

## **7.0 Appendix**

# **Final Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish**

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## 7.0 Appendix

This appendix contains the landings, survey indices, VPA spawning biomass and recruitment, surplus production results, hindcast spawning biomass and recruitment, and the stochastic projection files for the 19 stocks. A description of each of the recruitment models used in the stochastic projection program are also presented, as well as the six-panel plots depicting trends in catch, abundance indices, relative F, and the replacement ratios.

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## 7.1 Gulf of Maine cod

### Landings, survey indices, spawning biomass and recruitment.

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1960	3.577			1982	23.908	7.539
1961	3.234			1983	18.848	10.464
1962	3.072			1984	14.484	7.004
1963	2.731	17.9		1985	15.947	10.161
1964	3.251	22.8		1986	17.024	12.538
1965	3.928	12.0		1987	15.262	25.198
1966	4.392	12.9		1988	16.406	4.302
1967	5.973	9.2		1989	22.561	4.021
1968	6.421	19.4	17.9	1990	24.200	6.992
1969	8.484	15.4	13.2	1991	21.088	6.411
1970	8.261	16.4	11.1	1992	13.096	9.327
1971	7.662	16.5	7.0	1993	11.396	3.325
1972	6.917	13.0	8.0	1994	13.141	3.386
1973	6.146	8.7	18.8	1995	14.587	3.020
1974	7.764	9.0	7.4	1996	12.901	4.745
1975	9.015	8.6	6.0	1997	10.357	4.498
1976	10.188	6.7	7.6	1998	9.943	9.549
1977	12.426	10.2	8.5	1999	11.121	5.656
1978	12.426	12.9	7.7			
1979	11.680	17.5	9.5			
1980	13.528	14.2	6.2			
1981	12.534	8.1	10.8			
1982	13.582	16.1	8.6			
1983	13.981	8.8	10.5			
1984	10.806	8.8	5.8			
1985	10.693	8.5	7.7			
1986	9.664	5.1	3.6			
1987	7.527	3.4	3.0			
1988	7.958	6.6	3.3			
1989	10.397	4.6	2.5			
1990	15.154	4.9	3.1			
1991	17.781	2.8	2.9			
1992	10.891	2.4	8.7			
1993	8.287	1.0	5.9			
1994	7.877	2.7	2.4			
1995	6.798	3.7	2.4			
1996	7.194	2.4	5.4			
1997	5.421	1.9	5.6			
1998	4.156	1.5	4.2			
1999	4.136	3.5	5.1			
2000	4.730	4.7	3.2			

## Gulf of Maine cod hindcast spawning biomass and recruitment

<u>Year class</u>	<u>Spawning Biomass (k mt)</u>	<u>Recruitment Age 1 (millions)</u>
1963	62.29148	7.949413
1964	80.66966	5.781391
1965	41.45909	1.942186
1966	45.12267	1.616983
1967	32.44377	1.111111
1968	68.70363	2.393857
1969	54.34368	2.158988
1970	57.49655	10.993680
1971	58.38674	19.629630
1972	43.37777	1.707317
1973	29.83352	27.705510
1974	30.83010	1.887986
1975	28.63124	3.242999
1976	23.48166	3.351400
1977	35.73851	5.365854
1978	44.69708	23.504970
1979	48.87845	3.450768
1980	48.62665	28.383020
1981	26.26570	8.825655
1982	54.58839	3.803071
1983	29.21287	8.220416
1984	30.51091	4.426378
1985	28.73054	11.960250
1986	16.25026	20.280040
1987	11.09004	21.598920
1988	21.15867	3.315266
1989	14.63304	1.282746
1990	16.83189	4.065041
1991	9.69980	5.140018
1992	8.28827	7.949413
1993	3.18834	2.529359
1994	8.91246	3.432701
1995	12.48738	0.776874
1996	8.00809	2.890696
1997	6.45116	3.279133
1998	5.10702	8.888889
1999	11.96958	
2000	15.77857	

# Gulf of Maine cod projection F= Fmsy

GoM Cod 2001-2010 - Ages 1-7+

```

2001
  10
  100
23512
  0
  1
  0
  0
  0
  0
  0
  1
  0
  0
  0
  0
  1
  1
  7 1 7
0.200000
0.264 0.860    1.811    2.336    3.314    4.659    11.331
0.468 1.582    2.064    2.726    3.982    5.804    10.767
0.040 0.380    0.890    0.990    1.000    1.000    1.000
0.1667
  5
  9854.36    7516.10    0.276
  1000.000    1000.000
  600

```

```

gmc2001bootn7.dat
1000.000
82830000 90300000 0.225 33000000 0.31
0.001 0.013    0.2867    1.000000    1.000000    1.000000    1.000000
1 0 0 0 0 0 0 0 0
7994000 0 0 0 0 0 0 0 0
0 0.258 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225

```

```

=====
PROJECTION RUN: GoM Cod 2001-2010 - Ages 1-7+
INPUT FILE: gmcod_7_Fmsy.in
OUTPUT FILE: gmcod_7_Fmsy.out
RECRUITMENT MODEL: 5
NUMBER OF SIMULATIONS: 100

```

```

MIXTURE OF F AND QUOTA BASED CATCHES
YEAR   F           QUOTA (THOUSAND MT)
2001           7.994
2002  0.258
2003  0.225
2004  0.225
2005  0.225
2006  0.225
2007  0.225
2008  0.225
2009  0.225
2010  0.225

```

```

SPAWNING STOCK BIOMASS (THOUSAND MT)
YEAR   AVG SSB (000 MT)   STD
2001      19.840          3.749
2002      22.404          5.023
2003      29.277          5.394
2004      37.388          7.372
2005      48.666          9.692
2006      55.310         11.073
2007      61.421         11.630
2008      67.561         13.796
2009      72.466         14.912

```

2010 76.610 15.664

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	11.886	14.176	15.255	17.372	19.565	22.286	24.399	25.960	30.393
2002	12.003	15.100	16.427	18.931	22.135	25.485	28.772	31.297	36.363
2003	18.104	21.290	22.907	25.568	28.909	32.555	36.098	38.622	43.559
2004	23.064	26.938	28.889	32.304	36.636	41.600	46.825	50.384	58.968
2005	30.133	34.825	37.335	41.916	47.675	54.278	61.267	65.964	76.359
2006	34.417	39.588	42.446	47.554	54.110	61.659	69.639	75.280	87.260
2007	39.824	44.996	47.918	53.193	60.098	68.105	76.662	82.403	94.783
2008	42.423	48.087	51.481	57.810	65.892	75.539	85.718	92.545	107.179
2009	44.882	51.312	54.991	61.925	70.711	81.204	92.261	99.312	114.618
2010	47.498	54.144	58.234	65.538	74.766	85.808	97.210	105.036	121.199

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 82.830 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.004
2006	0.018
2007	0.047
2008	0.132
2009	0.222
2010	0.306

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
2001	28.343	5.462
2002	33.089	6.041
2003	41.725	8.266
2004	50.598	10.231
2005	60.677	12.020
2006	67.506	13.300
2007	73.728	14.212
2008	79.483	15.749
2009	84.092	16.571
2010	87.929	17.122

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	16.632	20.459	21.959	24.630	28.022	31.666	35.299	37.716	43.295
2002	20.506	24.226	25.989	28.911	32.594	36.762	40.776	43.642	49.107
2003	25.916	30.057	32.209	36.007	40.842	46.410	52.337	56.350	65.967
2004	31.347	36.168	38.749	43.479	49.442	56.414	63.868	68.971	80.196
2005	38.158	43.555	46.656	52.211	59.365	67.591	76.440	82.442	95.083
2006	42.567	48.592	52.033	58.122	66.052	75.212	84.907	91.525	105.712
2007	47.268	53.442	57.060	63.673	72.115	82.046	92.490	99.357	114.076
2008	50.172	57.003	60.978	68.361	77.725	88.736	100.428	107.916	124.077
2009	52.950	60.285	64.523	72.329	82.260	93.896	106.048	113.930	130.793
2010	55.551	63.102	67.565	75.797	86.160	98.154	110.531	118.892	135.779

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 33.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	0.183
2002	0.472
2003	0.875
2004	0.982
2005	0.998
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	AVG F_WT_B	STD
2001	0.293	0.059
2002	0.130	0.017
2003	0.125	0.018
2004	0.135	0.017
2005	0.146	0.017
2006	0.150	0.017
2007	0.154	0.017
2008	0.157	0.017
2009	0.160	0.017
2010	0.162	0.016

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.185	0.212	0.226	0.252	0.285	0.325	0.364	0.391	0.481
2002	0.088	0.102	0.109	0.119	0.130	0.142	0.151	0.157	0.169
2003	0.079	0.094	0.101	0.114	0.126	0.137	0.147	0.152	0.161
2004	0.093	0.106	0.113	0.124	0.136	0.147	0.157	0.163	0.172
2005	0.102	0.116	0.123	0.135	0.147	0.158	0.168	0.173	0.182
2006	0.107	0.120	0.127	0.139	0.151	0.162	0.172	0.177	0.186
2007	0.110	0.124	0.131	0.143	0.155	0.166	0.175	0.180	0.188
2008	0.113	0.128	0.135	0.146	0.158	0.169	0.178	0.183	0.191
2009	0.116	0.130	0.138	0.149	0.161	0.171	0.180	0.185	0.192
2010	0.119	0.133	0.140	0.151	0.163	0.173	0.182	0.187	0.194

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.310

YEAR	Pr(F_WT_B > Threshold Value)
2001	0.340
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	27.777	4.546
2002	29.754	5.918
2003	37.779	6.911
2004	46.912	9.108
2005	59.405	11.464
2006	66.867	12.899
2007	73.685	13.500
2008	80.432	15.744
2009	85.795	16.882
2010	90.320	17.650

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	18.251	21.238	22.137	24.596	27.526	30.610	33.488	35.889	40.534
2002	17.451	21.024	22.744	25.643	29.317	33.360	37.227	40.025	45.431
2003	23.639	27.643	29.658	32.980	37.203	41.906	46.664	49.949	56.371
2004	29.237	33.934	36.324	40.595	45.984	52.144	58.592	63.066	73.258
2005	37.297	42.878	45.903	51.412	58.249	66.077	74.345	79.918	91.906
2006	42.389	48.443	51.805	57.768	65.523	74.328	83.705	90.069	103.780
2007	48.248	54.420	57.866	64.179	72.181	81.555	91.382	98.007	111.860
2008	51.270	58.006	62.000	69.249	78.618	89.631	101.273	108.965	124.863
2009	54.169	61.588	65.948	73.859	83.922	95.801	108.085	116.349	133.209
2010	57.080	64.851	69.499	77.811	88.380	100.784	113.627	122.236	139.833

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 90.300 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.001



2005	0.013
2006	0.049
2007	0.112
2008	0.238
2009	0.351
2010	0.456

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2001	8125.988	4622.524
2002	8409.748	4755.169
2003	8968.925	5101.836
2004	9372.105	5275.166
2005	9753.143	5501.486
2006	9941.197	5623.511
2007	10062.957	5658.274
2008	10151.326	5715.531
2009	10243.879	5797.787
2010	10249.433	5773.748

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	2059.754	2975.490	3587.191	4948.216	7065.220	10084.030	13870.289	16843.496	24176.291
2002	2127.027	3085.024	3710.690	5100.262	7313.319	10475.649	14442.353	17393.844	24738.516
2003	2297.342	3280.612	3966.074	5451.221	7802.092	11143.389	15320.592	18591.646	26839.686
2004	2375.668	3414.604	4143.665	5722.254	8173.668	11676.232	16009.323	19311.029	27593.877
2005	2498.837	3584.299	4317.264	5954.478	8490.456	12113.656	16687.623	20062.018	28879.063
2006	2554.925	3651.092	4402.770	6068.686	8663.309	12339.632	16979.377	20615.850	29544.438
2007	2561.713	3682.953	4465.335	6166.412	8767.822	12465.082	17187.832	20780.143	29817.223
2008	2581.827	3705.480	4483.414	6184.714	8830.368	12638.841	17418.430	21051.080	29622.072
2009	2597.736	3747.049	4556.598	6254.257	8910.814	12717.455	17489.779	21279.107	30233.539
2010	2636.718	3754.955	4551.149	6262.999	8913.373	12755.239	17452.643	21051.342	30257.957

Catch FOR F-BASED PROJECTIONS

YEAR	AVG Catch (000 MT)	STD
2001	7.994	0.000
2002	4.334	1.090
2003	5.184	1.147
2004	6.760	1.211
2005	8.789	1.766
2006	10.075	2.096
2007	11.280	2.318
2008	12.440	2.713
2009	13.400	2.927
2010	14.208	3.085

PERCENTILES OF Catch (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	7.994	7.994	7.994	7.994	7.994	7.994	7.994	7.994	7.994
2002	2.120	2.694	3.006	3.605	4.241	5.044	5.672	6.153	7.405
2003	2.797	3.526	3.844	4.405	5.120	5.877	6.654	7.116	8.318
2004	4.230	4.984	5.336	5.924	6.666	7.489	8.303	8.886	9.969
2005	5.439	6.307	6.758	7.568	8.595	9.786	11.052	11.927	13.991
2006	6.251	7.164	7.674	8.611	9.818	11.249	12.784	13.859	16.278
2007	7.110	8.069	8.622	9.641	10.986	12.568	14.329	15.515	18.090
2008	7.575	8.666	9.313	10.515	12.099	13.984	16.007	17.388	20.408
2009	8.088	9.269	9.979	11.326	13.041	15.091	17.271	18.735	21.792
2010	8.563	9.837	10.617	12.027	13.831	15.985	18.269	19.811	23.129

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.815	0.260
2002	0.258	0.000
2003	0.225	0.000
2004	0.225	0.000
2005	0.225	0.000
2006	0.225	0.000
2007	0.225	0.000

2008	0.225	0.000
2009	0.225	0.000
2010	0.225	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.477	0.545	0.591	0.670	0.774	0.899	1.073	1.170	1.702
2002	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258
2003	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
2004	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
2005	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
2006	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
2007	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
2008	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
2009	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
2010	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.225

YEAR	Pr(F > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

# Gulf of Maine cod projection F= F rebuild

GoM Cod 2001-2010 - Ages 1-7+

```

2001
  10
  100
23512
  0
  1
  0
  0
  0
  0
  0
  1
  0
  0
  0
  0
  0
  1
  1
  7 1 7
0.200000
0.264 0.860 1.811 2.336 3.314 4.659 11.331
0.468 1.582 2.064 2.726 3.982 5.804 10.767
0.040 0.380 0.890 0.990 1.000 1.000 1.000
0.1667
  5
  9854.36 7516.10 0.276
  1000.000 1000.000
  600

```

gmc2001bootn7.dat

```

1000.000
82830000 90300000 0.225 33000000 0.31
0.001 0.013 0.2867 1.000000 1.000000 1.000000 1.000000
1 0 0 0 0 0 0 0 0 0
7994000 0 0 0 0 0 0 0 0 0
0 0.258 0.165 0.165 0.165 0.165 0.165 0.165 0.165 0.165

```

```

=====
PROJECTION RUN: GoM Cod 2001-2010 - Ages 1-7+
INPUT FILE: gmcod_7_Frebuild.in
OUTPUT FILE: gmcod_7_Frebuild.out
RECRUITMENT MODEL: 5
NUMBER OF SIMULATIONS: 100

```

## MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2001		7.994
2002	0.258	
2003	0.165	
2004	0.165	
2005	0.165	
2006	0.165	
2007	0.165	
2008	0.165	
2009	0.165	
2010	0.165	

## SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2001	19.840	3.749
2002	22.404	5.023
2003	29.501	5.443
2004	39.030	7.650
2005	52.602	10.305
2006	61.503	12.040
2007	69.822	12.720
2008	78.141	15.565
2009	84.957	17.087

2010 90.833 18.145

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	11.886	14.176	15.255	17.372	19.565	22.286	24.399	25.960	30.393
2002	12.003	15.100	16.427	18.931	22.135	25.485	28.772	31.297	36.363
2003	18.230	21.444	23.073	25.760	29.129	32.807	36.383	38.921	43.918
2004	23.983	28.121	30.184	33.757	38.274	43.435	48.833	52.493	61.173
2005	32.642	37.760	40.491	45.406	51.588	58.616	65.990	70.976	81.861
2006	38.435	44.311	47.473	53.069	60.259	68.489	77.132	83.095	96.137
2007	45.899	51.678	54.977	60.830	68.457	77.204	86.518	92.729	106.041
2008	49.648	56.174	59.987	67.136	76.242	87.076	98.640	106.390	123.024
2009	53.222	60.691	64.948	72.883	83.006	94.987	107.580	115.791	133.022
2010	57.038	64.814	69.594	78.032	88.740	101.483	114.710	123.765	142.341

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 82.830 THOUSAND MT

YEAR Pr(SSB > Threshold Value)

2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.008
2006	0.051
2007	0.146
2008	0.337
2009	0.504
2010	0.641

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
2001	28.343	5.462
2002	33.089	6.041
2003	42.381	8.372
2004	52.846	10.538
2005	65.173	12.611
2006	74.178	14.189
2007	82.502	15.306
2008	90.276	17.354
2009	96.662	18.501
2010	102.098	19.304

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	16.632	20.459	21.959	24.630	28.022	31.666	35.299	37.716	43.295
2002	20.506	24.226	25.989	28.911	32.594	36.762	40.776	43.642	49.107
2003	26.295	30.539	32.730	36.597	41.494	47.141	53.133	57.167	66.843
2004	32.828	37.876	40.616	45.521	51.698	58.879	66.532	71.707	83.236
2005	41.114	47.086	50.391	56.301	63.885	72.508	81.735	87.916	100.929
2006	47.223	53.885	57.599	64.181	72.698	82.453	92.763	99.611	114.650
2007	53.708	60.567	64.493	71.677	80.811	91.512	102.648	110.058	125.578
2008	57.856	65.437	69.896	78.038	88.320	100.502	113.289	121.592	139.191
2009	61.786	69.909	74.827	83.499	94.698	107.639	121.062	130.057	148.542
2010	65.435	73.990	79.103	88.479	100.154	113.646	127.574	136.978	155.692

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 33.000 THOUSAND MT

YEAR Pr(MEAN B > Threshold Value)

2001	0.183
2002	0.472
2003	0.892
2004	0.989
2005	0.999
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	AVG F_WT_B	STD
2001	0.293	0.059
2002	0.130	0.017
2003	0.092	0.013
2004	0.102	0.013
2005	0.111	0.012
2006	0.114	0.012
2007	0.118	0.012
2008	0.120	0.012
2009	0.122	0.011
2010	0.124	0.011

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.185	0.212	0.226	0.252	0.285	0.325	0.364	0.391	0.481
2002	0.088	0.102	0.109	0.119	0.130	0.142	0.151	0.157	0.169
2003	0.059	0.070	0.075	0.084	0.093	0.102	0.108	0.112	0.119
2004	0.071	0.080	0.085	0.094	0.102	0.110	0.118	0.122	0.128
2005	0.079	0.089	0.094	0.103	0.111	0.119	0.126	0.130	0.136
2006	0.083	0.093	0.098	0.107	0.115	0.123	0.129	0.133	0.139
2007	0.087	0.097	0.102	0.110	0.118	0.126	0.132	0.135	0.141
2008	0.089	0.100	0.105	0.113	0.121	0.129	0.135	0.138	0.143
2009	0.092	0.102	0.107	0.115	0.123	0.131	0.136	0.139	0.144
2010	0.095	0.104	0.109	0.117	0.125	0.132	0.138	0.141	0.146

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.310

YEAR	Pr(F_WT_B > Threshold Value)
2001	0.340
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	27.777	4.546
2002	29.754	5.918
2003	37.779	6.911
2004	48.351	9.333
2005	63.186	12.002
2006	73.015	13.783
2007	82.145	14.505
2008	91.163	17.426
2009	98.517	18.974
2010	104.845	20.053

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	18.251	21.238	22.137	24.596	27.526	30.610	33.488	35.889	40.534
2002	17.451	21.024	22.744	25.643	29.317	33.360	37.227	40.025	45.431
2003	23.639	27.643	29.658	32.980	37.203	41.906	46.664	49.949	56.371
2004	30.090	35.000	37.476	41.885	47.427	53.756	60.338	64.900	75.247
2005	39.787	45.748	48.981	54.822	62.029	70.243	78.894	84.544	96.892
2006	46.516	53.202	56.878	63.314	71.636	81.044	90.934	97.713	112.096
2007	54.471	61.316	65.126	71.913	80.616	90.654	101.122	108.249	122.966
2008	58.819	66.399	70.827	78.818	89.176	101.326	114.118	122.703	140.726
2009	63.064	71.360	76.320	85.099	96.429	109.729	123.644	132.760	151.385
2010	67.120	75.937	81.181	90.691	102.656	116.667	131.246	141.177	160.921

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 90.300 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.001

2005	0.024
2006	0.106
2007	0.257
2008	0.473
2009	0.635
2010	0.757

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2001	8125.988	4622.524
2002	8409.748	4755.169
2003	8982.904	5109.675
2004	9440.333	5312.693
2005	9855.380	5558.289
2006	10067.067	5693.243
2007	10202.157	5734.890
2008	10296.666	5796.401
2009	10393.295	5880.758
2010	10400.816	5857.825

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	2059.754	2975.490	3587.191	4948.216	7065.220	10084.030	13870.289	16843.496	24176.291
2002	2127.027	3085.024	3710.690	5100.262	7313.319	10475.649	14442.353	17393.844	24738.516
2003	2301.100	3285.504	3972.390	5460.288	7814.479	11160.188	15345.392	18617.604	26882.736
2004	2393.405	3439.658	4173.841	5765.908	8233.155	11757.769	16124.305	19460.355	27813.766
2005	2523.846	3622.090	4363.927	6018.590	8579.655	12243.002	16852.756	20280.707	29187.961
2006	2589.854	3700.878	4460.315	6146.804	8771.720	12496.217	17191.012	20866.238	29929.811
2007	2597.390	3731.358	4528.628	6251.656	8890.730	12636.687	17427.895	21058.801	30243.906
2008	2619.921	3755.775	4549.445	6276.037	8956.998	12822.392	17672.799	21350.947	30062.779
2009	2640.213	3804.531	4623.726	6344.292	9041.694	12898.939	17738.516	21589.328	30669.178
2010	2675.397	3807.917	4618.646	6355.905	9045.031	12940.195	17708.404	21377.459	30688.885

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
2001	7.994	0.000
2002	4.334	1.090
2003	3.901	0.865
2004	5.316	0.960
2005	7.168	1.419
2006	8.455	1.718
2007	9.668	1.917
2008	10.842	2.302
2009	11.832	2.518
2010	12.685	2.679

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	7.994	7.994	7.994	7.994	7.994	7.994	7.994	7.994	7.994
2002	2.120	2.694	3.006	3.605	4.241	5.044	5.672	6.153	7.405
2003	2.101	2.652	2.891	3.314	3.853	4.424	5.010	5.358	6.265
2004	3.312	3.908	4.187	4.654	5.242	5.894	6.539	7.003	7.867
2005	4.433	5.159	5.525	6.184	7.020	7.981	8.994	9.689	11.302
2006	5.275	6.055	6.481	7.256	8.255	9.425	10.668	11.544	13.507
2007	6.190	6.998	7.462	8.313	9.429	10.744	12.191	13.160	15.271
2008	6.693	7.636	8.178	9.203	10.558	12.150	13.871	15.052	17.569
2009	7.240	8.275	8.894	10.046	11.529	13.289	15.159	16.414	18.998
2010	7.783	8.881	9.558	10.789	12.368	14.245	16.219	17.542	20.424

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.815	0.260
2002	0.258	0.000
2003	0.165	0.000
2004	0.165	0.000
2005	0.165	0.000
2006	0.165	0.000
2007	0.165	0.000

2008	0.165	0.000
2009	0.165	0.000
2010	0.165	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.477	0.545	0.591	0.670	0.774	0.899	1.073	1.170	1.702
2002	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258	0.258
2003	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
2004	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
2005	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
2006	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
2007	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
2008	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
2009	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
2010	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.225

YEAR Pr(F > Threshold Value)

2001	1.000
2002	1.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

## 7.2 Georges Bank cod

### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn Survey (kg/tow)	NEFSC Spring Survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1893	34.246			1978	80.447	23.512
1894	40.377			1979	89.224	20.109
1895	44.839			1980	92.560	41.393
1896	34.662			1981	86.373	17.470
1897	33.165			1982	89.609	9.615
1898	31.881			1983	78.214	27.390
1899	34.870			1984	67.075	8.672
1900	24.550			1985	55.382	42.751
1901	32.666			1986	57.374	16.376
1902	30.297			1987	68.273	23.448
1903	28.309			1988	73.633	15.689
1904	21.949			1989	72.016	9.218
1905	26.224			1990	68.186	17.866
1906	44.549			1991	52.504	6.632
1907	40.810			1992	39.299	8.433
1908	29.171			1993	29.413	6.300
1909	28.647			1994	19.233	4.331
1910	25.126			1995	18.136	7.612
1911	19.083			1996	20.538	10.325
1912	20.191			1997	22.898	3.179
1913	17.403			1998	25.236	7.291
1914	23.699			1999	27.422	4.896
1915	13.329			2000	29.003	1.710
1916	13.566					
1917	15.402					
1918	21.518					
1919	21.629					
1920	19.746					
1921	23.139					
1922	22.275					
1923	22.023					
1924	23.568					
1925	24.782					
1926	28.957					
1927	28.404					
1928	25.088					
1929	26.733					
1930	29.852					
1931	24.073					
1932	25.122					
1933	25.155					
1934	15.976					
1935	21.162					
1936	23.349					
1937	32.282					
1938	22.048					
1939	18.418					
1940	25.453					
1941	18.333					
1942	17.341					
1943	17.632					
1944	14.251					
1945	20.875					



Continued.

Year	Landings (k mt)	NEFSC Autumn Survey (kg/tow)	NEFSC Spring Survey (kg/tow)
1946	16.582		
1947	17.640		
1948	17.681		
1949	15.389		
1950	14.791		
1951	10.904		
1952	8.105		
1953	8.826		
1954	9.286		
1955	10.495		
1956	10.388		
1957	11.085		
1958	12.071		
1959	10.391		
1960	10.853		
1961	14.731		
1962	23.486		
1963	27.189	17.8	
1964	25.165	11.4	
1965	38.333	11.8	
1966	53.134	8.1	
1967	36.752	13.6	
1968	43.136	8.6	12.7
1969	37.939	8.0	17.8
1970	25.652	12.6	15.8
1971	28.179	9.8	14.3
1972	25.059	22.9	19.3
1973	28.923	30.9	94.5
1974	27.331	8.2	36.4
1975	25.008	14.1	26.1
1976	19.926	17.7	18.6
1977	27.367	12.5	15.3
1978	35.357	23.3	31.2
1979	38.623	16.5	16.2
1980	48.116	6.7	24.1
1981	42.348	20.3	26.1
1982	57.157	6.1	101.9
1983	48.886	6.1	23.5
1984	38.678	10.0	15.3
1985	37.271	3.1	21.7
1986	25.901	3.7	16.7
1987	30.880	4.4	9.9
1988	39.242	5.6	13.5
1989	33.098	4.7	10.9
1990	42.503	11.5	11.7
1991	37.630	1.4	8.9
1992	28.567	3.0	7.4
1993	23.113	2.2	7.0
1994	15.169	3.3	1.2
1995	7.859	5.6	8.4
1996	8.905	2.7	7.5
1997	10.435	1.9	5.2
1998	8.832	2.8	11.7
1999	9.879	3.0	4.7
2000	9.189	1.4	8.2

Georges Bank cod projection F = Fmsy

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PROJECTION RUN: GB cod:gb2002\_v2\_bh  
 INPUT FILE: gbcod\_v2\_bh.in  
 OUTPUT FILE: gbcod\_v2\_bh.out  
 RECRUITMENT MODEL: 5  
 NUMBER OF SIMULATIONS: 100

MIXTURE OF F AND QUOTA BASED LANDINGS

YEAR	F	QUOTA (THOUSAND MT)
2001		12.765
2002	0.169	
2003	0.175	
2004	0.175	
2005	0.175	
2006	0.175	
2007	0.175	
2008	0.175	
2009	0.175	
2010	0.175	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2001	30.759	3.787
2002	28.613	4.639
2003	33.913	6.100
2004	41.687	9.538
2005	51.221	13.315
2006	61.678	17.065
2007	72.546	20.906
2008	85.281	24.997
2009	98.290	29.045
2010	111.151	32.893

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	23.107	24.911	25.969	28.099	30.518	32.974	35.723	37.117	40.655
2002	19.294	21.640	22.967	25.245	28.320	31.405	34.577	36.855	41.072
2003	22.668	25.275	26.790	29.626	33.282	37.367	41.743	44.753	52.041
2004	25.953	29.238	31.281	35.106	40.194	46.513	53.684	58.963	72.206
2005	29.653	34.092	36.769	41.923	49.020	57.956	68.247	75.951	93.768
2006	33.976	39.513	42.985	49.688	58.901	70.501	83.798	93.343	115.853
2007	38.308	45.078	49.400	57.750	69.208	83.547	99.740	111.355	137.480
2008	43.901	52.174	57.433	67.560	81.334	98.594	117.977	131.662	162.167
2009	49.840	59.583	65.700	77.642	93.893	113.976	136.399	151.889	187.440
2010	55.660	66.946	74.013	87.714	106.313	129.049	154.355	171.947	210.256

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 216.780 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.001
2009	0.002
2010	0.008

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 10

YEAR	AVG MEAN B (000 MT)	STD
2001	34.834	4.758
2002	38.622	7.669
2003	47.227	10.845
2004	56.973	14.579
2005	68.812	18.890
2006	81.655	23.284
2007	95.258	27.868
2008	110.311	32.475
2009	125.444	36.791
2010	140.556	40.900

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	25.475	27.750	29.078	31.414	34.480	37.700	40.886	43.258	47.511
2002	25.159	28.135	29.950	33.324	37.634	42.690	48.348	52.332	62.252
2003	29.086	32.940	35.299	39.715	45.576	52.807	60.959	67.025	81.384
2004	33.025	38.068	41.039	46.780	54.608	64.414	75.708	83.977	103.308
2005	38.075	44.201	48.008	55.506	65.726	78.602	93.312	103.907	128.398
2006	43.332	51.004	55.817	65.174	77.981	93.919	112.088	124.909	153.982
2007	49.158	58.338	64.197	75.465	90.861	110.249	131.743	147.095	181.049
2008	55.974	66.927	73.773	87.232	105.360	127.950	152.901	170.320	209.751
2009	63.076	75.844	83.767	99.193	120.064	145.636	173.950	193.671	235.318
2010	70.321	84.955	93.817	111.336	134.861	163.052	194.725	216.078	262.295

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 108.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	0.000
2002	0.000
2003	0.001
2004	0.007
2005	0.038
2006	0.124
2007	0.272
2008	0.466
2009	0.644
2010	0.783

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 10

YEAR	AVG F_WT_B	STD
2001	0.373	0.050
2002	0.120	0.014
2003	0.115	0.015
2004	0.113	0.013
2005	0.119	0.014
2006	0.121	0.013
2007	0.122	0.013
2008	0.125	0.013
2009	0.127	0.013
2010	0.128	0.013

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 10

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.268	0.295	0.312	0.339	0.370	0.406	0.439	0.460	0.500
2002	0.079	0.093	0.101	0.112	0.122	0.130	0.136	0.139	0.144
2003	0.077	0.089	0.095	0.105	0.116	0.126	0.134	0.138	0.145
2004	0.079	0.090	0.096	0.105	0.114	0.123	0.129	0.133	0.140
2005	0.083	0.095	0.101	0.110	0.120	0.128	0.135	0.139	0.146
2006	0.085	0.097	0.103	0.112	0.122	0.130	0.137	0.141	0.147
2007	0.087	0.099	0.105	0.114	0.124	0.132	0.139	0.142	0.149
2008	0.089	0.101	0.107	0.117	0.126	0.134	0.140	0.144	0.150
2009	0.092	0.104	0.110	0.119	0.128	0.136	0.142	0.146	0.151
2010	0.094	0.106	0.111	0.120	0.129	0.137	0.144	0.147	0.153

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.320

YEAR	Pr(F_WT_B > Threshold Value)
2001	0.861
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	37.973	4.276
2002	37.279	7.063
2003	45.378	9.743
2004	54.814	13.301
2005	66.220	17.452
2006	78.940	21.814
2007	92.160	26.319
2008	107.192	30.918
2009	122.445	35.315
2010	137.469	39.500

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	29.608	31.614	32.828	34.852	37.648	40.523	43.423	45.421	49.393
2002	24.473	27.417	29.152	32.362	36.465	41.153	46.360	49.893	58.431
2003	28.627	32.261	34.472	38.613	44.022	50.521	57.748	63.098	75.623
2004	32.668	37.409	40.164	45.542	52.727	61.691	71.875	79.349	96.699
2005	37.616	43.361	46.936	53.935	63.443	75.306	88.891	98.499	121.154
2006	42.845	50.179	54.674	63.529	75.544	90.391	107.506	119.444	146.661
2007	48.452	57.217	62.805	73.468	88.052	106.318	126.603	140.996	173.011
2008	55.357	65.770	72.414	85.251	102.511	124.047	147.635	164.399	202.072
2009	62.443	74.814	82.448	97.272	117.289	141.886	169.031	187.806	228.212
2010	69.500	83.656	92.377	109.270	132.061	159.216	189.710	210.565	254.936

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000

2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2001	9560.610	6405.460
2002	9081.725	6106.981
2003	10257.571	6970.770
2004	11674.299	7879.284
2005	13253.582	9008.064
2006	14796.707	10168.632
2007	16041.247	10908.973
2008	17368.743	11687.334
2009	18565.348	12604.998
2010	19466.734	13091.958

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	1928.358	2942.873	3643.962	5290.754	7957.990	11949.787	17250.122	21574.358	32819.336
2002	1821.796	2763.902	3440.012	4957.060	7527.730	11392.462	16531.063	20615.826	31162.788
2003	2028.891	3081.021	3863.617	5605.004	8493.251	12842.670	18693.743	23366.772	35627.087
2004	2283.806	3496.520	4381.935	6370.992	9676.246	14676.969	21288.877	26502.024	40299.896
2005	2609.210	3983.304	4994.504	7212.576	10977.095	16633.572	24149.279	30006.777	45959.709
2006	2880.185	4405.286	5518.022	8051.350	12237.291	18487.511	26947.069	33733.757	52162.556
2007	3125.073	4799.696	6002.771	8751.518	13251.067	20111.847	29290.298	36695.927	55668.903
2008	3435.351	5189.456	6538.087	9495.236	14371.114	21857.656	31708.488	39573.704	58967.014
2009	3647.698	5598.035	7007.819	10186.144	15373.859	23217.165	33651.817	42229.427	64471.947
2010	3897.085	5908.616	7362.881	10715.539	16155.846	24426.685	35356.113	43903.355	66569.748

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2001	12.765	0.000
2002	4.563	0.762
2003	5.330	0.870
2004	6.355	1.358
2005	8.081	2.171
2006	9.792	2.804
2007	11.597	3.455
2008	13.691	4.146
2009	15.837	4.841
2010	18.007	5.526

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	12.765	12.765	12.765	12.765	12.765	12.765	12.765	12.765	12.765
2002	3.019	3.378	3.631	4.019	4.528	5.017	5.580	5.922	6.580
2003	3.620	4.054	4.285	4.700	5.275	5.853	6.461	6.869	7.740
2004	4.082	4.559	4.861	5.423	6.155	7.052	8.047	8.787	10.741
2005	4.675	5.354	5.778	6.582	7.701	9.136	10.811	12.084	15.190
2006	5.328	6.211	6.757	7.823	9.314	11.209	13.406	15.010	18.780
2007	6.038	7.115	7.813	9.158	11.023	13.374	16.096	18.026	22.457
2008	6.928	8.258	9.113	10.755	13.021	15.887	19.083	21.391	26.574
2009	7.861	9.450	10.452	12.399	15.069	18.404	22.174	24.829	30.824
2010	8.830	10.677	11.828	14.074	17.143	20.987	25.240	28.244	35.026

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.498	0.073
2002	0.169	0.000
2003	0.175	0.000
2004	0.175	0.000
2005	0.175	0.000
2006	0.175	0.000
2007	0.175	0.000
2008	0.175	0.000
2009	0.175	0.000
2010	0.175	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.348	0.390	0.409	0.450	0.492	0.541	0.597	0.629	0.686
2002	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
2003	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
2004	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
2005	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
2006	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
2007	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
2008	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
2009	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
2010	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.175

YEAR Pr(F > Threshold Value)

2001	1.000
2002	0.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

Georges Bank cod projection F= F rebuild

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GB cod:gbcod_v2_50
  2001
    10
    100
  123456
    0
    1
    0
    0
    0
    0
    0
    1
    0
    0
    0
    0
    1
    1
    10 1 10
  0.200000
0.6825 1.1462 1.8820 2.9264 4.2452 5.7163 7.3870 8.9626 10.4888 15.231
0.888 1.514 2.361 3.634 5.024 6.588 8.334 9.742 11.366 15.231
0.13 0.57 0.92 1.0000 1.000 1.000 1.0000 1.000 1.0000 1.0000
  0.1667
  5
  28.2855 77.6945 0.36
  1000000 1000000
  1000
gbcodboot.dat
  1000.000
216780000 0 0.175 108000000 0.32
  0.0000 0.1900 0.6600 1.0000 1.0000 1.0000 1.0000 1.000 1.000 1.0000
  1 0 0 0 0 0 0 0 0 0
127650000 0 0 0 0 0 0 0 0 0
  0 0.169 0 0 0 0 0 0 0

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=====
PROJECTION RUN: GB cod:gbcod_v2_50
INPUT FILE: gbcod_v2_50.in
OUTPUT FILE: gbcod_v2_50.out
RECRUITMENT MODEL: 5
NUMBER OF SIMULATIONS: 100

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MIXTURE OF F AND QUOTA BASED LANDINGS
YEAR   F           QUOTA (THOUSAND MT)
2001   0.000          12.765
2002   0.169
2003   0.000
2004   0.000
2005   0.000
2006   0.000
2007   0.000
2008   0.000
2009   0.000
2010   0.000

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SPAWNING STOCK BIOMASS (THOUSAND MT)
YEAR   AVG SSB (000 MT)   STD
2001   30.759             3.787
2002   28.613             4.639
2003   34.754             6.222
2004   47.970             10.416
2005   64.688             15.617
2006   84.905             21.650
2007   107.863            28.486
2008   136.798            36.431
2009   168.850            44.863
2010   202.560            53.577

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PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	23.107	24.911	25.969	28.099	30.518	32.974	35.723	37.117	40.655
2002	19.294	21.640	22.967	25.245	28.320	31.405	34.577	36.855	41.072
2003	23.256	25.928	27.472	30.376	34.122	38.284	42.735	45.808	53.195
2004	30.426	34.140	36.464	40.777	46.445	53.368	61.085	66.760	80.920
2005	38.843	44.329	47.589	53.831	62.211	72.697	84.616	93.405	114.316
2006	49.210	56.509	61.011	69.716	81.514	96.187	112.841	124.955	153.257
2007	60.514	70.221	76.170	87.809	103.451	122.846	144.952	160.631	196.364
2008	75.572	88.097	95.940	111.034	131.261	156.344	184.375	204.086	247.743
2009	92.513	108.289	118.084	137.025	162.287	193.462	227.593	251.775	304.673
2010	110.184	129.682	141.474	164.436	195.129	232.358	273.134	301.361	362.648

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 216.780 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.004
2008	0.031
2009	0.135
2010	0.342

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 10

YEAR	AVG MEAN B (000 MT)	STD
2001	34.834	4.758
2002	38.622	7.669
2003	49.868	11.175
2004	65.923	15.862
2005	86.690	22.024
2006	111.380	29.115
2007	139.507	37.103
2008	173.126	45.889
2009	209.453	54.766
2010	247.897	63.926

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	25.475	27.750	29.078	31.414	34.480	37.700	40.886	43.258	47.511
2002	25.159	28.135	29.950	33.324	37.634	42.690	48.348	52.332	62.252
2003	31.027	35.043	37.499	42.128	48.205	55.667	64.018	70.260	84.931
2004	39.457	45.129	48.422	54.852	63.464	74.142	86.261	95.175	115.850
2005	50.303	57.646	62.272	71.213	83.243	98.251	115.197	127.324	155.731
2006	62.648	72.727	78.859	90.897	106.952	126.786	149.381	165.116	201.427
2007	77.004	89.805	97.858	113.201	133.850	159.599	188.079	207.960	252.895
2008	94.838	111.119	121.104	140.554	166.503	198.399	233.087	258.041	311.841
2009	114.590	134.607	146.867	170.469	201.932	240.101	281.712	310.612	371.746
2010	135.646	159.553	174.281	202.417	239.541	283.490	332.305	365.520	435.917

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 108.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	0.000
2002	0.000
2003	0.001
2004	0.018
2005	0.148
2006	0.484
2007	0.808
2008	0.961
2009	0.995
2010	0.999

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 10

YEAR	AVG F_WT_B	STD
2001	0.373	0.050
2002	0.120	0.014
2003	0.000	0.000
2004	0.000	0.000



2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 10

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.268	0.295	0.312	0.339	0.370	0.406	0.439	0.460	0.500
2002	0.079	0.093	0.101	0.112	0.122	0.130	0.136	0.139	0.144
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.320

YEAR	Pr(F_WT_B > Threshold Value)
2001	0.861
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	37.973	4.276
2002	37.279	7.063
2003	45.378	9.743
2004	60.421	13.980
2005	79.591	19.496
2006	103.003	26.145
2007	129.325	33.627
2008	161.535	42.006
2009	196.789	50.667
2010	233.562	59.592

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	29.608	31.614	32.828	34.852	37.648	40.523	43.423	45.421	49.393
2002	24.473	27.417	29.152	32.362	36.465	41.153	46.360	49.893	58.431
2003	28.627	32.261	34.472	38.613	44.022	50.521	57.748	63.098	75.623
2004	36.821	41.899	44.880	50.669	58.314	67.762	78.390	86.116	104.157
2005	47.032	53.737	57.886	65.912	76.644	89.873	104.857	115.482	140.470
2006	58.982	68.224	73.753	84.609	99.083	116.883	136.979	151.248	183.909
2007	72.604	84.264	91.553	105.516	124.229	147.511	173.268	191.401	231.796
2008	89.662	104.812	113.899	131.721	155.430	184.638	216.402	239.016	288.237
2009	109.006	127.441	139.007	160.731	189.813	225.166	263.567	290.253	347.607
2010	128.914	151.264	165.029	191.123	225.782	266.736	312.077	343.179	408.951

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH  
BIRTH

YEAR	RECRUITMENT	STD
2001	9560.610	6405.460
2002	9081.725	6106.981
2003	10433.243	7086.380
2004	12771.463	8572.972
2005	15180.205	10221.818
2006	17499.828	11874.756
2007	19378.242	12988.619
2008	21268.751	14110.751
2009	22898.359	15324.941
2010	24064.954	15958.408

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH  
BIRTH

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	1928.358	2942.873	3643.962	5290.754	7957.990	11949.787	17250.122	21574.358	32819.336
2002	1821.796	2763.902	3440.012	4957.060	7527.730	11392.462	16531.063	20615.826	31162.788
2003	2065.346	3135.411	3929.792	5701.849	8641.647	13060.791	19007.063	23764.036	36250.816
2004	2520.676	3848.237	4815.433	6994.484	10605.681	16050.447	23251.467	28919.863	43846.569
2005	3038.316	4610.772	5777.495	8316.174	12609.047	19043.560	27603.926	34198.593	52323.334
2006	3480.980	5289.107	6606.285	9603.225	14527.923	21874.622	31657.885	39625.557	60961.788
2007	3862.611	5901.343	7347.427	10668.217	16070.669	24274.071	35248.077	43945.072	66344.048
2008	4308.041	6487.050	8117.429	11738.187	17674.665	26734.886	38629.379	48102.299	71445.145
2009	4629.103	7026.163	8774.315	12688.064	19027.573	28653.191	41280.056	51755.207	78308.556
2010	4896.838	7422.175	9236.992	13356.589	20029.310	30176.109	43425.495	53789.192	81151.291

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2001	12.765	0.000
2002	4.563	0.762
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	12.765	12.765	12.765	12.765	12.765	12.765	12.765	12.765	12.765
2002	3.019	3.378	3.631	4.019	4.528	5.017	5.580	5.922	6.580
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.498	0.073
2002	0.169	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.348	0.390	0.409	0.450	0.492	0.541	0.597	0.629	0.686
2002	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.175

YEAR	Pr(F > Threshold Value)
2001	1.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

### 7.3 Georges Bank haddock

#### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn Survey (kg/tow)	NEFSC Spring Survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1904	19.740			1931	107.648	46.446
1905	11.975			1932	103.795	52.495
1906	12.678			1933	87.808	61.339
1907	9.497			1934	78.018	59.106
1908	10.804			1935	83.877	58.621
1909	5.226			1936	85.567	106.412
1910	9.752			1937	84.818	79.547
1911	10.828			1938	93.235	60.377
1912	11.887			1939	110.450	112.278
1913	7.538			1940	106.869	115.339
1914	4.771			1941	115.696	62.092
1915	7.899			1942	120.833	23.637
1916	4.265			1943	121.608	66.785
1917	14.100			1944	105.342	51.753
1918	24.800			1945	101.404	94.700
1919	39.400			1946	97.542	60.755
1920	49.600			1947	92.915	34.660
1921	29.700			1948	89.075	125.967
1922	30.800			1949	73.176	59.135
1923	32.900			1950	79.648	105.924
1924	36.900			1951	85.079	43.559
1925	41.400			1952	89.134	134.229
1926	51.300			1953	87.916	53.495
1927	73.900			1954	100.342	93.280
1928	98.600			1955	113.326	61.251
1929	115.500			1956	122.187	61.951
1930	95.000			1957	121.980	59.853
1931	59.486			1958	118.454	131.958
1932	54.512			1959	127.009	124.988
1933	42.215			1960	153.952	54.929
1934	25.795			1961	195.738	39.492
1935	40.944			1962	199.533	190.706
1936	43.445			1963	167.603	486.215
1937	49.359			1964	132.978	32.602
1938	47.773			1965	149.358	4.081
1939	54.054			1966	189.106	13.172
1940	47.906			1967	122.279	0.420
1941	62.944			1968	85.356	0.984
1942	55.376			1969	60.760	4.773
1943	46.323			1970	49.694	0.473
1944	49.637			1971	47.491	8.507
1945	40.473			1972	17.779	19.485
1946	53.719			1973	11.061	10.792
1947	54.431			1974	23.256	7.623
1948	48.360			1975	18.642	102.889
1949	42.254			1976	22.367	14.366
1950	41.273			1977	42.217	5.984
1951	47.318			1978	69.739	84.416
1952	43.252			1979	67.988	10.103

Continued.

Year	Landings (k mt)	NEFSC Autumn Survey (kg/tow)	NEFSC Spring Survey (kg/tow)
1953	35.926		
1954	46.388		
1955	40.851		
1956	51.144		
1957	48.561		
1958	37.322		
1959	36.051		
1960	40.877		
1961	46.650		
1962	54.004		
1963	54.846	79.77	
1964	64.086	96.75	
1965	150.362	72.78	
1966	121.274	29.87	
1967	51.469	25.47	
1968	40.923	15.40	20.55
1969	22.252	8.44	16.93
1970	11.300	13.50	17.12
1971	10.862	5.59	5.00
1972	5.733	8.47	7.37
1973	5.331	9.78	15.37
1974	4.290	3.99	17.70
1975	5.420	15.10	8.21
1976	4.324	35.76	15.72
1977	10.843	27.52	26.58
1978	22.339	18.06	31.27
1979	19.461	31.98	19.77
1980	27.487	21.98	53.92
1981	24.834	14.01	38.02
1982	17.497	7.34	13.11
1983	11.890	5.75	13.21
1984	10.270	4.48	7.45
1985	7.757	3.86	11.14
1986	6.754	5.10	5.86
1987	6.859	2.56	5.60
1988	6.538	5.57	3.43
1989	4.489	4.70	4.70
1990	5.284	2.62	7.57
1991	6.841	0.94	4.38
1992	6.063	3.17	1.41
1993	4.414	4.33	2.48
1994	2.629	2.93	3.63
1995	2.282	10.66	5.72
1996	3.969	4.11	25.73
1997	3.627	6.51	18.50
1998	5.212	5.75	6.12
1999	6.455	23.13	7.75
2000	8.768	15.41	17.88

Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1980	63.931	7.222
1981	56.330	2.501
1982	45.901	3.098
1983	35.681	17.294
1984	27.141	1.754
1985	20.019	14.716
1986	20.388	2.198
1987	18.478	16.986
1988	17.688	1.083
1989	18.277	2.634
1990	20.572	2.431
1991	18.721	10.161
1992	13.937	13.892
1993	11.368	13.500
1994	15.085	10.717
1995	24.526	11.035
1996	30.274	20.693
1997	37.588	13.817
1998	43.217	39.604
1999	51.626	19.573
2000	59.739	57.290

# Georges Bank haddock projections F= Fmsy

GBHAD Run 1: F=F40%MSP (no 63 yc in cdf) 75 kt SSB cutoff

```

2001
  10
   50
 14145
   0
   1
   0
   0
   0
   0
   0
   1
   0
   0
   0
   0
   1
   1
   9 1 9
0.2000
0.388 0.732 1.277 1.704 2.039 2.350 2.749 3.204 3.678
0.545 1.060 1.533 1.874 2.247 2.498 2.970 3.180 3.678
0.040 0.490 0.950 1.000 1.000 1.000 1.000 1.000 1.000
0.2500
  15
33 36 ! Number of R in first group, Number of R in second group
7.50E+07 ! Cutoff in SSB between groups
1.08E+07 1.35E+07 1.39E+07 1.07E+07 1.08E+06 1.95E+07 2.63E+06 1.70E+07 1.03E+08 1.02E+07
1.47E+07 2.20E+06 2.43E+06 1.44E+07 7.62E+06 1.10E+07 1.75E+06 2.07E+07 1.73E+07 1.38E+07
5.98E+06 3.96E+07 3.10E+06 8.51E+06 4.73E+05 1.96E+07 2.50E+06 5.73E+07 4.77E+06 7.22E+06
1.01E+07 8.44E+07 5.91E+07
5.91E+07 1.06E+08 5.86E+07 7.95E+07 4.36E+07 9.84E+05 1.06E+08 6.13E+07 5.35E+07 1.26E+08
1.34E+08 3.47E+07 6.04E+07 6.08E+07 9.33E+07 9.47E+07 5.25E+07 5.18E+07 1.15E+08 4.64E+07
1.12E+08 6.13E+07 6.21E+07 1.32E+08 2.36E+07 6.68E+07 5.99E+07 6.20E+07 4.20E+05 1.25E+08
3.26E+07 4.08E+06 5.49E+07 1.32E+07 3.95E+07 1.91E+08
 1000
gbhadboot.dat
1000.000
250000000.000 0.0 0.263 0.0 0.0
0.003 0.088 0.471 0.920 1.000 1.000 1.000 1.000 1.000
1 0 0 0 0 0 0 0 0
11553600 -1 -1 -1 -1 -1 -1 -1 -1
-1 0.26 0.263 0.263 0.263 0.263 0.263 0.263 0.263 0.263
=====

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PROJECTION RUN: GBHAD Run 1: F=F40%MSP (no 63  
INPUT FILE: gbhad75no63.in  
OUTPUT FILE: gbhad75no63.out  
RECRUITMENT MODEL: 15  
NUMBER OF SIMULATIONS: 50

MIXTURE OF F AND QUOTA BASED LANDINGS

YEAR	F	QUOTA (THOUSAND MT)
2001		11.554
2002	0.260	
2003	0.263	
2004	0.263	
2005	0.263	
2006	0.263	
2007	0.263	
2008	0.263	
2009	0.263	
2010	0.263	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2001	81.101	8.811
2002	97.303	12.529
2003	123.570	24.903
2004	149.693	40.088
2005	174.955	47.827
2006	195.400	51.010
2007	210.871	52.810
2008	221.949	53.641
2009	230.229	53.986
2010	235.605	54.081

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	63.149	67.423	70.208	75.249	80.552	86.467	92.756	96.077	104.823
2002	70.586	78.504	82.146	89.103	96.358	104.397	113.656	118.882	131.608
2003	74.392	87.857	94.290	106.298	121.957	137.765	153.520	164.823	198.690
2004	69.807	89.851	99.585	120.372	147.202	176.269	202.991	218.452	251.772
2005	68.173	99.550	115.751	141.711	172.846	207.042	237.073	256.438	291.691
2006	72.862	114.787	132.796	161.022	193.897	228.962	261.492	281.212	317.764
2007	77.008	127.954	146.425	175.788	209.938	245.375	278.789	299.022	336.631
2008	82.684	138.299	156.998	186.526	221.085	256.878	290.592	311.325	348.904
2009	90.864	145.948	164.993	194.592	229.479	265.709	298.980	318.830	357.996
2010	98.035	151.890	169.978	200.011	234.799	270.853	304.510	325.053	364.099

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 250.000 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.000
2002	0.000
2003	0.001
2004	0.011
2005	0.064
2006	0.143
2007	0.224
2008	0.293
2009	0.350
2010	0.388

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 9

YEAR	AVG MEAN B (000 MT)	STD
2001	124.970	16.870
2002	155.074	32.905
2003	189.074	47.436
2004	219.670	57.225
2005	246.683	62.438
2006	266.118	65.063
2007	281.591	66.193
2008	291.745	66.689
2009	299.272	66.820
2010	304.037	66.789

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	90.474	100.727	105.789	114.143	123.203	133.959	146.086	153.561	173.656
2002	91.748	106.424	113.906	130.571	153.215	176.116	196.311	210.765	244.524
2003	88.220	115.836	129.988	156.004	186.637	220.174	250.864	269.770	308.693
2004	90.370	129.750	148.801	180.461	217.250	257.542	293.961	316.822	359.747
2005	95.640	147.872	169.896	205.064	245.165	287.646	327.102	351.234	395.659
2006	96.885	164.176	187.015	223.260	265.208	308.214	349.433	374.552	419.601
2007	106.492	177.988	201.223	238.412	280.844	324.752	365.552	391.041	437.420
2008	115.780	187.919	210.989	248.094	291.031	335.609	376.428	400.732	449.568
2009	127.536	195.441	218.503	255.812	298.748	343.056	383.849	409.223	456.687
2010	141.424	199.975	223.179	260.202	303.465	347.361	388.734	414.337	463.078

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000

2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	AVG F_WT_B	STD
2001	0.094	0.012
2002	0.125	0.019
2003	0.127	0.022
2004	0.135	0.023
2005	0.142	0.024
2006	0.150	0.024
2007	0.156	0.023
2008	0.159	0.023
2009	0.162	0.022
2010	0.164	0.022

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.065	0.075	0.079	0.086	0.094	0.101	0.109	0.115	0.127
2002	0.085	0.095	0.101	0.111	0.125	0.138	0.149	0.157	0.174
2003	0.087	0.095	0.101	0.110	0.124	0.140	0.156	0.168	0.190
2004	0.092	0.103	0.109	0.119	0.133	0.148	0.164	0.175	0.202
2005	0.092	0.104	0.112	0.126	0.141	0.158	0.173	0.183	0.205
2006	0.097	0.112	0.120	0.134	0.149	0.166	0.180	0.190	0.208
2007	0.104	0.119	0.127	0.140	0.156	0.171	0.185	0.194	0.212
2008	0.107	0.122	0.131	0.144	0.159	0.174	0.188	0.197	0.215
2009	0.109	0.126	0.134	0.147	0.162	0.177	0.191	0.199	0.216
2010	0.113	0.128	0.136	0.149	0.164	0.179	0.192	0.201	0.218

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	118.859	14.272
2002	147.485	27.591
2003	180.277	40.352
2004	212.771	52.757
2005	241.493	60.329
2006	264.437	63.810
2007	281.936	65.485
2008	294.400	66.302
2009	303.532	66.606
2010	309.564	66.662

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	89.362	97.912	102.344	109.723	117.548	126.491	136.862	143.412	159.222
2002	92.943	105.271	111.924	127.757	146.588	165.389	182.006	193.176	219.947
2003	92.433	118.235	130.400	152.531	178.461	206.121	231.953	247.821	285.289
2004	95.454	130.774	147.233	176.442	210.290	247.585	281.634	302.477	342.457
2005	96.083	146.193	167.331	201.088	239.695	281.449	319.458	342.542	385.693
2006	99.435	164.352	186.868	222.482	263.458	306.005	345.944	370.654	415.974
2007	106.656	179.390	202.780	239.059	281.399	324.542	364.893	389.819	436.708
2008	118.268	191.280	214.443	251.318	293.842	337.686	378.389	402.643	450.242
2009	129.359	200.392	223.214	260.014	303.154	347.032	387.880	412.459	460.258
2010	143.394	206.071	228.958	266.429	308.887	352.852	393.485	419.399	466.790



ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2001	55573.854	41363.361
2002	66842.078	39077.262
2003	67323.488	38743.087
2004	67439.069	38907.265
2005	67437.668	38610.798
2006	67789.185	38767.771
2007	67588.165	38531.553
2008	67288.908	38832.685
2009	67522.949	38546.561
2010	67842.322	38751.952

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	626.758	2056.051	3798.398	16853.877	54641.323	78902.708	118575.817	129949.290	164267.172
2002	621.750	2926.916	13610.939	43994.649	60448.623	95568.489	125469.182	132526.365	169581.365
2003	626.450	2824.365	15209.322	45006.739	60516.297	95849.066	125385.808	132454.092	169965.764
2004	609.957	3135.977	15107.618	44763.562	60548.771	95774.219	125455.077	132475.007	172349.653
2005	635.162	3139.480	15598.441	44996.703	60551.140	96723.626	125384.677	132249.697	170759.252
2006	622.806	3263.746	16371.451	45304.136	60575.333	96662.674	125513.075	132541.644	171791.632
2007	620.234	3200.598	17158.132	45052.179	60527.259	95597.395	125450.459	132466.849	170496.603
2008	618.090	2870.630	15552.992	44777.104	60442.474	95662.376	125494.485	132518.632	171560.981
2009	605.666	3283.837	16756.457	44984.293	60565.902	95700.250	125403.589	132484.698	170259.572
2010	637.818	3279.351	16820.562	45246.084	60601.922	97348.377	125571.218	132601.386	171111.519

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2001	11.554	0.000
2002	18.913	2.280
2003	23.114	3.637
2004	29.047	6.888
2005	34.787	9.724
2006	39.650	10.829
2007	43.653	11.295
2008	46.282	11.573
2009	48.296	11.656
2010	49.594	11.680

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	11.554	11.554	11.554	11.554	11.554	11.554	11.554	11.554	11.554
2002	14.283	15.380	16.069	17.389	18.785	20.270	21.871	22.945	25.012
2003	15.534	17.805	18.844	20.746	22.859	25.122	27.541	29.134	33.751
2004	15.465	19.133	20.736	23.986	28.568	33.293	37.679	40.769	48.324
2005	14.527	19.856	22.646	27.887	34.195	41.296	47.622	51.581	58.889
2006	14.526	22.504	26.304	32.228	39.265	46.789	53.767	57.995	66.000
2007	16.183	25.964	29.813	36.104	43.359	51.059	58.306	62.636	70.560
2008	16.564	28.237	32.253	38.602	46.123	53.831	61.094	65.608	73.706
2009	18.066	30.145	34.136	40.645	48.109	55.936	63.180	67.654	75.756
2010	19.842	31.498	35.438	41.855	49.414	57.276	64.451	68.850	77.435

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.192	0.020
2002	0.260	0.000
2003	0.263	0.000
2004	0.263	0.000
2005	0.263	0.000
2006	0.263	0.000
2007	0.263	0.000
2008	0.263	0.000
2009	0.263	0.000
2010	0.263	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.150	0.161	0.167	0.178	0.191	0.205	0.219	0.227	0.243
2002	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260
2003	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2004	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2005	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2006	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2007	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2008	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2009	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263
2010	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263	0.263

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.263

YEAR	Pr(F > Threshold Value)
2001	0.002
2002	0.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

# Georges Bank haddock projections F= F rebuild

GBHAD Run 1: F=Frebuild (no 63 yc in cdf) 75 kt SSB cutoff

```

2001
 10
 50
14145
 0
 1
 0
 0
 0
 0
 0
 1
 0
 0
 0
 0
 1
 1
 9 1 9
0.2000
0.388 0.732 1.277 1.704 2.039 2.350 2.749 3.204 3.678
0.545 1.060 1.533 1.874 2.247 2.498 2.970 3.180 3.678
0.040 0.490 0.950 1.000 1.000 1.000 1.000 1.000 1.000
0.2500

```

```

15
33 36 ! Number of R in first group, Number of R in second group
7.50E+07 ! Cutoff in SSB between groups
1.08E+07 1.35E+07 1.39E+07 1.07E+07 1.08E+06 1.95E+07 2.63E+06 1.70E+07 1.03E+08 1.02E+07
1.47E+07 2.20E+06 2.43E+06 1.44E+07 7.62E+06 1.10E+07 1.75E+06 2.07E+07 1.73E+07 1.38E+07
5.98E+06 3.96E+07 3.10E+06 8.51E+06 4.73E+05 1.96E+07 2.50E+06 5.73E+07 4.77E+06 7.22E+06
1.01E+07 8.44E+07 5.91E+07
5.91E+07 1.06E+08 5.86E+07 7.95E+07 4.36E+07 9.84E+05 1.06E+08 6.13E+07 5.35E+07 1.26E+08
1.34E+08 3.47E+07 6.04E+07 6.08E+07 9.33E+07 9.47E+07 5.25E+07 5.18E+07 1.15E+08 4.64E+07
1.12E+08 6.13E+07 6.21E+07 1.32E+08 2.36E+07 6.68E+07 5.99E+07 6.20E+07 4.20E+05 1.25E+08
3.26E+07 4.08E+06 5.49E+07 1.32E+07 3.95E+07 1.91E+08

```

```

1000
gbhadboot.dat
1000.000
250200000.000 0.0 0.263 0.0 0.0
0.003 0.088 0.471 0.920 1.000 1.000 1.000 1.000 1.000
1 0 0 0 0 0 0 0 0
11553600 -1 -1 -1 -1 -1 -1 -1 -1
-1 0.26 0.210 0.210 0.210 0.210 0.210 0.210 0.210 0.210

```

```

=====
PROJECTION RUN: GBHAD Run 1: F=Frebuild (no 63
INPUT FILE: gbhad75no63rebuild.in
OUTPUT FILE: gbhad75no63rebuild.out
RECRUITMENT MODEL: 15
NUMBER OF SIMULATIONS: 50

```

## MIXTURE OF F AND QUOTA BASED LANDINGS

```

YEAR F QUOTA (THOUSAND MT)
2001 11.554
2002 0.260
2003 0.210
2004 0.210
2005 0.210
2006 0.210
2007 0.210
2008 0.210
2009 0.210
2010 0.210

```

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2001	81.101	8.811
2002	97.303	12.529
2003	124.685	25.052
2004	154.888	40.880
2005	184.384	49.527
2006	209.026	53.465
2007	228.615	55.682
2008	243.318	56.837
2009	254.728	57.465
2010	262.531	57.734

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	63.149	67.423	70.208	75.249	80.552	86.467	92.756	96.077	104.823
2002	70.586	78.504	82.146	89.103	96.358	104.397	113.656	118.882	131.608
2003	75.224	88.738	95.220	107.325	123.065	138.964	154.788	166.137	200.284
2004	73.145	93.890	103.764	125.048	152.388	181.888	209.019	224.872	259.287
2005	74.057	106.389	123.013	149.879	182.167	217.626	248.719	268.876	305.212
2006	81.564	124.513	143.294	172.904	207.351	244.232	278.263	298.897	337.442
2007	90.739	141.420	160.604	191.403	227.549	264.835	300.488	321.956	361.838
2008	103.372	154.695	174.000	205.619	242.320	280.317	316.075	338.153	378.418
2009	114.063	165.121	184.879	216.736	253.977	292.547	328.174	349.192	391.265
2010	123.292	173.007	192.041	224.287	261.696	300.234	335.875	358.198	399.600

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 250.200 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.000
2002	0.000
2003	0.001
2004	0.016
2005	0.096
2006	0.217
2007	0.339
2008	0.444
2009	0.526
2010	0.580

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 9

YEAR	AVG MEAN B (000 MT)	STD
2001	124.970	16.870
2002	155.074	32.905
2003	191.274	47.704
2004	226.159	58.141
2005	257.708	64.010
2006	281.401	67.129
2007	301.026	68.639
2008	314.569	69.436
2009	325.081	69.763
2010	332.094	69.871

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	90.474	100.727	105.789	114.143	123.203	133.959	146.086	153.561	173.656
2002	91.748	106.424	113.906	130.571	153.215	176.116	196.311	210.765	244.524
2003	89.747	117.603	131.833	158.040	188.845	222.537	253.349	272.439	311.672
2004	95.467	134.894	154.049	186.388	223.690	264.667	301.620	324.787	368.589
2005	104.157	156.810	178.853	214.897	255.966	299.581	340.338	365.298	411.039
2006	112.199	176.257	199.482	236.760	280.268	324.902	367.585	393.635	440.919
2007	128.990	193.764	217.430	255.773	300.133	345.733	388.102	415.119	463.640
2008	142.688	206.688	230.322	268.629	313.725	360.201	403.048	428.554	480.159
2009	155.262	216.843	240.315	279.169	324.423	370.797	413.353	440.751	490.297
2010	167.962	223.423	246.968	285.883	331.221	377.428	420.562	447.537	498.042

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000

2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	AVG F_WT_B	STD
2001	0.094	0.012
2002	0.125	0.019
2003	0.102	0.018
2004	0.110	0.018
2005	0.117	0.019
2006	0.124	0.019
2007	0.129	0.018
2008	0.132	0.018
2009	0.135	0.017
2010	0.137	0.017

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.065	0.075	0.079	0.086	0.094	0.101	0.109	0.115	0.127
2002	0.085	0.095	0.101	0.111	0.125	0.138	0.149	0.157	0.174
2003	0.070	0.077	0.081	0.089	0.100	0.113	0.125	0.135	0.152
2004	0.076	0.084	0.089	0.098	0.109	0.121	0.134	0.142	0.163
2005	0.077	0.087	0.093	0.104	0.116	0.129	0.141	0.149	0.166
2006	0.081	0.093	0.100	0.111	0.123	0.136	0.148	0.155	0.169
2007	0.088	0.100	0.106	0.117	0.129	0.141	0.152	0.159	0.172
2008	0.091	0.103	0.110	0.121	0.133	0.144	0.155	0.161	0.175
2009	0.094	0.107	0.113	0.124	0.135	0.147	0.157	0.164	0.176
2010	0.097	0.109	0.115	0.125	0.137	0.148	0.159	0.165	0.178

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	118.859	14.272
2002	147.485	27.591
2003	180.277	40.352
2004	216.962	53.223
2005	250.144	61.419
2006	277.498	65.516
2007	299.296	67.649
2008	315.593	68.809
2009	328.071	69.402
2010	336.701	69.650

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	89.362	97.912	102.344	109.723	117.548	126.491	136.862	143.412	159.222
2002	92.943	105.271	111.924	127.757	146.588	165.389	182.006	193.176	219.947
2003	92.433	118.235	130.400	152.531	178.461	206.121	231.953	247.821	285.289
2004	99.011	134.151	150.915	180.354	214.445	251.986	286.365	307.409	347.889
2005	103.449	153.337	174.446	208.846	248.276	290.796	329.605	352.974	397.254
2006	112.087	174.701	197.366	234.107	276.352	320.214	361.350	387.167	434.054
2007	128.826	193.793	217.238	254.617	298.452	343.305	385.136	411.411	460.079
2008	144.692	208.382	231.935	270.513	314.821	360.412	403.127	428.719	478.550
2009	158.508	220.337	243.920	282.146	327.501	373.492	416.331	442.253	492.624
2010	171.068	228.475	251.917	291.115	335.766	382.131	424.788	451.854	500.532

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2001	55573.854	41363.361
2002	66842.078	39077.262
2003	67346.354	38740.971
2004	67658.706	38827.776
2005	67635.601	38538.813
2006	67897.163	38720.805
2007	67714.836	38485.009
2008	67402.568	38799.120
2009	67619.094	38505.712
2010	67949.981	38708.869

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	626.758	2056.051	3798.398	16853.877	54641.323	78902.708	118575.817	129949.290	164267.172
2002	621.750	2926.916	13610.939	43994.649	60448.623	95568.489	125469.182	132526.365	169581.365
2003	626.450	2834.855	15244.593	45019.873	60520.066	95887.101	125389.030	132462.547	169965.764
2004	609.123	3223.113	15860.819	45017.000	60575.435	96142.418	125469.241	132480.961	172470.738
2005	635.046	3236.360	16661.359	45243.456	60576.118	97131.520	125397.708	132259.721	170778.645
2006	621.816	3315.714	16943.441	45447.052	60591.362	96841.702	125516.379	132545.067	171791.632
2007	620.234	3250.349	17745.250	45202.138	60544.205	95852.484	125465.994	132482.636	170507.438
2008	617.935	2891.652	15931.883	44884.353	60458.360	95845.023	125502.284	132529.362	171576.265
2009	605.666	3339.029	17132.235	45109.785	60573.753	95841.787	125418.477	132492.145	170259.572
2010	637.818	3333.384	17240.190	45383.072	60617.404	97514.616	125576.931	132604.045	171111.519

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2001	11.554	0.000
2002	18.913	2.280
2003	18.824	2.949
2004	24.405	5.699
2005	29.898	8.211
2006	34.638	9.305
2007	38.699	9.795
2008	41.521	10.085
2009	43.763	10.197
2010	45.274	10.252

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	11.554	11.554	11.554	11.554	11.554	11.554	11.554	11.554	11.554
2002	14.283	15.380	16.069	17.389	18.785	20.270	21.871	22.945	25.012
2003	12.672	14.518	15.362	16.904	18.618	20.452	22.420	23.707	27.407
2004	13.145	16.209	17.539	20.238	24.017	27.898	31.506	34.078	40.451
2005	12.797	17.301	19.633	24.080	29.395	35.388	40.716	44.043	50.282
2006	13.251	19.892	23.163	28.255	34.300	40.788	46.752	50.412	57.345
2007	15.056	23.347	26.656	32.123	38.425	45.118	51.375	55.212	62.070
2008	16.550	25.842	29.244	34.792	41.347	48.117	54.478	58.434	65.560
2009	18.796	27.868	31.341	37.011	43.569	50.443	56.764	60.775	67.853
2010	20.470	29.371	32.797	38.421	45.101	52.036	58.410	62.211	69.829

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.192	0.020
2002	0.260	0.000
2003	0.210	0.000
2004	0.210	0.000
2005	0.210	0.000
2006	0.210	0.000
2007	0.210	0.000
2008	0.210	0.000
2009	0.210	0.000
2010	0.210	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.150	0.161	0.167	0.178	0.191	0.205	0.219	0.227	0.243
2002	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260	0.260
2003	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2004	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2005	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2006	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2007	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2008	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2009	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210
2010	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210	0.210

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.263

YEAR	Pr(F > Threshold Value)
2001	0.002
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

## 7.4 Gulf of Maine haddock

### Landings and survey indices

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)
1956	7.307		
1957	6.166		
1958	7.367		
1959	4.660		
1960	4.924		
1961	5.409		
1962	5.110		
1963	4.789	50.697	
1964	5.453	18.829	
1965	4.363	17.644	
1966	5.704	13.859	
1967	5.496	16.853	
1968	3.557	15.484	7.887
1969	2.713	12.854	7.376
1970	1.562	7.354	1.725
1971	1.306	8.137	2.523
1972	0.936	3.036	0.867
1973	0.558	8.583	1.578
1974	0.829	3.347	1.059
1975	1.263	8.616	3.482
1976	1.956	8.040	6.350
1977	3.322	8.752	6.725
1978	5.179	20.932	1.434
1979	4.879	13.723	4.633
1980	7.473	9.835	3.383
1981	6.239	9.344	4.488
1982	6.923	4.164	2.555
1983	7.597	5.219	3.567
1984	4.038	3.893	1.144
1985	3.025	6.149	1.882
1986	1.668	1.392	1.284
1987	0.829	2.645	0.062
1988	0.436	1.476	0.301
1989	0.264	0.631	0.124
1990	0.433	0.432	0.000
1991	0.431	0.120	0.066
1992	0.312	0.091	0.271
1993	0.193	0.472	0.200
1994	0.112	0.217	0.253
1995	0.192	1.099	0.350
1996	0.257	3.543	0.338
1997	0.616	2.424	1.222
1998	1.018	2.917	0.112
1999	0.668	4.910	1.108
2000	0.660	14.030	1.815



## 7.5 Georges Bank yellowtail flounder

### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1935	0.4			1973	21.143	50.265
1936	0.4			1974	14.130	68.516
1937	0.4			1975	8.398	22.919
1938	0.4			1976	9.271	15.760
1939	0.5			1977	7.592	50.823
1940	0.8			1978	5.469	23.375
1941	1.2			1979	7.702	22.099
1942	2.1			1980	10.112	61.066
1943	1.7			1981	9.716	21.627
1944	2.2			1982	12.537	5.818
1945	1.9			1983	10.427	8.620
1946	1.2			1984	3.485	14.594
1947	3.1			1985	2.732	6.660
1948	7.7			1986	3.763	7.023
1949	9.8			1987	2.638	19.350
1950	5.3			1988	2.198	8.530
1951	5.8			1989	5.739	11.696
1952	5.0			1990	4.851	22.072
1953	3.9			1991	4.362	15.974
1954	3.9			1992	4.892	12.153
1955	3.9			1993	4.441	11.268
1956	2.1			1994	2.517	15.778
1957	3.1			1995	2.497	23.440
1958	6.1			1996	5.111	49.970
1959	5.5			1997	8.522	76.980
1963	16.7	12.79		1998	16.114	45.134
1964	19.8	13.63		1999	32.306	33.771
1965	19.4	9.10				
1966	13.7	3.99				
1967	15.3	7.58				
1968	18.2	10.53	2.81			
1969	20.9	9.28	11.17			
1970	21.3	4.98	5.31			
1971	15.5	6.36	4.61			
1972	17.6	6.33	6.45			
1973	16.5	6.60	2.94			
1974	16.6	3.73	2.72			
1975	16.0	2.36	1.68			
1976	14.4	1.53	2.27			
1977	10.0	2.83	1.00			
1978	6.2	2.38	0.74			
1979	6.2	1.52	1.23			
1980	6.9	6.72	4.46			
1981	6.3	2.62	1.96			
1982	12.0	2.27	2.50			
1983	11.4	2.13	2.64			
1984	5.8	0.59	1.65			
1985	2.5	0.71	0.99			
1986	3.1	0.82	0.85			

Continued.

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)
1987	3.0	0.51	0.33
1988	2.1	0.17	0.57
1989	1.2	0.98	0.73
1990	3.6	0.72	0.70
1991	2.0	0.73	0.63
1992	4.7	0.58	1.57
1993	3.9	0.55	0.48
1994	3.9	0.90	0.66
1995	0.8	0.35	2.58
1996	1.3	1.30	2.85
1997	1.8	3.78	4.36
1998	3.1	4.35	2.32
1999	4.4	7.97	9.31
2000	6.9	5.84	6.70

## Georges Bank yellowtail flounder hindcast spawning biomass and recruitment

---

Year	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1963	32.445	67.135981
1964	46.428	57.472924
1965	30.410	112.069795
1966	11.862	143.749913
1967	20.333	124.921781
1968	28.620	61.768953
1969	28.493	83.622142
1970	17.536	78.519856
1971	23.792	66.149218
1972	22.976	34.344164
1973	26.288	30.216607
1974	10.779	23.212996
1975	7.160	26.004813
1976	4.234	15.306859
1977	7.252	24.055355
1978	4.259	61.203369
1979	4.193	28.074609
1980	17.430	26.293622
1981	7.148	27.484958
1982	6.374	4.813478
1983	7.128	6.738869
1984	7.545	13.357401
1985	1.304	4.693141
1986	2.194	2.563177
1987	1.377	23.971119
1988	0.509	3.922984
1989	4.138	3.309266
1990	3.064	4.765343
1991	1.848	1.636582
1992	2.281	2.647413
1993	2.286	1.444043
1994	4.146	4.211793
1995	1.469	6.418773
1996	4.107	57.966306

---

## George Bank yellowtail flounder projection F= Fmsy

Georges Bank yellowtail flounder

```

2001      ! first year of projection run
10        ! number of years to project
100       ! number of simulations per pop vector
123456    ! random number seed
0         ! age-2 recruitment flag
1         ! harvest mixture flag
0         ! discard flag
0         ! quota-based flag
0         ! constant harvest strategy flag
0         ! F target flag
0         ! index flag
1         ! SFA threshold flag
0         ! market category flag
0         ! total mortality flag
0         ! partial recruitment flag
1         ! constant discard flag
0         ! bounded recruitment flag
1         ! constant M flag
1         ! bootstrap flag
6 1 6    ! # age classes, lowest and highest ages
0.2       ! M
0.181    0.349  0.462  0.578  0.710  0.948 ! spawning weights at age
0.181    0.349  0.462  0.578  0.710  0.948 ! landed weights at age
0.00     0.52   0.86   0.98   1.0    1.0    ! maturity at age
0.4167   ! fraction of mortality that occurs before spawning

15        ! recruitment flag
11 26     ! number of recruit values in each stanza
5000000   ! break point for stanzas
8.530E+06 2.344E+07 1.578E+07 1.935E+07 6.660E+06 1.459E+07 7.023E+06
1.597E+07 1.127E+07 2.207E+07 1.215E+07
4.997E+07 2.338E+07 1.170E+07 5.082E+07 2.210E+07 2.292E+07 7.698E+07
1.576E+07 2.163E+07 6.107E+07 8.620E+06 1.437E+08 5.818E+06 6.852E+07
4.513E+07 7.852E+07 1.249E+08 5.027E+07 3.434E+07 6.615E+07 8.362E+07
6.177E+07 1.121E+08 3.377E+07 6.714E+07 5.747E+07
800      ! number of bootstraps in file
gbyt2001bootn.dat
1000.0    ! conversion from VPA to absolute numbers
58.8E6   1.0E6  0.248  2.0E6  0.0 ! thresholds: SSB, total B, F, mean B, biomass weighted F
0.006    0.315  0.648  1.00  1.00  1.00 ! selectivity at age
1 0 0 0 0 0 0 0 0 ! annual projwhat flag (0=F, 1=catch)
7.740E6  0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0 ! projected catch in weight
0.0      0.265  0.248  0.248  0.248  0.248  0.248  0.248  0.248 ! projected F

! average discards/landings 1995-2000 = 0.096
! 2001 landings from RO Jan-Nov adjusted for Dec based on proportion of landings in 2000
! 2001 landings = 7.062E6 * 1.096 (disc ratio) => catch = 7.740E6
! 2002 F is F(0.1)
! 2003-2010 F are F40%MSP
! note that yield output is catch not landings

```

=====

```

PROJECTION RUN: Georges Bank yellowtail flound
INPUT FILE: GBYTempir.in
OUTPUT FILE: GBYTempir.out
RECRUITMENT MODEL: 15
NUMBER OF SIMULATIONS: 100

```

MIXTURE OF F AND QUOTA BASED CATCHES

```

YEAR  F      QUOTA (THOUSAND MT)
2001      7.740
2002  0.265
2003  0.248
2004  0.248
2005  0.248
2006  0.248
2007  0.248
2008  0.248
2009  0.248

```

2010 0.248

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2001	47.173	6.602
2002	46.599	6.924
2003	46.111	7.221
2004	47.371	9.146
2005	49.525	10.846
2006	51.430	11.804
2007	53.779	12.532
2008	55.286	12.810
2009	56.238	12.957
2010	56.819	13.025

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	33.214	37.002	38.659	42.814	46.578	51.372	56.145	59.044	63.364
2002	32.804	36.192	37.828	41.946	45.758	51.015	55.885	58.440	63.805
2003	31.523	35.236	37.351	40.974	45.565	50.724	55.632	58.780	65.082
2004	29.527	33.539	36.102	40.817	46.679	53.120	59.617	63.742	71.472
2005	27.963	33.014	36.164	41.764	48.706	56.457	64.087	68.751	77.629
2006	27.547	33.400	36.839	42.939	50.659	59.065	67.246	72.140	81.509
2007	28.292	34.498	38.159	44.868	53.024	61.900	70.372	75.698	85.705
2008	28.937	35.422	39.325	46.188	54.564	63.645	72.177	77.564	87.596
2009	29.417	36.157	39.980	47.077	55.556	64.650	73.380	78.666	89.016
2010	29.883	36.595	40.530	47.579	56.124	65.235	74.051	79.524	89.627

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 58.800 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.052
2002	0.045
2003	0.050
2004	0.114
2005	0.192
2006	0.256
2007	0.328
2008	0.374
2009	0.404
2010	0.421

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2001	55.711	7.682
2002	57.879	8.870
2003	60.721	11.208
2004	62.987	13.055
2005	65.247	14.285
2006	67.105	14.993
2007	69.387	15.533
2008	70.835	15.788
2009	71.722	15.907
2010	72.279	15.915

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	40.456	44.170	46.052	50.548	54.786	60.658	65.866	68.775	74.816
2002	39.883	44.490	47.111	51.573	57.247	63.542	69.549	73.431	81.191
2003	38.587	43.678	46.892	52.714	59.899	67.788	75.672	80.639	90.063
2004	36.883	43.062	46.872	53.674	62.050	71.341	80.468	86.076	96.699
2005	36.266	43.362	47.598	54.978	64.371	74.469	84.320	90.255	101.596
2006	36.554	44.034	48.415	56.446	66.236	76.812	86.935	93.272	105.276
2007	37.332	45.253	49.992	58.373	68.535	79.556	89.827	96.315	108.657
2008	37.899	46.381	51.047	59.720	70.049	81.116	91.664	98.169	110.654
2009	38.602	46.976	51.778	60.481	70.902	82.023	92.740	99.342	111.710
2010	39.136	47.601	52.389	61.057	71.473	82.649	93.262	99.791	112.396

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 2.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	AVG F_WT_B	STD
2001	0.142	0.019
2002	0.196	0.018
2003	0.171	0.020
2004	0.163	0.018
2005	0.165	0.020
2006	0.167	0.020
2007	0.170	0.020
2008	0.171	0.020
2009	0.172	0.020
2010	0.173	0.020

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.102	0.113	0.117	0.128	0.141	0.153	0.168	0.175	0.190
2002	0.151	0.163	0.171	0.184	0.196	0.211	0.220	0.224	0.229
2003	0.128	0.138	0.145	0.157	0.170	0.184	0.199	0.207	0.217
2004	0.124	0.134	0.140	0.150	0.162	0.175	0.188	0.196	0.208
2005	0.122	0.134	0.140	0.152	0.165	0.178	0.191	0.199	0.211
2006	0.122	0.135	0.142	0.154	0.167	0.181	0.193	0.200	0.213
2007	0.123	0.137	0.144	0.156	0.170	0.183	0.196	0.203	0.215
2008	0.125	0.138	0.146	0.158	0.171	0.185	0.197	0.204	0.216
2009	0.126	0.139	0.147	0.159	0.172	0.186	0.198	0.205	0.217
2010	0.127	0.140	0.147	0.160	0.173	0.186	0.198	0.205	0.217

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	65.702	8.461
2002	70.106	10.543
2003	72.649	13.021
2004	75.078	15.212
2005	77.878	16.829
2006	80.180	17.752
2007	83.011	18.454
2008	84.809	18.776
2009	85.916	18.925
2010	86.610	18.945

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	48.913	52.992	55.067	60.016	64.682	71.151	76.887	80.094	86.753
2002	48.512	54.117	57.317	62.673	69.348	76.870	83.946	88.502	97.682
2003	46.814	52.840	56.565	63.361	71.714	80.895	89.949	95.742	106.769
2004	44.668	51.859	56.312	64.241	73.996	84.829	95.417	101.949	114.213
2005	43.717	52.114	57.085	65.786	76.861	88.704	100.332	107.417	120.703
2006	44.004	52.841	58.025	67.556	79.148	91.682	103.702	111.202	125.301
2007	44.929	54.341	59.970	69.934	82.001	95.100	107.369	115.057	129.675
2008	45.573	55.658	61.249	71.615	83.879	97.039	109.576	117.252	132.021
2009	46.542	56.443	62.221	72.582	84.945	98.194	110.882	118.728	133.560
2010	47.070	57.229	62.907	73.259	85.626	98.943	111.591	119.409	134.389

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH BIRTH

YEAR	RECRUITMENT AVG	STD
2001	52910.843	32287.303
2002	52927.014	32326.947
2003	52887.235	32345.853
2004	53153.015	32342.433
2005	53006.503	32269.024
2006	53058.572	32445.040
2007	52945.284	32248.525
2008	52796.023	32440.113
2009	52879.600	32208.314
2010	53114.739	32420.804

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH BIRTH

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	6517.565	9370.097	13536.238	23025.961	50564.465	68226.839	97281.542	121633.303	138958.159
2002	6522.439	9451.390	13796.457	23040.729	50541.938	68144.990	98272.056	121863.834	138664.028
2003	6537.984	9216.514	13538.465	23033.330	50534.019	68188.823	97230.926	121784.749	138976.305
2004	6528.843	9479.884	13789.773	23048.462	50602.186	68216.214	98658.991	121745.644	139063.878
2005	6541.626	9409.575	13835.231	23050.657	50572.002	68263.572	97889.338	121161.260	138931.514
2006	6537.684	9468.315	13758.826	23043.999	50552.986	68165.762	98243.498	122316.533	139502.200
2007	6547.456	9458.538	13873.532	23033.036	50542.902	68163.446	97250.864	121657.406	138863.231
2008	6530.895	9240.434	13492.563	23008.800	50483.049	68121.248	98377.255	121978.531	138946.227
2009	6499.030	9414.445	13699.907	23034.884	50563.971	68111.273	96751.792	121612.119	138943.533
2010	6567.317	9458.210	13780.737	23046.554	50585.412	68222.772	99231.812	122097.067	138973.082

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
2001	7.740	0.000
2002	11.285	1.684
2003	10.247	1.540
2004	10.135	1.740
2005	10.686	2.261
2006	11.143	2.524
2007	11.707	2.720
2008	12.071	2.794
2009	12.301	2.829
2010	12.445	2.847

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	7.740	7.740	7.740	7.740	7.740	7.740	7.740	7.740	7.740
2002	7.854	8.720	9.174	10.182	11.089	12.350	13.630	14.260	15.416
2003	7.096	7.913	8.404	9.173	10.111	11.222	12.289	12.945	14.297
2004	6.685	7.503	7.994	8.891	10.006	11.236	12.449	13.221	14.711
2005	6.249	7.256	7.908	9.071	10.508	12.111	13.728	14.724	16.557
2006	6.071	7.308	8.033	9.334	10.969	12.762	14.520	15.601	17.610
2007	6.200	7.536	8.328	9.767	11.541	13.461	15.339	16.468	18.644
2008	6.375	7.761	8.602	10.082	11.902	13.895	15.769	16.977	19.172
2009	6.456	7.915	8.751	10.305	12.148	14.140	16.039	17.210	19.443
2010	6.565	8.028	8.884	10.426	12.295	14.290	16.213	17.398	19.643

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.187	0.027
2002	0.265	0.000
2003	0.248	0.000
2004	0.248	0.000
2005	0.248	0.000
2006	0.248	0.000
2007	0.248	0.000
2008	0.248	0.000
2009	0.248	0.000
2010	0.248	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.135	0.147	0.154	0.168	0.185	0.203	0.223	0.234	0.265
2002	0.265	0.265	0.265	0.265	0.265	0.265	0.265	0.265	0.265
2003	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248
2004	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248
2005	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248
2006	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248
2007	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248
2008	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248
2009	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248
2010	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248	0.248

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.248

YEAR	Pr(F > Threshold Value)
2001	0.020
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000



## George Bank yellowtail flounder projection F= F rebuild

```

Georges Bank yellowtail flounder Frebuild
 2001      ! first year of projection run
 10        ! number of years to project
 100       ! number of simulations per pop vector
123456     ! random number seed
 0         ! age-2 recruitment flag
 1         ! harvest mixture flag
 0         ! discard flag
 0         ! quota-based flag
 0         ! constant harvest strategy flag
 0         ! F target flag
 0         ! index flag
 1         ! SFA threshold flag
 0         ! market category flag
 0         ! total mortality flag
 0         ! partial recruitment flag
 1         ! constant discard flag
 0         ! bounded recruitment flag
 1         ! constant M flag
 1         ! bootstrap flag
 6 1 6     ! # age classes, lowest and highest ages
0.2        ! M
0.181 0.349 0.462 0.578 0.710 0.948 ! spawning weights at age
0.181 0.349 0.462 0.578 0.710 0.948 ! landed weights at age
0.00 0.52 0.86 0.98 1.0 1.0 ! maturity at age
0.4167     ! fraction of mortality that occurs before spawning

 15        ! recruitment flag
11 26      ! number of recruit values in each stanza
5000000    ! break point for stanzas
8.530E+06 2.344E+07 1.578E+07 1.935E+07 6.660E+06 1.459E+07 7.023E+06
1.597E+07 1.127E+07 2.207E+07 1.215E+07
4.997E+07 2.338E+07 1.170E+07 5.082E+07 2.210E+07 2.292E+07 7.698E+07
1.576E+07 2.163E+07 6.107E+07 8.620E+06 1.437E+08 5.818E+06 6.852E+07
4.513E+07 7.852E+07 1.249E+08 5.027E+07 3.434E+07 6.615E+07 8.362E+07
6.177E+07 1.121E+08 3.377E+07 6.714E+07 5.747E+07
 800       ! number of bootstraps in file
gbyt2001bootn.dat
1000.0     ! conversion from VPA to absolute numbers
58.8E6 1.0E6 0.248 2.0E6 0.0 ! thresholds: SSB, total B, F, mean B, biomass weighted F
0.006 0.315 0.648 1.00 1.00 1.00 ! selectivity at age
1 0 0 0 0 0 0 0 0 ! annual projwhat flag (0=F, 1=catch)
7.740E6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 ! projected catch in weight
0.0 0.265 0.22 0.22 0.22 0.22 0.22 0.22 0.22 ! projected F

! average discards/landings 1995-2000 = 0.096
! 2001 landings from RO Jan-Nov adjusted for Dec based on proportion of landings in 2000
! 2001 landings = 7.062E6 * 1.096 (disc ratio) => catch = 7.740E6
! 2002 F is F(0.1)
! 2003-2010 F are Frebuild
! note that yield output is catch not landings

```

=====

```

PROJECTION RUN: Georges Bank yellowtail flound
INPUT FILE: GBYTrebuid.in
OUTPUT FILE: GBYTrebuid.out
RECRUITMENT MODEL: 15
NUMBER OF SIMULATIONS: 100

```

### MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2001		7.740
2002	0.265	
2003	0.220	
2004	0.220	
2005	0.220	
2006	0.220	
2007	0.220	
2008	0.220	

2009 0.220  
 2010 0.220

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2001	47.173	6.602
2002	46.599	6.924
2003	46.578	7.285
2004	48.721	9.320
2005	51.568	11.145
2006	54.024	12.218
2007	56.887	13.069
2008	58.775	13.413
2009	60.005	13.593
2010	60.787	13.679

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	33.214	37.002	38.659	42.814	46.578	51.372	56.145	59.044	63.364
2002	32.804	36.192	37.828	41.946	45.758	51.015	55.885	58.440	63.805
2003	31.847	35.594	37.732	41.399	46.027	51.230	56.180	59.360	65.724
2004	30.502	34.619	37.231	42.038	48.025	54.586	61.183	65.400	73.246
2005	29.398	34.599	37.834	43.609	50.734	58.682	66.524	71.318	80.463
2006	29.302	35.369	38.923	45.230	53.232	61.905	70.384	75.455	85.166
2007	30.223	36.759	40.585	47.597	56.111	65.370	74.189	79.711	90.197
2008	31.151	37.988	42.041	49.267	58.037	67.506	76.461	82.097	92.706
2009	31.735	38.920	42.932	50.414	59.292	68.822	77.954	83.528	94.298
2010	32.420	39.510	43.668	51.096	60.074	69.665	78.883	84.594	95.141

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 58.800 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.052
2002	0.045
2003	0.057
2004	0.143
2005	0.247
2006	0.331
2007	0.421
2008	0.477
2009	0.514
2010	0.537

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2001	55.711	7.682
2002	57.879	8.870
2003	61.263	11.271
2004	64.415	13.214
2005	67.360	14.547
2006	69.755	15.350
2007	72.540	15.992
2008	74.361	16.302
2009	75.520	16.449
2010	76.273	16.473

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	40.456	44.170	46.052	50.548	54.786	60.658	65.866	68.775	74.816
2002	39.883	44.490	47.111	51.573	57.247	63.542	69.549	73.431	81.191
2003	38.994	44.126	47.347	53.214	60.434	68.376	76.291	81.283	90.773
2004	37.976	44.248	48.121	54.996	63.482	72.873	82.098	87.751	98.478
2005	37.817	45.064	49.383	56.910	66.475	76.726	86.792	92.829	104.371
2006	38.454	46.103	50.602	58.852	68.890	79.702	90.076	96.567	108.875
2007	39.502	47.679	52.553	61.222	71.691	83.024	93.606	100.293	112.963
2008	40.267	49.048	53.916	62.911	73.554	84.990	95.854	102.588	115.375
2009	41.226	49.905	54.902	63.908	74.688	86.204	97.220	104.054	116.771
2010	41.784	50.703	55.688	64.682	75.429	87.023	97.973	104.807	117.771

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 2.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	AVG F_WT_B	STD
2001	0.142	0.019
2002	0.196	0.018
2003	0.152	0.018
2004	0.146	0.016
2005	0.148	0.017
2006	0.151	0.017
2007	0.153	0.017
2008	0.155	0.017
2009	0.156	0.017
2010	0.157	0.017

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.102	0.113	0.117	0.128	0.141	0.153	0.168	0.175	0.190
2002	0.151	0.163	0.171	0.184	0.196	0.211	0.220	0.224	0.229
2003	0.114	0.123	0.129	0.139	0.152	0.164	0.177	0.184	0.193
2004	0.111	0.120	0.125	0.135	0.145	0.156	0.168	0.175	0.185
2005	0.111	0.121	0.127	0.137	0.148	0.160	0.171	0.178	0.188
2006	0.111	0.122	0.128	0.139	0.150	0.162	0.173	0.180	0.190
2007	0.113	0.124	0.131	0.141	0.153	0.165	0.176	0.182	0.192
2008	0.114	0.126	0.132	0.143	0.155	0.167	0.177	0.183	0.193
2009	0.115	0.127	0.134	0.144	0.156	0.168	0.178	0.184	0.194
2010	0.116	0.128	0.134	0.145	0.157	0.168	0.178	0.185	0.194

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	65.702	8.461
2002	70.106	10.543
2003	72.649	13.021
2004	76.164	15.313
2005	79.766	17.030
2006	82.697	18.056
2007	86.108	18.875
2008	88.340	19.261
2009	89.764	19.444
2010	90.689	19.482

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	48.913	52.992	55.067	60.016	64.682	71.151	76.887	80.094	86.753
2002	48.512	54.117	57.317	62.673	69.348	76.870	83.946	88.502	97.682
2003	46.814	52.840	56.565	63.361	71.714	80.895	89.949	95.742	106.769
2004	45.549	52.777	57.281	65.252	75.078	85.962	96.625	103.163	115.535
2005	45.196	53.701	58.722	67.524	78.739	90.712	102.468	109.639	123.082
2006	45.899	54.871	60.160	69.853	81.659	94.413	106.647	114.210	128.589
2007	47.059	56.772	62.536	72.741	85.114	98.454	111.018	118.816	133.874
2008	47.989	58.373	64.129	74.827	87.410	100.890	113.705	121.624	136.731
2009	49.246	59.476	65.391	76.062	88.801	102.409	115.419	123.481	138.446
2010	49.954	60.395	66.331	76.978	89.706	103.405	116.361	124.422	139.838

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH BIRTH

YEAR	RECRUITMENT AVG	STD
2001	52910.843	32287.303
2002	52927.014	32326.947
2003	52887.235	32345.853
2004	53153.015	32342.433
2005	53006.503	32269.024
2006	53058.572	32445.040
2007	52945.284	32248.525
2008	52796.023	32440.113
2009	52879.600	32208.314
2010	53114.739	32420.804

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH BIRTH

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	6517.565	9370.097	13536.238	23025.961	50564.465	68226.839	97281.542	121633.303	138958.159
2002	6522.439	9451.390	13796.457	23040.729	50541.938	68144.990	98272.056	121863.834	138664.028
2003	6537.984	9216.514	13538.465	23033.330	50534.019	68188.823	97230.926	121784.749	138976.305
2004	6528.843	9479.884	13789.773	23048.462	50602.186	68216.214	98658.991	121745.644	139063.878
2005	6541.626	9409.575	13835.231	23050.657	50572.002	68263.572	97889.338	121161.260	138931.514
2006	6537.684	9468.315	13758.826	23043.999	50552.986	68165.762	98243.498	122316.533	139502.200
2007	6547.456	9458.538	13873.532	23033.036	50542.902	68163.446	97250.864	121657.406	138863.231
2008	6530.895	9240.434	13492.563	23008.800	50483.049	68121.248	98377.255	121978.531	138946.227
2009	6499.030	9414.445	13699.907	23034.884	50563.971	68111.273	96751.792	121612.119	138943.533
2010	6567.317	9458.210	13780.737	23046.554	50585.412	68222.772	99231.812	122097.067	138973.082

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
2001	7.740	0.000
2002	11.285	1.684
2003	9.197	1.381
2004	9.279	1.582
2005	9.918	2.074
2006	10.441	2.335
2007	11.053	2.538
2008	11.458	2.618
2009	11.722	2.657
2010	11.892	2.677

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	7.740	7.740	7.740	7.740	7.740	7.740	7.740	7.740	7.740
2002	7.854	8.720	9.174	10.182	11.089	12.350	13.630	14.260	15.416
2003	6.371	7.103	7.544	8.235	9.076	10.072	11.029	11.617	12.828
2004	6.143	6.887	7.335	8.148	9.161	10.277	11.379	12.079	13.440
2005	5.844	6.769	7.370	8.439	9.758	11.227	12.708	13.626	15.302
2006	5.757	6.893	7.562	8.768	10.278	11.943	13.569	14.574	16.426
2007	5.916	7.159	7.900	9.242	10.900	12.688	14.439	15.494	17.513
2008	6.104	7.418	8.200	9.591	11.306	13.166	14.919	16.042	18.109
2009	6.217	7.602	8.389	9.844	11.577	13.449	15.230	16.327	18.412
2010	6.348	7.738	8.544	10.003	11.753	13.620	15.438	16.547	18.639

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.187	0.027
2002	0.265	0.000
2003	0.220	0.000
2004	0.220	0.000
2005	0.220	0.000
2006	0.220	0.000
2007	0.220	0.000
2008	0.220	0.000
2009	0.220	0.000
2010	0.220	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.135	0.147	0.154	0.168	0.185	0.203	0.223	0.234	0.265
2002	0.265	0.265	0.265	0.265	0.265	0.265	0.265	0.265	0.265
2003	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
2004	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
2005	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
2006	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
2007	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
2008	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
2009	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
2010	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.248

YEAR	Pr(F > Threshold Value)
2001	0.020
2002	1.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

## 7.6 Southern New England yellowtail flounder

### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1963	27.90	16.84		1973	14.365	9.233
1964	29.00	19.03		1974	8.689	28.901
1965	27.80	12.68		1975	3.923	12.938
1966	23.60	9.43		1976	4.794	47.569
1967	25.80	14.06		1977	4.945	52.416
1968	28.00	10.06	18.62	1978	9.071	30.079
1969	35.60	14.40	13.34	1979	10.167	42.018
1970	22.40	10.97	11.72	1980	9.126	126.932
1971	12.20	11.63	10.69	1981	10.820	53.152
1972	13.20	20.11	10.73	1982	21.956	14.611
1973	8.37	2.26	14.68	1983	16.355	16.731
1974	15.06	2.14	5.04	1984	5.299	19.837
1975	5.08	0.72	1.98	1985	3.522	6.970
1976	3.18	2.96	2.45	1986	2.906	13.991
1977	4.66	1.50	1.99	1987	1.720	122.011
1978	7.33	3.06	5.15	1988	6.163	16.496
1979	9.72	2.57	2.15	1989	21.901	6.861
1980	7.72	1.96	5.95	1990	14.316	3.544
1981	5.91	3.79	6.85	1991	3.984	1.973
1982	15.34	8.13	6.00	1992	1.576	0.884
1983	20.51	6.52	4.64	1993	0.804	1.728
1984	9.01	1.37	1.63	1994	0.466	1.807
1985	3.91	0.44	0.67	1995	0.534	3.136
1986	4.37	0.88	1.61	1996	0.704	6.013
1987	2.48	0.61	0.40	1997	1.027	5.863
1988	2.69	0.50	0.40	1998	1.903	4.638
1989	7.95	2.36	2.43			
1990	17.68	0.97	7.83			
1991	6.21	1.01	2.79			
1992	2.46	0.23	0.65			
1993	0.60	0.05	0.51			
1994	0.29	0.37	0.22			
1995	0.25	0.43	0.36			
1996	0.38	0.27	1.05			
1997	0.26	1.04	1.18			
1998	0.46	0.90	0.97			
1999	0.80	0.10	1.76			
2000	0.77	0.99	1.44			

## Southern New England yellowtail flounder hindcast spawning biomass and recruitment

Year	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1963	54.18	122.23
1964	66.49	74.66
1965	41.69	178.05
1966	20.04	76.30
1967	57.44	67.91
1968	48.61	38.49
1969	70.78	75.99
1970	63.22	115.00
1971	63.09	9.09
1972	122.88	11.70
1973	12.14	2.95
1974	11.53	41.89
1975	2.27	13.00
1976	11.67	43.42
1977	4.18	25.90
1978	9.93	25.75
1979	9.25	51.11
1980	7.30	167.84
1981	12.51	102.61
1982	46.38	12.67
1983	35.17	2.55
1984	6.85	9.63
1985	0.92	3.85
1986	2.49	2.22
1987	1.73	45.74
1988	1.07	0.55
1989	10.77	1.25
1990	3.86	0.35
1991	3.37	0.09
1992	0.92	3.16
1993	0.09	7.46
1994	1.36	1.66
1995	1.82	4.09
1996	0.71	14.92
1997	1.03	5.86
1998	1.90	4.64

## 7.7 Cape Cod yellowtail flounder

### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)	MaDMF Autumn survey (kg/tow)	MaDMF Spring survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1978	4.083			2.802	10.164	1985	0.540	4.712
1979	4.663	5.342	1.197	7.326	11.377	1986	0.654	6.755
1980	5.706	13.521	4.893	5.901	10.029	1987	0.934	21.229
1981	3.749	4.106	4.414	2.755	16.351	1988	0.468	7.697
1982	3.550	4.317	7.158	4.204	12.854	1989	0.972	6.280
1983	2.184	0.491	4.781	3.393	9.004	1990	2.172	9.144
1984	1.141	2.787	1.988	1.177	7.373	1991	1.046	7.159
1985	1.044	3.252	1.374	1.171	5.212	1992	0.859	7.099
1986	1.346	1.550	0.812	1.361	4.520	1993	0.966	5.579
1987	1.357	0.873	5.574	1.086	3.674	1994	1.257	5.218
1988	1.368	1.791	1.958	3.705	3.829	1995	1.287	7.263
1989	1.299	3.675	1.505	1.521	4.730	1996	1.163	5.652
1990	4.125	3.721	3.418	4.162	6.597	1997	1.020	8.114
1991	1.877	1.825	2.941	3.229	3.319	1998	1.469	7.973
1992	1.465	2.977	1.305	1.998	6.537			
1993	0.718	1.677	0.727	3.986	4.604			
1994	1.170	4.205	1.400	3.269	6.228			
1995	1.440	1.167	2.873	5.750	10.383			
1996	1.246	3.999	0.485	1.557	9.247			
1997	1.297	3.618	1.900	2.098	7.549			
1998	1.244	2.529	1.809	2.684	5.174			
1999	1.204	9.284	2.852	4.707	5.078			
2000	2.680	7.118	15.153	3.460	20.370			



## Cape Cod yellowtail flounder hindcast spawning biomass and recruitment

Year	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1979	0.630	16.912281
1980	2.353	9.456140
1981	0.499	1.543860
1982	1.332	3.947368
1983	0.117	6.105263
1984	0.855	12.526316
1985	0.605	4.561404
1986	0.120	15.807018
1987	0.223	19.982456
1988	0.210	20.877193
1989	1.021	5.842105
1990	1.135	9.280702
1991	0.688	15.087719
1992	1.191	25.035088
1993	0.230	2.877193
1994	1.390	9.403509
1995	0.397	8.403509
1996	2.254	9.824561

## Cape Cod yellowtail flounder projection F= Fmsy

```

Cape Cod yellowtail
  2000      ! first year of projection run
    11      ! number of years to project
    100     ! number of simulations per pop vector
  123456    ! random number seed
    0       ! age-2 recruitment flag
    1       ! harvest mixture flag
    0       ! discard flag
    0       ! quota-based flag
    0       ! constant harvest strategy flag
    0       ! F target flag
    0       ! index flag
    1       ! SFA threshold flag
    0       ! market category flag
    0       ! total mortality flag
    0       ! partial recruitment flag
    1       ! constant discard flag
    0       ! bounded recruitment flag
    1       ! constant M flag
    1       ! bootstrap flag
    6 1 6   ! # age classes, lowest and highest ages
    0.2     ! M
    0.048   0.263   0.382   0.493   0.588   1.056   ! spawning weights at age
    0.048   0.263   0.382   0.493   0.588   1.056   ! landed weights at age
    0.00    0.08    0.81    1.0     1.0     1.0     ! maturity at age
    0.4167  ! fraction of mortality that occurs before spawning

    14      ! recruitment flag
    14      ! number of recruitments
  4.71E+06  6.76E+06  2.12E+07  7.70E+06  6.28E+06  9.14E+06  7.16E+06
  7.10E+06  5.58E+06  5.22E+06  7.26E+06  5.65E+06  8.11E+06  7.97E+06
    1000    ! number of bootstraps in file
cycybootN.dat
  1000.0    ! conversion from VPA to absolute numbers
  8.38E6   1.0E6   0.214  2.0E6  0.0   ! thresholds: SSB, total B, F, mean B, biomass weighted F
  0.02 0.11 0.65 1.00 1.00 1.00   ! selectivity at age
  1 1 0 0 0 0 0 0 0 0   ! annual projwhat flag (0=F, 1=catch)
  2.354E6 2.571E6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 ! projected catch in weight
  0.0    0.0    2.047  0.214  0.214  0.214  0.214  0.214  0.214  0.214  0.214 ! projected F

! avg discard/landing ratio 1995-1999 0.156
! 2000 landings from R0 = 2.036E6 * 1.156 (disc ratio) => catch = 2.354E6
! 2001 landings from R0 Jan-Nov adjusted for Dec based on proportion of landings in 2000
! 2001 landings = 2.224E6 * 1.156 (disc ratio) => catch = 2.571E6
! 2002 F is median of F(2001)
! 2003-2010 F are F40%SPR
! note yield output is catch not landings

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PROJECTION RUN: Cape Cod yellowtail
INPUT FILE: CCYTnpF40.in
OUTPUT FILE: CCYTnpF40.out
RECRUITMENT MODEL: 14
NUMBER OF SIMULATIONS: 100

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MIXTURE OF F AND QUOTA BASED CATCHES
YEAR   F           QUOTA (THOUSAND MT)
2000           2.354
2001           2.571
2002  2.047
2003  0.214
2004  0.214
2005  0.214
2006  0.214
2007  0.214
2008  0.214
2009  0.214
2010  0.214

```

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2000	1.951	0.601
2001	1.504	0.996
2002	1.059	0.496
2003	1.552	0.429
2004	2.847	0.636
2005	4.059	0.770
2006	5.240	0.890
2007	6.140	0.962
2008	6.759	1.000
2009	7.165	1.014
2010	7.430	1.017

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.794	1.076	1.219	1.523	1.892	2.349	2.744	3.002	3.572
2001	0.048	0.132	0.270	0.706	1.389	2.176	2.897	3.299	4.186
2002	0.167	0.340	0.463	0.688	1.007	1.375	1.741	1.951	2.396
2003	0.809	1.013	1.122	1.299	1.500	1.706	1.941	2.358	3.266
2004	1.900	2.124	2.246	2.463	2.717	3.012	3.661	4.323	5.035
2005	2.934	3.187	3.333	3.577	3.876	4.261	5.190	5.764	6.572
2006	3.945	4.228	4.381	4.658	5.005	5.538	6.586	7.089	8.091
2007	4.738	5.036	5.200	5.495	5.877	6.525	7.574	8.077	9.220
2008	5.296	5.595	5.766	6.078	6.488	7.205	8.226	8.750	9.947
2009	5.664	5.969	6.149	6.470	6.893	7.636	8.647	9.176	10.366
2010	5.911	6.224	6.405	6.729	7.164	7.912	8.922	9.448	10.608

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 8.380 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2000	0.000
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.007
2007	0.031
2008	0.083
2009	0.133
2010	0.171

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2000	3.881	0.950
2001	3.123	1.198
2002	2.627	0.736
2003	3.341	0.705
2004	4.709	0.871
2005	5.897	0.972
2006	7.045	1.063
2007	7.922	1.123
2008	8.522	1.152
2009	8.915	1.162
2010	9.176	1.166

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	2.210	2.527	2.746	3.163	3.769	4.519	5.201	5.590	6.386
2001	0.926	1.332	1.636	2.227	3.037	3.907	4.759	5.242	6.211
2002	1.219	1.576	1.773	2.128	2.552	3.029	3.545	3.945	4.906
2003	2.275	2.530	2.668	2.913	3.197	3.534	4.246	4.963	5.745
2004	3.431	3.716	3.878	4.156	4.501	4.956	5.998	6.617	7.506
2005	4.464	4.780	4.954	5.262	5.649	6.228	7.357	7.940	8.981
2006	5.454	5.804	5.991	6.325	6.763	7.508	8.608	9.165	10.438
2007	6.245	6.594	6.791	7.148	7.626	8.461	9.548	10.126	11.475
2008	6.790	7.142	7.347	7.719	8.219	9.108	10.178	10.781	12.111
2009	7.150	7.511	7.723	8.100	8.616	9.515	10.579	11.189	12.510
2010	7.401	7.766	7.970	8.356	8.883	9.780	10.839	11.442	12.755

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 2.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2000	1.000
2001	0.806
2002	0.812
2003	0.999
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	AVG F_WT_B	STD
2000	0.643	0.157
2001	0.979	0.470
2002	0.725	0.212
2003	0.088	0.012
2004	0.117	0.012
2005	0.136	0.011
2006	0.149	0.010
2007	0.156	0.009
2008	0.160	0.009
2009	0.163	0.009
2010	0.164	0.008

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.369	0.421	0.453	0.521	0.625	0.744	0.857	0.932	1.065
2001	0.414	0.490	0.540	0.658	0.847	1.154	1.572	1.931	2.775
2002	0.272	0.385	0.447	0.565	0.722	0.878	1.011	1.077	1.187
2003	0.056	0.065	0.071	0.080	0.088	0.096	0.102	0.106	0.113
2004	0.082	0.096	0.103	0.111	0.118	0.124	0.130	0.135	0.148
2005	0.101	0.116	0.125	0.131	0.137	0.142	0.148	0.153	0.162
2006	0.115	0.131	0.139	0.144	0.149	0.155	0.160	0.164	0.170
2007	0.123	0.139	0.147	0.152	0.157	0.162	0.167	0.170	0.175
2008	0.128	0.144	0.151	0.156	0.161	0.166	0.170	0.173	0.178
2009	0.132	0.147	0.154	0.159	0.163	0.168	0.172	0.175	0.179
2010	0.133	0.148	0.156	0.161	0.165	0.169	0.173	0.176	0.180

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2000	5.740	1.002
2001	5.151	1.179
2002	4.183	1.402
2003	3.845	0.811
2004	5.499	1.016
2005	6.947	1.145
2006	8.349	1.259
2007	9.420	1.335
2008	10.153	1.371
2009	10.634	1.384
2010	10.952	1.389

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	4.023	4.332	4.558	4.977	5.614	6.402	7.128	7.557	8.409
2001	3.101	3.480	3.746	4.259	5.016	5.893	6.785	7.299	8.340
2002	1.573	2.166	2.505	3.155	4.039	5.052	6.092	6.666	8.086
2003	2.603	2.903	3.066	3.352	3.683	4.075	4.883	5.705	6.598
2004	3.995	4.334	4.524	4.851	5.257	5.791	7.010	7.715	8.758
2005	5.254	5.630	5.833	6.199	6.655	7.340	8.665	9.346	10.579
2006	6.461	6.876	7.099	7.494	8.014	8.900	10.198	10.848	12.357
2007	7.424	7.841	8.075	8.498	9.066	10.066	11.356	12.027	13.619
2008	8.087	8.512	8.754	9.196	9.792	10.860	12.118	12.833	14.424
2009	8.531	8.960	9.213	9.661	10.276	11.352	12.614	13.335	14.914
2010	8.836	9.268	9.514	9.972	10.602	11.679	12.930	13.647	15.208

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2000	7459.868	2642.454
2001	7451.306	2648.205
2002	7475.878	2683.949
2003	7458.514	2656.443
2004	7451.193	2644.670
2005	7463.961	2665.061
2006	7452.669	2648.041
2007	7438.005	2631.902
2008	7457.745	2649.668
2009	7445.585	2630.747
2010	7452.603	2630.354

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	4778.263	5049.113	5335.156	5817.077	7133.707	7910.765	8826.635	13355.370	19579.010
2001	4777.785	5046.921	5333.845	5817.555	7129.128	7895.569	8815.694	13346.761	19632.914
2002	4780.336	5045.559	5328.881	5808.588	7130.322	7910.963	8855.973	13645.313	19650.978
2003	4778.366	5037.292	5329.532	5823.906	7130.587	7902.786	8835.627	13475.289	19655.301
2004	4779.443	5041.217	5327.311	5805.674	7130.043	7900.927	8838.704	13286.784	19661.638
2005	4775.689	5041.694	5336.951	5816.544	7131.541	7902.012	8834.193	13492.402	19656.059
2006	4776.539	5042.132	5323.394	5809.534	7130.553	7907.327	8835.304	13370.354	19645.240
2007	4774.576	5038.748	5320.442	5785.043	7127.781	7897.189	8826.638	13207.052	19593.374
2008	4779.925	5044.276	5332.462	5812.417	7131.054	7907.618	8835.783	13412.906	19634.431
2009	4777.570	5039.589	5323.224	5807.402	7129.822	7904.658	8835.630	13273.180	19563.423
2010	4776.305	5047.843	5328.659	5820.765	7130.430	7904.830	8831.998	13348.223	19542.012

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
2000	2.354	0.000
2001	2.571	0.000
2002	1.992	0.969
2003	0.293	0.077
2004	0.553	0.121
2005	0.803	0.150
2006	1.049	0.176
2007	1.236	0.192
2008	1.365	0.200
2009	1.450	0.203
2010	1.505	0.204

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	2.354	2.354	2.354	2.354	2.354	2.354	2.354	2.354	2.354
2001	2.571	2.571	2.571	2.571	2.571	2.571	2.571	2.571	2.571
2002	0.356	0.654	0.857	1.255	1.865	2.595	3.342	3.770	4.684
2003	0.152	0.192	0.212	0.246	0.284	0.324	0.370	0.433	0.584
2004	0.367	0.412	0.436	0.479	0.529	0.587	0.706	0.830	0.965
2005	0.581	0.632	0.660	0.709	0.768	0.844	1.020	1.126	1.303
2006	0.790	0.848	0.878	0.934	1.003	1.109	1.314	1.413	1.617
2007	0.955	1.016	1.049	1.108	1.185	1.314	1.520	1.626	1.853
2008	1.071	1.131	1.166	1.229	1.312	1.455	1.657	1.764	2.004
2009	1.148	1.210	1.246	1.310	1.396	1.546	1.745	1.855	2.094
2010	1.200	1.263	1.299	1.364	1.452	1.602	1.802	1.911	2.145

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2000	1.472	0.469
2001	3.186	3.257
2002	2.047	0.000
2003	0.214	0.000
2004	0.214	0.000
2005	0.214	0.000
2006	0.214	0.000
2007	0.214	0.000
2008	0.214	0.000
2009	0.214	0.000
2010	0.214	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.757	0.886	0.970	1.127	1.392	1.708	2.081	2.334	2.977
2001	0.703	0.887	1.010	1.339	2.047	3.582	6.638	9.681	19.040
2002	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047
2003	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2004	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2005	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2006	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2007	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2008	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2009	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2010	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.214

YEAR	Pr(F > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

# Cape Cod yellowtail flounder projection F=F rebuild

```

Cape Cod yellowtail
  2000      ! first year of projection run
   11      ! number of years to project
  100      ! number of simulations per pop vector
123456     ! random number seed
   0       ! age-2 recruitment flag
   1       ! harvest mixture flag
   0       ! discard flag
   0       ! quota-based flag
   0       ! constant harvest strategy flag
   0       ! F target flag
   0       ! index flag
   1       ! SFA threshold flag
   0       ! market category flag
   0       ! total mortality flag
   0       ! partial recruitment flag
   1       ! constant discard flag
   0       ! bounded recruitment flag
   1       ! constant M flag
   1       ! bootstrap flag
   6 1 6   ! # age classes, lowest and highest ages
  0.2      ! M
  0.048   0.263   0.382   0.493   0.588   1.056   ! spawning weights at age
  0.048   0.263   0.382   0.493   0.588   1.056   ! landed weights at age
  0.00    0.08    0.81    1.0      1.0      1.0      ! maturity at age
  0.4167   ! fraction of mortality that occurs before spawning

   14      ! recruitment flag
   14      ! number of recruitments
  4.71E+06 6.76E+06 2.12E+07 7.70E+06 6.28E+06 9.14E+06 7.16E+06
  7.10E+06 5.58E+06 5.22E+06 7.26E+06 5.65E+06 8.11E+06 7.97E+06
  1000     ! number of bootstraps in file
ccytbootN.dat
  1000.0   ! conversion from VPA to absolute numbers
  8.38E6   1.0E6   0.214 2.0E6 0.0 ! thresholds: SSB, total B, F, mean B, biomass weighted F
  0.02 0.11 0.65 1.00 1.00 1.00 ! selectivity at age
  1 1 0 0 0 0 0 0 0 0 ! annual projwhat flag (0=F, 1=catch)
  2.354E6 2.571E6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 ! projected catch in weight
  0.0     0.0     2.047 0.139 0.139 0.139 0.139 0.139 0.139 0.139 ! projected F

! avg discard/landing ratio 1995-1999 0.156
! 2000 landings from RO = 2.036E6 * 1.156 (disc ratio) => catch = 2.354E6
! 2001 landings from RO Jan-Nov adjusted for Dec based on proportion of landings in 2000
! 2001 landings = 2.224E6 * 1.156 (disc ratio) => catch = 2.571E6
! 2002 F is median of F(2001) = 2.047
! 2003-2010 F are chosen to give 50% prob of S>Smsy in 2009
! 2003-2010 F    P(S>Smsy) in year 2009
! -----
! 0.130         0.608
! 0.139         0.510
! 0.140         0.499
! note output yield is catch not landings

```

```

=====
PROJECTION RUN: Cape Cod yellowtail
INPUT FILE: CCYTnpFrebuild.in
OUTPUT FILE: CCYTnpFrebuild.out
RECRUITMENT MODEL: 14
NUMBER OF SIMULATIONS: 100

MIXTURE OF F AND QUOTA BASED CATCHES
YEAR  F      QUOTA (THOUSAND MT)
2000      2.354
2001      2.571
2002  2.047
2003  0.139
2004  0.139
2005  0.139
2006  0.139
2007  0.139

```

2008 0.139  
 2009 0.139  
 2010 0.139

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2000	1.951	0.601
2001	1.504	0.996
2002	1.059	0.496
2003	1.587	0.439
2004	3.017	0.673
2005	4.448	0.838
2006	5.950	1.004
2007	7.176	1.114
2008	8.081	1.178
2009	8.723	1.206
2010	9.177	1.217

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.794	1.076	1.219	1.523	1.892	2.349	2.744	3.002	3.572
2001	0.048	0.132	0.270	0.706	1.389	2.176	2.897	3.299	4.186
2002	0.167	0.340	0.463	0.688	1.007	1.375	1.741	1.951	2.396
2003	0.825	1.035	1.146	1.328	1.534	1.745	1.986	2.410	3.337
2004	2.003	2.243	2.376	2.609	2.881	3.197	3.882	4.581	5.324
2005	3.202	3.487	3.650	3.922	4.253	4.677	5.685	6.284	7.164
2006	4.466	4.799	4.975	5.290	5.689	6.296	7.476	8.016	9.165
2007	5.538	5.889	6.080	6.425	6.874	7.646	8.824	9.411	10.749
2008	6.339	6.700	6.903	7.272	7.765	8.637	9.792	10.395	11.840
2009	6.916	7.286	7.502	7.886	8.402	9.329	10.464	11.084	12.503
2010	7.335	7.712	7.931	8.325	8.860	9.795	10.929	11.564	12.965

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 8.380 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2000	0.000
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.001
2006	0.028
2007	0.150
2008	0.297
2009	0.510
2010	0.724

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 6

YEAR	AVG MEAN B (000 MT)	STD
2000	3.881	0.950
2001	3.123	1.198
2002	2.627	0.736
2003	3.390	0.715
2004	4.901	0.903
2005	6.309	1.032
2006	7.775	1.163
2007	8.973	1.258
2008	9.855	1.309
2009	10.480	1.332
2010	10.926	1.343

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	2.210	2.527	2.746	3.163	3.769	4.519	5.201	5.590	6.386
2001	0.926	1.332	1.636	2.227	3.037	3.907	4.759	5.242	6.211
2002	1.219	1.576	1.773	2.128	2.552	3.029	3.545	3.945	4.906
2003	2.304	2.564	2.705	2.956	3.245	3.588	4.307	5.032	5.823
2004	3.561	3.863	4.033	4.325	4.687	5.164	6.245	6.873	7.783
2005	4.762	5.111	5.299	5.632	6.048	6.671	7.857	8.454	9.578
2006	6.015	6.406	6.614	6.981	7.468	8.302	9.485	10.055	11.473
2007	7.073	7.479	7.699	8.099	8.640	9.609	10.785	11.413	12.930
2008	7.864	8.273	8.508	8.933	9.514	10.557	11.713	12.391	13.901



2009	8.434	8.853	9.099	9.534	10.142	11.205	12.367	13.053	14.578
2010	8.856	9.279	9.518	9.965	10.595	11.665	12.816	13.512	15.002

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 2.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2000	1.000
2001	0.806
2002	0.812
2003	0.999
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	AVG F_WT_B	STD
2000	0.643	0.157
2001	0.979	0.470
2002	0.725	0.212
2003	0.057	0.008
2004	0.078	0.008
2005	0.091	0.007
2006	0.100	0.006
2007	0.105	0.006
2008	0.108	0.005
2009	0.110	0.005
2010	0.111	0.005

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 6

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.369	0.421	0.453	0.521	0.625	0.744	0.857	0.932	1.065
2001	0.414	0.490	0.540	0.658	0.847	1.154	1.572	1.931	2.775
2002	0.272	0.385	0.447	0.565	0.722	0.878	1.011	1.077	1.187
2003	0.037	0.043	0.047	0.053	0.058	0.063	0.067	0.070	0.074
2004	0.055	0.064	0.069	0.074	0.078	0.082	0.086	0.090	0.098
2005	0.068	0.079	0.084	0.088	0.091	0.095	0.099	0.102	0.107
2006	0.079	0.089	0.094	0.097	0.100	0.104	0.107	0.110	0.113
2007	0.085	0.095	0.099	0.103	0.106	0.109	0.112	0.114	0.117
2008	0.089	0.098	0.103	0.106	0.109	0.112	0.114	0.116	0.119
2009	0.092	0.101	0.105	0.108	0.111	0.113	0.116	0.117	0.120
2010	0.093	0.102	0.106	0.109	0.112	0.115	0.117	0.118	0.121

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2000	5.740	1.002
2001	5.151	1.179
2002	4.183	1.402
2003	3.845	0.811
2004	5.615	1.035
2005	7.273	1.189
2006	9.002	1.348
2007	10.415	1.461
2008	11.455	1.523

2009	12.192	1.551
2010	12.717	1.564

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	4.023	4.332	4.558	4.977	5.614	6.402	7.128	7.557	8.409
2001	3.101	3.480	3.746	4.259	5.016	5.893	6.785	7.299	8.340
2002	1.573	2.166	2.505	3.155	4.039	5.052	6.092	6.666	8.086
2003	2.603	2.903	3.066	3.352	3.683	4.075	4.883	5.705	6.598
2004	4.073	4.421	4.617	4.955	5.371	5.920	7.161	7.870	8.921
2005	5.485	5.890	6.106	6.492	6.973	7.692	9.055	9.743	11.053
2006	6.960	7.415	7.657	8.082	8.646	9.613	10.981	11.649	13.286
2007	8.207	8.680	8.934	9.399	10.026	11.152	12.518	13.252	15.011
2008	9.139	9.616	9.888	10.382	11.057	12.273	13.613	14.406	16.168
2009	9.811	10.298	10.585	11.090	11.798	13.037	14.386	15.184	16.948
2010	10.309	10.801	11.078	11.599	12.332	13.579	14.918	15.726	17.466

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 1.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2000	7459.868	2642.454
2001	7451.306	2648.205
2002	7475.878	2683.949
2003	7458.514	2656.443
2004	7451.193	2644.670
2005	7463.961	2665.061
2006	7452.669	2648.041
2007	7438.005	2631.902
2008	7457.745	2649.668
2009	7445.585	2630.747
2010	7452.603	2630.354

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	4778.263	5049.113	5335.156	5817.077	7133.707	7910.765	8826.635	13355.370	19579.010
2001	4777.785	5046.921	5333.845	5817.555	7129.128	7895.569	8815.694	13346.761	19632.914
2002	4780.336	5045.559	5328.881	5808.588	7130.322	7910.963	8855.973	13645.313	19650.978
2003	4778.366	5037.292	5329.532	5823.906	7130.587	7902.786	8835.627	13475.289	19655.301
2004	4779.443	5041.217	5327.311	5805.674	7130.043	7900.927	8838.704	13286.784	19661.638
2005	4775.689	5041.694	5336.951	5816.544	7131.541	7902.012	8834.193	13492.402	19656.059
2006	4776.539	5042.132	5323.394	5809.534	7130.553	7907.327	8835.304	13370.354	19645.240
2007	4774.576	5038.748	5320.442	5785.043	7127.781	7897.189	8826.638	13207.052	19593.374
2008	4779.925	5044.276	5332.462	5812.417	7131.054	7907.618	8835.783	13412.906	19634.431
2009	4777.570	5039.589	5323.224	5807.402	7129.822	7904.658	8835.630	13273.180	19563.423
2010	4776.305	5047.843	5328.659	5820.765	7130.430	7904.830	8831.998	13348.223	19542.012

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
2000	2.354	0.000
2001	2.571	0.000
2002	1.992	0.969
2003	0.195	0.051
2004	0.382	0.084
2005	0.575	0.107
2006	0.779	0.131
2007	0.946	0.146

2008	1.069	0.155
2009	1.156	0.159
2010	1.217	0.161

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	2.354	2.354	2.354	2.354	2.354	2.354	2.354	2.354	2.354
2001	2.571	2.571	2.571	2.571	2.571	2.571	2.571	2.571	2.571
2002	0.356	0.654	0.857	1.255	1.865	2.595	3.342	3.770	4.684
2003	0.101	0.127	0.141	0.164	0.189	0.216	0.246	0.288	0.388
2004	0.252	0.284	0.301	0.331	0.366	0.407	0.488	0.572	0.670
2005	0.414	0.451	0.472	0.508	0.551	0.606	0.731	0.805	0.932
2006	0.585	0.629	0.652	0.693	0.746	0.824	0.975	1.050	1.196
2007	0.730	0.777	0.802	0.847	0.906	1.007	1.161	1.243	1.414
2008	0.838	0.887	0.913	0.962	1.027	1.140	1.293	1.376	1.563
2009	0.918	0.966	0.995	1.045	1.114	1.235	1.385	1.470	1.658
2010	0.974	1.024	1.053	1.105	1.176	1.298	1.448	1.535	1.717

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2000	1.472	0.469
2001	3.186	3.257
2002	2.047	0.000
2003	0.139	0.000
2004	0.139	0.000
2005	0.139	0.000
2006	0.139	0.000
2007	0.139	0.000
2008	0.139	0.000
2009	0.139	0.000
2010	0.139	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.757	0.886	0.970	1.127	1.392	1.708	2.081	2.334	2.977
2001	0.703	0.887	1.010	1.339	2.047	3.582	6.638	9.681	19.040
2002	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047
2003	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
2004	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
2005	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
2006	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
2007	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
2008	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
2009	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
2010	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.214

YEAR	Pr(F > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

## 7.8 Mid-Atlantic yellowtail flounder

### Landings and survey indices

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)
1963		11.45	
1964	1.80	6.22	
1965	2.10	7.45	
1966	2.40	11.33	
1967	5.30	11.93	
1968	3.30	17.26	21.78
1969	4.60	12.61	17.67
1970	4.20	13.20	14.41
1971	7.90	4.84	10.10
1972	8.90	26.82	12.69
1973	5.10	2.40	11.76
1974	1.90	0.24	5.62
1975	0.70	0.21	0.90
1976	0.30	0.08	1.22
1977	0.60	0.23	2.26
1978	0.40	0.29	2.59
1979	0.50	0.26	0.77
1980	0.30	0.19	4.60
1981	0.70	3.04	8.16
1982	0.43	2.18	6.71
1983	0.59	0.47	4.27
1984	1.04	0.23	1.22
1985	0.15	0.19	1.37
1986	0.25	0.21	0.56
1987	0.17	0.01	0.23
1988	0.09	0.23	0.33
1989	0.40	1.16	1.65
1990	0.24	0.81	2.62
1991	0.21	0.13	2.08
1992	0.24	0.00	0.83
1993	0.17	0.09	0.19
1994	0.24	0.23	0.06
1995	0.02	0.03	0.28
1996	0.15	0.06	0.46
1997	0.54	0.21	0.43
1998	0.22	0.09	0.68
1999	0.47	0.50	0.59
2000	0.22	0.11	0.57

## 7.9 American plaice

### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1960	1.310			1980	46.575	25.119
1961	1.522			1981	33.095	21.949
1962	1.971			1982	34.370	25.120
1963	2.333	5.87		1983	26.335	13.184
1964	3.799	2.84		1984	20.741	14.385
1965	3.635	3.80		1985	14.393	18.443
1966	3.867	4.90		1986	11.111	36.859
1967	4.469	2.69		1987	9.319	53.355
1968	2.975	2.91	3.40	1988	7.505	27.101
1969	2.955	2.36	2.68	1989	7.427	33.361
1970	4.175	2.01	1.81	1990	8.324	33.777
1971	2.724	1.96	1.26	1991	11.340	39.816
1972	2.171	1.60	1.32	1992	12.828	50.074
1973	1.924	1.94	1.85	1993	12.385	41.884
1974	2.031	1.42	1.94	1994	12.217	24.426
1975	2.593	2.43	1.72	1995	10.900	24.189
1976	3.525	2.99	3.37	1996	12.533	13.064
1977	7.140	3.52	5.11	1997	14.364	27.527
1978	9.587	4.66	3.82	1998	15.401	34.453
1979	11.336	4.00	3.62	1999	14.056	14.187
1980	13.586	5.12	4.78			
1981	12.827	5.62	5.88			
1982	15.110	2.49	3.80			
1983	13.134	3.45	4.60			
1984	10.118	2.02	1.42			
1985	7.056	2.00	1.88			
1986	4.499	1.56	0.92			
1987	3.846	1.09	0.81			
1988	3.476	1.46	0.84			
1989	2.417	1.17	0.75			
1990	2.492	2.90	0.75			
1991	4.246	1.56	1.05			
1992	6.404	1.78	1.36			
1993	5.703	2.39	1.39			
1994	4.993	2.67	0.85			
1995	4.612	2.58	1.94			
1996	4.345	2.23	1.69			
1997	3.956	1.94	1.62			
1998	3.639	2.22	1.11			
1999	3.225	2.57	1.20			
2000	4.208	2.80	2.30			

American Plaice projection F= Fmsy

```

ap_2001:ap_10yr_yc no disc
2000
11
100
123456
0
1
0
0
0
0
0
0
1
0
0
0
1
0
1
1
9 1 9
0.2
0.010 0.029 0.087 0.228 0.360 0.521 0.727 0.960 1.563
0.016 0.050 0.158 0.297 0.439 0.618 0.855 1.094 1.606
0 0.03 0.17 0.6 0.92 1 1 1 1
0.25
14
20
25119000 21949000 25120000 13184000
14385000 18443000 36859000 53355000 27101000
33361000 33777000 39816000 50074000 41884000
24426000 24189000 13064000 27527000 34453000 14187000
1000
amp\boot.dat
1000
28600000 0 0.166 0 0
0.03 0.10 0.12 0.49 1 1 1 1 1
1 1 0 0 0 0 0 0 0
5275000 5370000 0 0 0 0 0 0 0
0 0 0.33 0.166 0.166 0.166 0.166 0.166 0.166 0.166 0.166
=====

```

PROJECTION RUN: ap\_2001:ap\_10yr\_yc no disc  
INPUT FILE: ap\_10yr\_yc.in  
OUTPUT FILE: ap\_10yr\_yc.out  
RECRUITMENT MODEL: 14  
NUMBER OF SIMULATIONS: 100

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2000		5.275
2001		5.370
2002	0.330	
2003	0.166	
2004	0.166	
2005	0.166	
2006	0.166	
2007	0.166	
2008	0.166	
2009	0.166	
2010	0.166	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2000	16.209	1.811
2001	15.956	2.124
2002	16.024	2.286
2003	15.824	2.085
2004	17.270	2.197
2005	18.910	2.384

2006	21.040	2.637
2007	23.049	2.884
2008	23.965	3.021
2009	25.271	3.186
2010	26.206	3.273

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	12.519	13.316	13.923	14.920	16.118	17.405	18.608	19.350	20.665
2001	11.573	12.489	13.218	14.377	15.918	17.393	18.738	19.590	21.322
2002	11.158	12.350	13.160	14.295	16.011	17.547	18.953	20.077	21.622
2003	11.583	12.567	13.187	14.314	15.763	17.158	18.578	19.482	20.962
2004	12.676	13.890	14.534	15.725	17.179	18.674	20.126	21.036	22.912
2005	13.933	15.210	15.937	17.248	18.785	20.452	22.005	22.981	25.008
2006	15.474	16.912	17.727	19.198	20.921	22.763	24.501	25.549	27.670
2007	16.919	18.478	19.415	21.027	22.941	24.950	26.833	27.979	30.144
2008	17.547	19.182	20.146	21.841	23.861	25.954	27.936	29.115	31.381
2009	18.434	20.182	21.231	23.037	25.180	27.391	29.436	30.680	33.053
2010	19.152	20.980	22.037	23.919	26.120	28.387	30.494	31.760	34.150

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 28.600 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2000	0.000
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.005
2007	0.032
2008	0.068
2009	0.150
2010	0.231

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 9

YEAR	AVG MEAN B (000 MT)	STD
2000	21.502	2.188
2001	21.708	2.638
2002	21.132	2.705
2003	21.553	2.628
2004	23.704	2.847
2005	25.727	3.077
2006	27.833	3.304
2007	29.758	3.513
2008	30.786	3.642
2009	32.027	3.770
2010	32.913	3.839

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	16.849	18.031	18.666	19.861	21.479	22.985	24.369	25.262	26.939
2001	16.192	17.522	18.399	19.754	21.675	23.450	25.080	26.348	28.063
2002	15.543	16.863	17.726	19.188	21.068	22.875	24.684	25.873	27.702
2003	16.051	17.464	18.252	19.700	21.447	23.239	24.968	26.035	28.202
2004	17.695	19.260	20.135	21.719	23.570	25.553	27.403	28.545	30.909
2005	19.194	20.897	21.857	23.585	25.600	27.738	29.765	30.982	33.393
2006	20.780	22.588	23.665	25.514	27.715	30.004	32.158	33.475	35.953
2007	22.213	24.172	25.314	27.300	29.651	32.081	34.352	35.715	38.345
2008	22.976	24.992	26.175	28.234	30.684	33.206	35.546	36.987	39.720
2009	23.891	26.012	27.229	29.400	31.928	34.533	36.965	38.417	41.176
2010	24.600	26.787	28.024	30.234	32.812	35.486	37.941	39.407	42.214

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000

2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	AVG F_WT_B	STD
2000	0.248	0.026
2001	0.251	0.031
2002	0.254	0.011
2003	0.130	0.007
2004	0.127	0.007
2005	0.130	0.006
2006	0.132	0.006
2007	0.135	0.006
2008	0.136	0.006
2009	0.137	0.006
2010	0.138	0.005

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.195	0.208	0.216	0.229	0.245	0.266	0.283	0.292	0.311
2001	0.191	0.204	0.214	0.229	0.248	0.272	0.292	0.306	0.332
2002	0.225	0.234	0.239	0.247	0.255	0.262	0.267	0.271	0.278
2003	0.114	0.119	0.121	0.126	0.131	0.135	0.139	0.141	0.144
2004	0.111	0.116	0.118	0.122	0.127	0.132	0.136	0.138	0.141
2005	0.114	0.119	0.121	0.125	0.130	0.134	0.138	0.140	0.144
2006	0.117	0.122	0.124	0.128	0.133	0.137	0.140	0.142	0.146
2007	0.120	0.125	0.127	0.131	0.135	0.139	0.142	0.144	0.147
2008	0.121	0.126	0.128	0.132	0.136	0.140	0.143	0.145	0.148
2009	0.123	0.127	0.129	0.133	0.137	0.141	0.144	0.146	0.149
2010	0.124	0.128	0.130	0.134	0.138	0.141	0.144	0.146	0.149

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2000	21.565	2.013
2001	21.903	2.439
2002	21.775	2.880
2003	20.630	2.546
2004	22.647	2.720
2005	24.622	2.933
2006	26.966	3.184
2007	29.167	3.431
2008	30.171	3.573
2009	31.603	3.744
2010	32.629	3.834

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	17.446	18.341	18.919	20.058	21.541	22.894	24.232	25.018	26.586
2001	16.777	18.030	18.832	20.061	21.873	23.550	25.029	26.245	27.919
2002	15.804	17.186	18.140	19.680	21.733	23.647	25.510	26.774	28.775
2003	15.324	16.660	17.432	18.812	20.555	22.274	23.962	25.032	26.993
2004	16.942	18.414	19.239	20.744	22.525	24.404	26.180	27.291	29.542
2005	18.422	20.037	20.942	22.574	24.490	26.532	28.453	29.629	31.981
2006	20.170	21.929	22.957	24.748	26.844	29.059	31.141	32.406	34.842



2007	21.838	23.710	24.829	26.762	29.058	31.432	33.656	34.991	37.542
2008	22.536	24.496	25.652	27.670	30.062	32.520	34.843	36.244	38.955
2009	23.530	25.605	26.843	28.986	31.506	34.096	36.502	37.974	40.735
2010	24.339	26.498	27.746	29.945	32.527	35.182	37.662	39.096	41.899

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2000	28361.267	10702.068
2001	28409.299	10717.280
2002	28394.078	10639.461
2003	28385.242	10696.373
2004	28352.798	10674.012
2005	28371.209	10693.957
2006	28357.621	10660.047
2007	28422.100	10736.093
2008	28416.056	10709.839
2009	28330.934	10683.482
2010	28378.226	10695.403

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	13087.472	13178.915	14081.639	21024.684	26062.493	35085.022	42687.066	50252.236	52703.885
2001	13087.294	13180.227	14107.915	21098.628	26174.909	35113.333	42879.616	50308.643	52749.983
2002	13086.309	13180.151	14128.337	21212.608	26173.159	35095.162	42486.816	50148.679	52690.727
2003	13087.610	13177.937	14098.996	21117.881	26134.438	35035.080	42714.072	50329.444	52743.326
2004	13087.463	13177.979	14099.039	21036.146	26043.299	34995.003	42588.703	50218.368	52701.859
2005	13087.166	13178.206	14072.677	21117.085	26114.291	35028.059	42790.409	50234.800	52734.775
2006	13088.971	13180.205	14099.844	21105.953	26094.324	35006.218	42436.254	50193.488	52739.301
2007	13086.424	13176.713	14075.065	21081.617	26196.964	35128.121	43030.929	50336.166	52749.675
2008	13086.882	13178.546	14095.955	21167.557	26172.423	35154.160	42885.318	50289.705	52729.718
2009	13087.681	13177.181	14071.916	20987.831	26044.683	35000.799	42630.951	50203.283	52721.632
2010	13086.551	13179.064	14085.644	21053.075	26156.089	35078.805	42762.956	50183.822	52722.908

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
2000	5.275	0.000
2001	5.370	0.000
2002	5.370	0.748
2003	2.808	0.367
2004	3.009	0.387
2005	3.337	0.432
2006	3.686	0.476
2007	4.006	0.515
2008	4.176	0.538
2009	4.382	0.561
2010	4.529	0.574

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	5.275	5.275	5.275	5.275	5.275	5.275	5.275	5.275	5.275
2001	5.370	5.370	5.370	5.370	5.370	5.370	5.370	5.370	5.370
2002	3.780	4.163	4.423	4.811	5.368	5.878	6.332	6.677	7.199
2003	2.059	2.240	2.345	2.544	2.795	3.045	3.289	3.446	3.738
2004	2.207	2.421	2.533	2.736	2.989	3.254	3.508	3.670	4.027
2005	2.445	2.669	2.798	3.035	3.313	3.616	3.899	4.076	4.442

2006	2.686	2.943	3.089	3.353	3.663	3.996	4.311	4.502	4.875
2007	2.912	3.191	3.355	3.644	3.986	4.345	4.682	4.887	5.269
2008	3.033	3.324	3.494	3.797	4.158	4.533	4.884	5.093	5.487
2009	3.180	3.487	3.670	3.988	4.366	4.755	5.115	5.336	5.753
2010	3.294	3.613	3.798	4.128	4.513	4.912	5.283	5.505	5.921

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2000	0.316	0.037
2001	0.340	0.049
2002	0.330	0.000
2003	0.166	0.000
2004	0.166	0.000
2005	0.166	0.000
2006	0.166	0.000
2007	0.166	0.000
2008	0.166	0.000
2009	0.166	0.000
2010	0.166	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.242	0.258	0.269	0.289	0.313	0.340	0.366	0.383	0.406
2001	0.247	0.270	0.282	0.305	0.334	0.373	0.406	0.430	0.469
2002	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330
2003	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2004	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2005	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2006	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2007	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2008	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2009	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2010	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.166

YEAR	Pr(F > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

American Plaice projection F = F rebuild

```

ap_2001:ap_50_yc no disc
2000
11
100
123456
0
1
0
0
0
0
0
0
1
0
0
0
1
0
1
1
9 1 9
0.2
0.010 0.029 0.087 0.228 0.360 0.521 0.727 0.960 1.563
0.016 0.050 0.158 0.297 0.439 0.618 0.855 1.094 1.606
0 0.03 0.17 0.6 0.92 1 1 1 1
0.25
14
20
25119000 21949000 25120000 13184000
14385000 18443000 36859000 53355000 27101000
33361000 33777000 39816000 50074000 41884000
24426000 24189000 13064000 27527000 34453000 14187000
1000
amp\boot.dat
1000
28600000 0 0.166 0 0
0.03 0.10 0.12 0.49 1 1 1 1 1
1 1 0 0 0 0 0 0 0
5275000 5370000 0 0 0 0 0 0 0
0 0 0.33 0.129 0.129 0.129 0.129 0.129 0.129 0.129 0.129 0.129
=====

```

PROJECTION RUN: ap\_2001:ap\_50\_yc no disc  
INPUT FILE: ap\_50\_yc.in  
OUTPUT FILE: ap\_50\_yc.out  
RECRUITMENT MODEL: 14  
NUMBER OF SIMULATIONS: 100

MIXTURE OF F AND QUOTA BASED CATCHES

YEAR	F	QUOTA (THOUSAND MT)
2000		5.275
2001		5.370
2002	0.330	
2003	0.129	
2004	0.129	
2005	0.129	
2006	0.129	
2007	0.129	
2008	0.129	
2009	0.129	
2010	0.129	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2000	16.209	1.811
2001	15.956	2.124
2002	16.024	2.286
2003	15.964	2.104
2004	17.970	2.284
2005	20.167	2.531

2006	22.921	2.850
2007	25.580	3.170
2008	26.952	3.360
2009	28.750	3.583
2010	30.086	3.709

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	12.519	13.316	13.923	14.920	16.118	17.405	18.608	19.350	20.665
2001	11.573	12.489	13.218	14.377	15.918	17.393	18.738	19.590	21.322
2002	11.158	12.350	13.160	14.295	16.011	17.547	18.953	20.077	21.622
2003	11.686	12.677	13.303	14.440	15.903	17.310	18.741	19.656	21.147
2004	13.193	14.455	15.124	16.362	17.877	19.434	20.940	21.889	23.830
2005	14.884	16.241	17.011	18.405	20.035	21.800	23.451	24.483	26.666
2006	16.910	18.467	19.348	20.935	22.788	24.778	26.652	27.794	30.102
2007	18.851	20.568	21.585	23.364	25.453	27.662	29.734	31.015	33.400
2008	19.817	21.635	22.712	24.592	26.829	29.158	31.354	32.683	35.216
2009	21.055	23.032	24.206	26.234	28.645	31.124	33.442	34.832	37.494
2010	22.085	24.163	25.362	27.487	29.988	32.560	34.934	36.382	39.095

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 28.600 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2000	0.000
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.002
2006	0.029
2007	0.171
2008	0.303
2009	0.505
2010	0.644

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 9

YEAR	AVG MEAN B (000 MT)	STD
2000	21.502	2.188
2001	21.708	2.638
2002	21.132	2.705
2003	21.850	2.664
2004	24.615	2.947
2005	27.250	3.237
2006	29.998	3.527
2007	32.564	3.803
2008	34.064	3.981
2009	35.786	4.160
2010	37.060	4.261

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	16.849	18.031	18.666	19.861	21.479	22.985	24.369	25.262	26.939
2001	16.192	17.522	18.399	19.754	21.675	23.450	25.080	26.348	28.063
2002	15.543	16.863	17.726	19.188	21.068	22.875	24.684	25.873	27.702
2003	16.269	17.704	18.504	19.974	21.744	23.561	25.313	26.396	28.588
2004	18.404	20.015	20.923	22.560	24.475	26.532	28.446	29.627	32.078
2005	20.378	22.175	23.175	24.993	27.115	29.359	31.487	32.782	35.347
2006	22.463	24.407	25.561	27.532	29.874	32.307	34.609	36.024	38.693
2007	24.410	26.513	27.751	29.903	32.449	35.079	37.540	39.024	41.886
2008	25.532	27.725	29.026	31.277	33.947	36.694	39.259	40.825	43.834
2009	26.805	29.147	30.496	32.878	35.676	38.552	41.219	42.851	45.890
2010	27.817	30.241	31.641	34.089	36.955	39.901	42.643	44.262	47.354

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000

2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	AVG F_WT_B	STD
2000	0.248	0.026
2001	0.251	0.031
2002	0.254	0.011
2003	0.102	0.005
2004	0.100	0.005
2005	0.102	0.005
2006	0.105	0.005
2007	0.106	0.004
2008	0.107	0.004
2009	0.108	0.004
2010	0.109	0.004

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 9

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.195	0.208	0.216	0.229	0.245	0.266	0.283	0.292	0.311
2001	0.191	0.204	0.214	0.229	0.248	0.272	0.292	0.306	0.332
2002	0.225	0.234	0.239	0.247	0.255	0.262	0.267	0.271	0.278
2003	0.089	0.093	0.095	0.098	0.102	0.105	0.108	0.110	0.112
2004	0.088	0.091	0.093	0.096	0.100	0.103	0.106	0.108	0.111
2005	0.091	0.094	0.096	0.099	0.102	0.106	0.108	0.110	0.113
2006	0.093	0.097	0.099	0.101	0.105	0.108	0.110	0.112	0.114
2007	0.096	0.099	0.101	0.104	0.107	0.110	0.112	0.113	0.116
2008	0.097	0.100	0.102	0.105	0.108	0.110	0.113	0.114	0.116
2009	0.098	0.102	0.103	0.106	0.109	0.111	0.114	0.115	0.117
2010	0.099	0.102	0.104	0.107	0.109	0.112	0.114	0.115	0.117

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2000	21.565	2.013
2001	21.903	2.439
2002	21.775	2.880
2003	20.630	2.546
2004	23.259	2.789
2005	25.833	3.061
2006	28.836	3.377
2007	31.724	3.699
2008	33.213	3.894
2009	35.166	4.125
2010	36.618	4.255

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	17.446	18.341	18.919	20.058	21.541	22.894	24.232	25.018	26.586
2001	16.777	18.030	18.832	20.061	21.873	23.550	25.029	26.245	27.919
2002	15.804	17.186	18.140	19.680	21.733	23.647	25.510	26.774	28.775
2003	15.324	16.660	17.432	18.812	20.555	22.274	23.962	25.032	26.993
2004	17.407	18.918	19.761	21.305	23.133	25.062	26.884	28.018	30.328
2005	19.364	21.051	21.996	23.696	25.693	27.825	29.828	31.056	33.519
2006	21.641	23.502	24.593	26.483	28.707	31.046	33.256	34.602	37.204

2007	23.821	25.843	27.051	29.135	31.602	34.165	36.563	38.019	40.798
2008	24.904	27.040	28.299	30.490	33.084	35.767	38.304	39.846	42.814
2009	26.289	28.562	29.923	32.287	35.060	37.912	40.562	42.175	45.209
2010	27.431	29.828	31.194	33.634	36.506	39.446	42.200	43.816	46.903

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
2000	28361.267	10702.068
2001	28409.299	10717.280
2002	28394.078	10639.461
2003	28385.242	10696.373
2004	28352.798	10674.012
2005	28371.209	10693.957
2006	28357.621	10660.047
2007	28422.100	10736.093
2008	28416.056	10709.839
2009	28330.934	10683.482
2010	28378.226	10695.403

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	13087.472	13178.915	14081.639	21024.684	26062.493	35085.022	42687.066	50252.236	52703.885
2001	13087.294	13180.227	14107.915	21098.628	26174.909	35113.333	42879.616	50308.643	52749.983
2002	13086.309	13180.151	14128.337	21212.608	26173.159	35095.162	42486.816	50148.679	52690.727
2003	13087.610	13177.937	14098.996	21117.881	26134.438	35035.080	42714.072	50329.444	52743.326
2004	13087.463	13177.979	14099.039	21036.146	26043.299	34995.003	42588.703	50218.368	52701.859
2005	13087.166	13178.206	14072.677	21117.085	26114.291	35028.059	42790.409	50234.800	52734.775
2006	13088.971	13180.205	14099.844	21105.953	26094.324	35006.218	42436.254	50193.488	52739.301
2007	13086.424	13176.713	14075.065	21081.617	26196.964	35128.121	43030.929	50336.166	52749.675
2008	13086.882	13178.546	14095.955	21167.557	26172.423	35154.160	42885.318	50289.705	52729.718
2009	13087.681	13177.181	14071.916	20987.831	26044.683	35000.799	42630.951	50203.283	52721.632
2010	13086.551	13179.064	14085.644	21053.075	26156.089	35078.805	42762.956	50183.822	52722.908

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
2000	5.275	0.000
2001	5.370	0.000
2002	5.370	0.748
2003	2.219	0.290
2004	2.450	0.315
2005	2.783	0.358
2006	3.136	0.401
2007	3.468	0.441
2008	3.661	0.466
2009	3.883	0.490
2010	4.047	0.505

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	5.275	5.275	5.275	5.275	5.275	5.275	5.275	5.275	5.275
2001	5.370	5.370	5.370	5.370	5.370	5.370	5.370	5.370	5.370
2002	3.780	4.163	4.423	4.811	5.368	5.878	6.332	6.677	7.199
2003	1.627	1.770	1.853	2.010	2.208	2.406	2.598	2.722	2.955
2004	1.798	1.972	2.063	2.228	2.435	2.650	2.857	2.988	3.279
2005	2.043	2.229	2.337	2.533	2.763	3.013	3.249	3.396	3.702

2006	2.293	2.511	2.634	2.856	3.117	3.398	3.663	3.826	4.144
2007	2.531	2.771	2.912	3.159	3.451	3.758	4.047	4.223	4.555
2008	2.673	2.923	3.071	3.333	3.645	3.969	4.274	4.455	4.799
2009	2.833	3.102	3.260	3.539	3.869	4.209	4.524	4.716	5.081
2010	2.961	3.241	3.405	3.695	4.034	4.384	4.709	4.903	5.271

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2000	0.316	0.037
2001	0.340	0.049
2002	0.330	0.000
2003	0.129	0.000
2004	0.129	0.000
2005	0.129	0.000
2006	0.129	0.000
2007	0.129	0.000
2008	0.129	0.000
2009	0.129	0.000
2010	0.129	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2000	0.242	0.258	0.269	0.289	0.313	0.340	0.366	0.383	0.406
2001	0.247	0.270	0.282	0.305	0.334	0.373	0.406	0.430	0.469
2002	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330
2003	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
2004	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
2005	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
2006	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
2007	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
2008	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
2009	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129
2010	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129	0.129

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.166

YEAR	Pr(F > Threshold Value)
2000	1.000
2001	1.000
2002	1.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

## 7.10 Witch flounder

### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 3 (millions)
1960	1.255			1982	18.124	7.326
1961	1.024			1983	14.801	4.876
1962	0.977			1984	12.493	2.950
1963	1.374	3.46		1985	13.779	9.502
1964	1.418	2.00		1986	11.281	6.359
1965	2.664	2.27		1987	9.277	6.871
1966	3.314	4.56		1988	8.743	8.949
1967	3.682	2.02		1989	6.879	15.279
1968	3.054	3.49	3.34	1990	6.526	10.906
1969	3.852	4.40	2.53	1991	5.492	13.869
1970	3.261	3.71	4.49	1992	5.315	27.833
1971	6.115	2.95	2.06	1993	4.375	26.142
1972	5.515	2.42	4.01	1994	4.608	20.549
1973	3.162	2.05	6.21			
1974	2.140	1.54	3.62			
1975	2.357	1.03	2.75			
1976	1.882	0.94	3.70			
1977	2.493	3.38	1.96			
1978	3.525	2.94	2.56			
1979	2.895	1.62	1.77			
1980	3.147	2.04	3.89			
1981	3.449	2.19	4.18			
1982	4.953	0.83	1.87			
1983	6.162	2.12	2.74			
1984	6.760	2.34	1.66			
1985	6.191	1.59	2.75			
1986	4.635	1.09	1.35			
1987	3.497	0.37	0.65			
1988	3.322	0.57	0.85			
1989	2.207	0.38	0.74			
1990	1.662	0.40	0.24			
1991	1.893	0.54	0.57			
1992	2.417	0.24	0.50			
1993	2.981	0.54	0.36			
1994	3.092	0.42	0.53			
1995	2.477	0.62	0.47			
1996	2.542	1.02	0.28			
1997	2.168	0.77	0.43			
1998	2.184	0.47	0.77			
1999	2.505	0.88	0.48			
2000	2.878	1.11	0.52			



Witch flounder projection F= Fmsy

```

Witch Fld 3-11+ (94-98 wts)
1999
12
100
12345
0
1
0 !discard flag
0
0
0
0
1
0
0
0
1
0
1
1
1
9 1 9
0.150000
0.042 0.114 0.221 0.333 0.468 0.595 0.766 0.920 1.236
0.067 0.179 0.264 0.399 0.527 0.660 0.868 0.974 1.248
0.00 0.08 0.45 0.85 1.00 1.00 1.00 1.00 1.00
0.16670
14
13
7326000 4876000 2950000 9502000
6359000 6871000 8949000 15279000 10906000 13869000 27833000
26142000 20549000
1000
boot54n.txt
1000.000
19900000 19900000 0.164 25000000 0.09
0.013 0.073 0.233 0.473 1.00 1.00 1.00 1.00 1.00
1 1 1 0 0 0 0 0 0 0 0
2505000 2878000 3459000 0 0 0 0 0 0 0 0
0 0 0 0.191 0.164 0.164 0.164 0.164 0.164 0.164 0.164 0.164

```

=====

```

PROJECTION RUN: Witch Fld 3-11+ (94-98 wts)
INPUT FILE: mod14_1r.in
OUTPUT FILE: mod14_1r.out
RECRUITMENT MODEL: 14
NUMBER OF SIMULATIONS: 100

```

```

MIXTURE OF F AND QUOTA BASED CATCHES
YEAR F QUOTA (THOUSAND MT)
1999 2.505
2000 2.878
2001 3.459
2002 0.191
2003 0.164
2004 0.164
2005 0.164
2006 0.164
2007 0.164
2008 0.164
2009 0.164
2010 0.164

```

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
1999	13.990	2.505
2000	18.242	3.733
2001	23.739	6.940
2002	28.744	10.984
2003	30.768	11.972
2004	30.450	11.152
2005	29.657	10.234
2006	28.429	9.290
2007	27.427	8.381
2008	25.296	6.555
2009	23.746	5.321
2010	22.614	4.524

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1999	8.959	10.118	10.927	12.251	13.861	15.438	17.309	18.379	20.696
2000	10.455	12.551	13.797	15.860	17.928	20.337	23.345	25.133	27.817
2001	11.354	14.416	16.279	19.191	22.727	26.902	32.363	37.193	45.788
2002	11.972	15.412	17.468	21.600	26.719	33.157	42.097	49.855	66.684
2003	13.318	16.736	18.779	23.002	28.419	35.375	45.153	54.080	73.217
2004	14.083	17.327	19.301	23.165	28.298	34.792	43.891	51.830	70.241
2005	14.602	17.577	19.419	22.933	27.701	33.766	41.880	49.096	66.300
2006	14.691	17.443	19.092	22.268	26.657	32.231	39.480	45.883	61.962
2007	14.840	17.358	18.900	21.852	25.866	30.968	37.413	43.118	57.571
2008	14.626	16.893	18.279	20.887	24.256	28.362	33.247	37.393	47.862
2009	14.377	16.485	17.742	20.084	23.076	26.532	30.383	33.324	40.706
2010	14.148	16.090	17.284	19.437	22.172	25.207	28.418	30.645	35.871

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 19.900 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
1999	0.021
2000	0.291
2001	0.716
2002	0.819
2003	0.866
2004	0.880
2005	0.883
2006	0.868
2007	0.856
2008	0.813
2009	0.763
2010	0.711

MEAN BIOMASS (THOUSAND MT) FOR AGES:3 TO 11+

YEAR	AVG MEAN B (000 MT)	STD
1999	24.005	5.775
2000	29.216	8.987
2001	32.488	11.233
2002	34.495	12.676
2003	34.748	12.185
2004	34.148	11.309
2005	33.276	10.350
2006	31.594	8.992
2007	30.435	7.973
2008	28.491	6.382
2009	27.075	5.338
2010	26.037	4.687

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1999	13.653	16.095	17.797	20.225	23.203	26.676	31.163	35.023	42.181
2000	14.956	18.009	19.862	23.387	27.728	32.860	40.135	46.496	59.666
2001	15.153	18.798	20.928	25.215	30.495	36.961	46.114	54.106	71.283
2002	15.644	19.445	21.732	26.263	32.097	39.430	49.796	58.953	79.156
2003	16.670	20.292	22.515	26.800	32.445	39.544	49.351	58.121	78.057
2004	17.344	20.730	22.786	26.725	32.010	38.704	47.640	55.592	74.566
2005	17.750	20.895	22.814	26.435	31.342	37.560	45.579	52.820	70.423
2006	17.700	20.584	22.317	25.629	29.988	35.480	42.375	48.439	63.520
2007	17.753	20.420	22.039	25.104	29.104	34.033	40.033	45.223	58.346

2008	17.483	19.935	21.405	24.135	27.635	31.709	36.353	40.028	49.414
2009	17.186	19.485	20.875	23.371	26.516	30.065	33.839	36.533	43.249
2010	16.880	19.088	20.397	22.740	25.665	28.865	32.112	34.262	39.137

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 25.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
1999	0.357
2000	0.663
2001	0.759
2002	0.798
2003	0.820
2004	0.823
2005	0.817
2006	0.783
2007	0.756
2008	0.692
2009	0.624
2010	0.558

F WEIGHTED BY MEAN BIOMASS FOR AGES:3 TO 11+

YEAR	AVG F_WT_B	STD
1999	0.110	0.025
2000	0.107	0.030
2001	0.118	0.037
2002	0.140	0.009
2003	0.137	0.010
2004	0.136	0.010
2005	0.136	0.009
2006	0.135	0.009
2007	0.134	0.009
2008	0.132	0.009
2009	0.131	0.009
2010	0.130	0.009

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:3 TO 11+

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1999	0.059	0.071	0.080	0.094	0.108	0.124	0.141	0.155	0.182
2000	0.048	0.062	0.072	0.088	0.104	0.123	0.145	0.160	0.192
2001	0.049	0.064	0.075	0.094	0.113	0.137	0.165	0.184	0.228
2002	0.118	0.126	0.129	0.134	0.140	0.146	0.151	0.155	0.160
2003	0.109	0.119	0.123	0.130	0.138	0.144	0.149	0.151	0.155
2004	0.110	0.119	0.123	0.130	0.137	0.144	0.148	0.151	0.155
2005	0.111	0.119	0.123	0.130	0.137	0.143	0.148	0.150	0.154
2006	0.111	0.118	0.122	0.129	0.136	0.142	0.146	0.149	0.153
2007	0.110	0.118	0.122	0.128	0.135	0.141	0.145	0.148	0.152
2008	0.109	0.116	0.120	0.126	0.133	0.139	0.144	0.146	0.150
2009	0.108	0.115	0.119	0.125	0.132	0.138	0.142	0.145	0.149
2010	0.108	0.114	0.118	0.124	0.130	0.136	0.141	0.144	0.148

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.090

YEAR	Pr(F_WT_B > Threshold Value)
1999	0.803
2000	0.716
2001	0.789
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
1999	21.821	4.457
2000	26.915	7.267
2001	31.452	10.213
2002	34.364	12.559

2003	35.420	12.698
2004	35.090	11.839
2005	34.255	10.883
2006	32.964	9.902
2007	31.910	8.951
2008	29.665	7.053
2009	28.029	5.785
2010	26.834	4.978

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1999	13.388	15.303	16.826	18.978	21.176	24.069	27.413	30.136	34.831
2000	14.712	17.494	19.224	22.213	25.790	30.050	35.477	41.089	51.101
2001	15.528	18.855	20.871	24.825	29.661	35.536	43.903	51.063	66.433
2002	15.364	19.311	21.605	26.216	32.053	39.324	49.561	58.602	78.154
2003	16.562	20.356	22.663	27.171	33.026	40.368	50.683	59.960	80.343
2004	17.469	21.020	23.178	27.334	32.856	39.841	49.282	57.616	77.250
2005	17.938	21.266	23.289	27.086	32.208	38.709	47.217	54.864	73.171
2006	18.034	21.073	22.908	26.403	31.120	37.125	44.764	51.599	68.470
2007	18.159	20.976	22.684	25.968	30.297	35.771	42.632	48.678	63.776
2008	17.900	20.472	21.993	24.893	28.626	33.058	38.274	42.572	53.546
2009	17.625	19.989	21.431	24.036	27.349	31.121	35.262	38.372	46.124
2010	17.297	19.557	20.929	23.352	26.390	29.741	33.238	35.593	41.181

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 19.900 THOUSAND MT

YEAR	Pr(B > Threshold Value)
1999	0.658
2000	0.867
2001	0.929
2002	0.939
2003	0.958
2004	0.968
2005	0.972
2006	0.971
2007	0.971
2008	0.963
2009	0.952
2010	0.939

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
1999	12158.045	6975.374
2000	12164.116	6993.203
2001	12174.658	6997.350
2002	12171.338	6986.388
2003	12154.890	6980.624
2004	12199.027	7006.769
2005	12207.903	6997.948
2006	12161.958	6995.360
2007	12209.288	7000.655
2008	12155.261	6981.814
2009	12154.336	6981.975
2010	12190.718	7012.549

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1999	3184.435	4116.847	5168.238	6873.507	9508.232	15262.640	24957.822	26799.189	27629.796
2000	3185.174	4113.251	5174.526	6871.460	9499.791	15321.691	24970.065	26820.687	27615.252
2001	3188.229	4071.075	5158.641	6867.906	9515.632	15390.937	25032.853	26805.504	27625.290
2002	3171.009	4092.528	5174.401	6876.551	9519.748	15269.287	25044.897	26814.487	27627.758
2003	3192.503	4110.379	5173.660	6856.942	9496.901	15271.582	24927.381	26814.539	27628.646
2004	3195.957	4124.678	5187.498	6872.750	9539.215	15315.709	25113.663	26850.051	27634.090
2005	3187.887	4127.116	5194.081	6873.785	9547.044	15399.024	25045.425	26826.460	27625.092
2006	3192.024	4112.977	5167.155	6863.045	9494.674	15315.622	25044.065	26824.134	27630.836
2007	3192.035	4123.348	5191.153	6884.202	9560.739	15463.769	25032.989	26822.473	27639.734
2008	3179.008	4125.079	5187.410	6874.237	9495.378	15271.936	25049.026	26822.184	27631.259
2009	3184.655	4112.645	5187.939	6885.739	9488.679	15263.363	25023.439	26811.187	27626.451
2010	3175.728	4104.677	5175.009	6875.087	9522.102	15300.641	25110.690	26847.682	27640.403

CATCH FOR F-BASED PROJECTIONS

YEAR	AVG CATCH (000 MT)	STD
1999	2.505	0.000
2000	2.878	0.000
2001	3.459	0.000
2002	4.818	1.721
2003	4.820	1.968
2004	4.720	1.823
2005	4.576	1.661
2006	4.300	1.433
2007	4.109	1.260
2008	3.790	0.989
2009	3.558	0.806
2010	3.388	0.689

PERCENTILES OF CATCH (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1999	2.505	2.505	2.505	2.505	2.505	2.505	2.505	2.505	2.505
2000	2.878	2.878	2.878	2.878	2.878	2.878	2.878	2.878	2.878
2001	3.459	3.459	3.459	3.459	3.459	3.459	3.459	3.459	3.459
2002	2.022	2.648	3.013	3.699	4.539	5.531	6.924	8.132	10.583
2003	1.997	2.545	2.866	3.541	4.407	5.564	7.216	8.683	11.832
2004	2.116	2.611	2.915	3.530	4.352	5.417	6.918	8.218	11.248
2005	2.188	2.646	2.931	3.483	4.246	5.232	6.561	7.742	10.584
2006	2.191	2.608	2.861	3.349	4.025	4.887	6.000	6.992	9.468
2007	2.205	2.584	2.822	3.269	3.876	4.647	5.610	6.465	8.635
2008	2.180	2.516	2.726	3.122	3.634	4.260	4.994	5.615	7.190
2009	2.142	2.453	2.645	3.001	3.456	3.984	4.566	5.012	6.111
2010	2.106	2.394	2.575	2.903	3.320	3.789	4.275	4.609	5.400

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
1999	0.220	0.044
2000	0.186	0.042
2001	0.179	0.050
2002	0.191	0.000
2003	0.164	0.000
2004	0.164	0.000
2005	0.164	0.000
2006	0.164	0.000
2007	0.164	0.000
2008	0.164	0.000
2009	0.164	0.000
2010	0.164	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1999	0.136	0.157	0.168	0.190	0.215	0.245	0.276	0.300	0.335
2000	0.111	0.128	0.137	0.158	0.180	0.206	0.238	0.263	0.318
2001	0.096	0.111	0.124	0.146	0.171	0.200	0.240	0.275	0.348
2002	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191	0.191
2003	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
2004	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
2005	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
2006	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
2007	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
2008	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
2009	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
2010	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.164

YEAR	Pr(F > Threshold Value)
1999	0.925
2000	0.686
2001	0.574
2002	1.000
2003	1.000
2004	1.000

2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

## 7.11 Southern New England winter flounder

### Landings, survey indices, spawning biomass and recruitment

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)	Ma DMF Spring survey (kg/tow)	Year Class	Spawning Biomass (k mt)	Recruitment Age 1 (millions)
1960					1982	10.387	52.021
1961					1983	13.004	56.505
1962					1984	14.765	35.618
1963		3.283			1985	14.006	34.619
1964		4.894			1986	10.874	32.806
1965		4.435			1987	8.662	26.007
1966		3.275			1988	7.356	26.822
1967		2.745			1989	5.667	23.487
1968		2.191	0.734		1990	4.567	17.999
1969		1.939	3.414		1991	4.348	12.423
1970		2.376	1.326		1992	4.563	8.834
1971		1.232	0.756		1993	4.081	12.020
1972		3.054	0.656		1994	3.758	14.601
1973		0.776	2.013		1995	3.420	23.288
1974		0.821	1.043		1996	4.078	18.806
1975		0.742	0.354		1997	5.202	21.039
1976		1.251	0.805		1998	8.558	16.837
1977		1.735	1.190				
1978		1.430	1.758	18.120			
1979		2.606	1.069	18.170			
1980		3.216	3.551	15.180			
1981	15.657	3.109	4.762	15.770			
1982	13.110	1.683	1.918	14.820			
1983	12.619	2.691	2.469	19.450			
1984	15.788	0.887	2.072	14.680			
1985	14.014	0.991	1.983	11.600			
1986	9.208	0.487	0.766	10.420			
1987	9.324	0.419	0.568	9.570			
1988	8.708	0.530	0.730	6.460			
1989	6.925	0.341	0.582	7.960			
1990	5.999	0.546	0.472	5.380			
1991	6.872	0.708	0.692	2.910			
1992	4.735	0.829	0.435	7.990			
1993	4.041	0.392	0.219	8.160			
1994	3.095	1.482	0.329	12.590			
1995	3.439	0.626	0.592	7.260			
1996	3.707	1.063	0.428	9.780			
1997	4.337	2.583	0.399	10.020			
1998	4.024	2.232	0.845	7.990			
1999	4.033	1.549	1.245	4.440			
2000	4.711	2.143	1.123				

Southern New England winter flounder projection F= Fmsy

SNEWIN Run 1: Constant F=FMSY

1998  
13  
50  
7511  
0  
1  
1  
0  
0  
0  
0  
1  
0  
0  
0  
1  
0  
1  
1  
1

7 1 7

0.200000  
0.067000 0.264000 0.430000 0.540000 0.657000 0.867000 1.113000  
0.204000 0.427000 0.520000 0.615000 0.755000 0.941000 1.135000  
0.134000 0.277000 0.350000 0.445000 0.617000 0.000000 0.000000  
0.000000 0.000000 0.530000 0.950000 1.000000 1.000000 1.000000  
0.200000

5  
47.5356 7.3975 0.1183  
1000000.0 1000000.0

200

snewinboot.dat

1000  
30100000 10 0.32 10 0.00  
0.020000 0.250000 0.610000 1.000000 1.000000 1.000000 1.000000  
1.000000 0.350000 0.150000 0.010000 0.010000 0.000000 0.000000  
1 1 1 1 0 0 0 0 0 0 0 0 0  
3777000 3779000 4426000 4448000 -1 -1 -1 -1 -1 -1 -1 -1 -1  
-1 -1 -1 -1 0.251 0.32 0.32 0.32 0.32 0.32 0.32 0.32 0.32

=====

PROJECTION RUN: SNEWIN Run 1: Constant F=FMSY  
INPUT FILE: mt\_Fmsy.in  
OUTPUT FILE: mt\_Fmsy.out  
RECRUITMENT MODEL: 5  
NUMBER OF SIMULATIONS: 50

MIXTURE OF F AND QUOTA BASED LANDINGS

YEAR	F	QUOTA (THOUSAND MT)
1998		3.777
1999		3.779
2000		4.426
2001		4.448
2002	0.251	
2003	0.320	
2004	0.320	
2005	0.320	
2006	0.320	
2007	0.320	
2008	0.320	
2009	0.320	
2010	0.320	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
1998	10.428	1.466
1999	12.254	2.037
2000	13.963	2.739
2001	16.460	3.732



2002	19.971	4.707
2003	22.779	4.738
2004	24.249	4.619
2005	25.702	4.623
2006	26.957	4.638
2007	28.067	4.658
2008	29.015	4.669
2009	29.815	4.679
2010	30.434	4.703

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	7.235	8.140	8.770	9.288	10.366	11.284	12.184	13.051	14.169
1999	7.633	9.126	9.740	10.802	12.256	13.563	14.709	15.863	17.499
2000	8.705	9.519	10.519	11.901	13.928	15.652	17.348	19.238	20.653
2001	8.936	10.735	11.852	13.764	16.213	18.848	21.523	23.002	25.946
2002	10.517	12.859	14.156	16.661	19.689	22.963	26.075	28.244	32.344
2003	13.173	15.557	16.924	19.425	22.482	25.788	28.906	30.997	35.528
2004	15.112	17.258	18.470	20.947	23.982	27.169	30.225	32.321	36.380
2005	16.542	18.625	19.928	22.454	25.394	28.621	31.819	33.823	37.528
2006	17.705	19.991	21.291	23.641	26.604	29.858	33.085	35.070	39.366
2007	18.812	21.025	22.360	24.769	27.718	30.937	34.247	36.292	40.407
2008	19.775	22.044	23.338	25.669	28.620	31.914	35.128	37.201	41.470
2009	20.576	22.863	24.145	26.435	29.456	32.849	35.924	37.919	42.325
2010	21.241	23.431	24.693	27.077	30.075	33.332	36.548	38.601	43.329

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 30.100 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
1998	0.000
1999	0.000
2000	0.000
2001	0.001
2002	0.027
2003	0.069
2004	0.105
2005	0.168
2006	0.236
2007	0.305
2008	0.382
2009	0.447
2010	0.498

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
1998	22.553	3.092
1999	26.190	4.258
2000	31.114	5.687
2001	36.019	7.028
2002	40.621	7.741
2003	43.933	7.856
2004	46.229	7.880
2005	48.360	7.891
2006	50.119	7.879
2007	51.585	7.883
2008	52.752	7.910
2009	53.651	7.921
2010	54.396	7.951

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	16.541	17.693	18.680	20.180	22.318	24.432	26.393	28.524	29.854
1999	17.652	19.725	20.997	23.088	25.886	28.942	31.960	33.652	36.929
2000	19.695	22.561	24.070	27.107	30.715	34.716	38.542	41.129	46.172
2001	21.734	25.297	27.338	31.056	35.574	40.439	45.112	48.188	54.940
2002	25.062	28.814	30.937	35.135	40.207	45.567	50.603	54.029	60.723
2003	28.115	31.789	34.056	38.409	43.439	48.960	54.221	57.639	63.896
2004	30.407	34.172	36.561	40.590	45.704	51.234	56.648	60.069	67.370
2005	32.516	36.398	38.622	42.797	47.826	53.286	58.751	62.266	69.109
2006	34.257	38.318	40.461	44.524	49.528	55.049	60.488	63.905	70.984
2007	36.054	39.835	41.950	45.909	51.047	56.704	61.896	65.274	72.663
2008	37.261	40.921	43.103	47.060	52.213	57.713	63.009	66.314	74.000

2009	37.927	41.627	43.850	48.032	53.142	58.562	63.980	67.350	74.782
2010	38.328	42.366	44.709	48.853	53.856	59.348	64.819	68.151	75.667

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
1998	1.000
1999	1.000
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	AVG F_WT_B	STD
1998	0.187	0.025
1999	0.161	0.026
2000	0.161	0.030
2001	0.141	0.029
2002	0.145	0.013
2003	0.190	0.016
2004	0.192	0.016
2005	0.193	0.016
2006	0.195	0.015
2007	0.196	0.015
2008	0.198	0.015
2009	0.199	0.015
2010	0.200	0.015

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	0.137	0.146	0.157	0.169	0.184	0.204	0.220	0.234	0.245
1999	0.112	0.123	0.130	0.143	0.159	0.178	0.196	0.209	0.232
2000	0.106	0.118	0.126	0.140	0.157	0.178	0.200	0.215	0.245
2001	0.089	0.101	0.109	0.121	0.137	0.158	0.179	0.194	0.225
2002	0.114	0.123	0.128	0.136	0.145	0.154	0.162	0.167	0.175
2003	0.152	0.163	0.170	0.180	0.190	0.201	0.211	0.216	0.226
2004	0.154	0.166	0.171	0.181	0.192	0.203	0.212	0.217	0.226
2005	0.156	0.167	0.173	0.183	0.194	0.204	0.213	0.218	0.227
2006	0.158	0.169	0.175	0.185	0.195	0.206	0.214	0.220	0.229
2007	0.161	0.171	0.177	0.186	0.197	0.207	0.216	0.221	0.230
2008	0.162	0.173	0.179	0.188	0.198	0.208	0.217	0.222	0.232
2009	0.163	0.174	0.180	0.189	0.200	0.210	0.218	0.224	0.233
2010	0.165	0.175	0.181	0.190	0.200	0.211	0.219	0.224	0.234

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
1998	1.000
1999	1.000
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
1998	19.693	2.369
1999	22.220	3.206
2000	26.363	4.427
2001	30.750	5.749
2002	35.422	7.030
2003	39.530	7.218
2004	41.758	7.192
2005	43.918	7.199
2006	45.729	7.182
2007	47.242	7.178
2008	48.502	7.192
2009	49.496	7.206
2010	50.280	7.225

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	14.706	15.924	16.619	17.942	19.633	20.945	22.598	24.166	25.792
1999	15.837	17.204	18.171	19.897	22.074	24.267	26.546	28.129	30.037
2000	17.416	19.617	20.920	23.208	26.093	29.187	32.302	34.097	37.757
2001	19.045	21.997	23.620	26.676	30.395	34.409	38.169	40.765	45.862
2002	21.172	24.652	26.671	30.482	35.055	39.912	44.414	47.710	53.961
2003	24.941	28.420	30.418	34.418	39.169	44.183	49.001	52.101	57.965
2004	27.440	30.705	32.774	36.669	41.324	46.329	51.221	54.420	60.120
2005	29.375	32.916	35.017	38.817	43.411	48.478	53.347	56.456	62.765
2006	31.263	34.881	36.801	40.645	45.287	50.212	55.171	58.426	64.814
2007	32.791	36.437	38.407	42.119	46.752	51.846	56.587	59.780	66.162
2008	34.197	37.765	39.696	43.269	48.023	53.153	57.830	60.827	67.648
2009	35.238	38.630	40.667	44.334	49.011	54.012	58.839	61.830	69.035
2010	35.695	39.264	41.423	45.236	49.770	54.807	59.644	62.834	69.621

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
1998	1.000
1999	1.000
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
1998	29546.707	10558.513
1999	31317.993	11293.509
2000	32699.967	11918.195
2001	34556.386	12491.892
2002	36270.080	13160.699
2003	37497.366	13407.487
2004	38519.693	13764.575
2005	38993.953	13832.830
2006	39629.329	14209.669
2007	39662.911	14065.142
2008	39928.149	14420.211
2009	40365.204	14395.116
2010	40324.928	14630.188

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	12647.772	15772.021	17697.439	22026.438	27953.495	35091.339	43302.475	49289.822	62908.401
1999	13218.468	16519.455	18747.360	23232.206	29479.210	37210.960	46366.673	52601.486	65762.024
2000	13456.855	16909.721	19422.859	24144.896	30661.264	39034.439	48644.138	55296.314	68828.491
2001	14281.764	18192.757	20764.454	25543.892	32479.321	41018.036	51101.353	57883.030	74027.588

2002	14934.283	19136.038	21639.833	26838.341	34059.559	43229.549	53682.079	61213.615	75683.907
2003	15489.290	19846.642	22426.613	28019.541	35098.717	44735.035	55280.430	62611.771	77480.423
2004	15966.609	20593.081	23111.149	28819.311	36193.684	46107.265	56590.637	64169.655	80527.321
2005	16605.476	20972.744	23673.790	29191.902	36748.573	46304.512	57348.732	64682.961	81219.940
2006	16582.138	20969.940	23820.168	29405.539	37435.513	47177.925	57995.197	66232.193	83476.028
2007	16823.196	21338.812	24108.753	29593.307	37327.293	47152.687	58116.718	66018.944	83490.356
2008	16540.668	21194.288	24016.796	29424.471	37609.711	47559.799	58699.482	66824.715	85634.544
2009	16699.608	21496.855	24468.498	30186.829	37953.175	48008.575	59399.372	67075.706	85478.935
2010	17083.038	21347.595	24206.720	29945.623	38013.309	47917.164	58968.678	66846.382	85162.506

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
1998	3.777	0.000
1999	3.779	0.000
2000	4.426	0.000
2001	4.448	0.000
2002	5.433	1.212
2003	7.718	1.532
2004	8.192	1.497
2005	8.645	1.497
2006	9.046	1.503
2007	9.395	1.509
2008	9.695	1.514
2009	9.937	1.515
2010	10.127	1.522

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	3.777	3.777	3.777	3.777	3.777	3.777	3.777	3.777	3.777
1999	3.779	3.779	3.779	3.779	3.779	3.779	3.779	3.779	3.779
2000	4.426	4.426	4.426	4.426	4.426	4.426	4.426	4.426	4.426
2001	4.448	4.448	4.448	4.448	4.448	4.448	4.448	4.448	4.448
2002	2.986	3.605	3.925	4.569	5.357	6.191	7.007	7.548	8.602
2003	4.633	5.388	5.815	6.641	7.635	8.678	9.685	10.379	11.823
2004	5.181	5.895	6.318	7.127	8.095	9.160	10.144	10.781	12.128
2005	5.701	6.374	6.792	7.580	8.546	9.590	10.629	11.294	12.475
2006	6.043	6.787	7.211	7.974	8.926	9.989	11.043	11.670	13.017
2007	6.392	7.133	7.536	8.320	9.286	10.330	11.386	12.055	13.454
2008	6.694	7.429	7.838	8.607	9.578	10.648	11.661	12.344	13.751
2009	6.970	7.689	8.099	8.849	9.832	10.913	11.907	12.542	14.015
2010	7.150	7.866	8.262	9.041	10.024	11.069	12.098	12.771	14.307

DISCARDS FOR F-BASED PROJECTIONS

YEAR	AVG DISCARDS (000 MT)	STD
1998	0.243	0.034
1999	0.227	0.040
2000	0.277	0.056
2001	0.294	0.058
2002	0.314	0.074
2003	0.420	0.097
2004	0.437	0.101
2005	0.454	0.104
2006	0.467	0.106
2007	0.477	0.106
2008	0.484	0.107
2009	0.488	0.109
2010	0.490	0.109

PERCENTILES OF DISCARDS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	0.162	0.187	0.201	0.220	0.246	0.267	0.286	0.295	0.314
1999	0.149	0.167	0.178	0.198	0.225	0.253	0.280	0.299	0.341
2000	0.171	0.195	0.208	0.236	0.271	0.311	0.351	0.377	0.430
2001	0.182	0.208	0.224	0.253	0.289	0.330	0.370	0.396	0.449
2002	0.179	0.210	0.228	0.261	0.306	0.359	0.410	0.447	0.527
2003	0.242	0.282	0.304	0.351	0.408	0.476	0.548	0.598	0.697
2004	0.254	0.293	0.318	0.364	0.424	0.497	0.571	0.620	0.726
2005	0.265	0.307	0.332	0.379	0.440	0.516	0.591	0.640	0.748
2006	0.274	0.317	0.341	0.392	0.455	0.530	0.608	0.659	0.769
2007	0.284	0.326	0.352	0.401	0.464	0.539	0.617	0.670	0.781
2008	0.291	0.331	0.357	0.407	0.471	0.549	0.626	0.675	0.785
2009	0.292	0.335	0.360	0.412	0.476	0.549	0.631	0.687	0.801

2010 0.290 0.336 0.362 0.413 0.478 0.554 0.634 0.689 0.801

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
1998	0.334	0.048
1999	0.294	0.051
2000	0.301	0.063
2001	0.260	0.063
2002	0.251	0.000
2003	0.320	0.000
2004	0.320	0.000
2005	0.320	0.000
2006	0.320	0.000
2007	0.320	0.000
2008	0.320	0.000
2009	0.320	0.000
2010	0.320	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	0.234	0.257	0.275	0.303	0.328	0.365	0.396	0.423	0.440
1999	0.194	0.220	0.234	0.260	0.289	0.326	0.364	0.391	0.440
2000	0.193	0.211	0.229	0.257	0.290	0.337	0.385	0.421	0.474
2001	0.157	0.177	0.189	0.215	0.251	0.294	0.342	0.377	0.450
2002	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
2003	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
2004	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
2005	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
2006	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
2007	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
2008	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
2009	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
2010	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.320

YEAR	Pr(F > Threshold Value)
1998	0.570
1999	0.275
2000	0.328
2001	0.153
2002	0.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

Southern New England winter flounder projection F= F rebuild

SNEWIN Run 2: Constant F=Frebuild

1998  
13  
50  
69342  
0  
1  
1  
0  
0  
0  
0  
1  
0  
0  
0  
1  
0  
1  
1  
1

7 1 7

0.200000  
0.067000 0.264000 0.430000 0.540000 0.657000 0.867000 1.113000  
0.204000 0.427000 0.520000 0.615000 0.755000 0.941000 1.135000  
0.134000 0.277000 0.350000 0.445000 0.617000 0.000000 0.000000  
0.000000 0.000000 0.530000 0.950000 1.000000 1.000000 1.000000  
0.200000

5  
47.5356 7.3975 0.1183  
1000000.0 1000000.0

200

snewinboot.dat

1000  
30100000 10 0.32 10 0.00  
0.020000 0.250000 0.610000 1.000000 1.000000 1.000000 1.000000  
1.000000 0.350000 0.150000 0.010000 0.010000 0.000000 0.000000  
1 1 1 1 0 0 0 0 0 0 0 0 0 0  
3777000 3779000 4426000 4448000 -1 -1 -1 -1 -1 -1 -1 -1 -1  
-1 -1 -1 -1 0.251 0.30 0.30 0.30 0.30 0.30 0.30 0.30 0.30

=====

PROJECTION RUN: SNEWIN Run 2: Constant F=Frebu  
INPUT FILE: mt\_Freb.in  
OUTPUT FILE: mt\_Freb.out  
RECRUITMENT MODEL: 5  
NUMBER OF SIMULATIONS: 50

MIXTURE OF F AND QUOTA BASED LANDINGS

YEAR	F	QUOTA (THOUSAND MT)
1998		3.777
1999		3.779
2000		4.426
2001		4.448
2002	0.251	
2003	0.300	
2004	0.300	
2005	0.300	
2006	0.300	
2007	0.300	
2008	0.300	
2009	0.300	
2010	0.300	

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
1998	10.428	1.466
1999	12.254	2.037
2000	13.963	2.739
2001	16.460	3.732

2002	19.971	4.707
2003	22.863	4.756
2004	24.712	4.707
2005	26.488	4.759
2006	28.000	4.803
2007	29.325	4.840
2008	30.460	4.865
2009	31.416	4.885
2010	32.165	4.916

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	7.235	8.140	8.770	9.288	10.366	11.284	12.184	13.051	14.169
1999	7.633	9.126	9.740	10.802	12.256	13.563	14.709	15.863	17.499
2000	8.705	9.519	10.519	11.901	13.928	15.652	17.348	19.238	20.653
2001	8.936	10.735	11.852	13.764	16.213	18.848	21.523	23.002	25.946
2002	10.517	12.859	14.156	16.661	19.689	22.963	26.075	28.244	32.344
2003	13.220	15.615	16.986	19.499	22.565	25.885	29.015	31.112	35.661
2004	15.405	17.582	18.824	21.352	24.441	27.689	30.805	32.939	37.072
2005	17.066	19.187	20.540	23.144	26.168	29.499	32.771	34.830	38.608
2006	18.401	20.769	22.127	24.560	27.653	31.017	34.362	36.409	40.878
2007	19.670	21.996	23.383	25.899	28.965	32.302	35.733	37.869	42.130
2008	20.817	23.194	24.533	26.983	30.064	33.500	36.832	39.008	43.386
2009	21.768	24.156	25.486	27.878	31.038	34.596	37.787	39.863	44.500
2010	22.545	24.827	26.168	28.659	31.801	35.226	38.568	40.663	45.593

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 30.100 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
1998	0.000
1999	0.000
2000	0.000
2001	0.001
2002	0.027
2003	0.071
2004	0.124
2005	0.215
2006	0.312
2007	0.408
2008	0.497
2009	0.572
2010	0.639

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 7

YEAR	AVG MEAN B (000 MT)	STD
1998	22.553	3.092
1999	26.190	4.258
2000	31.114	5.687
2001	36.019	7.028
2002	40.621	7.741
2003	44.175	7.898
2004	46.880	7.979
2005	49.364	8.025
2006	51.432	8.037
2007	53.160	8.059
2008	54.546	8.099
2009	55.621	8.119
2010	56.511	8.155

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	16.541	17.693	18.680	20.180	22.318	24.432	26.393	28.524	29.854
1999	17.652	19.725	20.997	23.088	25.886	28.942	31.960	33.652	36.929
2000	19.695	22.561	24.070	27.107	30.715	34.716	38.542	41.129	46.172
2001	21.734	25.297	27.338	31.056	35.574	40.439	45.112	48.188	54.940
2002	25.062	28.814	30.937	35.135	40.207	45.567	50.603	54.029	60.723
2003	28.264	31.972	34.243	38.626	43.690	49.222	54.513	57.981	64.261
2004	30.838	34.671	37.070	41.173	46.354	51.965	57.391	60.918	68.191
2005	33.229	37.203	39.442	43.715	48.824	54.401	59.934	63.466	70.471
2006	35.217	39.370	41.559	45.704	50.815	56.473	62.002	65.505	72.611
2007	37.271	41.114	43.289	47.331	52.617	58.409	63.692	67.135	74.589
2008	38.634	42.434	44.661	48.716	53.973	59.623	65.063	68.426	76.179

2009	39.451	43.256	45.564	49.846	55.117	60.673	66.204	69.650	77.262
2010	39.942	44.156	46.557	50.833	55.957	61.594	67.184	70.608	78.340

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
1998	1.000
1999	1.000
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	AVG F_WT_B	STD
1998	0.187	0.025
1999	0.161	0.026
2000	0.161	0.030
2001	0.141	0.029
2002	0.145	0.013
2003	0.179	0.015
2004	0.181	0.015
2005	0.183	0.015
2006	0.185	0.014
2007	0.186	0.014
2008	0.188	0.014
2009	0.190	0.014
2010	0.190	0.014

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 7

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	0.137	0.146	0.157	0.169	0.184	0.204	0.220	0.234	0.245
1999	0.112	0.123	0.130	0.143	0.159	0.178	0.196	0.209	0.232
2000	0.106	0.118	0.126	0.140	0.157	0.178	0.200	0.215	0.245
2001	0.089	0.101	0.109	0.121	0.137	0.158	0.179	0.194	0.225
2002	0.114	0.123	0.128	0.136	0.145	0.154	0.162	0.167	0.175
2003	0.143	0.153	0.159	0.169	0.179	0.189	0.198	0.203	0.212
2004	0.145	0.156	0.162	0.171	0.181	0.191	0.200	0.204	0.213
2005	0.148	0.158	0.164	0.173	0.183	0.193	0.201	0.206	0.215
2006	0.150	0.160	0.166	0.175	0.185	0.195	0.203	0.208	0.217
2007	0.153	0.163	0.168	0.177	0.187	0.196	0.205	0.209	0.218
2008	0.155	0.165	0.170	0.179	0.188	0.198	0.206	0.211	0.220
2009	0.156	0.166	0.171	0.180	0.190	0.199	0.207	0.212	0.221
2010	0.157	0.167	0.172	0.181	0.191	0.200	0.208	0.213	0.222

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
1998	1.000
1999	1.000
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000



TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
1998	19.693	2.369
1999	22.220	3.206
2000	26.363	4.427
2001	30.750	5.749
2002	35.422	7.030
2003	39.530	7.218
2004	42.201	7.266
2005	44.734	7.318
2006	46.865	7.329
2007	48.653	7.345
2008	50.143	7.374
2009	51.326	7.398
2010	52.266	7.424

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	14.706	15.924	16.619	17.942	19.633	20.945	22.598	24.166	25.792
1999	15.837	17.204	18.171	19.897	22.074	24.267	26.546	28.129	30.037
2000	17.416	19.617	20.920	23.208	26.093	29.187	32.302	34.097	37.757
2001	19.045	21.997	23.620	26.676	30.395	34.409	38.169	40.765	45.862
2002	21.172	24.652	26.671	30.482	35.055	39.912	44.414	47.710	53.961
2003	24.941	28.420	30.418	34.418	39.169	44.183	49.001	52.101	57.965
2004	27.755	31.022	33.112	37.061	41.774	46.830	51.766	54.962	60.728
2005	29.920	33.491	35.675	39.559	44.227	49.366	54.336	57.510	63.896
2006	32.071	35.780	37.738	41.677	46.434	51.463	56.517	59.822	66.270
2007	33.844	37.610	39.602	43.394	48.115	53.368	58.211	61.481	67.930
2008	35.442	39.114	41.104	44.798	49.658	54.923	59.734	62.742	69.696
2009	36.705	40.160	42.263	46.048	50.830	55.966	60.906	64.061	71.328
2010	37.278	40.944	43.168	47.070	51.746	56.940	61.916	65.145	72.210

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
1998	1.000
1999	1.000
2000	1.000
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	AVG RECRUITMENT	STD
1998	29546.707	10558.513
1999	31317.993	11293.509
2000	32699.967	11918.195
2001	34556.386	12491.892
2002	36270.080	13160.699
2003	37531.898	13419.028
2004	38691.578	13822.900
2005	39258.529	13922.174
2006	39954.913	14318.990
2007	40027.237	14187.783
2008	40323.303	14556.686
2009	40785.840	14537.608
2010	40761.848	14781.419

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH

BIRTH YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	12647.772	15772.021	17697.439	22026.438	27953.495	35091.339	43302.475	49289.822	62908.401
1999	13218.468	16519.455	18747.360	23232.206	29479.210	37210.960	46366.673	52601.486	65762.024
2000	13456.855	16909.721	19422.859	24144.896	30661.264	39034.439	48644.138	55296.314	68828.491
2001	14281.764	18192.757	20764.454	25543.892	32479.321	41018.036	51101.353	57883.030	74027.588

2002	14934.283	19136.038	21639.833	26838.341	34059.559	43229.549	53682.079	61213.615	75683.907
2003	15504.971	19871.979	22450.226	28047.747	35127.434	44776.672	55322.563	62657.513	77539.078
2004	16037.395	20682.253	23230.526	28950.573	36377.068	46323.982	56844.639	64406.090	80883.194
2005	16717.451	21112.831	23859.545	29395.971	37008.358	46608.547	57695.103	65119.400	81718.948
2006	16729.784	21136.871	24024.803	29639.946	37737.160	47569.386	58435.059	66738.686	84123.749
2007	17019.691	21546.263	24351.370	29870.375	37677.002	47568.672	58663.872	66636.513	84181.671
2008	16703.587	21437.000	24256.205	29739.405	37977.364	48047.024	59232.773	67473.465	86500.618
2009	16929.493	21726.965	24725.126	30507.692	38349.449	48542.179	60059.582	67800.026	86269.859
2010	17260.950	21599.215	24508.402	30280.119	38438.416	48432.480	59572.411	67480.896	86038.704

#### LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
1998	3.777	0.000
1999	3.779	0.000
2000	4.426	0.000
2001	4.448	0.000
2002	5.433	1.212
2003	7.293	1.448
2004	7.850	1.435
2005	8.369	1.449
2006	8.819	1.462
2007	9.209	1.472
2008	9.545	1.481
2009	9.818	1.484
2010	10.033	1.493

#### PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	3.777	3.777	3.777	3.777	3.777	3.777	3.777	3.777	3.777
1999	3.779	3.779	3.779	3.779	3.779	3.779	3.779	3.779	3.779
2000	4.426	4.426	4.426	4.426	4.426	4.426	4.426	4.426	4.426
2001	4.448	4.448	4.448	4.448	4.448	4.448	4.448	4.448	4.448
2002	2.986	3.605	3.925	4.569	5.357	6.191	7.007	7.548	8.602
2003	4.377	5.091	5.495	6.276	7.214	8.204	9.154	9.809	11.175
2004	4.961	5.650	6.053	6.829	7.757	8.779	9.721	10.322	11.621
2005	5.518	6.170	6.571	7.344	8.273	9.287	10.283	10.926	12.064
2006	5.896	6.609	7.032	7.778	8.705	9.742	10.765	11.368	12.698
2007	6.276	6.988	7.396	8.162	9.106	10.131	11.154	11.814	13.152
2008	6.621	7.332	7.731	8.482	9.434	10.478	11.475	12.127	13.492
2009	6.906	7.614	8.015	8.750	9.715	10.774	11.749	12.368	13.784
2010	7.109	7.807	8.199	8.968	9.936	10.957	11.967	12.622	14.097

#### DISCARDS FOR F-BASED PROJECTIONS

YEAR	AVG DISCARDS (000 MT)	STD
1998	0.243	0.034
1999	0.227	0.040
2000	0.277	0.056
2001	0.294	0.058
2002	0.314	0.074
2003	0.395	0.091
2004	0.412	0.096
2005	0.429	0.098
2006	0.443	0.101
2007	0.453	0.101
2008	0.461	0.102
2009	0.465	0.103
2010	0.468	0.104

#### PERCENTILES OF DISCARDS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	0.162	0.187	0.201	0.220	0.246	0.267	0.286	0.295	0.314
1999	0.149	0.167	0.178	0.198	0.225	0.253	0.280	0.299	0.341
2000	0.171	0.195	0.208	0.236	0.271	0.311	0.351	0.377	0.430
2001	0.182	0.208	0.224	0.253	0.289	0.330	0.370	0.396	0.449
2002	0.179	0.210	0.228	0.261	0.306	0.359	0.410	0.447	0.527
2003	0.228	0.266	0.287	0.330	0.385	0.449	0.516	0.563	0.656
2004	0.240	0.277	0.301	0.344	0.400	0.469	0.540	0.586	0.686
2005	0.250	0.291	0.314	0.359	0.416	0.488	0.559	0.605	0.707
2006	0.260	0.301	0.324	0.371	0.431	0.502	0.576	0.625	0.729
2007	0.270	0.310	0.335	0.381	0.441	0.512	0.586	0.636	0.742
2008	0.278	0.315	0.340	0.388	0.449	0.522	0.595	0.642	0.747
2009	0.279	0.320	0.344	0.393	0.454	0.524	0.601	0.654	0.764

2010 0.277 0.320 0.346 0.394 0.456 0.529 0.605 0.656 0.763

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
1998	0.334	0.048
1999	0.294	0.051
2000	0.301	0.063
2001	0.260	0.063
2002	0.251	0.000
2003	0.300	0.000
2004	0.300	0.000
2005	0.300	0.000
2006	0.300	0.000
2007	0.300	0.000
2008	0.300	0.000
2009	0.300	0.000
2010	0.300	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
1998	0.234	0.257	0.275	0.303	0.328	0.365	0.396	0.423	0.440
1999	0.194	0.220	0.234	0.260	0.289	0.326	0.364	0.391	0.440
2000	0.193	0.211	0.229	0.257	0.290	0.337	0.385	0.421	0.474
2001	0.157	0.177	0.189	0.215	0.251	0.294	0.342	0.377	0.450
2002	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
2003	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
2004	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
2005	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
2006	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
2007	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
2008	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
2009	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
2010	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.320

YEAR	Pr(F > Threshold Value)
1998	0.570
1999	0.275
2000	0.328
2001	0.153
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

## 7.12 Georges Bank winter flounder

### Landings, survey indices and surplus production results

Year	Landings (k mt)	NEFSC Autumn Survey (kg/tow)	Fishing mortality	Yield (k mt)	Total Biomass (k mt)	Year	Total Biomass (k mt)	Yield (k mt)
1963		1.82	0.000	0.000	18.760	1964	6.019	1.517
1964	1.517	1.82	0.032	0.574	17.822	1965	7.161	1.687
1965	1.687	2.05	0.064	1.087	16.884	1966	8.128	2.197
1966	2.197	5.66	0.097	1.540	15.946	1967	8.843	2.349
1967	2.349	2.07	0.129	1.933	15.008	1968	9.685	2.001
1968	1.999	1.07	0.161	2.265	14.070	1969	10.420	2.518
1969	2.518	2.39	0.193	2.537	13.132	1970	10.760	2.719
1970	2.716	6.49	0.225	2.748	12.194	1971	10.230	4.183
1971	4.183	1.26	0.258	2.899	11.256	1972	8.867	4.512
1972	4.512	1.58	0.290	2.990	10.318	1973	8.169	2.976
1973	2.976	1.20	0.322	3.020	9.380	1974	8.568	2.218
1974	2.218	1.46	0.354	2.990	8.442	1975	8.985	2.937
1975	2.937	2.06	0.386	2.899	7.504	1976	9.604	1.889
1976	1.893	3.93	0.419	2.748	6.566	1977	9.837	3.594
1977	3.594	3.99	0.451	2.537	5.628	1978	9.443	3.250
1978	3.250	3.10	0.483	2.265	4.690	1979	9.311	3.064
1979	3.064	3.83	0.515	1.933	3.752	1980	8.772	3.975
1980	3.975	1.87	0.547	1.540	2.814	1981	7.739	4.012
1981	4.012	2.43	0.580	1.087	1.876	1982	7.165	2.980
1982	2.980	2.69	0.612	0.574	0.938	1983	6.471	3.911
1983	3.908	2.36	0.644	0.000	0.000	1984	5.079	3.933
1984	3.931	2.45				1985	4.358	2.165
1985	2.163	1.12				1986	4.574	1.788
1986	1.787	2.18				1987	4.556	2.671
1987	2.669	0.89				1988	3.871	2.861
1988	2.859	1.27				1989	3.406	1.892
1989	1.891	1.05				1990	3.242	1.954
1990	1.953	0.35				1991	3.032	1.830
1991	1.828	0.14				1992	2.766	1.850
1992	1.849	0.38				1993	2.443	1.684
1993	1.683	0.66				1994	2.498	0.972
1994	0.972	0.58				1995	3.163	0.760
1995	0.760	1.34				1996	3.983	1.336
1996	1.336	1.76				1997	4.751	1.430
1997	1.430	1.53				1998	5.797	1.335
1998	1.335	1.57				1999	7.331	1.042
1999	1.042	2.64				2000	8.843	1.839
2000	1.839	2.66						

# Georges Bank winter flounder projection F = Fmsy

12 Mar 2002 at 07:59.52

Georges Bank Winter Flounder (biomass and yield in k mt)  
Fmsy projection

Page 1  
Output from ASPIC-P.EXE

## USER CONTROL INFORMATION (FROM INPUT FILE)

Name of biomass (B10) file gbwint34.bio  
Name of output file (this file) gbwint\_1.prj  
Number of years of projections 14

CAUTION: ASPIC-P is designed for SHORT-TERM projections. Projections longer than 5 years are increasingly uncertain.

Year	Input data	User data type
2001	2.273E+00	TAC
2002	1.115E+00	F/F(2000)
2003	1.548E+00	F/F(2000)
2004	1.548E+00	F/F(2000)
2005	1.548E+00	F/F(2000)
2006	1.548E+00	F/F(2000)
2007	1.548E+00	F/F(2000)
2008	1.548E+00	F/F(2000)
2009	1.548E+00	F/F(2000)
2010	1.548E+00	F/F(2000)
2011	1.548E+00	F/F(2000)
2012	1.548E+00	F/F(2000)
2013	1.548E+00	F/F(2000)
2014	1.548E+00	F/F(2000)

## TRAJECTORY OF RELATIVE BIOMASS (BOOTSTRAPPED)

Year	Bias-corrected estimate	Ordinary estimate	Relative bias	Approx 80% lower CL	Approx 80% upper CL	Approx 50% lower CL	Approx 50% upper CL	Inter-quartile range	Relative IQ range
1964	5.812E-01	5.822E-01	0.17%	4.087E-01	9.058E-01	4.694E-01	7.282E-01	2.588E-01	0.445
1965	6.979E-01	7.007E-01	0.41%	4.823E-01	1.035E+00	5.650E-01	8.538E-01	2.888E-01	0.414
1966	8.181E-01	8.244E-01	0.77%	5.691E-01	1.148E+00	6.712E-01	9.952E-01	3.240E-01	0.396
1967	8.947E-01	9.062E-01	1.29%	6.145E-01	1.214E+00	7.264E-01	1.061E+00	3.348E-01	0.374
1968	9.741E-01	9.766E-01	0.26%	6.794E-01	1.286E+00	7.986E-01	1.140E+00	3.409E-01	0.350
1969	1.089E+00	1.085E+00	-0.40%	7.961E-01	1.372E+00	9.267E-01	1.246E+00	3.188E-01	0.293
1970	1.137E+00	1.134E+00	-0.30%	8.474E-01	1.378E+00	9.760E-01	1.276E+00	2.998E-01	0.264
1971	1.159E+00	1.159E+00	-0.01%	8.860E-01	1.353E+00	1.012E+00	1.275E+00	2.628E-01	0.227
1972	1.035E+00	1.032E+00	-0.30%	8.022E-01	1.185E+00	9.091E-01	1.124E+00	2.146E-01	0.207
1973	8.717E-01	8.713E-01	-0.05%	6.673E-01	9.925E-01	7.694E-01	9.485E-01	1.791E-01	0.205
1974	8.702E-01	8.707E-01	0.05%	6.579E-01	9.913E-01	7.642E-01	9.489E-01	1.847E-01	0.212
1975	9.551E-01	9.536E-01	-0.16%	7.368E-01	1.088E+00	8.390E-01	1.037E+00	1.985E-01	0.208
1976	9.625E-01	9.618E-01	-0.07%	7.473E-01	1.090E+00	8.487E-01	1.044E+00	1.956E-01	0.203
1977	1.093E+00	1.082E+00	-1.04%	8.785E-01	1.233E+00	9.849E-01	1.176E+00	1.906E-01	0.174
1978	1.029E+00	1.020E+00	-0.93%	8.425E-01	1.142E+00	9.372E-01	1.099E+00	1.613E-01	0.157
1979	1.004E+00	9.952E-01	-0.91%	8.289E-01	1.104E+00	9.186E-01	1.062E+00	1.431E-01	0.142
1980	1.005E+00	9.905E-01	-1.43%	8.584E-01	1.104E+00	9.312E-01	1.062E+00	1.306E-01	0.130
1981	8.951E-01	8.870E-01	-0.90%	7.748E-01	9.708E-01	8.366E-01	9.403E-01	1.037E-01	0.116
1982	7.755E-01	7.710E-01	-0.57%	6.684E-01	8.260E-01	7.274E-01	8.077E-01	8.023E-02	0.103
1983	7.638E-01	7.573E-01	-0.84%	6.738E-01	8.270E-01	7.206E-01	7.997E-01	7.912E-02	0.104
1984	6.321E-01	6.309E-01	-0.18%	5.554E-01	6.726E-01	5.991E-01	6.572E-01	5.804E-02	0.092
1985	4.685E-01	4.652E-01	-0.71%	4.301E-01	4.980E-01	4.478E-01	4.816E-01	2.716E-02	0.058
1986	4.662E-01	4.640E-01	-0.47%	4.221E-01	4.894E-01	4.448E-01	4.776E-01	2.833E-02	0.061
1987	5.102E-01	5.108E-01	0.11%	4.457E-01	5.373E-01	4.787E-01	5.274E-01	4.872E-02	0.095
1988	4.611E-01	4.628E-01	0.35%	4.010E-01	4.873E-01	4.315E-01	4.781E-01	4.656E-02	0.101
1989	3.678E-01	3.684E-01	0.17%	3.255E-01	3.861E-01	3.481E-01	3.764E-01	2.827E-02	0.077
1990	3.565E-01	3.581E-01	0.43%	3.138E-01	3.751E-01	3.371E-01	3.666E-01	2.951E-02	0.083
1991	3.326E-01	3.338E-01	0.36%	2.935E-01	3.549E-01	3.150E-01	3.425E-01	2.756E-02	0.083
1992	3.133E-01	3.132E-01	-0.02%	2.789E-01	3.591E-01	2.993E-01	3.332E-01	2.697E-02	0.086
1993	2.826E-01	2.779E-01	-1.66%	2.405E-01	3.464E-01	2.576E-01	3.118E-01	4.460E-02	0.158
1994	2.535E-01	2.442E-01	-3.67%	2.058E-01	3.418E-01	2.200E-01	2.955E-01	7.542E-02	0.298
1995	2.998E-01	2.892E-01	-3.55%	2.375E-01	4.121E-01	2.596E-01	3.530E-01	9.346E-02	0.312
1996	4.006E-01	3.884E-01	-3.04%	3.224E-01	5.374E-01	3.544E-01	4.645E-01	1.101E-01	0.275
1997	4.758E-01	4.612E-01	-3.06%	3.672E-01	6.480E-01	4.141E-01	5.537E-01	1.397E-01	0.294
1998	5.682E-01	5.521E-01	-2.83%	4.260E-01	7.903E-01	4.840E-01	6.550E-01	1.709E-01	0.301
1999	7.058E-01	6.843E-01	-3.05%	5.284E-01	1.017E+00	6.061E-01	8.498E-01	2.436E-01	0.345
2000	9.055E-01	8.788E-01	-2.96%	6.800E-01	1.242E+00	7.742E-01	1.090E+00	3.159E-01	0.349
2001	1.032E+00	1.003E+00	-2.81%	7.800E-01	1.368E+00	8.892E-01	1.238E+00	3.485E-01	0.338
2002	1.111E+00	1.082E+00	-2.59%	8.256E-01	1.387E+00	9.464E-01	1.276E+00	3.292E-01	0.296
2003	1.168E+00	1.142E+00	-2.25%	8.840E-01	1.429E+00	1.018E+00	1.333E+00	3.155E-01	0.270
2004	1.121E+00	1.099E+00	-2.01%	8.430E-01	1.356E+00	9.693E-01	1.277E+00	3.077E-01	0.274
2005	1.093E+00	1.070E+00	-2.14%	8.174E-01	1.323E+00	9.454E-01	1.239E+00	2.935E-01	0.268
2006	1.073E+00	1.050E+00	-2.22%	7.986E-01	1.297E+00	9.241E-01	1.219E+00	2.946E-01	0.274
2007	1.059E+00	1.036E+00	-2.21%	7.839E-01	1.285E+00	9.081E-01	1.207E+00	2.990E-01	0.282

2008	1.048E+00	1.026E+00	-2.10%	7.724E-01	1.278E+00	8.955E-01	1.195E+00	2.990E-01	0.285
2009	1.040E+00	1.018E+00	-2.08%	7.617E-01	1.273E+00	8.870E-01	1.191E+00	3.036E-01	0.292
2010	1.035E+00	1.013E+00	-2.11%	7.561E-01	1.271E+00	8.811E-01	1.188E+00	3.074E-01	0.297
2011	1.032E+00	1.010E+00	-2.15%	7.474E-01	1.269E+00	8.735E-01	1.187E+00	3.132E-01	0.304
2012	1.029E+00	1.007E+00	-2.18%	7.421E-01	1.268E+00	8.697E-01	1.186E+00	3.159E-01	0.307
2013	1.028E+00	1.005E+00	-2.23%	7.354E-01	1.264E+00	8.664E-01	1.184E+00	3.178E-01	0.309
2014	1.027E+00	1.004E+00	-2.25%	7.321E-01	1.263E+00	8.646E-01	1.184E+00	3.193E-01	0.311
2015	1.026E+00	1.003E+00	-2.23%	7.286E-01	1.263E+00	8.633E-01	1.184E+00	3.203E-01	0.312

NOTE: Printed BC confidence intervals are always approximate.  
At least 500 trials are recommended when estimating confidence intervals.

Georges Bank Winter Flounder (biomass and yield in k mt)  
Fmsy projection

Page 2  
Output from ASPIC-P.EXE

TRAJECTORY OF RELATIVE FISHING MORTALITY RATE (BOOTSTRAPPED)

Year	Bias-corrected estimate	Ordinary estimate	Relative bias	Approx 80% lower CL	Approx 80% upper CL	Approx 50% lower CL	Approx 50% upper CL	Inter-quartile range	Relative IQ range
1964	7.883E-01	7.828E-01	-0.70%	5.491E-01	1.036E+00	6.530E-01	9.288E-01	2.758E-01	0.350
1965	7.351E-01	7.317E-01	-0.45%	5.244E-01	9.706E-01	6.155E-01	8.644E-01	2.489E-01	0.339
1966	8.474E-01	8.395E-01	-0.93%	6.205E-01	1.115E+00	7.233E-01	9.924E-01	2.691E-01	0.318
1967	8.240E-01	8.251E-01	0.13%	6.333E-01	1.079E+00	7.095E-01	9.530E-01	2.434E-01	0.295
1968	6.359E-01	6.417E-01	0.90%	5.055E-01	8.183E-01	5.594E-01	7.331E-01	1.737E-01	0.273
1969	7.444E-01	7.508E-01	0.86%	6.168E-01	9.379E-01	6.694E-01	8.492E-01	1.799E-01	0.242
1970	7.748E-01	7.847E-01	1.28%	6.579E-01	9.336E-01	6.988E-01	8.556E-01	1.568E-01	0.202
1971	1.255E+00	1.270E+00	1.21%	1.100E+00	1.480E+00	1.153E+00	1.373E+00	2.195E-01	0.175
1972	1.567E+00	1.580E+00	0.87%	1.402E+00	1.860E+00	1.467E+00	1.724E+00	2.572E-01	0.164
1973	1.123E+00	1.131E+00	0.78%	1.002E+00	1.346E+00	1.049E+00	1.225E+00	1.764E-01	0.157
1974	7.962E-01	8.040E-01	0.97%	7.109E-01	9.500E-01	7.398E-01	8.675E-01	1.277E-01	0.160
1975	9.978E-01	1.015E+00	1.75%	8.891E-01	1.182E+00	9.319E-01	1.090E+00	1.585E-01	0.159
1976	5.969E-01	6.109E-01	2.34%	5.270E-01	6.974E-01	5.549E-01	6.502E-01	5.533E-02	0.160
1977	1.112E+00	1.135E+00	2.05%	9.822E-01	1.286E+00	1.038E+00	1.200E+00	1.612E-01	0.145
1978	1.049E+00	1.069E+00	1.94%	9.383E-01	1.195E+00	9.838E-01	1.123E+00	1.395E-01	0.133
1979	1.005E+00	1.022E+00	1.68%	9.015E-01	1.137E+00	9.441E-01	1.068E+00	1.238E-01	0.123
1980	1.389E+00	1.407E+00	1.32%	1.255E+00	1.561E+00	1.307E+00	1.464E+00	1.573E-01	0.113
1981	1.593E+00	1.610E+00	1.07%	1.463E+00	1.760E+00	1.512E+00	1.665E+00	1.528E-01	0.096
1982	1.281E+00	1.292E+00	0.81%	1.173E+00	1.401E+00	1.212E+00	1.332E+00	1.200E-01	0.094
1983	1.868E+00	1.877E+00	0.52%	1.719E+00	2.037E+00	1.781E+00	1.943E+00	1.618E-01	0.087
1984	2.392E+00	2.405E+00	0.55%	2.284E+00	2.544E+00	2.327E+00	2.460E+00	1.145E-01	0.048
1985	1.539E+00	1.543E+00	0.26%	1.482E+00	1.595E+00	1.504E+00	1.564E+00	3.741E-02	0.024
1986	1.208E+00	1.214E+00	0.49%	1.165E+00	1.271E+00	1.182E+00	1.236E+00	5.406E-02	0.045
1987	1.817E+00	1.821E+00	0.22%	1.710E+00	1.934E+00	1.759E+00	1.869E+00	1.101E-01	0.061
1988	2.294E+00	2.295E+00	0.06%	2.201E+00	2.397E+00	2.242E+00	2.340E+00	9.811E-02	0.043
1989	1.728E+00	1.725E+00	-0.16%	1.678E+00	1.791E+00	1.701E+00	1.759E+00	5.740E-02	0.033
1990	1.878E+00	1.872E+00	-0.29%	1.813E+00	1.944E+00	1.843E+00	1.910E+00	6.691E-02	0.036
1991	1.881E+00	1.875E+00	-0.36%	1.769E+00	1.949E+00	1.829E+00	1.921E+00	7.712E-02	0.041
1992	2.076E+00	2.077E+00	0.03%	1.858E+00	2.223E+00	1.960E+00	2.168E+00	1.274E-01	0.061
1993	2.113E+00	2.141E+00	1.32%	1.754E+00	2.336E+00	1.919E+00	2.255E+00	3.364E-01	0.159
1994	1.187E+00	1.208E+00	1.78%	9.364E-01	1.392E+00	1.047E+00	1.312E+00	2.649E-01	0.223
1995	7.379E-01	7.462E-01	1.13%	5.877E-01	8.761E-01	6.639E-01	8.185E-01	1.546E-01	0.209
1996	1.017E+00	1.042E+00	2.45%	7.904E-01	1.236E+00	9.131E-01	1.137E+00	2.237E-01	0.220
1997	9.135E-01	9.349E-01	2.34%	6.824E-01	1.143E+00	8.033E-01	1.043E+00	2.400E-01	0.263
1998	6.981E-01	7.153E-01	2.47%	4.906E-01	9.034E-01	5.938E-01	8.067E-01	2.129E-01	0.305
1999	4.294E-01	4.415E-01	2.82%	3.110E-01	5.665E-01	3.587E-01	5.034E-01	1.447E-01	0.337
2000	6.312E-01	6.459E-01	2.33%	4.763E-01	8.332E-01	5.307E-01	7.396E-01	2.088E-01	0.331
2001	7.102E-01	7.207E-01	1.48%	5.603E-01	9.666E-01	6.115E-01	8.405E-01	2.289E-01	0.322
2002	7.038E-01	7.202E-01	2.33%	5.311E-01	9.290E-01	5.918E-01	8.246E-01	2.329E-01	0.331
2003	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2004	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2005	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2006	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2007	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2008	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2009	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2010	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2011	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2012	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2013	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331
2014	9.771E-01	9.999E-01	2.33%	7.373E-01	1.290E+00	8.216E-01	1.145E+00	3.233E-01	0.331

TABLE OF PROJECTED YIELDS

2001	2.273E+00	2.273E+00	0.00%	2.273E+00	2.273E+00	2.273E+00	2.273E+00	0.000E+00	0.000
2002	2.453E+00	2.421E+00	-1.28%	2.272E+00	2.577E+00	2.352E+00	2.529E+00	1.769E-01	0.072
2003	3.426E+00	3.378E+00	-1.38%	3.156E+00	3.642E+00	3.277E+00	3.548E+00	2.707E-01	0.079
2004	3.322E+00	3.271E+00	-1.53%	3.069E+00	3.578E+00	3.195E+00	3.452E+00	2.569E-01	0.077
2005	3.259E+00	3.198E+00	-1.88%	3.027E+00	3.565E+00	3.135E+00	3.401E+00	2.657E-01	0.082
2006	3.212E+00	3.147E+00	-2.04%	2.991E+00	3.553E+00	3.094E+00	3.368E+00	2.739E-01	0.085
2007	3.180E+00	3.111E+00	-2.17%	2.973E+00	3.587E+00	3.081E+00	3.373E+00	2.920E-01	0.092
2008	3.158E+00	3.085E+00	-2.31%	2.961E+00	3.604E+00	3.063E+00	3.373E+00	3.091E-01	0.098
2009	3.145E+00	3.067E+00	-2.47%	2.952E+00	3.637E+00	3.050E+00	3.393E+00	3.431E-01	0.109
2010	3.133E+00	3.054E+00	-2.51%	2.935E+00	3.631E+00	3.029E+00	3.380E+00	3.508E-01	0.112
2011	3.123E+00	3.044E+00	-2.52%	2.924E+00	3.627E+00	3.018E+00	3.376E+00	3.576E-01	0.115
2012	3.119E+00	3.038E+00	-2.60%	2.911E+00	3.584E+00	3.005E+00	3.358E+00	3.531E-01	0.113
2013	3.114E+00	3.033E+00	-2.60%	2.902E+00	3.582E+00	3.000E+00	3.353E+00	3.533E-01	0.113
2014	3.111E+00	3.029E+00	-2.62%	2.901E+00	3.581E+00	2.997E+00	3.349E+00	3.521E-01	0.113

NOTE: Printed BC confidence intervals are always approximate.  
At least 500 trials are recommended when estimating confidence intervals.

Georges Bank Winter Flounder (biomass and yield in k mt)  
Fmsy projection

Page 3  
Output from ASPIC-P.EXE

TRAJECTORY OF ABSOLUTE BIOMASS (BOOTSTRAPPED)

Year	Bias-corrected estimate	Ordinary estimate	Relative bias	Approx 80% lower CL	Approx 80% upper CL	Approx 50% lower CL	Approx 50% upper CL	Inter-quartile range	Relative IQ range
1964	5.677E+00	5.461E+00	-3.80%	3.907E+00	1.091E+01	4.486E+00	8.074E+00	3.588E+00	0.632
1965	6.675E+00	6.573E+00	-1.54%	4.691E+00	1.192E+01	5.401E+00	9.114E+00	3.712E+00	0.556
1966	7.802E+00	7.733E+00	-0.89%	5.687E+00	1.304E+01	6.464E+00	1.030E+01	3.836E+00	0.492
1967	8.617E+00	8.500E+00	-1.36%	6.317E+00	1.370E+01	7.158E+00	1.094E+01	3.786E+00	0.439
1968	9.347E+00	9.160E+00	-2.00%	7.009E+00	1.423E+01	7.976E+00	1.182E+01	3.846E+00	0.412
1969	1.053E+01	1.017E+01	-3.41%	8.174E+00	1.550E+01	9.156E+00	1.279E+01	3.635E+00	0.345
1970	1.113E+01	1.064E+01	-4.45%	8.789E+00	1.572E+01	9.641E+00	1.315E+01	3.506E+00	0.315
1971	1.137E+01	1.087E+01	-4.35%	9.205E+00	1.705E+01	1.002E+01	1.342E+01	3.402E+00	0.299
1972	1.012E+01	9.680E+00	-4.31%	8.144E+00	1.584E+01	8.878E+00	1.228E+01	3.398E+00	0.336
1973	8.609E+00	8.173E+00	-5.07%	6.683E+00	1.419E+01	7.410E+00	1.080E+01	3.392E+00	0.394
1974	8.595E+00	8.166E+00	-4.98%	6.692E+00	1.399E+01	7.413E+00	1.067E+01	3.254E+00	0.379
1975	9.367E+00	8.944E+00	-4.51%	7.511E+00	1.463E+01	8.218E+00	1.146E+01	3.246E+00	0.347
1976	9.455E+00	9.022E+00	-4.59%	7.646E+00	1.454E+01	8.344E+00	1.144E+01	3.099E+00	0.328
1977	1.057E+01	1.015E+01	-3.96%	8.872E+00	1.552E+01	9.516E+00	1.265E+01	3.137E+00	0.297
1978	9.944E+00	9.565E+00	-3.81%	8.370E+00	1.471E+01	8.953E+00	1.197E+01	3.014E+00	0.303
1979	9.665E+00	9.335E+00	-3.42%	8.190E+00	1.372E+01	8.715E+00	1.144E+01	2.723E+00	0.282
1980	9.576E+00	9.290E+00	-2.98%	8.201E+00	1.333E+01	8.716E+00	1.105E+01	2.334E+00	0.244
1981	8.556E+00	8.320E+00	-2.75%	7.267E+00	1.197E+01	7.824E+00	9.921E+00	2.097E+00	0.245
1982	7.414E+00	7.232E+00	-2.46%	6.269E+00	1.050E+01	6.779E+00	8.687E+00	1.907E+00	0.257
1983	7.246E+00	7.104E+00	-1.96%	6.189E+00	1.005E+01	6.662E+00	8.389E+00	1.728E+00	0.238
1984	6.024E+00	5.918E+00	-1.76%	5.050E+00	8.197E+00	5.495E+00	6.969E+00	1.474E+00	0.245
1985	4.454E+00	4.363E+00	-2.03%	3.555E+00	6.574E+00	3.977E+00	5.411E+00	1.433E+00	0.322
1986	4.437E+00	4.352E+00	-1.90%	3.564E+00	6.484E+00	3.982E+00	5.365E+00	1.383E+00	0.312
1987	4.869E+00	4.791E+00	-1.60%	4.052E+00	6.795E+00	4.447E+00	5.740E+00	1.293E+00	0.265
1988	4.409E+00	4.341E+00	-1.54%	3.621E+00	6.029E+00	3.999E+00	5.118E+00	1.120E+00	0.254
1989	3.515E+00	3.456E+00	-1.68%	2.779E+00	5.071E+00	3.139E+00	4.139E+00	1.000E+00	0.285
1990	3.425E+00	3.359E+00	-1.93%	2.739E+00	4.967E+00	3.069E+00	4.090E+00	1.022E+00	0.298
1991	3.198E+00	3.131E+00	-2.09%	2.534E+00	4.738E+00	2.848E+00	3.853E+00	1.004E+00	0.314
1992	2.987E+00	2.938E+00	-1.63%	2.331E+00	4.519E+00	2.652E+00	3.636E+00	9.841E-01	0.329
1993	2.662E+00	2.606E+00	-2.10%	2.007E+00	4.370E+00	2.326E+00	3.377E+00	1.051E+00	0.395
1994	2.363E+00	2.290E+00	-3.07%	1.636E+00	4.430E+00	1.978E+00	3.238E+00	1.261E+00	0.534
1995	2.824E+00	2.712E+00	-3.96%	1.922E+00	5.042E+00	2.298E+00	3.811E+00	1.513E+00	0.536
1996	3.748E+00	3.643E+00	-2.79%	2.741E+00	6.383E+00	3.165E+00	4.934E+00	1.770E+00	0.472
1997	4.414E+00	4.326E+00	-2.00%	3.239E+00	6.863E+00	3.649E+00	5.532E+00	1.883E+00	0.427
1998	5.191E+00	5.178E+00	-0.25%	3.850E+00	7.766E+00	4.348E+00	6.393E+00	2.045E+00	0.394
1999	6.363E+00	6.418E+00	0.87%	4.673E+00	8.645E+00	5.329E+00	7.446E+00	2.118E+00	0.333
2000	8.205E+00	8.242E+00	0.46%	6.299E+00	1.047E+01	7.154E+00	9.419E+00	2.265E+00	0.276
2001	9.409E+00	9.410E+00	0.00%	7.441E+00	1.162E+01	8.310E+00	1.055E+01	2.243E+00	0.238
2002	1.025E+01	1.015E+01	-0.95%	8.367E+00	1.264E+01	9.268E+00	1.150E+01	2.236E+00	0.218
2003	1.090E+01	1.071E+01	-1.76%	8.930E+00	1.344E+01	9.782E+00	1.208E+01	2.302E+00	0.211
2004	1.050E+01	1.031E+01	-1.85%	8.470E+00	1.306E+01	9.340E+00	1.172E+01	2.381E+00	0.227
2005	1.026E+01	1.003E+01	-2.24%	8.205E+00	1.286E+01	9.070E+00	1.149E+01	2.418E+00	0.236
2006	1.009E+01	9.845E+00	-2.43%	8.038E+00	1.274E+01	8.956E+00	1.134E+01	2.386E+00	0.236
2007	9.971E+00	9.713E+00	-2.59%	7.943E+00	1.257E+01	8.830E+00	1.124E+01	2.413E+00	0.242
2008	9.865E+00	9.619E+00	-2.49%	7.849E+00	1.252E+01	8.789E+00	1.116E+01	2.368E+00	0.240
2009	9.795E+00	9.552E+00	-2.48%	7.742E+00	1.244E+01	8.706E+00	1.110E+01	2.398E+00	0.245
2010	9.736E+00	9.504E+00	-2.38%	7.679E+00	1.238E+01	8.665E+00	1.107E+01	2.405E+00	0.247
2011	9.707E+00	9.470E+00	-2.44%	7.637E+00	1.250E+01	8.668E+00	1.107E+01	2.399E+00	0.247
2012	9.685E+00	9.445E+00	-2.48%	7.599E+00	1.246E+01	8.689E+00	1.108E+01	2.393E+00	0.247
2013	9.665E+00	9.427E+00	-2.46%	7.569E+00	1.248E+01	8.671E+00	1.105E+01	2.378E+00	0.246
2014	9.643E+00	9.414E+00	-2.37%	7.561E+00	1.247E+01	8.647E+00	1.104E+01	2.398E+00	0.249
2015	9.635E+00	9.405E+00	-2.39%	7.557E+00	1.246E+01	8.647E+00	1.103E+01	2.381E+00	0.247

NOTE: Printed BC confidence intervals are always approximate.

At least 500 trials are recommended when estimating confidence intervals.

Georges Bank Winter Flounder (biomass and yield in k mt)  
Fmsy projection

Page 4  
Output from ASPIC-P.EXE

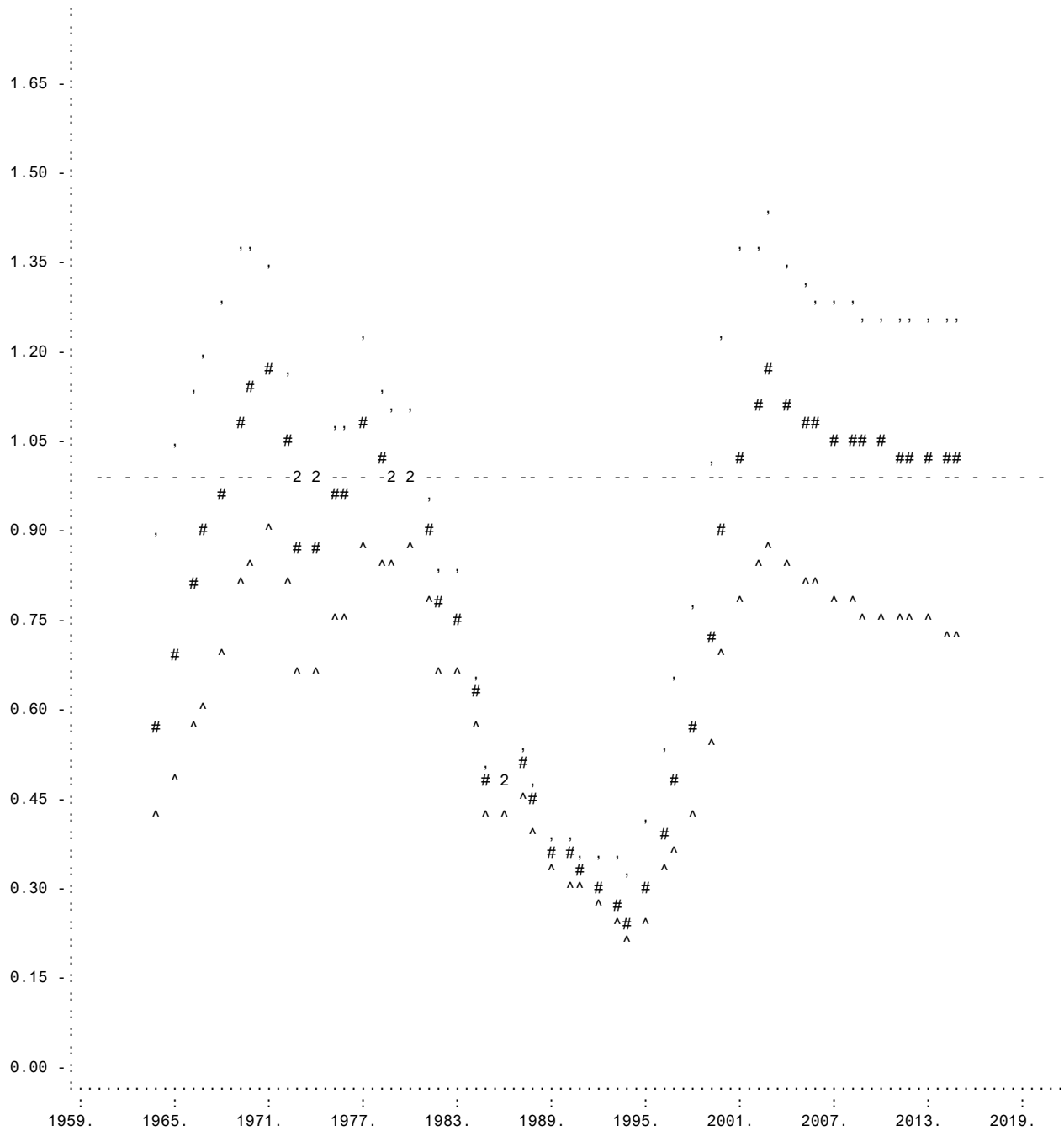
TRAJECTORY OF ABSOLUTE FISHING MORTALITY RATE (BOOTSTRAPPED)

Year	Bias-corrected estimate	Ordinary estimate	Relative bias	Approx 80% lower CL	Approx 80% upper CL	Approx 50% lower CL	Approx 50% upper CL	Inter-quartile range	Relative IQ range
1964	2.439E-01	2.520E-01	3.35%	1.327E-01	3.538E-01	1.768E-01	3.068E-01	1.301E-01	0.533
1965	2.333E-01	2.356E-01	0.97%	1.384E-01	3.241E-01	1.743E-01	2.849E-01	1.106E-01	0.474
1966	2.670E-01	2.703E-01	1.23%	1.679E-01	3.654E-01	2.074E-01	3.240E-01	1.166E-01	0.437
1967	2.610E-01	2.656E-01	1.78%	1.685E-01	3.521E-01	2.071E-01	3.107E-01	1.036E-01	0.397
1968	2.006E-01	2.066E-01	3.01%	1.344E-01	2.620E-01	1.619E-01	2.321E-01	7.019E-02	0.350
1969	2.317E-01	2.417E-01	4.31%	1.613E-01	2.964E-01	1.941E-01	2.671E-01	7.307E-02	0.315
1970	2.399E-01	2.527E-01	5.32%	1.600E-01	3.013E-01	2.035E-01	2.765E-01	7.297E-02	0.304
1971	3.903E-01	4.089E-01	4.78%	2.542E-01	4.839E-01	3.247E-01	4.451E-01	1.205E-01	0.309
1972	4.820E-01	5.088E-01	5.57%	2.979E-01	6.141E-01	3.904E-01	5.578E-01	1.675E-01	0.347
1973	3.438E-01	3.643E-01	5.96%	2.107E-01	4.446E-01	2.773E-01	4.020E-01	1.247E-01	0.363
1974	2.454E-01	2.589E-01	5.47%	1.547E-01	3.117E-01	2.013E-01	2.835E-01	8.228E-02	0.335
1975	3.111E-01	3.269E-01	5.08%	2.014E-01	3.876E-01	2.576E-01	3.551E-01	9.752E-02	0.313
1976	1.874E-01	1.967E-01	4.96%	1.246E-01	2.279E-01	1.563E-01	2.104E-01	5.417E-02	0.289
1977	3.498E-01	3.654E-01	4.44%	2.375E-01	4.179E-01	2.932E-01	3.903E-01	9.703E-02	0.277
1978	3.313E-01	3.442E-01	3.89%	2.277E-01	3.930E-01	2.804E-01	3.685E-01	8.813E-02	0.266
1979	3.176E-01	3.291E-01	3.61%	2.252E-01	3.739E-01	2.735E-01	3.514E-01	7.790E-02	0.245
1980	4.400E-01	4.532E-01	2.99%	3.136E-01	5.158E-01	3.799E-01	4.824E-01	1.025E-01	0.233
1981	5.034E-01	5.184E-01	2.98%	3.594E-01	5.960E-01	4.338E-01	5.539E-01	1.201E-01	0.238
1982	4.064E-01	4.159E-01	2.34%	2.911E-01	4.794E-01	3.511E-01	4.452E-01	9.408E-02	0.232
1983	5.933E-01	6.044E-01	1.88%	4.388E-01	7.042E-01	5.162E-01	6.489E-01	1.327E-01	0.224
1984	7.588E-01	7.744E-01	2.06%	5.383E-01	9.319E-01	6.436E-01	8.433E-01	1.998E-01	0.263
1985	4.867E-01	4.968E-01	2.09%	3.317E-01	6.083E-01	4.019E-01	5.455E-01	1.437E-01	0.295
1986	3.841E-01	3.909E-01	1.79%	2.693E-01	4.692E-01	3.219E-01	4.251E-01	1.032E-01	0.269
1987	5.763E-01	5.863E-01	1.72%	4.207E-01	6.964E-01	4.963E-01	6.351E-01	1.388E-01	0.241
1988	7.271E-01	7.390E-01	1.63%	5.147E-01	9.000E-01	6.230E-01	8.076E-01	1.846E-01	0.254
1989	5.449E-01	5.555E-01	1.94%	3.769E-01	6.896E-01	4.631E-01	6.115E-01	1.484E-01	0.272
1990	5.896E-01	6.028E-01	2.24%	4.036E-01	7.430E-01	4.944E-01	6.625E-01	1.681E-01	0.285
1991	5.915E-01	6.036E-01	2.04%	3.931E-01	7.508E-01	4.889E-01	6.651E-01	1.762E-01	0.298
1992	6.549E-01	6.688E-01	2.11%	4.115E-01	8.469E-01	5.280E-01	7.452E-01	2.172E-01	0.332
1993	6.700E-01	6.894E-01	2.90%	3.814E-01	9.201E-01	5.032E-01	7.834E-01	2.802E-01	0.418
1994	3.752E-01	3.891E-01	3.69%	2.101E-01	5.454E-01	2.792E-01	4.604E-01	1.812E-01	0.483
1995	2.324E-01	2.403E-01	3.36%	1.355E-01	3.285E-01	1.727E-01	2.804E-01	1.077E-01	0.463
1996	3.266E-01	3.355E-01	2.71%	2.022E-01	4.395E-01	2.535E-01	3.908E-01	1.373E-01	0.420
1997	2.984E-01	3.010E-01	0.88%	1.974E-01	4.030E-01	2.401E-01	3.587E-01	1.187E-01	0.398
1998	2.308E-01	2.303E-01	-0.22%	1.624E-01	3.159E-01	1.946E-01	2.764E-01	8.185E-02	0.355
1999	1.433E-01	1.421E-01	-0.79%	1.092E-01	1.899E-01	1.234E-01	1.674E-01	4.397E-02	0.307
2000	2.084E-01	2.080E-01	-0.19%	1.665E-01	2.662E-01	1.839E-01	2.374E-01	5.351E-02	0.257
2001	2.314E-01	2.320E-01	0.29%	1.892E-01	2.888E-01	2.073E-01	2.590E-01	5.164E-02	0.223
2002	2.323E-01	2.319E-01	-0.19%	1.857E-01	2.968E-01	2.050E-01	2.647E-01	5.967E-02	0.257
2003	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2004	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2005	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2006	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2007	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2008	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2009	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2010	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2011	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2012	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2013	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257
2014	3.226E-01	3.219E-01	-0.19%	2.578E-01	4.120E-01	2.847E-01	3.675E-01	8.284E-02	0.257

NOTE: Printed BC confidence intervals are always approximate.  
At least 500 trials are recommended when estimating confidence intervals.

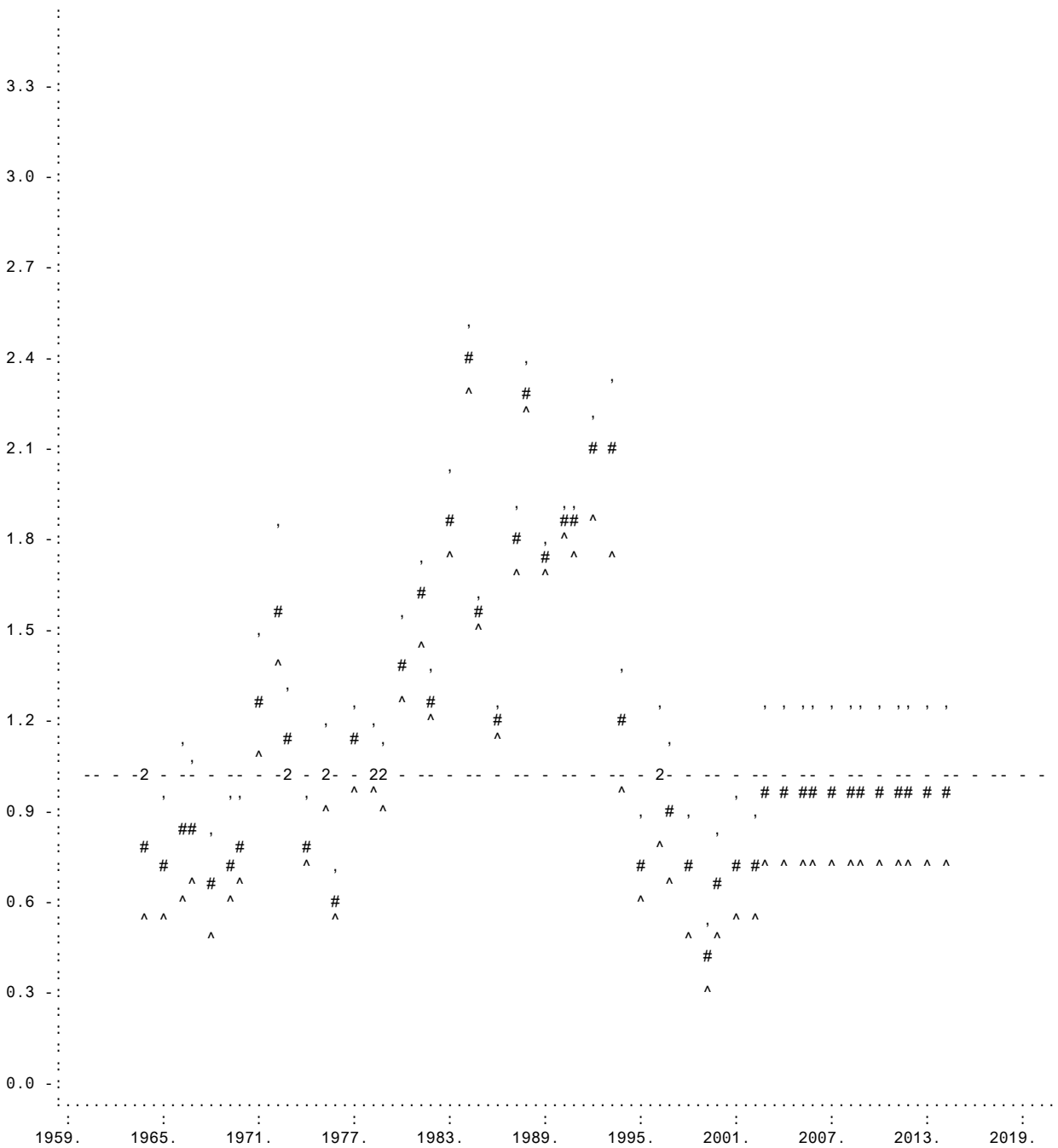


Bias-Corrected Time Plot of B-Ratio (#) with Approximate 80% Confidence Interval (^,)  
 (Dashed reference line is 1.0)



NOTE: Estimates beginning in 2002 depend on the user projection data listed on page 1.

Bias-Corrected Time Plot of F-Ratio (#) with Approximate 80% Confidence Interval (^,)  
 (Dashed reference line is 1.0)



NOTE: Estimates beginning in 2001 depend on the user projection data listed on page 1.

## 7.13 Acadian redfish

### Landings, survey indices, and stock-recruitment

Year	Landings (k mt)	NEFSC Autumn Survey kg/tow	NEFSC Spring Survey kg/tow	Year class	Spawning biomass (k mt)	Recruitment Age 1 (millions)
1934	0.519			1952	146.227	73.594
1935	7.549			1953	140.210	78.185
1936	23.162			1954	132.628	70.600
1937	14.823			1955	133.064	62.127
1938	20.640			1956	131.622	66.089
1939	25.406			1957	125.093	69.981
1940	26.762			1958	118.210	49.945
1941	50.796			1959	116.975	70.402
1942	55.892			1960	115.097	42.673
1943	48.348			1961	114.117	85.298
1944	50.439			1962	112.289	48.289
1945	37.912			1963	111.691	98.136
1946	42.423			1964	112.862	76.867
1947	40.160			1965	115.730	33.821
1948	43.631			1966	120.214	7.819
1949	30.743			1967	122.824	4.329
1950	34.307			1968	125.994	2.627
1951	30.077			1969	131.025	2.792
1952	21.377			1970	130.185	4.217
1953	16.791			1971	124.696	249.227
1954	12.988			1972	114.010	6.505
1955	13.914			1973	101.277	2.533
1956	14.388			1974	90.998	1.904
1957	18.490			1975	85.068	1.701
1958	16.047			1976	82.873	1.560
1959	15.521			1977	81.922	2.200
1960	11.375			1978	76.359	52.759
1961	14.101			1979	68.060	2.475
1962	14.134			1980	54.391	2.804
1963	10.046	4.931		1981	44.329	10.179
1964	8.313	11.172		1982	35.772	21.235
1965	8.057	2.680		1983	30.366	8.664
1966	8.569	5.954		1984	27.902	20.031
1967	10.864	4.972		1985	25.299	11.193
1968	6.777	8.266	3.478	1986	24.343	5.091
1969	12.455	4.808	4.031	1987	23.733	4.368
1970	16.741	6.732	3.867	1988	24.131	28.989
1971	20.034	4.788	14.650	1989	25.499	51.392
1972	19.095	5.033	9.085	1990	27.888	8.733
1973	17.360	3.478	5.177	1991	29.372	35.717
1974	10.471	4.952	3.847	1992	30.571	327.489
1975	10.572	8.164	3.601	1993	32.548	73.332
1976	10.696	3.131	5.361	1994	35.919	35.005
1977	13.223	3.540	2.373	1995	40.315	22.434
1978	14.083	4.235	2.496	1996	47.654	24.948
1979	14.755	3.274	6.609	1997	62.684	32.173
1980	10.183	2.578	4.154	1998	81.943	34.470
1981	7.915	2.496	3.806	1999	100.488	29.245
1982	6.903	0.696	1.923			

Continued.

Year	Landings (k mt)	NEFSC Autumn Survey kg/tow	NEFSC Spring Survey kg/tow
1983	5.328	0.839	1.248
1984	4.793	0.798	0.552
1985	4.282	1.166	1.350
1986	2.929	1.637	0.655
1987	1.894	1.125	2.639
1988	1.177	1.289	0.675
1989	0.637	1.391	0.593
1990	0.601	2.496	1.391
1991	0.525	1.719	0.880
1992	0.849	1.656	2.183
1993	0.800	2.291	3.581
1994	0.440	1.215	0.802
1995	0.440	0.952	0.393
1996	0.322	6.268	2.433
1997	0.251	3.875	6.965
1998	0.320	6.490	1.604
1999	0.353	4.678	3.892
2000	0.319	5.361	11.460

# Acadian redfish projection F = Fmsy

Redfish Projection: F=FMSY

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2001
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25000
1948
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0.636 0.654 0.669 0.683 0.696 0.706 0.716 0.750
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1.0 1.0
  0.4
  14
  48
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76867000 33821100 7819450 4328840 2627460 2791680 4217410 249227000 6505090 2532910 1903790 1701060 1559610
2200200 52758500 2475350 2803740 10179000 21234900 8663740 20031300 11192500 5091330 4367510 28989400
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red.dat
  1000.000
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1 1 1 1
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  -1 0.003 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04
```

```
=====
PROJECTION RUN: Redfish Projection: F=FMSY
INPUT FILE: redf_fmsy.in
OUTPUT FILE: redf_fmsy.out
RECRUITMENT MODEL: 14
NUMBER OF SIMULATIONS: 25000
```

```
MIXTURE OF F AND QUOTA BASED LANDINGS
YEAR   F           QUOTA (THOUSAND MT)
2001           0.328
2002  0.003
2003  0.040
2004  0.040
2005  0.040
2006  0.040
2007  0.040
2008  0.040
2009  0.040
2010  0.040
```

SPAWNING STOCK BIOMASS (THOUSAND MT)

YEAR	AVG SSB (000 MT)	STD
2001	119.590	0.000
2002	130.217	0.005
2003	138.498	0.019
2004	143.697	0.130
2005	149.419	0.630
2006	152.171	2.149
2007	150.927	4.735
2008	153.192	7.567
2009	155.900	10.730
2010	155.571	13.329

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	119.590	119.590	119.590	119.590	119.590	119.590	119.590	119.590	119.590
2002	130.213	130.213	130.213	130.213	130.216	130.219	130.220	130.222	130.241
2003	138.480	138.481	138.482	138.485	138.493	138.506	138.514	138.522	138.590
2004	143.582	143.586	143.592	143.608	143.668	143.757	143.798	143.844	144.344
2005	148.838	148.861	148.893	148.996	149.268	149.696	149.919	150.170	152.520
2006	150.051	150.162	150.298	150.764	151.642	153.059	153.956	155.022	162.479
2007	145.722	146.113	146.543	147.858	149.850	152.604	155.222	159.260	171.896
2008	143.865	144.865	145.954	148.195	151.705	155.710	160.905	169.138	182.608
2009	141.592	143.707	145.329	148.873	153.701	159.573	168.425	178.862	194.620
2010	136.694	139.952	142.116	146.758	152.745	160.359	173.097	184.087	200.061

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 236.700 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 26

YEAR	AVG MEAN B (000 MT)	STD
2001	133.845	0.000
2002	148.385	0.096
2003	159.092	0.557
2004	165.634	1.543
2005	170.859	3.073
2006	174.895	5.087
2007	178.010	7.471
2008	180.313	10.071
2009	182.103	12.774
2010	183.408	15.446

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	133.845	133.845	133.845	133.845	133.845	133.845	133.845	133.845	133.845
2002	148.310	148.311	148.312	148.317	148.364	148.431	148.458	148.487	148.868
2003	158.596	158.608	158.633	158.715	158.963	159.349	159.525	159.735	161.855
2004	164.059	164.145	164.247	164.627	165.253	166.233	166.965	167.967	172.828
2005	167.356	167.653	167.994	168.864	170.190	171.919	173.735	176.570	184.070
2006	168.581	169.310	170.040	171.547	173.880	176.635	180.118	185.230	195.040
2007	168.131	169.569	170.692	173.119	176.507	180.581	186.422	193.685	205.739
2008	166.301	168.632	170.198	173.709	178.244	183.904	192.808	201.695	215.661
2009	163.602	166.946	169.112	173.576	179.445	186.902	199.047	209.010	224.821
2010	160.428	164.742	167.508	172.951	180.212	189.637	204.777	215.099	233.632

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000

2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 26

YEAR	AVG F_WT_B	STD
2001	0.002	0.000
2002	0.003	0.000
2003	0.038	0.000
2004	0.038	0.000
2005	0.038	0.001
2006	0.038	0.001
2007	0.038	0.001
2008	0.038	0.001
2009	0.038	0.001
2010	0.038	0.001

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 26

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
2002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
2003	0.037	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038
2004	0.036	0.037	0.038	0.038	0.038	0.038	0.038	0.038	0.038
2005	0.035	0.037	0.037	0.038	0.038	0.038	0.038	0.038	0.038
2006	0.035	0.036	0.037	0.037	0.038	0.038	0.039	0.039	0.039
2007	0.034	0.035	0.036	0.037	0.038	0.038	0.039	0.039	0.039
2008	0.034	0.035	0.036	0.037	0.038	0.038	0.039	0.039	0.039
2009	0.034	0.035	0.036	0.037	0.038	0.038	0.039	0.039	0.039
2010	0.034	0.035	0.036	0.037	0.038	0.038	0.039	0.039	0.039

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	134.590	0.000
2002	143.707	0.492
2003	154.018	1.064
2004	159.379	2.843
2005	165.854	5.093
2006	169.360	7.782
2007	168.556	10.366
2008	171.132	12.645
2009	174.024	15.154
2010	173.709	17.334

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	134.590	134.590	134.590	134.590	134.590	134.590	134.590	134.590	134.590
2002	143.324	143.328	143.333	143.357	143.599	143.942	144.078	144.231	146.185
2003	152.921	152.958	153.018	153.321	153.775	154.365	154.976	155.994	158.715
2004	156.315	156.570	156.827	157.522	158.732	160.491	161.857	163.681	172.547
2005	159.818	160.431	161.037	162.531	164.827	167.554	170.742	176.040	186.785
2006	159.390	160.642	161.811	164.268	167.780	171.993	177.715	185.649	198.847
2007	154.308	156.623	158.212	161.749	166.406	172.134	181.426	190.944	204.747
2008	152.799	156.099	158.259	162.704	168.468	175.803	188.338	197.921	212.619
2009	151.416	155.702	158.442	163.775	170.847	180.032	195.233	205.008	222.909
2010	147.158	152.426	155.649	161.807	170.075	181.231	198.180	208.180	228.581

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH BIRTH AVG

YEAR	RECRUITMENT	STD
2001	39941.332	49175.986
2002	40135.554	49764.562
2003	40185.207	50578.068
2004	40472.014	51145.564
2005	40235.343	50506.907
2006	40511.903	51210.247
2007	40261.901	50032.549
2008	39752.985	50105.780
2009	40137.511	49872.169
2010	40325.166	50249.909

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH BIRTH

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	1626.355	2004.832	2512.583	4949.103	29161.824	63388.402	77085.584	92300.691	287692.735
2002	1626.091	2012.191	2515.452	4971.040	29153.158	63206.554	77375.182	93693.871	285957.644
2003	1632.055	1949.845	2507.504	4910.452	29085.110	62745.875	77226.121	93915.627	288630.523
2004	1618.087	2004.339	2512.262	4945.270	29146.721	62693.983	77363.503	93623.533	294153.086
2005	1631.710	2018.273	2516.866	4926.497	29143.333	63306.917	77323.175	92432.351	291807.062
2006	1633.983	2039.265	2517.605	5061.809	29105.492	62788.295	77271.500	94339.685	292577.169
2007	1628.215	2036.302	2523.187	4918.460	29149.628	63296.591	77162.818	93493.172	289261.482
2008	1621.529	1962.670	2507.430	4737.178	29038.715	62400.175	77219.355	93079.943	292270.364
2009	1623.206	2024.874	2515.438	4891.887	29155.059	62833.336	77152.367	92970.535	286482.584
2010	1639.514	2045.800	2523.701	5016.588	29156.401	63072.089	77260.132	94017.013	288831.536

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2001	0.328	0.000
2002	0.415	0.000
2003	6.012	0.000
2004	6.266	0.001
2005	6.446	0.006
2006	6.577	0.037
2007	6.685	0.120
2008	6.764	0.214
2009	6.820	0.325
2010	6.872	0.473

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328
2002	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415
2003	6.012	6.012	6.012	6.012	6.012	6.012	6.012	6.012	6.012
2004	6.266	6.266	6.266	6.266	6.266	6.267	6.267	6.267	6.270
2005	6.441	6.441	6.442	6.442	6.445	6.449	6.451	6.453	6.476
2006	6.545	6.546	6.547	6.552	6.569	6.594	6.606	6.619	6.760
2007	6.567	6.573	6.580	6.607	6.656	6.734	6.786	6.849	7.256
2008	6.517	6.538	6.562	6.625	6.721	6.833	6.967	7.200	7.645
2009	6.406	6.457	6.506	6.607	6.754	6.929	7.173	7.509	8.047
2010	6.236	6.334	6.406	6.561	6.775	7.038	7.426	7.857	8.613



REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.003	0.000
2002	0.003	0.000
2003	0.040	0.000
2004	0.040	0.000
2005	0.040	0.000
2006	0.040	0.000
2007	0.040	0.000
2008	0.040	0.000
2009	0.040	0.000
2010	0.040	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
2002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
2003	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2004	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2005	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2006	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2007	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2008	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2009	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2010	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.040

YEAR	Pr(F > Threshold Value)
2001	0.000
2002	0.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

# Acadian redfish projection F = F rebuild

Redfish Projection: F=Frebuild

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  10
25000
1948
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  0
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  0
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0.548 0.558 0.565 0.581 0.595 0.583 0.582 0.637
0.002 0.012 0.033 0.064 0.103 0.148 0.196 0.246 0.295 0.343 0.388 0.430 0.469 0.505 0.537 0.566 0.592 0.615
0.636 0.654 0.669 0.683 0.696 0.706 0.716 0.750
0.01 0.02 0.05 0.15 0.36 0.64 0.85 0.95 0.98 0.99 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
1.0 1.0
0.4
14
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76867000 33821100 7819450 4328840 2627460 2791680 4217410 249227000 6505090 2532910 1903790 1701060 1559610
2200200 52758500 2475350 2803740 10179000 21234900 8663740 20031300 11192500 5091330 4367510 28989400
51391700 87333350 35716500 327489000 73331800 35004700 22433700 24948100 32172600 34470300 29245000
1
red.dat
1000.000
236700000 0 0.04 0 0
0.000435309 0.00224363 0.0114563 0.0549092 0.225537 0.525062 0.65931 0.783106 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1
1 0 0 0 0 0 0 0 0
327700 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 0.003 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

```

```

=====
PROJECTION RUN: Redfish Projection: F=Frebuild
INPUT FILE: redf_frebuild.in
OUTPUT FILE: redf_frebuild.out
RECRUITMENT MODEL: 14
NUMBER OF SIMULATIONS: 25000

```

```

MIXTURE OF F AND QUOTA BASED LANDINGS
YEAR   F           QUOTA (THOUSAND MT)
2001           0.328
2002  0.003
2003  0.000
2004  0.000
2005  0.000
2006  0.000
2007  0.000
2008  0.000
2009  0.000
2010  0.000

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SPAWNING STOCK BIOMASS (THOUSAND MT)
YEAR   AVG SSB (000 MT)   STD
2001   119.590           0.000
2002   130.217           0.005
2003   140.655           0.019

```

2004	151.321	0.130
2005	163.048	0.631
2006	171.677	2.162
2007	175.720	4.817
2008	183.900	7.822
2009	192.673	11.308
2010	197.410	14.317

PERCENTILES OF SPAWNING STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	119.590	119.590	119.590	119.590	119.590	119.590	119.590	119.590	119.590
2002	130.213	130.213	130.213	130.213	130.216	130.219	130.220	130.222	130.241
2003	140.638	140.638	140.639	140.643	140.651	140.663	140.671	140.679	140.748
2004	151.206	151.210	151.216	151.232	151.292	151.381	151.422	151.468	151.968
2005	162.466	162.489	162.521	162.624	162.897	163.325	163.549	163.800	166.153
2006	169.546	169.658	169.794	170.262	171.145	172.572	173.471	174.541	182.052
2007	170.440	170.835	171.267	172.598	174.621	177.434	180.079	184.114	197.109
2008	174.303	175.321	176.440	178.740	182.368	186.515	191.813	200.226	214.587
2009	177.701	179.864	181.571	185.286	190.358	196.534	205.606	216.597	234.012
2010	177.250	180.688	182.993	187.977	194.403	202.492	215.985	228.142	245.607

ANNUAL PROBABILITY THAT SSB EXCEEDS THRESHOLD: 236.700 THOUSAND MT

YEAR	Pr(SSB > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.007
2010	0.025

MEAN BIOMASS (THOUSAND MT) FOR AGES:1 TO 26

YEAR	AVG MEAN B (000 MT)	STD
2001	133.845	0.000
2002	148.385	0.096
2003	162.092	0.557
2004	174.825	1.544
2005	186.681	3.077
2006	197.380	5.112
2007	207.278	7.578
2008	216.364	10.360
2009	224.837	13.374
2010	232.575	16.508

PERCENTILES OF MEAN STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	133.845	133.845	133.845	133.845	133.845	133.845	133.845	133.845	133.845
2002	148.310	148.311	148.312	148.317	148.364	148.431	148.458	148.487	148.868
2003	161.596	161.608	161.633	161.715	161.963	162.349	162.525	162.735	164.855
2004	173.250	173.336	173.437	173.818	174.444	175.424	176.156	177.158	182.022
2005	183.173	183.471	183.812	184.683	186.011	187.742	189.557	192.391	199.915
2006	191.040	191.770	192.504	194.015	196.364	199.134	202.621	207.751	217.670
2007	197.283	198.732	199.866	202.320	205.759	209.894	215.752	223.060	235.476
2008	202.013	204.379	205.982	209.570	214.230	220.055	229.036	238.367	252.946
2009	205.589	209.042	211.277	215.943	222.077	229.846	242.262	252.888	270.283
2010	208.191	212.731	215.629	221.420	229.168	239.101	254.920	266.669	286.695

ANNUAL PROBABILITY THAT MEAN BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(MEAN B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000

2010 1.000

F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 26

YEAR	AVG F_WT_B	STD
2001	0.002	0.000
2002	0.003	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000

PERCENTILES OF F WEIGHTED BY MEAN BIOMASS FOR AGES:1 TO 26

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
2002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL PROBABILITY THAT F WEIGHTED BY MEAN BIOMASS EXCEEDS THRESHOLD: 0.000

YEAR	Pr(F_WT_B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

TOTAL STOCK BIOMASS (THOUSAND MT)

YEAR	AVG TOTAL B (000 MT)	STD
2001	134.590	0.000
2002	143.707	0.492
2003	154.018	1.064
2004	164.917	2.843
2005	177.451	5.095
2006	186.926	7.795
2007	191.550	10.429
2008	200.136	12.831
2009	209.182	15.587
2010	214.044	18.095

PERCENTILES OF TOTAL STOCK BIOMASS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	134.590	134.590	134.590	134.590	134.590	134.590	134.590	134.590	134.590
2002	143.324	143.328	143.333	143.357	143.599	143.942	144.078	144.231	146.185
2003	152.921	152.958	153.018	153.321	153.775	154.365	154.976	155.994	158.715
2004	161.853	162.108	162.365	163.061	164.270	166.029	167.395	169.220	178.086
2005	171.413	172.026	172.632	174.126	176.424	179.151	182.340	187.640	198.393
2006	176.943	178.194	179.366	181.827	185.344	189.567	195.291	203.226	216.488
2007	177.229	179.560	181.149	184.702	189.390	195.135	204.454	214.030	228.018
2008	181.579	184.903	187.080	191.583	197.429	204.853	217.484	227.377	242.398
2009	186.015	190.406	193.171	198.641	205.926	215.380	230.907	241.001	259.687
2010	186.399	191.854	195.249	201.663	210.235	221.845	239.433	250.226	271.699

ANNUAL PROBABILITY THAT TOTAL STOCK BIOMASS EXCEEDS THRESHOLD: 0.000 THOUSAND MT

YEAR	Pr(B > Threshold Value)
2001	1.000
2002	1.000
2003	1.000
2004	1.000
2005	1.000
2006	1.000
2007	1.000
2008	1.000
2009	1.000
2010	1.000

RECRUITMENT UNITS ARE:1000. FISH BIRTH AVG

YEAR	RECRUITMENT	STD
2001	39941.332	49175.986
2002	40135.554	49764.562
2003	40185.207	50578.068
2004	40472.014	51145.564
2005	40235.343	50506.907
2006	40511.903	51210.247
2007	40261.901	50032.549
2008	39752.985	50105.780
2009	40137.511	49872.169
2010	40325.166	50249.909

PERCENTILES OF RECRUITMENT UNITS ARE:1000. FISH BIRTH

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	1626.355	2004.832	2512.583	4949.103	29161.824	63388.402	77085.584	92300.691	287692.735
2002	1626.091	2012.191	2515.452	4971.040	29153.158	63206.554	77375.182	93693.871	285957.644
2003	1632.055	1949.845	2507.504	4910.452	29085.110	62745.875	77226.121	93915.627	288630.523
2004	1618.087	2004.339	2512.262	4945.270	29146.721	62693.983	77363.503	93623.533	294153.086
2005	1631.710	2018.273	2516.866	4926.497	29143.333	63306.917	77323.175	92432.351	291807.062
2006	1633.983	2039.265	2517.605	5061.809	29105.492	62788.295	77271.500	94339.685	292577.169
2007	1628.215	2036.302	2523.187	4918.460	29149.628	63296.591	77162.818	93493.172	289261.482
2008	1621.529	1962.670	2507.430	4737.178	29038.715	62400.175	77219.355	93079.943	292270.364
2009	1623.206	2024.874	2515.438	4891.887	29155.059	62833.336	77152.367	92970.535	286482.584
2010	1639.514	2045.800	2523.701	5016.588	29156.401	63072.089	77260.132	94017.013	288831.536

LANDINGS FOR F-BASED PROJECTIONS

YEAR	AVG LANDINGS (000 MT)	STD
2001	0.328	0.000
2002	0.415	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000

PERCENTILES OF LANDINGS (000 MT)

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328
2002	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415	0.415
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

REALIZED F SERIES FOR QUOTA-BASED PROJECTIONS

YEAR	AVG F	STD
2001	0.003	0.000
2002	0.003	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.000
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000

PERCENTILES OF REALIZED F SERIES

YEAR	1%	5%	10%	25%	50%	75%	90%	95%	99%
2001	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
2002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL PROBABILITY FULLY-RECRUITED F EXCEEDS THRESHOLD: 0.040

YEAR	Pr(F > Threshold Value)
2001	0.000
2002	0.000
2003	0.000
2004	0.000
2005	0.000
2006	0.000
2007	0.000
2008	0.000
2009	0.000
2010	0.000

## 7.14 White hake

### Landings, survey indices and surplus production results

Year	Landings all sizes (k mt)	Landings => 60 cm (k mt)	NEFSC	NEFSC	Fishing Mortality	Yield (k mt)	Total	Year	Total	Yield (k mt)
			Autumn survey => 60 cm (kg/tow)	Spring survey =>60cm (kg/tow)			Biomass (k mt)		Biomass (k mt)	
1963										
1964	3.709	2.284	3.253		0.000	0.000	29.040	1964	5.183	2.284
1965	3.025	1.963	4.602		0.029	0.795	27.588	1965	5.592	1.963
1966	1.861	1.172	4.002		0.058	1.506	26.136	1966	6.812	1.172
1967	1.430	0.857	1.786		0.086	2.133	24.684	1967	9.099	0.8565
1968	1.620	0.971	2.201	0.983	0.115	2.677	23.232	1968	12.05	0.9712
1969	1.753	1.037	8.382	3.577	0.144	3.137	21.780	1969	15.22	1.037
1970	2.715	1.600	7.757	9.124	0.173	3.513	20.328	1970	18.03	1.6
1971	3.657	2.173	7.999	3.619	0.202	3.806	18.876	1971	19.99	2.173
1972	3.823	2.359	7.042	8.951	0.230	4.015	17.424	1972	21.25	2.359
1973	4.168	2.551	8.223	7.010	0.259	4.141	15.972	1973	22.07	2.551
1974	4.736	3.004	8.195	10.340	0.288	4.182	14.520	1974	22.39	3.004
1975	4.354	2.864	4.459	7.481	0.317	4.141	13.068	1975	22.52	2.864
1976	4.933	3.224	6.830	12.900	0.346	4.015	11.616	1976	22.5	3.224
1977	6.398	4.113	9.066	7.969	0.374	3.806	10.164	1977	21.93	4.113
1978	5.915	3.790	8.462	4.969	0.403	3.513	8.712	1978	21.29	3.79
1979	5.112	3.224	6.972	2.829	0.432	3.137	7.260	1979	21.2	3.224
1980	6.102	3.790	11.600	8.728	0.461	2.677	5.808	1980	21.09	3.79
1981	7.795	4.817	8.437	13.470	0.490	2.133	4.356	1981	20.28	4.817
1982	8.470	5.209		6.152	0.518	1.506	2.904	1982	19.01	5.209
1983	9.141	5.413	6.059	1.539	0.547	0.795	1.452	1983	17.66	5.413
1984	9.807	5.827	5.054	2.676	0.576	0.000	0.000	1984	16.16	5.827
1985	10.468	6.306	5.491	3.065				1985	14.28	6.306
1986	8.904	6.405	4.380	2.286				1986	12.07	6.405
1987	8.273	5.025	4.556	2.558				1987	10.39	5.025
1988	6.779	3.295	5.405	1.897				1988	10.11	3.295
1989	7.180	3.944	3.845	1.803				1989	10.32	3.944
1990	9.783	3.156	3.787	12.140				1990	10.67	3.156
1991	7.520	3.824	4.832	2.763				1991	11.12	3.824
1992	10.296	6.147	4.145	2.305				1992	9.933	6.147
1993	9.762	5.576	4.900	2.680				1993	7.572	5.576
1994	5.923	4.041	2.462	1.229				1994	5.761	4.041
1995	4.945	2.188	2.963	1.960				1995	5.266	2.188
1996	4.174	2.850	3.335	1.773				1996	5.222	2.85
1997	2.739	2.322	2.597	0.140				1997	5.091	2.322
1998	2.831	2.498	1.636	0.256				1998	5.107	2.498
1999	4.873	3.095	1.263	1.432				1999	4.63	3.095
2000	3.494	3.015	2.909	1.077				2000	3.581	3.015

## 7.15 Pollock

### Landings and survey indices

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Year	Landings Subareas 5 & 6 (k mt)	NEFSC Autumn survey (kg/tow)
1960	10.397	
1961	8.219	
1962	6.151	
1963	6.241	4.960
1964	9.008	2.420
1965	9.000	2.120
1966	9.847	1.610
1967	8.534	1.160
1968	5.222	2.300
1969	9.822	3.010
1970	11.976	2.000
1971	15.203	1.900
1972	13.013	3.130
1973	13.076	4.040
1974	12.393	1.520
1975	13.871	1.500
1976	13.382	7.320
1977	16.273	5.260
1978	22.305	3.560
1979	18.452	4.670
1980	23.539	3.320
1981	22.068	1.560
1982	19.466	1.629
1983	17.816	1.414
1984	20.633	0.700
1985	21.069	1.967
1986	26.507	1.205
1987	22.347	1.202
1988	17.304	1.753
1989	11.903	0.608
1990	11.201	1.054
1991	9.600	0.640
1992	10.225	0.920
1993	9.873	0.496
1994	7.099	0.409
1995	4.362	0.667
1996	4.164	0.704
1997	5.483	0.984
1998	7.441	0.758
1999	5.591	1.522
2000	5.240	0.833

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## 7.16 Northern windowpane flounder

### Landings and survey indices

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Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)
1963		0.241
1964		0.095
1965		0.171
1966		0.475
1967		0.515
1968		0.262
1969		0.637
1970		0.189
1971		0.160
1972		0.572
1973		1.532
1974		0.816
1975	1.300	0.385
1976	1.516	1.169
1977	1.099	1.555
1978	0.923	1.151
1979	0.856	0.728
1980	0.408	0.626
1981	0.413	0.787
1982	0.411	0.494
1983	0.460	0.546
1984	0.743	2.135
1985	2.141	0.936
1986	1.842	1.105
1987	1.396	0.646
1988	1.377	0.650
1989	1.577	0.414
1990	1.078	1.128
1991	2.862	0.171
1992	1.519	0.379
1993	1.212	0.618
1994	0.300	0.308
1995	0.700	0.803
1996	0.700	0.499
1997	0.418	0.434
1998	0.396	1.656
1999	0.046	0.730
2000	0.142	1.220

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## 7.17 Southern windowpane flounder

### Landings and survey indices

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)
1963		1.986
1964		0.869
1965		0.779
1966		1.113
1967		0.814
1968		0.895
1969		0.369
1970		0.309
1971		0.400
1972		0.568
1973		0.578
1974		0.260
1975	0.681	0.143
1976	0.568	0.360
1977	0.647	0.536
1978	0.898	0.537
1979	0.633	0.763
1980	0.532	0.256
1981	0.883	0.518
1982	0.651	0.873
1983	0.798	0.367
1984	1.088	0.247
1985	2.065	0.619
1986	1.381	0.563
1987	0.887	0.440
1988	1.172	0.424
1989	1.121	0.092
1990	0.890	0.181
1991	0.817	0.405
1992	0.584	0.180
1993	0.469	0.031
1994	0.200	0.225
1995	0.100	0.200
1996	0.200	0.262
1997	0.107	0.127
1998	0.123	0.182
1999	0.116	0.116
2000	0.126	0.280

## 7.18 Ocean pout

### Landings and survey indices

Year	Landings (k mt)	NEFSC Spring survey (kg/tow)
1968	13.061	5.366
1969	26.972	6.154
1970	7.172	5.180
1971	4.910	2.183
1972	3.351	4.453
1973	5.370	3.373
1974	3.732	1.479
1975	0.277	1.293
1976	0.678	1.400
1977	1.059	3.605
1978	1.035	3.371
1979	0.672	1.493
1980	0.350	5.729
1981	0.251	7.605
1982	0.321	4.743
1983	0.408	4.236
1984	1.324	5.540
1985	1.504	6.494
1986	0.802	6.345
1987	2.185	2.705
1988	1.811	3.244
1989	1.306	2.792
1990	1.312	5.074
1991	1.424	3.783
1992	0.474	2.257
1993	0.232	3.084
1994	0.196	2.309
1995	0.065	1.916
1996	0.051	2.058
1997	0.034	1.632
1998	0.018	1.733
1999	0.017	2.561
2000	0.019	2.016

## 7.19 Atlantic halibut

### Landings and survey swept area indices

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)
1893	0.634		
1894	0.843		
1895	4.200		
1896	4.908		
1897	0.733		
1898	0.564		
1899	0.407		
1900	0.311		
1901	0.287		
1902	0.367		
1903	0.502		
1904	0.332		
1905	0.580		
1906	0.542		
1907	0.447		
1908	0.891		
1909	0.193		
1910	0.329		
1911	0.389		
1912	0.460		
1913	0.402		
1914	0.329		
1915	0.336		
1916	0.478		
1917	0.293		
1918	0.375		
1919	0.496		
1920	0.896		
1921	0.689		
1922	0.694		
1923	0.508		
1924	0.616		
1925	0.843		
1926	0.944		
1927	0.831		
1928	0.781		
1929	0.570		
1930	0.716		
1931	0.511		
1932	0.443		
1933	0.279		
1934	0.192		
1935	0.292		
1936	0.374		
1937	0.187		
1938	0.146		
1939	0.124		
1940	0.497		

Continued.

Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)
1941	0.145		
1942	0.250		
1943	0.076		
1944	0.077		
1945	0.055		
1946	0.124		
1947	0.196		
1948	0.156		
1949	0.157		
1950	0.116		
1951	0.154		
1952	0.123		
1953	0.104		
1954	0.125		
1955	0.074		
1956	0.062		
1957	0.080		
1958	0.073		
1959	0.059		
1960	0.063		
1961	0.084		
1962	0.146		
1963	0.183	2.821	
1964	0.236	2.224	
1965	0.299	1.062	
1966	0.282	0.133	
1967	0.514	0.299	
1968	0.270	0.000	4.282
1969	0.168	16.397	7.833
1970	0.138	0.000	3.485
1971	0.119	3.020	1.095
1972	0.108	0.597	0.166
1973	0.089	4.348	3.751
1974	0.076	0.465	3.718
1975	0.106	3.153	0.000
1976	0.091	12.547	21.376
1977	0.081	1.958	4.713
1978	0.134	9.758	5.410
1979	0.154	1.328	11.850
1980	0.168	0.332	18.687
1981	0.198	10.655	2.191
1982	0.201	3.817	2.722
1983	0.203	0.000	20.280
1984	0.137	4.116	0.730
1985	0.118	3.518	2.091
1986	0.076	10.389	0.000
1987	0.050	1.095	9.526
1988	0.128	0.133	0.763
1989	0.078	2.191	0.000
1990	0.074	1.992	2.124
1991	0.088	8.066	2.058

Continued.

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Year	Landings (k mt)	NEFSC Autumn survey (kg/tow)	NEFSC Spring survey (kg/tow)
1992	0.069	6.672	1.228
1993	0.065	1.527	0.199
1994	0.046	0.000	0.564
1995	0.019	2.191	0.166
1996	0.025	1.759	0.431
1997	0.028	5.775	2.091
1998	0.017	3.419	0.564
1999	0.020	0.498	7.933
2000	0.017	0.697	0.000

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## 7.20 Recruitment Models

A description of each of the recruitment models used in the projection analyses has been taken directly from AGEPRO Users' Guide by Brodziak and Rago (2002). A full description of the all input parameters for the age-based stochastic projection program, AGEPRO, can be found in:

Brodziak, J. K. T., and P. J. Rago. 2002. AGEPRO Version 2.0 User's Guide. Northeast Fisheries Science Center, 166 Water Street, Woods Hole, Massachusetts, 02543, 108 pp.

### *Model 5. Beverton-Holt Curve With Lognormal Error*

The Beverton-Holt curve with lognormal errors is a parametric model of recruitment generation where survival to recruitment age is density dependent and subject to stochastic variation. The Beverton-Holt curve with lognormal error generates recruitment as

$$n_R(t) = \frac{a \cdot ssb(t-R)}{b + ssb(t-R)} \cdot e^w$$

$$\text{where } w \sim N(0, \sigma_w^2), \tag{1}$$

$$N_R(t) = c_R \cdot n_R(t),$$

$$\text{and } SSB(t-R) = c_{SSB} \cdot ssb(t-R)$$

where the stock-recruitment parameters “a”, “b”, and “ $\sigma_w^2$ ” and the conversion coefficients for recruitment ( $c_R$ ) and spawning stock biomass ( $c_{SSB}$ ) are specified by the USER. Here it is assumed that the parameter estimates for the Beverton-Holt curve have been estimated in relative units determined by the USER (e.g.  $n_R(t)$  and  $ssb(t-R)$ ) and then converted to absolute values with the conversion coefficients. *In the AGEPRO software, the absolute value for recruitment is numbers of fish, while for SSB, the absolute value is kilograms of SSB.* For example, if the stock-recruitment curve was estimated with stock-recruitment data that were measured in millions of fish and thousands of metric tons of SSB, then  $c_R=10^6$  and  $c_{SSB}=10^6$ . Note that it is common to estimate the parameters of the stock-recruitment curve in relative units to reduce the potential effects of roundoff error on parameter estimates.

### *Model 14. Empirical Cumulative Distribution Function of Recruitment*

The empirical cumulative distribution function (cdf) of recruitment can be used to randomly generates recruitment under the assumption that the distribution of the R is stationary and independent of stock size. To describe this nonparametric approach, let  $R_s$  represent the  $s^{\text{th}}$  element in the ordered set of observed recruitment values. The probability density function for  $R_s$ , denoted as  $f(R_s)$ , is  $1/T$  for all values of  $R \in R_s$  where T is the number of stock-recruitment data points. Let  $F(R_s)$  denote the cumulative distribution function (cdf). Let  $F(R_{\min}) = 0$  and  $F(R_{\max}) = 1$  so that the cdf of  $R_s$  can be written as

$$F(R_s) = \frac{s-1}{T-1} \tag{2}$$

Random values of R can be generated by applying the probability integral transform to the empirically derived cdf. Let U be a uniformly distributed random variable on the interval [0,1]. The value of R corresponding to U is determined by applying the inverse of the cdf  $F(R_s)$ . In particular, when U is an integer multiple of  $1/(T-1)$  so

that  $U=s/(T-1)$  then  $R = F^{-1}(U) = R_s$ . Otherwise  $R$  can be obtained by linear interpolation. In particular, if  $(s-1)/(T-1) < U < s/(T-1)$ , then

$$U = \left( \frac{\frac{s}{T-1} - \frac{s-1}{T-1}}{R_{s+1} - R_s} \right) [R - R_s] + \left( \frac{s-1}{T-1} \right) \quad (3)$$

Solving for  $R$  as a function of  $U$  yields

$$R = (T-1)(R_{s+1} - R_s) \left( U - \frac{s-1}{T-1} \right) + R_s \quad (4)$$

where the interpolation index  $s$  is determined as the greatest integer in  $1+U(T-1)$ . The AGEPRO software can generate stochastic recruitments based on a USER-specified set of up to 100 stock-recruitment data points.

***Model 15. Two-Stage Empirical Cumulative Distribution Function of Recruitment***

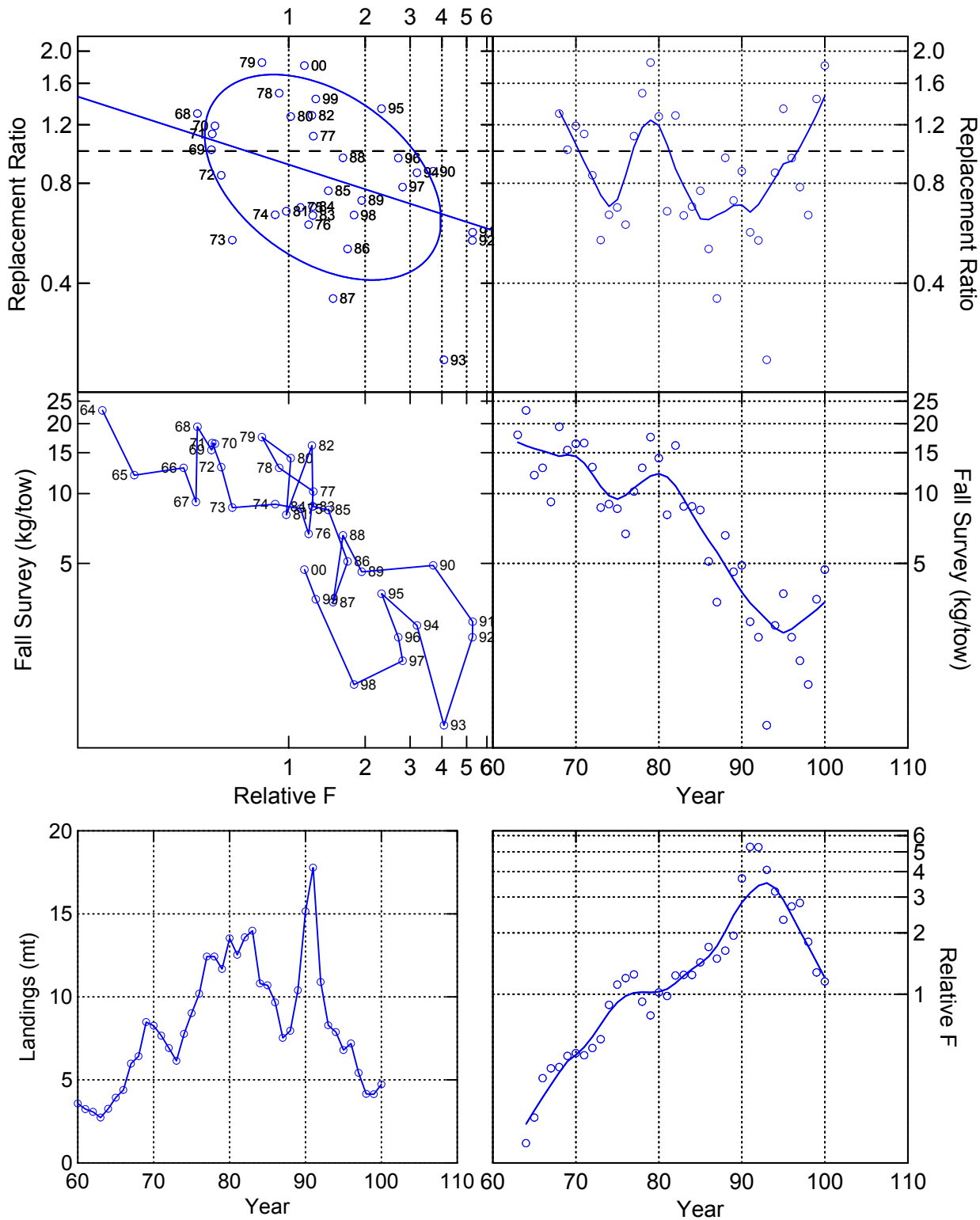
The two-stage empirical cumulative distribution function of recruitment model is a direct generalization of Model 14 where the spawning stock of the population is categorized into “low” and “high” states. In particular, there is a cdf for  $R$  when the population is in the low SSB state and a cdf for  $R$  when the population is in the high SSB state. Let  $F_{LOW}$  be the cdf and let  $T_{LOW}$  be the number of  $R$  values for the low SSB state. Similarly, let  $F_{HIGH}$  be the cdf and let  $T_{HIGH}$  be the number of  $R$  values for the high SSB state. Further, let  $SSB^*$  denote the cutoff level of SSB such that, if  $SSB \geq SSB^*$ , then SSB is considered to be in the high state, while if  $SSB < SSB^*$  then SSB is in the low state. Recruitment is stochastically generated from  $F_{LOW}$  and  $T_{LOW}$  using Equations (3) and (4) when SSB is in the low state. Conversely, Recruitment is stochastically generated from  $F_{HIGH}$  and  $T_{HIGH}$  using Equations (3) and (4) when SSB is in the high state. The AGEPRO software can generate stochastic recruitments for the two-stage model given a USER-specified set of stock-recruitment data of up to 100 stock-recruitment data points.



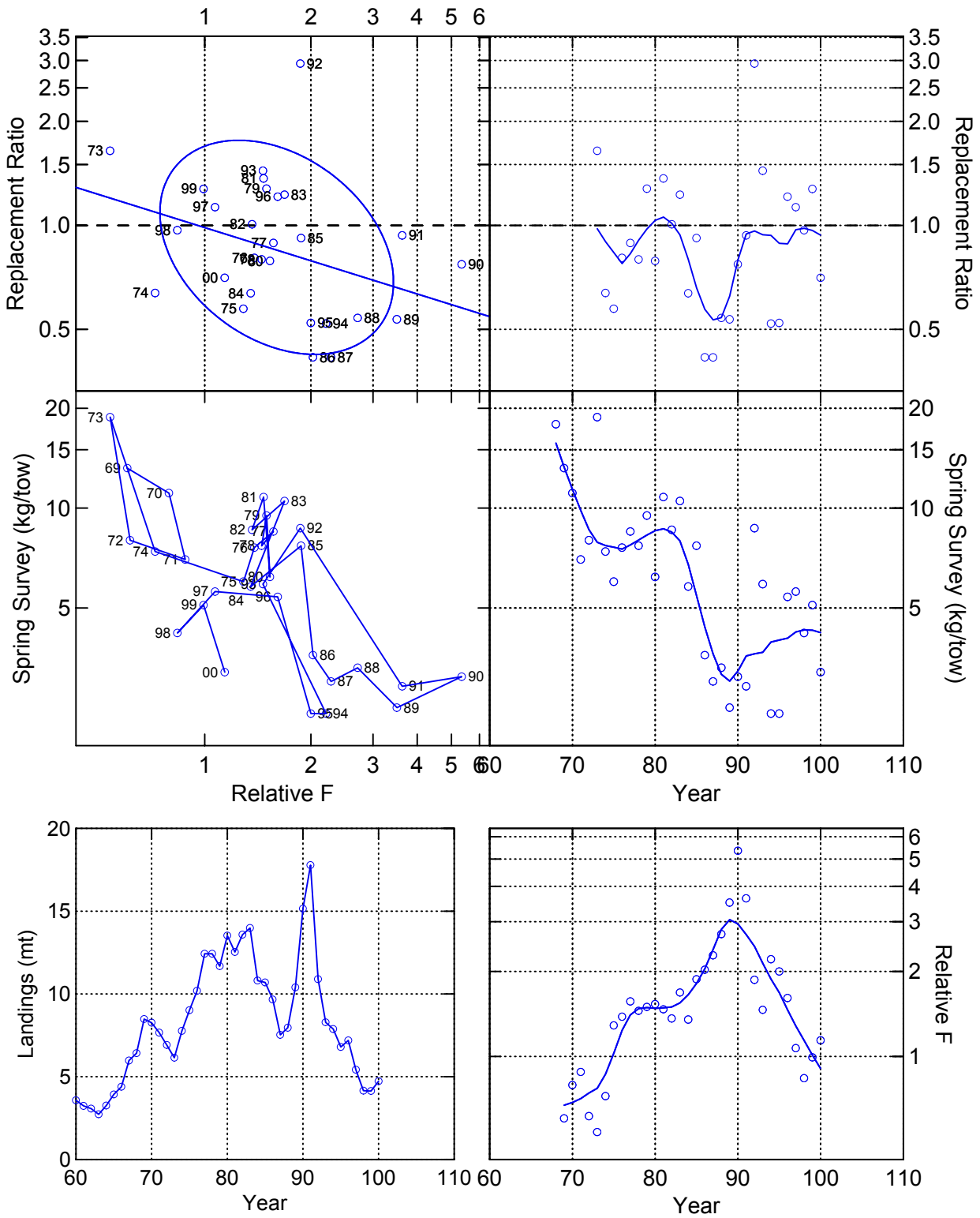
## 7.21 Six-Panel Plots of Catch, Relative F, and Replacement Ratios for 19 stocks

The relationships among the catches, abundance indices, relative F, replacement ratios and time are summarized in a series of six-panel plots for each stock (19) and survey type (fall, spring). The panels are aligned to facilitate interpretation of the stock dynamics and to allow for a standard approach for comparison among stocks. The top four panels illustrate the interrelationships among the natural log of relative F, the natural log of the replacement ratio, the survey indices and time. The variables share axes such that the temporal and phase plane interactions are easily followed. The dashed horizontal line represents the replacement ratio of 1.0 and the diagonal line in the top left panel represents the robust regression estimate. The bottom two panels illustrate the temporal patterns between catch and the natural log of relative F. To facilitate the detection of temporal patterns, Lowess smoothing (with a tension = 0.3) is applied to the panels in the right-hand column. A guide to these plots are given in the main report.

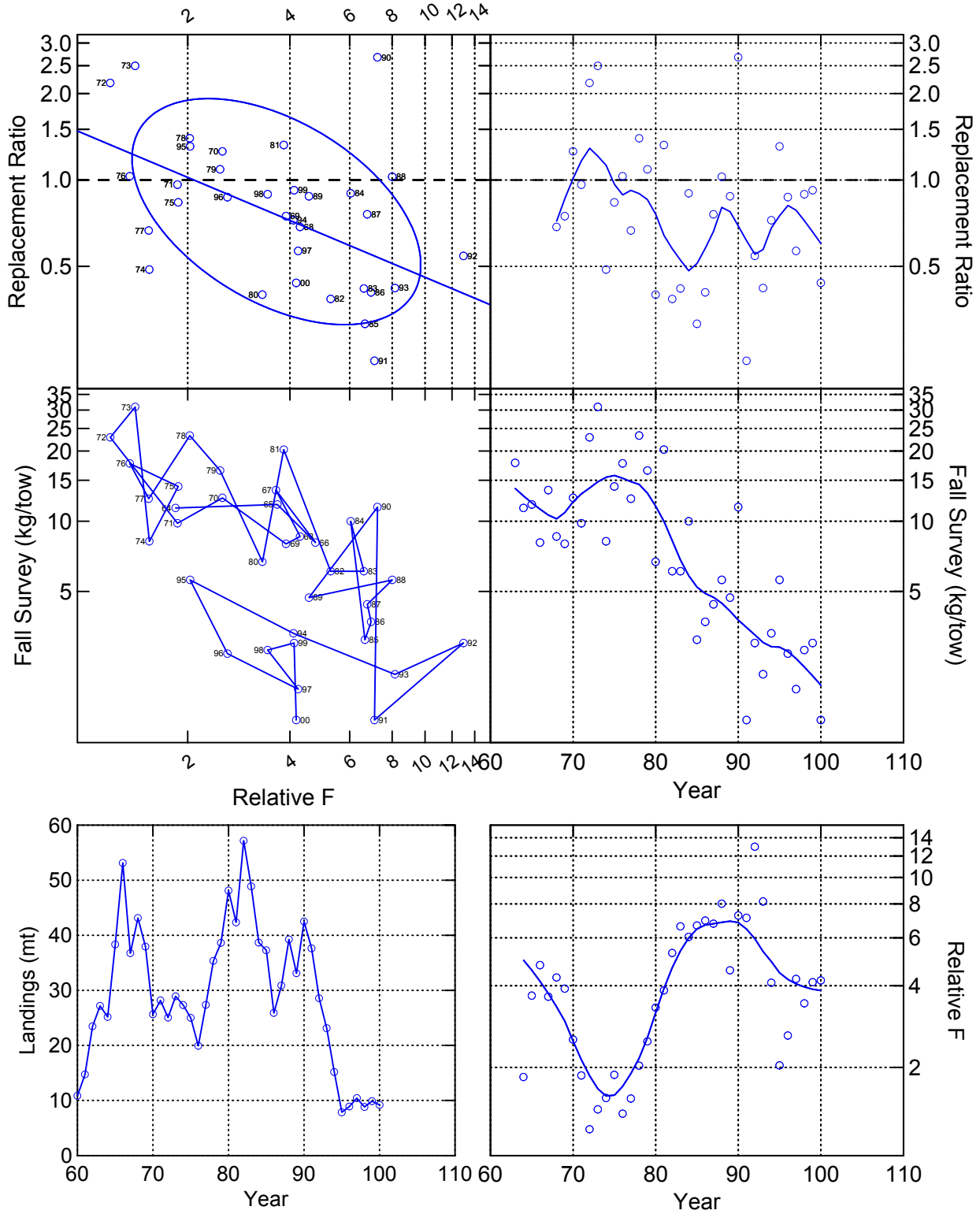
# Gulf of Maine Cod, Fall



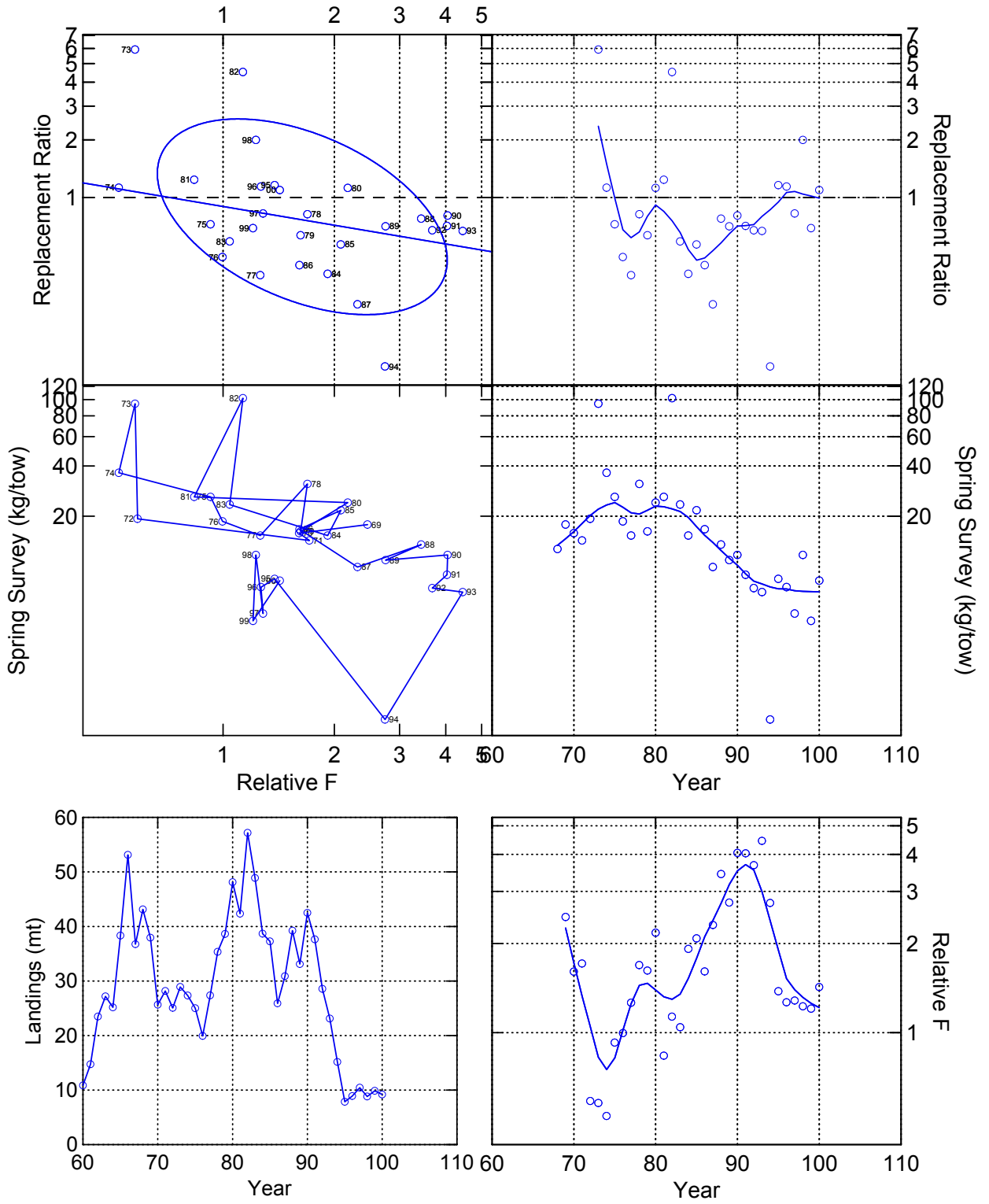
# Gulf of Maine Cod, Spring



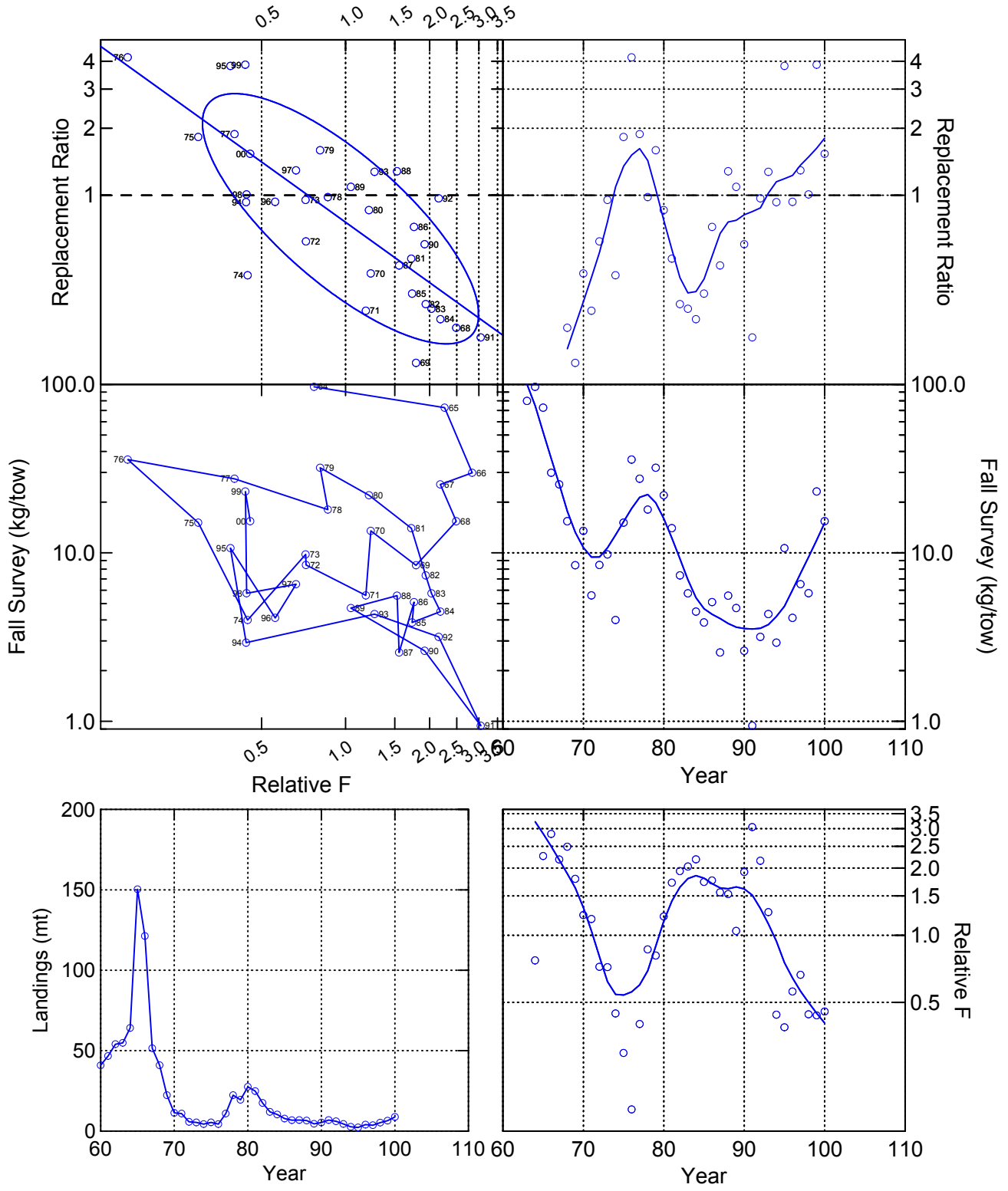
# Georges Bank Cod, Fall



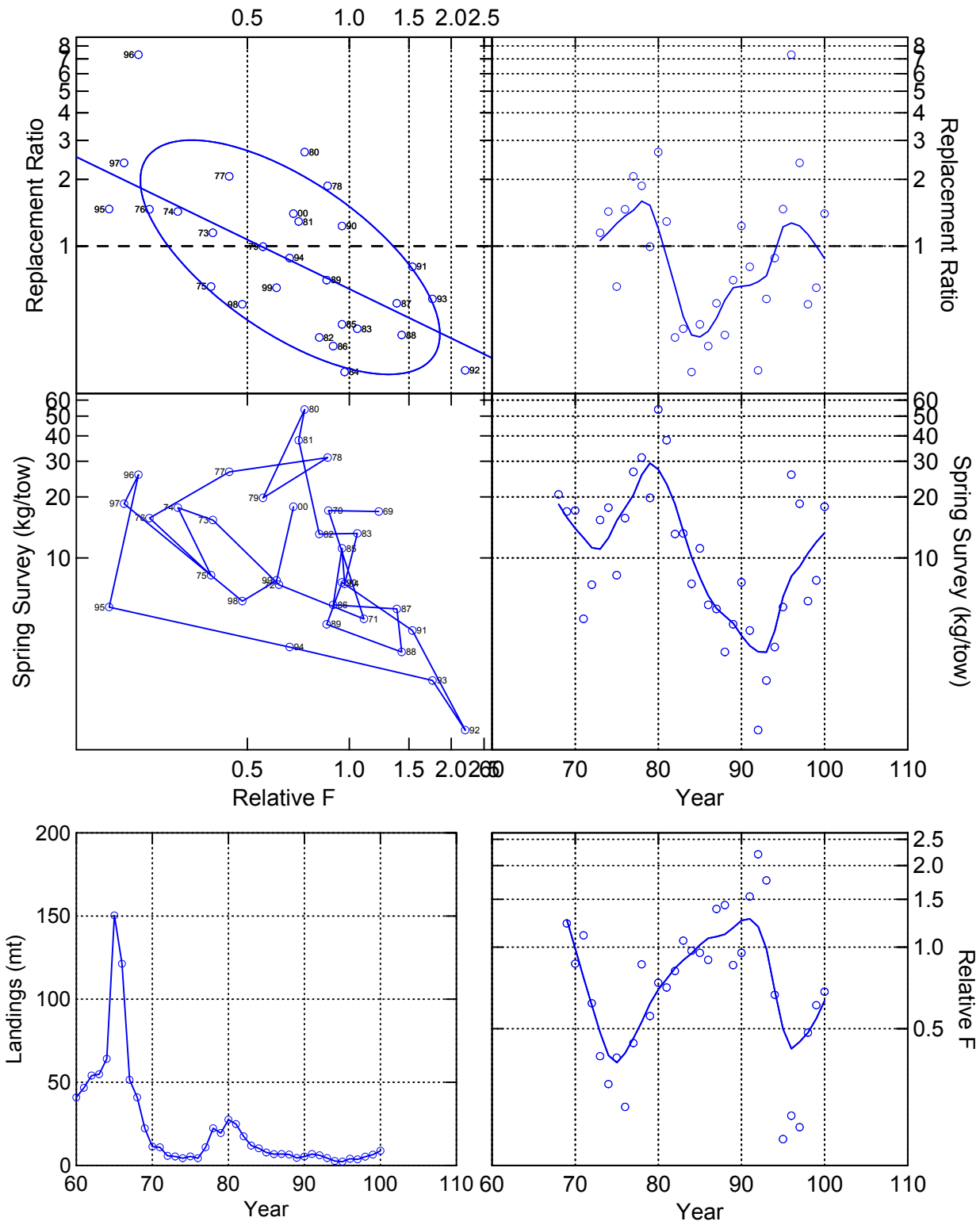
# Georges Bank Cod, Spring



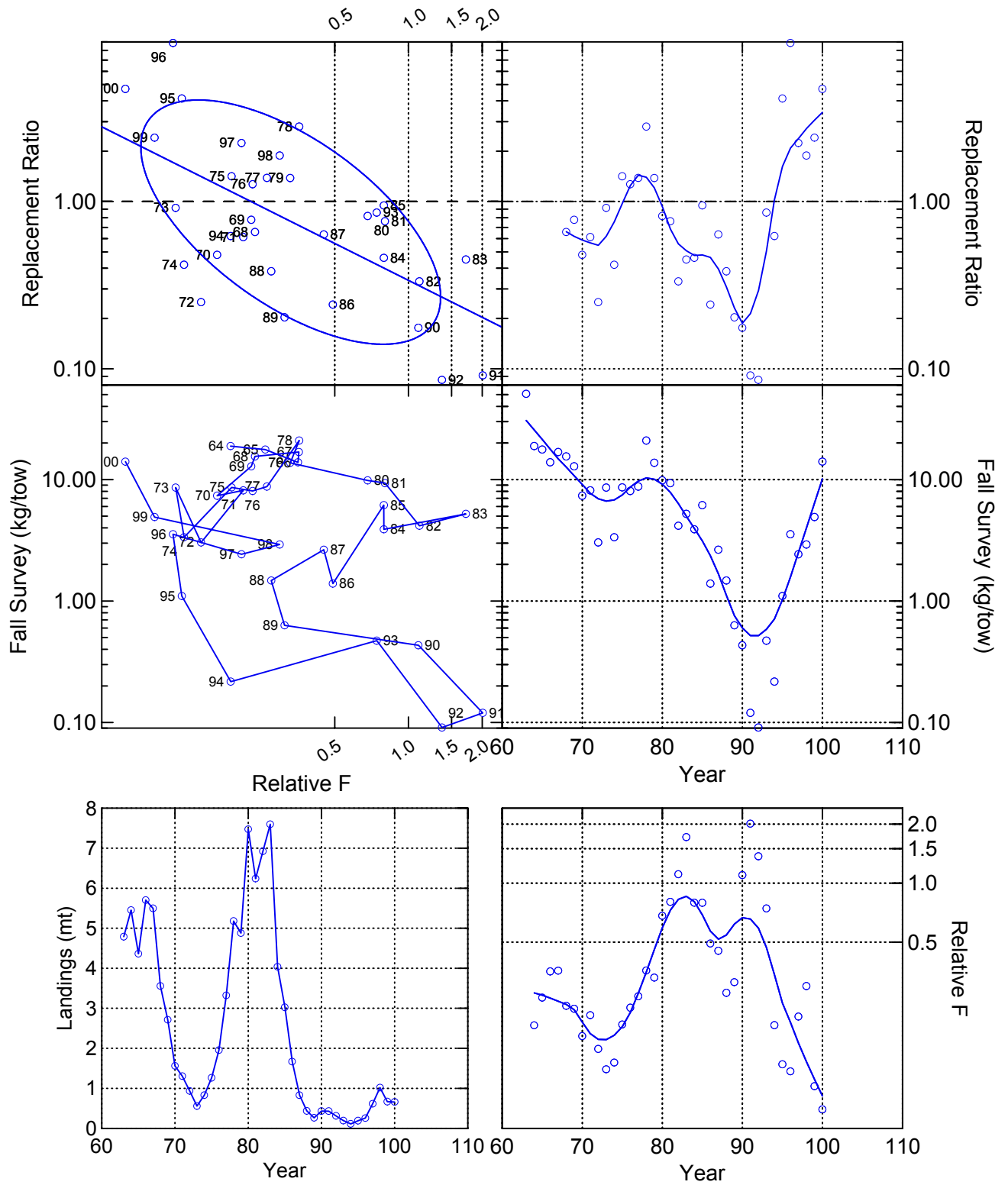
# Georges Bank Haddock, Fall



# Georges Bank Haddock, Spring

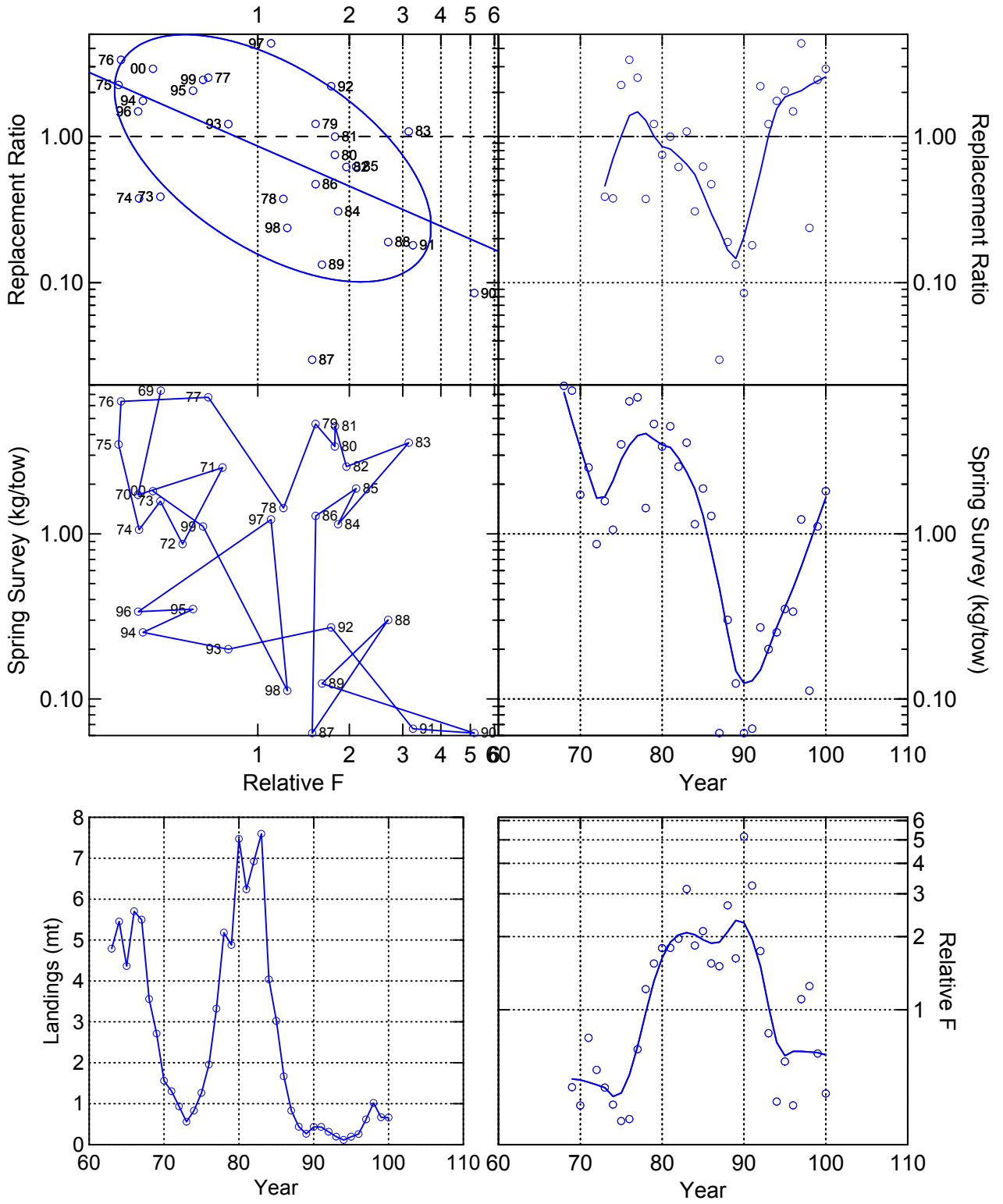


# Gulf of Maine Haddock, Fall

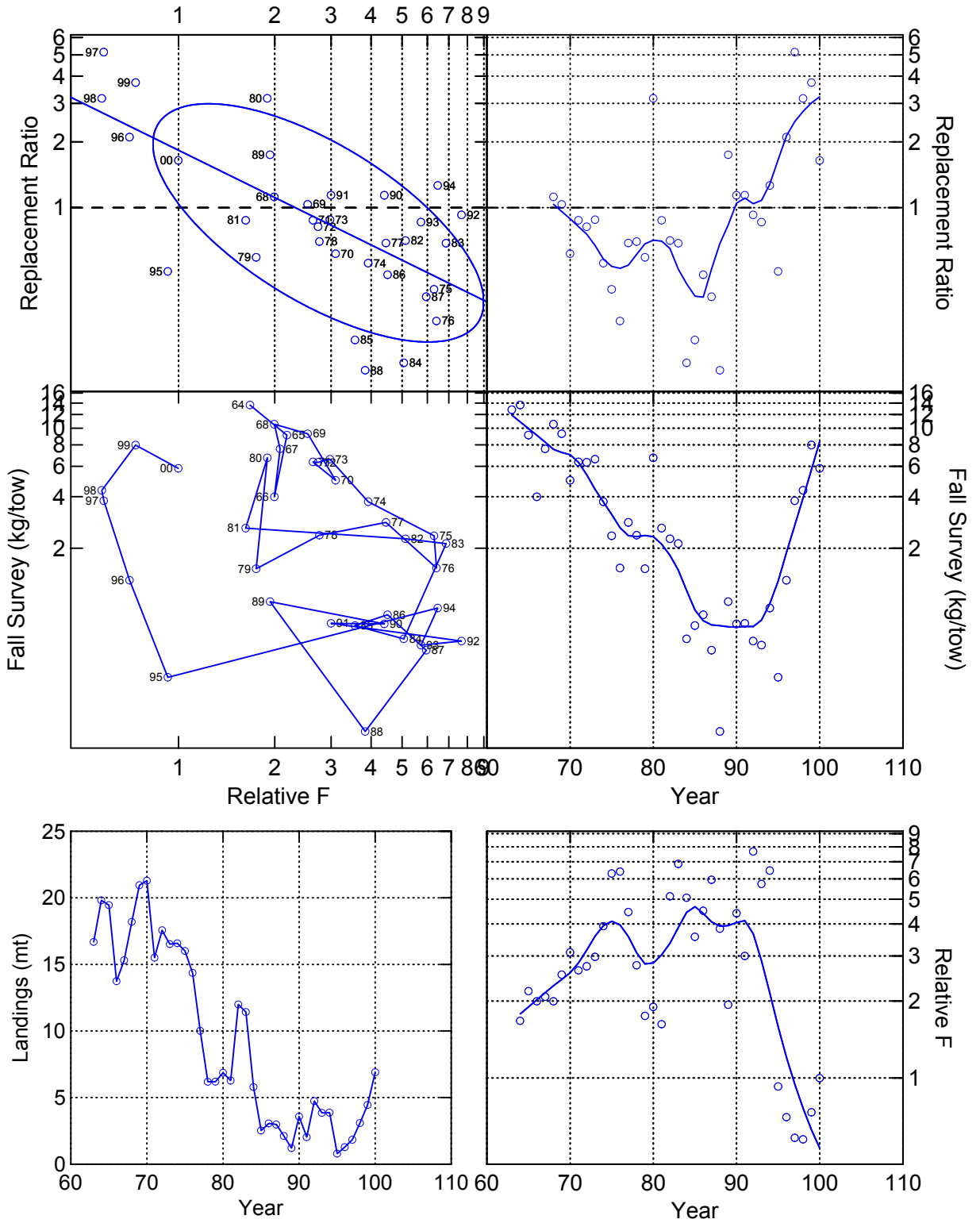


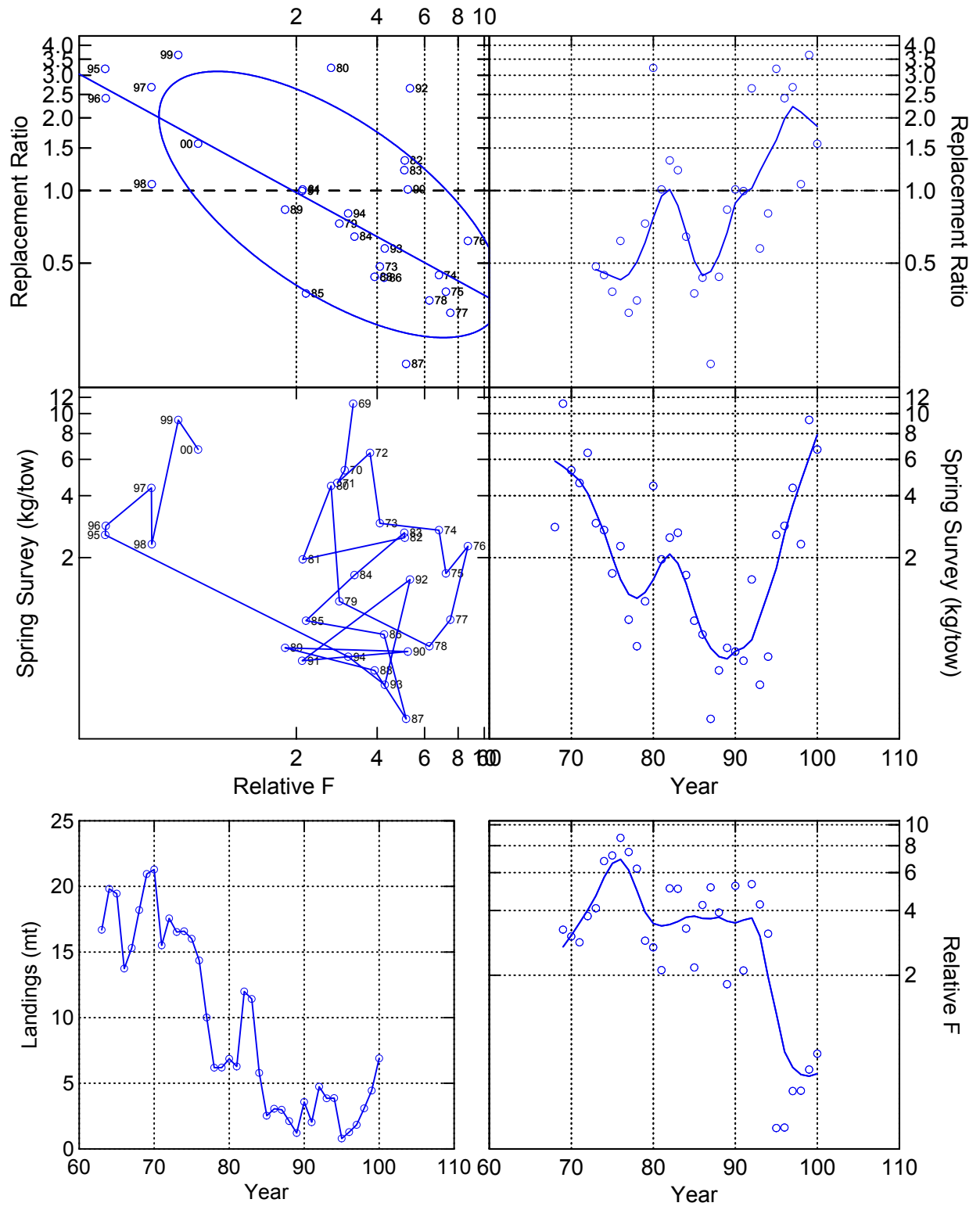


# Gulf of Maine Haddock, Spring

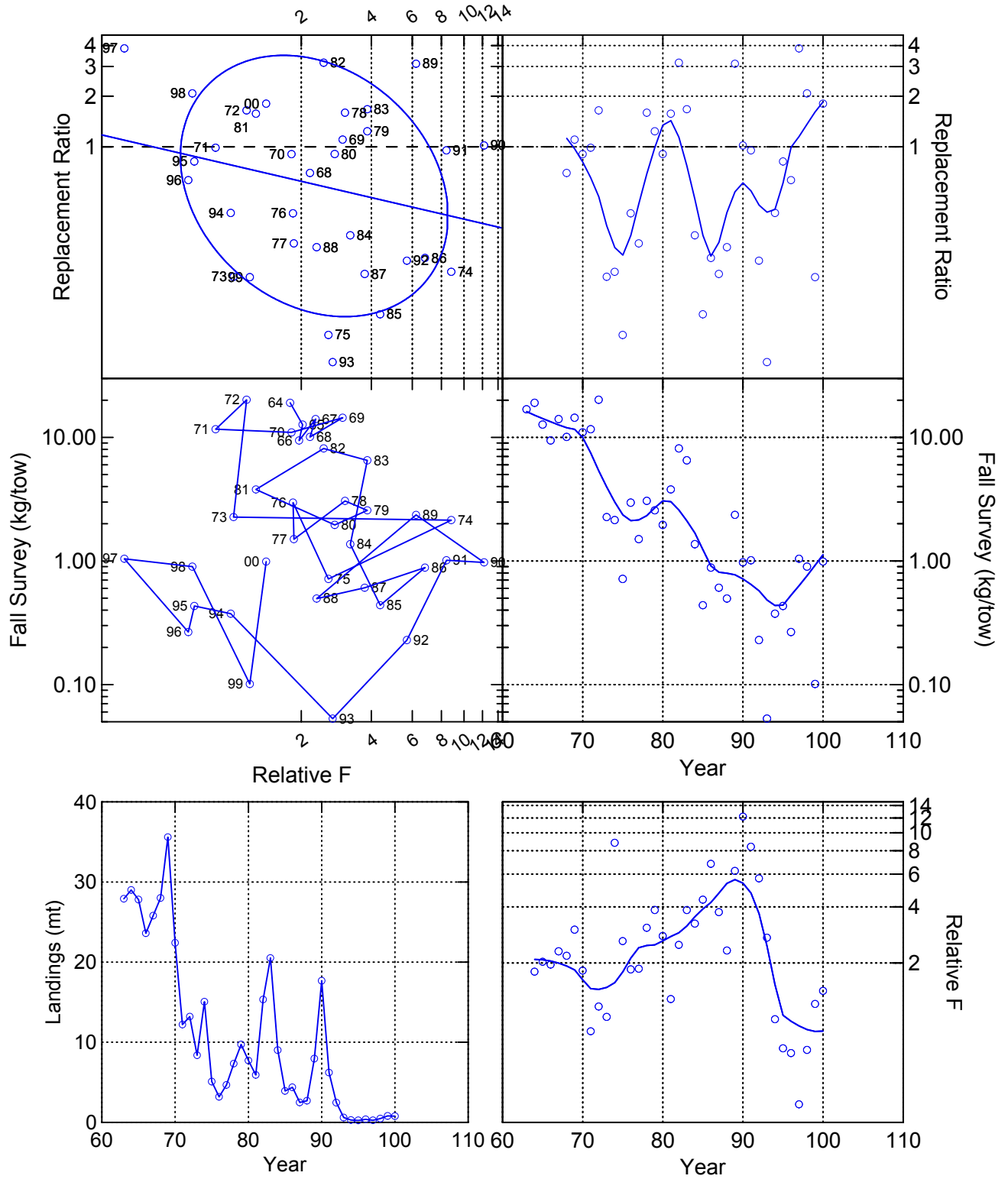


# Georges Bank Yellowtail Flounder, Fall

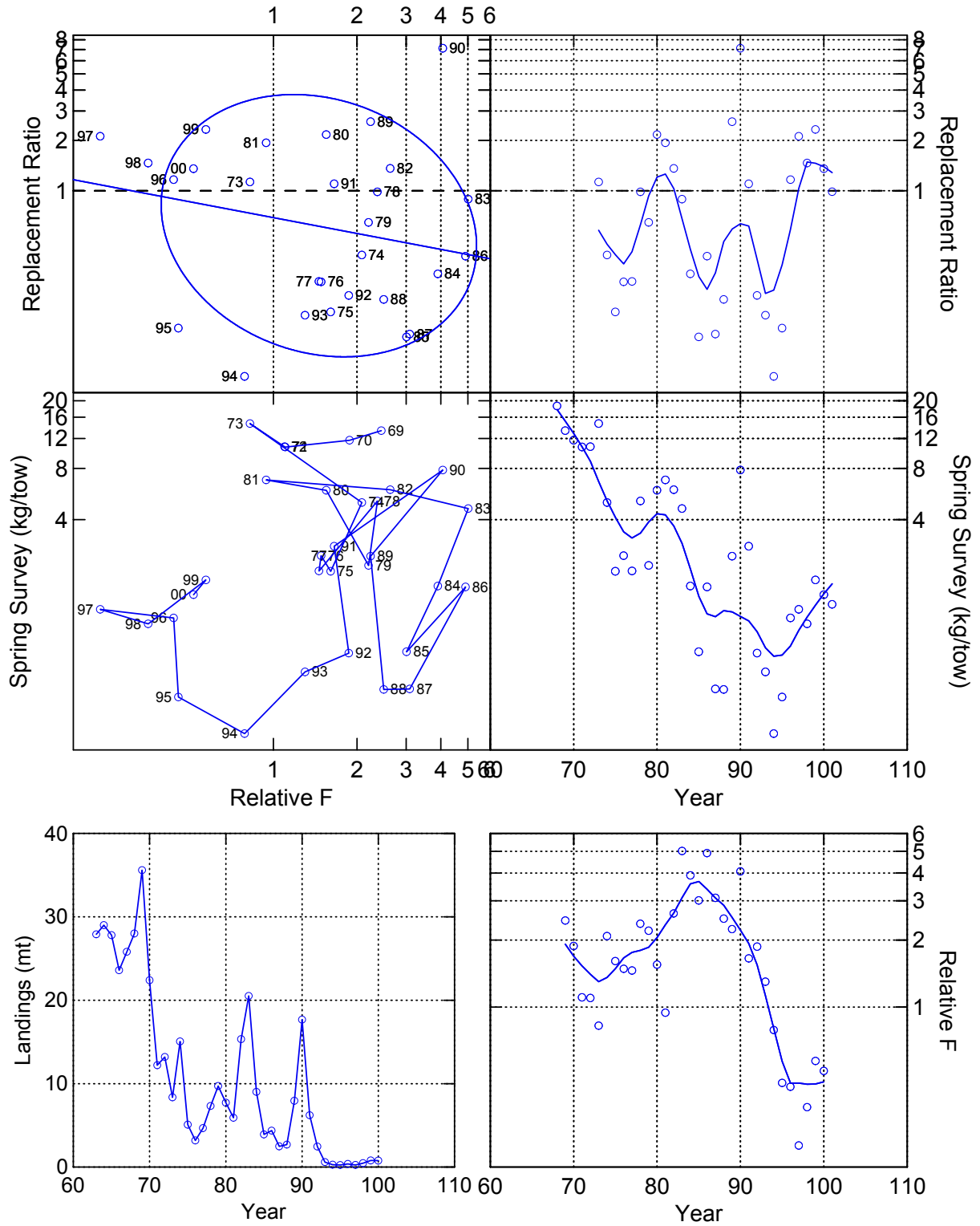




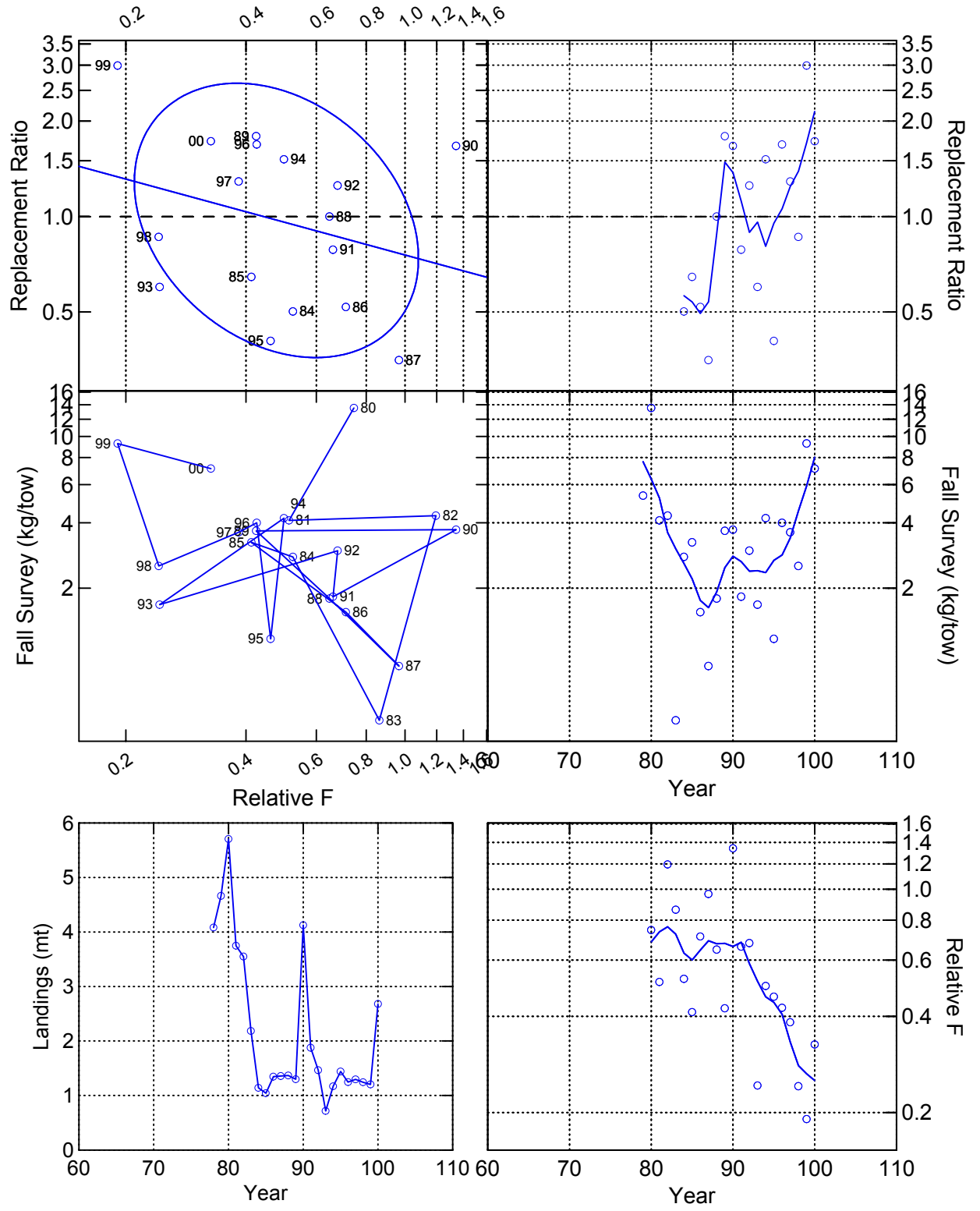
# SNE Yellowtail Flounder, Fall



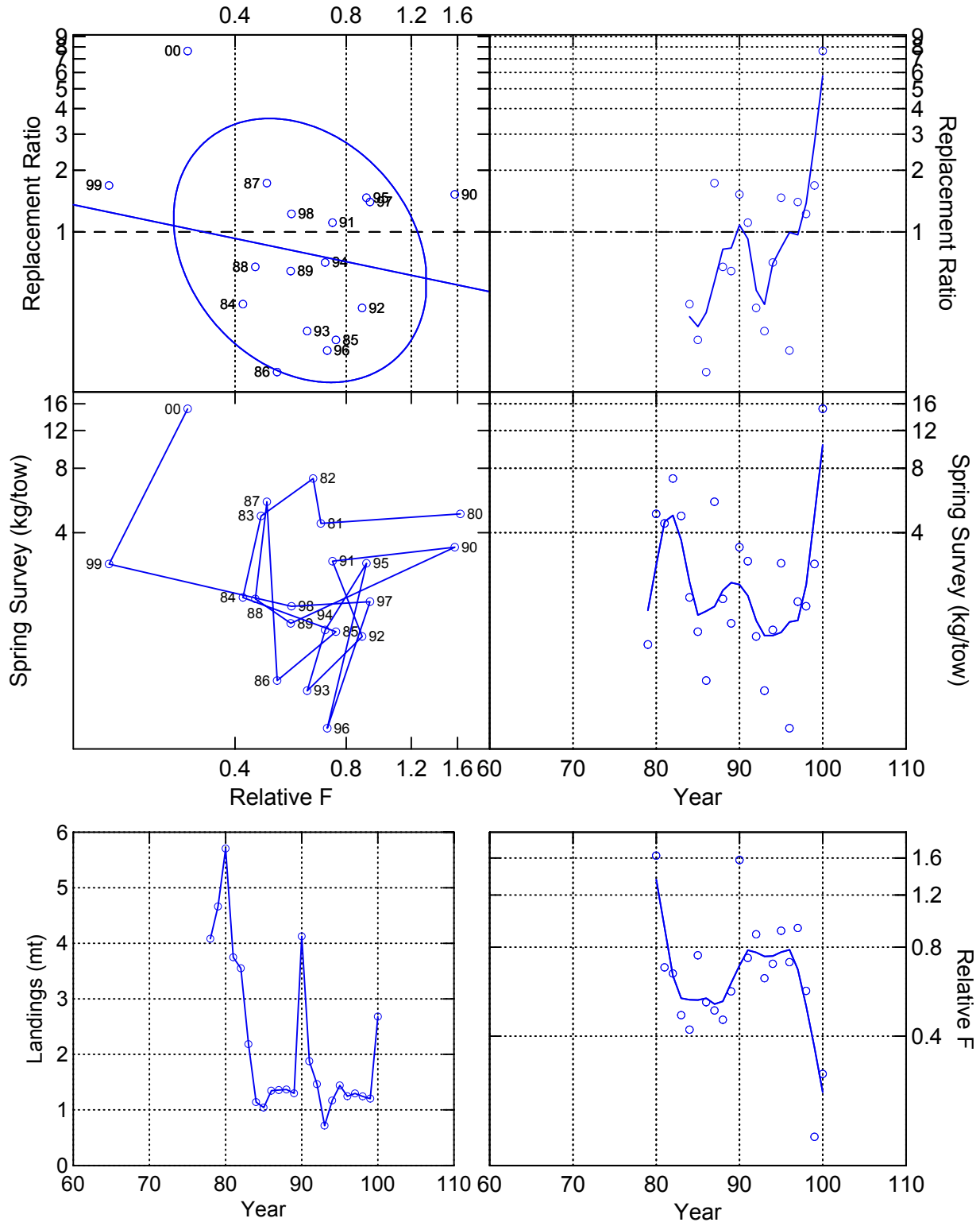
# SNE Yellowtail Flounder, Spring



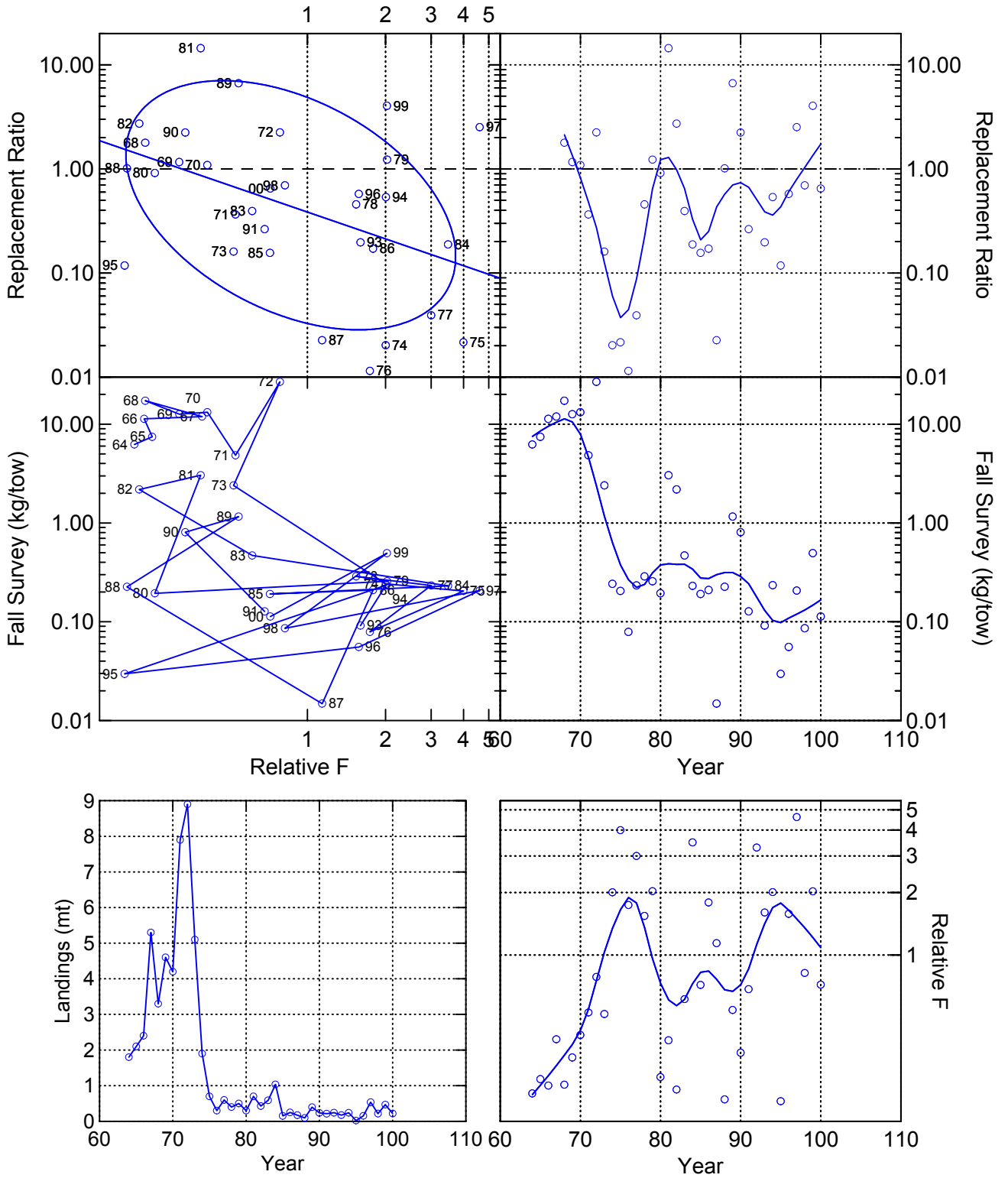
# Cape Cod Yellowtail Flounder, Fall



# Cape Cod Yellowtail Flounder, Spring

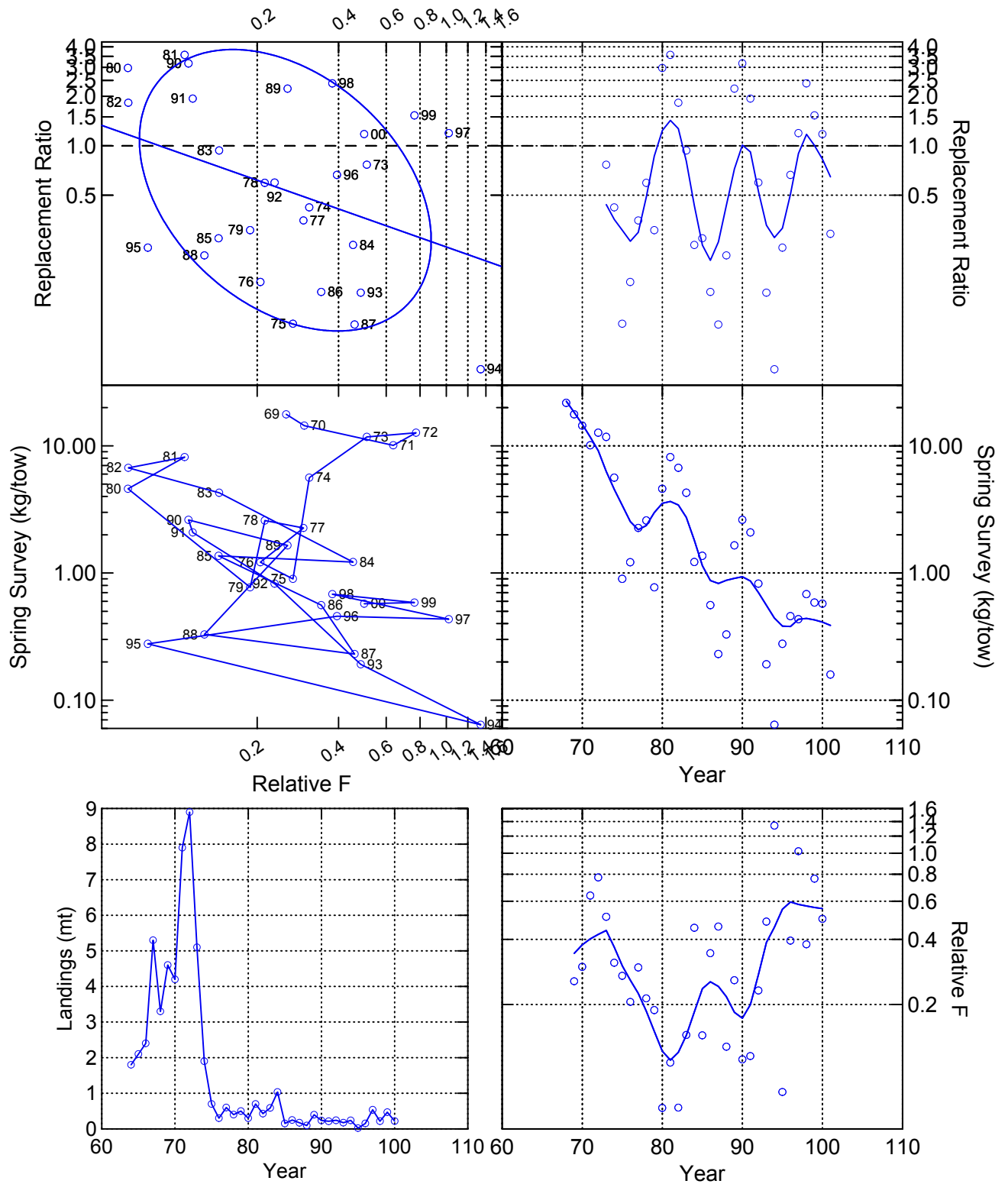


# Mid Atl. Yellowtail Flounder, Fall

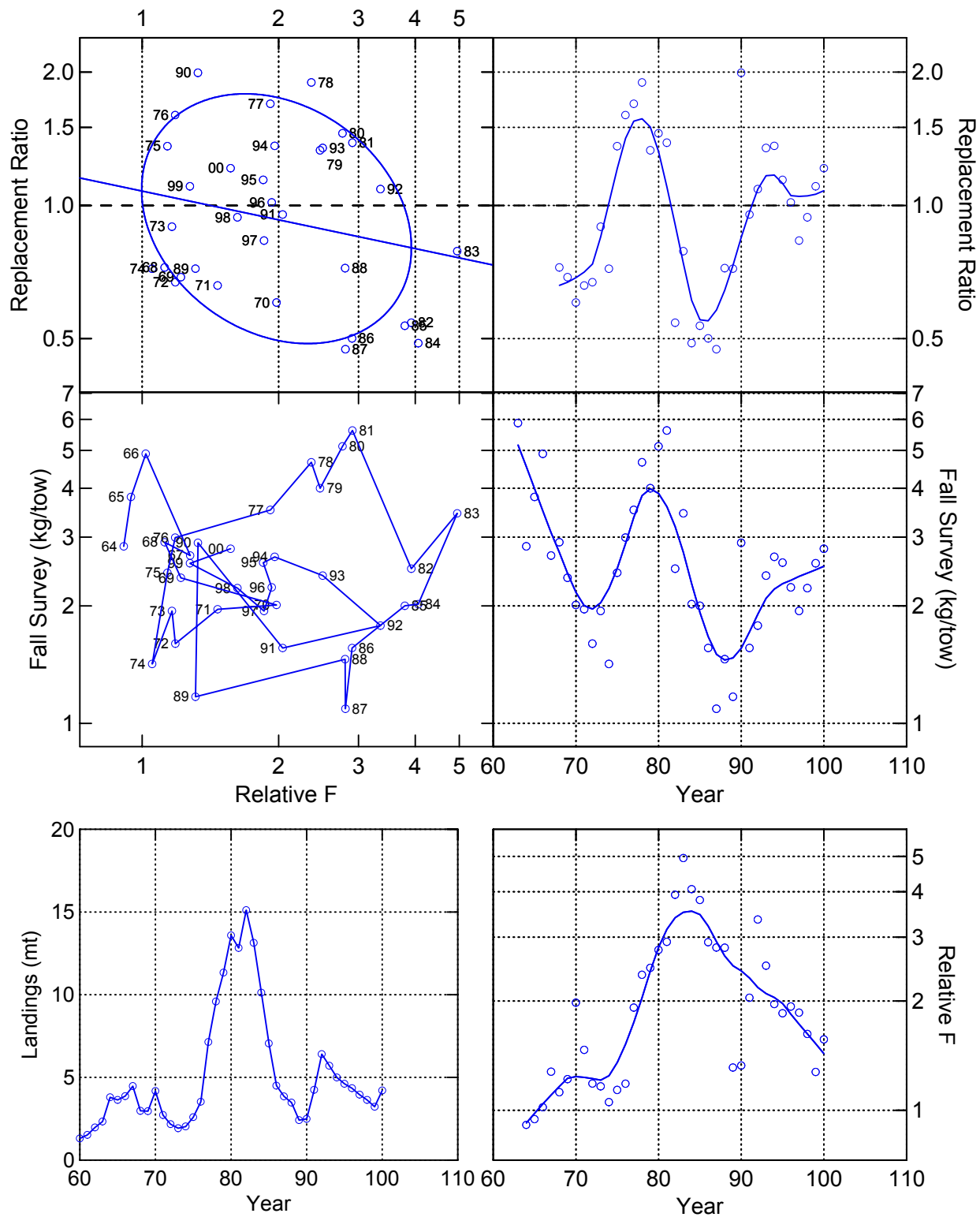




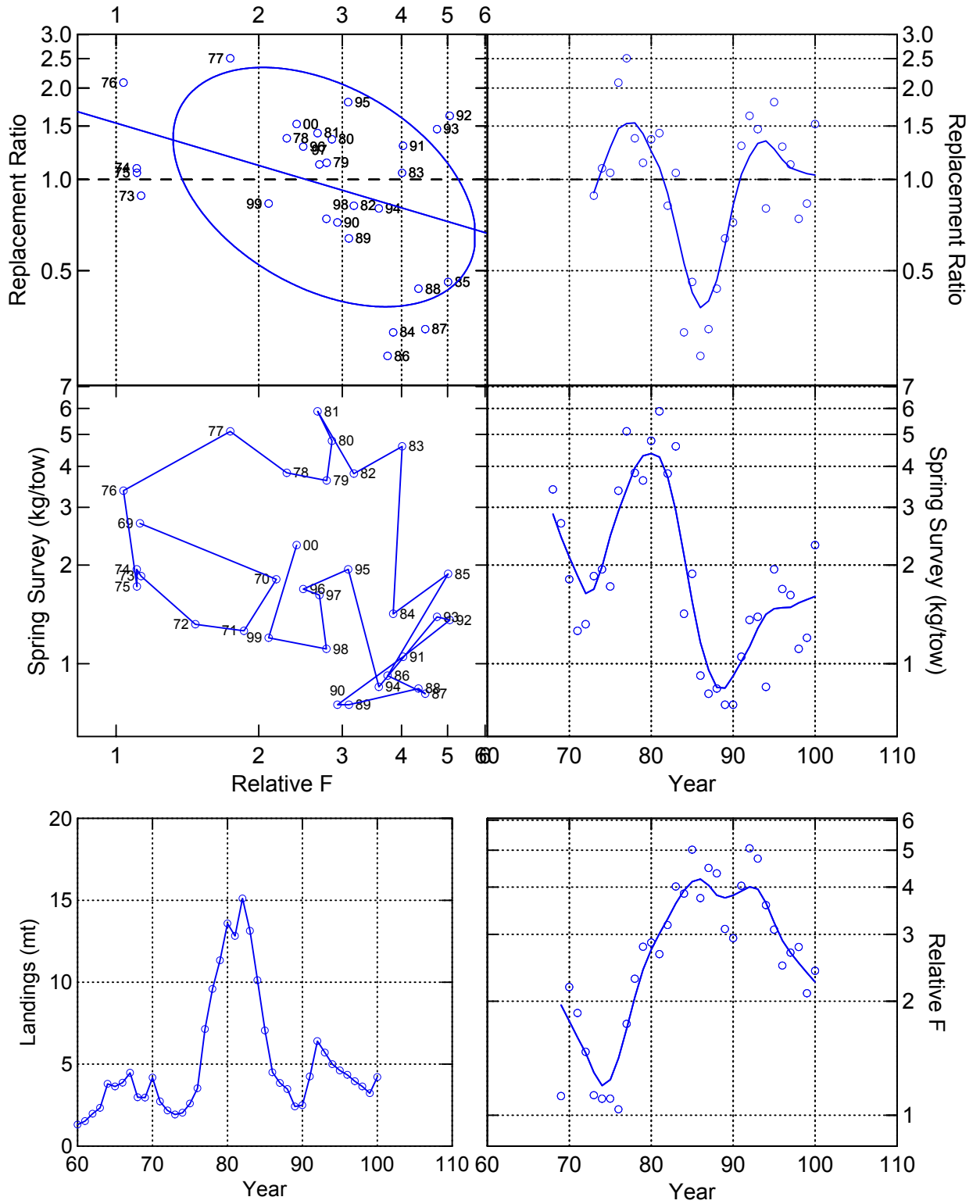
# Mid Atl. Yellowtail Flounder, Spring



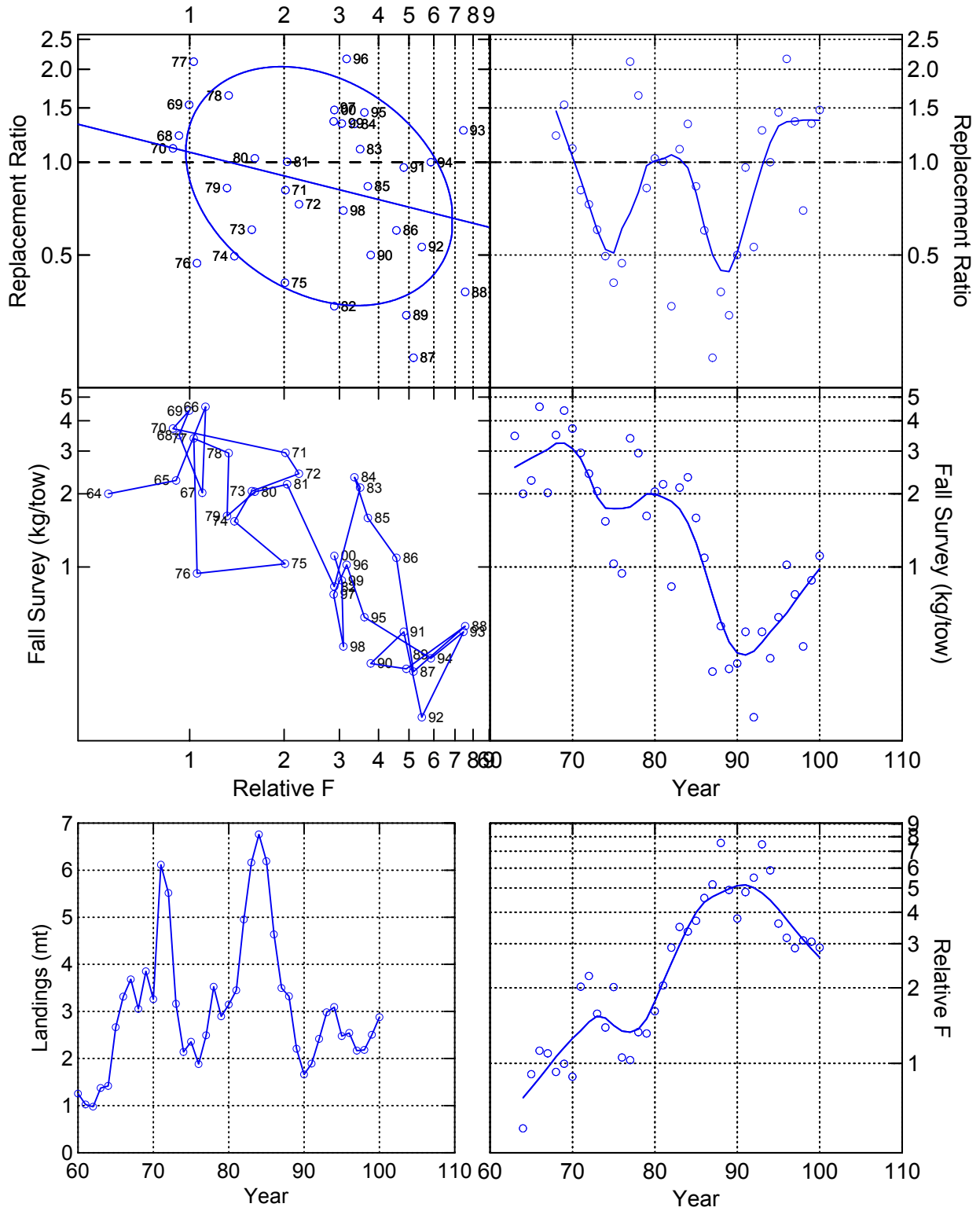
# American Plaice, Fall



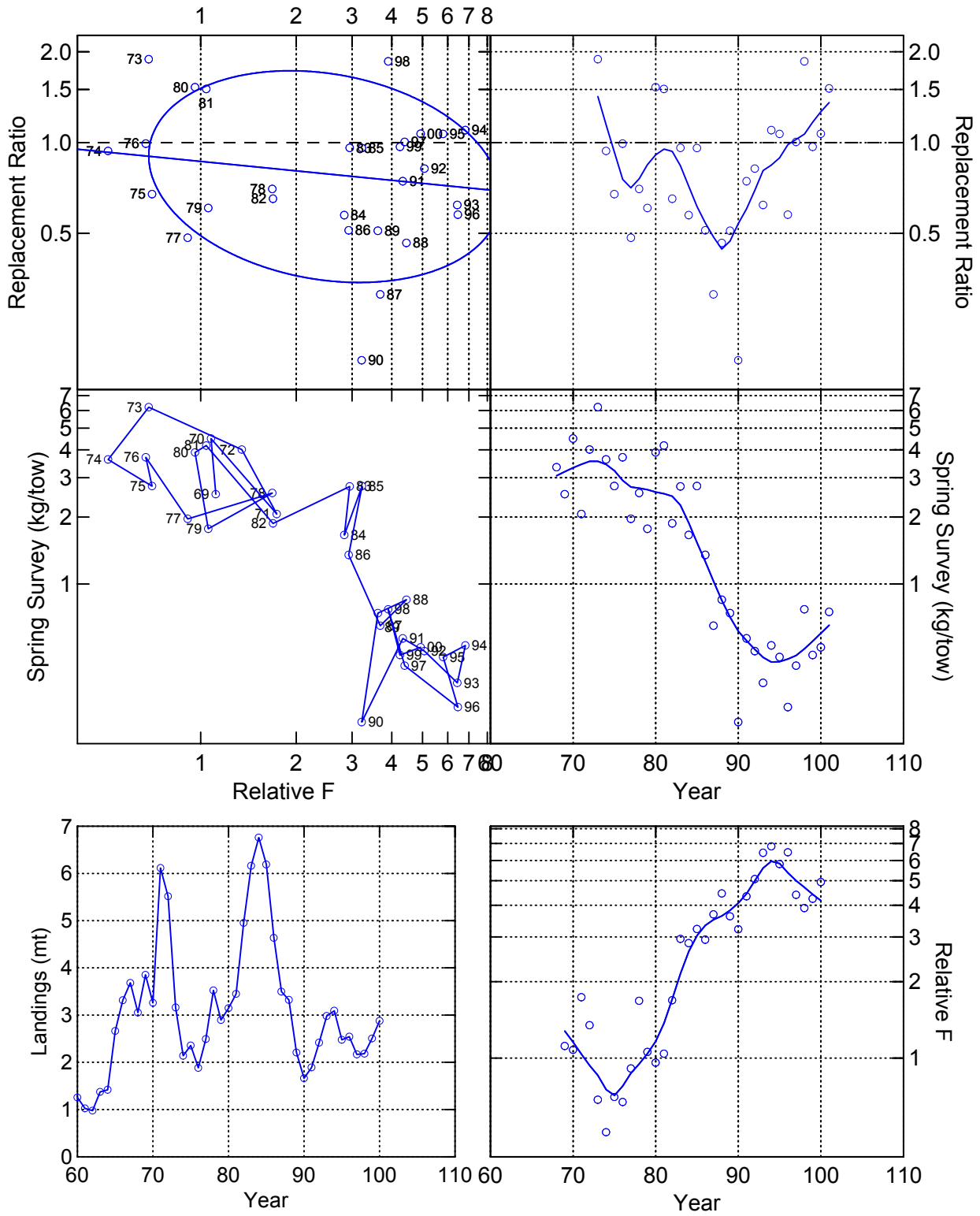
# American Plaice, Spring



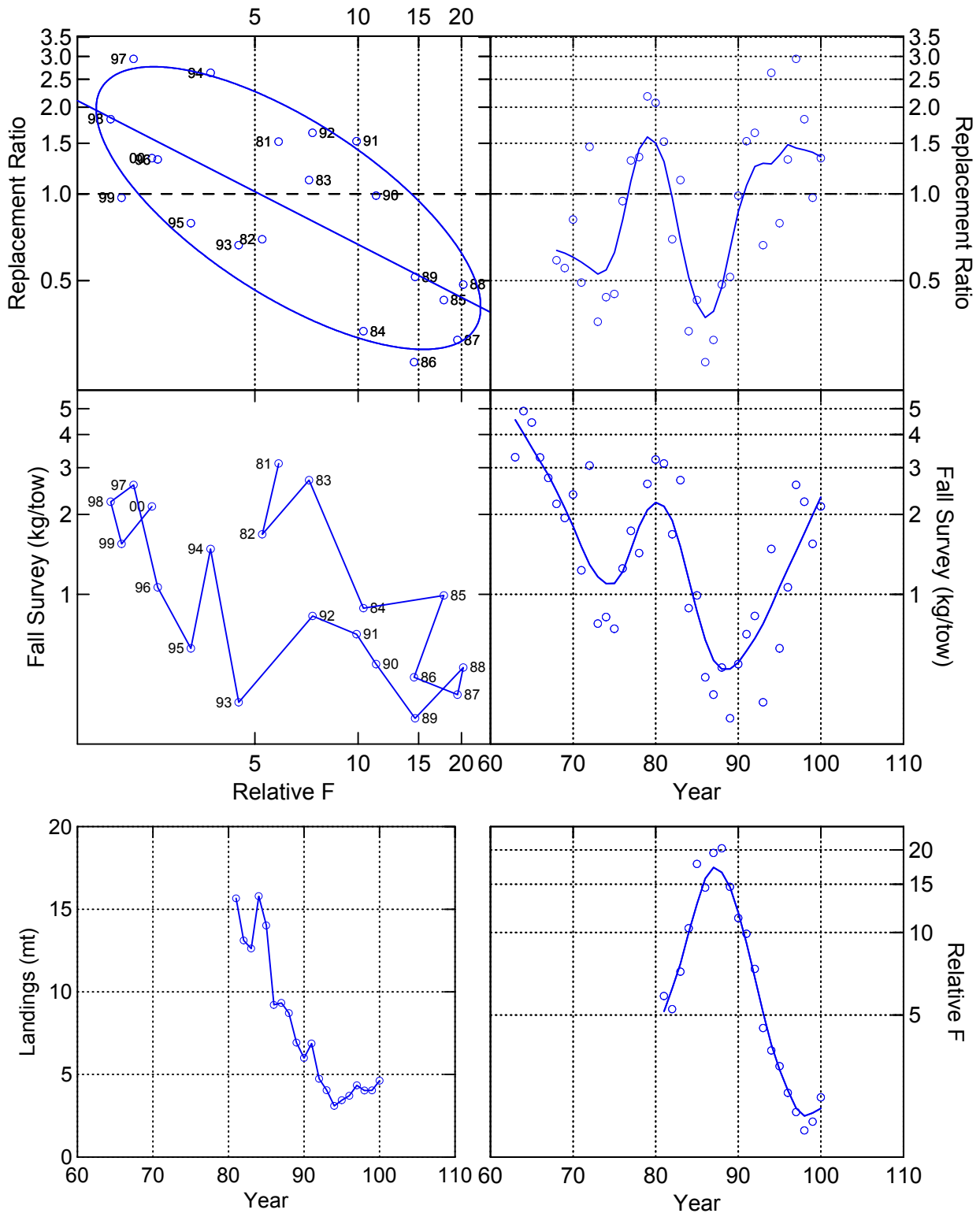
# Witch Flounder, Fall



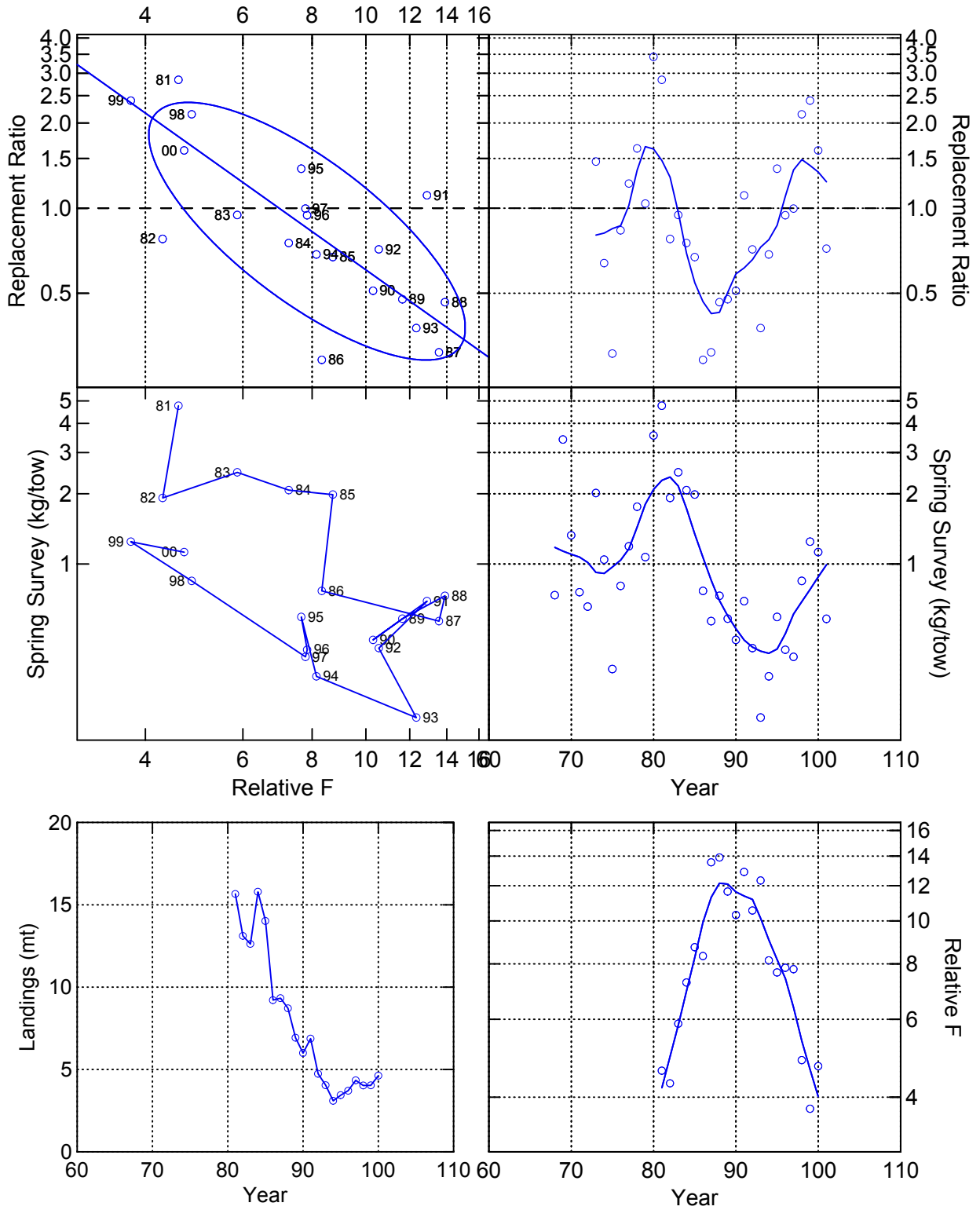
# Witch Flounder, Spring



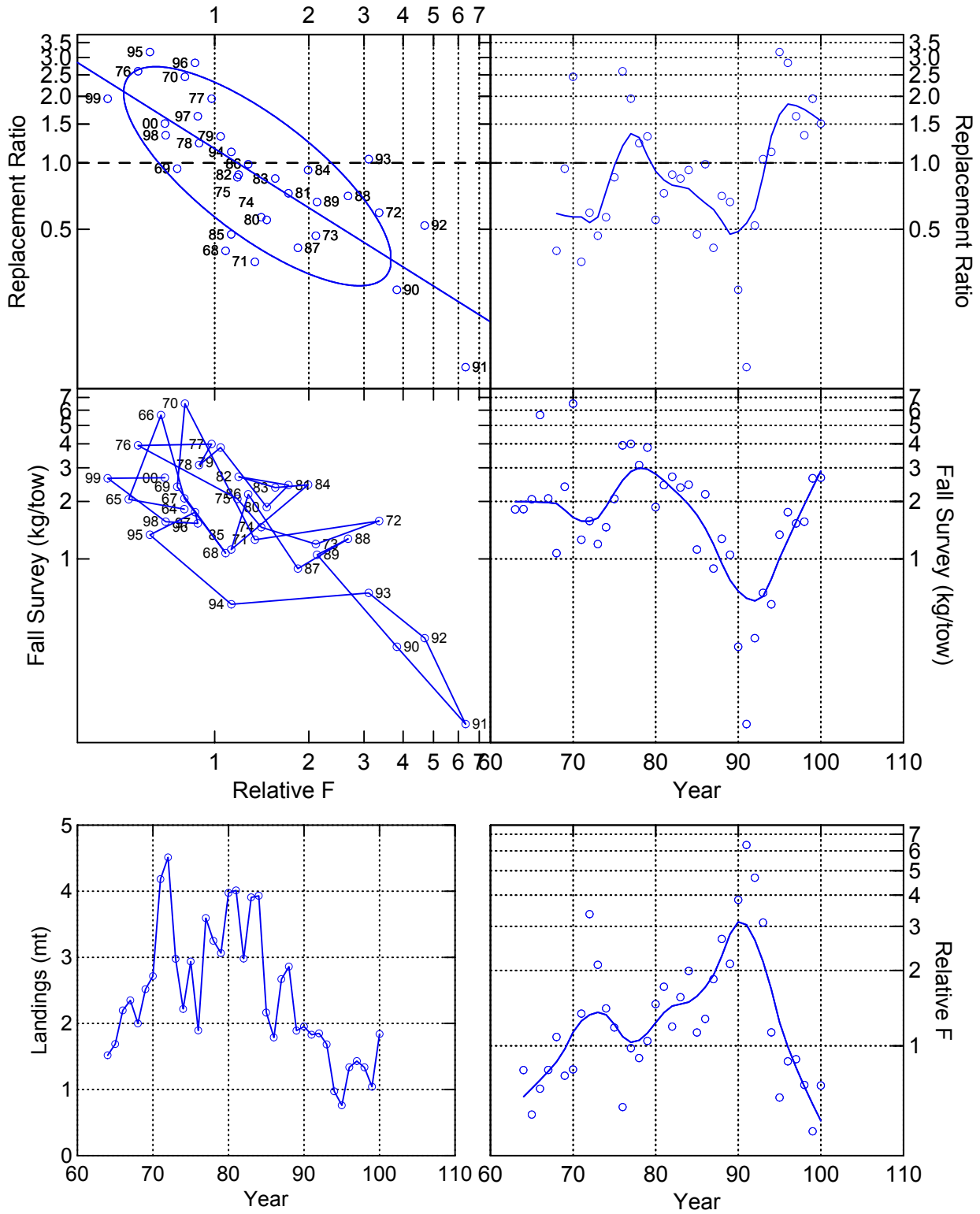
# SNE Winter Flounder, Fall



# SNE Winter Flounder, Spring

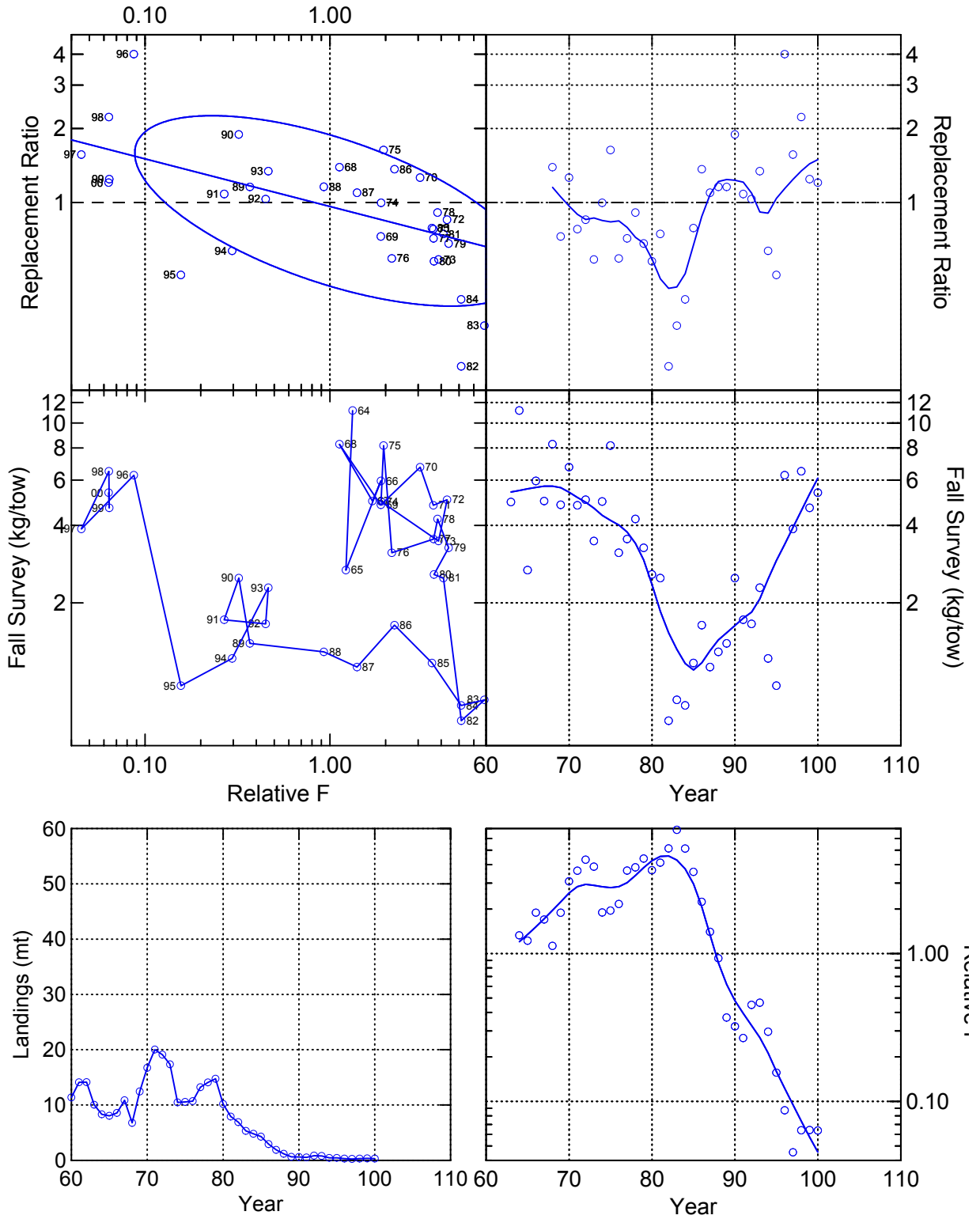


# Georges Bank Winter Flounder, Fall

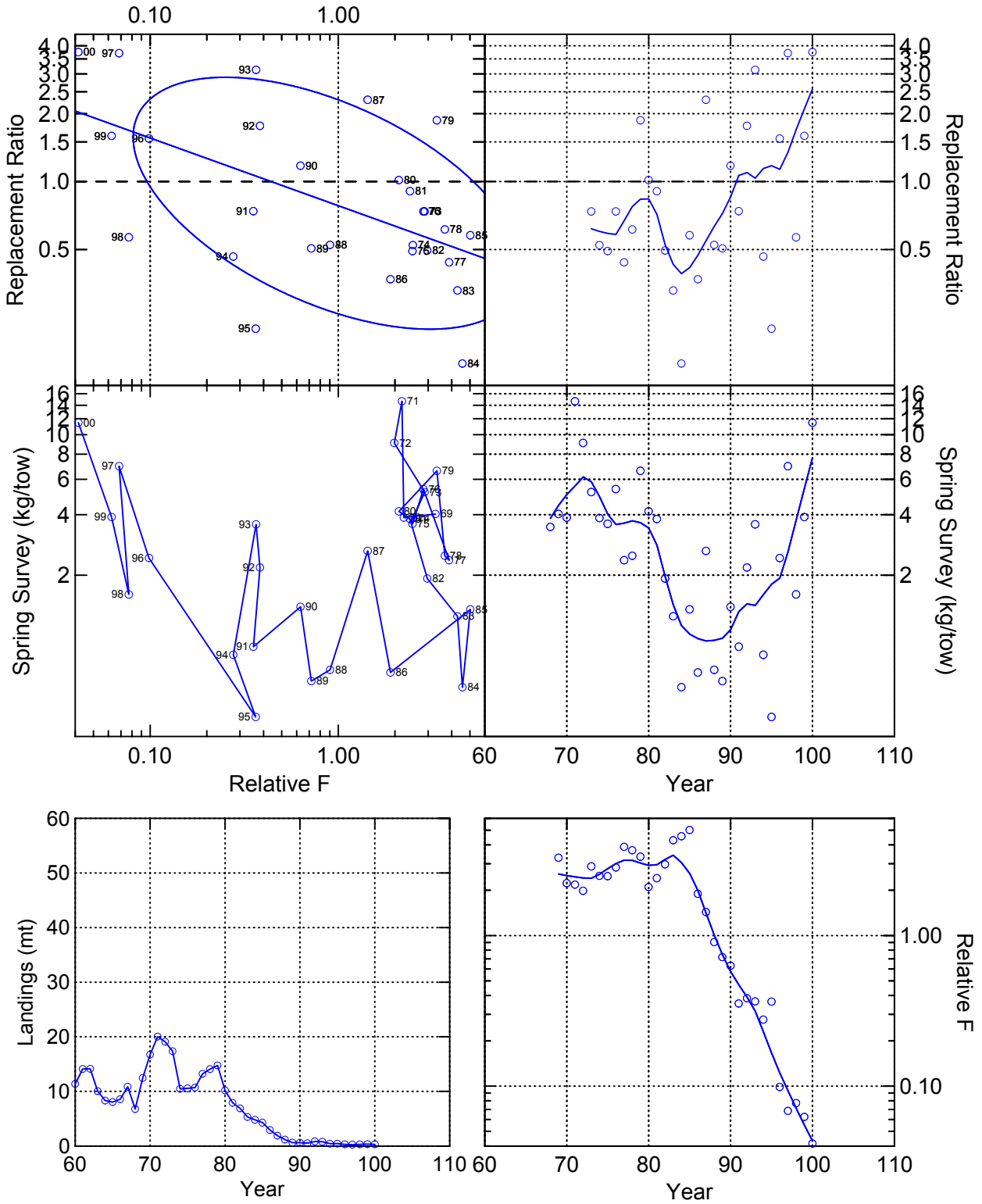




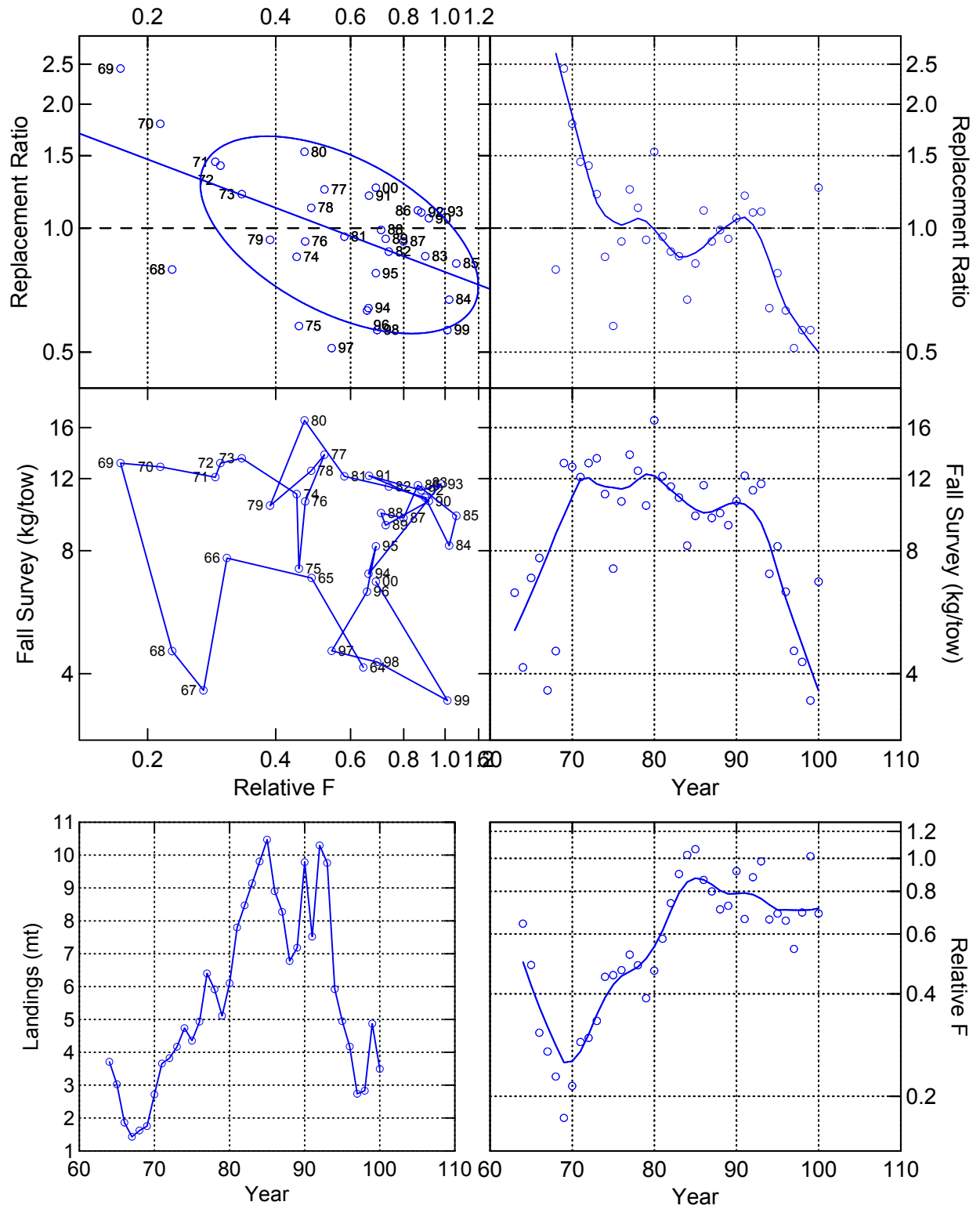
# Acadian Redfish, Fall



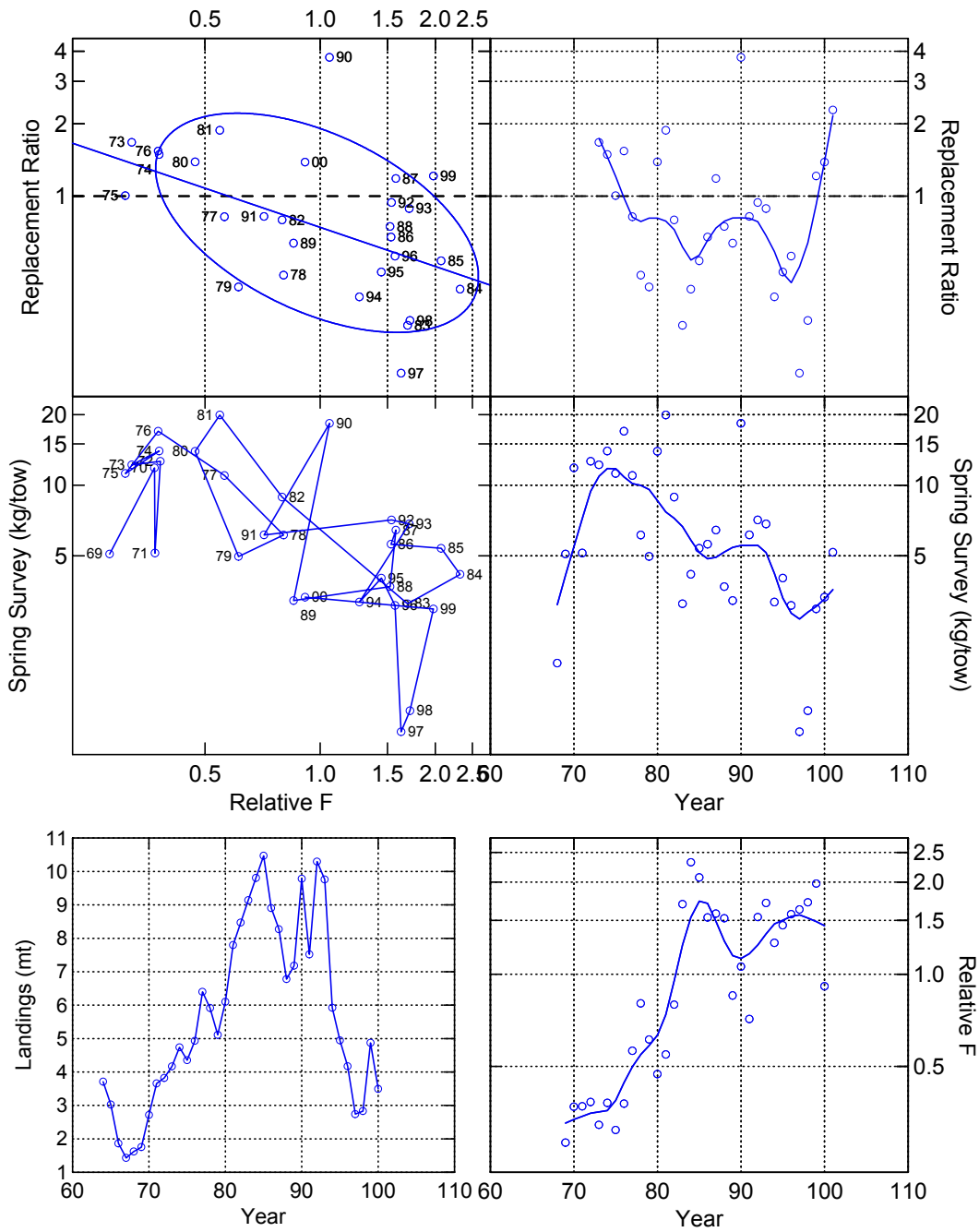
# Acadian Redfish, Spring



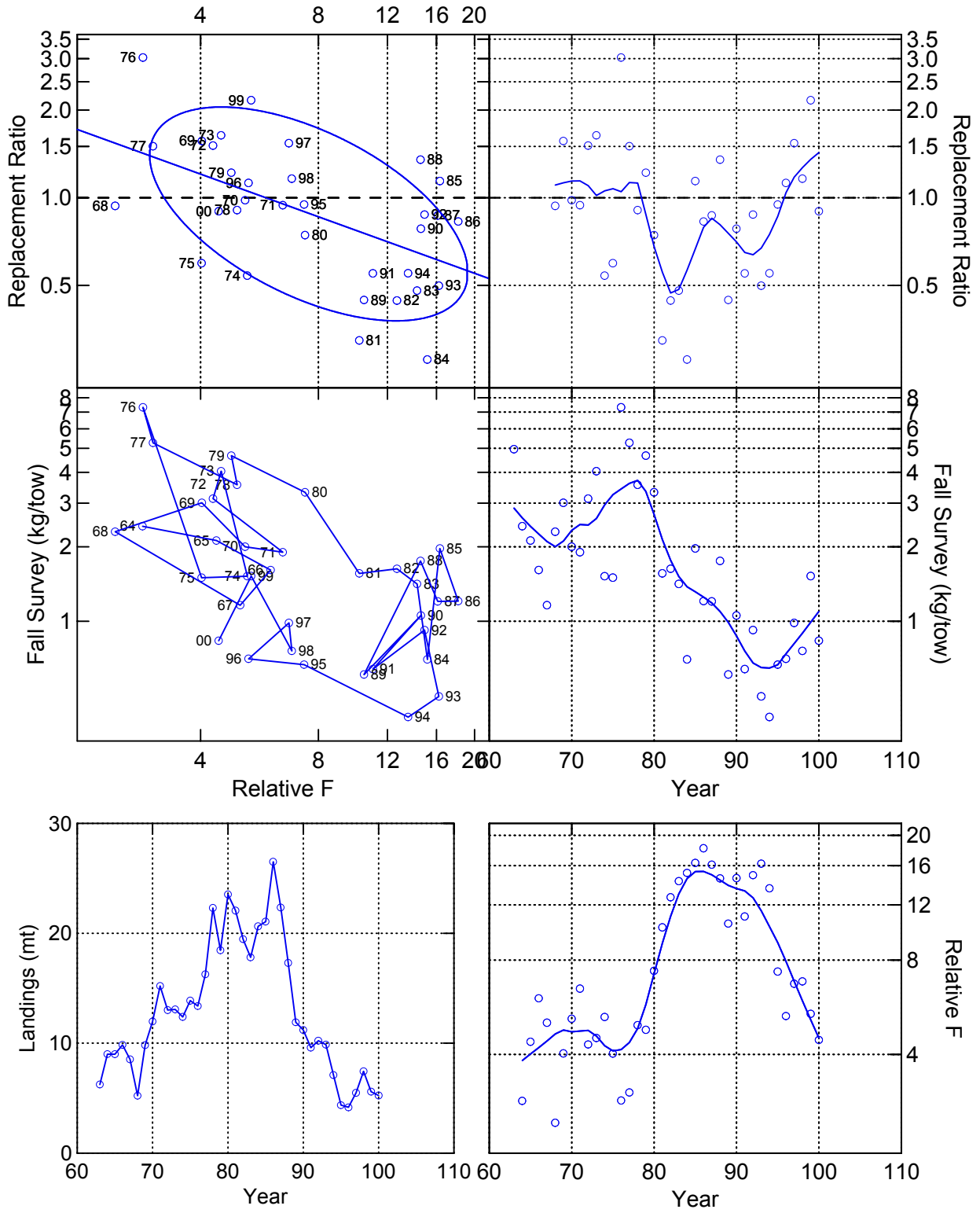
# White Hake, Fall



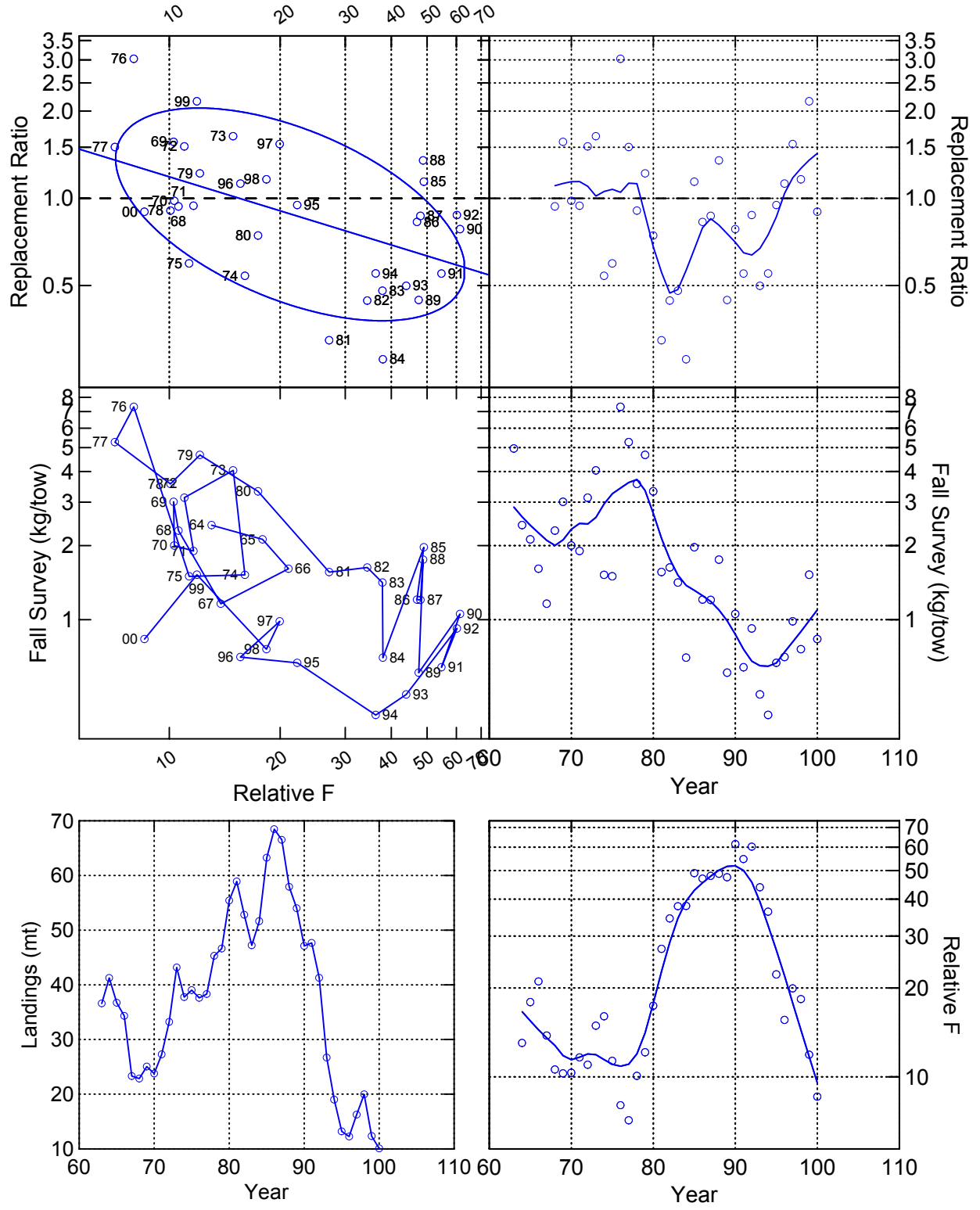
# White Hake, Spring



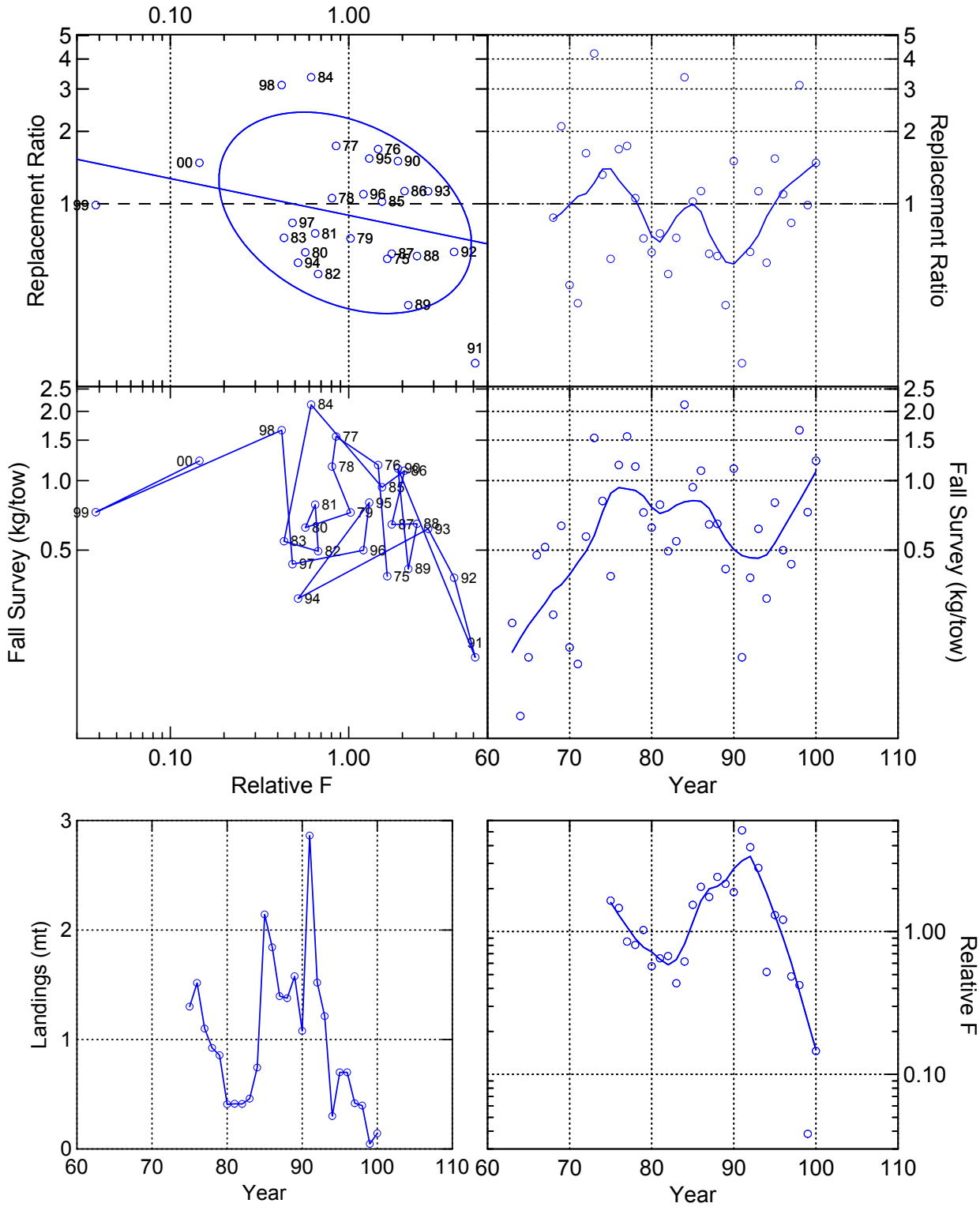
# Pollock (Areas 5 and 6), Fall



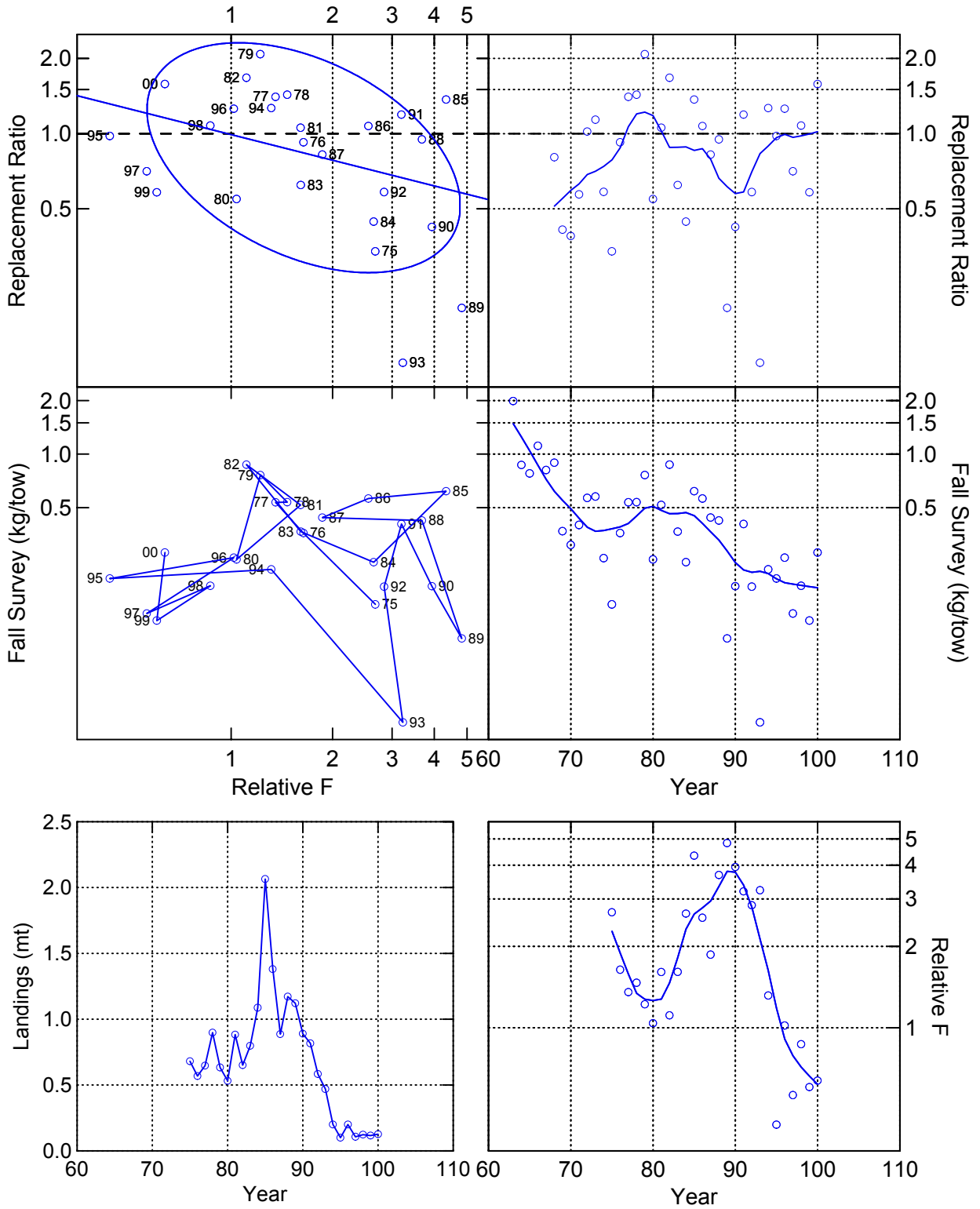
# Pollock (all Catches), Fall



# Northern Windowpane Flounder, Fall

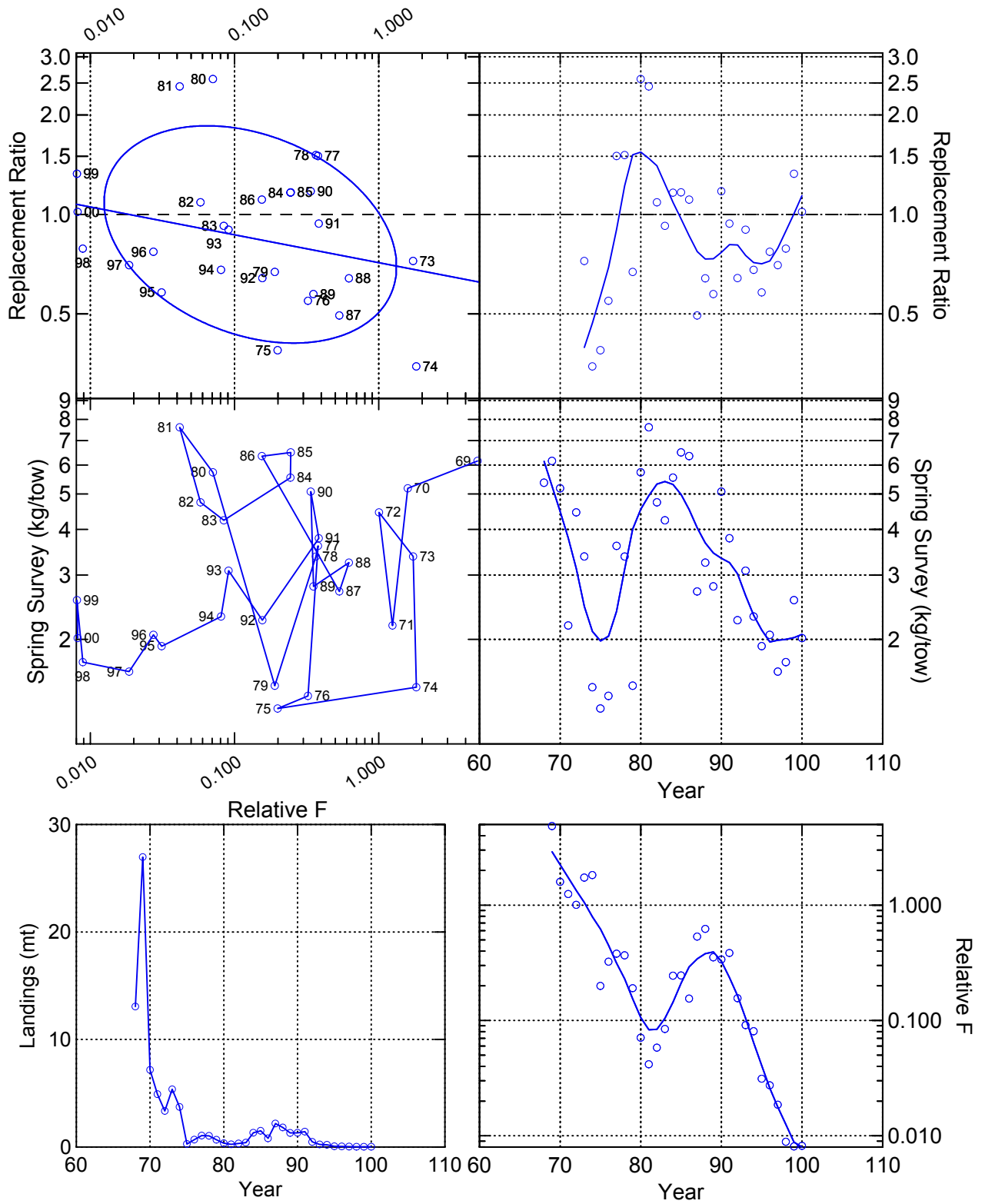


# Southern Windowpane Flounder, Fall

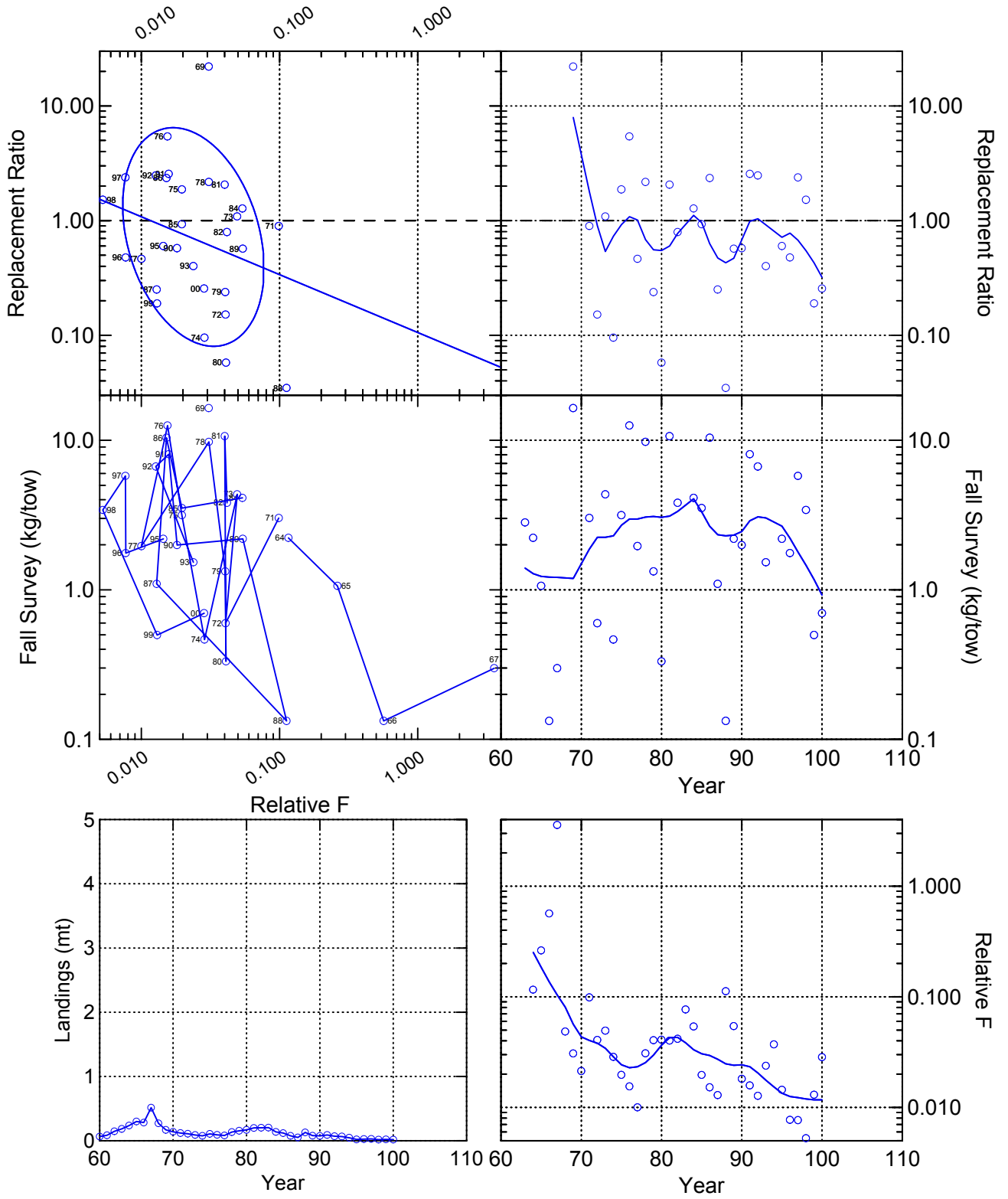




# Ocean Pout, Spring



# Halibut, Fall



# Halibut, Spring

