Scientific and Technical Advisory Committee
Annual Activity Update to the Executive Council
January 10, 2004

The Scientific and Technical Advisory Committee (STAC) provides scientific and technical guidance to the Chesapeake Bay Program on measures to restore and protect the Chesapeake Bay. As an advisory committee, STAC reports quarterly to the Implementation Committee and annually to the Executive Council. Since it's creation in December 1984, STAC has worked to enhance scientific communication and outreach throughout the Chesapeake Bay watershed and beyond. STAC provides scientific and technical advice in various ways, including (1) technical reports and papers, (2) discussion groups, (3) assistance in organizing merit reviews of CBP programs and projects, (4) technical conferences and workshops, and (5) service by STAC members on CBP subcommittees and workgroups. In addition, STAC now has the mechanisms in place that will allow STAC to hold meetings, workshops, and reviews in rapid response to CBP subcommittee and workgroup requests for scientific and technical input. This will allow STAC to provide the CBP subcommittees and workgroups with information and support needed as specific issues arise while working towards meeting the goals outlined in the *Chesapeake 2000* agreement in a way that STAC was not able to in years past. For additional information and copies of all STAC publications, please visit the STAC website at www.chesapeake.org/stac.

The following document outlines STAC activities conducted in the past year as well as those currently being conducted and planned for the current year. In addition to these activities, STAC conducts quarterly committee meetings, and quarterly STAC Executive Board meetings.

STAC Activities Completed During the Past Project Year

Quantifying the Environmental Benefits of Activities that Promote a Stewardship Ethic and Effect Behavior Change in Chesapeake Bay Watershed Residents (Rapid Response Workshop, September 15, 2003)

STAC responded to a request from the CBP Communications and Education Subcommittee (CESC) to advise them in their efforts to quantify the benefits of a mass media campaign. On September 15, 2003, STAC convened a one day workshop for presentations by experts who have participated in efforts to quantify behavior changes, especially those affected as a result of a campaign of this scale, as well as experts who have conducted mass media campaigns resulting in behavior change. The purpose of the workshop was to provide recommendations for the types of information that need to be collected and the methodology for collecting, tracking and reporting that information in order to measure behavior change(s) effected as a result of the CESC mass media campaign and campaign methodology to effectively measure and to increase response rate/behavior change. Following the presentations, select members of CESC and STAC, and the presenters participated in facilitated discussions to reach consensus on recommendations and a plan of action for the following topics: campaign plans, target

audience, expected response rate, tasks for completion and information that should be collected by the ad firm, quantifying benefits, and ways to encourage "piggybacking" on the campaign by other organizations and outreach vehicles.

Scientific Review of the Proposal *How Oxygen and Windmills Can Save the Bay* (Expert Panel Review)

The Chesapeake Bay Program requested that STAC conduct a scientific review of the proposal *How Oxygen and Windmills Can Save the Bay*. STAC members reviewed the proposal and believe that the author should be commended for thinking creatively and proposing an innovative approach to addressing the problem of anoxia/hypoxia in the Bay, and that the concept of mechanical aeration, powered by windmills, may have some limited practical applications in subsystems of the Bay and its tributaries. The idea does not, however, represent a potential solution to the low dissolved oxygen conditions found in deep waters of the Bay mainstem. The proposal to aerate the Bay with windmills addresses a symptom, not the cause of the Bay's problem. Reducing nutrient inputs is the only long-term solution to extensive hypoxia in the deep waters of the Chesapeake Bay.

Scientific Review of the NOAA Chesapeake Bay Office's Fisheries Ecosystem Management Plan (Expert Panel Review)

The NOAA Chesapeake Bay Office requested that STAC conduct a scientific review of the current draft of their Fisheries Ecosystem Management Plan. A panel of experts from both within STAC and outside of the Chesapeake Bay Region was assembled to conduct the review. Overall the reviewers agreed that the Fisheries Ecosystem Plan (FEP) is an impressive and for the most part comprehensive document that is extremely well written with a wealth of detailed information on many aspects of the Chesapeake Bay ecosystem and that the document will prove valuable to the implementation of fisheries ecosystem management in the Chesapeake Bay. There were also specific areas that the reviewers recommended additional revision and those comments were considered and incorporated, where appropriate, into the final version. At the December 2004 STAC meeting the committee endorsed the use of this document and recommends that the IC offer its endorsement as well.

Identifying and Prioritizing Research Required to Evaluate Ecological Risks, Benefits and Alternatives Related to the Potential Introduction of *Crassostrea ariakensis* to Chesapeake Bay (Rapid Response Workshop, December 2-3, 2003)

It is important that sound scientific information be available to inform the decision-making process with regards to the potential introduction of *C. ariakensis* to the Chesapeake Bay. Neither the risks, potential consequences nor the potential benefits of introducing *C. ariakensis* to the Chesapeake Bay are adequately known. The current understanding of the biology and ecology of *C. ariakensis* is insufficient to predict whether an introduction will provide desired benefits or have a substantial adverse impact within the Bay or other Atlantic Coast estuaries over short or long time scales. STAC convened a workshop of research scientists in Annapolis on December 2-3, 2003 to discuss and prioritize research needed to fill critical gaps in our ability to predict risks and benefits that might result from an introduction of diploid *C. ariakensis* to Chesapeake Bay. The outcome of this effort represents a disciplined approach to prioritize research

needs and only those that were considered to be most important were recommended in the workshop report. The credibility of decisions surrounding the proposed introduction of *C. ariakensis* depends upon the quality of the science that underpins the decision-making process— a process that ultimately, will require management and the scientific communities to work in concert to achieve an outcome in the best interest of the long-term health of Chesapeake Bay.

Coupling Water Quality and Upper Trophic Level Modeling for Chesapeake Bay
(Responsive Workshop, January 8-9, 2004)

The Chesapeake Bay Program has invested in several numerical models to address issues related to management of the estuary. The Chesapeake Bay Water Quality Model (*CBWQM*) has been the primary tool used to forecast estuarine ecosystem responses to variations in nutrient and sediment inputs from the watershed. Although this model includes variables related to food supply at lower trophic levels (plankton, benthos) and related to benthic habitat conditions (O_2, SAV), it does not simulate dynamics of exploited fisheries populations. Many of the goals of the *Chesapeake 2000* agreement relate to interactions between water and habitat quality and populations at upper trophic levels. This workshop helped us address the following goals: to assess capabilities and limitations of *CBWQM* and *Ecopath with Ecosim* for addressing interactions between water quality, habitat condition, food availability, and fisheries population dynamics; to identify possible mechanisms by which these two models could interact via direct or indirect coupling; and to consider alternative modeling approaches for simulating dynamic interactions between exploited animal populations and the ecosystems that they inhabit. The workshop discussions led to several tentative conclusions regarding model coupling and recommendations for future action. The completed workshop report is scheduled for publication in January 2005.

Spatial Management in the Chesapeake Bay: Applications, Issues, and Opportunities
(Proactive Workshop, April 13-14, 2004)

STAC sponsored a workshop on Spatial Management, including protected areas, that was directed primarily at identifying and defining issues, concerns, and opportunities for increased implementation of spatial management. The workshop was held on April 13 -14, 2004 and was the first of two workshops that STAC will sponsor on this topic. Workshop participants represented a diverse group of stakeholders, management agencies, and academia. The workshop report emphasizes that, while workshop participants were supportive of spatial management, many issues and concerns must be addressed. These include: 1) stakeholder involvement at the outset and throughout development of spatial management planning; 2) the need for an inventory of present spatial management in the Bay ecosystem; 3) the need for science to define how spatial management could perform better than conventional management approaches; 4) the need for evaluation and monitoring of any spatially managed areas and benefits/costs of their implementation; and 5) the need to consider access privileges and the concern over 'permanency' of implementation in the absence of sufficient evaluation of performance. The report also indicates broad opportunities for expansion of spatial management in support of Chesapeake Bay resource management and protection, especially for Habitats and Biodiversity Conservation, and potentially for Fisheries Management. Results and

recommendations of the present workshop will serve as a framework and foundation for the second workshop that will address technical issues related to design and implementation of spatially managed areas.

Understanding the "Lag Times" Affecting the Improvement of Water Quality in Chesapeake Bay (Proactive Workshop, May 19-20, 2004)

Better quantifying the "lag time" between changes in nutrient and sediment sources in the Chesapeake Bay watershed and improvement in the Bay's water quality and submerged aquatic vegetation (SAV) is critical to help resource managers to implement the most effective nutrient and sediment reduction strategies and for scientists to improve monitoring and modeling. Tributary strategy plans for basins within the Bay watershed have been developed to implement appropriate best management practices (BMP's) to reduce nutrient and sediment loads to the Bay. These practices are designed so water-quality criteria (for dissolved oxygen, water clarity, and chlorophyll) can be met in the Bay by 2010. However, there is a large degree of uncertainty about the "lag time" between implementing the nutrient and sediment practices and detecting an actual improvement of water quality and SAV in the Bay. The objectives of the workshop were to provide the CBP with a better understanding of the factors affecting the "lag time" associated with improving water quality and SAV in the Bay and provide recommendations for improved monitoring and modeling of these factors. Results from the workshop suggest that "lag times" associated with implementation of management practices, impacts of watershed properties, and response of the Bay water quality will make it very difficult to meet water-quality criteria in the Bay by 2010. Additionally, there are lag times associated with the movement of nutrients and sediment in the watershed. These include the influence of ground water which may cause a lag time from months to decades for improvement in nitrogen concentrations. Watershed properties affecting the storage and transport of phosphorus and sediment may cause lag times of years to decades in water-quality improvements. Lag times in the tidal waters appear to be much shorter. The findings suggest that water-quality conditions in tidal waters may improve within a season as nutrient and sediment loadings are reduced to the Bay.

Urban Tree Canopy (Rapid Response Workshop, May 24, 2004)

STAC responded to a request from the Chesapeake Bay Program's Forestry Workgroup to create a workshop that would help partners implement the urban canopy cover goals of the Riparian Forest Buffer Directive No. 03-01, signed by the Chesapeake Executive Council in December 2003. The workshop brought together urban forestry researchers and practitioners from federal, state, and local levels in the Chesapeake Bay region and beyond to: define the water quality benefits that urban tree canopy provides and how these can contribute toward Chesapeake Bay Program goals; address what an appropriate canopy cover goal for urban watersheds is to produce measurable water quality and quantity benefits; and synthesize knowledge and ideas for the creation of a guide for local governments and community organizations to use in conducting urban canopy cover assessments, developing canopy cover goals, and implementing canopy cover enhancement strategies. The workshop and its report are technology transfer tools intended to help local jurisdictions accomplish the directive's goals. The workshop and proceedings assist local practitioners in understanding the role of urban tree canopy cover

in addressing the goals of the *Chesapeake 2000* agreement; learning about various data sources for, and methods of, quantifying tree canopy cover; learning how to set appropriate canopy cover enhancement goals; and, strategies for implementing those goals.

STAC Activities Completed During the Current Project Year

Scientific and Technical Needs for Fulfilling *Chesapeake 2000* Goals

As the *Chesapeake 2000* agreement (C2K) is now the regional community's "Strategic Plan" for restoring the system, STAC has updated its list of recommendations for undertaking the restoration. The success of the restoration will be maximized if the effort selects the best available scientific approaches. Thus STAC provides suggestions for implementing the goals and commitments of the *Chesapeake 2000* agreement. Specific recommendations are provided to increase probable success for the five restoration goals of the agreement. These recommendations can be summarized as: conduct critical research (laboratory, field, and modeling) needed to undertake specific restoration commitments in each goal and distribute comprehensible information to local decision makers where, ultimately, Bay recovery rests.

Scientific and Technical Needs for Fulfilling the *Chesapeake 2000* Goals: Priority Needs in Support of C2K

After completing the Scientific and Technical Needs for Fulfilling the *Chesapeake 2000* Goals, STAC selected several of the recommendations and identified them as priorities. These selected priority recommendations, if applied towards fulfilling the goals of the *C2K*, could substantively improve the chances of achieving the agreement's ambitious goals.

Chesapeake Futures: Choices for the 21st Century

Distribution of the STAC Report *Chesapeake Futures: Choices for the 21st Century* continued. The primary goal of this project was to produce a technical assessment of the long-range trends and possible outcomes for the Chesapeake Bay ecosystem into the 21st century. Environmental managers and decision-makers can use the detailed results of this process to make long-range plans and decisions. In addition, scientists will be able to use the information to identify information gaps, which will guide future research priorities. However, the general public within the watershed also has a vested interest in the health of Chesapeake. Information about critical issues may energize citizen organizations and assist in focusing their efforts.

Evaluating the Design and Implementation of the Chesapeake Bay Shallow Water Monitoring Program (Responsive Workshop, November 31-December 1, 2004)

The EPA Chesapeake Bay Program and its state partners have agreed to implement a comprehensive and coordinated Shallow Water Monitoring program as part of the new design to assess the Bay's shallow water habitats required by the development of the new water quality criteria. Currently, sparse water quality data are collected in shallow portions of Chesapeake Bay and its tributaries. STAC held a workshop that reviewed the design of the Chesapeake Bay Shallow Water Monitoring Program to

ensure that the design meets the objectives established by the Shallow Water Monitoring Design workgroup, while optimizing achievable temporal and spatial coverage with limited resources. The second objective was to solicit input from workshop participants and technical experts in the field of monitoring on outstanding issues regarding implementation, data analyses and model integration. Prior to the STAC workshop, documentation on the tidal monitoring design process was made available to workshop participants. Discussions focused on development of criteria to optimize site selection and monitoring duration, and to enhance coordination with living resource and local source monitoring efforts. The workshop results are currently being compiled and a full workshop report will be completed and published early in 2005.

STAC Activities in Progress for the Current Project Year

Spatial Management II Workshop (Proactive Workshop, Date TBD)

In April 2004 STAC sponsored a workshop on Spatial Management, including protected areas, that was directed at identifying and defining issues, concerns, and opportunities for increased implementation of spatial management. The second workshop on this topic will take the concerns and recommendations compiled from the April workshop, and incorporate them into the content and discussions planned for the second workshop, which will focus on the technical issues surrounding the planning and design of spatially managed areas.

Urban Stormwater Sediment: Sources, Impacts and Control (Responsive Workshop, Date TBD)

Sediment has long been recognized as a major water quality problem in the Chesapeake Bay and its tributaries. The Bay agreement, *Chesapeake 2000* (C2K) identifies sediment as a major source of impaired water quality, comparable with nutrients. Impacts from sediment include loss of riparian and streambed habitat, turbidity that prevents or impedes the growth of underwater grasses and conveyance of toxic chemicals and other pollutants that impair water quality. Sediment associated with urban stormwater is a significant part of that problem. Urban stormwater causes streambank erosion, erosion from construction sites, resuspension of previously deposited ("legacy") sediment and carries suspended solids from urban areas. Monitoring and modeling information are not sufficiently developed to systematically document the scope and impact of the sediment problems in the Bay watershed. The workshop will blend science, technology and management. It will bring together experts to document the current state of knowledge and identify priorities and recommendations for advancing scientific knowledge, improving monitoring and modeling and improving technology and management practices.

Integrated Land Use and Watershed Management (Responsive Workshop, Dates TBD)

Land use has a direct impact on downstream water quality and habitat. As land is converted from forests and wetlands to agricultural uses, runoff increases causing erosion and carrying an array of pollutants. Further conversion of land for housing and commercial uses brings increasing imperviousness, greater rates of runoff, and additional problems of erosion, pollution, and habitat loss. These state specific workshops will

promote the integration of watershed or natural resource management into local land use planning to ensure the implementation of local water quality/quantity, habitat, and forest buffer goals (and ultimately C2K goals). Relevant county examples will be highlighted and discussion on the advantages/disadvantages of each example will be encouraged.

STAC Peer Review of the Chesapeake Bay Watershed Model (Expert Panel Review)

STAC will provide an independent external review of the current version of the watershed model used by the Chesapeake Bay Program, and will provide continuing review of model implementation during the one year period following the review. STAC will form a small steering committee composed of several STAC members that will work with the CBP staff to develop an explicit charge for the external review panel. The charge will identify specific questions or issues that will form the minimum expectations for the panel's review. The panel will be expected to spend up to two weeks reviewing model background materials, meeting with CBP staff and/or model stakeholders, and preparing written comments responding to the panel's charge and any other issues the panel may identify during the course of its review. In addition, three reviewers (ideally part of the original review panel) will be contracted to meet with CBP staff and model stakeholders 3 times during the twelve month period following the initial peer review. These meetings will be to observe and comment on the initial model implementation activities. Each of the quarterly reviews will be summarized in a written report to STAC and the CBP staff.

Future STAC Activities for the Current Project Year

Monitoring of Toxic Chemicals in the Chesapeake Bay Region (Responsive Workshop, Date TBD)

The objective of this workshop is to provide guidance for state agencies and other organizations collecting data on toxics pollution in the Chesapeake Bay region in order to encourage the use of appropriate detection limits and consistent monitoring techniques to maximize the usefulness of the data for the wider Bay community. The following questions will be addressed through the course of the workshop: What are appropriate detection limits to allow load quantification? What are acceptable low-detection limit sampling and analytical methodologies? What consistent set of parameters should be analyzed for each chemical class (e.g. a list of PCB congeners, individual PAHs, etc.)? What method(s) should be used to collect storm water monitoring samples for load estimates?