ASMFC Risk and Uncertainty Policy Workshop

Workshop Structure

- Clicker Training
- Brief introduction
- Workshop participants will step through decisions
  - Will go through all decisions for full understanding of the process
  - Participants will use clickers to make decision, majority vote will be the decision
- Review results
- Next steps

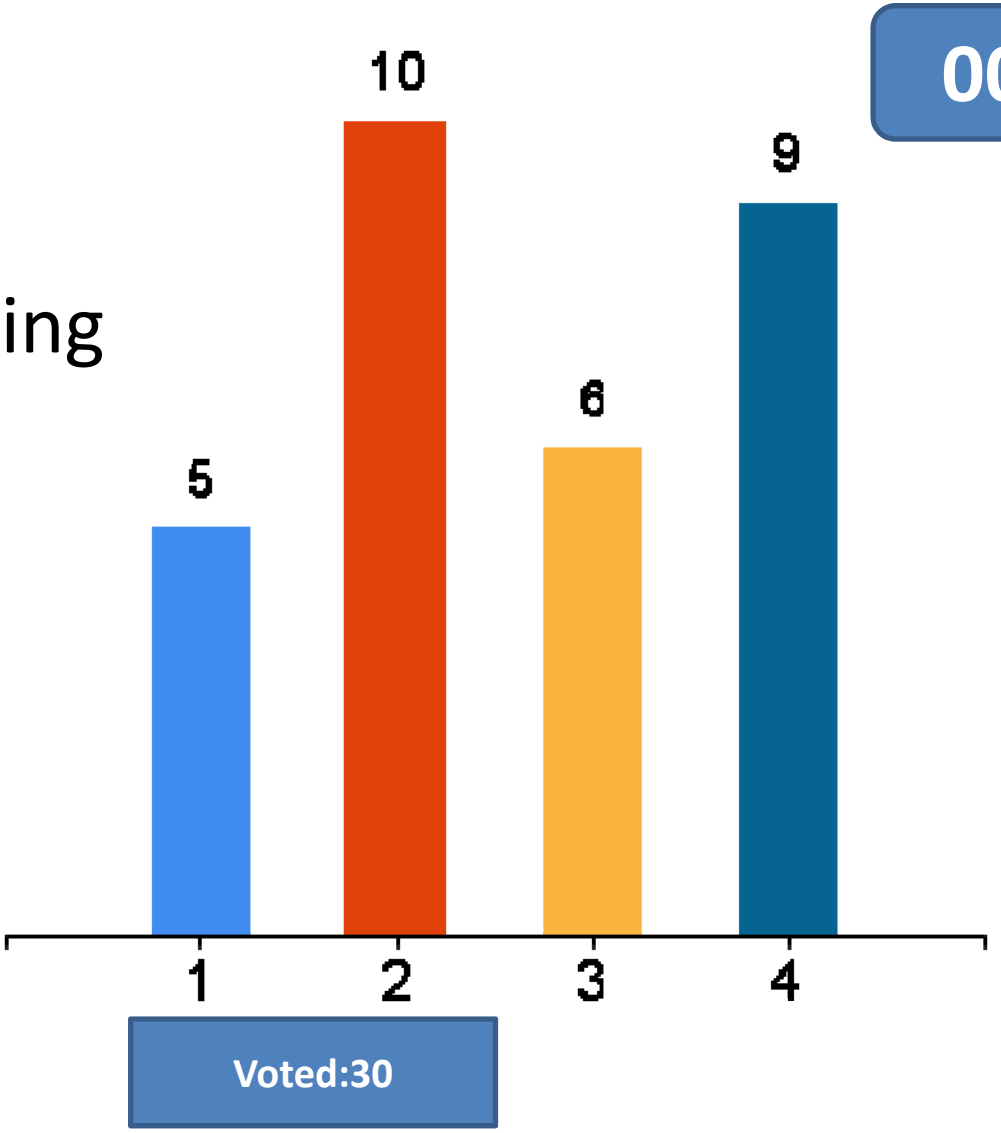
START… YOUR… CLICKERS!

- We will start with test run of the clickers

- There will be a question at the top of the slide
  - Read the question
  - Decide on your answer
  - Click the corresponding button

What Is Your Favorite Olympic Sport?

1. Curling
2. Downhill Skiing
3. Luge
4. Other



Introduction

- This process could be used for many different risk decisions made by the ASMFC
  - Creates a systematic process to meet the ASMFC's risk policy goals
- We will concentrate today on a decision process to get to an Ftarget
- The example you requested is for striped bass
- The goal of the workshop is to give a tangible sense of how this process can work

Introduction

- The values assigned at this point are not real, but are used to keep things tractable
  - As we will note in the next steps, further refinement will be needed from the TCs

- Discussion at this point is to not do this in an omnibus fashion, but to go species by species, customizing as appropriate for each species

Introduction

- The Decision Tree is broken in to 4 tiers
  - Initial decision to conduct management
  - Decision based on information available
  - Quantifiable decisions
  - Qualitative decisions

- Flexibility is a key element for the Risk Policy

- Once we step through the questions, we will end up with a Board-preferred probability with regard to being at or below Ftarget for quota setting, projections, etc.

Striper Example

- Risk policy is triggered by a determination that management action is needed
- Based on previous discussions, the first step is to determine what kind of assessment we are dealing with
- Starting you off easy, here is the first decision: For striper, it is data rich (as opposed to data poor)
- As a starting point, will assume **50%** probability of meeting management goals is the default
  - Can be customized by species and/or assessment type

Striper Example

Initial Decision

Management Action Needed – Management Goal Should Be Defined; Example is Ftarget

Decision on Information Available

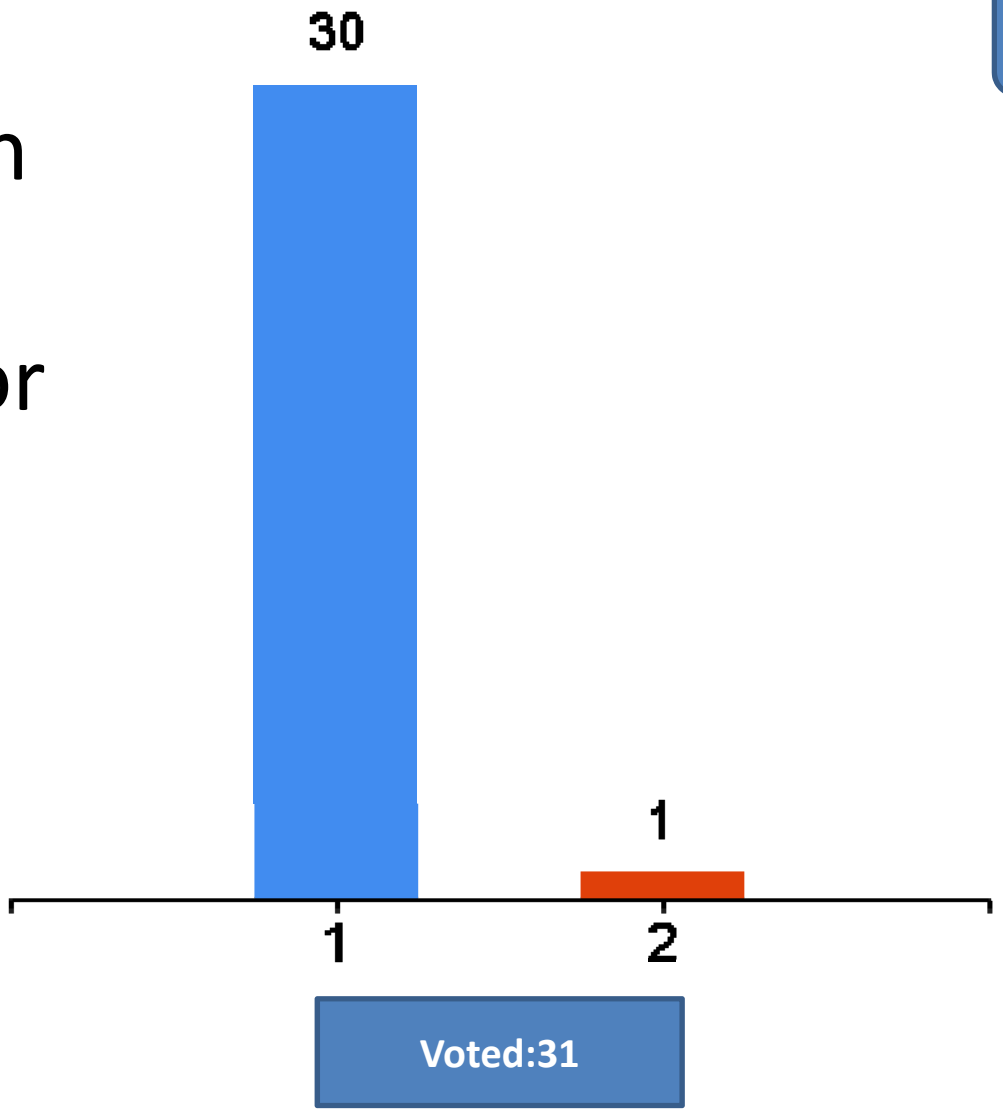
Data Rich

Data Poor

Is the species data rich or data poor?

00:00

1. Data Rich
2. Data Poor



Striper Example

- Data rich and data poor will likely have separate decision trees, or at least will dictate the range of available risk outcomes
- Next is to determine stock status
- The strategy will be to review the “Species Matrix” for most of the needed info
- Here we will assign a value of 2.5% for each decision, so if stock status is good, subtract 2.5%, and vise versa

Striper Example

FMP	**Atlantic Striped Bass- Amendent 6 and A**	*"Complete this table with information about current conditions for the stock/fishery based on the most recent assessment and round of fishery specifications. This is an inventory of current conditions - not a "wish list."*
STOCK(S)	**Atlantic stock (Kennebec River?, Hudso**	
Is the stock jointly ma	**NO, moratorium on possession in federa**	*Information provided in the cells should relate specifically to evaluating the risks to the resource*
LAST ASSESSMENT	**57th SAW/SARC, 2013 Benchmark; 2016**	

Assessment Model, Terminal Year	Description of Assessment	Overfishing? Overfished?	In Rebuilding Program?	FMP Defined Overfishing Target	FMP Defined Overfished	ACL	ACT
Age-structured forward projecting statistical catch-at-age model, 2015	Estimates numbers-at-age through time given model estiamtes of recruitment and age-specific total mortality. Generalized to allow specification of multiple fleets. Data from 1982-present	Overfishing not occuring (F_{2015}=0.16, $F_{threshold}$=0.22) Not overfished (SSB_{2015}=58,853MT, $SSB_{threshold}$=57,626MT)	NO	For the Atlantic stock, overfishing is occuring when the fishing (F) mortality threshold (0.22) is exceeded. F threshold is defined as the level of F that will achieve the spawning stock biomass	No set ABCs. The stock is considered overfished when the spawning stock biomass (SSB) falls below the threshold level. SSB threshold is currently 57,626MT, and is equivalent to		

Issue 1: SSB has steadily declined towards the threshold level since 2004. F reference points were updated in the 2013 benchmark, and F in 2014 was estiamted to be above the target thus triggering management action. Addendum IV, implemented in 2015, required a 25% reduction in harvest along the coast and 20.5% in the Chesapeake Bay in order to reduce F to a level at or below the new target by 2016. Addendum IV succeeded in reducing F below the target (0.16 in 2015), however, SSB continues to decline and was estimated just above the threshold in 2016. If SSB drops below the threshold, the Board will be required to adjust the program to rebuild SSB. Also, 2016 removals were estimated at 3.56 million fish, which is a 19% increase relative to 2015.

Issue 2: Public comment received regarding concern over economic harships endured by Chesapeake Bay stakeholders in 2015 following implementation of Addedum IV regulations. Board initiated an addendum to consider relaxing Addendum IV regulations in the Bay and across coast, however the Board did not move forward with the addendum due to concerns that relaxing regulations would result in F being above the target and SSB to drop below the threshold. Accordingly, the Board postponed revisiting fishery regulations until after review of the 2018 benchmark assessment.

Discards
Discard estimates are based on the ratio of tags reported from discarded fish in the commercial fisheries to tags reported from discarded fish in the recreational fishery, scaled by total recreational discards. Total discards are allocated to fishing gears based on the relative number of tags recovered by each gear. Discards by fishing gear are multiplied by gear-specific release

Availability of Biological and Assessment Data	*Fisheries-Dependent:* Commercial landings compiled annually via state biologists through strict state and federal quota monitoring systems (i.e., harvester and dealer reports). Reliable commercial discard data is limited to a few states. Recreational information compiled annual via state biologists through NOAA Fisheries MRFSS/MRIP. Catch-at-age data from commercial and recreational catches is also used in assessment. *Fisheries-Independent:* ME, NY, NJ, MD, VA, and NC are required to conduct juvenile abundance index surveys on an annual basis. NY, PA, DE, MD, VA, and NC, are required to conuct SSB surveys on an annual basis. The results of these surveys are reported annually, and are utilized within stock assessments. *Other Ecological Data that may be available but not currently used in assessment:* Telemetry data has become increasingly available in recent years , ID other biological data that may be available but not used in assessment
Recent Management Performance	Although the commercial quotas were reduced in 2015 through management action, commercial harvest has been stable from 2014-2016 (by weight and by numbers). Estimates of commercial dead discards were extremely high in 2014 (almost double the 10-year average) and were estimated below average in 2015 and 2016. Recreational measures have resulted in a variable removals from 2014-2016 (by weight and by number) with a 22% increase in removals by numbers in 2016 compared 2015; 2014 levels were similiar to 2016. The overall trend in recreational catch is similar to that of SSB; steady decline since mid-2000s (although a slightly increasing trend in catch since 2012, while harvest trends are relatively constant during that time).
Current Management Program	Coastal commercial fisheries managed through hard state-by-state quota allocation (established in Amendment 6 and Addendum IV), and seasons. Chesapeake Bay commercial fisheries managed through seasons, and hard quota allocation via forward projecting model based on recruitment in the Bay. Recreational fisheries managed through seasons, bag limits and minimum size restrictions. Possession of striped bass in the EEZ has been prohibited since 1990. Management triggers: (1) if the overfishing occurs, the Board must take action to reduce F to a level at or below the target within one year, (2) if overfished, the Board must take action to rebuild the SSB to the target level within a specfiic rebuilding schedule (not to exceed 10 years), (3 and 4) If F target is exceed in two consecutive years and SSB falls below the target in either of those years, or visa versa, then the Board must take action to reduce F to a level at or below the target within one year, or rebuild SSB to a level at or above
Catch, Revenues, and Variability	3 yr avg (2014-2016) catch is as follows: Commercial- 9.2 million pounds (866,113 fish), Recreational- 20.7 million pounds (7.6 million fish), Com dead discards- 545,257, Rec dead discards- 815,506 fish. 10 yr avg (2005-2014) catch is as follows: Commercial- 8.3 million pounds (864,962 fish), Recreational- 30.2 million pounds (2.8 million fish), Com dead discards- 535,377 fish, Rec dead discards- 807,280 fish. Average commercial value is $21.9 million (SAFIS, 2012-2014). No reliable
Data - Vessels, Permits, Dealers, Processors, Employment	*For the most recent three years, number of vessels by permit and/or gear (and % of active/inactive), and percentage of catch taken by each category;* *Briefly summarize shoreside components- number of active dealers, processors/plants; ID and summarize any available employment information;* *Characterize trends and variability over 10 to 15 years, depending on data availability, using avg, min, and max values*
% Commercial, % Recreational	Recreational harvest is the largest source of removals; 80% of total landings by weight and 70% by numbers from 2014-2016 (not including dead discards). Although variable, recreational dead discards are generally the same magnitute as commercial harvest by numbers (higher some years, and lower in other). Commercial dead discards are the largest source of uncertainty in removals estiatmes and are extremely variable from year to year (average is 0.5 million fish from 2014-2016). Majority of landings come from MA, NY, NJ (recreational only) and the Chesapeake Bay fisheries.

Striper Example

FMP	**Atlantic Striped Bass- Amendent 6 and Addenda I-IV**
STOCK(S)	**Atlantic stock (Kennebec River?, Hudson River, DE Bay, Che**
Is the stock jointly managed?	**NO, moratorium on possession in federal waters**
LAST ASSESSMENT	**57th SAW/SARC, 2013 Benchmark; 2016 update**

**Complete this table with information about current conditions for the stock/fishery fishery specifications. This is an inventory of current conditions - not a "wish list."*

Information provided in the cells should relate specifically to evaluating the risks to

Assessment Model, Terminal Year	Description of Assessment Model	Overfishing? Overfished?	In Rebuilding Program?	FMP Defined Overfishing Target and Threshold	FMP Defined Overfished Target and Threshold
Age-structured forward projecting statistical catch-at-age model, 2015	Estimates numbers-at-age through time given mode estiamtes of recruitment and age-specific total mortality. Generalized to allow specification of multiple fleets. Data from 1982-present.	Overfishing not occuring (F_{2015}=0.16, F_{thresh}=0.22) Not overfished (SSB_{2015}=58,853MT, SSB_{thresh}=57,626MT)	NO	For the Atlantic stock, overfishing is occuring when the fishing (F) mortality threshold (0.22) is exceeded. F threshold is defined as the level of F that will achieve the spawning stock biomass threshold.	No set ABCs. The stock is considered overfished when the spawning stock biomass (SSB) falls below the threshold level. SSB threshold is currently 57,626MT, and is equivalent to that level estimated in 1995.

Data rich SCAA model
Overfishing not occurring, Not Overfished

Striper Example

Initial Decision

Management Needed

Decision on Information Available

Data Rich

Data Poor

Overfishing Occurring

No Overfishing Occurring

Unknown

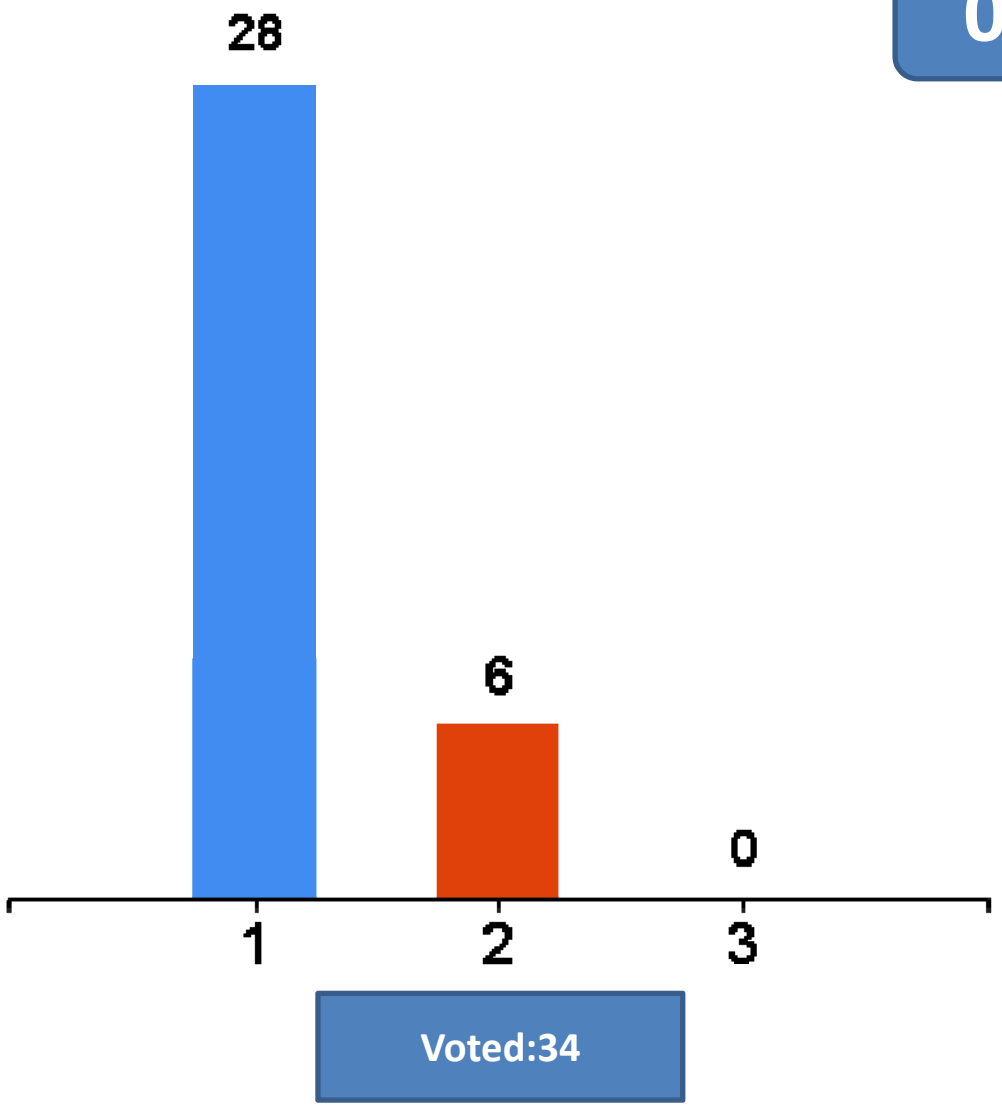
To Be Developed…

Quantifiable Decisions

Is overfishing occurring?

00:00

1. No
2. Yes
3. Unknown

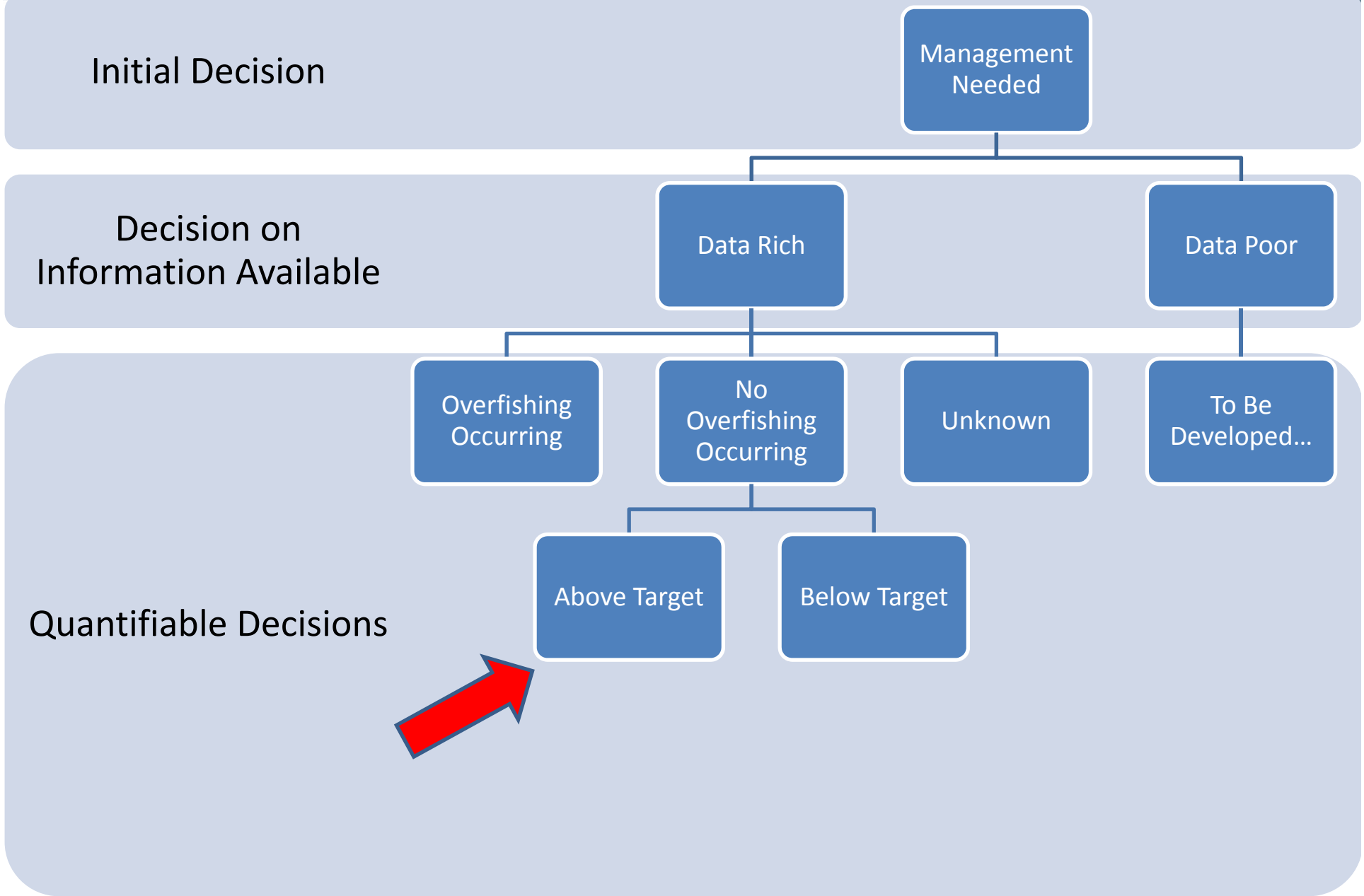


Striper Example

- Once the limit decision has been made, we determine where we are relative to the target

- Continue to use a 2.5% value to add or subtract based on where the population is relative to the target

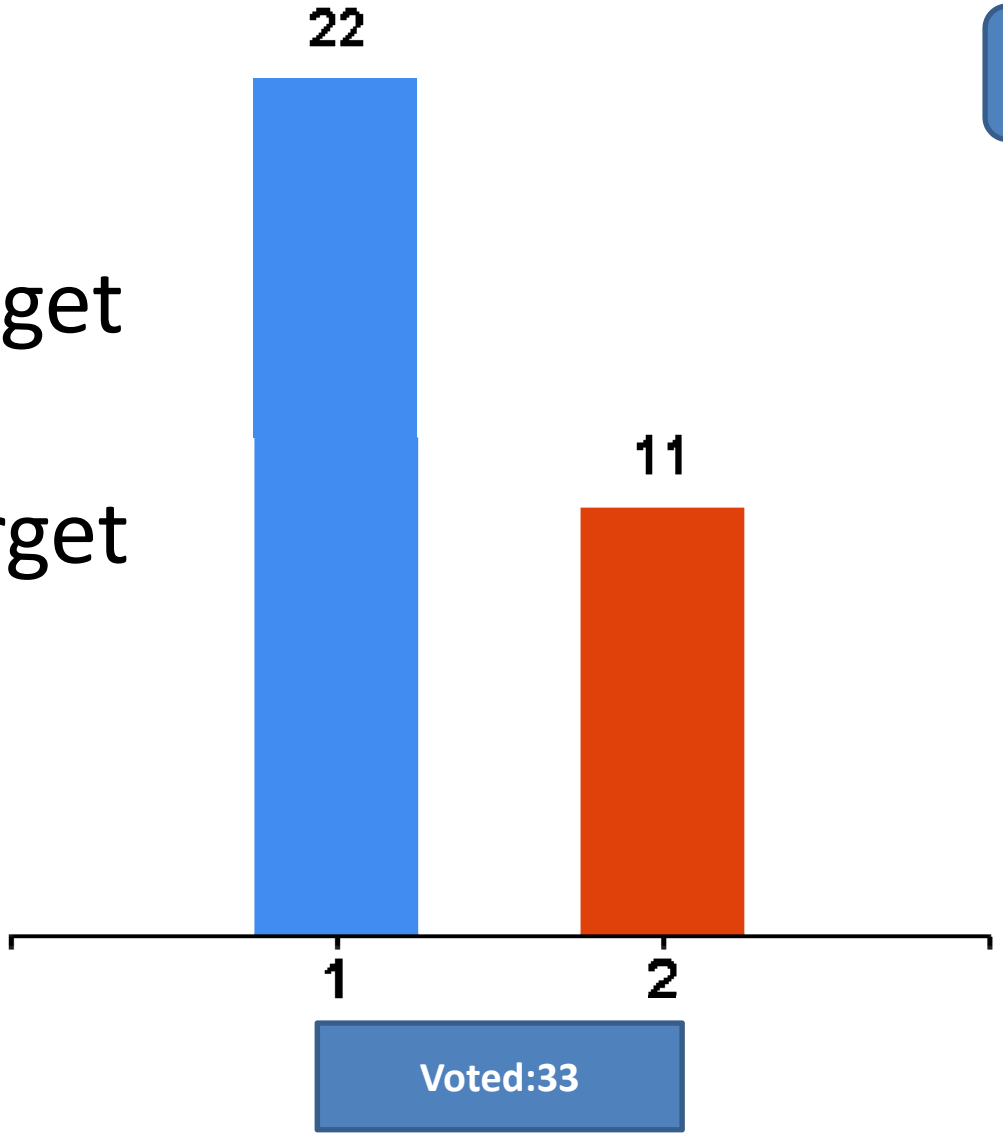
Striper Example



Where is current F in relation to the Ftarget?

00:00

1. Below target
2. Above target

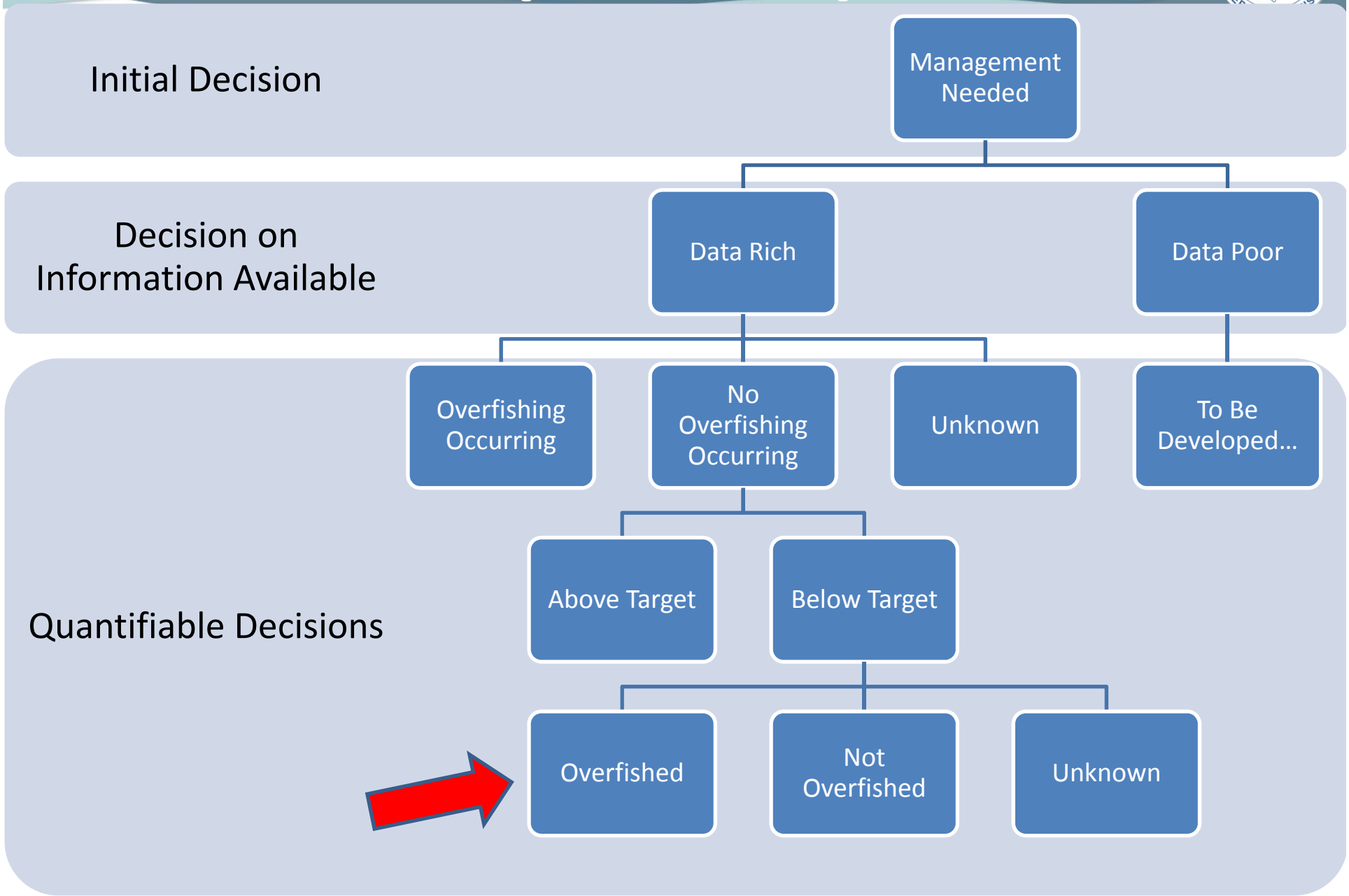


Striper Example

- Next is the overfished status decision

- Same procedure and same scores as discussed previously (2.5%)

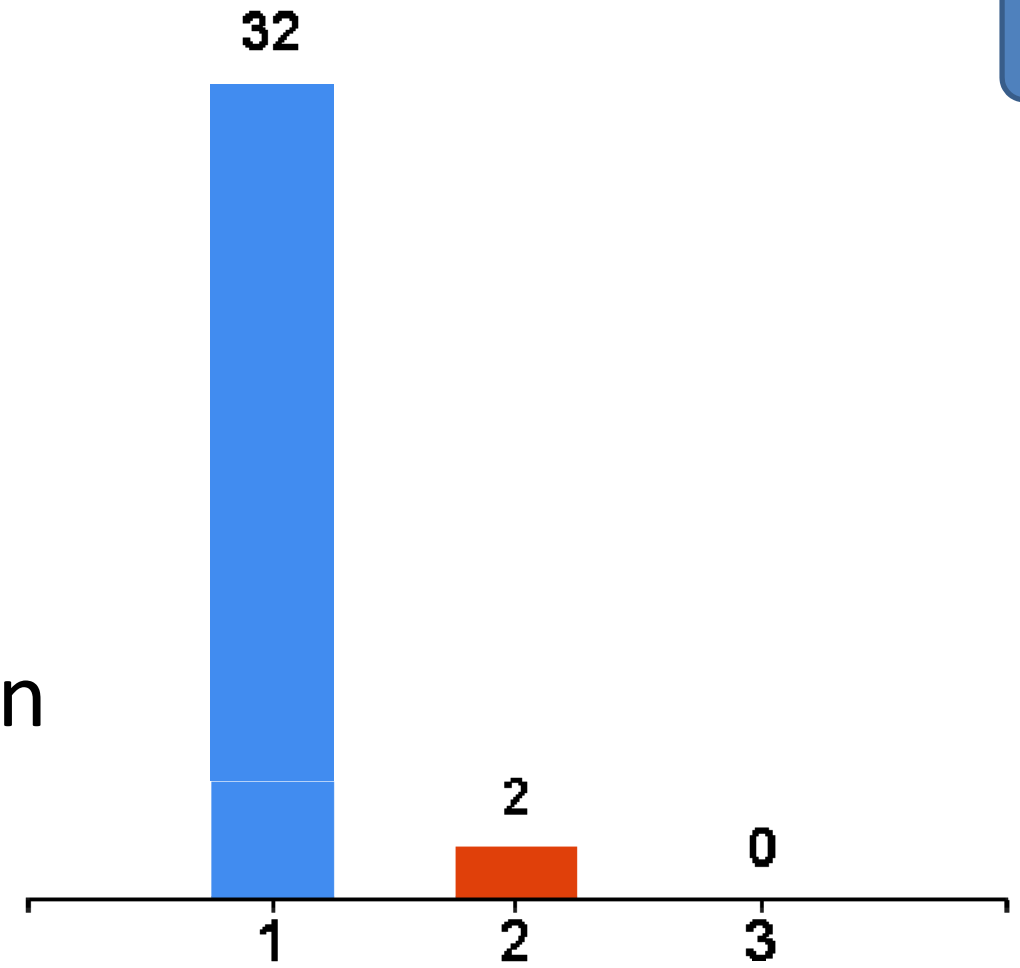
Striper Example



Is the species overfished?

00:00

1. No
2. Yes
3. Unknown



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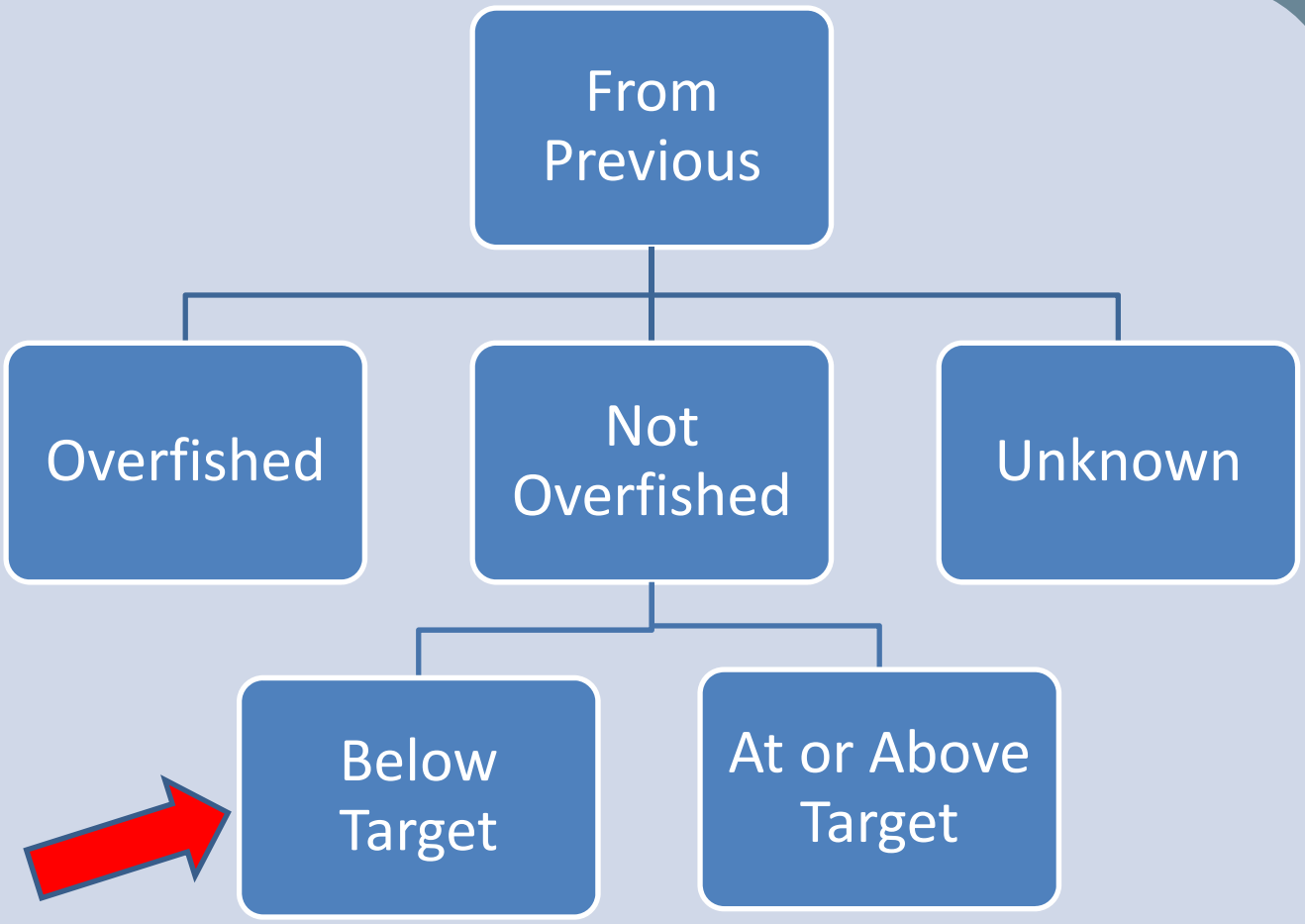
Striper Example

- Once the limit decision has been made, we determine where we are relative to the target

- Same procedure and same scores as discussed previously (2.5%)

Striper Example

Quantifiable Decisions



Where is the species relative to the SSB target?

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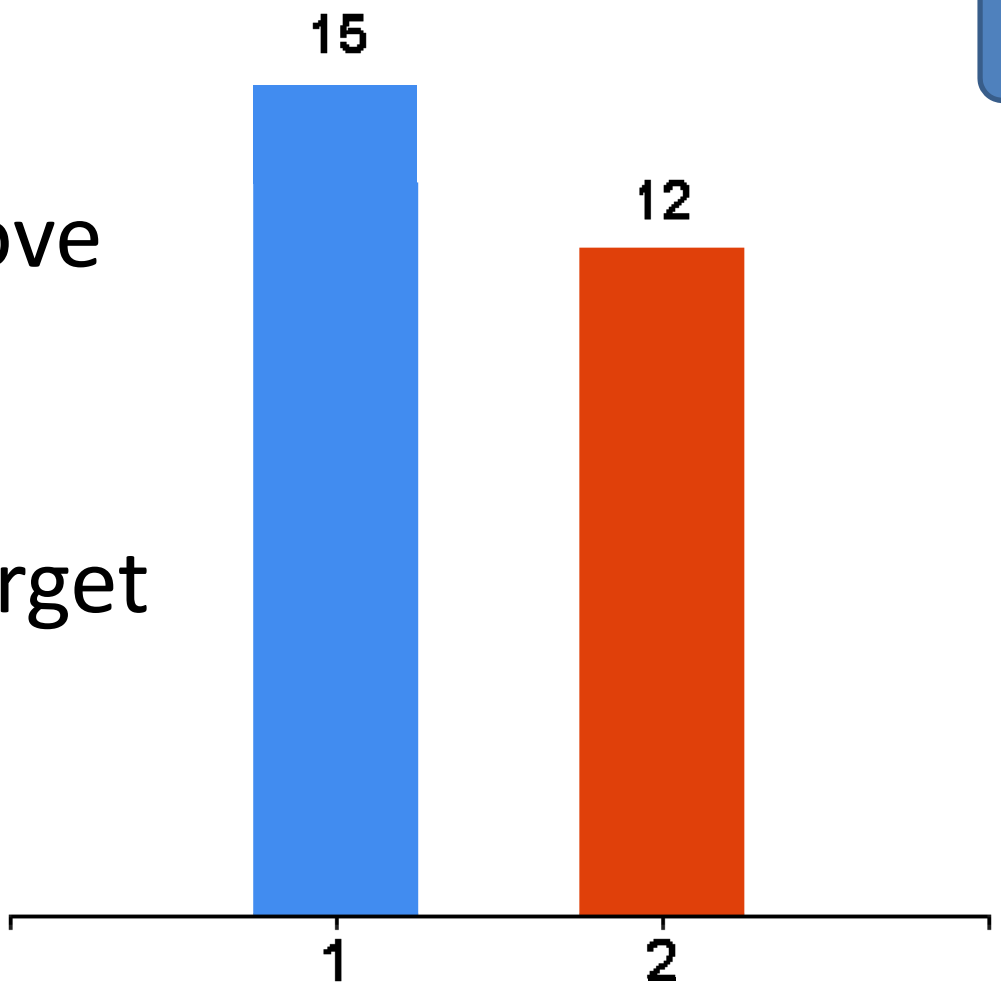
1. At or above target

2. Below target



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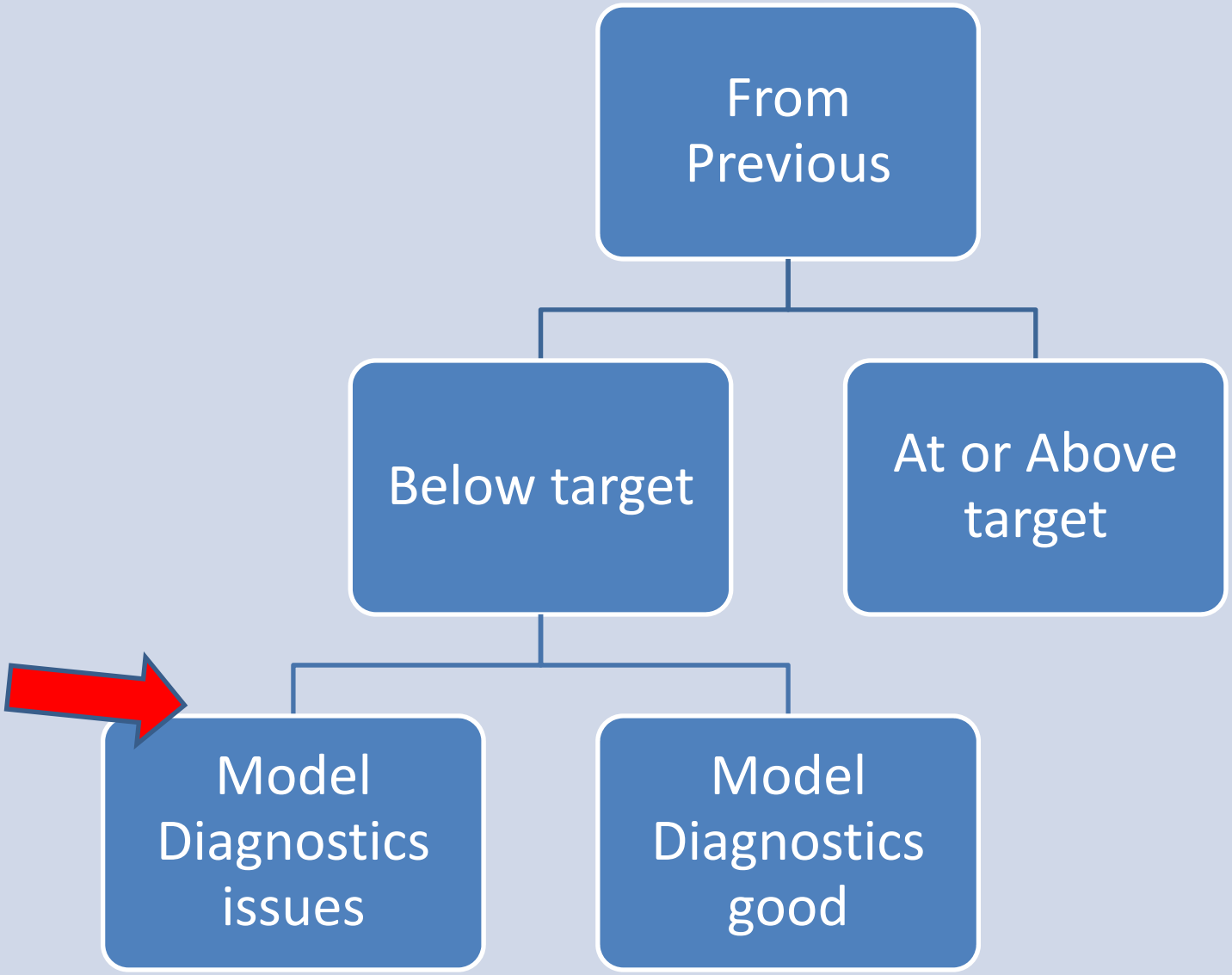
Striper Example

- Next is to consider model diagnostics
  - Important diagnostics: retro, sensitivities, bootstrap bounds, ability to estimate recruitment
- For striper, there is a modest “conservative” retro
- Here we will assign a 5% score

Striper Example

ntifiable
ecisions



How are the model diagnostics?

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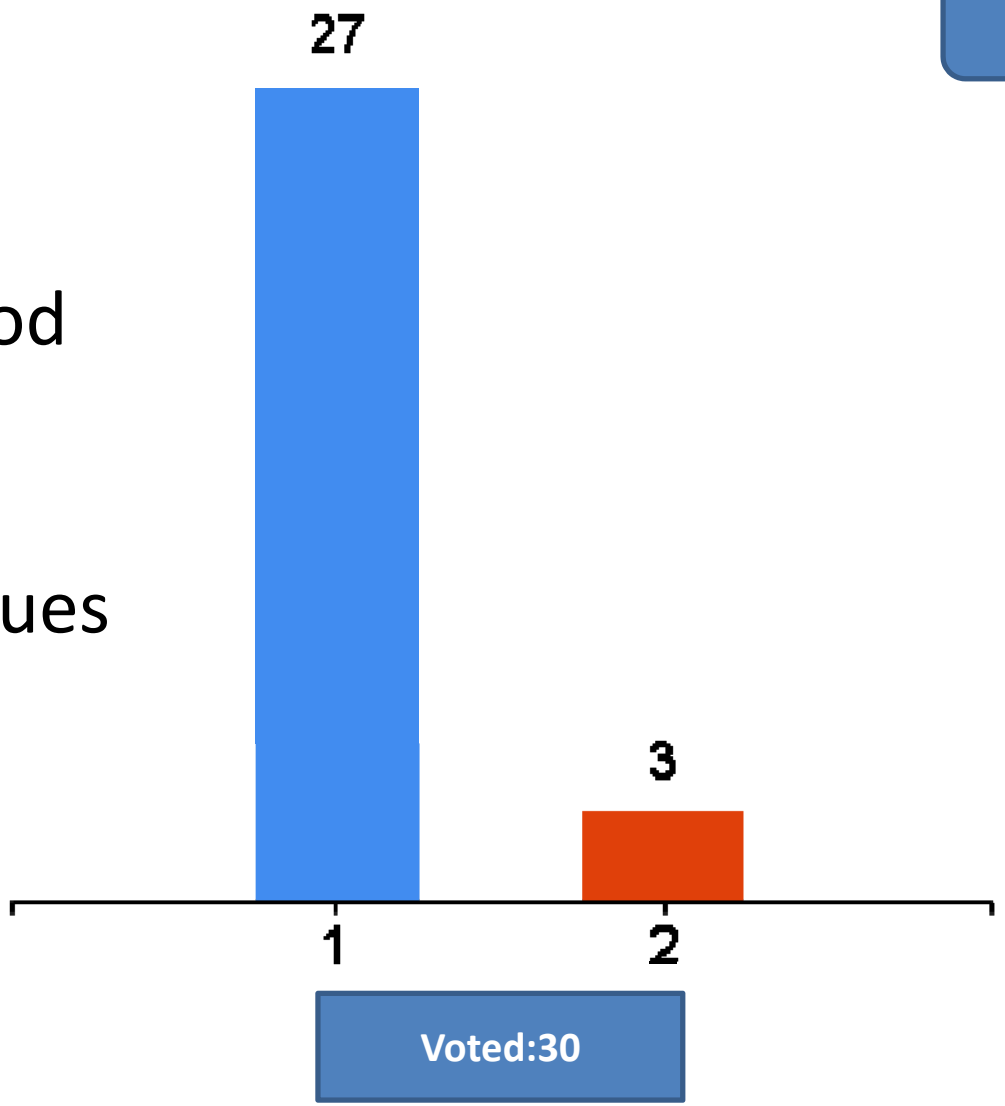
1. Model diagnostics good

2. Model diagnostics issues



Striper Example

- To this point for the striped bass example, there are quantifiable buffers that ***could*** be applied to each step

- The next set of information is trickier to deal with
  - "Flexibility" options

Striper Example

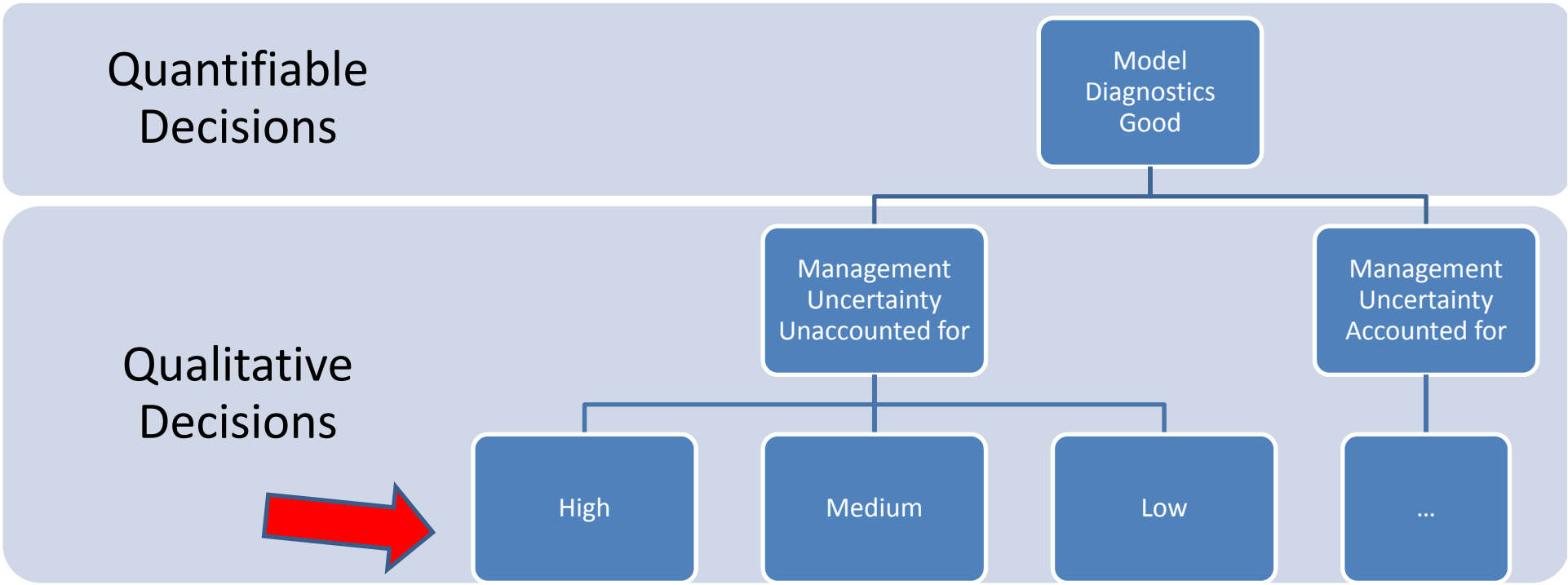
- The next set of questions are more difficult to quantify, though not impossible in all cases

Fishing Communities	*ID Top Fishing Communities for last 3-5 years based on: (RQ) = Revenue of that species in a port/total revenue fishery-wide; and (LQ) = Revenue of that species in a port/total revenue in that port. Characterize trends. Identify any vulnerable communities that may incur significant economic risk from resource decline*
Other Economic/Social Factors	*Identify any other economies/industries that may be dependent on the resource (other than directed fishery); Describe the potential impacts of variability and size composition of resource/catch on market share and prices.*
Major Sources of Scientific Uncertainty	Commercial dead discards is the largest source of uncertainty due to data limitations.
Major Sources of Management Uncertainty	A repeated source of management uncertainty are how to interpret reptrospective analysis and projections of the probability overshooting F and SSB targets and thresholds. Both of these analysis are provided in stock assessment updates and are routinely noted by managers and stakeholders when providing comment on proposed management options.
Interactions with Other Fisheries/Stocks, Bycatch Issues	Anecdotal information suggests that striped bass are caught as bycatch in various fisheries along the Atlantic coast, primarily trawl and gill net fisheries that occur in areas where striped bass are present (e.g., hudson river commercial shad fishery).
Ecosystem Considerations: Trophic Interactions	Bluefish, weakfish, coastal sharks, and other piscivores prey on juvenile striped bass. Adult striped bass compete with these same predators for prey. Adult striped bass prey on a variety of fish and invertebrates depending upon size of the fish and time of year, but menhaden is likely the most significant predator-prey interaction. Anecdotal information suggests that decline in striped bass SSB may be correlated with the recent decreasing trend of menhaden abundance, especially in the Chesapeake Bay which is considered the largest (in terms of recruitment) of the three producer areas for the Atlantic stock (i.e., Hudson, DE Bay, and CB).
Ecosystem Considerations: Habitat	Poor water quality due to elevated nutrient loading in spawning and nursery habitats likely negatively effects recruitment rates. Occurance of mycobacteriosis may also be correlated with elevated nutrient levels.
Ecosystem Considerations: Climate	*Does the stock exhibit strong response to temperature? Has climate change affected the distribution of the stock? Discuss trends/variability over the last 10-15 years, and identify any new related data/analyses*
Other Important Considerations/Notes	*Discuss any other important considerations for evaluating risk to the resource and net benefits to the Nation.*

Striper Example

- A high level question is with regard to management uncertainty
  - Could quantify in a number of ways (simulation, MSE, performance)
  - For striped bass, only a judgement on performance of management towards goals is available
  - Can tier management uncertainty approach for now and assign Low, Medium, and High categories
  - Scores of 2.5%, 5%, 10% to account for uncertainty

Striper Example



Is the management uncertainty accounted for?

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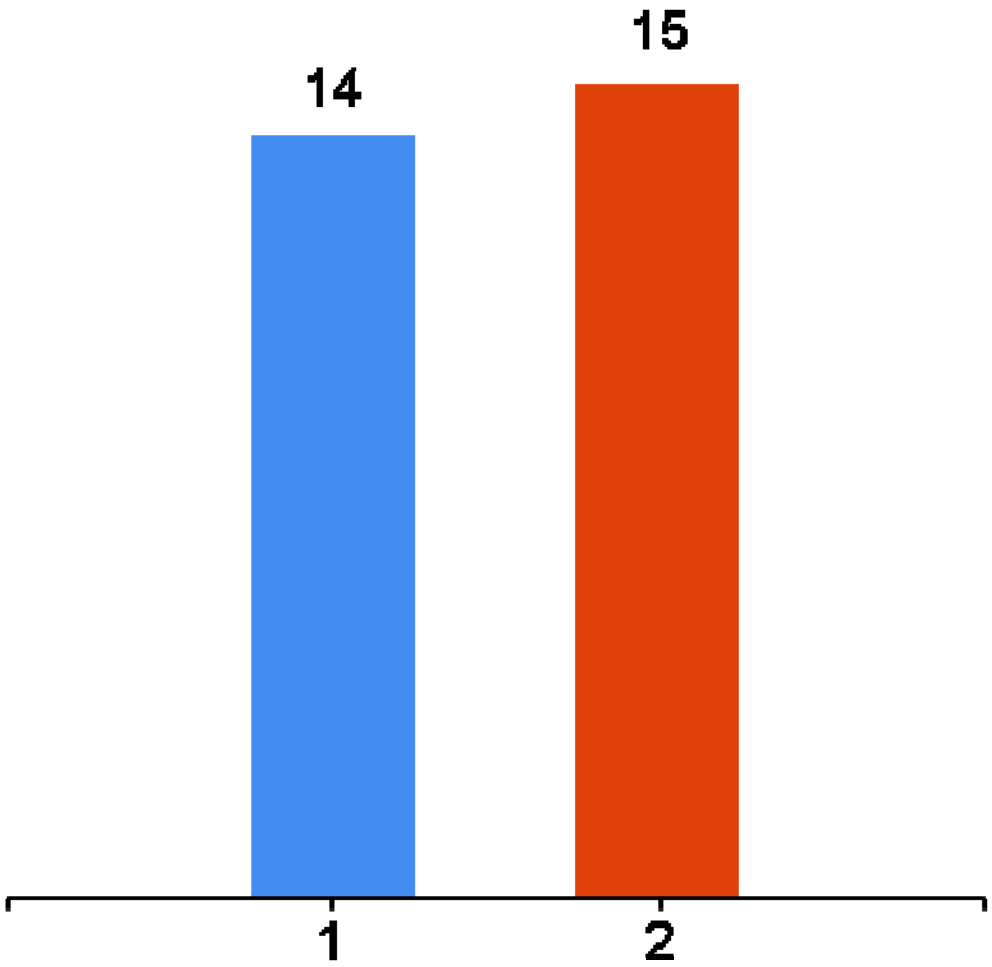
1. Yes

2. No



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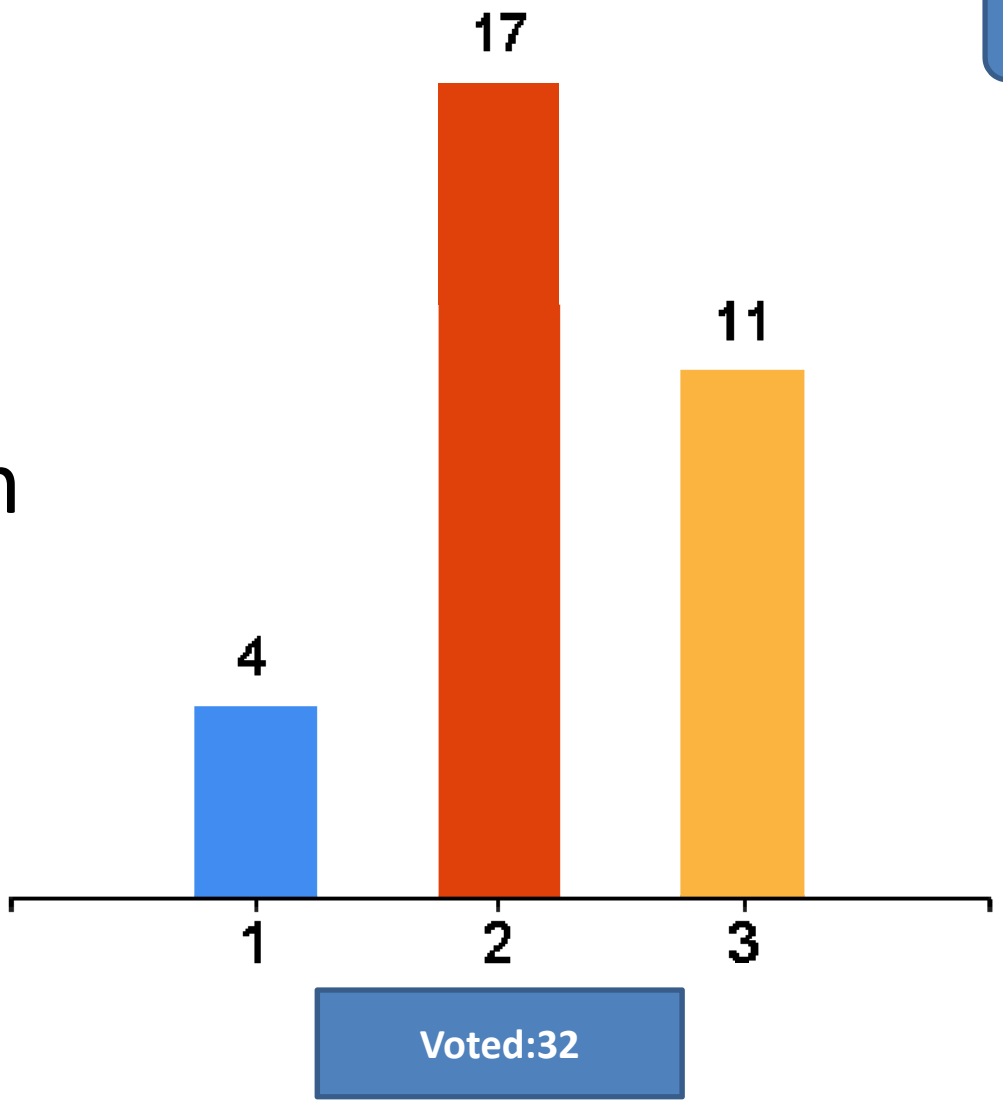
Degree of management uncertainty

00:00

1. High
2. Medium
3. Low

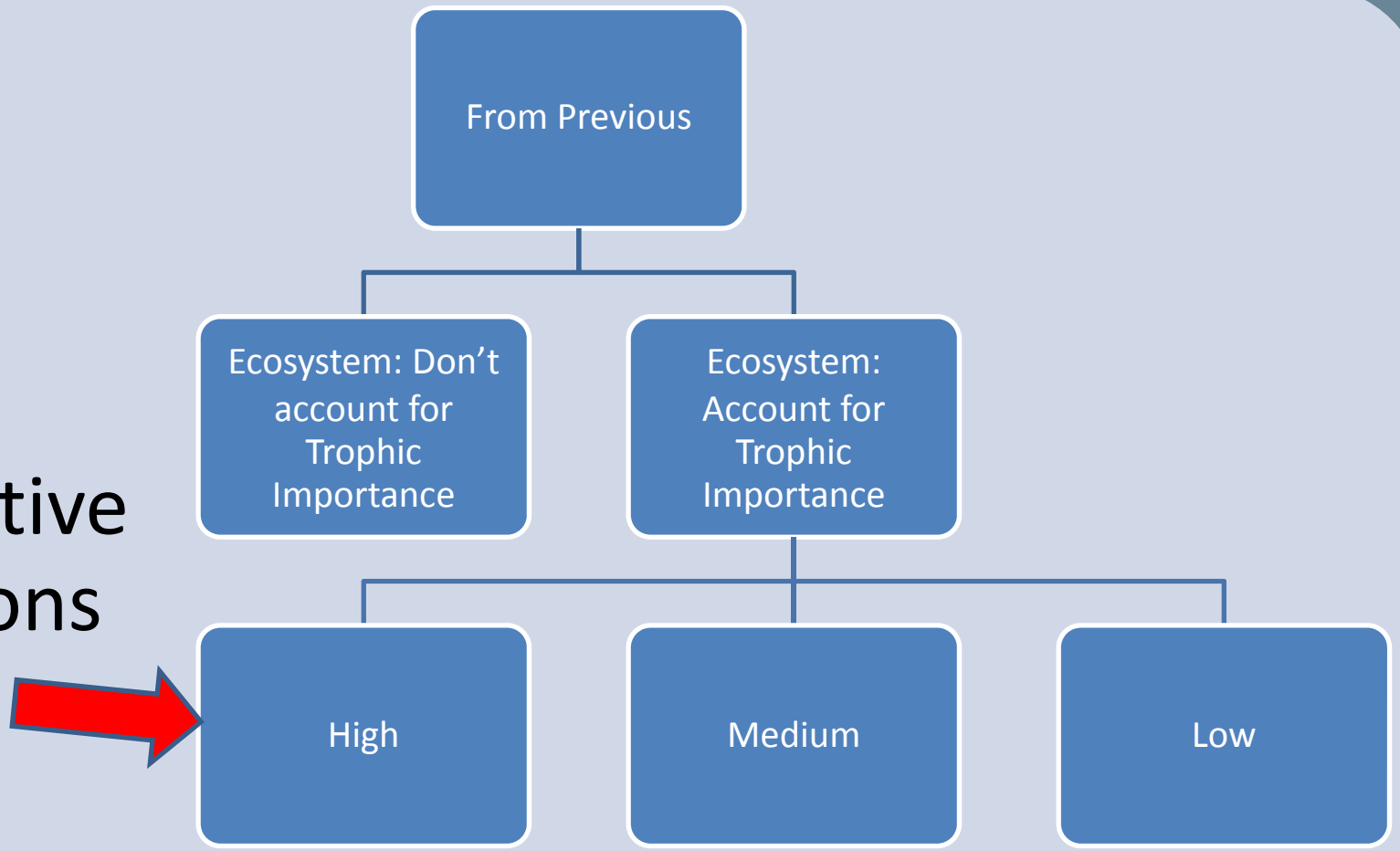


Striper Example

- Ecosystem considerations
  - Trophic importance
    - Multispecies modeling, meta analysis, or assignment of board-chosen risk tolerances
  - Climate vulnerability
    - Could use existing climate vulnerability work but would need to assign needed buffer based on “rank”
  - If unaccounted for, assign low, medium, and high categories for each
  - Scores of 2.5%, 5%, 10% to account for uncertainty

Striper Example

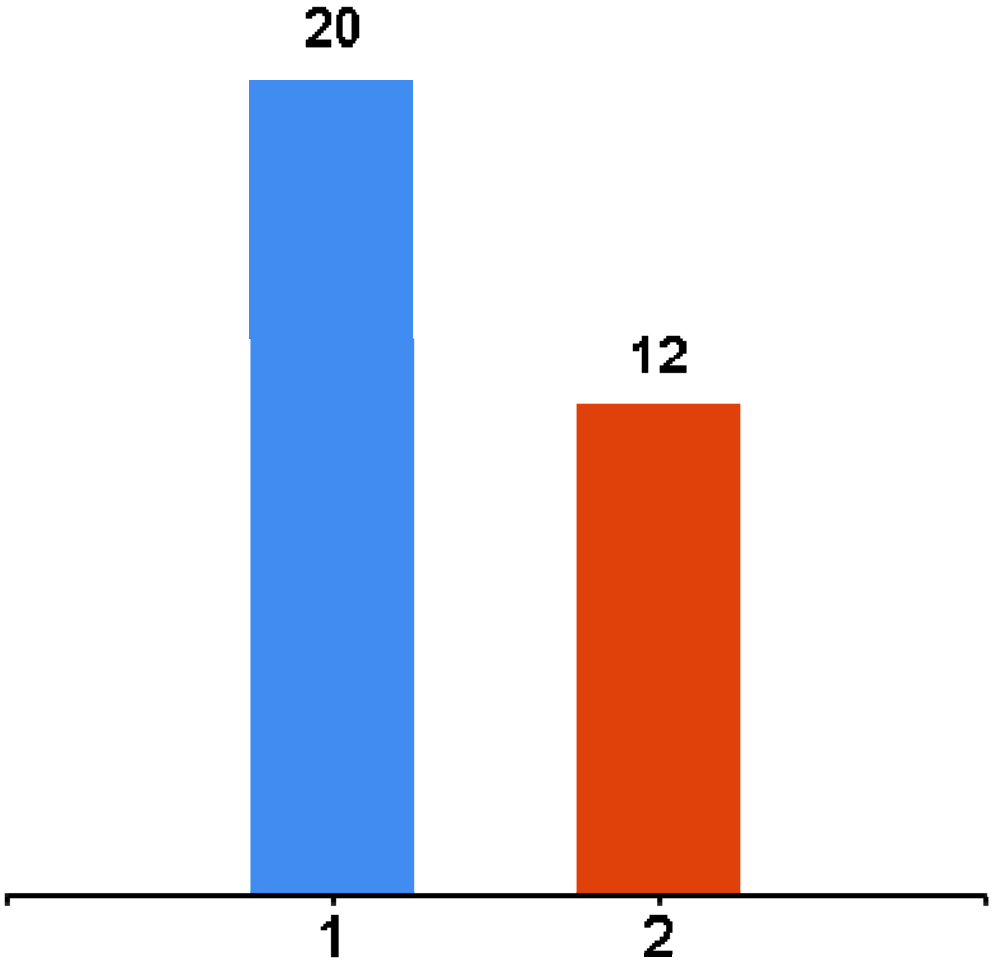
Qualitative Decisions



Do we need to be precautionary due to trophic importance?

1.Yes

2.No



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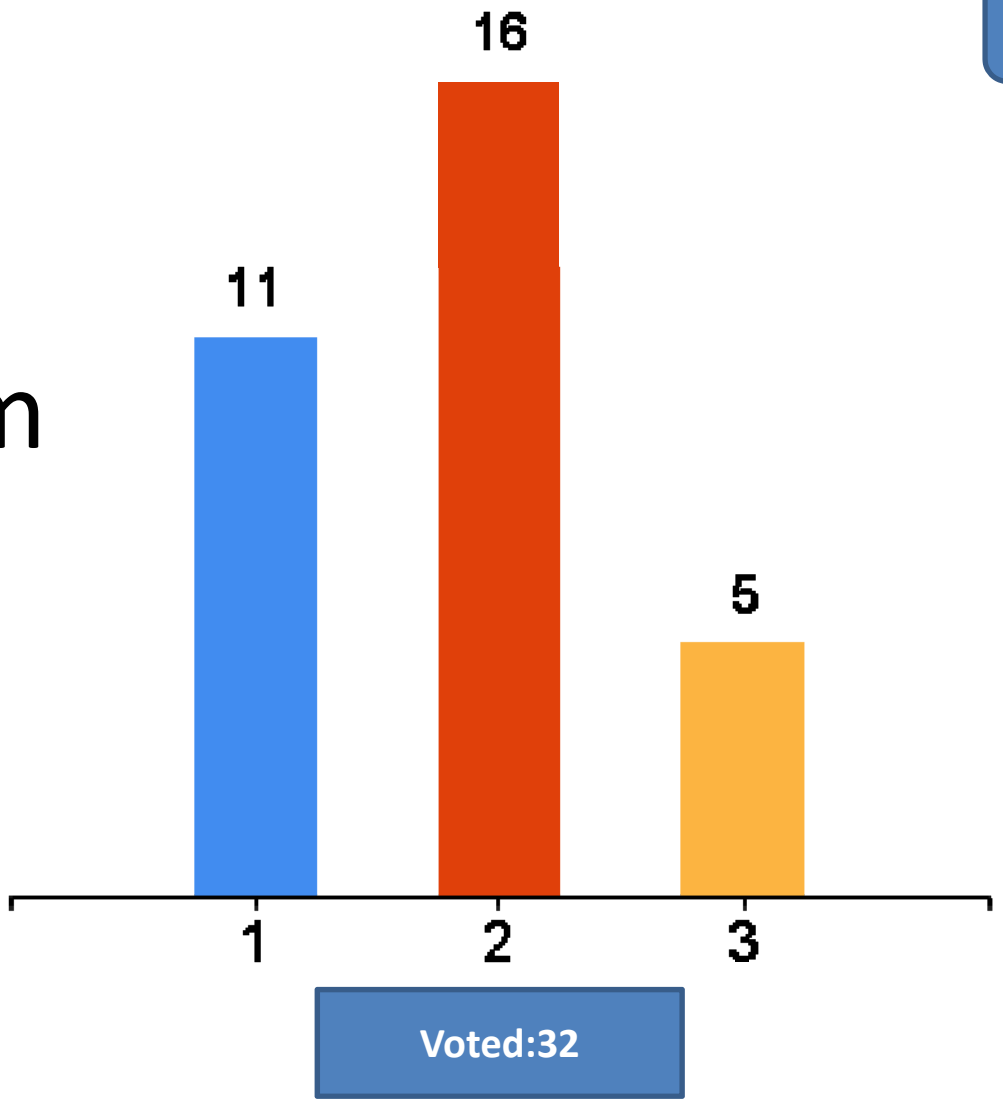
Species trophic importance level

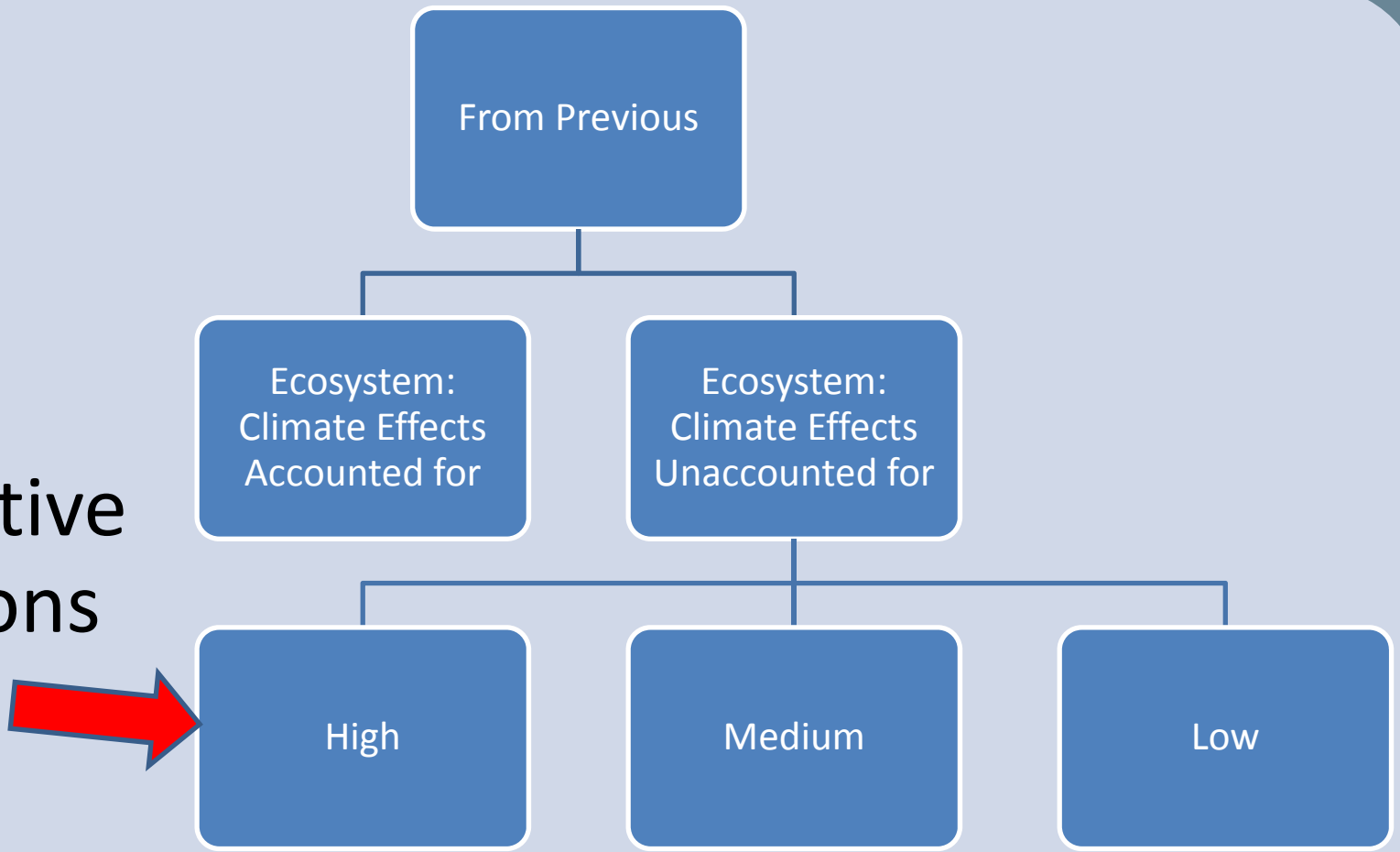
00:00

1. High
2. Medium
3. Low



Striper Example

Qualitative Decisions

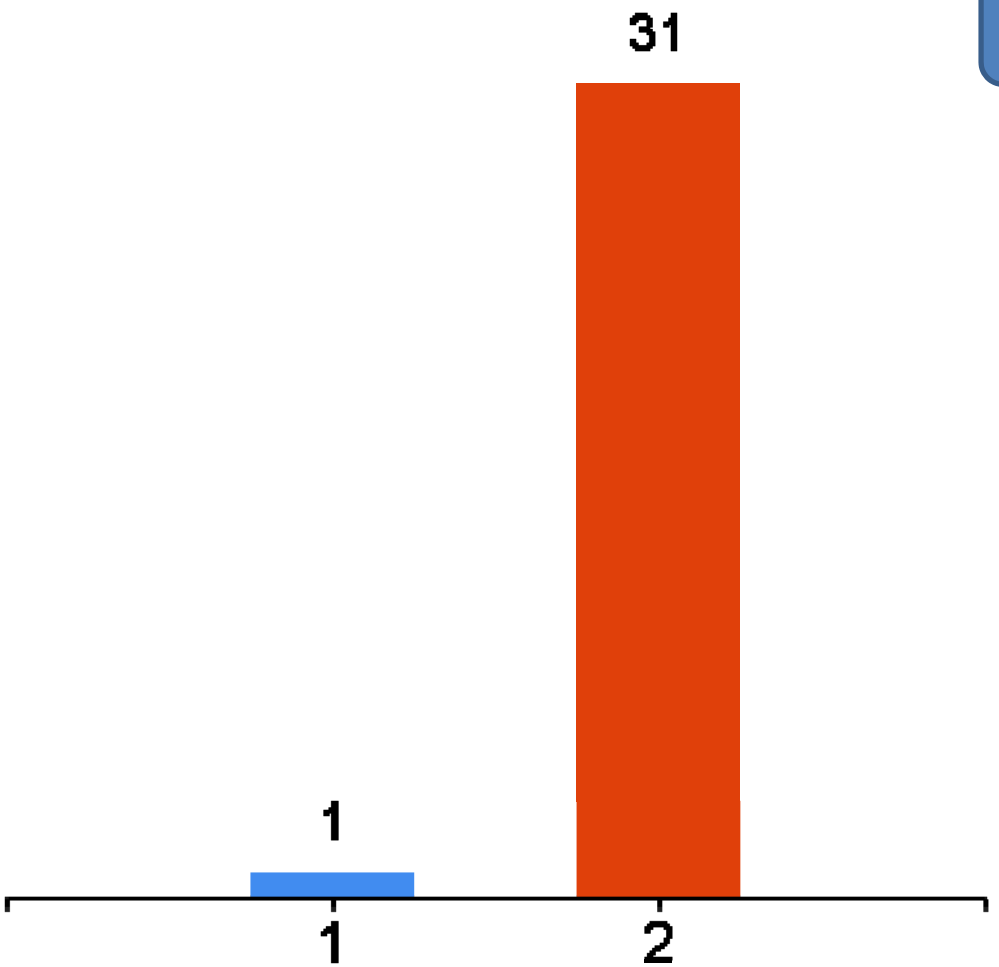


Are climate effects accounted for?

00:00

1. Yes

2. No



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What level of influence are climate effects expected to have?

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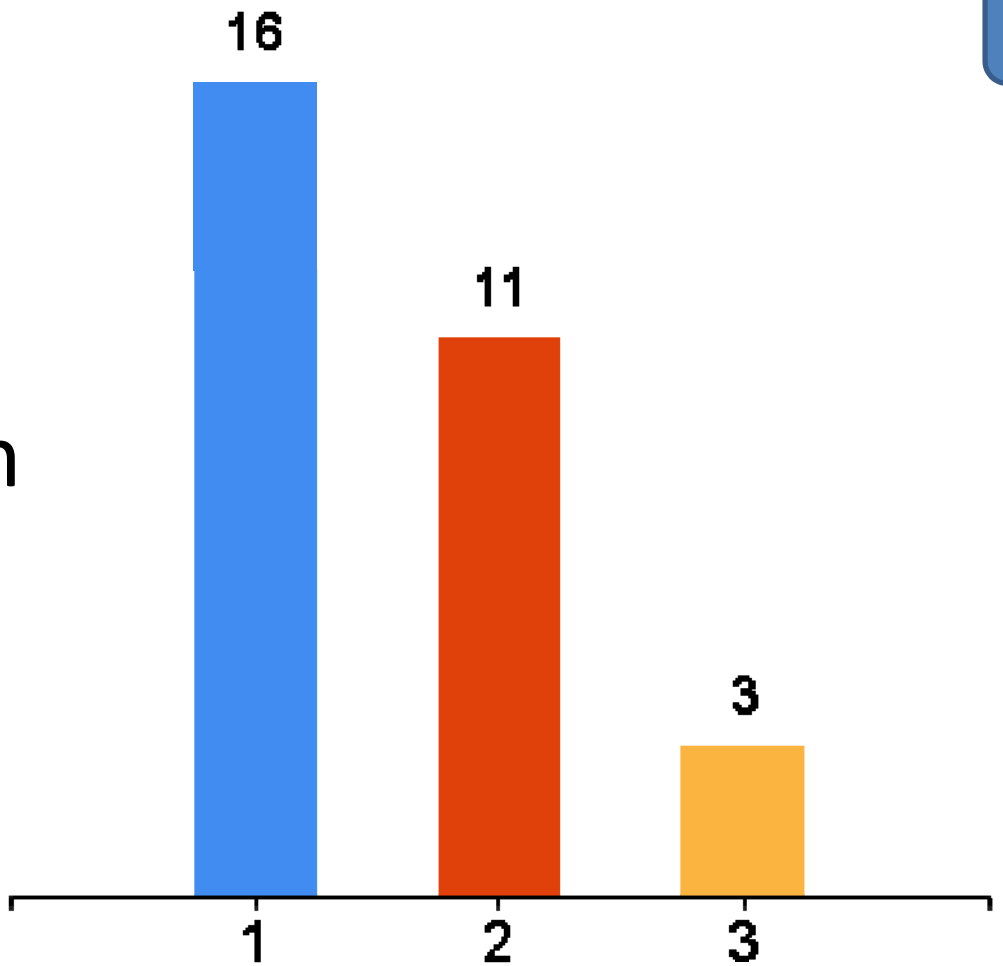
1. High
2. Medium
3. Low



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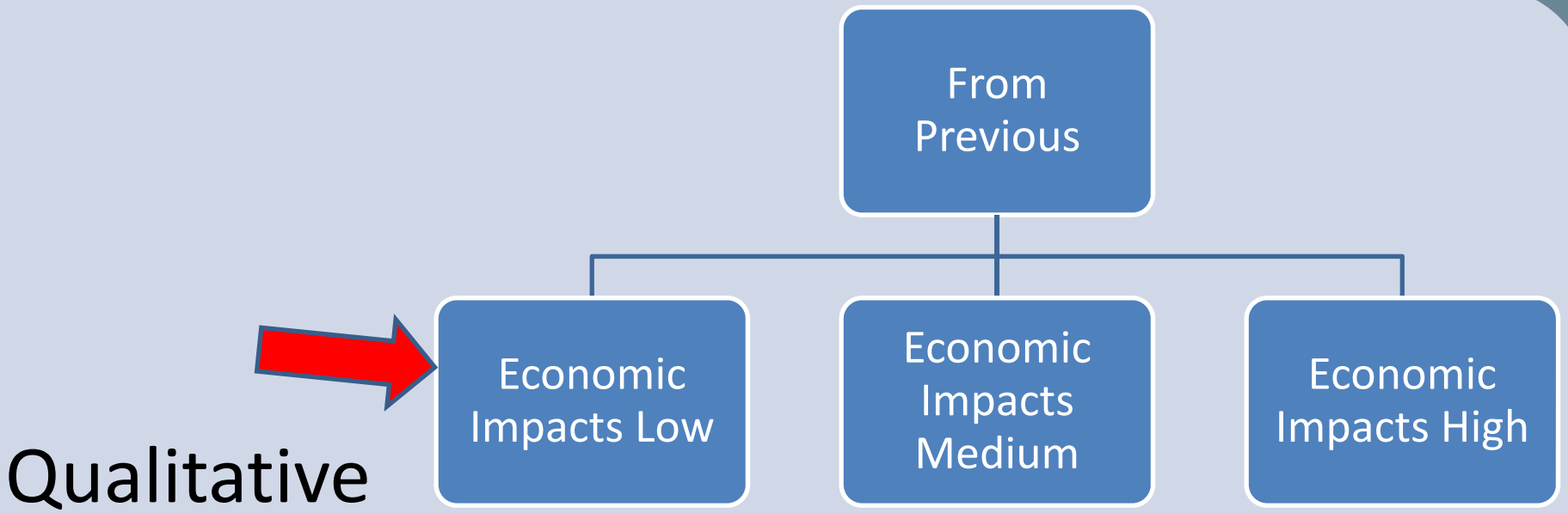
Striper Example

- Economic impacts
  - This category allows you to push back against the buffer to offset economic impacts if warranted
  - This is one that could be quantified, leaving it qualitative for now
  - Assign low, medium, and high categories for impact
  - Scores of 2.5%, 5%, 10% to account for uncertainty

Striper Example

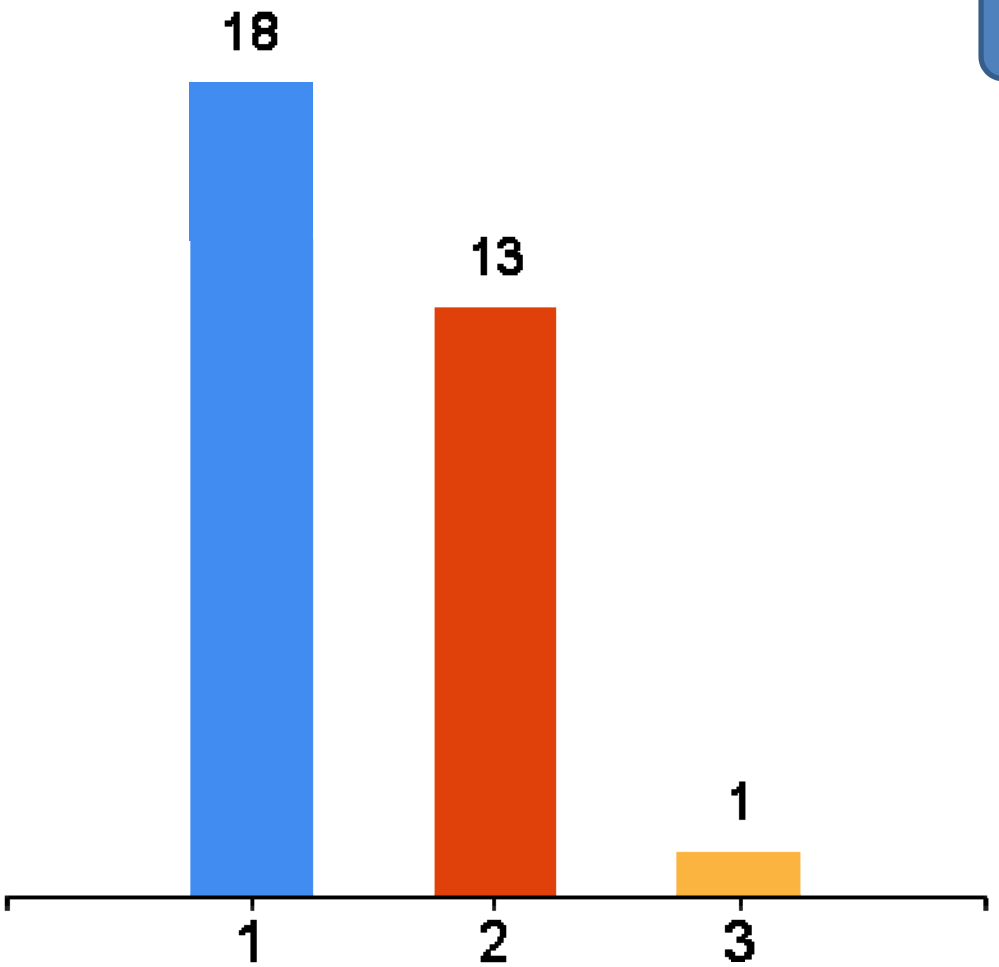


Qualitative Decisions

At what level are the economic impacts?

00:00

1. High
2. Medium
3. Low



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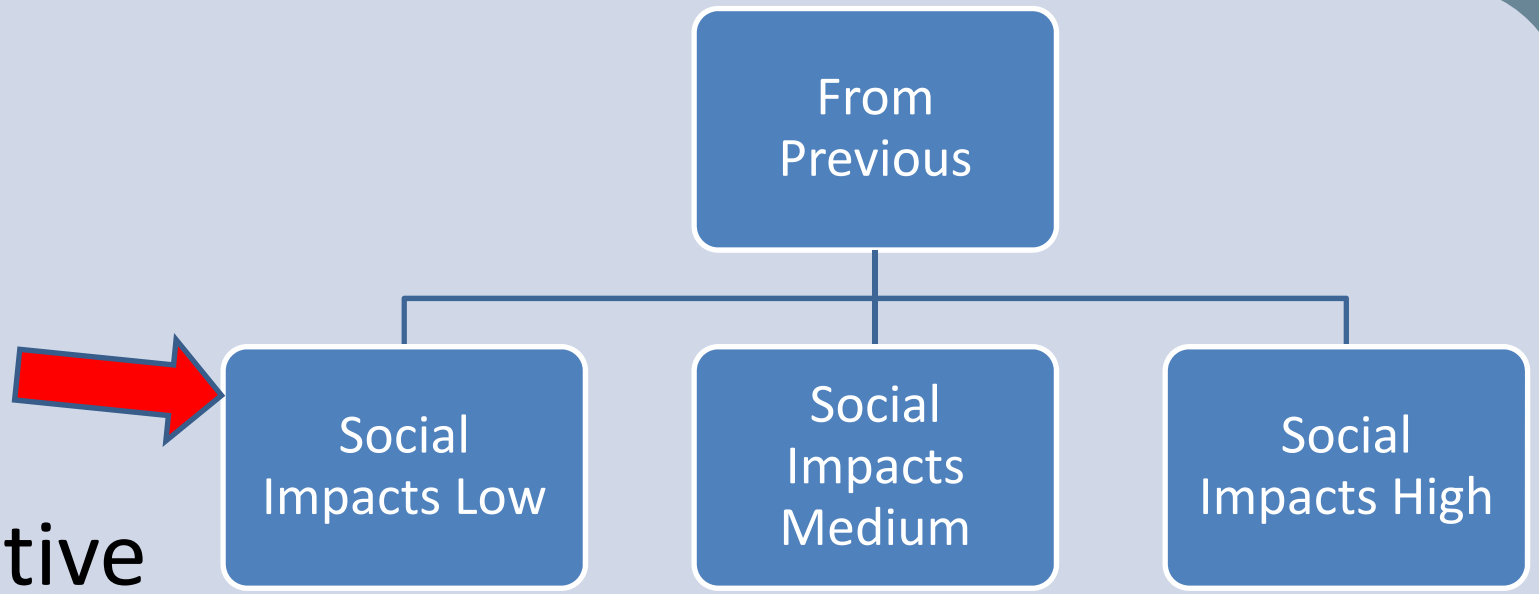
Striper Example

- Social impacts
  - This category also allows you to push back against the buffer to offset social impacts, such as importance to subsistence fishers, importance to unique fishing communities, etc.
  - May be a way to quantify some of these types of impacts, leaving it qualitative for now
  - Assign low, medium, and high categories for impact
  - Scores of 2.5%, 5%, 10% to account for uncertainty

Striper Example

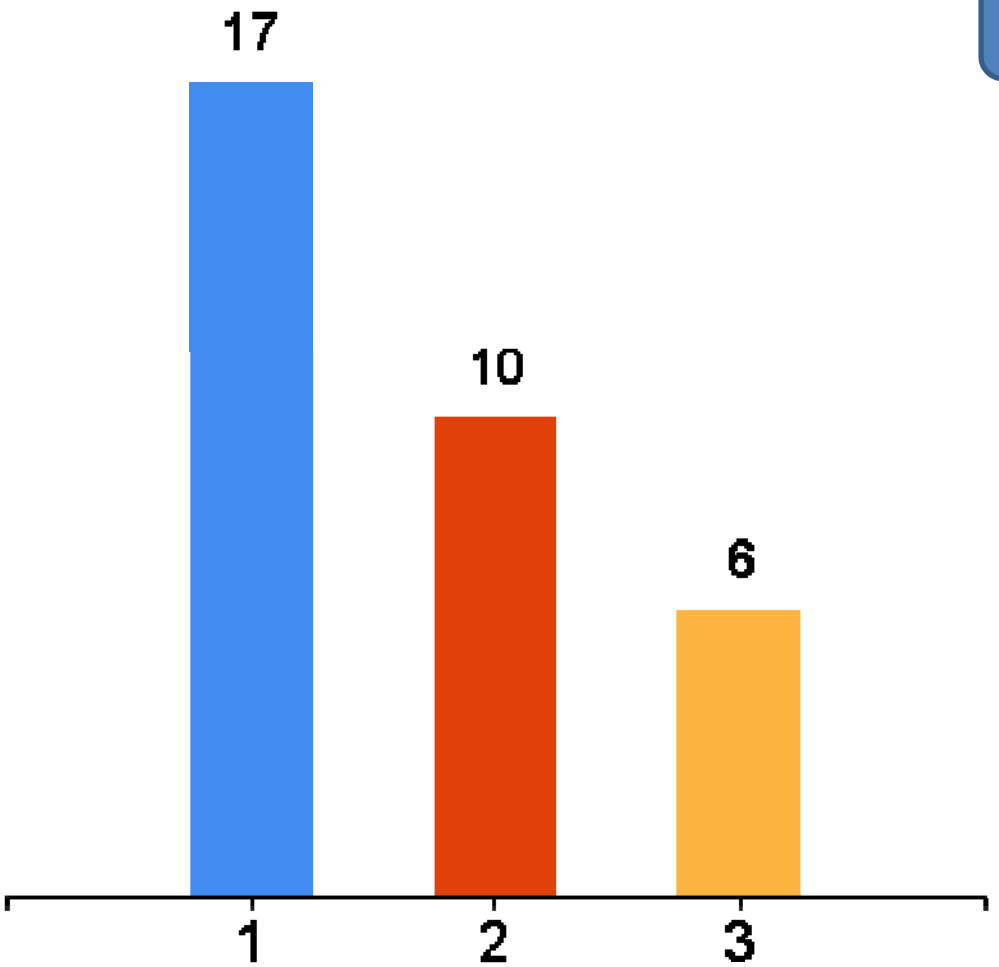


Qualitative Decisions

At what level are the social impacts?

00:00

1. High
2. Medium
3. Low



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RECAP

Where we ended up

Start at 50%
Overfishing definition = -2.5 + -2.5
Overfished definition = -2.5 + 2.5
Model diagnostics = 0
Management uncertainty = 5
Ecosystem Trophic = 5
Ecosystem Climate = 10
Economic = -10
Social = -10
Risk Assessment = 45

Next Steps

- Is this something you would like to actually use for upcoming striped bass assessment process?
- If yes, send the decision tree to the striped bass TC for refinement
- Have them review the decision categories and refine, add, subtract
- Have them walk through decisions and assign appropriate buffers for quantitative elements
- Could also have them take a first cut at qualitative elements, which the board could then refine

Next Steps

- Here, the risk assignment can be less than 50%, potentially by a lot
  - Would need to determine if this is OK, and if not, what should the lowest level be

- Remember, the goal is to be systematic and transparent when incorporating risk in to decision making

- As noted by the working group, this is a good tool for informing stakeholders about how decisions were arrived at

Extra Slides

Striper Example

- From ASC/MSC

- Recap of the risk we are assigning based on these factors:

$$
\begin{aligned}
&no\ overfishing\ and\ below\ target \\
&+ \quad not\ overfished\ but\ below\ target \\
&+ \quad model\ diagnostics\ good \\
&+ management\ uncertainty\ unaccounted\ for\colon\ medium\ level \\
&+ ecosystem\ climate\ effects\ unaccounted\ for\colon high\ level \\
&+ social\ and\ economic\ impacts\colon\ high \\
&= \ 0.5 \\
&+ \{(-0.025 - 0.025) + (-.025 + 0.025) + (-0.05) + (0.05) \\
&+ (0.1) + (-0.05)\} = 0.5
\end{aligned}
$$

- End up back at default of 0.5, or 50% probability of achieving the F target, but path to get there is explicit and transparent