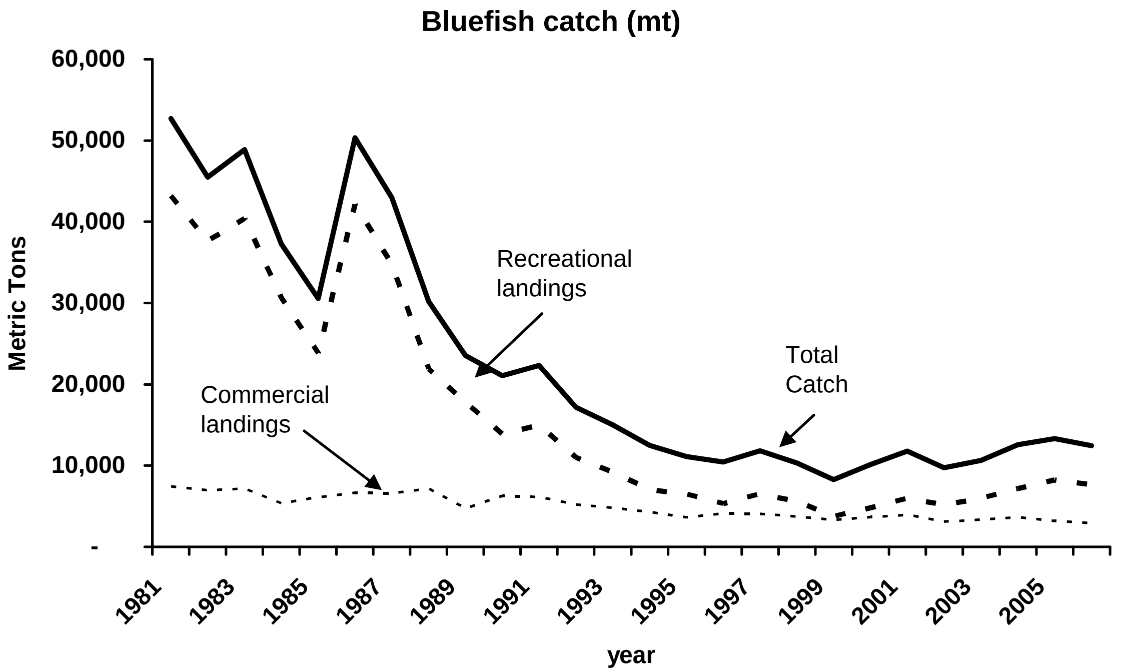

Figure 1. Total catch (landings plus recreational discards), recreational and commercial landings of bluefish, Maine to Florida, 1981-2006.

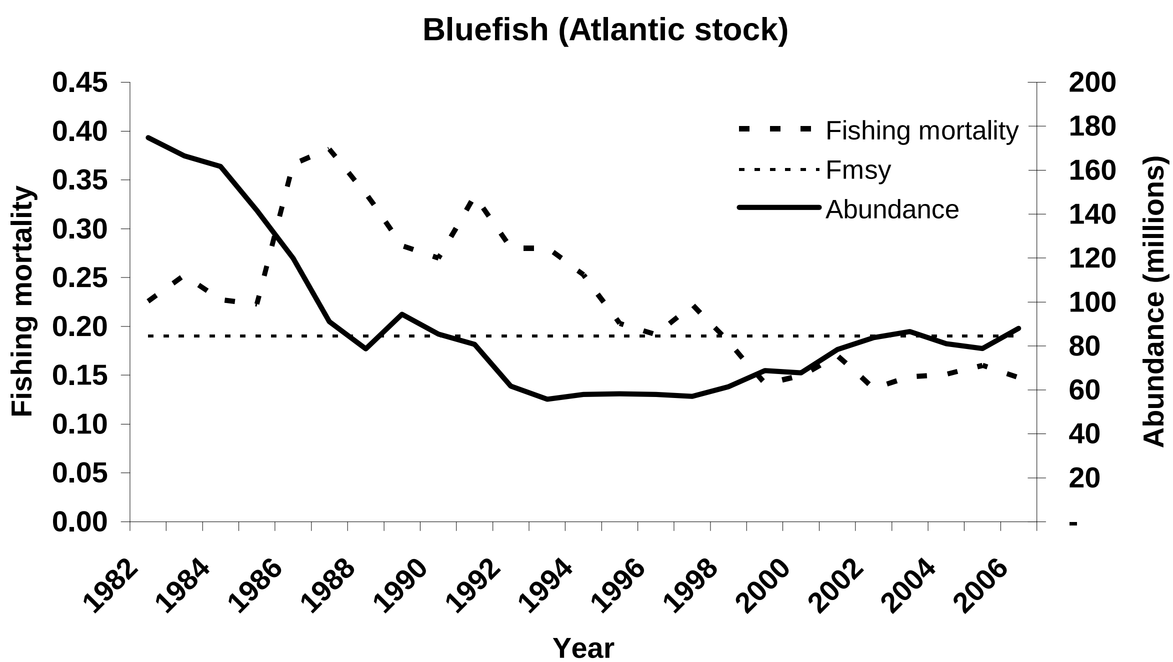

Figure 2. Fishing mortality and abundance estimates of bluefish (millions of fish) along the Atlantic coast estimated from the ASAP model.

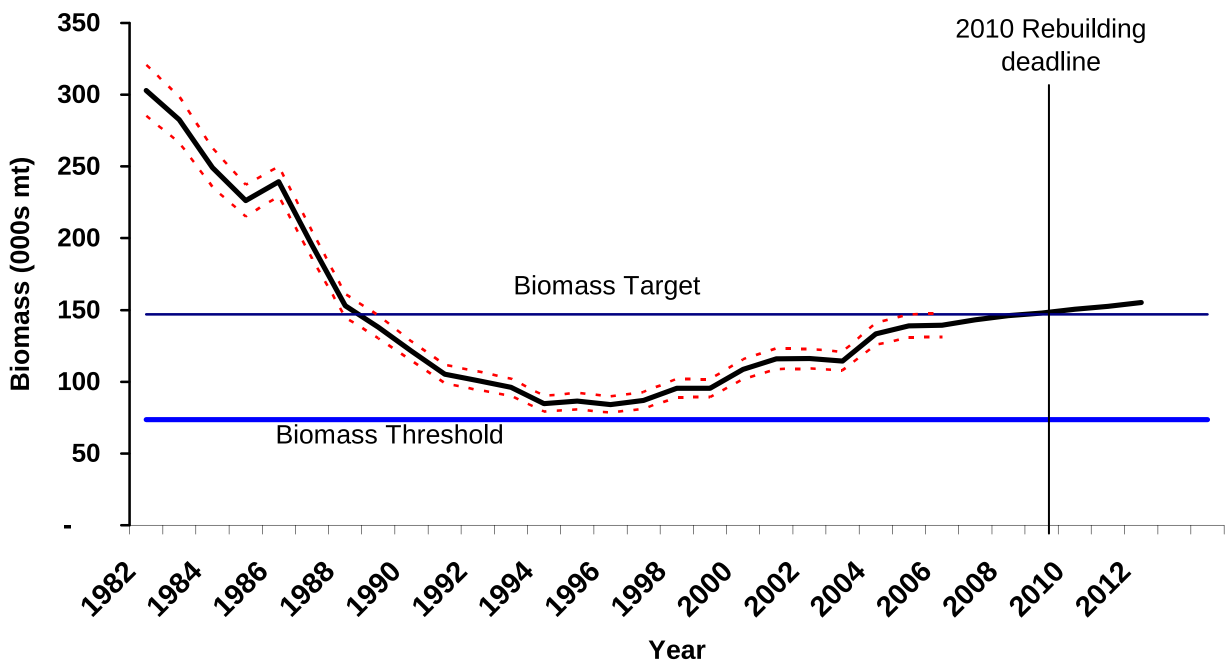

Figure 3. Atlantic coast bluefish biomass (+ 2 SEs) and biological reference points based on ASAP model results.

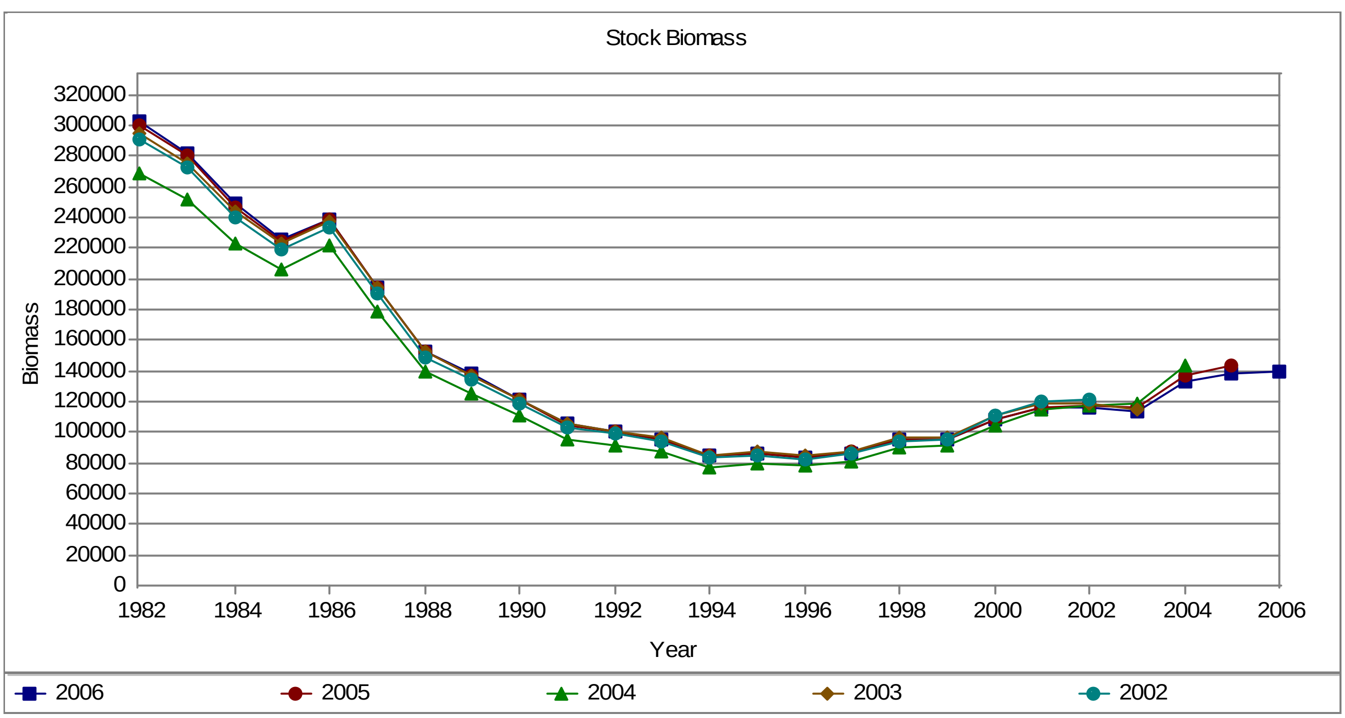

Figure 4. Retrospective pattern of total biomass from the ASAP model.

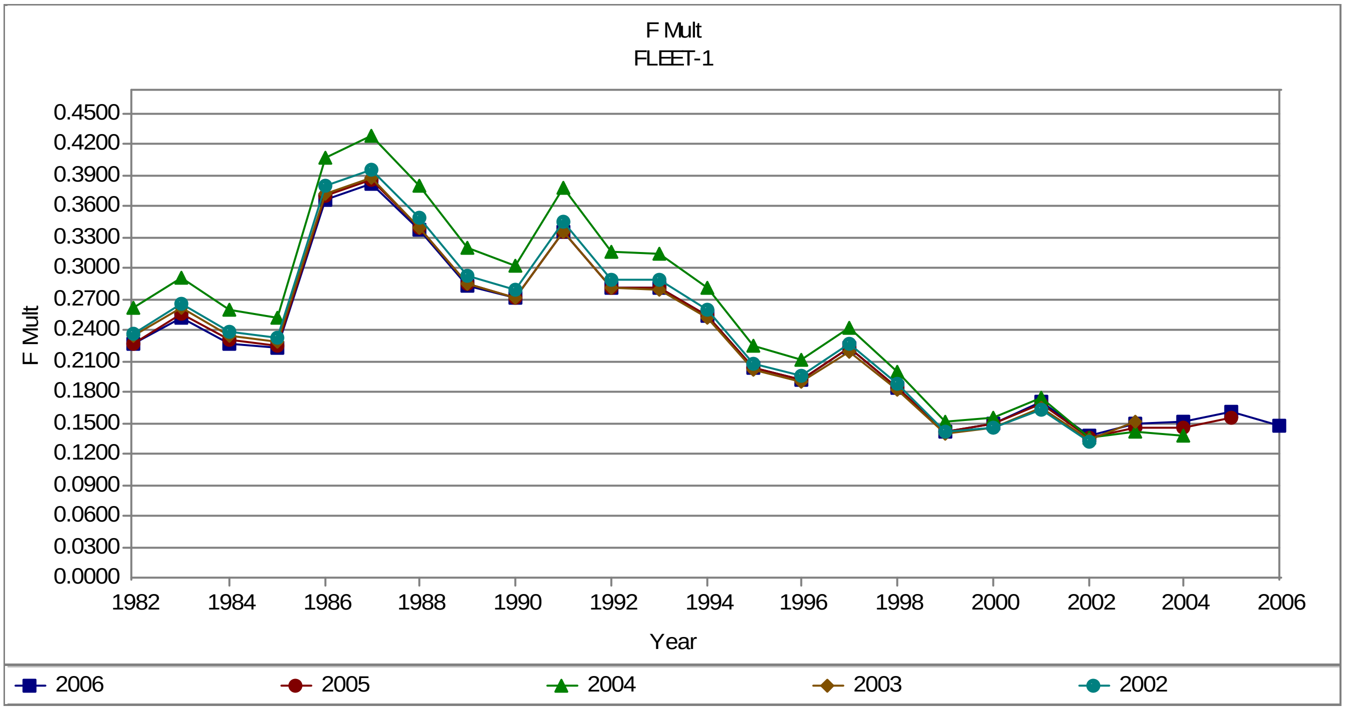

Figure 5. Retrospective pattern of F (avg. ages 1-2) from the updated ASAP model.

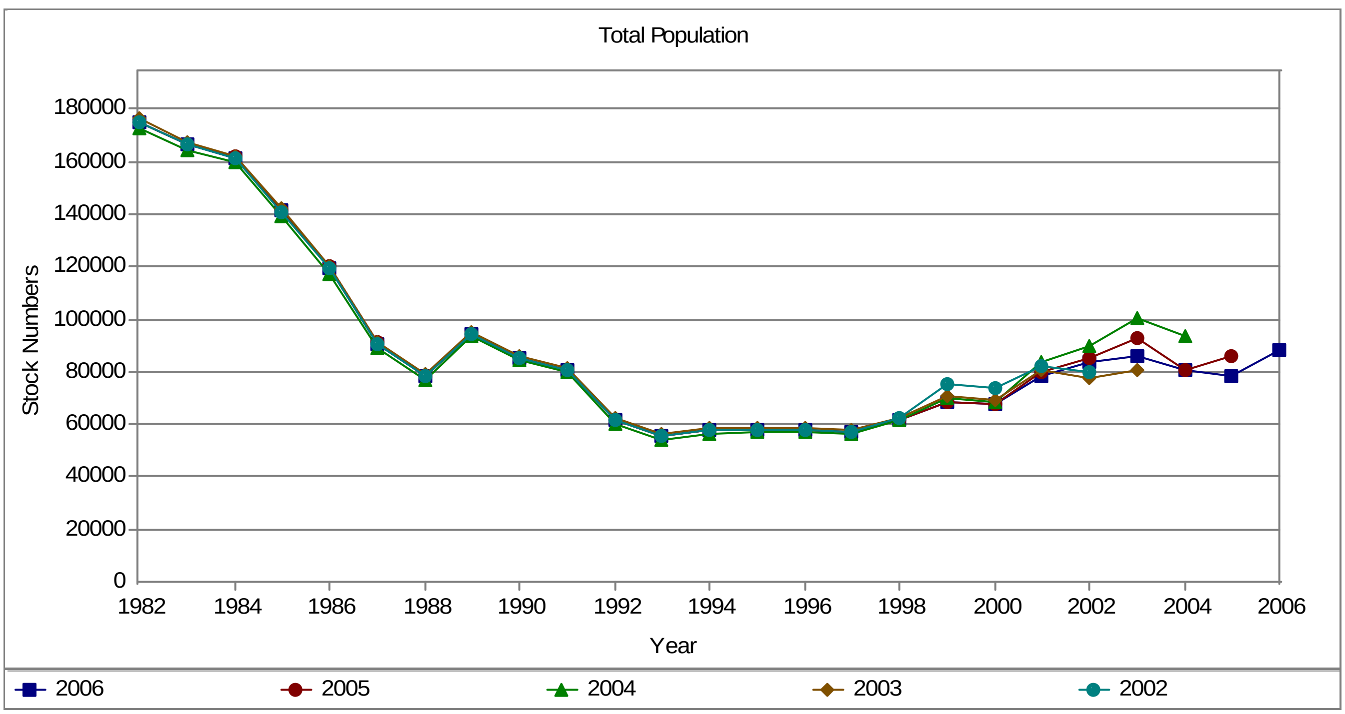

Figure 6. Retrospective pattern of N from updated ASAP model.

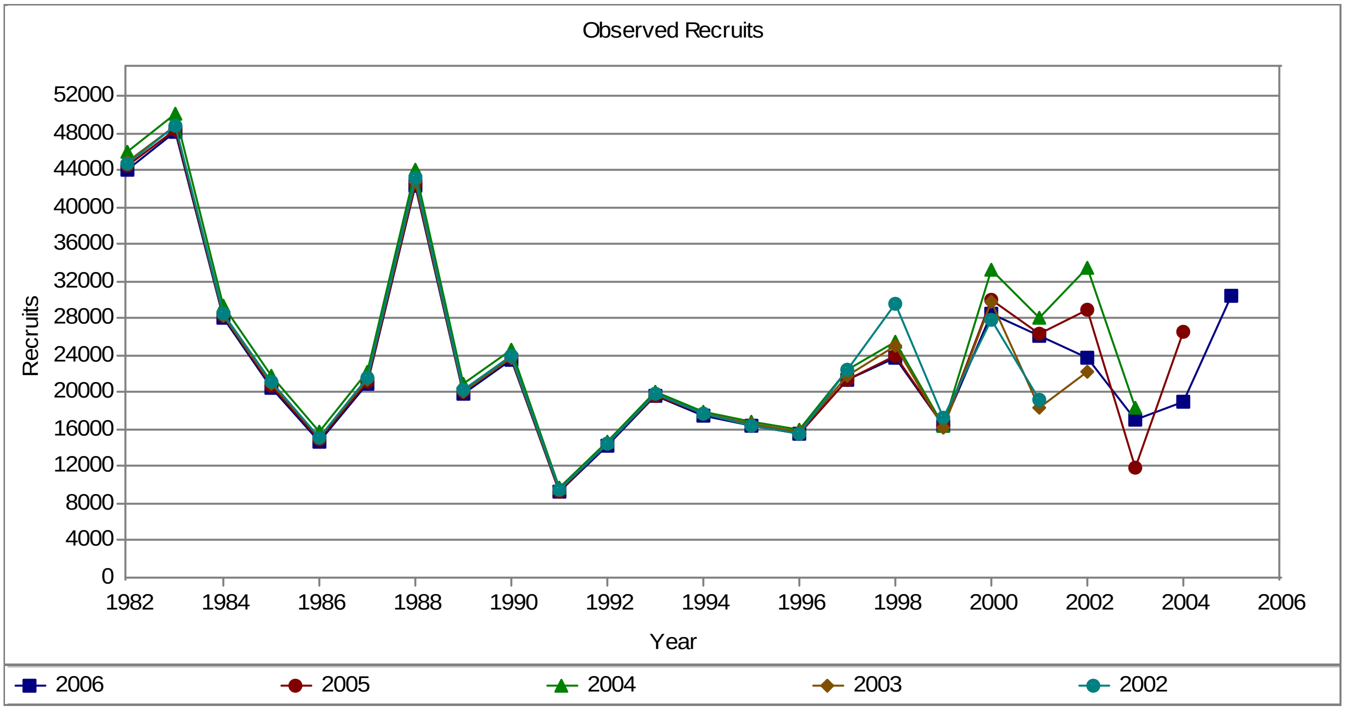

Figure 7. Retrospective pattern of observed recruits from updated ASAP model.

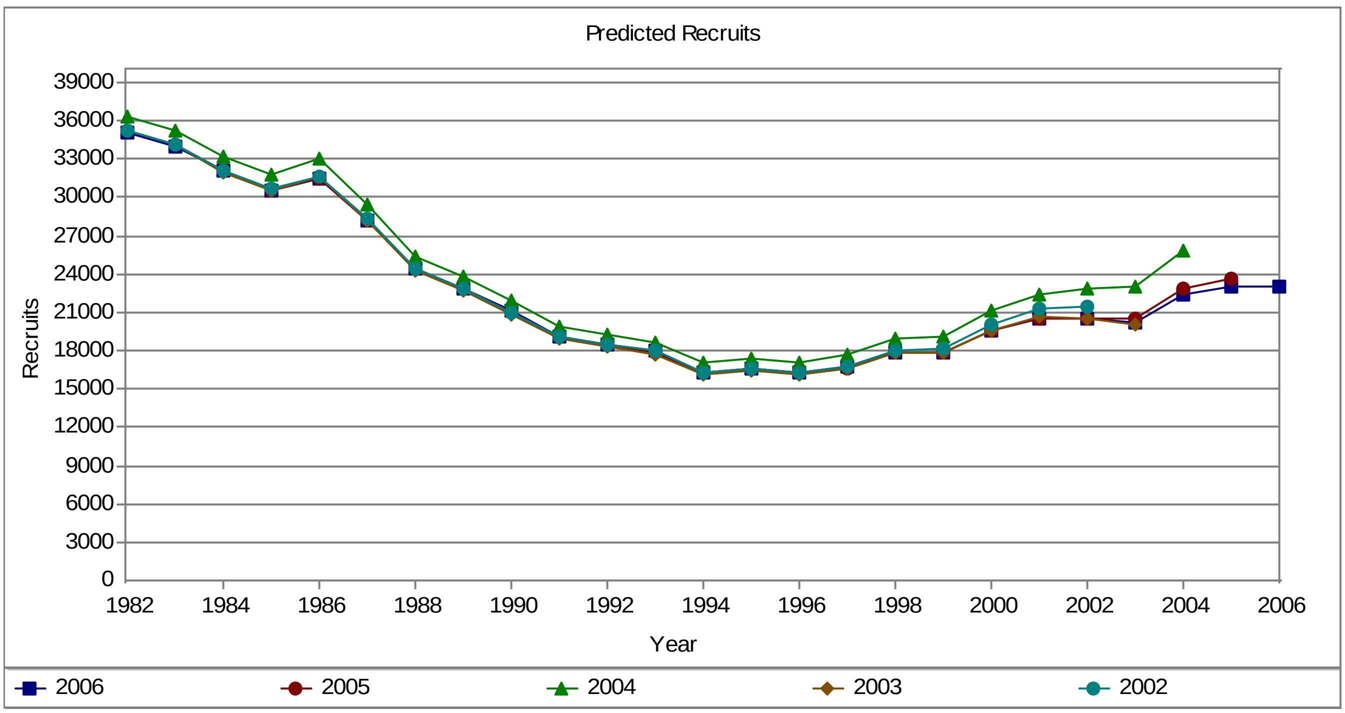

Figure 8. Retrospective pattern of predicted recruits from updated ASAP model.

Table 1. Bluefish biological reference points.

Assessment year	catch year	F_{multi}	F_{msy}	$F_{0.1}$	F_{max}	Biomass in metric tons B_{msy}	$1/2\ B_{msy}$	2006 Biomass	2006 landings	MSY
2007	**2006**	0.15	0.19	0.18	0.28	147,051	73,526	139,496	12,448	17,744

Table 2. Fishing mortality at age from updates ASAP model.

F at age	0	1	2	3	4	5	6+	F_{mult}
1982	0.08	0.23	0.21	0.11	0.08	0.16	0.21	0.23
1983	0.09	0.25	0.24	0.12	0.09	0.18	0.23	0.25
1984	0.08	0.23	0.21	0.11	0.08	0.16	0.21	0.23
1985	0.08	0.22	0.21	0.11	0.08	0.15	0.20	0.22
1986	0.12	0.37	0.34	0.17	0.13	0.25	0.33	0.37
1987	0.13	0.38	0.36	0.18	0.13	0.26	0.35	0.38
1988	0.11	0.34	0.32	0.16	0.12	0.23	0.31	0.34
1989	0.10	0.28	0.27	0.13	0.10	0.20	0.26	0.28
1990	0.09	0.27	0.25	0.13	0.09	0.19	0.25	0.27
1991	0.11	0.33	0.31	0.16	0.11	0.23	0.30	0.33
1992	0.09	0.28	0.26	0.13	0.10	0.19	0.26	0.28
1993	0.09	0.28	0.26	0.13	0.10	0.19	0.26	0.28
1994	0.09	0.25	0.24	0.12	0.09	0.18	0.23	0.25
1995	0.07	0.20	0.19	0.10	0.07	0.14	0.19	0.20
1996	0.06	0.19	0.18	0.09	0.07	0.13	0.18	0.19
1997	0.08	0.22	0.21	0.11	0.08	0.15	0.20	0.22
1998	0.06	0.18	0.17	0.09	0.06	0.13	0.17	0.18
1999	0.05	0.14	0.13	0.07	0.05	0.10	0.13	0.14
2000	0.05	0.15	0.14	0.07	0.05	0.10	0.14	0.15
2001	0.06	0.17	0.16	0.08	0.06	0.12	0.16	0.17
2002	0.05	0.14	0.13	0.07	0.05	0.09	0.13	0.14
2003	0.05	0.15	0.14	0.07	0.05	0.10	0.14	0.15
2004	0.05	0.15	0.14	0.07	0.05	0.10	0.14	0.15
2005	0.05	0.16	0.15	0.08	0.05	0.11	0.15	0.16
2006	0.05	0.15	0.14	0.07	0.05	0.10	0.13	0.15
Selectivity	0.34	1.00	0.94	0.48	0.34	0.69	0.91	

Table 3. Population abundance (000s) at age from updated ASAP model.

	0	1	2	3	4	5	6+	total 000s
1982	55,223	46,336	13,853	7,012	7,065	14,031	31,289	174,808
1983	44,010	41,897	30,282	9,173	5,157	5,354	30,673	166,545
1984	48,181	33,088	26,656	19,550	6,661	3,872	23,623	161,630
1985	28,065	36,534	21,589	17,623	14,367	5,045	18,426	141,649
1986	20,545	21,311	23,937	14,329	12,977	10,897	15,844	119,839
1987	14,744	14,862	12,098	13,880	9,855	9,370	16,202	91,013
1988	20,999	10,611	8,308	6,914	9,477	7,079	15,246	78,633
1989	42,366	15,346	6,208	4,956	4,824	6,914	13,772	94,386
1990	19,953	31,528	9,473	3,895	3,548	3,585	13,363	85,346
1991	23,605	14,913	19,713	6,016	2,805	2,648	10,985	80,685
1992	9,359	17,267	8,749	11,791	4,203	2,049	8,353	61,770
1993	14,342	6,970	10,681	5,501	8,448	3,126	6,674	55,740
1994	19,705	10,681	4,312	6,717	3,942	6,283	6,337	57,977
1995	17,564	14,813	6,793	2,783	4,877	2,959	8,436	58,225
1996	16,374	13,427	9,900	4,594	2,069	3,724	7,842	57,931
1997	15,581	12,565	9,077	6,768	3,434	1,586	8,059	57,070
1998	21,343	11,834	8,239	6,029	4,985	2,605	6,499	61,533
1999	23,835	16,420	8,059	5,671	4,522	3,832	6,374	68,713
2000	16,328	18,602	11,668	5,774	4,340	3,526	7,428	67,667
2001	28,593	12,710	13,115	8,298	4,403	3,376	7,907	78,402
2002	26,042	22,105	8,781	9,151	6,266	3,401	8,000	83,746
2003	23,807	20,358	15,784	6,320	7,020	4,895	8,313	86,497
2004	16,957	18,540	14,374	11,241	4,822	5,463	9,561	80,958
2005	19,162	13,194	13,056	10,211	8,566	3,749	10,849	78,787
2006	29,885	14,863	9,206	9,195	7,747	6,639	10,422	87,957

Table 4. Population biomass (MT) at age from updated ASAP model.

	0	1	2	3	4	5	6+	total mt
1982	7,731	22,704	21,057	14,374	22,607	59,378	155,133	302,985
1983	4,401	17,597	29,979	19,722	16,295	23,648	171,064	282,706
1984	4,818	13,566	24,790	35,777	19,382	17,359	133,469	249,161
1985	2,807	14,614	20,942	34,012	40,516	20,134	93,104	226,127
1986	2,465	10,442	28,724	33,243	40,876	46,891	76,813	239,454
1987	1,769	4,459	14,276	28,038	29,171	36,797	80,752	195,262
1988	3,570	4,244	8,308	14,174	26,913	25,229	70,482	152,920
1989	5,508	4,604	6,581	10,508	17,559	28,389	65,001	138,150
1990	4,190	15,764	8,336	6,739	11,494	14,974	59,787	121,286
1991	3,305	4,921	13,799	10,408	7,883	10,494	54,543	105,352
1992	1,497	6,734	9,099	22,284	11,769	6,767	42,656	100,806
1993	2,581	4,112	10,147	13,532	23,062	10,118	32,567	96,120
1994	2,365	4,273	3,881	12,628	11,983	23,604	25,937	84,671
1995	2,986	6,518	6,658	4,815	13,898	12,009	39,614	86,497
1996	2,784	5,908	9,702	7,948	5,896	15,113	36,827	84,177
1997	2,025	6,408	9,440	15,024	10,507	6,519	37,072	86,996
1998	4,055	7,100	7,744	14,167	16,949	10,472	34,965	95,453
1999	3,337	8,703	7,415	11,853	15,509	15,709	32,953	95,478
2000	2,776	8,557	11,668	15,706	15,235	12,731	41,894	108,565
2001	4,575	5,592	11,935	20,911	17,039	13,099	42,938	116,088
2002	4,427	12,158	10,274	20,956	18,173	12,855	37,282	116,124
2003	2,857	11,400	15,784	13,715	18,533	17,917	34,165	114,370
2004	1,357	8,343	18,973	24,055	15,769	20,486	44,363	133,345
2005	1,533	5,937	17,234	21,851	28,011	14,060	50,340	138,967
2006	2,391	6,688	12,152	19,677	25,334	24,896	48,359	139,496

Table 5. Catch at age (000s) for bluefish, Maine to Florida as used in the ASAP model.

	0	1	2	3	4	5	6+	Total
1982	11,164	9,748	2,851	2,439	795	1,214	3,736	31,947
1983	4,778	7,667	8,686	3,022	971	1,325	4,778	31,228
1984	7,121	6,807	6,719	2,040	895	745	3,177	27,503
1985	4,677	6,469	5,773	2,926	1,328	520	2,377	24,070
1986	5,169	8,071	8,728	2,802	1,056	1,703	4,465	31,994
1987	3,127	5,419	5,178	5,757	2,009	1,083	3,948	26,522
1988	1,710	2,084	2,524	1,589	1,984	1,599	2,740	14,229
1989	3,474	5,673	3,221	992	396	1,168	2,410	17,334
1990	2,727	7,186	1,841	687	382	432	2,479	15,732
1991	3,695	5,293	7,392	1,591	311	225	2,136	20,642
1992	2,131	9,633	1,710	2,353	583	479	967	17,857
1993	1,194	2,082	1,567	593	1,041	669	1,179	8,324
1994	1,971	3,144	1,313	368	297	850	1,073	9,016
1995	1,823	3,371	736	138	214	696	1,058	8,035
1996	1,701	2,145	632	202	207	545	1,412	6,844
1997	1,636	4,432	1,528	571	210	96	1,244	9,719
1998	665	2,680	2,711	838	254	300	447	7,895
1999	1,570	1,999	2,107	614	191	385	481	7,347
2000	646	4,256	2,607	695	94	519	151	8,968
2001	1,338	4,227	3,280	1,090	188	575	230	10,929
2002	566	4,959	1,601	523	328	228	401	8,607
2003	816	2,634	3,957	771	376	318	641	9,514
2004	421	5,149	2,222	1,226	425	461	644	10,547
2005	3,263	2,560	4,179	1,390	412	585	495	12,884
2006	2,727	3,499	2,983	1,092	302	284	665	11,553

Table 6. Yield at age (MT) estimated in ASAP model.

	0	1	2	3	4	5	6+	total
1982	1,563	4,776	4,333	5,001	2,545	5,136	18,525	41,878
1983	478	3,220	8,599	6,497	3,067	5,854	26,649	54,364
1984	712	2,791	6,248	3,733	2,605	3,339	17,948	37,376
1985	468	2,588	5,600	5,646	3,746	2,075	12,012	32,135
1986	620	3,955	10,474	6,500	3,328	7,328	21,646	53,851
1987	375	1,626	6,110	11,630	5,947	4,253	19,678	49,619
1988	291	833	2,524	3,257	5,635	5,697	12,669	30,906
1989	452	1,702	3,414	2,103	1,441	4,798	11,374	25,284
1990	573	3,593	1,620	1,189	1,237	1,803	11,089	21,103
1991	517	1,747	5,174	2,752	874	891	10,608	22,562
1992	341	3,757	1,778	4,447	1,634	1,583	4,940	18,479
1993	215	1,228	1,489	1,459	2,842	2,166	5,753	15,151
1994	236	1,258	1,182	692	902	3,192	4,392	11,854
1995	310	1,483	721	238	610	2,823	4,967	11,153
1996	289	944	619	350	591	2,211	6,630	11,633
1997	213	2,260	1,590	1,268	644	396	5,724	12,094
1998	126	1,608	2,549	1,970	864	1,205	2,402	10,724
1999	220	1,060	1,938	1,284	654	1,577	2,488	9,221
2000	110	1,958	2,607	1,890	329	1,873	851	9,618
2001	214	1,860	2,985	2,747	726	2,232	1,251	12,016
2002	96	2,728	1,874	1,198	951	863	1,868	9,577
2003	98	1,475	3,957	1,673	993	1,165	2,635	11,997
2004	34	2,317	2,933	2,623	1,391	1,728	2,988	14,013
2005	261	1,152	5,517	2,974	1,347	2,195	2,296	15,742
2006	218	1,574	3,938	2,338	989	1,065	3,084	13,206

Table 7. Projections of abundance at age, biomass at age, catch at age and yield at age for 2007-2012 from ASAP model. Assumed constant F and weight at age equivalent to 2006. Yield includes recreational discards with 15% mortality.

Abundance (000s)

	0	1	2	3	4	5	6+	total 000s
2007	23,452	23,278	10,500	6,559	7,018	6,030	12,363	89,200
2008	23,554	18,251	16,404	7,464	5,000	5,457	13,274	89,405
2009	23,848	18,331	12,862	11,660	5,690	3,889	13,502	89,782
2010	24,161	18,560	12,918	9,143	8,889	4,425	12,507	90,602
2011	24,430	18,803	13,079	9,182	6,969	6,913	12,193	91,570
2012	24,625	19,013	13,251	9,297	7,000	5,420	13,804	92,409

Biomass (mt)

	0	1	2	3	4	5	6+	total mts
2007	1,876	10,475	13,860	14,037	22,948	22,613	57,366	143,174
2008	1,884	8,213	21,653	15,973	16,351	20,465	61,593	146,132
2009	1,908	8,249	16,977	24,953	18,606	14,582	62,650	147,925
2010	1,933	8,352	17,051	19,565	29,066	16,593	58,033	150,594
2011	1,954	8,461	17,264	19,650	22,790	25,922	56,574	152,617
2012	1,970	8,556	17,491	19,896	22,890	20,325	64,049	155,176

Catch at Age (000s)

	0	1	2	3	4	5	6+	total
2007	1,052	2,946	1,257	410	319	541	1,439	7,964
2008	1,056	2,310	1,964	467	227	490	1,545	8,059
2009	1,069	2,320	1,540	729	259	349	1,571	7,838
2010	1,083	2,349	1,546	572	404	397	1,456	7,808
2011	1,096	2,380	1,566	574	317	620	1,419	7,972
2012	1,104	2,406	1,586	581	318	487	1,607	8,090

Yield at age (mt)

	0	1	2	3	4	5	6+	total
2007	84	1,326	1,659	878	1,044	2,030	6,676	13,697
2008	85	1,039	2,592	999	744	1,837	7,168	14,464
2009	86	1,044	2,032	1,560	846	1,309	7,291	14,169
2010	87	1,057	2,041	1,223	1,322	1,489	6,754	13,974
2011	88	1,071	2,067	1,229	1,037	2,327	6,584	14,402
2012	88	1,083	2,094	1,244	1,041	1,824	7,454	14,829