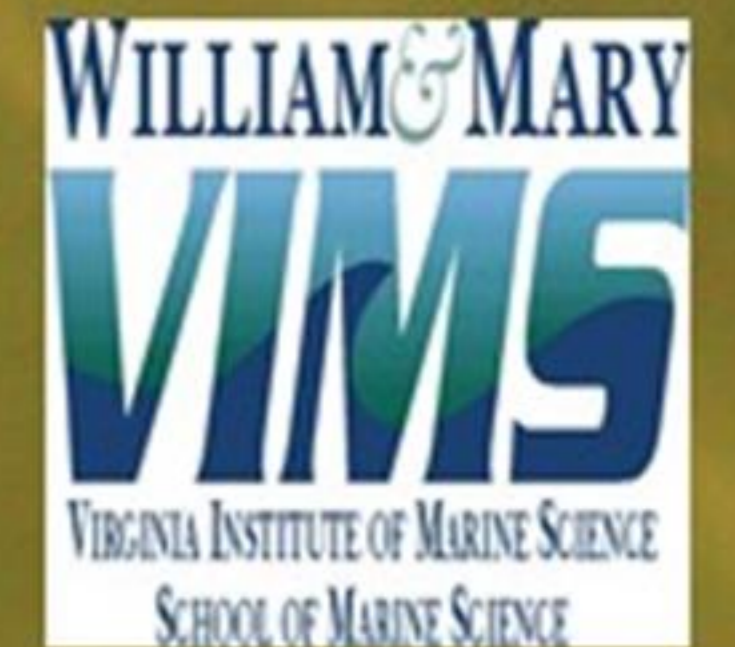


Atlantic Sturgeon (ATS) Movements in Relation to an Active Dredge in the James River, VA

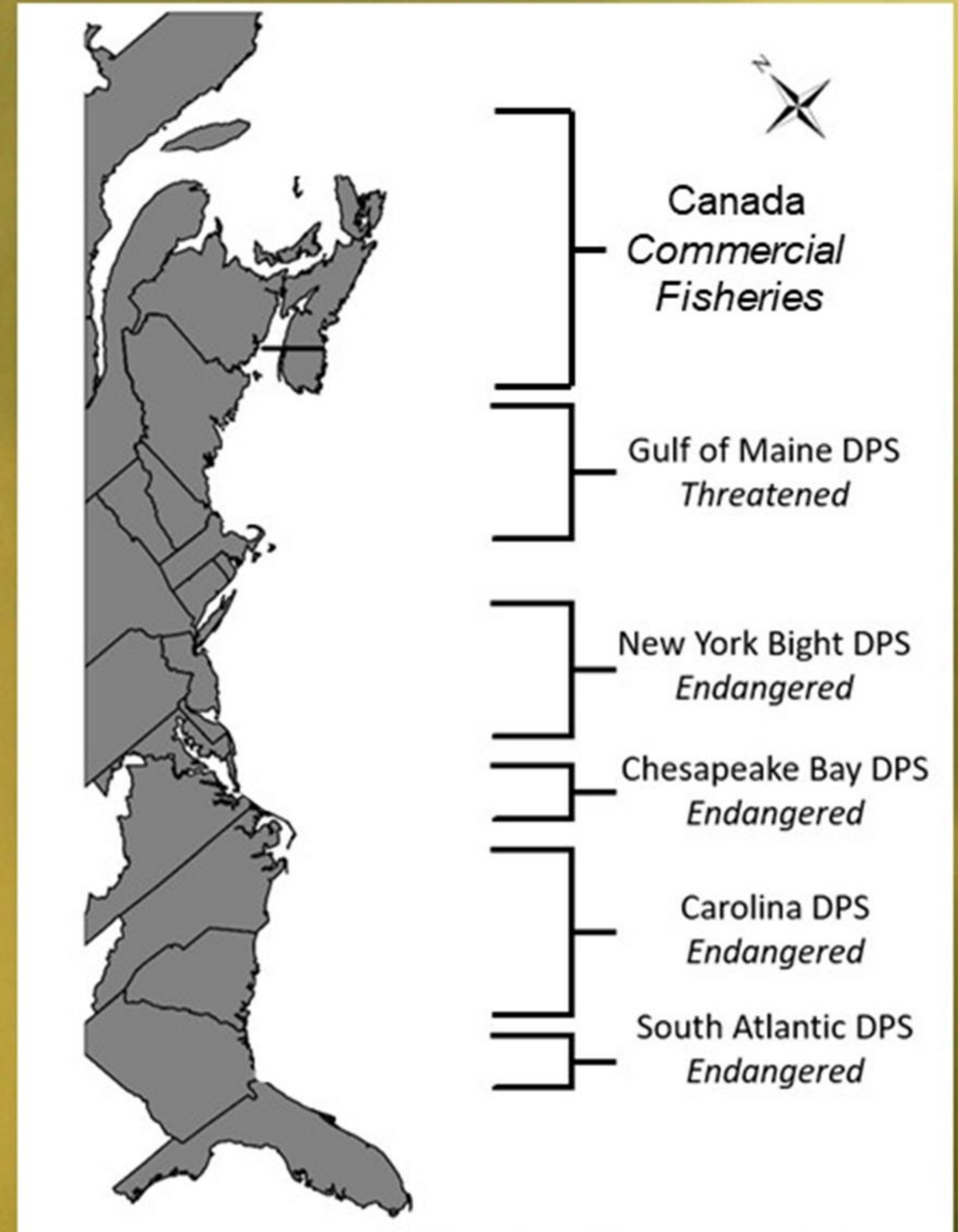


James River Atlantic Sturgeon (ATS) Partnership



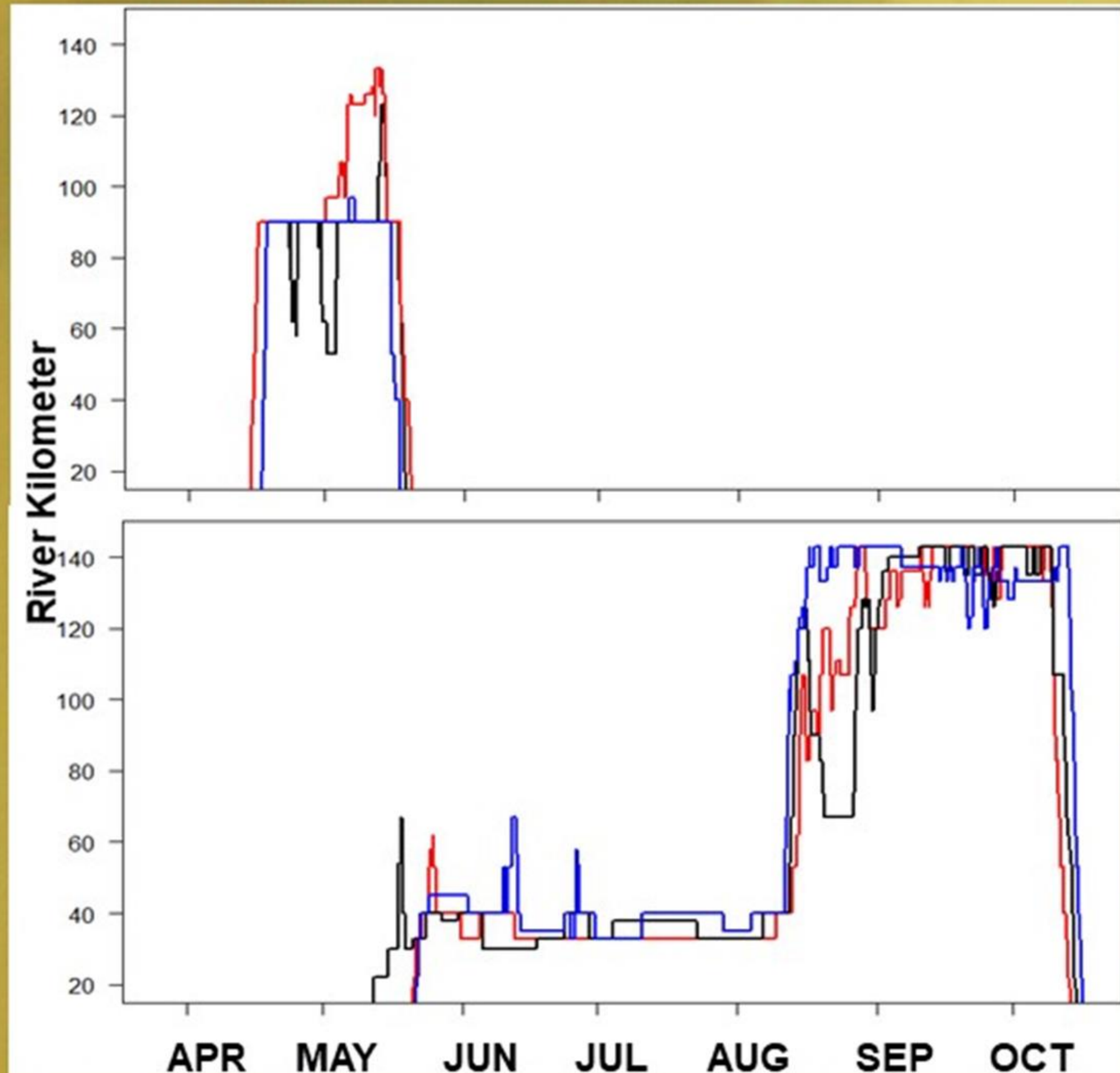
ATS Status in VA

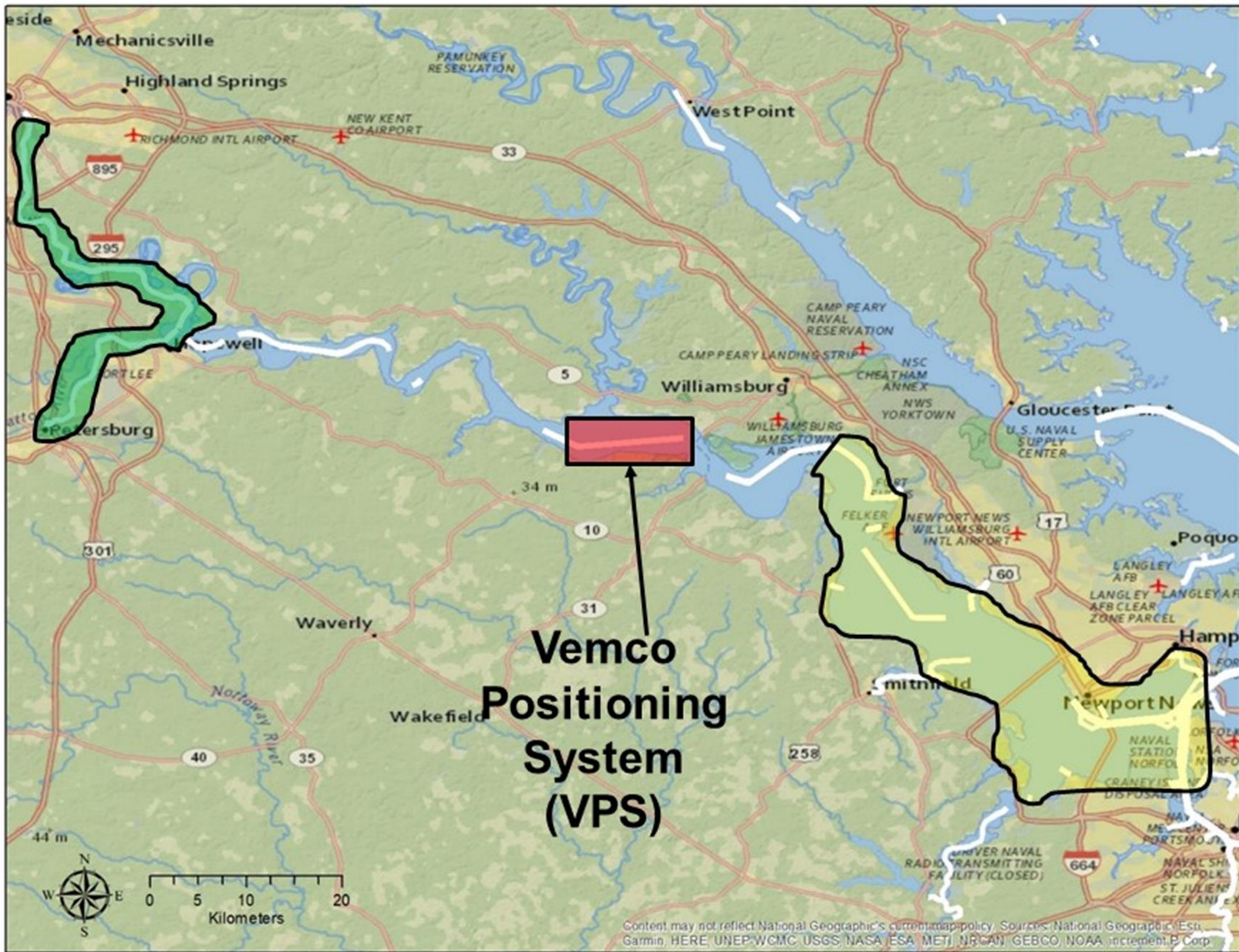
- Heavily Exploited in 1800s
- State Moratoriums Started in 1974
- 1998 ASMFC Moratorium
- 2012 All DPS ESA Listed
- Dredging Listed as Threat to Recovery



Concern

- Environmental Windows
- Anadromous Fish Run
- Spring Run, Not Fall Run

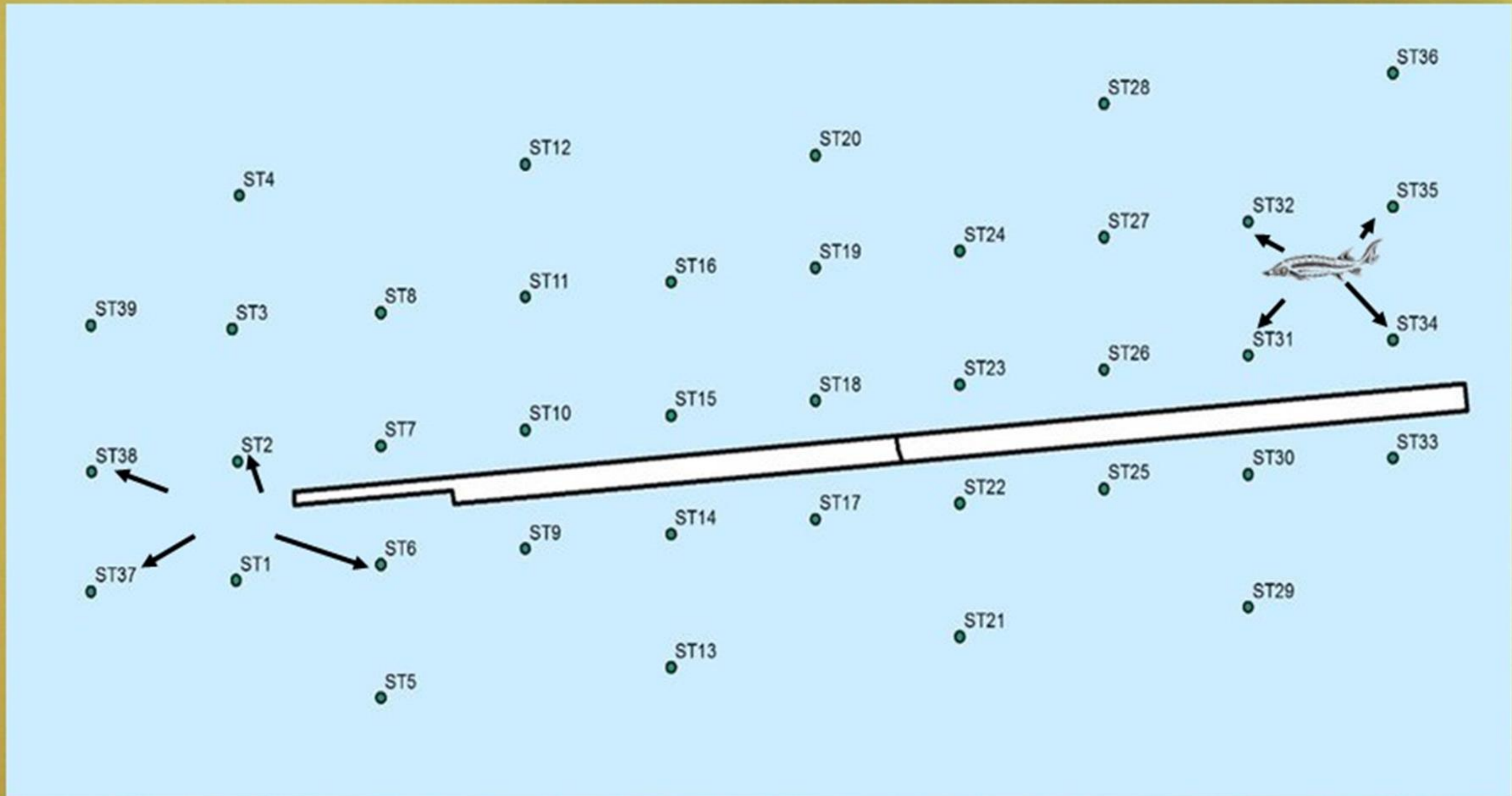




Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment, P Corp.

VPS

See how spring-spawning Atlantic sturgeon on hypothesized spawning habitat react to relatively large vessels passing through the area. Utilize Vemco-Positioning-System (VPS) technology.



Dredge VPS

What we need:

Telemetered Fish:

VCU/MIMS tagging fish since 2011: ~130 fall adults, ~60 subadults and 3 juveniles at large during study

VPS Receiver Array:

37 receiver Vemco Positioning Array with two reference tags deployed August through November 2017.

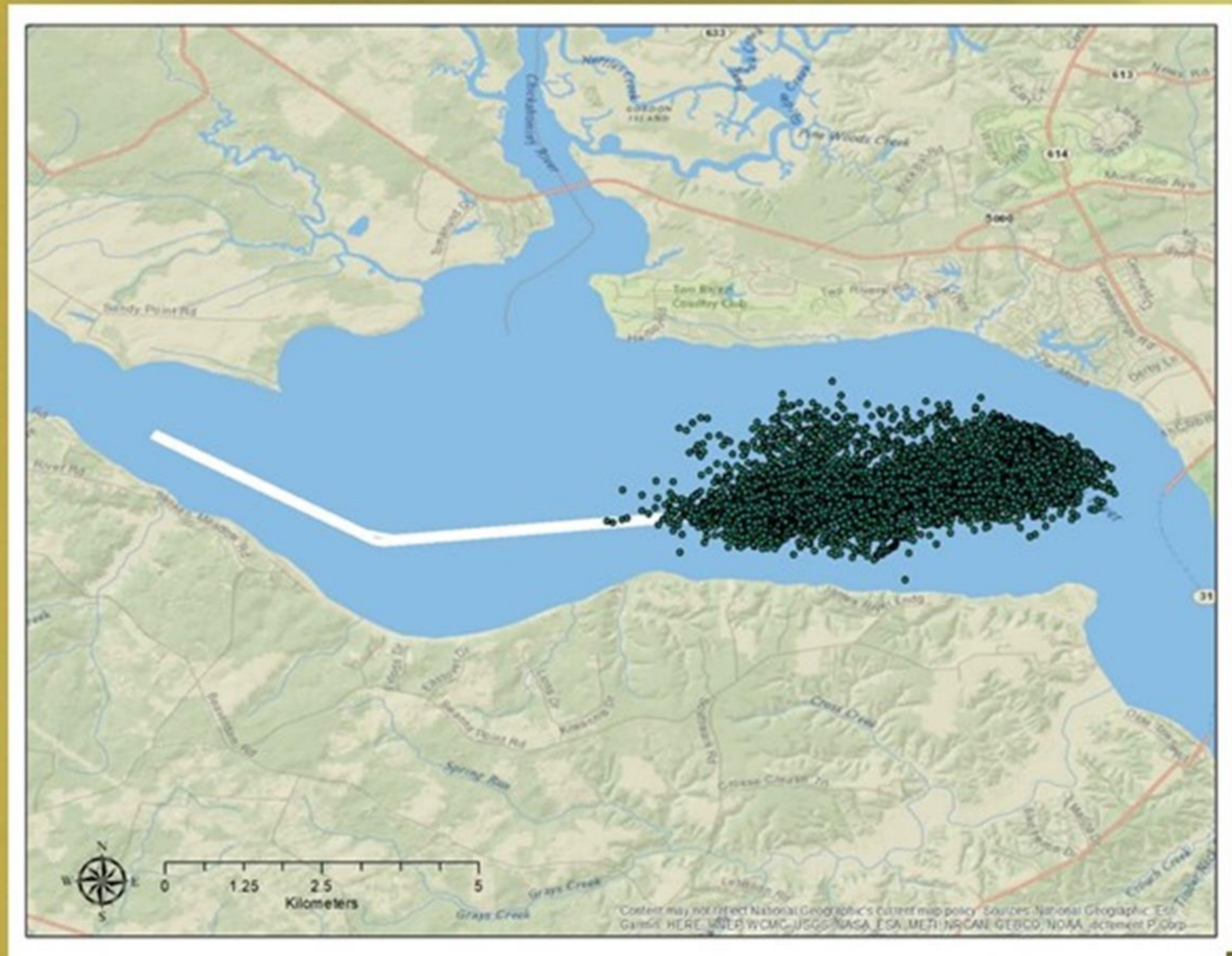
Dredge Positions and Communication:

The AISAP tool maintained by USACE was used for dredge position data.

Fish to cooperate. (Clockwork)

Funding:

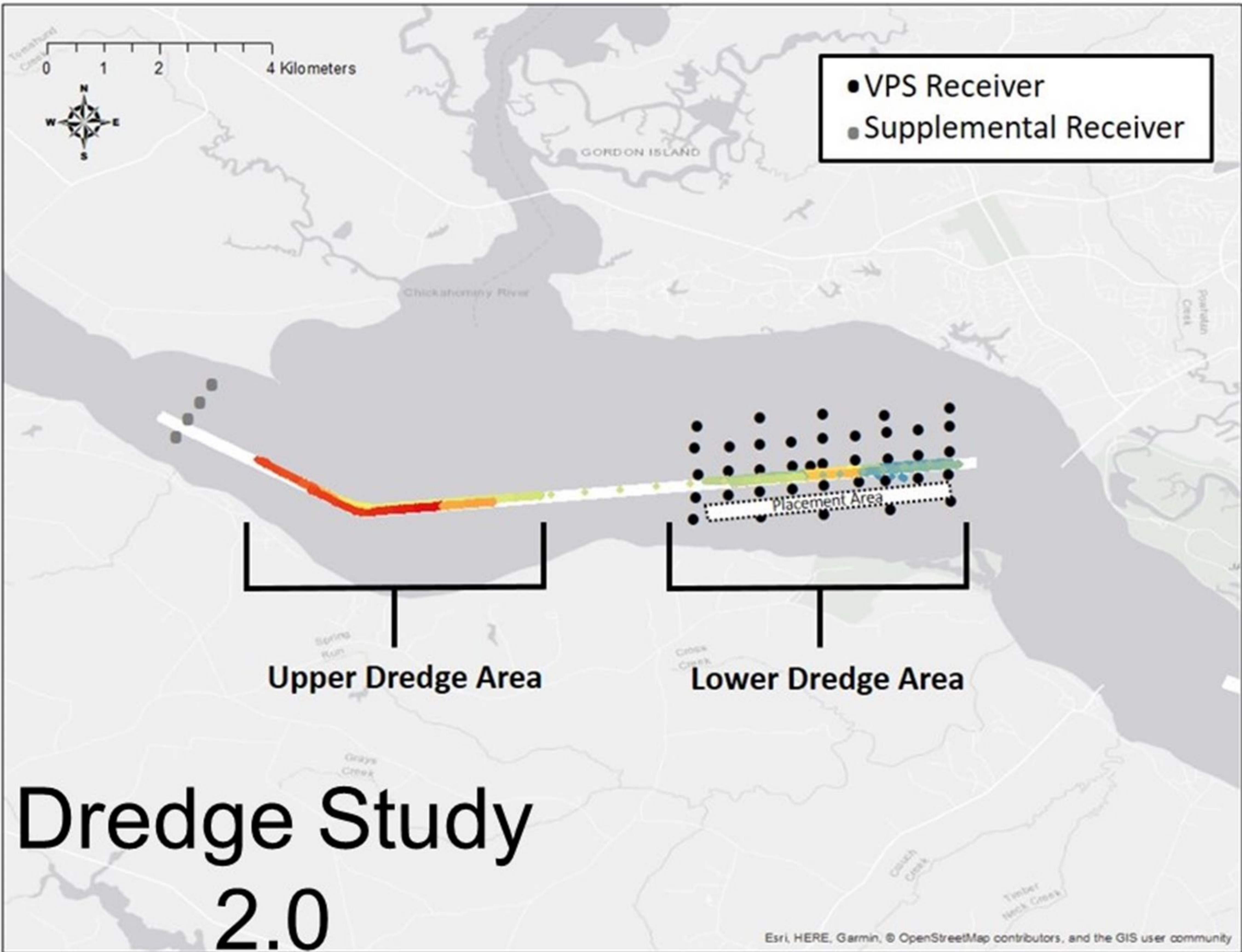
**NOAA/VDGIF Section 6 Grant
#NA13NMF4720037
USACE DOER Grant
Project#17-10**



Dredge

- Hydraulic-Cutterhead Dredge *Lexington*
- Length 60m
- Beam 12m
- Draft <2m
- Intake 51cm
- Sunk Pipeline
- Intake Velocity ~30cm/sec at 1m Distance
- Cutterhead Width 1.4m, Continuous Work
- No Engine Propulsion





Dredge Study 2.0

Results

- Dredged from July 28-September 16
- 505,367 m³ removed
 - Lower area 278,056 m³
 - Upper area 227,311 m³
- 124 total ATS
 - 106 adults
 - 18 subadults
 - 0 juveniles
- 9387 positions



Juveniles

- Only 3 at Large
- No Detections
 - 40km upstream
 - 20km downstream
- Need More Data
 - Stage of Concern



Adults

- 110 telemetered adults
- 106
 - 99 males
 - 7 females
- No points for 7 males
- One thing in mind



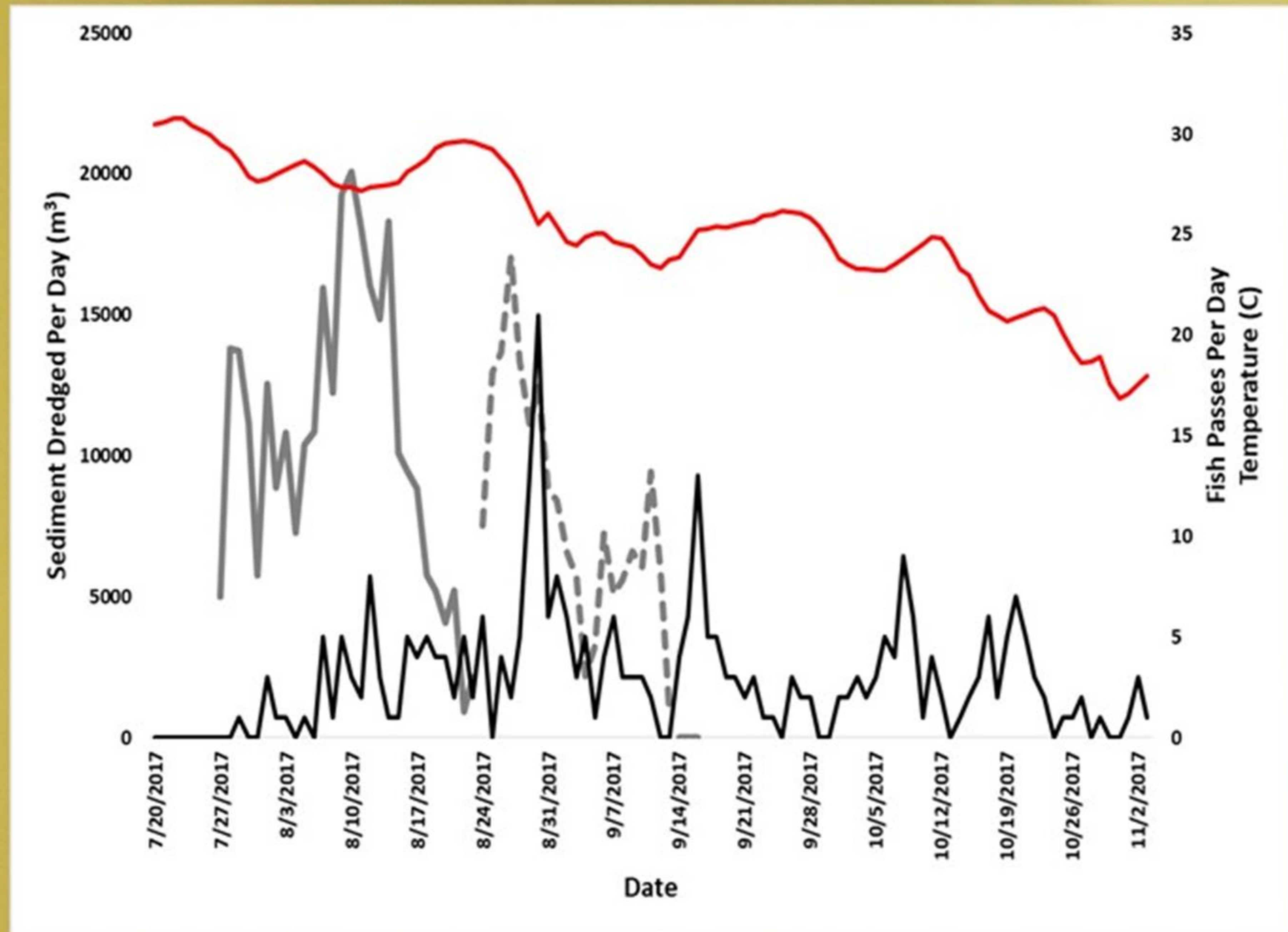
Adults

Overview:

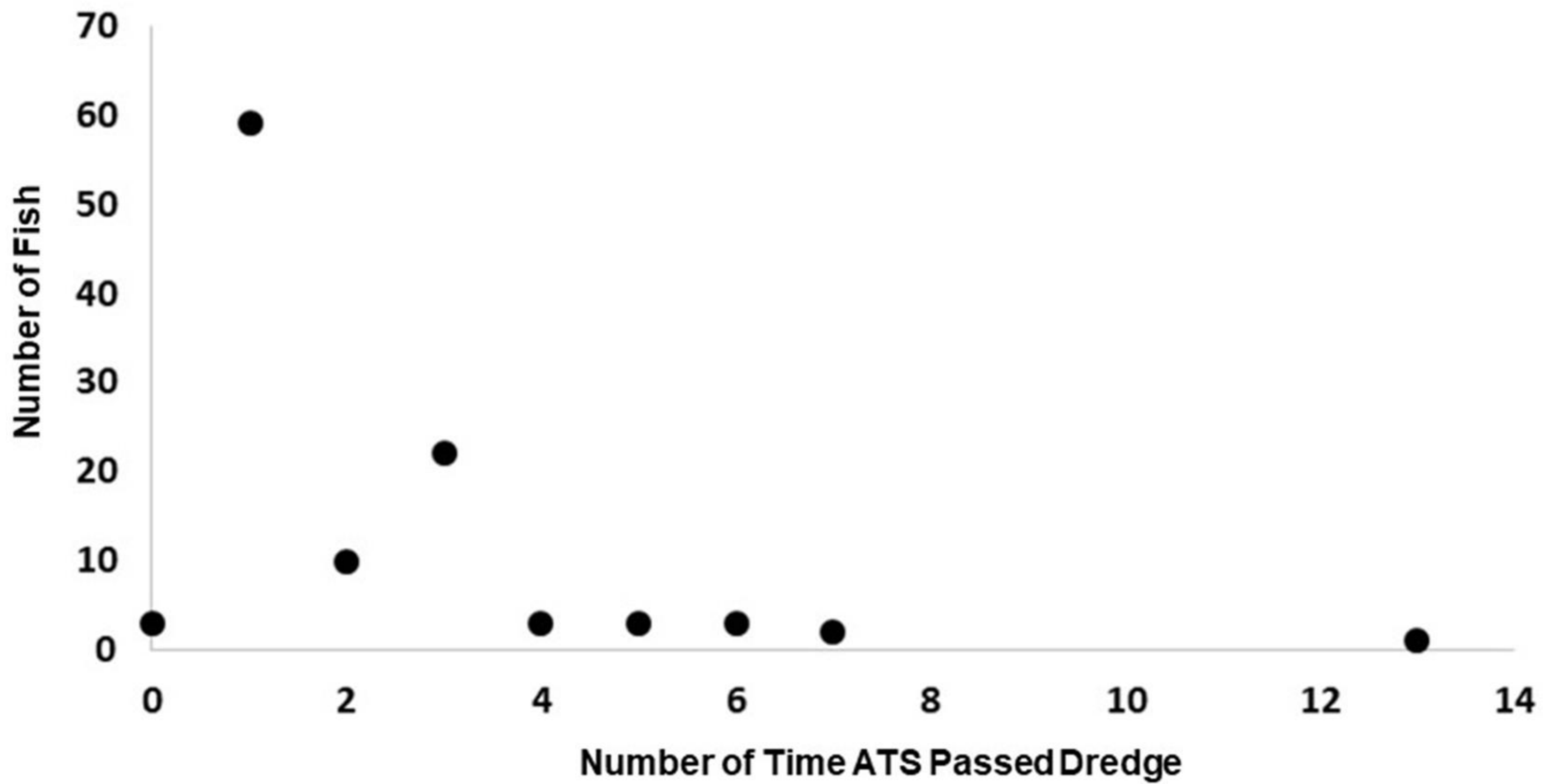
Red Line: water temperature (right y axis).

Grey Line: Material dredged per day, solid line lower area, dashed line upper area (left y axis).

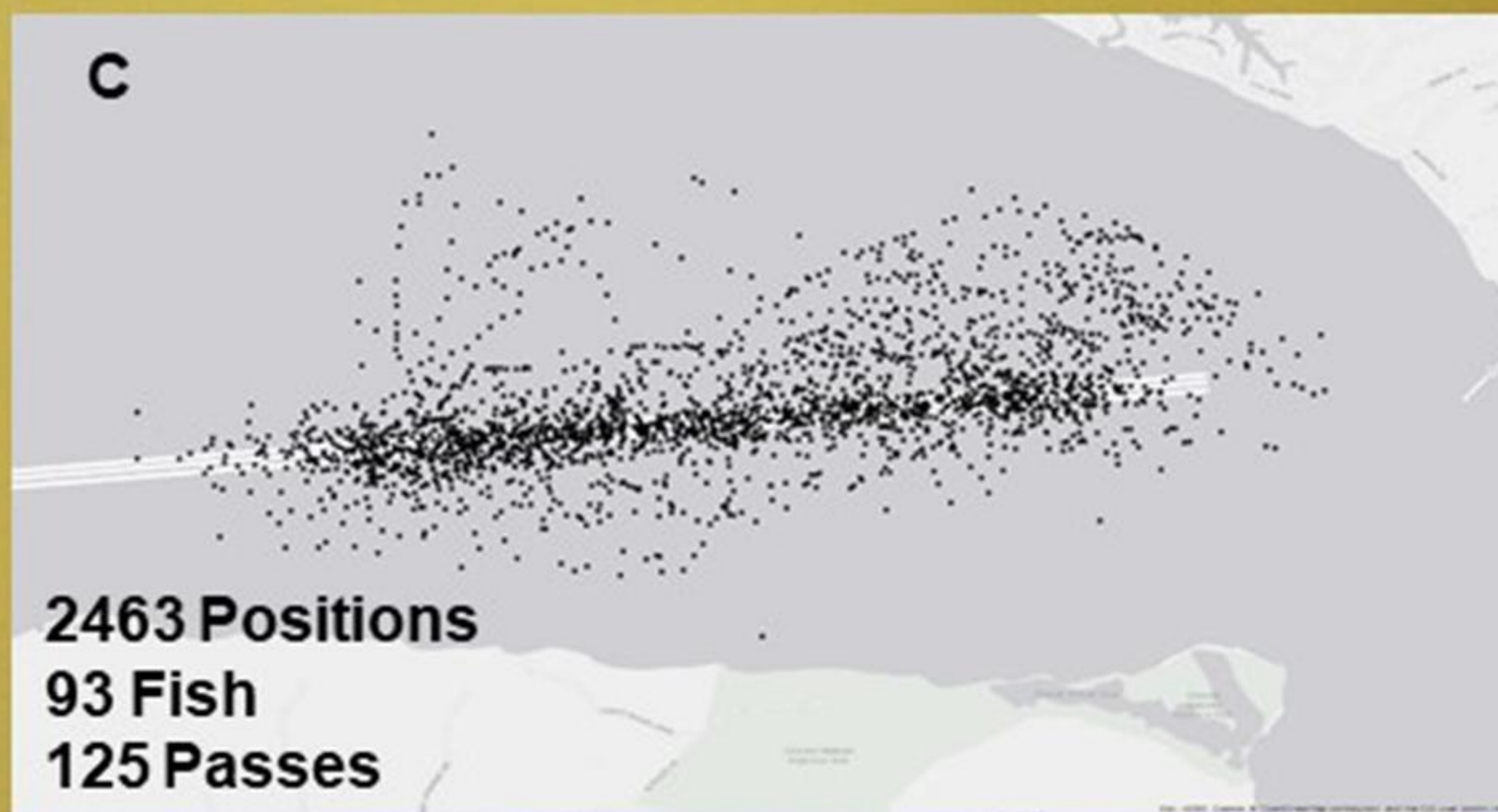
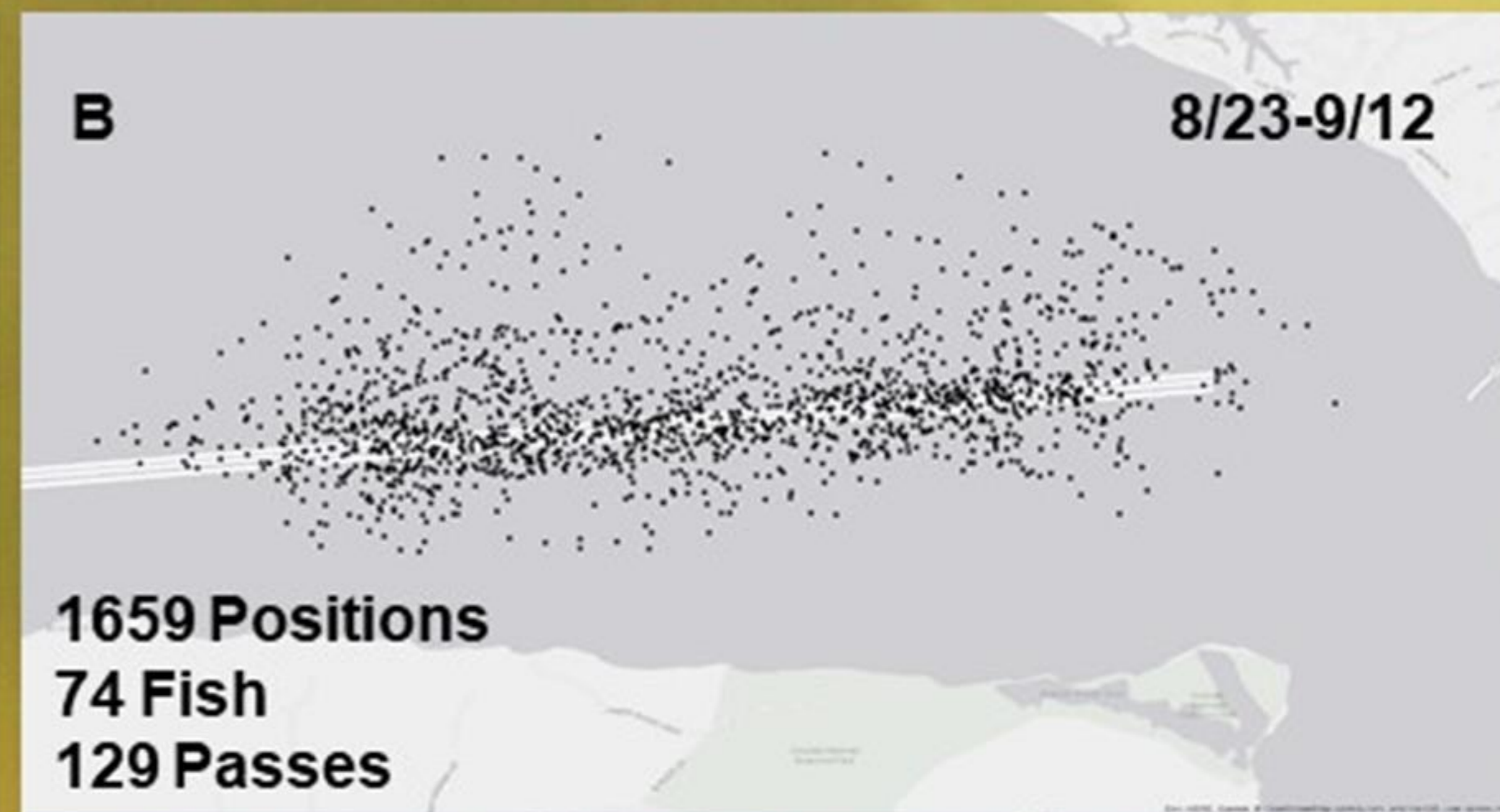
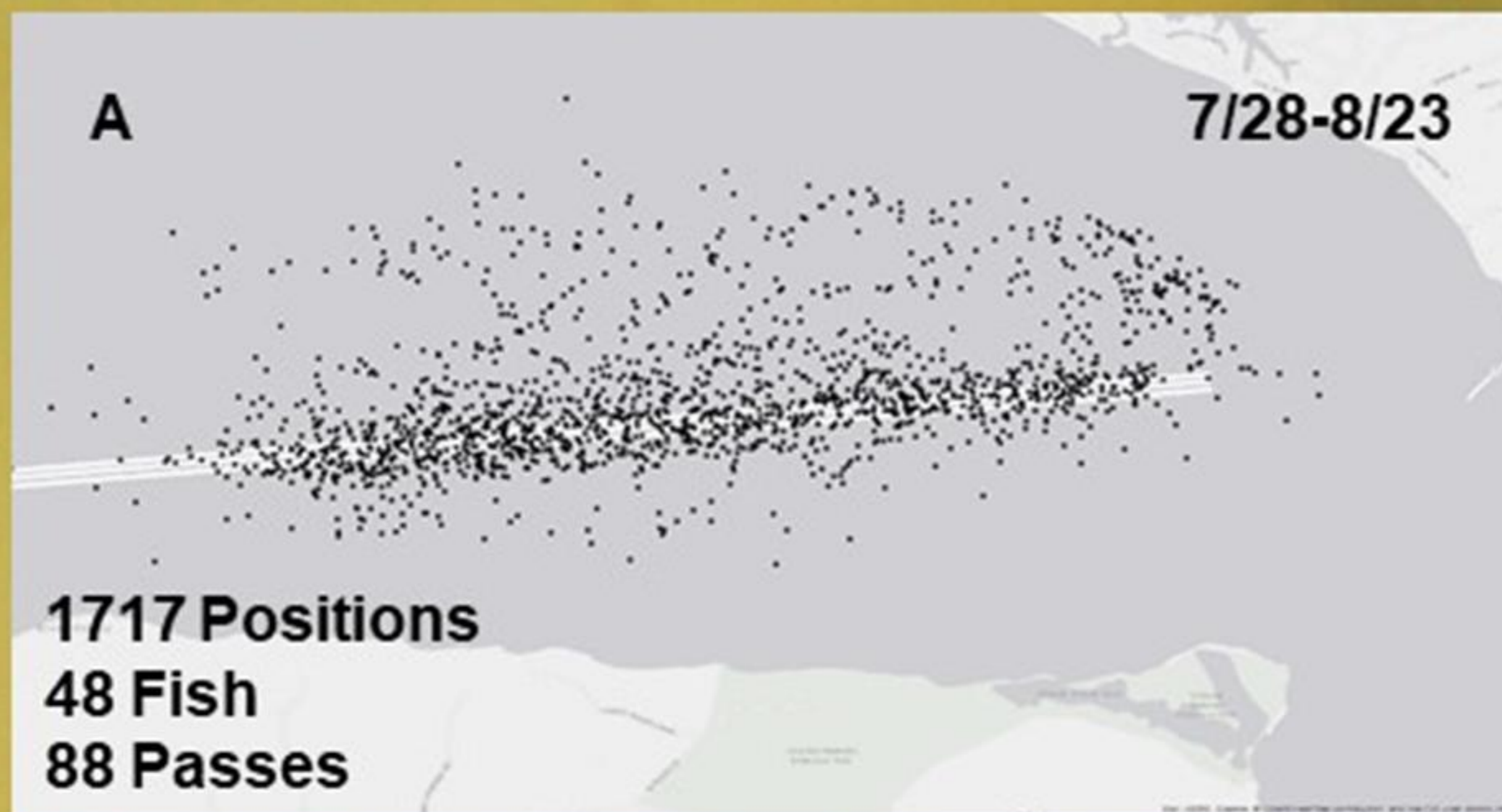
Black Line: number of times ATS moved past the study area per day (right y axis).



Adults

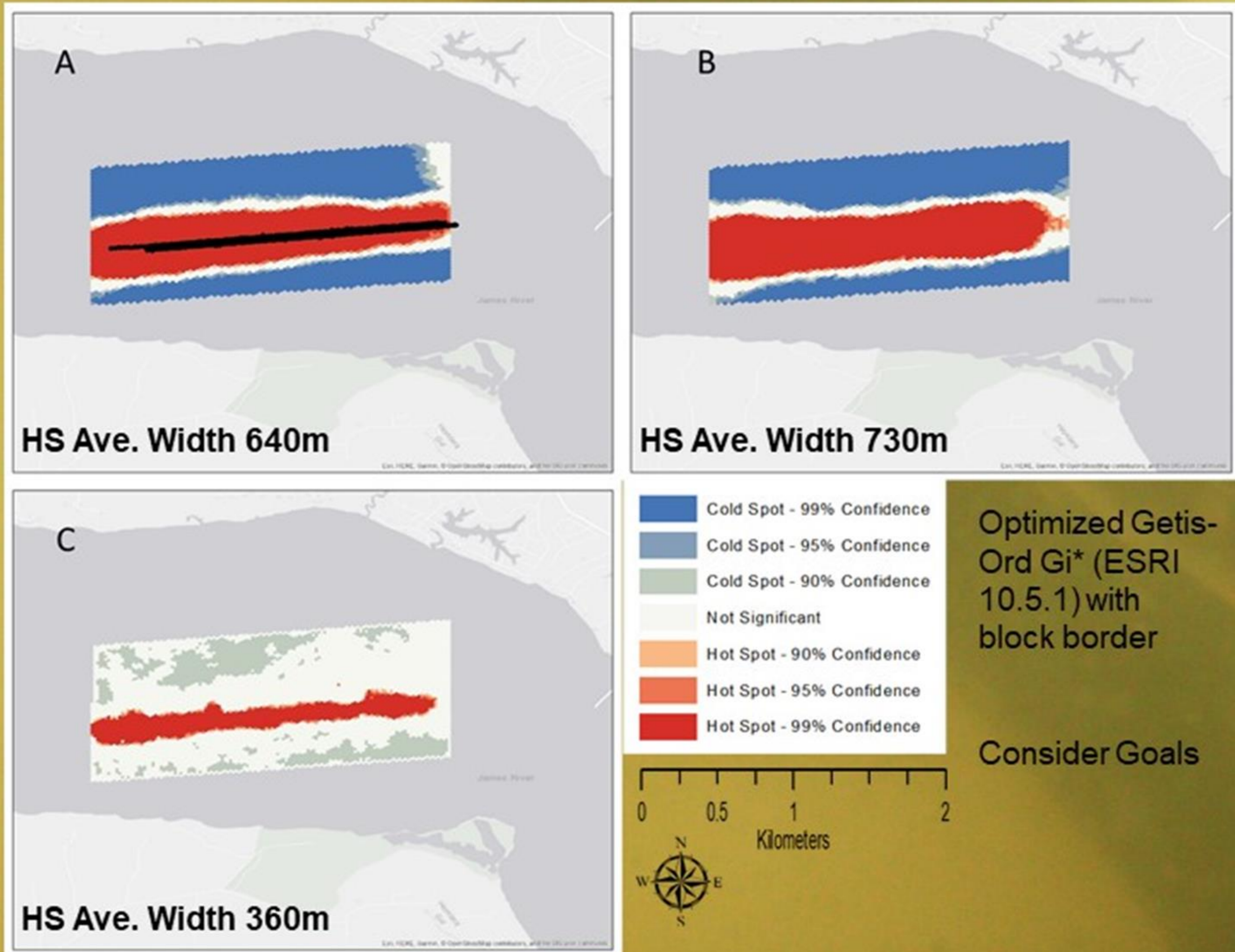


Adults



A: Dredge in lower area
B: Dredge in upper area
C: No Dredging

Adults



Adults

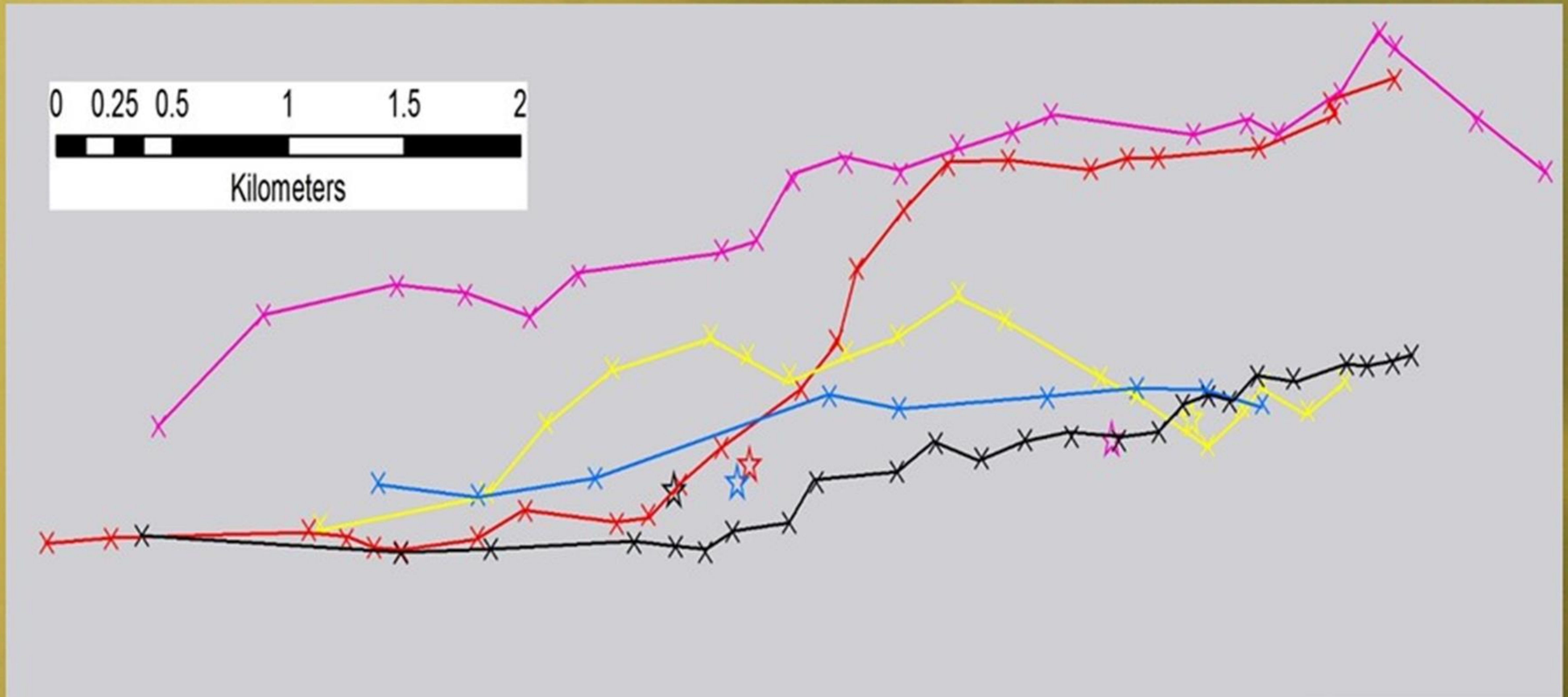
Individual Adult Tracks

Color Coordinated

X and Line are ATS

Star is Dredge Location

2 Possible Turnarounds



Adults

Historical Dredging

Dredging has occurred during the fall spawning season every year since 1998 except 2000, 2006 and 2013. Passive telemetry data show adults moved past an active dredge hundreds of times without mortality. Fall group had past (adults now) and recent spawning success.

Fall population in the thousands.

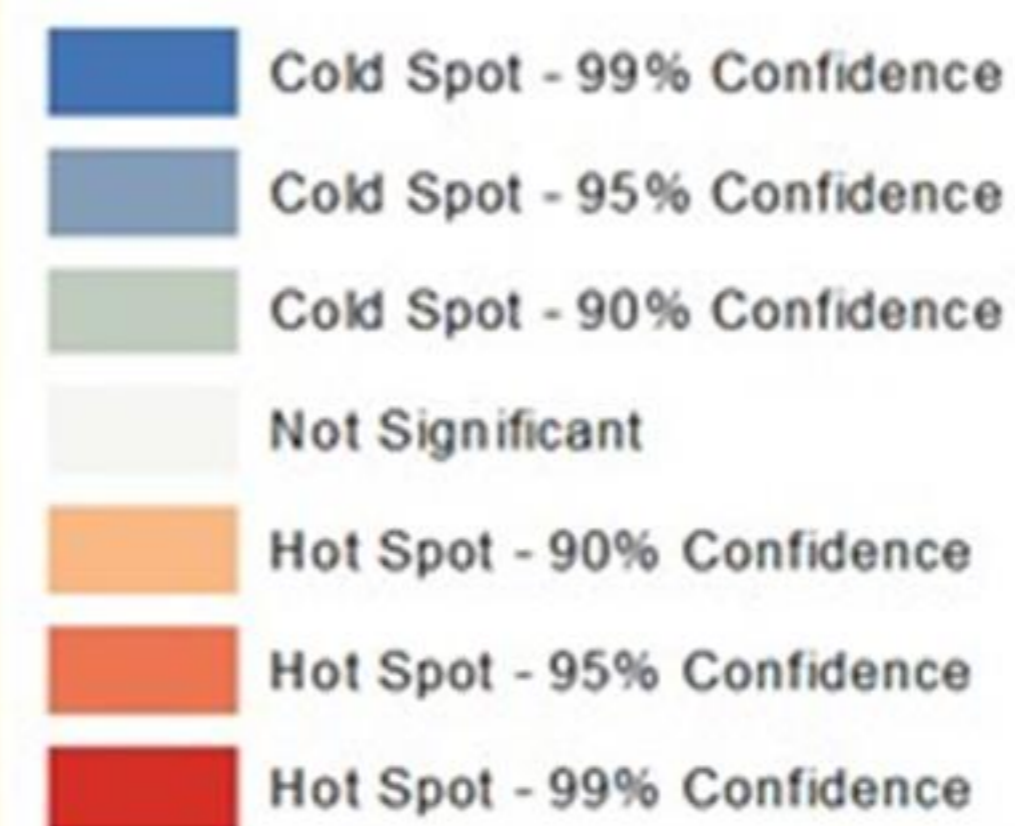
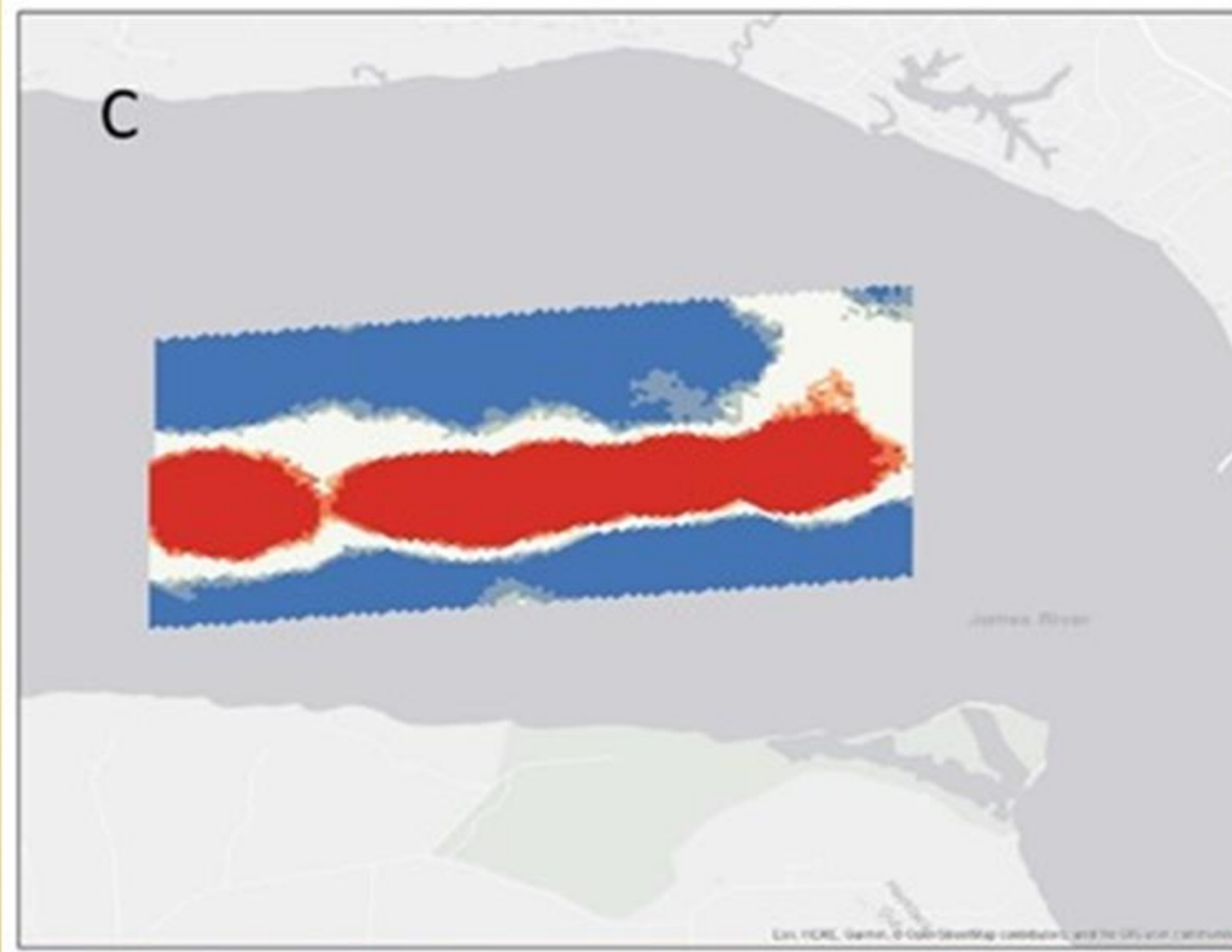
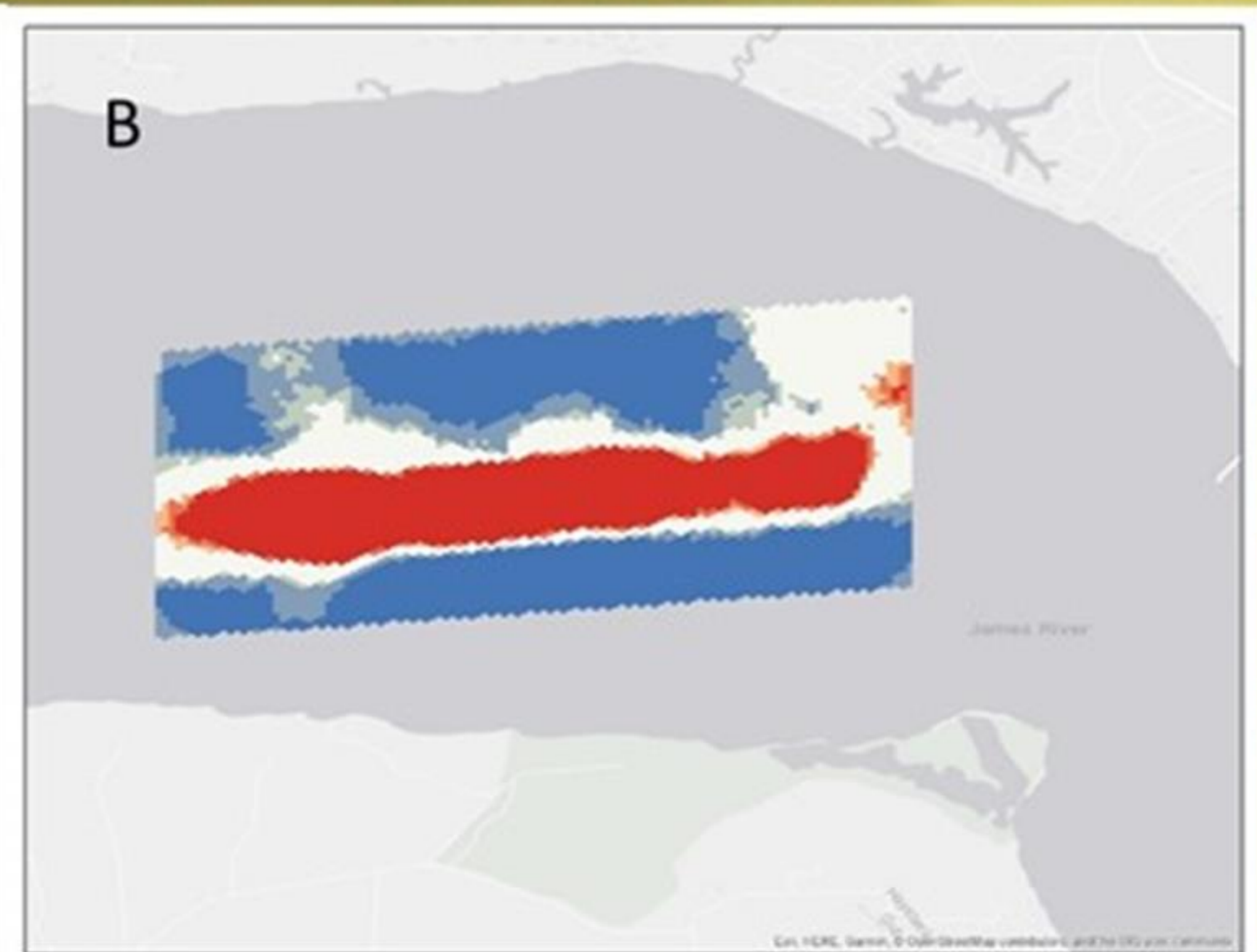


Subadults

- 18 subadults
 - 3548 positions
 - Lower area 4 fish 8 passes
 - Upper area 8 fish 18 passes
 - No dredge 13 fish 42 passes
- Most were upstream
- Feeding

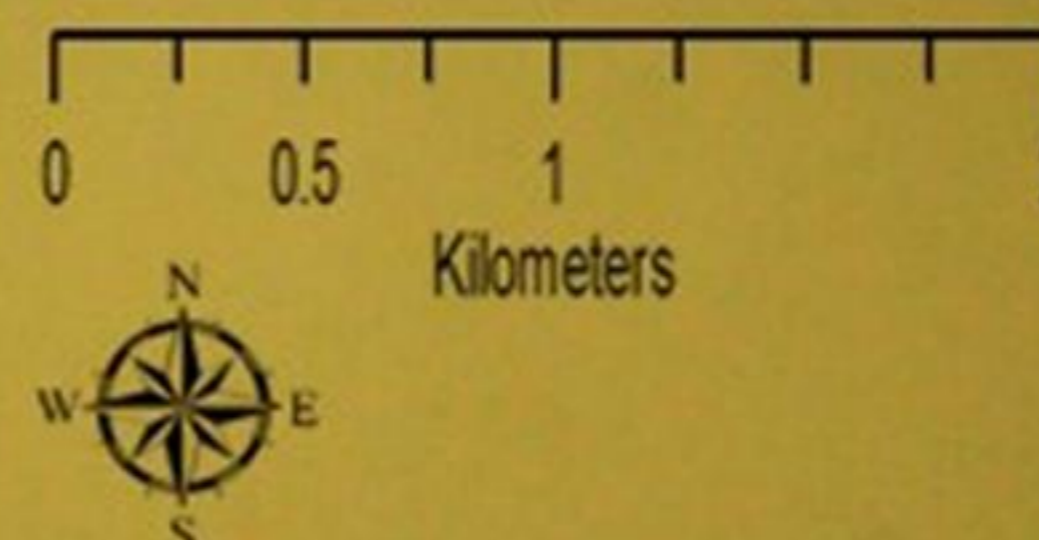


Subadults



Optimized Getis-Ord G_i^* (ESRI 10.5.1) with block border

None died during study in the past or around past dredging operations



Conclusions

- Cutterhead dredge does not stop migrating adults (wide area)
- Passive telemetry suggests no direct mortality, however, data on juveniles is limited
- Behavioral Impacts?

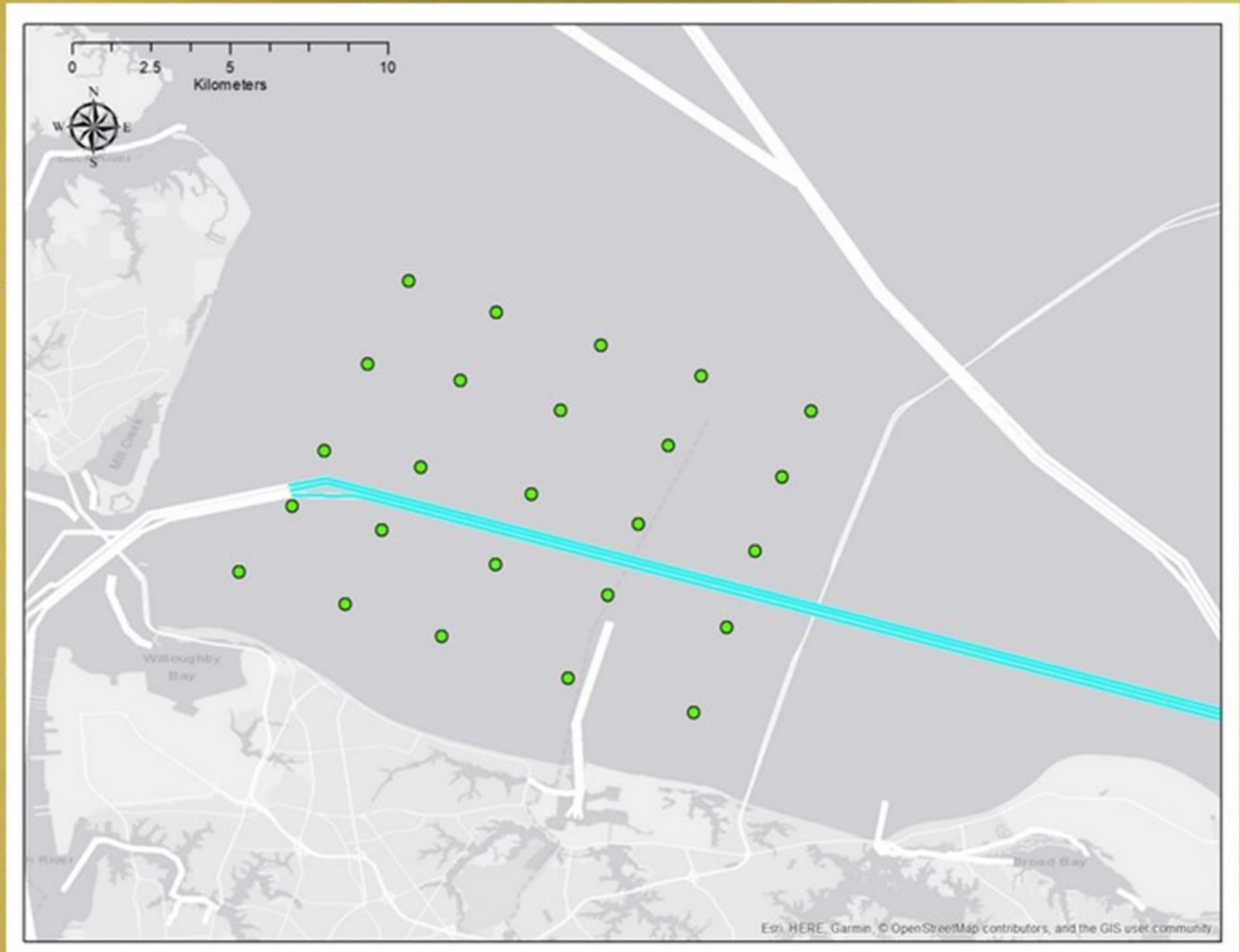
Future Work

Repeat study in same area with no dredging

Try in a narrower area

Different dredge types

Different species



Acknowledgements

- Funding
 - NOAA/VDGIF Section 6 #NA13NMF4720037
 - USACE DOER 17-10
- James River Atlantic Sturgeon Restoration Partnership



Questions

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