Methods and Tools for Freight Flow Disaggregation

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Contents

Background

TN DOT Ongoing Study (Began April 2019)

Objective

- Review freight disaggregation methods
- Develop in-house GIS tools

Team members:

- TNDOT: D. Pallme, A. Kosanovic
- UoM: M. Golias, S. Mishra, K. Pujats

Methods

How do we create disaggregate freight OD?

Approach 1: Productions/Attractions => OD Matrix

Approach 2: OD Disaggregation

Both consider relationship between:

- Commodity producing/consuming industries
- Socio-economic variables
- Some impedance function

Used Data Sources and Crosswalk Tables

Data Sources:

- Transearch
- InfoUSA
- Bureau of Economic Analysis (BEA) Input-Output (IO) Accounts Supply and Use tables
- Network Data (Zones, Links, Facilities)

Crosswalk Tables:

- BEA IO Account code to NAICS code crosswalk
- SCTG 2-digit to NAICS 3-digit crosswalk (see Anderson et al., 2013)

Anderson, M., Blanchard, L., Neppel, L., Khan, T., 2013. Validation of Disaggregate Methodologies for National Level Freight Data. International Journal of Traffic and Transportation Engineering 2013, 2(3): 51-54. DOI: 10.5923/j.ijtte.20130203.05

GIS Toolbox

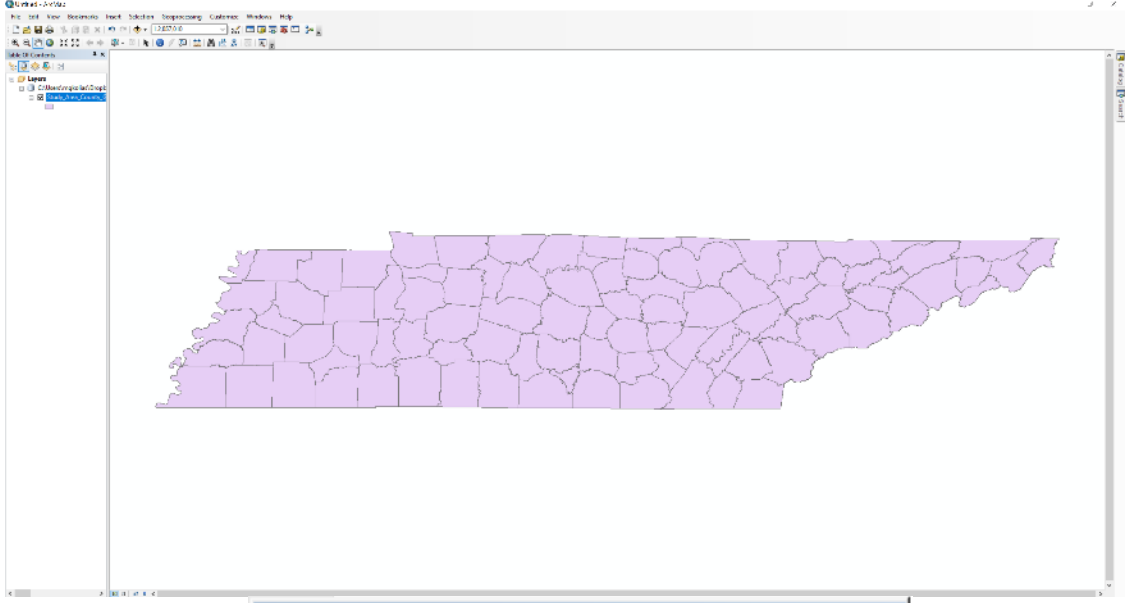
Preprocessing tools:

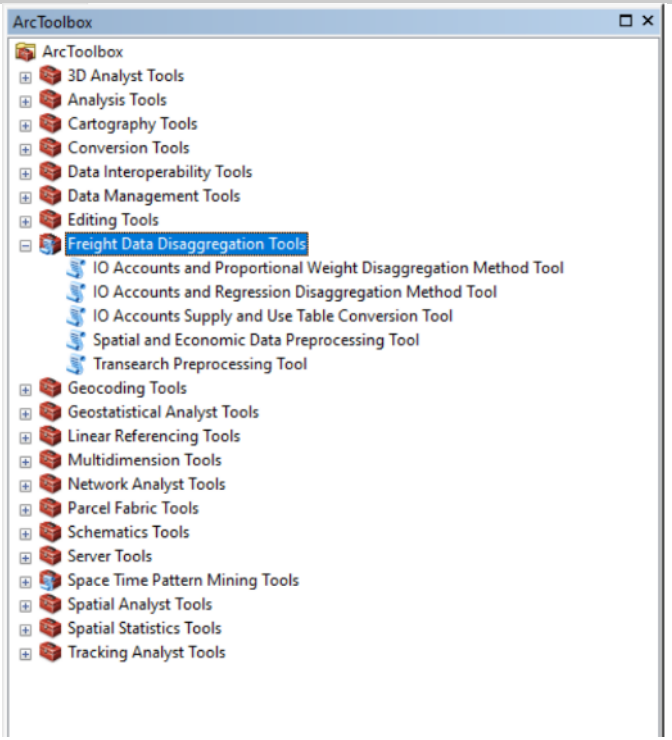
1. Transearch: SCTG3=>SCTG2 (County level in TN)
2. IO Accounts Supply and Use: Industry shares (producing and using) by IOCode, NAICS
3. Spatial and economic data (InfoUSA): Aggregate and disaggregate values/shares for sq. ft., value of sales, employment

Disaggregation tools:

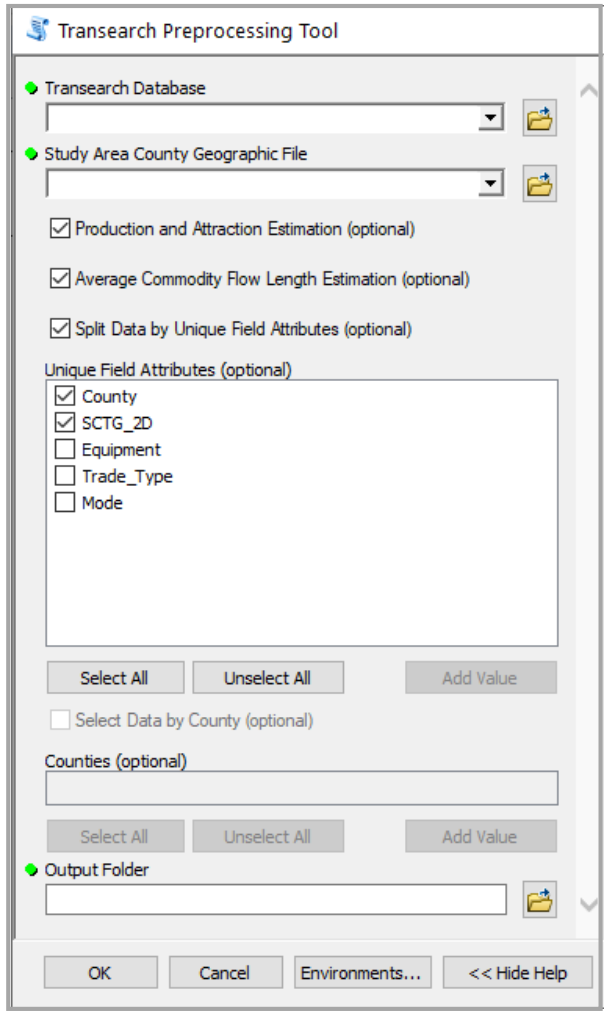
1. Trip productions/attractions disaggregation=> Create OD

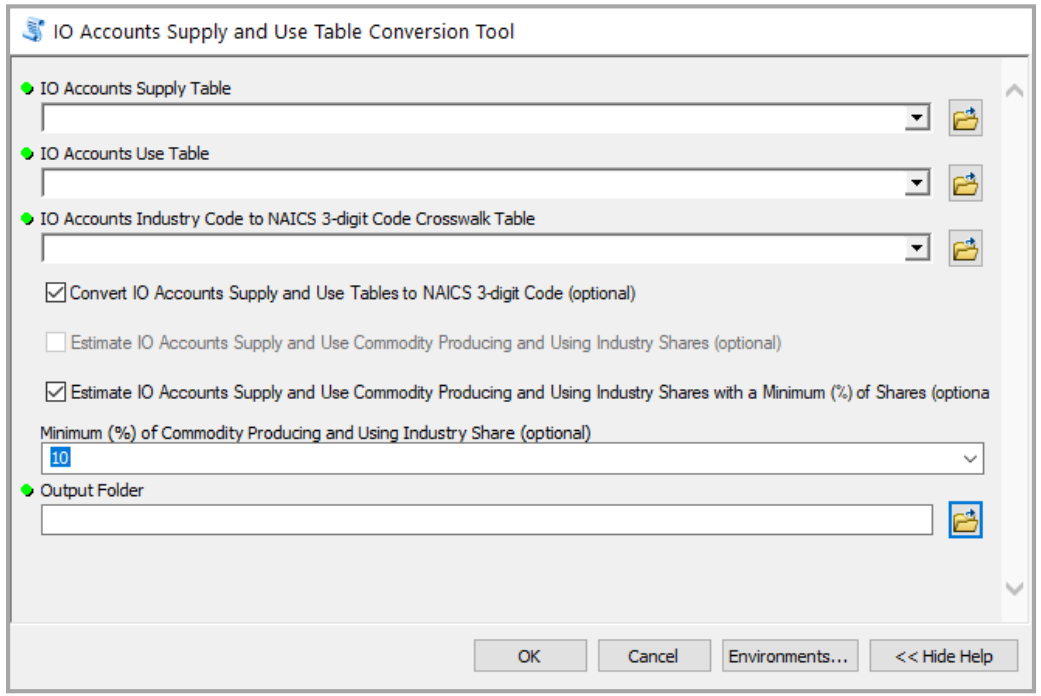
2. Direct OD Disaggregation

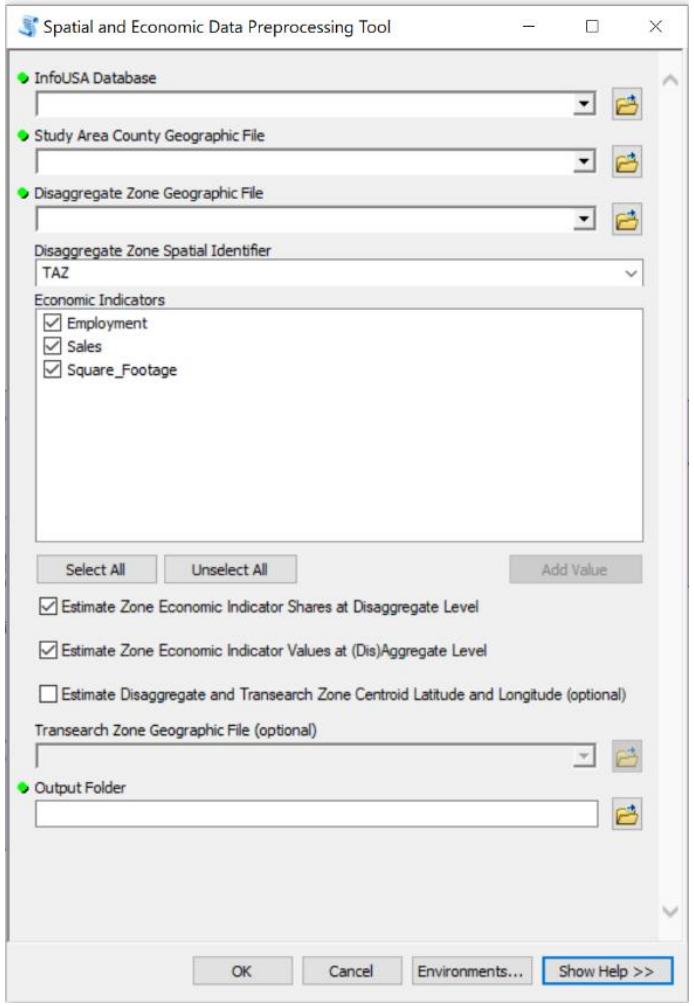




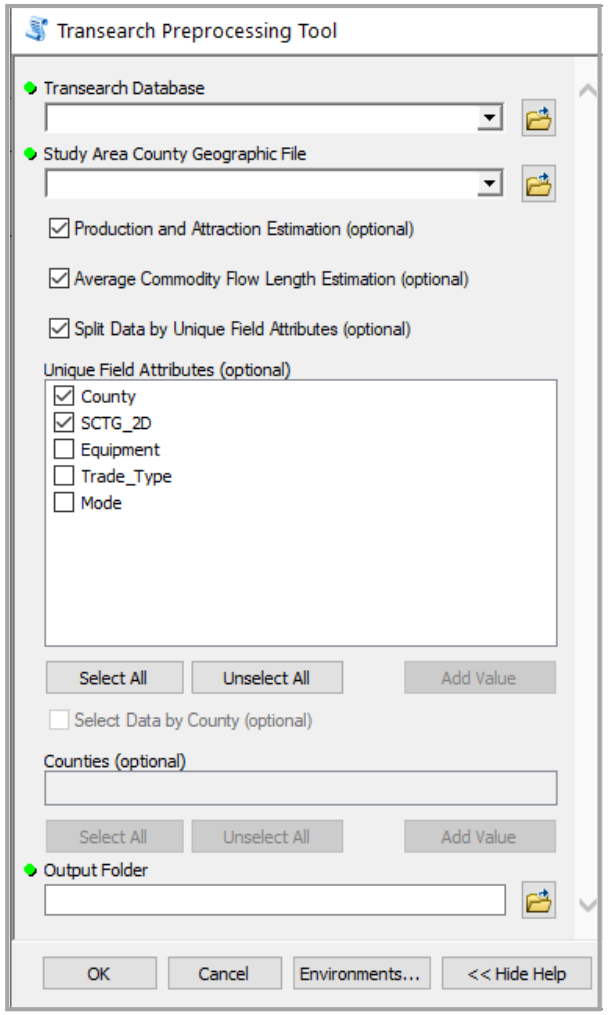
Preprocessing Tools



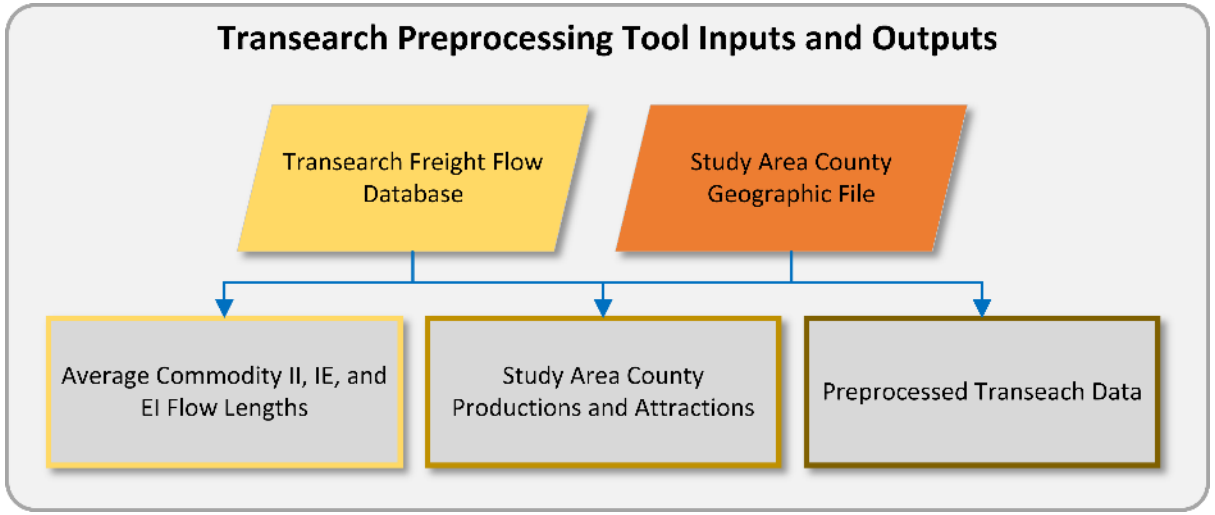




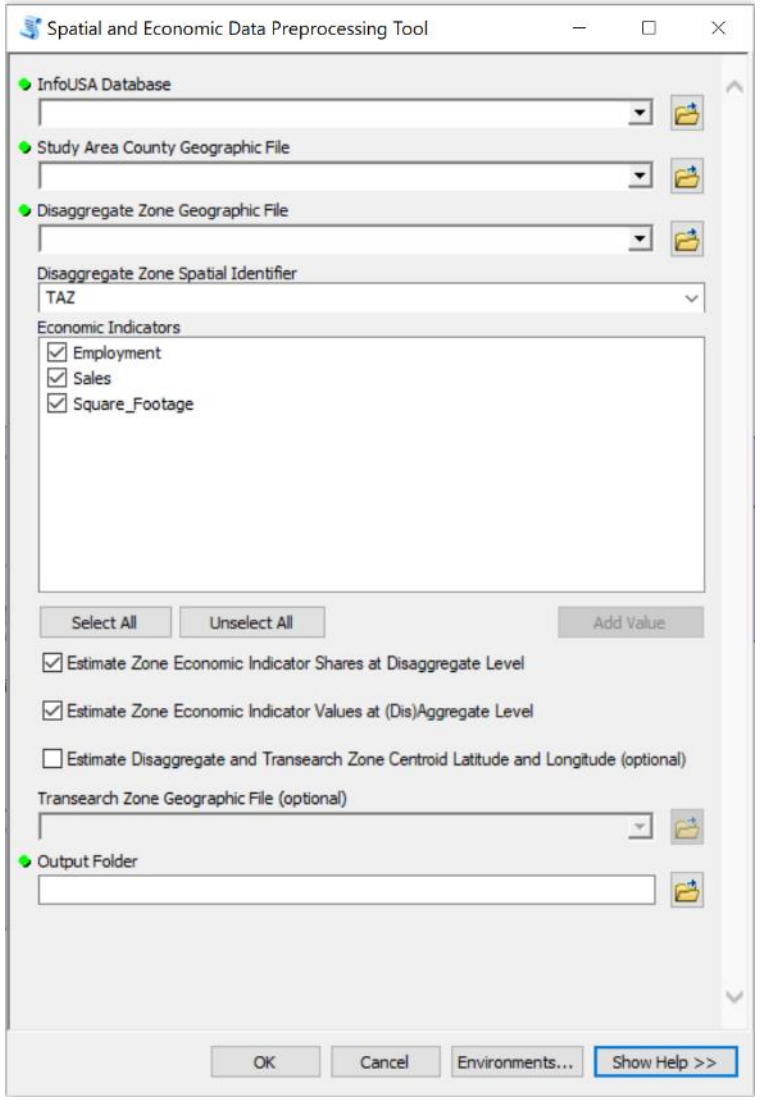
Transearch Preprocessing Tool



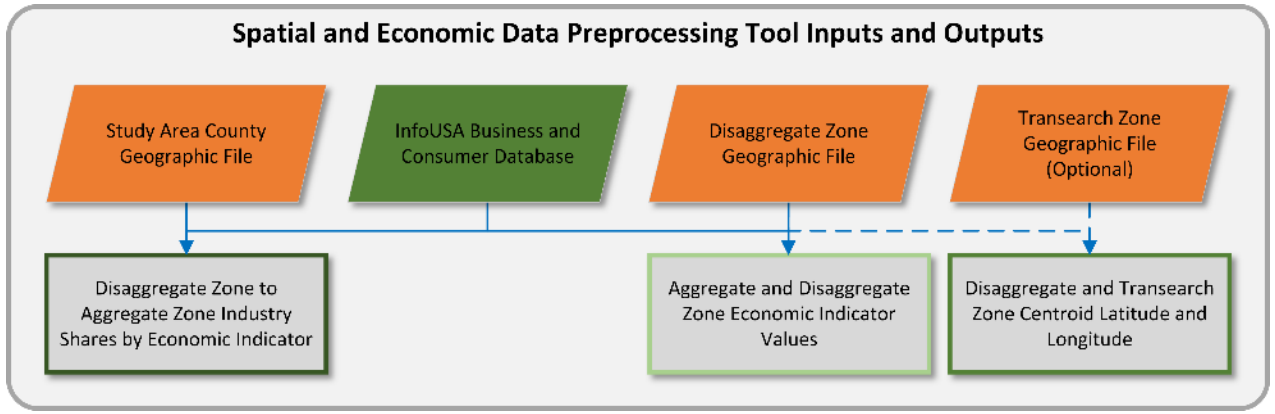
- From SCTG 3 to SCTG 2 digit code BY:
    i. Equipment type
    ii. Trade type
    iii. Mode
- Average length (miles between ODs)
- Estimate Productions and Attractions (Aggregate Level)



Spatial and Economic Data Preprocessing Tool

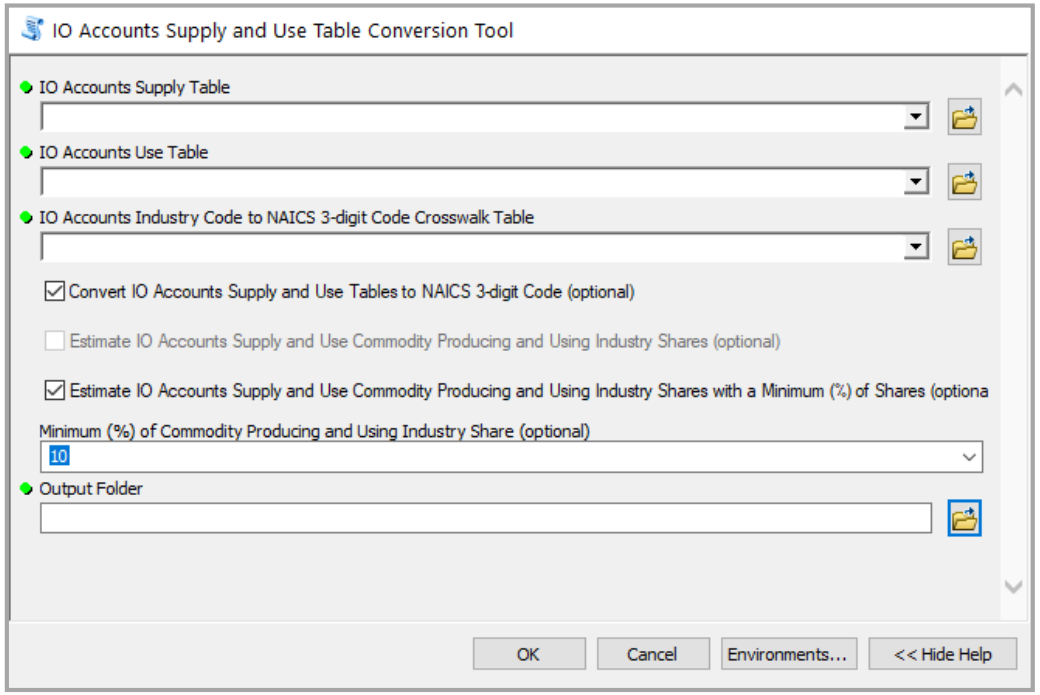


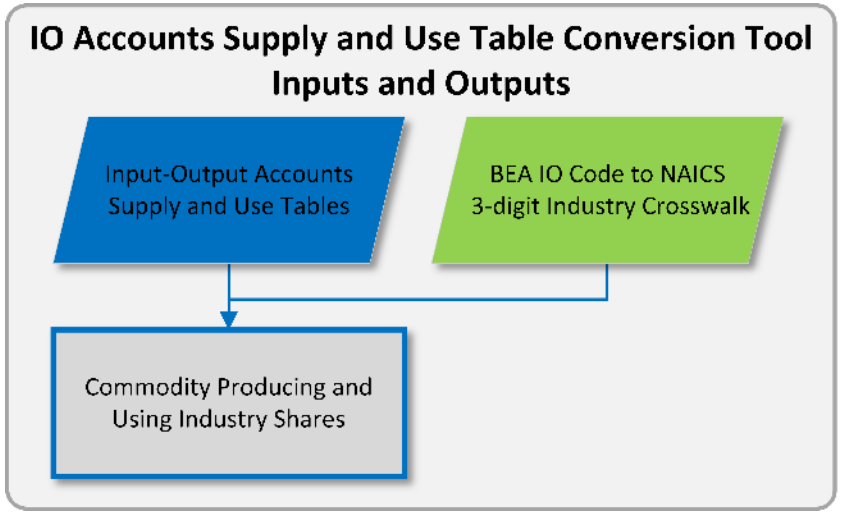
- Economic indicator shares and values at disaggregate level
- Centroid of disaggregate and Transearch zones (estimate travel times or length)



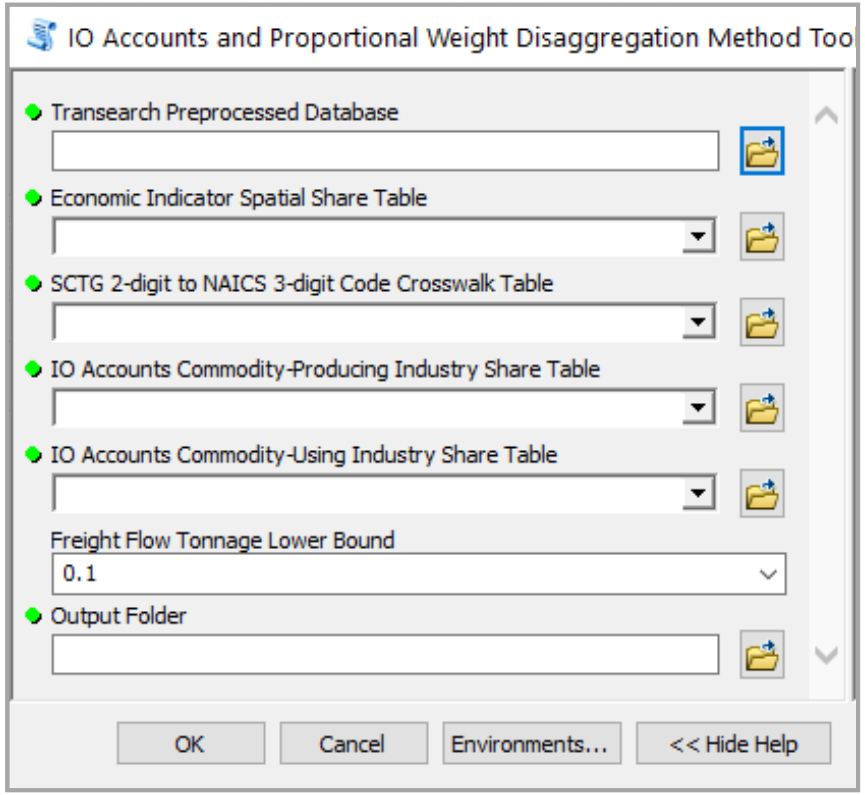
IO Accounts Supply and Use Table Conversion Tool

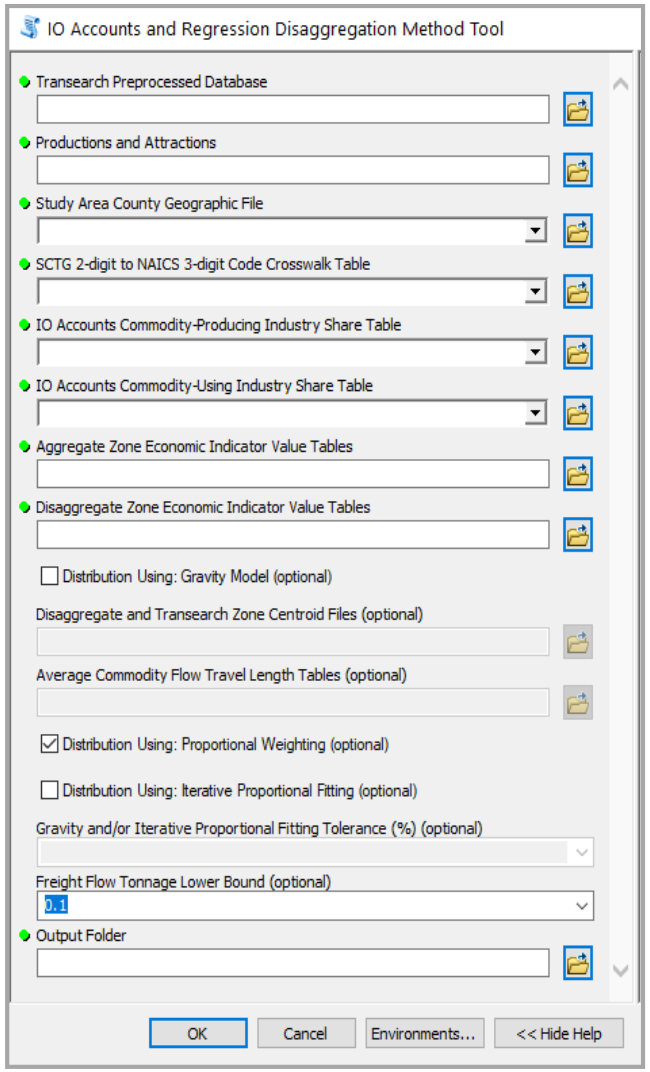
- Supply and Use Shares (any level of aggregation available)



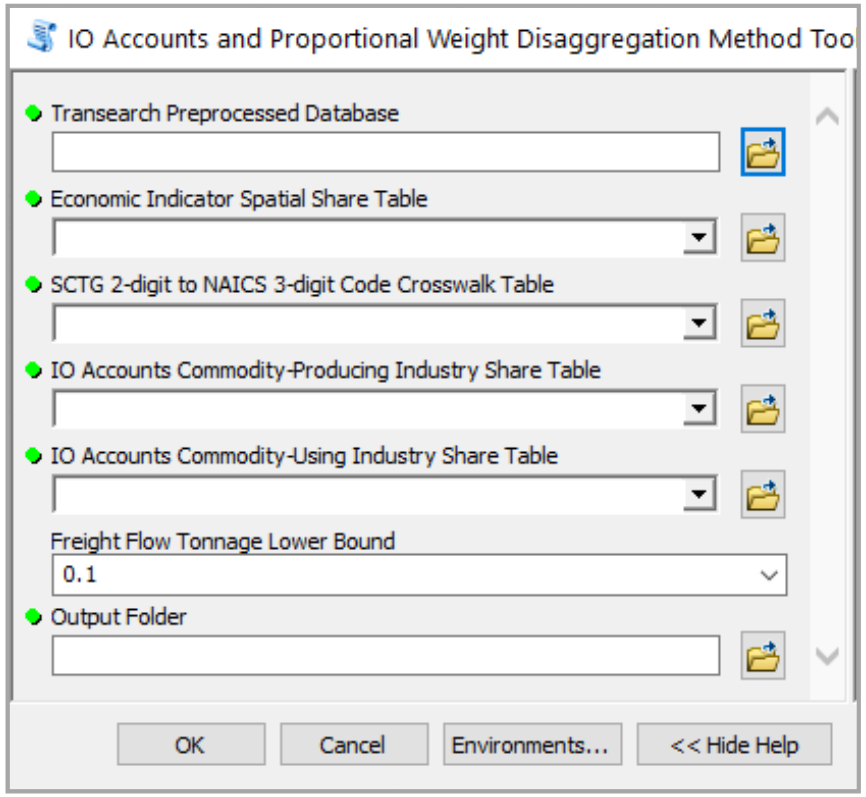


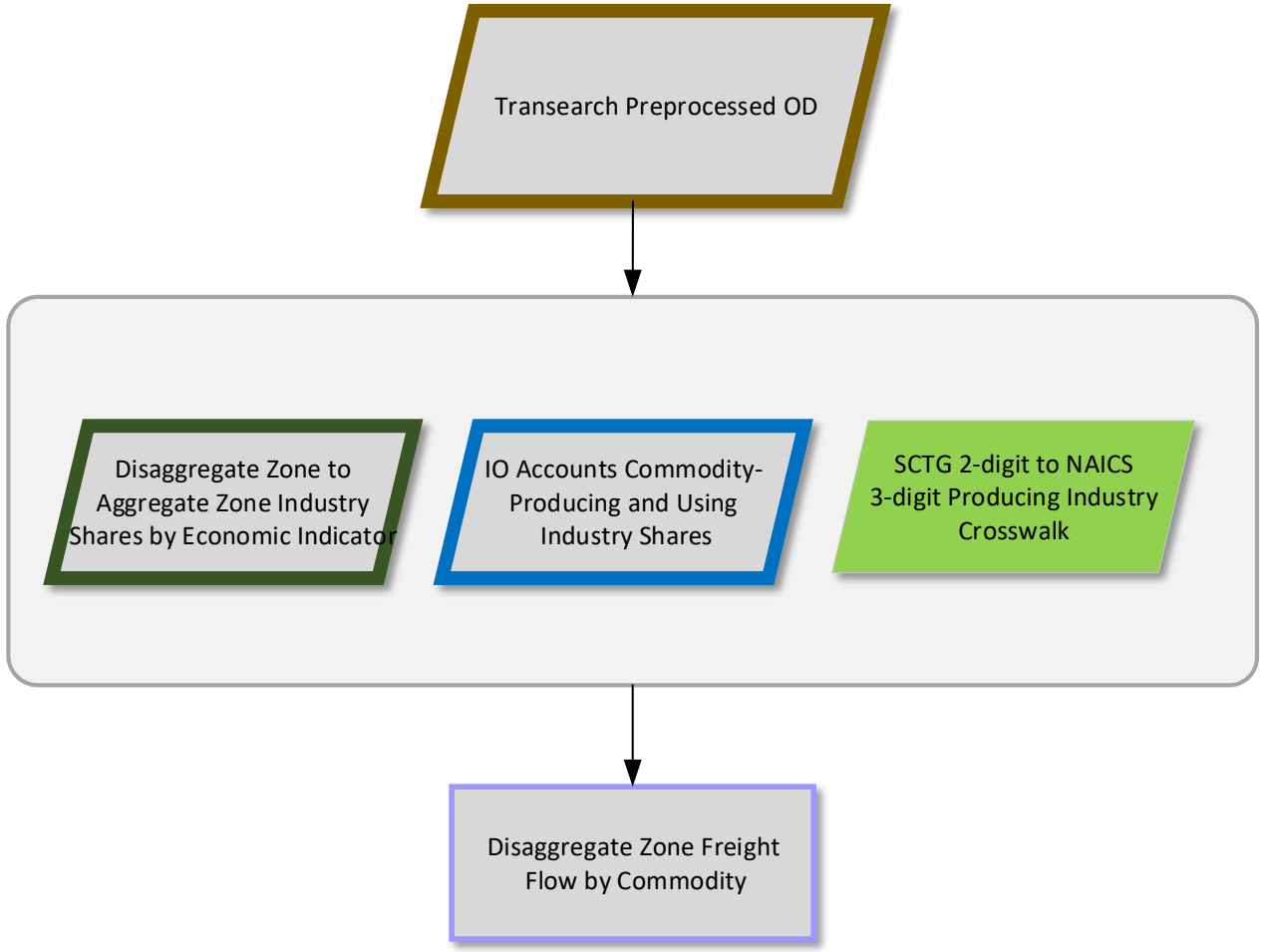
OD Estimation/Disaggregation



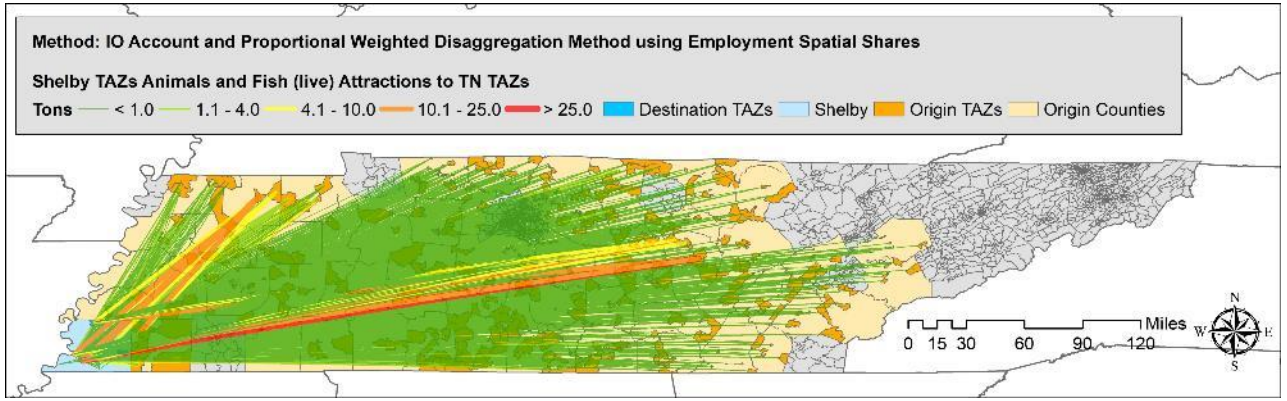


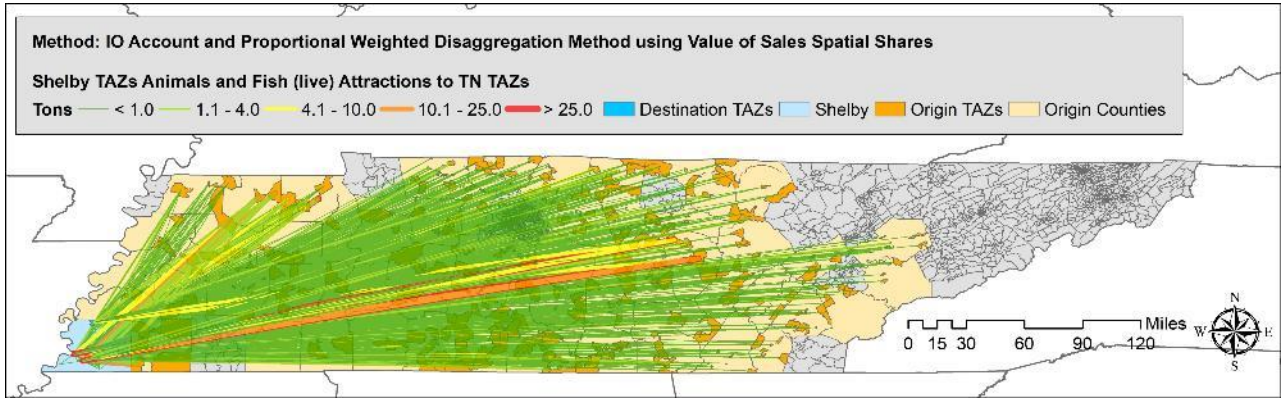
Proportional Weight OD Disaggregation

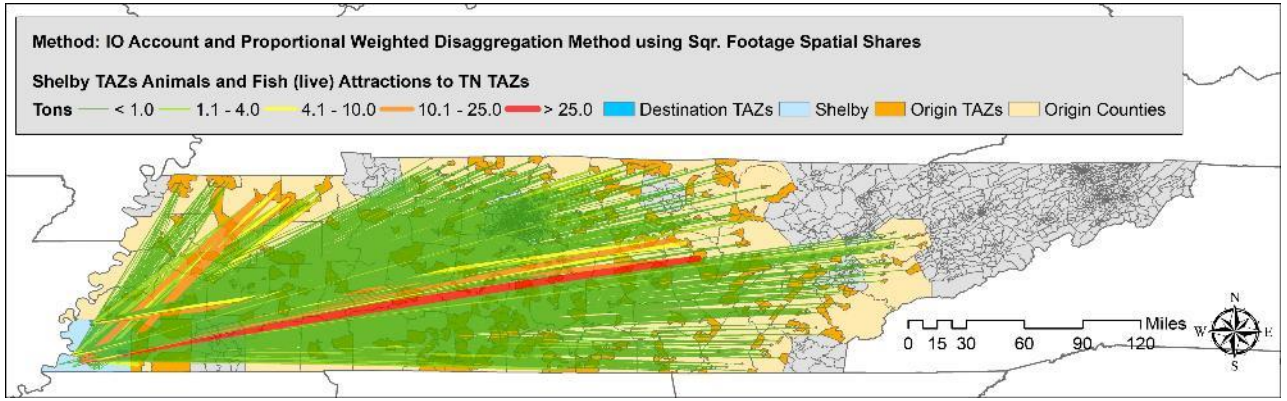




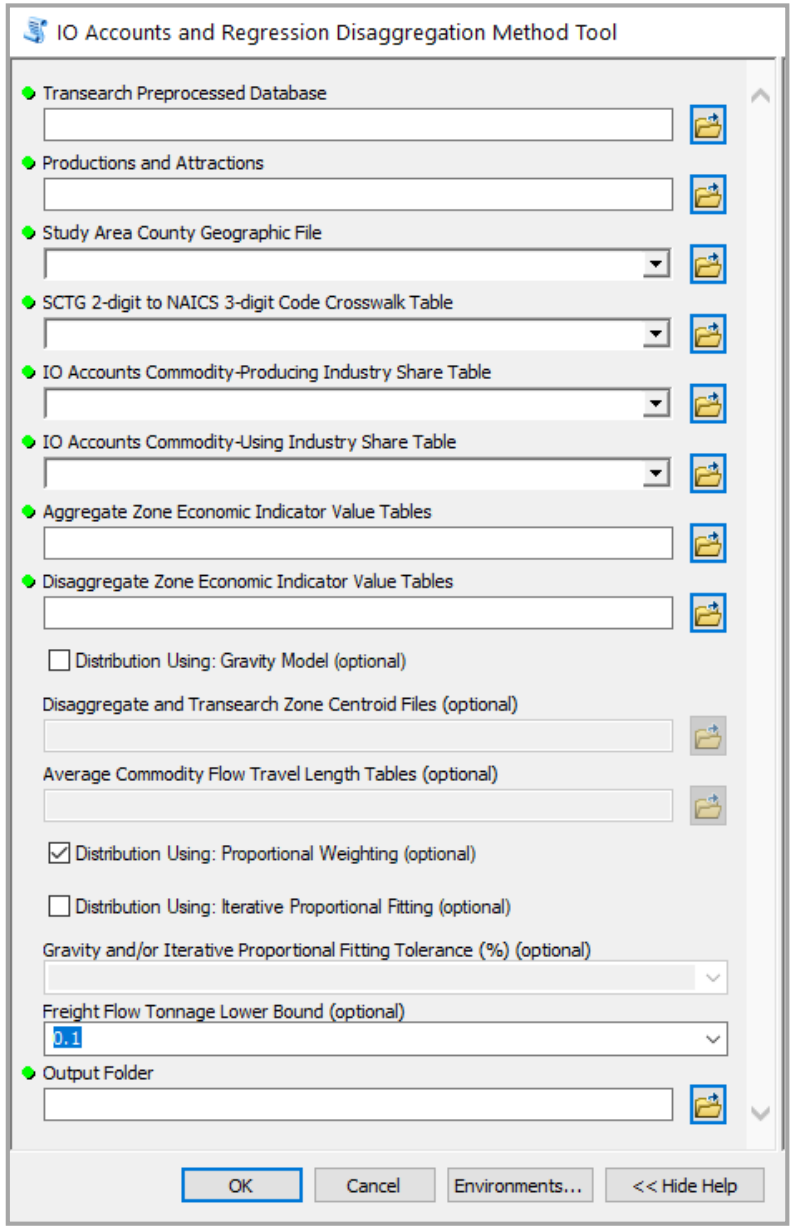
Proportional Weight OD Disaggregation Example Output

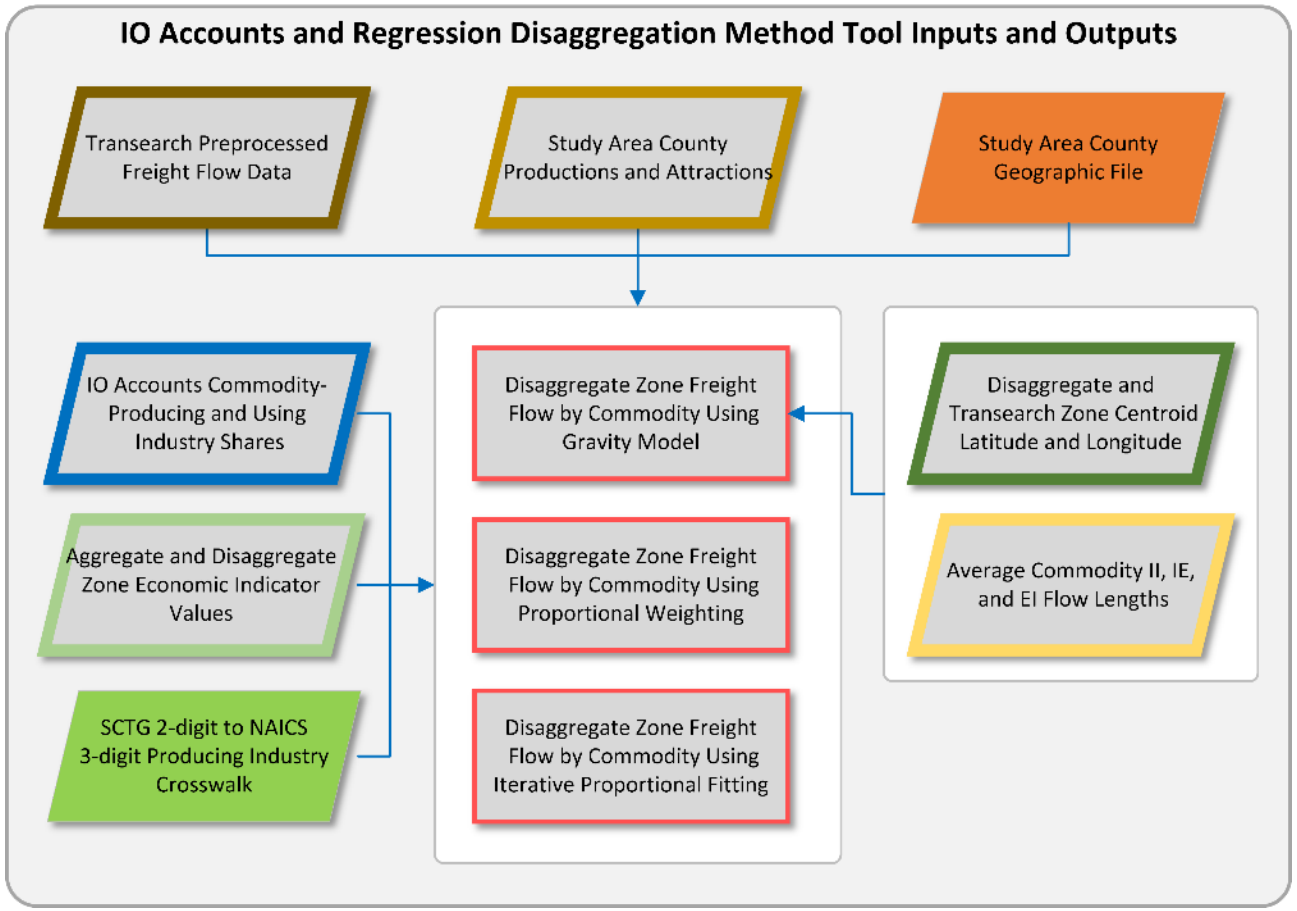




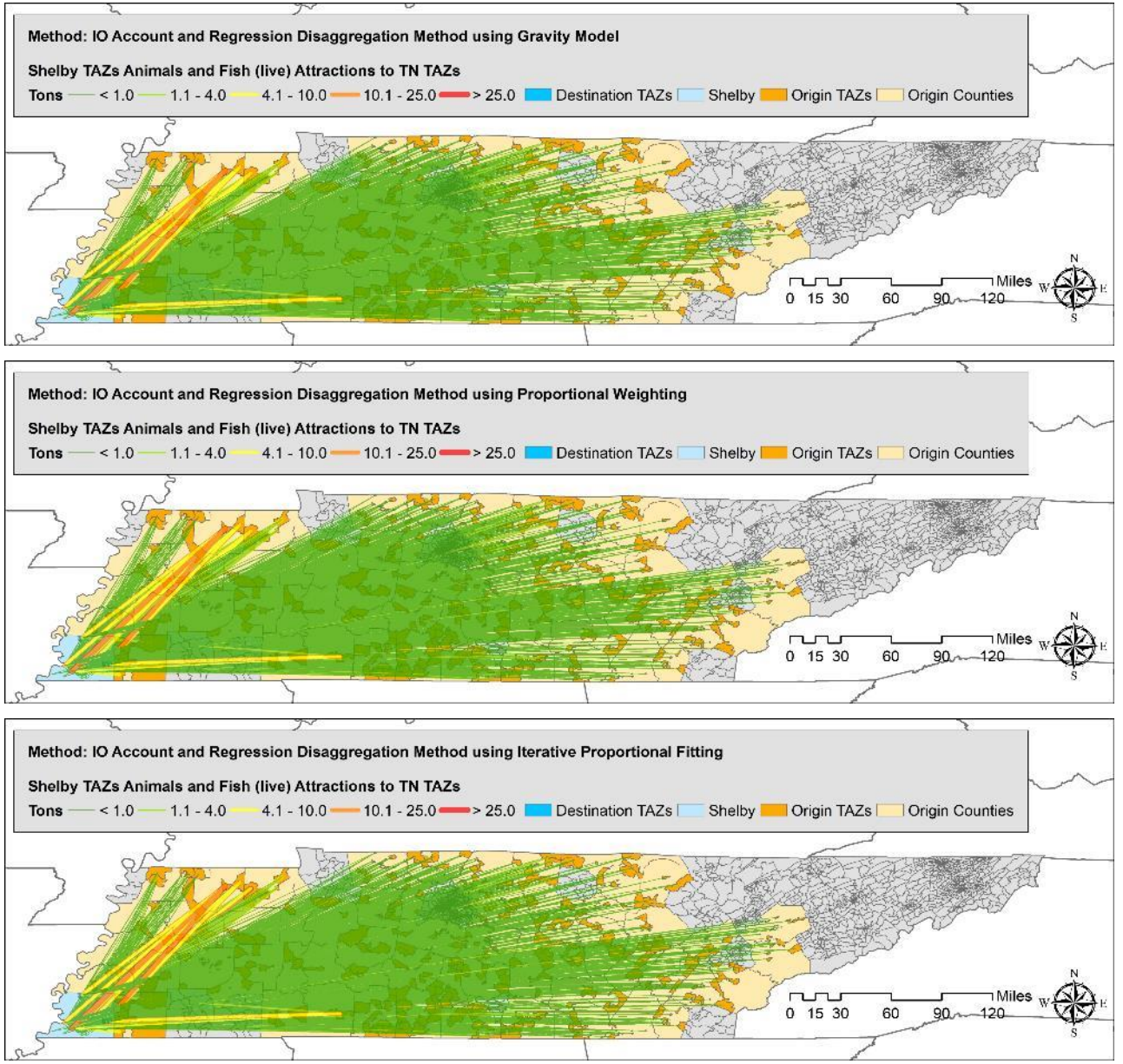


Regression Disaggregation Method Tool





Regression Method Tool Example Output



Next Steps

- Finalize GIS Tool Test
  - Tonnage to Truck Trip Conversion
  - Fix Bugs (if any)
- Validation/ Comparison of the two methods
- Finalize report by August 2020

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