Identifying Opportunities and Guidance for BUDM to Promote SAV Resilience

Reference SON: *1947 BUDM Tampa Bay & 1933 Great Lakes BUDM*

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Research Need

Historical negative impacts from dredging and placement in and around submerged aquatic vegetation (SAV) habitats (i.e., plant removal, burial, increased turbidity; Erftemeijer and Robin Lewis, 2006) have limited the opportunities for beneficial use of dredged material (BUDM) to restore these ecologically critical, federally protected habitats, despite their growing disappearance due to changing conditions and increased anthropogenic disturbances (Waycott et al., 2009). However, recent monitoring of SAV habitat response to co-located or nearby BUDM placement indicates that the long-term (3-5+ years) gains in SAV habitat health/coverage outweigh any short-term (days-weeks) impacts to water quality (e.g., Russ et al., 2023 and Figure 1). In a recent workshop, USACE practitioners identified multiple ways ERDC can help overcome the inertia surrounding BUDM for SAV, including facilitation, tool development, educational resources, and monitoring support (Russ et al. 2025).

Project Purpose & Objectives

This project seeks to address the gap in resources that collectively illustrate the purpose, benefits, and best practices of BUDM placement for SAV. The deliverables proposed for this project include:

- Synthesize literature, PDT insights, and data (where available) to clearly articulate the benefits and value added/saved by implementing BUDM for SAV habitat.
- Develop a geospatial framework to identify light-limited areas of coastal inlet/estuary where BU lift could create suitable SAV habitat.
- Apply framework at test site(s) and document key findings, best practices, data/information gaps, and future directions. Present findings via ArcGIS Knowledge Hub, webinars, conference presentations, written publications (Technical Documents and journal article.

Value of Research and Development (Payoff)

The value of the proposed geospatial framework and knowledge hub includes a potential increase in BUDM by Districts, resulting in reduced navigation costs and time by decreasing dredged material transport distance (and rehandling) by utilizing nearby open water placement sites instead of upland CDFs, and reduced maintenance dredging costs by reducing shoaling due to increased sediment stability within the SAV beds. SAV species are also highly valued for the many economic, ecological, and cultural services that they provide, including shelter for fisheries and improving ambient water quality (Barbier et al., 2011; Sherman and DeBrukeyre, 2018).

Products and Deliverables

Technical Notes (TNs)

Initial Geospatial Framework TN
Holzenthal, E.R., E.R. Russ, K. Richards, S.P. McGill, D.M. Robinson, and T.P. Huff. (2025). Light Availability Calculator for Identifying Suitable Habitat for Light-Limited Aquatic Vegetation. ERDC-TN EMRRP-RQ-4. Vicksburg, MS: US Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory. https://dx.doi.org/10.21079/11681/49919

Geospatial Tool User Feedback TN (FY26 deliverable)
Russ, E., E. Holzenthal, and T. Huff. (est. Sep 2026). Light Availability Calculator: User Feedback and Future Directions. ERDC-TN EMRRP-XX-X.

Final Tool Documentation (FY26 deliverable)
Huff, T., E. Russ, and E. Holzenthal. (est. Sep 2026). Light Availability Calculator: Updates to Geospatial Tool. ERDC-TN EMRRP-XX-X.

Conference Presentations/Webinars/Workshops

ASBPA Conference Presentation
Robinson, D., E. Holzenthal, and S. McGill. "Development and Validation of an ADCIRC Model for Barnegat Bay, NJ to Predict Optimal Locations for Submerged Aquatic Vegetation Habitat for a Range of Sea Level Rise Scenarios." American Shore and Beach Preservation Association (ASBPA) 2024 National Coastal Conference.

Initial Geospatial Framework Demo
Russ, E., E. Holzenthal, and S. McGill. "Light Availability Calculator: Scientific basis, demo, and assumptions and limitations." EMRRP Webinar. March 2025.

Final Tool Webinar (FY26 deliverable)
Huff, T., E. Russ, and E. Holzenthal. "Light Availability Calculator: Updates to Geospatial Tool and Future Directions." EMRRP Webinar. Q4 2026.

Works Cited

Barbier, E.B., S.D. Hacker, C. Kennedy, E.W. Koch, A.C. Stier, and B.R. Silliman. (2011). The value of estuarine and coastal ecosystem services. Ecological monographs, 81(2), 169-193.

Erftemeijer, P.L.A.; Robin Lewis, R.R. Environmental impacts of dredging on seagrasses: A review. March Pollut. Bull. 2006, 52, 1553–1572, doi:10.1016/j.marpolbul.2006.09.006.

Russ, E.R., Yarnall, A.H., and Altman, S. 2023. Dredged Material Can Benefit Submerged Aquatic Vegetation (SAV) Habitats. ERDC/TN EWN-23-1. Vicksburg, MS: US Army Engineer Research and Development Center– Environmental Laboratory

Sherman, K., & DeBruyckere, L.A. (2018). Eelgrass habitats on the US West Coast: State of the knowledge of eelgrass ecosystem services and eelgrass extent. Tech. rep.

Waycott, M., C.M. Duarte, T.J.B. Carruthers, R.J. Orth, W.C. Dennison, S. Olyarnik, A. Calladine, et al. 2009. “Accelerating Loss of Seagrasses across the Globe Threatens Coastal Ecosystems.” Proc. Natl. Acad. Sci. U. S. A. 106:12377–381. doi:10.1073/pnas.0905620106.

IMAGES

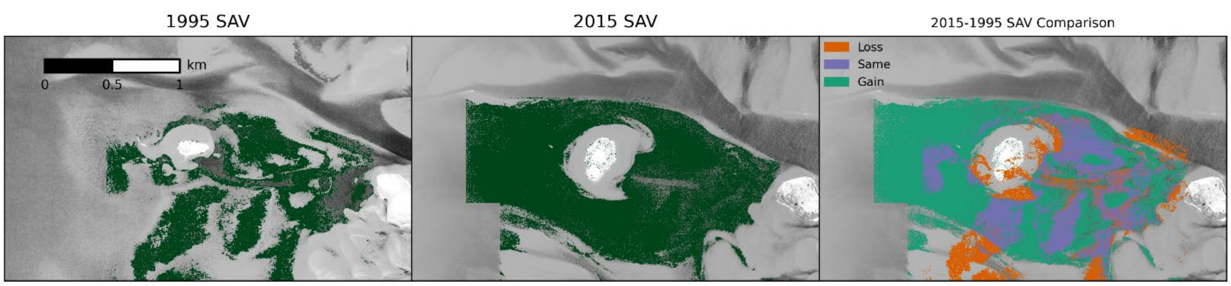

Figure 1. This figure, developed by co-PI Russ and published in Russ et al., 2023, shows the change in SAV (*Zostera marina*) coverage between 1995 and 2015 in Barnegat Bay, New Jersey (USACE-NAP) following multiple open water placements of dredged material, which created suitable depths for SAV to expand. There was a net gain of 0.78 km2 of SAV coverage over this period.

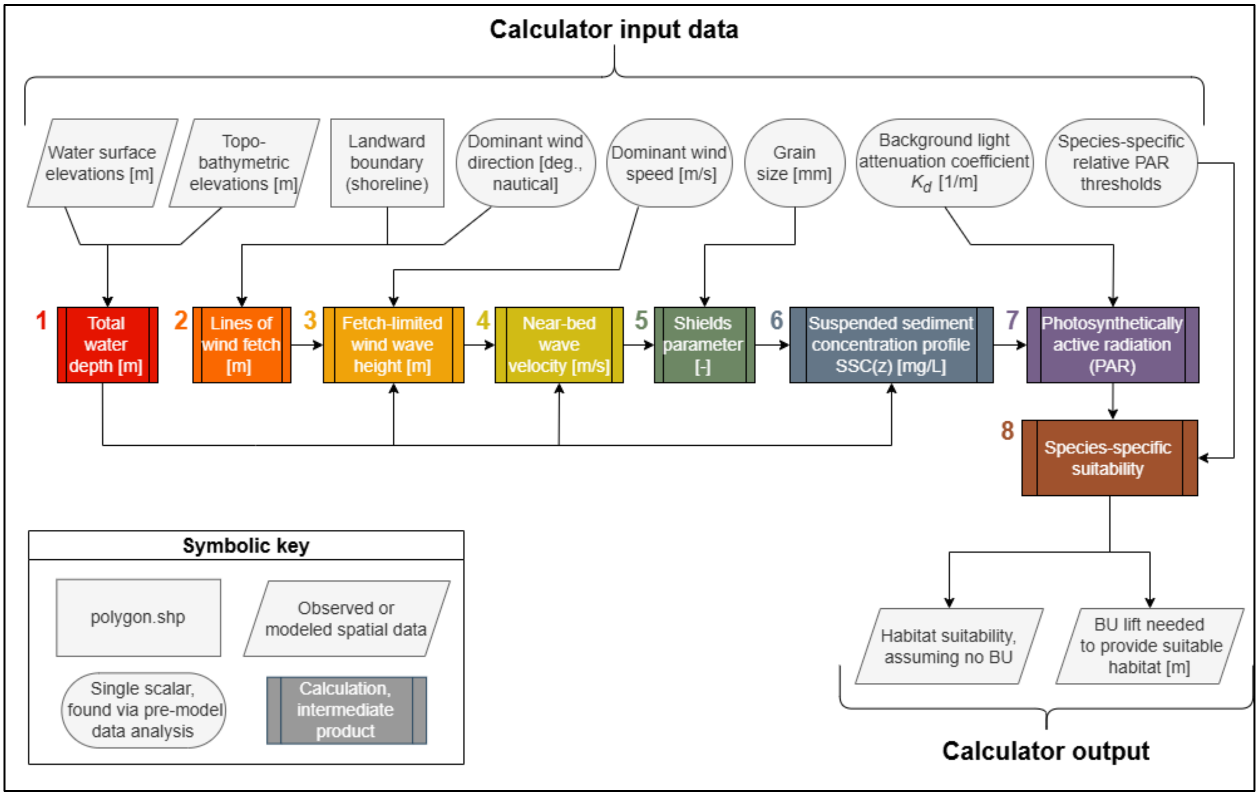

Figure 2. Conceptual diagram of the geospatial operations performed by the Light Availability Calculator. Calculation steps are presented sequentially and numbered for reference in the Holzenthal et al. (2025) TN.

49.2% total accuracy ***96.8% SAV-suit. overlap***		SAV presence (obs)	
		True	False
Suitability (predicted)	True	13.9% (TP)	50.4% (FP)
	False	0.5% (FN)	35.2% (TN)

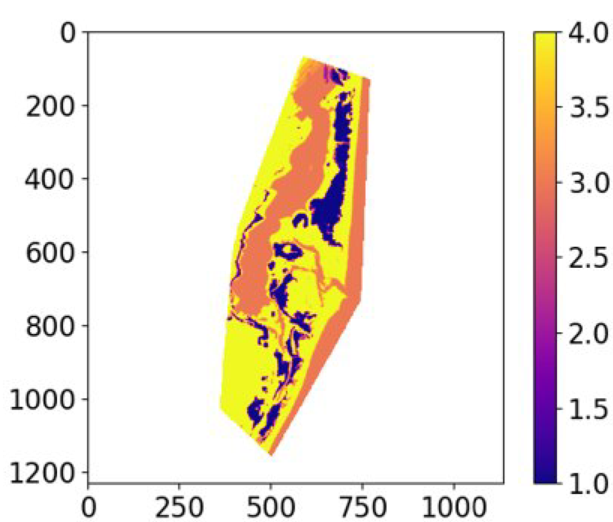

Figure 3. Comparison of predicted and observed SAV suitability for a portion of Barnegat Bay, NJ. Table presents rates where the prediction results were true positive (TP, dark blue in figure), false positive (FP, yellow), and true negative (TN, orange).

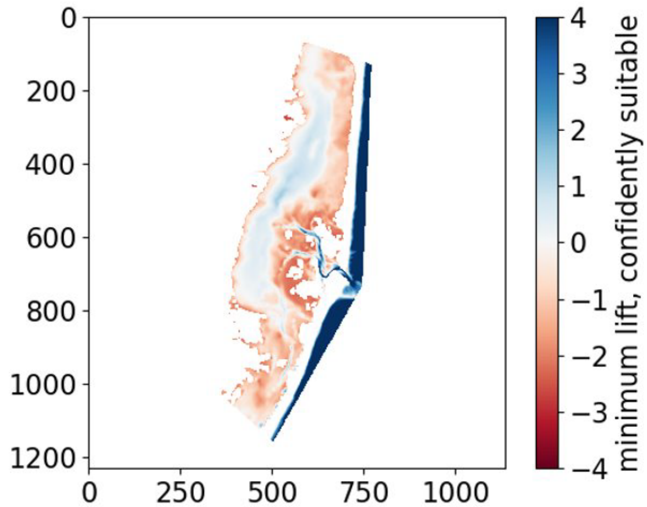

Figure 4. Raster output of geospatial tool indicating the minimum elevation lift (placement) required for SAV suitability. Blue shading corresponds to depth needed, where red indicates depths already deemed suitable by the calculator.