

## **BLACK SEA BASS TABLES**

Table 1. Landings of the northern stock of black sea bass, 1968-2003.

Year	commercial landings 000s lbs	commercial landings (mt)	recreational landings (mt)	total landings (mt)
1963				
1964				
1965				
1966				
1967				
1968	2,648	1201		
1969	2,643	1199		
1970	2,425	1100		
1971	1,354	614		
1972	1,676	760		
1973	2,560	1161		
1974	2,357	1069		
1975	4,156	1885		
1976	3,726	1690		
1977	5,344	2424		
1978	4,663	2115		
1979	4,134	1875		
1980	2,760	1252		
1981	2,489	1129	559	1688
1982	2,595	1177	4483	5660
1983	3,336	1513	1850	3363
1984	4,332	1965	656	2621
1985	3,419	1551	951	2502
1986	4,191	1901	5621	7522
1987	4,167	1890	873	2763
1988	4,142	1879	1301	3180
1989	2,919	1324	1492	2816
1990	3,501	1588	1252	2840
1991	2,804	1272	1899	3171
1992	3,007	1364	1227	2591
1993	3,113	1412	2196	3608
1994	1,975	896	1337	2233
1995	2,039	925	2815	3740
1996	3,245	1472	1811	3283
1997	2,615	1186	1936	3122
1998	2,564	1163	522	1685
1999	2,974	1349	755	2104
2000	2,714	1231	1798	3029
2001	2,934	1331	1630	2961
2002	3,532	1602	2024	3626
2003	3,077	1396	1933	3329

Table 2. NEFSC spring offshore survey In re-transformed stratified mean number per tow.

Year	MEAN	95% CI	
		LOW	HIGH
1968	0.159	0.109	0.212
1969	0.113	0.084	0.142
1970	0.111	0.073	0.150
1971	0.135	0.084	0.188
1972	0.555	0.393	0.735
1973	0.377	0.242	0.526
1974	1.277	0.851	1.803
1975	0.648	0.506	0.803
1976	1.587	1.286	1.929
1977	1.014	0.817	1.233
1978	0.854	0.650	1.082
1979	0.483	0.369	0.607
1980	1.328	0.981	1.735
1981	0.465	0.373	0.562
1982	0.120	0.085	0.156
1983	0.387	0.261	0.526
1984	0.219	0.149	0.292
1985	0.388	0.277	0.508
1986	1.136	0.811	1.519
1987	0.680	0.525	0.849
1988	0.982	0.731	1.269
1989	0.428	0.329	0.533
1990	0.553	0.372	0.757
1991	0.838	0.598	1.114
1992	0.962	0.735	1.218
1993	0.290	0.210	0.375
1994	0.198	0.131	0.269
1995	0.521	0.409	0.642
1996	0.306	0.228	0.389
1997	0.704	0.524	0.904
1998	0.210	0.154	0.268
1999	0.801	0.541	1.103
2000	1.066	0.788	1.388
2001	1.126	0.866	1.423
2002	2.175	1.769	2.641
2003	2.136	1.598	2.787
2004	0.864	0.700	1.043

Table 3. NEFSC winter survey In re-transformed stratified mean number per tow.

Year	MEAN	95% CI	
		LOW	HIGH
1992	2.452	2.015	2.952
1993	1.365	1.091	1.676
1994	0.761	0.554	0.996
1995	1.537	1.203	1.921
1996	3.319	2.640	4.126
1997	0.700	0.564	0.847
1998	0.771	0.637	0.915
1999	1.176	0.947	1.431
2000	4.481	3.523	5.641
2001	3.829	3.196	4.558
2002	8.188	6.718	9.937
2003	10.400	7.752	13.850
2004	2.023	1.704	2.379

Table 4. NEFSC fall survey In re-transformed stratified mean number per tow.

Year	MEAN	95% CI	
		LOW	HIGH
1972	0.454	0.330	0.590
1973	2.069	1.554	2.689
1974	1.871	1.423	2.402
1975	3.952	2.786	5.477
1976	4.547	3.021	6.653
1977	3.824	2.960	4.877
1978	0.521	0.330	0.739
1979	0.675	0.520	0.845
1980	1.844	1.270	2.562
1981	1.004	0.598	1.514
1982	1.230	0.924	1.585
1983	1.778	1.379	2.244
1984	0.905	0.598	1.270
1985	1.882	1.468	2.366
1986	3.685	2.572	5.146
1987	1.357	0.932	1.875
1988	3.695	2.834	4.749
1989	1.553	1.079	2.135
1990	2.069	1.483	2.792
1991	2.292	1.692	3.026
1992	1.880	1.277	2.643
1993	0.740	0.577	0.921
1994	1.642	1.251	2.101
1995	3.457	2.391	4.858
1996	0.838	0.586	1.130
1997	1.927	1.489	2.443
1998	3.299	2.324	4.559
1999	2.609	1.615	3.979
2000	6.102	4.278	8.557
2001	2.050	1.573	2.616
2002	3.138	2.306	4.178
2003	2.741	2.085	3.536

Table 5. NEFSC spring offshore survey In re-transformed stratified mean weight (kg) per tow.

Year	95% CI		
	MEAN	LOW	HIGH
1968	0.054	0.035	0.074
1969	0.058	0.040	0.075
1970	0.073	0.048	0.100
1971	0.051	0.020	0.083
1972	0.156	0.098	0.216
1973	0.203	0.112	0.303
1974	0.621	0.378	0.907
1975	0.315	0.247	0.386
1976	0.591	0.439	0.760
1977	0.379	0.277	0.490
1978	0.336	0.251	0.426
1979	0.290	0.215	0.369
1980	0.277	0.187	0.374
1981	0.232	0.174	0.294
1982	0.041	0.026	0.056
1983	0.125	0.067	0.186
1984	0.108	0.064	0.154
1985	0.147	0.098	0.197
1986	0.355	0.225	0.499
1987	0.254	0.178	0.335
1988	0.328	0.238	0.424
1989	0.146	0.093	0.202
1990	0.131	0.079	0.186
1991	0.077	0.034	0.121
1992	0.306	0.220	0.399
1993	0.094	0.059	0.130
1994	0.080	0.043	0.118
1995	0.153	0.103	0.206
1996	0.105	0.073	0.137
1997	0.250	0.168	0.339
1998	0.091	0.057	0.126
1999	0.292	0.164	0.434
2000	0.161	0.104	0.222
2001	0.383	0.275	0.502
2002	0.723	0.582	0.875
2003	0.852	0.601	1.141
2004	0.390	0.300	0.485

Table 6. NEFSC winter survey In re-transformed stratified mean weight (kg) per tow.

Year	MEAN	95% CI	
		LOW	HIGH
1992	0.464	0.374	0.560
1993	0.506	0.390	0.632
1994	0.170	0.112	0.231
1995	0.365	0.262	0.477
1996	0.501	0.380	0.633
1997	0.198	0.142	0.257
1998	0.195	0.166	0.224
1999	0.266	0.212	0.323
2000	0.478	0.366	0.599
2001	0.949	0.747	1.175
2002	1.573	1.293	1.888
2003	1.832	1.360	2.398
2004	0.671	0.551	0.801

Table 7. NEFSC Spring offshore survey indices of exploitable biomass ( $\geq 22$  cm) and relative exploitation rate.

Year	3 pt avg		ln re-transformed 3 pt avg		Rel Expl. index/1000	3 pt avg mov. Avg.
	Mean kg/tow	mov. Avg.	Mean kg/tow	mov. Avg.		
1968	0.152		0.040			
1969	0.217	0.145	0.024	0.042		
1970	0.066	0.115	0.062	0.041		
1971	0.063	0.095	0.036	0.069		
1972	0.155	0.163	0.108	0.092		
1973	0.272	0.464	0.131	0.249		
1974	0.964	0.694	0.509	0.292		
1975	0.846	0.814	0.237	0.367		
1976	0.631	0.866	0.355	0.247		
1977	1.120	0.827	0.149	0.232		
1978	0.730	<b>0.976</b>	0.193	0.149		
1979	1.078	0.700	0.104	0.144		
1980	0.292	0.560	0.134	0.134		
1981	0.311	0.210	0.164	0.106	10.32	
1982	0.027	0.161	0.019	0.088	294.25	115.39
1983	0.145	0.098	0.081	0.066	41.60	120.94
1984	0.122	0.144	0.097	0.098	26.98	30.05
1985	0.164	0.281	0.116	0.142	21.56	27.97
1986	0.559	0.367	0.213	0.177	35.36	23.50
1987	0.380	0.448	0.204	0.205	13.56	21.63
1988	0.407	0.308	0.199	0.162	15.97	20.95
1989	0.138	0.230	0.085	0.123	33.31	27.62
1990	0.144	0.113	0.085	0.072	33.58	44.25
1991	0.057	0.188	0.048	0.114	65.84	37.30
1992	0.362	0.187	0.208	0.099	12.47	55.73
1993	0.141	0.196	0.041	0.102	88.89	46.47
1994	0.086	0.125	0.059	0.069	38.04	53.96
1995	0.148	0.126	0.107	0.086	34.95	36.34
1996	0.143	0.197	0.091	0.111	36.04	31.35
1997	0.300	0.185	0.135	0.093	23.06	30.53
1998	0.111	0.278	0.052	0.136	32.50	21.68
1999	0.424	0.230	0.222	0.137	9.49	21.37
2000	0.156	0.350	0.137	0.198	22.11	14.73
2001	0.470	0.582	0.235	0.390	12.59	13.08
2002	1.121	1.247	0.799	0.509	4.54	7.96
2003	2.151	1.403	0.493	0.537	6.75	
2004	0.937		0.320			



Table 8. NEFSC black sea bass juvenile indices  
( $\leq 14$  cm) from spring survey.

Year	In re-transformed stratified mean #/tow
1968	0.085
1969	0.000
1970	0.000
1971	0.000
1972	0.143
1973	0.000
1974	0.000
1975	0.061
1976	0.557
1977	0.163
1978	0.148
1979	0.017
1980	0.482
1981	0.045
1982	0.003
1983	0.009
1984	0.007
1985	0.085
1986	0.149
1987	0.030
1988	0.232
1989	0.070
1990	0.171
1991	0.499
1992	0.164
1993	0.007
1994	0.011
1995	0.162
1996	0.063
1997	0.024
1998	0.000
1999	0.347
2000	0.661
2001	0.078
2002	0.554
2003	0.154
2004	0.080

Table 9. Black sea bass mean number per tow from state spring surveys.

	MA #/tow	CT #/tow	NJ #/tow
1968			
1969			
1970			
1971			
1972			
1973			
1974			
1975			
1976			
1977			
1978	1.958		
1979	0.988		
1980	0.997		
1981	2.233		
1982	2.158		
1983	4.529		
1984	1.597	0.164	
1985	1.208	0.274	
1986	1.583	0.123	
1987	0.705	0.053	
1988	0.420	0.045	
1989	0.547	0.079	0.166
1990	0.698	0.103	0.044
1991	0.381	0.072	0.327
1992	0.087	0.026	0.392
1993	0.112	0.072	0.123
1994	0.219	0.121	0.202
1995	0.465	0.066	1.673
1996	0.154	0.107	0.295
1997	0.452	0.095	0.763
1998	0.224	0.042	0.317
1999	1.255	0.077	1.094
2000	4.003	0.219	0.246
2001	1.752	0.253	0.912
2002	1.880	0.673	2.699
2003	0.830	0.213	1.657

Table 10. Juvenile black sea bass indices, mean number per tow. NJ indices are log<sub>e</sub> transformed, MD indices are geometric mean

	MA	NJ	MD
<b>1972</b>			8.34
<b>1973</b>			1.40
<b>1974</b>			1.94
<b>1975</b>			1.48
<b>1976</b>			1.28
<b>1977</b>			0.78
<b>1978</b>	79.3		0.75
<b>1979</b>	73.2		0.07
<b>1980</b>	93.1		1.08
<b>1981</b>	62.9		0.78
<b>1982</b>	397.2		0.53
<b>1983</b>	185.7		0.00
<b>1984</b>	201.3		0.99
<b>1985</b>	198.5		1.70
<b>1986</b>	80.4		4.94
<b>1987</b>	35.3		1.35
<b>1988</b>	60.4	0.536	1.41
<b>1989</b>	6.5	0.380	0.16
<b>1990</b>	4.3	0.043	1.24
<b>1991</b>	9.5	0.851	1.12
<b>1992</b>	10.8	0.872	0.92
<b>1993</b>	1.1	0.449	0.18
<b>1994</b>	45	0.178	0.84
<b>1995</b>	32.6	0.512	1.71
<b>1996</b>	23.6	1.032	0.06
<b>1997</b>	5.3	5.136	0.93
<b>1998</b>	9.9	2.880	0.33
<b>1999</b>	22.1	0.577	1.74
<b>2000</b>	195.5	0.974	1.95
<b>2001</b>	87.9	0.628	1.12
<b>2002</b>	118.9	0.815	1.95
<b>2003</b>	178.2	0.516	0.82

Table 11. Correlation among spring surveys.

	NMFS spring	MA	CT	NJ	NMFS winter	NMFS fall
NMFS -spr	1.00					
MA	0.10	1.00				
CT	0.62	0.52	1.00			
NJ	0.76	0.23	0.73	1.00		
NMFS -winter	0.90	0.39	0.69	0.63	1.00	
NMFS -fall	0.45	0.25	0.19	0.26	0.25	1.00

Table 12. Summary of black sea bass releases by state, season, tag type.

<b>Fall 2002</b>	<b>MA</b>	<b>RI</b>	<b>CT</b>	<b>NY</b>	<b>NJ</b>	<b>DE</b>	<b>MD</b>	<b>VA</b>
<b>regular</b>	1168	234		206	517		1014	332
<b>\$</b>	93	24		20	33		98	44
<b>Spring 2003</b>								
<b>regular</b>	131				445	283	557	955
<b>\$</b>	7				25	16	35	
<b>Fall 2003</b>								
<b>regular</b>	369	535	24	216	686		550	652
<b>\$</b>	30	30	2	18	55		46	83

Table 13a. Tagged black sea bass dispersal among statistical areas for Fall 2002 releases.

Release Area	Recapture Area						
	538	539	612	613	614	621	631
<b>week 1</b>							
538	2						
539		33					
612			1				
613				9			
614					1		
621						1	
631							1

  

Release Area	Recapture Area									
	514	537	538	539	612	613	614	621	625	631
<b>week 2</b>										
514	2									
537										
538		1	4							
539				32						
612					4	1				
613						3				
614							1			
621								3		
625										2
631										

  

Release Area	Recapture Area									
	514	537	538	539	612	613	614	621	625	631
<b>week 3</b>										
514										
537										
538		1	13							
539				14						
612					4					
613										
614										
621								1		
625										4
631										

  

Release Area	Recapture Area							
	514	537	538	539	612	613	614	621
<b>week 4</b>								
514	7							
537								
538		3	14					
539								
612					4			
613						2		
614								
621							1	2

Table 13b. Tagged black sea bass dispersal among statistical areas for spring 2003 releases.

Release area	Recapture area							
	week 1	538	612	614	621	625	631	635
538		3						
612			5	1				
614								
621					14			
625						1		
631							4	1
635								

week 2	538	612	614	615	621	631
538	2					
612		4		1		
614						
615						
621			1		17	
631						6

week 3	538	612	621	626	631
538	1				
612		15			
621			12		
626				2	
631					1

week 4	538	612	613	621	631
538	1				
612		5	1		
613					
621				15	1
631					2

Table 13c. Tagged black sea bass dispersal among statistical areas for fall 2003 releases.

		Recapture area							
week 1		538	539	612	613	614	621	625	631
Release Area	538	2	1						
	539		11						
	612			8		1			
	613				5				
	614					2			
	615					4			
	621						11		
	625							2	5
	631								

  

week 2		538	539	611	612	613	614	615	621	625	631
538	1										
539		3									
611			1								
612				2							
613					5						
614							42	4			
615								1			
621									13		
625										5	
631											11

  

week 3		539	612	613	614	615	621	631
539	6							
612		1						
613			3					
614				4				
615				1				
621						3		
631								8

  

week 4		539	611	612	613	614	615	621	631
539	1								
611		1							
612			2						
613				2					
614					14	1			
615					2				
621								2	
631									6

Table 14. Black sea bass tag recapture rates by region, fishery and combined for fall 2002 and spring 2003 releases. Assumed reporting rate for \$100 tags of 100%.

**Regular Tags**

Area	Number Released	Recreational Recaptures	Commercial Recaptures	total
MA-NY	1652	43	131	174
NJ-DE	1050	179	8	187
MD-VA	2623	53	45	98
<b>total</b>	<b>5325</b>	<b>275</b>	<b>184</b>	<b>459</b>

**Recapture rate**

Rec.		Com.		Area only	Fishery only		Overall
Rec.	Com.	Rec.	Com.		Rec.	Com.	
2.6%	7.9%			MA-NY	3.3%		
17.0%	0.8%			NJ-DE	3.5%	5.2%	3.5%
2.0%	1.7%			MD-VA	1.8%		8.6%

**High Reward Tags**

Area	Number Released	Recreational Recaptures	Commercial Recaptures	total
MA-NY	132	7	18	25
NJ-DE	57	17	0	17
MD-VA	158	2	3	5
<b>total</b>	<b>347</b>	<b>26</b>	<b>21</b>	<b>47</b>

**Recapture rate**

Rec.		Com.		Area only	Fishery only		Overall
Rec.	Com.	Rec.	Com.		Rec.	Com.	
5.3%	13.6%			MA-NY	7.2%		
29.8%	0.0%			NJ-DE	4.9%	7.5%	6.1%
1.3%	1.9%			MD-VA	1.4%		13.5%

Table 15 . Black sea bass tag reporting rates by region, fishery and combined for fall 2002 and spring 2003 releases. Assuming 100% reporting of high reward tags.

Area	Fishery		Area	Area	Fishery		Overall
	Rec.	Com.			Rec.	Com.	
MA-NY	49.1%	58.2%	MA-NY	45.4%	68.9%	57.1%	63.6%
NJ-DE	57.2%	0.0%	NJ-DE	71.7%			
MD-VA	100.0%	90.4%	MD-VA	127.7%			

Table 16. Black sea bass tag reporting rates by region, fishery and combined for fall 2002 and spring 2003 releases with the assumption of 80% reporting of high reward tags in the commercial fishery.

Area	Fishery		Area	Area	Fishery		Overall
	Rec.	Com.			Rec.	Com.	
MA-NY	49.1%	47.6%	MA-NY	39.1%	68.9%	44.4%	56.4%
NJ-DE	57.2%	43.4%	NJ-DE	67.7%			
MD-VA	100.0%	67.8%	MD-VA	106.4%			



Table 17. Black sea bass Fall 2002 tag release/recaptures for fish  $\geq 28$  cm, at large  $> 7$  and  $\leq 365$  days and without RI recaptures within 2 weeks of releases. Killed fish only, assuming 100% high reward reporting and 10% tag loss rate.

region	Releases		fishery	Regular Tag		expected High		sum
	Regular Tags	High Reward Tags		Recaptures	Reporting Rates	regular Recaptures	Reward Recaptures	
MA-NY	1524	125	Com	120	58.2%	206	15	221
			Rec	33	49.1%	67	7	74
NJ-DE	416	24	Com	7	57.2%	12	0	12
			Rec	47	57.2%	82	6	88
MD-VA	1192	130	Com	28	90.4%	31	4	35
			Rec	22	100.0%	22	2	24
sum	3132	279				421	34	455

  

tag loss adj.		Overall	
R	M	u	F
Regular	2819	14.8%	0.177
\$	251		
Overall	3070		

\* region 2 com reporting rate set = rec

Table 18 . Black sea bass Spring 2003 tag release/recaptures for fish  $\geq 28$  cm, at large  $> 7$  and  $\leq 365$  days and without RI recaptures within 2 weeks of releases. Killed fish only, assuming 100% high reward reporting and 10% tag loss rate.

region	Releases		fishery	Regular	Reporting	expected	High	sum
	Regular Tags	High Reward Tags		Tag Recaptures	Rates	regular Recaptures	Reward Recaptures	
MA-NY	128	7	Com	10	58.2%	17	0	17
			Rec	8	49.1%	16	0	16
NJ-DE	634	33	Com	3	<b>57.2%</b>	5	0	5
			Rec	130	57.2%	227	10	237
MD-VA	1431	28	Com	20	90.4%	22	0	22
			Rec	97	100.0%	97	2	99
sum	2193	68		268		385	12	397

  

tag loss adj.	
R	M
Regular	385
\$	12
Overall	397

  

Overall	
u	F
19.5%	<b>0.241</b>

Table 19. Black sea bass Fall 2002 tag release/recaptures for fish  $\geq 28$  cm, at large  $> 7$  and  $\leq 365$  days and without RI recaptures within 2 weeks of releases. Killed fish only, assuming 80% high reward reporting and 10% tag loss rate.

Releases			fishery					
region	Regular Tags	High Reward Tags	Regular Tag Recaptures	Reporting Rates	expected regular Recaptures	High Reward Recaptures	sum	
MA-NY	1524	125	Com	120	47.6%	252	19	271
			Rec	33	49.1%	67	7	74
NJ-DE	416	24	Com	7	43.4%	16	1	17
			Rec	47	57.2%	82	6	88
MD-VA	1192	130	Com	28	67.8%	41	5	46
			Rec	22	100.0%	22	2	24
sum	3132	279				481	40	521

  

tag loss adj.		Overall	
	R	M	F
Regular	481	2819	
\$	40	251	
Overall	521	3070	17.0%
			<b>0.207</b>

Table 20. Black sea bass Spring 2003 tag release/recaptures for fish  $\geq 28$  cm, at large  $> 7$  and  $\leq 365$  days and without RI recaptures within 2 weeks of releases. Killed fish only, assuming 80% high reward reporting and 10% tag loss rate.

region	Releases		fishery	Regular	Reporting	expected	High	sum
	Regular Tags	High Reward Tags		Tag Recaptures	Rates	regular Recaptures	Reward Recaptures	
MA-NY	128	7	Com	10	47.6%	21	2	23
			Rec	8	49.1%	16	2	18
NJ-DE	634	33	Com	3	43.4%	7	2	9
			Rec	130	57.2%	227	12	239
MD-VA	1431	28	Com	20	67.8%	30	2	32
			Rec	97	100.0%	97	2	99
sum	2193	68		268		398	22	421

  

tag loss adj.	
R	M
Regular	398
\$	22
Overall	420

  

Overall	
u	F
20.6%	0.258

\* region 2 com reporting rate set = region 1

Table 21. Sensitivity analyses of alternative weighting schemes in the calculation of from R/M model. M per region assumed independent and 100% reporting of high reward

Region	Fishery	Fall 2002	Spring 2003
		F	F
MA-NY	Com	0.179	0.170
	Rec	0.056	0.160
NJ-DE	Com	0.035	0.010
	Rec	0.280	0.568
MD-VA	Com	0.032	0.019
	Rec	0.022	0.086
Weighted by proportion M per		<b>0.176</b>	<b>0.258</b>
<u>Alternative weighting</u>			
by % marked per <u>regio</u>		0.183	0.258
Hypothetica	33:33:33	0.168	0.348
Regiona	25:50:25	0.189	0.405
Proportion of	50:25:25	0.175	0.352
	25:25:50	0.138	0.287

Table 22 . Alternative estimation method for black sea bass tag release/recaptures.  
 Limited to fish at large >7 days, <=365 days; excludes RI recaptures <=14 days;  
 Released fish >= 28 cm, releases adjusted for 10% tag loss; includes regular and high reward tags;  
 high reward tags assume 100% reporting; regular tags adjusted for overall reporting rate.

expected recaptures:  $E(i,j) = N(i) * St * (1 - (\exp(-(F+M)) * (t_j - t_i))) * (F / (F+M))$   
 solve F such that  $E(i,j) = R(i,j)$   
 time = Sept. 2002 to Sept. 2003

**Fall 2002**

10/01/2002 - 9/30/2003

Ni	3411		
St	1		
F	<b>0.152</b>	E(i,j)	R(i,j)
M	0.2	438.0	438
tj	1		
ti	0	\$ rcaps=	34
Rs	0.636	rcaps=	257

**if commercial high reward reporting rate 80%**

Ni	3411		
St	1		
F	<b>0.174</b>	E(i,j)	R(i,j)
M	0.2	496.0	495.7
tj	1		
ti	0	red rcaps=	40
Rs	0.564	or rcaps=	257

**if overall reporting rate 10% lower**

Ni	3411		
St	1		
F	<b>0.169</b>	E(i,j)	R(i,j)
M	0.2	483.0	483
tj	1		
ti	0	red rcaps=	34
Rs	0.572	or rcaps=	257

**Spring 2003**

6/1/2003 - 5/1/2004

Ni	2261		
St	1		
F	<b>0.236</b>	E(i,j)	R(i,j)
M	0.2	433.0	433
tj	1		
ti	0	\$ rcaps=	12
Rs	0.636	rcaps=	268

Ni	2261		
St	1		
F	<b>0.276</b>	E(i,j)	R(i,j)
M	0.2	497.0	497.2
tj	1		
ti	0	red rcaps=	22
Rs	0.564	or rcaps=	268

Ni	2261		
St	1		
F	<b>0.266</b>	E(i,j)	R(i,j)
M	0.2	481.0	481
tj	1		
ti	0	red rcaps=	12
Rs	0.572	or rcaps=	268

Ni # tags released  
 St tag induced mortality  
 F fishing mortality  
 M natural mortality  
 tj end of time period  
 ti beginning of time period  
 Rs reporting rate

**Table 23 . AIM results using shortened catch time series.**

First Year: 1981  
 Last Year: 2003  
 Number of Years: 23

Number of Years for Smoothing Abundance Indices: 4  
 Number of Years for Smoothing Relative F: 1  
 Number of Realizations for Randomization Test: 1000  
 Number of Bootstrap Iterations: 1000  
 Number of Lags for Auto & Cross-correlation: 7

Relative F Smoothing Method is Lagged

	Catch	SPR WT
1981	1.6900E+00	2.3200E-01
1982	5.6600E+00	4.1000E-02
1983	3.3600E+00	1.2500E-01
1984	2.6200E+00	1.0800E-01
1985	2.5000E+00	1.4700E-01
1986	7.5200E+00	3.5500E-01
1987	2.7600E+00	2.5400E-01
1988	3.1800E+00	3.2800E-01
1989	2.8200E+00	1.4600E-01
1990	2.8400E+00	1.3100E-01
1991	3.1700E+00	7.7000E-02
1992	2.5900E+00	3.0600E-01
1993	3.6100E+00	9.4000E-02
1994	2.2300E+00	8.0000E-02
1995	3.7400E+00	1.5300E-01
1996	3.2800E+00	1.0500E-01
1997	3.1200E+00	2.5000E-01
1998	1.6900E+00	9.1000E-02
1999	2.1000E+00	2.9200E-01
2000	3.0300E+00	1.6100E-01
2001	2.9600E+00	3.8300E-01
2002	3.6300E+00	7.2300E-01
2003	3.3300E+00	8.5200E-01

Base Case Results

	Replacement Ratio	Relative F
1981	N/A	7.2844828
1982	N/A	138.0487805
1983	N/A	26.8800000
1984	N/A	24.2592593
1985	1.1620553	17.0068027
1986	3.3729216	21.1830986
1987	1.3823129	10.8661417
1988	1.5185185	9.6951220
1989	0.5387454	19.3150685
1990	0.4838412	21.6793893
1991	0.3585565	41.1688312
1992	1.7947214	8.4640523
1993	0.5696970	38.4042553
1994	0.5263158	27.8750000
1995	1.0987433	24.4444444
1996	0.6635071	31.2380952
1997	2.3148148	12.4800000
1998	0.6190476	18.5714286

1999	1.9499165	7.1917808
2000	0.8726287	18.8198758
2001	1.9294710	7.7284595
2002	3.1197411	5.0207469
2003	2.1860167	3.9084507

Simple Regression Results

$$\text{LN(Replacement Ratio)} = A + B * \text{LN(Relative F)}$$

SPR WT Coefficient	A	B
Estimated Value	2.2254E+00	-7.7808E-01
Std Error Coeff	4.4470E-01	1.5970E-01
t Statistic	5.0042E+00	-4.8720E+00
p-Value (2 Sided)	1.0862E-04	1.4335E-04
Variance Inflation Factor	1.8103E+01	1.0000E+00

Relative F (for ln(Replacement Ratio = 0) = 1.746357E+01

Analysis of Variance

Degrees of Freedom for Regression	1.0000E+00
Degrees of Freedom for Error	1.7000E+01
Total Degrees of Freedom	1.8000E+01
Sum of Squares for Regression	4.9267E+00
Sum of Squares for Error	3.5285E+00
Total Sum of Squares	8.4552E+00
Regression Mean Square	4.9267E+00
Error Mean Square	2.0756E-01
F-Statistic	2.3737E+01
p-Value	1.4335E-04
R Squared (percent)	5.8268E+01
Adjusted R Squared (percent)	5.5814E+01
Estimated Standard deviation of model error	4.5559E-01
Mean of response (dependent) variable	1.1947E-01
Coefficient of Variation (percent)	3.8134E+02

Least Absolute Value Regression Results

$$\text{LN(Replacement Ratio)} = A + B * \text{LN(Relative F)}$$

SPR WT Coefficient	A	B
Estimated Value	2.3217E+00	-8.3749E-01
Sum of Absolute Value of Error	= 5.4203E+00	
Relative F (for ln(Replacement Ratio = 0)	= 1.599398E+01	



Table 24. AIM results when using commercial catch series only.

First Year: 1968  
 Last Year: 2003  
 Number of Years: 36

Number of Years for Smoothing Abundance Indices: 4  
 Number of Years for Smoothing Relative F: 1  
 Number of Realizations for Randomization Test: 1000  
 Number of Bootstrap Iterations: 1000  
 Random Number Generation Seed: 123456  
 Number of Lags for Auto & Cross-correlation: 7

Relative F Smoothing Method is Lagged

	Catch	SPR WT
1968	1.2010E+03	5.4000E-02
1969	1.1990E+03	5.8000E-02
1970	1.1000E+03	7.3000E-02
1971	6.1400E+02	5.1000E-02
1972	7.6000E+02	1.5600E-01
1973	1.1610E+03	2.0300E-01
1974	1.0690E+03	6.2100E-01
1975	1.8850E+03	3.1500E-01
1976	1.6900E+03	5.9100E-01
1977	2.4240E+03	3.7900E-01
1978	2.1150E+03	3.3600E-01
1979	1.8750E+03	2.9000E-01
1980	1.2520E+03	2.7700E-01
1981	1.1290E+03	2.3200E-01
1982	1.1770E+03	4.1000E-02
1983	1.5130E+03	1.2500E-01
1984	1.9650E+03	1.0800E-01
1985	1.5510E+03	1.4700E-01
1986	1.9010E+03	3.5500E-01
1987	1.8900E+03	2.5400E-01
1988	1.8790E+03	3.2800E-01
1989	1.3240E+03	1.4600E-01
1990	1.5880E+03	1.3100E-01
1991	1.2720E+03	7.7000E-02
1992	1.3640E+03	3.0600E-01
1993	1.4120E+03	9.4000E-02
1994	8.9600E+02	8.0000E-02
1995	9.2500E+02	1.5300E-01
1996	1.4720E+03	1.0500E-01
1997	1.1860E+03	2.5000E-01
1998	1.1630E+03	9.1000E-02
1999	1.3490E+03	2.9200E-01
2000	1.2310E+03	1.6100E-01
2001	1.3310E+03	3.8300E-01
2002	1.6020E+03	7.2300E-01
2003	1.3960E+03	8.5200E-01

Base Case Results

	Replacement Ratio	Relative F
1968	N/A	22240.7407407
1969	N/A	20672.4137931
1970	N/A	15068.4931507
1971	N/A	12039.2156863
1972	2.6440678	4871.7948718
1973	2.4023669	5719.2118227
1974	5.1428571	1721.4170692
1975	1.2221145	5984.1269841
1976	1.8254826	2859.5600677
1977	0.8763006	6395.7783641
1978	0.7051417	6294.6428571
1979	0.7156076	6465.5172414
1980	0.6942356	4519.8555957
1981	0.7238690	4866.3793103
1982	0.1444934	28707.3170732
1983	0.5952381	12104.0000000
1984	0.6400000	18194.4444444
1985	1.1620553	10551.0204082
1986	3.3729216	5354.9295775
1987	1.3823129	7440.9448819
1988	1.5185185	5728.6585366
1989	0.5387454	9068.4931507
1990	0.4838412	12122.1374046
1991	0.3585565	16519.4805195
1992	1.7947214	4457.5163399
1993	0.5696970	15021.2765957
1994	0.5263158	11200.0000000
1995	1.0987433	6045.7516340
1996	0.6635071	14019.0476190
1997	2.3148148	4744.0000000
1998	0.6190476	12780.2197802
1999	1.9499165	4619.8630137
2000	0.8726287	7645.9627329
2001	1.9294710	3475.1958225
2002	3.1197411	2215.7676349
2003	2.1860167	1638.4976526

Simple Regression Results

$$\text{LN(Replacement Ratio)} = A + B * \text{LN(Relative F)}$$

Coefficient	A	B
Estimated Value	8.4237E+00	-9.4919E-01
Std Error Coeff	1.0122E+00	1.1465E-01
t Statistic	8.3222E+00	-8.2788E+00
p-Value (2 Sided)	2.7384E-09	3.0586E-09
Variance Inflation Factor	1.7870E+02	1.0000E+00

$$\text{Relative F (for ln(Replacement Ratio) = 0)} = 7.148225E+03$$

Analysis of Variance

Degrees of Freedom for Regression	1.0000E+00
Degrees of Freedom for Error	3.0000E+01
Total Degrees of Freedom	3.1000E+01
Sum of Squares for Regression	1.2575E+01
Sum of Squares for Error	5.5041E+00
Total Sum of Squares	1.8079E+01
Regression Mean Square	1.2575E+01
Error Mean Square	1.8347E-01
F-Statistic	6.8539E+01
p-Value	3.0586E-09
R Squared (percent)	6.9555E+01
Adjusted R Squared (percent)	6.8540E+01
Estimated Standard deviation of model error	4.2833E-01
Mean of response (dependent) variable	6.7345E-02
Coefficient of Variation (percent)	6.3603E+02

Least Absolute Value Regression Results

$$\text{LN(Replacement Ratio)} = A + B * \text{LN(Relative F)}$$

Coefficient	A	B
Estimated Value	8.6533E+00	-9.7562E-01

$$\text{Sum of Absolute Value of Error} = 1.0706E+01$$

$$\text{Relative F (for ln(Replacement Ratio) = 0)} = 7.112004$$

Table 25. Yield per recruit of black sea bass, assuming M=0.2.

Proportion Fishing Mortality Before Spawning = 0.53  
 Proportion Natural Mortality Before Spawning = 0.30

Age	Selectivity F	Selectivity M	Stock Weight	Catch Weight	Maturity
1	0.0000	1.00	0.0590	0.0640	0.10
2	0.1020	1.00	0.1620	0.1770	0.65
3	0.6780	1.00	0.3700	0.3210	0.90
4	0.9550	1.00	0.6540	0.5240	1.00
5	1.0000	1.00	0.8030	0.7980	1.00
6	1.0000	1.00	1.1960	1.2540	1.00
7	1.0000	1.00	1.0310	1.1320	1.00
8	1.0000	1.00	1.6560	1.4370	1.00
9	1.0000	1.00	1.8360	1.9310	1.00
10	1.0000	1.00	1.9970	1.9970	1.00
11	1.0000	1.00	2.1630	2.1630	1.00
12	1.0000	1.00	2.3800	2.3800	1.00
13	1.0000	1.00	2.5750	2.5750	1.00
14	1.0000	1.00	2.7470	2.7470	1.00
15	1.0000	1.00	2.8980	2.8980	1.00

Reference Point	F	YPR	SSBR	Mean Age	Mean Gen T	Exp Spawn
F Zero	0.000	0.000	3.828	4.731	8.297	3.265
F-01	0.187	0.261	1.628	3.405	6.339	1.937
F-Max	<b>0.329</b>	0.280	1.048	2.915	5.340	1.502
F at 20 %MSP	0.465	0.274	0.766	2.638	4.706	1.255