

# Study on Estuary to Ocean Connectivity; Surveying Migration Patterns using Acoustic Telemetry

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Funded By:

## Background

- Stakeholders are concerned about the installation of windfarms and the buried electrical cables may effect fish movement
- The purpose of the study is to understand the fish movement between estuaries and continental shelf habitats

## Methods

### Acoustic tag deployments:

- Fish tags are Vemco V13-1x acoustic transmitter
- Fish species were chosen based stakeholder request and indicator application
- Target species being summer flounder (*Paralichthys dentatus*), smooth dogfish (*Mustelus canis*), clearnose skate (*Raja eglanteria*), horseshoe crabs (*Limulus polyphemus*)
- Spring and Summer tagging occurred inside estuary, and Fall/ Winter occurred in the ocean.

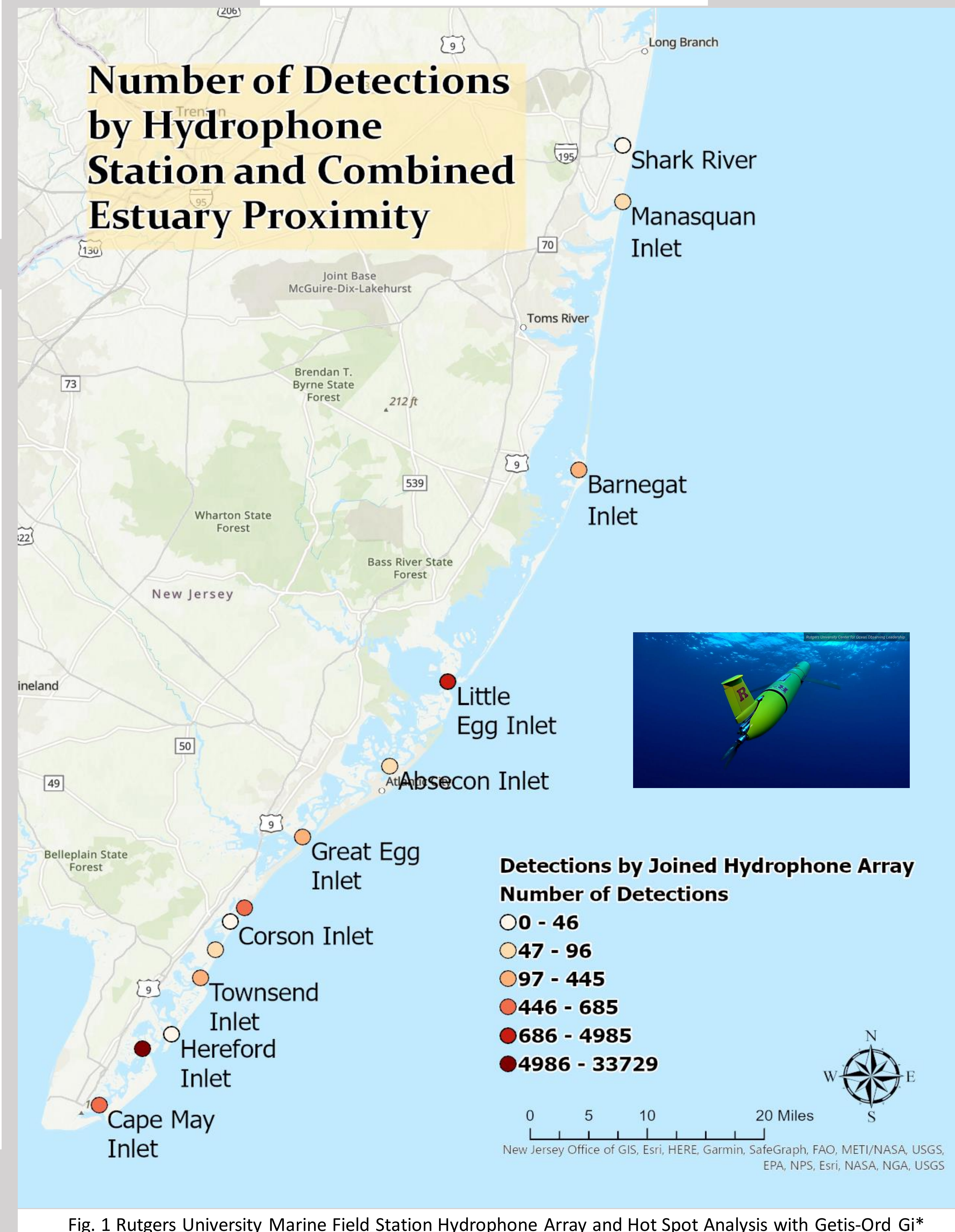
### Hydrophone Deployments:

- All New Jersey estuarine inlets
- Roaming Glider Robots
- Vessels of opportunity



Species acoustically tagged	N of deployed tags	Detected tags
<i>Mustelus canis</i>	16	1
<i>Raja eglanteria</i>	8	1
<i>Paralichthys dentatus</i>	41	8
<i>Gymnura micrura</i>	1	0
<i>Dasyatis say</i>	1	1
<i>Cynoscion regalis</i>	1	1
<i>Limulus polyphemus</i>	3	0
Other project tags	unknown	114

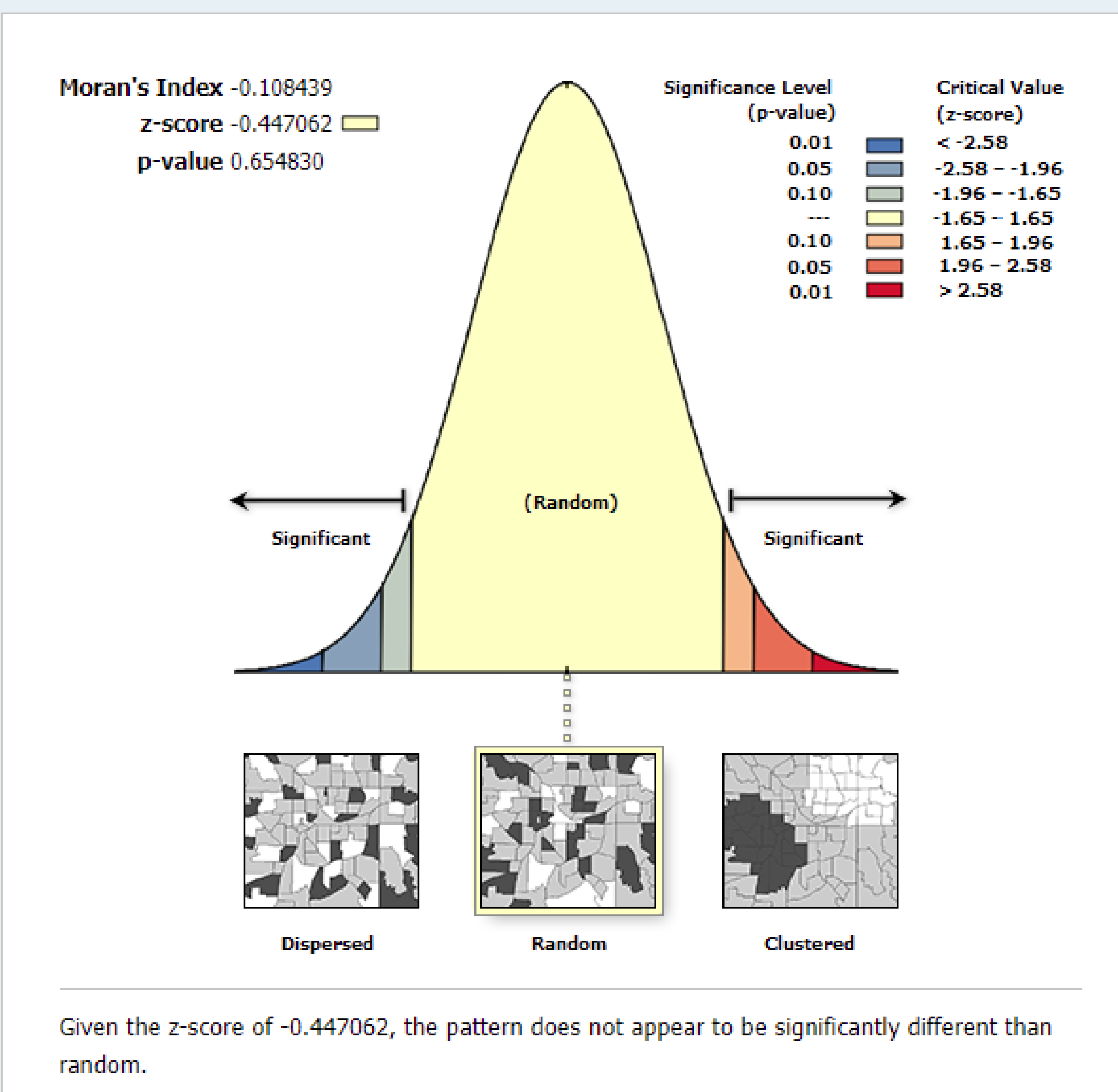
## Analyzing Tagged Fish Data



- Rutgers Marine Field Station has implanted a total 72 acoustic tags in individual fish
- The Hydrophone Array detected 126 individual tags
- 12 were tags were from this project
- There was 41269 total detections, 3493 detections belong to the Rutgers Marine Field Station project

## Results

### Spatial Autocorrelation Report



### Global Moran's I Summary

<b>Moran's Index</b>	-0.108439
<b>Expected Index</b>	-0.083333
<b>Variance</b>	0.003154
<b>z-score</b>	-0.447062
<b>p-value</b>	0.654830

Fig. 2 ArcGIS Pro Spatial Statistical analysis of Detections in the Hydrophone Array

## Discussion

- Fig 1. displays a hotspot analysis of detections by inlet
- Spatial Analysis shows that there is a random pattern in fish movement and estuary use
- The frequency of passage and use in one estuary does not effect the amount of passage in neighboring estuaries
- This is the first step in a 5 year project
- Tag detections from gliders are still being compiled
- Data was used in compliance with ACT\_MATOS database User Agreement and Data Policy Version 1.2