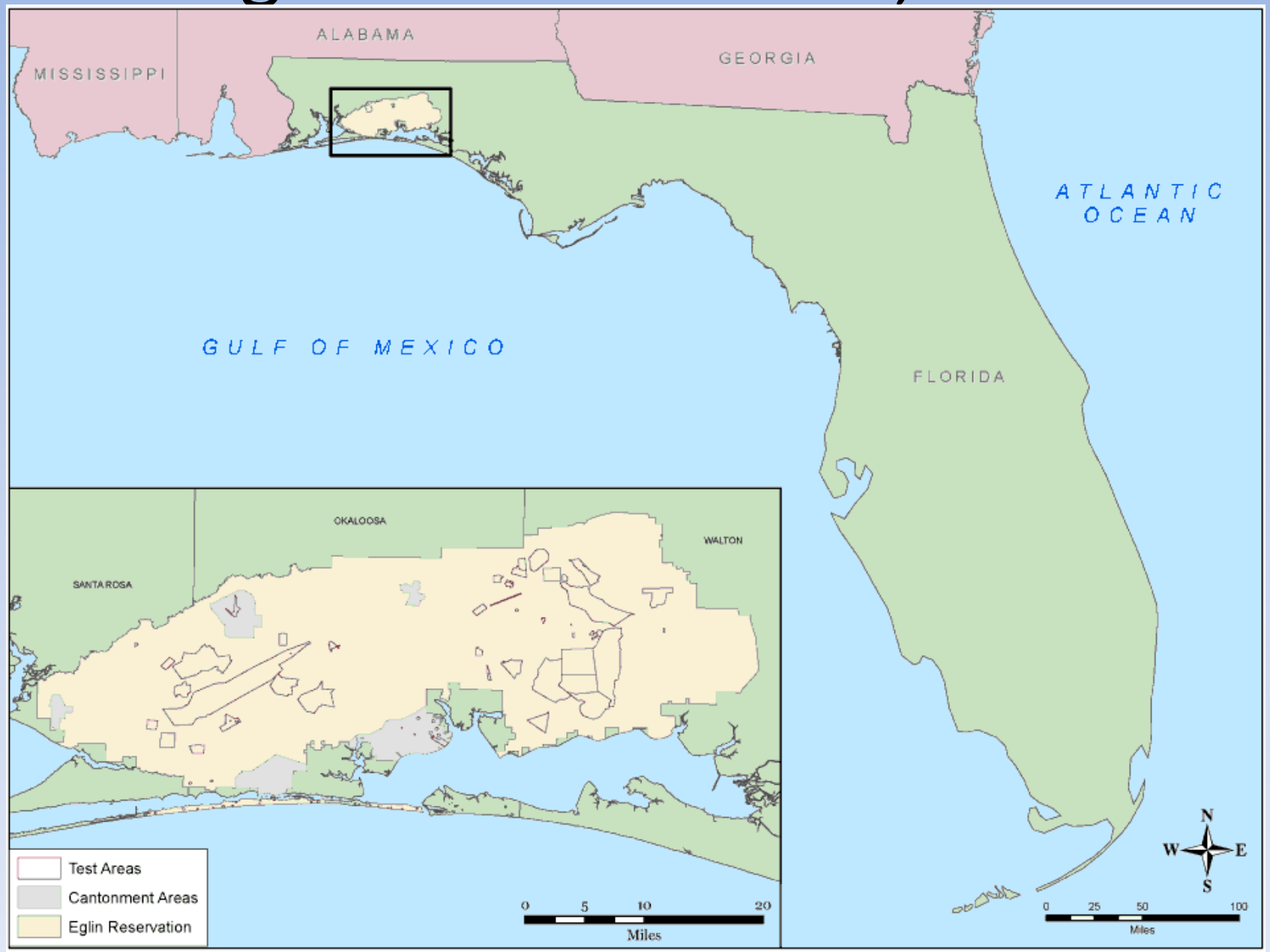
Determining Marine Movement and Behavior of the Gulf Sturgeon in the Gulf Sturgeon Critical Habitat of the Gulf Testing and Training Range and Santa Rosa Island Complex

Bob Miller/J. Mike Nunley /Amanda Robydek
Science Applications International Corporation
Eglin Air Force Base Natural Resources Section
DoD Legacy Resource Management Program

Eglin Air Force Base, FL



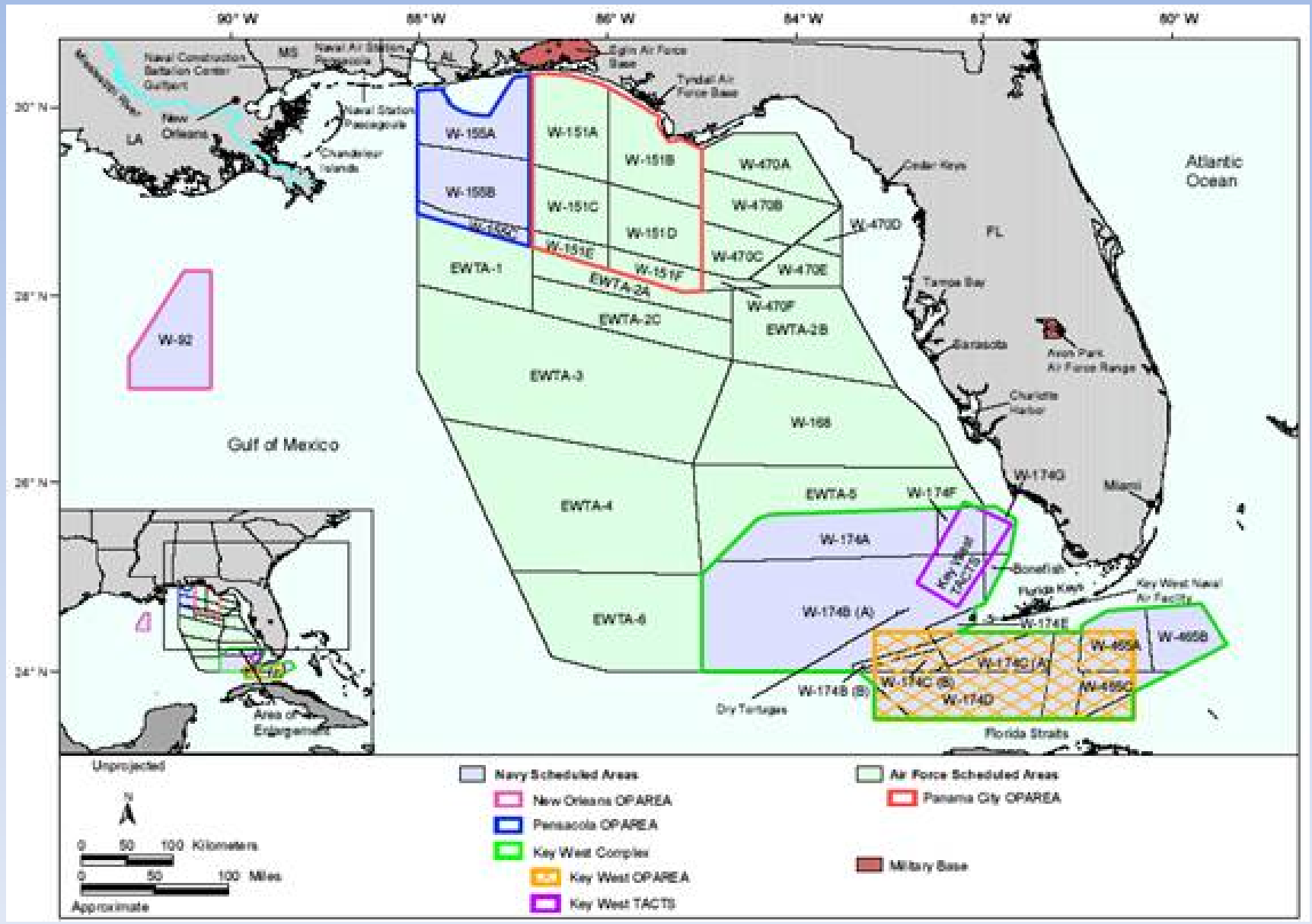
Missions on Eglin AFB

- Unique and ideal setting for military testing and training

- Majority of Eglin's missions occur within the Eglin Gulf Testing and Training Range and in the Santa Rosa Island Test and Training Range Complex

- Overlaps with Gulf sturgeon critical habitat areas in the Gulf of Mexico

Eglin Gulf Test and Training Range: 124,642 square miles of water ranges



Santa Rosa Island location within Gulf Sturgeon Critical Habitat

MISSION IMPACTS TO PROTECTED SPECIES???

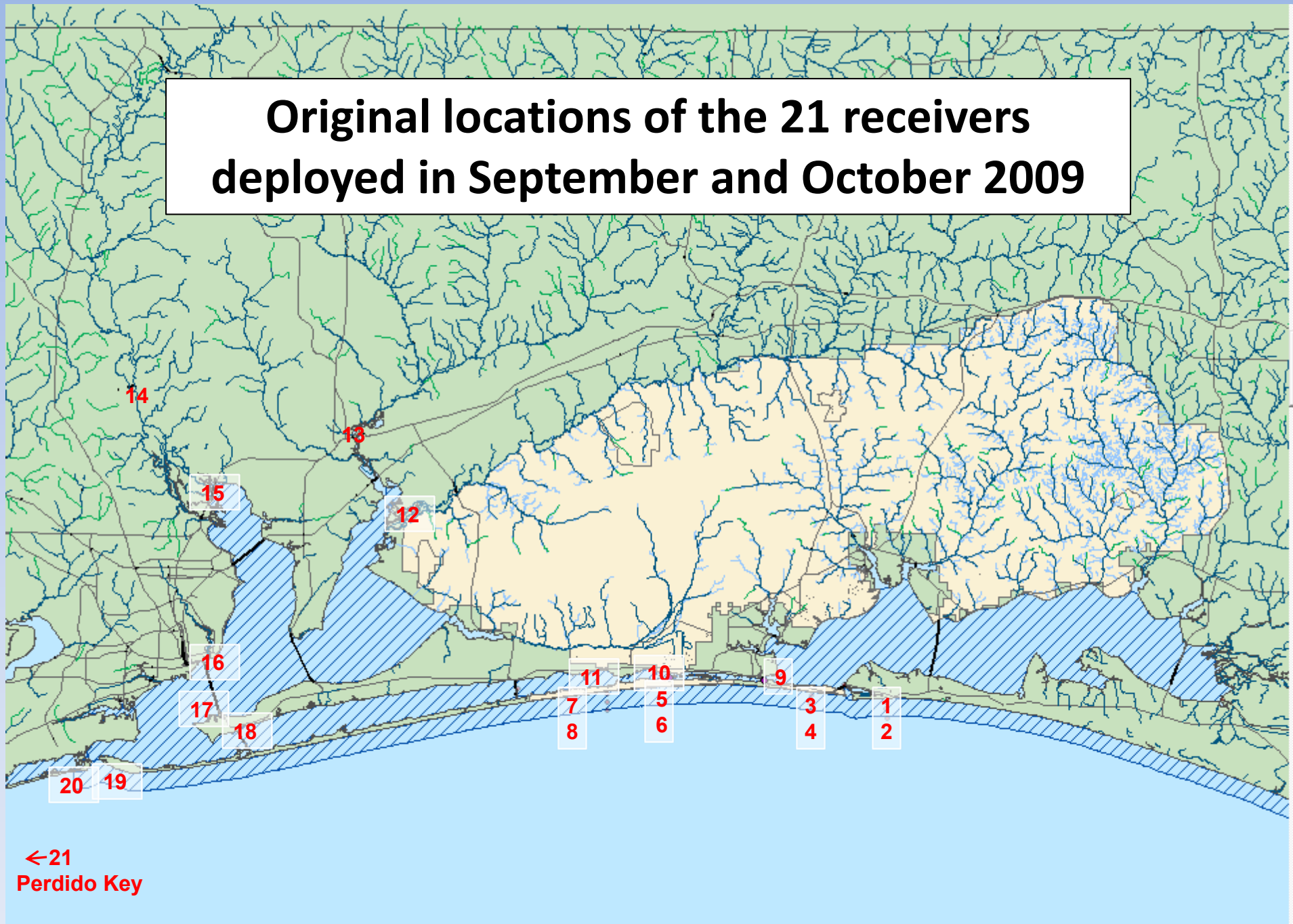
- Gulf sturgeon federally protected under the Endangered Species Act
- Section 7 consultations are required
- Lack of data concerning Gulf sturgeon's usage of areas surrounding Eglin's Gulf ranges
  - Difficult to determine impacts
  - Cannot develop mission avoidance zones or other mitigation measures
- Secured funding from the Department of Defense's Legacy Resource Management Program to conduct this study.

Summary of Approach

- Vemco® V16-5H coded acoustic transmitters were surgically inserted into the abdominal cavity of adult Gulf sturgeon
- 40 Gulf sturgeon from the Choctawhatchee River were tagged in 2008 Pilot Study
- 40 more Gulf sturgeon from the Yellow, Blackwater, and Escambia Rivers were tagged between August and September 2009
  - 12 adults from the Yellow River
  - 25 adults from the Blackwater River
  - 3 adults from the Escambia River
- 80 total Gulf sturgeon tagged and tracked by Eglin

Summary of Approach

- 21 Vemco® VR2W Receivers were deployed in September and October 2009
  - 11 in the Gulf of Mexico
  - 4 in the Santa Rosa Sound
  - 2 in the Pensacola Bay
  - 1 in the Yellow River
  - 1 in the Blackwater River
  - 2 in the Escambia River
- Based off findings from 2008 Pilot Study showing that 99% of all detections occurred within 1,000 m of the shoreline, "inshore" receivers were placed 500 m from shore and "offshore" receivers were placed 1,000 m from shore


Original locations of the 21 receivers deployed in September and October 2009
14
13
15
12
16
17
18
20
19
11
7
8
10
5
6
9
3
4
1
2
←21
Perdido Key

Final Location of Receivers for Eglin's 2009 – 2010 Study

SUMMARY OF RESULTS:
Number of Sturgeon Detected

161,569 detections from 86 different tagged sturgeon

# of Sturgeon Detected	Year Tagged	Location Tagged	Associated Study
39	2009	Yellow, Blackwater, and Escambia Rivers	Eglin 2009-2010 Legacy Study
14	2008	Choctawhatchee River	Eglin 2008-2009 Pilot Study
30	2009	Choctawhatchee River	Delaware State University[1]
3	2005	Escambia River	National Oceanic & Atmospheric Administration (NOAA)[2]

1. Fleming et al., Ongoing
2. Duncan et al., submitted for publication

SUMMARY OF RESULTS:
Number of Detections

161,569 detections from 86 different tagged sturgeon

Sturgeon Study	# of Detections	% of Total
Eglin 2009 – 2010 Study	64,683	40%
Eglin 2008 – 2009 Pilot Study	19,832	12%
Delaware State University[1]	76,787	48%
NOAA 2005 Study[2]	267	< 1%

1. Fleming et al., Ongoing
2. Duncan et al., Submitted for publication

SUMMARY OF RESULTS:

Movement Patterns

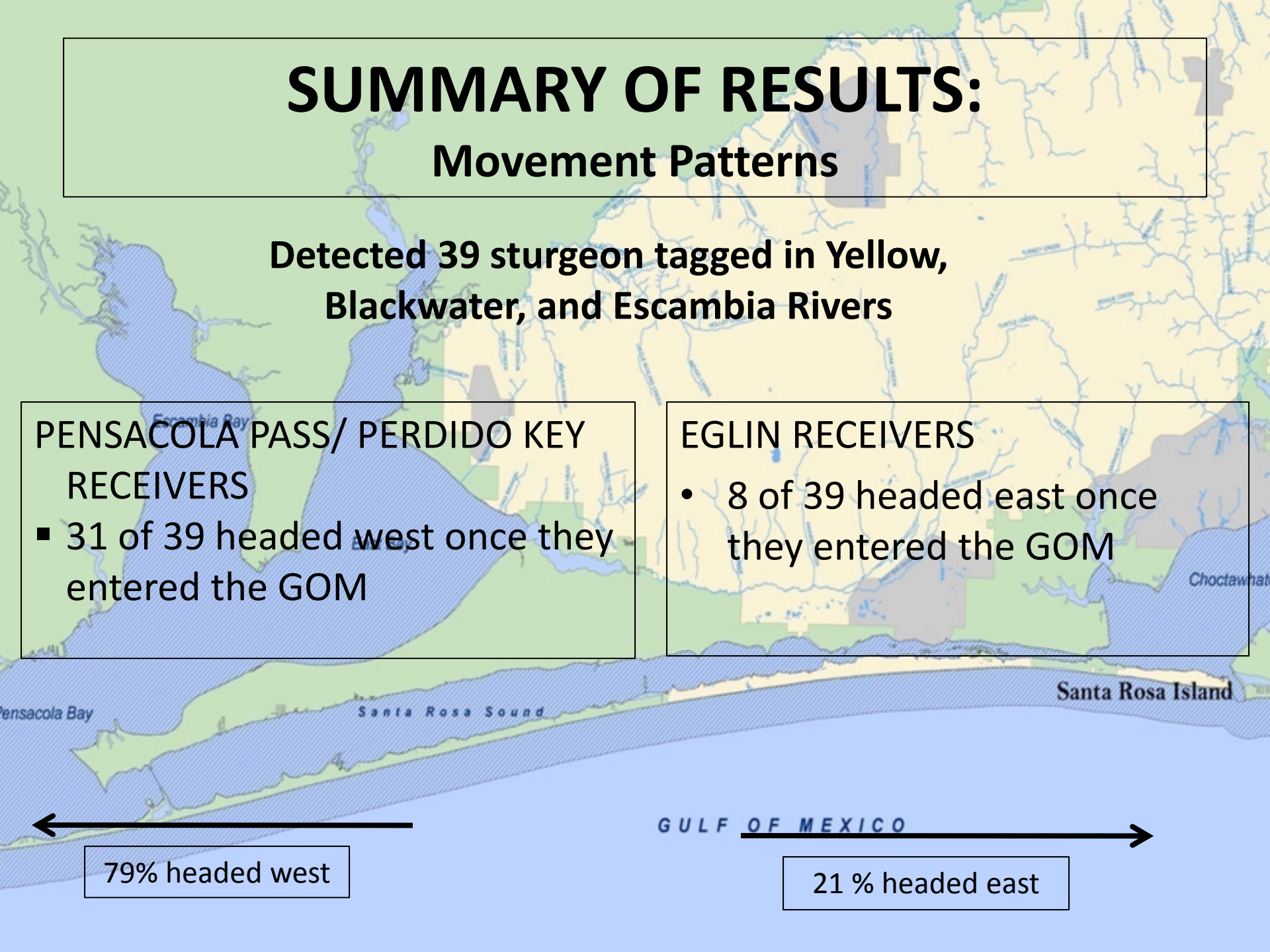
Detected 39 sturgeon tagged in Yellow, Blackwater, and Escambia Rivers

PENSACOLA PASS/ PERDIDO KEY RECEIVERS

- 31 of 39 headed west once they entered the GOM

EGLIN RECEIVERS

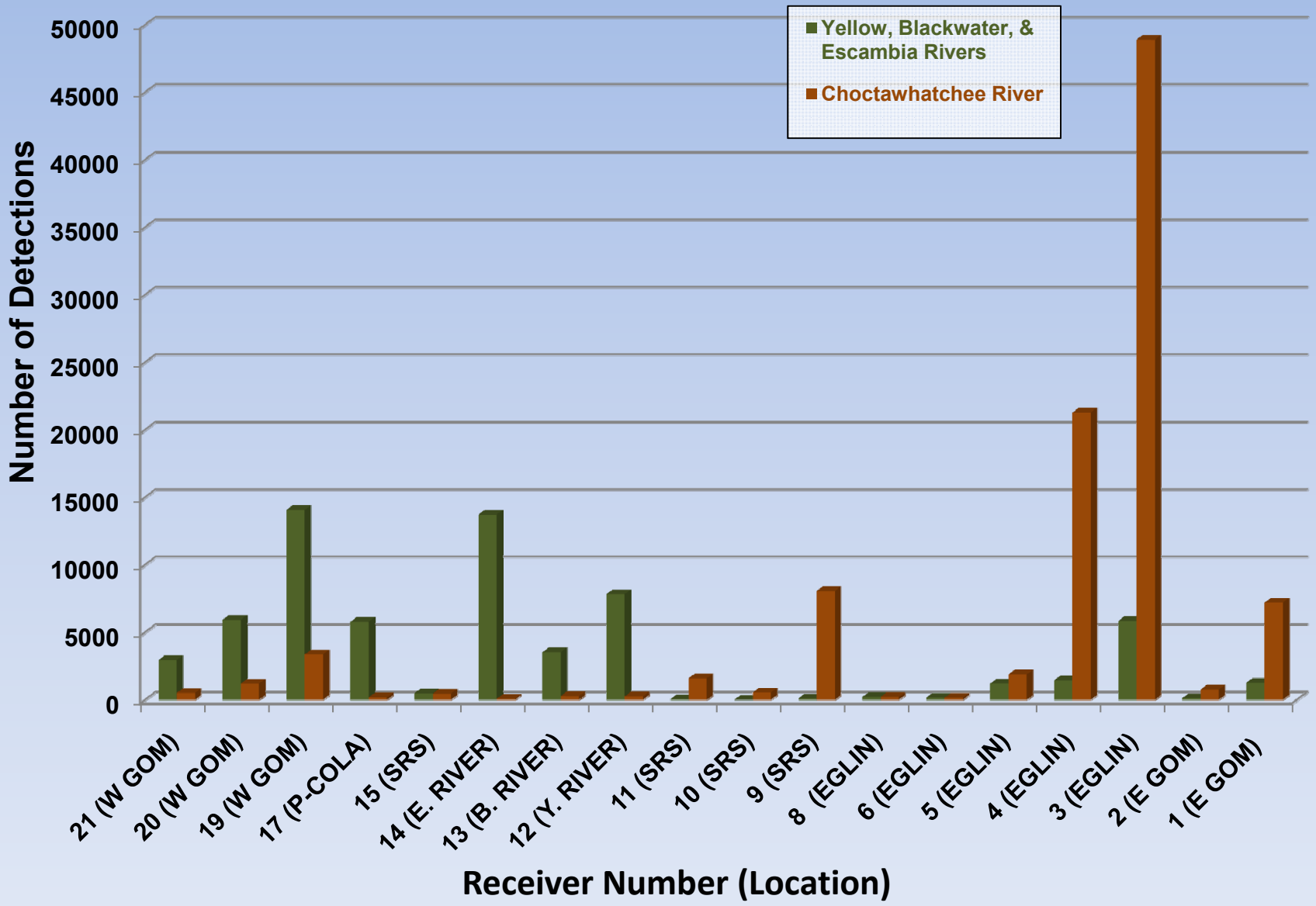
- 8 of 39 headed east once they entered the GOM

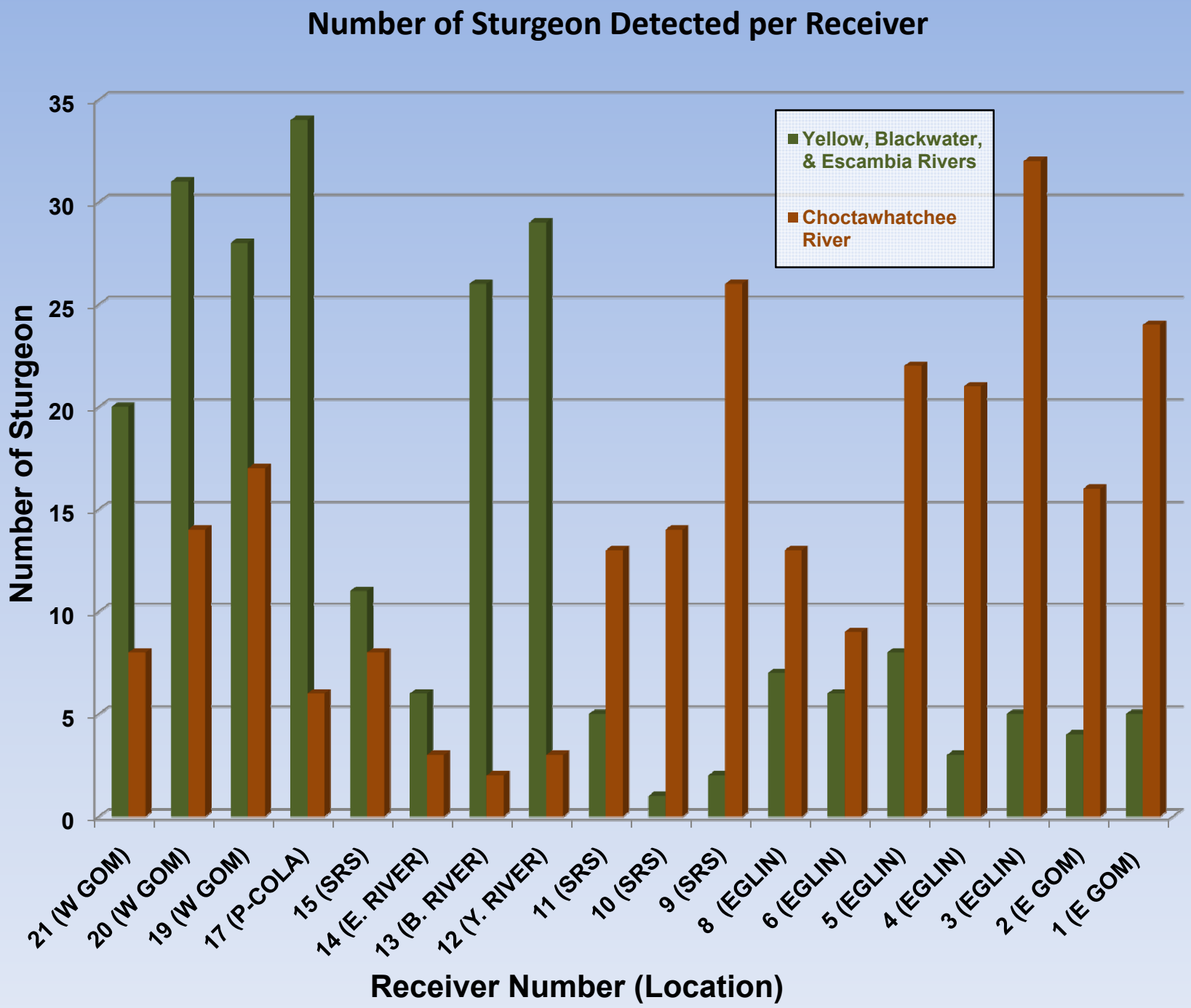


79% headed west

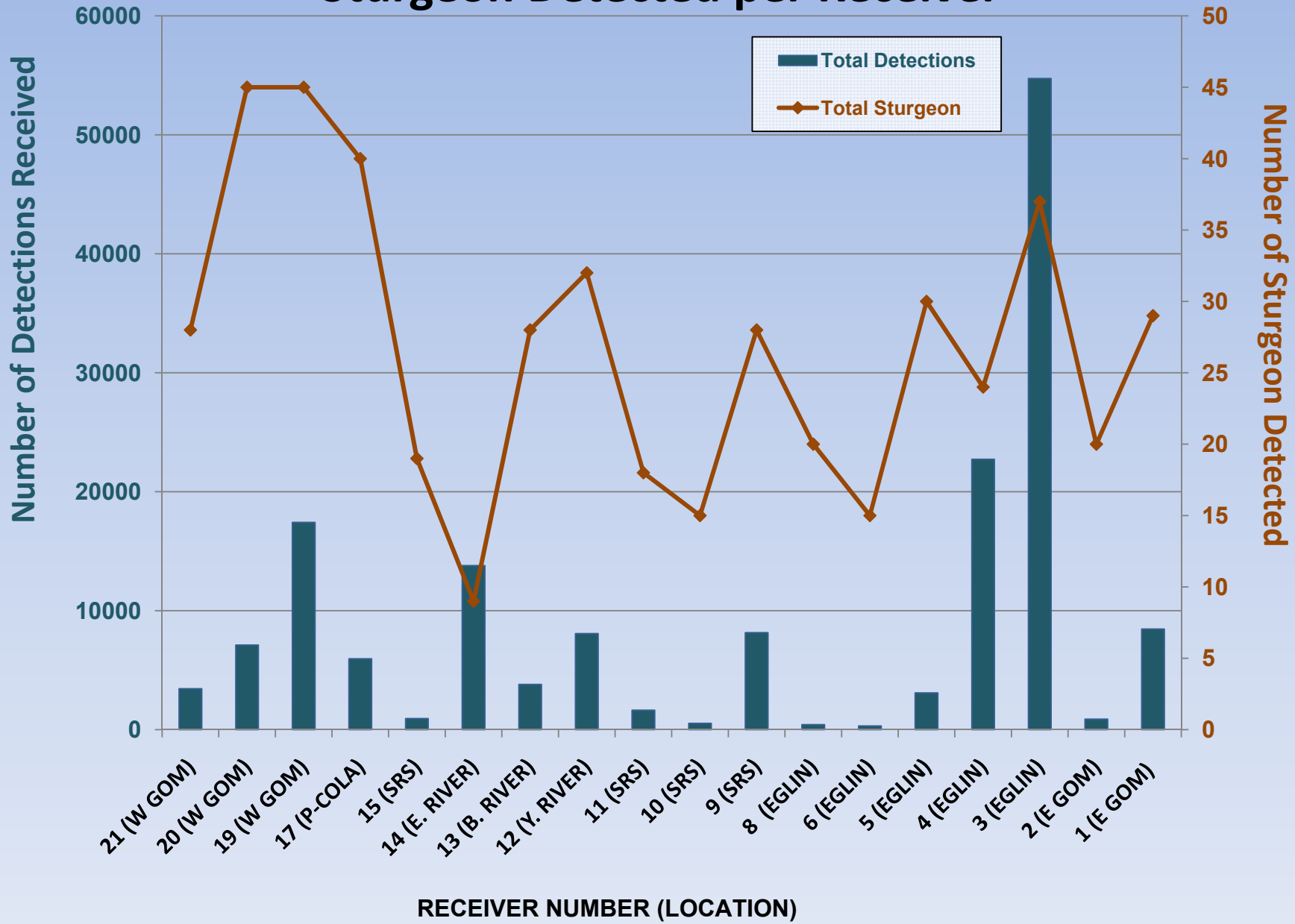
21 % headed east

Number of Detections per Receiver



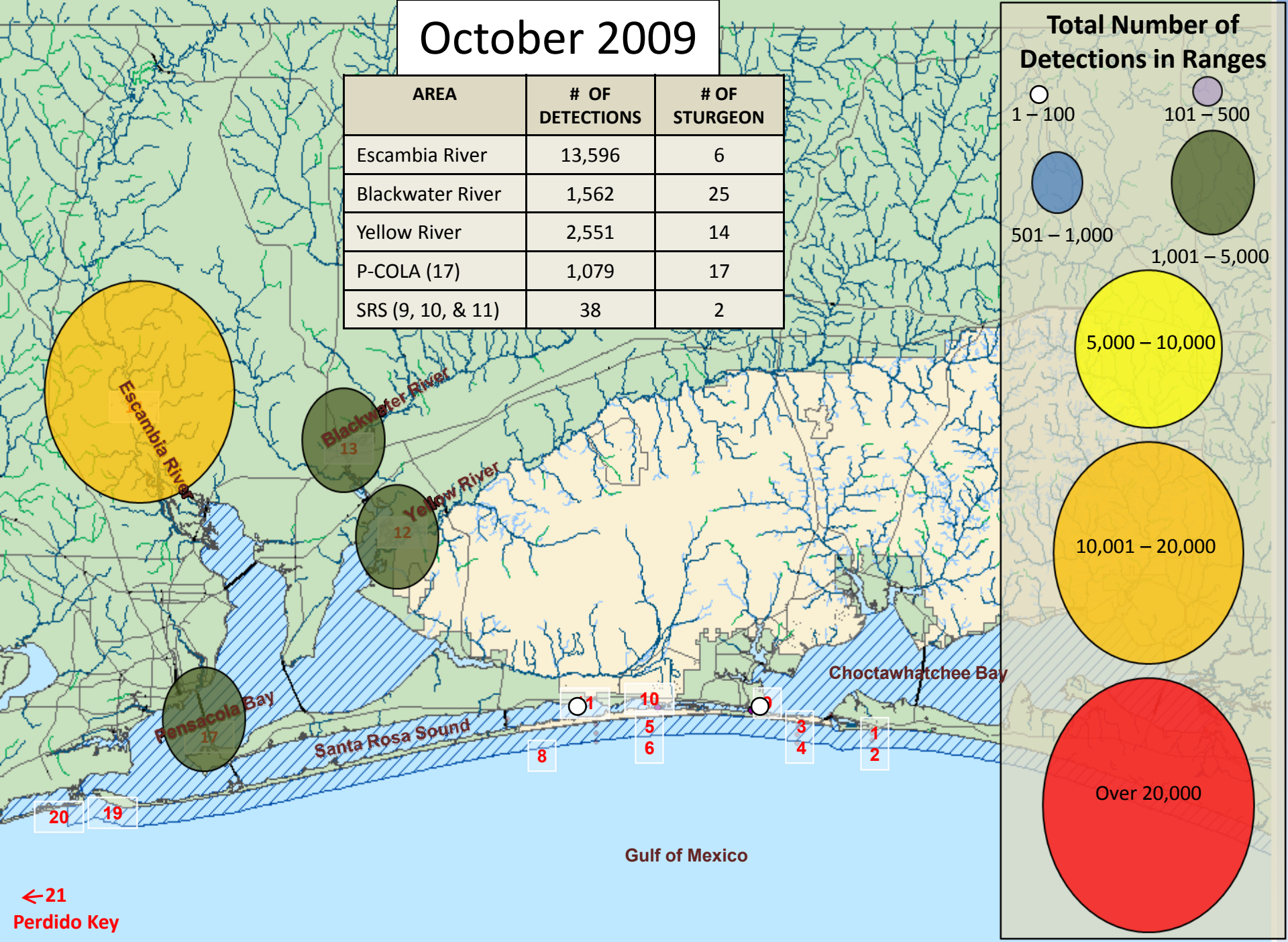

Number of Sturgeon Detected per Receiver
Yellow, Blackwater, & Escambia Rivers
Choctawhatchee River
Number of Sturgeon
0
5
10
15
20
25
30
35
21 (W GOM)
20 (W GOM)
19 (W GOM)
17 (P-COLA)
15 (SRS)
14 (E. RIVER)
13 (B. RIVER)
12 (Y. RIVER)
11 (SRS)
10 (SRS)
9 (SRS)
8 (EGLIN)
6 (EGLIN)
5 (EGLIN)
4 (EGLIN)
3 (EGLIN)
2 (E GOM)
1 (E GOM)
Receiver Number (Location)

Total Detections vs. Total Number of Sturgeon Detected per Receiver



October 2009

AREA	# OF DETECTIONS	# OF STURGEON
Escambia River	13,596	6
Blackwater River	1,562	25
Yellow River	2,551	14
P-COLA (17)	1,079	17
SRS (9, 10, & 11)	38	2

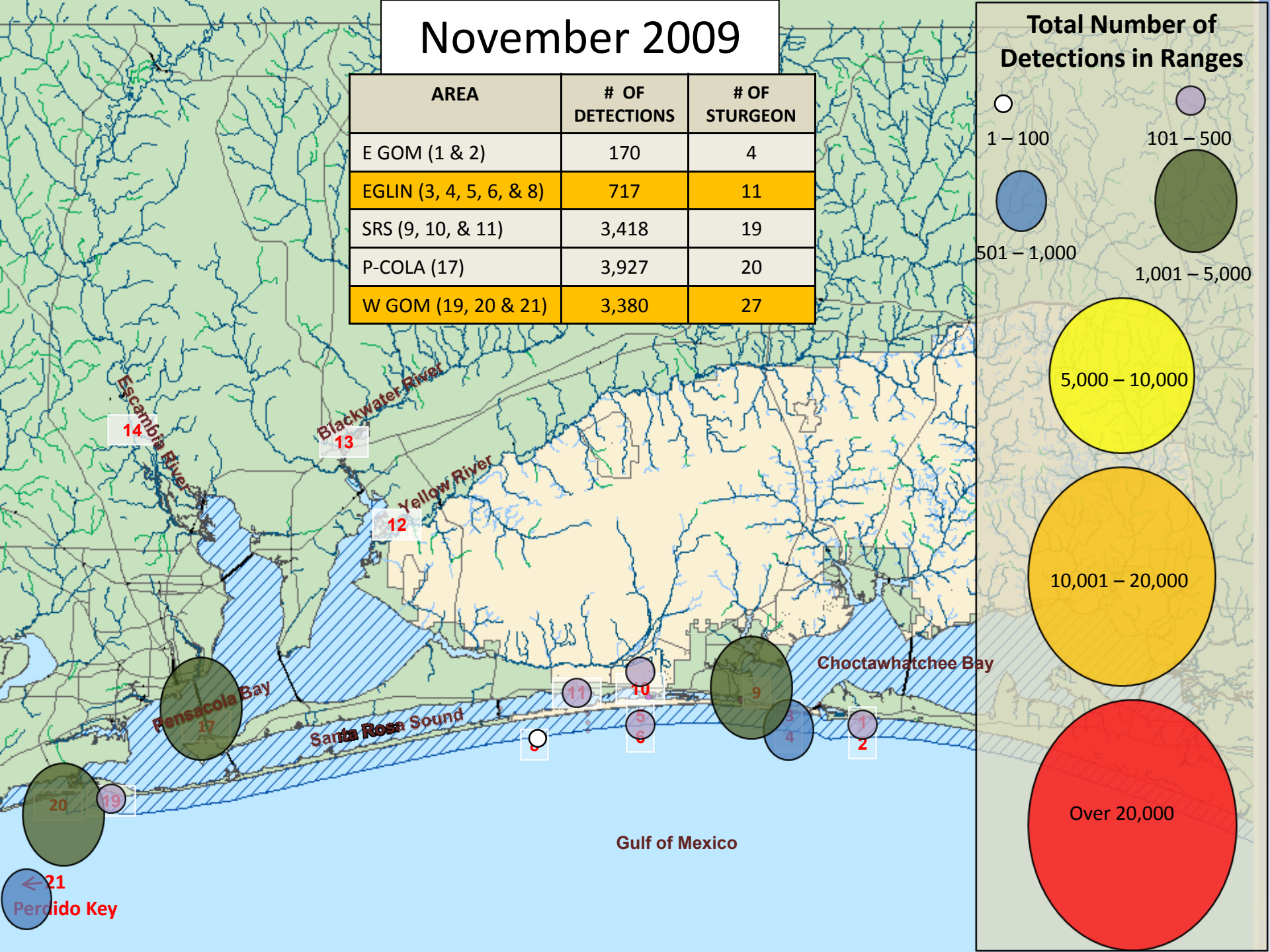


Total Number of Detections in Ranges

- 1 – 100
- 101 – 500
- 501 – 1,000
- 1,001 – 5,000
- 5,000 – 10,000
- 10,001 – 20,000
- Over 20,000

November 2009

AREA	# OF DETECTIONS	# OF STURGEON
E GOM (1 & 2)	170	4
EGLIN (3, 4, 5, 6, & 8)	717	11
SRS (9, 10, & 11)	3,418	19
P-COLA (17)	3,927	20
W GOM (19, 20 & 21)	3,380	27

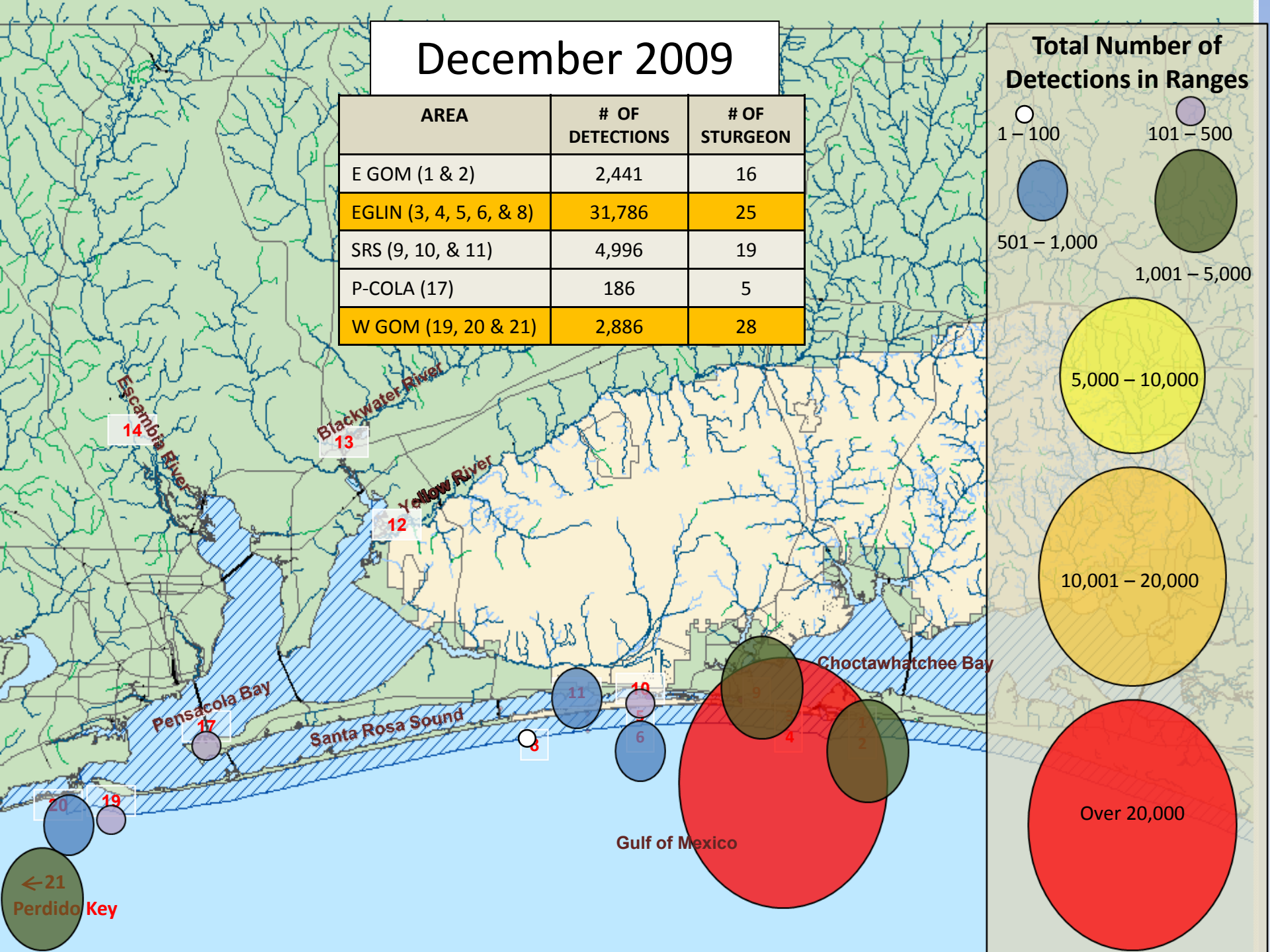


Total Number of Detections in Ranges

- 1 – 100
- 101 – 500
- 501 – 1,000
- 1,001 – 5,000
- 5,000 – 10,000
- 10,001 – 20,000
- Over 20,000

December 2009

AREA	# OF DETECTIONS	# OF STURGEON
E GOM (1 & 2)	2,441	16
EGLIN (3, 4, 5, 6, & 8)	31,786	25
SRS (9, 10, & 11)	4,996	19
P-COLA (17)	186	5
W GOM (19, 20 & 21)	2,886	28

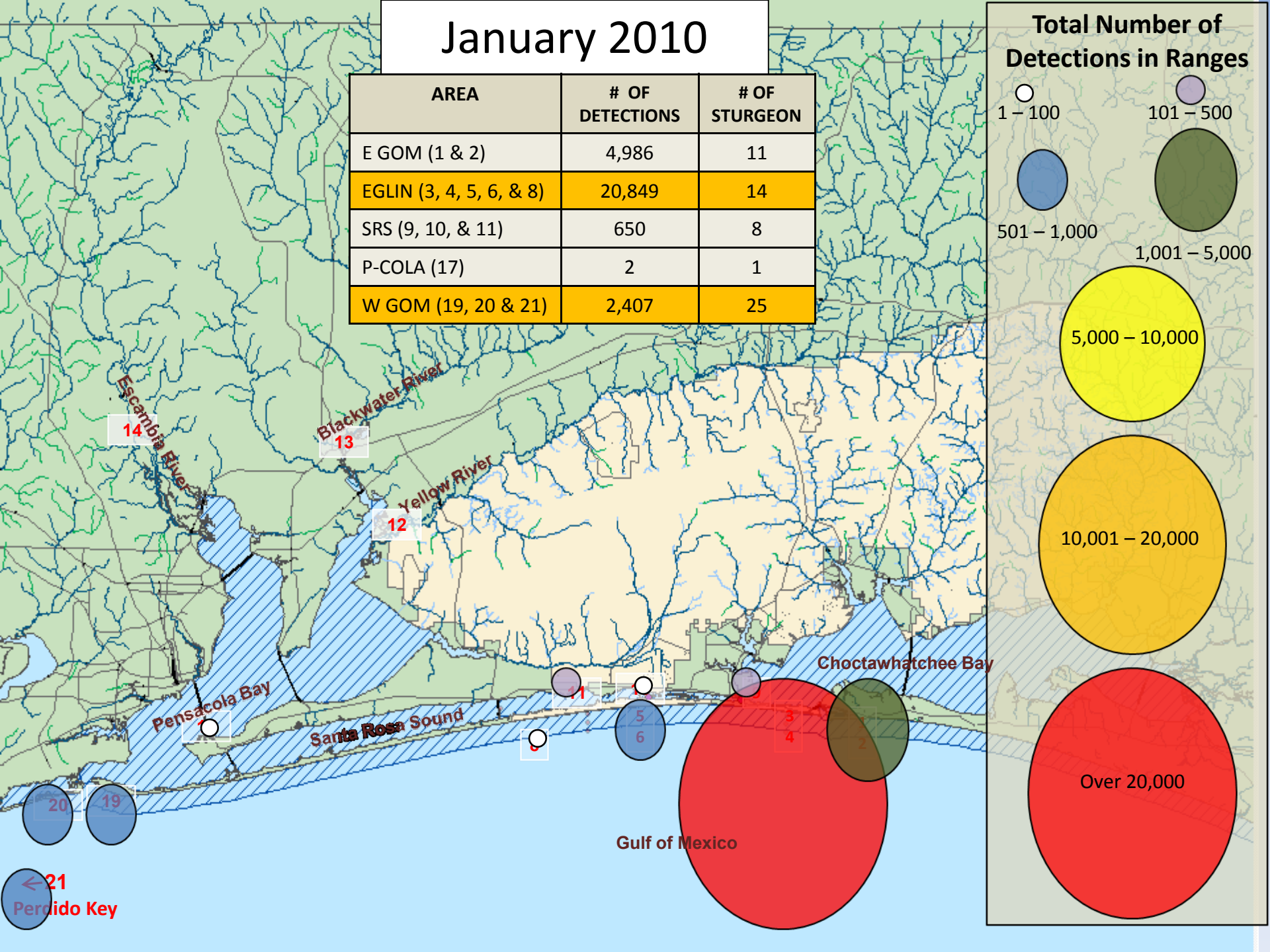


Total Number of Detections in Ranges

- 1 – 100
- 101 – 500
- 501 – 1,000
- 1,001 – 5,000
- 5,000 – 10,000
- 10,001 – 20,000
- Over 20,000

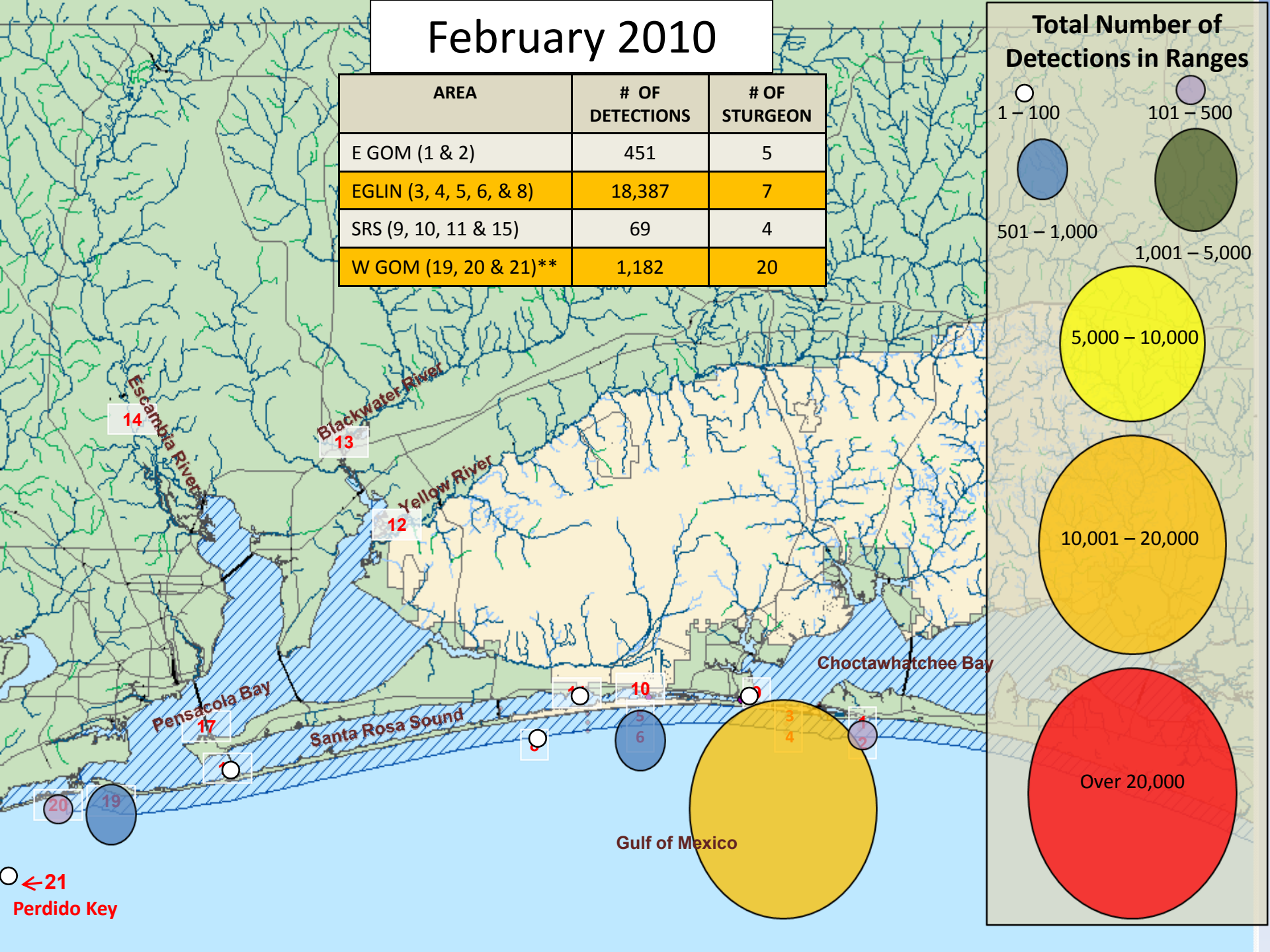
January 2010

AREA	# OF DETECTIONS	# OF STURGEON
E GOM (1 & 2)	4,986	11
EGLIN (3, 4, 5, 6, & 8)	20,849	14
SRS (9, 10, & 11)	650	8
P-COLA (17)	2	1
W GOM (19, 20 & 21)	2,407	25



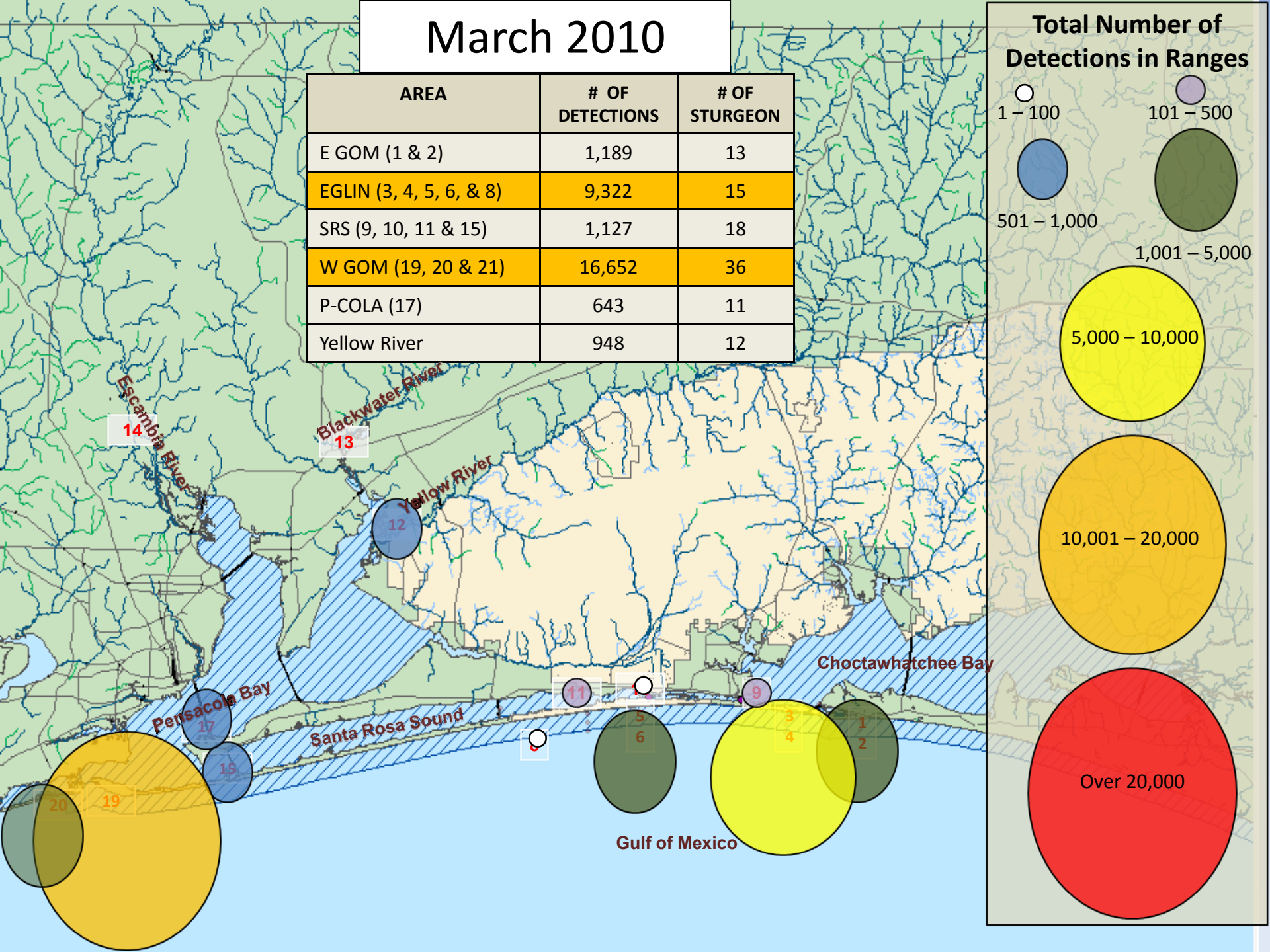
February 2010

AREA	# OF DETECTIONS	# OF STURGEON
E GOM (1 & 2)	451	5
EGLIN (3, 4, 5, 6, & 8)	18,387	7
SRS (9, 10, 11 & 15)	69	4
W GOM (19, 20 & 21)**	1,182	20



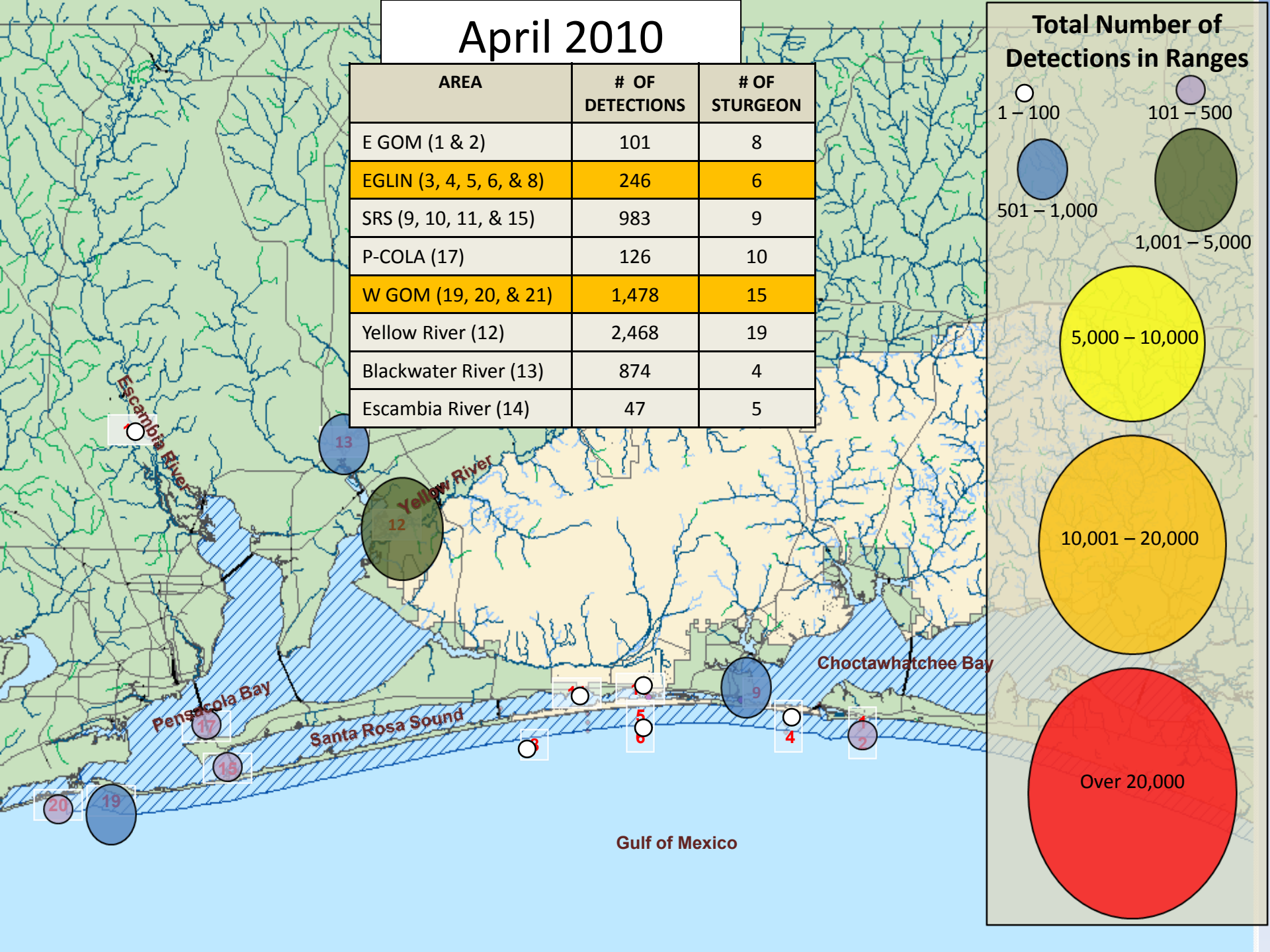
March 2010

AREA	# OF DETECTIONS	# OF STURGEON
E GOM (1 & 2)	1,189	13
EGLIN (3, 4, 5, 6, & 8)	9,322	15
SRS (9, 10, 11 & 15)	1,127	18
W GOM (19, 20 & 21)	16,652	36
P-COLA (17)	643	11
Yellow River	948	12



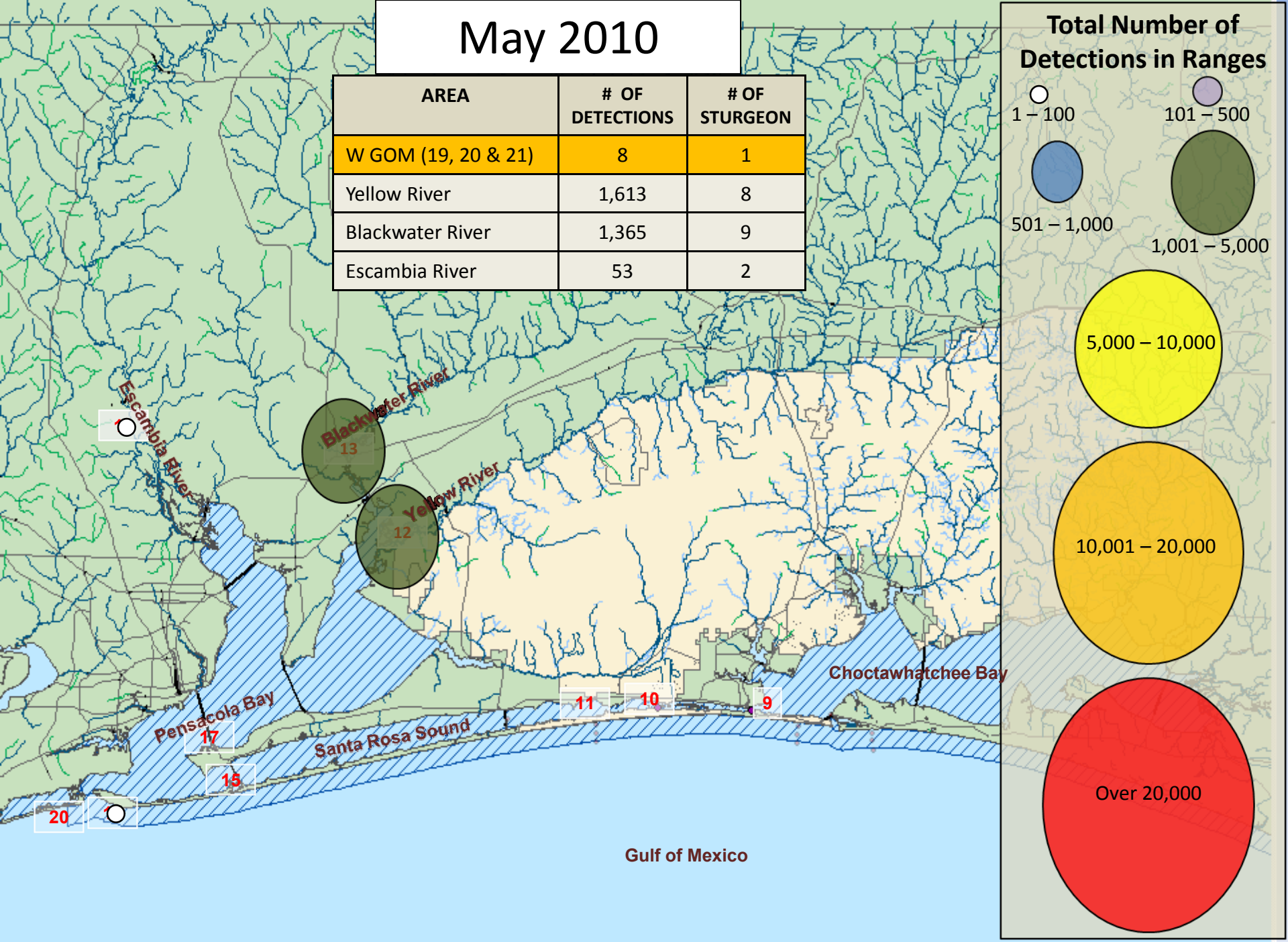
April 2010

AREA	# OF DETECTIONS	# OF STURGEON
E GOM (1 & 2)	101	8
EGLIN (3, 4, 5, 6, & 8)	246	6
SRS (9, 10, 11, & 15)	983	9
P-COLA (17)	126	10
W GOM (19, 20, & 21)	1,478	15
Yellow River (12)	2,468	19
Blackwater River (13)	874	4
Escambia River (14)	47	5



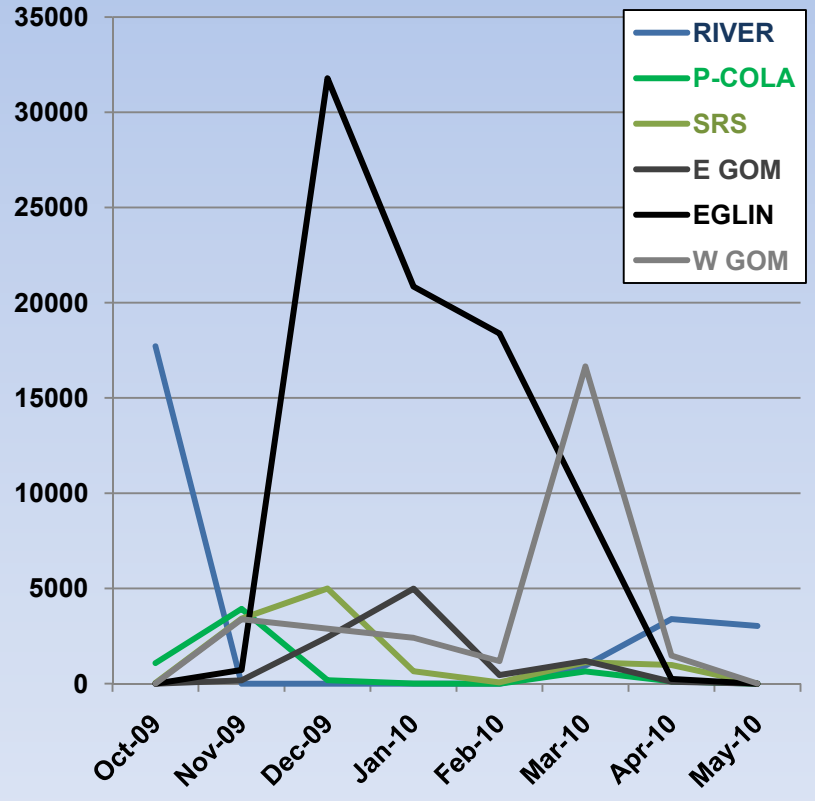
May 2010

AREA	# OF DETECTIONS	# OF STURGEON
W GOM (19, 20 & 21)	8	1
Yellow River	1,613	8
Blackwater River	1,365	9
Escambia River	53	2

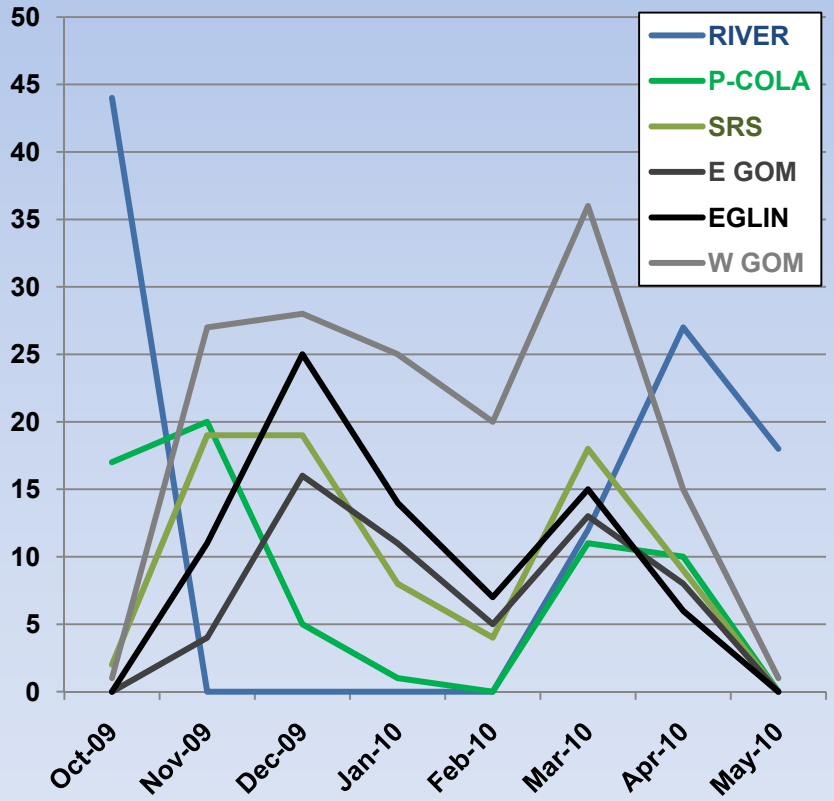


Summary of Data Collected

Detections Received per Location per Month

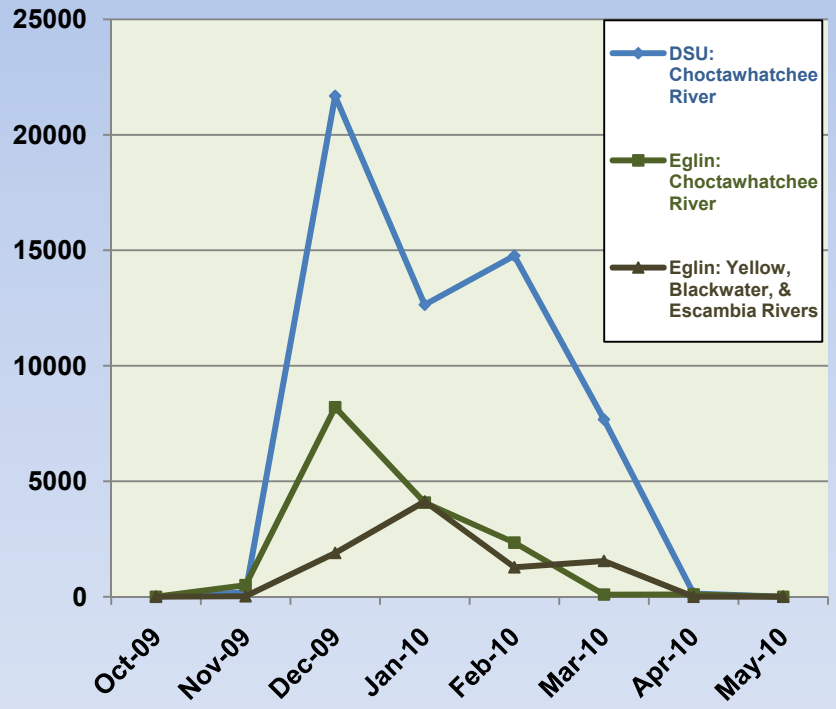


Number of Sturgeon Detected per Location per Month

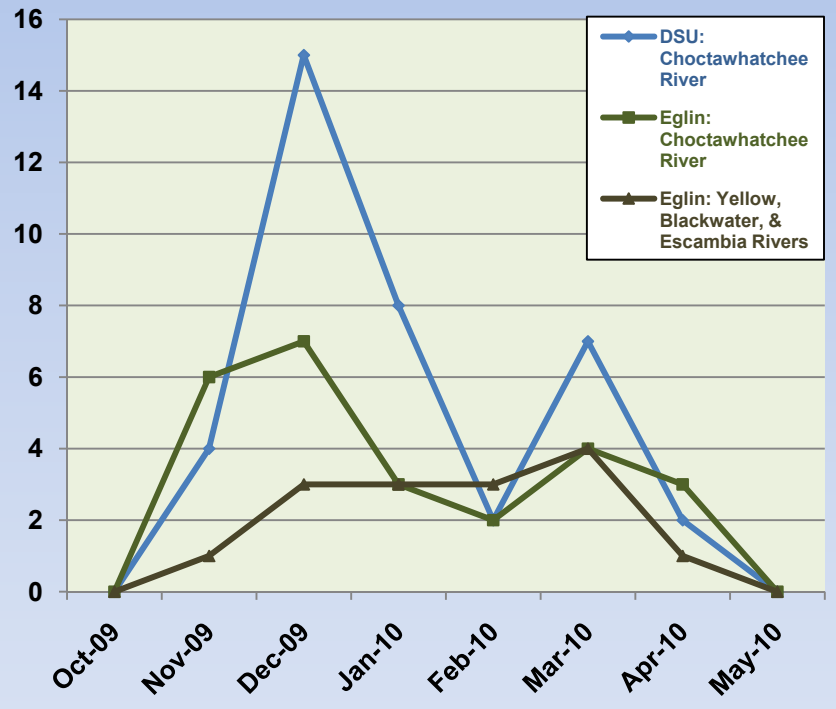


EGLIN RECEIVERS (3, 4, 5, 6, & 8)

Number of Detections Received per Month



Number of Sturgeon Detected per Month

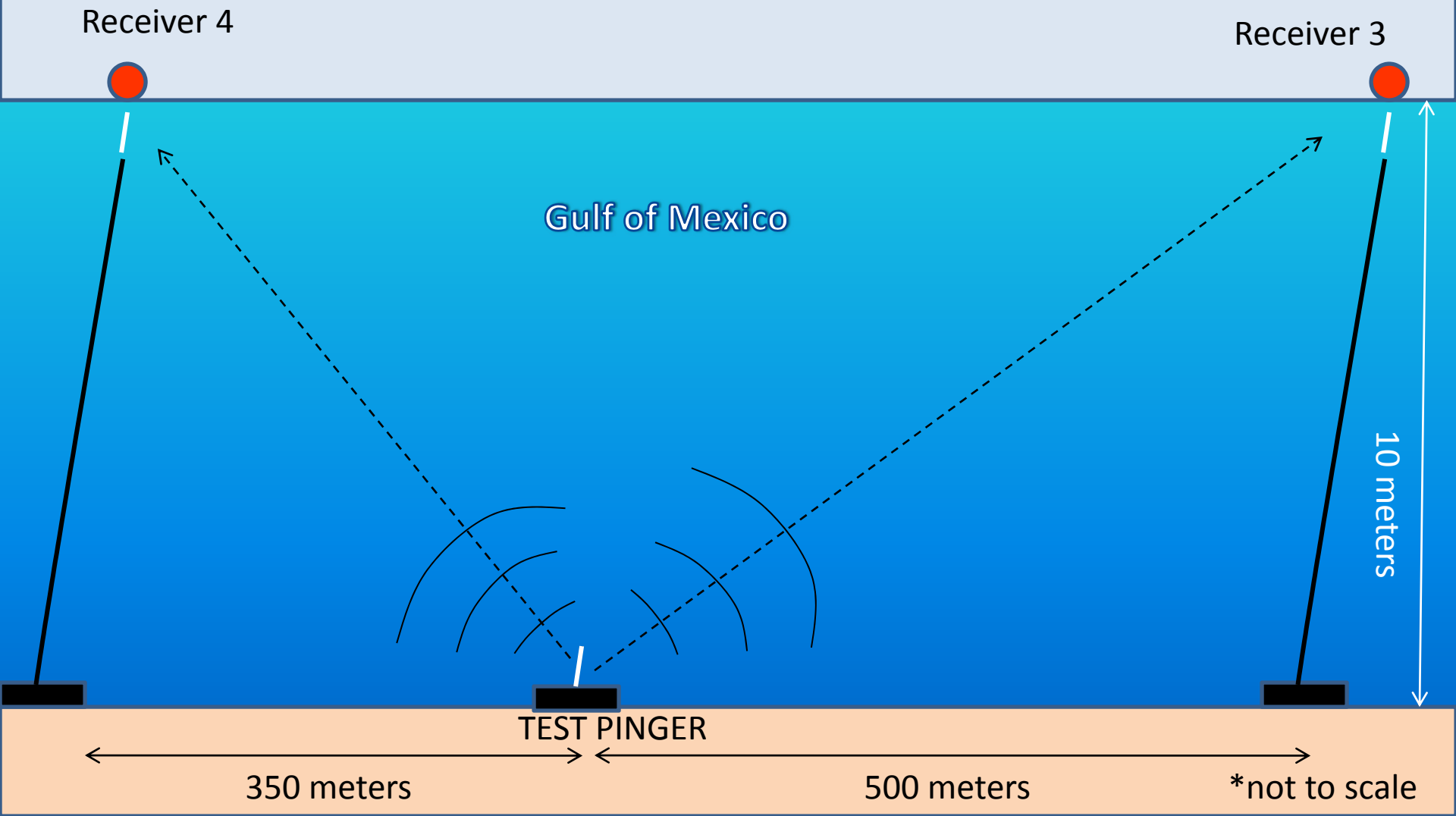


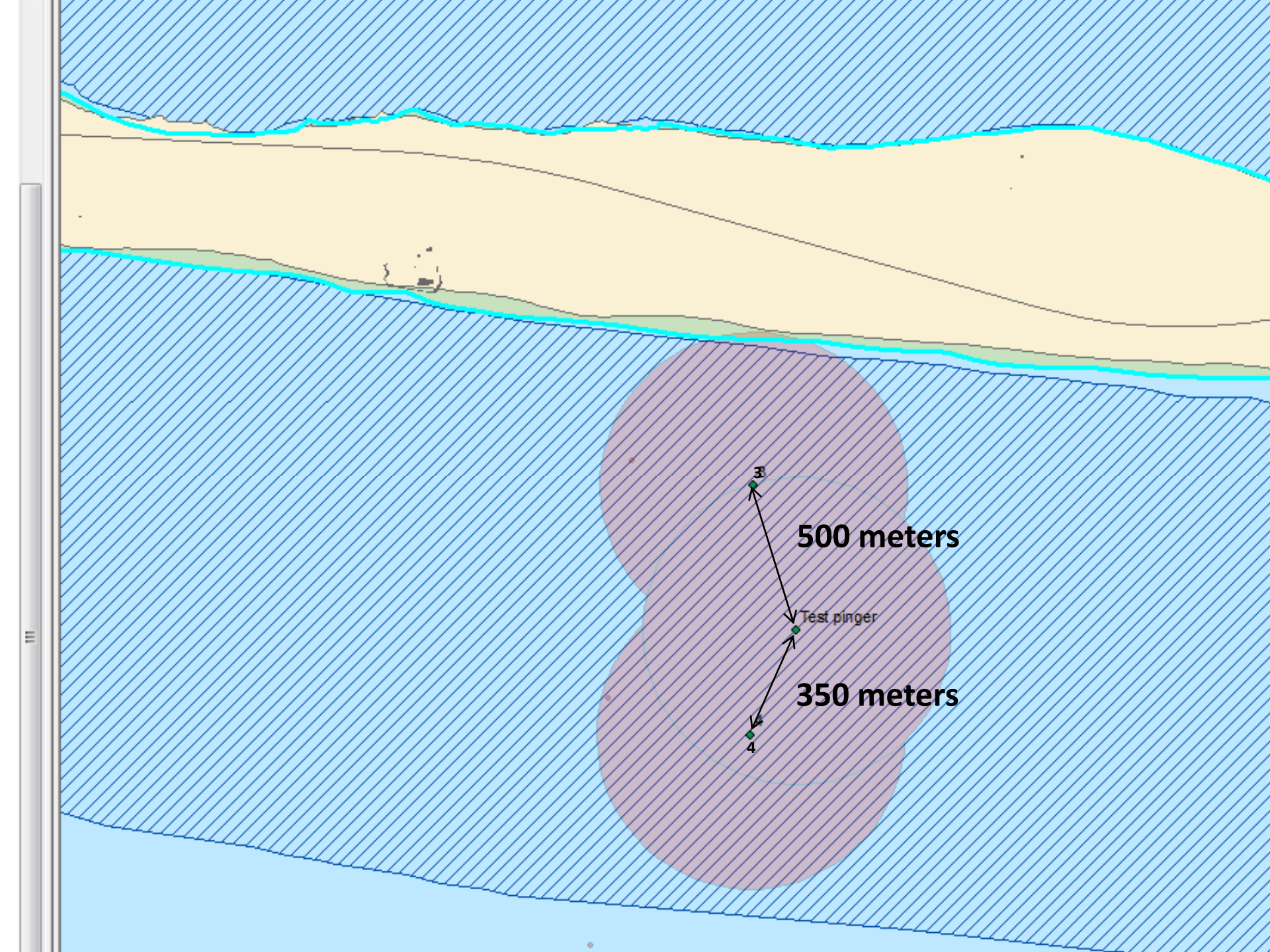
River Fidelity

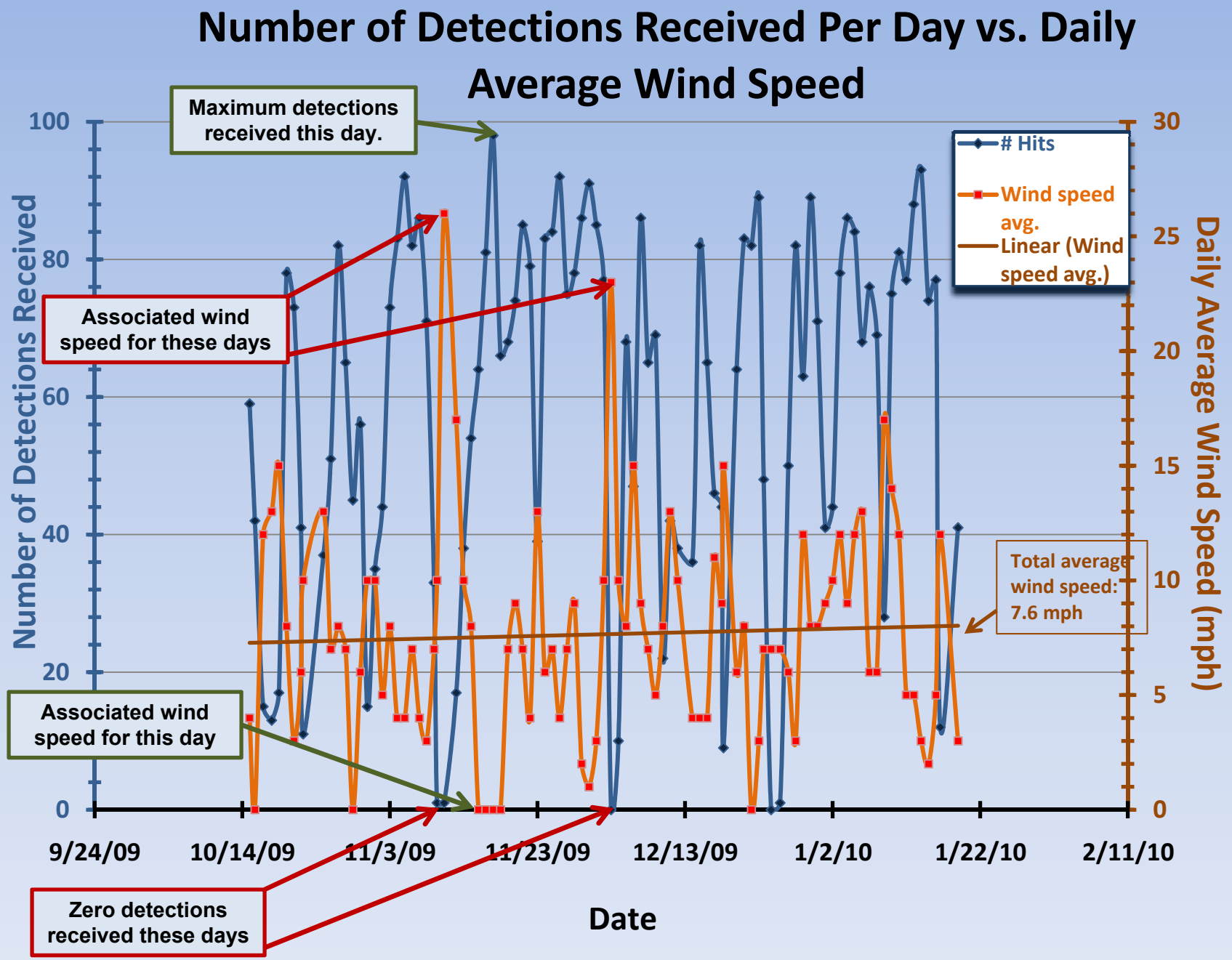
- Of the 39 sturgeon tagged in the 2009 Legacy Study only 22 returned to the same river
- 17 sturgeon (44%) were detected in rivers where they were not originally tagged
  - 12 from Blackwater ended up in the Yellow River
  - 2 from Blackwater ended up in the Escambia River
  - 1 from Escambia ended up in the Blackwater
  - 2 from Blackwater were detected in the Yellow River in April before returning to the Blackwater River in May
- Do not appear to have high river fidelity – Justifies grouping sturgeon from these river systems as one group

TEST PINGER ANALYSIS

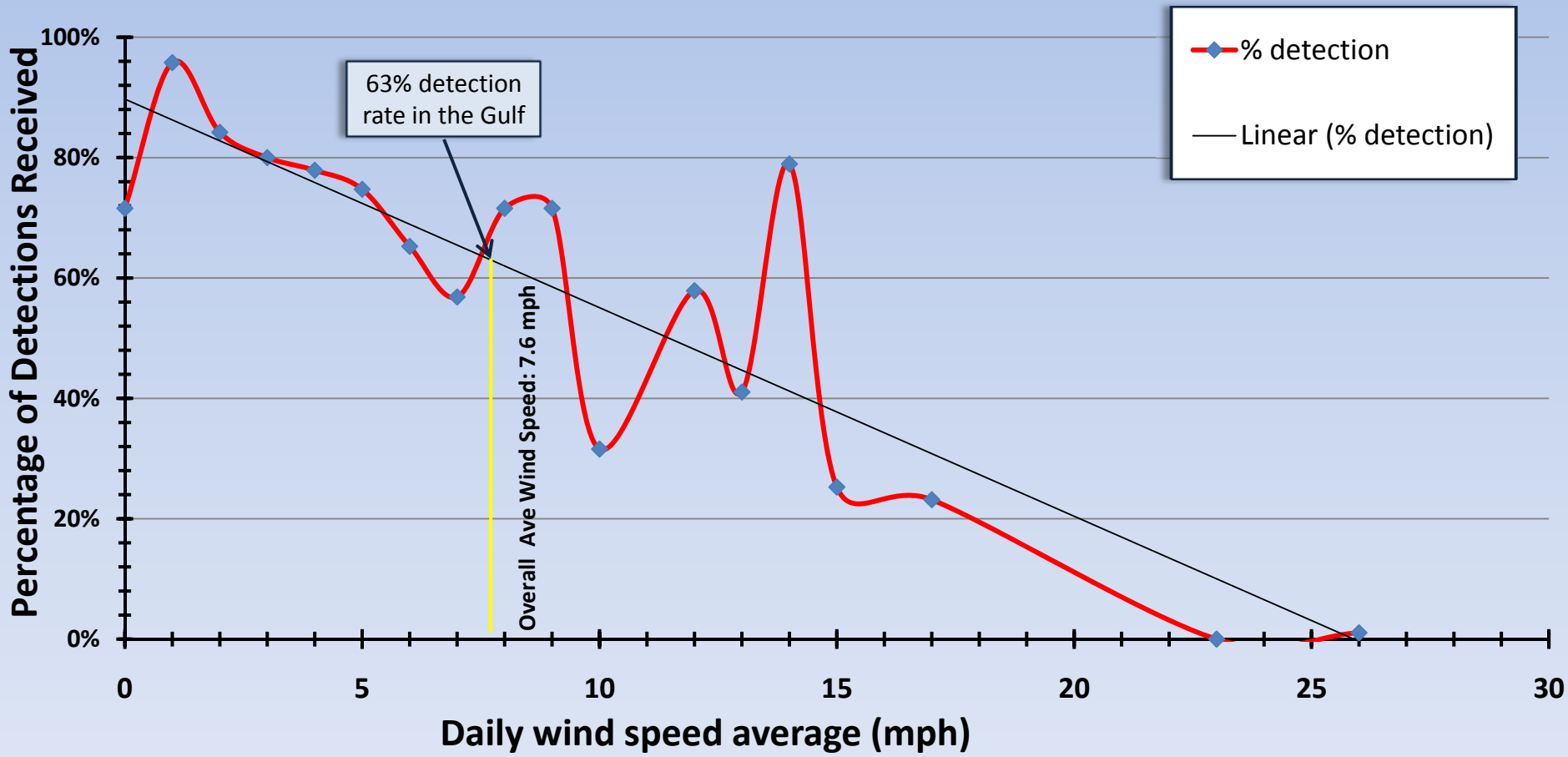
HOW MANY DETECTIONS ARE
WE ACTUALLY RECEIVING?




3
500 meters
Test pinger
350 meters
4


Number of Detections Received Per Day vs. Daily Average Wind Speed
Maximum detections received this day.
Associated wind speed for these days
Associated wind speed for this day
Zero detections received these days
Total average wind speed: 7.6 mph
Hits
Wind speed avg.
Linear (Wind speed avg.)
Number of Detections Received
Daily Average Wind Speed (mph)
Date
100
80
60
40
20
0
30
25
20
15
10
5
0
9/24/09
10/14/09
11/3/09
11/23/09
12/13/09
1/2/10
1/22/10
2/11/10

Percentage of Detections Received vs. Average Wind Speed



500 meters is too far apart for Gulf of Mexico receivers

350 meter ping distance

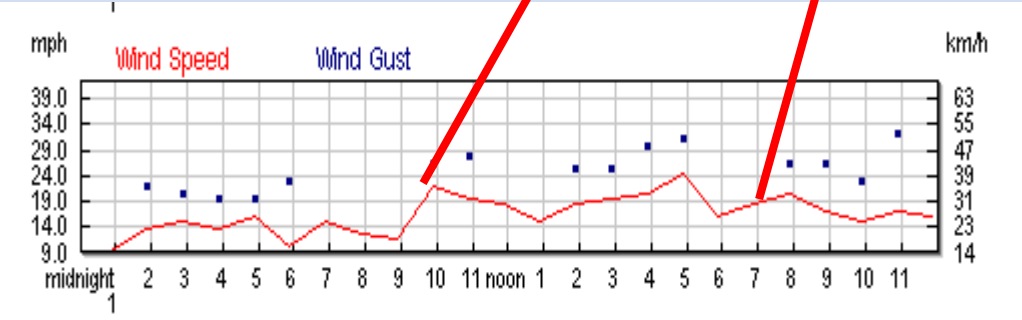
Low reception at 350 meters

500 meter ping distance

3pm on 10/15/09 – 9am on 10/16/09
No reception at 500 meters

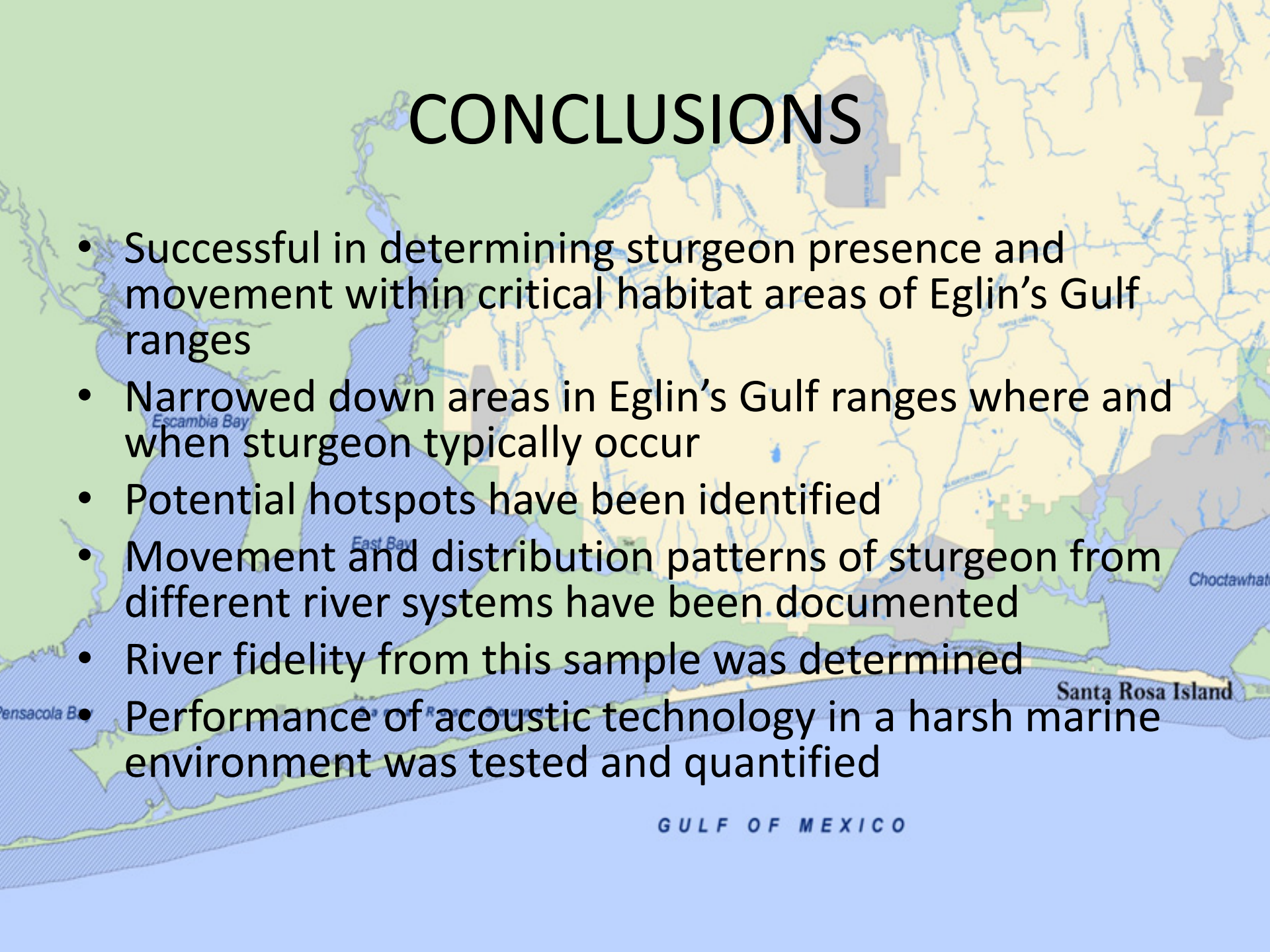
9am – 10pm on 10/17/09
No reception at 500 meters

10/14/2009 0:00 | 10/15/2009 0:00 | 10/16/2009 0:00 | 10/17/2009 0:00 | 10/18/2009 0:00 | 10/19/2009 0:00



CONCLUSIONS

- Successful in determining sturgeon presence and movement within critical habitat areas of Eglin's Gulf ranges
- Narrowed down areas in Eglin's Gulf ranges where and when sturgeon typically occur
- Potential hotspots have been identified
- Movement and distribution patterns of sturgeon from different river systems have been documented
- River fidelity from this sample was determined
- Performance of acoustic technology in a harsh marine environment was tested and quantified



Plans for the Future

- One more year of Legacy Funding to continue this study
  - Tag 40 more sturgeon in the Escambia, Yellow, and Blackwater Rivers
  - Redeploy our 18 receivers in the rivers, bays, and Gulf areas surrounding the EGTTR and SRI
- Issues to be addressed
  - Explain discrepancies between 2008 Pilot Study results and 2009 Legacy Study results
  - Investigate level of river fidelity by exploring sturgeon occurrence in other nearby rivers
  - Continue testing receiver performance in the Gulf environment
  - Possibly begin documenting impacts in Gulf habitat utilization from the oil spill

ACKNOWLEDGEMENTS

- Eglin Natural Resources Section
- Department of Defense Legacy Resource Management Program
- National Marine Fisheries Service
- Florida Fish and Wildlife Conservation Commission
- Mike Randall and Ken Sulak – U. S. Geological Survey
- Frank Parauka – U.S. Fish and Wildlife Service
- Dewayne Fox and Kate Fleming – Delaware State University


??? QUESTIONS ???