BIENNIAL STRATEGY REVIEW SYSTEM
Chesapeake Bay Program

[INSERT OUTCOME NAME AND DATE OF QUARTERLY PROGRESS MEETING]

ABSTRACT: The Forage outcome is on track and has made great strides in its acquired scientific knowledge since 2014. Through strong action team participation/coordination and research investment from NOAA and the Chesapeake Bay Program Partnership, the Action Team has identified key forage species, crafted an indicator plan to guide indicator development, and now has four indicators under development/looking to acquire funding. Moving forward, the team will continue to support research expanding our knowledge of the bay's forage base and will look for venues to present connections between forage, environmental parameters, and other key By Program goals.

NOTE: The narrative analysis summarizes the findings of the logic and action plan and serves as the bridge between the pre-quarterly logic and action plan and the quarterly progress meeting presentation. After the quarterly progress meeting, your responses to these questions will guide your updates to your logic and action plan. Additional guidance can be found on ChesapeakeDecisions.

1. Are we, as a partnership, making progress at a rate that is necessary to achieve this outcome? Use a graph or chart to illustrate where feasible (replace example provided with your illustration).

The Forage Fish Outcome states that the Forage Action Team (FAT) will work to continually improve the partnership's capacity to understand the role of forage in the bay and its connection to key predator populations. Although this outcome is not quantifiable, the FAT leadership and members believe the outcome is on track. The FAT started in 2014 knowing relatively little about forage and now has a science based list of the most important forage in the bay, information on the abundances of key forage and environmental drivers of abundance, and an assessment of gaps. Much of this progress is due to excellent collaborations with scientists across the bay supported by NOAA and Bay program funding. The FAT is currently focused on packaging the new science into a suite of indicators of forage status and trends. The team has published an indicator development plan that prioritized 7 indicators that can be developed with existing data and have clear management applications. Four indicators are either under development or ready for development.

The four indicators under development are:

- Benthic invertebrate status and trends
- Habitat suitability index for bay anchovy and juvenile spot
- Springtime warming impacts on forage abundance
- Shoreline condition threshold for juvenile blue crab and other forage

Tier 1: Abundance	Species of Interest
Benthic Invertebrates	Polychaetes
Demersal Finfishes	Atlantic croaker
Pelagic Finfishes	Bay anchovy Atlantic menhaden
Tier 2: Habitat and Environmental Factors	**Species of Interest**
Springtime Warming	Bay anchovy Polychaetes
Habitat Suitability Index	Bay anchovy
Hardened Shorelines	Juvenile blue crabs
Tier 3: Predator Consumption	**Species of Interest**
Diet Profiles	Striped bass

Figure 1. The seven proposed priority indicators in their respective tiers and suggested focal species for each.

2. Looking back over the last two or more years, describe any scientific (including the impacts of climate change), fiscal, and policy-related developments that impacted your progress or may influence your work over the next two years. Have these resulted in revised needs (*e.g.,* less, more) to achieve the outcome?

*To the extent feasible, describe your needs using the SPURR thought model, i.e., **S**pecific and actionable, **P**rogrammatic partner, **U**rgency of the needed action, **R**isk of not acting, **R**esources required.*

Science
- Some research findings show that environmental factors (e.g., spring warming, area of suitable habitat) drive forage species abundance; these findings inform indicator development and can be used to guide restoration and protection.
- New studies and observational data may enhance indicators. NOAA is working through the Sustainable Fisheries Goal Implementation Team (Fish GIT) and other Bay Program partners to establish telemetry arrays and hypoxia profilers which will help track fish movements and the impacts of hypoxia on fish habitat condition. There is also a project to estimate the current and historical abundance of striped bass in the Chesapeake Bay which can be used to estimate the "nutritional" or forage needs of this key predator.

Fiscal
- NOAA and CBP funding helped address science priorities. Gaps still remain in monitoring forage which have no identified funding sources.

Policy
- An emphasis by NOAA in implementing Ecosystem Approaches to Fishery Management facilitates management application of forage science and indicators at a regional level.
- There is a need to communicate the importance of forage to policy makers within the CBP

highlighting the connections to water quality and habitat.

3. Based on the red/yellow/green analysis of the actions described in your logic and action plan, summarize what you have learned over the past two years of implementation.

Summarize overall (not per action) what you have learned about what worked and what didn't work. For example, have you identified additional factors to consider or filled an information gap?

Over the past couple of years, the Forage Action Team has found success advancing the understanding of the bay's forage base by focusing team efforts on existing funding sources, such as NOAA and the EPA GIT-funding process. The team's collective interest in furthering research to be used for indicator development and ecosystem-based fisheries management has led to a focused Action Team with clear objectives. The Team has also succeeded in communicating results to a broader audience, and will continue work synthesizing findings, as highlighting developments with the group will be key to regional management buy-in.

An area of slower progress has been in filling identified monitoring gaps. The team has identified monitoring needs in the STAR science prioritization database and continually raised the issue with the CBP. The primary monitoring needs are plankton surveys and shallow water fish sampling. The team does not have the capacity to support these. The current PSC monitoring review affords the Management Board an opportunity to endorse the need for these and other living resource monitoring as well as water quality monitoring.

4. Based on what you have learned through this process and any new developments or considerations described in response to question #2, how will your work change over the next two years? If we need to accelerate progress towards achieving our outcome, what steps are needed and, in particular, what specific actions or needs are beyond the ability of your group to meet and, therefore, you need the assistance of the Management Board to achieve?

Describe any adaptations that may be necessary to achieve your outcome more efficiently and explain how these changes might lead you to adjust your Management Strategy (if significant) or the actions described in column four of your Logic & Action Plan. What new science, fiscal, and policy-related information, could be recommended or pursued over the next two years to maintain or, if needed, accelerate progress? Use the SPURR model described in question #2, to provide detail to the needed steps and actions.

- Based on membership conversations, an important process for this two-year cycle will be a focus on piloting indicators that have a tangible management utility. The planned indicators are:
  - Benthic invertebrate status and trends
  - Habitat suitability index for bay anchovy and juvenile spot
  - Springtime warming impacts on forage abundance
  - Shoreline condition threshold for juvenile blue crab and other forage
- The FAT will work with the Fisheries GIT Establish a process to regularly communicate indicator results and implications to managers and the public.

- The team will also need to revisit strategies for data limitations/monitoring gaps.

Management Board Request:

- The FAT needs support in connecting the information we have gathered on forage status and trends to habitat conservation, land use, and other policy decisions. An example of what this could look like is to have a focused session at a Chesapeake Bay Commission meeting on the value and status of forage as they relate to water quality and climate drivers.
- Emphasize the need for shallow-water fish surveys and plankton monitoring to explore possible correlations between living resource data with water quality parameters

5. What steps are you taking, or do you recommend, to ensure your actions and work will be equitably distributed and focused in geographic areas and communities that have been underserved in the past?

The FAT recognizes the need to put more focus on DEIJ issues. Some of the current work we intend to build from include:

- Modifying funding opportunities to better support researchers at HBCUs and MSIs and include students of color in projects.
- Identifying opportunities to connect forage condition, recreational fishing, and fish consumption in urban areas building off work in Baltimore Harbor.
- Coordinatinating with the Fish Habitat Action Team on more diverse recreational fishing engagement.