



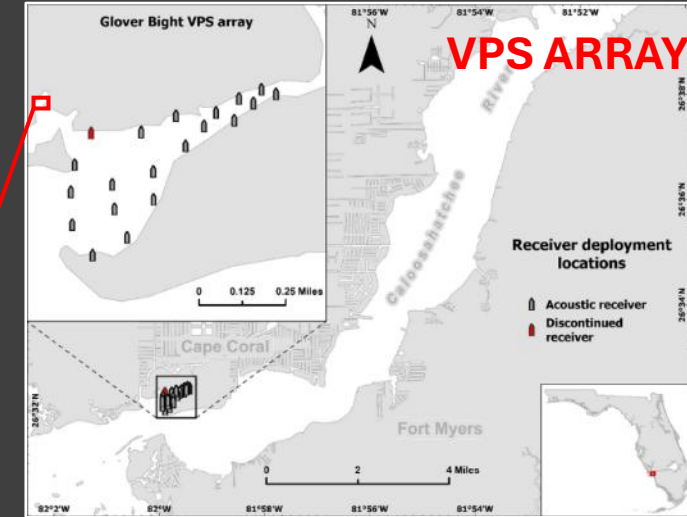
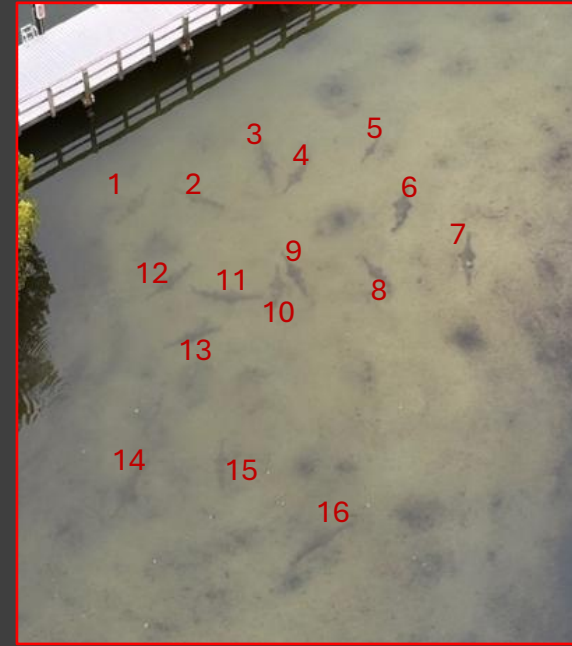
Space Use of Juvenile Smalltooth Sawfish in a High-Use Portion of Critical Habitat

Brian Moe, Andrew Wooley, Lukas Heath, Dylan Yakich, and Gregg Poulakis



The Glover Bight System

- A historical **HOTSPOT**
 - One of few remaining mangrove lined shores in lower Caloosahatchee
- Serves as a **nursery for sawfish and bull sharks**
 - primarily the creek
- Provides a **thermal refuge**
 - Large numbers across entire juvenile length range present during extreme cold snaps
- 18 receiver VPS array

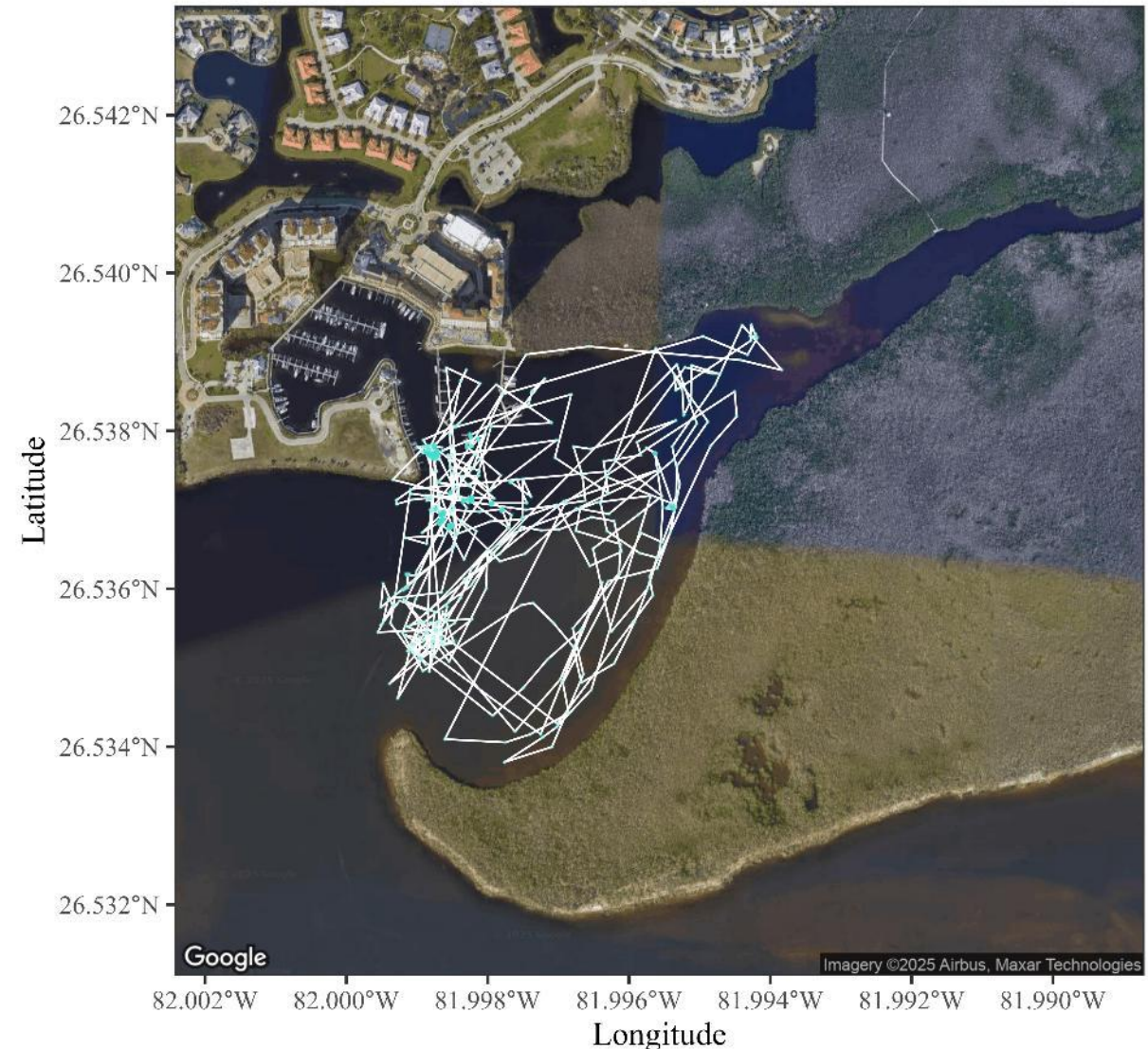


CTCRW Movement Process Model

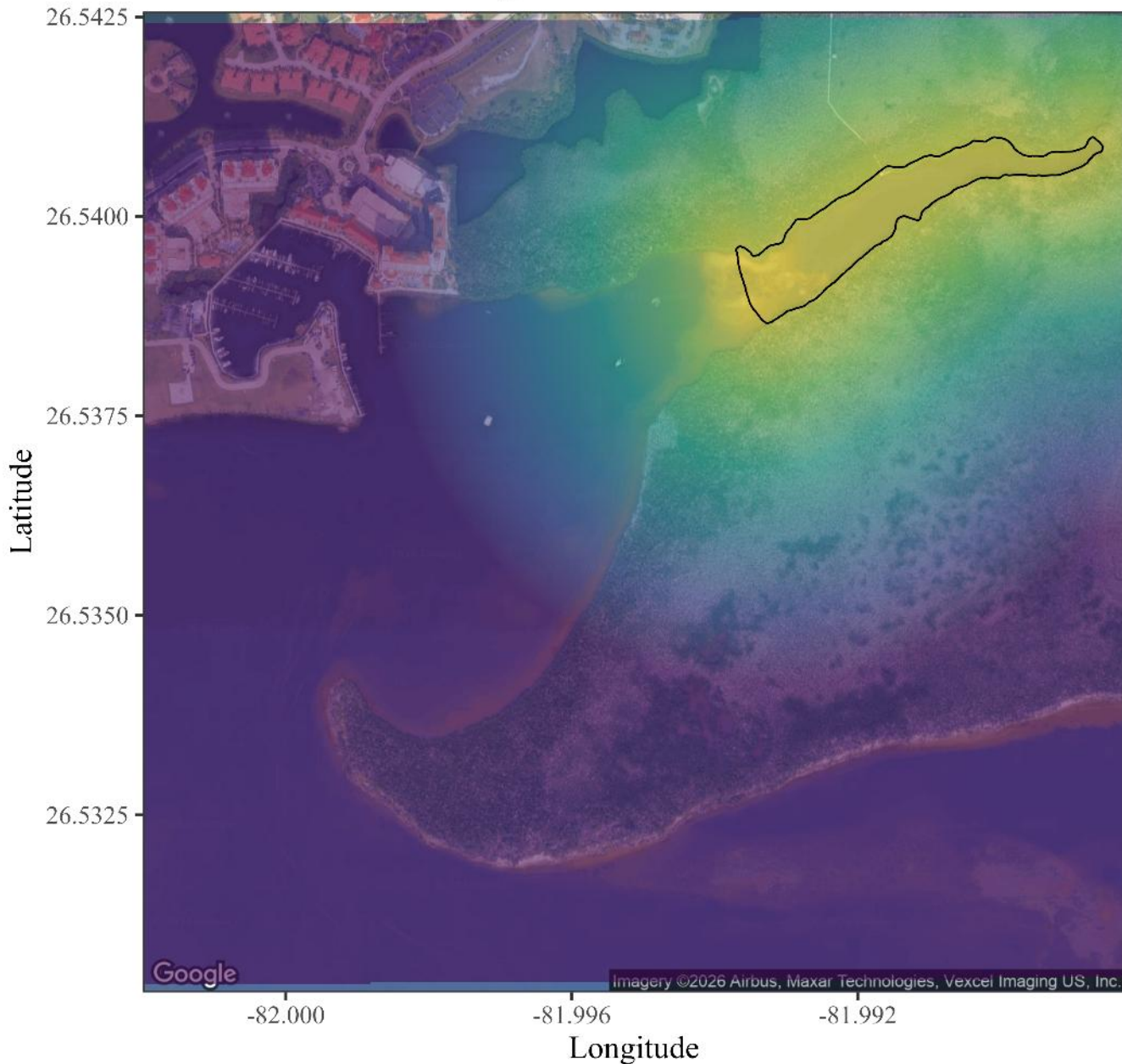
- ~ 32,000 positional estimates across 19 individuals
- Bayesian State Space model using a **continuous time correlated random walk**
 - Describes **HOW** an animal moves through time
 - Movement dependent on latent **velocity** states
 - Velocity is **autocorrelated** through time
 - Operates in continuous time
 - Allows for irregular intervals between consecutive positional estimates

Path of Sawfish 60308

Catch Date: 3/8/2022; 2222mm female



Refuge Gradient Potential



Environmental Covariates

- Covariates as **forces acting on velocity**
- Integrated as x/y **gradient maps**
 - **Behavioral thermoregulation** - restorative force
 - **Depth preference** – ontogenetic shift
 - **Refuge attraction** – shift in preference for Glover Bight Creek related to body length

Bull Shark Predation in Glover Bight

- Bite marks observed on sawfish often made by comparably sized or smaller bulls



Location of
initial catch



X = recapture

ONE
WEEK
LATER...



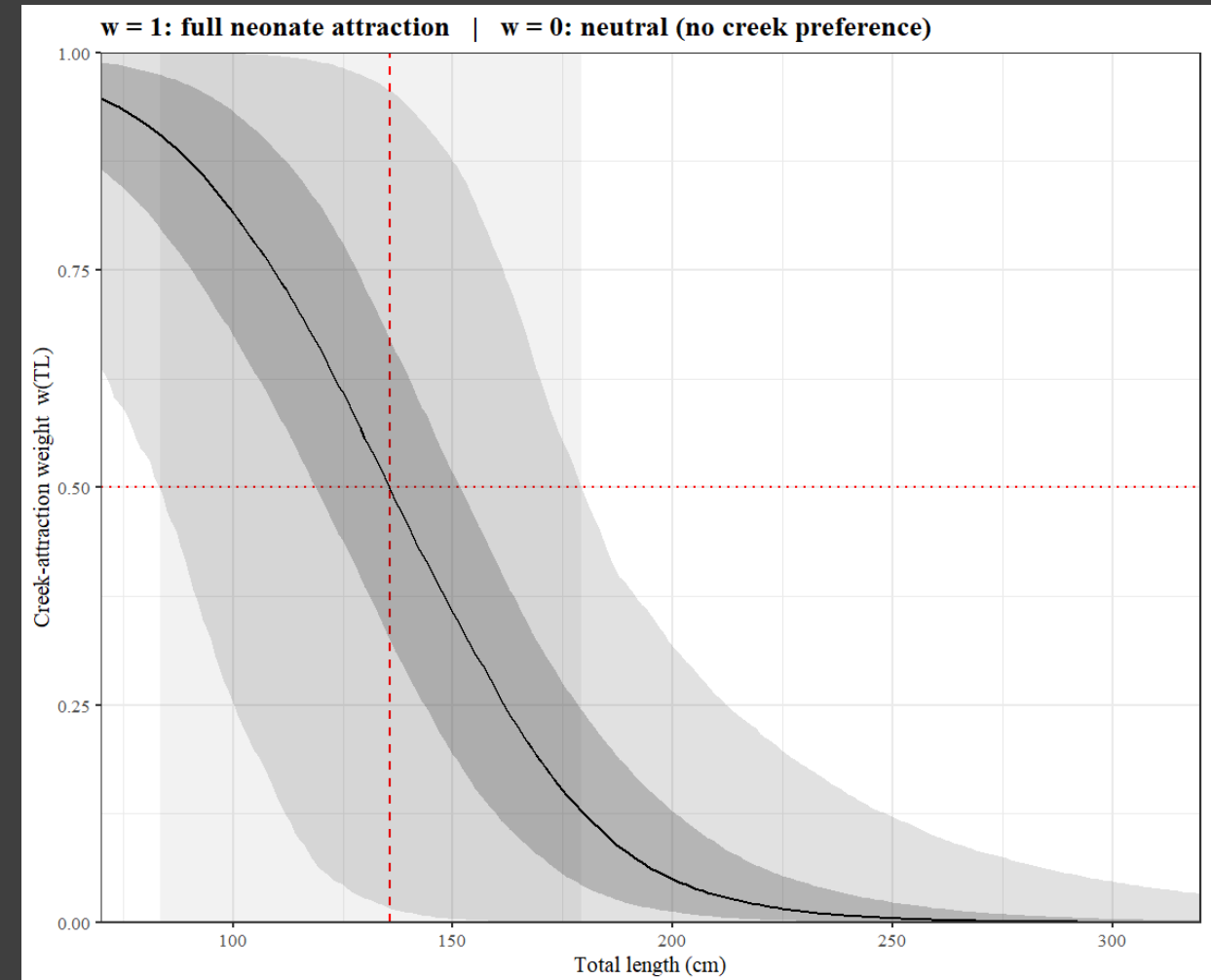
Glover Bight Creek

- Serves as a **predation** refuge for small sawfish
 - particularly yoy and age 1
- Largest bull sharks ~ 140 cm
 - Most are 80 – 120 cm
- Model Identifies **critical body length** where a shift in refuge use occurs
 - A logistic relationship

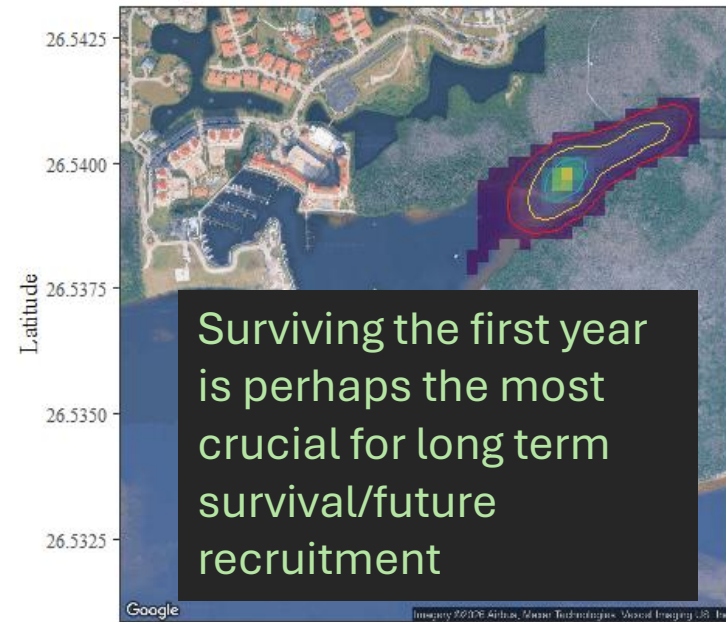


Predation Refuge Shift

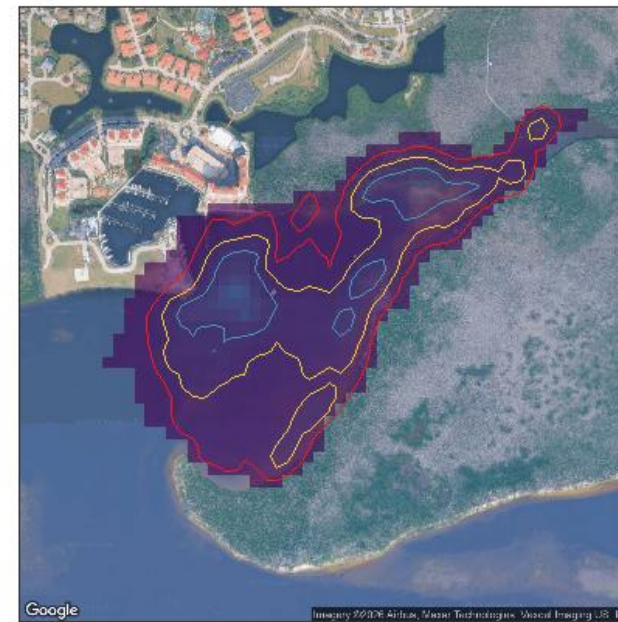
- Transition away from creek attraction at 135 cm (± 24.2)
 - 95% CI: 95.4 – 173.0 cm
- Sized out of most common predation risk by **age 1**
- **Still use creek**, but no longer specifically drawn towards it



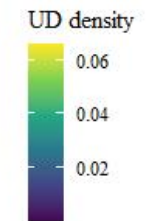
Young-of-Year



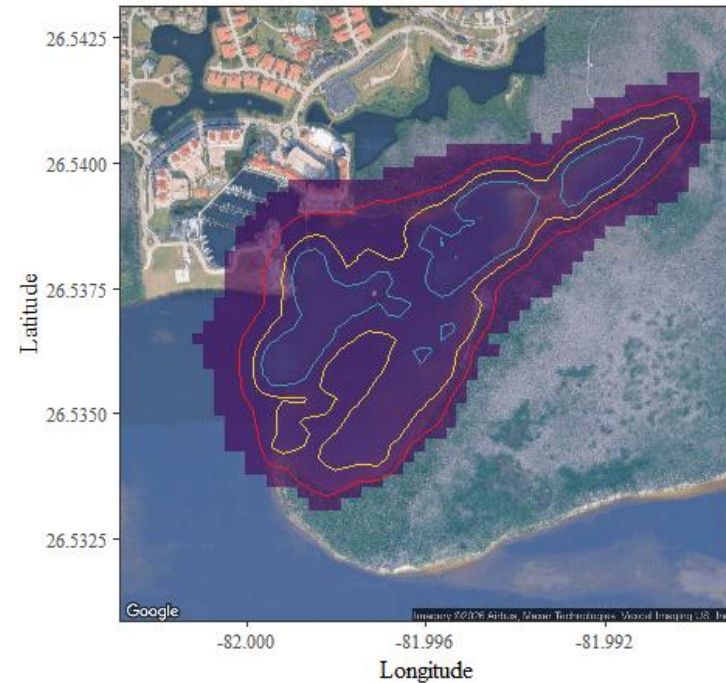
Age 1



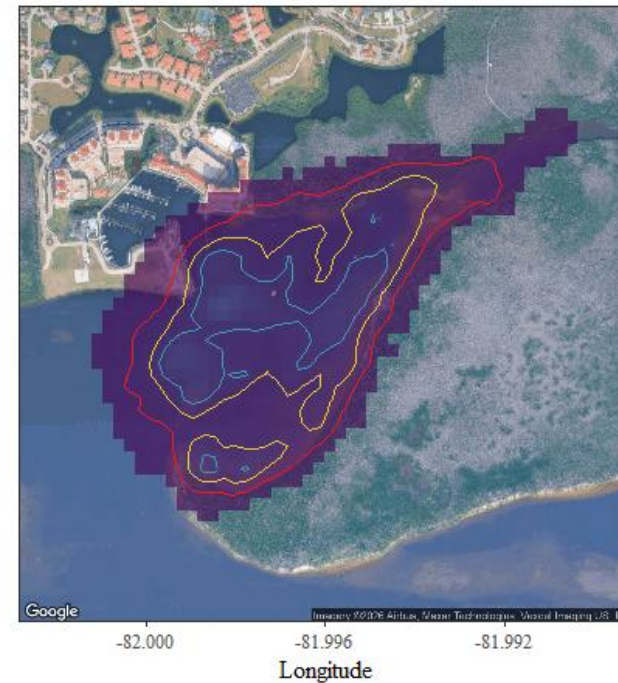
Age 2



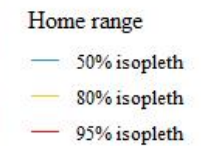
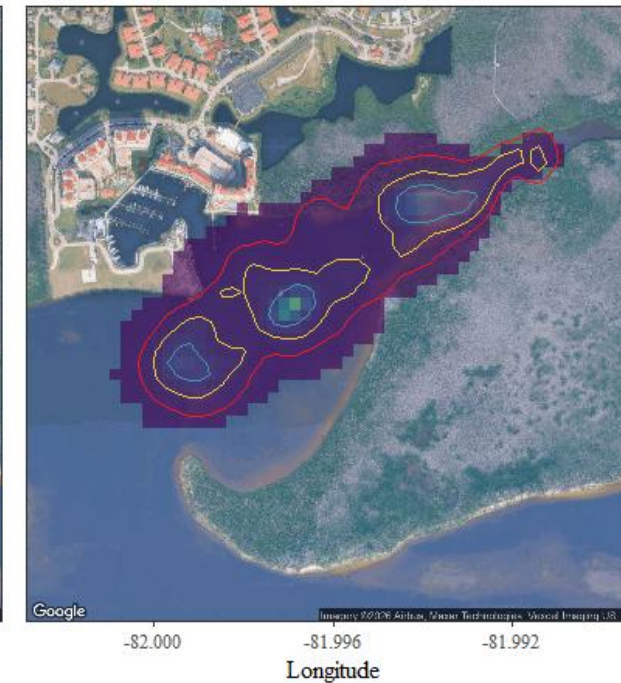
Age 3



Age 4



Age 5



THANK YOU SYMPOSIUM SPONSORS!



**Shark
Conservation
Fund**



SSM CTCRW

GitHub: Brian-J-Moe

All activities performed under
authorization and guidance of
NOAA Fisheries Emergency Section 7
Consultation
#SERO-2024-00402

and

ESA Section 10 permits
to Gregg Poulakis,
Tonya Wiley, John
Carlson, and Colin
Simpfendorfer

