SAFMC Long-Term Assessment Considerations

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February 15, 2017

This document was developed to provide the SAFMC information on potential assessment priorities and the NMFS prioritization tool to help guide long-term assessment planning. First, the resources necessary to keep existing assessments up to date are considered. Next, unassessed stocks are considered to identify candidates for future assessments. Finally, the current assessment list and likely future candidates are compared to the results of the SSC application of the NMFS prioritization tool.

1. Currently Assessed Stocks

There are two important considerations in long-term assessment planning: keeping existing assessments up to date, and producing new assessments to reduce the number of unassessed stocks. Limited resources must be divided between these basic needs. Keeping assessments up to date requires deciding when an existing assessment becomes uninformative. Typical "rules of thumb" for maximum assessment age tend to run between 5 and 10 years. In reality, the maximum acceptable age (or target frequency for assessment updates, as expressed in the prioritization tool) really depends on the nature of the model and input data, its uncertainties, the management program and stock status. Target assessment frequency in the initial prioritization tool application ranged from 1 to 10 years, and considered factors such as recruitment variability, mean age of the catch, and ecosystem and fishery importance. Past SEDAR experience suggests that stocks tend to rise in importance as they approach 5 years of age, and ages pushing 10 are only tolerated when the stock is not experiencing overfishing and no major management controversies have developed since the prior assessment. The average assessment age in 2017 is 5 years, including assessments conducted through the 2017 Red Grouper update.

There are 22 South Atlantic stocks that have been assessed for the SAFMC since SEDAR began in 2003 (Table 1). Three, Gray Triggerfish, Hogfish (NC-GA stock) and Goliath Grouper, were not accepted by their most recent peer reviews, and one, Wreckfish, was assessed outside of SEDAR. For several years the SAFMC has developed assessment priorities under the expectation that 4 stocks can be assessed through SEDAR each year by the SEFSC team. In the typical nomenclature, these are termed "slots" that the Council can fill to meet its assessment need. An additional assessment can be provided by the Florida Fish and Wildlife Conservation Commission (FWCC) assessment team, although the stocks to be assessed by FWCC are typically determined by FWCC. To date, FWCC has taken responsibility for assessments of Black Grouper, Hogfish (2 stocks), Mutton Snapper, Yellowtail Snapper, Goliath Grouper, and Spiny Lobster. Most of these are centered in Florida and managed jointly by the Gulf and South Atlantic Fishery Management Councils. Removing the FWCC assessments as well as Gray Triggerfish and Wreckfish from the list leaves a pool of 13 stocks the Council should consider for regular updates. This brings the number of annual assessment slots required to maintain a minimum age of 5 years to 2.6, leaving 2.4 slots per year available for new assessment efforts, including both first time assessments and new benchmark assessments of previously assessed stocks.

- 13 stocks to consider for regular updates through SEDAR/SEFSC
- 7 stocks to consider for regular updates through SEDAR/FWCC
- 1 stock requiring special consideration (Wreckfish)

2. Future Assessment Candidates

A first take on future assessment candidates was provided by the SAFMC Research Prioritization Plan. A number of managed stocks are identified in several categories reflecting target assessment types: Primary stocks for age-based assessments; secondary stocks, for survey methods or production models; and special needs stocks, with unique management challenges or biological traits that may hinder traditional assessment methods (Table 2). With the exception of Scamp, Dolphin, and White Grunt, all primary stocks have been assessed. Scamp is scheduled for assessment in 2018 and White Grunt in 2021. No secondary stocks have been assessed, although several did rank high on the prioritization tool. These should be considered potential future assessment priorities, or considered for removal from the research plan listing if they are no longer assessment priorities. Four of the identified special needs stocks have been assessed. Three stocks have been assessed but are not included in the priorities: Cobia and the two Hogfish stocks. The Council should consider adding these stocks when the research plan is updated in June 2017.

- Consider adding Cobia and the Hogfish stocks as primary data collection species in the Research Plan
- Consider assessment priorities among the secondary species.
- Solidify plans to assess White Grunt in 2021.

Landings provide another perspective that is commonly considered when establishing assessment priorities. Most of the stocks ranking high in landings in the snapper grouper FMP have been assessed (Table 3). Exceptions include Scamp, slated to be assessed in 2018, Gray Snapper, considered in past assessment plans, White Grunt, requested for a 2021 assessment, and Atlantic Spadefish. The assessed stocks in the snapper grouper fishery account for 74% of the 2016 ACL, rising to 82% when Gray Triggerfish, White Grunt, and Scamp are considered.

Considering other FMPs, all of the stocks in the coastal migratory pelagic FMP have been assessed (Table 4), and none in the dolphin wahoo FMP (Table 5). It is noted that an exploratory assessment of dolphin was prepared in 2000 by Dr. Mike Prager of the Beaufort lab. The findings were inconclusive and the data needs recommended to support an acceptable assessment, specifically stock structure identification and a fishery-independent abundance survey, are yet to be addressed. Crustacean FMPs are addressed in Table 6, only Spiny Lobster has been assessed.

Based on landings, the snapper grouper and coastal migratory pelagic FMPs are well covered by the current assessments. Dolphin and perhaps Wahoo should be considered for future priorities, as this may help initiate research to address the known data needs. The life history of shrimp is not conducive to typical age-based assessment methods, although the SEFSC Galveston lab has made efforts in the past to assess Gulf of Mexico shrimp using age-based models.

- Consider adding Dolphin as a future priority
- Consider the priority level of Atlantic Spadefish

3. Stock Assessment Prioritization

The NMFS Stock Assessment Prioritization Tool provides another perspective on assessment priorities. The Tool was applied to 31 SAFMC-managed finfish species considered by SEFSC and SAFMC staff to be reasonable candidates for assessments, based on whether the stock has been

assessed before, if it is representative of a complex, and if it is included in the NMFS "FSSI" ranking. Initial scoring values were developed by SEFSC and SAFMC staff, then reviewed and refined by the SSC and AP representatives during the October 2016 SSC meeting. Full details on the scoring applied by the SSC is provided in the accompanying spreadsheet (Attachment 2, March 2017, SAFMC Data Committee) and results are summarized in Table 7.

Most of the stocks considered in the tool application have been assessed. Speckled Hind and Warsaw Grouper, two of the eight currently unassessed stocks, are under harvest prohibitions in federal waters. Further information is provided on the scoring for the remaining 6 unassessed stocks (Dolphin, Knobbed Porgy, Lane Snapper, Almaco Jack, Red Hind, and Silk Snapper) that all ranked in the top half of the prioritized list shown in Table 7. All 6 of these stocks were scored as 3 (out of 5, with 3 set as default score for unassessed stocks) for relative stock abundance and relative fishing mortality (**Attachment 2**, Spread Sheet – Prioritization Tool). Dolphin, Almaco Jack, and Lane Snapper scored fairly high (4 or greater out of 5) on one or both of commercial and recreational fishery importance, although there was not much difference in the average scoring of these metrics between the overall higher ranked and lower ranked stocks.

All 6 scored high (16-20, out of 24) on the "years assessment overdue" metric (shown in the stock scores-calculations tab in Attachment 2). This metric reflects both the target assessment frequency and the current assessment age. The scoring process results in high values of this metric for unassessed stocks because, by default, they receive the maximum value for the time elapsed since the last assessment. Other alternatives that could be considered for scoring unassessed stocks, such as an average, low, or missing value, would change the relative ranking of the currently unassessed stocks. The "years assessment overdue" metric influences the priority ranking as currently developed, with stocks in the upper half of the priority ranking tending to score higher (average score of 9) for "year assessment overdue" than those on the lower end (average score of 1.3.) To a large extent this is intentional, and is due to both to the default scoring, as noted, as well as the relative factor score for this metric of 0.15 being set at the highest of the metrics considered. In other words, this metric carries the highest relative weight in the overall score.

Four of these 6 stocks are included as secondary stocks for data and assessment in the SAFMC research plan (Table 2), Dolphin is listed as a primary stock. Only Silk Snapper is not included. It was included in the prioritization rankings as a potential deepwater complex indicator. The Council may wish to consider adding Silk Snapper, and raising the priority level for secondary stocks that scored high on the prioritization. However, increasing the number of stocks for which age based assessments are desired will increase the burden of collecting and evaluating age structures.

Given that deciding which stocks need to be assessed over the long-term may require different considerations than the frequency of assessments for those stocks chosen to be assessed, an alternative ranking was developed that does not include assessment frequency or the years an assessment is overdue. This alternative, shown in Table 8, may prove informative for developing a list of stocks for regular, ongoing assessment and status evaluations. The relative factor weight of "years assessment overdue" was set at 0, thereby effectively removing it from the scoring. This change pushes Almaco Jack, Silk Snapper, and Red Hind to the lower half of the rankings (higher than 15), and drops Lane Snapper to #8 and Dolphin to #13 (Table 8). King Mackerel, a long-standing priority stock, moves from #18 to #9 in this alternative ranking.

Another approach that may be worth considering to manage limited assessment resources is to divide the assessment capability, by allocating one portion to maintenance of existing assessments and another to developing new assessments. This could allow the Council to develop two priority rankings, one to identify those existing assessment most in need of an update, and another to identify unassessed stocks most in need of an initial assessment. Considering the resources (expressed as assessment slots) needed to keep existing assessments up to date, 3 of the 4 existing slots could be devoted to maintenance and updates, and the fourth to new assessments and major revisions (i.e. "benchmark assessments") of existing assessments.

- Consider elevating Lane Snapper, Almaco Jack, Knobbed Porgy, and Red Hind to primary data collection and age-based assessment stocks.
- Consider adding Silk Snapper as a secondary data collection and assessment stock.
- Consider the alternative priority scoring for identifying the universe of stocks to assess routinely.

Table 1. South Atlantic assessed stocks, sorted by assessment age. Assessment age is defined as the elapsed years between the terminal data year of the prior assessment and 2017.

Stock	Age in '17	Status[1]	Terminal Data Year	Next Assessment
Gray Triggerfish	NA	4		
Greater Amberjack	11	3	2006	2018
Black Grouper	9	3	2008	2017
Spiny Lobster	8	3	2009	
Yellowtail Snapper	7	3	2010	2018
Wreckfish	7	3	2010	
Vermilion Snapper	6	3	2011	2017
Red Porgy	6	1	2011	2018
Spanish Mackerel	6	3	2011	2019
Cobia	6	3	2011	2020
Mutton Snapper	6	3	2011	
Black Sea Bass	5	3	2012	2017
King Mackerel	5	3	2012	2018
Snowy Grouper	5	1	2012	2019
Gag	5	3	2012	2019
Hogfish (East FL)	5	1	2012	
Hogfish (NC-GA)	NA	4	2012	
Red Snapper	3	1	2014	<2020
golden Tilefish	3	3	2014	<2020
Goliath Grouper	NA	4	2014	
Red Grouper	2	1	2015	<2020
Blueline Tilefish	2	2	2015	

1. Status according to the prior assessment: 1 = overfished or in rebuilding, 2 = overfishing, 3 = neither overfished nor overfishing, 4 = assessments attempted but rejected by peer review.

Table 2. SAFMC stocks categorization in the Research Prioritization Plan.

Category	Primary	Secondary	Special
Stocks	Vermilion Snapper Snowy Grouper golden Tilefish Red Grouper Black Grouper Scamp Black Sea Bass Gag Greater Amberjack White Grunt Yellowtail Snapper Gray Triggerfish Mutton Snapper Red Porgy Dolphin King Mackerel Spanish Mackerel Blueline Tilefish	Tomtate Knobbed Porgy Bar Jack Almaco Jack Lane Snapper Banded Rudderfish Rock Hind Red Hind Wahoo Penaeid Shrimp	Warsaw grouper Speckled Hind Goliath grouper Nassau grouper Red Snapper Wreckfish Spiny Lobster Golden Crab
Assessment Goal	Age based	Survey methods or production models	Varies due to unique management circumstances

2. Stocks sorted by the 2016 total ACL and assessment status

Table 3. Snapper Grouper FMP stocks, 2016 ACL, and assessment status. Note that OY is presented for stocks under rebuilding plans to prevent downplaying their importance in the fishery with reduced rebuilding catch limits.

ASSESS	STOCK	ACL (or OY)
Complete	Yellowtail Snapper	3,037,500
Complete	Greater Amberjack	1,937,225
Complete	Black Sea Bass	1,756,452
Complete	Vermilion Snapper	1,681,480
Complete	Red Grouper (OY)	1,095,000
Complete	Mutton Snapper	926,600
Complete	Red Porgy (OY)	810,000
Complete	Gag	610,233
Complete	golden Tilefish	560,490
Complete	Wreckfish	423,700
Complete	Snowy Grouper (OY)	407,300
Complete	Red Snapper (OY)	398,000
Complete	Hogfish (EFL)(OY)	265,000
Complete	Black Grouper	262,594
Complete	Blueline Tilefish	174,798
Attempted	Hogfish (GA-NC)	33,930
Attempted	Goliath Grouper	0
Attempted	Gray Triggerfish	716,999
Planned	White Grunt	643,889
Planned	Scamp	335,744
Considered	Gray Snapper	1,247,132
	Atlantic Spadefish	812,478
	Almaco Jack	302,517
	Bar Jack	62,249
Considered	Speckled Hind	0
Considered	Warsaw Grouper	0
NA-Complex	grunts (4- White)	192,136
NA-Complex	snappers (3-Gray)	266,751
NA-Complex	jacks (4 - Almaco)	154,704
NA-Complex	deepwater (6)	169,896
NA-Complex	porgy (5)	143,262
NA-Complex	shallow groupers (6)	104,190
TOTAL		19,532,249
	assessed	14,380,302
	% assessed SG	74
	Plan to assess	1,696,632
	% assessed in future	82

Table 4. Coastal Migratory Pelagic FMP stocks, 2016 ACL, and assessment status.

ASSESSMENT	STOCK	ACL
Complete	Spanish Mackerel	6,057,000
Complete	King Mackerel	10,460,000
Complete	Cobia	670,000
Total		17,187,000
	assessed	17,187,000
	% assessed	100

Table 5. Dolphin Wahoo FMP stocks, 2016 ACL, and assessment status.

ASSESSMENT	STOCK	ACL
Considered	Dolphin	15,344,846
None planned	Wahoo	1,794,960
Total		17,139,806
	assessed	0
	% assessed	0

Table 6. Other SAFMC FMP stocks, 2016 ACL, and assessment status.

ASSESSMENT	STOCK	FMP	ACL
Completed	Spiny Lobster	Spiny Lobster	7,320,000
None planned	Golden Crab	Golden Crab	2,000,000
None planned	White Shrimp	Shrimp	14,500,000
None planned	Brown Shrimp	Shrimp	9,200,000
None planned	Pink Shrimp	Shrimp	1,800,000
None planned	Rock Shrimp	Shrimp	6,829,449
Total			41,649,449
		assessed	7,320,000
		% assessed	18

Table 7. Results of the SAFMC SSC application of the NMFS Assessment Prioritization Tool, assessment status, ACL of unassessed stocks, and the SAFMC research plan priority.

Rank	Stock	Score	Assessed?	ACL	Priority
1	Red Snapper	5.7	Yes		Special
2	Lane Snapper	4.7	No	203,486	Secondary
3	FLK/EFL Hogfish	4.7	Yes		NOT LISTED
4	Red Porgy	4.7	Yes		Primary
5	Dolphin	4.5	No	15,344,846	Primary
6	White Grunt	4.4	Planned		Primary
7	Snowy Grouper	4.2	Yes		Primary
8	Almaco Jack	4.1	No	302,517	Secondary
9	Scamp	3.7	Planned		Primary
10	Red Grouper	3.7	Yes		Primary
11	Knobbed Porgy	3.5	No	67,441	Secondary
12	Blueline Tilefish	3.4	Yes		Primary
13	GA-NC Hogfish	3.4	Attempted		NOT LISTED
14	Red Hind	3.3	No	33,084	Secondary
15	Silk Snapper	3.3	No	90,323	NOT LISTED
16	Gray Triggerfish	3.1	Attempted		Primary
17	Warsaw Grouper	3.1	No	0	Special
18	King Mackerel	2.9	Yes		Primary
19	Spanish Mackerel	2.9	Yes		Primary
20	Black Sea Bass	2.7	Yes		Primary
21	Gag	2.5	Yes		Primary
22	Cobia	2.5	Yes		NOT LISTED
23	golden Tilefish	2.5	Yes		Primary
24	Vermilion Snapper	2.4	Yes		Primary
25	Greater Amberjack	2.4	Yes		Primary
26	Black Grouper	2.2	Yes		Primary
27	Mutton Snapper	2.1	Yes		Primary
28	Yellowtail Snapper	2.1	Yes		Primary
29	Speckled Hind	2.0	No	0	Special
30	Goliath Grouper	2.0	Attempted		Special
31	Wreckfish	1.4	Yes		Special
NA	Wahoo		No	1,794,960	Secondary
NA	Tomtate		No	92,670	Secondary
NA	Bar Jack		No	62,249	Secondary
NA	Banded rudderfish		No	145,434	Secondary
NA	Rock Hind		No	37,493	Secondary
NA	Penaeid Shrimp		No	25,500,000	Secondary
NA	Nassau Grouper		No	0	Special
NA	Spiny Lobster		Yes	7,320,000	Special
NA	Golden Crab		No	2,000,000	Special

Table 8. Stock priority rankings and scores with the "assessment overdue" factor removed from the scoring.

Rank	Stock	Score
1	Red Snapper	6.50
2	FLK/EFL Hogfish	5.54
3	Red Porgy	5.49
4	Snowy Grouper	4.89
5	Red Grouper	4.03
6	Blueline Tilefish	4.01
7	White Grunt	3.97
8	Lane Snapper	3.77
9	King Mackerel	3.44
10	Spanish Mackerel	3.42
11	Gray Triggerfish	3.42
12	Scamp	3.41
13	Dolphin	3.02
14	Black Sea Bass	2.99
15	Gag	2.98
16	Cobia	2.96
17	golden Tilefish	2.94
18	Vermilion Snapper	2.86
19	Almaco Jack	2.81
20	Black Grouper	2.54
21	Mutton Snapper	2.49
22	Greater Amberjack	2.47
23	Yellowtail Snapper	2.45
24	GA-NC Hogfish	2.40
25	Speckled Hind	2.40
26	Knobbed Porgy	2.36
27	Goliath Grouper	2.31
28	Silk Snapper	2.29
29	Red Hind	2.17
30	Warsaw Grouper	2.05
31	Wreckfish	1.61

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24 March, 2017

TO: Gregg Waugh,
SAFMC Executive Director

FROM: Bonnie J. Ponwith, Ph.D.
Science and Research Director

SUBJECT: SAFMC Assessment and Related Requests

You noted the decision to postpone the MRIP revision assessments until after the third year of comparison data are available in your memo dated 22 March. This decision does, indeed, create an opportunity to consider other activities that are commensurate with that level of effort. Unfortunately, a Standard Assessment for Golden Tilefish is not a good fit for that window. That assessment would require a dedicated analyst for between six to nine months. After consulting with our age readers, we have also determined it would not be possible to have the otoliths ready in time to fit this window. Based on discussions at the last SAFMC meeting, I believe conducting a workshop that includes MRIP, SEFSC, SAFMC and GMFMC SSC representatives to begin the work on setting minimum standards for and improving the precision of MRIP catch estimates for management purposes would be a good fit in terms of priority and relative effort.

You requested that our analysts complete an evaluation to determine if the same challenges we encountered reading blueline tilefish carry over into our work on golden tilefish, and to have that analysis by April 21 for discussion at the SEDAR Steering Committee Meeting. We will be able to meet this request.

You also requested an analysis regarding our aging capacity in the South Atlantic, including the SEFSC and MARMAP partners, in time for the June 2017 briefing book deadline, including:

- Resources required to clear the current backlog of age evaluations
- Resources required to provide up-to-date structure evaluations for primary data collection species, and
- A comparison of the current capacity/resources relative to what it would take to stay up to date for those species.

We will be able to meet this request.

If you have questions or concerns, please to not hesitate to contact me.

cc: Monica Smit-Brunello
John McGovern, Rick DeVictor
Theo Brainerd, Trika Gerard, Peter Thompson,
Larry Massey, Erik Williams

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April 14, 2017

TO: Gregg Waugh.
SAFMC Executive Director

FROM: Bonnie J. Ponwith, Ph.D.
Science and Research Director

SUBJECT: SAFMC Assessment and Related Requests

On March 24, 2017, I responded to your request of March 22 titled, "SAFMC Assessment and Related Requests." In it I discussed the problem of scheduling a golden tilefish assessment, proposed having a workshop to set minimum standards for MRIP catch estimates, and agreed that the SEFSC and MARMAP have adequate aging capacity in the South Atlantic. The attached report addresses an additional concern: if challenges encountered in reading blueline tilefish carry over into our work on golden tilefish. The attached report was prepared to address that issue.

Please do not hesitate to contact me if you have additional questions.

cc: Monica Smit-Brunello
John McGovern, Rick DeVictor
Theo Brainerd, Trika Gerard, Peter Thompson,
Erik Williams, Larry Massey

Ageing of Tilefish (*Lopholatilus chamaeleonticeps*) in the Southeastern United States

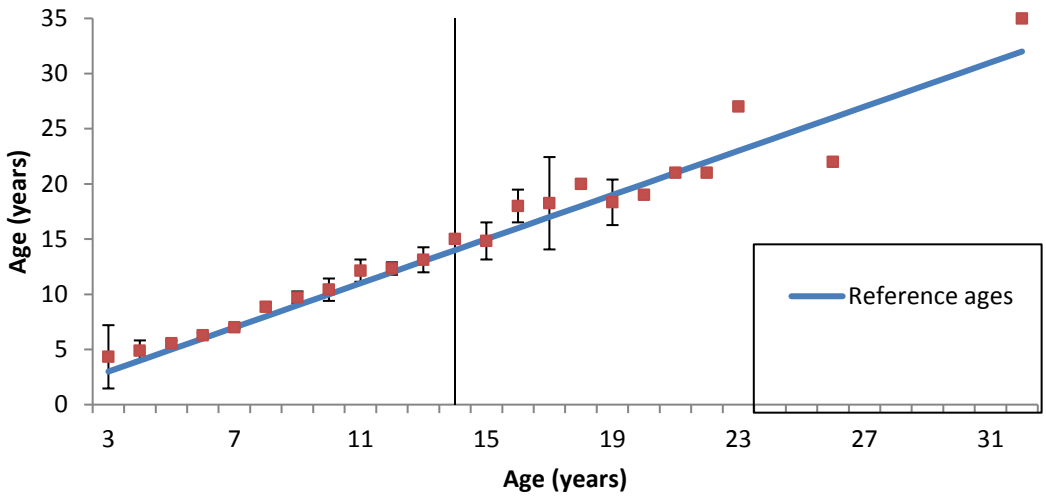
In the Southeastern U.S., the species of the deepwater complex are difficult to age with any consistency and work on validation of ages is in its infancy. Blueline tilefish (*Caulilatilus microps*) is a prime example of the difficulty in interpretation of the growth zones on the otoliths, and the challenges with techniques to validate the age readings. Tilefish (*Lopholatilus chamaeleonticeps*) otoliths are also difficult to interpret, but have exhibited a relatively more consistent pattern of growth zones compared to other deepwater species.

In 2009, a tilefish age workshop was held with expert age readers from NMFS Beaufort, NMFS Panama City, SCDNR, and NMFS Woods Hole. Prior to this meeting, Linda Lombardi-Carlson of NMFS Panama City had completed a radiometric (lead-radium) age validation study of tilefish caught off the east coast of Florida (results published in Lombardi-Carlson and Allen, 2015). Her work involved identifying a consistent pattern of growth zones on the otolith sections to determine age and then comparing those age readings to the estimated ages from the lead-radium ratios. The age reading precision between two readers at Panama City was calculated as average percent error (APE) of 5.5%, which is very good for a long-lived species. She then compared those ages to results of lead-radium dating, and found that all age groups of females and the oldest age groups (unidentified sexes) were validated. The male ages were not validated. The results of her study were used during the workshop to aid in interpretation of the growth zones in the otoliths. Following the age workshop, reference sets were exchanged between laboratories. APEs from this exchange ranged from 6.0% to 9.8% between pairs of age readers. These results were deemed to be very good for long-lived fish with difficult to interpret otoliths. No bias in age readings was noted.

Prior to the 2016 update of SEDAR25 Tilefish assessment, the age readers will read reference sets to ensure that they are still reading the otoliths consistently. NMFS Beaufort re-read their own reference set and NMFS Panama City's tilefish reference set. The APEs were 4.4% and 5.7%, respectively, with no bias in readings (Figure 1). SCDNR follows a similar protocol to ensure their age readers are consistently assigning ages to the samples. They re-read their own reference set and have found comparable APEs to those NMFS Beaufort has achieved. These results have lead our labs to believe that our age readings are consistent between laboratories and over time.

In conclusion, both NMFS Beaufort and SCDNR feel that the age readings of tilefish are useable in stock assessments because of the consistency in age readings between laboratories and the published age validation paper.

a. NMFS Beaufort Reference set



b. **NMFS Panama City reference set**

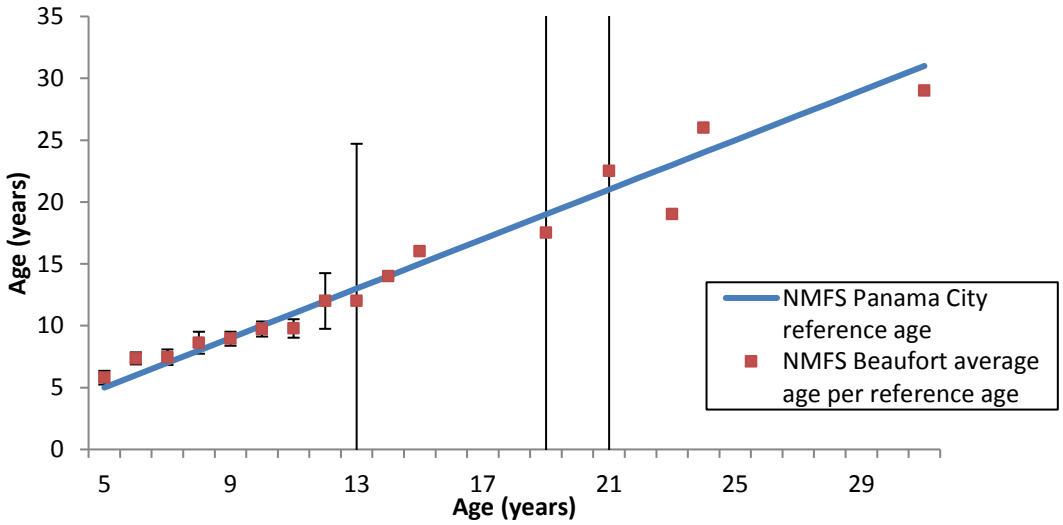


Figure 1. Tilefish age bias plots of NMFS Beaufort readings compared to reference ages of a) NMFS Beaufort reference set and b) NMFS Panama City reference set.