# Engineering With Nature Project Fact Sheet

## Engineering With Nature® (EWN®) Toolkit Expansion and Tech Transfer

### *Background*

Natural and Nature Based Features (NNBF) are increasingly being considered for implementation as a means of enhancing coastal protection and resiliency. Unfortunately, numerical modeling of NNBF can often be difficult due to the amount of time and skill required, as well as the lack of standardized approaches available to the modeling community. The Engineering With Nature® (EWN®) Toolkit was developed to enable more rapid and consistent representation of NNBF by modelers. However, the Toolkit is currently only operational with the Advanced Circulation (ADCIRC) model.

### *Objectives*

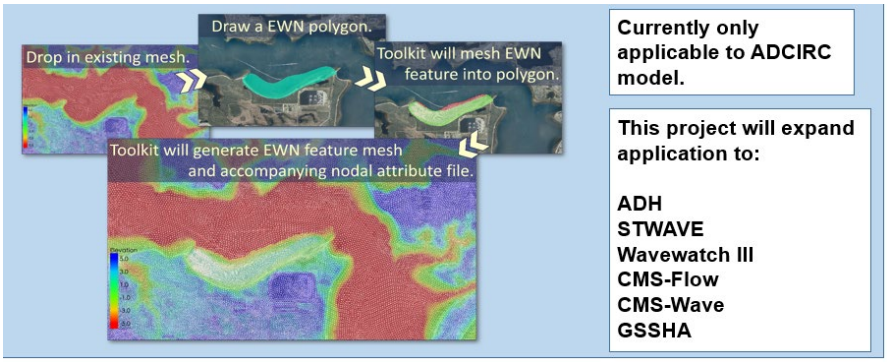
This project will expand the capabilities of the EWN® Toolkit such that it can be applied to additional models commonly used by USACE engineers and the broader modeling community, such as the Adaptive Hydraulics (ADH) modeling system, Steady State Spectral Wave (STWAVE), Coastal Modeling System (CMS)-Flow, CMS-Wave, and WaveWatch III. The Toolkit will then be applied to multiple test case studies to examine the functionality of the tools for a diverse array of NNBF scenarios. The final component of this work will be focused on making the Toolkit accessible to collaborative partners and providing guidance and resources for users in the modeling community. The project will advance current EWN® practice by enabling NNBF designs to be more rapidly modeled and tested for implementation in an expanded number of scenarios for a greater number of numerical models, thus increasing the capabilities and applicability of the Toolkit.

### *Approach*

The Toolkit will be expanded for use with additional hydrology, hydraulics, overland, riverine, and coastal numerical models such as ADH, STWAVE, CMS-Flow/Wave, and WaveWatch III in collaboration with the numerical modeling community and the Toolkit GUI developers at Aquaveo. NNBF modeling capabilities such as particle tracking, three-dimensional modeling, and representation of geomorphological and ecological processes that are critical to understanding the impacts of NNBF's on natural systems will be addressed. Test cases designed to compare the Toolkit's performance versus traditional modeling approaches will allow for model development time savings enabled by the Toolkit as well as solution variation between the different methods to be quantified.

### *Outcomes*

This project will leverage natural processes to reduce coastal and fluvial risk more effectively and efficiently than traditional modeling methods. By streamlining and standardizing the Toolkit workflow to apply to additional numerical models, this project will allow a more significant number of USACE Districts and modelers to validate NNBF designs for a broader range of project scenarios and natural environments faster and more efficiently. This will improve the ability of coastal modelers and engineers to evaluate the efficacy of various designs, will provide crucial information to decision makers, and will ultimately lead to more successful application of NNBFs in a wider variety of coastal management and flood risk scenarios.

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