A historical look at scientific uncertainty in the Gulf of Mexico fishery stock assessment process:

Are we underestimating scientific uncertainty?

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Ocean Conservancy

Motivation

- Large discrepancies between projected quotas and landings for several stocks in the Gulf of Mexico including Cobia, Greater Amberjack, and both Red and Gag grouper

- The magnitude of those discrepancies suggests the quota setting process is underestimating scientific or management uncertainties

- Provide some perspective on uncertainty by taking a historical look at stock assessment projections across all species

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Research Paper

Retrospective investigation of assessment uncertainty for fish stocks off southeast Australia

Andre E. Punt[a,b,*], Jemery Day[a], Gavin Fay[c], Malcolm Haddon[a], Neil Klaer[d,a], L. Richard Little[a], Kristin Privitera-Johnson[b], Anthony D.M. Smith[a,d], David C. Smith[a], Miriana Sporcic[a], Robin Thomson[a], Geoffrey N. Tuck[a], Judy Upston[a], Sally Wayte[e]

Ralston, S., Punt, A. E., Hamel, O. S., DeVore, J. D., & Conser, R. J. (2011). **A meta-analytic approach to quantifying scientific uncertainty in stock assessments.** *Fishery Bulletin*, *109*(2).

- This **is not** a criticism of our stock assessments nor our assessment scientists
  - Assessment advice is applied with an unrealistic expectation of certainty

- This **is** an agnostic and empirical look across historical assessments to measure uncertainty in the OFLs over time

Methods

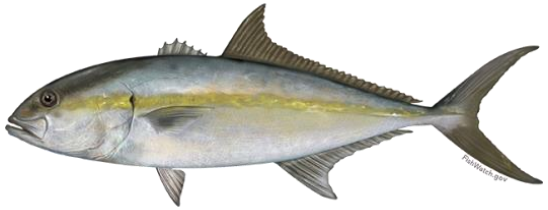
- Collated historical stock assessment and quota for all of the assessed stock in the Gulf of Mexico
- Qualitative look across assessments to identify discrepancies and/or patterns in projections across stocks
- Quantitative comparison of the projected OFLs over time

Results

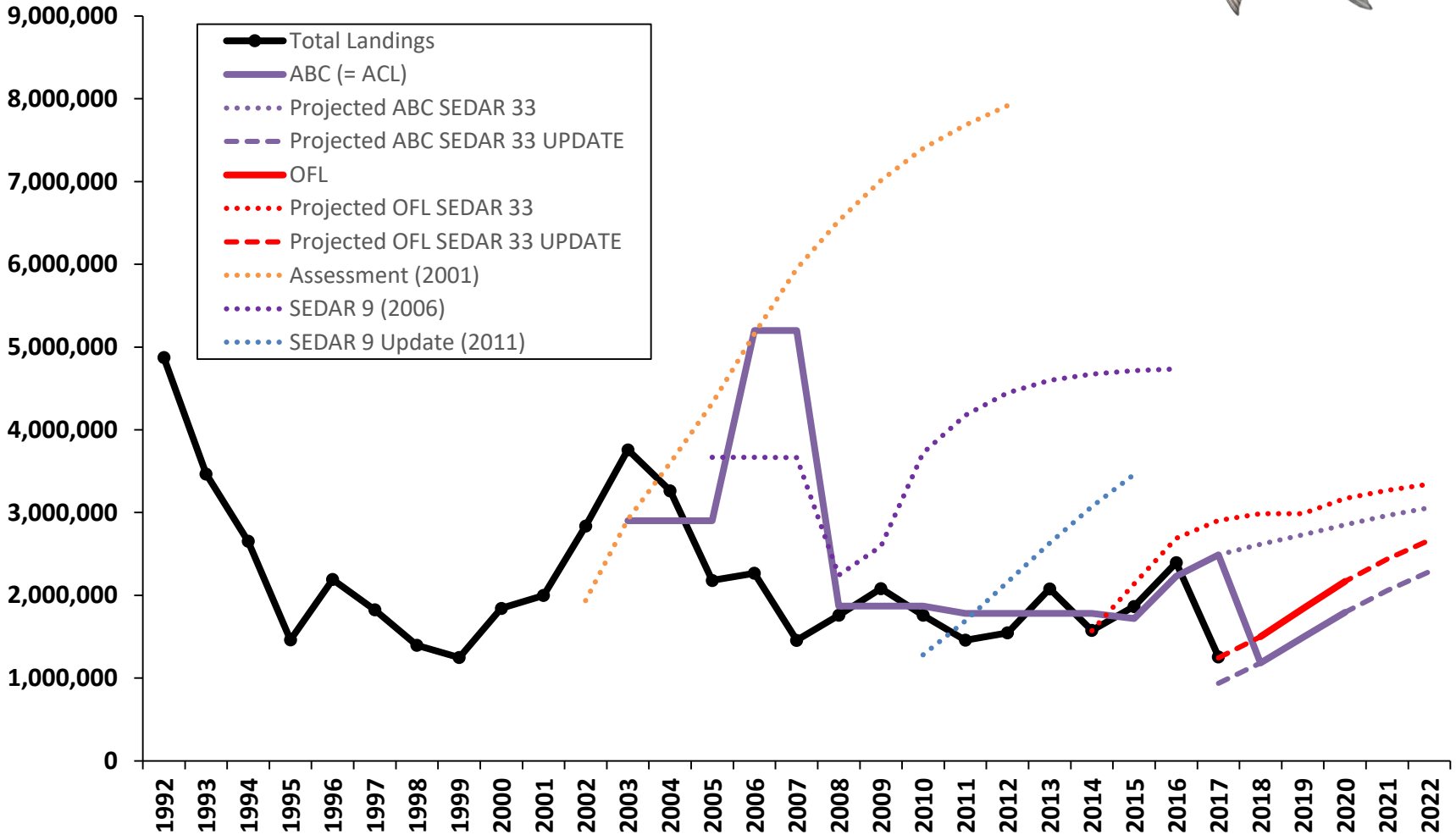
- Strong spikes in the projected yield streams for some stocks starting around 2015

- Differences in the OFL projections over time are much larger than currently applied ABC buffers

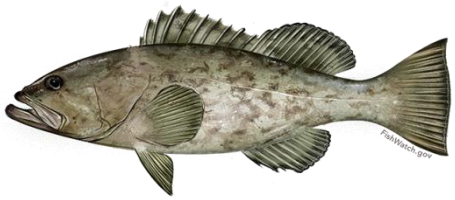
Projected yield spikes

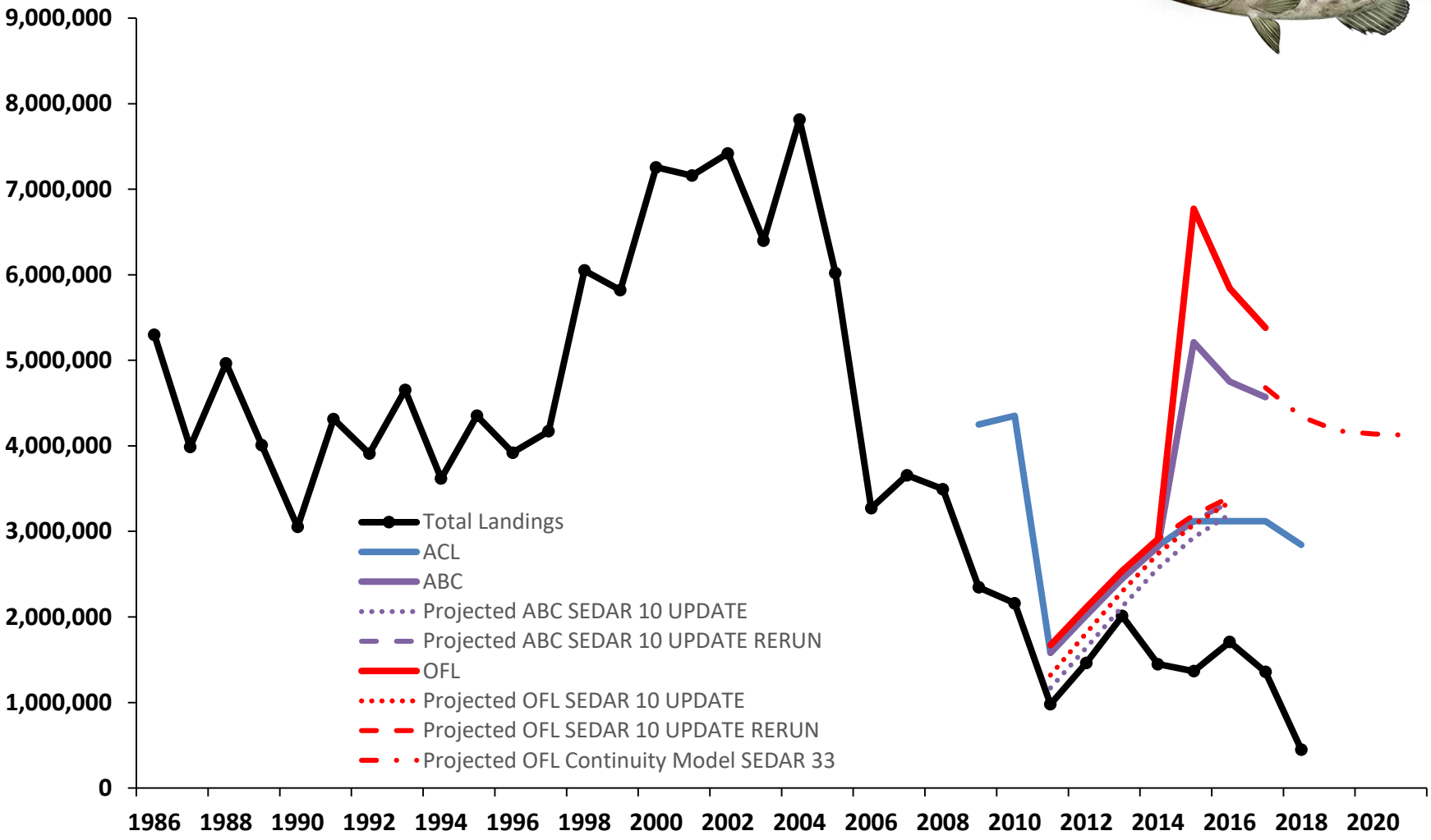


Greater Amberjack



Gag Grouper

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ABC
Projected ABC SEDAR 10 UPDATE
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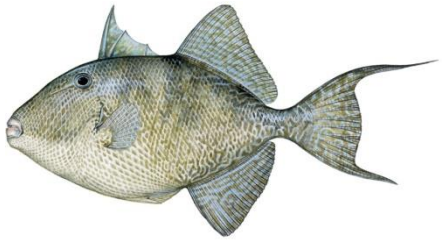
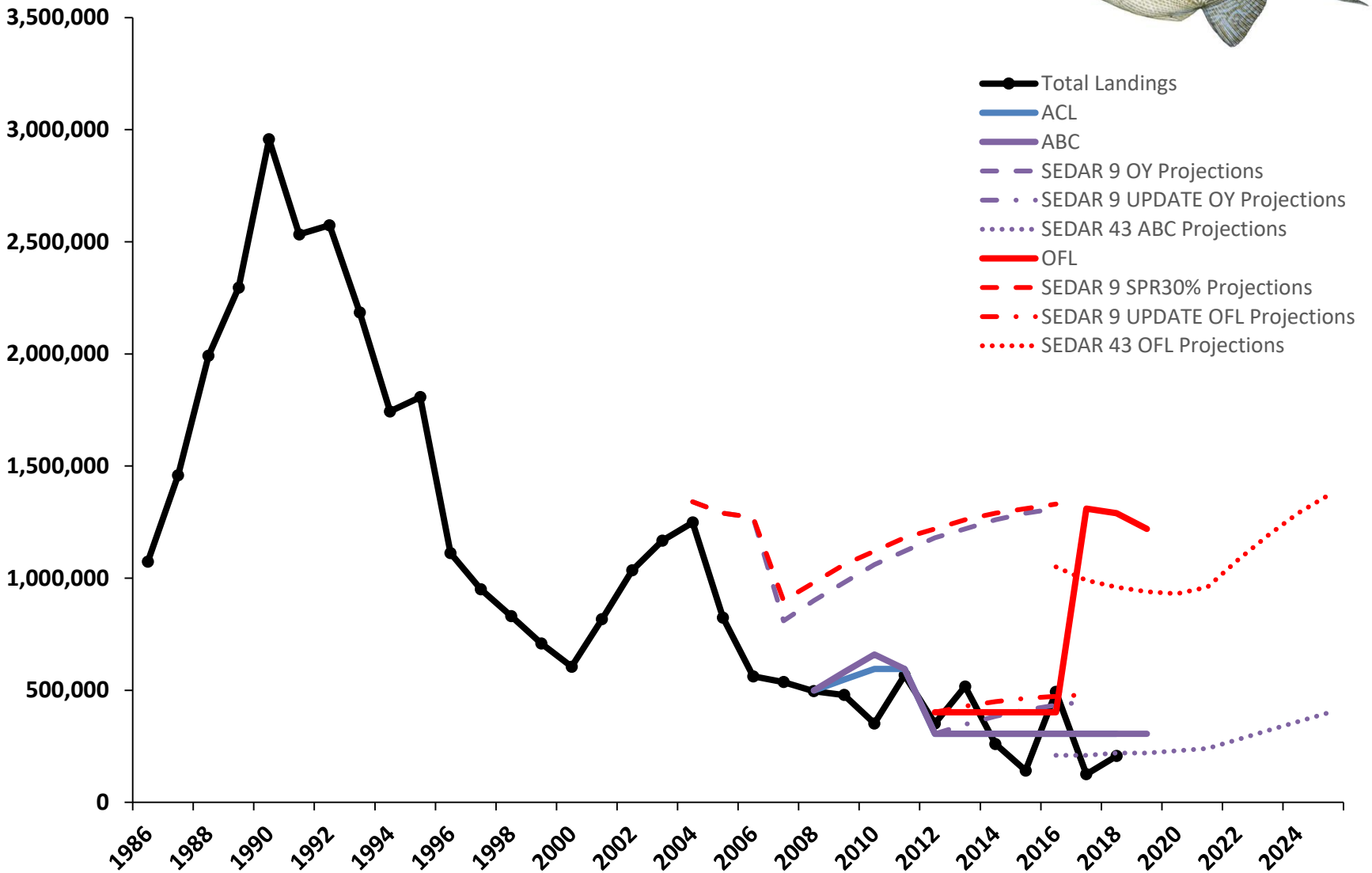
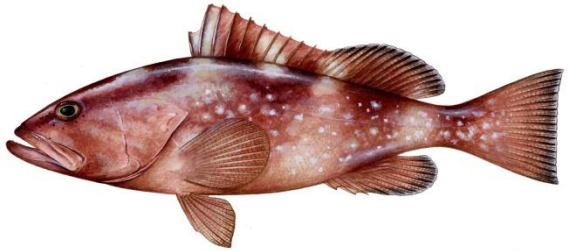
OFL
Projected OFL SEDAR 10 UPDATE
Projected OFL SEDAR 10 UPDATE RERUN
Projected OFL Continuity Model SEDAR 33

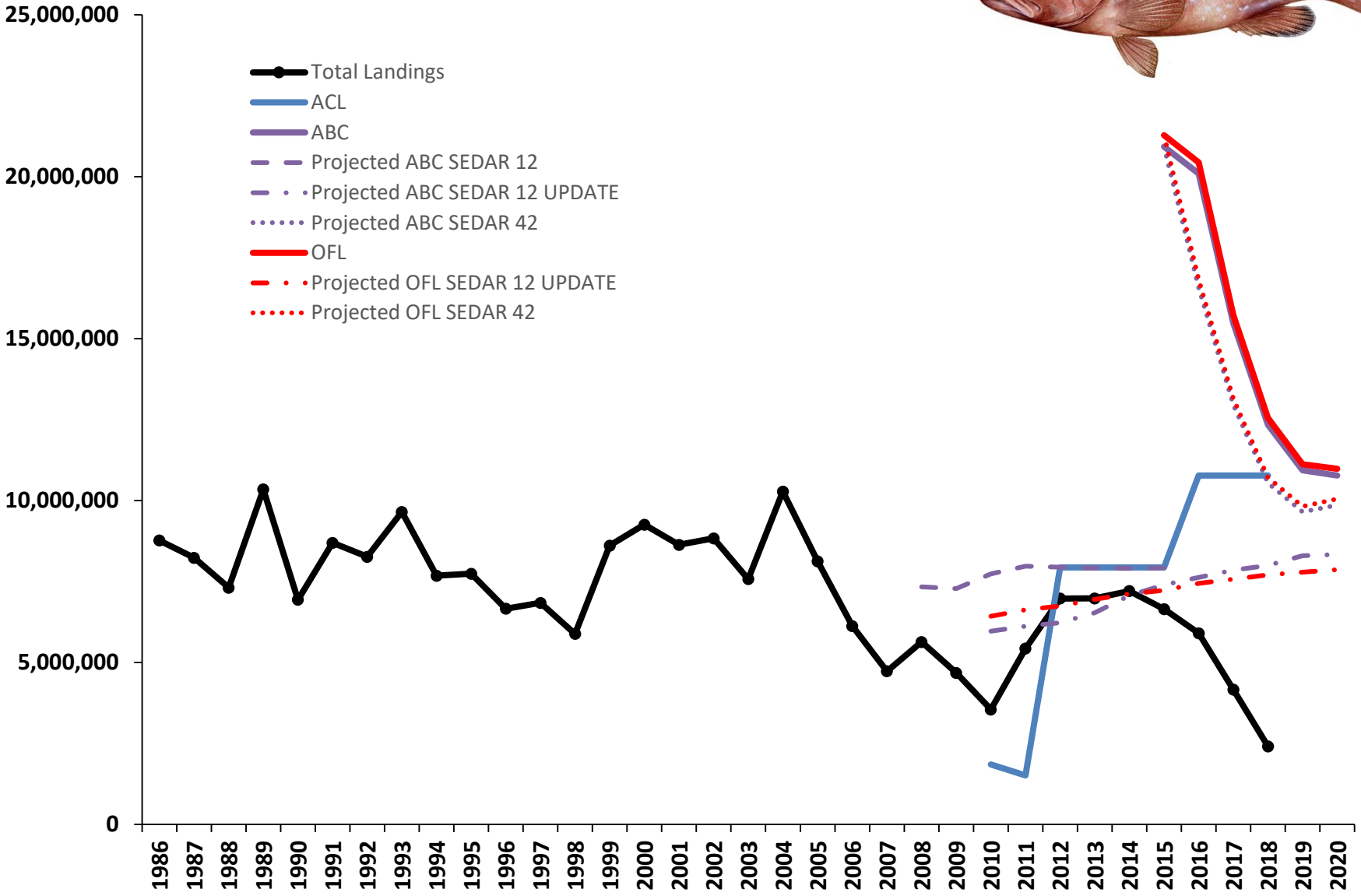
Gray Triggerfish





Red Grouper

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Total Landings
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Projected ABC SEDAR 12 UPDATE
Projected ABC SEDAR 42
OFL
Projected OFL SEDAR 12 UPDATE
Projected OFL SEDAR 42
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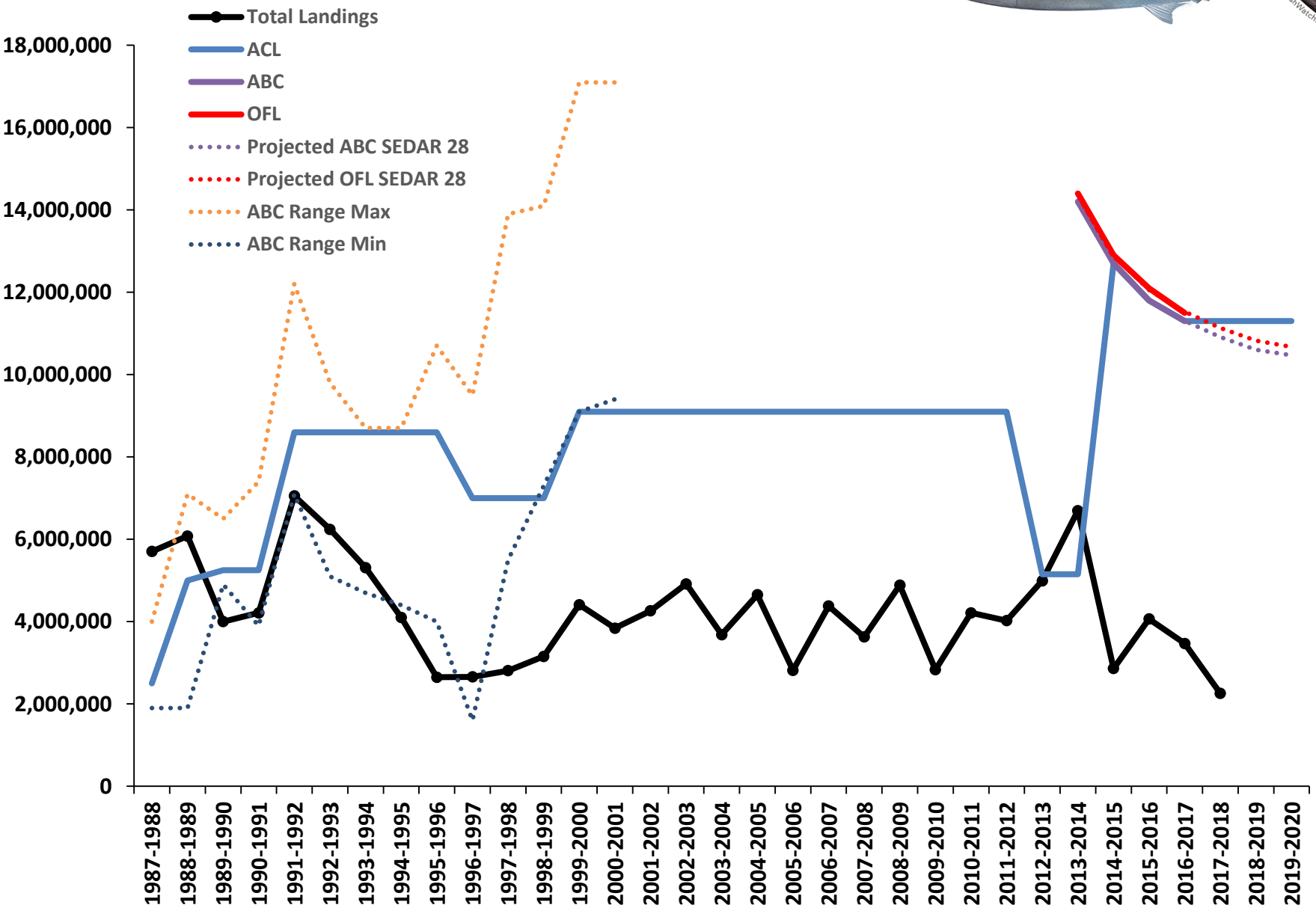
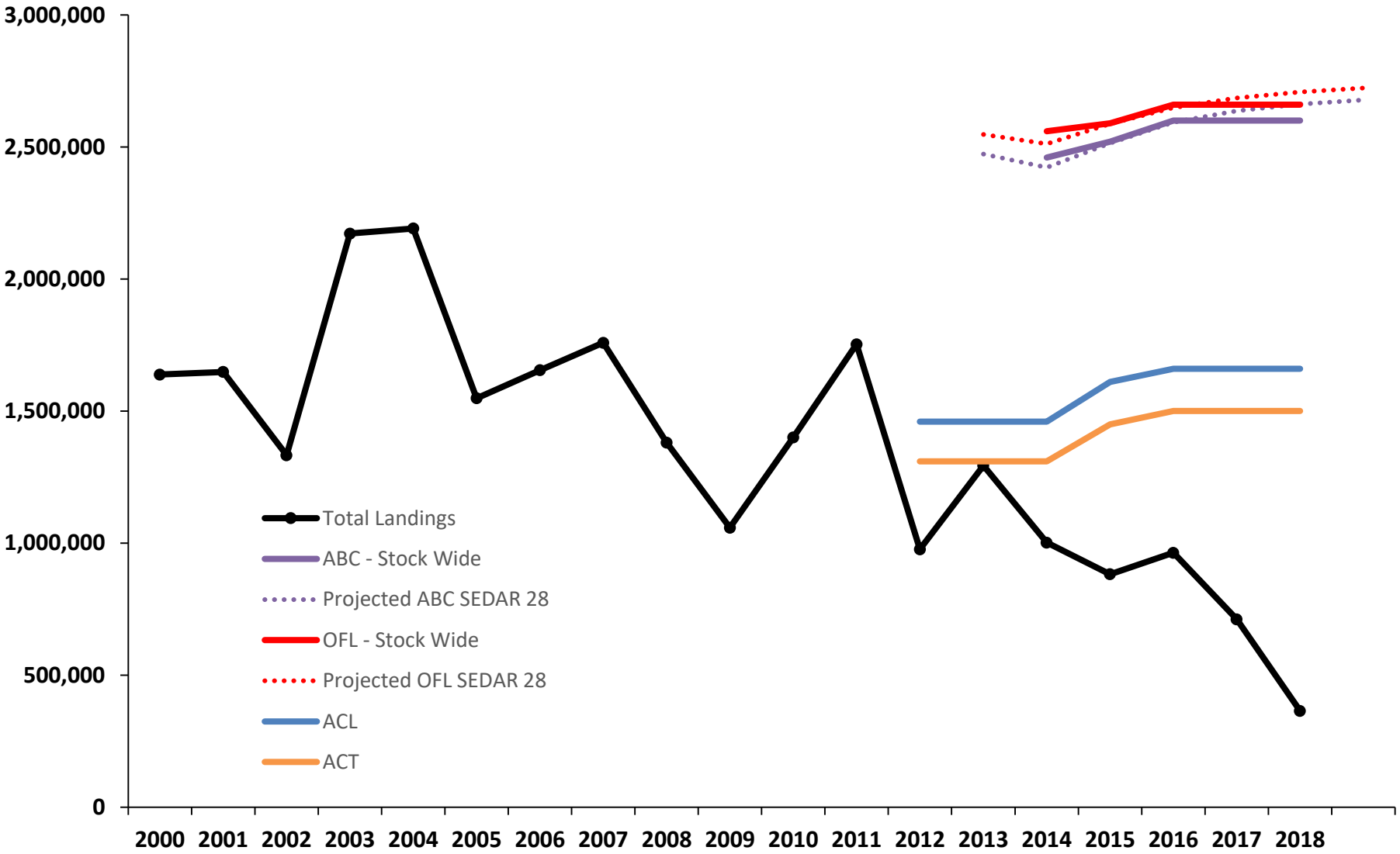
2020

Gulf Group Spanish Mackerel



Cobia

FishWatch.gov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1,000,000
500,000
0
2000
2001
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2005
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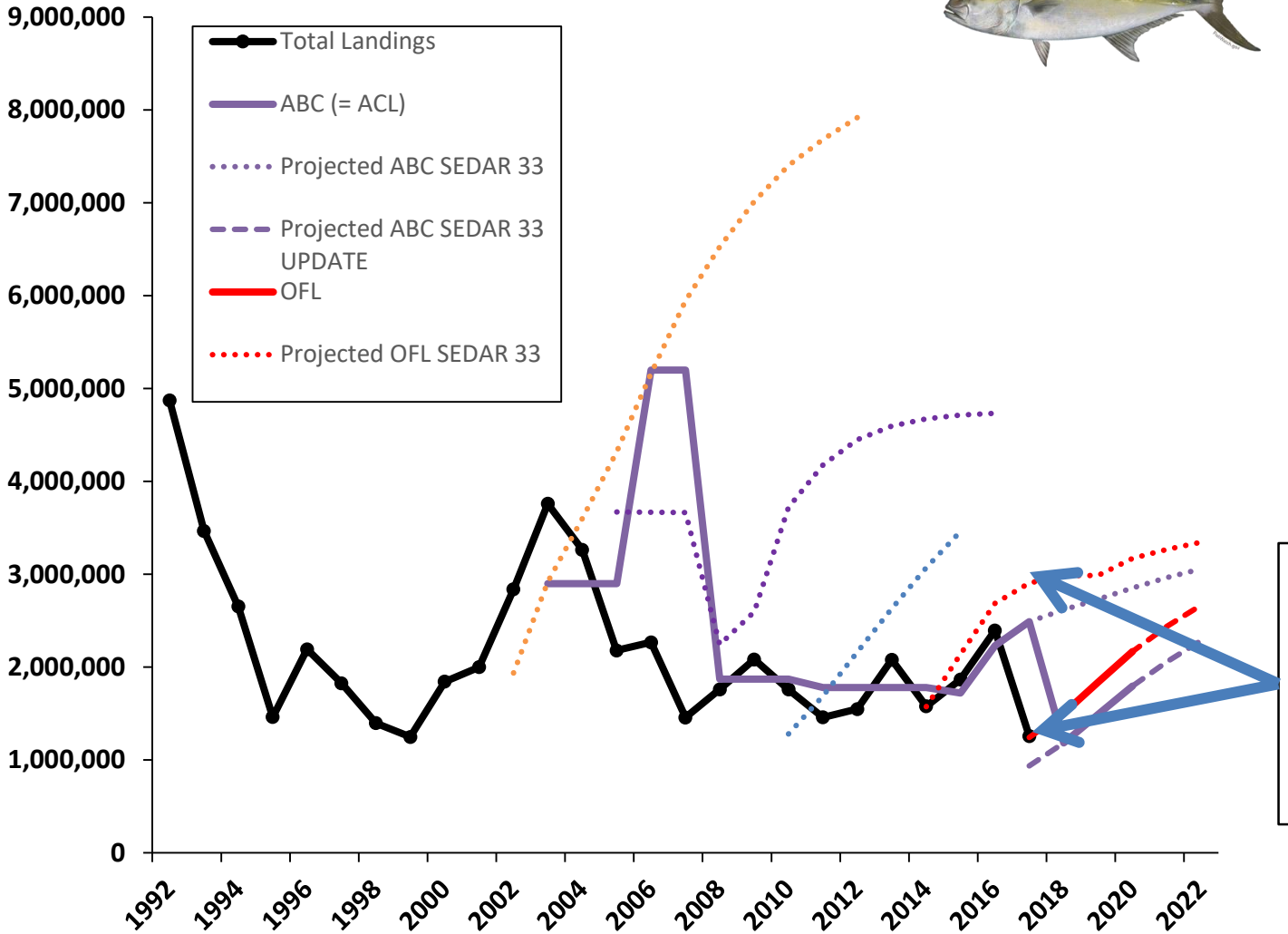
2014
2015
2016
2017
2018
Total Landings
ABC - Stock Wide
Projected ABC SEDAR 28
OFL - Stock Wide
Projected OFL SEDAR 28
ACL
ACT

Yield spike results

- Five stocks with recent inflated yield streams relative to landings
  - Cobia, Gag, Gray triggerfish, Red Grouper, Spanish Mackerel
- Most due to apparent spike in yield streams
- Yield stream spikes are interrelated to the issue of estimating uncertainty in the OFL

Historical uncertainty in the OFLs

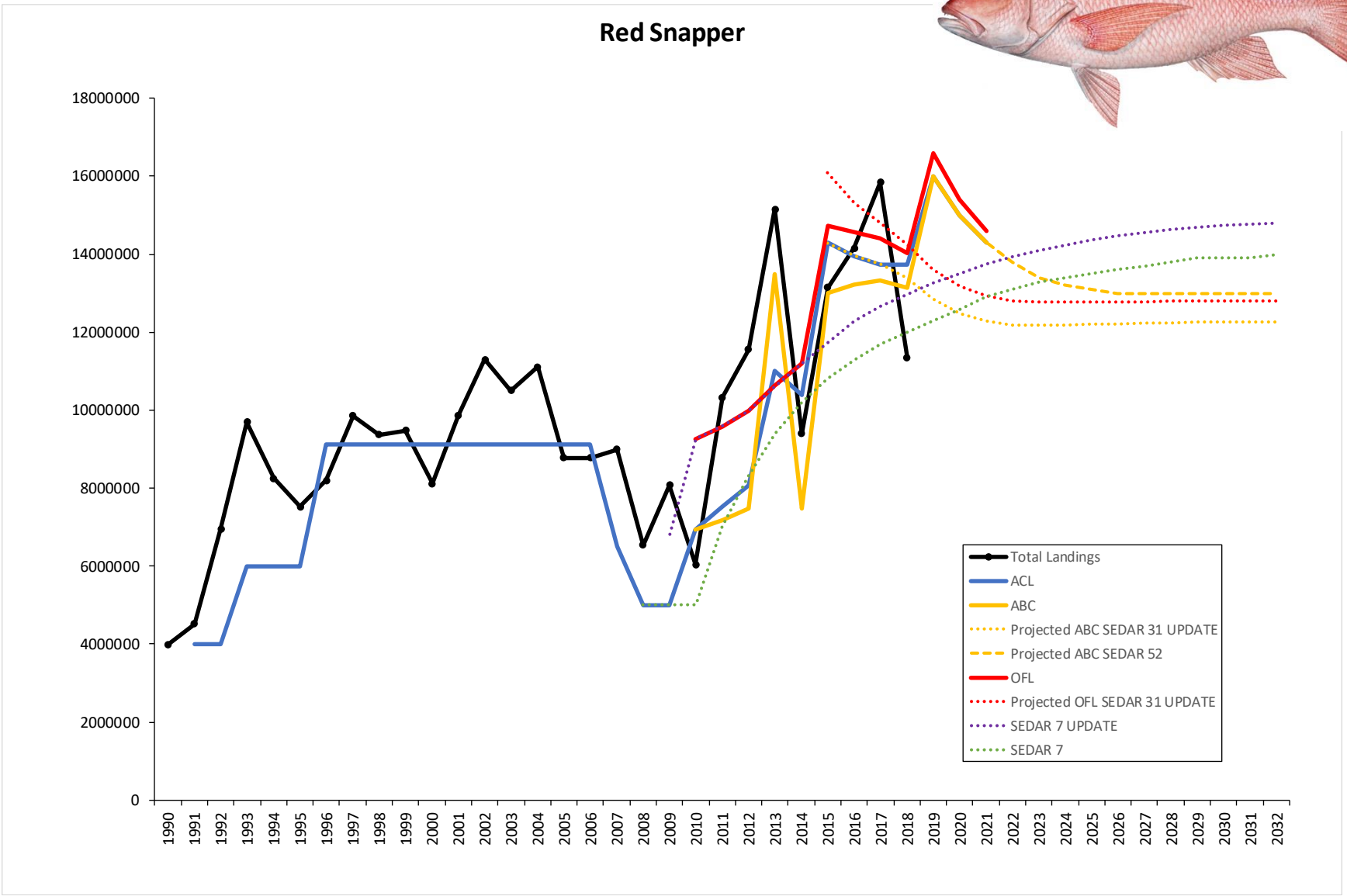
Greater Amberjack



Historical difference in estimating OFLs

5 year projection window

OFL projection differences


Red Snapper
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14000000
12000000
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2030
2031
2032
Total Landings
ACL
ABC
Projected ABC SEDAR 31 UPDATE
Projected ABC SEDAR 52
OFL
Projected OFL SEDAR 31 UPDATE
SEDAR 7 UPDATE
SEDAR 7

Caveats

- This study was intended to be a proof of concept with data collated from stock assessment and management documents

- Should a historical approach be considered, historical assessment projections should be rerun to estimate uncertainty in the OFL

Conclusions

- **Yield stream spikes were observed in at least 5 species and began in 2015**
- **Current estimates of uncertainty in the overfishing limit (OFL) are likely too small**
- **Yield stream spikes and uncertainty in the OFL are interrelated**
- **There are a range of alternative methods to generate an ABC that provide a more realistic picture of uncertainty in the OFL**
- **Any revisions to the ABC control rule should capture the historical uncertainty in our estimation of OFLs**