

NEW ENGLAND FISHERY MANAGEMENT COUNCIL

**SMALL MESH MULTISPECIES**

**(WHITING, RED HAKE, OFFSHORE HAKE):**

**Summary of Whiting Discard Analyses**

Bycatch and discard of silver hake occurs in both the directed and non-directed silver hake fisheries. This document provides a summary of available discard analyses for Whiting.

Historical discard to kept ratios for silver hake were determined by Brodziak *et al.* (2001) using weigh-out interview data (1983-1993), sea sampling data (1989-1999) and fishing vessel logbook data (1994-1999). There were no estimates prior to 1983 due to data limitations. A summary of the results follows.

Discard to kept ratios in the weigh out interview data for otter trawls ranged from 10% to 80% from 1983-1993, with an average of 30%. Fishery logbook data (1994-1999) showed that silver hake discarding practices varied through time and differed between directed and non-directed fisheries. Discard to kept ratios (representing only a fraction of the total) were calculated with logbook data from 1994-1999. Discard to kept (DK) ratios by weight (discarded/landed) varied through time, and ranged from 0% to over 100% for the directed silver hake fishery (small mesh otter trawl) and for the non-directed fisheries (large mesh otter trawl, shrimp trawl, sink gill net, and scallop dredge). Variability in discard ratios were attributed to a number of factors, including non-random coverage of the fleet, small sample sizes and inherent variation in discard rates and practices. There were no records of discard for the scallop dredge fishery, though discard of silver hake was known to occur in the sea scallop fishery. Sea sampling data (1989-1999) collected by observers on fishing vessels showed discarding by otter trawls and scallop dredges occurred throughout both stock areas (Figures 16 and 17 Brodziak *et al.* 2001) but discards from the sink gill net fishery occurred primarily in the north (Figure 18 Brodziak *et al.* 2001).

Updated discard estimates for 2001-2004 were determined in the 2006 Stock Assessment (NEFSC 2006). A summary of the results follows.

Discard estimates were calculated using observer data and a ratio estimator (NEFSC 2003). For the ratio estimator, species groups and gear groups were used to tabulate and stratify observer and “landings” data (landings and haul weights for individual tows) at the trip level. Species potentially landed were assigned to a species group and potential gear types used were assigned to a gear group.

The kept (landed) weight was tabulated for each trip by species and gear group and the total silver hake discard and landings in each of the species groups were determined for each trip. The sum of landings for all species groups equaled the total landings for the trip. Primary and secondary species groups were identified based on the groups with the highest and second highest landings respectively. The discard to kept (DK) ratio for each species group and gear

group was calculated. Observer data (2001-2004) were pooled to estimate one set of DK ratios and average annual discard estimates for 2001-2004.

During 2001-2004, mean annual discards of silver hake averaged about 3,820 mt per year (0.8% of the total silver hake catch). Trips with hakes and ocean pout as the primary species landed in the other/unknown and bottom trawl gear groups had the highest discard to kept ratios with 12.5% to 24% of the amount landed being discarded. The highest levels of average annual silver hake discards were for crab/shrimps in shrimp trawls, and hakes and ocean pout in bottom trawls.

Discard by stock area was not evaluated but prorated estimates for primary species and gear groups with discards of at least 70 mt per year were generated (Table A7 NEFSC 2006). Discards of silver hake in the northern stock area from 2001-2004 averaged 1,580 mt per year (41% of the total silver hake discarded, 0.3% of the total catch) with an average total of 2,142 mt per year of silver hake landed during this timeframe. Discards in the southern stock area averaged 1,998 mt per year (or 52% of the total silver hake discarded, 0.4% of the total catch) from 2001-2004 with an average 7,153 mt per year of silver hake landed. The remaining silver hake discarded from 2001-2004 (242 mt) were not attributed to a stock area.

These discard analyses identify bottom trawls, in both the directed and non-directed fisheries, as the highest source of whiting discard for both sets of time series (1994-1999, 2001-2004). Discard of silver hake was documented to occur for both the Northern and Southern stocks and the later estimates (2001-2004) suggest that the highest discards, 52% of the total silver hake discarded for this time period, originated from the Southern stock while 41% of the discards originated from the Northern stock.

## **LITERATURE CITED**

Brodziak, J.K.T., E.M. Holmes, K.A. Sosebee, and R.K. Mayo. 2001. Assessment of the silver hake resource in the northwest Atlantic in 2000. NEFSC Ref. Doc. 01-03.

Northeast Fisheries Science Center (NEFSC). 2003. Report of the 37th Northeast Regional Stock Assessment Workshop (37th SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. Northeast Fish. Sci. Cent. Ref. Doc. 03-16. 597 pp.

Northeast Fisheries Science Center (NEFSC). 2006. Report of the 42nd Northeast Regional Stock Assessment Workshop (42nd SAW): Stock Assessment Review Committee (SARC) Stock Assessment Report. Northeast Fish. Sci. Cent. Ref. Doc. 06-09. 308 pp.

Figure 16. Spatial pattern of silver hake discard by otter trawls, 1989-1999.

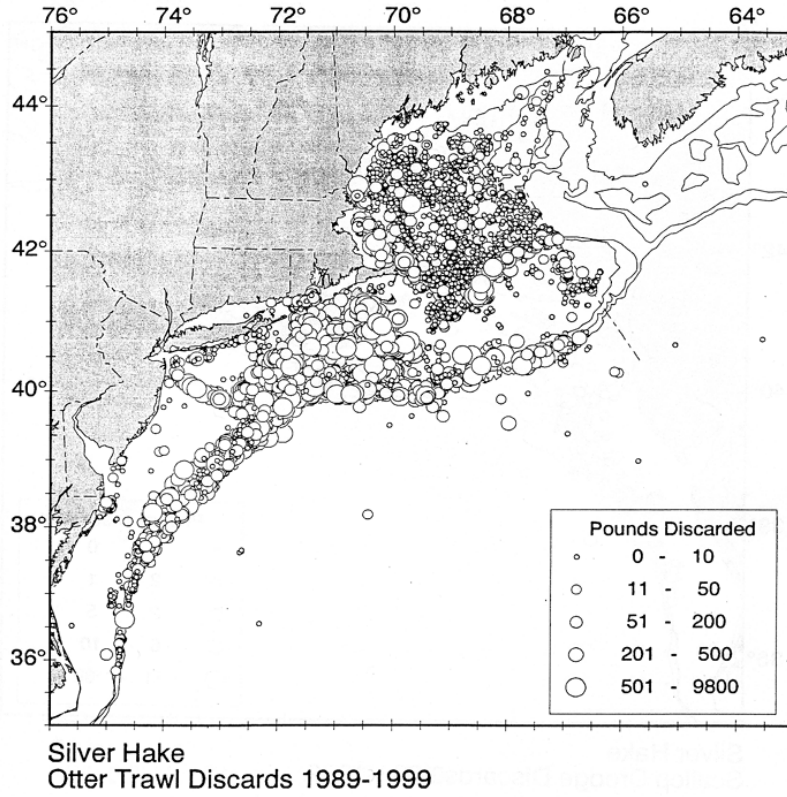


Figure 17. Spatial pattern of silver hake discard by scallop dredges, 1989-1999.

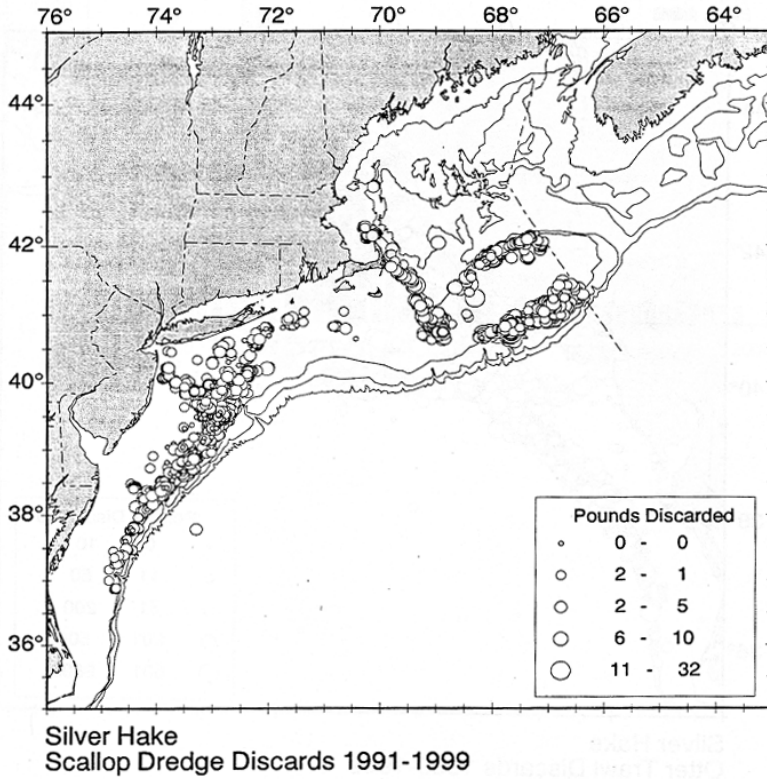


Table A7. Discard to kept (DK) ratios and mean annual discard (mt y<sup>-1</sup>) for silver hake from ratio estimators, by primary species group and primary gear group, based on observer data for 2001-2004. Results are sorted in descending order by DK ratio. Primary species group and gear group combinations not shown had DK ratios < 0.00001. The CV for the DK ratio is the same as the CV for discard because landings were assumed measured without error. The "Assumed stock area" for cases with mean annual discard > 70 mt per year is the principle silver hake stock area for landings and discards based on the primary geographical location of the fishery. Landings for crabs/shrimps in shrimp trawls also include landings for crabs/shrimps in other/unknown gear.

Species Group	Gear Group	N trips	DK ratio	CV	Mean 2001 - 2004 landings (mt y <sup>-1</sup> )	Mean discard 2001-2004 (mt y <sup>-1</sup> )	Assumed stock area
Hakes+OceanPout	Other/unknown gear	6	0.24082	1.46	297	72	South
Hakes+OceanPout	Bottom trawls	93	0.12455	0.20	9,822	1,223	South
Squid/ButterFish	Bottom trawls	233	0.02423	0.24	24,673	598	South
Crabs/Shrimps	Shrimp trawls	31	0.02150	0.32	73,479	1,580	North
Dogfishes	Bottom trawls	16	0.00946	0.39	232	2.2	
Monkfish	Bottom trawls	147	0.00830	0.14	12,672	105	South
Principal Gmdfsh	Other/unknown gear	5	0.00458	0.91	415	1.9	
Flatfish	Bottom trawls	722	0.00437	0.15	17,133	75	
Principal Gmdfsh	Bottom trawls	559	0.00434	0.14	19,112	83	
Flatfish	Other/unknown gear	13	0.00406	0.84	651	2.6	
Atlantic herring	Bottom trawls	12	0.00371	1.04	7,678	28	
Scup/Seabass	Bottom trawls	67	0.00189	0.41	2,775	5.2	
Flatfish	Gill/set nets	229	0.00166	0.41	648	1.1	
Fluke/Fourspot	Bottom trawls	358	0.00085	0.28	5,831	5.0	
Squid/ButterFish	Midwater trawls	12	0.00080	0.90	176	0.1	
Principal Gmdfsh	Gill/set nets	1595	0.00045	0.13	5,892	2.7	
Scallops	Bottom trawls	37	0.00028	0.73	14,540	4.1	
Atlantic herring	Other/unknown gear	82	0.00020	0.63	38,263	7.7	
Skates/Rays	Bottom trawls	102	0.00020	0.35	9,897	2.0	
Dogfishes	Gill/set nets	242	0.00011	0.27	1,156	0.1	
Other Species	Bottom trawls	51	0.00011	0.81	5,612	0.6	
Scallops	Dredges	285	0.00010	0.37	191,675	19.2	
Monkfish	Gill/set nets	865	0.00006	0.25	8,428	0.5	
Atlantic herring	Midwater trawls	27	0.00005	0.73	26,953	1.3	
Skates/Rays	Gill/set nets	218	0.00003	0.72	3,292	0.1	
Crabs/Shrimps	Bottom trawls	66	0.00002	0.60	1,057	0.0	
All	All	6073		0.17	482,358	3,820	na