NOAA
FISHERIES
SERVICE

SAW/SARC-51 Summary

Presentations: Jan. Feb., 2011

SAW/SARC Process

1. **SAW Working Groups (WG): Hake WG, Invert. WG**

2. **External Peer Review Panel: Center of Independent Experts (CIE) + SSC.**

   - Emphasis on reviewing just the science/assessment.

3. **Products: (Reviewer's Reports) + (2 Science Reports)**
   http://www.nefsc.noaa.gov/nefsc/saw/ (see SAW51)
   http://www.nefsc.noaa.gov/publications/ (see Ref. Docs.)

4. **Management advice:**
   - **Some in the SAW/SARC reports to support SSC in making ABC recommendation.**
   - **Developed by Tech. Committees, PDTs, SSC.**

The 51st Northeast Regional Stock Assessment Review Committee (51th SARC)

Stephen H. Clark Conference Room – Northeast Fisheries Science Center
Woods Hole, Massachusetts
Nov. 29 – Dec. 3, 2010

SARC Chairman:
J.-J. Maguire
(Halieutikos Inc.; NEFMC SSC)

SARC Panelists:
Dr. Mike Armstrong
(CEFAS, UK; CIE)

Dr. Beatriz Roel
(CEFAS, UK; CIE)

Dr. Geoff Tingley
(CEFAS, UK; CIE)

A. Silver hake (N, S)
B. Loligo squid
C. Red hake (N, S)
D. Offshore hake

Silver hake

Silver hake

TORs (1)

1. **Estimate catch from all sources including landings, discards, and effort. Characterize the uncertainty in these sources of data, and estimate LPUE. Analyze and correct for any species mis-identification in these data.**

2. **Present the survey data being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, etc.). Characterize the uncertainty and any bias in these sources of data.**

3. **Evaluate the validity of the current stock definition, and determine whether it should be changed. Take into account what is known about migration among stock areas.**

4. **Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series (integrating results from Silver hake TOR-5), and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results.**

5. **Evaluate the amount of silver hake consumed by other species as well as the amount due to cannibalism. Include estimates of uncertainty. Relate findings to the stock assessment model.**

6. **State the existing stock status definitions for "overfished" and "overfishing". Then update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and $F_{MSY;}$ and estimates of their uncertainty). If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the "new" (i.e., updated, redefined, or alternative) BRPs.**

Silver hake

TORs (2)

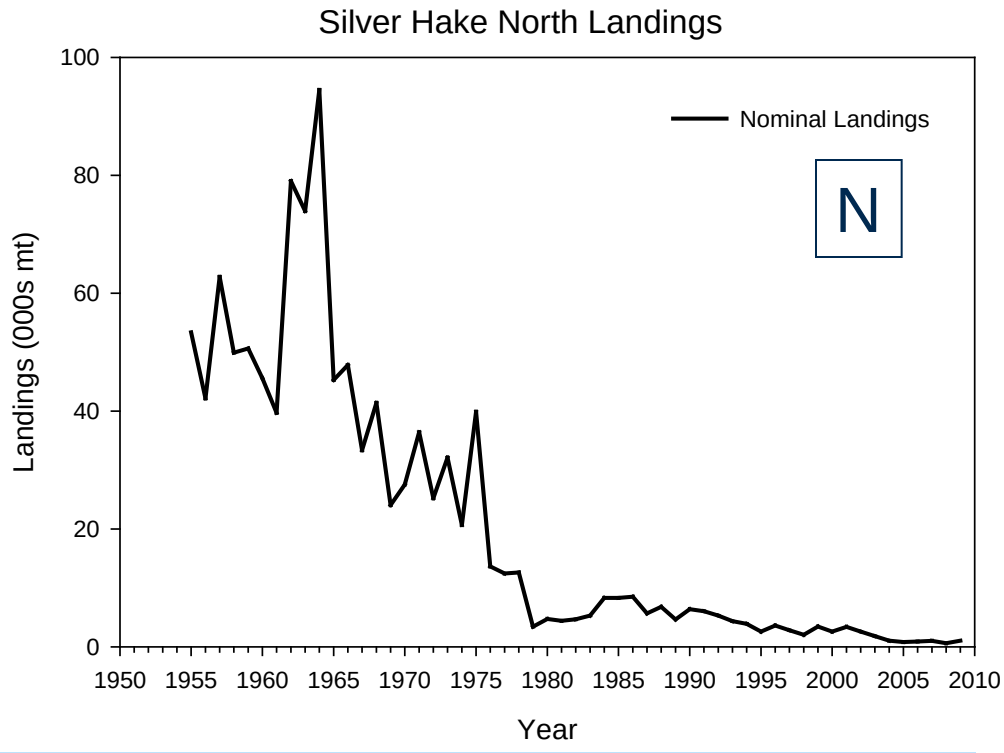
7. **Evaluate stock status (overfished and overfishing) with respect to the existing BRPs, as well as with respect to the "new" BRPs (from Silver hake TOR 6).**

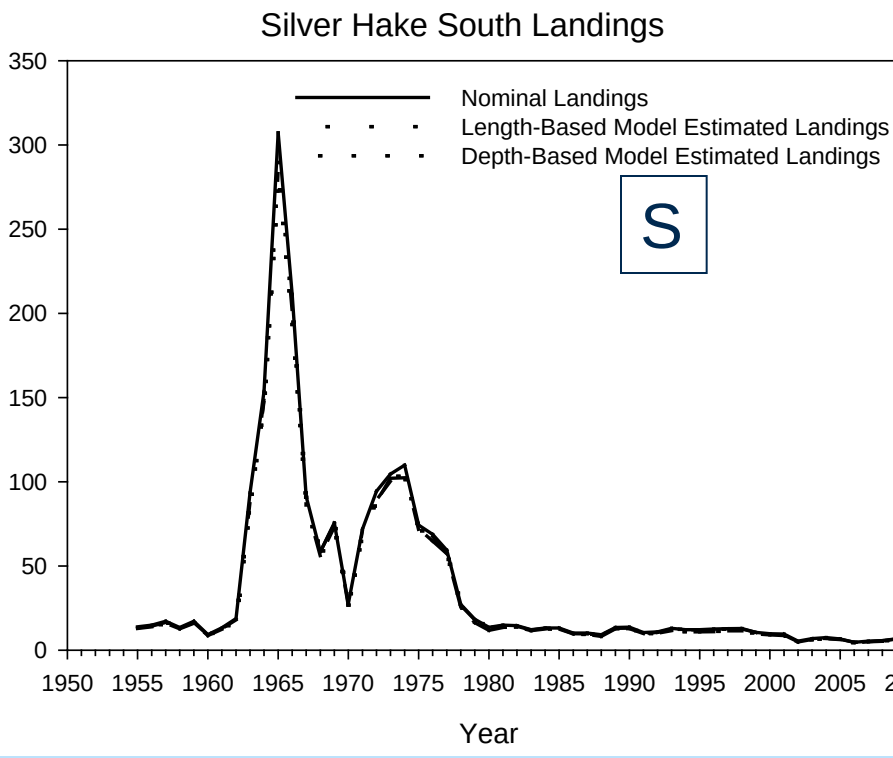
8. **Develop and apply analytical approaches and data that can be used for conducting single and multi-year stock projections and for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs).**
    a. **Provide numerical short-term projections (3 years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. In carrying out projections, consider a range of assumptions about the most important uncertainties in the assessment (e.g., terminal year abundance, variability in recruitment).**
    b. **Comment on which projections seem most realistic, taking into consideration uncertainties in the assessment.**
    c. **Describe this stock's vulnerability to becoming overfished, and how this could affect the choice of ABC.**

9. **Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in recent SARC reviewed assessments and review panel reports. Identify new research recommendations.**

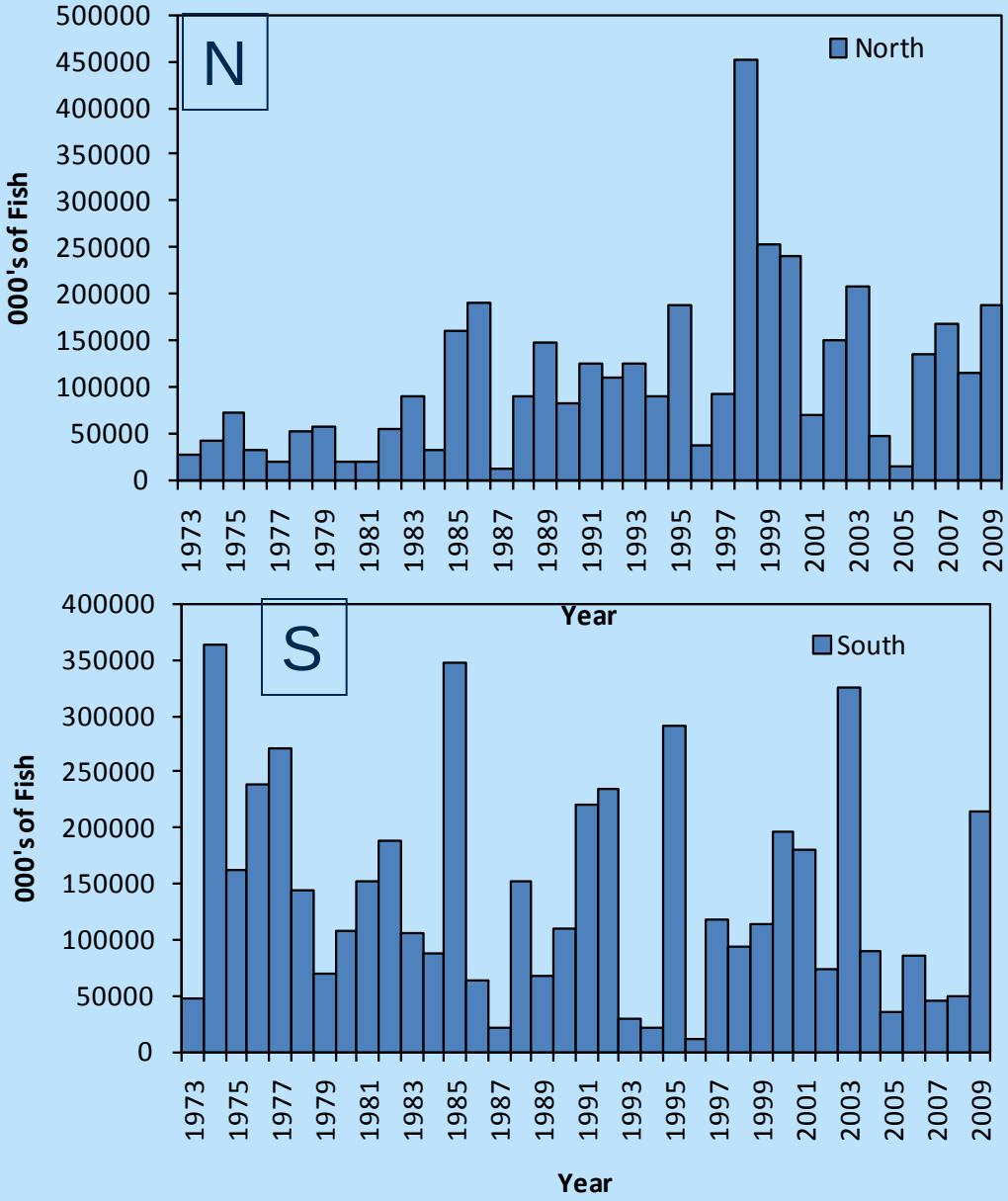
Silver hake

Landings (1955-present)



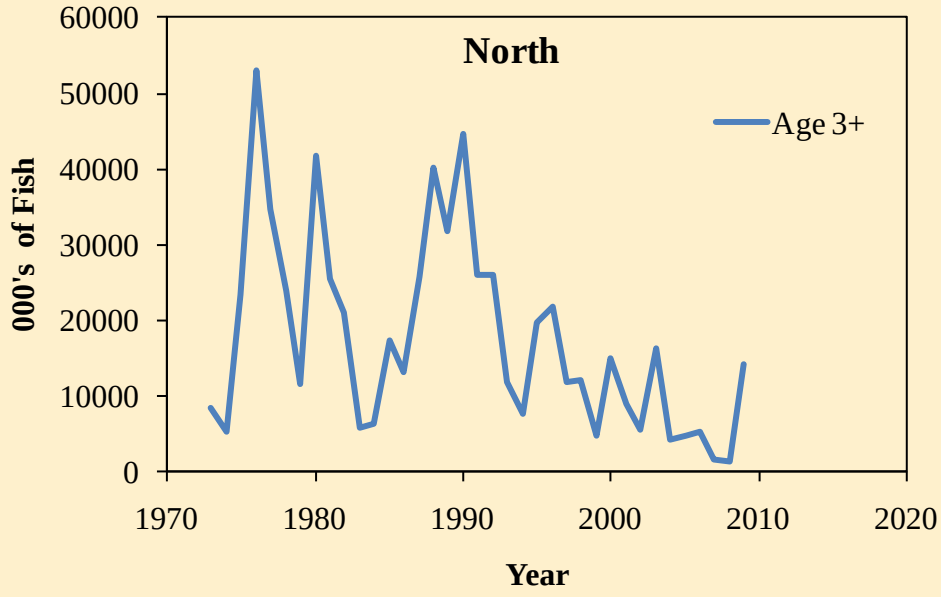


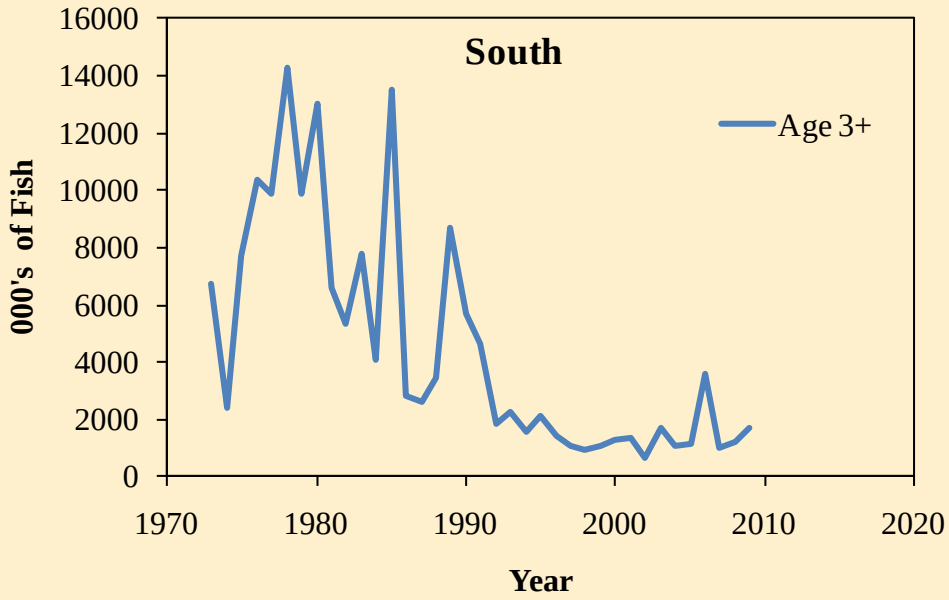
Silver hake



Recruitment (0 and 1 yr olds): variable, w/ no obvious time trend

Silver hake



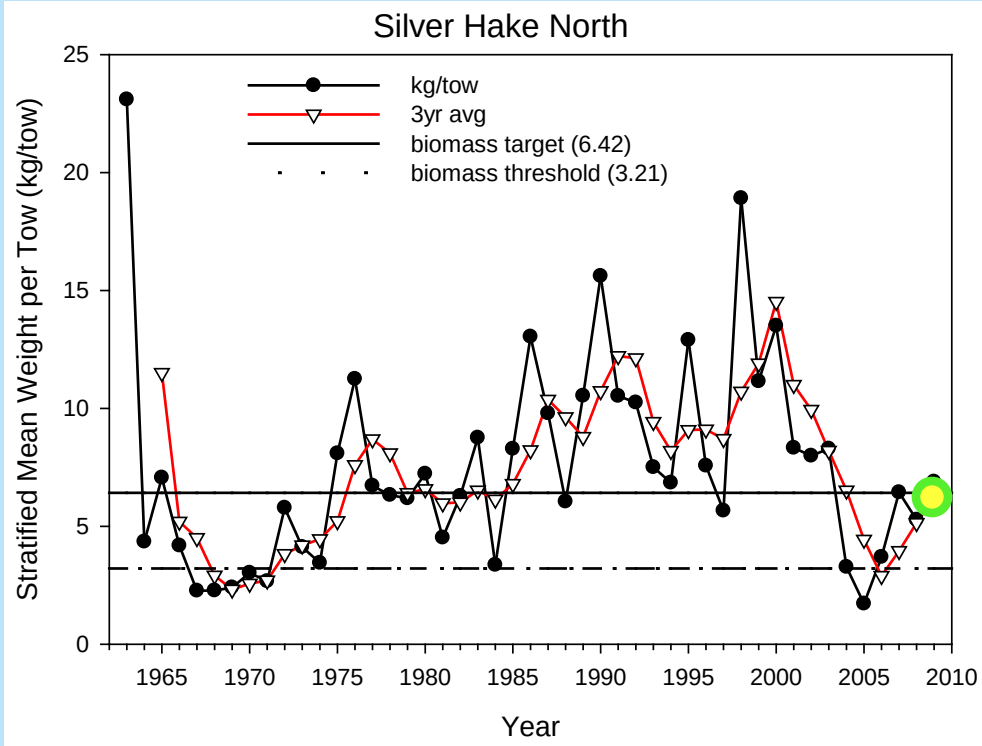


Decline in # of age 3+ fish in survey over time !

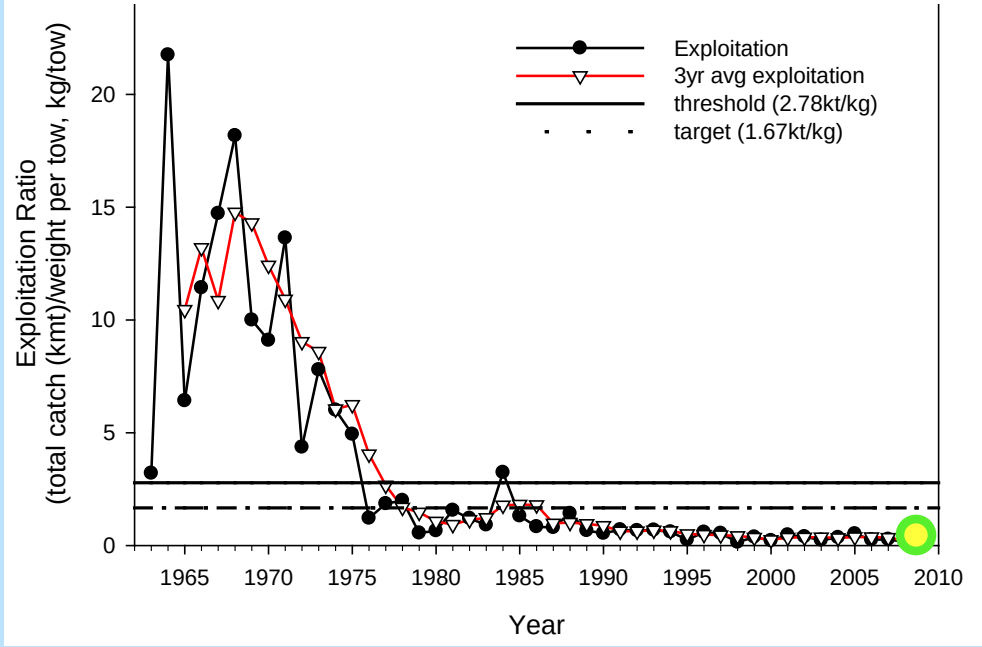
Silver hake

Consumption of silver hake: exceeds total catch.

Silver hake (N)



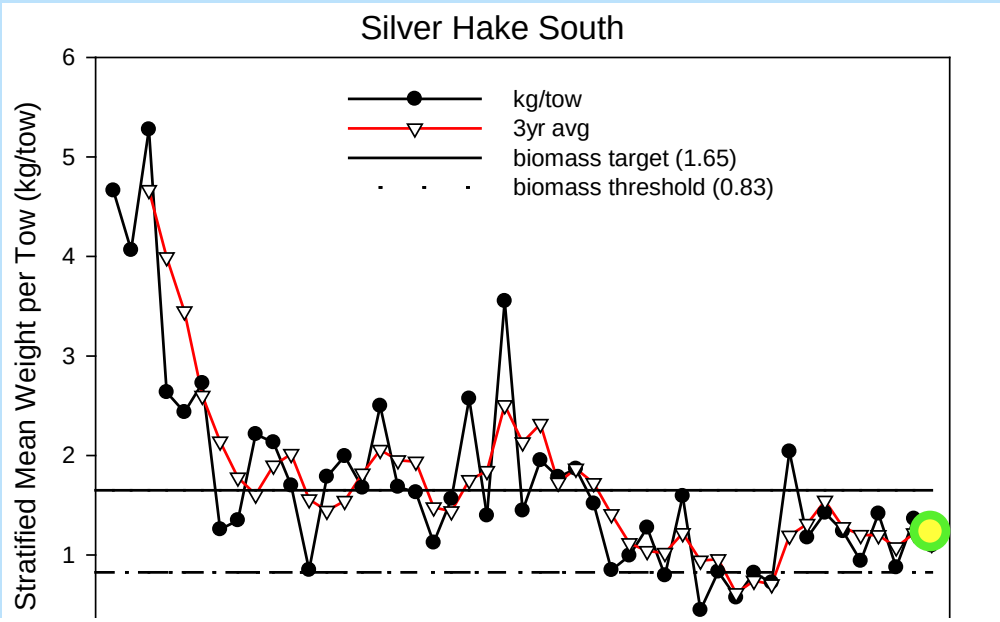
Survey average (‘07-’09) = 6.2 kg/tow. Not overfished.

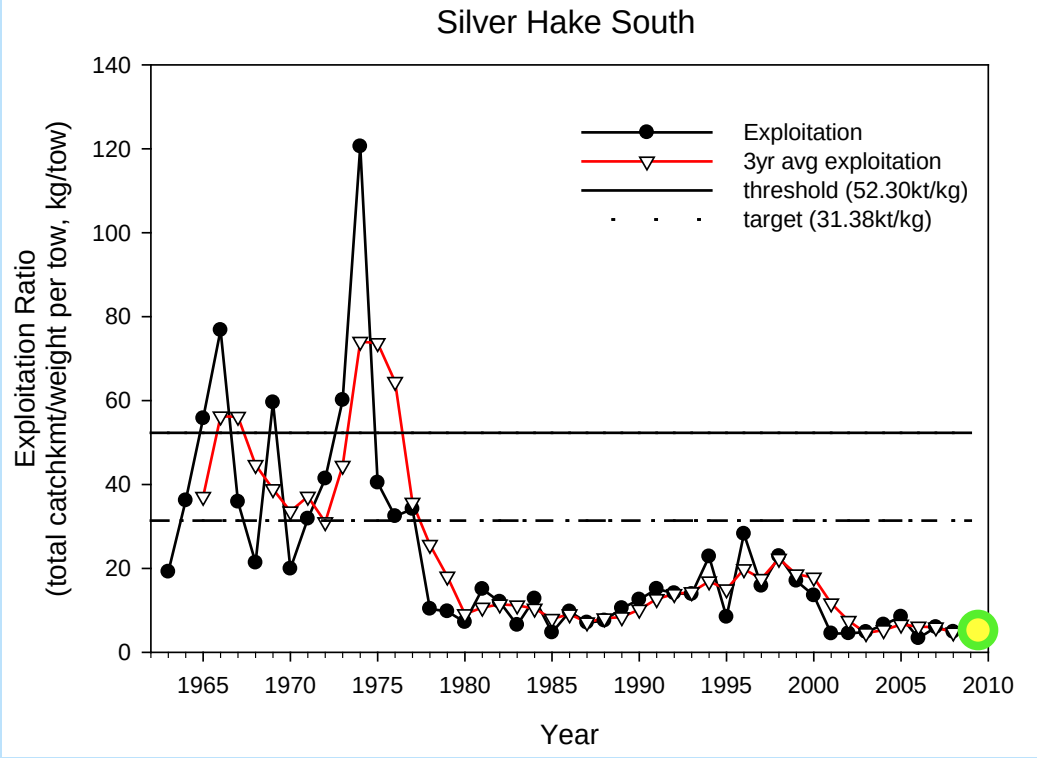


Exploitation (‘07-’09) = 0.2 kt/kg. Not overfishing.

Note: Newly proposed overfishing definitions are represented here.

Silver hake (S)





Survey average ('07-'09) = 1.11 kg/tow. Not overfished.

Exploitation ('07-'09) = 5.87 kt/kg. Not overfishing.

Note: Newly proposed overfishing definitions are represented here.

Silver hake | SARC Panel Comments (1)

- **New ASAP model: very informative, explored all data sources**
- **However, no unique ASAP model run provided a consistent interpretation of data. ASAP model NOT accepted as basis for management advice.**
- **Outcome: Previous simpler approaches (catch and "survey index") were retained, with some modifications for stock status determination.**
- **Caution: Surveys may not be accurately tracking population biomass. Survey biomass indices do not show clear response to fishery over time (i.e., AIM model).**
- **Caution: Total mortality may be increasing (evidence: ASAP and declining survey catch rates of 3+ fish). Proposed BRPs, which are based on averages of historical indices and catch rates, may not be appropriate.**

- **Factors other than abundance may affect survey trends. Fishing mortality may be too low to impact survey trends.**
- **Multi-year stock projections were not possible.**
- **Change to *RV Bigelow* in 2009 will improve survey (greater vertical opening).**
- **Evidence for separate N and S stocks is equivocal.**
- **Consumption estimates: an important finding for ecosystem-based management.**

Silver hake | SARC Panel Recommendations

- **Consider using ASAP model in future, if research has been done on: 1.) year, area or size/age effects on surveys, 2.) whether "cryptic" biomass is exists, 3.) amount of older hake consumed by predators.**

- **Examine survey catchability across ages and years. Ensure that "apparent" mortality can be assigned to the right sources (fishing, natural factors, changes in distribution or changes in survey catchability).**

- **Examine distribution of silver hake with regard to depth, area and fish size. Consider acoustic methods and egg production surveys.**

- **Obtain age data directly from the fishery catch.**

- **Expand consumption studies: include more predators.**

Red hake

Red hake

TORs (1)

1. Estimate catch from all sources including landings, discards, and effort. Characterize the uncertainty in these sources of data, and estimate LPUE. Analyze and correct for any species mis-identification in these data.

2. Present the survey data that are being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, etc.). Characterize the uncertainty in these sources of data.

3. Evaluate the validity of the current stock definition, and determine whether this should be changed. Take into account what is known about migration among stock areas.

4. Estimate measures of annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and characterize their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results.

5. State the existing stock status definitions for the terms “overfished” and “overfishing”. Then update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and $F_{MSY;}$ and estimates of their uncertainty). If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.

Red hake

TORs (2)

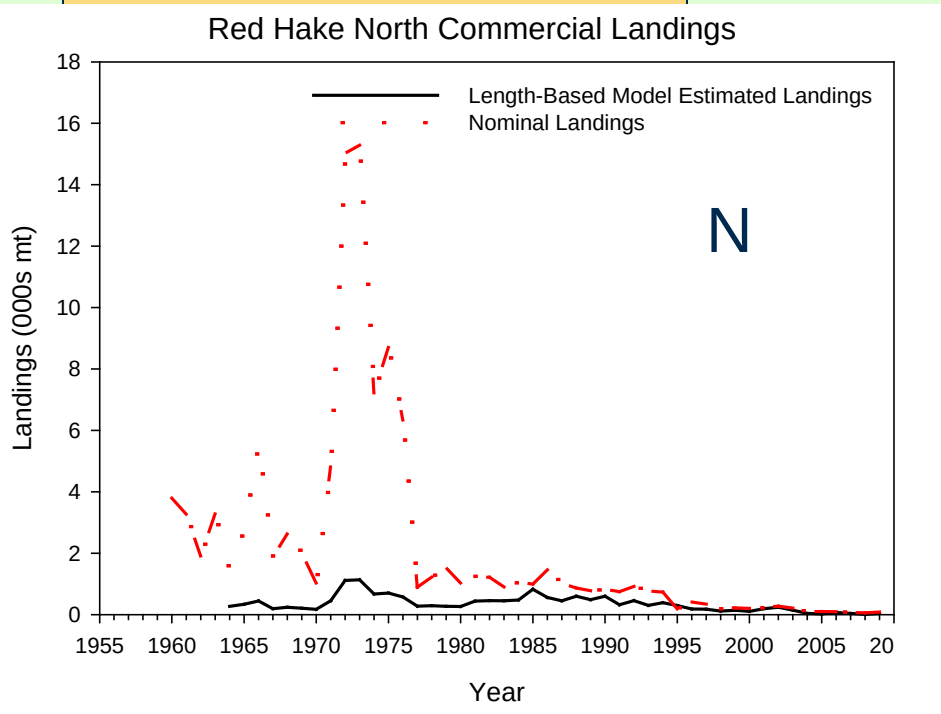
6. Evaluate stock status (overfished and overfishing) with respect to the existing BRPs, as well as with respect to the "new" BRPs (from Red hake TOR 5).

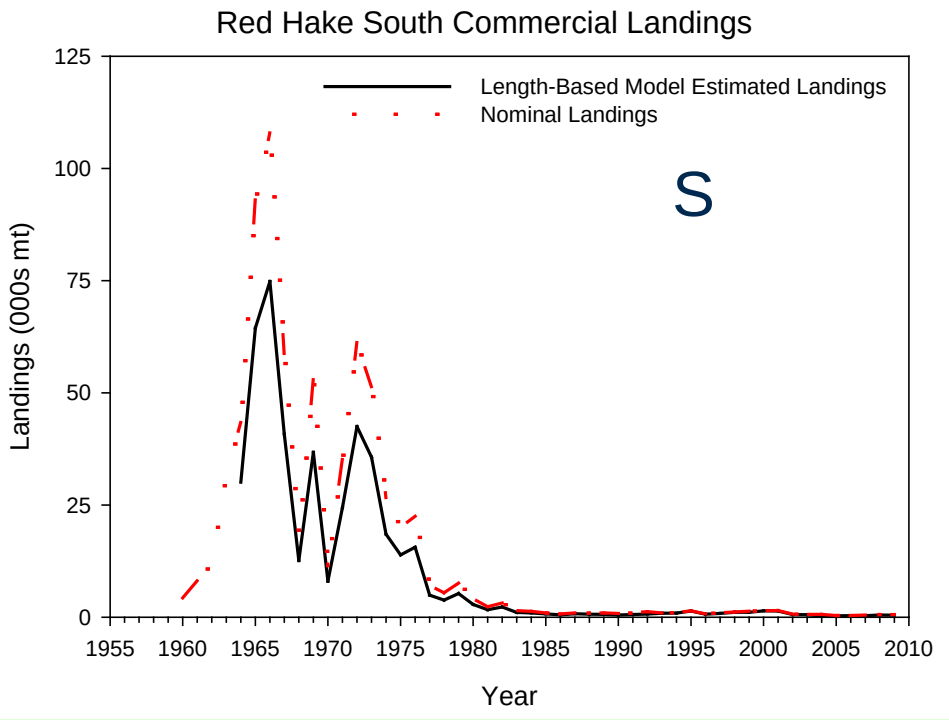
7. Develop and apply analytical approaches and data that can be used for conducting single and multi-year stock projections and for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs).
    a. Provide numerical short-term projections (3 years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. In carrying out projections, consider a range of assumptions about the most important uncertainties in the assessment (e.g., terminal year abundance, variability in recruitment).
    b. Comment on which projections seem most realistic, taking into consideration uncertainties in the assessment.
    c. Describe this stock's vulnerability to becoming overfished, and how this could affect the choice of ABC.

8. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in recent SARC reviewed assessments and review panel reports. Identify new research recommendations.

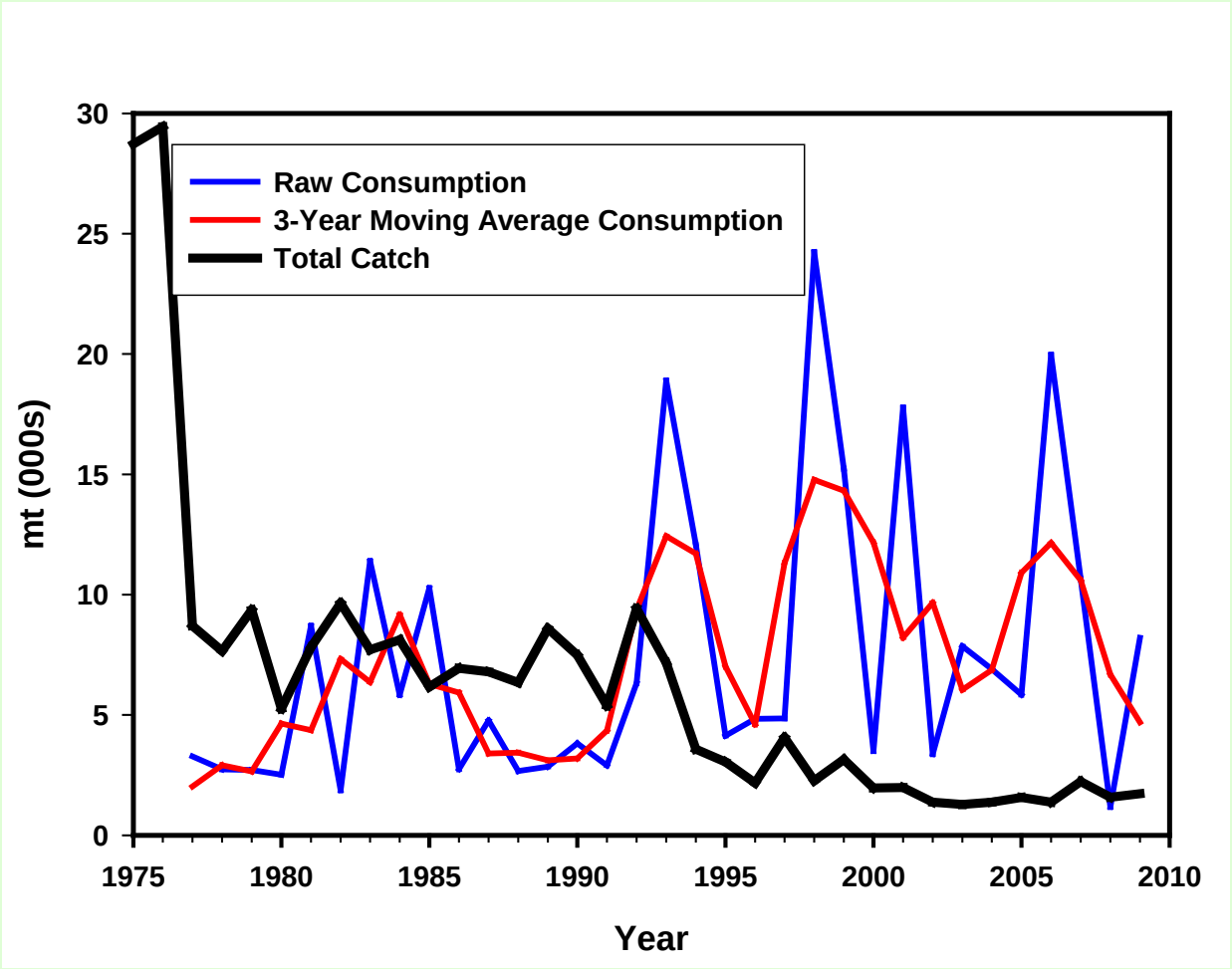
Red hake:

Landings (1960-present)

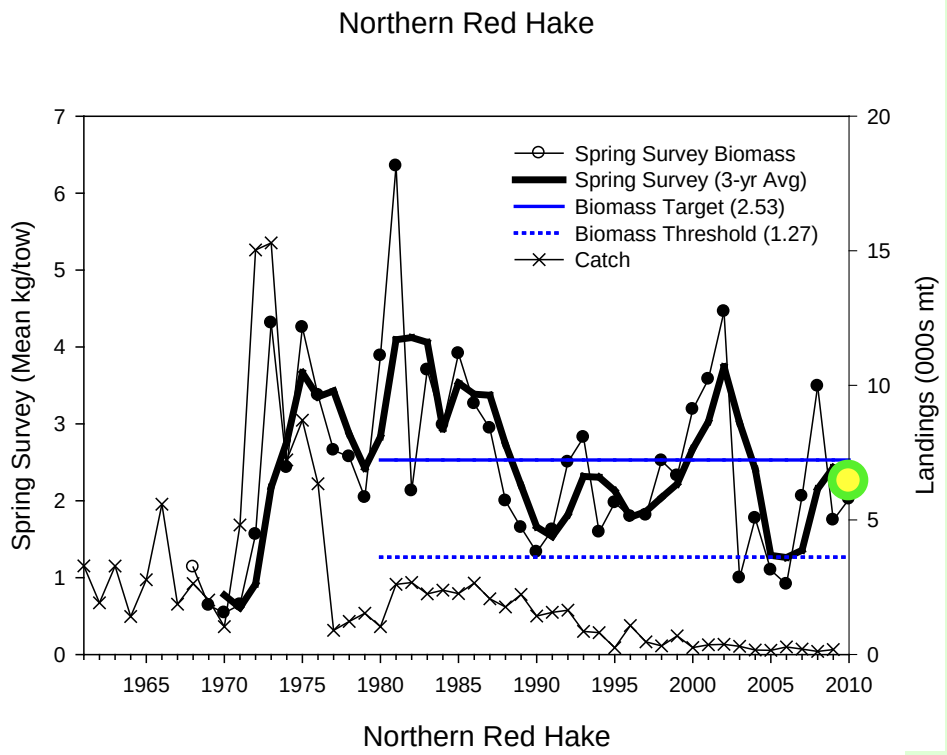


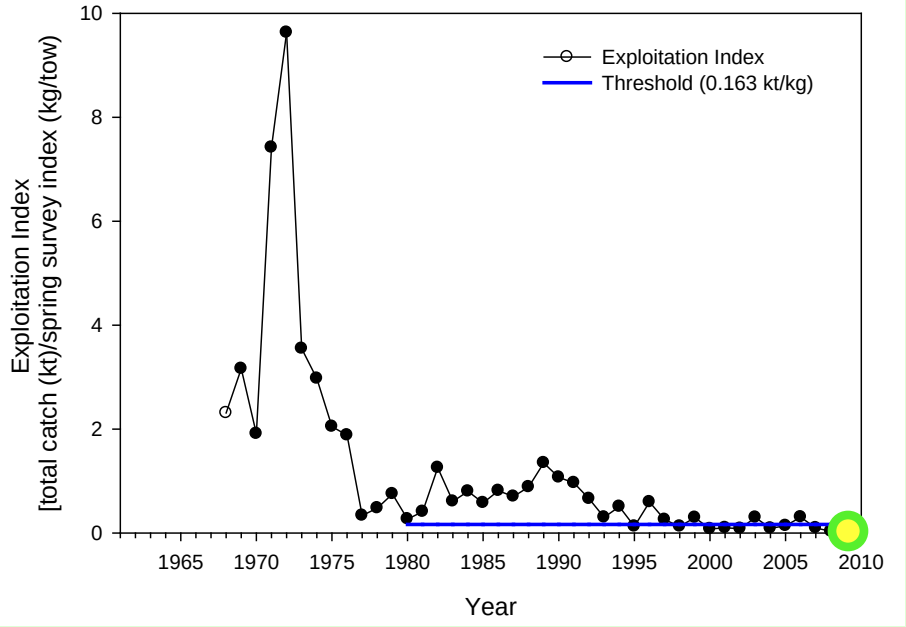


Red hake:



Recent consumption of red hake: Exceeds total catch.



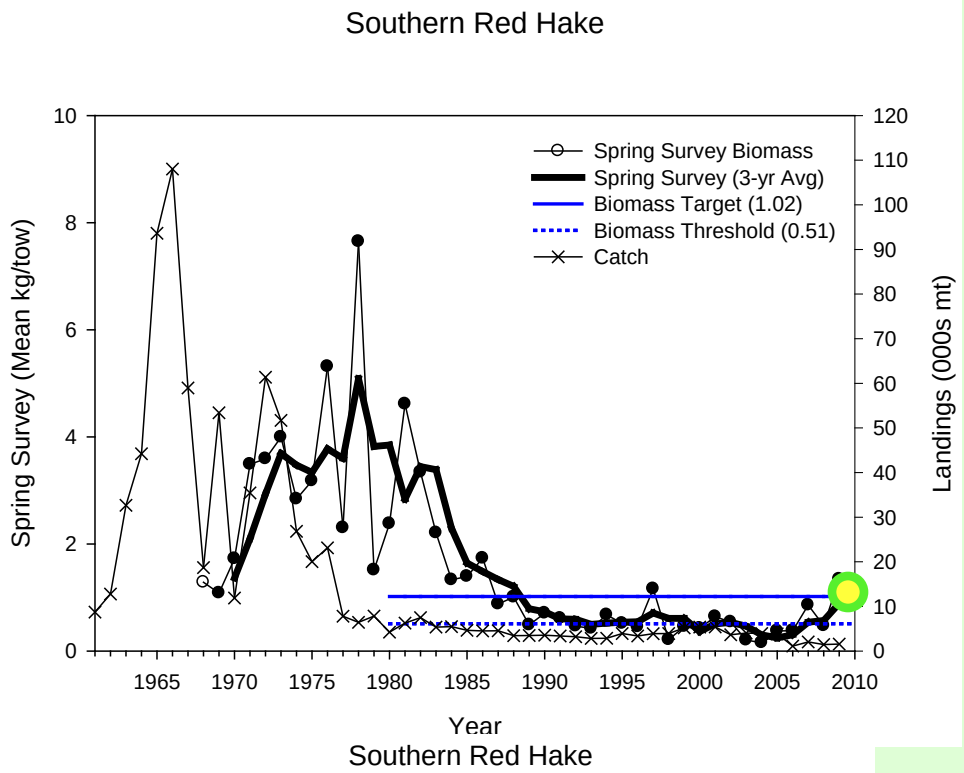


Red hake (N)

Survey average (‘08-’10) = 2.42 kg/tow. Not overfished.

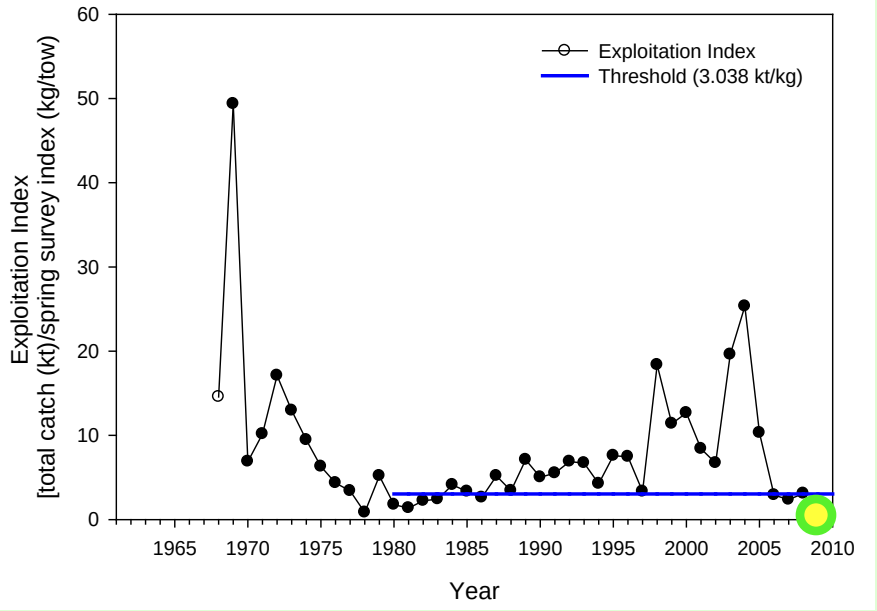
Exploitation (‘08-’10) = 0.10 kt/kg. Not overfishing.

Note: Newly proposed overfishing definitions are represented here.



Red hake (S)

Survey average ('08-'10) = 0.95 kg/tow. Not overfished.



Exploitation ('08-'10) = 1.15 kt/kg. Not overfishing.

Note: Newly proposed overfishing definitions are represented here.

Red hake:

SARC Panel Comments (1)

- **AIM analysis provided a basis to inform decisions about reference points. SCALE and SS3 models experienced difficulties.**
- **Major improvement understanding existing data, population, and fishery.**
- **Outcome: Survey indices are proposed for stock status determination.**
- **However, it is uncertain how well survey indices represent stock size. F may be too low for fishery to have detectable effect.**

Red hake:

SARC Panel Comments (2)

- **Survey catchability not well enough understood. Use of survey indices for management is somewhat uncertain.**
- **Evidence for the existence of a single or two separate (N and S) stocks is equivocal.**
- **New BRPs were recommended for both N and S red hake stocks.**
- **Not possible to perform multi-year projections.**

Red hake: SARC Panel Recommendations

- **Endorses the Res. Rec. list of the Hake WG.**
- **Determine whether a significant portion of discards are returned alive to the water in a sufficiently undamaged state**
- **Test assumption of constant survey catchability. Study size/age related vertical distributions and trawl escapement by depth, area, time. Consider using acoustics and new technologies.**
- **Investigate spatio-temporal effort and CPUE, and standardized CPUE indices for vessels in the fishery.**
- **Obtain age data directly from the fishery catch.**
- **Expand consumption studies: include more predators of hake.**

Offshore hake | TORs (1)

1. Use models to estimate the commercial catch. Describe the uncertainty in these sources of data.

2. Characterize the survey data that are being used in the assessment (e.g., regional indices of abundance, recruitment, age-length data, etc.). Describe the uncertainty in these sources of data.

3. Estimate measures of annual fishing mortality, recruitment and stock biomass for the time series, and characterize the uncertainty of those estimates.

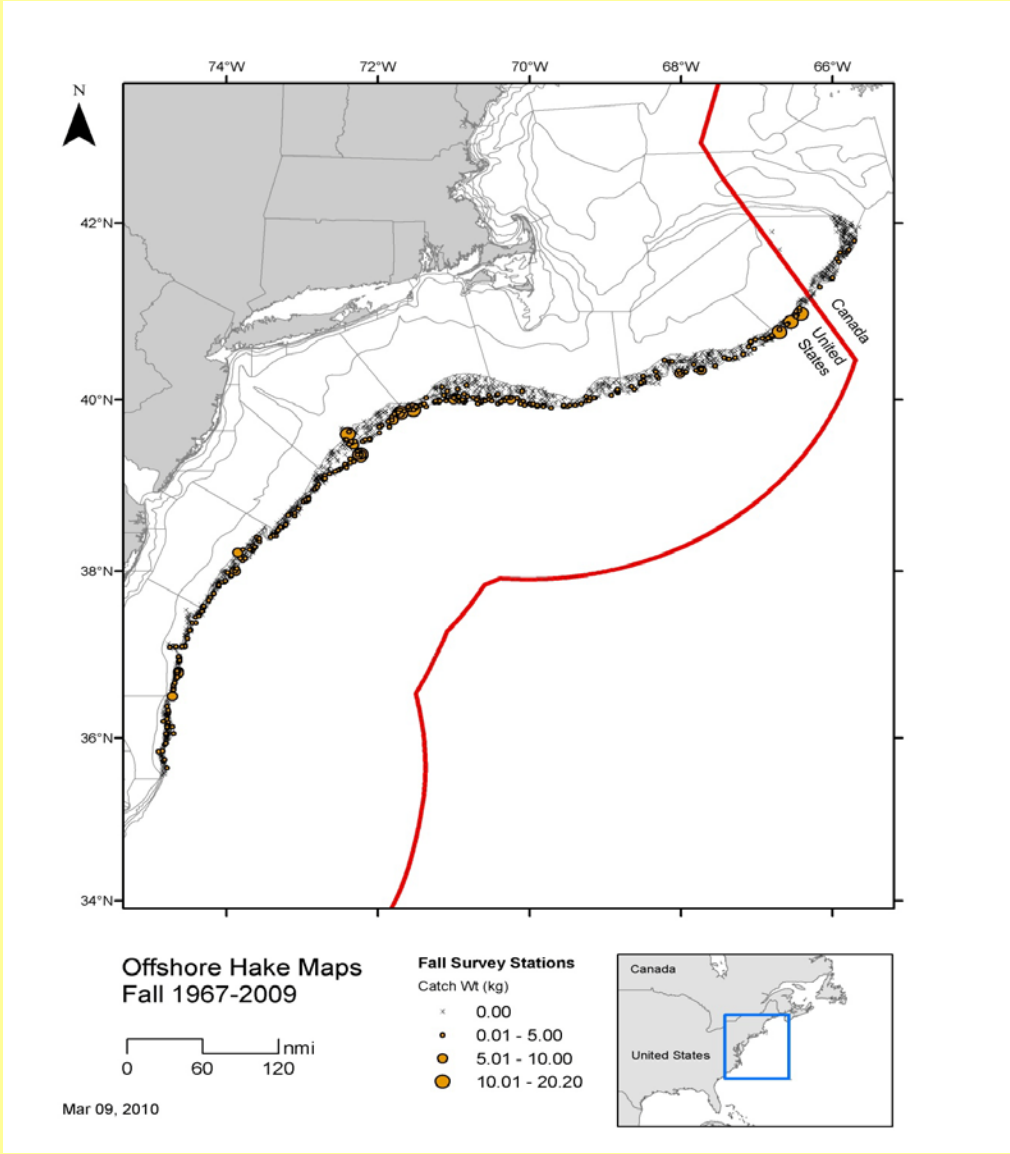
4. State the existing stock status definitions for the terms “overfished” and “overfishing”. Then update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and $F_{MSY;}$ and estimates of their uncertainty). If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.

5. Evaluate stock status (overfishing and overfished) with respect to the existing BRPs, as well as with respect to the "new" BRPs (from Offshore hake TOR 4).

6. If a model can be developed, conduct single and multi-year stock projections and for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs).
    a. Provide numerical short-term projections (3 years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. In carrying out projections, consider a range of assumptions about the most important uncertainties in the assessment (e.g., terminal year abundance, variability in recruitment).
    b. Comment on which projections seem most realistic, taking into consideration uncertainties in the assessment.
    c. Describe this stock's vulnerability to becoming overfished, and how this could affect the choice of ABC.

7. Propose new research recommendations.

Offshore hake



Survey data may not be a good index of abundance (or of mean weight) and may be driven more by changes in distribution of offshore hake.

Offshore hake

Biological Ref. Pnts.

“In previous SAFE Reports, the Whiting Monitoring Committee (WMC) noted problems associated with the overfishing definition for offshore hake.”

“No alternative reference points are recommended and the existing BRPs should also be rejected.”

Offshore hake

SARC Panel Comments

- **1st offshore hake assessment. WG did thorough job. But data are insufficient to complete an assessment. Not possible to estimate fishing mortality, recruitment or biomass.**

- **Surveys are believed to cover an unknown and variable proportion of the stock.**

- **Accuracy of the historical landings is poorly known.**

- **Possible spp. identification problems.**

- **Can't determine stock status. Fishery data are insufficient and survey data are not considered to reflect stock trends. Status is unknown.**

- **No alternative reference points could be recommended, and the existing BRPs should also be rejected.**

Offshore hake

SARC Panel Recommendations

- **General endorsement of Res. Rec. list from Hake WG.**
- **Evaluate areal distribution of offshore hake.**
- **See if port sampling protocols can improve for better catch estimation.**
- **Investigate simple approaches to providing management advice.**

Loligo squid

Loligo squid

TORs (1)

1. Characterize the commercial catch including landings, effort, LPUE and discards. Describe the uncertainty in these sources of data.

2. Characterize the survey data that are being used in the assessment (e.g., regional indices of abundance, recruitment, age-length data, etc.). Describe the uncertainty in these sources of data.

3. Estimate annual fishing mortality, recruitment and stock biomass for the time series, and characterize the uncertainty of those estimates (consider *Loligo* TOR-4). Include a historical retrospective analysis to allow a comparison with previous assessment results.

4. Summarize what is known about consumptive removals of *Loligo* by predators and explore how this could influence estimates of natural mortality (M).

Loligo:

TORs (2)

5. State the existing stock status definitions for the terms “overfished” and “overfishing”. Then update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and $F_{MSY;}$ and estimates of their uncertainty). Comment on the scientific adequacy of existing BRPs and for the “new” (i.e., updated, redefined, or alternative) BRPs.

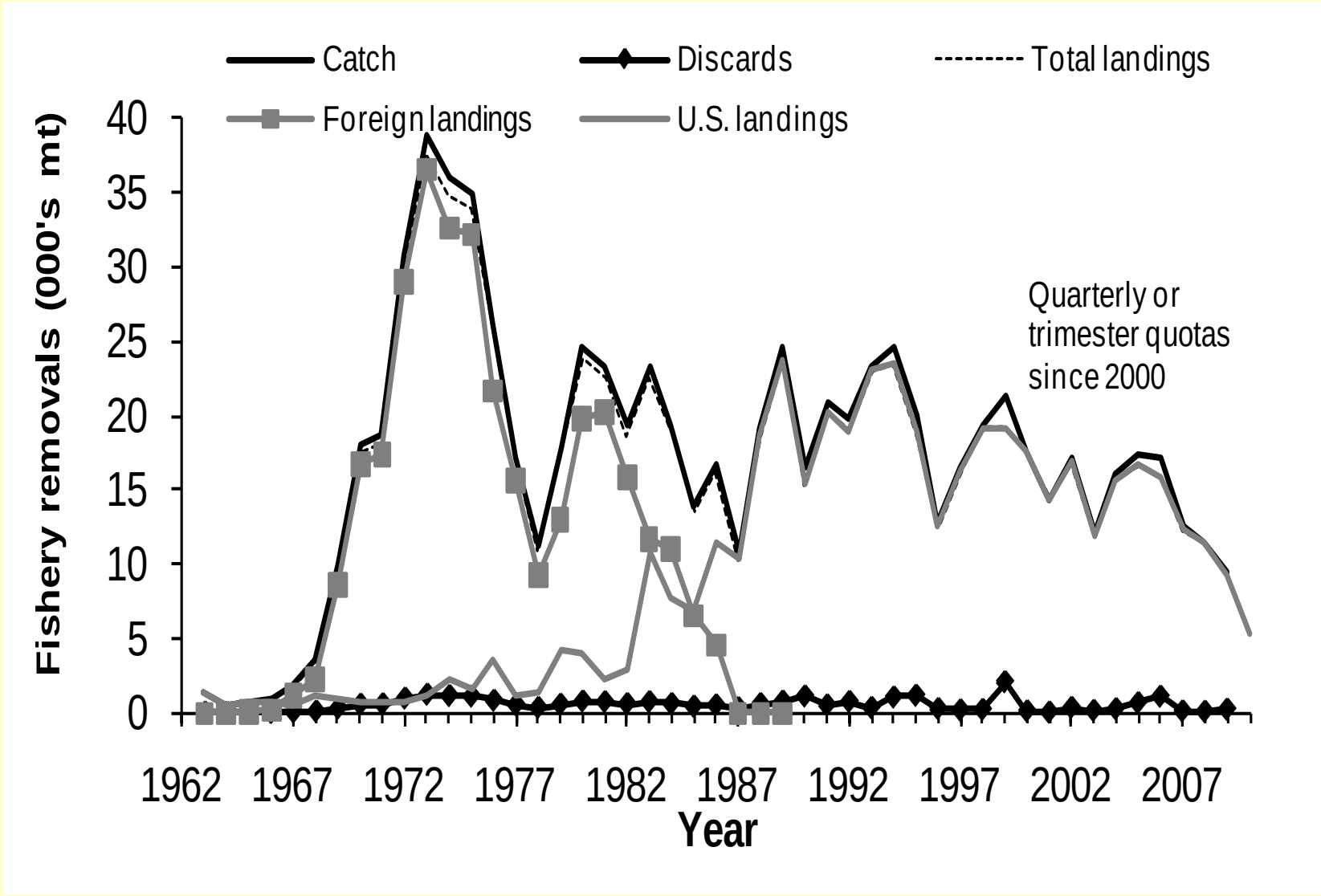
6. Evaluate stock status with respect to the existing BRPs, as well as with respect to the “new” BRPs (from *Loligo* TOR 5).

7. Develop approaches for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs), and comment on the ability to perform projections for this stock.

8. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in recent SARC reviewed assessments and review panel reports. Identify new research recommendations.

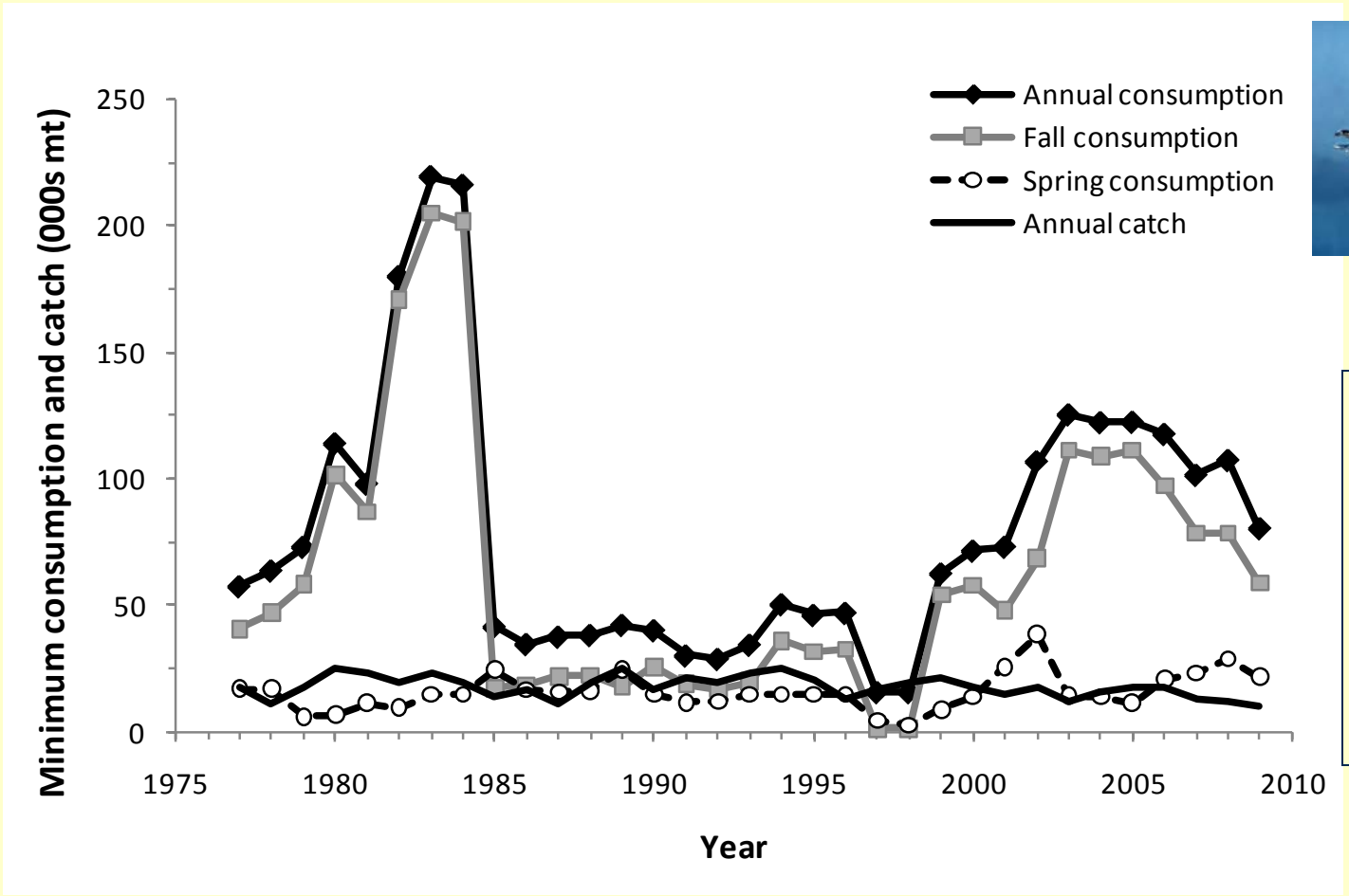
Loligo:

Catch, Landings, Discards



Loligo:

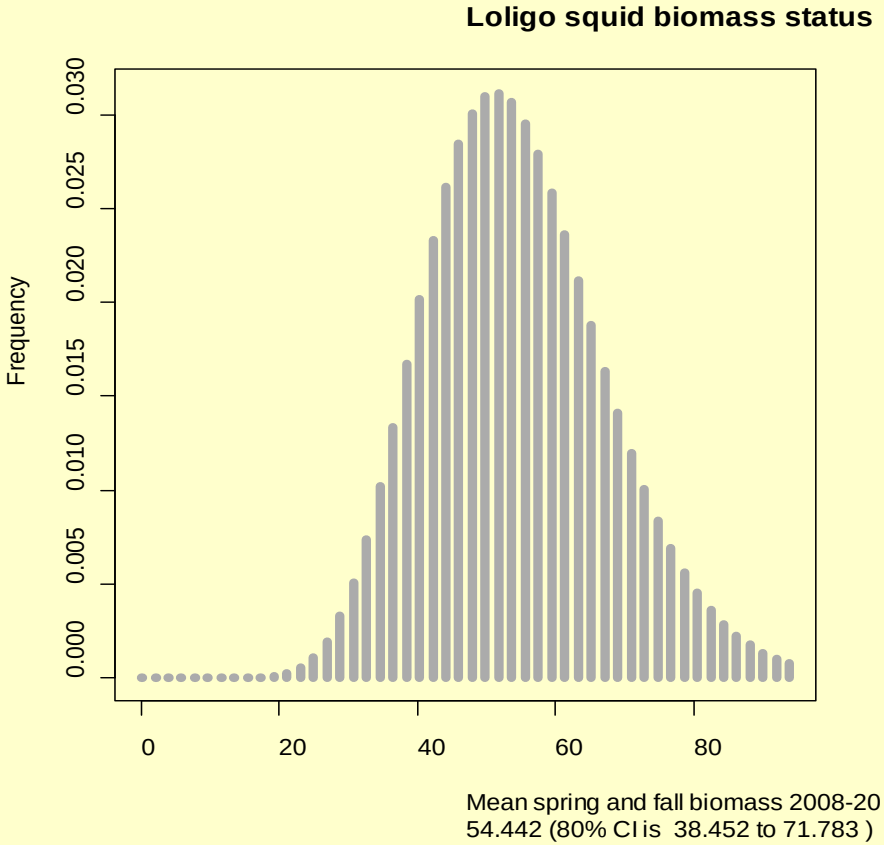
Consumption vs Catch of Loligo

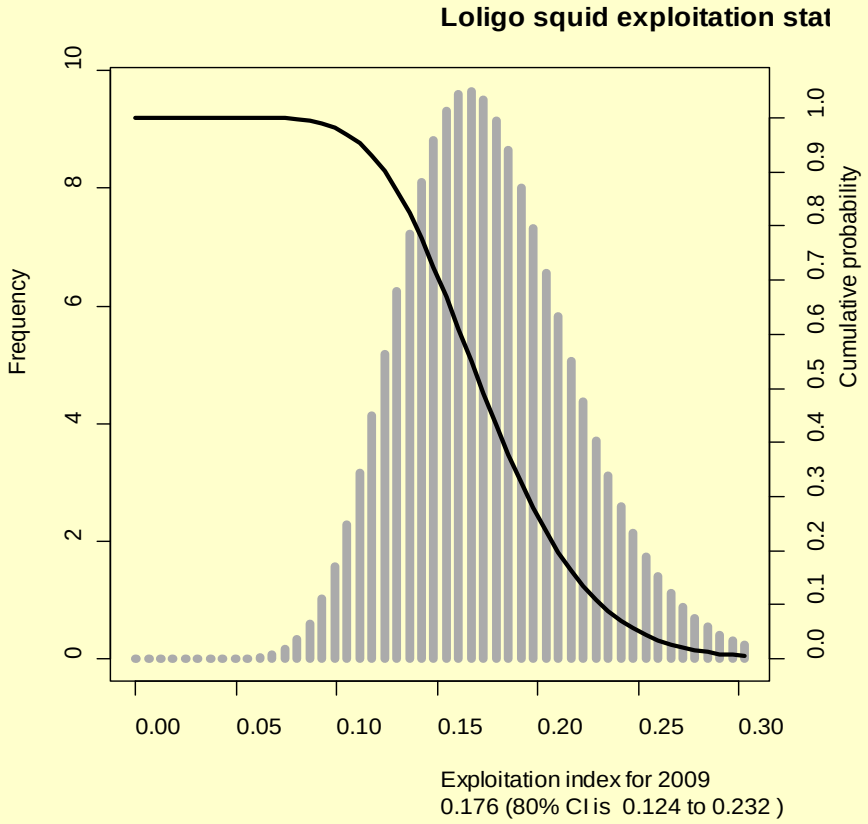


Annual consumption of Loligo exceeds total catch.

Loligo:

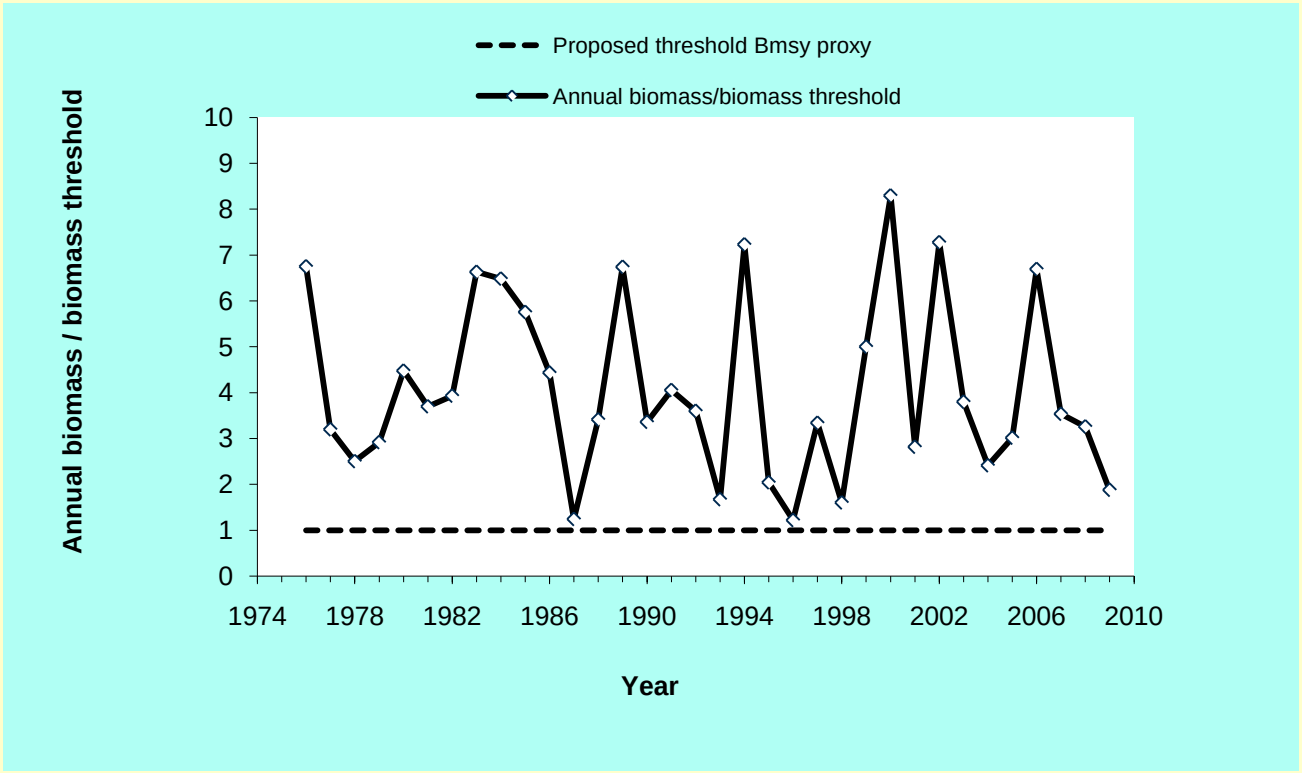
Stock status





Loligo:

New Biomass Threshold



How was $B_{threshold}$ derived?

- $B_{threshold} = .5(B_{target})$
- $B_{target} = .5K$
- $K = B_{1976\text{-}2008} / 0.9$
- **Assumes stock lightly exploited**

Loligo:

Overfishing Definition

The current F_{MSY} proxy (0.31 per quarter or 1.24 per year) was calculated in the last assessment as the 75th percentile of quarterly exploitation indices during 1987-2000. The current fishing mortality reference point approach is not appropriate for the lightly exploited stock.

A new threshold reference point for fishing mortality was NOT recommended in the 2010 assessment because there was no clear statistical relationship between catch and annual biomass estimates during 1975-2009.

Loligo: SARC Panel Comments

- **A majority of the Panel considers the data and assessment for *Loligo* to provide a basis for developing annual management advice for this stock as long as the exploitation rate is kept low.**

- **Annual estimates in assessments and annual management are not optimal. Shorter periods of time would be better which take into account size of cohorts within years.**

- **Stock is probably lightly exploited: Based on biomass estimates relative to $B_{threshold}$ and catches relative to estimates of minimum consumption**

- **Survey trawl efficiency estimates between seasons are not robust and require further analysis.**

Loligo:

SARC Panel Recommendations (1)

- **Estimate survey catch efficiency for the spring and fall surveys. This is a key parameter in the assessment and stock status determination.**

- **Conduct additional studies and modelling of seasonal cohort recruitment, growth , mortality, catch and effort.**

- **Consider within-season or within year management.**