

Common Snook Use of Thermal Refugia along the Nature Coast: Implications for Minimum Flows and Levels

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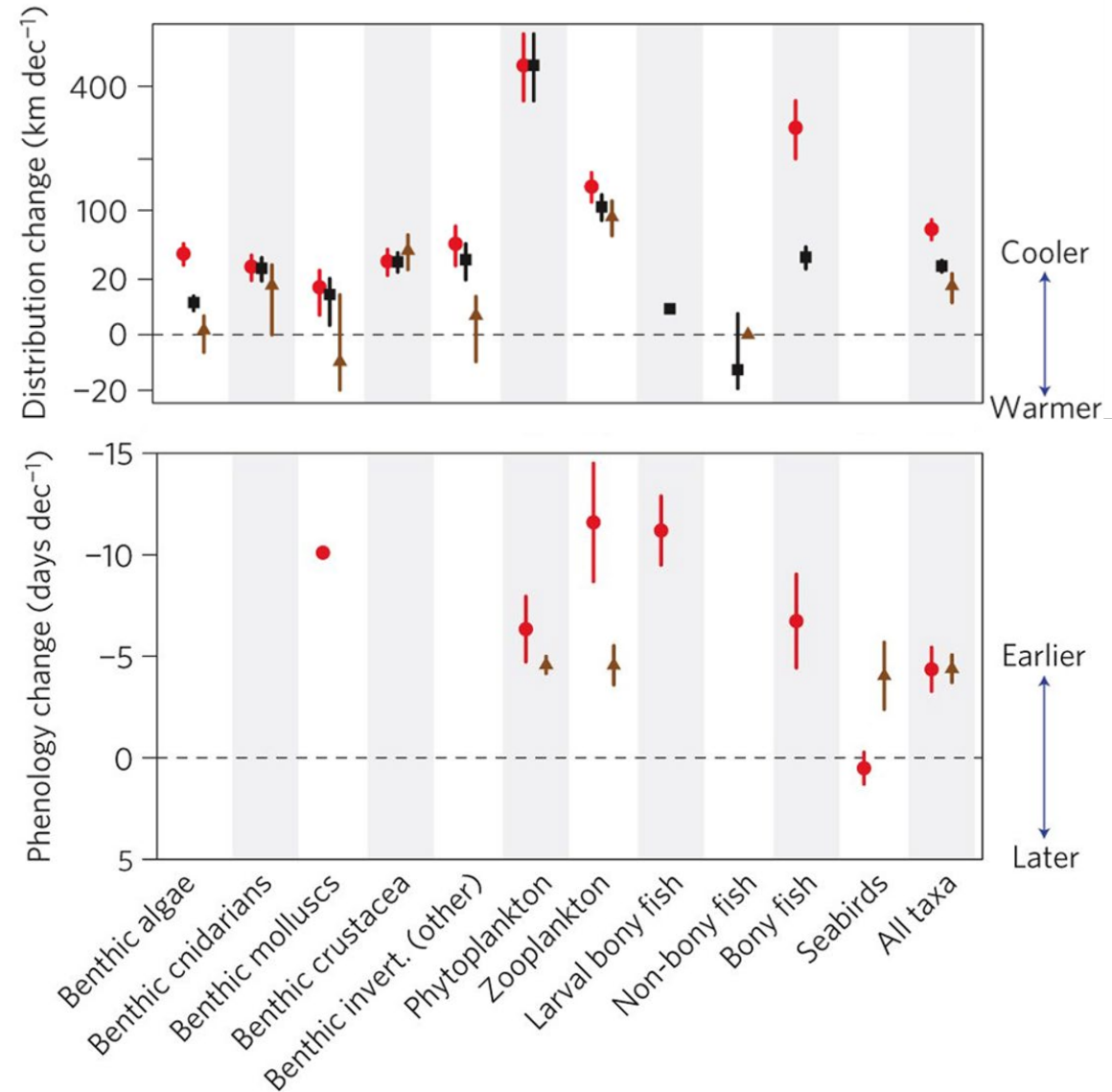
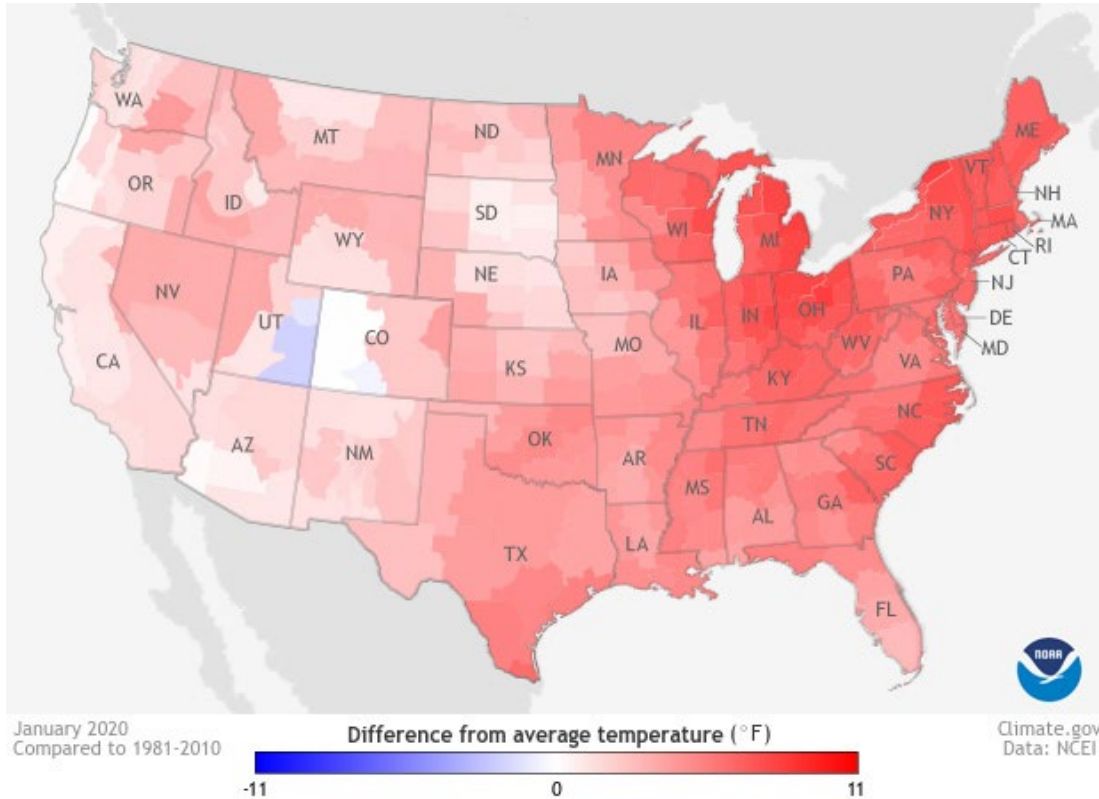
Eric Latimer
Duke Energy

Funding:

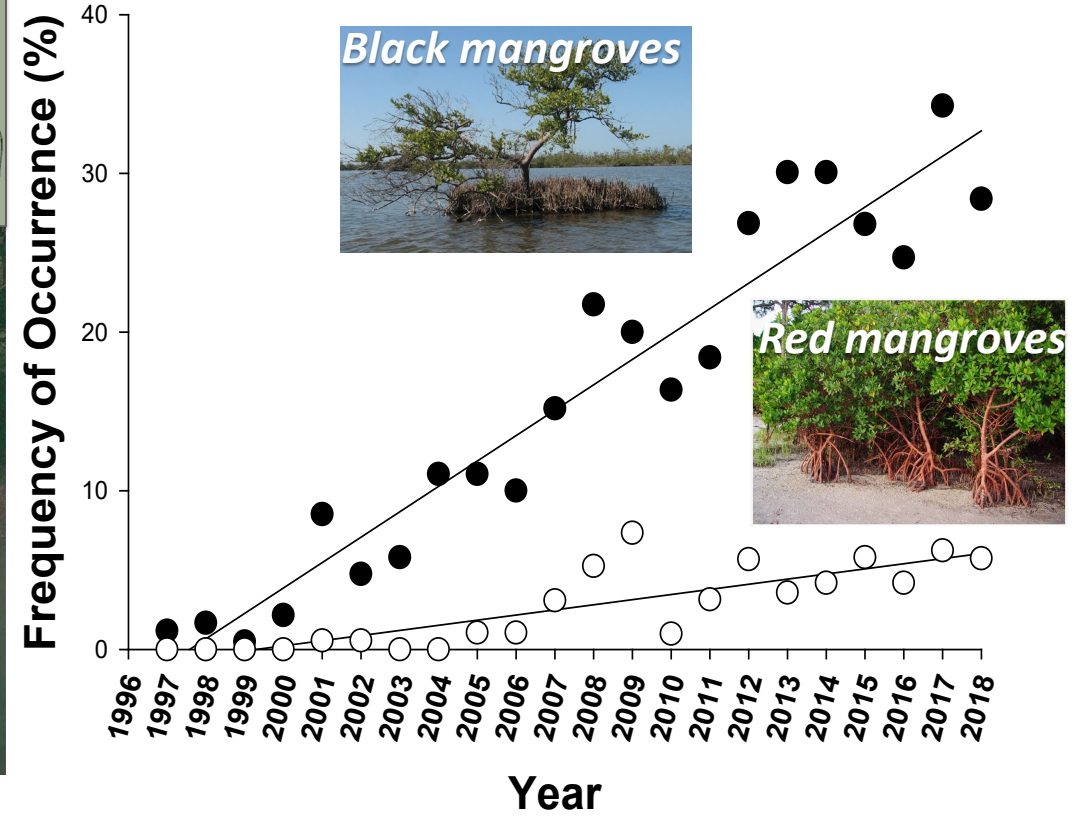
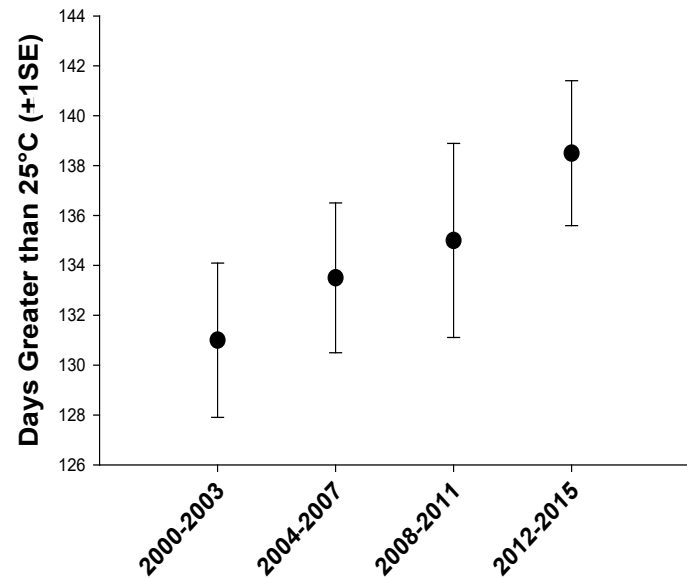
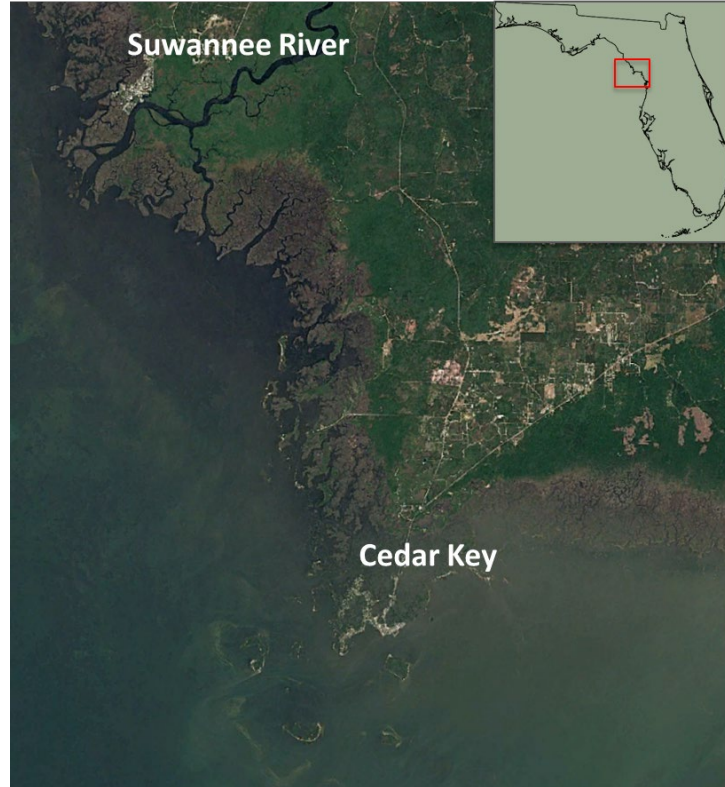
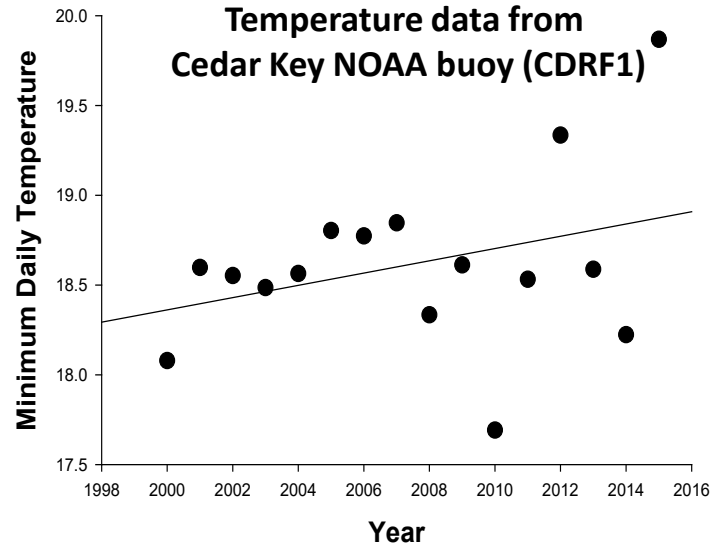


A Warming Climate is Driving Species Distribution Changes

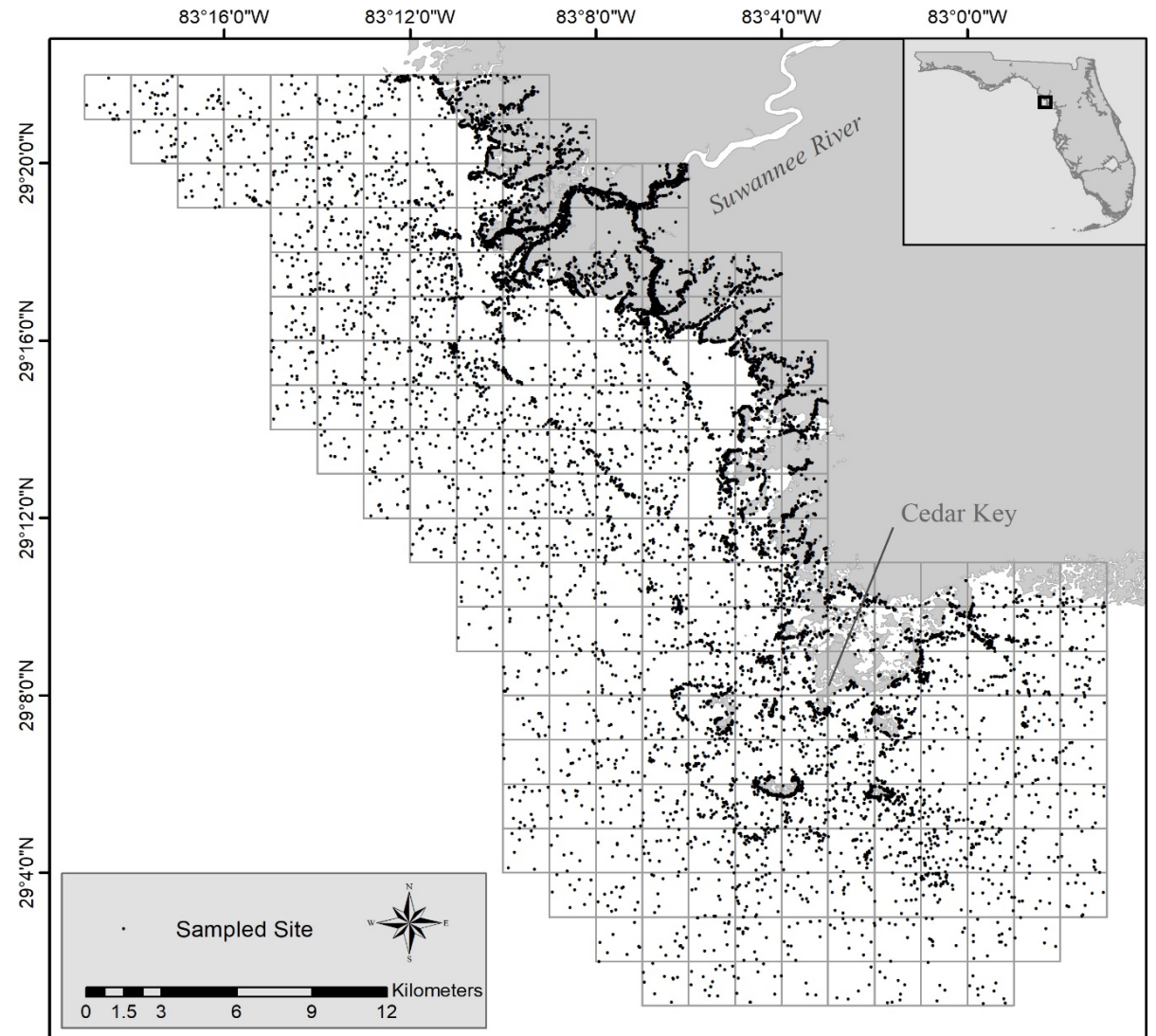
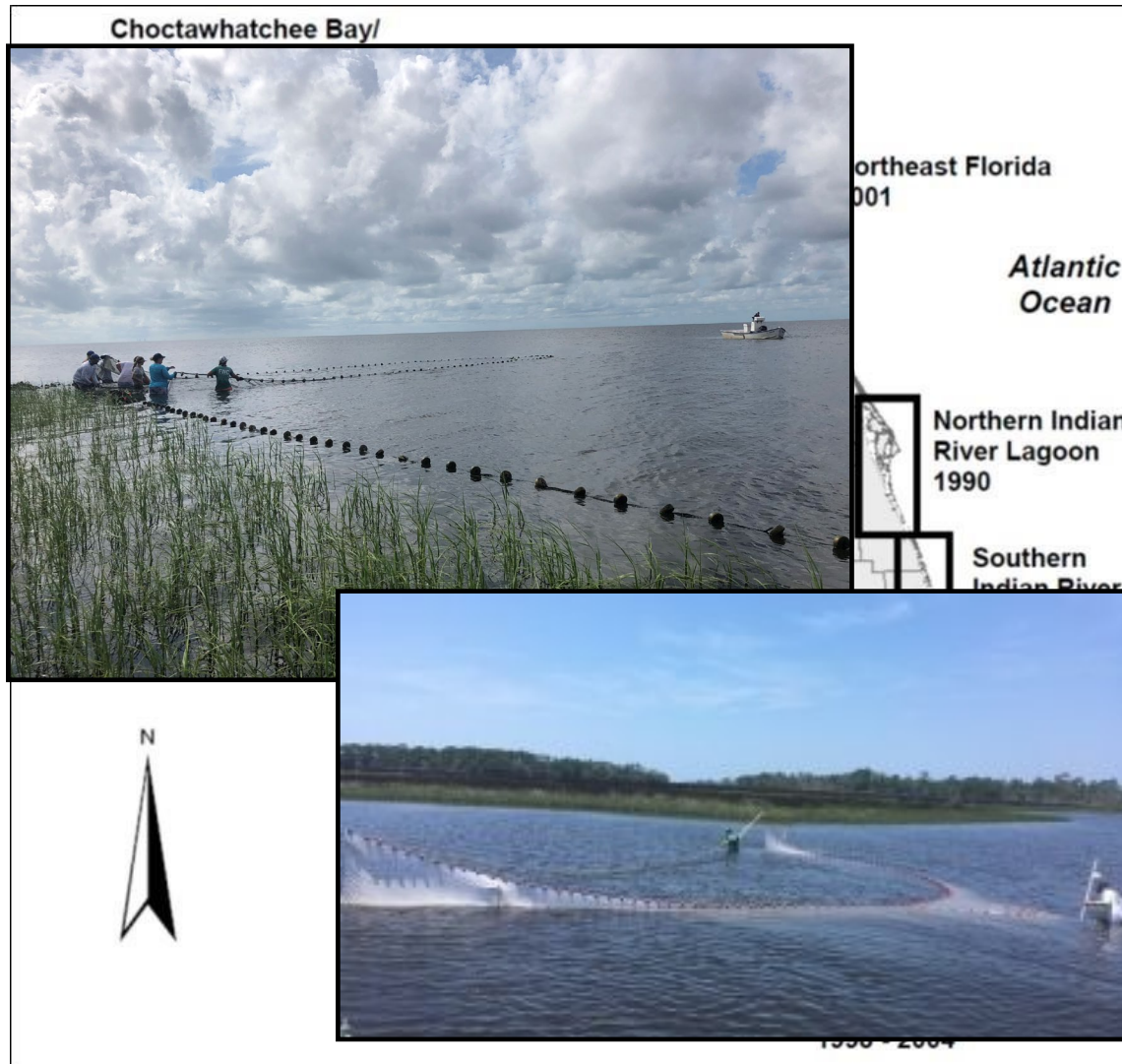
- Marine species are shifting poleward (Poloczanska et al. 2013)
 - Leading edge is ~45 miles per decade
 - Phenology alterations



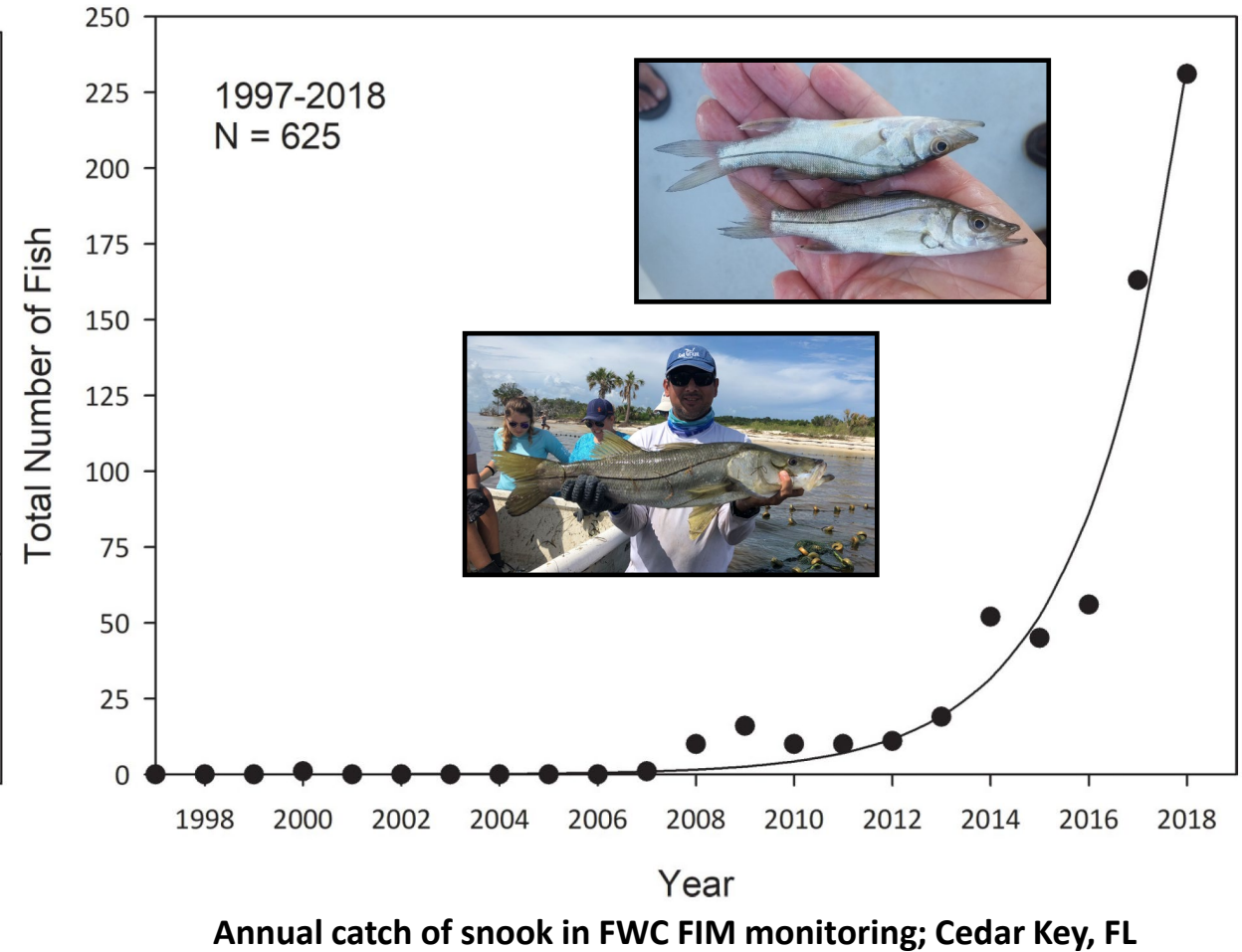
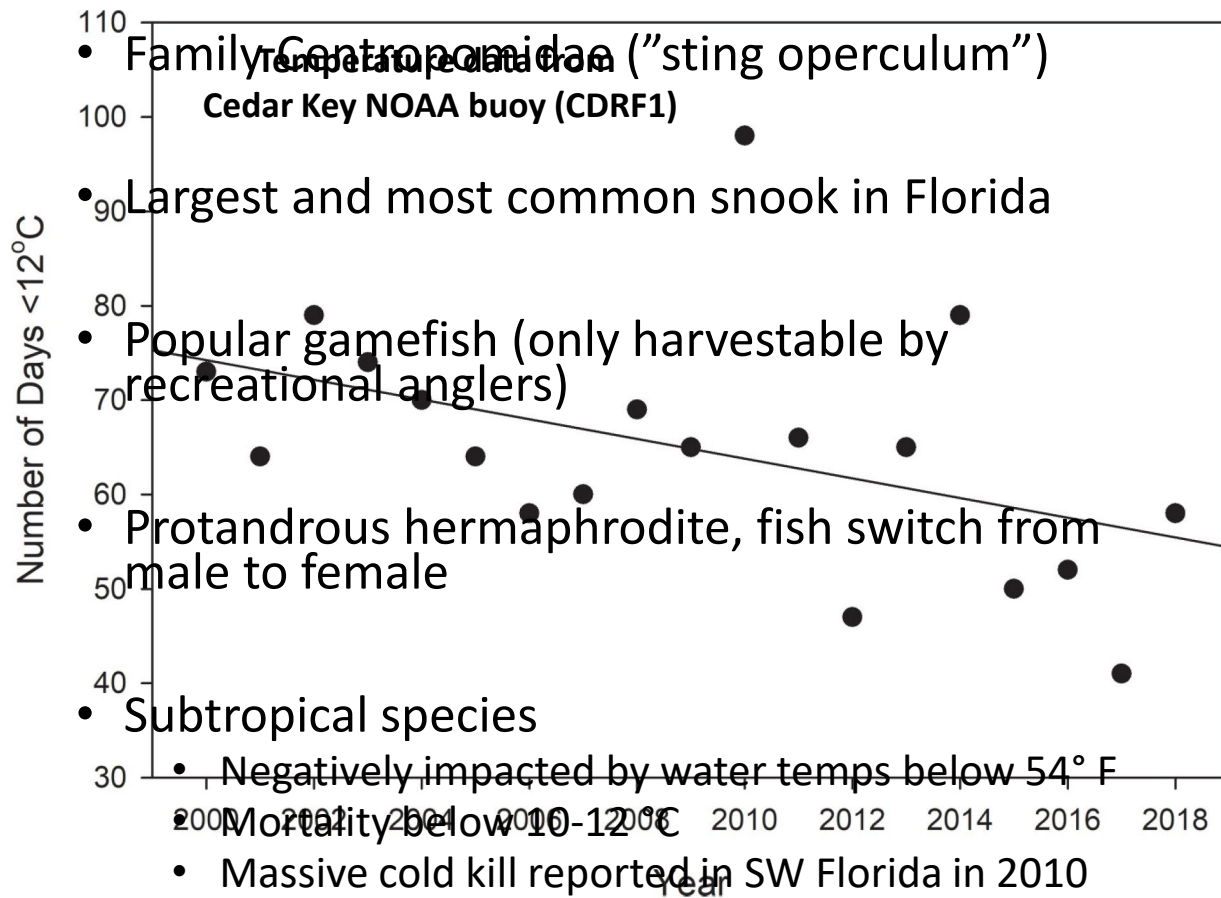
Effects of climate change can be seen locally!



Monitoring is key to identifying changes



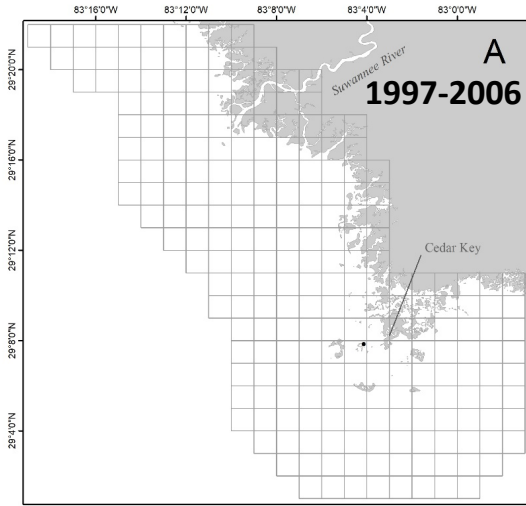
Increasing Temperatures and Common Snook Expansion on Florida's Gulf Coast



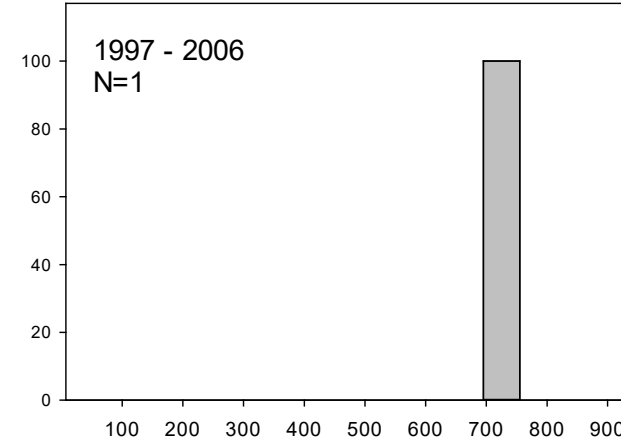
Purtlebaugh CH, CW Martin, and MS Allen. 2020. Poleward expansion of common snook *Centropomus undecimalis* in the northeastern Gulf of Mexico and future research needs. *PLoS ONE*, 15(6), p.e0234083.

Chronology of Common Snook Range Expansion

Spatial Expansion

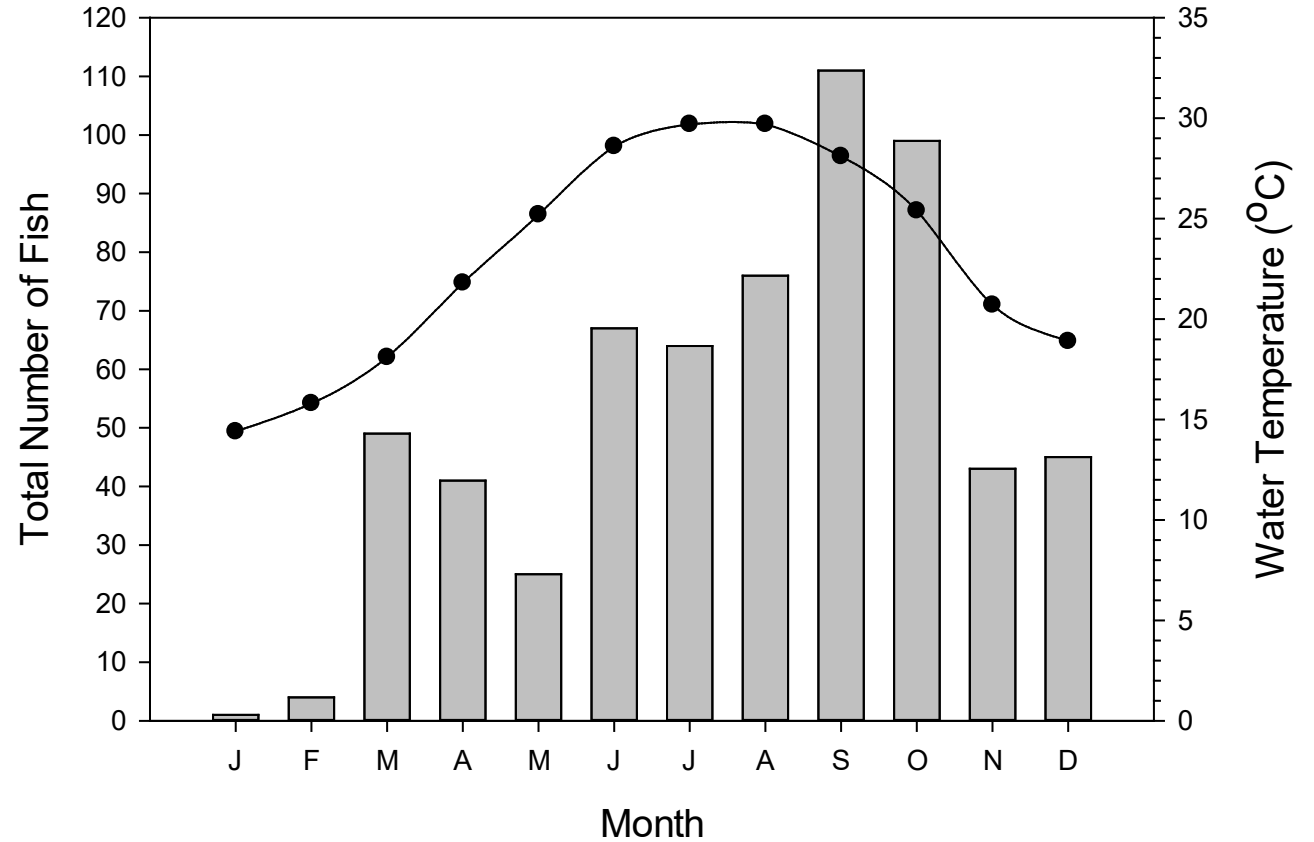
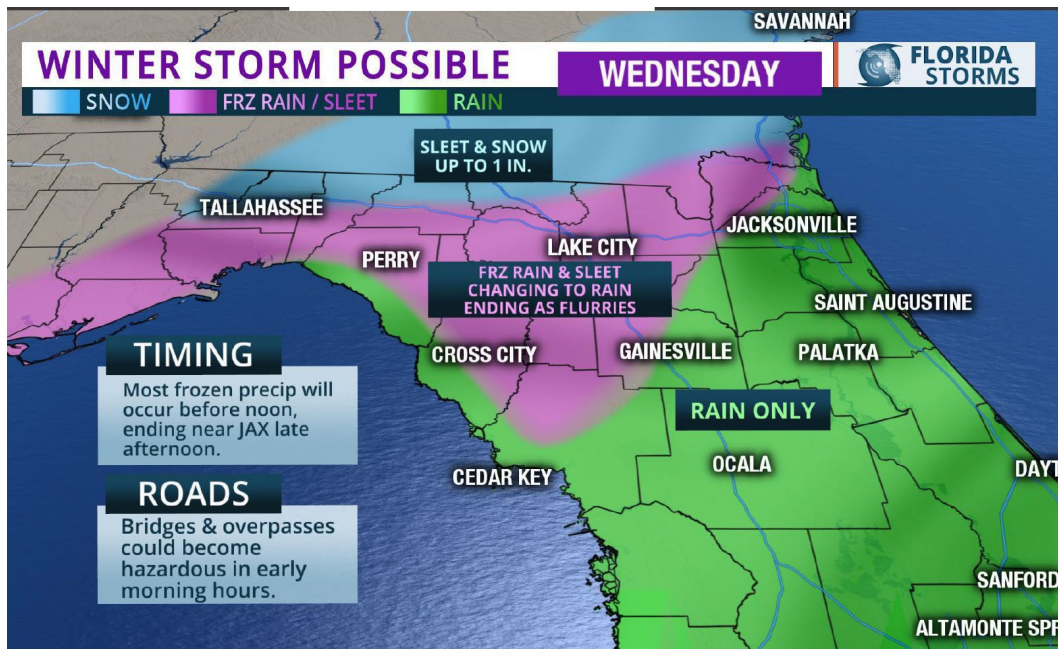


Size Frequency



Snook Seasonal Occurrence in Cedar Key, FL

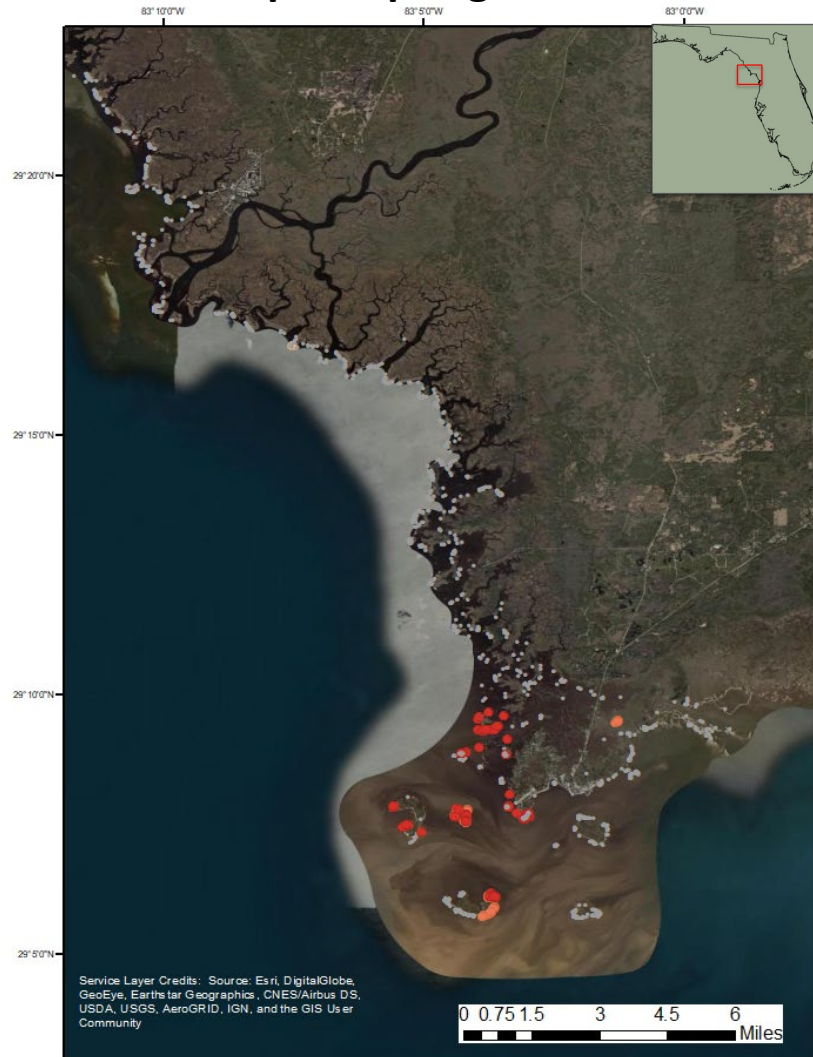
It still gets cold here...



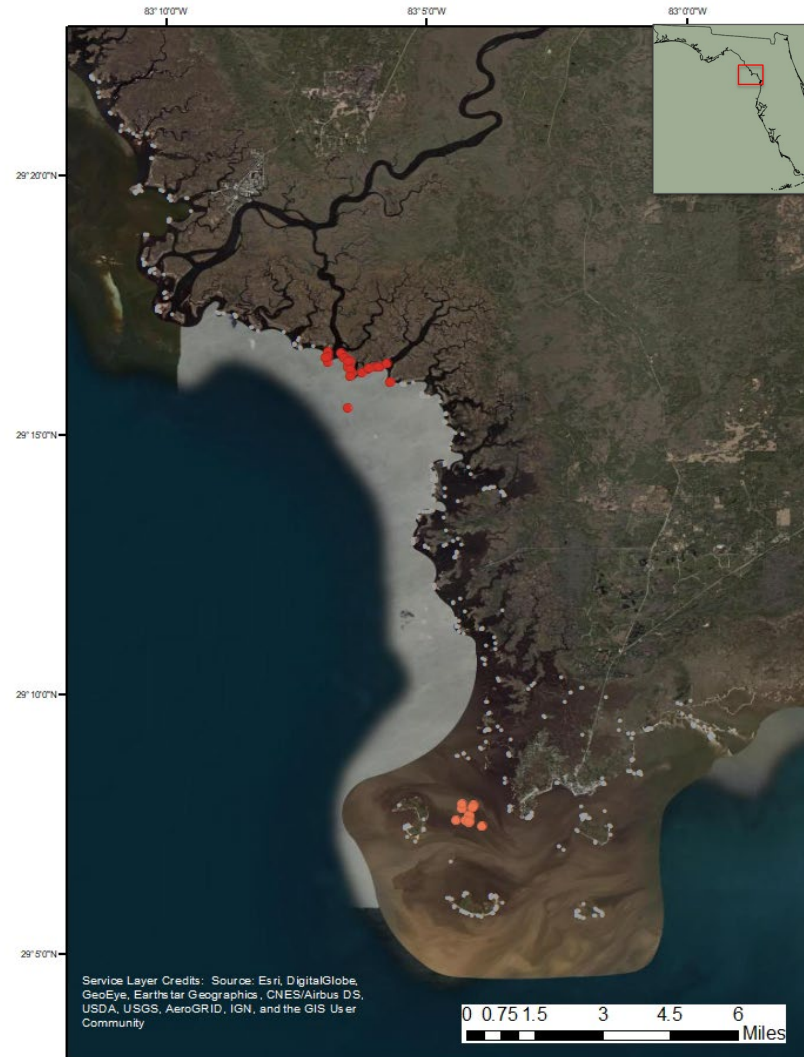
...Cedar Key catches decline in winter

Snook Seasonal Occurrence in Cedar Key, FL

Snook Hotspots Spring, Summer, and Fall

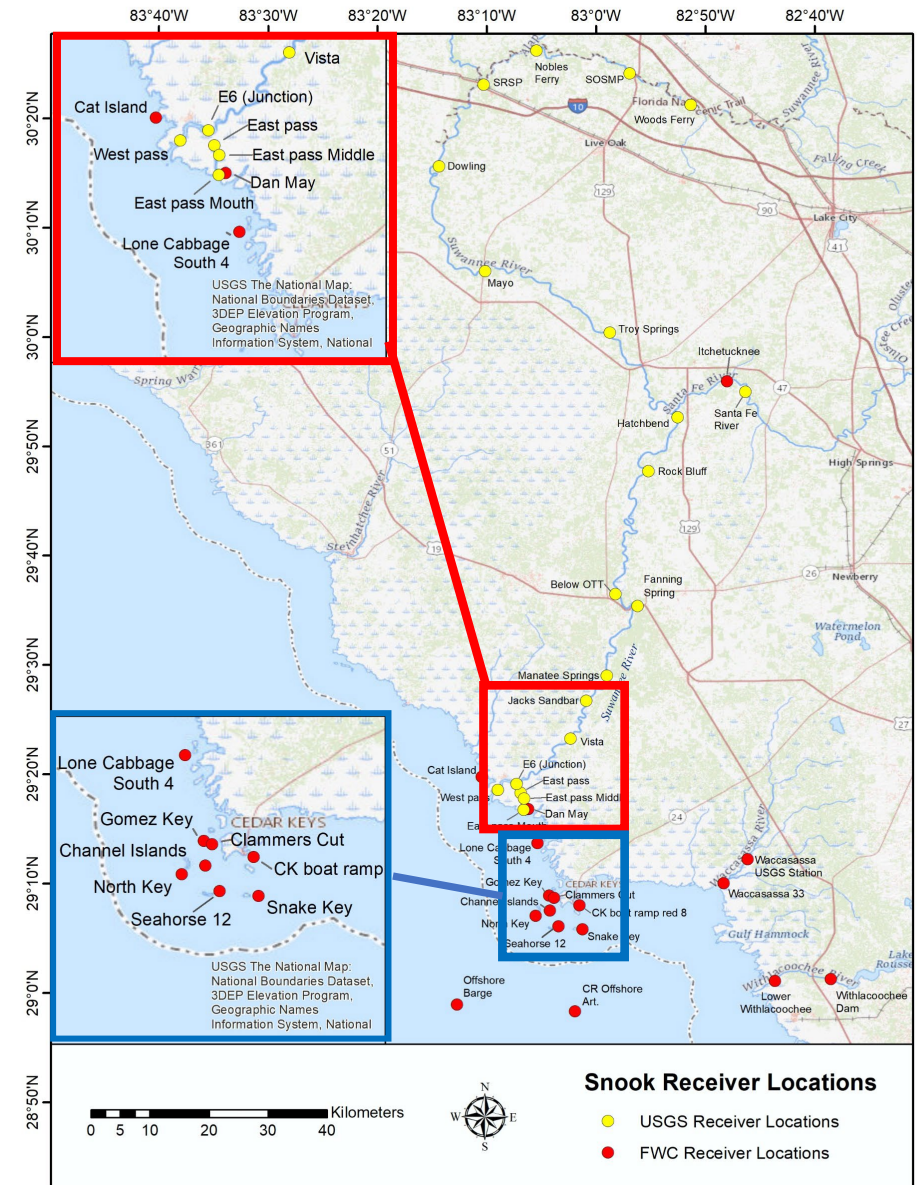


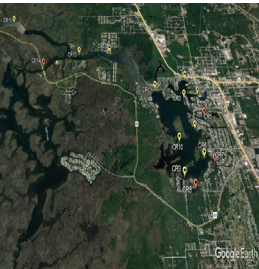
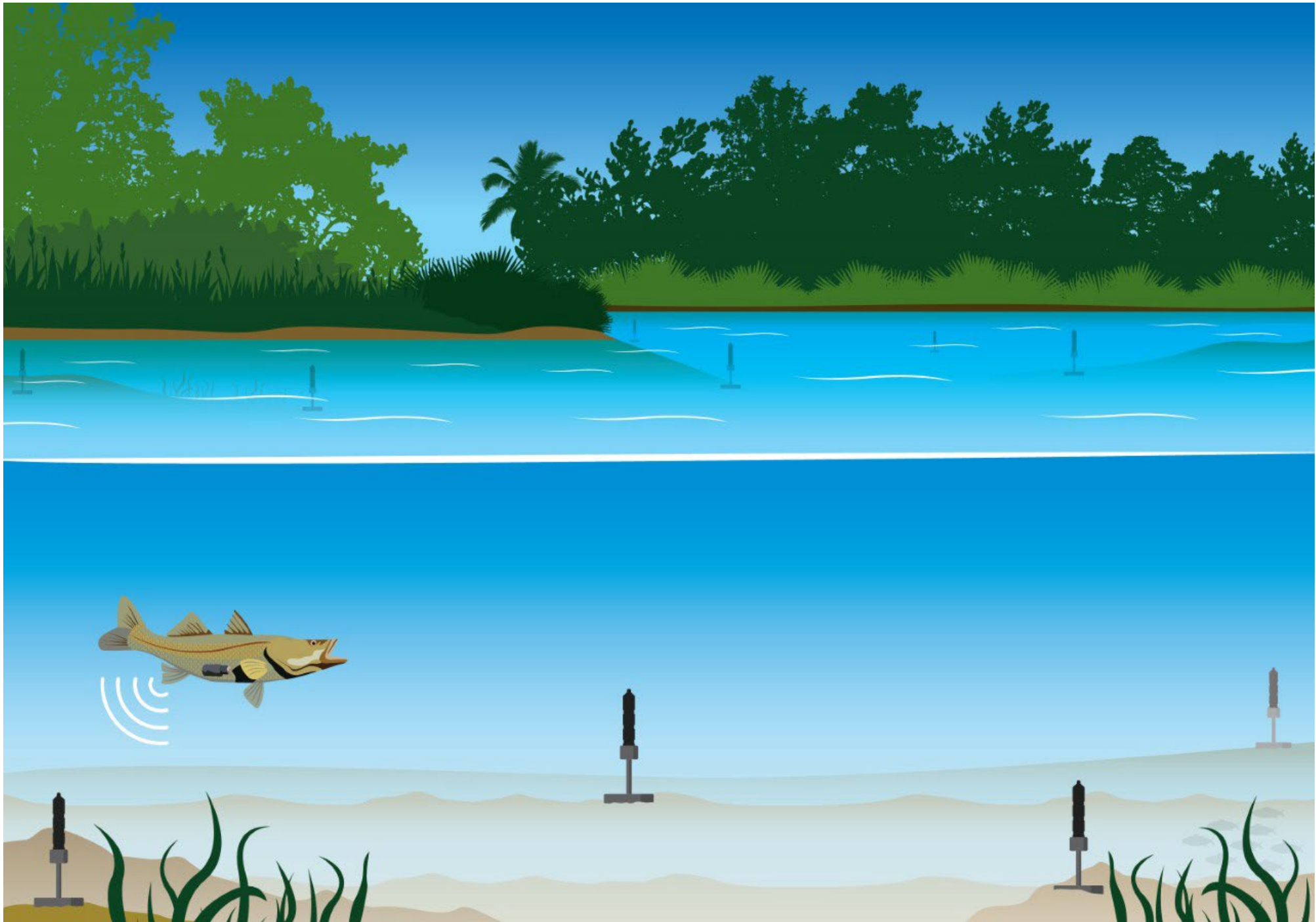
Snook Hotspots Winter



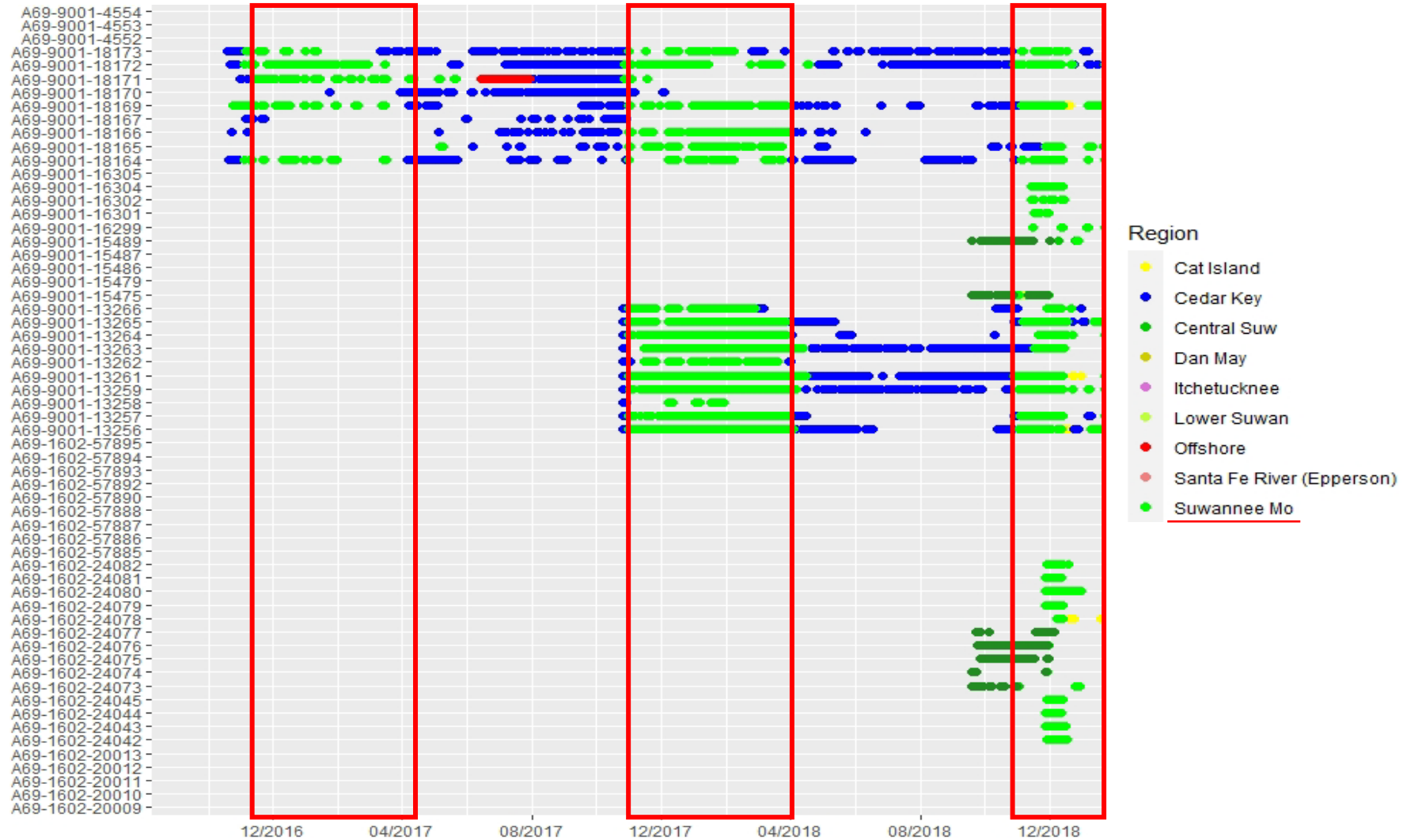
Snook Telemetry in Cedar Key, FL

- **19** Vemco VR2Tx deployed in the Cedar Key region (red dots)
- **20** USGS receivers within the Suwannee River (yellow dots)
- **144** snook tagged since 2016 throughout the region





Snook Movement in Cedar Key, FL



Snook in the Suwannee: thermal refuge?

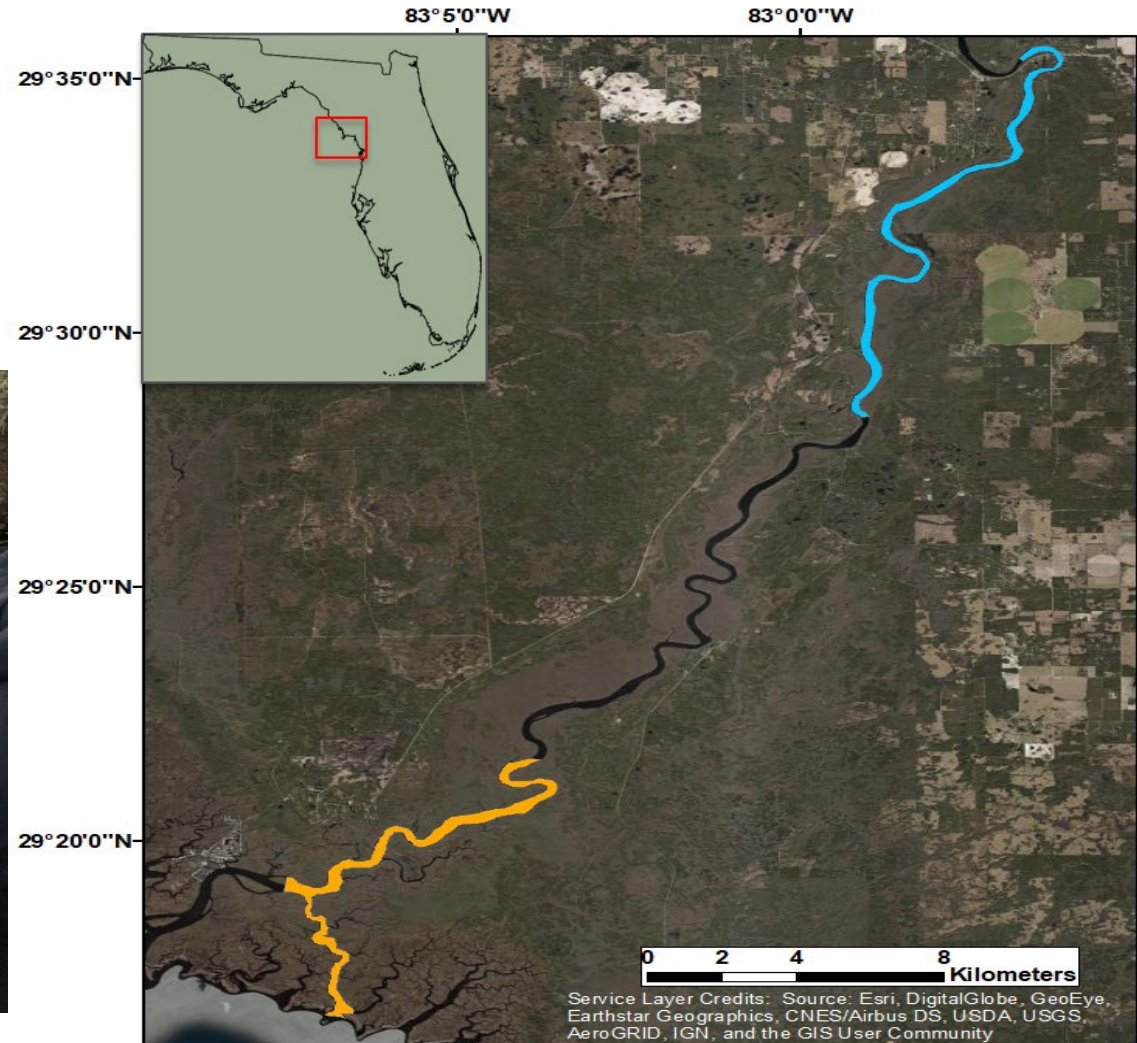


Suwannee Springs Telemetry

- Two ~13-mile river sections
 - River mouth (orange)
 - Springs (blue)
- Tagged 42 snook 2020-2022 (21 per river section)



Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Groundwater is at risk ...

- Municipal
- Agriculture
- Climate patterns
- Land use changes
- Other factors

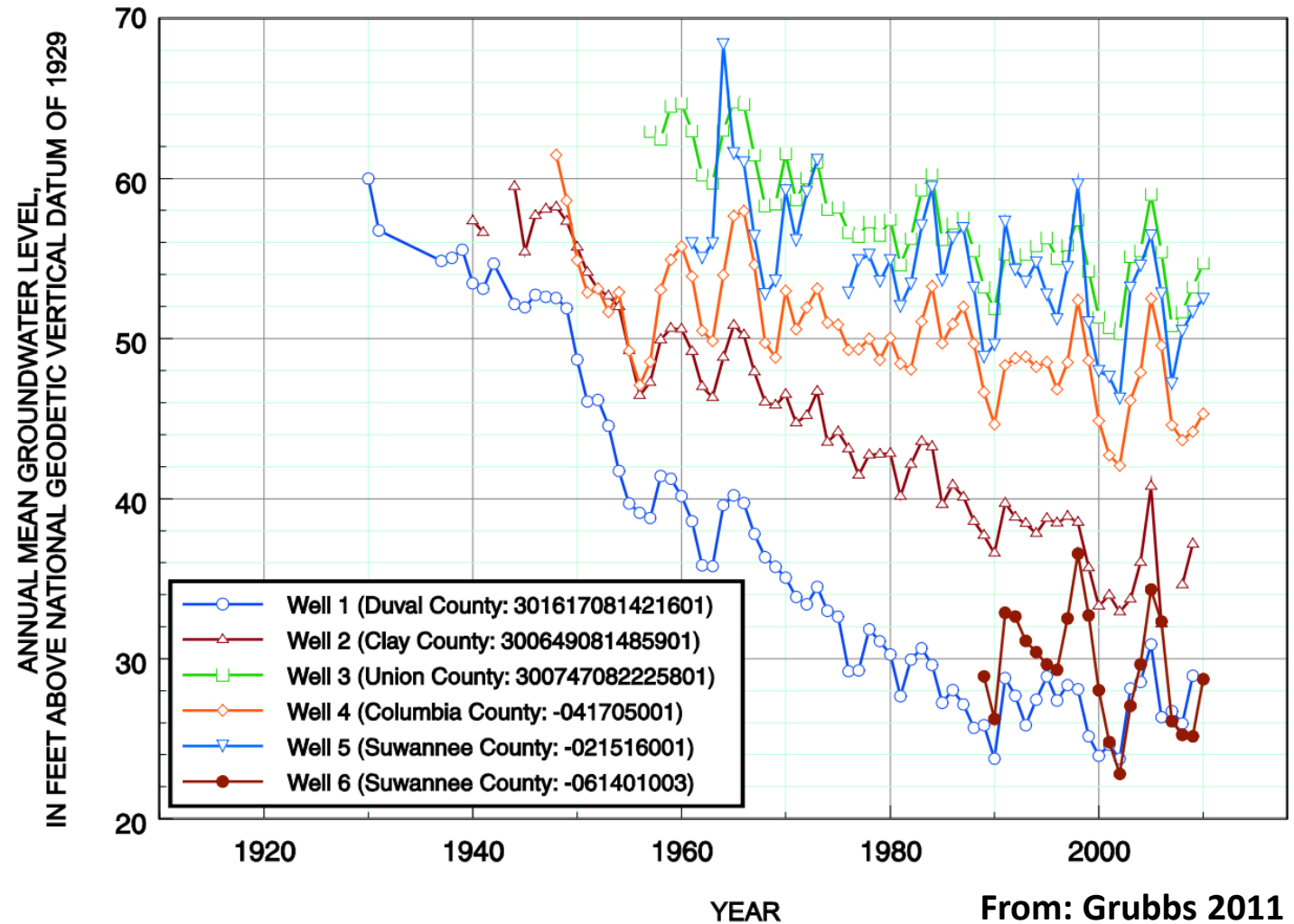
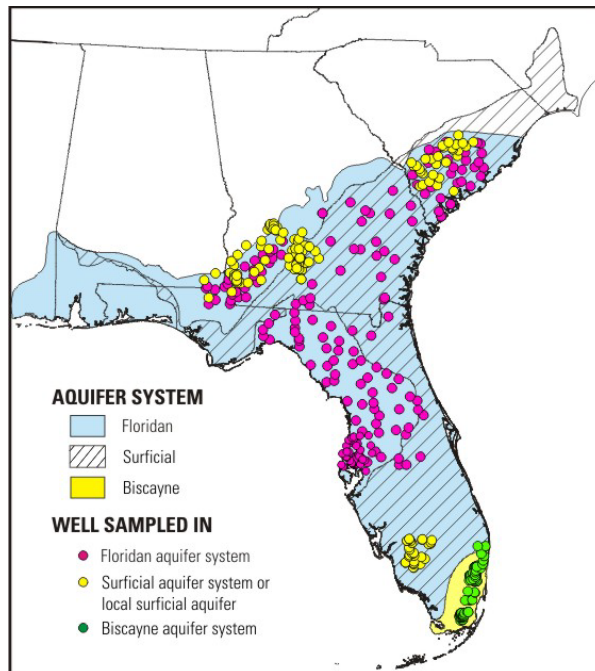
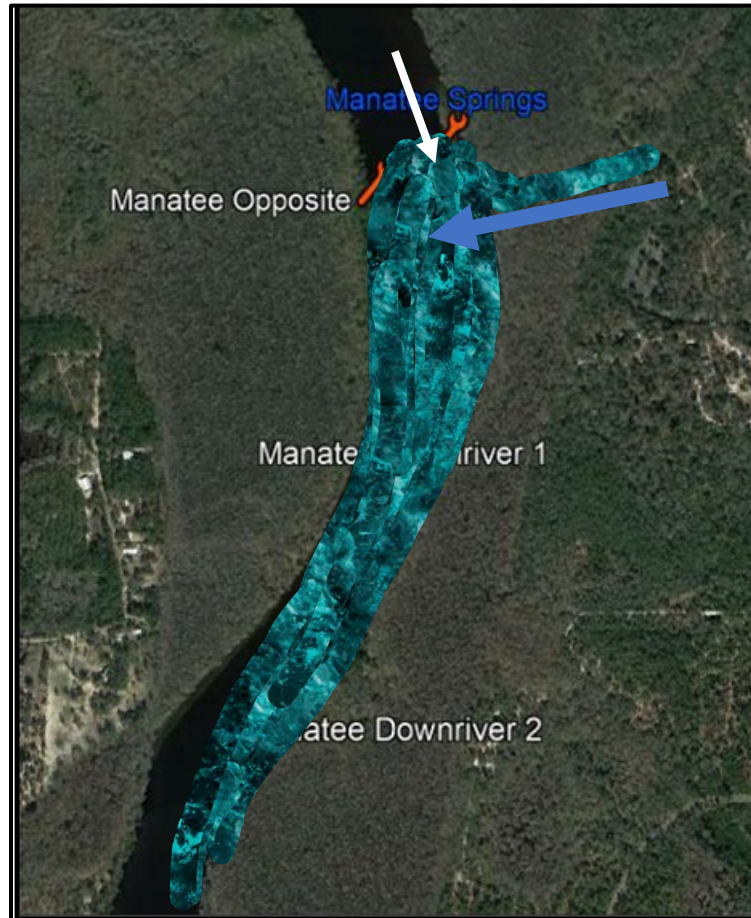


Figure 4. Time-series of groundwater levels from selected wells in northern peninsular Florida.

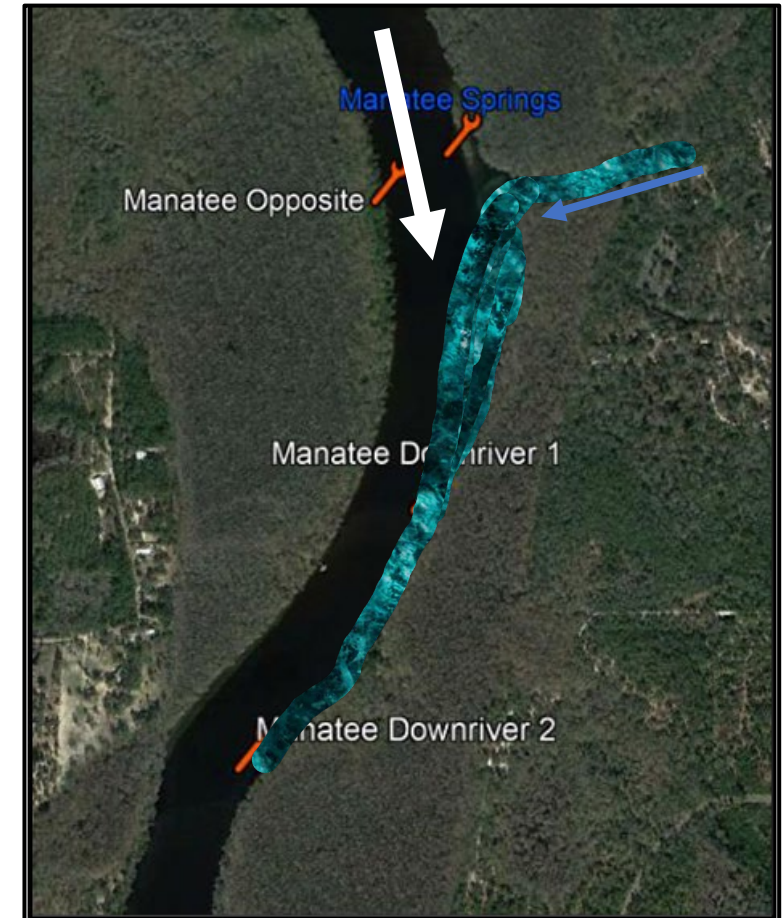
Thermal Refuge as Potential Snook Habitat

- Springs plume range influenced by multiple hydrogeologic factors
- More spatial coverage of plume, more space for overwintering snook seeking refuge during lethal temperature periods

Normal/Low River + High Springs Discharge



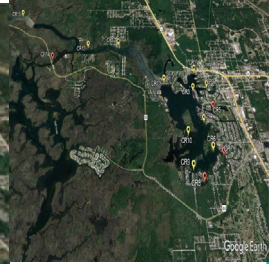
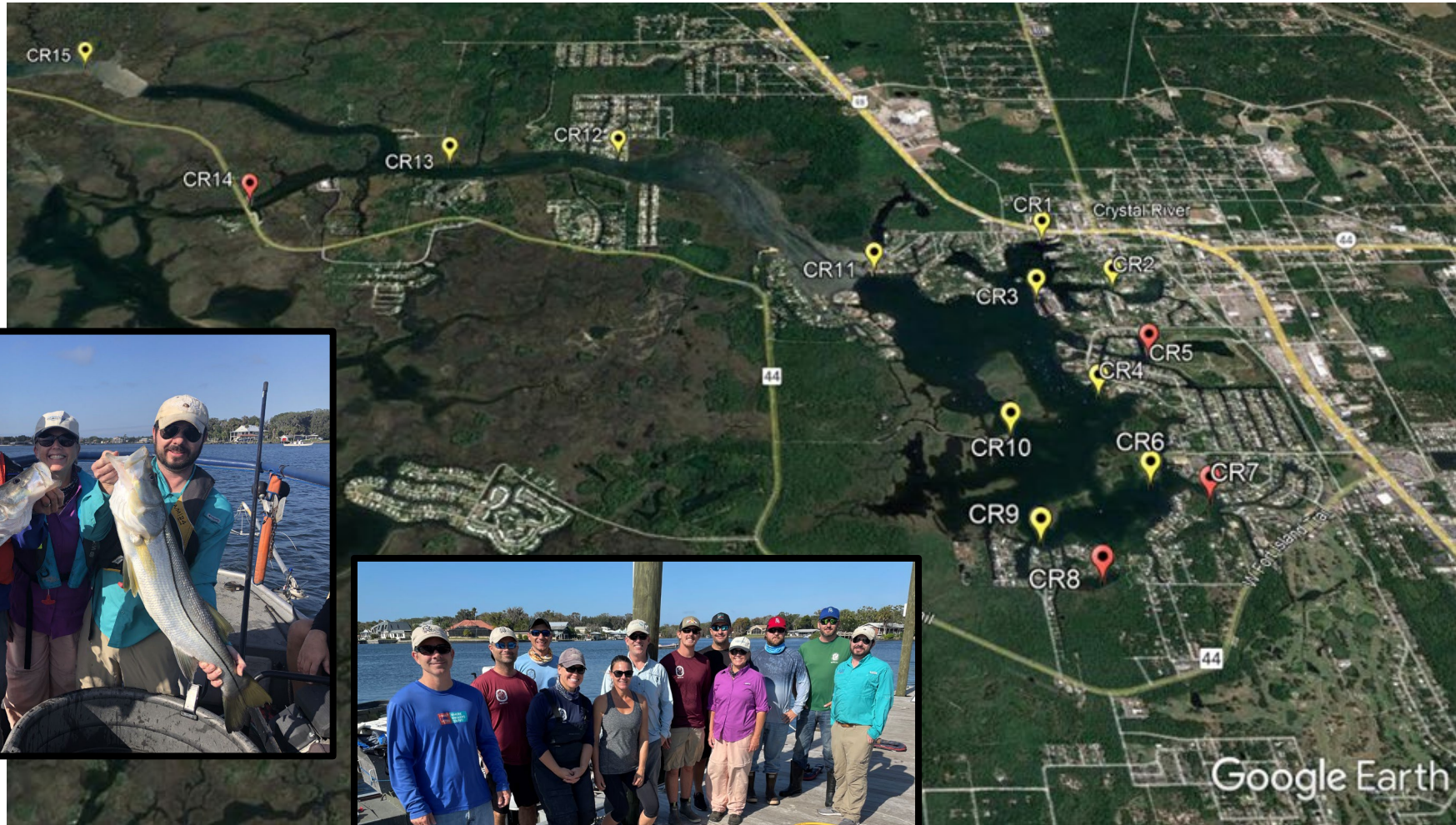
High River + Low Springs Discharge



Duke Energy Industrial Canal



Crystal River/Kings Bay Telemetry



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Klimek, Alexis Trotter, Phil
Stevens, Kyle Williams**
Florida Fish and Wildlife
Conservation Commission

Kym Holzwart
Southwest Florida Water
Management District



Final Thoughts

- Snook rapidly expanding their range northward
- Sustainable population may be dependent on thermal refuge provided by groundwater
 - Thermal refuge habitat is vulnerable



St. Theresa, Florida



Choctawhatchee, Florida



Wolf Bay, Alabama



Grand Isle, Louisiana

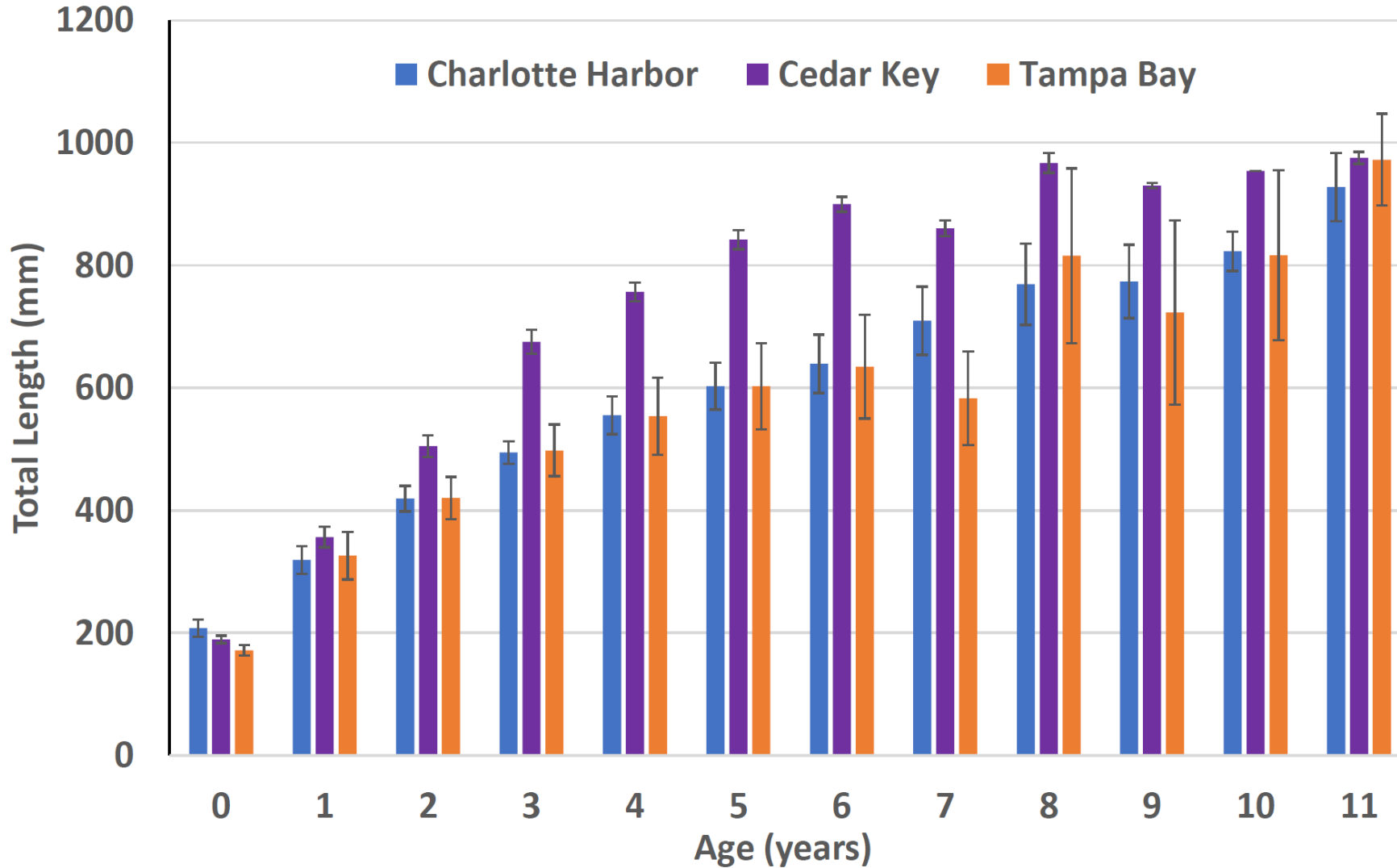
Questions?



Funding and collaborators:



Cedar Key Snook are Large!



Have Snook ever been in Cedar Key?

- Scoured area newspapers, museum records, popular and academic literature, and interviewed local archaeologists/journalists for records of snook
- Found **341** reports of snook north of Tarpon Springs – with **60%** from the last decade and **85%** from the last 30 years.



GENERAL
Area and statewide fishing is yet to come in our area. However, in areas to our south some kinds of fishing have peaked. This is probably true for bass and speck fishing on Lake Okeechobee, for example. Area fishing of all kinds can be counted on to improve — saltwater and freshwater alike. In the salt waters, kingfish and Spanish mackerel are presently edging north along our Gulf flank; the tarpon are sure to follow. In area fresh waters, specks and bass are either bedding or getting ready to bed. The post-spawning "feeding frenzy" is still in prospect.

AREA FISHING

CEDAR KEY
Joyner's Motel
Speckled trout fishing is picking up. Mr. Joyner and David Bell took nice catches of trout on both Saturday and Sunday. They were using live shrimp.

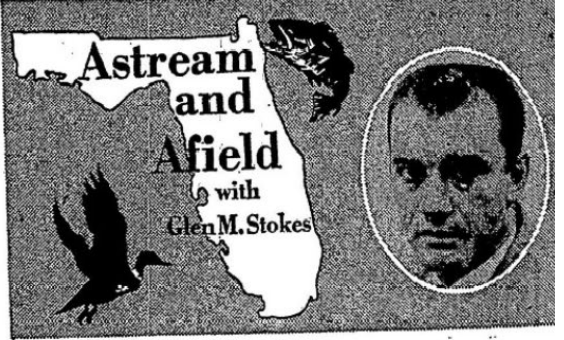
CRYSTAL RIVER
Knox's Bait House
Snook, speckled trout, and jack crevalle are being taken. Snook which aren't too common in the river are hitting. The Bang-o-lure took an 18-pounder last week. Speckled trout are yielding to live

shrimp and Bang-o-lures. Large schools of jack crevalle are now in the lower river.

CROSS CREEK
Sportsman's Haven
Speck fishing good to excellent in Orange Lake. Thomas Fishing Resort
Limits of specks are being taken in Orange Lake. Lee-Mac's Fishing Lodge
Speck fishing excellent; shellcracker fishing good. Limits of specks are being taken; mornings seem to be best. Bass are hitting in creek early in the mornings. Shellcrackers are being taken in creeks on live worms.

J. M. FIELD'S REPORT
John Ellett and son took nine bass and several specks Sunday in Santa Fe. They took the bass on a Hawaiian Wiggler; the specks on a jig.

LOCHLOOSA LAKE
Carl's Fish Camp
Speck fishing good. Specks are being taken in bonnets and also trolling. Cross Creek Fish Camp
Fishing has picked up since



fished on the bottom. Tyson's Fishing Camp
Speck fishing good in bonnets. Lochloosa Springs Fish Camp
Speck fishing good. Specks are being taken in open water, in the bonnets, and in shallow waters of creek.

NEWNAN'S LAKE
McGilvray's Fish Camp
Speck fishing good; fishing fair to good. fishing is picking up. spot is north end "woods." The water lake is slowly falling. bass fisherman will be interested to learn that McIl-

REPORT
fishing the 's

Springs) took six bass Saturday wading the eel grass beds on the edge of Lake George. They took these on black worms. Leon tells me that speck fishing in the runs is good to excellent.

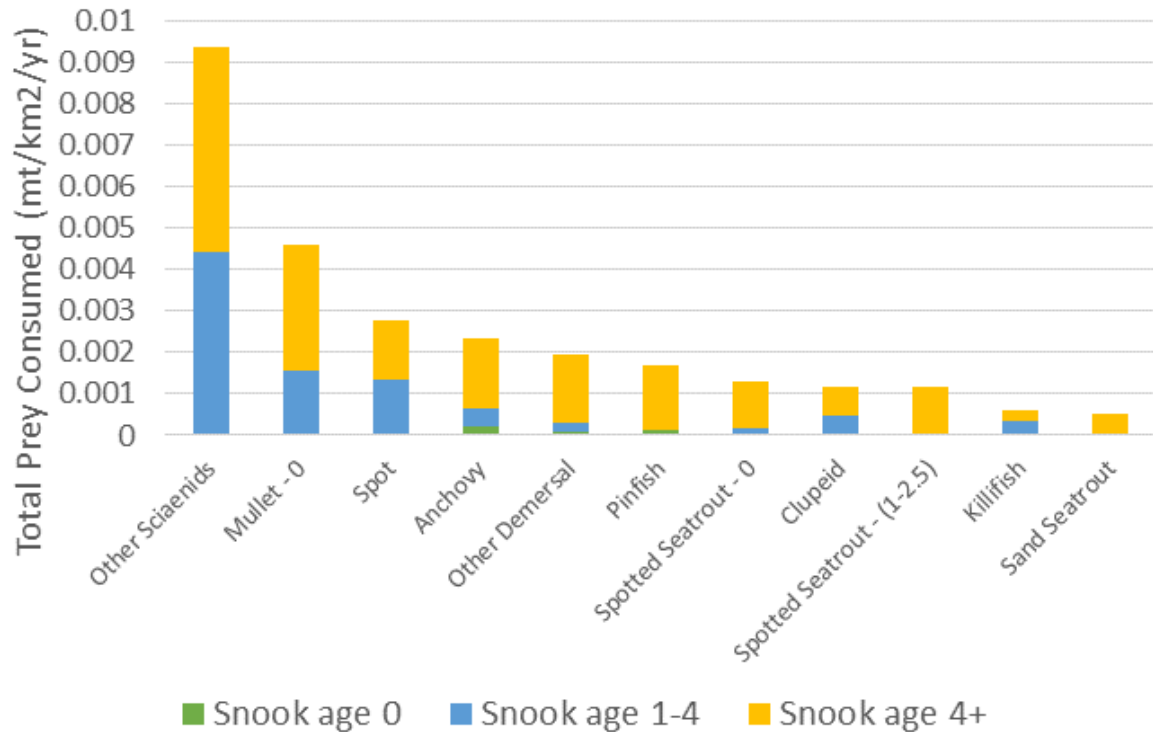
TACKLE BOX REPORT
The only in bass fishing contest for March (and the year) is Ervory Singletary's 12 - pound, 11 - ounceunker. He took this fine fish Sunday in Orange Lake on a black worm. As in this month's contest over the past week are bounds. The bass fisherman will be interested to learn that McIl-



Katie Everett
2021 Undergraduate

Snook May Impact Resident Food Webs

Total Prey Consumption By Snook



Prey Overlap with Snook

