

February 13, 2023

Dear Maryland Legislators,

I am writing to provide information relevant to Maryland Senate Bill 417 and House Bill 602. I am a Virginia resident, a Professor at William & Mary's Virginia Institute of Marine Science, and I have been working on effects of living shorelines on natural resources for over two decades. I therefore believe that I can provide a knowledgeable opinion on the benefits that living shorelines can provide for both the benthic, bottom-dwelling food resources (e.g., clams and worms living in seafloor sediments) in Chesapeake Bay, as well as the fish and crabs (e.g., croaker, blue crab) feeding in these coastal systems. I hope this will help Maryland legislators understand the ecological and economic reasons that underlie the value of living shorelines for the Chesapeake Bay ecosystem, and aid legislators in reaching an informed decision on Senate Bill 417 and House Bill 602.

First, my students and I have tracked the effects of living shoreline construction on bottom-dwelling animal communities in Chesapeake Bay. Coastal erosion and sea level rise have led to increased interest and demand for living shorelines, which incorporate plants, natural materials and ecologically beneficial artificial structures to stabilize and reduce erosion of marsh land, rather than traditional shoreline armoring, such as bulkheads. One of our studies evaluated the ecosystem services provided by living shoreline projects. In a study funded by the National Oceanic and Atmospheric Administration, Center for Sponsored Coastal and Ocean Research, our results indicated that when living shorelines replaced a bulkhead, the resulting benthic community closely resembled that in adjacent natural marshes with no bulkhead after only two years, by increasing the density and biomass of clams. Bivalves, such as clams, are a reliable indicator of a healthy ecosystem, and are useful for assessing the benefits of living shorelines. Similarly, the density and biomass of polychaete worms increased in the third year after construction of the living shoreline. Benthic species such as clams and worms are key food items for the blue crab and fish such as spot and croaker in Chesapeake Bay, such that living shorelines can enhance the production of fishery species, in contrast to bulkheads which reduce food availability for fishery species. Overall, these results highlight the benefit to benthic communities by preventing erosion using living shorelines instead of traditional shoreline hardening techniques. Moreover, declines of benthic prey species due to hardened shorelines will have ramifications for animals higher in the food web. More information can be found in the peer-reviewed scientific publication, Davenport et al. 2018, here: <https://rdcu.be/c5xXk>.

Second, in two studies, my colleagues and I demonstrated negative impacts of shoreline hardening on fish and crabs in Chesapeake Bay. In one study, we compiled databases from fish net surveys for a comprehensive review using 587 sites in 39 subestuaries in Chesapeake Bay (meta-analysis; peer-reviewed publication Kornis et al. 2017: <https://link.springer.com/article/10.1007/s12237-017-0213-6>), and found that shoreline hardening degraded estuarine fauna both directly adjacent to the hardened shoreline and, at a larger scale, as cumulative hardened shoreline increased in each subestuary. In another study, funded by the Chesapeake Bay Trust, we examine threshold effects of hardened shorelines on critical forage species (e.g., croaker, silverside, blue crab) in Chesapeake Bay by examining patterns in fish and crab abundances in comparison to shoreline development in Chesapeake Bay tributaries. We determined that there were threshold declines in seven key species when shorelines were developed, and

these declines occurred at levels between 10% and 30% of tributary shoreline hardening. Furthermore, juvenile blue crab abundance declined with shoreline development, whereby for every 10% increase in shoreline hardening, there was a 4% decrease in crab abundance. For example, if a tributary without shoreline hardening supported 100 million blue crabs, that same tributary would lose production of 4 million blue crabs for every 10% increase in shoreline hardening. This indicates that economically and ecologically valuable natural resources may be strongly degraded by shoreline development due to a loss of food availability. In addition, developing legislation on a threshold for shoreline hardening may be appropriate, especially for tributaries in highly developed subestuaries. These results have been presented to the Chesapeake Bay Fisheries Goal Implementation Team and at a national conference.

In summary, multiple studies provide convincing evidence of the adverse impacts of shoreline development and positive effects of living shorelines on living resources. **Benthic organisms and the economically and ecologically important fish and crabs that feed on them can all benefit from reductions in shoreline hardening and increased use of living shorelines.**

Please do not hesitate to contact me if you would like further information at 804-684-7698 or seitz@vims.edu. I hope this information will assist you as you prepare your decision on Maryland Senate Bill 417 and House Bill 602.

Sincerely,



Rochelle D. Seitz, Ph.D.