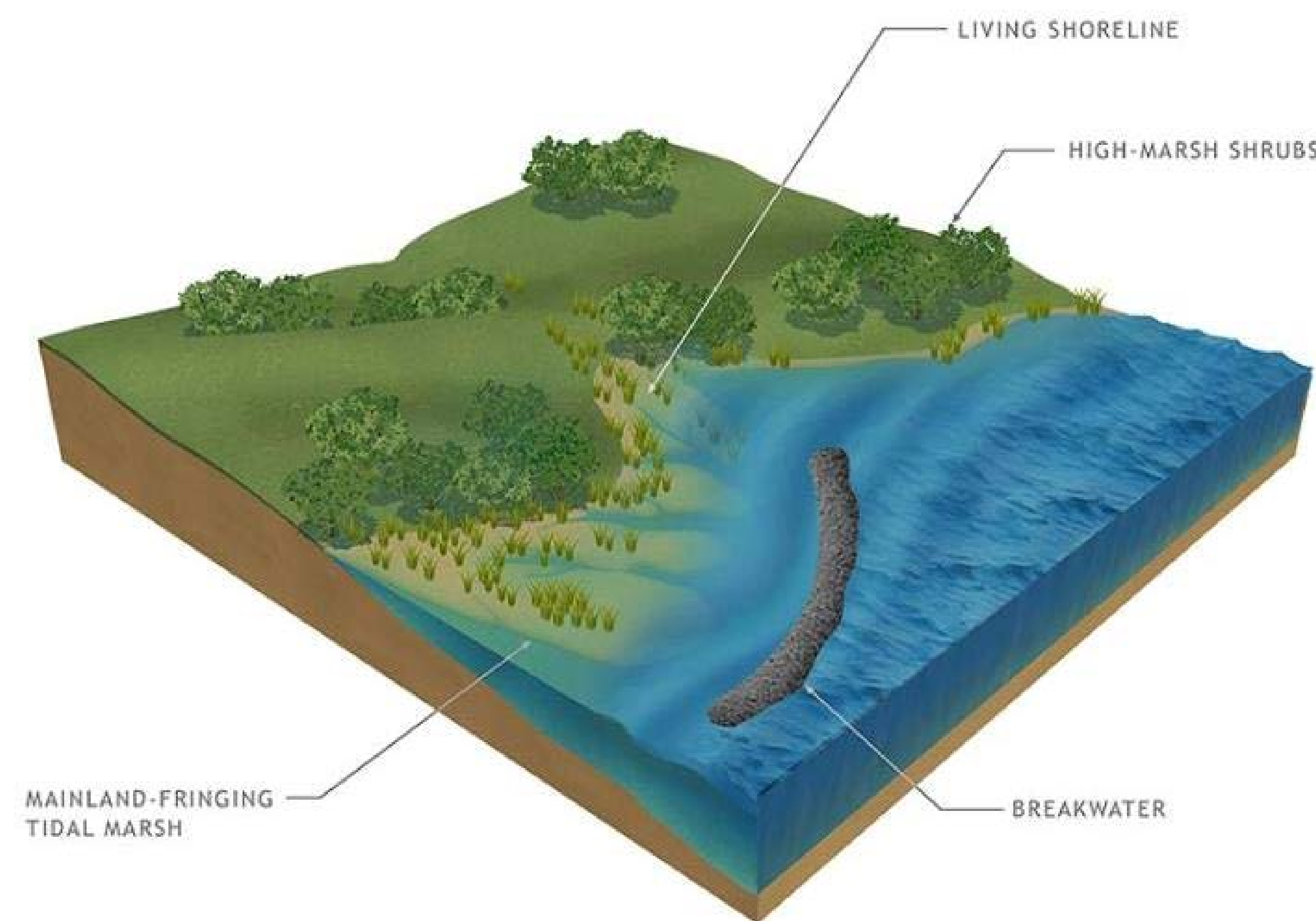


Natural and Nature Based Features in NJBB Study

Possible Natural and Nature Based (NNBF) Measures in NJBB Study- Similar to structural and nonstructural measures, NNBF measures are subject to benefit and cost analyses and need to meet the economic criteria to be included in a plan. Living shorelines are an NNBF measure currently under consideration in the NJBB study in areas where there is no existing shoreline armoring, and as a complement to structural measures such as floodwalls, levees, and storm surge barriers. Depending on the wave energy at a site, living shorelines stabilize marsh edges with marsh sills, breakwaters, or coir logs. In addition to NNBF measures, the NJBB study is considering modifications that can be made to structural measures such as floodwalls to enhance their ecological value.



Construction of living shoreline in Camp Pecometh, MD. Image source: Jack Shaum, MyEasternShoreMD



Conceptual diagram of living shoreline



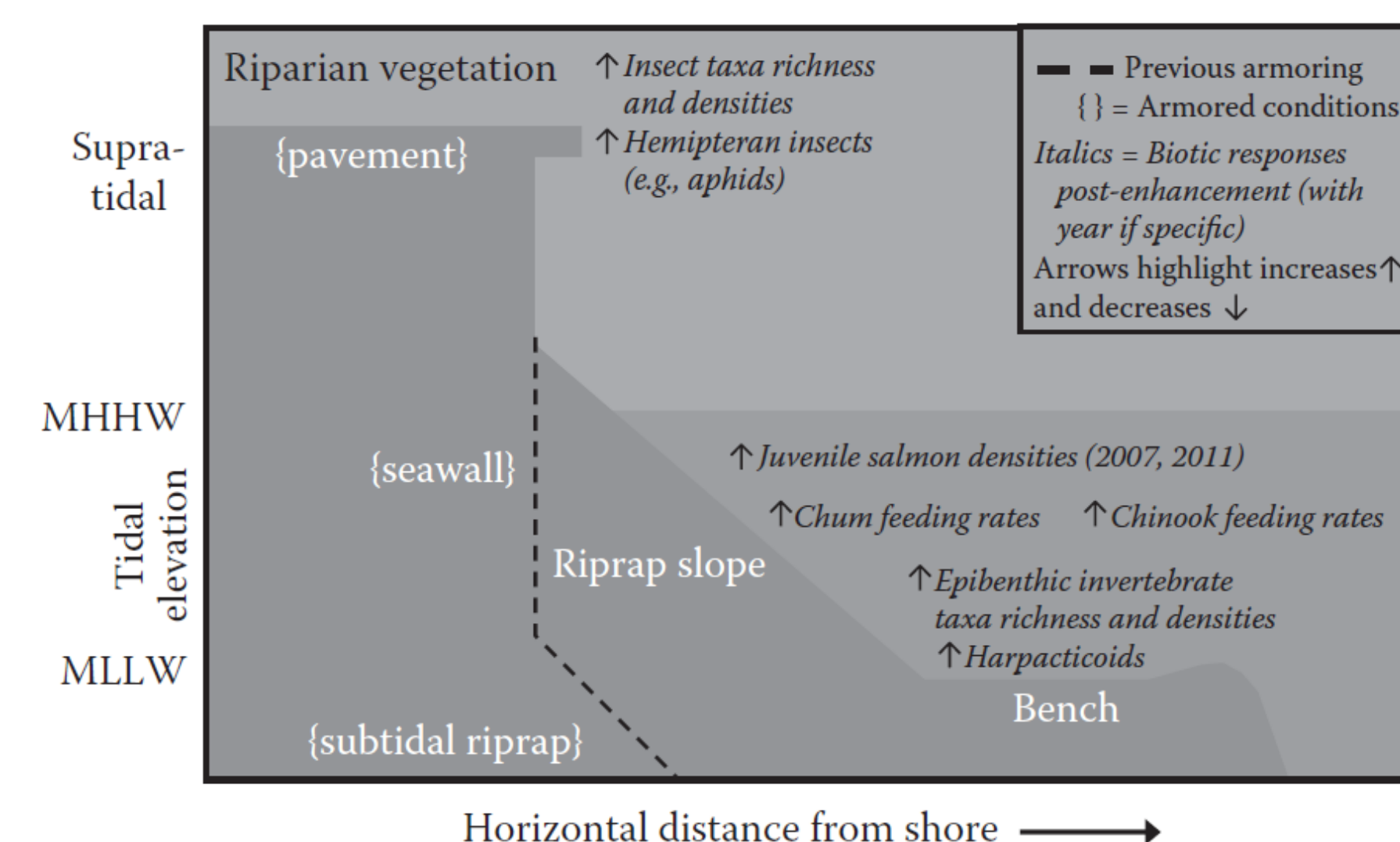
Construction of living shoreline in Cedar Key, FL. Image source: Dr. Mark Clark; University of Florida, Nature Coast Biological Station

Texturing concrete creates greater habitat complexity, allowing a wider range of algae and invertebrates to colonize a structure, which enhances habitat for other aquatic organisms such as fish. Floodwalls are a possible measure that could be modified to include textured concrete

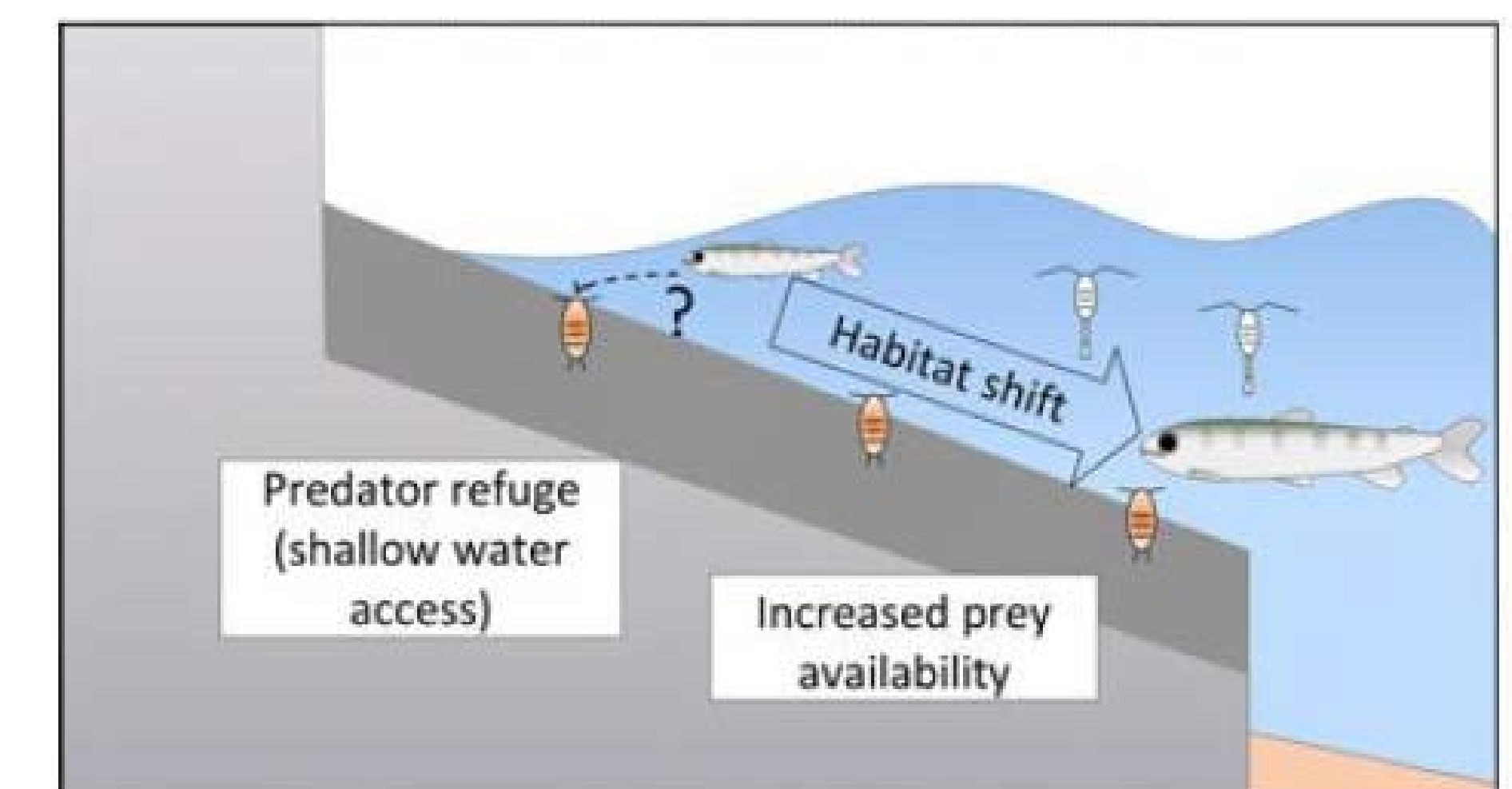


Examples of Textured Concrete. Source: USACE Buffalo District

Placing a bench of textured substrate in front of a concrete structure creates a depth gradient that more closely aligns with the shoreline slope of an unarmored shoreline. This provides greater habitat complexity and a wider range of habitat types for fish and invertebrates. Habitat benches could be constructed of textured concrete, riprap, or other substrate.



Ecological responses to a habitat bench in front of a seawall in Seattle, WA. Image Source: Cordell et al. (2017).



Conceptual diagram of habitat bench. Image Source: Munsch et al. (2017). British Ecological Society, Journal of Applied Ecology, 54, 1373-1384