STAC Technical review
Evaluating boat wake wave impacts on shoreline erosion and potential policy solutions

The Chesapeake Bay Commission (CBC) requested that STAC conduct a technical review of the relevant information on the potential impacts of boat generated waves on shoreline stability and attendant ecosystem properties, and provide advice on available policy actions to minimize any adverse effects.

STAC was also asked to address several questions related to (*i*) erosion and sediment inputs caused by boat wake waves, (*ii*) existing and needed data to develop best management practices to minimize shoreline erosion from boat wake waves, and (*iii*) political and legal challenges associated with policy actions to reduce boat wakes.

Background:
Salt marshes have weak resistance to wave action (Fagherazzi et al. 2013) and boat wakes have been shown to negatively impact shoreline stability in salt marshes (Castillo et al. 2001). Boat wake impacts include shoreline erosion, vegetative damage, and impacts to the faunal communities (Parnell and Koefoed-Hansen 2001). Although periodic disturbances (compared to wind waves) boat wakes can be a significant source of erosive energy. In one study, it was discovered that although boat wakes only accounted for about 5% of the wave energy at a site, due to their longer height and period, they accounted for 25% of the cumulative wave force (Houser 2010).

Shoreline erosion due to boat wakes is related to the number of boats passing (frequency of the disturbance) and the energy of the total wave disturbance (calculated by speed, vessel size and distance from channel; Glamore 2008). Wake effects are particularly significant in areas of restricted depth and width (FitzGerald et al 2011), such as tidal creeks. In these systems, they can undercut banks and have significant impact to marshes, especially in areas where synergistic impacts may have reduced marsh soil strength.

Review focus areas:

1. Evaluate the state of the science of known effects of boat generated waves on shoreline stability and other ecosystem components (e.g., vegetative habitat, faunal community composition, nearshore TSS concentration).
2. Identify data requirements to effectively model the potential effect of boat wake waves on shorelines
3. Identify data gaps and research needs
4. Determine existing and potential policy actions to reduce adverse effects of boat wake waves on shorelines. Describe political and legal challenges for designating no-wake zones in Chesapeake Bay. Are there case studies that can be learned from in the bay of no-wake zone designation and/or evaluation of response from management action?

Questions of interest:

1. What is the relative contribution of sediment inputs from boat wake induced shoreline erosion in Chesapeake Bay?
2. Are these types of sediment inputs currently represented in the Bay Watershed Model?

3. Would expanding no-wake zones be beneficial to the Bay?
4. Are there other policy options besides no-wake zones to consider?

Overview of review approach:
To be responsive to the CBC request, we are proposing to form a core review panel to assimilate relevant information in the form of a white paper. Once a draft technical review is complete, the document will be disseminated to additional external reviewers for further input to ensure critical areas of expertise are well-represented.

Proposed Core Review Team:
Donna Bilkovic, VIMS, College of William & Mary, STAC member, donnab@vims.edu - **confirmed**
Molly Mitchell, VIMS, College of William & Mary, molly@vims.edu - **confirmed**
Jenny Davis, NOAA (NC), jenny.davis@noaa.gov - **confirmed**; expertise in relationship of shoreline erosion to wave energy setting; wave energy modeling
Pam Mason, VIMS- mason@vims.edu, **confirmed**
Jana Davis (Chesapeake Bay Trust), JDavis@cbtrust.org **confirmed**
Julie Herman, VIMS- herman@vims.edu,
Elizabeth Andrews, Virginia Coastal Policy Center, eaandrews@wm.edu – summer student review of related legal/policy issues – **confirmed** (stipend available?)
Navid Tahvildari, ODU, ntahvild@odu.edu - **confirmed**

Potential External Reviewers and their pertinent expertise:
Carl Friedrichs, VIMS – **confirmed** to assess the TSS-boat wake sections
Duncan FitzGerald, Boston University –boat wake impacts and their role in shore erosion process
Linda Walters, UCF – boat wake effects on living shorelines and oyster reefs
Scott Hardaway, VIMS – geologist, expert in shoreline erosion and protection approaches
Gary Schenk – for input about Bay Watershed Model
Skip Stiles (Wetlands Watch), skip.stiles@wetlandswatch.org

Additional contacts for the review:
Bruce Michael, MDDNR, Bruce.Michael@Maryland.Gov – will provide continuous TSS data to assess temporal patterns that may be related to boating activity
Justin Schafer, City of Norfolk, justin.shafer@norfolk.gov, will provide information on proportion of city-managed property in Lafayette River, VA experiencing boat-wake induced erosion that requires erosion protection. Another contact for this issue: Kevin Dubois, kevin.dubois@norfolk.gov

Proposed Timeline

June 1 2016	Begin technical review
Sept 30 2016	Draft review document completed by core team
October 2016	External review
December 2016	Core Team synthesizes external reviewer comments into final document
January 2017	Internal document review by STAC
February 2017	Final Report released
Spring 2017	Report to Chesapeake Bay Commission