



# *Illex* 2022

*April 2022*

# *Illex* 2021 and 2022 so far...

- Not looking at 2023 yet – later based on assessments (RTA & MTA)
- 33,000 MT ABC
- 4.61% Discards (2017-2019)
- 31,478 MT Quota
- Close at 94% (1,889 buffer)
- No action needed, but...

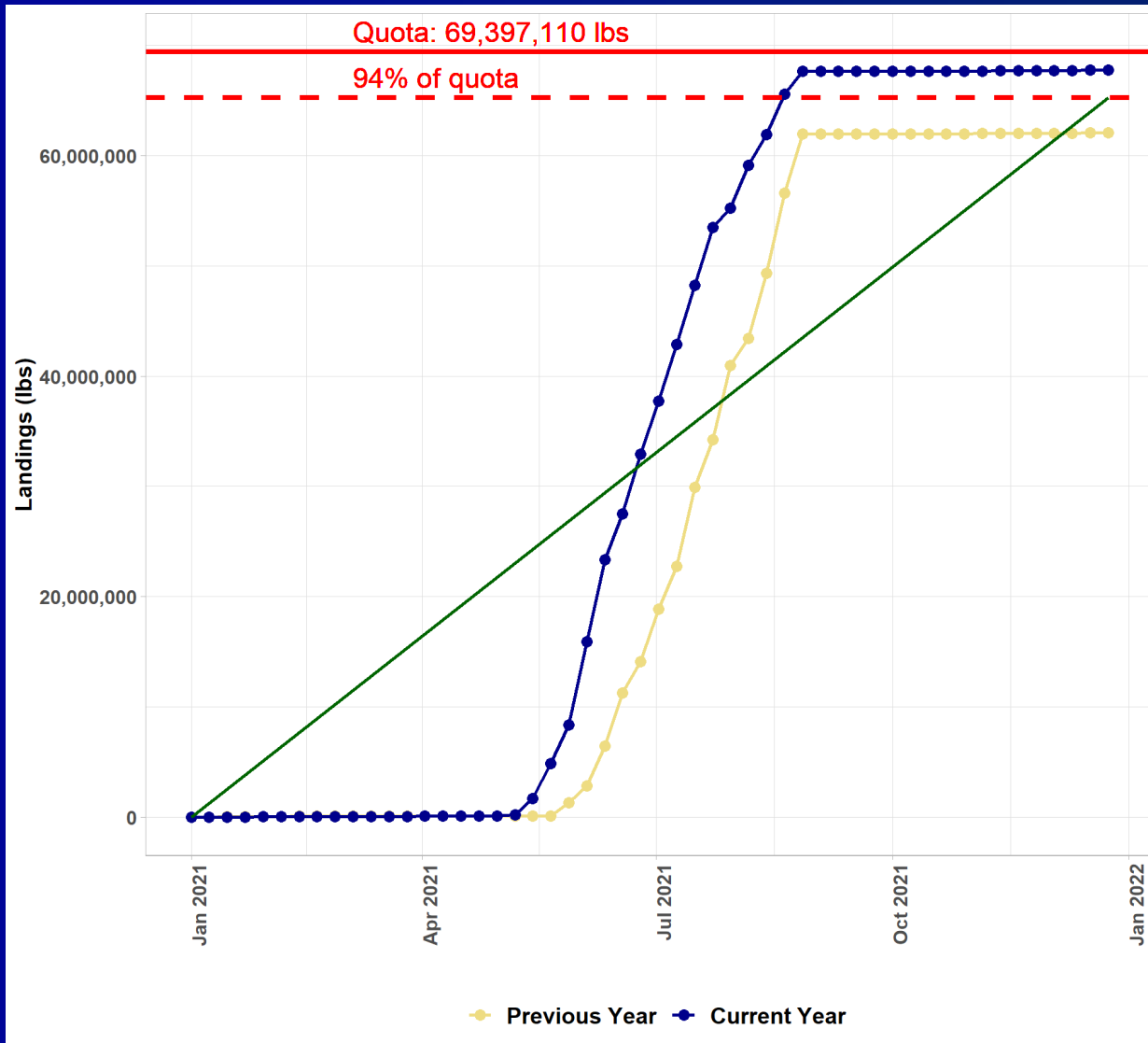
# *Illex* Assessment

- Research Track Assessment (RTA) Review
  - Depletion model – work in progress...
  - Indirect analyses (Rago et al. “kitchen sink”)
- Review being finalized...
- Not clear to staff how different a situation we’ll be in later this year for 2023

# *Illex* Permit Action

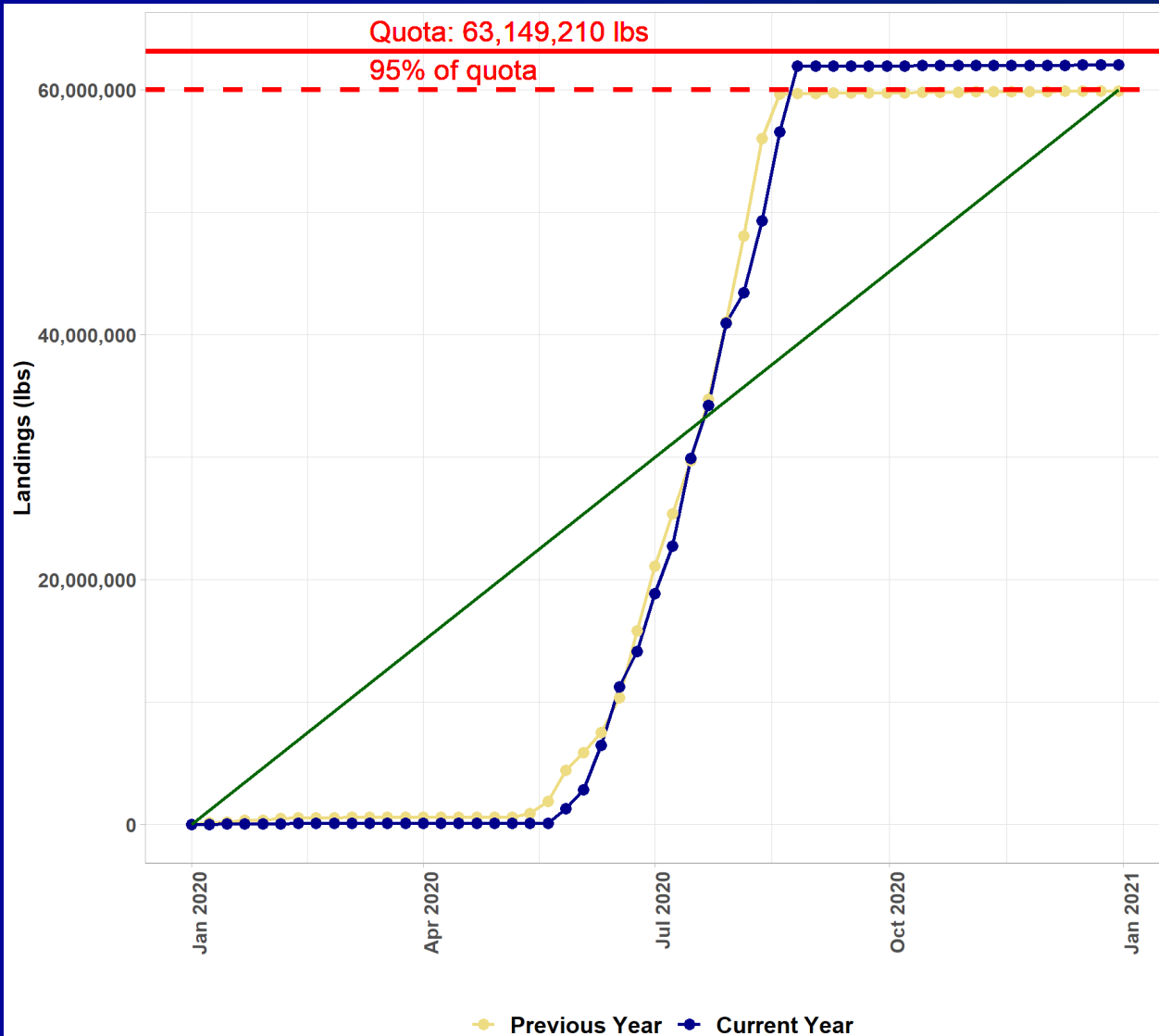
- Staff wrapping up edits this week
- If approved could affect 2023...

# Illex 2021 Monitoring



97.6%

# Illex 2020 Monitoring



**98.2%**

**...but  
2018 and  
2019  
overages**

# AP Fishery Performance Report

- Market conditions/prices similar in 2021 as 2020 - “stable”
- +7% price increase = +3 cents/pound
- world market dominates price - U.S. landings are a small component
  - FAO has 2019 Argentine shortfin squid = about 250,000 MT

# AP Fishery Performance Report

- Continue to involve fishermen in work to understand environmental linkages
- Opposing perspectives RE: how/whether SSC/Council should consider role of *Illex* in the food web as related to the strategic plan and Ecosystem Approaches to Fishery Management Guidance Document



# *Illex—Data and Methods*

- Evaluated alternative catch limits of 24,000 to 60,000 mt for 2022.
- Methodology built upon the methods used in 2021 and some advances developed within the Research Track Assessment.
- Based on commercial landings and NEFSC fall bottom trawl surveys data from 1997 to 2021.
  - Survey data were not available for 2017 and 2020, and catch data for 2021 are preliminary.
- Catch limits were evaluated with respect to their implications for percentage escapement and the ratio of fishing mortality to natural mortality over all years.
- Percentage escapement is the ratio of fished to the unfished stock size at the end of the fishing season.

## *Illex—Data and Methods*

- Computations rely on three parameters: catchability (i.e., probability of capture per tow), availability (i.e., fraction of stock in the sampling domain), and the instantaneous natural mortality rate.
- Effects of uncertainty in the parameters were evaluated by assuming that each parameter had a uniform distribution with lower and upper bounds as described above.
- The joint effect of these three sources of uncertainty on escapement was evaluated by integrating over the entire parameter space using a numerically intensive method.
- Additional details on the parameterization and methodology may be found in the report by Rago (2022) to the Mid-Atlantic Fishery Management Council.

# *Illex—Results*

- Based on the actual catches (1997-2021) the estimated probabilities of falling below 50% escapement were below 13%.
- The maximum historical probability of exceeding  $F/M=2/3$  was less than 21%.
- Hence the historical catches are unlikely to have resulted in overfishing during this period.
- Consideration of hypothetical alternative catches reveal similarly low probabilities of creating overfishing over most years
- Analyses based on consideration of all historical years is likely to give a more accurate forecast of risk in an “average” future year.
- Statistical theory can advise on the consequences of alternative catches but choices related to appropriate risk are matters of policy, not science.

## *Illex—SSC Concerns*

- Revised methodology more fully considered the uncertainty in the catchability, availability and natural mortality parameters.
  - Ranges of parameters were refined by comparisons with values in the scientific literature or via analyses prepared in support of the Research Track Working Group by John Manderson, Brooke Lowman and Anna Mercer.
  - Estimates of availability were improved via spatial analyses of seasonal bottom trawl surveys conducted in the shelf waters of the US and Canada. Estimates do not consider the availability of unsampled but possibly extensive offshore populations.
  - Estimates of catchability were improved by comparisons with calibration experiments and expert judgement of fishermen.
  - Estimates of a range of natural mortality rates were based on comparisons with values used in the scientific literature.

# *TOR: Illex—SSC Terms of Reference*

*1) Review the current 2022 Illex acceptable biological catch (ABC) of 33,000 MT and determine if an ABC adjustment is warranted. If so, please specify an adjusted 2022 Illex ABC and provide any rationale and justification for the adjustment;*

- *Illex* squid continues to be a data poor species.
- New report included an enhanced, numerical analysis of possible scenarios related to available biomass, the impact of the fishery, and the vulnerability of squid to surveys. This represented extensions to the framework previously presented to the SSC and that is the basis for the existing ABC determination.

## *TOR: Principal conclusions from the analyses accepted by the SSC:*

- 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 thought 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.
- The analyses do not consider any autocorrelation in the dynamics of the squid population that could be caused by stock-recruitment dynamics or by environmental drivers.

# *TOR: Illex—SSC Terms of Reference ABC Recommendation*

- The SSC believes that an ABC of 33,000 MT for 2022 is no longer warranted. Instead, the SSC recommends an ABC for 2022 of 40,000 MT based on the following lines of evidence:
  - Consistent with discussions of the SSC last year that noted a desire to increase the ABC, but which lacked a more complete exploration of the implications catch on the squid population. Current analysis provides such information.
  - Approximately 20% increase in the ABC above the 2021 determination, consistent with the incremental approach the SSC has adopted previously.
  - Based on an evaluation of a prolonged time series, it is consistent with
    - A low chance of falling below the escapement level of 40% that has been used in the management of other squid fisheries ( $p=0.065$ ), and
    - A moderate risk of exceeding a ratio of F:M=2/3 ( $p=0.20$ )
    - Both a 40% escapement level and an F:M=2/3 have been suggested as candidate reference points.
  - The SSC believes this level of ABC will lead to a low risk of overfishing.
  - The SSC did not feel comfortable increasing the ABC beyond this level because we continue to lack a clear link between escapement, F:M and the risk of overfishing and thus cannot yet directly apply the Council's risk policy.

## *TOR:Illex—Sources of Uncertainty for ABC*

- The lack of a peer-reviewed OFL introduces substantial uncertainty for the foundation of ABC determination. SSC is relying on data poor approaches and reference points used to manage other squid fisheries and used to promote sustainability of exploited forage species
  - Continued uncertainty over the fraction, and the interannual variability, of the squid population that is subject to exploitation. Therefore estimates are likely lower bound estimates of the impact of the fishery on the squid population.
  - Lack of understanding of stock- recruitment processes in squid complicates development of biological reference points.
  - Lack of understanding of the coherence of squid availability on the shelf with environmental drivers of distribution complicate understanding of whether sequences of good or bad years are likely to occur, which would bias understanding of stock status when using data poor approaches.
  - Levels of escapement that afford protection against overfishing are poorly understood analytically and empirically.
  - Estimates of  $q$ ,  $v$ , and  $M$  are uncertain and estimates are assumed to be uncorrelated, whereas there are easily conceived processes that could introduce correlations among these key parameters.
- The SSC believes these recommendations meet National Standard guidelines for best available scientific information available.



## *Illex—Public Comments*

- Public commenters noted the use of escapement targets in squid fisheries around the world. MSC now recommends the use of escapement targets in their most recent guidance documents. Fisheries operating under such targets have generally been stable.
- Another commenter noted the economic and social importance of this fishery particularly during this period when other pelagic fishing opportunities are declining. This proposal was supported by others who further emphasized the small area of fishing relative to the total stock area, the exclusion of *Illex* in offshore areas and the short season length.
- Others cited observations from research vessels from tows deeper than 2500 m.
- Ex-vessel value alone is an insufficient measure of economic value.

# *Illex* SSC

- Expanded Rago analyses justified ABC increase to 40,000 MT
  - low risk of overfishing
- Beyond 40,000 MT??
  - ...lack clear link between escapement, fishing mortality, and the risk of overfishing

# MSB Monitoring Committee

- Working off SSC's 40,000 MT ABC...
- Recently improved projections and reporting
- 2021's 1,889 MT buffer might be sufficient, but overage less likely at current 94%
  - Over/under possible either way
- To “ensure” specs not exceeded...
  - no strong rationale to recommend a change from the current 94% closure threshold until more years' closure performances evaluated

# MSB Committee

- Committee recommends that for the 2022 *Illex* specifications ABC= 40,000 MT, IOY=DAH=DAP=38,156 MT.
  - ABC = Acceptable Biological Catch
  - IOY = Initial Optimum Yield
  - DAH = Domestic Annual Harvest (“Quota”)
  - DAP = Domestic Annual Processing

# MSB Committee

- Committee recommends the fishery close with a 96% directed fishery threshold.  
Committee rationale summary:
  - Balance potential for overages or underages
  - 2020/21 performance suggests 96% enough
    - at potential new 2022 DAH, 4% buffer = 1,526 MT  
(In terms of weight, between 2020 and 2021)



# ***Illex* 2022 Review**

*?s, discussion, motions*