

Proposed Allocation Decision Trees: *A Draft Blueprint for Applying Biological, Social, and Economic Considerations in Allocation Decisions*

Prepared for the SAFMC Socio-Economic Panel

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Introduction



- Council has been making allocation decisions for decades.
- Recent events such as the GAO Report and revised recreational landings data has focused more attention on sector allocation.
 - The GAO recommended that the Councils develop methods for analyzing sector allocation needs using *trends in catch and landings, stock assessment results, economic analyses, social indicator analyses, and ecosystem models.*
 - Shift in historic landings due to revised methodology for estimating recreational landings.
- Goal is to help the Council develop an approach to addressing allocation decisions that applies consistent methods in an objective manner across all species.



Request of the SEP

- Consider the proposed decision tree approach.
- Provide general feedback on:
 1. Draft decision tree questions
 2. Structure of the approach
 3. Potential utility of the approach



Background

- Since the last reauthorization the MSA, which required establishing annual catch limits (ACLs) and prompted establishment of sector allocations for managed species, landings have been the primary data source used for allocation purposes.
 - The most consistent data available.
 - Can be obtained for all species.
- In most cases, the Council has not used data other than landings.
 - Other types of data are at times lacking for the South Atlantic region.
 - There has not been a consistent method to apply the concepts across all species.
- Currently, the Council is reconsidering sector allocations in a systematic manner without specific time constraints that were present after the MSA reauthorization.
 - Allows time to consider additional methods.



Recent Council Action

- In March 2020, the SAFMC identified criteria they were interested in considering when discussing allocations.
- In June 2020, the SAFMC was presented with potential readily available criteria that relate to the outline considerations for use in allocation decisions.
 - *Landings history, discard/bycatch rates, accountability, fairness and equity, market needs and trends, importance to a sector, cultural importance, and informed judgement.*
 - Also approved developing a decision tree approach.
 - Wanted to create an objective and organized approach to allocation decisions.
 - Did not want to be overly prescriptive and wanted to maintain flexibility to address allocations on a species by species basis.



The Decision Tree Approach

- Uses the same question pattern, or tree for each species considered.
- As a question is answered, the tree “branches”, or directs to the next question to be answered.
- Intended to allow the Council to identify the most important factors to consider for each species based on available data when making sector allocation decisions.



Draft Allocation Decision Tree

- The decision trees are slightly modified from the original GAO criteria definitions:
 - Landings history
 - Stock status
 - Economic factors
 - Social factors
- Each species would pass through all four decision trees.
- Some decision trees may not provide a relevant outcome for a given species.
- A question in one decision tree could be applicable to another tree too.



Draft Decision Tree Questions: Landings

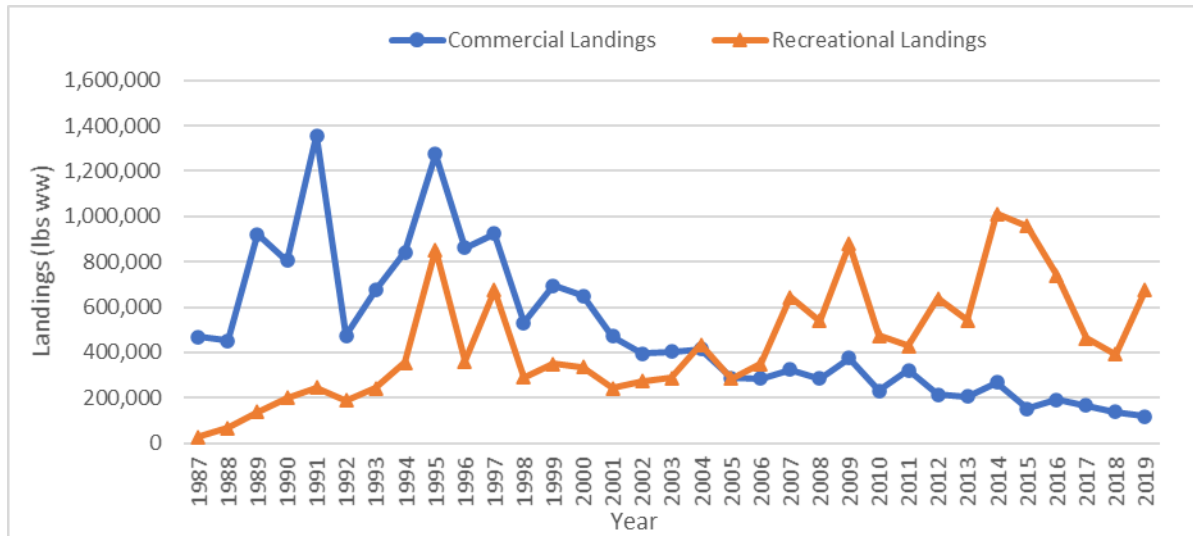
Landings: Should future allocations be based on harvests impacted by previous or current allocations?

Answers:

1. **No.** Consider allocations developed using harvests from a time period that represents the desired composition of the fishery or other factors addressed in other decision trees.
2. **Yes.** Have both, only one, or neither sector met or exceeded the ACLs or experienced closures due the ACLs to being projected to be met or being exceeded in any of the past five fishing years?
 - a. **Both sectors.** Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.
 - b. **One sector.** Consider reallocation of no more than the difference between the maximum annual harvest in the last five years and the ACL from the underharvesting sector. Consider a minimum threshold for the difference to avoid reallocating insignificant portions of the ACL.
 - c. **Neither.** Current fisheries have not been limited by the ACLs. Consider recent proportions of total landings in allocations. If one sector has recently shown significant growth, consider this trend in setting future allocations.



Draft Decision Tree Questions: Landings



- Potential analysis:
 - Landings and ACL by sector time series.
 - Time series of any ACL-induced closures and when those closures occurred.



Draft Decision Tree Questions: Stock Status

Stock Status: Has stock status been determined?

Answers:

1. Yes. What is the stock status?

- a. **Overfished/Overfishing.** *Prioritize reallocation towards a sector if that could increase biomass (via increased survivorship, particularly of juveniles and adult females) or decrease dead discards.*
- b. **Overfished/Not Overfishing.** *Prioritize reallocation towards a sector if that could increase biomass (via increased survivorship, particularly of juveniles and adult females).*
- c. **Not Overfished/Overfishing**
 - i. **Does one sector typically underharvest its ACL?**
 1. **Yes.** *Consider reallocation of harvest from the underharvesting sector to the overharvesting sector, without inhibiting the underharvesting sector's ability to maintain current harvest levels. Also consider other measures to help the overharvesting sector achieve its ACL.*
 2. **No.** *Prioritize any reallocation to sector that has fewer dead discards. Also consider other measures to help both sectors achieve their ACLs.*
 3. **Not Overfished/Not Overfishing** - *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*



Draft Decision Tree Questions: Stock Status

1. **No; stock status is unknown. Is there an adequate index of abundance showing population trends?**
 - a. **Yes. Is the population growing, stable, or decreasing?**
 - i. **Stable or Growing.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*
 - ii. **Decreasing.** *Prioritize reallocation towards a sector if that could increase biomass (via increased survivorship, particularly of juveniles and adult females) or decrease dead discards.*
 - b. **No.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*



Draft Decision Tree Questions: Stock Status

National Marine Fisheries Service - 4th Quarter 2020 Update
Table A. Summary of Stock Status for FSSI Stocks

Jurisdiction	FMP	Stock	Overfishing? (Is Fishing Mortality above Threshold?)	Overfished? (Is Biomass below Threshold?)	Approaching Overfished	Management Action Required	Rebuilding Program Progress	B/B _{MSY}	Points
SAFMC	Snapper-Grouper Fishery of the South Atlantic Region	Red grouper - Southern Atlantic Coast	No	Yes	NA	Continue Rebuilding	Year 10 of 9-year plan	0.29	2
SAFMC	Snapper-Grouper Fishery of the South Atlantic Region	Red porgy - Southern Atlantic Coast *	Yes	Yes	No	Reduce Mortality, Continue Rebuilding	Year 23 of 19-year plan	0.27	1
SAFMC	Snapper-Grouper Fishery of the South Atlantic Region	Red snapper - Southern Atlantic Coast	Yes	Yes	NA	Reduce Mortality, Continue Rebuilding	Year 11 of 35-year plan	0.16	1
SAFMC	Snapper-Grouper Fishery of the South Atlantic Region	Scamp - Southern Atlantic Coast	No	Unknown	Unknown	NA	NA	not estimated	1.5
SAFMC	Snapper-Grouper Fishery of the South Atlantic Region	Snowy grouper - Southern Atlantic Coast	No	Yes	NA	Continue Rebuilding	Year 16 of 34-year plan	0.49	2
SAFMC	Snapper-Grouper Fishery of the South Atlantic Region	Tilefish - Southern Atlantic Coast	Yes	No	No	Reduce Mortality	NA	0.85	3
SAFMC	Snapper-Grouper Fishery of the South Atlantic Region	Vermilion snapper - Southern Atlantic Coast	No	No	No	NA	NA	1.13	4

- Potential analysis:
 - SEDAR stock assessments.
 - Fishery stock status updates from NOAA.



Draft Decision Tree Questions: Economic

Trends in Demand: Are there notable trends in demand for the species?

Answers:

1. **Yes. What is the trend by sector?**
 - a. **Demand is increasing in both sectors.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*
 - b. **Demand is increasing for one sector and not the other.** *Prioritize reallocation towards sector that is exhibiting increasing demand.*
2. **No.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*



Draft Decision Tree

Questions: Economic

- Potential analysis (Trends in Demand):

- Use the following as proxies for demand:

- Trends in ex-vessel price and landings for the commercial sector.
- Trends in directed effort and landings for the recreational sector.

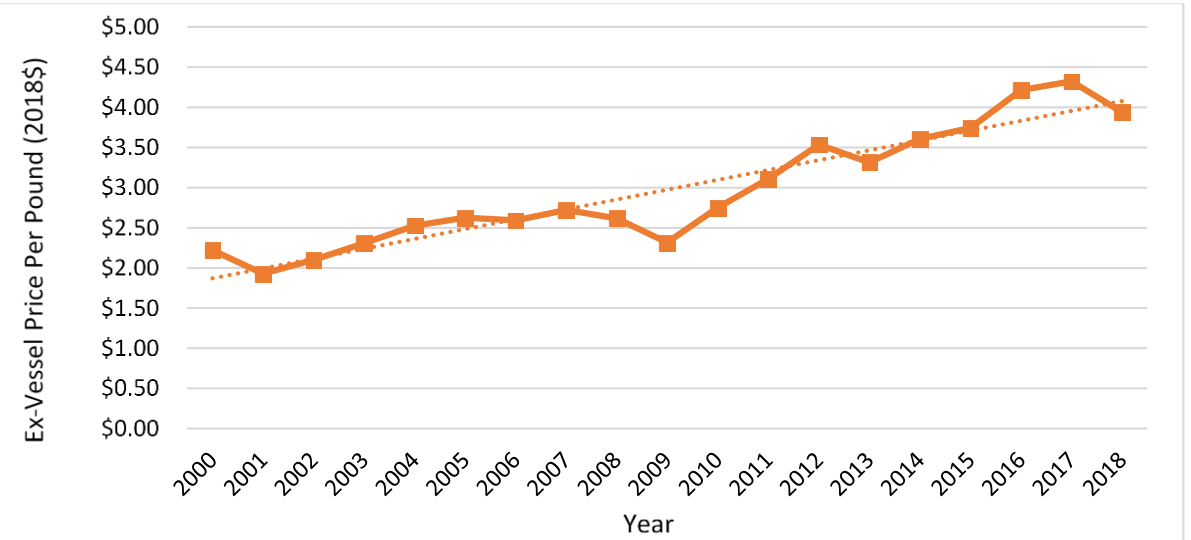


Figure 3. Ex-vessel price for Shadow Shark landings, 2000-2018 (2018 dollars).

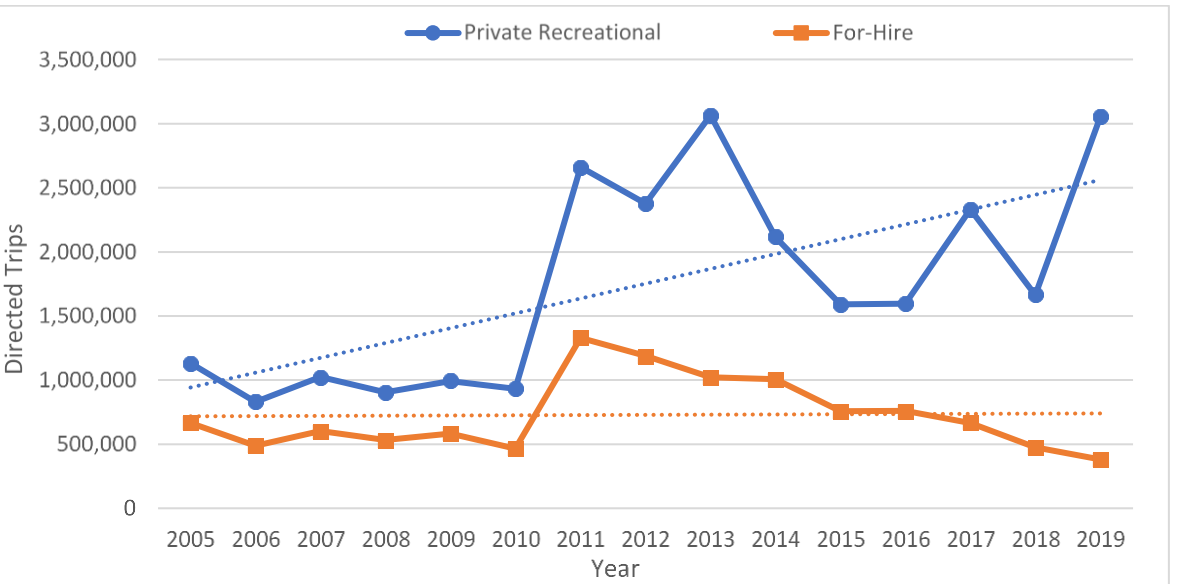


Figure 4. Directed recreational Shadow Shark trips, 2005-2019.



Draft Decision Tree Questions: Economic

Economic Importance: Is the species economically important?

Answers:

1. **Yes.** Is it becoming more economically important?
 - a. **Becoming more important to one sector relative to the other.** *Prioritize reallocation towards the sector for which the species has a higher economic importance.*
 - b. **Becoming important to both sectors.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*
2. **No.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*



Table 3.3.1.4. Number of vessels and dockside revenues by year for vessels that landed blueline tilefish from the South Atlantic, 2012-2016 (2016 dollars).

Year	Number of vessels that caught blueline tilefish	Gross ex-vessel revenue from blueline tilefish	Gross ex-vessel revenue from 'other species' jointly caught with blueline tilefish	Gross ex-vessel revenue from 'other species' caught on SATL trips without blueline tilefish	Gross ex-vessel revenue from all species caught on Gulf trips	Total gross ex-vessel revenue	Average total gross ex-vessel revenue per vessel
2012	125	\$730,580	\$1,122,941	\$7,389,313	\$598,485	\$9,841,319	\$78,731
2013	129	\$620,582	\$1,752,682	\$7,813,566	\$193,055	\$10,379,885	\$80,464
2014	138	\$398,833	\$1,684,712	\$9,802,364	\$522,476	\$12,408,385	\$89,916
2015	124	\$233,927	\$1,062,592	\$8,120,484	\$822,735	\$10,239,738	\$82,579
2016	155	\$356,290	\$2,017,875	\$9,269,234	\$813,393	\$12,456,792	\$80,366
Average	134	\$468,042	\$1,528,160	\$8,478,992	\$590,029	\$11,065,224	\$82,411

Source: SEFSC Coastal Fisheries Logbook (Accessed June 2018).

Table 2. Top ten species managed by the South Atlantic Council ranked by directed recreational fishing trips and by weight of recreational landings, average from 2016-2019.

Top Ten Species by Directed Trips		Top Ten Species by Weight of Harvest	
Species	Directed Trips ^{1,2}	Species	Pounds Landed (ww)
Dolphin	938,251	Dolphin	6,537,000
Spanish Mackerel	866,158	Shadow Shark	1,662,074
King Mackerel	474,676	King Mackerel	1,455,438
Gray Snapper	444,020	Wahoo	1,282,298
Shadow Shark	417,566	Spanish Mackerel	1,054,063
Yellowtail Snapper	352,616	Greater Amberjack	1,040,608
Black Sea Bass	203,718	Yellowtail Snapper	792,158
Mutton Snapper	163,440	Gray Snapper	604,224
Wahoo	96,688	Mutton Snapper	536,164
Gray Triggerfish	84,595	Red Snapper	355,073

Draft Decision Tree Questions: Economic

- Potential analysis (Economic Importance):
 - Logbook information to determine commercial importance through a comparison of gross revenue from a species to total revenue.
 - Potentially compare some metric of directed effort for all SAFMC-managed species in the appropriate region as a proxy for recreational importance.



Draft Decision Tree Questions: Economic

Change in Net Benefits: Are there clear indications that changing allocations will likely yield an increase in net economic benefits?

Answers:

- 1. Yes.** *Prioritize reallocation towards the sector that would likely result in an increase in net economic benefits from additional ACL.*
- 2. No.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*

Potential data analysis:

- Historical use of sector ACL.
- Projected use of new ACL under the status quo allocation.



Draft Decision Tree Questions: Economic

Pareto Improvement: Is it possible to make one sector better off without economically harming the other sector?

Answers:

1. **Yes.** *Prioritize reallocation towards the sector that would likely result in an increase in net economic benefits from additional ACL.*
2. **No.** *Consider maintaining current allocations or basing changes to allocations on other factors addressed in other decision trees.*

Potential data analysis:

- Historical use of sector ACL.
- Projected use of new ACL under the status quo allocation.



SEP Discussion Questions: Economic

1. Keeping in mind the need to focus on readily available data and completion of the decision tree in a relatively short time (several weeks to a few months), does the SEP feel that the set of questions presented covering economic topics is adequate?
2. Are there additional economic-related questions or topics that should be covered in this portion of the decision tree approach? Are there questions that should be removed?
3. Does the SEP feel that the outline potential data analyses are adequate? Are there other readily available analyses or data sources that should be examined?
4. Are the resulting recommendations from the economic decision trees appropriate? Will they help guide allocation decisions without being too prescriptive?



Draft Decision Tree Questions: Social

Fishery Dependence: Among communities with a high regional quotient, are most of them engaged in commercial fishing, recreational fishing, or both?

Answers:

- 1. Most are highly engaged in commercial fishing.**
 - a. Are commercial fishermen dependent on the resource for their livelihood (local quotient)?**
 - i. Yes.** *Consider prioritizing commercial fishing opportunities.*
 - ii. No.** *Review fishing opportunities for associated species and consider whether adjustments to focus species allocations are necessary.*
- 2. Most are highly engaged in recreational fishing.**
 - a. Are recreational fishermen dependent on the resource for trip satisfaction (directed trips)?**
 - i. Yes.** *Consider prioritizing recreational fishing opportunities.*
 - ii. No.** *Review fishing opportunities for associated species and consider whether adjustments to focus species allocations are necessary.*
- 3. Equally engaged in commercial and recreational fishing.** *Consider removing sector allocations or allocating equally between the sectors.*



Draft Decision Tree Questions: Social

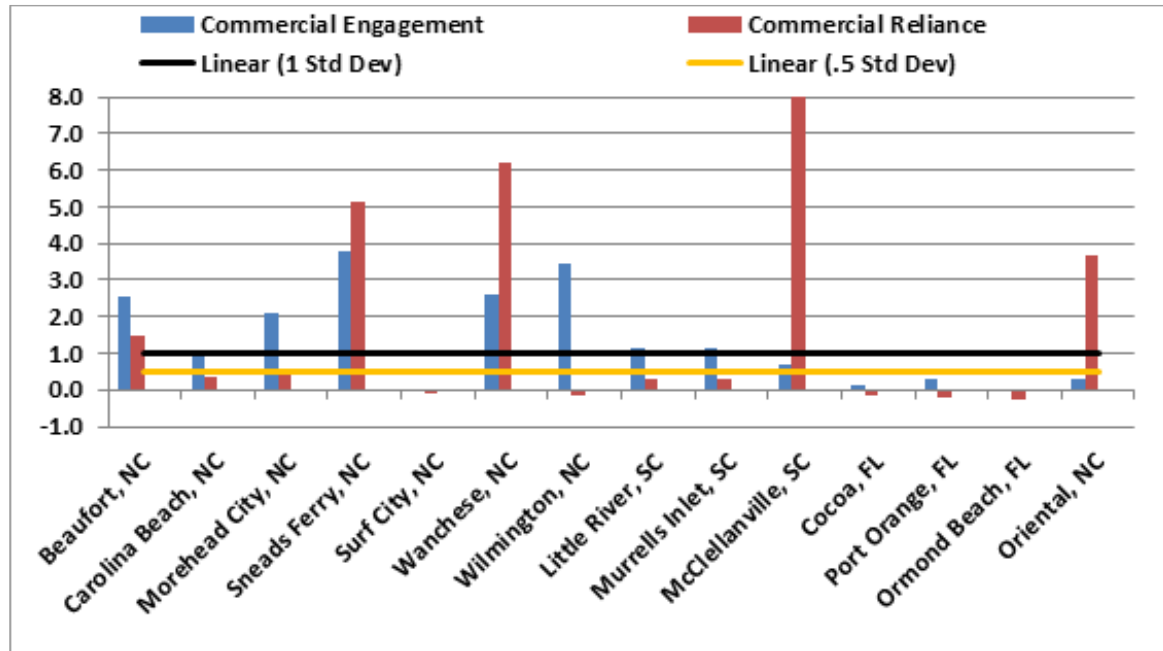


Figure 5. Commercial fishing engagement and reliance for top Shadow Shark fishing communities.

- Potential analysis (Fishery Dependence):
 - Social indicators including commercial and recreational fishing engagement, regional quotient, and local quotient.



Draft Decision Tree Questions: Social

Cultural Importance: Does the fishery play an important role in the history of fishing communities?

Answers:

- 1. Yes. Does the fishery play an important role in community cultural tradition?**
 - a. Yes. Have changes in the regulatory environment effected the role this species plays in communities?**
 - i. Yes. Consider allocations that mirror the historical real or de facto allocations and/or current values in the fishery.*
 - ii. No.** *Consider allocations that prioritize biological/ecosystem needs.*
 - b. No.** *Consider allocations that mirror the historical real or de facto allocations.*
- 2. No.** *Consider allocations that reflect the current state of the fishery and would allow for growth and adjustment.*



Draft Decision Tree Questions: Social



Ben Hartig's Oral History Interview:

<https://voices.nmfs.noaa.gov/benjamin-hartig>

Photo Credit: John Carmichael

- Potential analysis (Cultural Importance):
 - Summary of information provided in fishery performance reports
 - Oral histories found in NOAA's Voices database.



SEP Discussion Questions: Social

1. Are there additional sociocultural-related questions or topics that should be covered in this portion of the decision tree approach? Are there questions that should be removed?
2. Does the SEP feel that the outlined data analyses are adequate? Are there other readily available analyses or data sources that should be examined?
3. Given the need to complete any decision tree related analysis in a short amount of time, what is the best way to summarize and present available qualitative data?
4. Should the vulnerability social indicators be incorporated into the social decision trees?
5. Are the resulting recommendations from the social decision trees appropriate? Are they clear enough to guide allocation decisions without being too prescriptive?
6. Should questions listed in the decision trees be posed to Advisory Panels when conducting Fishery Performance Reports?



Topics Initially Considered by Removed from the Decision Tree Approach

- **Bycatch rates, discard rates, and mortalities**
 - Examples: Higher discard rate, mortality by sex/maturity stage, greater juvenile or female mortality, potential for protogyny, one sector more directly fishing on spawning aggregations.
 - Rationale for non-inclusion: Difficult to address through allocation changes or may be addressed through fisheries management measures other than allocations.
- **Effort by gear, catch by location, changing distribution of stock due to climate change or other factors**
 - Examples: Effects from different gears or fishing locations, effects of gear on habitat, shifting migration patterns.
 - Rationale for non-inclusion: Potentially important consideration in analysis of allocation decisions but not an informative measure to use in initial allocation decisions before the Council has developed allocation alternatives for a species.
 - Intent of the Decision Tree approach is to aid the Council in signaling the need for reallocation when first addressing the topic for a species.
 - Other than commercial allocations of King and Spanish Mackerel, the Council does not currently implement notable regional or location-based allocations.



Working with Decision Tree Results

- Possible that not all decision trees are going to have input every time for every species.
- Not likely that all decision tree “nodes” will point to the same sector allocation recommendation.
 - Consider a single rank order to the four decision trees?
 - Weight outcome of each major topic ahead of time
 - Go with the preponderance of the decision tree recommendations?
 - Majority rules
 - Assign no rank or order?
- Consider example



Timeline for the Development of the Decision Tree Approach

Table 3. Timeline for development of the decision tree approach to allocations.

TOR	TASK	DEADLINE
ONE	Draft questions developed for landings history, stock assessment results, and biological/ecosystem decision trees.	Complete
	Draft questions developed for economic and social decision trees.	Complete
	Draft order and branching of landings history, stock assessment results, and biological/ecosystem decision trees determined.	Complete
	Draft order and branching of economic and social decision trees determined.	Complete
	Descriptions of each decision tree (question reasoning, branching logic).	Complete
	Council Update at the March 2021 meeting.	Complete
	Draft Blueprint including decision tree descriptions and details on how they can be used when developing allocation alternatives and decisions.	Complete
TWO	Draft Blueprint reviewed by the SSC and SEP.	April 2021
	Draft Blueprint sent to SERO and SEFSC for review.	May 2021
	Draft Blueprint reviewed by Council AP members.	Summer 2021
THREE	Draft Blueprint demonstrated to the Council.	September 2021
FOUR	Final Allocation Decision Trees Blueprint	December 2021



SEP Discussion Questions: General

1. Given the overlap of some information that falls across multiple topics, such as landings or importance of a fishery to a given sector, does the SEP suggest the continued use of a “siloes approach” where the decision tree questions remain organized by subject (Social, Economic, Landings, Stock Status) or should a more mixed approach be used, where appropriate, crossing multiple topics in one branch of the decision tree? For example, the overarching topic of landings could be addressed using biologic, social, and economic questions.
2. Does the SEP feel that the use of a decision tree method as outlined would be useful for the Council to systematically and objectively examine allocations?
3. It is likely that the outcomes of working through the decision tree will vary by topic.
 - a. To provide the Council more conclusive guidance, should some topics be weighted more heavily than others? If so, which ones should be prioritized?
 - b. Would it be better to not provide a weighting to the topics and rely on a “majority rules” approach where each topic has equal ranking and the Council should consider allocation decisions based on net outcome of the topics. For example, if three of the five topics point towards additional allocation to the sector, the Council would be encouraged to prioritize additional ACL to that sector.

