Tab B, No. 8(b)

Gulf of Mexico Lane Snapper Updated Headboat Index of Abundance, OFL and ABC

Southeast Fisheries Science Center,
Sustainable Fisheries Division

Gulf of Mexico Fishery Management Council
Reef Fish Advisory Panel

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Purpose

- Update Headboat Index
  - Follow SEDAR 49 Methods for data subsetting and index development

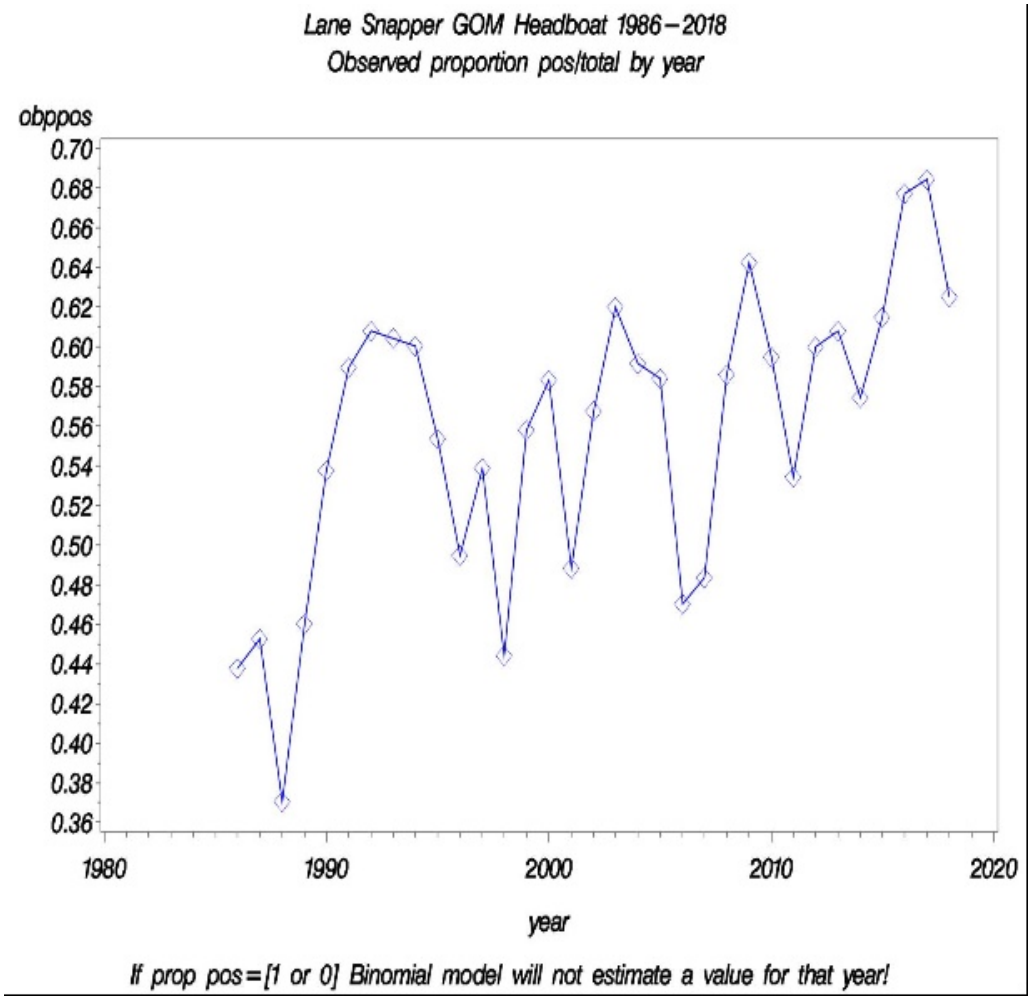
- Update Estimates of Overfishing and Allowable Biological Catch using SEDAR 49 Methods

- SEDAR 49 – conducted in 2016
  - SSC reviewed 2017

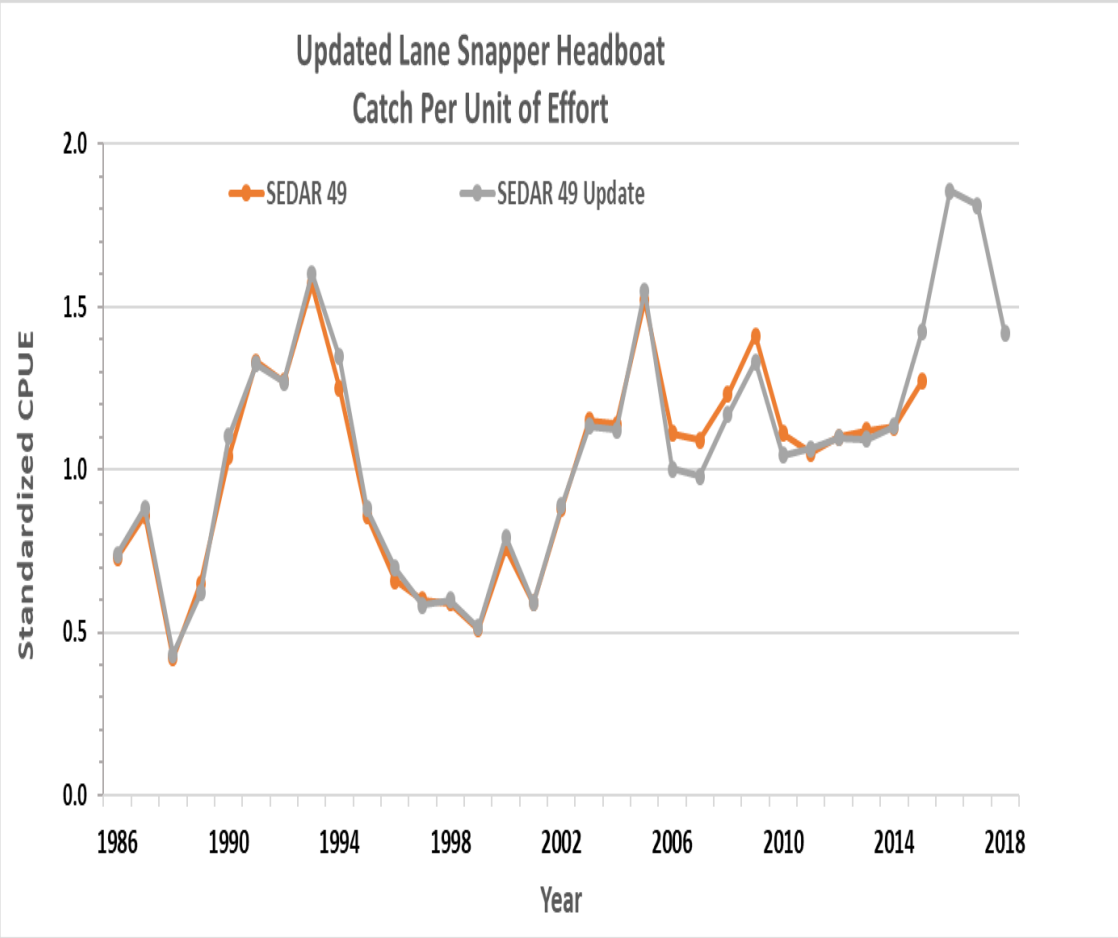
Results Summary: Updated Headboat CPUE Index

Data - Catch and effort (angler hours) observations for southeast headboats 1986 through 2018.

- Added **four (4) new years of data** (2015-2018) since SEDAR 49
- Lane snapper <u>occurred in between 38 and 68% of trips</u>
- Generally showing an **increasing trend** in the number of successful (positive) headboat trips for lane snapper over the time series



Final Index: Lane Snapper Updated Headboat CPUE 1986-2018

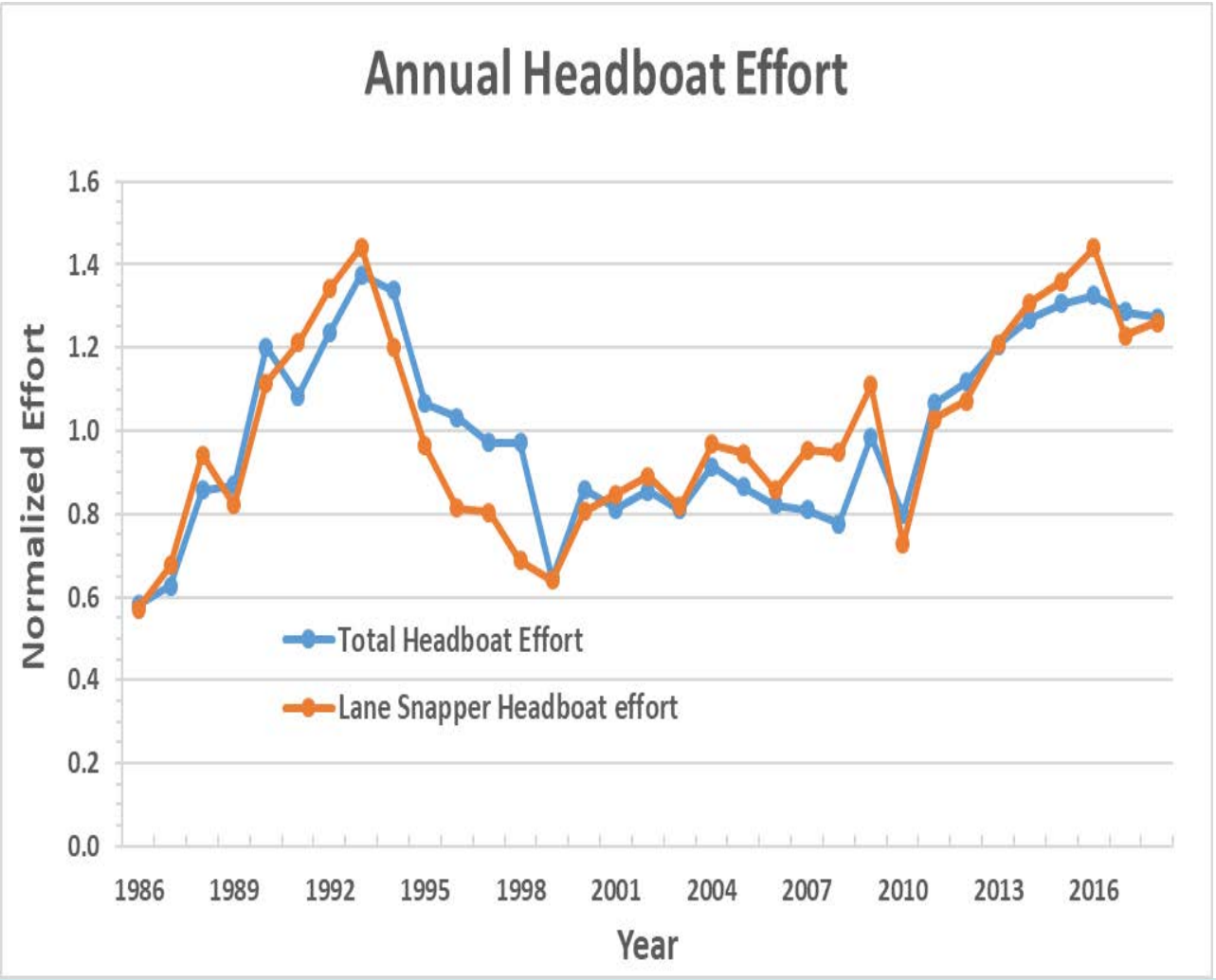


Standardized CPUE
(Updated=brown line)

- Increased 1986-1993
- Declined 1994 - 2001
- Increased 2001- 2005
- Without trend 2006-2014
- Brief 3 year strong increasing trend (through 2016)
- Decline 2017 to 2018

- Large increase in standardized CPUE in last 5 years (i.e., post SEDAR 49) vs the status quo reference period (1999-2008)

Total Headboat effort and Lane Snapper effort

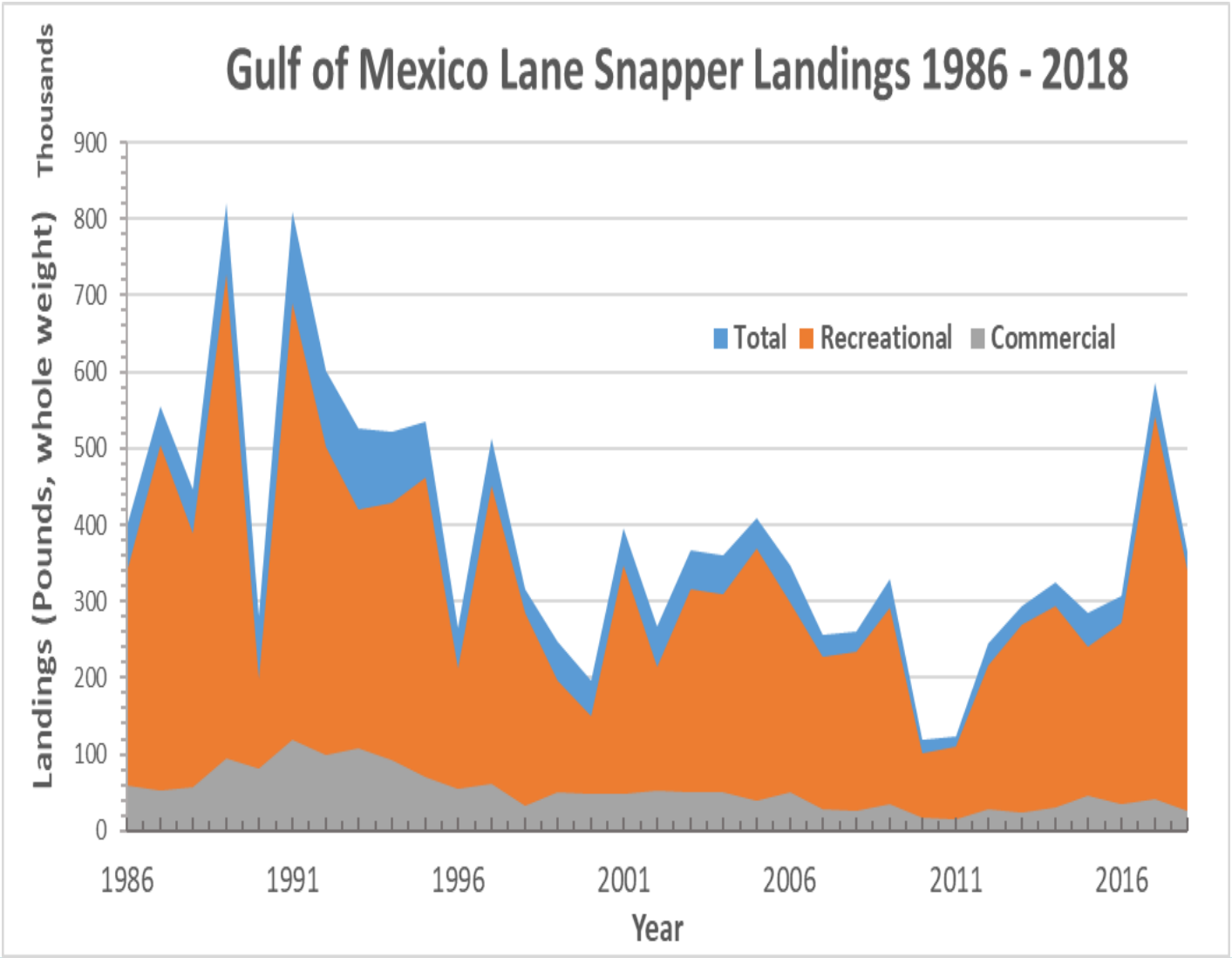


Total headboat effort and lane snapper effort (orange line)

- Steady increase 1986-1993
- Declined through 1999
- Steady increase since 1999 (except 2010 and after 2017)

- Lane effort follows similar trend in total headboat effort (blue line) with minor divergences

Updated Lane Snapper Total Landings 1986-2018



- Varied from 118 - 820 thousand pounds since 1986
- Recreational component averaged 86% of total across all years

- Regulations:
  - 8 inch TL size limit and 20 fish aggregate recreational bag limit
- Overfishing (OFL and Allowable Biological Catch (ABC) (March 2017) defined as 364,082 and 355,501 pounds ww

Lane Snapper OFL and ABC

SEDAR 49

- Data Workshop (DW) endorsed the Headboat index of Abundance:
  - High occurrence of trips catching lane snapper,
  - Large sample size, and
  - Relatively low CV
- DW recommended using methods that incorporated indices of abundance for use establishing catch advice
  - *Such methods incorporate a time series of abundance information, auxiliary to the catch time series and can provide information on changes in stock condition needed to track changes*
  - The Itarget method was recommended for evaluation of lane snapper –had sufficient data for application of the model
  - This update applied the Itarget method as in SEDAR 49 to estimate updated OFL and ABC for lane

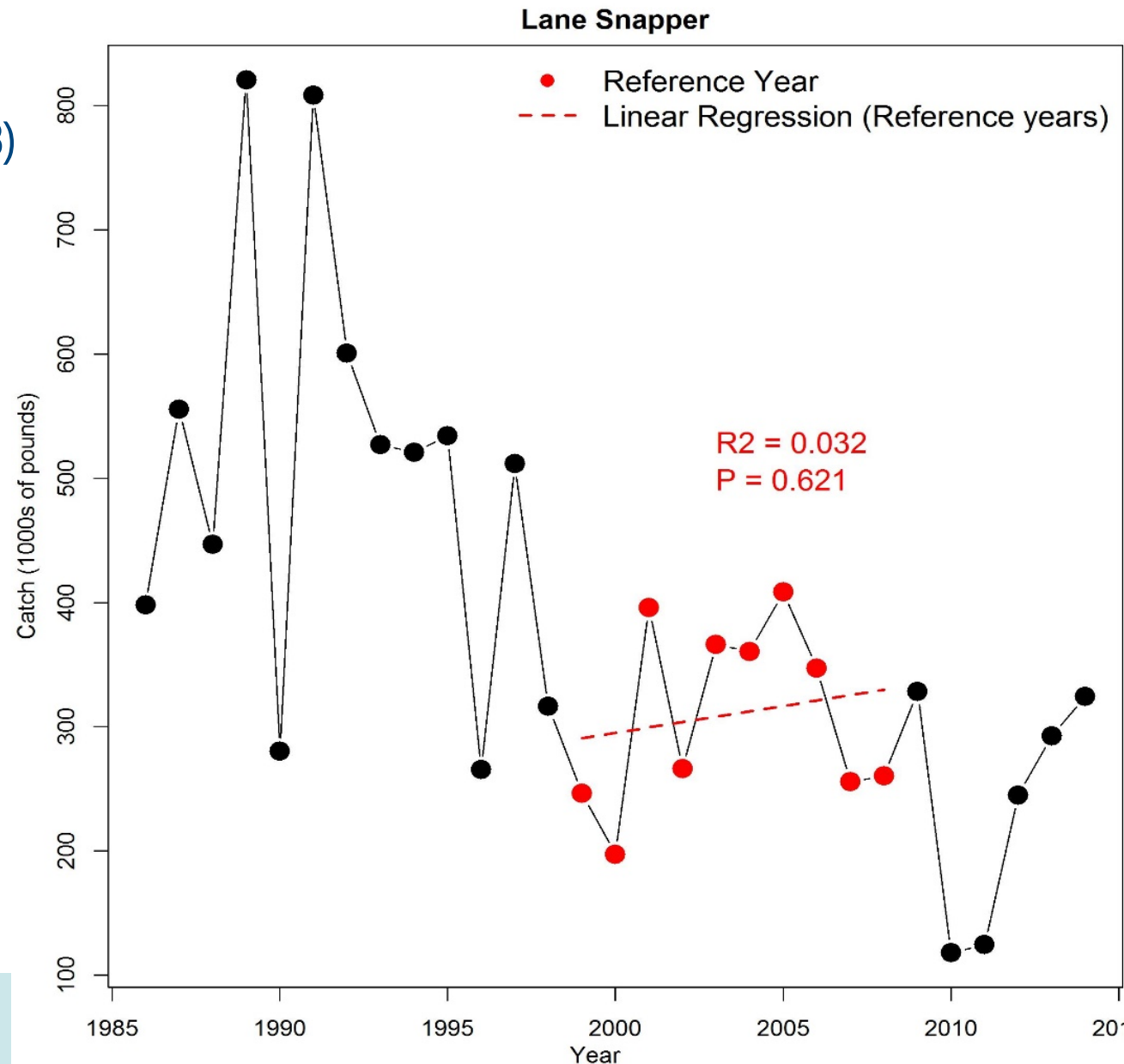
Itarget Method: General

- Itarget index method **calculates a catch recommendation by adjusting mean catch** during a reference period to achieve a target CPUE
  - SEDAR 49 used 5 most recent years index to compare against Reference period index
- Itarget assumes any trend in the index is a reliable indicator of the trend in resource biomass.
- SEDAR 49 assumed the **reference period of 1999-2008** recommended by the GMFMC SSC for lane snapper after confirming no trend in landings.
- SEDAR 49 assumed lane snapper stock condition was near MSY during the reference period (1999-2008)

Lane Snapper Reference Catch

Reference Period (1999-2008)
Catch: 310,363 lbs, ww
CPUE Index: 0.974

Recent Index (2015-2018)
1.528



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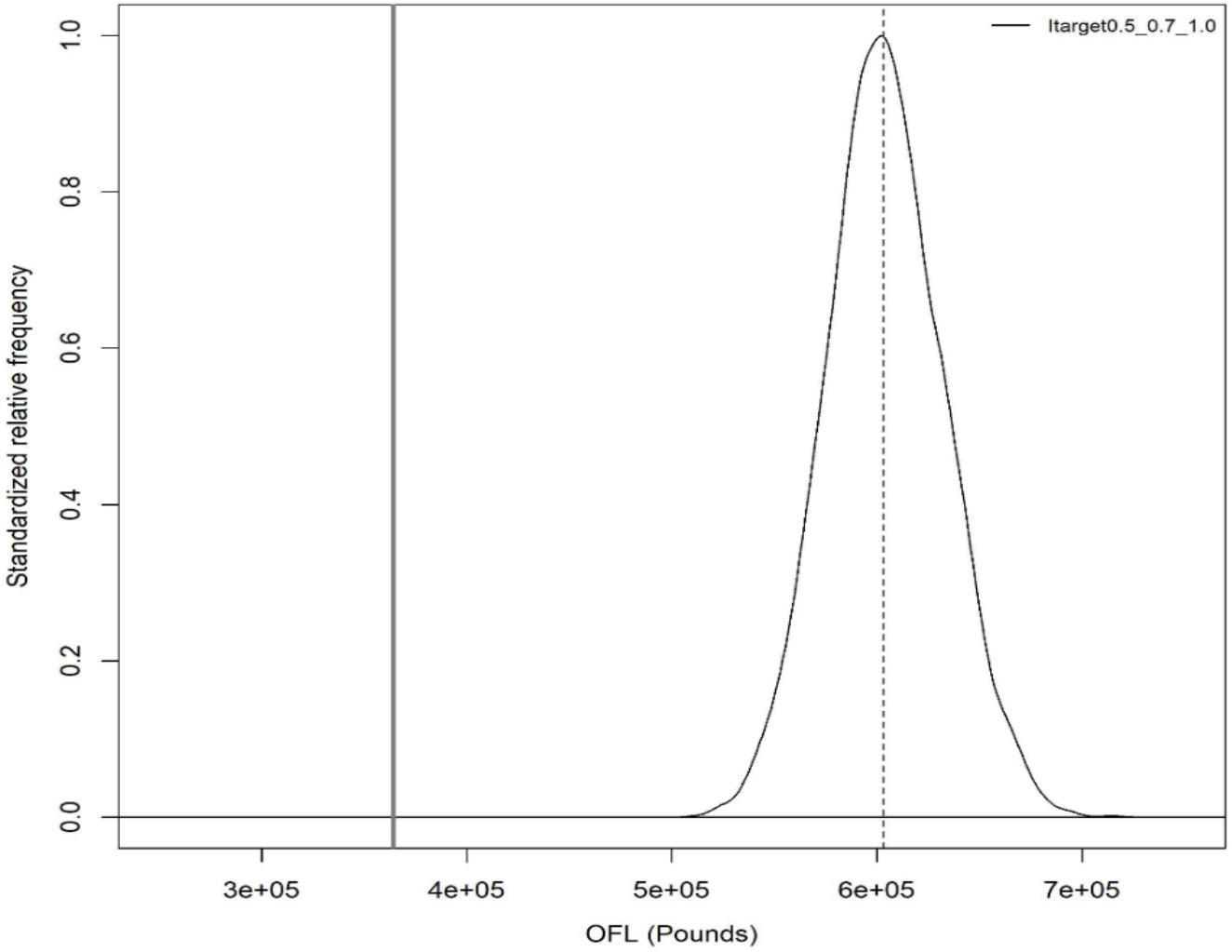
Summary Itarget Results: OFL/ABC Updated Relative frequency distribution

Thick gray line = calculated OFL (estimated TAC= 364,082 pounds ww) at the 50% probability of exceeding OFL from the March 2017 SSC Review of the SEDAR 49 data limited evaluation.



Updated Gulf of Mexico lane snapper OFL and ABC (and 2017 March estimates for comparison)

Method	ABC		OFL	SD	SE	CV
	30%	40%	50%			
Updated ltarget0.5_0.7_1.0 2019	588,965	596,349	603,195	27,616	276	0.046
ltarget0.5_0.7_1.0 SEDAR 49, March 2017	355,501	360,059	364,082	16,965	170	0.047

Following the determination of the March 2017 GMFMC SSC that OFL and ABC should be defined as the 50th and 30th percentiles of the OFL distribution

Units = pounds whole weight

Thank you and any questions please ?

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Extra

Updated Calculations of OFL and ABC

Approach- Apply the Data Limited Method 'Itarget_0.5_0.7_1.0'

The TAC was calculated for lane snapper as:

$$\text{if } I_y^{recent} < 0.7 \text{ x } I^{ave}, \quad \boldsymbol{w} \; x \; C^{ave} \left[\frac{I_y^{recent}}{0.7 \text{ x } I^{ave}}\right]^2$$

$$\text{if } I_y^{recent} \geq 0.7 \text{ x } I^{ave}, \; C^{ave} \left[\boldsymbol{w} + (1 - \mathbf{w}) \frac{(I_y^{recent} - 0.7 \text{ x } I^{ave})}{(I^{target} - 0.7 \text{ x } I^{ave})}\right]$$

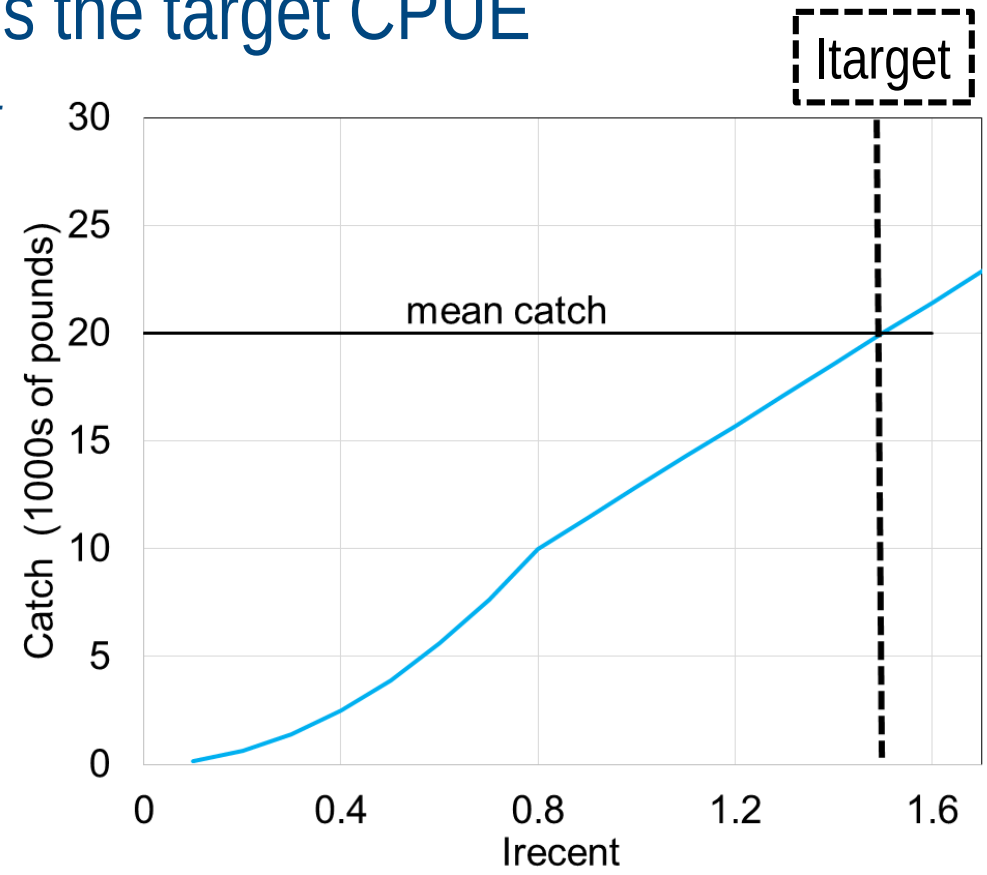
- Where:
- C^{ave} = average catch over reference time series (1999-2008)
- I^{ave} = average index over reference time series (1999-2008)
- I^{recent} = average index over 5 most recent years (2014-2018)
- $I^{target} = I^{ave} \text{ x } I^{multi}$ - where the "I^{multi}" scalar on I^{ave} was set as 1.0 for SEDAR 49 evaluations based on the assumption that the stock was near MSY during the reference period.
- w = 0.5, where w is the smoothing parameter that defines the catch advice when $I^{recent} = 0.7\ I^{ave}$.

Geromont and Butterworth (2014)

Tuning of data-limited methods: Itarget

- **Itarget scalar** = determines the target CPUE
- *Itarget* = *Itarget scalar* x I^{REF}
- How much of mean index during reference period do we want to achieve?

Stock Status During Reference Period	Itarget Scalar
Overexploited	>1
Near MSY	1
Underexploited	<1



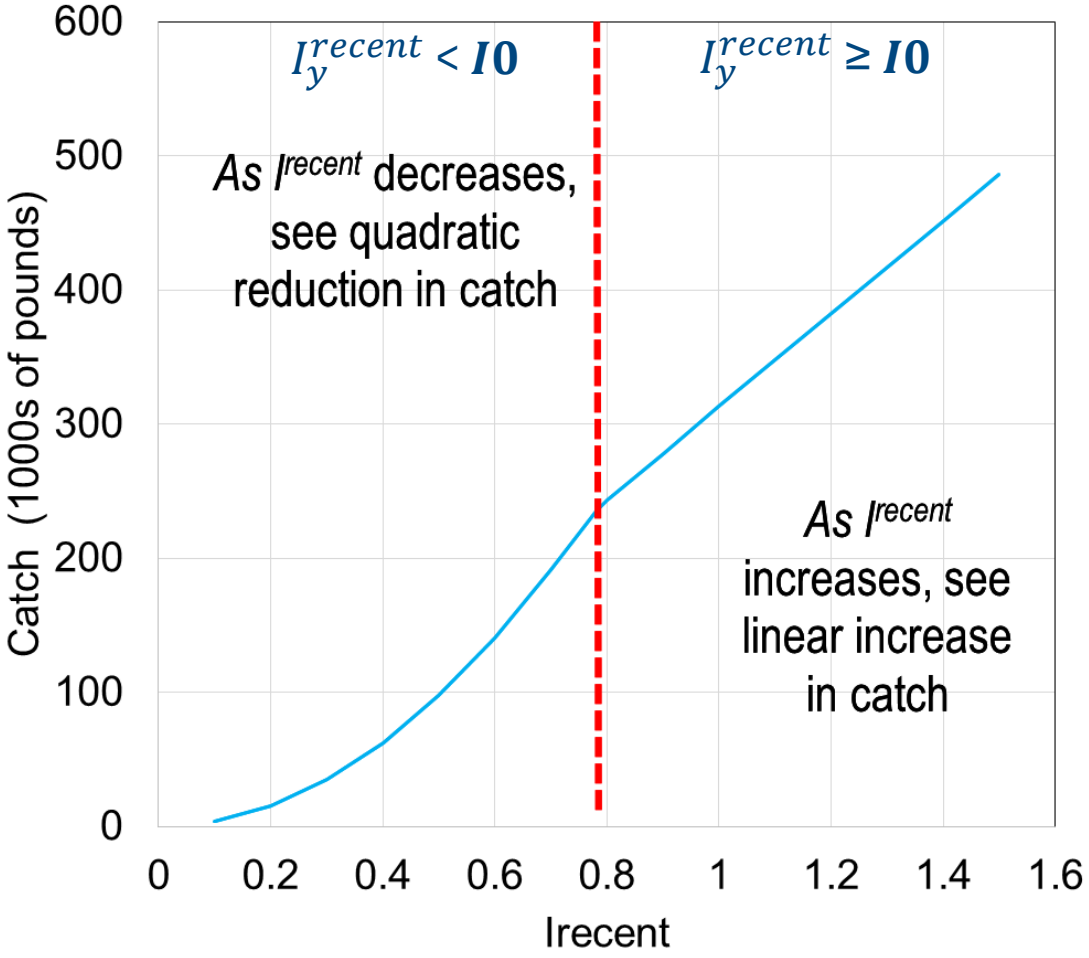
Example (overexploited)

Geromont and Butterworth (2014)

Tuning of data-limited methods: Itarget

- *I0* = determines lower limit
- *I0 = I0 scalar* x I^{REF}

Conditions	I0 scalar
Stock overexploited or is likely to require a long rebuilding period if overfished, low productivity	0.8
Stock near MSY	0.7
Stock underexploited, high productivity	0.5

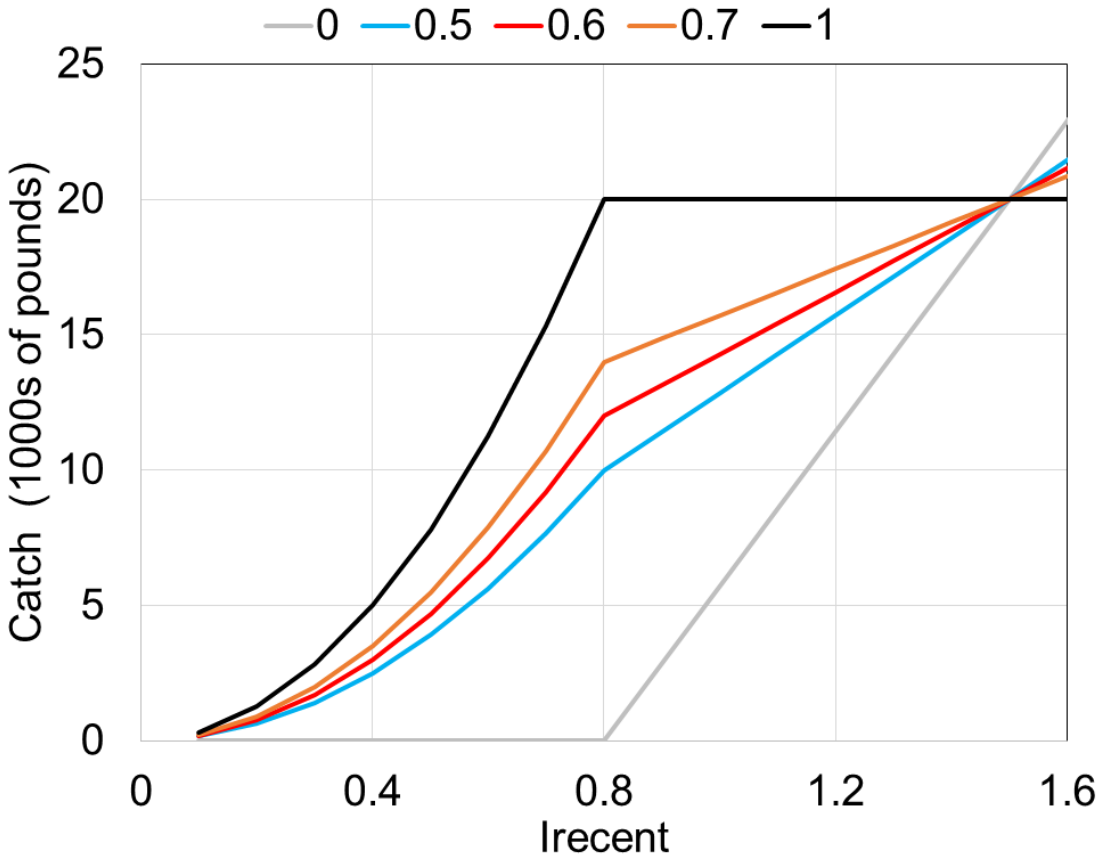


Geromont and Butterworth (2014)

Tuning of data-limited methods: Itarget

- Smoothing parameter (w) = controls the rate of change in catch advice

W	Condition
0	Catch advice = 0 below limit (I0)
0.5	Relatively large slope when above limit (I0)
0.6	Intermediate slope both above and below limit (I0)
0.7	Relatively large slope when below limit (I0)
1.0	Catch advice capped when above limit (I0)



Geromont and Butterworth (2014)