Landings and Survey Data for Northern Shortfin Squid, *Illex illecebrosus,* and Longfin Inshore Squid, *Doryteuthis* (*Amerigo*) *pealeii,* through 2013

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This report presents the landings and indices of relative abundance and biomass for *Illex illecebrosus* and *Doryteuthis* (*Amerigo*) *pealeii* through 2013 as an aid to establishing annual quotas for both squid stocks during 2015. The 2013 landings data are provisional.

Illex illecebrosus

The *I. illecebrosus* resource constitutes a unit stock throughout the species range from Newfoundland to Florida (Dawe and Hendrickson 1999). However, landings from areas outside the US EEZ (i.e., the Scotian Shelf and inshore Newfoundland) have been very low (averaging < 7% of the total landings) since 1999 (Hendrickson and Showell 2013), and therefore, only the US EEZ landings are presented herein.

The *I. illecebrosus* bottom trawl fishery within the US EEZ has solely been a domestic fishery since 1987 (Fig. 1). During 1987-2012, landings averaged 12,914 mt with a peak of 26,097 mt in 2004 (Table 1, Fig. 1). Landings exceeded the quotas during 1998 and 2004. In recent years, landings dropped substantially from 18,797 mt in 2011, when 81% of the quota was harvested, to 3,799 mt in 2013. Landings during 2013 were the third lowest since the inception of the domestic fishery in 1987 and totaled 16.5 % of the 2013 quota (22,915 mt).

Indices of relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) were derived using data from NEFSC fall bottom trawl surveys conducted during 1967-2013 (Table 2, Fig. 2). The *H. B. Bigelow* replaced the *Albatross IV* as the survey vessel beginning in 2009. Indices for 2009 onward were converted to *Albatross IV* units using fall conversion factors (Miller et al. 2010) and the CVs account for the variance associated with the conversion factors.

Relative abundance and biomass indices were highly variable during 1967-2013, as is typical for squid species. In recent years, relative abundance has declined from the highest point in the time series in 2006 (29.5 squid per tow) to 4.7 squid per tow in 2013 which is below the time series median (Table 2, Fig. 2).

Doryteuthis (*Amerigo*) *pealeii*

Doryteuthis (*Amerigo*) *pealeii* landings, by domestic and foreign fleets, are presented for 1963-2013 (Table 3 and Fig. 3). The *D. pealeii* bottom trawl fishery has essentially been a domestic

fishery since 1987 (Fig. 3). During 1987-2012, landings averaged 15,784 mt with a peak of 23,738 mt in 1989 (Table 3, Fig. 3). Landings exceeded the annual quotas during 2000 and were near the annual quotas during 2002 and 2005. Since 2000, the fishery has been subject to annual and in-season quotas. During 1999-2010, landings gradually declined from 19,173 t in 1999 to 6,913 t in 2010, but then increased again to 12,820 mt in 2012. During 2013, the landings totaled 11,075 mt, which was 50.2% of the 2013 quota (22,049 mt).

Indices of relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) were derived using daytime tows (solar zenith angles of 43°-80°) from NEFSC fall bottom trawl surveys conducted during 1975-2013 (Table 4, Fig. 4). The *H. B. Bigelow* replaced the *Albatross IV* in 2009. Indices for 2009 onward were converted to *Albatross IV* units using NEFSC fall survey daytime conversion factors (NEFSC 2010) and the CVs account for the variance associated with the conversion factors. The survey time series was derived using the strata set sampled by the *H. B. Bigelow* (depths > 18 m).

In recent years, relative abundance declined from the third highest point in the time series during 2006 (1,778 squid per tow) to 416 squid per tow in 2009, a level below the time series median (638 squid per tow). Relative abundance indices increased again to well above the median in 2012 (1,371 squid per tow). Relative abundance in 2013 (1,102 squid per tow) was 26% lower than during 2012 but remained above the time series median (Table 4, Fig. 4).

References

Dawe, E. G. and L. C. Hendrickson. 1998. A review of the biology, population dynamics, and exploitation of short-finned squid in the northwest Atlantic Ocean, in relation to assessment and management of the resource. NAFO SCR Doc. 98/59, Ser. No. N3051, 33 p.

Hendrickson, L.C. and M.A. Showell. 2013. Assessment of Northern shortfin squid (*Illex illecebrosus*) in Subareas 3+4 for 2012. NAFO SCR Doc. 13/31, Ser. No. N6185, 25 p.

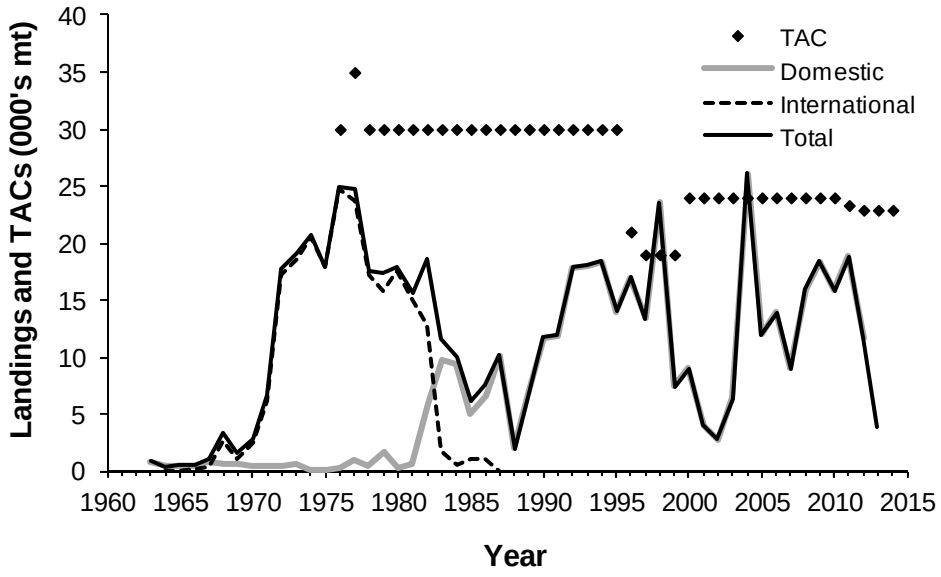

Figure 1. Landings (000's mt) of *Illex illecebrosus* in the US EEZ, by fleet, and TACs (000's mt) during 1963-2013.

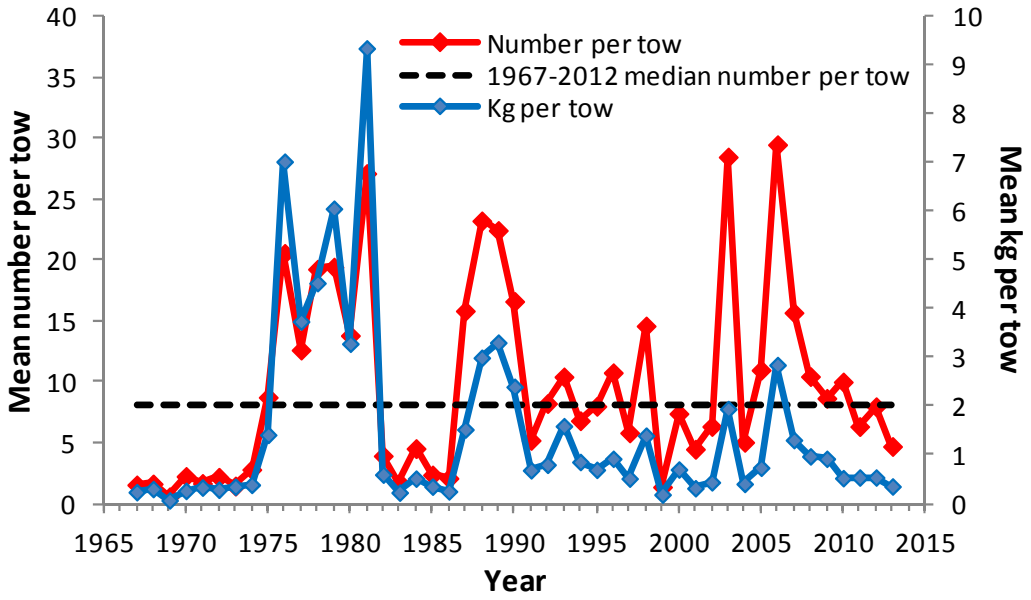

Figure 2. *Illex illecebrosus* indices of relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) derived from NEFSC fall bottom trawl surveys conducted during 1967-2013.

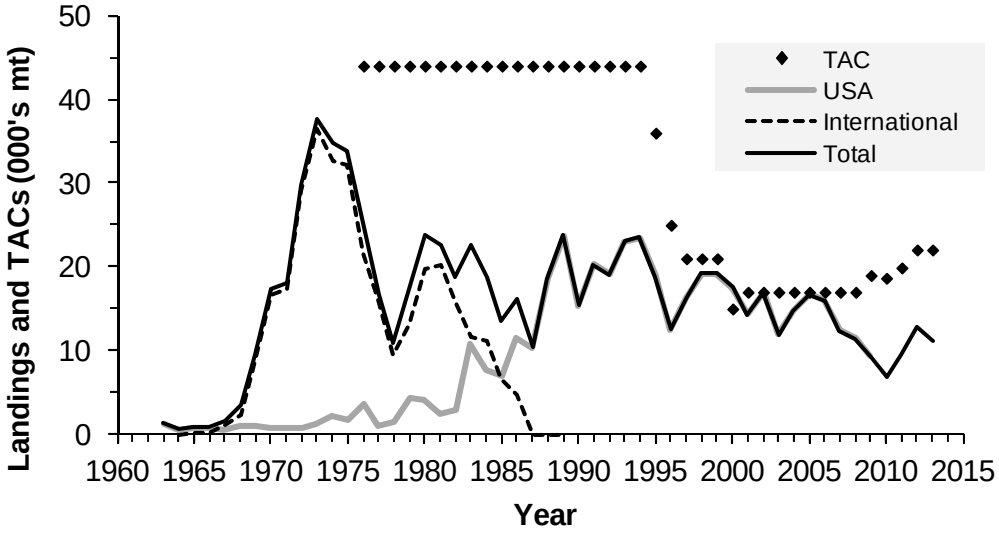

Figure 3. Landings (000's mt) of *Doryteuthis* (*Amerigo*) *pealeii*, by fleet, and TACs (000's mt) during 1963-2013.

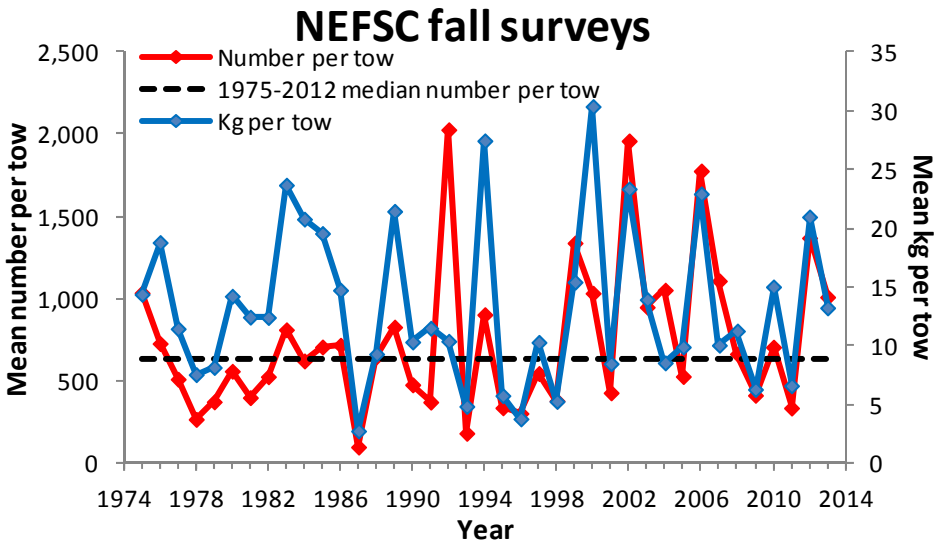

Figure 4. *Doryteuthis* (*Amerigo*) *pealeii* indices of relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) derived using daytime tows (solar zenith angles of 43°-80°) from NEFSC fall bottom trawl surveys conducted during 1975-2013.

Table 1. USA EEZ landings of *Illex illecebrosus*, by fleet, during 1963-2013. The 2013 landings are preliminary.

Year	USA	Foreign	Total
1963	810		810
1964	358	2	360
1965	444	78	522
1966	452	118	570
1967	707	288	995
1968	678	2,593	3,271
1969	562	975	1,537
1970	408	2,418	2,826
1971	455	6,159	6,614
1972	472	17,169	17,641
1973	530	18,625	19,155
1974	148	20,480	20,628
1975	107	17,819	17,926
1976	229	24,707	24,936
1977	1,024	23,771	24,795
1978	385	17,207	17,592
1979	1,493	15,748	17,241
1980	299	17,529	17,828
1981	615	14,956	15,571
1982	5,871	12,762	18,633
1983	9,775	1,809	11,584
1984	9,343	576	9,919
1985	5,033	1,082	6,115
1986	6,493	977	7,470
1987	10,102	0	10,102
1988	1,958	0	1,958
1989	6,801	0	6,801
1990	11,670	0	11,670
1991	11,908	0	11,908
1992	17,827	0	17,827
1993	18,012	0	18,012
1994	18,350	0	18,350
1995	13,976	0	13,976
1996	16,969	0	16,969
1997	13,356	0	13,356
1998	23,568	0	23,568
1999	7,388	0	7,388
2000	9,011	0	9,011
2001	4,009	0	4,009
2002	2,750	0	2,750
2003	6,391	0	6,391
2004	26,097	0	26,097
2005	12,011	0	12,011
2006	13,944	0	13,944
2007	9,022	0	9,022
2008	15,900	0	15,900
2009	18,418	0	18,418
2010	15,825	0	15,825
2011	18,797	0	18,797
2012	11,709	0	11,709
2013	3,799	0	3,799

Table 2. *Illex illecebrosus* relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) indices, and CVs (%), derived from NEFSC fall bottom trawl surveys during 1967-2013.

Year	All sizes (Number per tow)	% CV	All sizes (Kg per tow)	% CV
1967	1.6	17	0.24	17
1968	1.6	21	0.31	17
1969	0.6	23	0.07	26
1970	2.3	21	0.27	15
1971	1.7	12	0.34	14
1972	2.2	25	0.29	15
1973	1.5	24	0.35	25
1974	2.8	40	0.39	30
1975	8.7	36	1.42	18
1976	20.6	16	7.02	19
1977	12.6	18	3.74	18
1978	19.3	21	4.53	26
1979	19.4	11	6.05	11
1980	13.8	15	3.29	18
1981	27.1	32	9.34	40
1982	3.9	15	0.60	13
1983	1.7	14	0.23	13
1984	4.5	17	0.52	19
1985	2.4	17	0.36	18
1986	2.1	15	0.26	17
1987	15.8	31	1.53	29
1988	23.2	25	3.00	24
1989	22.4	45	3.31	57
1990	16.6	12	2.40	13
1991	5.2	17	0.69	18
1992	8.2	15	0.80	16
1993	10.4	19	1.60	20
1994	6.8	24	0.86	25
1995	8.0	30	0.70	39
1996	10.8	22	0.93	19
1997	5.8	25	0.52	17
1998	14.6	29	1.40	50
1999	1.4	16	0.19	17
2000	7.4	28	0.71	22
2001	4.5	27	0.32	23
2002	6.4	20	0.44	19
2003	28.5	61	1.95	67
2004	5.1	24	0.41	22
2005	11.0	35	0.74	41
2006	29.5	43	2.85	31
2007	15.7	33	1.31	33
2008	10.4	22	0.98	20
2009	8.7	18	0.93	21
2010	10.0	23	0.53	23
2011	6.3	20	0.54	20
2012	8.0	17	0.54	15
2013	4.7	17	0.36	16

Table 3. USA landings of *Doryteuthis* (*Amerigo*) *pealeii*, by fleet, during 1963-2013. The 2013 landings are preliminary.

Year	USA	Foreign	Total
1963	1,294	0	1,294
1964	576	2	578
1965	709	99	808
1966	722	226	948
1967	547	1,130	1,677
1968	1,084	2,327	3,411
1969	899	8,643	9,542
1970	653	16,732	17,385
1971	727	17,442	18,169
1972	725	29,009	29,734
1973	1,105	36,508	37,613
1974	2,274	32,576	34,850
1975	1,621	32,180	33,801
1976	3,602	21,682	25,284
1977	1,088	15,586	16,674
1978	1,476	9,355	10,831
1979	4,252	13,068	17,320
1980	3,996	19,750	23,746
1981	2,316	20,212	22,528
1982	2,848	15,805	18,653
1983	10,867	11,720	22,587
1984	7,689	11,031	18,720
1985	6,899	6,549	13,448
1986	11,525	4,598	16,123
1987	10,367	2	10,369
1988	18,593	3	18,596
1989	23,733	5	23,738
1990	15,399	0	15,399
1991	20,299	0	20,299
1992	19,018	0	19,018
1993	23,020	0	23,020
1994	23,480	0	23,480
1995	18,880	0	18,880
1996	12,503	0	12,503
1997	16,270	0	16,270
1998	19,145	0	19,145
1999	19,173	0	19,173
2000	17,540	0	17,540
2001	14,345	0	14,345
2002	16,868	0	16,868
2003	11,941	0	11,941
2004	14,800	0	14,800
2005	16,724	0	16,724
2006	15,928	0	15,928
2007	12,354	0	12,354
2008	11,406	0	11,406
2009	9,307	0	9,307
2010	6,913	0	6,913
2011	9,556	0	9,556
2012	12,820	0	12,820
2013	11,075	0	11,075

Table 4. Relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) indices for *Doryteuthis (Amerigo) pealeii*, and CVs (%), derived using daytime tows (solar zenith angles of 43°-80°) from NEFSC fall bottom trawl surveys conducted during 1975-2013.

Year	Number per tow	%CV	Kg per tow	%CV
1975	1,038	14	14.4	11
1976	730	12	18.8	15
1977	513	14	11.5	18
1978	270	16	7.6	11
1979	376	12	8.2	12
1980	562	13	14.2	8
1981	402	10	12.5	6
1982	529	13	12.4	15
1983	814	14	23.7	20
1984	625	10	20.8	17
1985	709	15	19.6	11
1986	720	13	14.8	4
1987	101	9	2.8	9
1988	651	14	9.3	13
1989	830	25	21.5	34
1990	480	12	10.4	14
1991	375	12	11.5	10
1992	2,029	27	10.4	20
1993	185	26	4.9	10
1994	905	11	27.5	15
1995	340	15	5.8	8
1996	306	18	3.8	20
1997	548	21	10.3	22
1998	381	14	5.3	14
1999	1,341	10	15.4	10
2000	1,035	12	30.4	7
2001	431	11	8.5	8
2002	1,960	4	23.4	5
2003	951	8	14.0	11
2004	1,055	14	8.6	10
2005	530	14	9.9	20
2006	1,778	10	22.9	6
2007	1,111	17	10.1	18
2008	667	18	11.3	25
2009	416	9	6.3	13
2010	708	21	15.0	12
2011	339	16	6.6	12
2012	1,371	11	21.0	9
2013	1,012	36	13.3	16