**Stock: Hake - Southern (Divisions VIIIc and IXa)**

**Assessment Quality Control Diagram 1**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Average F(2-5 ,u) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date of assessment | | 1988 | | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | |
| 1989 | |  | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| 1990 | |  | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| 1991 | |  | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| 1992 | |  | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| 1993 | | 0.29 | | | 0.31 | | 0.27 | | 0.23 | | 0.30 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| 1994 | | 0.34 | | | 0.36 | | 0.31 | | 0.29 | | 0.38 | | 0.31 | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| 1995 | | 0.33 | | | 0.36 | | 0.31 | | 0.28 | | 0.36 | | 0.25 | | 0.29 | |  | |  | |  | |  | |  | |  | |  | |  | |
| 1996 | | 0.34 | | | 0.36 | | 0.31 | | 0.28 | | 0.35 | | 0.23 | | 0.22 | | 0.30 | |  | |  | |  | |  | |  | |  | |  | |
| 1997 | | 0.36 | | | 0.38 | | 0.32 | | 0.29 | | 0.35 | | 0.23 | | 0.23 | | 0.35 | | 0.24 | |  | |  | |  | |  | |  | |  | |
| 1998 | | 0.40 | | | 0.41 | | 0.35 | | 0.32 | | 0.40 | | 0.27 | | 0.29 | | 0.48 | | 0.37 | | 0.26 | |  | |  | |  | |  | |  | |
| 1999\* | | 0.54 | | | 0.49 | | 0.43 | | 0.43 | | 0.51 | | 0.37 | | 0.39 | | 0.62 | | 0.45 | | 0.37 | | 0.21 | |  | |  | |  | |  | |
| 2000 | | 0.49 | | | 0.46 | | 0.41 | | 0.40 | | 0.46 | | 0.32 | | 0.33 | | 0.52 | | 0.38 | | 0.35 | | 0.25 | | 0.30/0.36 | |  | |  | |  | |
| 2001 | | 0.49 | | | 0.46 | | 0.41 | | 0.40 | | 0.47 | | 0.33 | | 0.34 | | 0.53 | | 0.40 | | 0.38 | | 0.27 | | 0.30 | | 0.27 | |  | |  | |
| 2002 | | 0.51 | | | 0.48 | | 0.43 | | 0.42 | | 0.51 | | 0.39 | | 0.42 | | 0.70 | | 0.59 | | 0.56 | | 0.41 | | 0.46 | | 0.43 | | 0.42 | |  | |
| 2003\*\* | | 0.47 | | | 0.42 | | 0.41 | | 0.48 | | 0.39 | | 0.44 | | 0.74 | | 0.59 | | 0.57 | | 0.43 | | 0.48 | | 0.49 | | 0.39 | | 0.34 | | 0.41 | |

**Remarks:** 1983 XSA with shrinkage (SE 0.5), age 0 as recruits, Q plateau at age 7 (10 as Group+). 1994 XSA with shrinkage (SE 0.8), (8 as Group+). Input data for 1991 was revised. 1995 XSA equal to 1994 XSA. 1996 XSA 10 years with no time series weighting. 1997 XSA with shrinkage (s.e. 1.0), mean logQ model, Q plateau at age 6 (8 as group+), all years tuning data no weighting. 1998 XSA with shrinkage (S.E.. 2.5), mean logQ model, Q plateau at age 6 (8 as group+), 10 years tuning data no weighting . 1999XSA with shrinkage (S.E., mean log Q model, Q plateau at age 6, 11 years tuning data no weighting, age 0 not used in the assessment. 2000XSA catch at age 0 set to zero, with shrinkage (S.E.. 0.8), mean logQ model, Q plateau at age 6, tricubic tape over 18 years. 2001XSA used segmented fleets. 2002XSA removed Cadiz landings from the analysis. **\*** Data revised for whole period \*\* Cadiz landings removed – with bias, – with bias corrected

**Stock: : Hake - Southern (Divisions VIIIc and IXa**

**Assessment Quality Control Diagram 2**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Recruitment (age 0) Unit: millions (age 1 in 2000 assessment) | | | | | | | | | | | | | | | | |
| Year class | | | | | | | | | | | | | | | | |
| Date of assessment | | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| 1989 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1990 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1991 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1992 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1993 | | 61.4 | 48.8 | 28.9 | 26.3 | 50.1 |  |  |  |  |  |  |  |  |  |  |
| 1994 | | 50.9 | 40.8 | 43.3 | 27.3 | 40.7 | 50.1 |  |  |  |  |  |  |  |  |  |
| 1995 | | 54.5 | 54.2 | 54.9 | 37.2 | 65.1 | 69.7 | 69.7 |  |  |  |  |  |  |  |  |
| 1996 | | 55.5 | 60.0 | 67.3 | 103.4 | 115.9 | 45.0 | 69.2 | 93.4 |  |  |  |  |  |  |  |
| 1997 | | 55.8 | 59.0 | 68.7 | 86.1 | 69.8 | 63.1 | 32.5 | 82.8 | 85.4 |  |  |  |  |  |  |
| 1998 | | 51.8 | 52.5 | 57.1 | 68.3 | 60.0 | 77.0 | 115.0 | 122.3 | 82.6 | 82.6 |  |  |  |  |  |
| 1999 | | 65.4 | 55.0 | 48.7 | 56.8 | 65.8 | 59.4 | 75.1 | 124.2 | 75.0 | 39.0 | 63.5 |  |  |  |  |
| 2000 | | 55.4 | 48.5 | 41.8 | 47.9 | 55.5 | 46.6 | 50.4 | 67.6 | 40.8 | 59.3 | 51.3/41.8 | 51.3/41.8 |  |  |  |
| 2001 | | 66.2 | 57.8 | 51.2 | 58.1 | 65.3 | 52.8 | 63.1 | 77.2 | 65.0 | 62.1 | 56.7 | 36.1 | 61.0 |  |  |
| 2002 | | 63.6 | 53.0 | 45.0 | 52.4 | 57.3 | 47.0 | 53.5 | 64.0 | 52.0 | 54.0 | 49.0 | 44.9 | 52.6 | 52.6 |  |
| 2003 | | 57.4 | 47.7 | 41.5 | 48.9 | 53.1 | 41.9 | 47.6 | 59.4 | 48.0 | 45.7 | 45.2 | 35.9 | 26.0 | 31.6 | 45.1 |

Assumed.Arithmetic mean 1986-1992. Geometric mean 1982-1993. Geometric mean 1982-1994. Geometric mean 1982-1995. Geometric mean 1989-1998. Geometric mean 1989-1998 with bias. Geometric mean 1989-1998 with bias corrected. Geometric mean 1989-1999 **Remarks:** 1998 assessment XSA with revised data for the whole period. 1999, 2001, 2002, 2003 assessment XSA - age 0 was not used. 2002 and 2003 assessment XSA with segmented fleets. 2003 assessment without Cadiz landings.

**Stock: Hake - Southern (Divisions VIIIc and IXa)**

**Assessment Quality Control Diagram 3**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Spawning stock biomass ('000 t) | | | | | | | | | | | | | | | | | |
| Year | | | | | | | | | | | | | | | | | |
| Date of assessment | 1989 | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| 1989 |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1990 |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1991 |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1992 |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1993 | 23.9 | | 22.7 | 23.4 | 23.8 | 21.8 | 19.7 | 17.3 |  |  |  |  |  |  |  |  |  |  |
| 1994 | 24.6 | | 23.7 | 22.1 | 23.7 | 21.2 | 16.4 | 13.9 | 12.0 |  |  |  |  |  |  |  |  |  |
| 1995 | 24.4 | | 24.2 | 22.8 | 24.8 | 22.6 | 16.6 | 15.1 | 13.9 | 13.2 |  |  |  |  |  |  |  |  |
| 1996 | 21.4 | | 21.4 | 22.3 | 23.7 | 22.8 | 17.6 | 15.7 | 16.6 | 17.2 | 17.6 |  |  |  |  |  |  |  |
| 1997 | 18.9 | | 19.4 | 20.5 | 21.5 | 21.0 | 16.5 | 15.2 | 18.0 | 18.9 | 18.9 | 18.7 |  |  |  |  |  |  |
| 1998 | 15.1 | | 15.5 | 15.8 | 16.7 | 16.0 | 12.5 | 11.3 | 12.0 | 12.3 | 13.2 | 13.2 | 14.3 |  |  |  |  |  |
| 1999 | 21.4 | | 21.0 | 21.4 | 21.8 | 20.2 | 17.1 | 16.2 | 16.8 | 16.5 | 20.2 | 30.9 | 34.3 | 34.2 |  |  |  |  |
| 2000 | 25.0 | | 24.6 | 24.8 | 25.3 | 23.8 | 21.9 | 20.5 | 22.5 | 21.8 | 22.7 | 24.1 | 24.8  23.8 | 34.026.0 | 36.7  26.8 |  |  |  |
| 2001 | 25.5 | | 24.5 | 24.4 | 24.6 | 23.3 | 20.7 | 19.6 | 20.7 | 20.2 | 21.4 | 22.1 | 27.0 | 32.4 | 35.7 | 37.7 |  |  |
| 2002 | 23.6 | | 22.7 | 22.8 | 22.9 | 20.8 | 17.6 | 15.3 | 14.0 | 12.1 | 11.8 | 12.6 | 14.4 | 14.9 | 16.8 | 17.3 | 17.6 |  |
| 2003 | 22.1 | | 21.3 | 21.3 | 21.5 | 19.9 | 16.6 | 14.2 | 12.5 | 10.7 | 10.4 | 11.1 | 12.6 | 12.5 | 15.0 | 16.0 | 15.3 | 14.7 |

Forecast. \* - with bias . \*\* - with bias corrected **Remarks:** 1998 assessment XSA with revised data for the whole period. 1999, 2001, 2002, 2003 assessment XSA - age 0 was not used. 2002 and 2003 assessment XSA with segmented fleets. 2003 assessment without Cadiz landings.