



Chesapeake Bay Program
SCIENTIFIC AND TECHNICAL ADVISORY COMMITTEE

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James Edward
Acting Director of the Chesapeake Bay Program
US Environmental Protection Agency
410 Severn Ave., Suite 109
Annapolis, MD 21403

C/O Lee Karrh
Chair, Chesapeake Bay Program's Submerged Aquatic Vegetation Workgroup
Maryland Department of Natural Resources
Tawes State Office Building
Annapolis, MD 21401

Dear Mr. Edward and Mr. Karrh,

The SAV Workgroup requested a review of the CBP's SAV restoration program. In its request, the SAV workgroup acknowledged that the "Bay Program has fallen far short of its proximate SAV goal of direct restoration of 1,000 acres of SAV. Further, it is unclear whether or not direct restoration has or could advance the overall goal of achieving 185,000 acres of SAV bay wide." Specifically, the workgroup requested STAC conduct a review of the effectiveness of direct SAV restoration efforts, evaluate the efficacy of the direct restoration strategy for accelerating broader SAV recovery, and, if appropriate, provide guidance on how the CBP might improve restoration efforts.

To conduct this review, STAC members and external SAV experts from outside the Chesapeake Bay Watershed reviewed a number of published and unpublished scientific studies provided by the SAV workgroup. The review committee has recently completed its review of these documents, and is currently writing a review report which will describe, in detail, its findings. For now, the review committee would like to present a summary of its recommendations to help the SAV workgroup move forward with successful restoration efforts.

Recommendations from the STAC's SAV Restoration Review Committee

1. **Discontinue efforts aimed at widespread restoration of SAV until environmental conditions improve.** Work in the Virginia Coastal Bays clearly reveals that techniques developed under the SAV restoration program are viable for overcoming apparent recruitment limitation for the target species, *Zostera marina*, and can generate sustainable beds over large regions where water quality and summertime temperatures are supportive. However, without water quality improvements in the Chesapeake Bay, SAV seeding and planting is not a viable strategy for widespread restoration because SAV restoration techniques only address recruitment limitation and not other habitat quality limitations. Therefore, the apparent failure of large-scale restoration of SAV within the Chesapeake Bay is not a methodological limitation, but an environmental limitation. Until such time as either optical water quality is improved, summertime temperatures moderate, or the site selection criteria are vastly improved, only limited SAV restoration efforts in the Chesapeake Bay are warranted.
2. **Continue targeted restoration efforts, both to establish viable beds and to further understand site selection criteria.** Restoration is still appropriate in areas with high probability of success, if such areas can be identified. Efforts should be made to improve site selection criteria for *Zostera* through additional analysis of monitoring data that includes:
 - a. Evaluating extremes of temperature and clarity, rather than average conditions;

- b. Considering the interacting effects of multiple stressors (particularly temperature, clarity, and salinity) and temporal dynamics/sequencing, such as high temperatures that follow months with high chlorophyll a or low dissolved oxygen concentrations.

The focus should be on establishing a few beds with a high probability of success, as opposed to setting an arbitrary goal of a specified number of acres.

3. **Develop SAV restoration strategies that are responsive to climate change.** The effects of warming waters on *Zostera* should be evaluated and applied to site selection criteria and other strategies, since warming is expected to limit the range of this species in the future. Although the species occurs in North Carolina, which has warmer average water temperatures, the species' ability to tolerate warmer waters may be dependent upon sufficient water clarity. Therefore, the interaction of multiple stressors will be an important consideration for projecting future *Zostera* viability.
4. **Incorporate full adaptive management into restoration decision making.** Future restoration programs could be improved through the use of a thorough adaptive management (AM) framework that engages researchers and managers and applies lessons learned from successes and failures. Many elements of AM were applied in the current effort such as engaging a broad range of stakeholders in initial goal-setting and applying monitoring results to inform strategies. However, the process did not always explore the full implications of monitoring results to inform subsequent actions or to re-evaluate targets. Therefore, the approach could be improved by:
 - a. Developing deliberate and sequential implementation strategies, with sufficient opportunity to evaluate restoration responses and apply improved understanding of causal relationships to refine restoration approaches
 - b. Conducting additional research (possibly using lab and mesocosm studies) to fill gaps in understanding
 - c. Incorporating flexibility in adaptive decision-making so that policy-makers, managers, researchers, and restoration practitioners can provide appropriate input for adjusting targets, techniques, and allocation of effort and funds, as knowledge is gained.
5. **Build on the successful research into restoration techniques.** The innovations developed for seeding and planting *Zostera* should be transferred to other native species that have potential for large-scale restoration in order to enlarge the set of restoration options available to the Chesapeake Bay Program.

Accomplishing these recommendations will require a renewed investment in the research on SAV restoration. Improving site selection capabilities, incorporating the effects of climate change and building truly adaptive management strategies will require an improved understanding of the effects of multiple, interacting stressors of *Zostera* and other SAV species. STAC recommends that funding for SAV restoration in the Chesapeake Bay be largely devoted to research directed at answering such fundamental questions, prior to engaging in widespread restoration.

Thank you for requesting this review. The eventual successful restoration of SAV to the Chesapeake Bay will prove essential to the recovery of the Bay's ecosystem, and STAC looks forward to continued collaboration to realize this goal.

Sincerely,

Chris Pyke,



Chair, Chesapeake Bay Program's Scientific and Technical Advisory Committee