Stock: Sole in Division IIIa

# Assessment Quality Control Diagram 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Average F(4–-8,u) | | | | | | | | | | | | | | | |
| Date of assessment | Year | | | | | | | | | | | | | | |
|  | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| 1989 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1990 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1991 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1992 | 0.38 | 0.34 | 0.47 |  |  |  |  |  |  |  |  |  |  |  |  |
| 1993 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1994 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1995 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1996 | 0.31 | 0.26 | 0.31 | 0.30 | 0.30 | 0.19 | 0.29 |  |  |  |  |  |  |  |  |
| 1997 | 0.34 | 0.29 | 0.36 | 0.39 | 0.43 | 0.30 | 0.50 | 0.44 |  |  |  |  |  |  |  |
| 1998 | 0.37 | 0.28 | 0.38 | 0.33 | 0.31 | 0.18 | 0.24 | 0.15 | 0.16 |  |  |  |  |  |  |
| 1999 | 0.36 | 0.29 | 0.4 | 0.36 | 0.37 | 0.23 | 0.32 | 0.21 | 0.24 | 0.21 |  |  |  |  |  |
| 2000 | 0.37 | 0.30 | 0.42 | 0.40 | 0.42 | 0.28 | 0.39 | 0.26 | 0.32 | 0.27 | 0.28 |  |  |  |  |
| 2001 | 0.38 | 0.30 | 0.41 | 0.38 | 0.40 | 0.27 | 0.38 | 0.26 | 0.31 | 0.28 | 0.28 | 0.38 |  |  |  |
| 2002 | 0.39 | 0.31 | 0.43 | 0.41 | 0.44 | 0.29 | 0.42 | 0.30 | 0.38 | 0.36 | 0.39 | 0.57 | 0.46 |  |  |
| 2003 | 0.41 | 0.34 | 0.39 | 0.42 | 0.44 | 0.35 | 0.45 | 0.30 | 0.37 | 0.36 | 0.37 | 0.46 | 0.35 | 0.46 |  |
| 2004 | 0.39 | 0.31 | 0.44 | 0.42 | 0.45 | 0.29 | 0.43 | 0.30 | 0.38 | 0.35 | 0.37 | 0.40 | 0.31 | 0.46 | 0.29 |

**Remarks:** VPA results from 1996 not considered reliable.

Terminal F in separable VPA changed in 1997.

Assessment used XSA tuned with 2 commercial fleets. F based on ages 4–8. Assessment used XSA tuned with 3 commercial fleets. F based on ages 4-8.

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**Assessment Quality Control Diagram 2**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Recruitment (age 2) Unit: thousands | | | | | | | | | | | | | | | | |
| Date of assessment | Year class | | | | | | | | | | | | | | | |
|  | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
| 1989 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1990 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1991 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1992 | 4879 | 4896 | 3413 | 5733 |  |  |  |  |  |  |  |  |  |  |  |  |
| 1993 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1994 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1995 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1996 | 3943 | 6475 | 8367 | 8006 | 10781 | 7917 | 3068 | 3644 |  |  |  |  |  |  |  |  |
| 1997 | 3731 | 5958 | 7289 | 6629 | 8166 | 6085 | 2641 | 4164 | 4233 |  |  |  |  |  |  |  |
| 1998 | 3989 | 6674 | 8974 | 9130 | 12399 | 9701 | 4556 | 5523 | 3124 | 1162 |  |  |  |  |  |  |
| 1999 | 3835 | 6383 | 8069 | 8466 | 10176 | 7941 | 3872 | 3927 | 2102 | 1150 | 5049 |  |  |  |  |  |
| 2000 | 3752 | 6191 | 7725 | 7753 | 9193 | 7257 | 3618 | 3593 | 2092 | 1022 | 5060 | 3911 |  |  |  |  |
| 2001 | 3791 | 6288 | 7830 | 7839 | 9079 | 7223 | 3635 | 3663 | 1998 | 1011 | 5158 | 2869 | 2063 |  |  |  |
| 2002 | 3743 | 6167 | 7664 | 7591 | 8863 | 6655 | 3385 | 3266 | 1898 | 906 | 4218 | 2365 | 1566 | 1352 |  |  |
| 2003 | 3511 | 5927 | 7588 | 7756 | 8743 | 6953 | 3424 | 3168 | 1898 | 925 | 4050 | 2224 | 1356 | 2248 | 5190 |  |
| 2004 | 3739 | 6151 | 7632 | 7544 | 8831 | 6590 | 3478 | 3467 | 1867 | 893 | 3982 | 2422 | 1501 | 2205 | 1896 | 2272 |

**Remarks:** VPA results from 1996 not considered reliable.

Terminal F in separable VPA changed in 1997

Assessment used XSA tuned with 2 commercial fleets. F based on ages 4–8. Assessment used XSA tuned with 3 commercial fleets. F based on ages 4-8. Recruitment estimated as GM 1998-2002. See report for details.

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**Assessment Quality Control Diagram 3**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Spawning stock biomass (t) | | | | | | | | | | | | | | | | | | |
| Date of assessment | Year | | | | | | | | | | | | | | | | | |
|  | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 1989 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1990 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1991 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1992 | 1950 | 2373 | 2614 | 2326 | 2111 | 1989 |  |  |  |  |  |  |  |  |  |  |  |  |
| 1993 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1994 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1995 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1996 | 2380 | 3012 | 3509 | 5105 | 5211 | 5608 | 487 |  |  |  |  |  |  |  |  |  |  |  |
| 1997 | 2190 | 2713 | 2994 | 4127 | 3796 | 3755 | 2696 | 2555 | 2753 | 2857 | 2955 |  |  |  |  |  |  |  |
| 1998 | 2219 | 2870 | 3505 | 5354 | 5798 | 6740 | 5839 | 6333 | 5600 | 6134 | 4157 | 4547 |  |  |  |  |  |  |
| 1999 | 2490 | 3167 | 3513 | 5107 | 5540 | 5964 | 4937 | 4880 | 4028 | 3249 | 2822 | 3064 | 3314 |  |  |  |  |  |
| 2000 | 2448 | 3072 | 3517 | 5070 | 4981 | 5263 | 4329 | 4075 | 3248 | 2501 | 2892 | 2234 | 2361 | 2871 |  |  |  |  |
| 2001 | 2466 | 3109 | 3576 | 5183 | 5055 | 5326 | 4389 | 4168 | 3279 | 2513 | 2898 | 2737 | 2365 | 2052 | 1877 |  |  |  |
| 2002 | 2407 | 3016 | 3452 | 4945 | 4824 | 4974 | 4026 | 3678 | 2805 | 2050 | 2260 | 2043 | 1492 | 1180 | 1092 | 1062 |  |  |
| 2003 | 2455 | 2998 | 3476 | 5120 | 4768 | 4818 | 3987 | 3822 | 2917 | 1994 | 2236 | 1871 | 1500 | 1537 | 2007 |  |  |  |
| 2004 | 2391 | 2993 | 3413 | 4892 | 4777 | 4915 | 3995 | 3688 | 2825 | 2070 | 2235 | 2026 | 1604 | 1542 | 1329 | 1405 | 1825 | 1902 |

Forecast.

Assessment used XSA tuned with 2 commercial fleets. F based on ages 4–8.

Assessment used XSA tuned with 3 commercial fleets. F based on ages 4-8. **Remarks:** No forecast made in 1996