



New England Fishery Management Council

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MEMORANDUM

DATE: August 25, 2015
TO: Science and Statistical Committee
FROM: Skate Plan Development Team (PDT)
SUBJECT: NE Skate Complex ABCs for FY 2016 - 2017

This memorandum forwards the Skate PDT recommendation for ABC for the NE Skate Complex for FY 2016 and FY 2017 (Table 1). The Skate PDT also recommends incorporating newly available skate discard mortality rate estimates for little (48%) and winter (34%) skate in scallop dredge gear into the specifications. This would replace the assumed 50% discard mortality rate for both species in this gear type. The stock was last assessed at the Data Poor Stocks Working Group in 2009, but trawl survey biomass updates are provided annually.

The ABC is based on the current default ABC control rule established in Amendment 3. The control rule uses the median catch/biomass ratio as an estimate of exploitation rate applied to the three-year moving average of fall (spring for little skate) survey stratified mean weight per tow.

Survey Data

Specifications for FY 2016 and 2017 incorporate the most recent three years of the fall survey data (spring for little skate); older survey years drop out of the calculation. Based on the updated survey data, thorny skate remains overfished ($0.03 B_{MSY}$) but overfishing is no longer occurring (overfishing was occurring during 2013 and 2014 according to previous stock updates). Winter skate ($0.89 B_{MSY}$) is also no longer experiencing overfishing (overfishing was occurring during 2013 and 2014 according to previous stock updates). The B_{MSY} proxy for each skate species is the 75th percentile of the mean weight per tow of the reference survey series for that species. A species is considered overfished if its three-year moving average survey B falls below $\frac{1}{2} B_{MSY}$ proxy. Survey indices for two of the seven species have decreased (Table 3). Figure 2 shows the long-term survey trends and biomass reference proxies for all seven species. Little skate and winter skate continue to dominate the survey biomass. The 2012-2014 3-year average for winter skate has increased slightly but is still affected by the low survey index in 2013. The 2013-2015 3-year average for little skate decreased because the higher 2012 survey index dropped out of the calculation. In spring 2014, the NEFSC trawl survey was unable to complete tows south of Delaware. The spring 2014 little skate survey index was adjusted to account for this and may not be directly comparable to other years. However, after an analysis of the entire time series that indicated little skate were more abundant in northern strata, the index was incorporated in the 3 year moving average.

Landings

The overall TAL was not exceeded for the skate fisheries. 2014 skate wing landings were 10,605 mt (97.3% of the wing TAL), and skate bait landings were 4,499 mt (82% of the bait TAL). Historic catch and landings are provided in **Error! Reference source not found.**. State landings were 329 mt. State landings have been variable over the last three fishing years (Table 2), and the PDT used a three-year average (FY 2012-2014) for specifying the assumed amount of state landings to deduct from the TAL for 2016-2017 (2.6%).

Discards

Discards were estimated through calendar year 2014 by gear (Table 5). Discards are estimated for a calendar year, rather than the fishing year, because they rely on the NMFS area allocation landings tables to expand observed discard/kept-all ratios to total based on landings by gear, area and quarter. The observed D/K-all ratios were derived from the NEFOP and the At Sea Monitoring programs and included both sector and non-sector vessels, but were not stratified on that basis. The hindcasted discard estimates are calculated using a three-year average of the discards of skates/landings of all species. An assumed discard mortality rate of 50% is applied for all gears and species, except for otter trawl gear.

Total estimated discards for 2014 were 42,732 mt (Table 5). Total discards decreased by only 0.03% over the 2013 estimates. The weighted aggregate mean discard mortality rate (across all species and gear types) was estimated to be 32 %. The assumed dead discard rate (dead discards/total catch) for 2016-2017 is 43%, including the new scallop dredge discard mortality rate estimates for little and winter skates. Applying this rate to the updated specifications results in projected dead discards for FY2016 and 2017 of 10,095 mt.

By comparison, the assumed dead discard rate (dead discards/total catch) for 2016-2017 is 45%, based on the existing discard mortality rate estimates. The weighted aggregate mean discard mortality rate (across all species gear types) was estimated to be 34% resulting in projected dead discards for FY2016 and 2017 of 10,571 mt.

Northeast Skate Complex Annual Catch Limit Accounting

Only 79% of the 35,479 mt skate complex ACL was caught in 2014; accordingly, no Accountability Measures (AMs) were triggered (Table 4). The total catch for 2014 was 28,819 mt composed of 11,452 mt of dead discards and 16,251 mt of landings (including state landings). Total catch was higher than the ACT (75% of ACL), but less than the ACL.

Discard mortality rates

The baseline discard mortality rate estimates are set at 50% for all species and all gear types, where new research has not allowed for the revision of that number. This was established in Amendment 3 to the NE Skate Complex FMP. Currently, revised discard mortality rates have only been implemented for little, smooth, thorny, and winter skates in otter trawl gear. Specifications for FY 2014-2015 incorporated final

trawl gear discard mortality rate estimates for little (22%), smooth (60%), thorny (23%) and winter (9%) skate as determined by Mandelman *et al.* (2013). For these 4 species, the 50% discard mortality rate estimate is assumed for remaining gear (scallop dredge, longline, and gillnet).

Recent research has provided revised discard mortality rate estimates for winter (35%) and little (51%) skate in scallop dredge gear (see Rudders et al., 2015). The revised scallop dredge discard mortality rate estimates reduce the assumed dead discard rate for 2016 to 44%. Changes to the discard mortality rate estimates affect the catch history and therefore the catch/biomass medians. The revised scallop dredge discard mortality rate estimates were applied to the entire catch time series despite changes in gear configuration during this time period.

The discard mortality rate estimates provided in the final report (Rudders et al., 2015) differ from those provided to the PDT by the principal investigators (winter skate – 34%; little skate – 48%). The difference is because the model parameters were finalized after the final report was submitted to the funding agency. The PDT is recommending using these most recent discard mortality rates for the 2016-2017 specifications. The impact on ABC is slight, showing an increase of ~360 mt, with a corresponding low increase in the TAL (Table 1).

The PDT recommends revising the scallop dredge discard mortality rate estimates for little and winter skate based on the final model parameters (i.e. 34% for winter skate and 48% for little skate) and incorporating this research into the ABC recommendations. The PDT provided a comparison between the status quo and the PDT recommendation (Table 1).

The PDT also received an update on a preliminary sink gillnet discard mortality rate estimates for winter skate (being conducted by James Sulikowski et al. at University of New England). This research is currently ongoing, however, preliminary results estimate the discard mortality rate for winter skate in gillnet gear to be 2%. Because these data are preliminary, they cannot be incorporated into skate specifications at this time, as per Council policy. The PDT would recommend considering these data in the next round of specifications, provided the study is complete.

Specifications

The proposed specifications for FY 2016 and 2017 use the updated discard mortality rate estimates for little and winter skate in scallop dredge gear, as well as the revised catch history and the catch/biomass medians. The revised catch/biomass medians have standardized years from 1969-2014. Table 1 shows a comparison of the proposed specifications for FY 2016 and 2017 including the revised scallop dredge discard mortality estimates (PDT recommendation) with both the previous specifications package (FY2014 – 2015) and a revised specifications based on existing discard mortality rate estimates. The changes in survey indices and revised medians contribute to lowering the ABC. Overall discards have increased, which has increased the proportion of dead discards, further impacting the available TAL.

MSY is defined as the catch resulting from the application of the catch/biomass medians to the target skate biomass levels. MSY, based on the revised catch/biomass medians, is estimated to be 36,860 mt (MSY was estimated in the FY2014 – 2015 specifications to be 36,414.86mt).

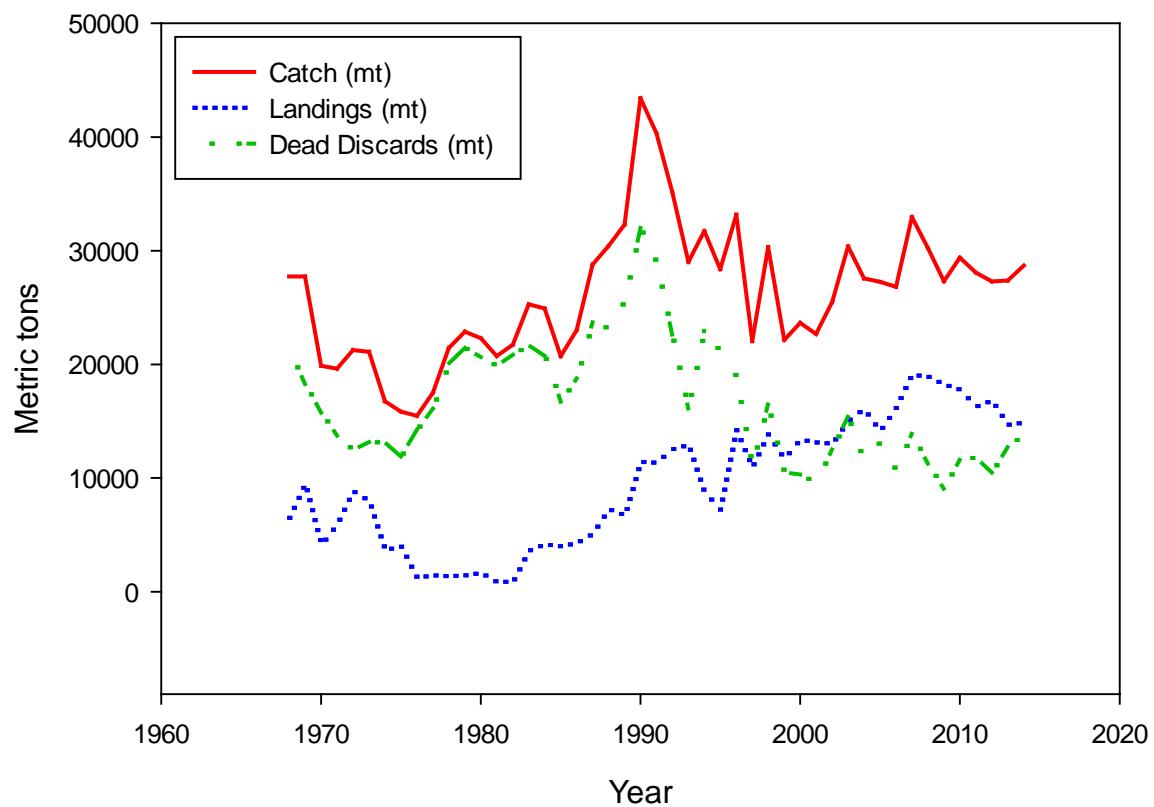


Figure 1 - Historic catch (in mt) from 1968 to 2014 compared to landings and dead discards

Skate Complex Biomass Indices

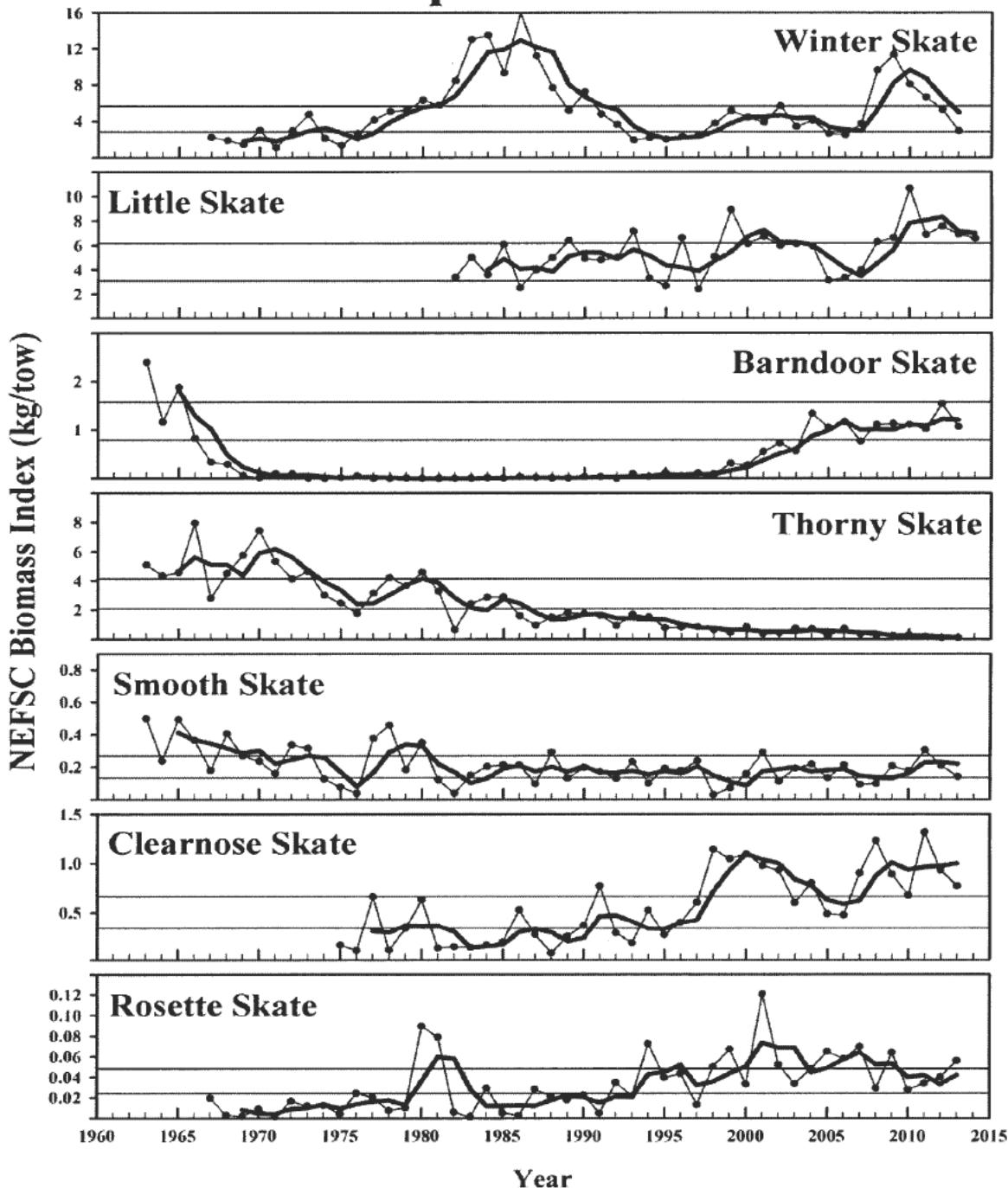


Figure 2 - NEFSC survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the biomass thresholds using consistent FSV Albatross/Bigelow strata.

Table 1 – Comparison of PDT recommended revised specifications for FY2016 and FY2017, with revised specifications for FY2016 & FY 2017 based on status quo discard mortality estimates, and specifications for FY2014 and YF2015.

PDT recommendation including scallop dredge discard estimates	Final report scallop discard mort. Rate estimates	Status Quo discard mortality rate estimates	FY 2014-15 specifications
ABC	31,081	31,441	35,479 mt
ACT	23,311	23,580	26,609 mt
TAL	13,216	13,263	17,562 mt
Federal TAL	12,872	12,918	16,385 mt
Wing TAL	8,560	8,591	10,896 mt
Bait TAL	4,312	4,328	5,849 mt

Table 2 – State-only landings for Fishing years 2012 - 2014

Fishing Year	State landings (mt)
2012	733
2013	190
2014	329

Table 3 - NEFSC trawl survey indices

	Barndoor	Clearnose	Little	Rosette	Smooth	Thorny	Winter
2011	1.02	1.32	6.88	0.034	0.30	0.18	6.65
2012	1.54	0.93	7.54	0.040	0.21	0.08	5.29
2013	1.07	0.77	6.9	0.056	0.14	0.11	2.95
2014	1.62	0.61	6.54 ^a	0.053	0.22	0.21	6.95
2015			6.82				
Three Year Moving Averages							
2011-2013	1.21	1.01	7.11	0.042	0.22	0.12	4.96
2012-2014	1.41	0.77	6.99 ^a	0.048	0.19	0.13	5.06
2013-2015			6.75 ^a				

Table 4 - FY2013 and 2014 catch and landings of skates compared to management specifications

Management Specification	2013		2014	
	Specification Amount	Catch/Landings (mt)	Specification Amount	Catch/Landings
ABC/ACL	50,435	27,922	35,479	28,032
ACT	37,826	27,992	26,609	28,032
Assumed Discards + State Landings	16,265	13,253	16,385	11,781
TAL Bait	7,223	5,596	5,489	4,499
TAL Wings	14,338	7,981	10,896	10,605

Table 5- Estimated discards(mt) of skates (all species) by gear type, 1968 - 2014

Year	Longline	Otter Trawl	Sink Gillnet	Scallop Dredge	Total
1968	597.4582	88738.78	46.48445	7930.126	97312.85
1969	797.1557	83465.99	38.48972	4966.278	89267.92
1970	778.6001	70101.08	29.19364	3968.984	74877.86
1971	1174.926	55084.89	29.35216	4058.723	60347.89
1972	1230.099	51537.76	44.66781	4175.135	56987.66
1973	1319.66	54757.81	46.26464	3872.19	59995.93
1974	1330.345	54082.42	82.31148	4128.971	59624.05
1975	1420.796	42752.51	86.88262	6439.156	50699.35
1976	887.6814	42854.46	135.335	10921	54798.48
1977	684.3216	48657.09	216.4877	15206.34	64764.24
1978	1317.235	58447.16	255.2043	20025.2	80044.8
1979	1622.962	66408.26	223.0057	20147.73	88401.96
1980	1347.212	69344.61	284.6494	19095.94	90072.41
1981	798.9696	69383.92	350.1818	19850.2	90383.27
1982	600.9036	81268.59	174.8562	17868.66	99913.01
1983	578.478	82378.47	185.0332	18724.75	101866.7
1984	461.5475	79784.25	217.237	17030.94	97493.98
1985	458.2516	64137.46	195.8288	14679.7	79471.24
1986	569.9353	63676.9	256.8817	17564.96	82068.68
1987	914.3742	60170.24	224.7242	28442.2	89751.54
1988	872.8039	58233.89	251.8068	30640.32	89998.82
1989	747.344	58017.28	139.7987	35986.03	94890.45
1990	600.2893	86463.79	420.5419	38151.2	125635.8
1991	1496.754	53024.58	211.8903	34357.68	89090.91
1992	2750.906	33009.16	376.4064	32646.49	68782.96
1993	96.87476	29821.5	321.387	22036.9	52276.66
1994	48.11701	81813.53	492.3781	11154.91	93508.93
1995	58.24285	34703.59	792.8354	28578.18	64132.85
1996	54.77733	41433.27	550.0027	19827.66	61865.7
1997	59.93143	13454.52	483.644	17396.08	31394.18
1998	58.94155	46867.16	468.5981	15263.03	62657.72

1999	47.26457	13439.83	847.478	15148.53	29483.1
2000	40.29534	23961.96	973.2846	9917.539	34893.08
2001	42.42211	29583.54	608.2923	7015.751	37250.01
2002	128.0853	21840.05	2855.692	13784.76	38608.58
2003	48.07422	35985.36	965.3109	15982.31	52981.05
2004	20.38864	36112.65	947.75	9309.703	46390.49
2005	144.7678	33384.91	1595.718	10691.47	45816.86
2006	212.0955	22911.73	1221.953	10662.96	35008.74
2007	73.32341	31527.49	1812.012	13019.26	46432.09
2008	175.9739	23372.57	2028.211	10012.23	35588.98
2009	307.0606	25610.4	1988.192	7290.094	35195.75
2010	477.7119	21302.46	2401.828	13365.77	37547.77
2011	146.8406	26527.97	3181.184	9639.893	39495.89
2012	99.94305	24483.41	2596.303	9096.895	36276.55
2013	719.5368	31416.84	1895.936	8683.932	42716.24
2014	26.36162	27135.24	2556.473	13014.16	42732.24

Table 6 - Estimates of discards by species from the longline fishery from 1968 - 2014

Year	longline								Total
	winter	little	barndoor	thorny	smooth	clearnose	rosette		
1968	216	110	18	235	19	0	0		597
1969	343	189	17	237	12	0	0		797
1970	332	124	3	304	16	0	0		779
1971	289	213	18	605	51	0	0		1175
1972	370	140	14	646	60	0	0		1230
1973	362	147	0	732	77	0	0		1320
1974	396	206	2	625	102	0	0		1330
1975	391	259	2	735	34	0	0		1421
1976	320	140	5	379	44	0	0		888
1977	253	81	0	315	35	0	0		684
1978	592	311	1	234	39	132	9		1317
1979	827	389	0	301	32	70	3		1623
1980	687	341	0	213	40	51	15		1347
1981	284	219	0	185	18	87	7		799
1982	276	224	0	90	5	5	0		601
1983	334	174	0	40	7	24	0		578
1984	300	110	0	30	1	15	5		462
1985	253	157	0	35	2	12	0		458
1986	343	112	0	43	4	68	0		570
1987	672	165	0	48	3	21	5		914
1988	675	145	0	41	5	2	4		873
1989	560	120	0	56	5	6	1		747
1990	367	132	0	78	8	14	1		600

1991	905	306	1	222	21	41	1	1497
1992	1463	806	17	365	31	54	14	2751
1993	41	28	0	25	3	0	0	97
1994	13	15	0	17	2	0	0	48
1995	40	6	4	5	1	1	0	58
1996	39	7	5	3	1	2	0	55
1997	36	8	9	4	1	3	0	60
1998	39	9	5	3	1	2	0	59
1999	33	7	5	1	0	1	0	47
2000	24	6	7	2	1	1	0	40
2001	24	8	7	1	1	2	0	42
2002	82	20	17	1	2	6	0	128
2003	29	9	6	2	2	1	0	48
2004	12	3	4	0	1	1	0	20
2005	70	19	39	6	11	0	0	145
2006	116	32	50	4	10	0	0	212
2007	36	11	23	1	2	0	0	73
2008	63	53	39	1	4	15	0	176
2009	181	79	29	1	3	15	0	307
2010	243	89	121	3	15	7	0	478
2011	68	29	36	1	11	1	0	147
2012	61	22	9	2	3	4	0	100
2013	345	139	173	3	4	56	0	720
2014	11	3	19	1	1	0	0	26

Table 7 - Estimates of discards by species from the otter trawl fisheries from 1968 - 2014

Year	otter trawl								Total
	winter	little	barndoor	thorny	smooth	clearnose	rosette		
1968	29746	35747	4116	17610	1423	35	62	88739	
1969	29240	36787	1343	14412	895	780	9	83466	
1970	21483	30043	884	15936	930	794	30	70101	
1971	15430	20556	582	16328	1783	399	7	55085	
1972	19276	16530	561	12950	1282	902	36	51538	
1973	18019	19966	83	14378	1801	475	35	54758	
1974	20645	17359	103	12949	2591	405	30	54082	
1975	14048	16189	36	11682	643	122	33	42753	
1976	13259	17041	146	10151	1119	837	301	42854	
1977	19902	15173	1	11619	1110	796	55	48657	
1978	29013	15807	27	9880	1734	1844	144	58447	
1979	30018	23290	12	10310	1206	1504	68	66408	
1980	38105	16454	2	11863	1919	759	242	69345	
1981	39178	16476	2	11483	1037	1109	99	69384	
1982	40881	30555	7	9051	502	243	31	81269	
1983	46678	23986	1	8819	964	1909	22	82378	
1984	41143	27779	5	8300	373	1572	613	79784	

1985	34981	19051	3	9090	444	558	11	64137
1986	38507	11655	12	6690	587	6183	43	63677
1987	30425	19848	12	5314	365	3336	870	60170
1988	32188	19164	10	3938	583	247	2103	58234
1989	26173	26266	23	3527	367	1501	161	58017
1990	37105	36204	18	6548	700	5432	458	86464
1991	17261	17806	39	3619	376	13767	155	53025
1992	10596	15732	130	1497	119	3433	1502	33009
1993	9578	15577	241	3402	368	424	232	29821
1994	16180	57575	254	2958	216	4430	200	81814
1995	16022	13707	230	466	437	3786	55	34704
1996	14602	20837	27	153	161	5449	205	41433
1997	6516	5814	65	327	222	491	19	13455
1998	21160	21146	171	789	396	3110	94	46867
1999	5867	6138	365	264	171	615	20	13440
2000	9158	11932	508	329	348	1583	104	23962
2001	15464	9334	2339	867	417	1156	6	29584
2002	12077	5504	1914	778	440	1124	2	21840
2003	16244	15465	1090	956	929	1287	14	35985
2004	20064	11871	1183	650	1440	868	37	36113
2005	14175	13214	2874	668	1601	808	45	33385
2006	10983	7220	2829	428	920	504	28	22912
2007	15493	9669	3542	355	705	1748	14	31527
2008	11220	6268	3258	90	591	1915	31	23373
2009	15734	6991	1492	179	591	600	24	25610
2010	14084	3637	2544	268	577	185	7	21302
2011	15062	5081	4370	149	637	1217	12	26528
2012	13688	5858	3413	326	596	591	10	24483
2013	15182	6732	5540	457	544	2937	26	31417
2014	11660	7423	6177	477	356	1013	30	27135

Table 8 - Estimates of discards by species from sink gillnet fisheries from 1968 - 2014

Year	sink gill net								Total
	winter	little	barndoor	thorny	smooth	clearnose	rosette		
1968	0	1	2	42	2	0	0		46
1969	1	0	5	30	2	0	0		38
1970	1	0	0	26	2	0	0		29
1971	0	1	0	25	4	0	0		29
1972	4	1	0	36	4	0	0		45
1973	1	0	0	40	5	0	0		46
1974	1	1	0	67	14	0	0		82
1975	2	0	0	80	4	0	0		87
1976	2	2	1	113	18	0	0		135
1977	6	0	0	190	20	0	0		216
1978	4	1	0	205	45	0	0		255

1979	50	4	0	144	26	0	0	223	
1980	55	12	0	184	33	0	0	285	
1981	36	12	0	270	33	0	0	350	
1982	40	17	0	112	6	0	0	175	
1983	43	4	0	122	16	0	0	185	
1984	65	11	0	136	5	0	0	217	
1985	35	10	0	145	6	0	0	196	
1986	60	8	0	174	14	0	0	257	
1987	49	6	0	160	9	0	0	225	
1988	45	44	0	141	21	0	0	252	
1989	65	7	0	62	5	0	0	140	
1990	48	33	0	300	40	0	0	421	
1991	46	9	1	140	16	0	0	212	
1992	66	147	18	138	8	0	0	376	
1993	96	132	1	81	11	0	0	321	
1994	89	221	1	136	25	18	2	492	
1995	435	286	8	25	16	23	0	793	
1996	324	188	2	8	3	23	1	550	
1997	189	263	1	4	1	25	1	484	
1998	163	261	1	4	6	32	2	469	
1999	282	514	3	5	3	40	1	847	
2000	651	247	12	29	16	19	0	973	
2001	347	150	39	13	5	52	1	608	
2002	2426	101	204	22	5	96	0	2856	
2003	548	225	89	18	20	64	0	965	
2004	501	248	134	15	25	25	0	948	
2005	803	331	297	23	52	89	1	1596	
2006	663	104	392	14	13	34	0	1222	
2007	1184	315	172	10	20	108	3	1812	
2008	650	295	742	3	18	320	0	2028	
2009	1407	286	188	8	23	75	0	1988	
2010	1471	122	764	6	15	23	0	2402	
2011	1222	150	1660	4	25	119	0	3181	
2012	1252	301	965	8	20	51	0	2596	
2013	1090	119	570	17	16	84	0	1896	
2014	1118	252	983	11	6	187	1	2556	

Table 9 - Estimates of discards by species from scallop dredge fisheries from 1968 - 2014

Year	scallop dredge								Total
	winter	little	barndoor	thorny	smooth	clearnose	rosette		
1968	4033	2592	88	711	67	402	37	7930	
1969	1893	1886	52	684	33	415	3	4966	
1970	1740	972	10	863	44	327	12	3969	
1971	994	1229	55	1304	145	327	4	4059	
1972	1094	1285	37	1410	159	184	7	4175	

1973	1162	962	1	1493	188	64	2	3872
1974	983	1298	3	953	177	674	40	4129
1975	814	3209	5	1915	82	400	15	6439
1976	2373	4695	22	1390	151	1745	545	10921
1977	6070	5076	1	1935	128	1772	225	15206
1978	7750	5505	6	1820	173	4468	304	20025
1979	8742	6499	7	2260	215	2313	111	20148
1980	7894	5193	1	3929	691	1069	318	19096
1981	11129	4131	1	3432	327	777	53	19850
1982	9669	6476	2	1431	84	188	20	17869
1983	7781	6794	0	1621	202	2301	26	18725
1984	7927	5517	2	1295	46	1757	487	17031
1985	6489	6130	1	1222	47	780	11	14680
1986	9984	2912	10	886	90	3661	22	17565
1987	12266	10899	7	849	54	3517	851	28442
1988	15736	10907	6	1305	194	621	1872	30640
1989	19790	12712	7	1419	162	1725	170	35986
1990	25519	6877	44	2129	180	3149	253	38151
1991	17490	9545	15	2434	207	4573	94	34358
1992	18091	8846	90	1794	195	2849	783	32646
1993	6497	12525	109	1762	203	702	239	22037
1994	2229	5939	48	1419	217	1161	142	11155
1995	9186	18712	59	109	113	241	159	28578
1996	5587	13517	90	173	166	90	205	19828
1997	4018	12444	305	155	217	212	46	17396
1998	3444	10989	122	219	227	145	116	15263
1999	2679	11971	117	132	75	96	78	15149
2000	1901	7637	74	94	68	71	73	9918
2001	1108	5600	32	23	50	72	127	7011
2002	1889	11300	160	38	87	236	75	13785
2003	2051	13436	92	127	213	43	21	15982
2004	3053	5536	79	32	96	496	17	9310
2005	3174	6686	397	59	152	168	56	10691
2006	3717	6079	395	92	151	208	22	10663
2007	3711	8579	324	70	122	185	29	13019
2008	2398	6613	290	31	250	383	40	10006
2009	2485	4228	335	18	48	153	23	7290
2010	4325	8446	303	22	52	196	21	13366
2011	3460	5199	570	22	128	235	25	9640
2012	3008	5295	503	73	172	37	9	9097
2013	3482	4239	515	89	137	196	27	8684
2014	4360	7997	364	91	116	53	32	13014