Stock: Norwegian spring-spawning herring

**Assessment Quality Control Diagram 1**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Average F(5-10,u) | | | | | | | | | | | | | | | | | | | | | | | |
| Date of assessment | Year | | | | | | | | | | | | | | | | | | | | | | |
|  | 1988 | 1989 | 1990 | 1991 | | | 1992 | 1993 | | 1994 | | 1995 | | 1996 | 1997 | | 1998 | | 1999 | 2000 | | 2001 | 2002 |
| 1989 | 0.20 |  |  | |  |  | |  | | |  | |  | | |  | |  | | |  | |  |
| 1990 | 0.19 | 0.05 |  |  | | |  | |  |  | |  | |  |  | |  | |  |  | |  |  |
| 1991 | 0.13 | 0.04 | 0.05 |  | | |  | |  |  | |  | |  |  | |  | |  |  | |  |  |
| 1992 | 0.21 | 0.05 | 0.05 | 0.04 | | |  | |  |  | |  | |  |  | |  | |  |  | |  |  |
| 1993 | 0.33 | 0.05 | 0.04 | 0.03 | | | 0.04 | |  |  | |  | |  |  | |  | |  |  | |  |  |
| 1994 | 0.25 | 0.06 | 0.13 | 0.06 | | | 0.07 | | 0.17 |  | |  | |  |  | |  | |  |  | |  |  |
| 1995 | 0.29 | 0.08 | 0.11 | 0.07 | | | 0.06 | | 0.09 | 0.23 | |  | |  |  | |  | |  |  | |  |  |
| 1996 | 0.46 | 0.19 | 0.23 | 0.04 | | | 0.26 | | 0.03 | 0.10 | | 0.21 | |  |  | |  | |  |  | |  |  |
| 1996 | 0.03 | 0.02 | 0.02 | 0.02 | | | 0.02 | | 0.05 | 0.10 | | 0.17 | |  |  | |  | |  |  | |  |  |
| 1997 | 0.03 | 0.02 | 0.02 | 0.02 | | | 0.02 | | 0.05 | 0.10 | | 0.16 | | 0.16 |  | |  | |  |  | |  |  |
| 1998 | 0.04 | 0.02 | 0.02 | 0.02 | | | 0.03 | | 0.06 | 0.12 | | 0.18 | | 0.14 | 0.13 | |  | |  |  | |  |  |
| 1999 | 0.04 | 0.02 | 0.02 | 0.02 | | | 0.02 | | 0.05 | 0.09 | | 0.15 | | 0.12 | 0.11 | | 0.10 | |  |  | |  |  |
| 2000 | .05 | .03 | .02 | .02 | | | .03 | | .06 | .12 | | .20 | | .16 | .15 | | .13 | | .16 |  | |  |  |
| 2001 | .04 | .02 | .02 | .02 | | | ..02 | | .06 | .11 | | .19 | | .15 | .15 | | .13 | | .16 | .17 | |  |  |
| 2002 |  |  |  |  | | |  | |  |  | |  | |  |  | |  | |  |  | |  |  |

**Remarks:** F5-12

F5-12,w

F5-13,w

F5-14,w

**Stock: Norwegian spring-spawning herring**

**Assessment Quality Control Diagram 2**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Recruitment (age 3) Unit: millions | | | | | | | | | | | | | | | | | | |
| Date of assessment | Year class | | | | | | | | | | | | | | | | | |
|  | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | | 1990 | | 1991 | 1992 | | 1993 | | 1994 | 1995 | | 1996 |
| 1989 | 237 |  |  | | | |  | |  | | |  | |  | | |  | |
| 1990 | 446 | 289 |  |  |  |  | |  | |  |  | |  | |  |  | |  |
| 1991 | 384 | 384 | 64 |  |  |  | |  | |  |  | |  | |  |  | |  |
| 1992 | 454 | 647 | 96 | 382 |  |  | |  | |  |  | |  | |  |  | |  |
| 1993 | 467 | 603 | 52 | 343 | 2008 |  | |  | |  |  | |  | |  |  | |  |
| 1994 | 383 | 601 | 47 | 148 | 2427 | 5243 | |  | |  |  | |  | |  |  | |  |
| 1995 | 428 | 1350 | 138 | 22 | 2447 | 6039 | | 6652 | |  |  | |  | |  |  | |  |
| 1996 | 2038 | 1622 | 299 | 308 | 2789 | 6761 | | 8482 | |  |  | |  | |  |  | |  |
| 1997 | 910 | 1636 | 186 | 182 | 2031 | 6229 | | 11546 | | 18952 |  | |  | |  |  | |  |
| 1998 | 1039 | 2383 | 603 | 393 | 1839 | 5768 | | 10754 | | 27613 | 32196 | |  | |  |  | |  |
| 1999 | 1059 | 6575 | 354 | 1020 | 2467 | 6234 | | 11375 | | 30956 | 39203 | | 5915 | |  |  | |  |
| 2000 | 757 | 4012 | 398 | 1104 | 1696 | 5342 | | 9188 | | 24918 | 29789 | | 7480 | | 2153 |  | |  |
| 2001 |  |  |  |  |  |  | |  | |  |  | |  | |  |  | |  |
| 2002 |  |  |  |  |  |  | |  | |  |  | |  | |  |  | |  |
| 2003 |  |  |  |  |  |  | |  | |  |  | |  | |  |  | |  |

**Remarks:**

**Stock: Norwegian spring-spawning herring**

**Assessment Quality Control Diagram 3**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Spawning stock biomass ('000 t) | | | | | | | | | | | | | | |
| Date of assessment | Year | | | | | | | | | | | | | |
|  | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
| 1989 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1990 | 1497 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1991 | 1547 | 1482 |  |  |  |  |  |  |  |  |  |  |  |  |
| 1992 | 2092 | 2076 | 2184 | 1947 | 2050 |  |  |  |  |  |  |  |  |  |
| 1993 | 2643 | 2602 | 2810 | 2396 | 2396 | 2788 |  |  |  |  |  |  |  |  |
| 1994 | 2753 | 2682 | 2760 | 2449 | 2317 | 2523 | 2306 | 3744 |  |  |  |  |  |  |
| 1995 | 3928 | 3942 | 4111 | 3663 | 3401 | 3842 | 3907 | 4765 | 6441 |  |  |  |  |  |
| 1996 | 5116 | 5209 | 5475 | 4856 | 4461 | 4955 | 5041 | 5353 | 7207 |  |  |  |  |  |
| 1997 | 4705 | 4649 | 4808 | 4585 | 4390 | 5091 | 5524 | 5558 | 9134 | 9596 |  |  |  |  |
| 1998 | 3839 | 3994 | 4158 | 4004 | 3864 | 4507 | 4899 | 5538 | 10149 | 9836 |  |  |  |  |
| 1999 | 4150 | 4848 | 5119 | 5016 | 4868 | 5604 | 5948 | 6652 | 11998 | 11144 | 10735 |  |  |  |
| 2000 | 3367 | 3781 | 3969 | 3875 | 3748 | 4310 | 4527 | 4975 | 8971 | 8309 | 7789 |  |  |  |
| 2001 | 3870 | 4167 | 4367 | 4244 | 4076 | 4629 | 5734 | 7615 | 9179 | 8423 | 7771 | 6725 |  |  |
| 2002 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Forecast.

**Remarks:** Very low Fs in 1983-1992 introduces uncertainties and instability when applying VPA methodology.