NOAA FISHERIES

SEFSC

Gulf Fisheries Branch

Interim Analysis Recommendations

GMFMC SSC Meeting

July 19-20, 2023

Request from the SSC

- Provide a presentation about interim analyses including discussions about the following:
  - General IA overview
  - Timing of index processing
    - Discuss the delivery dates and timing of the fishery-independent index processing compared to the delivery date of the IA.
  - Catch advice changes
    - Overfishing limit (OFL)
    - Acceptable biological catch (ABC)
  - Time limits on using IAs for catch advice X number of years after the terminal year of the stock assessment
  - What is a health check versus updated catch advice?

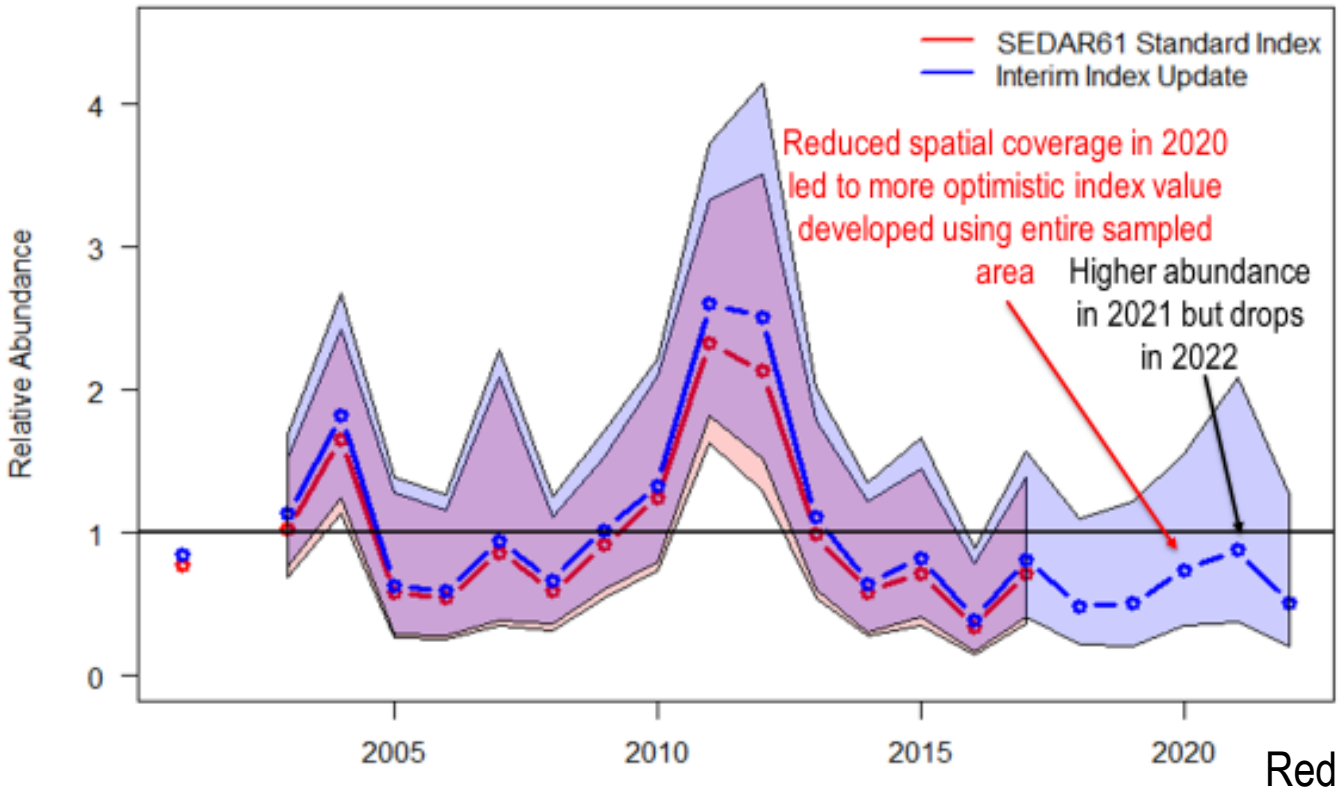
IA advantages over traditional projections

- Traditional projections use approximated catch data in the years immediately following the assessment, and project the assessment dynamics into the future at a fixed fishing mortality (assumed uncertainty around key quantities)
- Interim Analyses use the updated index of relative abundance (generally) to modify the catch advice provided in the year immediately following the assessment (no assumed data)
- IA uncertainty < projection uncertainty if the index is a good measure of stock abundance.

Uncertainty clearly defined, and is recalculated for each year of the index

Updated bottom longline index

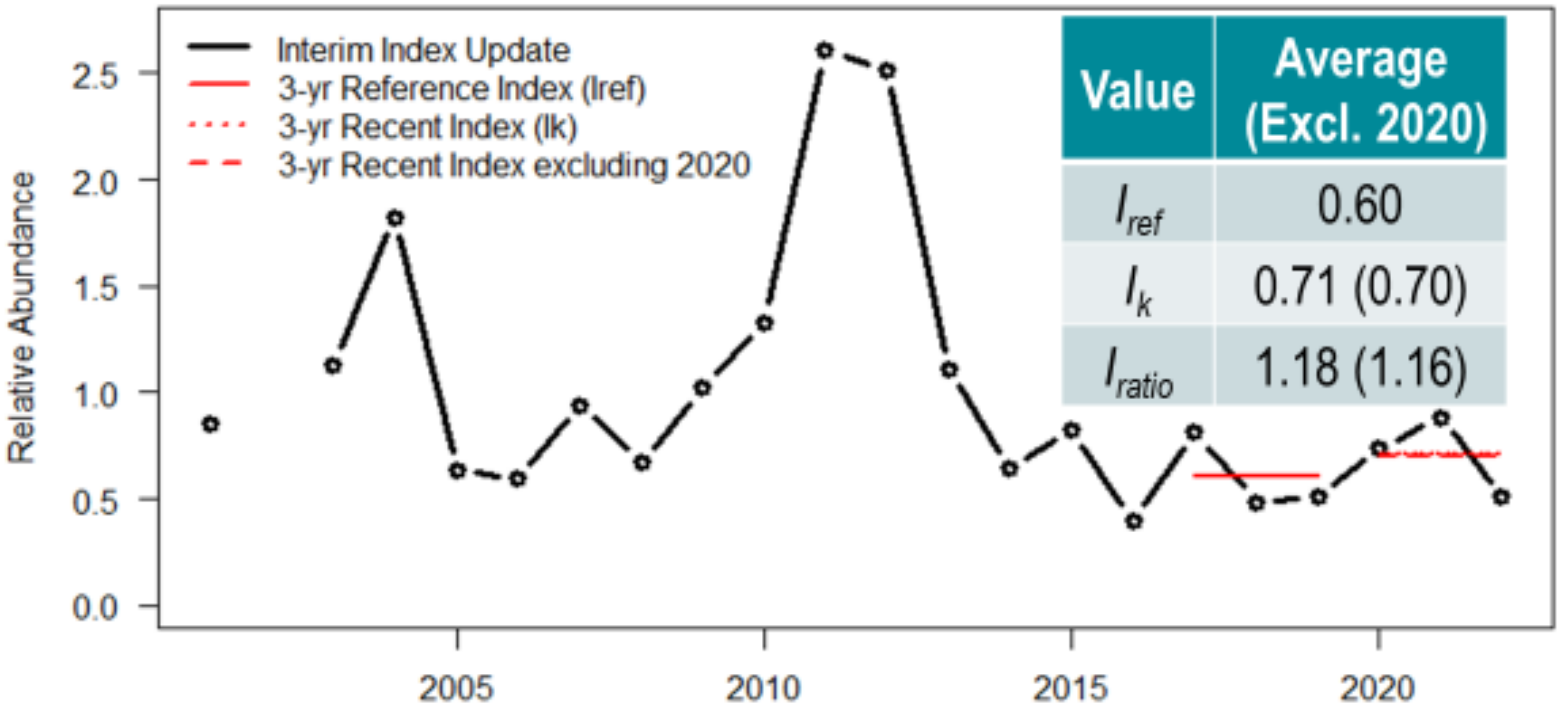
Index shown is for the entire Eastern Gulf



Red Grouper example

Buffers or averages incorporate index variability

Adjust ABC* using 3-year average



Value	Average (Excl. 2020)
I_{ref}	0.60
I_k	0.71 (0.70)
I_{ratio}	1.18 (1.16)

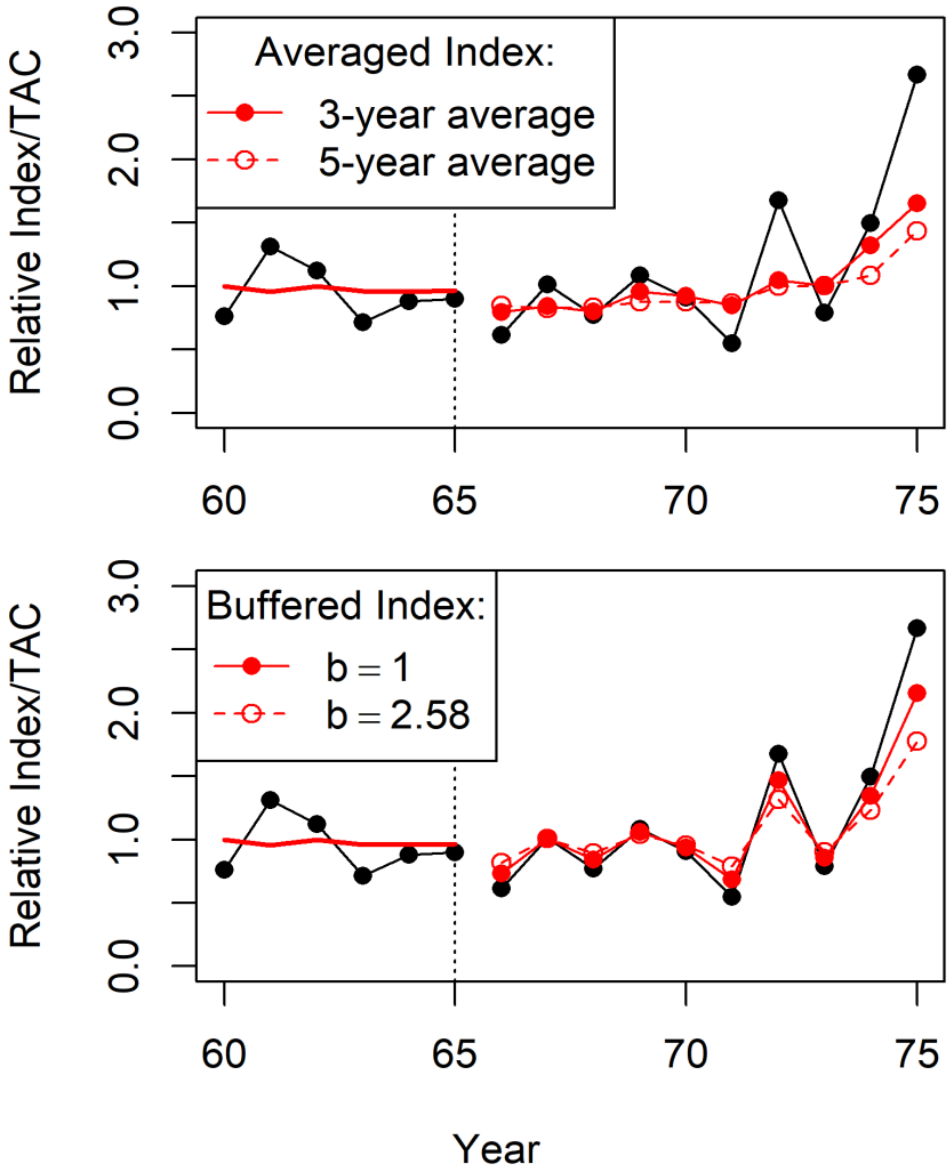
*C_{ref} = 5.57 million pounds gutted weight

C_{ref} 3-yr adjust = 6.58 or 6.45 (exclude 2020 from recent mean) million pounds gutted weight

Red Grouper example

Do we recommend a buffer or a number of years to average an index?

- Consider index noise, the life history of the fish, when the species recruit to the fishery, and/or the size/age composition of the survey.
- Is stable catch advice a management goal?
  - Choose longer averages or larger buffers on the index.
- Is quick response to highs or lows or episodic mortality a management goal?
  - Choose averages over fewer years or a smaller buffer on the index.



Which indices and how to decide?

- Fishery-independent indices are expected to track abundance better than fishery-dependent indices (Headboat used for iTarget method for Lane Snapper)
- Determine whether the index represents fishable biomass and the uncertainty of the indices being considered.
- (Relatively recent) Stock Synthesis diagnostic tests can show the predictive power of each index within the stock assessment.

Which indices and how to decide?

- Examples of Indices:
- SEAMAP surveys
  - Trawl
    - Plankton/larval
    - Groundfish
  - Bottom longline
- GFISHER – combined video indices from Pascagoula, Panama City, and FWC
  - If one video index has longer processing times, it affects the combined index delivery date.
- What do we do when there are absent or sparse years (KMK example)?
  - Judgement call when there is no best practice based on sample sizes and historical encounter rates.

The SEFSC would ideally test the use of each index in an MSE to determine which is most appropriate, but time has not allowed for that work.

Which species and which terminal years?

Special issues come up at the Council that can throw off the schedule

Last Updated: March 7, 2023				
Year	**Species**	**Index**	**Terminal Year:**	**Delivery Date:**
2023	1- Red Grouper*	NMFS BLL	2022	January 2023
	2- Gag	Truncated GFISHER	2021	September 2023
	3- Lane Snapper	Headboat CPUE	2022	September 2023
	4- Vermilion Snapper	Combined Video	2021	September 2023
2024	1- Red Grouper*	NMFS BLL	2023	January 2024
	2- Gray Triggerfish*	Combined Video	2022	September 2024
	3- Greater Amberjack*	Combined Video	2022	September 2024
	4- King Mackerel	?	?	?
2025	1- Lane Snapper	Headboat CPUE	2024	September 2025
	2- Vermilion Snapper	Combined Video	2023	September 2025
	3- Greater Amberjack*	Combined Video	2023	September 2025
	4- Gag	Truncated GFISHER	2023	September 2025
2026	1- Red Grouper	NMFS BLL	2025	January 2026
	2- Cobia	?	?	?
	3- Greater Amberjack*	Combined Video	2024	September 2026
	4- King Mackerel*	?	?	?

* Interim analyses for these species are considered "health checks", until the stock assessment upon which the IA is based has been used in the implementation of revised catch advice by the Council.

Updates to the timing of index processing

- SEAMAP reef fish video survey design ended in 2019.
- We moved to the GFISHER design in 2020; however:
  - COVID prevented western Gulf NOAA surveys in 2020
  - FWC sampled the eastern GOM
- In 2021, GFISHER design conducted Gulf-wide
- GFISHER has a separate artificial reef design
  - Western Gulf artificial data first collected in 2021
- Partnerships improve the survey, but may limit the expected video reading rate (previous year completed ~summer to early Fall of the following year).
  - Additional time is needed to standardize the index.

How long do we recommend using IAs?

- There is a potential to put off an assessment if the index isn't showing a clear trend in either direction (which may be fine).
  - If the species is in a rebuilding plan, only an assessment can update status.
  - IAs cannot necessarily detect range shifts or explain the trends we see in indices.
  - More problematic for species that experience episodic mortality (e.g. red tide).
  - A full assessment is needed to track what the age structure is doing in the stock or to change an assumption about selectivity/retention.

How long do we recommend using IAs?

- How many years of decreasing trend would concern us?
  - What level of averaging or buffering is warranted given the species life history or the "representativeness" of the index?
- What are the other options? Is it being used, or does it assist in monitoring status or stock health?

OFL vs. ABC advice?

- We can update OFL using the same I_{ratio} as is used for ABC
  - When/if we do so, we are assuming the F_{msy} is steady. Only biomass has changed.

- From the NS1 guidance document, "*Index-based approaches lack a population production function and thus can not provide MSY reference points. The performance of the biomass dynamics approach depends upon the time series being informative about what biomass level produces maximum stock productivity; whereas the index based methods treat the index solely as an indicator of change in stock abundance without expectation of detecting the MSY points, and without ability to measure the current level of the stock relative to B_{MSY}. Trend data can be used to adjust management to keep a stock near its current abundance (e.g. the ABC approach), but using indices of abundance as an indicator to compare to a SDC is dependent on defining a suitable reference point for comparison to the current index value in order to meet management objectives*."

Do we support health checks?

- Health checks require the same amount of work as an IA used to update catch advice:
  - Coordination by GFB to get the index, which may include DAAS, FSD, FATES, FWRI and/or PEM (different branches and/or divisions at the SEFSC)
  - Potential issues with indices are discussed, reminders sent, etc.
  - Staff time to develop index or indices
  - Ultimate goal to update indices on our (or a) website
  - Staff time to run the IA, write up results, and make a presentation.
- We encourage updated catch advice rather than a simple health check, but health checks can help prioritize assessments as well as raise the red flag if there are complex results (e.g., KMK).

Put it all in perspective

- The SEFSC cannot assess every species of interest to the Council every year, so IAs provide a viable alternative.
- It takes a long time to use the catch advice from an IA, but the Council is working on streamlining the actions.
  - May still require advice remain within a certain range in order to not need full rulemaking.
- Within the SEFSC, we would like to complete automation work that would make updates more of a possibility.
  - Life history data are still quite a data bottleneck for automation efforts.
- There are automation gains spotting Red Snapper in the videos, but progress on other species ID has yet to occur.

Questions?