

SSC Review of:

**GRSC-Informed Catch Analysis**

and

**Interim Analysis**

# Request and setting

- Agenda items IV & V
- All SSC members were eligible to participate and vote

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**Agenda Item IV:** Review of GRSC-informed Catch Analysis

**Action:** Presentations, discussions, and recommendations

**Committee input and next steps:** The SSC will review the catch analysis for red snapper developed by the Southeast Fisheries Science Center (SEFSC). This catch analysis uses data from the estimate of absolute abundance generated by the GRSC, and other data as necessary, to generate updated recommendations for the Gulf of Mexico (Gulf) red snapper overfishing limit (OFL) and acceptable biological catch (ABC). The SSC should evaluate the catch analysis, and recommend any modifications as appropriate.

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**Agenda Item V:** Review of the Red Snapper Interim Analysis (NMFS Bottom Longline)

**Action:** Presentations and discussions, and recommendations

**Committee input and next steps:** The SSC will review the interim analysis for red snapper developed by the SEFSC. This interim analysis uses the NMFS Bottom Longline survey as its representative index of relative abundance to generate updated OFL and ABC for Gulf red snapper. The SSC should evaluate the interim analysis, and recommend any modifications as appropriate.

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**Agenda Items IV/V:** Discussion: GRSC-informed Catch Analysis and Red Snapper Interim Analysis

**Action:** Discussions and recommendations

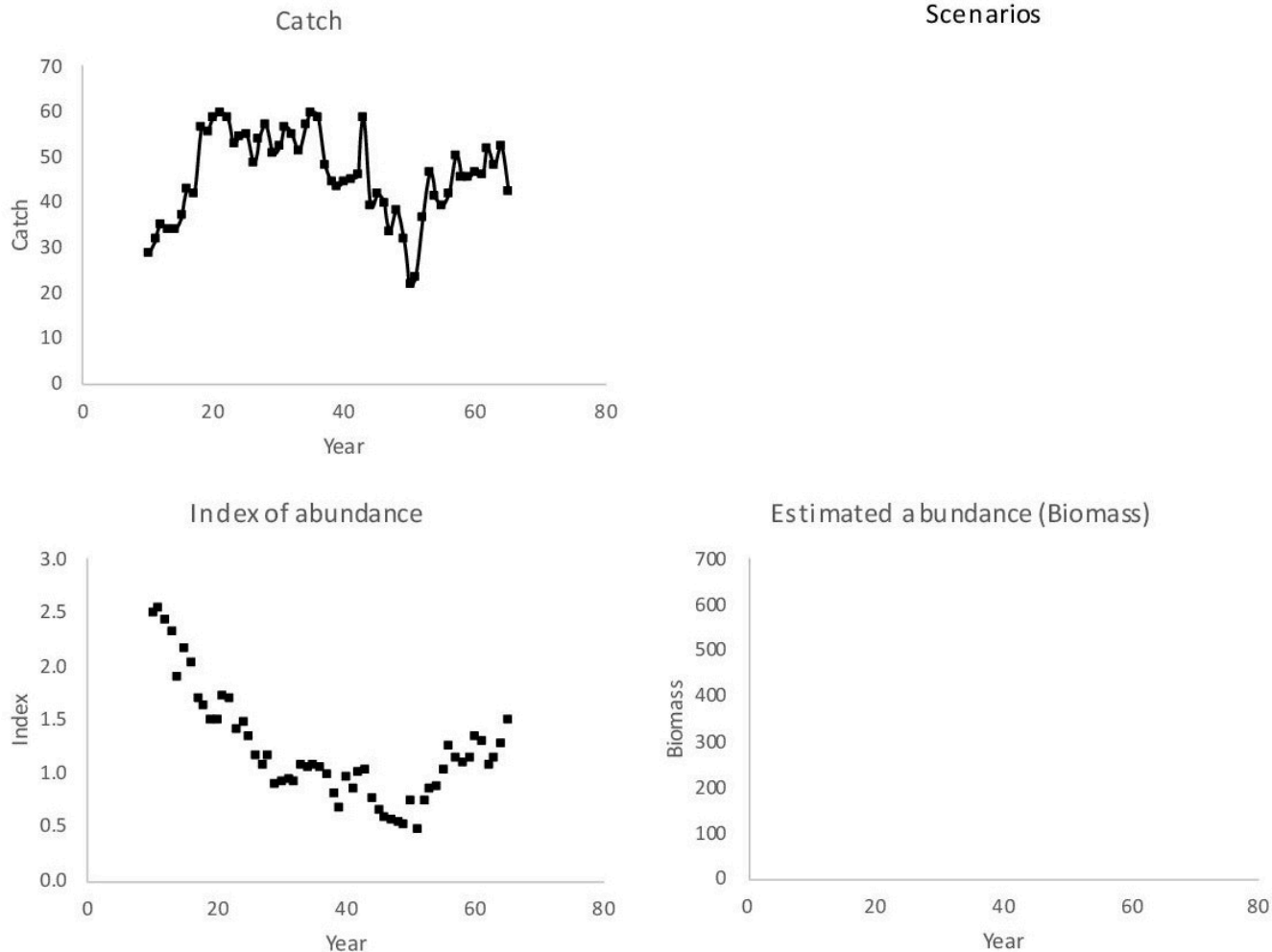
**Committee input and next steps:** The SSC will determine whether the GRSC-informed catch analysis, or the red snapper interim analysis using the NMFS Bottom Longline index, represents the best scientific information available, and whether such is suitable for management advice. If suitable, the SSC will recommend values for the OFL and ABC using the Council's ABC Control Rule or other method.

# The situation we are in

- We have extensive information on the red snapper fishery: historical pattern of depletion and recovery after management intervention, life history information, etc.
- Much of that information is synthesized in the stock assessment
- For the first time, we have an independent estimate of absolute abundance
- An abundance estimate by itself is not sufficient to derive management advice: we need to know what fraction of that abundance represents a sustainable catch
- Much of the relevant information comes from other sources including the stock assessment

# Integrating an absolute abundance estimate

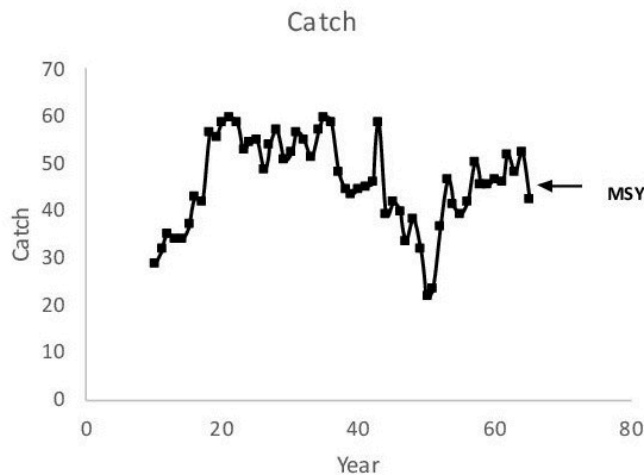
*(For illustration only – not real data)*



(Added for explanation by K. Lorenzen – not SSC graphic)

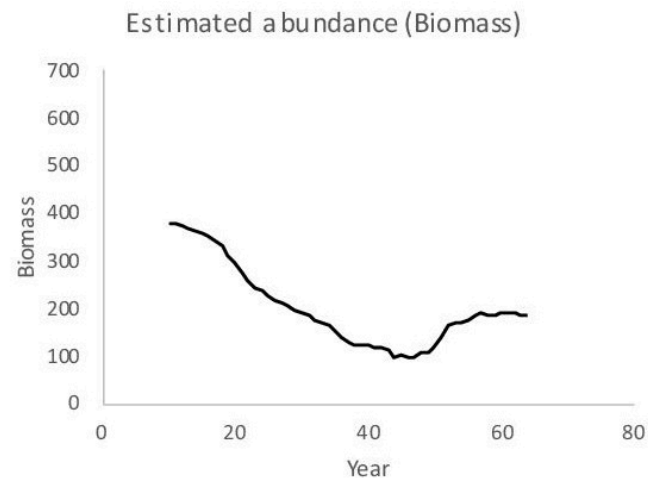
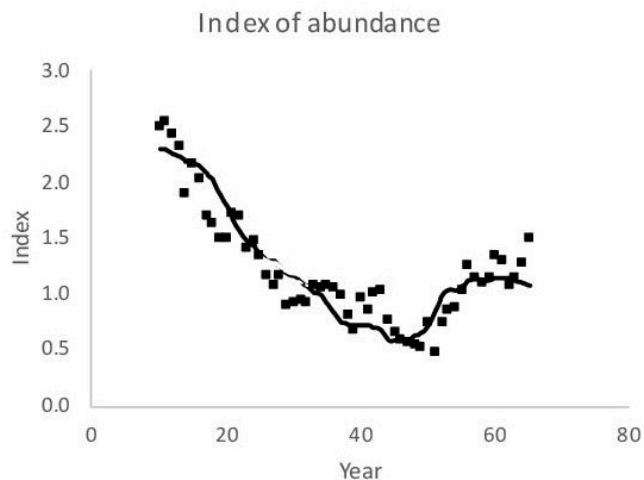
# Integrating an absolute abundance estimate

*(For illustration only – not real data)*



Scenarios

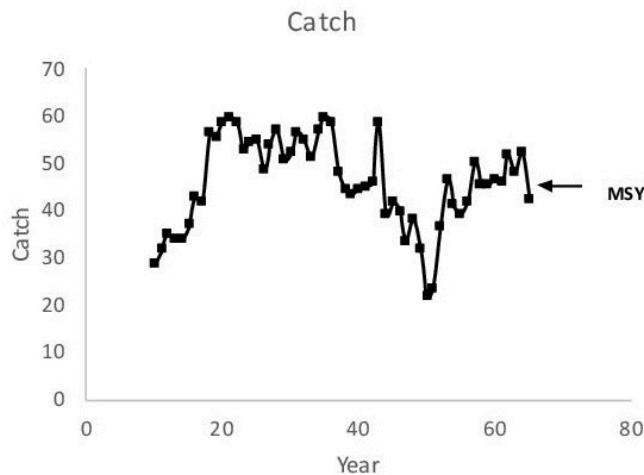
Stock assessment without absolute abundance estimate  
→ low abundance/high productivity stock



(Added for explanation by K. Lorenzen – not SSC graphic)

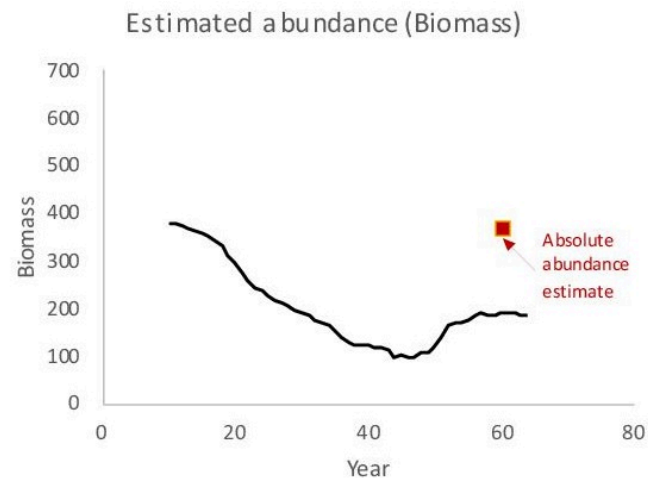
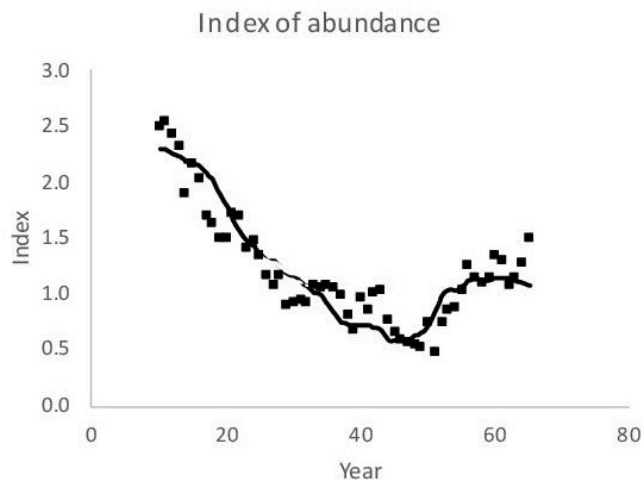
# Integrating an absolute abundance estimate

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Scenarios

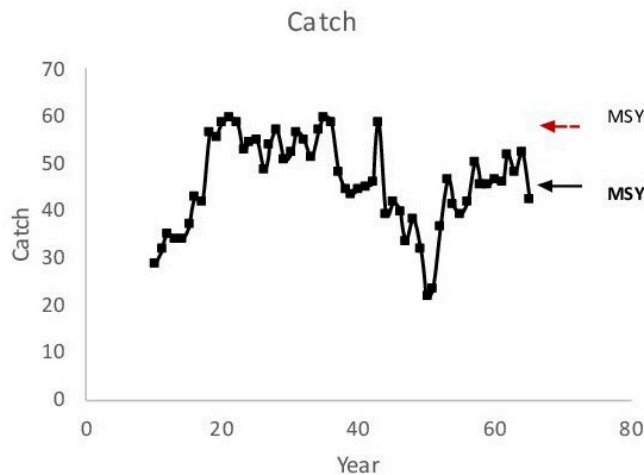
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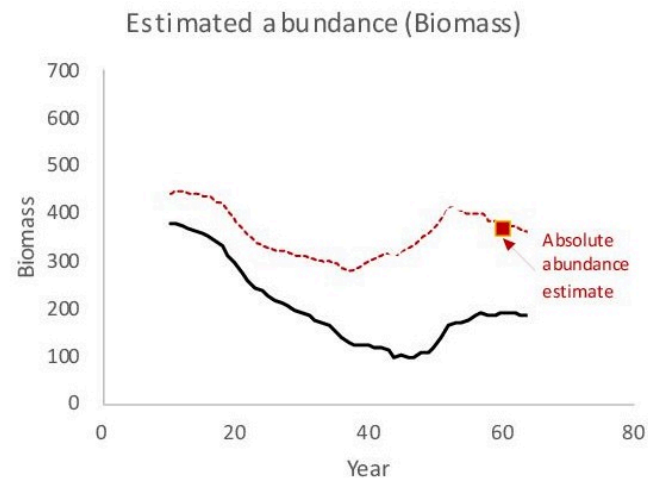
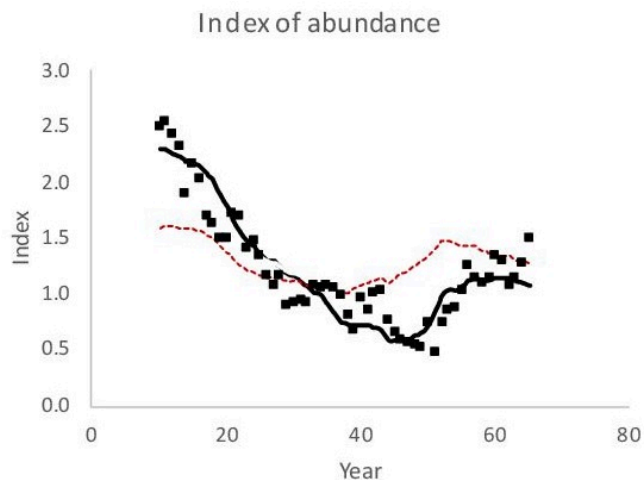
# Integrating an absolute abundance estimate

*(For illustration only – not real data)*



Partial/ad-hoc use of absolute abundance estimate (e.g. adjusting maximum recruitment) (dashed line)

Stock assessment without absolute abundance estimate  
-> low abundance/high productivity stock

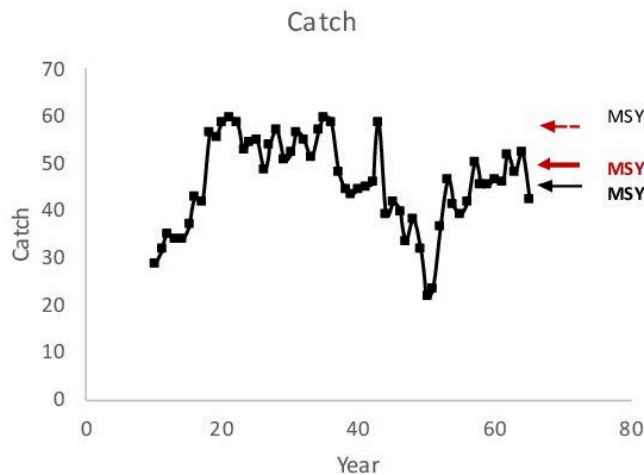


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# Integrating an absolute abundance estimate

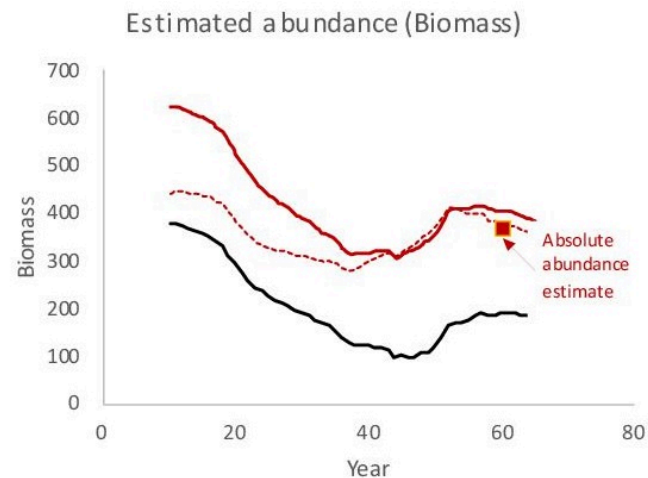
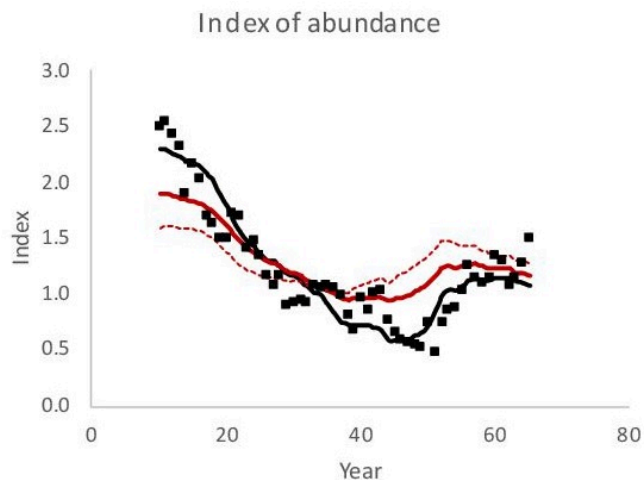
*(For illustration only – not real data)*



Partial/ad-hoc use of absolute abundance estimate (e.g. adjusting maximum recruitment) (dashed line)

Full integration of absolute abundance estimate with new estimates of productivity, fishing mortality, etc. -> high abundance/low productivity stock

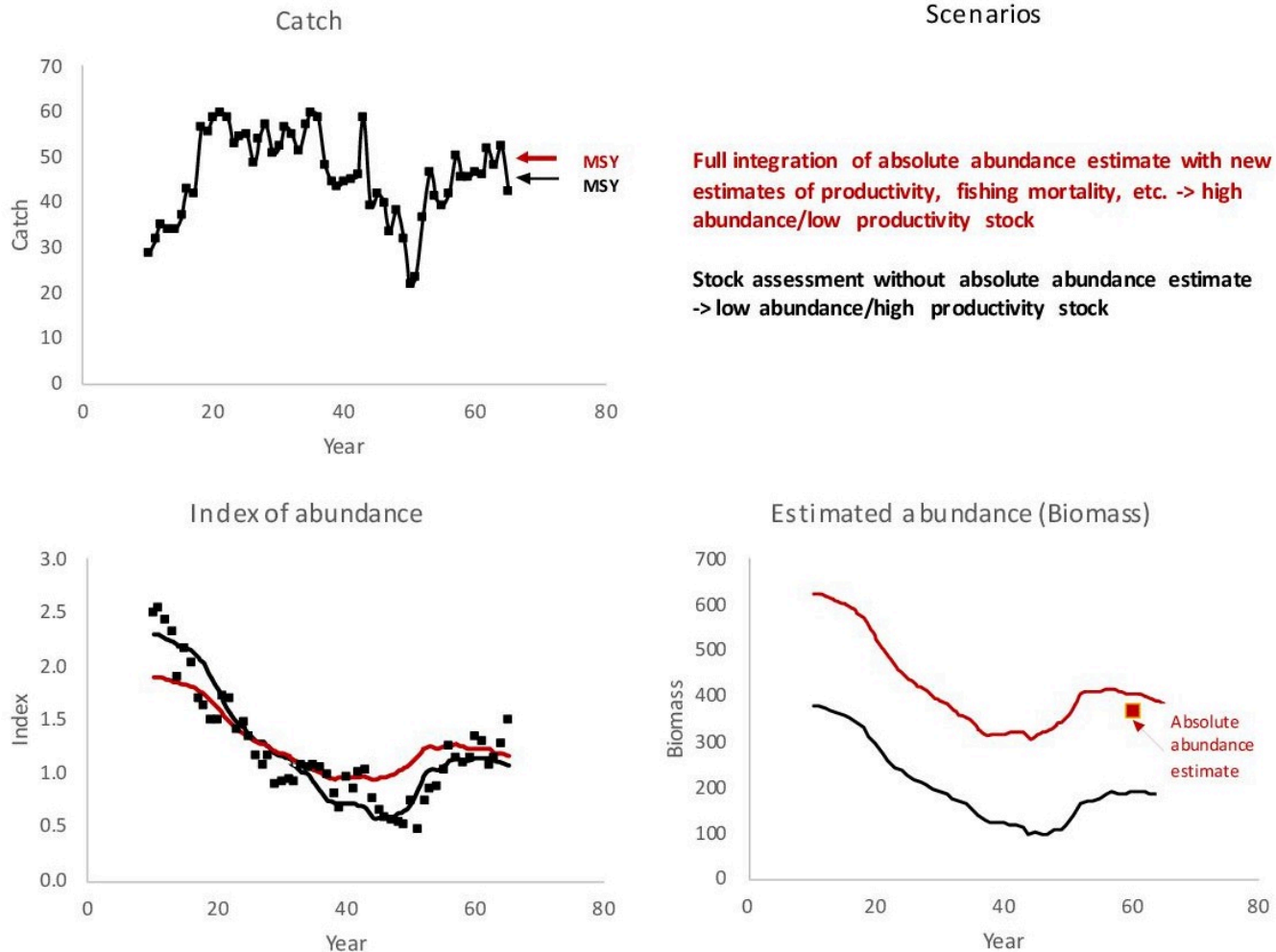
Stock assessment without absolute abundance estimate -> low abundance/high productivity stock



(Added for explanation by K. Lorenzen – not SSC graphic)

# Integrating an absolute abundance estimate

*(For illustration only – not real data)*



(Added for explanation by K. Lorenzen – not SSC graphic)



**NOAA**  
**FISHERIES**

# Catch Advice for the Gulf of Mexico Red Snapper Stock Derived from Estimates of Absolute Abundance Produced as Part of the Great Red Snapper Count

Sustainable Fisheries Division, SEFSC

April 1, 2021



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## Introduction

- SEFSC asked to provide interim catch advice using the new abundance estimates from the GRSC (the traditional approach also available)
- General approach
  - Convert the GRSC estimate of age 2+ into numbers-at-age by region (east/west).
  - Re-estimate fishing mortality rates through spreadsheet projections to estimate F-at-age by region
  - Use numbers-at-age, F-at-age, and mean landed weight-at-age to estimate catch

# Assumptions and implications

- GRSC point estimates of regional abundance are assumed to be correct as reported
- SEDAR 52 estimates correspond to abundance on structure, whereas abundance on UCB represents 'cryptic biomass', previously not quantified in the assessment
- A proportion of the 'cryptic biomass' may be vulnerable to fishing and can be added to the fishable abundance
- Different assumptions can be made about the vulnerable proportion of UCB biomass, necessary adjustment of the FMSY proxy (FSPR26% or FSPR40% ?) in the light of assuming a larger but less productive stock, and many other factors
- The analysis presents calculations based on various assumptions, but the sustainability implications of those assumptions cannot be readily assessed without full integration of GRSC and stock assessment information (or at least, simulation testing of partial/ad hoc integration )

# Catch projections

**% of UCB biomass considered vulnerable**

<b>Year</b>	<b>13%</b>		<b>22%</b>	
	<b>F<sub>SPR26%</sub></b>	<b>F<sub>SPR40%</sub></b>	<b>F<sub>SPR26%</sub></b>	<b>F<sub>SPR40%</sub></b>
2021	25.87	19.62	28.97	21.96
2022	25.44	20.28	28.47	22.69
2023	25.37	20.96	28.40	23.45
2024	25.46	21.57	28.49	24.13
2025	25.60	22.08	28.63	24.69
3 yr. avg. ('21-'23)	25.56	20.28	28.61	22.70
5 yr. avg. ('21-'25)	25.55	20.90	28.59	23.38

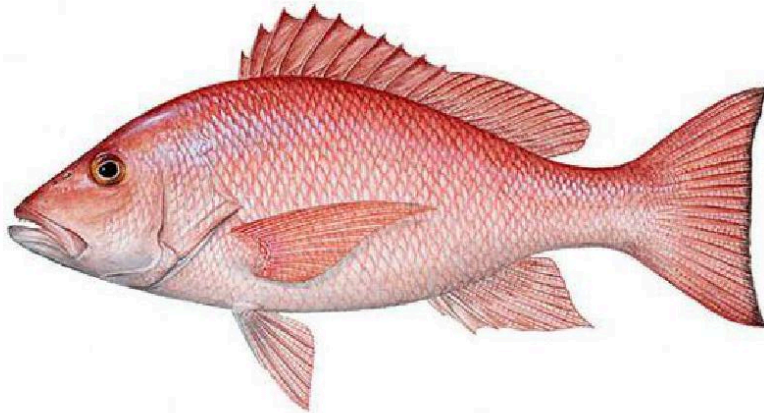




**NOAA**  
**FISHERIES**

# **“Traditional” Interim Assessment of Gulf of Mexico Red Snapper**

Sustainable Fisheries Division, SEFSC



Meeting of the Gulf SSC  
April 1-2, 2020

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## Purpose and need

- Interim assessments (IAs)
  - Occur on regular interval between assessments
  - Allow catch limits to be adjusted based on current stock conditions (e.g., red tide, recruitment failure)
  - Alternative catch advice to the IA including the GRSC\*
- Red snapper
  - Last accepted assessment SEDAR 52 (2018)
  - Catch advice based on SEDAR 52- terminal data year 2016
  - OFL set at 15.5 million pounds whole weight, ABC at 15.1 given constant catch projections
  - Stock was not experiencing overfishing
  - Currently in a rebuilding plan (2032)

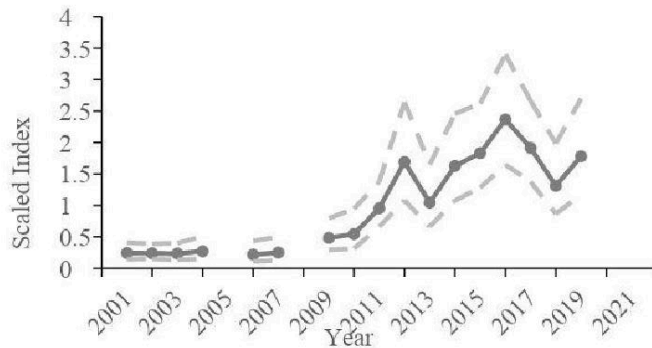
\*The Great Red Snapper Count: Estimating the Absolute Abundance of Age-2+ Red Snapper (*Lutjanus campechanus*) in the U.S. Gulf of Mexico



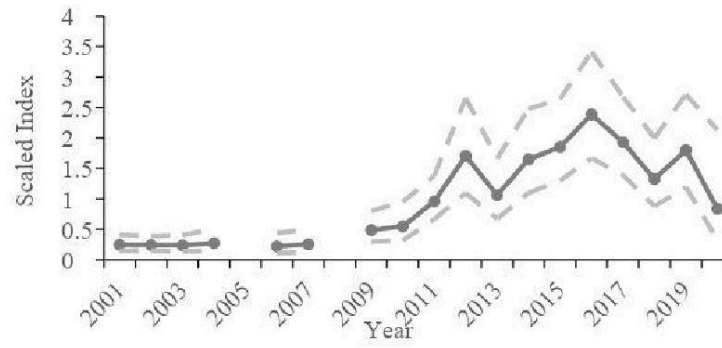


# Indices of abundance – Gulf-wide variants

Terminal Year - 2019



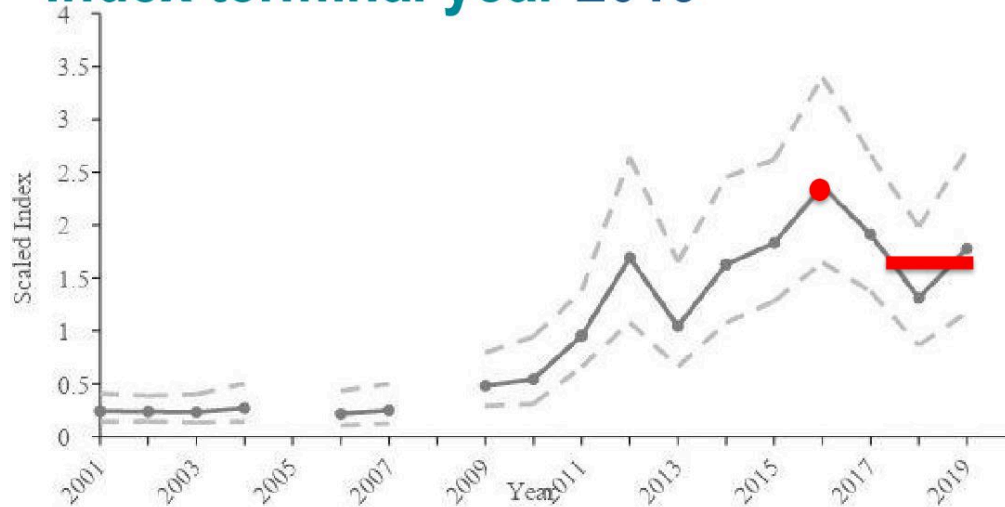
Terminal Year - 2020



- BLL indices generally agree that the highest gulf-wide abundance was in 2016 & has declined since
- Similar trajectories in EGOM with reduced area indicate reduced sampling in 2020 has little effect on abundance estimates in EGOM
- Decline in 2020 index value likely due to no sampling in WGOM in 2020

\* Figures from Pollack 2021

## Adjust current ABC of 15.1\* ( $C_{REF}$ ) Index terminal year 2019



Reference year is 2016, index has decreased since 2015-2017 by a 3-year average of 18% compared to 2017-2019, hence under interim approach  $ABC_{2016}$  decreased by 18%.

- $I_{ref} = \bullet$  ; Recent avg.  $I_k = \text{—}$  ;  $C_{ref} = 15.1^*$
- $I_{ratio} \text{ 3-yr} = 0.82$  ;  $I_{ratio} \text{ 5-yr} = 1.02$
- $C_{ref} \text{ 3-yr adjust} = 12.37^*$  ;  $C_{ref} \text{ 5-yr adjust} = 15.36^*$

\* All weights are in million pounds ww

The image displays three scientific reports and three human head silhouettes, illustrating a process of integration and judgment.

**Reports:**

- Stripper Count:** A report from the Southeast Fisheries Science Center, featuring a large blue arrow and the title "Stripper Count".
- SEDAR Southeast Data, Assessment, and Review:** A report from the Southeast Data, Assessment, and Review (SEDAR) program, featuring a logo and the title "SEDAR Southeast Data, Assessment, and Review".
- Adjust current ABC of 15.1\* (C<sub>REF</sub>) Index terminal year 2019:** A report from the National Oceanic and Atmospheric Administration (NOAA), featuring a line graph and the title "Adjust current ABC of 15.1\* (C<sub>REF</sub>) Index terminal year 2019".

**Human Head Silhouettes:**

- Three human head silhouettes are shown, each with a circular arrow indicating a process of "Integration Judgement".
- The silhouettes are labeled "SSC" and "Integration Judgement".

A large blue arrow curves from the reports towards the silhouettes, suggesting a flow of information or a process of integration.

(Added for explanation by K. Lorenzen – not SSC graphic)

# OFL and ABC determination

Year	13%		22%	
	F <sub>SPR26%</sub>	F <sub>SPR40%</sub>	F <sub>SPR26%</sub>	F <sub>SPR40%</sub>
2021	25.87	19.62	28.97	21.96
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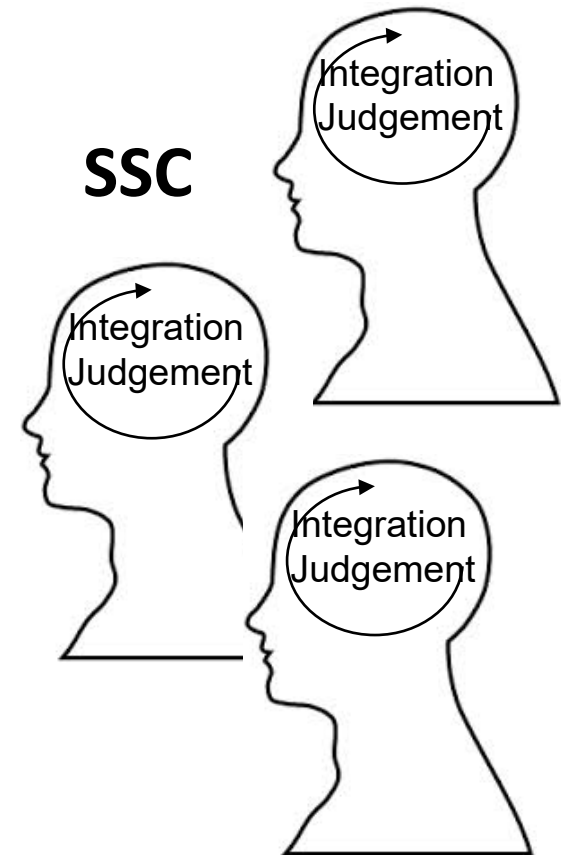
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**ABC**



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# OFL and ABC motions

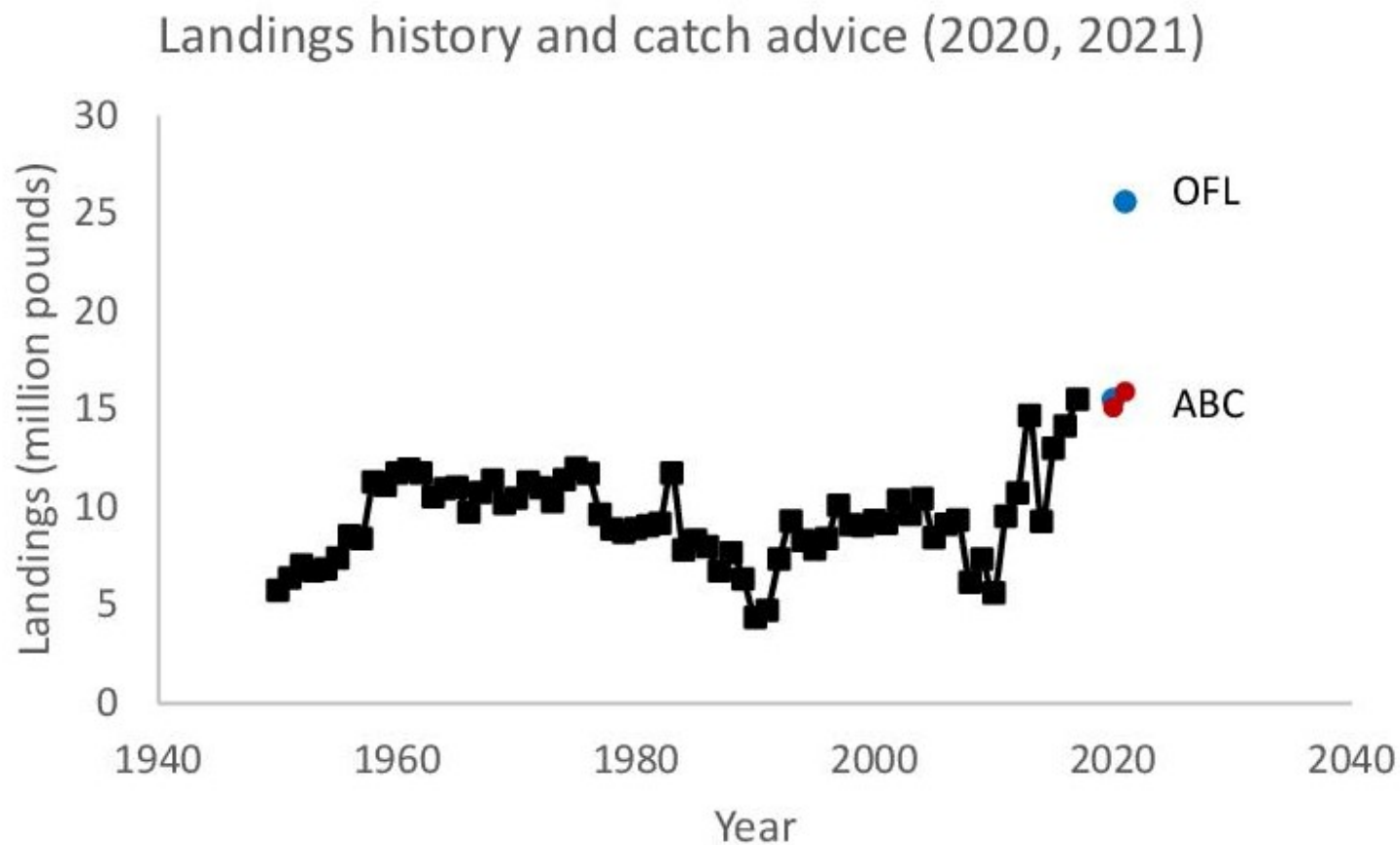
**Substitute Motion:** The SSC defines the OFL for Gulf of Mexico red snapper for 2021 as 25.6 mp ww in CHTS units based on the GRSC interim analysis, using 13% of the UCB, and using a three-year average at  $F_{\text{SPR}26\%}$  on the structured bottom representing the exploited fishery.

*Substitute motion carried 13 – 8 with 2 abstentions and 1 absent*

**Motion:** The SSC defines the ABC for Gulf of Mexico red snapper for 2021 as 15.4 mp ww in CHTS units based on the SEFSC Interim Analysis informed by the NMFS BLL survey (based on terminal year 2019, and the HCR 5-year moving average).

*Motion carried 11-10 with 1 abstention and 2 absent.*

# 2021 OFL and ABC in context



(Added for explanation by K. Lorenzen – not SSC graphic)

# Perspective

- This is only the prelude to using the GRSC information in management – the first chapter is waiting to be written
- GRSC information is already being integrated into the SEDAR 74 research track assessment, leading to the **full integration** required for management advice
- This will help identify new management options that may increase catches sustainably