N. Ocean Pout by S.E. Wigley

1.0 Background

Ocean pout, *Macrozoarces americanus*, are assessed as a unit stock from Cape Cod Bay south to Delaware. An index assessment for this species was last reviewed at SAW 11 in 1990 (NEFSC 1990). The status of this stock was most recently evaluated in 2000 (NEFSC 2001). At that time, the three year average spring biomass index (1997-1999 average = 1.98 kg/tow) was approximately 40% of the current B_{msy} proxy (1980-1991 median = 4.9 kg/tow) and below the biomass threshold (½ Bmsy = 2.4 kg/tow). Ocean pout are included in the New England Fishery Management Council's Multispecies Fishery Management Plan under the "nonregulated multispecies" category.

2.0 The Fishery

From 1964 to 1974, an industrial fishery developed for ocean pout, and nominal catches by the U.S. fleet averaged 4,700 mt. Distant-water fleets began harvesting ocean pout in large quantities in 1966, and total nominal catches peaked at 27,000 mt in 1969. Foreign catches declined substantially afterward, and none have been reported since 1974 (Table N1, Figure N1). United States landings declined to an average of 600 mt annually during 1975 to 1983. Catches increased in 1984 and 1985 to 1,300 mt and 1,500 mt respectively, due to the development of a small directed fishery in Cape Cod Bay supplying the fresh fillet market. Landings have declined more or less continually since 1987. In recent years, landings from the southern New England/Mid-Atlantic area have continued to dominate the catch, reversing landing patterns observed in 1986-1987, when the Cape Cod Bay fishery was dominant. The shift in landings is attributed to the changes in management (gear/mesh) regulations. Total landings in 2001 were only 18 mt, a near-record low in the time series (Table N1, Figure N1).

3.0 Research Survey Indices

Commercial landings and the NEFSC spring research vessel survey biomass index followed similar trends during 1968 to 1975 (encompassing peak levels of foreign fishing and the domestic industrial fishery); both declined from very high values in 1968-1969 to lows of 300 mt and 1.3 kg per tow, respectively, in 1975. Between 1975 and 1985, survey indices increased to record high levels, peaking in 1981 and 1985. Since 1985, survey catch per tow indices have generally declined, and are presently below than the long-term survey average (3.5 kg per tow); the 2001 spring survey index was 2.8 kg per tow (Table N2, Figure N1). Both NEFSC winter survey and the Massachusetts Division of Marine Fisheries inshore research vessel surveys confirm the declining trend observed in the NEFSC spring survey.

4.0 Exploitation Indices

Annual relative exploitation ratios (landings/NEFSC spring survey biomass index) have declined sharply from a peak in 1973 to low levels in the early 1980s then increased slightly in the late-1980s, after which they declined to record low levels (Table N3, Figure N2). The 2001 exploitation index (0.007) was the lowest in the time series and well below the Fmsy proxy (0.31), derived as the MSY proxy (1,500 mt) divided by the Bmsy proxy. Since discards have not been estimated, and landings,

not total catch, were used to derive exploitation ratios, the exploitation ratios may be under estimated.

5.0 Assessment Results

The index assessment presented above reveals that landings, survey and exploitation ratios trends have remained stable. No substantial change in stock status has occurred since the last assessment.

For ocean pout, the replacement ratio and relative F analyses were not sufficiently informative for estimating Bmsy, Fmsy, and MSY (NEFSC 2002). Thus, the biological reference points for ocean pout remain based upon research vessel survey biomass trends and the exploitation history (Applegate et al. 1998). MSY was chosen to be 1,500 mt and the Bmsy proxy was determined as the median survey index from 1980-1991 (4.9 kg/tow). The minimum biomass threshold is ½ of the Bmsy proxy (2.4 kg/tow). Given these proxies, the threshold Fmsy is 0.31 (1.5/4.9).

To evaluate stock conditions, the three year average of NEFSC spring survey indices and the exploitation ratio (2001 landings/ average of 1999, 2000, 2001 spring survey biomass indices) were used as proxies for biomass and fishing mortality, respectively. In 2001, the three year average survey index (2.46 kg/tow) indicates that biomass is slightly above 1/2Bmsy and the exploitation ratio (0.007) indicates F is below the F threshold (Figure N3). Thus, the ocean pout population was not overfished and overfishing did not occur in 2001.

Since the ocean pout fishery occurs primarily in the spring it is possible to evaluate the stock condition for 2002. Using the NEFSC 2002 spring survey (2.026 kg/tow), the 3 year average spring biomass index (2.28 kg/tow) is below ½ Bmsy. Using preliminary 2002 landings (9 mt), the 2002 exploitation ratio (0.004) remains below the F threshold. Thus, the preliminary evaluation for 2002 is that the ocean pout population is overfished and overfishing is not occurring.

Sensitivity analyses

Sensitivity analyses were conducted by deriving exploitation ratios from NEFSC spring biomass indices which were arbitrarily increased by 10%, 25% and 100% (Figure N3). Results are summarized in Section 5.2 (Summary of Assessment Advice).

6.0 GARM Comments

The discussion centered around the conclusion that the stock was defined as overfished despite minimal landings for two decades. Although landings have been low perhaps due to mesh size regulations, the possibility exists that significant numbers are discarded in other fisheries. The panel noted that the landings to survey ratio has not accounted for the changes in commercial catchability which has occurred over time due to changes in mesh regulation. Declining trends in the NEFSC spring biomass correspond with the declining biomass trends observed in the Massachusetts inshore survey. It was noted that any inflation of the NEFSC index to account for potential gear problems would only create a mis-match between these series.

A preliminary examination of length frequency data from the NEFSC spring survey series revealed

little change in the minimum and maximum size over time. The GARM suggested further exploration of the size distribution for evidence of changing stock demographics given the stock decline over time.

7.0 Sources of Uncertainty

- The size composition of the commercial landings could not be characterized, due to the lack of commercial length samples.

- Discards have not been estimated, only landings were used to derive exploitation ratios instead of total catch. Therefore, exploitation ratios may be underestimated.

Research Recommendations

- Explore various data sources to estimate the magnitude of discarding in fisheries which may impact the ocean pout population (e.g. scallop fishery).

- Explore computing survey biomass indices of exploitable biomass and utilize these for calculating exploitation ratios.

- Examine demographic data for changes over time.

- Initiate biological studies to update basic life history information.

8.0 References

Applegate, A., S.X. Cadrin, J. Hoenig, C. Moore, S. Murawski, and E. Pikitch. 1998. Evaluation of existing overfishing definitions and recommendations for new overfishing definitions to comply with the Sustainable Fisheries Act. New England Fishery Management Council Report.

Northeast Fisheries Science Center. 1990. Report of the Eleventh Stock Assessment Workshop (11th SAW), Fall 1990. Woods Hole, MA: NOAA/NMFS/NEFC. NEFC Ref. Doc. 90-09.

Northern Demersal and Southern Demersal Working Groups, Northeast Regional Stock Assessment Workshop. 2001. Assessment of 19 groundfish stocks through 2000: a report to the New England fishery management Council's Multi-species Monitoring Committee. Northeast Fish. Sci. Cent. Ref. Doc. 01-20; 217 p.

Northeast Fisheries Science Center. 2002. Final Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish.

Wigley, S.E. 2000. Ocean Pout. In: Clark, S.H. (Ed.) Status of the Fishery Resources off the Northeastern United States. NOAA Tech. Mem. NMFS-NE-115. Electronic document. http://www.nefsc.nmfs.gov/sos/spsyn/og/pout.html

Table N1. Commercial landings (mt, live) of ocean pout from the Gulf of Maine-Mid-Atlantic region (NAFO Subarea 5 and 6), 1962-2002.

	USA				
Year	5	6	Total	Other	Total
1962	0	0	0	0	0
1963	20	0	20	0	20
1964	2123	0	2123	0	2123
1965	877	0	877	0	877
1966	7149	0	7149	6231	13380
1967	7090	0	7090	271	7361
1968	8373	364	8737	4324	13061
1969	5571	966	6537	20435	26972
1970	5851	426	6277	895	7172
1971	2678	1448	4126	1784	5910
1972	1927	358	2285	1066	3351
1973	2810	285	3095	2275	5370
1974	2790	459	3249	483	3732
1975	209	65	274	3	277
1976	341	337	678	0	678
1977	809	250	1059	0	1059
1978	715	320	1035	0	1035
1979	658	14	672	0	672
1980	339	11	350	0	350
1981	234	17	251	0	251
1982	317	4	321	0	321
1983	408	0	408	0	408
1984	1324	0	1324	0	1324
1985	1450	54	1504	0	1504
1986	801	1	802	0	802
1987	2111	74	2185	0	2185
1988	1765	46	1811	0	1811
1989	1308	6	1314	0	1314
1990	1299	13	1312	0	1312
1991	1361	63	1424	0	1424
1992	406	68	474	0	474
1993	217	15	232	0	232
1994	137	59	196	0	196
1995	51	14	65	0	65
1996	22	29	51	0	51
1997	8	25	33	0	33
1998	8	9	17	0	17
1999	8	10	18	0	18
2000	8	11	19	0	19
2001	9	9	18	0	18
2002*	2	7	9	0	9

1994-1999 spatial patterns are based upon Vessel Trip Report data.
* preliminary.

Table N2. Stratified mean catch per tow in weight and numbers, mean length and individual average fish weight of ocean pout in NEFSC spring surveys, in the Gulf of Maine-Mid-Atlantic region (strata 1-26,73-76), 1968-2002.

Year	Mean weight (kg) per tow	Mean number per tow	Mean Length (cm)	Individual average weight (kg)
1968	5.366	6.766	51.1	0.793
1969	6.154	8.629	49.3	0.713
1970	5.180	6.133	51.9	0.845
1971	2.183	3.135	50.2	0.696
1972	4.453	5.090	51.6	0.875
1973	3.373	4.591	48.8	0.735
1974	1.479	2.310	47.0	0.640
1975	1.293	1.358	53.4	0.952
1976	1.400	2.440	46.5	0.574
1977	3.605	6.366	44.8	0.566
1978	3.371	11.831	31.6	0.285
1979	1.493	5.197	34.7	0.287
1980	5.729	11.837	42.6	0.484
1981	7.605	14.131	42.7	0.538
1982	4.743	8.690	44.0	0.546
1983	4.236	5.076	50.5	0.835
1984	5.540	7.275	50.0	0.762
1985	6.494	9.011	48.7	0.721
1986	6.345	6.995	53.0	0.907
1987	2.705	3.076	51.7	0.879
1988	3.244	5.405	45.0	0.600
1989	2.792	5.323	44.0	0.525
1990	5.074	6.369	50.3	0.797
1991	3.783	5.596	49.7	0.676
1992	2.257	2.639	52.9	0.855
1993	3.084	3.546	53.4	0.870
1994	2.309	2.639	54.3	0.875
1995	1.916	2.525	50.5	0.759
1996	2.058	3.127	47.6	0.658
1997	1.632	2.069	52.4	0.789
1998	1.733	2.957	46.1	0.586
1999	2.561	3.340	50.2	0.767
2000	2.016	3.113	48.2	0.648
2001	2.801	3.748	51.6	0.747
2002	2.026	2.809	51.3	0.721

Table N3. Annual relative exploitation ratios (annual landings /spring survey biomass indices) and relative exploitation ratios used in stock status (annual landings/ 3year average spring biomass indices) for ocean pout, 1968-2002.

Year	Annual relative exploitation rate (landings/spring index)	Relative exploitation ratio (landings/ 3 yr avg spring index)
1968	2.434	
1969	4.383	
1970	1.385	1.2884
1971	2.249	1.0897
1972	0.753	0.8508
1973	1.592	1.6096
1974	2.523	1.2032
1975	0.214	0.1352
1976	0.484	0.4875
1977	0.294	0.5044
1978	0.307	0.3707
1979	0.450	0.2380
1980	0.061	0.0991
1981	0.033	0.0508
1982	0.068	0.0533
1983	0.096	0.0738
1984	0.239	0.2736
1985	0.232	0.2773
1986	0.126	0.1309
1987	0.808	0.4217
1988	0.558	0.4419
1989	0.468	0.4482
1990	0.259	0.3543
1991	0.376	0.3667
1992	0.210	0.1280
1993	0.075	0.0763
1994	0.085	0.0770
1995	0.034	0.0268
1996	0.025	0.0244
1997	0.021	0.0180
1998	0.010	0.0097
1999	0.007	0.0086
2000	0.009	0.0089
2001	0.006	0.0071
2002	0.004	0.0039

Note: preliminary 2002 landings used.

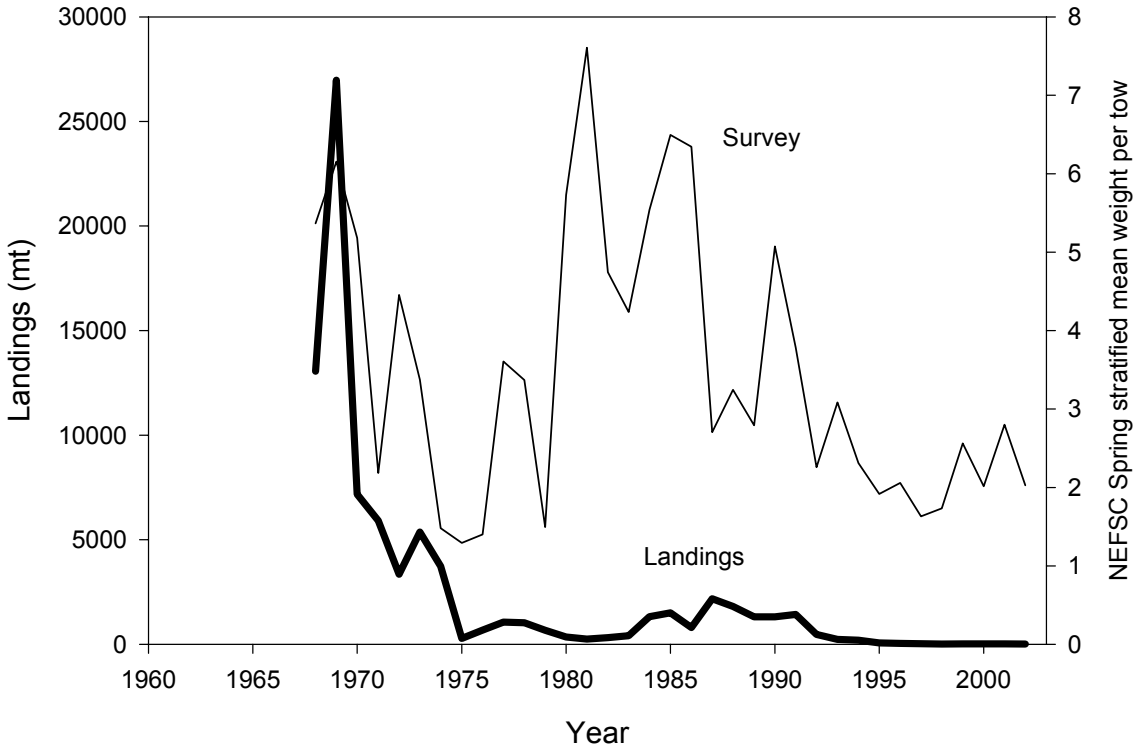

Figure N1. Trends in landings (mt) and NEFSC spring survey biomass (kg/tow) for ocean pout, 1968 - 2002.

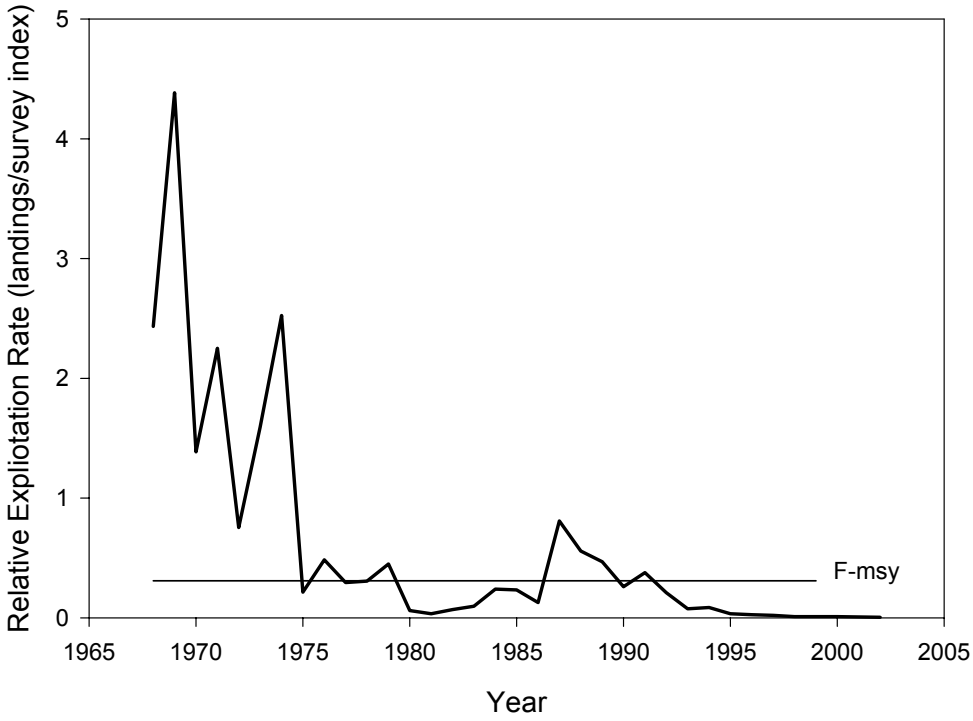

Figure N2.
Exploitation indices (landings/spring biomass index) for ocean pout, 1970 - 2002.

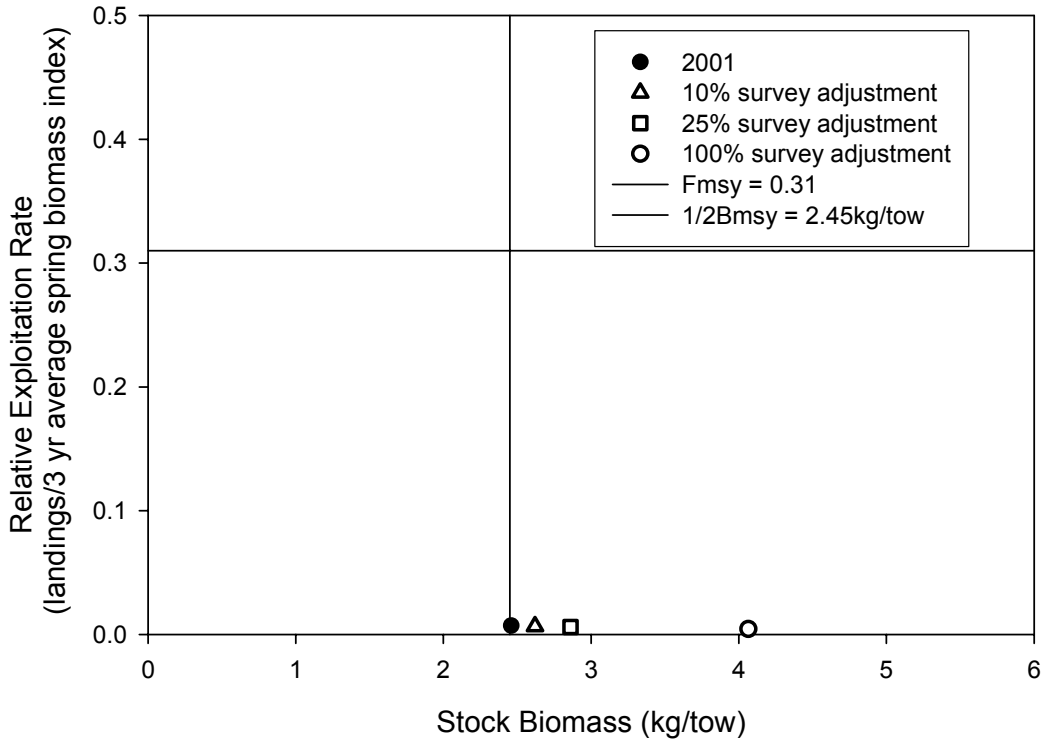

Figure N3. Ocean pout stock status in 2001 and three sensitivity analyses in which NEFSC spring survey biomass was arbitrarily adjusted by 10%, 25% and 100%.