Illex Hold Framework
MACKEREL, SQUID, AND BUTTERFISH (MSB) FISHERY MANAGEMENT PLAN

Measures to implement a volumetric vessel hold baseline and hold upgrade restriction.

Framework Draft Document/Outline 5/26/2023

Prepared by the

Mid-Atlantic Fishery Management Council (Council) in collaboration with the National Marine Fisheries Service (NMFS)

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Framework Meeting 1: planned August 2023

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This Framework would consider implementing a volumetric vessel hold baseline requirement and upgrade restriction for all *Illex* limited access permits. A similar volumetric requirement is in place for the directed mackerel fishery, and most regional (i.e. Mid-Atlantic and New England) limited access programs have other baselines (horsepower and length) to control increases in fishing power/capacity.

Overcapacity is a common characteristic of most fisheries except those managed with tradable quota systems (variously known as ITQ[1]s (e.g. surfclam/ocean quahog), IFQ[2]s (e.g. golden tilefish), and/or catch shares). Public perspectives on capacity in the *Illex* fishery have been consistently diverse starting from the early 2019 scoping of the largely disapproved *Illex* Permit Amendment[3] through to a recent November 2022 Joint MSB Committee/Advisory Panel (AP) Meeting that considered follow-up actions after the *Illex* Permit Amendment's disapproval. Comments have ranged from taking no action at all, to measures that would reduce the existing overcapacity by eliminating some existing limited access permits (overcapacity was indicated by NMFS' Northeast Fisheries Science Center staff technical analyses conducted as part of the *Illex* Permit Amendment).

The rationale/goal for baselines as described in the 1998 Consistency Amendment developed by NMFS is "capping fishing power." This aligns with issues mentioned in several national standards guidelines, especially #5 Efficiency: "Efficiency. In theory, an efficient fishery would harvest the OY with the minimum use of economic inputs such as labor, capital, interest, and fuel. Efficiency in terms of aggregate costs then becomes a conservation objective, where "conservation" constitutes wise use of all resources involved in the fishery, not just fish stocks." So capping additional vessel fishing power ("capital") to catch Optimum Yield (OY) becomes a conservation objective because the "wise use of all resources" is being addressed. (50 CFR 648.4(a)(5)(iii))

The objective of this action is therefore to consider requiring a volumetric vessel hold baseline requirement and upgrade restriction for all *Illex* limited access permits, with a similar purpose as other baseline requirements, i.e. to cap fishing power. There will be a tradeoff involved as the flexibility of the fleet is somewhat reduced, but the risks from uncontrolled fishing power in fishing fleets are well documented throughout fisheries literature and negative consequences of "increased fishing pressure" is a principal "finding" of Congress as enshrined in the Magnuson-Stevens Fishery Conservation and Management Act.

Two alternatives to add information collected during permit re-applications about vessel processing are also included for Council consideration – while they are not directly related to capacity issues, the relevant information has been discussed frequently as likely to be useful for various squid assessment analyses.

[1] ITQ = Individual Transferable Quota
[2] IFQ = Individual Fishing Quota
[3] This action would have reduced permits in the fishery based on updated catch-based qualification criteria

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2.0 LIST OF COMMON ACRONYMS AND ABBREVIATIONS

ABC	**Acceptable Biological Catch**
ACL	**Annual Catch Limit**
ACT	**Annual Catch Target**
ASMFC	**Atlantic States Marine Fisheries Commission or Commission**
B	**Biomass**
CFR	**Code of Federal Regulations**
CPH	**Confirmation of Permit History**
CV	**coefficient of variation**
DAH	**Domestic Annual Harvest**
DAP	**Domestic Annual Processing**
EEZ	**Exclusive Economic Zone**
EFH	**Essential Fish Habitat**
EIS	**Environmental Impact Statement**
ESA	**Endangered Species Act of 1973**
F	**Fishing Mortality Rate**
FMP	**Fishery Management Plan**
FR	**Federal Register**
GB	**Georges Bank**
GOM	**Gulf of Maine**
IOY	**Initial Optimum Yield**
M	**Natural Mortality Rate**
MAFMC	**Mid-Atlantic Fishery Management Council**
MMPA	**Marine Mammal Protection Act**
MSA	**Magnuson-Stevens Fishery Conservation and Management Act (as amended)**
MSB	**Atlantic Mackerel, Squid, Butterfish**
MSY	**Maximum Sustainable Yield**
MT (or mt)	**Metric Tons (1 mt equals about 2,204.62 pounds)**
NE	**Northeast**
NEFSC	**Northeast Fisheries Science Center**
NEPA	**National Environmental Policy Act**
NMFS	**National Marine Fisheries Service (NOAA Fisheries)**
NOAA	**National Oceanic and Atmospheric Administration**
OFL	**Overfishing Level**
PBR	**Potential Biological Removal**
SARC	**Stock Assessment Review Committee**
SAW	**Stock Assessment Workshop**
SNE	**Southern New England**
SSC	**Scientific and Statistical Committee**
US	**United States**
VTR	**Vessel Trip Report**

3.0 LISTS OF TABLES AND FIGURES

3.1 LIST OF TABLES

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4.0 INTRODUCTION, BACKGROUND, AND PROCESS

The Council established management of *Illex* in 1978 and the management unit includes all federal East Coast waters.

Access is limited with about 75 moratorium permits; Between 5-40 permits may be active in a given year. Trip limits are triggered when the quota is approached. Incidental permits are limited to 10,000 pounds per trip. Additional summary regulatory information is available at https://www.fisheries.noaa.gov/new-england-mid-atlantic/resources-fishing/resources-fishing-greater-atlantic-region.

The 2022 quota was 38,192 MT, based on a 40,000 MT Acceptable Biological Catch (ABC) and a 4.52% discard rate (the mean plus one standard deviation of the most recent 10 years of observed discard rates in the previous assessment). Recent SBRM discard rates have been similar, though are not based on calendar years. 2017-2019 discards in the recent Research Track Assessment were also a similar portion of total catch. A minor modification (reduction) of discard set-asides may be implemented in coming years. The fishery closes when 96% of the quota is projected to be landed. In 2021 the fishery closed effective August 30, 2021 – there was not a closure in 2022 as only about 14% of the quota was landed.

Recreational catch of *Illex* is believed to be negligible. There are no recreational regulations except for party/charter vessel permits and associated reporting.

A 2020 action to reduce *Illex* permits given overcapitalization in the fishery was disapproved: https://www.fisheries.noaa.gov/bulletin/amendment-22-mackerel-squid-and-butterfish-fishery-management-plan-decision. Good *Illex* availability and increased vessel participation in 2017-2021 triggered early closures, highlighting the issue of overcapacity in this fishery, which was also described in the disapproved *Illex* Permit Amendment via technical capacity analyses.

As a high volume fishery, vessel fishing power or "capacity" may be substantially increased within the existing length and horsepower restrictions by modifying the vessel's hold capacity, leading the Council to further consider vessel hold restrictions for the fishery.

4.1 OBJECTIVES, PURPOSE, AND NEED

The objective of this action is to consider requiring a volumetric vessel hold baseline requirement and upgrade restriction for all *Illex* limited access permits, with a similar purpose as other baseline requirements, i.e. to cap fishing power. There will be a tradeoff involved as the flexibility of the fleet is somewhat reduced, but the risks from uncontrolled fishing power in fishing fleets are well documented throughout fisheries literature and negative consequences of "increased fishing pressure" is a principal "finding" of Congress as enshrined in the Magnuson-Stevens Fishery Conservation and Management Act. This action is needed because effective caps on vessel fishing power in the *Illex* fishery do not exist.

4.2 REGULATORY AUTHORITY / PROCESS

The discretionary provisions of the MSA allow Councils to include measures that restrict the types of fishing vessels, and those provisions have led to the current baseline specifications.

The Council uses "framework adjustments" to amend measures previously used or considered, and permitting and vessel size restrictions are noted frameworkable options, as well as "Any other management measures currently included in the FMP." Vessel hold capacity restrictions are specifically used in the FMP already for the mackerel fishery. Vessel hold capacity restrictions were also considered specifically for the *Illex* fishery in the disapproved *Illex* Permit Amendment, so hold capacity restrictions are not a new concept for this FMP or fishery.

For frameworks, "The MAFMC shall develop and analyze appropriate management actions over the span of at least two MAFMC meetings. The MAFMC must provide the public with advance notice of the availability of the recommendation(s), appropriate justification(s) and economic and biological analyses, and the opportunity to comment on the proposed adjustment(s) at the first meeting and prior to and at the second MAFMC meeting."
[50 CFR 648.25(a)(1)]

It is anticipated that the August 2023 Council meeting will be Framework Meeting #1 and final action will be taken later in 2023.

5.0 WHAT ALTERNATIVES ARE BEING CONSIDERED?

5.1 ALTERNATIVE 1: No Action/Status Quo = Current Baselines and Reporting Only

Vessel replacements/upgrades for *Illex* squid moratorium permits are limited relative to a vessel's baselines:

(1) The upgraded vessel's horsepower may not exceed the horsepower of the vessel's baseline specifications by more than 20 percent.

(2) The upgraded vessel's length overall may not exceed the vessel's baseline specifications by more than 10 percent.

The vessel baseline specifications are the respective specifications (length, horsepower) of the vessel that was initially issued a limited access permit as of the date the initial vessel applied for such permit, and the baseline specifications are recorded in NMFS databases.

Also, no changes would be made to the information collected during the annual permit re-application process for squid permits.

5.2 ALTERNATIVE 2: Additional Volumetric Vessel Hold Baseline

If a vessel possesses a volumetric hold baseline related to its mackerel permit, that hold baseline would automatically be incorporated for its *Illex* moratorium permit also.

For other *Illex* moratorium permit vessels, NMFS would publish notice that:

In addition to other baseline specifications, the volumetric fish hold capacity of a vessel at the time it submits a hold baseline certification (a date would be published by NMFS) will be considered a baseline specification. The fish hold capacity measurement must be certified by one of the following qualified individuals or entities: An individual credentialed as a Certified Marine Surveyor with a fishing specialty by the National Association of Marine Surveyors (NAMS); an individual credentialed as an Accredited Marine Surveyor with a fishing specialty by the Society of Accredited Marine Surveyors (SAMS); employees or agents of a classification society approved by the Coast Guard pursuant to 46 U.S.C. 3316(c); the Maine State Sealer of Weights and Measures; a professionally-licensed and/or registered Marine Engineer; or a Naval Architect with a professional engineer license. The fish hold capacity measurement submitted to NMFS must include a signed certification by the individual or entity that completed the measurement, specifying how they meet the definition of a qualified individual or entity.

If an *Illex* moratorium permit is "on the shelf" in Confirmation of Permit History (CPH) when hold certifications are due, the hold capacity baseline for such vessels will be the hold capacity of the first replacement vessel after the permit is removed from CPH and measured as described above.

Replacement/upgraded vessels' volumetric fish hold capacity may not exceed by more than 10 percent the volumetric fish hold capacity of the vessel's baseline specifications. The modified fish hold, or the fish hold of the replacement vessel, must be resurveyed by a surveyor as described above unless the replacement vessel already had an appropriate certification.

5.3 ALTERNATIVE 3: Annual Processing Type Reporting: *Illex*

Information on processing has the potential to be used for catch per unit of effort analyses in squid fisheries. Each year when an *Illex* moratorium permit re-applies, it would have to state its intended primary processing type for that year. NMFS will specify relevant processing types, including freezing at-sea, refrigerated sea water, fresh/iced, etc. The statement of intent would not be limiting upon a vessel if it decides to change processing methods mid-year.

5.4 ALTERNATIVE 4: Annual Processing Type Reporting: Longfin

Information on processing has the potential to be used for catch per unit of effort analyses in squid fisheries. Each year when a Tier 1 longfin permit re-applies, it would have to state its intended primary processing type for that year. NMFS will specify relevant processing types, including freezing at-sea, refrigerated sea water, fresh/iced, etc. The statement of intent would not be limiting upon a vessel if it decides to change processing methods mid-year.

6.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND FISHERIES

6.1 Description of the Managed Resource (*Illex*) and Non-Target Species

Illex

Illex is a semi-pelagic/semi-demersal schooling cephalopod species that lives less than one year and is distributed between Newfoundland and the Florida Straits. *Illex* is a semelparous, terminal spawner whereby spawning and death occur within several days of mating. The northern stock component (also highly variable) in NAFO Subareas 3 and 4, is assessed and managed separately by the Northwest Atlantic Fisheries Organization (NAFO). The southern/U.S. stock component is located in NAFO Subareas 5 and 6 between the Gulf of Maine and Cape Hatteras, NC and is managed by the Mid-Atlantic Fishery Management Council (the Council or MAFMC) and NMFS. Additional life history information is detailed in the EFH document for the species, located at: http://www.nefsc.noaa.gov/nefsc/habitat/efh/.

The 2021 research track assessment (RTA) was unable to develop a method to resolve stock status, so the stock will officially remain "unknown" with respect to being overfished or overfishing. The RTA Review Panel agreed with the RTA Working Group Report that indications from the various assessment approaches were that the stock was lightly fished in 2019. However, the review report stated that the term "lightly fished" should be interpreted with caution because it has no specific definition relating to sustainable exploitation. After evaluating related analyses, the MAFMC's Scientific and Statistical Committee (SSC) recommended continuing the 2022 40,000 metric ton (MT) *Illex* Acceptable Biological Catch (ABC) to start 2023. In March 2023 the SSC will review updated analyses and may revise their 2023 ABC recommendation

In light of the failure of the assessment to produce accepted reference points to guide ABC setting, the SSC had to rely on an ad-hoc approach to setting a 2023 ABC that would meet the Council's risk policy to avoid overfishing and achieve optimum yield. Alternative quotas were examined with respect to their consequences for risk of exceeding escapement targets ranging from 40% to 50%, as has been used for other squid fisheries. In addition, harvest rates of F=2/3 M (natural mortality) have been used for forage species in various assessments around the world. The methodology allowed the SSC to examine the probability of violating the reference point for various levels of catch limits ranging from 24,000 to 60,000 mt. A 40,000 MT ABC was associated with an approximately 5% chance of exceeding a ⅔ F:M generic guidance for data poor species. Model results suggested a 40,000 MT ABC provided greater than 50% escapement for *Illex* squid, and a catch of 60,000 MT increases the chance of less escapement in some years. Previous SSC review (March 2022) of the analyses allowed them to conclude that:

• Escapement has been relatively high over the last 10 years, suggesting a relatively small impact of the fishery on the component of the stock that is exploited.

• Assumptions regarding parameters that were inputs to the analyses were thought to lead to minimum likely estimates.

• Distributions of the joint estimate of F:M suggests that exploitation rate in the fishery is likely low.

• By comparison to empirical escapement reference points used to manage squid fisheries elsewhere globally, the current ABC levels are associated with low risks of exceeding those escapement standards.

• A 40,000 MT ABC will lead to a low risk of overfishing.

(MAFMC SSC 2022, MAFMC 2022b)

While *Illex* is biologically a unit stock, the U.S. and Canadian assessments and quotas are currently analyzed, set, and monitored independently (unlike for example Atlantic mackerel where U.S. and Canadian data are integrated into both assessments), so the focus is on the U.S. component of the fishery. More information on the Canadian component is available at https://www.nafo.int/Science/Stocks-Advice and the potential usefulness of the NAFO assessment for U.S. management was considered previously by the Council's SSC, e.g. https://www.mafmc.org/s/g_NAFO_Didden.pdf at https://www.mafmc.org/ssc-meetings/2020/may-12-13.

Landings and survey information developed for 2022 specifications setting is presented below (Table 1, Figures 1-4).

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Table 1. Illex catches and landings limits (TACs) (mt) in NAFO Subareas (SA) 5+6 (within the U.S. EEZ after 1976) and Subareas 3+4 (NAFO and Canadian waters) 1963-2021

	Cape Hatteras to the Gulf of Maine SA 5+6 Landings			SA 3+4	SA 3-6 Total	SA 5+6		SA 3-6 Total			SA 5+6		
Year	Domestic (mt)	International (mt)	**Total (mt)**	Landings (mt)	**Landings (mt)**	Discards (mt)	**Catches (mt)**	**Catches (mt)**	TAC (mt) SA 3+4	TAC (mt) SA 5+6	% of TAC Harvested	Fishery Closure Dates	% of SA 3-6 Landings
1963	810		**810**	2,222	**3,032**								
1964	358	2	**360**	10,777	**11,137**								
1965	444	78	**522**	8,264	**8,786**								
1966	452	118	**570**	5,218	**5,788**								
1967	707	288	**995**	7,033	**8,028**								
1968	678	2,593	**3,271**	56	**3,327**								
1969	562	975	**1,537**	86	**1,623**								
1970	408	2,418	**2,826**	1,385	**4,211**								
1971	455	6,159	**6,614**	8,906	**15,520**								
1972	472	17,169	**17,641**	1,868	**19,509**								
1973	530	18,625	**19,155**	9,877	**29,032**								
1974	148	20,480	**20,628**	437	**21,065**					71,000			98
1975	107	17,819	**17,926**	17,696	**35,622**					71,000			50
1976	229	24,707	**24,936**	41,767	**66,703**				25,000	30,000	83		37
1977	1,024	23,771	**24,795**	83,480	**108,275**				25,000	35,000	71		23
1978	385	17,207	**17,592**	94,064	**111,656**				100,000	30,000	59		16
1979	1,593	15,748	**17,341**	162,092	**179,433**				120,000	30,000	58		10
1980	299	17,529	**17,828**	69,606	**87,434**				150,000	30,000	59		20
1981	615	14,956	**15,571**	32,862	**48,433**				150,000	30,000	52		32
1982	5,871	12,762	**18,633**	12,908	**31,541**				150,000	30,000	62		59
1983	9,775	1,809	**11,584**	426	**12,010**				150,000	30,000	39		96
1984	9,343	576	**9,919**	715	**10,634**				150,000	30,000	33		93
1985	5,033	1,082	**6,115**	673	**6,788**				150,000	30,000	20		90
1986	6,493	977	**7,470**	111	**7,581**				150,000	30,000	25		99
1987	10,102	0	**10,102**	562	**10,664**	517	**10,619**	**11,181**	150,000	30,000	34		95
1988	1,958	0	**1,958**	811	**2,769**	100	**2,058**	**2,869**	150,000	30,000	7		71
1989	6,801	0	**6,801**	5,971	**12,772**	498	**7,299**	**13,270**	150,000	30,000	23		53
1990	11,670	0	**11,670**	10,975	**22,645**	341	**12,011**	**22,986**	150,000	30,000	39		52
1991	11,908	0	**11,908**	2,913	**14,821**	1,150	**13,058**	**15,971**	150,000	30,000	40		80
1992	17,827	0	**17,827**	1,578	**19,405**	248	**18,075**	**19,653**	150,000	30,000	59		92
1993	18,012	0	**18,012**	2,686	**20,698**	443	**18,455**	**21,141**	150,000	30,000	60		87
1994	18,350	0	**18,350**	5,951	**24,301**	354	**18,704**	**24,655**	150,000	30,000	61		76
1995	13,976	0	**13,976**	1,055	**15,031**	58	**14,034**	**15,089**	150,000	30,000	47		93
1996	16,969	0	**16,969**	8,742	**25,711**	243	**17,212**	**25,954**	150,000	21,000	81		66
1997	13,356	0	**13,356**	15,614	**28,970**	1,002	**14,358**	**29,972**	150,000	19,000	70		46
1998	23,568	0	**23,568**	1,902	**25,470**	586	**24,154**	**26,056**	150,000	19,000	124	8/28	93
1999	7,388	0	**7,388**	305	**7,693**	1,094	**8,482**	**8,787**	75,000	19,000	39		96
2000	9,011	0	**9,011**	366	**9,377**	106	**9,117**	**9,483**	34,000	24,000	38		96
2001	4,009	0	**4,009**	57	**4,066**	466	**4,475**	**4,532**	34,000	24,000	17		99
2002	2,750	0	**2,750**	260	**3,010**	157	**2,907**	**3,167**	34,000	24,000	11		91
2003	6,391	0	**6,391**	1,133	**7,524**	166	**6,557**	**7,690**	34,000	24,000	27		85
2004	26,097	0	**26,097**	2,574	**28,671**	1,402	**27,499**	**30,073**	34,000	24,000	109	9/21	91
2005	12,011	0	**12,011**	578	**12,589**	1,850	**13,861**	**14,439**	34,000	24,000	50		95
2006	13,944	0	**13,944**	6,981	**20,925**	1,556	**15,500**	**22,481**	34,000	24,000	58		67
2007	9,022	0	**9,022**	246	**9,268**	639	**9,661**	**9,906**	34,000	24,000	38		97
2008	15,900	0	**15,900**	534	**16,434**	1,529	**17,429**	**17,963**	34,000	24,000	66		97
2009	18,418	0	**18,418**	718	**19,136**	672	**19,090**	**19,808**	34,000	24,000	77		96
2010	15,825	0	**15,825**	120	**15,945**	569	**16,394**	**16,514**	34,000	24,000	66		99
2011	18,797	0	**18,797**	126	**18,923**	690	**19,487**	**19,613**	34,000	23,328	81		99
2012	11,709	0	**11,709**	47	**11,756**	502	**12,211**	**12,258**	34,000	22,915	51		100
2013	3,792	0	**3,792**	27	**3,819**	315	**4,107**	**4,134**	34,000	22,915	17		99
2014	8,767	0	**8,767**	21	**8,788**	575	**9,342**	**9,363**	34,000	22,915	38		100
2015	2,422	0	**2,422**	14	**2,436**	451	**2,873**	**2,887**	34,000	22,915	11		99
2016	6,684	0	**6,684**	152	**6,836**	320	**7,004**	**7,156**	34,000	22,915	29		98
2017	22,516	0	**22,516**	365	**22,881**	855	**23,371**	**23,736**	34,000	22,915	98	9/15	98
2018	24,117	0	**24,117**	1,545	**25,662**	1,407	**25,524**	**27,069**	34,000	22,915	105	8/15	94
2019	27,164	0	**27,164**	2,914	**30,078**	1,331	**28,495**	**31,409**	34,000	24,825	109	8/21	90
2020	28,447	0	**28,447**	3,099	**31,546**	1,365	**29,812**	**32,911**	34,000	28,644	99	8/31	90
2021	30,886	0	**30,886**	11,455	**42,341**	535	**31,421**	**42,876**	34,000	31,478	98	8/30	73

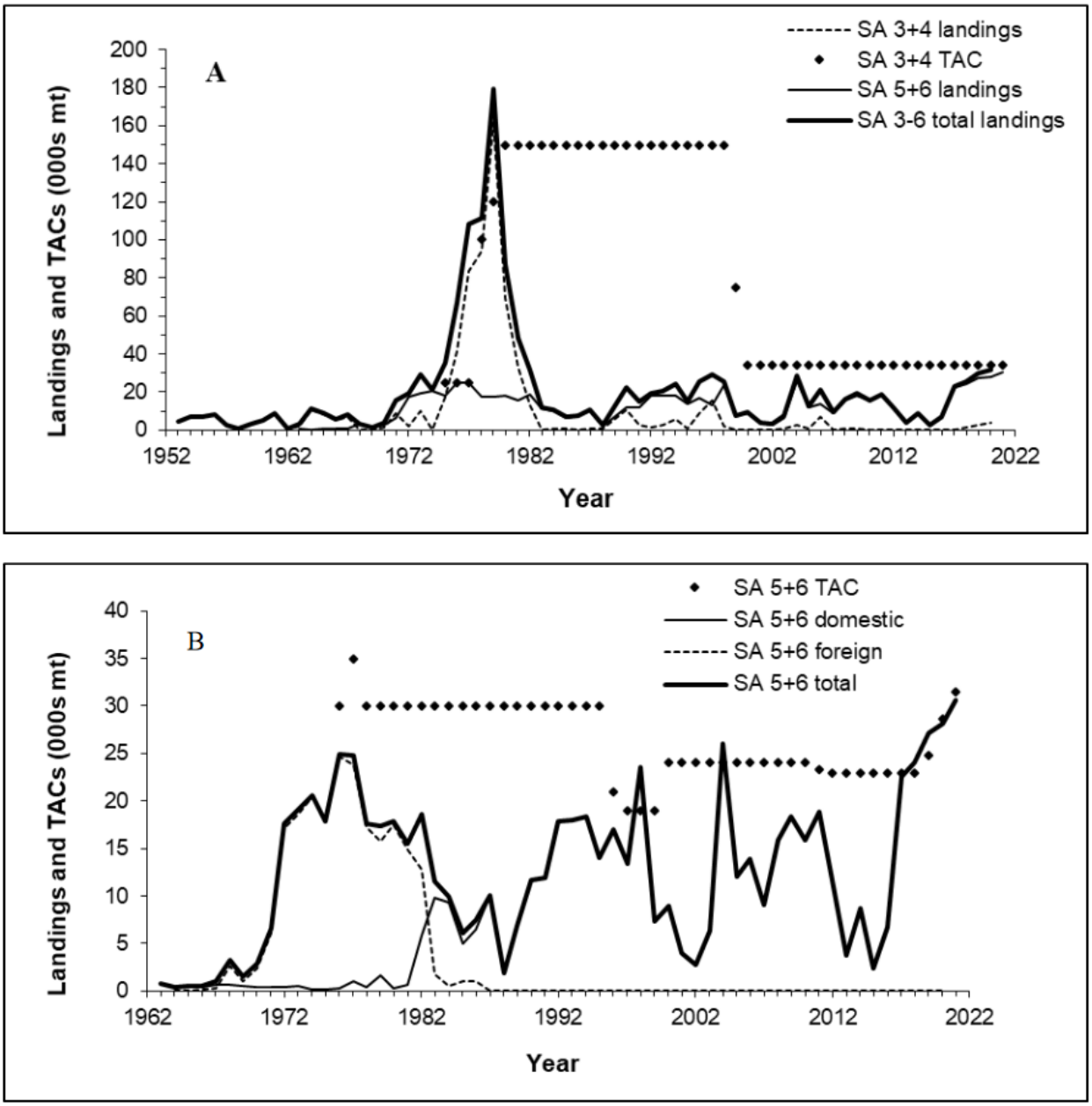

Figure 1. Landings of Illex illecebrosus in (A) NAFO Subareas 3-6 and (B) NAFO Subareas 5+6, with respect to landings limits 1963-2021.

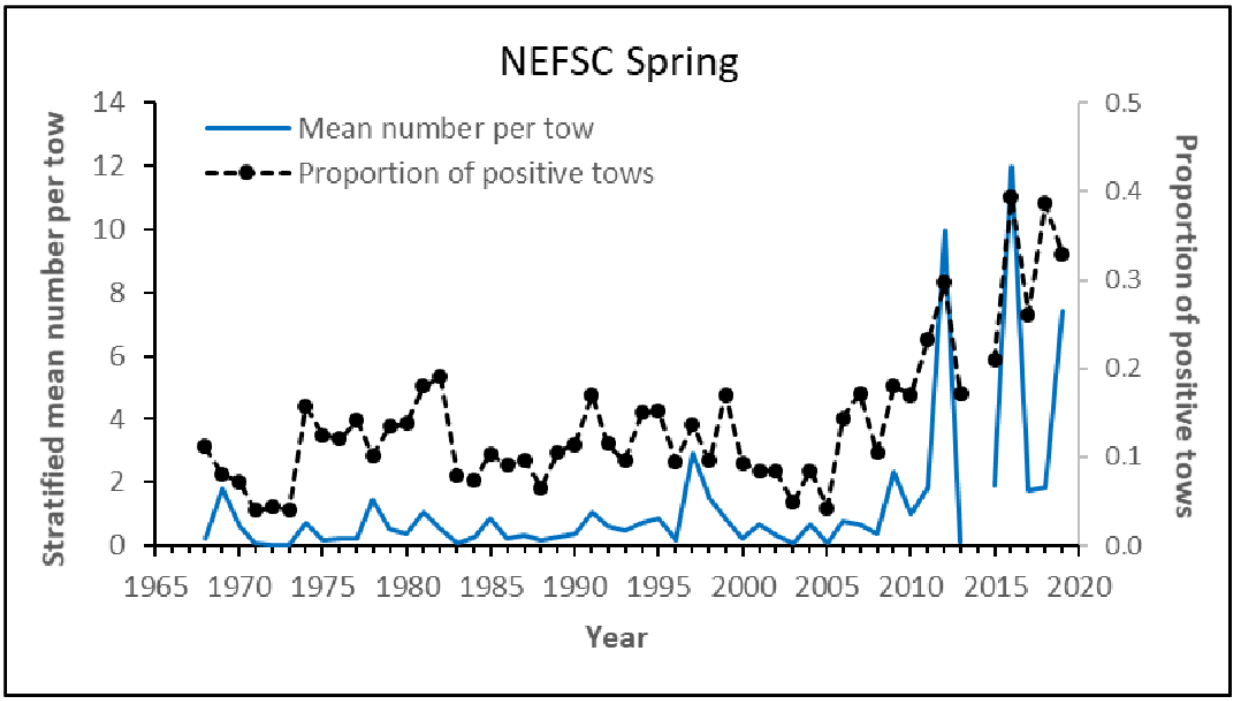

*Figure 2. Trends in Illex relative abundance indices and the proportion of positive tows derived with data from NEFSC **spring** bottom trawl surveys conducted on the U.S. shelf during 1968-2019.*

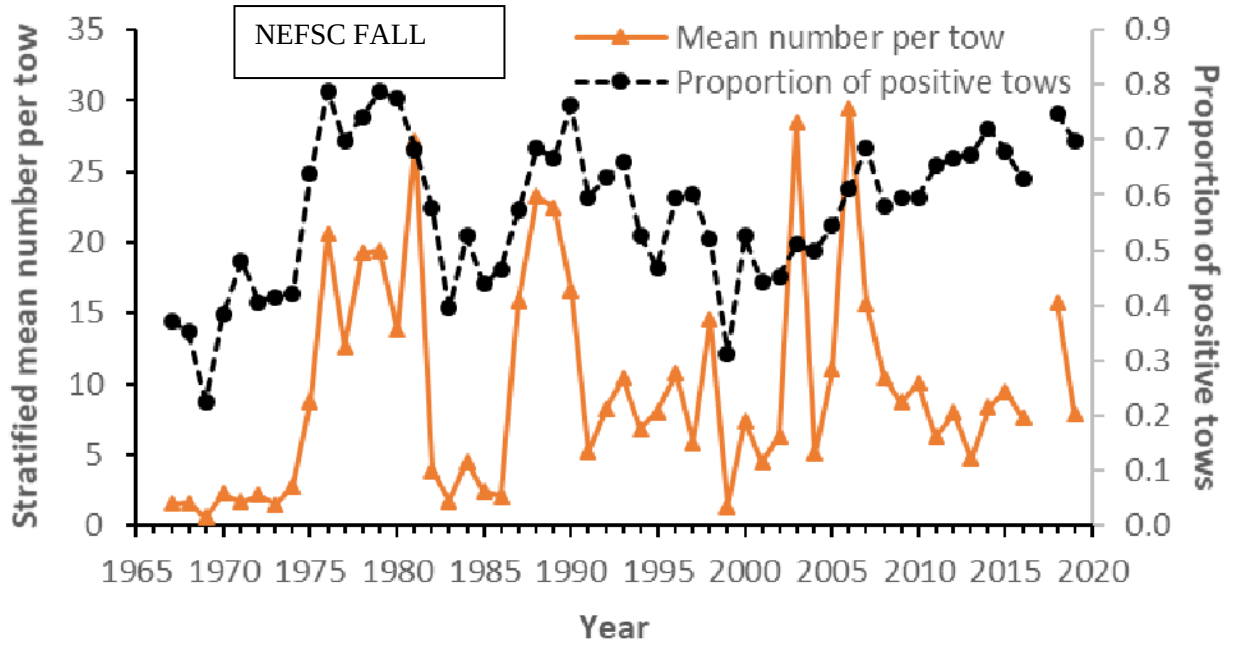

*Figure 3. Trends in Illex relative abundance indices and the proportion of positive tows derived with data from NEFSC **fall** bottom trawl surveys conducted on the U.S. shelf during 1967-2019.*

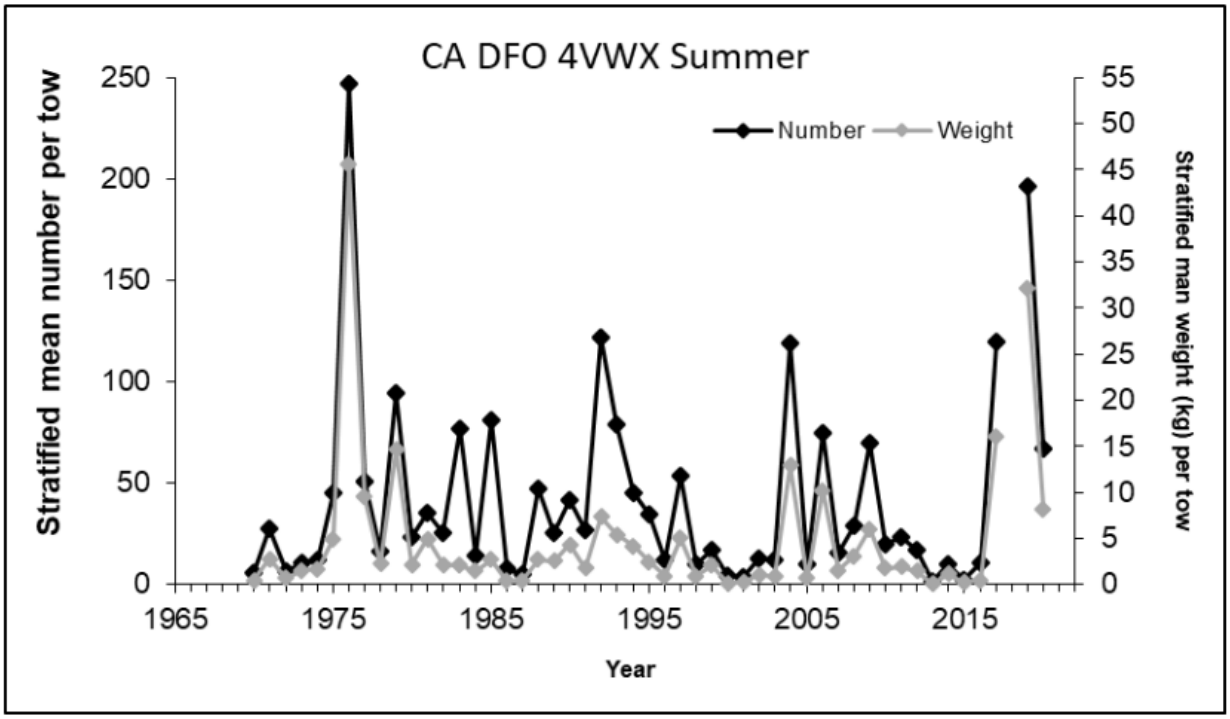

*Figure 4. Illex illecebrosus relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) indices derived with data from the Canada DFO summer (July) bottom trawl surveys conducted in Division 4VWX during 1970-2019.**

*Indices were not computed for the 2018 survey because large areas of *Illex* habitat could not be sampled due to survey vessel mechanical problems.

Non-Target Species

Due to reduced observer coverage in 2020-2022 due to Covid-19, observer data from 2017-2019 still best describe incidental catch in the *Illex* fishery. On the *Illex* trips identified in this analysis, the 2017-2019 overall discard rate was 2%. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery.

The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. A flexible criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal but is impracticable. From 2017-2019 there were on average 61 observed trips annually where *Illex* accounted for at least 50% of retained catch, and those trips form the basis of the following analysis. These trips made 1,298 hauls of which 93% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water before observing, etc.

The observed *Illex* kept on these trips accounted for approximately 15% of the total *Illex* landed (this is the overall coverage rate based on weight). While a very rough estimate, especially given non-accounting for spatial and temporal trends, one can use the information in the table immediately following and the fact that about 24,597 mt of *Illex* were caught annually 2017-2019 to

roughly estimate annual incidental catch and discards for the species in the table. Readers are strongly cautioned that while this is a reasonable approach for a quick, rough, and relative estimate given the available data, it is highly imprecise and does not follow the protocol used for official discard estimates. As a minimum threshold, only species estimated to be caught at a level more than 10,000 pounds per year are included (captures 92% of all discards). Species with a "*" are overfished, subject to overfishing, or otherwise considered depleted (none are caught in substantial quantities in the *Illex* fishery).

As listed in the table below the amounts of the various species (that are within this FMP or others) discarded in the *Illex* fishery, while rough approximations, are very low, including for the species noted to be overfished or otherwise depleted (Atlantic mackerel, bluefish, and red hake[4]). The amounts discarded for other species including those in the FMP (*Illex* squid, longfin squid, butterfish, and chub mackerel) all comprise a negligible portion of the catch and/or catch limits for those species.

Table 2. Incidental Catch and Discards in the Illex Squid Fishery.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Pounds of given species caught per mt Illex Kept	Pounds of given species discarded per mt Illex Kept	Rough Annual Catch (pounds) based on 3-year (2017-2019) average of Illex landings (24,597 mt)	Rough Annual Discards (pounds) based on 3-year (2017-2019) average of Illex landings (24,597 mt)
SQUID, SHORT-FIN	24,472,176	236,856	52%	1%	2,226	22	54,757,008	529,970
SQUID, ATL LONG-FIN	137,434	1,266	0%	1%	13	0	307,510	2,833
DORY, BUCKLER (JOHN)	59,564	15,045	3%	25%	5	1	133,275	33,663
MACKEREL, CHUB	50,659	18,909	4%	37%	5	2	113,349	42,310
BUTTERFISH	41,301	37,276	8%	90%	4	3	92,411	83,406
HAKE, SPOTTED	35,344	32,203	7%	91%	3	3	79,082	72,054
DOGFISH, SMOOTH	19,930	19,892	4%	100%	2	2	44,595	44,508
BEARDFISH	14,033	5,541	1%	39%	1	1	31,398	12,398
HAKE, SILVER (WHITING	9,919	8,168	2%	82%	1	1	22,194	18,275
FISH, NK	8,332	8,310	2%	100%	1	1	18,642	18,595
SEA ROBIN, NORTHERN	8,078	8,078	2%	100%	1	1	18,075	18,075
MACKEREL, ATLANTIC *	7,902	5,374	1%	68%	1	0	17,682	12,024
SCUP	7,774	5,561	1%	72%	1	1	17,395	12,443
SQUID, NK	6,020	6,020	1%	100%	1	1	13,470	13,470
BLUEFISH *	5,052	1,836	0%	36%	0	0	11,303	4,108
MONKFISH (GOOSEFISH)	4,742	2,211	0%	47%	0	0	10,609	4,947
HAKE, RED (LING) *	4,637	4,280	1%	92%	0	0	10,376	9,576

The observer program creates individual animal records for some fish species of interest, mostly larger pelagics and/or elasmobranchs, as well as tagged fish. Counts of these individual fish records from the same trips are provided in the table below.

[4] The 2023 ABC for Atlantic mackerel is over 17 million pounds, the 2023 bluefish ABC is over 30 million pounds, and the 2023 combined red hake ABCs are over 10 million pounds.

Table 3. Counts of fish in Individual Animal Records on observed Illex trips from 2017-2019

COMNAME	count
DOLPHINFISH (MAHI MAH	4
GROUPER, SNOWY	3
MARLIN, WHITE	1
MOLA, NK	4
MOLA, OCEAN SUNFISH	31
MOLA, SHARPTAIL	1
RAY, TORPEDO	37
SHARK, ATL ANGEL	1
SHARK, BASKING	14
SHARK, BLUE (BLUE DOG	1
SHARK, CARCHARHINID,N	4
SHARK, GREENLAND	2
SHARK, HAMMERHEAD, SC	14
SHARK, HAMMERHEAD,NK	7
SHARK, NIGHT	3
SHARK, NK	3
SHARK, SANDBAR (BROWN	48
SHARK, SPINNER	1
SHARK, THRESHER, BIGE	1
SHARK, TIGER	17
STINGRAY, ROUGHTAIL	19
SWORDFISH	108
TUNA, BLUEFIN	1
TUNA, LITTLE (FALSE A	9
TUNA, YELLOWFIN	3
WRECKFISH	1

6.2 Human Communities and Economic Environment

This section describes the performance of the *Illex* fishery to allow the reader to understand its socio-economic importance. The EA for the rejected *Illex* Permit Amendment contains additional detail about the *Illex* fishery, including demographic information on key ports – see https://www.mafmc.org/supporting-documents. Also see NMFS' communities page at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/socioeconomics/socioeconomic-cultural-and-policy-research-northeast.

The most obvious way that human communities are affected by the *Illex* fishery is from the revenues generated, and the jobs created. The affected communities include both individuals directly involved in harvesting and processing as well as indirect support services (e.g. vessel maintenance, insurance, ice, etc.). While the direct data points that are most available are landings and revenues, it is important to keep in mind that by contributing to the overall functioning of and employment in coastal communities, the fishery has indirect social impacts as well. Social impacts are strongly aligned with changes to fishing opportunities and while difficult to measure can include impacts to families from income changes/volatility, safety-at-sea (related to changes in fishery operations due to regulation changes), job satisfaction, and/or frustration by individuals due to management's impacts (especially if they perceive management actions to be unreasonable or ill-informed).

Recent Fishery Performance

This section establishes a descriptive baseline for the fishery with which to compare actual and predicted future socio-economic changes that result from management actions. The 2022 *Illex*

Fishery Information Document and 2022 MSB Fishery Performance Report have details on recent commercial *Illex* fishing activity, summarized below. These are available at https://www.mafmc.org/msb. There is negligible recreational catch.

Figure 5 below, from a previous Science Center data update, describes *Illex* catch 1963-2019 and highlights the early foreign fishery and then domestication of the fishery. Figures 6-7 describe domestic landings, ex-vessel revenues, and prices (inflation adjusted) 1996-2022. Data since 1996 is more reliable than previous data due to improvements in reporting requirements. The Gross Domestic Product Implicit Price Deflator was used to report revenues/prices as "2022 dollars." Figure 8 illustrates preliminary weekly 2021 (yellow-orange) and 2022 (blue) landings through the year.

Most recent *Illex* landings occurred in RI, NJ, and MA, but further breakdown may violate data confidentiality rules. Table 4 provides preliminary information on *Illex* landings by statistical area for 2022. Table 5 describes vessel participation over time.

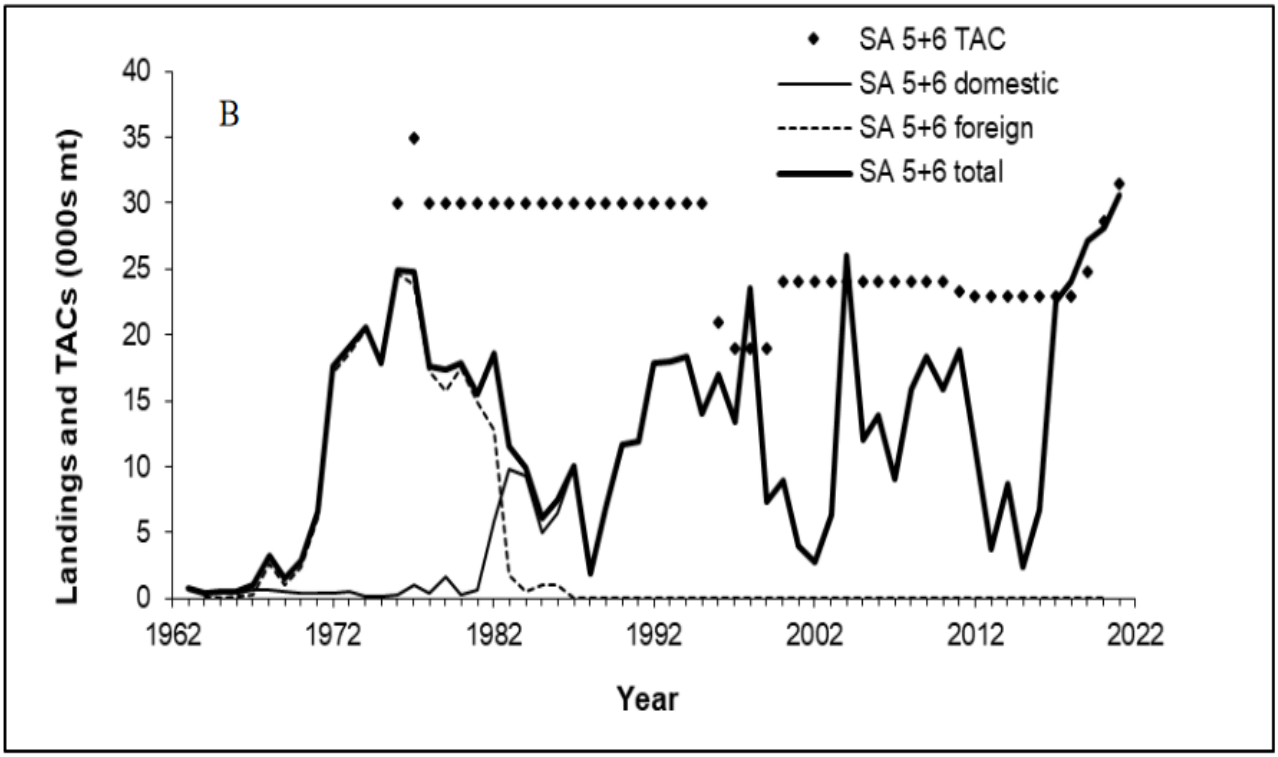

Figure 5. Total annual U.S. Illex catches (mt) by the U.S. and other countries for 1963-2021.

Sources: NEFSC Illex Data update, available at https://www.mafmc.org/ssc-meetings/2022/july-25-26 and NMFS unpublished dealer data.

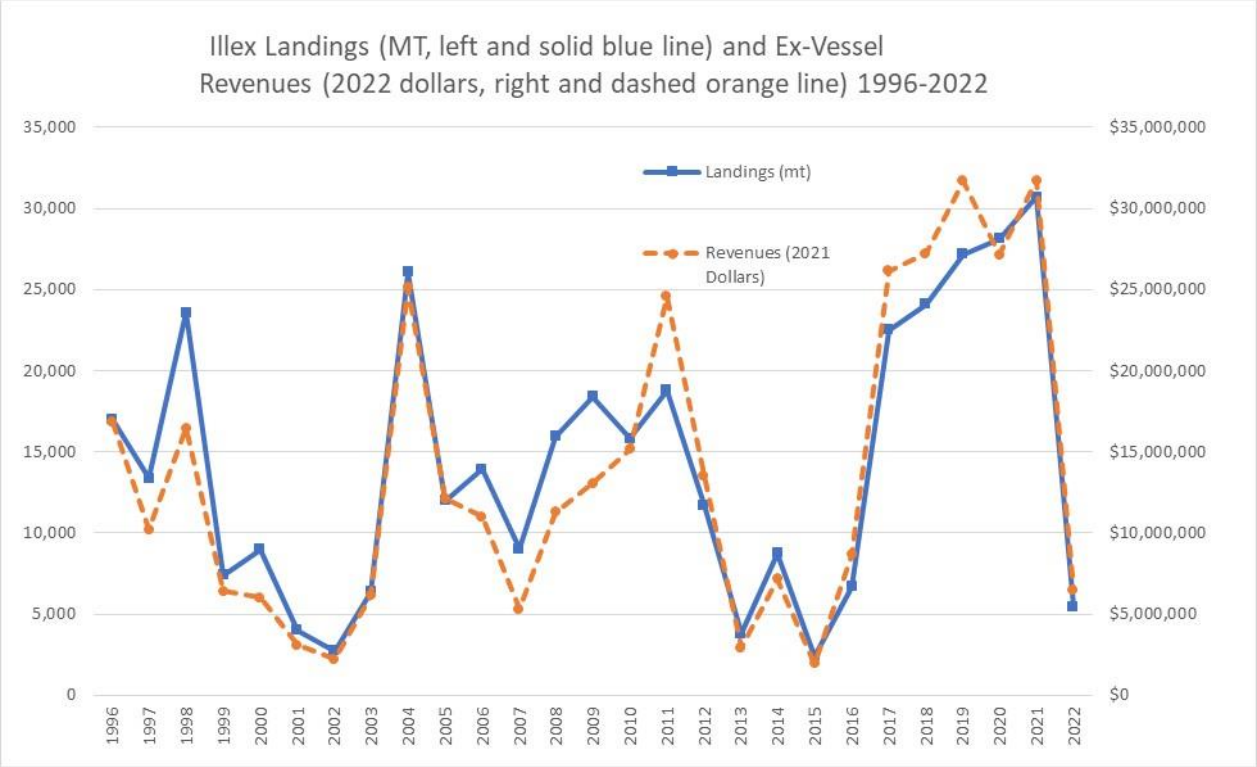

Figure 6. U.S. Illex Landings and Ex-Vessel Values 1996-2021. Source: NMFS unpublished dealer data.

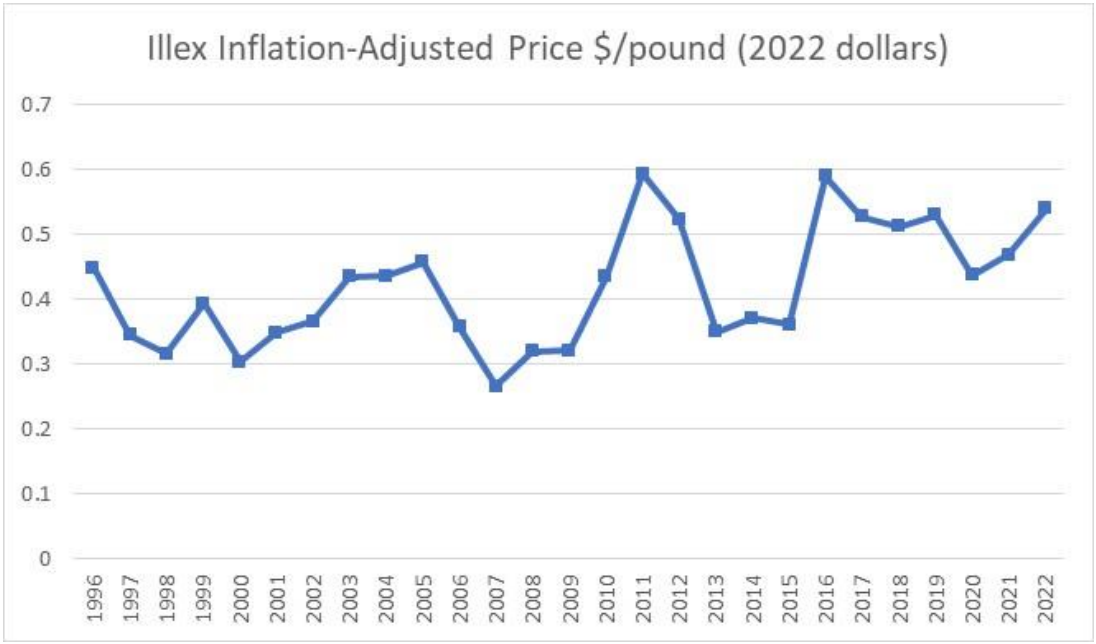

Figure 7. Ex-Vessel Illex Prices 1996-2021 Adjusted to 2021 Dollars Source: NMFS unpublished dealer data.

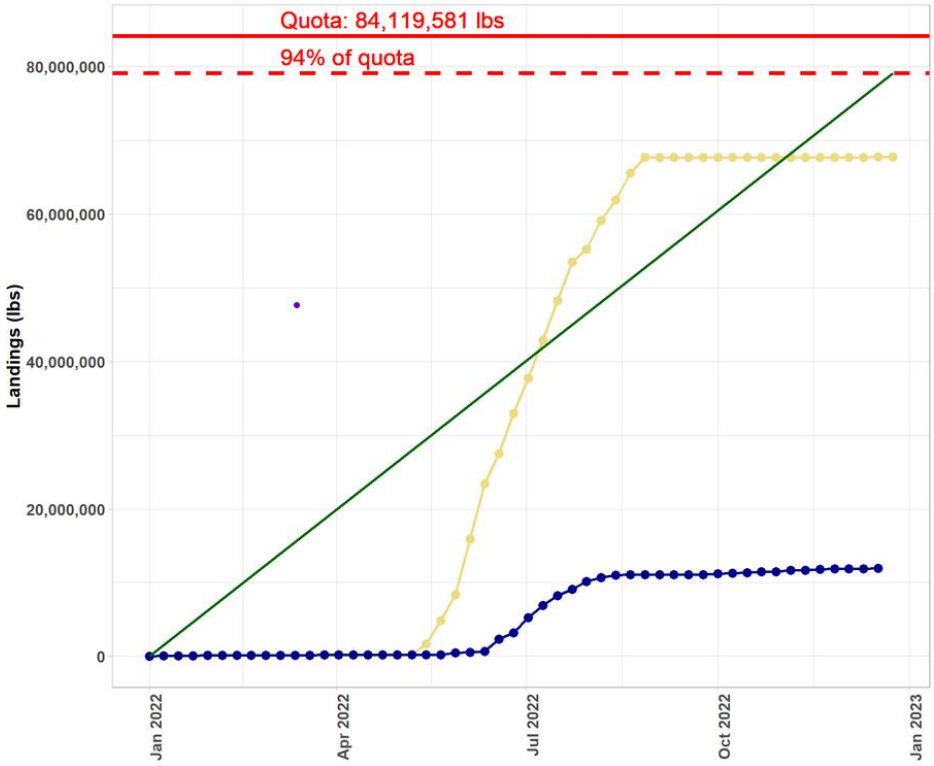

Figure 8. U.S. Preliminary Illex landings; 2022 in dark blue, 2021 in yellow-orange. Source: https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/quota-monitoring-greater-atlantic-region (Preliminary 2022 landings totaled 5,410 MT or 11.9 million pounds.)

Table 4. Commercial Illex landings by statistical area in 2022. Source: NMFS unpublished VTR data.

Stat Area	MT
537	94
616	347
622	3,198
623	421
626	859
632	323
Other	168
Total	5,410

Table 5. Vessel participation over time in the Illex Fishery based on annual landings (pounds)

YEAR	Vessels landing more than 50,000 pounds in year
1982	14
1983	16
1984	23
1985	12
1986	18
1987	19
1988	7
1989	14
1990	15
1991	14
1992	17
1993	23
1994	33
1995	31
1996	35
1997	24
1998	30
1999	17
2000	14
2001	8
2002	6
2003	12
2004	30
2005	22
2006	18
2007	11
2008	17
2009	14
2010	18
2011	23
2012	13
2013	12
2014	10
2015	4
2016	10
2017	20
2018	26
2019	32
2020	31
2021	31
2022	13

6.3 Habitat, Including Essential Fish Habitat (EFH)

To be added once alternatives are more defined.

6.4 Protected Species

To be added once alternatives are more defined.

7.0 WHAT ARE THE IMPACTS (Biological and Human Community) FROM THE ALTERNATIVES CONSIDERED IN THIS DOCUMENT?

To be added once alternatives are more defined, but not expected to be significant from a NEPA perspective.

8.0 WHAT LAWS APPLY TO THE ACTIONS CONSIDERED IN THIS DOCUMENT?

To be added once alternatives are more defined.

9.0 LITERATURE CITED AND SELECTED OTHER BACKGROUND DOCUMENTS

To be added once alternatives are more defined.

10.0 LIST OF AGENCIES AND PERSONS CONSULTED

To be added once alternatives are more defined.

11.0 LIST OF PREPARERS AND POINT OF CONTACT

To be added once alternatives are more defined.

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