Evolving the Scientific, Technical Assessment, and Reporting (STAR) Team to Better Meet the Science Needs of the Chesapeake Bay Program.

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Table of Contents:

Summary

The purpose of report is to provide an implementation plan for Chesapeake Bay Program (CBP) Scientific, Technical Assessment, and Reporting (STAR) team to expand its science capacity to better meet the needs of the Goal Implementation Teams (GITs). The plan provides a revised purpose and functions of STAR, based on an adaptive-management approach, and recommends actions for evolving the STAR to include a broader group of science providers and enhancing interaction with the GITs to address their science needs.

The revised purpose of STAR is to facilitate with science partners to have increased capacity to serve the priority science needs of the GITs, using an adaptive-management framework, and summarize key information for the CBP partners. STAR will help coordinate the modeling, monitoring, indicator, and information management activities needed by the GITs and work with CBP science partners to synthesize information for cross-cutting CBP products (such as the *Bay Barometer*). Revised major functions of STAR include:

- Provide access to and coordinate modeling and decision tools to provide the necessary information to help GITs prioritize the types and locations of management actions.
- Provide access to and coordinate monitoring, assessment, and development of indicators through increased monitoring partnerships.
- Coordinate evaluation and synthesis for key topics identified by the GITs. This function provides the explanation of the factors affecting ecosystem change and the effect of management practices.
- Provide access, share, and coordinate management of key data and information.
- Communicate results of key findings (working with the CBP communications office).
- Act as liaison to federal/state/academia/Non-governmental organizations (NGOs) to identify opportunities to address science needs of the GITs.

Short-term actions to evolve STAR and carry out the revised functions include: establish liaisons to each GIT; convene business, topical, and coordination meetings to support the GITs; increase the federal, state, and academic science providers in STAR; evolve the STAR workgroups to address major functions; increase interaction with Scientific and Technical Advisory Committee (STAC); and establish an annual work cycle to address GIT science needs.

Purpose of Report: The purpose of report is to provide an implementation plan for STAR to expand its science capacity to better meet the needs of the GITs. The plan provides a revised purpose and functions of STAR, based on an adaptive-management approach, and recommends actions for evolving the STAR to include a broader group of science providers and enhancing interaction with the GITs. This report was required as part of the Chesapeake Executive Order (EO) Strategy "Strengthening Science" chapter (EO action SS1): "EPA, USGS, and NOAA will lead transformation of the CBP Scientific, Technical Assessment and Reporting (STAR) team to be the primary coordinating entity for science activities in the CBP. STAR will be reorganized by 2011 to promote ecosystem-based, adaptive management. A draft reorganization plan will be developed by December, 2010 to support STAR reorganization in 2011. Additional federal agencies will become partners in technical workgroups to improve CBP scientific capabilities".

Current Priority Science Needs and Capabilities of the Chesapeake Goal Implementation Teams
To better identify the priority science needs of the GITs, the STAR set up a process to solicit information focused on employing adaptive management to:

- Target the types and locations of management actions.
- Enhance monitoring to assess progress (including improved reporting of Best Management Practices (BMPs) and indicators).
- Evaluate ecosystem change and the effect of management actions.

The needs for addressing the impacts of climate change on GIT objectives were also discussed.

Each topic was presented and discussed at the STAR meetings during fall, 2010 with the GIT representatives. Additional information on science needs was gathered from review of existing documents and discussion of ideas with individual GIT members. A summary of priority science needs for the major CBP Goal Teams is listed in Table 1 with more information in Appendix 1. These science needs will evolve based on the annual priorities of the GITs.

Table 1-Summary of Goal Team Priority Science Needs	
Goal Implementation Team	Identified Priorities
Fisheries (I)	**Target**: Benthic habitat characterizations for oysters and fisheries ; Evaluation of land use impacts on fisheries; Ecological reference points **Monitor**: Oyster restoration; Fisheries status and trends; Plankton; Emerging issues **Evaluate**: Oyster restoration; Fisheries health; EBFM; Invasive species; Socioeconomics
Habitat (II)	**Target:** wetlands, priority species, stream restoration **Monitor**: species for fish passage, stream habitat, LIDAR or wetland change **Evaluate**: Bird data, wetland extent, habitat/BMPs, brook trout and black duck indicators
Water Quality (III)	**Target**: BMPs on the landscape **Monitor**: BMP implementation, water quality **Evaluate**: Response to management actions
Healthy Watersheds (IV) (Provisional)	**Target**: Update resource land assessments **Monitor**: landscape coverage **Evaluate**: landscape change
Stewardship (V)	**Target:** Societal well being, land conservation **Monitor**: Public access, livable communities **Evaluate**: Watershed experience, citizen actions

In addition to the science needs, other major findings and associated recommendations to support the GITs include:

Finding: The technical needs of the GITs are quite diverse, and a variety of approaches will be needed to provide support to the GITs depending on the complexity and nature of the science need. Some needs may be met through the CBP science cluster for the modeling, monitoring, GIS, web development, and data management expertise within STAR. Some science needs may require the formation of longer-term teams of regional experts to develop approaches and provide guidance; other science needs may require only one-to-two day meetings organized to provide direction on a specific issue.

Recommendation: A critical role for STAR is to determine how to best engage the technical capacity in the region (and beyond) to participate in these efforts. The next section of the report has more details for increasing the science capacity of STAR to better meet the needs of the GITs.

Finding: The GITs expressed the need to have clear management goals and outcomes. Most of the GITs are focused on carrying out commitments from *CBP Chesapeake 2000* (C2K) agreement but many of the outcomes came due in 2010. The GITs are also considering addressing some of the outcomes in the more

recent Chesapeake EO Strategy. The lack of clear outcomes for some of GITs hindered development of science priorities. There needs to be an improved process to define goals for the GITs and how the science needs would be provided to STAR.
Recommendation: The CBP needs to update their overall goals and develop quantifiable outcomes so each Goal Team has a clear understanding of what they are striving to achieve. The CBP is in the process of considering how to update goals of the *Chesapeake 2000* and integrating outcomes that were developed for the Chesapeake EO Strategy. The Management Board will provide guidance on establishing clear outcomes for the GITs based on recommendations it receives from the Alignment Action Team and the ChesapeakeSTAT action team. Once these outcomes are finalized for the CBP partnership, the GITs can better determine their priority science needs for each outcome, emphasizing an adaptive management framework. The science needs would include information needed to prioritize practices and policies, monitoring for each specific outcome, and a process for analyzing the information to evaluate effectiveness of practices and policies.

Finding: The GITs do not have a uniform process to prepare annual work plans that would help facilitate identification of priority science needs. The GITs have different operating styles to determine their annual priorities.
Recommendation: The process of updating science needs for the GITs, and planning for STAR to address those needs, should be carried out through the proposed adaptive-management system that is being considered by the CBP Leadership Goal Team. The desired goal of the adaptive-management system is have an annual process to define priorities for each goal team, working in collaboration with the CBP Management Board, and assess progress toward meeting the actions. The CBP Leadership Team is still working to develop and implement the adaptive-management system.

Finding: The science capacity of each GIT differs depending on their current structure and membership. For example, the Fisheries Goal Team already has technical workgroups to address science needs through a large science coordination effort being overseen by Maryland Sea Grant. Maryland Sea Grant's Ecosystem Based Fisheries Management (EBFM) project has grown over the past three years to include over 85 participants drawn from the academic and research community, state and federal agency scientists, and non-governmental representatives. It is organized through a series of focused technical teams that are expressly integrated at the leadership level through the Fisheries Ecosystem Workgroup (see Appendix 1 for more information). The other GITs vary in their current science capabilities and support from STAR. The water-quality GIT has some dedicated science support for modeling and monitoring through the CBP science cluster. Additionally, some of the workgroups under each GIT already have technical capabilities that are addressing specific needs.
Recommendation: STAR should establish liaisons with each GIT to improve interaction and understand how they can best serve their science needs.

Finding: There is confusion about the respective roles of STAR and Scientific and Technical Advisory Committee (STAC) in supporting the science needs of the GITs.
Recommendation: The respective roles of STAR and STAC can be generally described as follows: STAR is the internal science provider, while STAC serves as the external advisor. The STAC provides scientific and technical advice to the CBP, reports annually to its Executive Council, and regularly interacts with the CBP throughout the year. The STAC Chair or designee is a member of the CBP

Management Board. In acknowledgement of its unique advisory role and the need to maintain independence, STAC's membership on the Management Board is as a non-voting, advisory member. Through both the expertise present within its membership, and its ability to serve as a portal to access global expertise, STAC is designed to serve as an independent, external source of scientific and technical counsel for the restoration effort. The STAC is employing an adaptive-management enterprise, by its very nature, confirms that it operates to (1) improve the understanding of the ecosystem by reducing uncertainty, (2) use science to develop policy and management actions, (3) assess the accuracy and appropriateness of the measures used to evaluate them, and (4) evaluate effectiveness of practices and policies so adjustments can be made. STAC advises the CBP on the uncertainty associated with all portions of the adaptive-management enterprise, identifies emerging challenges to the restoration effort, and also serves to assess whether the CBP is effectively implementing an ecosystem-based, adaptive management approach. In contrast, the role of STAR is to provide the science needed by the GITs to employ adaptive management (see next section of report). There will necessarily be some overlap in the activities of STAR and STAC while they each fulfill their respective missions, but in general the day-to-day data provision, analysis, and synthesis will be performed by STAR, while STAC may provide scientific and technical review of data sources, methodologies, and merit reviews.

Evolving STAR to meet the expanded science needs of the Goal Implementation Teams

STAR was reformed in 2009 to have improved interaction between the science providers and the GITs. The current membership of STAR relies on the expertise at the CBP office which is mainly focused on water-quality modeling, monitoring, GIS support, WWW development, and data management. There are five current workgroups under STAR: Tidal Monitoring and Analysis Workgroup, Non-tidal water-quality workgroup, modeling team, Indicators workgroup, and Analytical Methods and Quality Assurance Workgroup. The workgroups have representatives primarily from federal and state agencies.

Based on the findings of the needs of the GITs, and the CBP emphasis on adaptive management, STAR has revised its purpose and functions. The revised purpose, functions, and actions will result in a highly iterative and productive set of interactions between STAR and the GITs that will improve over time. Figure 1 illustrates role of STAR to support the GITs, carry out major functions, increase the number of science providers, and enhance interaction with STAC. A particular benefit to this structure is the opportunity for STAR to coordinate exchange among GIT workgroups and the proposed GIT-STAR liaisons. In doing so there should be chances to leverage activities and analyses as well as develop highly integrative approaches that may serve multiple GITs in new (and possibly unanticipated) ways. This should help build a stronger technical foundation for cross-cutting Bay Program science.

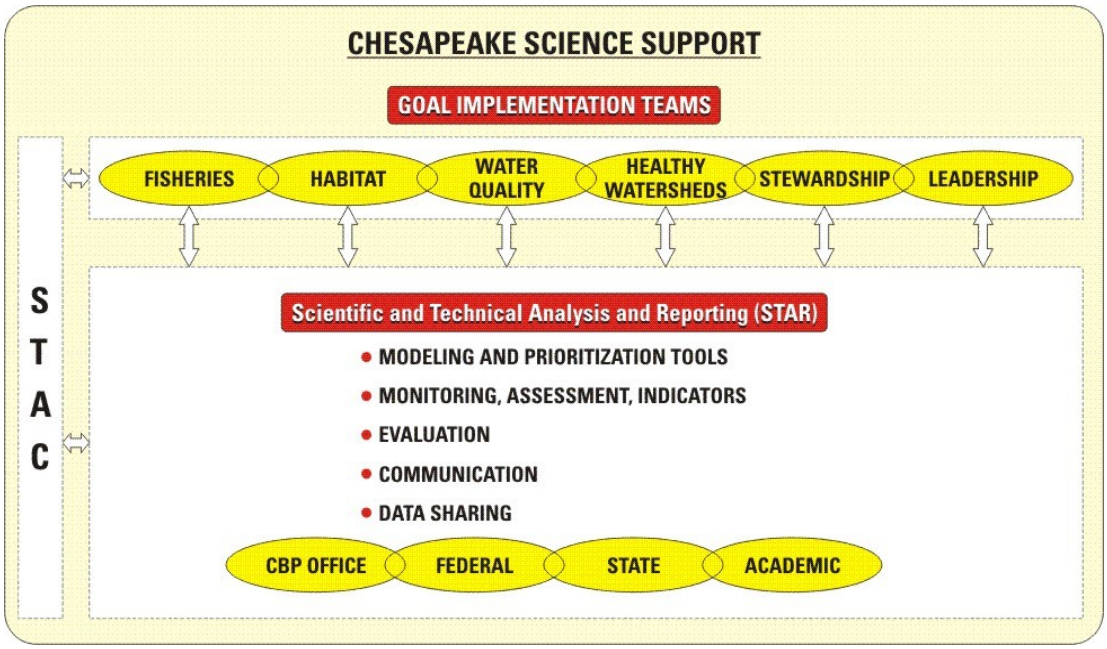

Figure 1—Summary of new functions for STAR and major science providers.

Revised Purpose of STAR: STAR will facilitate with science partners to increase capacity to serve the priority science needs of the GITs, using an adaptive management framework, and summarize key information for the CBP partners. STAR will help coordinate the modeling, monitoring, indicator, and information management activities needed by the GITs and work with CBP science partners to synthesize information for cross-cutting CBP products (such as the *Bay Barometer*).

Revised major functions of STAR include:

- Provide access to and coordinate modeling and decision tools to provide the necessary information to prioritize the types and locations of management actions.
- Provide access to and coordinate monitoring, assessment, and development of indicators to document changes in the implementation of management practices and in the condition of the Bay and its watershed through increased monitoring partnerships.
- Coordinate evaluation and synthesis for key topics identified by the GITs. This function provides the explanation of the factors affecting ecosystem change and the effect of management practices.
- Provide access, share, and coordinate management of key data and information.
- Communicate results of key findings (working with the CBP communications office).
- Act as liaison to federal/state/academia/NGOs to identify opportunities to address science needs of the GITs.

Below is a discussion for each function.

Provide access to and coordinate modeling and decision tools to provide the necessary information to help GITs prioritize the types and locations of management actions.

Modeling support will need to be expanded from a focus on water quality to coordinated modeling needed for other goal teams. The increased and diversified modeling capacity will need to come from other CBP partners because the EPA CBP model team will be meeting the needs of the Total Maximum Daily Load

(TMDL) during the foreseeable future. STAR should work closely with the Chesapeake Research Consortium (CRC) Chesapeake Community Modeling Program to coordinate existing modeling efforts that will meet the high priority needs of the GITs. The expanded model coordination may be best carried out during the quarterly meetings of the modeling team. STAR will need to work closely with the GITs to ensure that expanded modeling efforts meet the programmatic needs of the resource managers for which they are intended.

Provide access to and coordinate monitoring, assessment, and development of indicators through increased monitoring partnerships.

Monitoring will be expanded to include both reporting of management practices and monitoring ecosystem change for topics needed by all goal teams. Some of the initial high priority monitoring needs for fisheries, habitat, water quality, watersheds, and stewardship are summarized in the Appendix 1.

The STAR will work to implement a "monitoring alliance" as a process to take advantage of on-going or planned monitoring by CBP partners. A monitoring alliance was recommended in the Chesapeake EO strategy with a purpose to improve coordination of existing monitoring and enhance monitoring to assess progress toward the major restoration goals and outcomes. The STAR will also use the alliance to address STAC recommendations to improve monitoring needed for climate change. The EO strategy commits federal agencies to pursue opportunities to coordinate Chesapeake tidal and nontidal networks with national observation systems including the:

- Integrated Ocean Observing System (interagency led by NOAA)
- Nation Water-Quality Monitoring Network (led by USGS and EPA)
- National Fish Habitat Action Plan (FWS)
- National Water-Quality Assessment Program (USGS)
- Conservation Effects Assessment Project (USDA)
- Vital Signs Program (NPS)
- Climate Effects Monitoring (DOI and NOAA)

The EPA, USGS, NOAA, and other partners (states, academics, NGOs) will identify the most promising programs that can be part of the monitoring alliance. The partners will work through STAR to expand partnerships which meet the needs of the GITs. The EPA will develop guidance documents that define quality assurance requirements for a monitoring program to become a partner in the monitoring alliance.

Coordinate evaluation and synthesis for key topics identified by the GITs.

Much of the current monitoring effort in the CBP is done in the context of assessment: gathering and documenting information in regard to the achievement of discrete goals. Evaluation and synthesis of these different datasets is needed to better understand how interrelated factors affect ecosystem change and effectiveness of management practices and policies. STAR will work with STAC to convene synthesis workshops to address key topics identified by the GITs and have an integrated conceptual model that is updated through the adaptive-management process. STAR will also work with STAC to identify research needs that should be undertaken by academic or federal partners to inform these priorities. In addition to the workshops, the evaluation and synthesis function of STAR will be provided through (1) CBP science cluster resources, (2) having federal partners provide flexible funds that can be used to help meet short term needs of the Goal Teams, and (3) having federal and other partners undertake longer-term projects to

address specific GIT needs. STAR will also work with STAC, CRC, Sea Grant, and other organizations to bring together key science partners and those needing the information to address different synthesis topics.

Communicate results of key findings to CBP Management teams and other audiences (working with the CBP communications office).
The STAR will work with the GITs and CBP communications office to summarize key science information and their implications for the partners in the Goal Teams, the Management Board, Principal Staff Committee, Executive Board, and other CBP partners. The STAR will also summarize information for the annual *Bay Barometer*, which is the primary tool to reach the informed public. Additionally, communicating key results would be carried out by selected STAR members (depending on the topic) with the CBP communications office. The STAR will work with the CBP WWW team to have findings presented through WWW page and explore opportunities to improve visualization of findings and data for different audiences.

Provide access, share, and coordinate management of key data and information.
The STAR will lead coordination of CBP partners to improve access, sharing, and management of key data. With STAC assistance, the STAR will build from concepts presented in the EO strategy for a Chesapeake Bay 'data enterprise' as the next evolution of the Chesapeake Information Management System (CIMS).

Act as liaison to federal/state/NGOs to identify opportunities to address science needs of the GITs.
There are several key opportunities to have STAR facilitate working with additional science providers to meet the priority science needs of the GITs. These include:

- Federal Activities under the Executive Order. The EO specifies on-going and planned science activities to help address the new federal outcomes for the Chesapeake Bay and its watershed. Since many of these outcomes overlap with the activities of the GITs, there are opportunities to better coordinate federal science through STAR to meet the needs of the GITs.
- State activities-State partners are already members of STAR workgroups that address selected needs of the GITs (mostly with a water-quality focus). There are opportunities to include other additional state partners as STAR focuses on meeting the expanded needs of the GITs.
- Academic partners–Representatives from STAC and the CRC can identify opportunities where there are on-going or planned academic research activities that can meet the research needs of the GITs.

Short-term actions to evolve STAR and carry out revised functions

1. STAR will establish liaisons to each GIT.

STAR will establish liaisons to each GIT to better communicate the current science information that is available to meet their science needs and help prioritize unmet GIT science needs. GIT-STAR liaisons are essential to facilitating this interaction and tracking activities in this regard. STAR would appoint a liaison to each of the Goal Teams to receive science requests and advise on how best to address the GIT's technical needs. As the EBFM Project Coordinator is already fulfilling this role for the Fisheries Goal Team, the EBFM Project Coordinator will be added to the STAR membership and act as the STAR

liaison for this team. The remaining five STAR-GIT liaisons would be appointed based on their expertise relevant to the GIT focal area.

2. STAR will convene business, topical, and coordination meetings to support the GITs.

STAR will refine its monthly meetings to review progress of providing the science requested by the GITs. The monthly meetings will also have key presentations of findings that should be of interest to multiple GITs.

The STAR will also begin to have topical meetings to focus on high priority science needs as requested by the GITs. The topics may be an issue that addresses the need of more than one GIT (such as land-cover and land-use monitoring and assessment) or focused on a single GIT. The STAR would work directly with the requesting GIT(s) to set up the agenda, materials, and proposed attendees for the topical meetings. More complex topics would be done in coordination with STAC, CRC, Sea Grant, and other key partners.

Finally, STAR will have science coordination meetings to plan how the needs of the GITs will be addressed each year between all the STAR workgroups and associated science providers. Coordination meetings between the science providers would be held at least once a year.

3. Increase the number of science providers at the STAR meetings.

The membership of STAR will be expanded to include STAR workgroup chairs, additional federal agencies, and other CBP partners which have on-going (or planned) efforts to fill science needs. The suggested science providers that should be participants on STAR and its associated workgroups include:

- CBP science cluster- the group leaders in the CBP science cluster for modeling, monitoring, GIS support, WWW development, and data management.
- Federal agencies- liaisons to STAR should be established from these federal agencies: USEPA, NOAA, USGS, USFWS, NPS, USDA (including USFS, NRCS, ARS), and the USACOE. The representatives from these agencies should have an understanding of their respective agency science capabilities and the ability to guide resources to better meet the needs of the CBP. Federal liaisons to STAR will play a critical role in identifying the appropriate individuals from their agencies to attend topical meetings to address high priority science needs. The federal representatives on STAR should thereafter inform the Chesapeake Federal Office Directors of the science needs for the Executive Order annual action plan.
- State partners- the states already have involvement in STAR through their monitoring workgroups and would continue and potentially expand their membership as monitoring and assessment is expanded under STAR.
- Academic partners-the CRC would have a member on STAR and be the primary liaison to bringing in other academic partners as needed.

4. Evolve the STAR workgroups to address major functions.

The workgroups will be revised to implement an adaptive-management approach to meet the needs of the GITs. The proposed workgroups are:

- Modeling and decision-support tools-expand membership to address modeling being done for all CBP goals and also investigators developing decision-support tools to apply model results to better target management practices.
- Monitoring, assessment, and indicators-Provide a more integrated approach to assessing progress toward water quality and expand to meet the monitoring needs for other GITs, both integral to establishing a monitoring alliance.
- Information sharing and management-this workgroup will be responsible for improving data sharing between CBP partners and work to establish a data enterprise.
- Analytical methods and analysis will expand to also address science/data integrity.

The evaluation by STAR will be provided through action teams to coordinate existing CBP science cluster resources and by having federal partners provide flexible funds that can be used to help meet short term needs of the Goal Teams. STAR will also work with STAC, CRC, Sea Grant, and other organizations to bring together key science partners and those needing the information to address different synthesis topics. Additionally, communicating key findings would be carried out by selected STAR members (depending on the topic) with the CBP communications office.

5. Increase interaction with STAC.

STAR will increase its interaction with STAC while maintaining the need to have STAC as an advisor on science issues. STAC members who serve as liaisons to the GITs and their workgroups will advise STAR on improvements needed to provide science to the GITs and advise the Chesapeake Bay Partnership on scientific merit of approaches to address current and emerging issues. STAC will lead these key items:

- Review of key modeling, monitoring, assessment, and indicators being conducted by STAR.
- Advise on the evolution of an integrated modeling system for Chesapeake Bay and its watershed.
- Review the CBP's implementation of an adaptive-management strategy.
- Convene regional topic-specific workshops that can inform CBP restoration goals.
- Assist STAR in identifying regional expertise for GIT needs.
- Address new challenges to the restoration effort that need to be considered by the CBP (e.g., climate change).
- Organize bi-annual meetings of larger scientific community to provide the state of the science for all the major CBP restoration topics (STAC, CRC, and STAR).
- Work to conduct workshops on selected specific topics identified by the GITs. Workshops will be arranged both through direct interaction between the GITs and STAC and through coordinated efforts between STAC and STAR.

6. Prepare annual work plan to address GIT science needs.

Each year, STAR will work with the GITs to review their science priorities and identify available STAR science providers to work with them to address their science needs. STAR will prepare an annual work plan specifying what can be accomplished and list activities that need to be considered in later years.

STAR will evolve during 2011 by implementing these short-term recommendations.

Appendix 1

Appendix 1 contains two pieces of information:

- Table of science needs from the Goal Implementation Teams
- Text on the Science Support for the Fisheries Goal Team

Table A1-Summary of science needs of the Goal Implementation Teams

GIT	Topic Area	Information need--Targeting, Monitoring/Indicators/Evaluation
1 Fisheries	Targeting	Benthic habitat characterization and assessment for oyster restoration and fish utilization
		Land use impacts on fisheries
		Map fisheries migration, nursery areas, abundance/distribution with key habitats
		Biogeographic assessments
	Monitoring	Oyster restoration metrics
		Fisheries status and trends
		Plankton
		Emerging issues- Blue catfish
		Oyster restoration success
		Fisheries health (GIS, spatial planning tools linking land use and fisheries)
		Progress toward enhancement of fisheries management with ecosystem approaches
	Evaluating	Ecological impacts of blue catfish
		Valuation of ecological services and human uses of key fisheries and habitats
2 Habitat	Targeting	Wetland Restoration and Enhancement Prioritizations --Tidal (factors: climate change, black duck wintering habitat, living shorelines); Non-Tidal (phase II WIPs, forests, invasive species, agricultural lands) Priority Species Overlays--Estuarine (in cooperation with MD DNR), Piedmont/Appalachian TBD Stream Restoration Prioritization (Brook trout habitat; Mining impacts (pH); Temperature (forest buffers); Fluvial geomorphic stability Prioritize fish passage opportunities with special emphasis on removing blockages on the James and Susquehanna Rivers

	Monitoring	Baseline for tidal and non-tidal wetlands converted from historical coverage – ex. soils maps versus current NWI maps for non-tidal from which to determine adequate restoration and protection goals for wildlife habitat.
		Stream Habitat Health Index that incorporates fish passage, habitat stability, and the existing IBI for purposes of targeting restoration and tracking progress towards goals. Vertical and horizontal stream stability estimated through the measurement of floodplain connectivity, while horizontal stability can be estimated by measuring planform geometry. These estimates can be obtained largely via a desktop exercise using a combination of existing GIS data, existing watershed assessment data, and existing habitat monitoring data already being collected throughout the watershed.
		LIDAR for the Bay Watershed. This is along with land cover/use is critical for the forestry elements of the Habitat Goals and may be useful to data need 1 for wetlands.
		Expand the Atlantic Coast flyway sea/diving ducks surveys to include the entire Chesapeake Bay and map the diving duck habitat
		Expand existing monitoring efforts to include monitoring for fresh water mussels and American eel both critical measures of stream health.
		Assess and map the areas affected by invasive plants and animals in the Chesapeake Bay
		Obtain better wetlands monitoring data for acreage change assessment (beyond C-CAP data)
	Evaluating	Assess effectiveness of new and existing fish passages for restoring habitat range for diadromous fish.
		Assess effectiveness of habitat restoration activities
		GIS analysis of all open fish spawning habitat and total amount of habitat to be opened following removal of all prioritized or ranked projects. – Fish Passage Workgroup.
		Obtain synthetic aperture radar and ground data during optimal ground hydrologic conditions (i.e., spring) before and after planned hydrologic restorations on the Eastern Shore of Maryland Synthesize data on bird use of Chesapeake Bay habitats to guide restoration and protection Determine wetland extent required for a healthy Chesapeake Bay Habitat as BMP/Value of Ecosystem Services/Markets Wetland/SAV uptake of nutrient and sediments

		Assist in development and peer review of watershed-wide brook trout and black duck indicators

3 Water Quality	Targeting	Use results from watershed models to prioritize locations of actions
	Monitoring	TMDL related work--setting TMDL allocations
		Improve water-quality monitoring in the watershed
		Improve tracking of management actions and land-use activities
		Monitor and assess restoration activities in small watersheds
		Improve monitoring of stream conditions
		Improve monitoring of tidal waters (and expand NOAA buoy system)
		Track progress toward load reduction goals and 2-year milestones
	Evaluating	Synthesize results from past and present small watershed studies to provide products on effectiveness of point source, agriculture, and storm water management practices to reduce nutrients, sediment, and toxic contaminants
		Assess criteria related to toxic contaminant impairments
		Better relate local stream and river water quality standards to Bay water-quality standards
		Evaluate water-quality changes and progress
4 Healthy Watersheds	Targeting	Develop/provide access to GIS database and geographic indicators identifying priority healthy watersheds for protection
	Monitoring	Metrics for characterization of watershed heath at a scale relevant to local management
		Fish indicator for assessing stream/watershed health (e.g., fish community indicator)
		Tools for the valuation of watershed goods and services
	Evaluating	Tools for watershed health trend analysis
		Tools to characterize the existence and adequacy of protective mechanisms, including a compilation of state efforts, local protection

		Tools for the valuation of watershed goods and services
5 Stewardship	Targeting	
	Monitoring	Public access
		Livable communities metrics
	Evaluating	Watershed experiences
		Measure of citizen actions
6 Leadership	Targeting	
	Monitoring	
	Evaluating	Cross-partnership scientific capacity analysis

Science Support for the Fisheries Goal Team

Maryland Sea Grant's Ecosystem Based Fisheries Management (EBFM) project and the way in which it provides support to the Fisheries Goal Team may provide a possible model for STAR. Support for the development of EBFM has grown over the past three years to include over 85 participants drawn from the academic and research community, state and federal agency scientists and non-governmental representatives. It is organized through a series of focused technical teams (Species Teams and Quantitative Ecosystem Teams; Figure 1) that are expressly integrated at the leadership level through the Fisheries Ecosystem Workgroup (FEW). The effort builds upon the scientific foundation of the 2006 Chesapeake Bay Fisheries Ecosystem Plan.

The EBFM program is designed primarily to provide strategic guidance to the Fisheries Goal Team. To do so, it relies upon ongoing interactions with the GIT leadership at the level of the GIT's Executive Committee where the Coordinator of the EBFM Project acts as the liaison between the Fisheries Goal Team and the FEW. In the current model the FEW receives science requests from the Fisheries Goal Team and recommends the appropriate group(s) to address technical needs. These may include teams within the EBFM project or others with expertise depending on the nature of the request. Maryland Sea Grant acts as the facilitator to ensure that this iterative process works smoothly and the GIT understands what options and timelines are relevant to meeting their technical needs. Because the EBFM project has a specific focus, it is charged with developing new tools and approaches in a bottom-up manner. These address the overarching CAP goal and Fisheries Goal Team needs by enhancing single species approaches with ecosystem-based information products, indicators and reference points. Over time this will facilitate the development of integrated ecosystem based fisheries management plans in coordination with the GIT.

Figure A1. Maryland Sea Grant's Ecosystem Based Fisheries Management Project Structure