

User Guide:

AIS Vessel Transit Counter Tool (for ArcGIS Pro)

The Vessel Transit Counter Tool is designed to take AIS vessel trackline data and count transits through cells of a user defined grid and save them as a raster dataset. This tool has been designed as an ArcGIS Geoprocessing Model that is utilized within ArcGIS Pro (version 2.1.x or later). The user can specify the input trackline feature class, grid extent, cell size, output coordinate system, and the output raster dataset name and location.

This document outlines:

- System/Software requirements
- How to access the tool within ArcGIS Pro
- Usage instructions
- Transit Countint Methodology

Software Requirements

ArcGIS Pro	Version 2.1.x or later <ul style="list-style-type: none">• Designed in version 2.1.3
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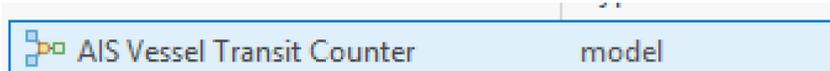
How to access the tool within ArcGIS Pro

No special installation is required to use this Geoprocessing Model. The model is stored within a toolbox which should be extracted with the AIS_Uilities_2018_Pro ZIP file. The toolbox can be accessed directly from the ArcGIS Pro Catalog:

1. Browse the directory containing the Toolbox file.
2. The **AIS_Vessel_Transit_Counter** Toolbox should appear with this location:



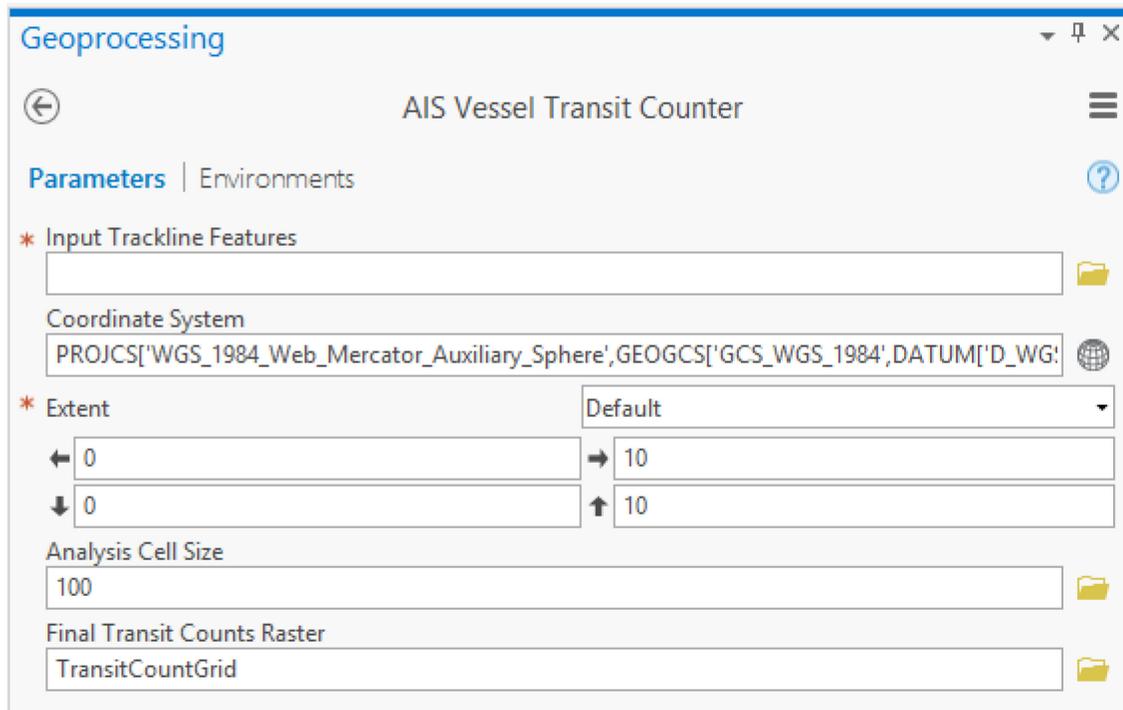
3. Double click the toolbox to access the **AIS Vessel Transit Counter** model:



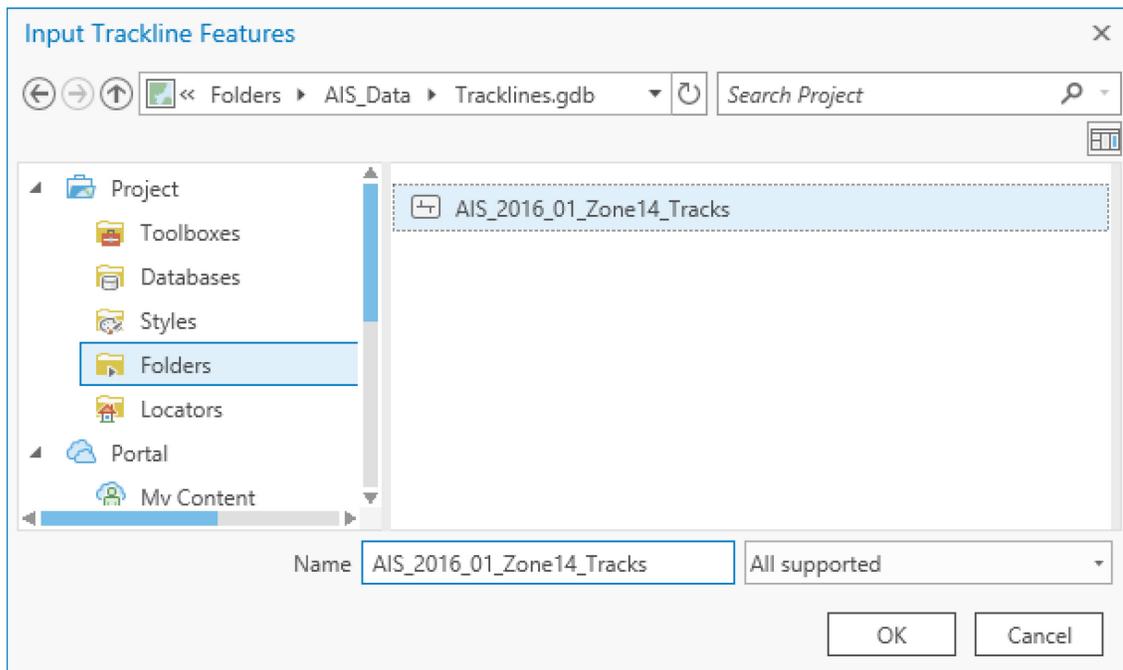
4. Double click on model to load the dialog and run the tool.

Usage instructions

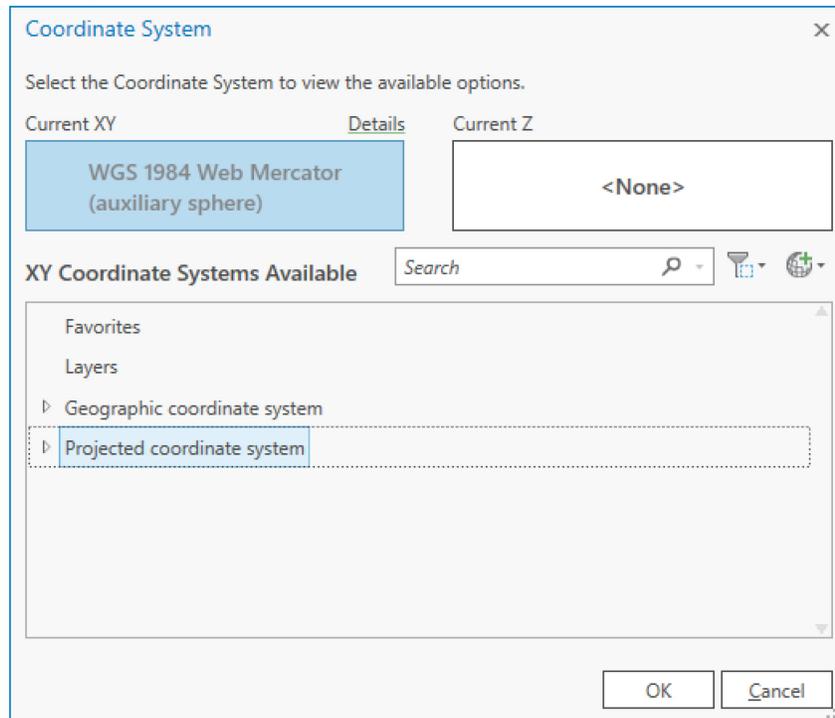
1. Open the **AIS Vessel Transit Counter** model from ArcGIS Pro



2. Browse to the input tracklines to be counted



3. Select the projected coordinate system to be used for all analysis and for the output raster. A projected coordinate system is required, geographic coordinate systems should not be used. The default coordinate system is **Web Mercator Auxiliary Sphere**.
 - a. Click on the globe icon to select a standard coordinate system, or import from an existing dataset.



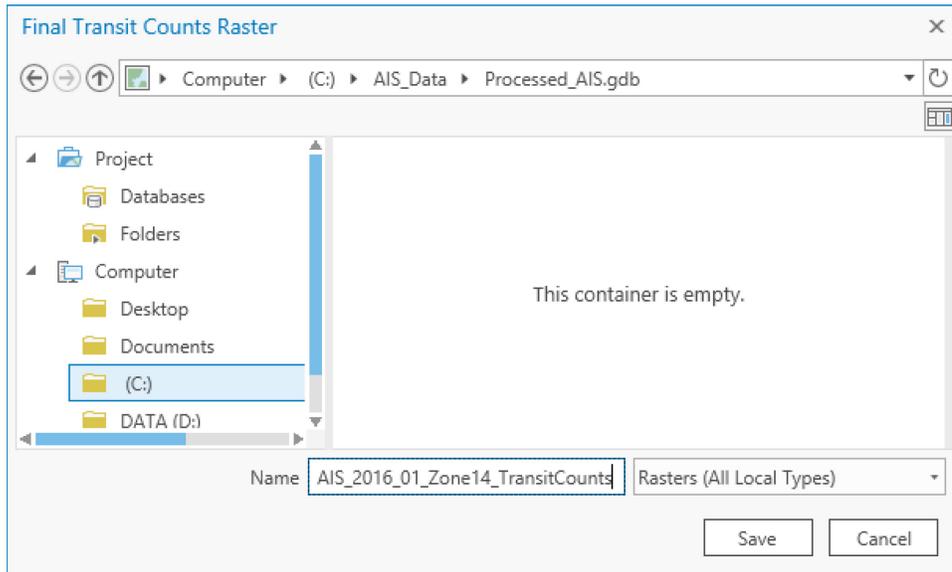
- b. **Recommendation:** The input trackline features should be in this selected coordinate system for optimal performance.
4. Select the extent for which processing will occur, and for the output transit count raster. The coordinate units must match the selected coordinate system. The extent can be specified one of two ways:

- a. Specifying the bounding coordinates
 - i. Select the “As Specified Below” option from the dropdown, then enter the coordinates for the left, right, bottom, and top edges of the extent in the four boxes provided.

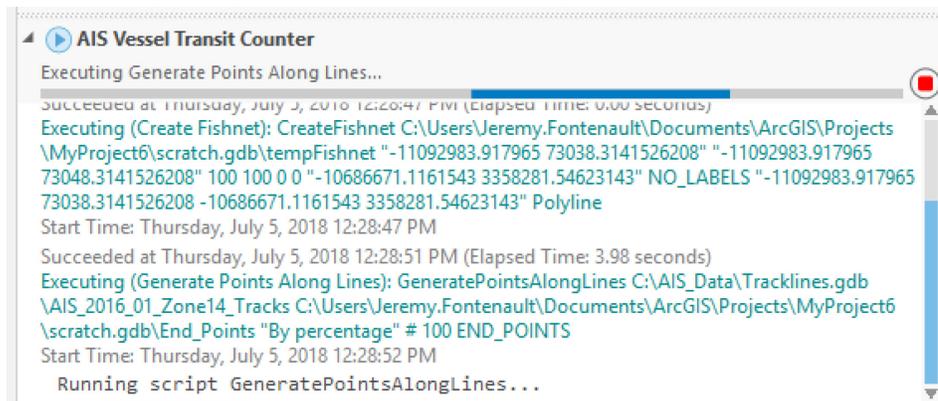
Extent		As Specified Below
← -11092983.917965	→ -10686671.1161543	
↓ 73038.3141526208	↑ 3358281.54623143	

- b. Importing an extent based on an existing dataset:
 - i. Select “Browse” from the dropdown, and browse to the dataset to copy the extent from. The four coordinates will then be populated automatically.
5. Select the Analysis Cell Size. The units must match the selected coordinate system. The resulting raster grid will have cells of this size.

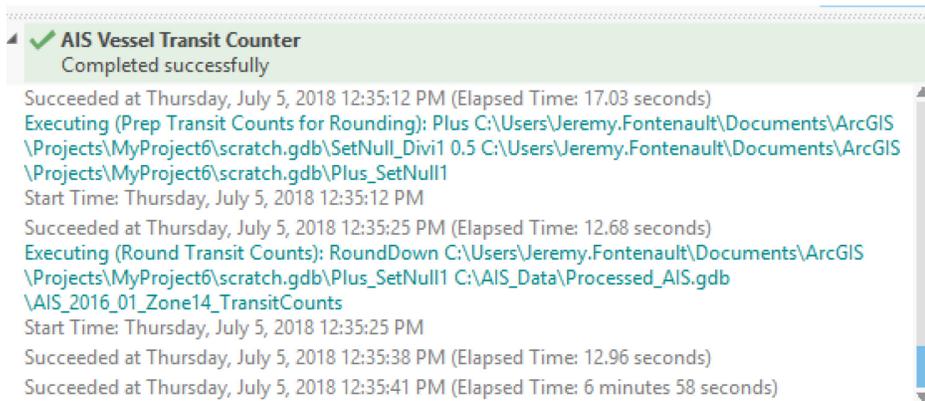
- Browse to the existing workspace where the new transit count raster will be created, enter the desired name of the new raster, and click Save



- Click Run button to run the tool
- The following dialog will show the model's progress



- When the tool has completed, the following messages should appear.

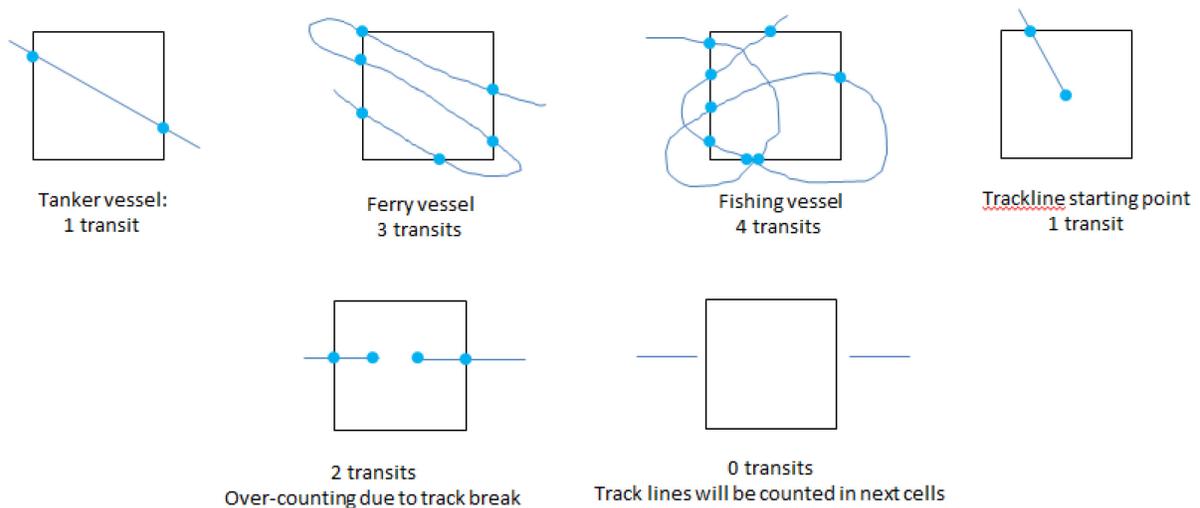


Methodology

The Transit Counter needed to be able to handle a variety of possible transit patterns for how trackline features might overlap or interact with grid features. This list includes some examples of tracklines that might:

1. Transit straight through a cell (i.e. tanker)
2. Crisscross back and forth across a cell multiple times (i.e. ferry)
3. Move irregularly across a cell with random exiting/entering (i.e. fishing boat)
4. Show incomplete coverage, such that part of the trackline is missing from the data

The following diagrams show examples of various transit patterns and how these are handled by the AIS Vessel Transit Counter Tool:



- The simple example of a tanker vessel shows one boat transiting straight through a cell. There are 2 trackline-to-grid intersections, one for entry and one for exit, resulting in a transit count of 1.
- The ferry example shows how a single trackline may cross a cell numerous times. There are 6 trackline-to-grid intersections, resulting in a transit count of 3.
- The fishing example shows a single trackline moving about a cell randomly without apparent pattern. There are 8 trackline-to-grid intersections, resulting in a transit count of 4.
- The example where a trackline starts within a cell shows 1 trackline-to-grid intersection and 1 end point. There are 2 points total, indicating a transit count of 1.
- The next two examples show where data may be missing. If there is a gap in a trackline within a cell, then the method will count 2 trackline-to-grid intersections and 2 end points. There are 4 points total, resulting in a transit count of 2 (over-counting). Alternatively, the trackline may break outside the grid cell, in which case the transit count would be 0.