

**APPENDIX: Full output of VPA RUN 301-f**

VPA Version 2.0.11

Model ID: witch fld. run 301-f new p-r 1980-2002 maturity

Input File: H:\WITCHASS\VPA\VPA2003\SERIES3\RUN301-F.DAT

Date of Run: 15-MAY-2003

Time of Run: 21:15

Levenburg-Marquardt Algorithm Completed 7 Iterations  
Residual Sum of Squares = 281.727

Number of Residuals = 364  
Number of Parameters = 8  
Degrees of Freedom = 356  
Mean Squared Residual = 0.791369  
Standard Deviation = 0.889589

Number of Years = 21  
Number of Ages = 9  
First Year = 1982  
Youngest Age = 3  
Oldest True Age = 10

Number of Survey Indices Available = 42  
Number of Survey Indices Used in Estimate = 18

VPA Classic Method - Auto Estimated Q's

Stock Numbers Predicted in Terminal Year Plus One (2003)

Age	Stock Predicted	Std. Error	CV
3	19759.763	0.128070E+05	0.648137E+00
4	25441.190	0.116744E+05	0.458878E+00
5	42739.077	0.161746E+05	0.378451E+00
6	41657.971	0.138230E+05	0.331822E+00
7	21203.570	0.658855E+04	0.310728E+00
8	10370.219	0.335096E+04	0.323133E+00
9	3903.193	0.131462E+04	0.336807E+00
10	791.907	0.361682E+03	0.456723E+00

Catchability Values for Each Survey Used in Estimate

INDEX	Catchability	Std. Error	CV
4	0.134450E-04	0.338182E-05	0.251531E+00
5	0.323264E-04	0.480692E-05	0.148699E+00
6	0.429554E-04	0.514639E-05	0.119808E+00
7	0.430079E-04	0.596770E-05	0.138758E+00
8	0.508706E-04	0.712473E-05	0.140056E+00
9	0.656138E-04	0.131051E-04	0.199731E+00
10	0.788325E-04	0.158102E-04	0.200554E+00
11	0.836507E-04	0.173114E-04	0.206948E+00
18	0.113695E-03	0.150419E-04	0.132300E+00
21	0.834330E-05	0.224168E-05	0.268681E+00
22	0.307342E-04	0.636966E-05	0.207250E+00
23	0.385675E-04	0.103815E-04	0.269179E+00
24	0.410818E-04	0.106353E-04	0.258880E+00
25	0.461380E-04	0.918963E-05	0.199177E+00
26	0.772831E-04	0.152953E-04	0.197913E+00
27	0.796591E-04	0.151773E-04	0.190528E+00
28	0.913192E-04	0.204756E-04	0.224221E+00
35	0.111457E-03	0.183216E-04	0.164383E+00

-- Non-Linear Least Squares Fit --

Default Tolerances Used

Scaled Gradient Tolerance = 6.055454E-06  
Scaled Step Tolerance = 3.666853E-11  
Relative Function Tolerance = 3.666853E-11  
Absolute Function Tolerance = 4.930381E-32

VPA Method Options

- Catch Equation Used in Cohort Solution
- Plus Group Backward Calculation Method Used
- Rivard Weights Used for JAN-1 Biomass
- Rivard Weights Used for SSB Biomass
- Heincke Rule Used in F-Oldest Calculation
- F-Oldest Calculation in Years Prior to Terminal Year  
Uses Stock Sizes in Ages 8 to 10
- Calculation of Population of Age 3 In Year 2003  
= Stock Estimate

Stock Estimates

Age 3  
Age 4  
Age 5  
Age 6  
Age 7  
Age 8  
Age 9  
Age 10

Full F in Terminal Year = 0.4087

F in Oldest True Age in Terminal Year = 0.4087

Full F Calculated Using Classic Method

Age	Input Partial Recruitment	Calc Partial Recruitment	Fishing Mortality	Used In Full F	Comments
3	0.004	0.003	0.0015	NO	Stock Estimate in T+1
4	0.023	0.029	0.0161	NO	Stock Estimate in T+1
5	0.070	0.049	0.0268	NO	Stock Estimate in T+1
6	0.193	0.108	0.0595	NO	Stock Estimate in T+1
7	0.528	0.315	0.1741	NO	Stock Estimate in T+1
8	1.000	0.479	0.2648	YES	Stock Estimate in T+1
9	1.000	1.000	0.5526	YES	Stock Estimate in T+1
10	1.000	0.740	0.4087		Input PR * Full F

JAN-1 Population Numbers

AGE	1982	1983	1984	1985	1986
3	15404.	17700.	16340.	7650.	5414.
4	12174.	13082.	14922.	13928.	6470.
5	9563.	9493.	10014.	11486.	10899.
6	7830.	7114.	6765.	6768.	7929.
7	4289.	5375.	4668.	4216.	4039.
8	2752.	3077.	3160.	2647.	2224.
9	2102.	1763.	1746.	1344.	1132.
10	1101.	1440.	839.	862.	599.
11	7260.	4728.	3844.	2926.	2039.
Total	62476.	63772.	62297.	51828.	40746.
AGE	1987	1988	1989	1990	1991
3	3001.	9740.	6214.	6670.	8831.
4	4639.	2562.	7827.	4934.	5422.
5	5220.	3825.	2076.	6333.	3660.
6	7978.	4060.	3047.	1726.	4431.
7	4267.	5683.	2886.	2332.	1249.
8	2034.	2222.	3615.	1783.	1754.
9	1146.	949.	853.	2297.	1100.
10	594.	544.	448.	413.	1668.
11	1151.	1218.	1263.	900.	1371.
Total	30029.	30804.	28229.	27388.	29487.
AGE	1992	1993	1994	1995	1996
3	14342.	9670.	13610.	12671.	15878.
4	7192.	11974.	7936.	11675.	10324.
5	4291.	5029.	8635.	5904.	9706.
6	2353.	2900.	3019.	4887.	4119.
7	3281.	1164.	1649.	1414.	2627.
8	857.	2162.	453.	660.	438.
9	1283.	552.	1320.	209.	321.
10	677.	940.	274.	640.	91.
11	2127.	1318.	782.	373.	180.
Total	36404.	35708.	37679.	38434.	43683.
AGE	1997	1998	1999	2000	2001
3	20226.	29659.	42904.	67651.	58704.
4	13554.	17283.	25221.	36778.	58131.
5	8400.	10686.	14360.	21220.	31390.
6	7237.	6290.	8213.	11345.	17842.
7	2289.	5033.	4106.	5717.	8693.
8	949.	1033.	2846.	2426.	3417.
9	136.	274.	547.	1743.	1138.
10	80.	39.	105.	239.	926.
11	112.	179.	181.	536.	667.
Total	52982.	70476.	98483.	147655.	180909.

JAN-1 Population Numbers

AGE	2002	2003
3	29603.	19760.
4	50462.	25441.
5	49716.	42739.
6	26146.	41658.
7	14340.	21204.
8	5910.	10370.
9	1599.	3903.
10	398.	792.
11	655.	603.
Total	178829.	166470.

Fishing Mortality Calculated

AGE	1982	1983	1984	1985	1986
3	0.0134	0.0207	0.0097	0.0175	0.0046
4	0.0988	0.1173	0.1117	0.0952	0.0648
5	0.1459	0.1889	0.2417	0.2207	0.1620
6	0.2261	0.2713	0.3227	0.3662	0.4696
7	0.1823	0.3814	0.4173	0.4895	0.5361
8	0.2953	0.4162	0.7051	0.6998	0.5136
9	0.2282	0.5929	0.5562	0.6573	0.4949
10	0.2657	0.4770	0.6495	0.6853	0.5072
11	0.2657	0.4770	0.6495	0.6853	0.5072
AGE	1987	1988	1989	1990	1991
3	0.0080	0.0686	0.0806	0.0571	0.0553
4	0.0430	0.0605	0.0618	0.1487	0.0839
5	0.1012	0.0773	0.0344	0.2072	0.2919
6	0.1892	0.1914	0.1176	0.1733	0.1503
7	0.5025	0.3025	0.3316	0.1350	0.2265
8	0.6118	0.8070	0.3035	0.3332	0.1624
9	0.5951	0.6015	0.5765	0.1699	0.3352
10	0.6058	0.7409	0.3502	0.2380	0.2255
11	0.6058	0.7409	0.3502	0.2380	0.2255
AGE	1992	1993	1994	1995	1996
3	0.0304	0.0475	0.0033	0.0549	0.0083
4	0.2077	0.1769	0.1458	0.0347	0.0562
5	0.2420	0.3602	0.4192	0.2100	0.1436
6	0.5542	0.4143	0.6087	0.4709	0.4376
7	0.2672	0.7926	0.7655	1.0227	0.8680
8	0.2907	0.3431	0.6230	0.5707	1.0205
9	0.1614	0.5517	0.5738	0.6881	1.2443
10	0.2112	0.3821	0.5862	0.5977	1.1092
11	0.2112	0.3821	0.5862	0.5977	1.1092

AGE	1997	1998	1999	2000	2001
3	0.0072	0.0121	0.0040	0.0016	0.0013
4	0.0877	0.0353	0.0227	0.0084	0.0064
5	0.1393	0.1132	0.0857	0.0234	0.0328
6	0.2131	0.2764	0.2122	0.1163	0.0685
7	0.6456	0.4201	0.3762	0.3646	0.2359
8	1.0930	0.4859	0.3402	0.6068	0.6097
9	1.0854	0.8049	0.6793	0.4829	0.9002
10	1.0920	0.5448	0.3876	0.5531	0.6747
11	1.0920	0.5448	0.3876	0.5531	0.6747

AGE	2002
3	0.0015
4	0.0161
5	0.0268
6	0.0595
7	0.1741
8	0.2648
9	0.5526
10	0.4087
11	0.4087

## Average Fishing Mortality For Ages 8- 9

Year	Average F	N Weighted	Biomass Wtd	Catch Wtd
1982	0.2618	0.2663	0.2631	0.2699
1983	0.5046	0.4806	0.4920	0.4922
1984	0.6307	0.6521	0.6456	0.6578
1985	0.6786	0.6855	0.6835	0.6859
1986	0.5042	0.5073	0.5063	0.5074
1987	0.6035	0.6058	0.6050	0.6059
1988	0.7043	0.7455	0.7364	0.7540
1989	0.4400	0.3557	0.3646	0.3810
1990	0.2515	0.2412	0.2337	0.2654
1991	0.2488	0.2290	0.2360	0.2565
1992	0.2260	0.2132	0.2086	0.2301
1993	0.4474	0.3855	0.3939	0.3999
1994	0.5984	0.5864	0.5846	0.5870
1995	0.6294	0.5990	0.6051	0.6020
1996	1.1324	1.1152	1.1262	1.1213
1997	1.0892	1.0920	1.0918	1.0920
1998	0.6454	0.5527	0.5710	0.5741
1999	0.5097	0.3948	0.4009	0.4243
2000	0.5448	0.5550	0.5504	0.5601
2001	0.7550	0.6823	0.6917	0.6977
2002	0.4087	0.3261	0.3344	0.3601

## Average Fishing Mortality For Ages 8- 9

Year	Average F	N Weighted	Biomass Wtd	Catch Wtd
1982	0.2618	0.2663	0.2631	0.2699
1983	0.5046	0.4806	0.4920	0.4922
1984	0.6307	0.6521	0.6456	0.6578
1985	0.6786	0.6855	0.6835	0.6859
1986	0.5042	0.5073	0.5063	0.5074
1987	0.6035	0.6058	0.6050	0.6059
1988	0.7043	0.7455	0.7364	0.7540
1989	0.4400	0.3557	0.3646	0.3810
1990	0.2515	0.2412	0.2337	0.2654
1991	0.2488	0.2290	0.2360	0.2565
1992	0.2260	0.2132	0.2086	0.2301
1993	0.4474	0.3855	0.3939	0.3999
1994	0.5984	0.5864	0.5846	0.5870
1995	0.6294	0.5990	0.6051	0.6020
1996	1.1324	1.1152	1.1262	1.1213
1997	1.0892	1.0920	1.0918	1.0920
1998	0.6454	0.5527	0.5710	0.5741
1999	0.5097	0.3948	0.4009	0.4243
2000	0.5448	0.5550	0.5504	0.5601
2001	0.7550	0.6823	0.6917	0.6977
2002	0.4087	0.3261	0.3344	0.3601

Back Calculated Partial Recruitment

AGE	1982	1983	1984	1985	1986
3	0.0454	0.0349	0.0138	0.0251	0.0085
4	0.3344	0.1978	0.1584	0.1361	0.1208
5	0.4940	0.3186	0.3428	0.3154	0.3022
6	0.7655	0.4576	0.4577	0.5233	0.8759
7	0.6172	0.6432	0.5918	0.6995	1.0000
8	1.0000	0.7021	1.0000	1.0000	0.9579
9	0.7728	1.0000	0.7889	0.9393	0.9231
10	0.8997	0.8046	0.9212	0.9793	0.9461
11	0.8997	0.8046	0.9212	0.9793	0.9461
AGE	1987	1988	1989	1990	1991
3	0.0131	0.0850	0.1397	0.1713	0.1651
4	0.0702	0.0750	0.1073	0.4462	0.2504
5	0.1654	0.0957	0.0597	0.6218	0.8709
6	0.3092	0.2372	0.2039	0.5201	0.4485
7	0.8212	0.3748	0.5751	0.4052	0.6756
8	1.0000	1.0000	0.5265	1.0000	0.4845
9	0.9726	0.7454	1.0000	0.5099	1.0000
10	0.9901	0.9182	0.6075	0.7143	0.6728
11	0.9901	0.9182	0.6075	0.7143	0.6728
AGE	1992	1993	1994	1995	1996
3	0.0549	0.0600	0.0043	0.0537	0.0067
4	0.3747	0.2232	0.1905	0.0340	0.0452
5	0.4367	0.4545	0.5476	0.2053	0.1154
6	1.0000	0.5227	0.7952	0.4604	0.3516
7	0.4822	1.0000	1.0000	1.0000	0.6976
8	0.5246	0.4329	0.8139	0.5580	0.8202
9	0.2912	0.6961	0.7496	0.6728	1.0000
10	0.3811	0.4821	0.7658	0.5845	0.8914
11	0.3811	0.4821	0.7658	0.5845	0.8914
AGE	1997	1998	1999	2000	2001
3	0.0066	0.0150	0.0060	0.0027	0.0014
4	0.0803	0.0439	0.0334	0.0139	0.0071
5	0.1274	0.1407	0.1261	0.0386	0.0364
6	0.1950	0.3434	0.3124	0.1916	0.0761
7	0.5907	0.5219	0.5538	0.6009	0.2620
8	1.0000	0.6036	0.5008	1.0000	0.6772
9	0.9931	1.0000	1.0000	0.7958	1.0000
10	0.9991	0.6769	0.5707	0.9115	0.7495
11	0.9991	0.6769	0.5707	0.9115	0.7495

Back Calculated Partial Recruitment

AGE	2002
3	0.0027
4	0.0292
5	0.0486
6	0.1077
7	0.3151
8	0.4793
9	1.0000
10	0.7396
11	0.7396

JAN-1 Biomass

AGE	1982	1983	1984	1985	1986
3	2027.	1336.	1247.	550.	247.
4	2784.	2293.	2758.	2637.	1050.
5	2822.	2423.	2581.	3031.	2902.
6	2967.	2611.	2280.	2539.	2795.
7	2235.	2509.	2192.	2058.	1931.
8	1913.	1786.	1853.	1615.	1375.
9	1774.	1340.	1236.	1005.	869.
10	1028.	1340.	718.	765.	543.
11	10204.	6418.	5148.	3878.	2694.
Total	27754.	22056.	20012.	18077.	14406.
AGE	1987	1988	1989	1990	1991
3	137.	374.	284.	305.	376.
4	603.	329.	684.	745.	601.
5	1293.	932.	530.	1325.	927.
6	2874.	1461.	1108.	648.	1456.
7	2041.	2744.	1441.	1164.	629.
8	1230.	1360.	2189.	1120.	1125.
9	857.	712.	631.	1748.	834.
10	543.	490.	399.	382.	1517.
11	1500.	1615.	1714.	1309.	1947.
Total	11077.	10017.	8980.	8745.	9411.
AGE	1992	1993	1994	1995	1996
3	866.	544.	591.	390.	607.
4	857.	1730.	1247.	1226.	896.
5	1178.	1359.	2055.	1518.	1988.
6	935.	1173.	1117.	1706.	1532.
7	1667.	577.	792.	694.	1289.
8	560.	1383.	276.	401.	276.
9	975.	446.	983.	166.	247.
10	581.	862.	245.	576.	85.
11	2644.	1760.	989.	463.	222.
Total	10264.	9833.	8294.	7141.	7141.
AGE	1997	1998	1999	2000	2001
3	941.	1433.	1742.	2699.	2718.
4	1438.	1848.	3110.	4230.	6255.
5	1698.	2367.	3130.	5169.	7022.
6	2282.	1972.	2649.	3712.	5611.
7	1046.	2154.	1763.	2422.	3596.
8	560.	556.	1518.	1269.	1697.
9	106.	202.	331.	1060.	668.
10	75.	36.	94.	156.	592.
11	145.	216.	158.	495.	561.
Total	8290.	10782.	14496.	21212.	28721.

JAN-1 Biomass

AGE	2002	2003
3	1492.	1433.
4	7039.	6106.
5	11002.	14813.
6	8312.	14601.
7	5937.	10411.
8	2998.	5619.
9	956.	2356.
10	290.	561.
11	602.	553.
Total	38628.	56452.

Mean Biomass

AGE	1982	1983	1984	1985	1986
3	2159.	2431.	2286.	902.	444.
4	2604.	2322.	3001.	2925.	1198.
5	2724.	2171.	2719.	2924.	2803.
6	2744.	2375.	2272.	2267.	2410.
7	2007.	2160.	1920.	1760.	1558.
8	1615.	1440.	1410.	1232.	1099.
9	1551.	989.	1023.	776.	711.
10	886.	1045.	532.	563.	428.
11	8349.	4768.	3544.	2629.	1974.
Total	24639.	19702.	18709.	15978.	12626.
AGE	1987	1988	1989	1990	1991
3	226.	392.	679.	372.	494.
4	806.	469.	1202.	796.	961.
5	1376.	1064.	609.	1368.	1018.
6	2932.	1493.	1136.	646.	1609.
7	1758.	2459.	1315.	1189.	602.
8	976.	955.	1982.	973.	1057.
9	669.	547.	496.	1669.	728.
10	408.	353.	341.	359.	1354.
11	1053.	1069.	1349.	1085.	1623.
Total	10205.	8801.	9109.	8455.	9447.
AGE	1992	1993	1994	1995	1996
3	1356.	1073.	878.	580.	877.
4	1389.	2063.	1386.	1689.	1390.
5	1346.	1253.	1846.	1626.	2226.
6	775.	957.	909.	1582.	1314.
7	1647.	403.	577.	467.	913.
8	512.	1137.	218.	324.	183.
9	906.	350.	782.	129.	148.
10	501.	746.	176.	439.	50.
11	2219.	1364.	700.	326.	126.
Total	10652.	9346.	7473.	7162.	7227.
AGE	1997	1998	1999	2000	2001
3	1308.	1917.	2688.	4130.	4821.
4	2274.	2578.	5031.	6656.	9461.
5	1999.	2445.	3722.	5325.	7338.
6	2280.	1837.	2756.	3666.	5800.
7	781.	1869.	1641.	2004.	3354.
8	341.	447.	1313.	906.	1317.
9	68.	153.	233.	818.	455.
10	47.	28.	75.	116.	408.
11	83.	156.	122.	356.	382.
Total	9181.	11429.	17581.	23978.	33336.

Mean Biomass

AGE	2002
3	3022.
4	10224.
5	12691.
6	9320.
7	5801.
8	2677.
9	747.
10	251.
11	461.
=====	
Total	45192.

Spawning Stock Biomass

AGE	1982	1983	1984	1985	1986
3	20.	13.	24.	5.	5.
4	107.	132.	185.	127.	91.
5	376.	458.	580.	684.	1019.
6	1115.	1241.	1243.	1584.	1916.
7	1543.	1883.	1715.	1720.	1636.
8	1634.	1544.	1559.	1388.	1218.
9	1632.	1172.	1088.	878.	780.
10	949.	1207.	628.	665.	487.
11	9521.	5781.	4505.	3374.	2414.
Total	16897.	13431.	11528.	10425.	9567.
AGE	1987	1988	1989	1990	1991
3	16.	115.	33.	24.	25.
4	216.	191.	238.	156.	104.
5	880.	745.	360.	587.	336.
6	2471.	1297.	964.	454.	886.
7	1794.	2494.	1303.	999.	496.
8	1072.	1148.	2010.	1003.	1004.
9	757.	628.	559.	1640.	754.
10	479.	422.	367.	358.	1411.
11	1323.	1392.	1577.	1227.	1829.
Total	9008.	8433.	7410.	6447.	6844.
AGE	1992	1993	1994	1995	1996
3	50.	21.	23.	11.	12.
4	145.	229.	154.	155.	113.
5	463.	437.	636.	601.	852.
6	582.	694.	630.	1200.	1139.
7	1369.	424.	585.	542.	1044.
8	500.	1210.	230.	352.	225.
9	916.	392.	862.	144.	196.
10	547.	789.	217.	509.	69.
11	2490.	1610.	875.	409.	180.
Total	7063.	5806.	4212.	3922.	3828.
AGE	1997	1998	1999	2000	2001
3	9.	56.	85.	158.	186.
4	97.	251.	453.	618.	975.
5	599.	883.	1114.	1657.	2384.
6	1740.	1304.	1671.	2095.	3192.
7	888.	1782.	1405.	1800.	2664.
8	455.	485.	1343.	1040.	1361.
9	87.	171.	286.	925.	544.
10	61.	32.	86.	137.	511.
11	118.	192.	145.	441.	489.
Total	4053.	5156.	6587.	8871.	12305.

Spawning Stock Biomass

AGE	2002
3	102.
4	1096.
5	3739.
6	4736.
7	4443.
8	2545.
9	825.
10	262.
11	548.
=====	
Total	18296.

Catch Biomass

AGE	1982	1983	1984	1985	1986
3	29.	50.	22.	16.	2.
4	257.	272.	335.	279.	78.
5	397.	410.	657.	645.	454.
6	620.	645.	733.	830.	1132.
7	366.	824.	801.	862.	835.
8	477.	599.	994.	862.	564.
9	354.	586.	569.	510.	352.
10	235.	499.	346.	386.	217.
11	2219.	2274.	2302.	1802.	1002.
Total	4955.	6160.	6761.	6192.	4636.
AGE	1987	1988	1989	1990	1991
3	2.	27.	55.	21.	27.
4	35.	28.	74.	118.	81.
5	139.	82.	21.	283.	297.
6	555.	286.	134.	112.	242.
7	883.	744.	436.	161.	136.
8	597.	771.	602.	324.	172.
9	398.	329.	286.	283.	244.
10	247.	261.	119.	85.	305.
11	638.	792.	472.	258.	366.
Total	3494.	3320.	2199.	1646.	1871.
AGE	1992	1993	1994	1995	1996
3	41.	51.	3.	32.	7.
4	288.	365.	202.	59.	78.
5	326.	451.	774.	342.	320.
6	430.	397.	554.	745.	575.
7	440.	320.	442.	477.	792.
8	149.	390.	136.	185.	186.
9	146.	193.	449.	89.	184.
10	106.	285.	103.	262.	56.
11	469.	521.	410.	195.	140.
Total	2395.	2973.	3072.	2386.	2339.
AGE	1997	1998	1999	2000	2001
3	9.	23.	11.	7.	6.
4	200.	91.	114.	56.	60.
5	278.	277.	319.	125.	241.
6	486.	508.	585.	426.	397.
7	504.	785.	617.	731.	791.
8	372.	217.	447.	550.	803.
9	73.	123.	158.	395.	410.
10	52.	15.	29.	64.	275.
11	91.	85.	47.	197.	258.
Total	2066.	2124.	2327.	2550.	3241.

Catch Biomass

AGE	2002
3	5.
4	165.
5	341.
6	555.
7	1010.
8	709.
9	413.
10	80.
11	188.
=====	
Total	3465.

Surplus Production

Average Adjustment Factor (Delta) = 1.0000

Year	Biomass	Delta Biomass	Catch Biomass	Surplus Production
1982	27753.983	-5697.846	4954.638	-743.208
1983	22056.137	-2044.094	6159.976	4115.882
1984	20012.043	-1934.768	6760.517	4825.749
1985	18077.275	-3671.668	6191.704	2520.036
1986	14405.606	-3328.378	4635.851	1307.473
1987	11077.228	-1059.758	3494.396	2434.637
1988	10017.470	-1037.240	3320.343	2283.103
1989	8980.230	-235.331	2199.015	1963.684
1990	8744.899	666.450	1646.456	2312.905
1991	9411.349	852.941	1870.786	2723.727
1992	10264.289	-430.994	2394.876	1963.882
1993	9833.296	-1539.477	2972.811	1433.334
1994	8293.818	-1153.030	3072.149	1919.119
1995	7140.788	-0.006	2385.733	2385.726
1996	7140.782	1149.552	2338.662	3488.214
1997	8290.334	2492.097	2066.078	4558.175
1998	10782.431	3713.086	2124.350	5837.436
1999	14495.517	6716.072	2327.426	9043.498
2000	21211.589	7509.247	2550.036	10059.282
2001	28720.836	9906.770	3241.147	13147.917
2002	38627.606	17824.499	3464.690	21289.189
2003	56452.105			

Summary of Survey Indices Used in the Estimate

INDEX	Survey Tag	Age	Time	Type
4	Spr	3	JAN-1	NUMBER
5	Spr	4	JAN-1	NUMBER
6	Spr	5	JAN-1	NUMBER
7	Spr	6	JAN-1	NUMBER
8	Spr	7	JAN-1	NUMBER
9	Spr	8	JAN-1	NUMBER
10	Spr	9	JAN-1	NUMBER
11	Spr	10	JAN-1	NUMBER
18	Spr	11 - 11	JAN-1	NUMBER
21	Aut	3	JAN-1	NUMBER
22	Aut	4	JAN-1	NUMBER
23	Aut	5	JAN-1	NUMBER
24	Aut	6	JAN-1	NUMBER
25	Aut	7	JAN-1	NUMBER
26	Aut	8	JAN-1	NUMBER
27	Aut	9	JAN-1	NUMBER
28	Aut	10	JAN-1	NUMBER
35	Aut	11 - 11	JAN-1	NUMBER

Survey Index: 4 Tag: Spr AGE = 3  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.134450E-04 Variance = 0.126535E+01  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.609600E+00	0.207109E+00	0.107956E+01
1983	0.531000E+00	0.237975E+00	0.802595E+00
1984	0.115000E-01	0.219690E+00	-0.294987E+01
1985	0.167000E-01	0.102859E+00	-0.181795E+01
1986	N/A	0.727929E-01	N/A
1987	N/A	0.403491E-01	N/A
1988	0.620000E-01	0.130952E+00	-0.747699E+00
1989	0.361000E-01	0.835456E-01	-0.839100E+00
1990	0.375000E-01	0.896771E-01	-0.871874E+00
1991	0.780500E+00	0.118731E+00	0.188307E+01
1992	0.187000E+00	0.192833E+00	-0.307154E-01
1993	0.137400E+00	0.130007E+00	0.553119E-01
1994	0.540900E+00	0.182987E+00	0.108382E+01
1995	0.581200E+00	0.170361E+00	0.122717E+01
1996	0.243500E+00	0.213484E+00	0.131556E+00
1997	0.152000E+00	0.271937E+00	-0.581690E+00
1998	0.712200E+00	0.398763E+00	0.579991E+00
1999	0.973800E+00	0.576838E+00	0.523645E+00
2000	0.119360E+01	0.909560E+00	0.271769E+00
2001	0.712600E+00	0.789274E+00	-0.102193E+00
2002	0.897200E+00	0.398006E+00	0.812812E+00
2003	0.159500E+00	0.265669E+00	-0.510209E+00

Survey Index: 5 Tag: Spr AGE = 4  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.323264E-04 Variance = 0.464341E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.483800E+00	0.393557E+00	0.206446E+00
1983	0.126160E+01	0.422894E+00	0.109302E+01
1984	0.307200E+00	0.482379E+00	-0.451232E+00
1985	0.459200E+00	0.450245E+00	0.196933E-01
1986	0.439000E-01	0.209159E+00	-0.156118E+01
1987	0.589000E-01	0.149955E+00	-0.934493E+00
1988	N/A	0.828321E-01	N/A
1989	0.100440E+01	0.253028E+00	0.137865E+01
1990	0.913000E-01	0.159510E+00	-0.557958E+00
1991	0.108400E+00	0.175285E+00	-0.480585E+00
1992	0.372800E+00	0.232479E+00	0.472242E+00
1993	0.472300E+00	0.387092E+00	0.198953E+00
1994	0.643500E+00	0.256548E+00	0.919605E+00
1995	0.315600E+00	0.377423E+00	-0.178891E+00
1996	0.394300E+00	0.333725E+00	0.166793E+00
1997	0.692500E+00	0.438141E+00	0.457767E+00
1998	0.388100E+00	0.558705E+00	-0.364359E+00
1999	0.796900E+00	0.815297E+00	-0.228229E-01
2000	0.692300E+00	0.118891E+01	-0.540776E+00
2001	0.147560E+01	0.187918E+01	-0.241772E+00
2002	0.262720E+01	0.163126E+01	0.476563E+00
2003	0.777900E+00	0.822423E+00	-0.556568E-01

Survey Index: 6 Tag: Spr AGE = 5  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.429554E-04 Variance = 0.315786E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.376500E+00	0.410784E+00	-0.871507E-01
1983	0.129330E+01	0.407785E+00	0.115421E+01
1984	0.777500E+00	0.430148E+00	0.591955E+00
1985	0.105720E+01	0.493403E+00	0.762052E+00
1986	0.240300E+00	0.468180E+00	-0.666964E+00
1987	0.113800E+00	0.224215E+00	-0.678163E+00
1988	0.724000E-01	0.164290E+00	-0.819428E+00
1989	0.105400E+00	0.891701E-01	0.167217E+00
1990	0.319400E+00	0.272036E+00	0.160509E+00
1991	0.870000E-01	0.157234E+00	-0.591827E+00
1992	0.852000E-01	0.184335E+00	-0.771755E+00
1993	0.319500E+00	0.216027E+00	0.391354E+00
1994	0.810300E+00	0.370923E+00	0.781411E+00
1995	0.178800E+00	0.253603E+00	-0.349503E+00
1996	0.345500E+00	0.416925E+00	-0.187915E+00
1997	0.616900E+00	0.360821E+00	0.536325E+00
1998	0.797800E+00	0.459009E+00	0.552789E+00
1999	0.482400E+00	0.616833E+00	-0.245825E+00
2000	0.659600E+00	0.911522E+00	-0.323482E+00
2001	0.102000E+01	0.134837E+01	-0.279090E+00
2002	0.226340E+01	0.213557E+01	0.581323E-01
2003	0.157250E+01	0.183587E+01	-0.154853E+00

Survey Index: 7 Tag: Spr AGE = 6  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.430079E-04 Variance = 0.404332E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.236700E+00	0.336734E+00	-0.352499E+00
1983	0.541000E+00	0.305943E+00	0.570021E+00
1984	0.401200E+00	0.290932E+00	0.321371E+00
1985	0.119940E+01	0.291091E+00	0.141594E+01
1986	0.528500E+00	0.340990E+00	0.438190E+00
1987	0.132800E+00	0.343117E+00	-0.949227E+00
1988	0.299900E+00	0.174623E+00	0.540819E+00
1989	0.727000E-01	0.131053E+00	-0.589262E+00
1990	N/A	0.742453E-01	N/A
1991	0.208600E+00	0.190567E+00	0.904155E-01
1992	0.110500E+00	0.101193E+00	0.879816E-01
1993	0.576000E-01	0.124706E+00	-0.772436E+00
1994	0.164400E+00	0.129855E+00	0.235883E+00
1995	0.311800E+00	0.210201E+00	0.394298E+00
1996	0.218400E+00	0.177149E+00	0.209339E+00
1997	0.437400E+00	0.311234E+00	0.340304E+00
1998	0.713200E+00	0.270515E+00	0.969435E+00
1999	0.164300E+00	0.353213E+00	-0.765378E+00
2000	0.239400E+00	0.487927E+00	-0.712031E+00
2001	0.400700E+00	0.767345E+00	-0.649724E+00
2002	0.822200E+00	0.112450E+01	-0.313107E+00
2003	0.107550E+01	0.179162E+01	-0.510335E+00

Survey Index: 8 Tag: Spr AGE = 7  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.508706E-04 Variance = 0.431545E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.608500E+00	0.218195E+00	0.102561E+01
1983	0.716200E+00	0.273446E+00	0.962856E+00
1984	0.309500E+00	0.237453E+00	0.264989E+00
1985	0.907500E+00	0.214493E+00	0.144242E+01
1986	0.411700E+00	0.205471E+00	0.694989E+00
1987	0.259200E+00	0.217053E+00	0.177457E+00
1988	0.379100E+00	0.289099E+00	0.271030E+00
1989	0.811000E-01	0.146812E+00	-0.593470E+00
1990	0.421000E-01	0.118623E+00	-0.103590E+01
1991	0.328000E-01	0.635607E-01	-0.661566E+00
1992	0.151800E+00	0.166929E+00	-0.950066E-01
1993	0.853000E-01	0.591906E-01	0.365411E+00
1994	0.268000E-01	0.838920E-01	-0.114113E+01
1995	0.116200E+00	0.719269E-01	0.479662E+00
1996	0.725000E-01	0.133630E+00	-0.611485E+00
1997	0.841000E-01	0.116435E+00	-0.325330E+00
1998	0.214300E+00	0.256033E+00	-0.177928E+00
1999	0.182300E+00	0.208889E+00	-0.136148E+00
2000	0.252800E+00	0.290841E+00	-0.140178E+00
2001	0.292800E+00	0.442219E+00	-0.412316E+00
2002	0.683000E+00	0.729464E+00	-0.658151E-01
2003	0.808600E+00	0.107864E+01	-0.288150E+00

Survey Index: 9 Tag: Spr AGE = 8  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.656138E-04 Variance = 0.797849E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.361900E+00	0.180588E+00	0.695149E+00
1983	0.632200E+00	0.201868E+00	0.114159E+01
1984	0.201700E+00	0.207317E+00	-0.274654E-01
1985	0.411900E+00	0.173675E+00	0.863593E+00
1986	0.171800E+00	0.145945E+00	0.163102E+00
1987	0.185300E+00	0.133445E+00	0.328286E+00
1988	0.238500E+00	0.145792E+00	0.492186E+00
1989	0.327400E+00	0.237172E+00	0.322398E+00
1990	0.870000E-02	0.116991E+00	-0.259878E+01
1991	0.100700E+00	0.115060E+00	-0.133311E+00
1992	0.449000E-01	0.562624E-01	-0.225589E+00
1993	N/A	0.141858E+00	N/A
1994	0.281000E-01	0.297449E-01	-0.568894E-01
1995	0.110200E+00	0.433175E-01	0.933740E+00
1996	N/A	0.287156E-01	N/A
1997	0.828000E-01	0.622769E-01	0.284838E+00
1998	0.153500E+00	0.677777E-01	0.817468E+00
1999	0.305000E-01	0.186736E+00	-0.181197E+01
2000	0.115800E+00	0.159195E+00	-0.318264E+00
2001	0.162700E+00	0.224235E+00	-0.320786E+00
2002	0.350600E+00	0.387771E+00	-0.100769E+00
2003	0.434500E+00	0.680430E+00	-0.448528E+00

Survey Index: 10 Tag: Spr AGE = 9  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.788325E-04 Variance = 0.804441E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.932000E-01	0.165726E+00	-0.575587E+00
1983	0.475300E+00	0.138991E+00	0.122954E+01
1984	0.196100E+00	0.137677E+00	0.353717E+00
1985	0.147800E+00	0.105918E+00	0.333194E+00
1986	0.194100E+00	0.892031E-01	0.777457E+00
1987	0.940000E-02	0.903062E-01	-0.226250E+01
1988	0.137200E+00	0.748424E-01	0.606055E+00
1989	0.812000E-01	0.672720E-01	0.188171E+00
1990	0.503000E-01	0.181051E+00	-0.128078E+01
1991	0.828000E-01	0.867019E-01	-0.460472E-01
1992	0.148500E+00	0.101149E+00	0.383994E+00
1993	0.154000E-01	0.435042E-01	-0.103849E+01
1994	0.704000E-01	0.104090E+00	-0.391065E+00
1995	0.420000E-01	0.164975E-01	0.934460E+00
1996	N/A	0.253146E-01	N/A
1997	0.144000E-01	0.107023E-01	0.296772E+00
1998	0.756000E-01	0.215883E-01	0.125331E+01
1999	0.144000E-01	0.431154E-01	-0.109665E+01
2000	N/A	0.137423E+00	N/A
2001	0.112600E+00	0.897399E-01	0.226926E+00
2002	0.191500E+00	0.126036E+00	0.418322E+00
2003	0.225500E+00	0.307698E+00	-0.310800E+00

Survey Index: 11 Tag: Spr AGE = 10  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.836507E-04 Variance = 0.770897E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.259300E+00	0.921099E-01	0.103500E+01
1983	0.214100E+00	0.120473E+00	0.575016E+00
1984	0.114600E+00	0.701648E-01	0.490601E+00
1985	0.148700E+00	0.720958E-01	0.723935E+00
1986	0.791000E-01	0.501318E-01	0.456057E+00
1987	0.614000E-01	0.496685E-01	0.212039E+00
1988	0.862000E-01	0.454891E-01	0.639198E+00
1989	0.151000E-01	0.374561E-01	-0.908475E+00
1990	0.175000E-01	0.345202E-01	-0.679343E+00
1991	0.137700E+00	0.139523E+00	-0.131542E-01
1992	0.153000E-01	0.566329E-01	-0.130874E+01
1993	0.154000E-01	0.786150E-01	-0.163020E+01
1994	0.820000E-02	0.228844E-01	-0.102632E+01
1995	N/A	0.535575E-01	N/A
1996	N/A	0.757193E-02	N/A
1997	N/A	0.666199E-02	N/A
1998	N/A	0.330153E-02	N/A
1999	0.228000E-01	0.881578E-02	0.950218E+00
2000	0.354000E-01	0.199644E-01	0.572760E+00
2001	0.281000E-01	0.774422E-01	-0.101376E+01
2002	0.102700E+00	0.333145E-01	0.112582E+01
2003	0.542000E-01	0.662436E-01	-0.200658E+00

Survey Index: 18 Tag: Spr AGE = 11 - 11  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.113695E-03 Variance = 0.315058E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.526400E+00	0.825415E+00	-0.449825E+00
1983	0.670900E+00	0.537523E+00	0.221648E+00
1984	0.578700E+00	0.436989E+00	0.280876E+00
1985	0.833300E+00	0.332638E+00	0.918338E+00
1986	0.403000E+00	0.231876E+00	0.552735E+00
1987	0.186200E+00	0.130897E+00	0.352413E+00
1988	0.112500E+00	0.138514E+00	-0.208022E+00
1989	0.185700E+00	0.143569E+00	0.257319E+00
1990	0.511000E-01	0.102310E+00	-0.694227E+00
1991	0.103500E+00	0.155893E+00	-0.409598E+00
1992	0.811000E-01	0.241825E+00	-0.109253E+01
1993	0.105500E+00	0.149822E+00	-0.350734E+00
1994	0.320000E-01	0.888716E-01	-0.102146E+01
1995	0.665000E-01	0.423526E-01	0.451172E+00
1996	0.320000E-01	0.204749E-01	0.446535E+00
1997	N/A	0.127458E-01	N/A
1998	0.284000E-01	0.203523E-01	0.333198E+00
1999	N/A	0.206274E-01	N/A
2000	N/A	0.609106E-01	N/A
2001	N/A	0.758869E-01	N/A
2002	0.803000E-01	0.745089E-01	0.748516E-01
2003	0.960000E-01	0.685140E-01	0.337310E+00

Survey Index: 21 Tag: Aut AGE = 3  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.834330E-05 Variance = 0.129941E+01  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.300000E-01	0.128522E+00	-0.145490E+01
1983	N/A	0.147676E+00	N/A
1984	0.109000E-01	0.136329E+00	-0.252631E+01
1985	N/A	0.638295E-01	N/A
1986	0.860000E-02	0.451718E-01	-0.165871E+01
1987	N/A	0.250387E-01	N/A
1988	0.229000E-01	0.812628E-01	-0.126655E+01
1989	N/A	0.518444E-01	N/A
1990	0.182000E-01	0.556493E-01	-0.111765E+01
1991	0.136700E+00	0.736788E-01	0.618073E+00
1992	0.177400E+00	0.119663E+00	0.393729E+00
1993	0.109100E+00	0.806758E-01	0.301826E+00
1994	0.154200E+00	0.113553E+00	0.305981E+00
1995	0.287200E+00	0.105718E+00	0.999404E+00
1996	0.764400E+00	0.132478E+00	0.175268E+01
1997	0.260700E+00	0.168751E+00	0.434945E+00
1998	0.978800E+00	0.247453E+00	0.137510E+01
1999	0.519800E+00	0.357958E+00	0.373029E+00
2000	0.117810E+01	0.564429E+00	0.735843E+00
2001	0.718800E+00	0.489786E+00	0.383615E+00
2002	0.210400E+00	0.246983E+00	-0.160311E+00
2003	0.274600E+00	0.164862E+00	0.510209E+00

Survey Index: 22 Tag: Aut AGE = 4  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.307342E-04 Variance = 0.859048E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.240000E+00	0.374173E+00	-0.444079E+00
1983	0.575000E-01	0.402065E+00	-0.194483E+01
1984	0.507300E+00	0.458620E+00	0.100880E+00
1985	0.932000E-01	0.428069E+00	-0.152454E+01
1986	0.588000E-01	0.198857E+00	-0.121844E+01
1987	N/A	0.142569E+00	N/A
1988	N/A	0.787524E-01	N/A
1989	0.724800E+00	0.240565E+00	0.110291E+01
1990	0.817000E-01	0.151654E+00	-0.618547E+00
1991	0.380200E+00	0.166652E+00	0.824792E+00
1992	0.661000E+00	0.221029E+00	0.109546E+01
1993	0.258500E+00	0.368026E+00	-0.353258E+00
1994	0.544200E+00	0.243913E+00	0.802507E+00
1995	0.531500E+00	0.358834E+00	0.392844E+00
1996	0.162390E+01	0.317288E+00	0.163277E+01
1997	0.785100E+00	0.416561E+00	0.633778E+00
1998	0.522300E+00	0.531187E+00	-0.168721E-01
1999	0.136260E+01	0.775141E+00	0.564105E+00
2000	0.151370E+01	0.113036E+01	0.292025E+00
2001	0.140820E+01	0.178663E+01	-0.238017E+00
2002	0.952400E+00	0.155092E+01	-0.487618E+00
2003	0.430900E+00	0.781916E+00	-0.595871E+00

Survey Index: 23 Tag: Aut AGE = 5  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.385675E-04 Variance = 0.159406E+01  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.440000E+00	0.368823E+00	0.176459E+00
1983	0.131000E-01	0.366129E+00	-0.333037E+01
1984	0.159570E+01	0.386208E+00	0.141869E+01
1985	0.943400E+00	0.443002E+00	0.755916E+00
1986	0.757000E-01	0.420355E+00	-0.171432E+01
1987	0.510000E-01	0.201311E+00	-0.137303E+01
1988	0.109000E-01	0.147508E+00	-0.260512E+01
1989	0.546000E-01	0.800613E-01	-0.382759E+00
1990	0.300600E+00	0.244248E+00	0.207598E+00
1991	0.506800E+00	0.141172E+00	0.127813E+01
1992	0.329000E+00	0.165505E+00	0.687054E+00
1993	0.223500E+00	0.193960E+00	0.141761E+00
1994	0.777000E+00	0.333033E+00	0.847200E+00
1995	0.165200E+00	0.227698E+00	-0.320862E+00
1996	0.857600E+00	0.374336E+00	0.828983E+00
1997	0.198750E+01	0.323963E+00	0.181400E+01
1998	0.870900E+00	0.412121E+00	0.748211E+00
1999	0.465200E+00	0.553824E+00	-0.174379E+00
2000	0.104380E+01	0.818409E+00	0.243260E+00
2001	0.174610E+01	0.121063E+01	0.366244E+00
2002	0.315550E+01	0.191742E+01	0.498164E+00
2003	0.147540E+01	0.164834E+01	-0.110838E+00

Survey Index: 24 Tag: Aut AGE = 6  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.410818E-04 Variance = 0.147441E+01  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.610000E+00	0.321654E+00	0.639984E+00
1983	0.270000E-01	0.292242E+00	-0.238174E+01
1984	0.757500E+00	0.277903E+00	0.100275E+01
1985	0.991400E+00	0.278055E+00	0.127130E+01
1986	0.610200E+00	0.325719E+00	0.627751E+00
1987	0.266400E+00	0.327751E+00	-0.207255E+00
1988	0.229000E-01	0.166803E+00	-0.198568E+01
1989	0.115000E-01	0.125184E+00	-0.238744E+01
1990	0.910000E-02	0.709203E-01	-0.205328E+01
1991	0.219100E+00	0.182033E+00	0.185343E+00
1992	0.289900E+00	0.966616E-01	0.109832E+01
1993	0.537000E-01	0.119121E+00	-0.796728E+00
1994	0.219300E+00	0.124040E+00	0.569839E+00
1995	0.395100E+00	0.200787E+00	0.676893E+00
1996	0.472100E+00	0.169215E+00	0.102602E+01
1997	0.138600E+01	0.297295E+00	0.153945E+01
1998	0.769600E+00	0.258400E+00	0.109136E+01
1999	0.303000E+00	0.337395E+00	-0.107522E+00
2000	0.599800E+00	0.466076E+00	0.252247E+00
2001	0.673800E+00	0.732981E+00	-0.841859E-01
2002	0.188570E+01	0.107414E+01	0.562782E+00
2003	0.997100E+00	0.171139E+01	-0.540208E+00

Survey Index: 25 Tag: Aut AGE = 7  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.461380E-04 Variance = 0.872772E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.460000E+00	0.197896E+00	0.843485E+00
1983	0.757000E-01	0.248007E+00	-0.118668E+01
1984	0.547900E+00	0.215362E+00	0.933772E+00
1985	0.604900E+00	0.194538E+00	0.113444E+01
1986	0.683900E+00	0.186356E+00	0.130015E+01
1987	0.353200E+00	0.196860E+00	0.584540E+00
1988	0.457000E-01	0.262204E+00	-0.174702E+01
1989	0.355000E-01	0.133154E+00	-0.132197E+01
1990	0.211000E-01	0.107587E+00	-0.162903E+01
1991	0.240000E-01	0.576475E-01	-0.876293E+00
1992	0.144900E+00	0.151400E+00	-0.438788E-01
1993	0.605000E-01	0.536840E-01	0.119528E+00
1994	0.578000E-01	0.760874E-01	-0.274893E+00
1995	0.370000E-01	0.652354E-01	-0.567085E+00
1996	0.229000E+00	0.121198E+00	0.636298E+00
1997	0.441200E+00	0.105603E+00	0.142981E+01
1998	0.383200E+00	0.232213E+00	0.500900E+00
1999	0.165100E+00	0.189455E+00	-0.137603E+00
2000	0.363500E+00	0.263784E+00	0.320650E+00
2001	0.588900E+00	0.401079E+00	0.384098E+00
2002	0.812900E+00	0.661601E+00	0.205946E+00
2003	0.532000E+00	0.978290E+00	-0.609163E+00

Survey Index: 26 Tag: Aut AGE = 8  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.772831E-04 Variance = 0.783392E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.270000E+00	0.212705E+00	0.238515E+00
1983	0.240900E+00	0.237770E+00	0.130787E-01
1984	0.444400E+00	0.244187E+00	0.598789E+00
1985	0.534700E+00	0.204563E+00	0.960829E+00
1986	0.482200E+00	0.171901E+00	0.103144E+01
1987	0.308500E+00	0.157178E+00	0.674343E+00
1988	0.192100E+00	0.171721E+00	0.112144E+00
1989	0.214800E+00	0.279352E+00	-0.262766E+00
1990	0.166000E-01	0.137798E+00	-0.211639E+01
1991	0.229000E-01	0.135524E+00	-0.177801E+01
1992	0.673000E-01	0.662686E-01	0.154447E-01
1993	N/A	0.167087E+00	N/A
1994	0.216000E-01	0.350350E-01	-0.483654E+00
1995	0.106100E+00	0.510214E-01	0.732136E+00
1996	N/A	0.338226E-01	N/A
1997	0.655000E-01	0.733527E-01	-0.113229E+00
1998	0.329400E+00	0.798318E-01	0.141735E+01
1999	0.110300E+00	0.219947E+00	-0.690183E+00
2000	0.275400E+00	0.187507E+00	0.384407E+00
2001	0.229300E+00	0.264115E+00	-0.141352E+00
2002	0.611800E+00	0.456735E+00	0.292302E+00
2003	0.330700E+00	0.801442E+00	-0.885202E+00

Survey Index: 27 Tag: Aut AGE = 9  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.796591E-04 Variance = 0.653415E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.260000E+00	0.167464E+00	0.439916E+00
1983	0.132300E+00	0.140448E+00	-0.597687E-01
1984	0.837000E-01	0.139120E+00	-0.508099E+00
1985	0.309600E+00	0.107029E+00	0.106218E+01
1986	0.269700E+00	0.901385E-01	0.109596E+01
1987	0.159700E+00	0.912531E-01	0.559660E+00
1988	0.714000E-01	0.756272E-01	-0.575180E-01
1989	0.484000E-01	0.679774E-01	-0.339676E+00
1990	0.837000E-01	0.182950E+00	-0.781973E+00
1991	0.229000E-01	0.876110E-01	-0.134177E+01
1992	0.591000E-01	0.102209E+00	-0.547791E+00
1993	N/A	0.439604E-01	N/A
1994	0.813000E-01	0.105182E+00	-0.257544E+00
1995	N/A	0.166705E-01	N/A
1996	N/A	0.255801E-01	N/A
1997	0.648000E-01	0.108145E-01	0.179042E+01
1998	N/A	0.218146E-01	N/A
1999	0.425000E-01	0.435674E-01	-0.248060E-01
2000	0.499000E-01	0.138864E+00	-0.102348E+01
2001	0.151600E+00	0.906809E-01	0.513899E+00
2002	0.158700E+00	0.127357E+00	0.220019E+00
2003	0.148400E+00	0.310925E+00	-0.739639E+00

Survey Index: 28 Tag: Aut AGE = 10  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.913192E-04 Variance = 0.955223E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.180000E+00	0.100554E+00	0.582264E+00
1983	0.145000E-01	0.131517E+00	-0.220499E+01
1984	0.137200E+00	0.765969E-01	0.582883E+00
1985	0.148800E+00	0.787050E-01	0.636897E+00
1986	0.102600E+00	0.547275E-01	0.628471E+00
1987	0.111800E+00	0.542217E-01	0.723631E+00
1988	N/A	0.496592E-01	N/A
1989	0.462000E-01	0.408898E-01	0.122099E+00
1990	0.783000E-01	0.376847E-01	0.731294E+00
1991	0.250000E-01	0.152314E+00	-0.180707E+01
1992	0.296000E-01	0.618245E-01	-0.736525E+00
1993	0.189000E-01	0.858218E-01	-0.151311E+01
1994	N/A	0.249822E-01	N/A
1995	0.425000E-01	0.584672E-01	-0.318961E+00
1996	0.107000E-01	0.826607E-02	0.258085E+00
1997	0.373000E-01	0.727271E-02	0.163486E+01
1998	N/A	0.360419E-02	N/A
1999	0.123000E-01	0.962394E-02	0.245346E+00
2000	0.370000E-01	0.217946E-01	0.529256E+00
2001	0.494000E-01	0.845414E-01	-0.537291E+00
2002	0.576000E-01	0.363686E-01	0.459818E+00
2003	0.711000E-01	0.723163E-01	-0.169624E-01

Survey Index: 35 Tag: Aut AGE = 11 - 11  
 Time = JAN-1 Type = NUMBER  
 Catchability = 0.111457E-03 Variance = 0.567455E+00  
 Residual = LN(Observed) - LN(Predicted)

Year	Observed	Predicted	Residual
1982	0.103000E+01	0.809166E+00	0.241311E+00
1983	0.409400E+00	0.526941E+00	-0.252396E+00
1984	0.625800E+00	0.428386E+00	0.379005E+00
1985	0.746700E+00	0.326090E+00	0.828490E+00
1986	0.471800E+00	0.227311E+00	0.730237E+00
1987	0.330500E+00	0.128320E+00	0.946081E+00
1988	0.116300E+00	0.135788E+00	-0.154919E+00
1989	0.233300E+00	0.140742E+00	0.505394E+00
1990	0.865000E-01	0.100296E+00	-0.147984E+00
1991	0.980000E-01	0.152824E+00	-0.444320E+00
1992	0.799000E-01	0.237065E+00	-0.108756E+01
1993	0.896000E-01	0.146872E+00	-0.494207E+00
1994	0.867000E-01	0.871221E-01	-0.485638E-02
1995	0.566000E-01	0.415188E-01	0.309862E+00
1996	0.635000E-01	0.200718E-01	0.115172E+01
1997	0.330000E-01	0.124948E-01	0.971192E+00
1998	0.195000E-01	0.199516E-01	-0.228942E-01
1999	N/A	0.202214E-01	N/A
2000	0.940000E-02	0.597115E-01	-0.184882E+01
2001	0.260000E-01	0.743929E-01	-0.105126E+01
2002	0.556000E-01	0.730420E-01	-0.272852E+00
2003	0.507000E-01	0.671652E-01	-0.281229E+00

**Bootstrap Summary Report**

Number of Bootstrap Repetitions Requested = 1000  
 Number of Bootstrap Repetitions Completed = 1000  
 Bootstrap Output Variable: Stock Estimates (2003)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
N 3	19760.	27028.	22590.	0.8358
N 4	25441.	29186.	14151.	0.4849
N 5	42739.	46607.	18703.	0.4013
N 6	41658.	44306.	15511.	0.3501
N 7	21204.	22124.	7147.	0.3231
N 8	10370.	10947.	3528.	0.3222
N 9	3903.	4039.	1305.	0.3231
N 10	792.	863.	358.	0.4152

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
N 3	7268.	750.	36.7840	12491.	1.8085
N 4	3745.	463.	14.7198	21696.	0.6522
N 5	3868.	604.	9.0507	38871.	0.4812
N 6	2648.	498.	6.3573	39010.	0.3976
N 7	920.	228.	4.3405	20283.	0.3524
N 8	577.	113.	5.5662	9793.	0.3602
N 9	136.	41.	3.4768	3767.	0.3464
N 10	71.	12.	8.9993	721.	0.4973

	LOWER 80. % CI	UPPER 80. % CI
N 3	7136.	54576.
N 4	13256.	47904.
N 5	25267.	71594.
N 6	26357.	65268.
N 7	13625.	31371.
N 8	6754.	15709.
N 9	2506.	5701.
N 10	448.	1352.

Bootstrap Output Variable: Catchability Estimates

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
Q 4	0.134450E-04	0.139774E-04	0.357412E-05	0.2557
Q 5	0.323264E-04	0.324874E-04	0.499383E-05	0.1537
Q 6	0.429554E-04	0.432622E-04	0.531046E-05	0.1228
Q 7	0.430079E-04	0.436599E-04	0.596464E-05	0.1366
Q 8	0.508706E-04	0.514536E-04	0.691624E-05	0.1344
Q 9	0.656138E-04	0.666622E-04	0.132064E-04	0.1981
Q 10	0.788325E-04	0.797692E-04	0.159116E-04	0.1995
Q 11	0.836507E-04	0.852533E-04	0.174415E-04	0.2046
Q 18	0.113695E-03	0.115577E-03	0.152687E-04	0.1321
Q 21	0.834330E-05	0.863377E-05	0.236581E-05	0.2740
Q 22	0.307342E-04	0.311082E-04	0.644467E-05	0.2072
Q 23	0.385675E-04	0.400842E-04	0.104468E-04	0.2606
Q 24	0.410818E-04	0.422332E-04	0.104730E-04	0.2480
Q 25	0.461380E-04	0.468698E-04	0.937549E-05	0.2000
Q 26	0.772831E-04	0.776712E-04	0.151170E-04	0.1946
Q 27	0.796591E-04	0.807409E-04	0.146354E-04	0.1813
Q 28	0.913192E-04	0.930613E-04	0.208653E-04	0.2242
Q 35	0.111457E-03	0.113312E-03	0.181145E-04	0.1599

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
Q 4	0.5324E-06	0.1143E-06	3.9602	0.1291E-04	0.2768
Q 5	0.1610E-06	0.1580E-06	0.4979	0.3217E-04	0.1553
Q 6	0.3068E-06	0.1682E-06	0.7142	0.4265E-04	0.1245
Q 7	0.6520E-06	0.1897E-06	1.5160	0.4236E-04	0.1408
Q 8	0.5831E-06	0.2195E-06	1.1461	0.5029E-04	0.1375
Q 9	0.1048E-05	0.4189E-06	1.5978	0.6457E-04	0.2045
Q 10	0.9368E-06	0.5040E-06	1.1883	0.7790E-04	0.2043
Q 11	0.1603E-05	0.5539E-06	1.9158	0.8205E-04	0.2126
Q 18	0.1881E-05	0.4865E-06	1.6548	0.1118E-03	0.1366
Q 21	0.2905E-06	0.7538E-07	3.4815	0.8053E-05	0.2938
Q 22	0.3740E-06	0.2041E-06	1.2168	0.3036E-04	0.2123
Q 23	0.1517E-05	0.3338E-06	3.9327	0.3705E-04	0.2820
Q 24	0.1151E-05	0.3332E-06	2.8027	0.3993E-04	0.2623
Q 25	0.7318E-06	0.2974E-06	1.5862	0.4541E-04	0.2065
Q 26	0.3882E-06	0.4782E-06	0.5023	0.7689E-04	0.1966
Q 27	0.1082E-05	0.4641E-06	1.3581	0.7858E-04	0.1863
Q 28	0.1742E-05	0.6621E-06	1.9078	0.8958E-04	0.2329
Q 35	0.1855E-05	0.5758E-06	1.6642	0.1096E-03	0.1653

	LOWER	UPPER
	80. % CI	80. % CI
Q 4	0.972636E-05	0.189646E-04
Q 5	0.261931E-04	0.392517E-04
Q 6	0.364525E-04	0.502755E-04
Q 7	0.361255E-04	0.513419E-04
Q 8	0.430078E-04	0.606003E-04
Q 9	0.506999E-04	0.842534E-04
Q 10	0.594134E-04	0.998205E-04
Q 11	0.644053E-04	0.107803E-03
Q 18	0.968436E-04	0.134914E-03
Q 21	0.587186E-05	0.118302E-04
Q 22	0.234795E-04	0.397340E-04
Q 23	0.278363E-04	0.546203E-04
Q 24	0.295456E-04	0.568077E-04
Q 25	0.355904E-04	0.591617E-04
Q 26	0.582349E-04	0.965514E-04
Q 27	0.627337E-04	0.997029E-04
Q 28	0.665440E-04	0.120632E-03
Q 35	0.911700E-04	0.136921E-03

Bootstrap Output Variable: Fishing Mortality (2002)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
AGE 3	0.0015	0.0016	0.000877	0.5331
AGE 4	0.0161	0.0175	0.007794	0.4466
AGE 5	0.0268	0.0284	0.010337	0.3638
AGE 6	0.0595	0.0629	0.019980	0.3179
AGE 7	0.1741	0.1813	0.057853	0.3192
AGE 8	0.2648	0.2797	0.087777	0.3138
AGE 9	0.5526	0.5753	0.193135	0.3357
AGE 10	0.4087	0.4275	0.101083	0.2365
AGE 11	0.4087	0.4275	0.101083	0.2365

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
AGE 3	0.000153	0.000028	10.2505	0.0013	0.6548
AGE 4	0.001341	0.000250	8.3254	0.0148	0.5277
AGE 5	0.001577	0.000331	5.8754	0.0253	0.4092
AGE 6	0.003316	0.000640	5.5688	0.0562	0.3554
AGE 7	0.007176	0.001844	4.1220	0.1669	0.3466
AGE 8	0.014858	0.002815	5.6101	0.2500	0.3511
AGE 9	0.022717	0.006150	4.1112	0.5298	0.3645
AGE 10	0.018787	0.003251	4.5969	0.3899	0.2592
AGE 11	0.018787	0.003251	4.5969	0.3899	0.2592

	LOWER	UPPER
	80. % CI	80. % CI
AGE 3	0.000793	0.002856
AGE 4	0.009644	0.027095
AGE 5	0.017206	0.042028
AGE 6	0.040591	0.090833
AGE 7	0.118230	0.255170
AGE 8	0.188377	0.386366
AGE 9	0.358831	0.831260
AGE 10	0.311489	0.560158
AGE 11	0.311489	0.560158

Bootstrap Output Variable: Average F (2002) AGES 8 - 9

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
AVG F	0.4087	0.4275	0.101083	0.2365
N WTD	0.3261	0.3329	0.075870	0.2279
B WTD	0.3344	0.3405	0.075636	0.2221
C WTD	0.3601	0.3776	0.081381	0.2155

  

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
AVG F	0.018787	0.003251	4.5969	0.3899	0.2592
N WTD	0.006831	0.002409	2.0948	0.3193	0.2376
B WTD	0.006045	0.002399	1.8075	0.3284	0.2303
C WTD	0.017461	0.002632	4.8483	0.3427	0.2375

  

	LOWER 80. % CI	UPPER 80. % CI
<b>AVG F</b>	<b>0.311489</b>	<b>0.560158</b>
N WTD	0.243401	0.425261
B WTD	0.251145	0.433677
C WTD	0.286044	0.485475

Bootstrap Output Variable: Biomass

JAN-1 Biomass (2003) Mean Biomass & SSB (2002)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
JAN-1	56452.	61054.	11000.	0.1802
MEAN	45192.	48178.	8243.	0.1711
SSB	18296.	19179.	2851.	0.1486

  

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
JAN-1	4602.	377.	8.1521	51850.	0.2121
MEAN	2986.	277.	6.6075	42206.	0.1953
SSB	884.	94.	4.8315	17412.	0.1637

  

	LOWER 80. % CI	UPPER 80. % CI
JAN-1	46785.	75591.
MEAN	37705.	58929.
<b>SSB</b>	<b>15603.</b>	<b>22969.</b>

Plus Group Diagnostic Report

Calculation Method Selected = Backward

Year	Population Backward	Population Forward	F Forward	F Backward	Ratio
1982	7260.	7260.	0.265727	0.265728	1.000002
1983	4728.	5517.	0.393693	0.477042	1.211710
1984	3844.	3973.	0.620564	0.649539	1.046692
1985	2926.	2215.	1.056192	0.685293	0.648833
1986	2039.	1037.	1.484863	0.507203	0.341583
1987	1151.	513.	4.265155	0.605723	0.142017
1988	1218.	694.	2.328713	0.740857	0.318140
1989	1263.	404.	2.328713	0.350167	0.150369
1990	900.	274.	1.164614	0.237924	0.204294
1991	1372.	354.	1.475319	0.225446	0.152811
1992	2128.	1216.	0.403839	0.211096	0.522722
1993	1318.	1171.	0.441947	0.381925	0.864187
1994	782.	1200.	0.342158	0.585644	1.711616
1995	373.	865.	0.216568	0.596709	2.755296
1996	180.	903.	0.145252	1.105538	7.611176
1997	113.	698.	0.114260	1.076386	9.420518
1998	181.	560.	0.145078	0.536699	3.699394
1999	192.	437.	0.143771	0.362347	2.520317
2000	549.	392.	0.862729	0.535635	0.620861
2001	768.	356.	2.328713	0.557471	0.239390
2002	738.	527.	0.539015	0.353809	0.656399
2003	660.	479.	N/A	N/A	

Warning \*\*\*\* Infeasible Mass Balance in Plus Group

Year = 1991

Year = 2000