



U.S. ARMY



COASTAL MODELING SYSTEM: ADVANCED TOPICS USING CMS 5.1 AND SMS 13.0

DAY 1: PERFORMING DREDGING/PLACEMENT OPERATIONS WITHIN ONE CMS SIMULATION

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☒ Enable Dredge Module

Name:
CapitolDredge

Dredging Update Interval (Explicit scheme only)
0.0 seconds

Dredge Dataset
Select DredgeArea

Dredge Method
Specify
Note: A
5292

Dredge Rate
10000.0
m³/da

Trigger
Method:
Depth
Note: Dr
Trigger D
6.0
m

Distribution
Percent
Note: A
The per

☒ Define Placement Area 1

Placement Area 1
Placement Dataset
Select PlacementArea

Placement Method
Specified Cell
Note: The dredge material is placed starting at the user-specified cell.

2679 Enter Cell

Distribution Percentage
100.0 Enter percentage of material from D

Choose Method for Limits on Placement in this Placement Area
Depth
3.0 m
Enter the depth below water surface that material placement

☐ Define Placement Area 2



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FY19 – Implementation of Dredge Module interface into SMS 13.0.9



Two simple dialogs to define parameters, zone selection, and schedule for removal and placement of material.

☒ Enable Dredge Module

Name: CapitoDredge

Dredging Update Interval: 0.0

Dredge Dataset: DredgeArea

Dredge Method: Specified Cell

Note: A dredging starting point is defined by a specified cell ID and progresses to cells farther away from the starting point.

5292 Enter Cell ID for starting cell

Dredge Rate: 10000.0

m^3/day

Trigger Method: Depth

Note: Dredging is triggered when the depth of a cell in the source area exceeds a depth threshold.

Trigger Depth and Units: 6.0 Enter depth beyond which dredging begins.

m

☒ Define Placement Area 1

Placement Area 1

Placement Dataset: PlacementArea

Placement Method: Specified Cell

Note: The dredge material is placed starting at the user-specified point.

2679 Enter Cell ID for starting cell

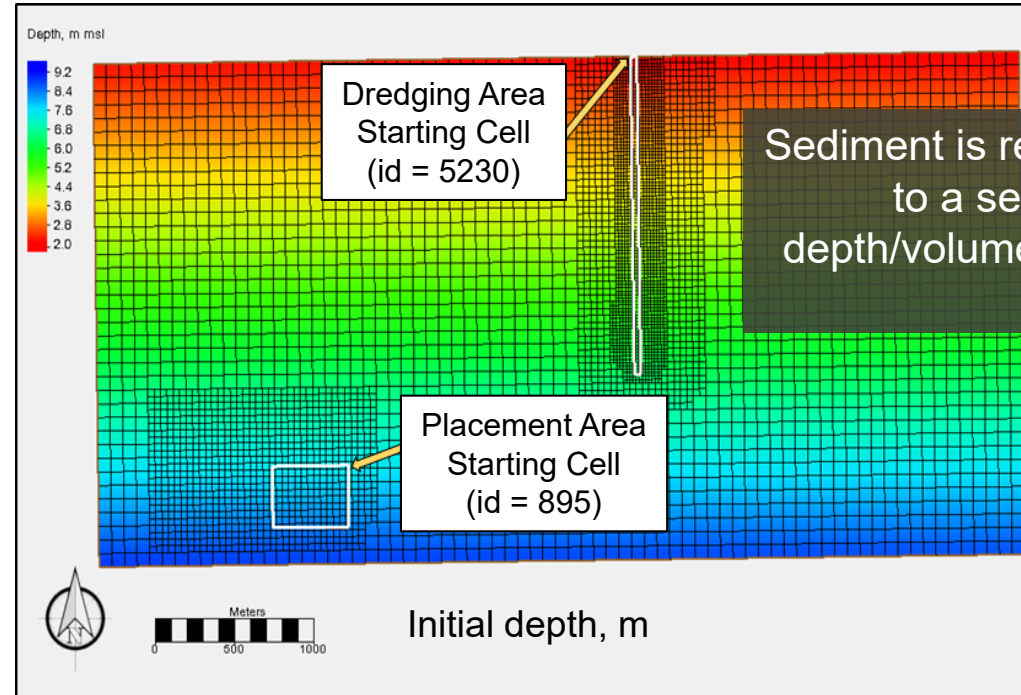
Distribution Percentage: 100.0 Enter percentage of material from Dredge Area placed in Placement Area 1

Choose Method for Limits on Placement in this Placement Area: Depth

3.0 m Enter the depth below water surface that material placement cannot exceed.

☐ Define Placement Area 2

☐ Define Placement Area 3

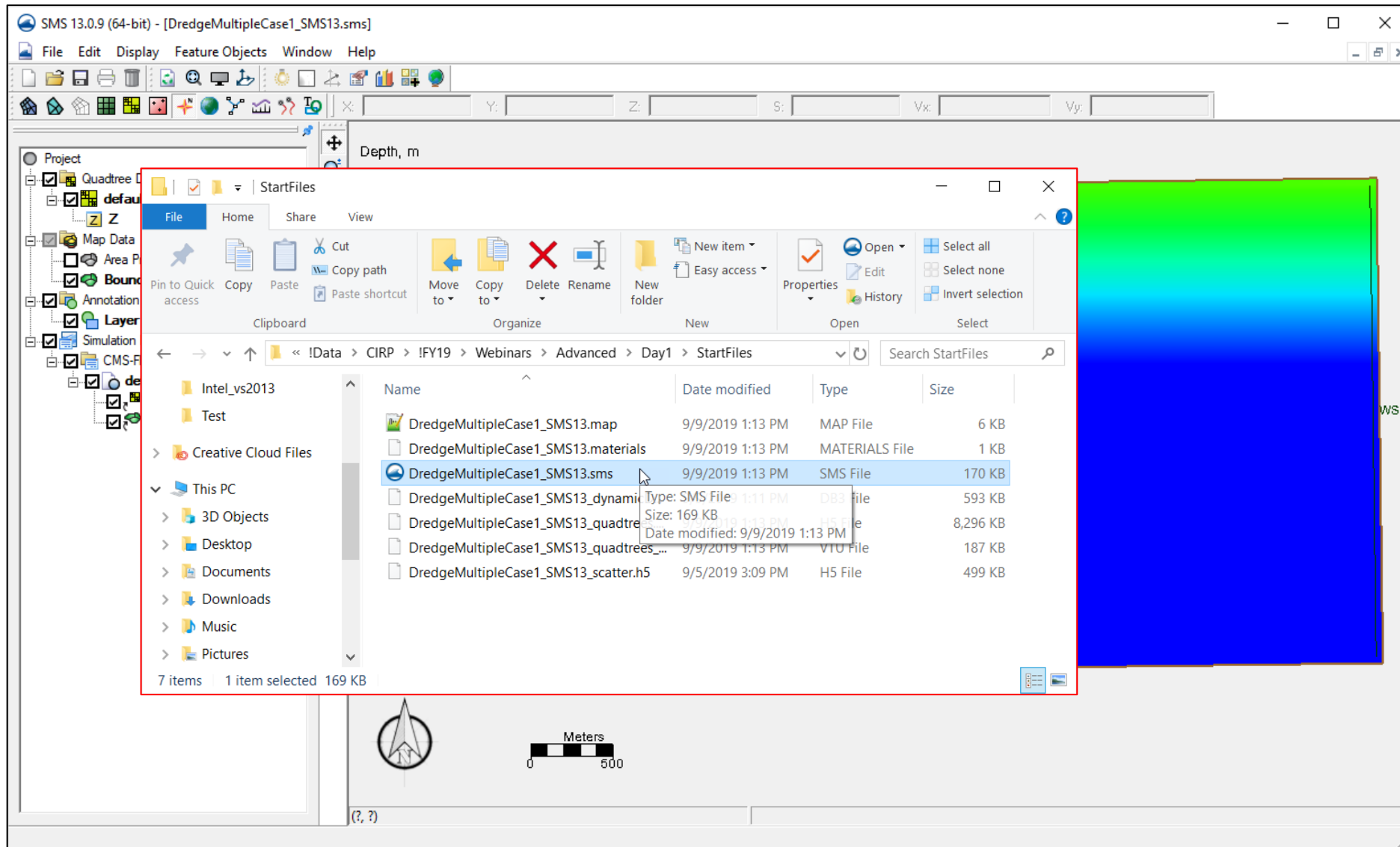


Sediment is removed and placed according to a set schedule or based on depth/volume threshold as defined by the user.

NOTE: This example is for demonstration purposes only. Your own bathymetry, sediment information, dredging schedule, etc is needed.

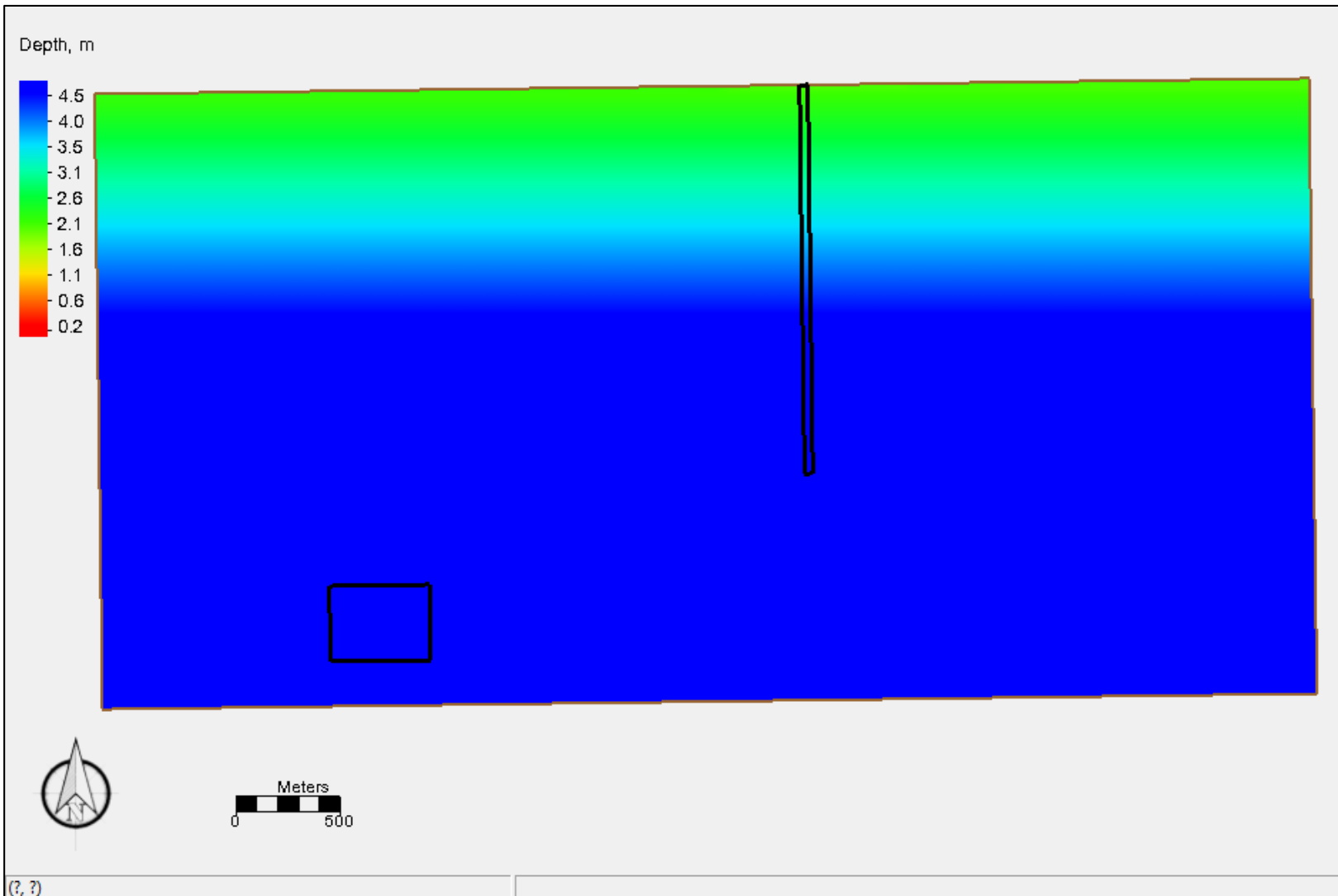


Open “StartFiles” folder and load project file



Grid with bathymetry and boundary conditions has already been created and saved.

Define the zones to use for cut and fill



Create a coverage in Map Module of any type (default is “Area Property”).

Define arcs and build polygons for cut/dredge and fill/placement zones.

Feature polygons can also come in from ArcGIS shape files.

“OtherNeededFiles” folder



Create datasets to specify values for cut/fill zones

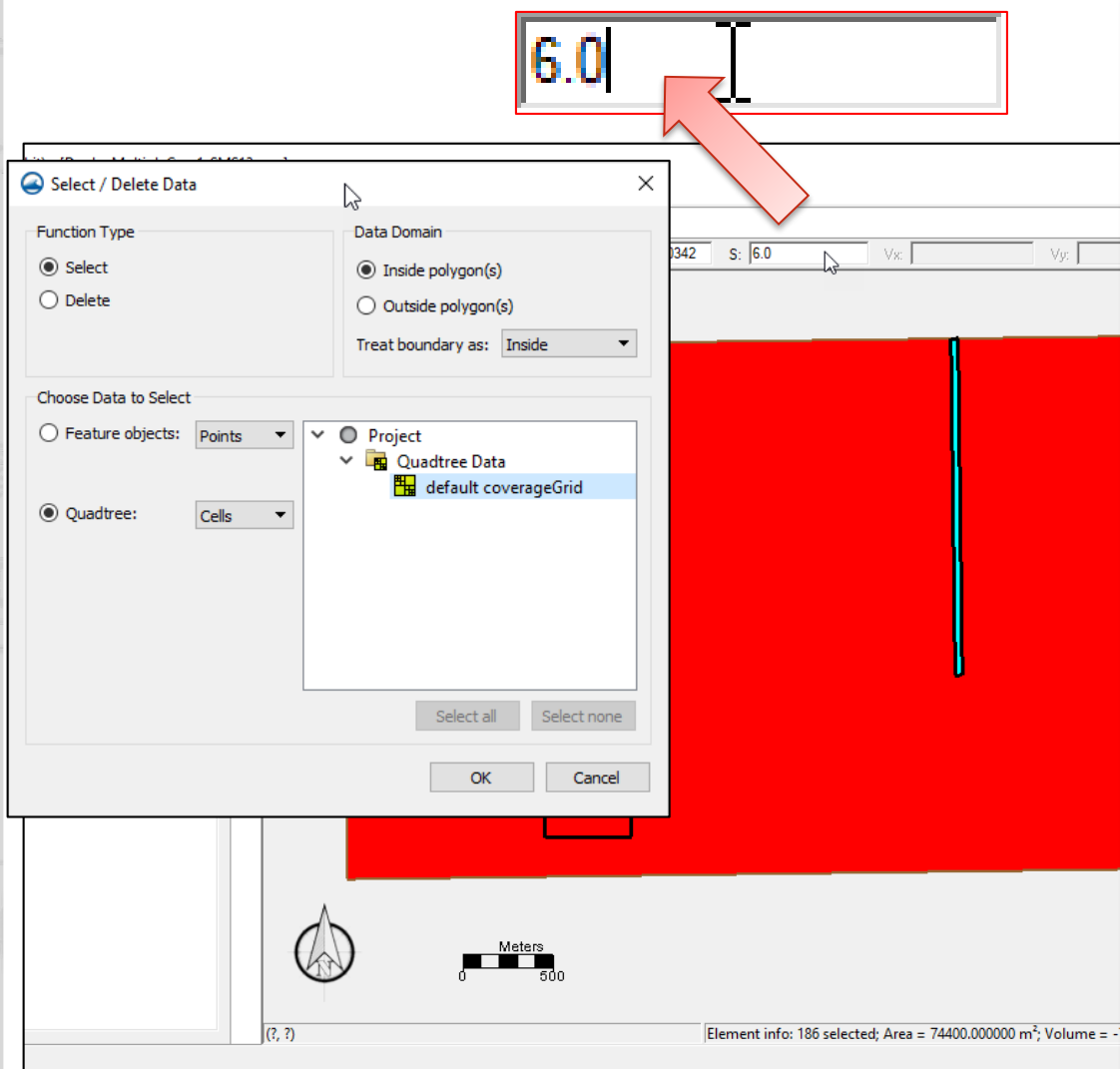
The image shows a software window titled 'Data Calculator'. It has three main sections: 'Data Sets' on the left, 'Time Steps' in the top right, and a 'Calculator' at the bottom right. The 'Data Sets' section contains a tree view with 'default coverageGrid' expanded, showing sub-items 'd1. Z', 'd2. x location', and 'd3. y location'. Below this are buttons 'Add to Expression' and 'Data Set Info...'. The 'Time Steps' section has a list box with '1. 0 00:00:00' and a checkbox 'Use all time steps'. The 'Calculator' section features a numeric keypad with buttons for /, (*), (-), (+), (,), ln, log, sqrt, 1/x, abs, min, max, ceil, and floor. A text input field above the keypad contains '-999'. At the bottom, there is a text field 'Output dataset name:' with 'Dredge' entered, and a 'Compute' button.

Using the Data Calculator, create datasets for the Dredge and up to three Placement areas.

Set the default value for each to -999.

Later steps will modify the values for each dataset depending on type.

Select cells to define areas and values



For each polygon, select the cells from the CMS grid and modify the values.

- Select polygon, then Feature objects | Select/Delete data
- “Select”, “Inside Polygon”, “Quadtree | Cells”
- Select correct Grid, then click OK.

Then, click the appropriate dataset in the data tree and modify the Scalar value.

For cut/dredge areas, set the value for each cell to the maximum dredge depth.

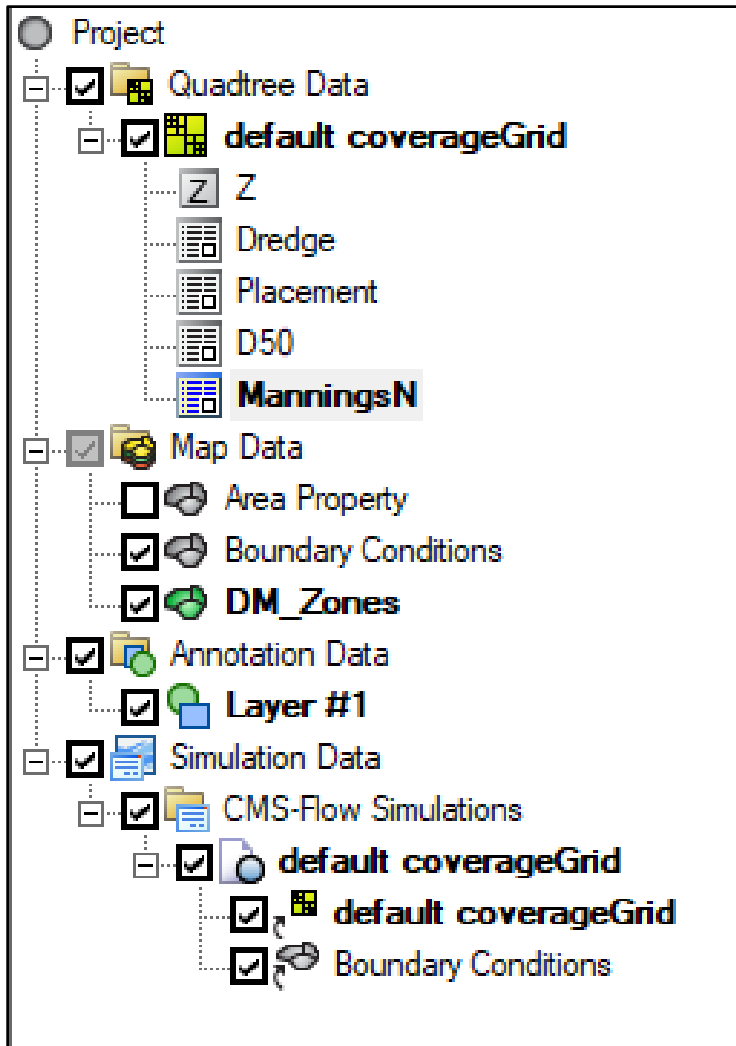
For fill/placement areas, set the value for each cell to 1.

Examine Datasets. Assign values to additional cells, if needed.





Set values for other needed datasets.



Example files located in
"OtherNeededFiles" folder:

- ManningsN
- D50



Dredge Module set up – Right click Simulation folder

- “Dredge Definition” Tab
- Click “Dredge Module Definition”
 - Enable
 - Select Dredge Dataset
 - Dredge Method: Specified Cell
 - 5230
 - Dredge Rate: 10000 m³/day
 - Trigger Depth: 6.0 m
 - Distribution: Percent (**actual percentages defined in Placement section**)

- “Placement Definition” Tab
- Click “Define Placement Area 1”
 - Select Placement Dataset
 - Placement Method: Specified Cell
 - 895
 - Distribution Percentage: 100%
 - Limits: Thickness: 1.1 m

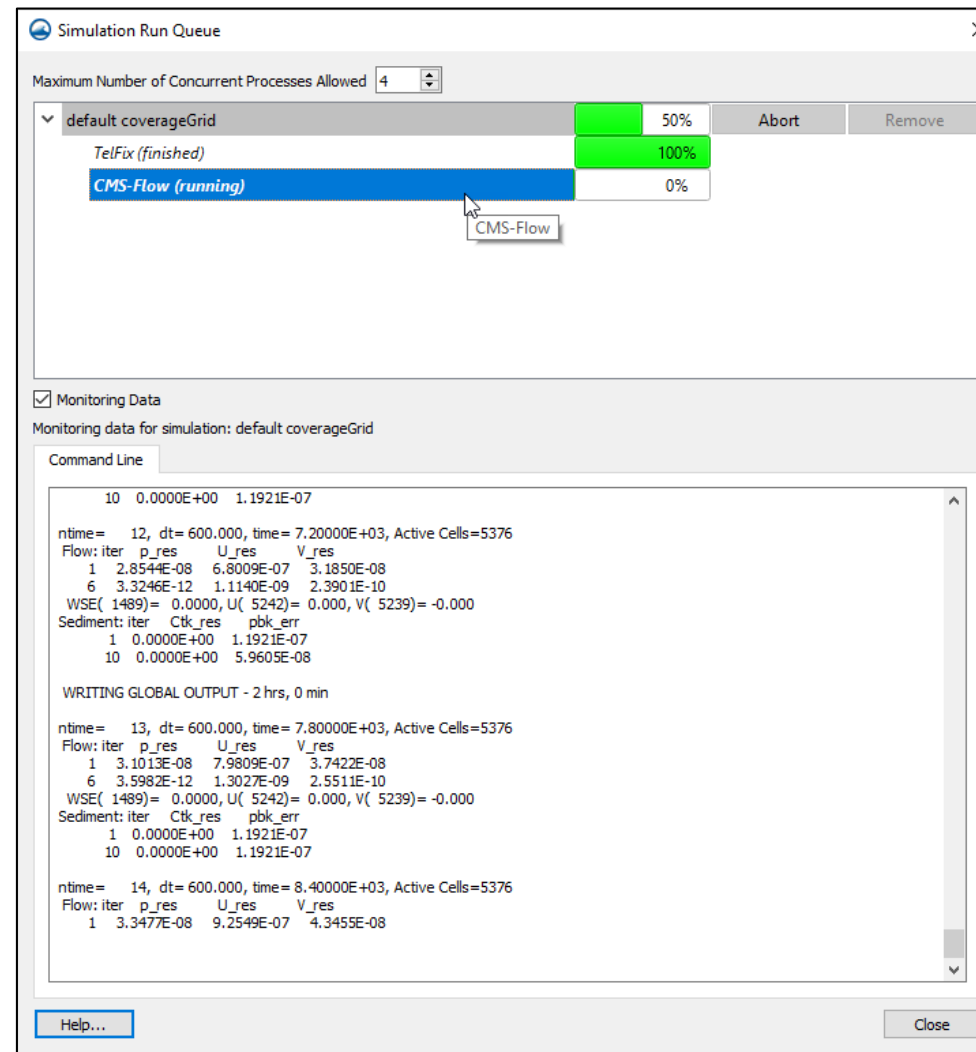
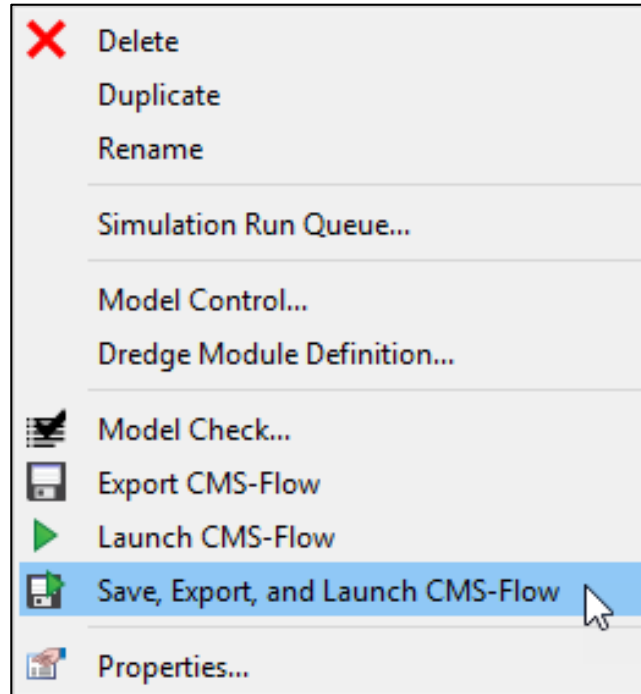
Click OK when finished.



Model Control settings

- General Tab
 - Simulation duration: 550 hours
 - Ramp duration: 2 days
 - Recurring Hot Start: 48 hours
- Flow Tab
 - Bottom Friction: Select ManningsN dataset
- Output Tab
 - List 1 – 0 to 720 hrs @ 1 hr inc.
 - Enable
 - Current Magnitude
 - Morphology (all)
 - Transport (all)
- Sediment Transport Tab
 - 1 Sediment size class: 0.2 mm diameter
 - Enable Simplified Multi Grain
 - 3 Grain sizes (mm) – 0.2, 1, 4
 - Standard Dev – 3.0
 - Bed Comp. Input - D50 Sigma
 - Select D50 dataset
 - Number of Bed Layers – 5
 - Constant Mixing Layer Thickness – 0.2
 - Constant Bed Layer Thickness – 0.8

Launch simulation



- Use latest CMS executable (5.1.10) – https://cirpwiki.info/wiki/CMS_Releases
- In SMS, Edit | Preferences | File Location → CMS-Flow, choose file

Visualize removal and placement of material through time.

