Day 5

- Presentations
    - Simple Post-Processing of Output

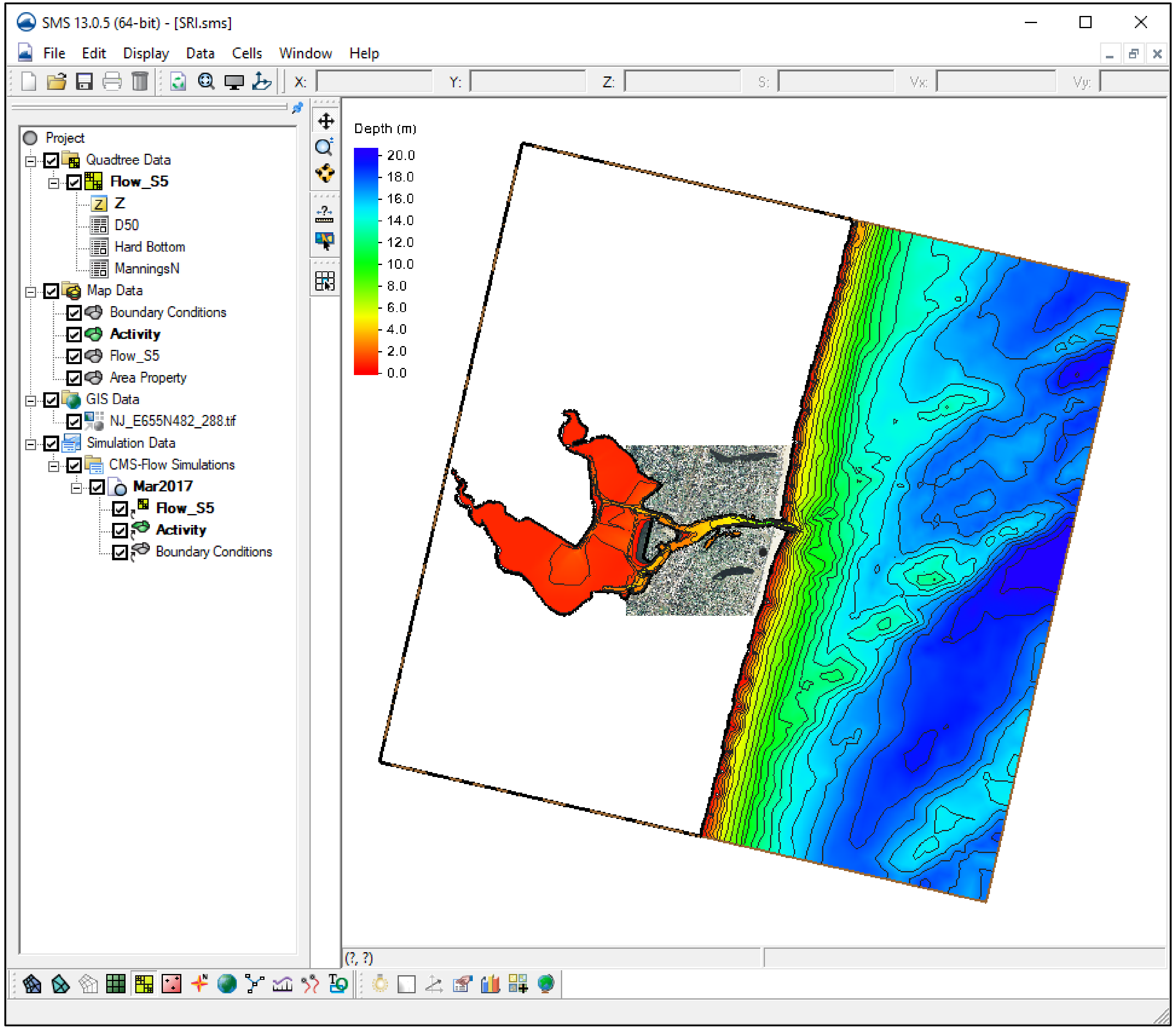
- Upcoming New features
    - Structures in CMS
        - Weir
        - Rubble Mound Jetty
        - Culvert
        - Tide Gate

    - Inline Dredge Module

    - SMS 13.next (13.1/14?) Sediment Management Tool

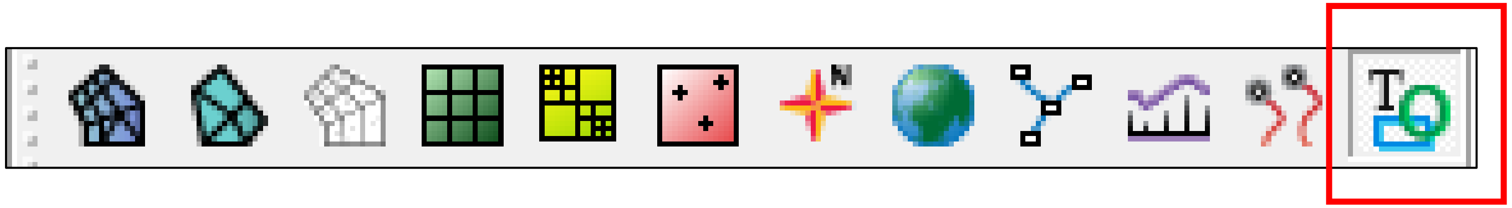
- Questions about materials covered

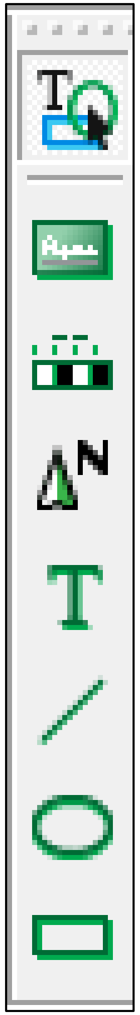
Simple Post Processing



- Load project from previous work
  - Files can be found in Day4\Steering\ folder
- Solutions are in subdirectory – SRI\CMS-Flow\Solutions

Annotation Module





Select Annotation

Images/Logos

Dynamic Scale Bar

Dynamic North Arrow

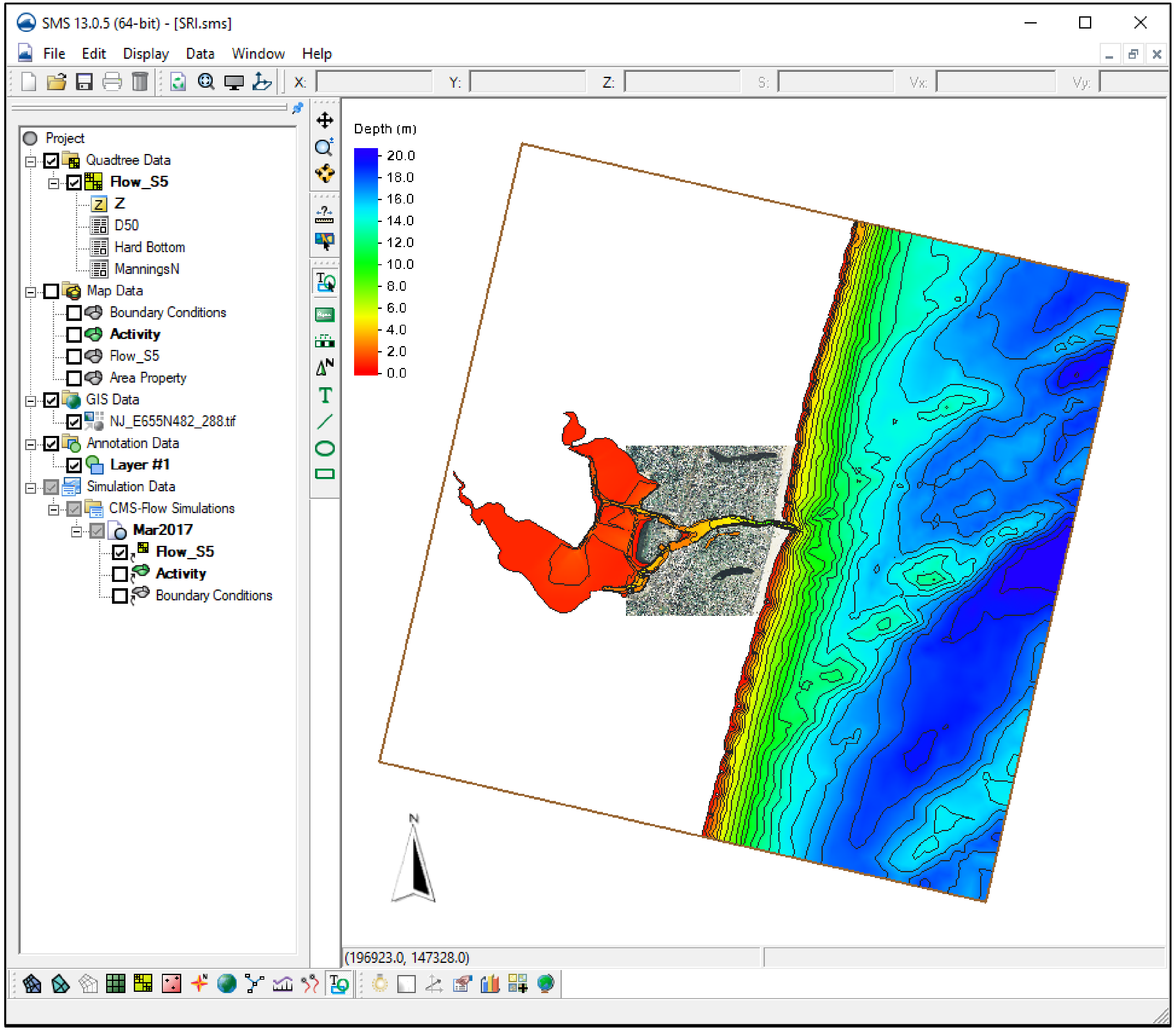
Text

Lines

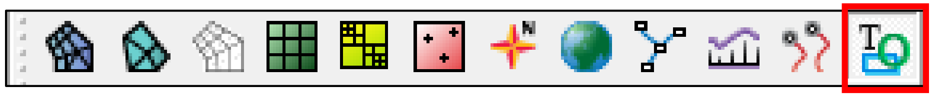
Ovals

Rectangle

North Arrows

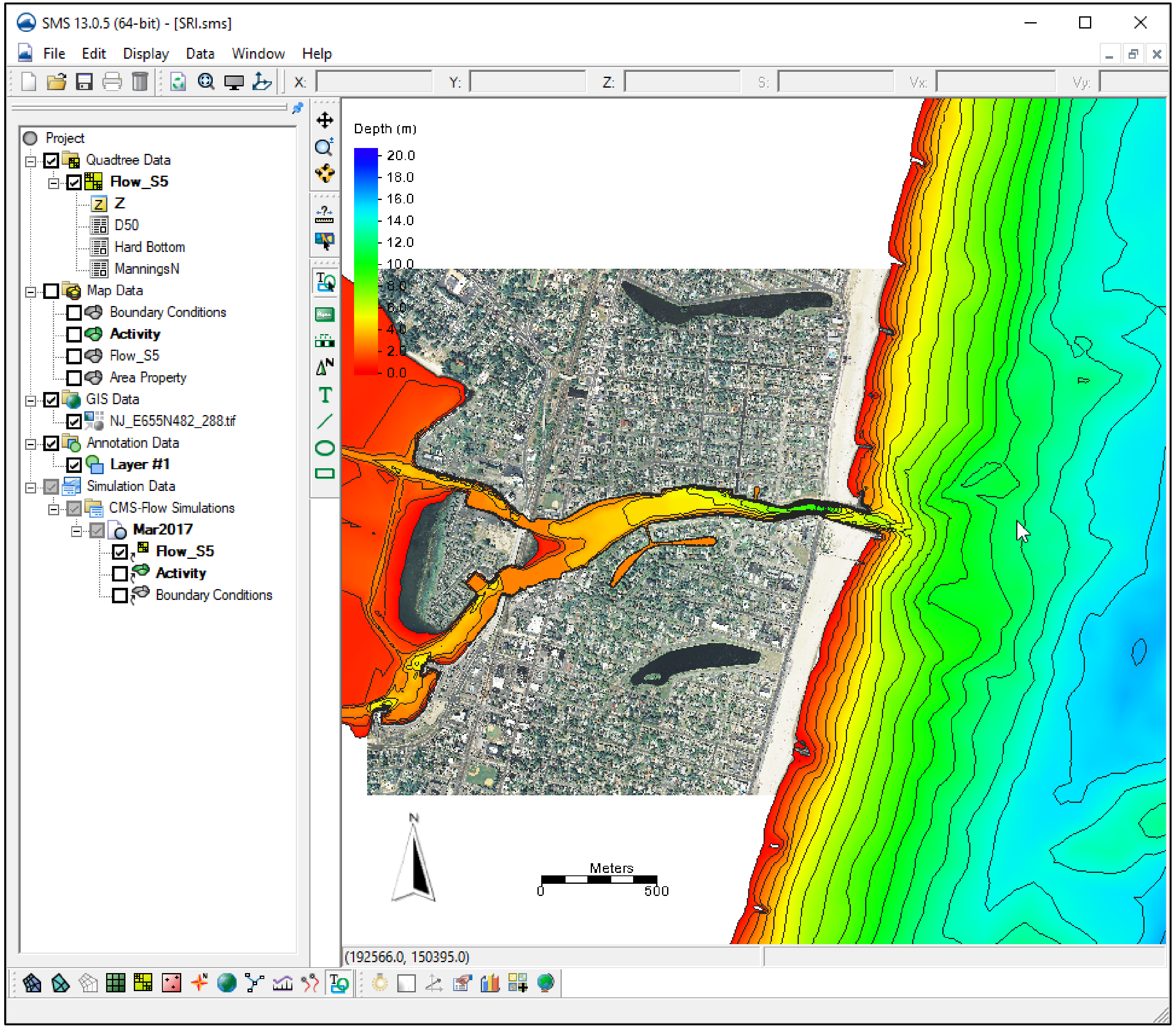


- Choose Annotation Module

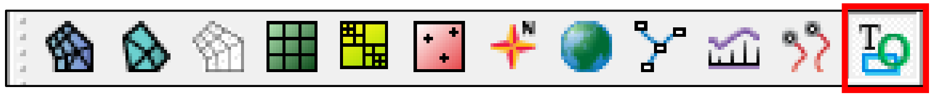


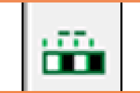
- Choose North Arrow
- Drag box for location/size
- Find Location of arrow images
  <sms>\Support Files\North Arrows
- Select an image
- Select tool, Double-click on item for properties
  - Resize and Move

Scale Bar



- Choose Annotation Module

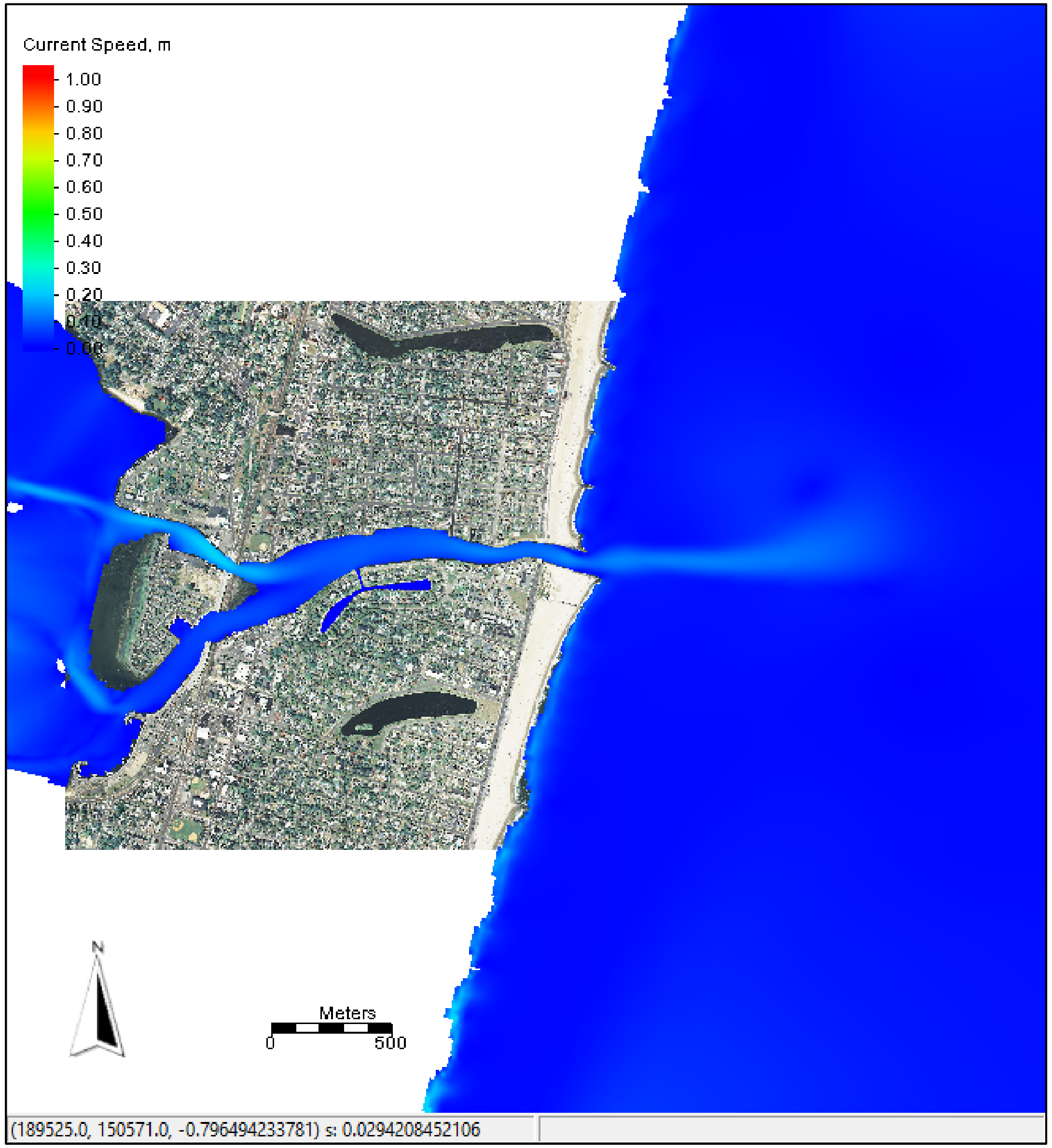


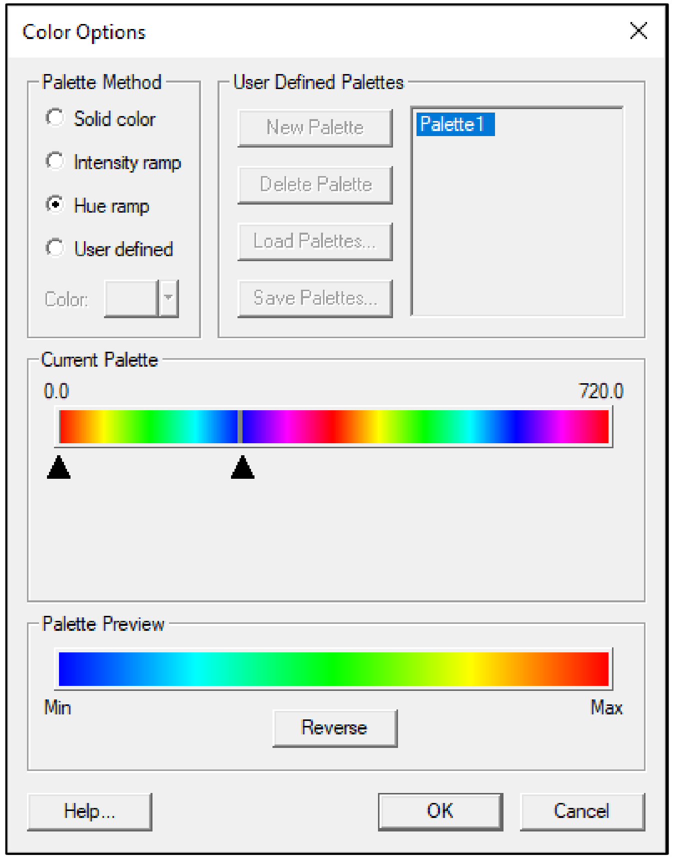


- Choose Scale Bar
- Drag box for location/size
- Choose units/text size

- Select tool, Double-click on item for properties
    - Resize and Move
- Scale Bar adjusts as you zoom

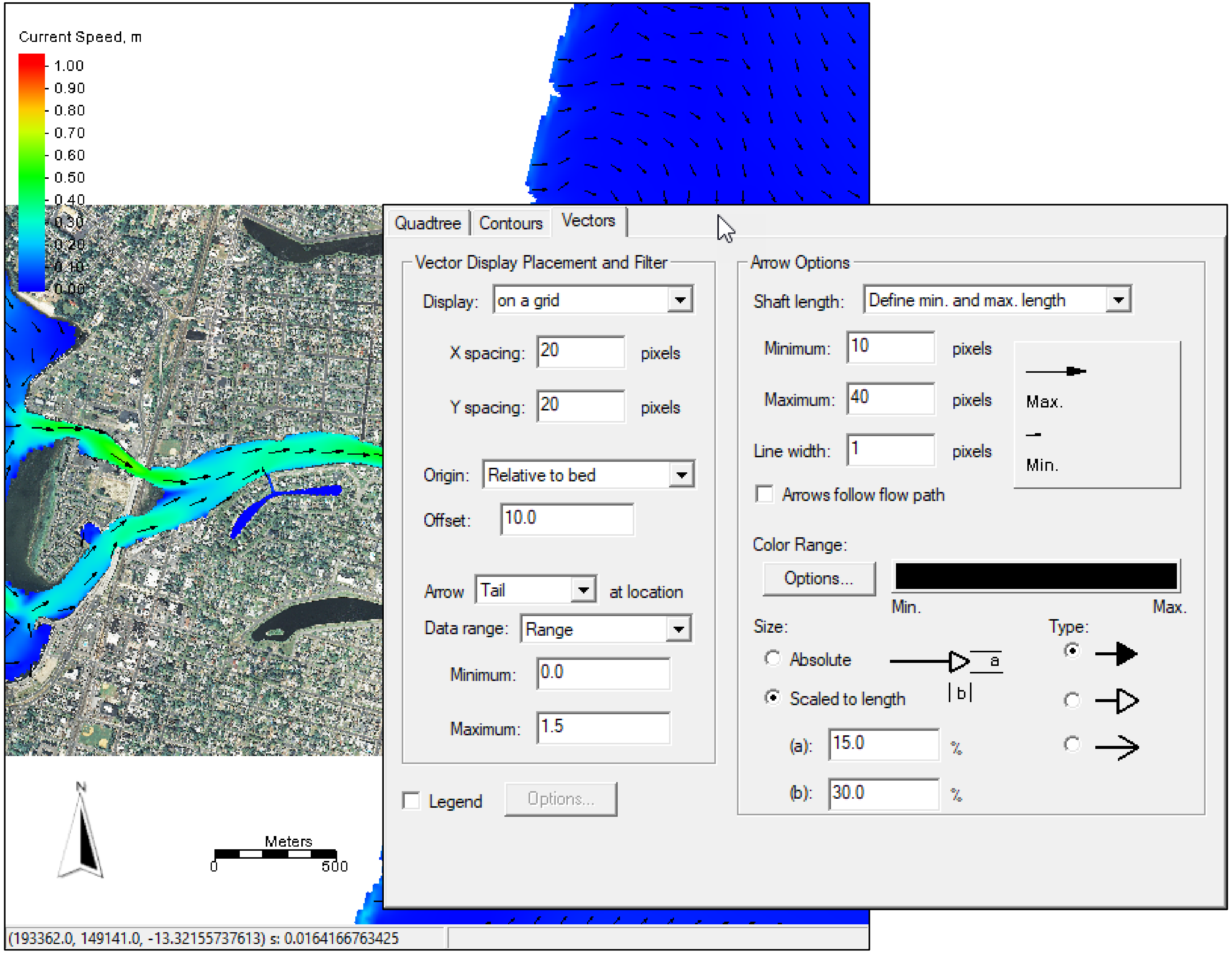
Contours





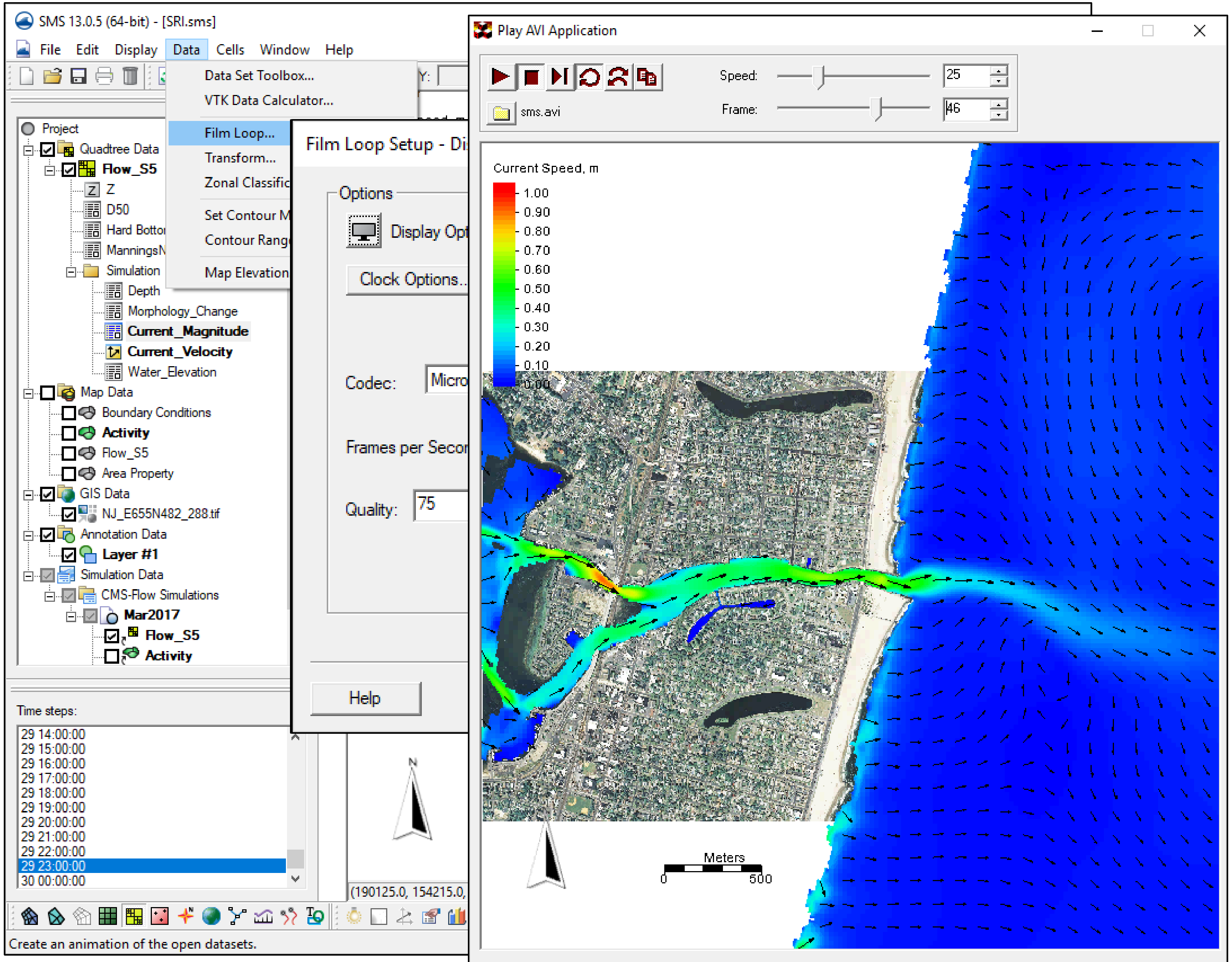
- Choose Contour Color scheme dependent on what variable you are examing
  - Depth
  - Morphology Change
  - Current Velocity
  - Other

Vectors



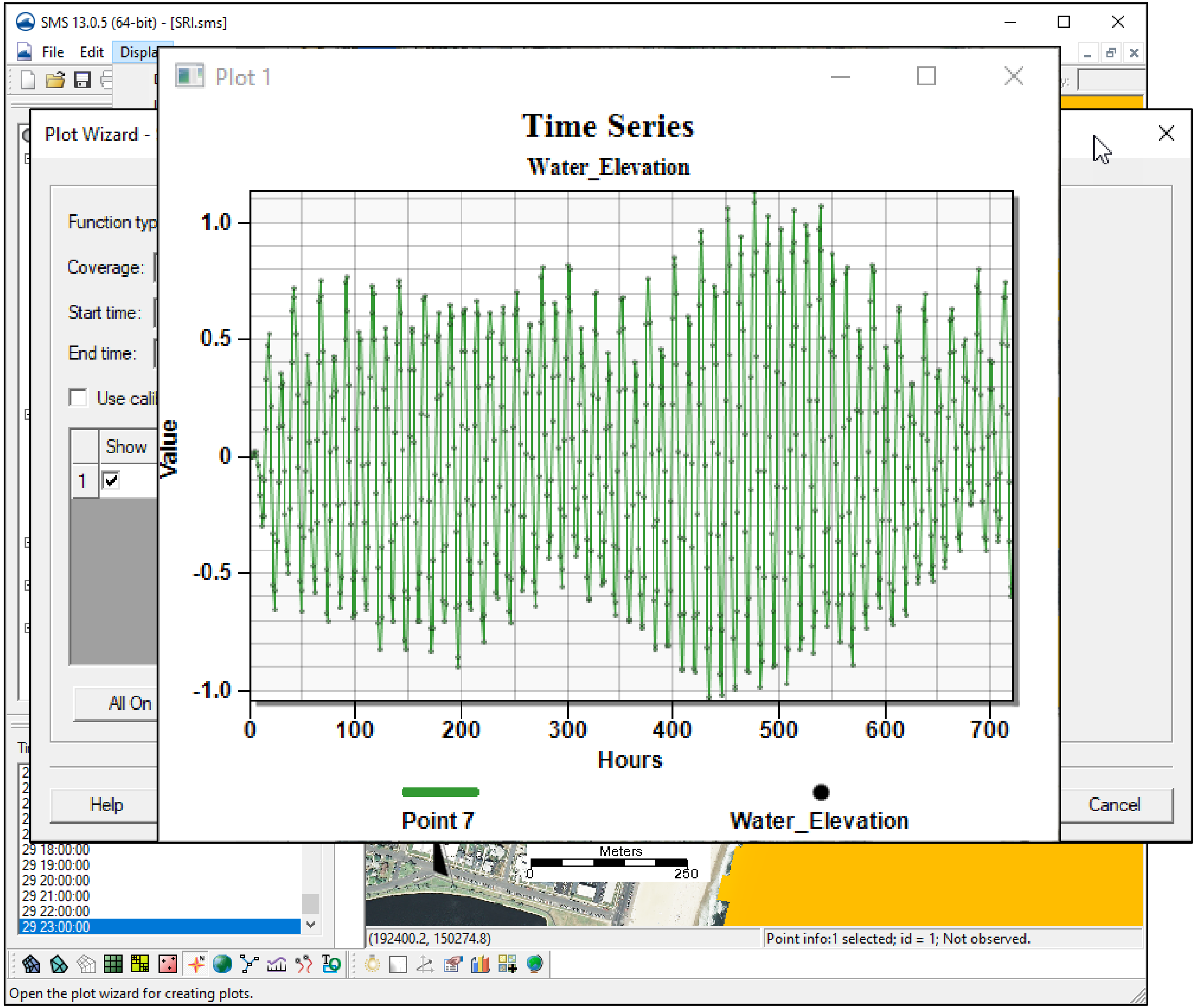
- Various options for display of vectors
  - Range of values
  - Arrow size
    - Min/Max Length
    - Scale to Magnitude
  - Arrow color
  - Placement
    - Normalized
    - Every cell

Film Loop



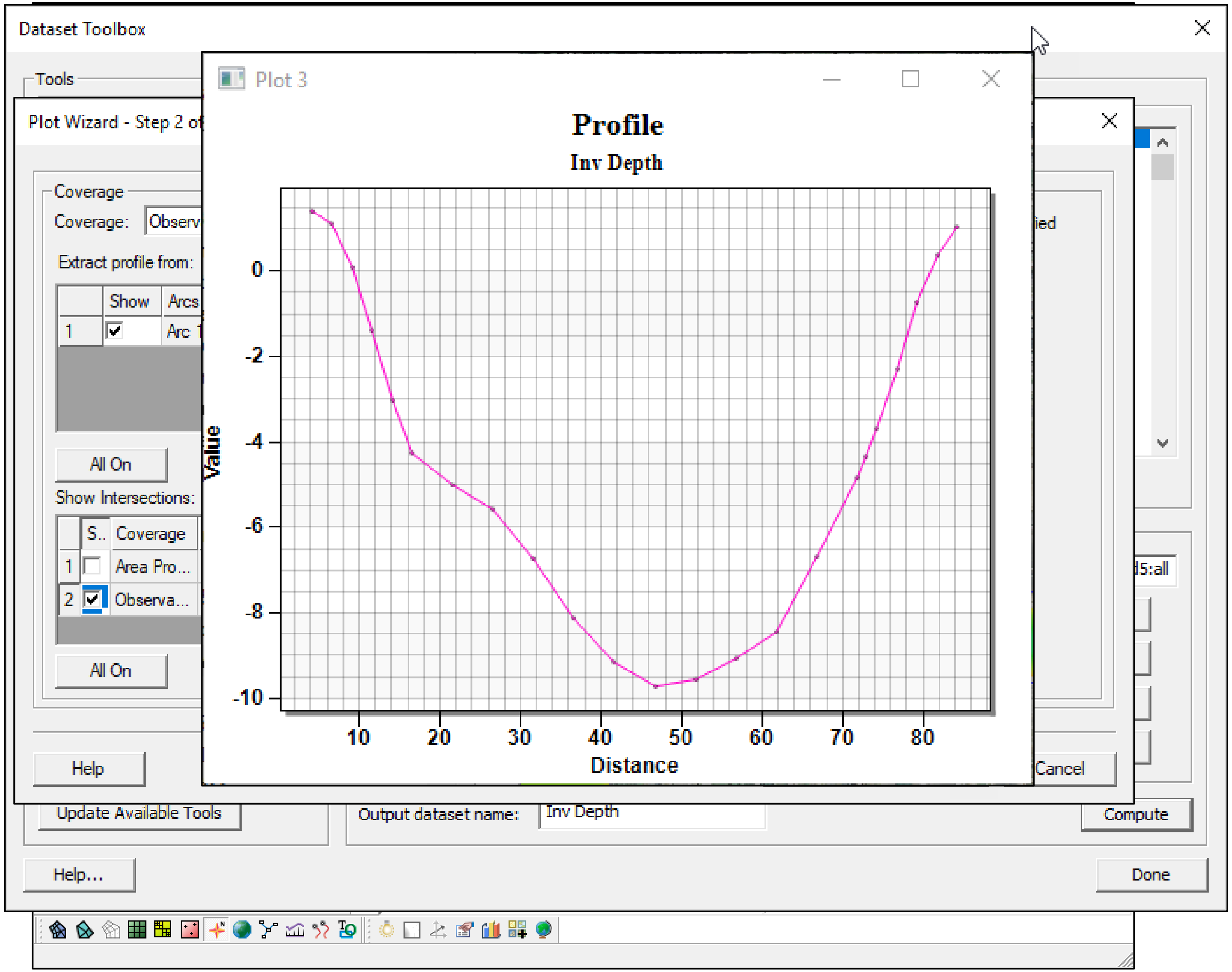
- Zoom to view for animation
- Choose Data | Film Loop
- Assign a file name/location to save
  - Click Next
- Enter range of time to animate
  - Click Next
- Change any final options
  - Click finish
- Wait for animation to finish and open in new screen

Plot scalar dataset values through time



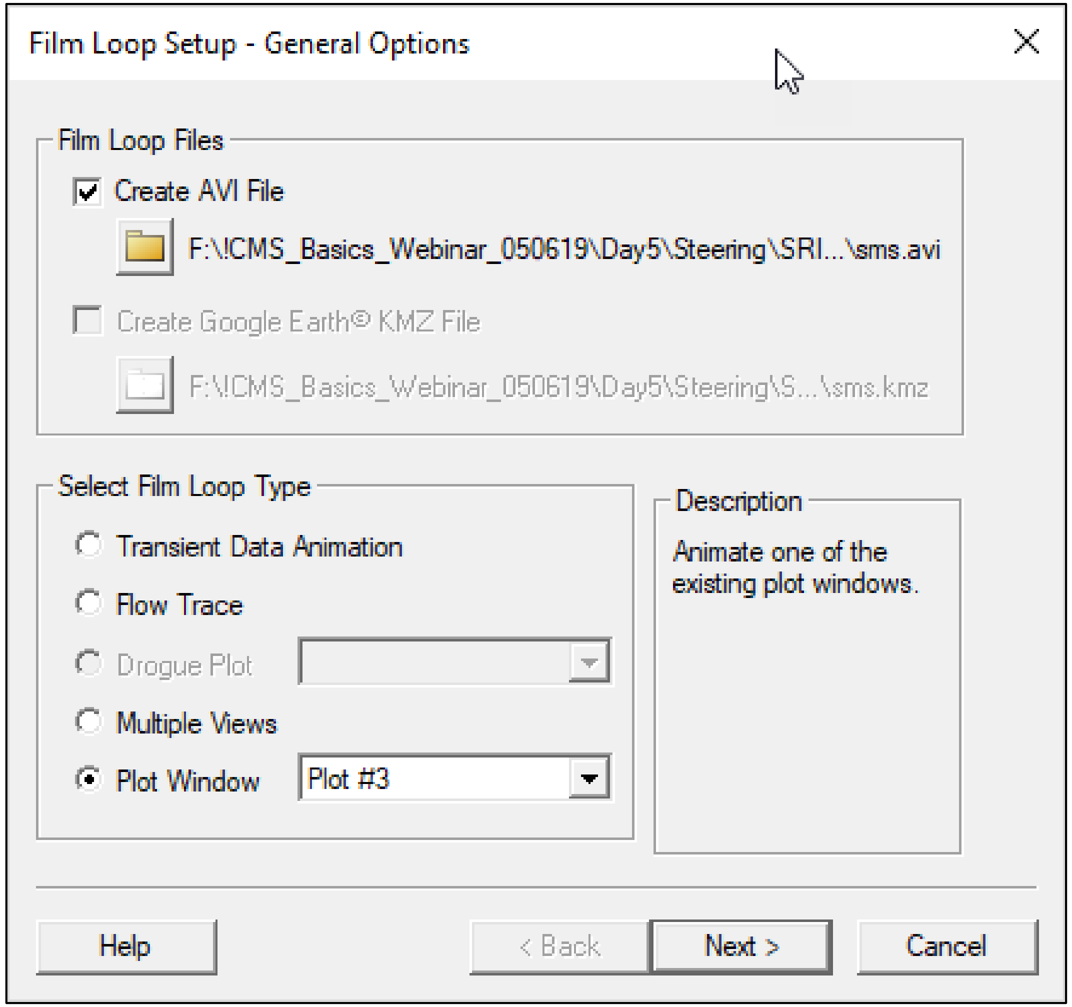
- Create "Observation" map coverage
- Add feature point at desired location
- Choose Display | Plot Wizard, Time Series, Next
- Choose selected datasets, check/uncheck datasets
  - Click Finish
- Repeat for other datasets

Plot data for profile lines



- Use Data Calculator to create dataset with changed sign on Depth dataset.
- Click “Observation” map coverage
- Add feature arc at desired location
  - Direction of arrows will be positive values
- Choose Display | Plot Wizard, Observation Profile
- Choose Specified datasets (inverted depth)
- Choose Active Time Step
  - Click Finish
- Repeat for other datasets

Film loop for profile line plots

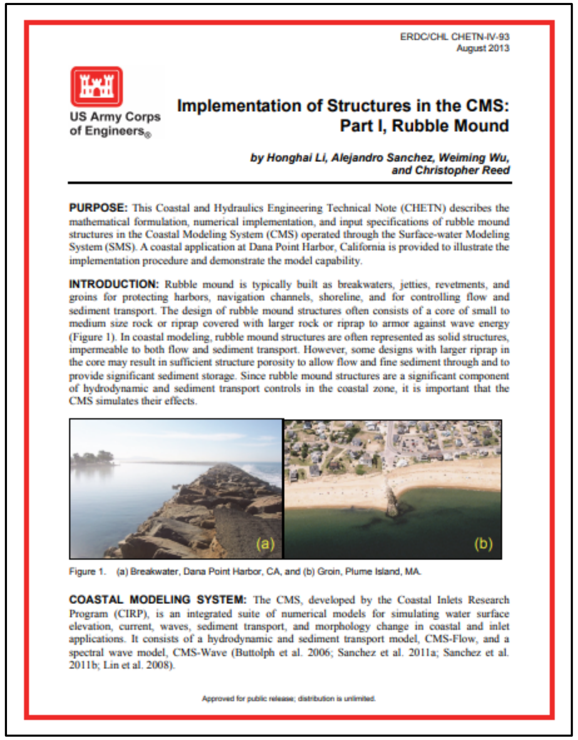


- Animations can be done from profile plots as well to see the changes through time.

Upcoming SMS integration

Structures with CMS

Rubble Mound Jetties



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August 2013

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Implementation of Structures in the CMS: Part I, Rubble Mound

by Honghai Li, Alejandro Sanchez, Weiming Wu, and Christopher Reed

PURPOSE: This Coastal and Hydraulics Engineering Technical Note (CHETN) describes the mathematical formulation, numerical implementation, and input specifications of rubble mound structures in the Coastal Modeling System (CMS) operated through the Surface-water Modeling System (SMS). A coastal application at Dana Point Harbor, California is provided to illustrate the implementation procedure and demonstrate the model capability.

INTRODUCTION: Rubble mound is typically built as breakwaters, jetties, revetments, and groins for protecting harbors, navigation channels, shoreline, and for controlling flow and sediment transport. The design of rubble mound structures often consists of a core of small to medium size rock or riprap covered with larger rock or riprap to armor against wave energy (Figure 1). In coastal modeling, rubble mound structures are often represented as solid structures, impermeable to both flow and sediment transport. However, some designs with larger riprap in the core may result in sufficient structure porosity to allow flow and fine sediment through and to provide significant sediment storage. Since rubble mound structures are a significant component of hydrodynamic and sediment transport controls in the coastal zone, it is important that the CMS simulates their effects.

Figure 1. (a) Breakwater, Dana Point Harbor, CA, and (b) Groin, Plume Island, MA.

COASTAL MODELING SYSTEM: The CMS, developed by the Coastal Inlets Research Program (CIRP), is an integrated suite of numerical models for simulating water surface elevation, current, waves, sediment transport, and morphology change in coastal and inlet applications. It consists of a hydrodynamic and sediment transport model, CMS-Flow, and a spectral wave model, CMS-Wave (Buttolph et al. 2006; Sanchez et al. 2011a; Sanchez et al. 2011b; Lin et al. 2008).

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Weirs

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Implementation of Structures in the CMS: Part II, Weir

by Honghai Li, Alejandro Sanchez, Weiming Wu, and Christopher Reed

PURPOSE: This Coastal and Hydraulics Engineering Technical Note (CHETN) describes the mathematical formulation, numerical implementation, and input specifications of weir structures in the Coastal Modeling System (CMS) operated through the Surface-water Modeling System (SMS). A coastal application at Rudee Inlet, Virginia is provided to illustrate the implementation procedure and demonstrate the model capability.

INTRODUCTION: A weir is an overflow structure built across a river or an open channel, allowing water to flow over the top. Weirs are commonly used for flow and flooding control and salinity and sediment management. Weirs are also constructed as nearshore coastal structures, such as weir jetties, to control longshore sediment transport, stabilize channel morphology, and protect harbors and navigation channels (Figure 1). In coastal applications, weirs represent unique features of solid structures and it is necessary to incorporate the structures into coastal hydrodynamic and sediment transport modeling systems.

Figure 1. (a) Coburg Lake, Victoria (Australia) (http://en.wikipedia.org/). (b) Rudee Inlet, VA.

COASTAL MODELING SYSTEM: The CMS, developed by the Coastal Inlets Research Program (CIRP), is an integrated suite of numerical models for simulating water surface elevation, current, waves, sediment transport, and morphology change in coastal and inlet applications. It consists of a hydrodynamic and sediment transport model, CMS-Flow, and a spectral wave model, CMS-Wave (Sanchez et al. 2011a; Sanchez et al. 2011b; Lin et al. 2011). Both are described in Part I of this series (Li et al. 2013).

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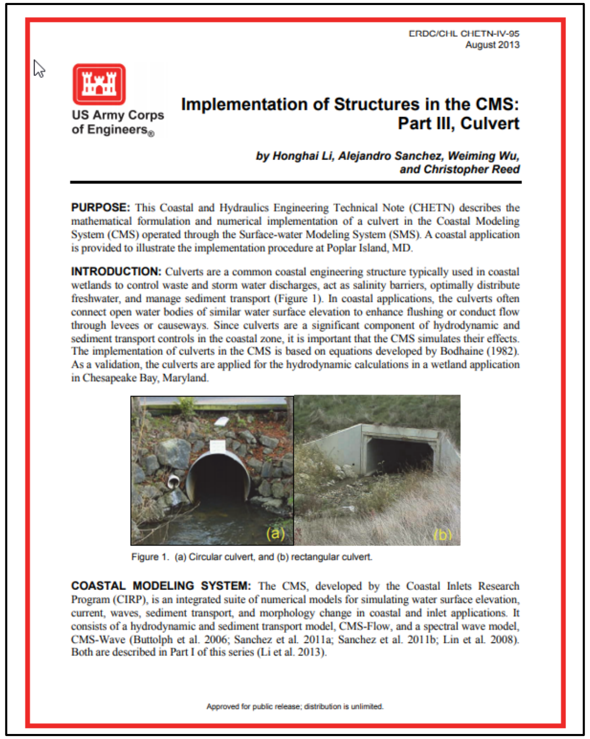
Culverts



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Implementation of Structures in the CMS: Part III, Culvert

by Honghai Li, Alejandro Sanchez, Weiming Wu, and Christopher Reed

PURPOSE: This Coastal and Hydraulics Engineering Technical Note (CHETN) describes the mathematical formulation and numerical implementation of a culvert in the Coastal Modeling System (CMS) operated through the Surface-water Modeling System (SMS). A coastal application is provided to illustrate the implementation procedure at Poplar Island, MD.

INTRODUCTION: Culverts are a common coastal engineering structure typically used in coastal wetlands to control waste and storm water discharges, act as salinity barriers, optimally distribute freshwater, and manage sediment transport (Figure 1). In coastal applications, the culverts often connect open water bodies of similar water surface elevation to enhance flushing or conduct flow through levees or causeways. Since culverts are a significant component of hydrodynamic and sediment transport controls in the coastal zone, it is important that the CMS simulates their effects. The implementation of culverts in the CMS is based on equations developed by Bodhaine (1982). As a validation, the culverts are applied for the hydrodynamic calculations in a wetland application in Chesapeake Bay, Maryland.

Figure 1. (a) Circular culvert, and (b) rectangular culvert.

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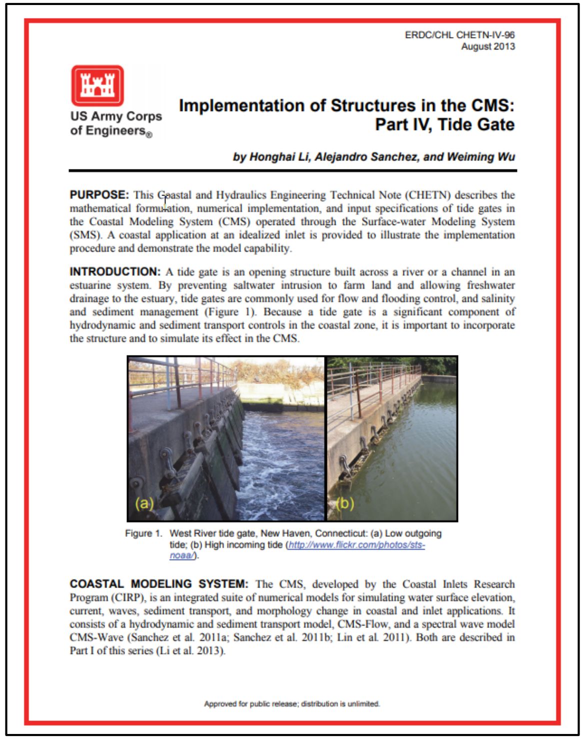
Tide Gates



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Implementation of Structures in the CMS: Part IV, Tide Gate

by Honghai Li, Alejandro Sanchez, and Weiming Wu

PURPOSE: This Coastal and Hydraulics Engineering Technical Note (CHETN) describes the mathematical formulation, numerical implementation, and input specifications of tide gates in the Coastal Modeling System (CMS) operated through the Surface-water Modeling System (SMS). A coastal application at an idealized inlet is provided to illustrate the implementation procedure and demonstrate the model capability.

INTRODUCTION: A tide gate is an opening structure built across a river or a channel in an estuarine system. By preventing saltwater intrusion to farm land and allowing freshwater drainage to the estuary, tide gates are commonly used for flow and flooding control, and salinity and sediment management (Figure 1). Because a tide gate is a significant component of hydrodynamic and sediment transport controls in the coastal zone, it is important to incorporate the structure and to simulate its effect in the CMS.

Figure 1. West River tide gate, New Haven, Connecticut: (a) Low outgoing tide; (b) High incoming tide (http://www.flickr.com/photos/sts-noaa/).

COASTAL MODELING SYSTEM: The CMS, developed by the Coastal Inlets Research Program (CIRP), is an integrated suite of numerical models for simulating water surface elevation, current, waves, sediment transport, and morphology change in coastal and inlet applications. It consists of a hydrodynamic and sediment transport model, CMS-Flow, and a spectral wave model CMS-Wave (Sanchez et al. 2011a; Sanchez et al. 2011b; Lin et al. 2011). Both are described in Part I of this series (Li et al. 2013).

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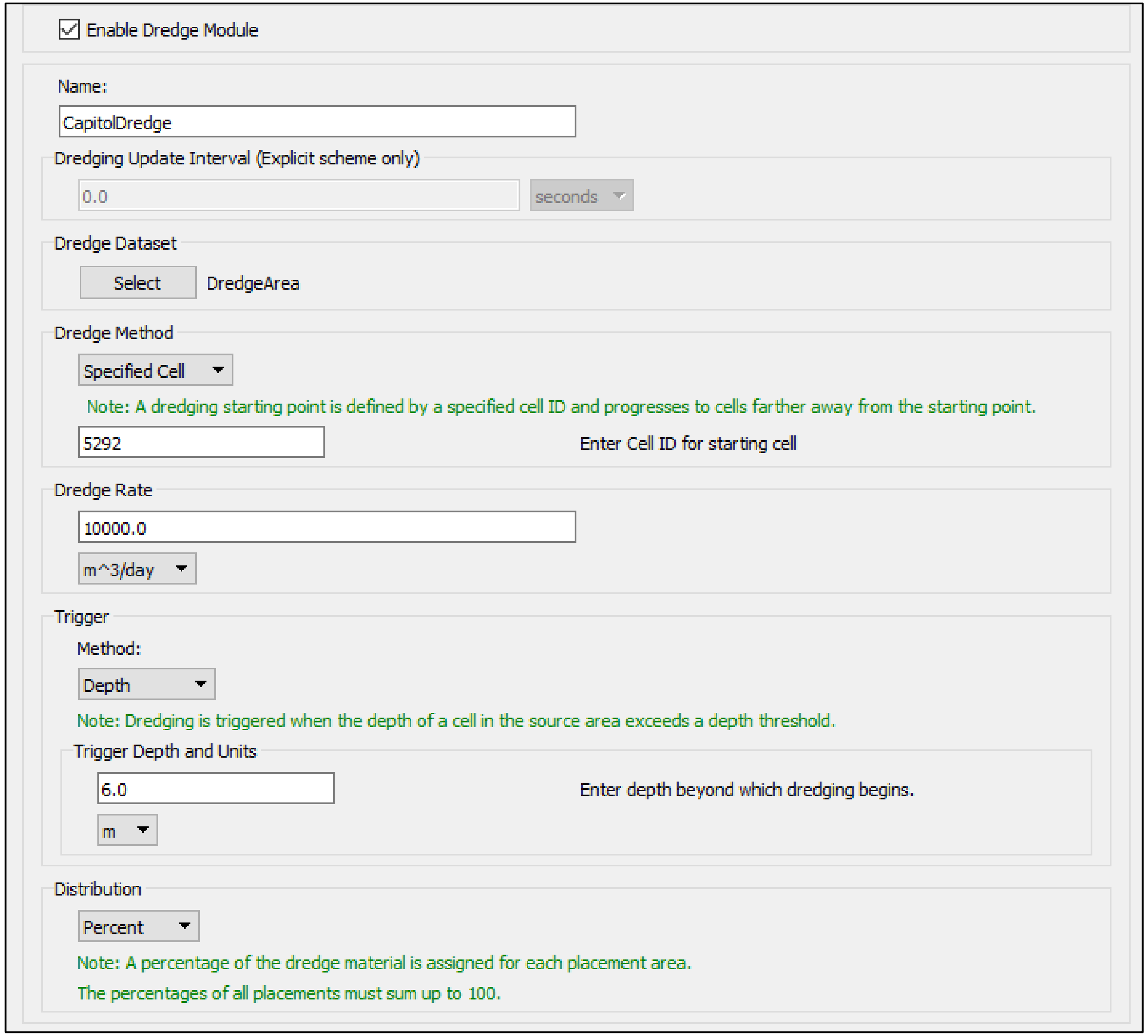
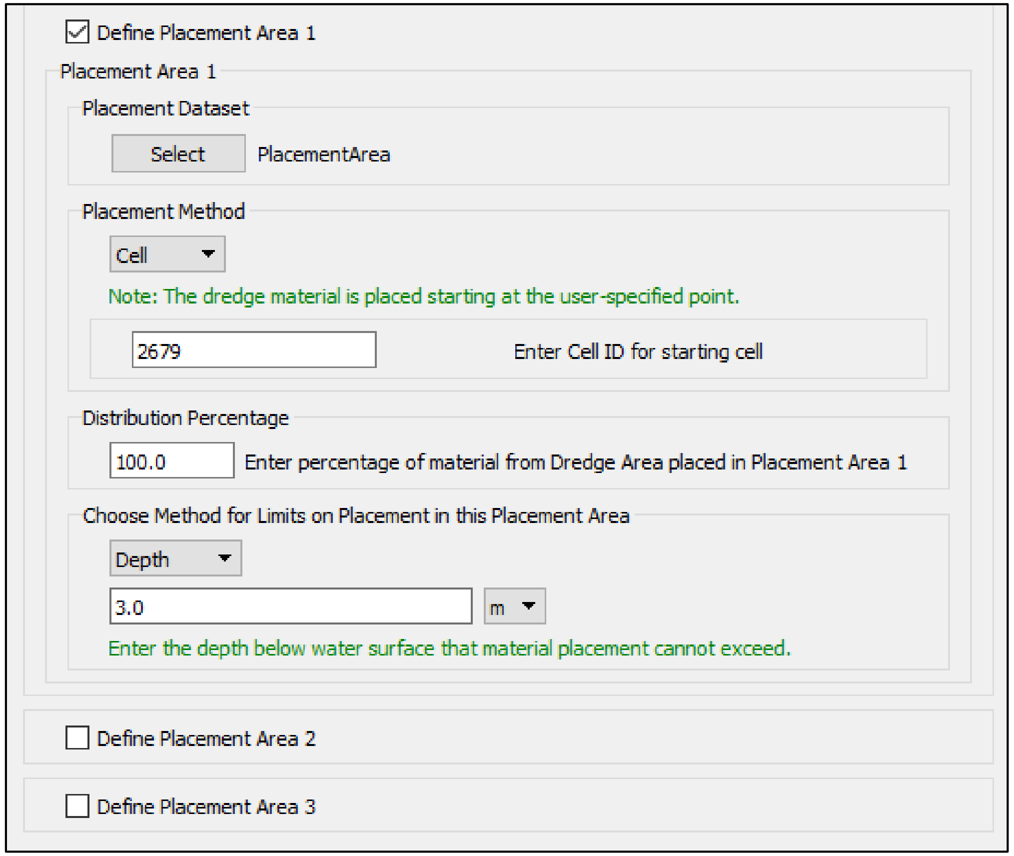
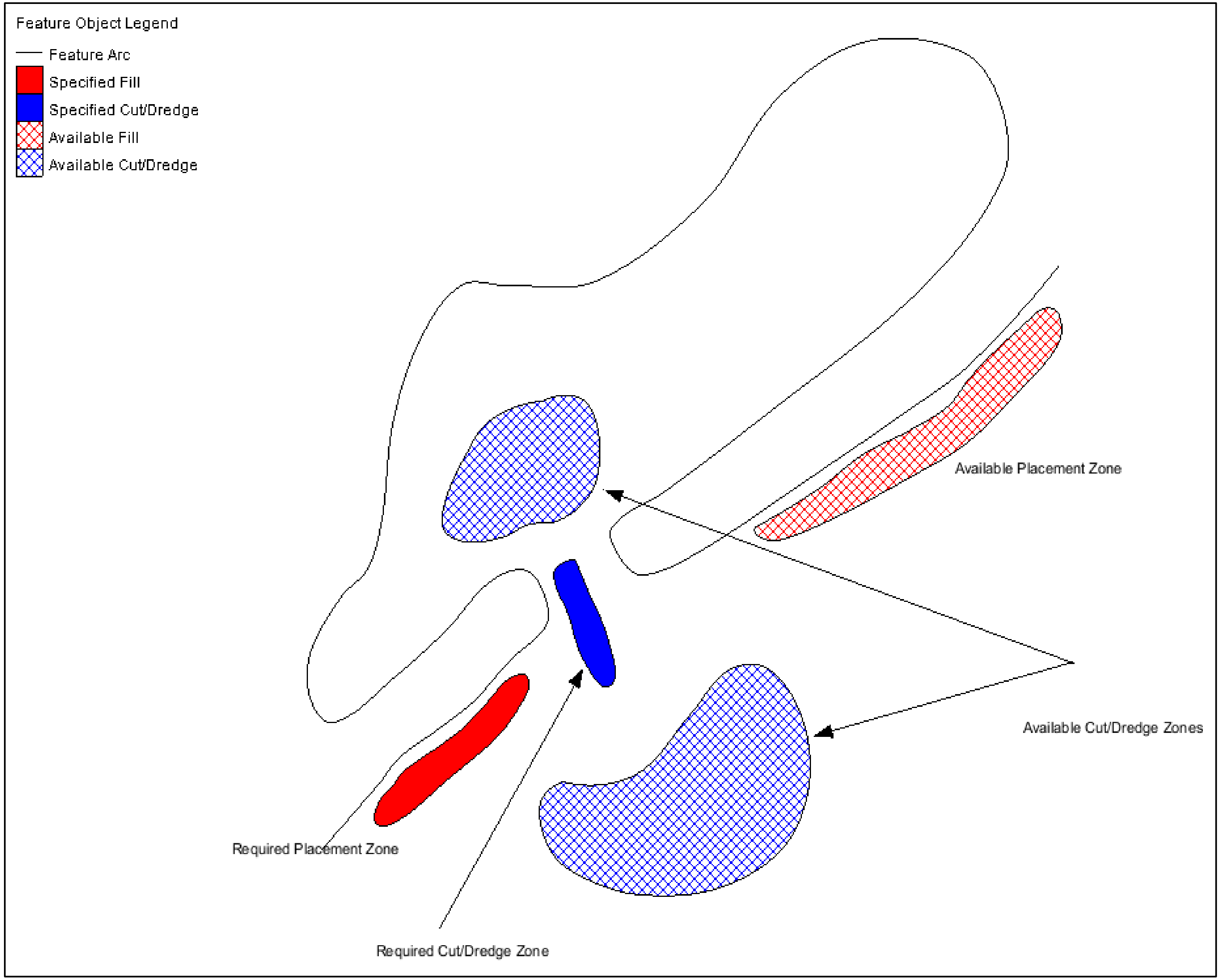
Upcoming SMS integration



Inline Dredge Module for dredge/placement events during CMS simulation



Upcoming SMS integration



Sediment Management Tools

For setting up various sediment management alternatives

- Define Placement and Dredge Zones
  - Available/Required
- Define Quantities
- SMS makes the calculations and performs the underlying bathymetric modifications and creates a new Quadtree grid with that bathymetry