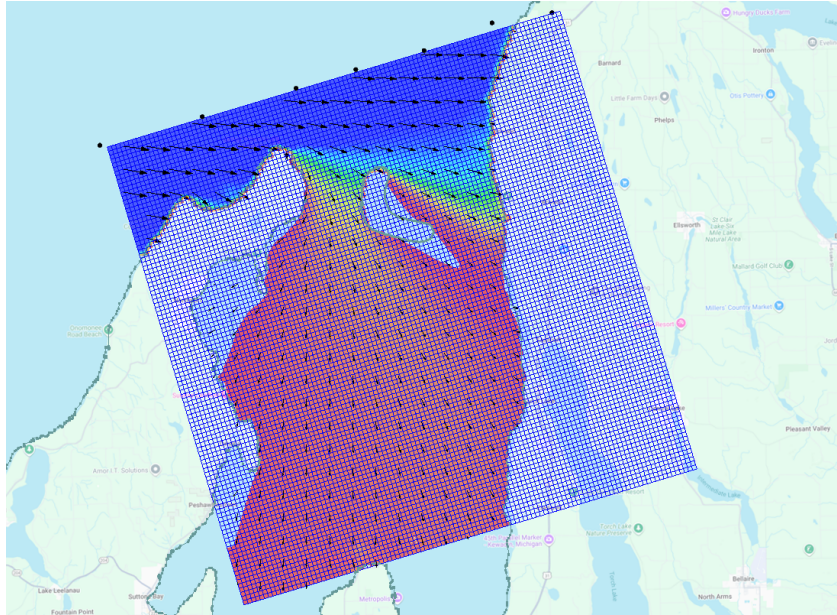


SMS 13.5 Tutorial

STWAVE Engineering With Nature

Modifying an STWAVE Simulation with an EWN Object

**Objectives**

This tutorial demonstrates the process of modifying an STWAVE simulation using an EWN feature object in the Surface-water Modeling System (SMS).

Prerequisite Tutorials

- Overview
- Map Module STWAVE
- STWAVE Parent Simulation
- STWAVE Child Simulation

Required Components

- SMS Core
- STWAVE Interface

Time

- 5–10 minutes

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1 Introduction

The Engineering With Nature (EWN) toolkit in the Surface-water Modeling System (SMS) includes an option to include proposed engineered features into an STWAVE simulation. This tutorial illustrates this process.

This tutorial is a continuation of the “STWAVE Child Simulation” tutorial.

2 Getting Started

For consistency, start by importing a project file containing the parent and child simulations:

1. Launch SMS and select **File | Open...** to bring up the *Open* dialog.
2. Select “Project Files (*.sms)” from the *Files of type* drop-down.
3. Browse to the *data files* folder for this tutorial and select “GrandTraverseBay.sms”.
4. Click **Open** to import the project and exit the *Open* dialog.

The initial project should appear similar to Figure 1. It includes:

- The output of the “STWAVE Child Simulation” tutorial.
- The “ EWN Feature” coverage.

This project also establishes the display (and working) projection to be UTM Zone 16.

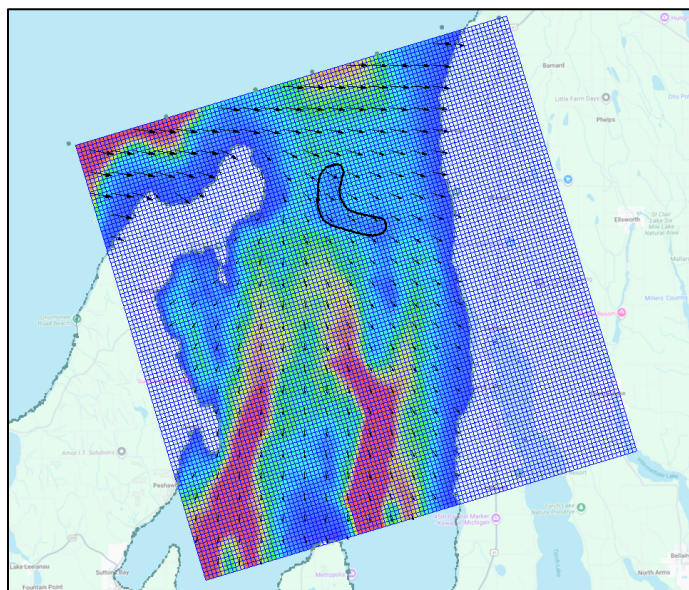


Figure 1 Initial project

3 Creating the EWN Feature Object Grid

The “ EWN Feature” coverage includes a polygon that was digitized to represent an area proposed for an engineering project. For more information on the attributes of this coverage you may want to refer to the other EWN tutorials. For information on how to digitize, import or edit the polygon, refer to the “Map Module” tutorial.

To set the EWN parameters for application in an STWAVE simulation:

1. Select the “ EWN Feature” coverage to make it active.
2. Right-click the “ EWN Feature” coverage and select **Zoom to Coverage**.
3. Using the **Select Feature Polygon**  tool, double-click in the polygon to bring up the *EWN Polygon Properties* dialog.
4. For the *Name*, enter “Island”. The name is for reference only.
5. For the *Classification*, select “East coast mangroves”.

The classification could really be any of the generic classification types since the EWN tool only needs the *Elevation* field specified when working with STWAVE Cartesian grids.

6. For the *Elevation*, enter “2.0”.
7. Click **OK** to save the attributes and close the *EWN Polygon Properties* dialog.

For this first use of the *EWN Polygon Properties* dialog, there is no preview of the EWN operation on a Cartesian grid because the modification does not impact the structure of the grid as it does for an unstructured mesh.

8. Right-click on the “ EWN Feature” coverage and select the *Tools | Insert EWN Feature...* to open the *Insert EWN Features* dialog.
9. For the *Target geometry*, click the **Select...** button to open the *Select EWN Geometry* dialog.
10. Select the “ Child” grid and click **OK** to close the *Select EWN Geometry* dialog.
11. Click **OK** to insert the feature and close the *Insert EWN Features* dialog.

This operation has created a new Cartesian grid named “ EWN Feature Mesh” which has elevation data in the cells inside of the EWN polygon changed to the specified elevation.

12. In the Project Explorer, right-click on the “ EWN Feature Mesh” and select **Rename**.
13. Enter “EWN Island” for the new name.

The EWN feature can also be used to modify the elevation of the cells inside of the polygon or create a new roughness dataset for the grid with the roughness in the polygon specified from the EWN object.

4 Creating an EWN Simulation

Now to create a modified STWAVE simulation by doing the following:

1. Right-click on the “ Child” simulation and select **Duplicate**.
2. Right-click on the “ Child (2)” simulation and select **Rename**.

3. Enter “EWN Island” for the new name.
4. Under “ EWN Island”, right-click on the “ **Child**” Cartesian grid link and select **Remove**.
5. Drag the “ EWN Island” Cartesian grid into the “ EWN Island” simulation.

All the other simulation parameters for this simulation can remain the same as they were when set for the “ Child” simulation.

5 Running STWAVE

To execute the simulation:

1. Right-click on the “ EWN Island” simulation and choose **Save Project, Simulation and Run** to save the simulation files and open the *Simulation Run Queue*.

As implied, this command does three things. It saves the project, exports the simulation and launches STWAVE. The *Simulation Run Queue* appears to track progress on the run.

6 Reviewing the Solution

To review the solution created by STWAVE:

1. When the simulation has finished running, click on the **Load Solution** button.

The solution for this simulation consists of a set of five datasets loaded onto the “ EWN Island” Cartesian grid.

2. Right-click on the “ EWN Island” Cartesian grid and select **Zoom to grid**.
3. Select the “ Wave Height” dataset.

The provided project includes display templates to set the contour options for this dataset. (Refer to the “Display Themes” tutorial for more information on these themes). The graphics window now shows the wave heights and directions in the form of arrows focusing on wave heights below 0.5 meters. Figure 2 shows the shadow of the new EWN island and the impact the modification makes on the wave model results.

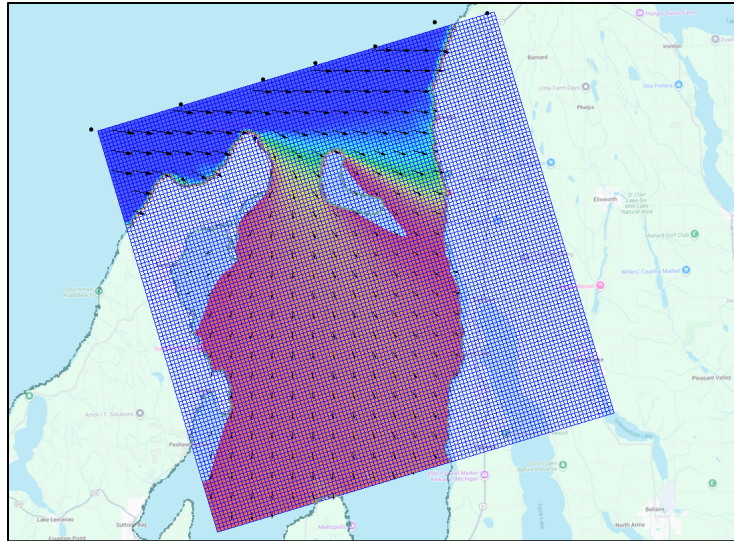


Figure 2 Wave heights and directions

7 Conclusion

This concludes the “STWAVE Engineering With Nature” tutorial. Features that have been described include:

- Insertion of an EWN object into a Cartesian grid.
- Duplicating and modifying an STWAVE simulation.
- Reading and viewing an STWAVE simulation solution.

If desired, experiment with different elevations for the EWN feature. For example, try specifying the elevation to be just below the water level simulating a marsh.

Another EWN function is the creation of a roughness dataset. This could be added to the STWAVE simulation in the *STWAVE Model Control* dialog. Another option would be to follow the process outlined in the “Observation” and “Observation – Data” tutorials to create a profile plot through the EWN object as illustrated in Figure 3.

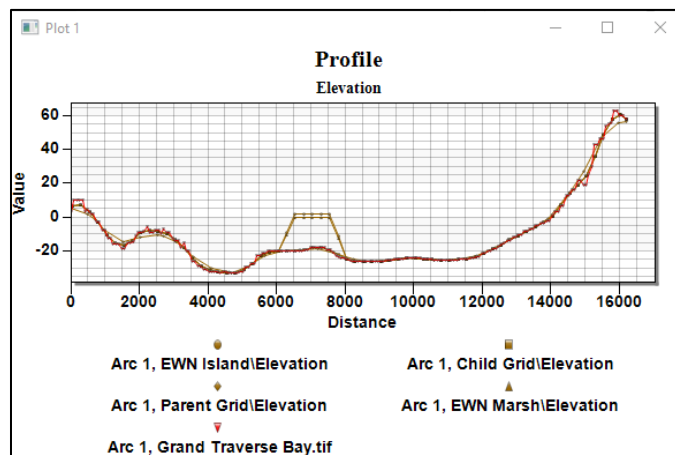


Figure 3 Profile of elevations through the EWN object