



GULF STURGEON STANDARDIZED ABUNDANCE AND MORTALITY STUDY:
YEAR TWO REPORT
BY
IVY E. BAREMORE
J. DREW ROSATI



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Panama City Laboratory
3500 Delwood Beach Rd.
Panama City, FL 32408

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U. S. DEPARTMENT OF COMMERCE
Rebecca M. Blank, Acting Secretary for Commerce

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Kathryn D. Sullivan, Acting Administrator for Oceans and Atmosphere

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Ivy Baremore
Fishery Biologist
National Marine Fisheries Service
Panama City Laboratory
3500 Delwood Beach Rd.
Panama City, FL 32408

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Introduction

The Gulf sturgeon, (*Acipenser oxyrinchus desotoi*) was listed as threatened under the Endangered Species Act (ESA) in 1991. This listing was a result of population decline due to heavy fishing mortality in the early twentieth century, as well as probable habitat loss in its historic range (56 FR 49653). Periodic assessments of the Gulf sturgeon are conducted by the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS). The most recent five-year review recommended the threatened listing under the ESA continue given low abundance in several riverine populations, along with continued habitat loss in critical spawning and nursery areas (NMFS and USFWS, 2009).

The 2009 Gulf Sturgeon 5-Year Status Review (NMFS and USFWS, 2009) brought forward three recommendations for this species: 1) to prevent further reduction of existing wild populations of Gulf sturgeon within the range of the subspecies, 2) to establish population levels that would allow delisting of the Gulf sturgeon by management units, and 3) to establish a self-sustaining population that could withstand directed fishing pressure within management units. Concurrently Pine and Martell (2009), while analyzing currently available data, found that trends in abundance were unreliable due to “low recapture rates and sparse data.” Therefore the 5-Year Review recommended data gathering be improved and standardized. A workshop was organized and hosted by NMFS and USFWS in 2009 to identify survey protocols and monitoring procedures in order to fulfill the data needs of future assessments. The primary objective was to obtain reliable estimates of natural mortality (M) and abundance throughout the range of the Gulf sturgeon. The focus of this multi-year survey and monitoring project is to facilitate these objectives by standardization of data collection methodology and to collect critical data in order

to assess the status of the Gulf sturgeon. In addition, the project will provide opportunity to obtain other life history information.

Five of the seven major rivers that support reproducing Gulf sturgeon populations (68 FR 13370) were included in the initial year of the monitoring project (Apalachicola, Choctawhatchee, Yellow, Pascagoula, and Pearl), and serve as the basis for a five-year natural mortality and abundance study (NMFS and USFWS, 2010). Separate studies undertaken by researchers participating in this project provided additional data from the Suwannee, Ochlockonee, Blackwater, and Escambia Rivers. Other projects also expanded sampling into bay systems during winter and early spring months, including Choctawhatchee, Escambia, and Mobile Bays. In order to assess M, acoustic transmitter tags were implanted into Gulf sturgeon. Presence/absence was identified via a system of listening “gates” established in the five rivers to detect sturgeon as they exited the rivers in the fall and reentered in the spring. The gates are passive listening stations (VEMCO VR2Ws), and the detections will be based on active transmitters (VEMCO V16s). The goals of the cooperative study are as follows:

1. Tagging - Tag 20 Gulf sturgeon every year for three years from each of the five previously named rivers with V16s. Fish will be collected during fall outmigration in the rivers. This assures that sturgeon are concentrated and avoids surgical procedures on fish during the active spawning period (spring).
2. Deploy receivers - Receivers at the mouths of the five named rivers will act as gates. Placement of additional receivers in all other rivers known to be inhabited by Gulf sturgeon will detect potential inter-riverine movements.

3. Monitor receivers - The V16s have a battery life of approximately six years, therefore receivers will be maintained and the data downloaded for five years to capture data over the 5-year period.

Additional goals include determining river fidelity, and estimating life history parameters such as growth rate and age distribution, genetic tissue sampling, identification of spawning sites, and standardization of tagging methodology (i.e. PIT tags). Gulf sturgeon scientists across the Gulf of Mexico are collaboratively collecting ageing structures, blood and tissue samples, and water samples to assist in research to facilitate conservation of the Gulf sturgeon.

An overview of the initial year of this project has been previously published (Baremore and Rosati, 2011). A total of 174 Gulf sturgeon were implanted with V16 transmitters in the fall of 2010 in eight rivers. Receivers were deployed in ten rivers throughout the range of the Gulf sturgeon. Monitoring of receivers continues on a regular basis.

This report summarizes sampling efforts for 2011, which was the second of three planned years of intensive tagging with acoustic transmitters throughout the range of the Gulf sturgeon. Efforts were focused on the five “core” rivers defined previously, however additional funding and complementary projects increased the number of acoustic transmitters and river locations by a substantial amount.

Methods

Sampling, Year 2 (2011)

Additional Gulf sturgeon monitoring projects were developed in response to the Deepwater Horizon Event in 2010, therefore Gulf sturgeon sampling activities expanded into spring months. Researchers used drift and anchored gillnets to passively fish for Gulf sturgeon in bays and rivers from February—November 2011. Due to the increase in sampling and because Gulf sturgeon tagged in 2010 were encountered throughout the year, the results presented in this study will encompass the entire year's sampling efforts. Gillnets were deployed in locations either based on historic presence of Gulf sturgeon, or were actively set where Gulf sturgeon had been located using side-scan sonar or hydrophones. Locations and fishing methods differed by the time of year, with both anchored and drift gillnets used throughout the year. Specific methods can be found in Baremore and Rosati (2011). Acoustic receivers were maintained and monitored on 10 rivers and bay systems (Fig. 1).

Standardized paper datasheets were distributed to Gulf sturgeon researchers, along with 134.2 kHz PIT tags, PIT tag scanners, and vials for tissue samples. Twenty V16s were distributed to researchers on each of the five core rivers defined previously, with additional tags deployed by concurrent Gulf sturgeon studies and for the ongoing Deepwater Horizon Event sampling. Each V16 acoustic transmitter provided by the monitoring project was coated in medical grade elastomer (FactorII silicone) to reduce possible rejection by the fish (Damon-Randall, et al., 2010), though tags deployed for other projects may not have been coated. Data for each trip was entered into a centralized Oracle database. Sections of the second marginal fin ray were collected from a subset of Gulf sturgeon for ageing analysis (Baremore and Rosati, 2011).

During spring and summer months, captured Gulf sturgeon were scanned for PIT tags and measured for fork (FL) and total lengths (TL), using a tape measure across the body from the tip of the snout, and were weighed (kg). PIT tags with a frequency of 134.2 kHz frequency were implanted below the dorsal fins of all Gulf sturgeon unless a 134.2 kHz tag was detected in the initial scan. Additional samples were collected according to the ancillary projects' protocols, and the fish was released. Gulf sturgeon selected for acoustic monitoring were surgically implanted with transmitters, using methods described in Baremore and Rosati (2011).

Data and analysis

Length-frequencies were constructed for all Gulf sturgeon captured, and histograms were produced for all locations and the types of tags implanted. Recaptures were documented by river, and in some cases individual recapture histories were documented. Recapture rates were calculated using only PIT tag numbers due to inconsistencies with external tag numbering and recording. Because of the limited time frame of data obtained from the Suwannee River, recapture rates are not presented for this location.

Historic databases (1977-2007) from three sources were obtained for Gulf sturgeon. Data included captures of Gulf sturgeon throughout most Florida rivers that are known to support Gulf sturgeon. Each capture record included lengths (FL, TL), weight (kg) when taken, date, and all tag numbers associated with each fish at the time of capture. One historic database included ages of a subset of Gulf sturgeon. These records were incorporated into the Oracle database to enhance the ability to reconstruct the capture histories of Gulf sturgeon.

Results

A total of 658 unique Gulf sturgeon were captured, and 657 were measured by collaborative researchers in nine rivers and two bay systems from February 8—November 13, 2011 (Table 1, Fig. 2). Forty five were captured at least twice within the same calendar year, with two Gulf sturgeon captured three times. Most of the within-year recaptures occurred within a few days of each other, though several were recaptured months apart and in different systems. Overall the largest number of Gulf sturgeon were captured on the Yellow River (161), followed by the Blackwater (147), and Apalachicola Rivers (139). Captured Gulf sturgeon ranged in size from 41 to 209 cm FL and 0.35 to 80.6 kg. The Apalachicola, Blackwater, and Yellow Rivers had the broadest size ranges of Gulf sturgeon sampled, and all sizes were well represented overall. Data presented from the Suwannee River only include Gulf sturgeon tagged with V16 transmitters during three sampling days in October, 2011. Overall length-frequencies showed a fairly bimodal distribution of lengths, with peaks around 85 and 125 cm FL. However, these two modes were driven mostly by the Apalachicola and Blackwater Rivers; the Apalachicola was dominated by juveniles, while the Blackwater had a large number of sturgeon between 100 and 150 cm FL. These two rivers contributed nearly half of the total number of Gulf sturgeon captured in 2011 (Table 1, Fig. 3). On the five core rivers (Apalachicola, Choctawhatchee, Pearl, Pascagoula, and Yellow), the size distribution was representative of the entire size range of the species (Fig. 3).

New 134.4 kHz frequency PIT tags were deployed in 532 Gulf sturgeon overall (Table 2, Fig. 4). Of those PIT tagged in 2011, 434 (82%) were virgin captures. When taking into account the total number of Gulf sturgeon captured, approximately 33% had been previously PIT tagged

(Table 3). Because sampling techniques were different among systems and times of year, recapture rates were broken down by targeted vs. passive sampling (Table 3). Among rivers, the recapture rate was highest on the Choctawhatchee River (50%), followed by the Apalachicola (37%), and the Yellow River (33%). Recapture rates for Gulf sturgeon collected in bay systems during the early spring was high, at 56 and 45% for Choctawhatchee and Escambia Bays, respectively. Sampling in the bays was generally undertaken in winter/spring months, and net locations were chosen based on known presence of V16-tagged sturgeon using a hydrophone. No Gulf sturgeon were captured in Mobile Bay. Only the first captures of these fish were used to calculate recapture rates, and the Suwannee and Ochlockonee Rivers were not included in analysis because data were not available for the entire sampling period.

Passive acoustic transmitters were surgically implanted in 177 Gulf sturgeon on nine rivers from August—November 2011 (Table 4, Fig. 5). For the purposes of the Gulf Sturgeon Cooperative Research Project, along with several other complementary Gulf sturgeon studies, 155 Gulf sturgeon in eight rivers were surgically implanted with VEMCO V16 transmitters. The majority of Gulf sturgeon implanted with passive transmitters were > 130 cm FL.

In addition to the new acoustic transmitters deployed in 2011, 17 Gulf sturgeon implanted with transmitters during the 2010 sampling period were recaptured (Table 5). Four of the 17 recaptured Gulf sturgeon had also been captured prior to the 2010 sampling period and were identified by their PIT tag numbers, while one tag of unknown origin was also found. Fish with V16 45760 was 127 cm FL (19 kg) upon its first capture in 2003 in the Yellow River; subsequently it was captured in the Blackwater in the fall of 2010 at 167 cm FL (39 kg),

implanted with the V16, and sexed as a female. Upon recapture in the early spring of 2011 in Escambia Bay the female was 168 cm FL (55 kg).

Several Gulf sturgeon caught during the 2011 sampling season, which were not implanted with acoustic transmitters, had been recaptured multiple times over the last ten years. One such sturgeon was captured initially in the Ochlockonee River in 2002, and subsequently captured in the same river in 2003, 2006, and 2011, having grown from 90.2 cm FL (5.2 kg) to 161 cm FL (36 kg). Another such fish was collected in the Suwannee River in 1998 at 124 cm FL, then was captured in 2004, 2005, 2006, and 2011 in the Apalachicola River (Fig. 6).

Total fishing time was 4787.7 hours; however, data from the Suwannee and Ochlockonee Rivers were not complete for the year and therefore were not included in CPUE calculations. Excluding the two rivers, a total of 668 Gulf sturgeon captured (including within year recaptures), resulting in an overall CPUE of 0.14 Gulf sturgeon caught per hour (Table 6, Fig. 7). The highest effort was reported for the Yellow River, with 1624.3 hours of fishing time, though CPUE was fairly low (0.11). Effort was also high for the Pearl River and Yellow Rivers. The lowest CPUE was for the Pearl River, which suffered a large scale fish kill due to a paper mill discharge in August 2011; this likely had an impact on the CPUE. Outmigration-type surveys were conducted on the Blackwater, Escambia, Pearl, Pascagoula, and Yellow Rivers. Of those surveys, the Blackwater River had the highest CPUE (1.98), with an overall fishing time of 83 hours. Taking into consideration the larger time scale of the sampling period of this report, CPUE values were very similar to those reported in 2010 (Baremore and Rosati, 2011).

Historic data from three sources were incorporated into the Oracle database, including catch information for Gulf sturgeon from the Suwannee River, FL to the Yellow River, FL. Overall, more than 18,000 records were incorporated, with records of Gulf sturgeon dating back to 1976. The tracking capabilities of the Oracle database allows researchers to find complete capture histories of Gulf sturgeon based on PIT, t-bar, V16, or any other tag number encountered (see Fig. 6 for example). Data can also be outputted in raw format based on date, location, or researcher. Though the historic data are fairly encompassing, several years of data have not been incorporated to date. Likewise, historic data from the western range of the species are not included. Data gaps in ongoing sampling are also evident. Fifteen Gulf sturgeon were recaptured with 134.2 kHz PIT tags in 2011 that could not be identified in the recapture history. This indicates that some data have not been resolved, and adversely affects the results of these reports.

The Gulf Sturgeon Fin Ray Archive was established, with a total of 636 primary dorsal fin rays (“spines”) and secondary marginal dorsal fin rays (“fin rays”) in the collection. Of these, 472 spines were donated by K. Sulak, and 56 fin rays were collected from live sturgeon on the Choctawhatchee, river, 30 from the Choctawhatchee Bay, 25 from the Apalachicola river, 24 from the Yellow River, and 29 spines from the Pascagoula river. All spines and fin rays collected through 2011 have been sectioned and mounted on microscope slides with Cytoseal mounting medium. Ageing analysis is ongoing and results will be published in a peer-reviewed journal. As more spines and fin rays are collected, ages will be assigned as samples are processed and sections will be archived at the NMFS Panama City Laboratory for future analysis.

Discussion

Catches on the two western-most rivers, the Pearl and Pascagoula, were low even in respect to their historically low catches. A late-season tropical storm in the Gulf of Mexico may have caused Gulf sturgeon in the Pascagoula River to move into the Gulf of Mexico earlier than usual, and therefore before researchers had sampling equipment in place for the fall outmigration. However, in the Pearl River, a paper mill inadvertently released an excessive amount of “black liquor,” causing a massive fish kill in August 2011. Several dozen Gulf sturgeon were among the thousands of dead fish and shellfish catalogued. Of the Gulf sturgeon collected, none appeared to have been tagged for this project, but the fish kill likely had an effect on the low catch in 2011.

Originally, V16 tags were to be implanted in 100 Gulf sturgeon each year for three years with monitoring continuing for a total of five years. That objective has been exceeded for the first two years of the project, with the increase in the number of transmitters leading to an expansion into several non-core rivers. The goal of 20 V16 transmitters per river has been met for three of the five core rivers for the first two years, with the obvious exception of the Pascagoula and Pearl Rivers due to extremely low catches. Preliminary findings from recaptures of sturgeon tagged with PIT tags and V16’s indicate that some Gulf sturgeon, and especially those in the Florida Panhandle region, move among rivers quite freely over time. There are also quite a few cases of river-fidelity, in which Gulf sturgeon captured many times over a period of more than 10 years in the same river. Because sex information is limited, it is unclear whether site fidelity is a sex-specific characteristic, or if other factors affect river fidelity.

Overall CPUE values for 2011 were lower than that reported for 2010, however it should be noted that data used to calculate 2010 values were restricted to the last four months of the year. When compared among similar survey types, CPUE values were similar. The Choctawhatchee River had the highest CPUE overall, with 2.0 Gulf sturgeon captured per hour of fishing, followed by the Apalachicola with 1.0 sturgeon per hour. The high value for the Choctawhatchee is likely due to the use of sonar to locate Gulf sturgeon before nets were deployed.

Goals for the third year of this project include filling in historic data, continuing to proof and authenticate data already entered, and the dissemination of data to Gulf sturgeon researchers in a timely manner. An additional 100 V16 tags will be distributed to researchers among the core five rivers for the final year of tagging. Data from receivers will be downloaded and processed in order to determine the presence of Gulf sturgeon as they migrate in and out of rivers.

Acknowledgments

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Table 1. Length-frequencies of all unique Gulf sturgeon measured during Year 2 of the Standardized Gulf Sturgeon Cooperative Project. Location codes are as follows: AR Apalachicola River, BR Blackwater River, CB Choctawhatchee Bay, CR Choctawhatchee River, EB Escambia Bay, ER Escambia River, OR Ochlockonee River, PE Pearl River, PR Pascagoula River, SR Suwannee River, YR Yellow River. The asterisk denotes approximate size at maturity.

FL (cm)	AR	BR	CB	CR	EB	ER	OR	PE	PR	SR	YR	TOTAL
40-50						1			3		5	9
50-60	10	1							3		12	26
60-70	23	9		1		1	2		4		14	54
70-80	17	3				4	2				13	39
80-90	21	10		4	2	6	2				11	56
90-100	10	7	1	4		3	7		1		6	39
100-110	8	13	1	4	2	5			1		8	42
110-120	12	21	3	5	2	1		1			11	56
120-130	5	24	5	11		9	1	1	2	5	19	82
130-140*	4	19	8	9	1	7	2		1	4	14	69
140-150	8	9	7	7	1	5	5		1	7	13	63
150-160	9	13	3	2		2	2			1	11	43
160-170	2	9		2	1		2			2	6	24
170-180	1	4	3	4	2		2				9	25
180-190	5	2	2	3						1	7	20
190-200	2	2	1								2	7
200-210	2	1										3
TOTAL	139	147	34	56	11	44	27	2	16	20	161	657

Table 2. Length-frequencies of all Gulf sturgeon implanted with PIT tags during Year 2 of the Standardized Gulf Sturgeon Cooperative Project. Location codes are as follows: AR Apalachicola River, BR Blackwater River, CB Choctawhatchee Bay, CR Choctawhatchee River, EB Escambia Bay, ER Escambia River, PE Pearl River, PR Pascagoula River, YR Yellow River. The asterisk denotes approximate size at maturity. Data from the Ochlockonee and Suwannee Rivers are excluded.

FL (cm)	AR	BR	CB	CR	EB	ER	PE	PR	YR	TOTAL
40-50						1		3	5	9
50-60	10							3	12	25
60-70	22	9		1		1		3	13	49
70-80	12	3				4			13	32
80-90	14	9		4	2	6			10	45
90-100	8	6	1	4		3			5	27
100-110	7	13	1	4	1	4			5	35
110-120	10	19	3	5	2	1	1		8	49
120-130	5	19	6	11	1	7	1	2	16	68
130-140*	3	18	7	8		6		1	11	54
140-150	6	9	6	7	1	4		1	11	45
150-160	8	10	2	2		3			5	30
160-170	2	9		2					5	18
170-180	1	4	2	4	2				6	19
180-190	3	2	3	3					7	18
190-200	2	1	1						2	6
200-210	2	1								3
TOTAL	115	132	32	55	9	40	2	13	134	532

Table 3. Recapture rates based on PIT tag presence for Gulf sturgeon overall and broken down by targeted vs. passive sampling. “Other” category encompasses sampling in bays during early spring months, juvenile-targeted sets, and passive sampling in rivers during summer months. Location codes are as follows: AR Apalachicola River, BR Blackwater River, CB Choctawhatchee Bay, CR Choctawhatchee River, EB Escambia Bay, ER Escambia River, PE Pearl River, PR Pascagoula River, YR Yellow River. Data from the Ochlockonee and Suwannee Rivers are excluded.

Recapture rates (%)	AR	BR	CB	CR	EB	ER	PE	PR	YR	TOTAL
Total captured	36.7	32.0	55.9	50.0	45.5	22.7	0.0	25.0	32.91	32.7
New PIT tagged fish	11.3	16.7	46.9	45.5	22.2	12.5	0.0	0.0	12.6	18.1
Total captured-targeted	35.3			48.2						42.1
Total captured-outmigration		50.0				21.2	0.0	25.0	36.9	36.1
Total captured-other	39.3	25.2	52.8	50.0	41.7	25.0		0.0	19.0	32.6

Table 4. Length-frequencies of all Gulf sturgeon implanted with VEMCO transmitters during Year 2 of the Standardized Gulf Sturgeon Cooperative Project. Location codes are as follows: AR Apalachicola River, BR Blackwater River, CR Choctawhatchee River, Escambia River, OR Ochlockonee River, PE Pearl River, PR Pascagoula River, SR Suwannee River, YR Yellow River. The asterisk denotes approximate size at maturity.

FL (cm)	AR	BR	CR	ER	OR	PE	PR	SR	YR	TOTAL
40-50							3			3
50-60							3			3
60-70			1				3			4
70-80										0
80-90			4							4
90-100			3		4		1			8
100-110	1		4				1			6
110-120	6		5							11
120-130	2	7	10	4		1	1	5	6	36
130-140*	2	5	6	4	2		1	4	5	29
140-150	4		6	4	5		1	7	3	30
150-160	4	2	2	2	2			1	1	14
160-170	1	2	2		2			2	1	10
170-180		2	4		2				3	11
180-190		1	3					1	1	6
190-200		1							1	2
200-210										
TOTAL	20	20	50	14	17	1	14	20	21	177

Table 5. Locations of multiple captures of Gulf sturgeon tagged in 2010 with acoustic transmitters by year. Location codes are as follows: BR Blackwater River, CB Choctawhatchee Bay, CR Choctawhatchee River, EB Escambia Bay, ER Escambia River, PR Pascagoula River, YR Yellow River, UN unknown.

Transmitter	2011	2010	2006	2005	2004	2003	1999
31795	PR	PR					
45724	ER	ER	ER				
45726	ER	ER					
45734	BR	BR					
45756	ER	ER					
45760	EB	BR				YR	
45761	ER	ER					
45866	CB	CR			CR		CR
45867	BR	CR					
46166	BR	YR					
46183	BR	CR					
46188	CR	CR					
46220	BR	YR					
46430	EB	BR					
46449	YR	ER		ER			
47987	CR	CR					
62416	BR	UN					

Table 6. Total number of Gulf sturgeon captured in 2011, with total fishing time, and catch per unit effort (CPUE) calculated as the number of fish caught per hour of fishing time. CPUE is also broken down by survey type. Survey type OTHER includes juvenile targeted, spring, and summer sampling. Location codes are as follows: AR Apalachicola River, BR Blackwater River, CR Choctawhatchee River, Escambia River, MB Mobile Bay, PE Pearl River, PR Pascagoula River, YR Yellow River. The Suwannee and Ocholockonee Rivers are not included in analysis.

	AR	BR	CB	CR	EB	ER	MB	PE	PR	YR	TOTAL
TOTAL FISH CAPTURED	163	164	36	58	12	45		2	16	172	668
FISHING TIME (HOURS)	161.70	82.65	126.52	26.20	111.77	85.32	87.48	1195.02	1286.7	1624.33	4787.68
CPUE TOTAL	1.01	1.98	0.28	2.21	0.11	0.53	0.00	0.00	0.01	0.11	0.14
CPUE TARGETED	0.57			2.20							0.93
CPUE OUTMIGRATION		7.35				1.99		0.00	0.02	0.11	0.09
CPUE OTHER	1.54	1.59	0.28	2.61	0.11	0.17		0.00	0.00	0.10	0.16

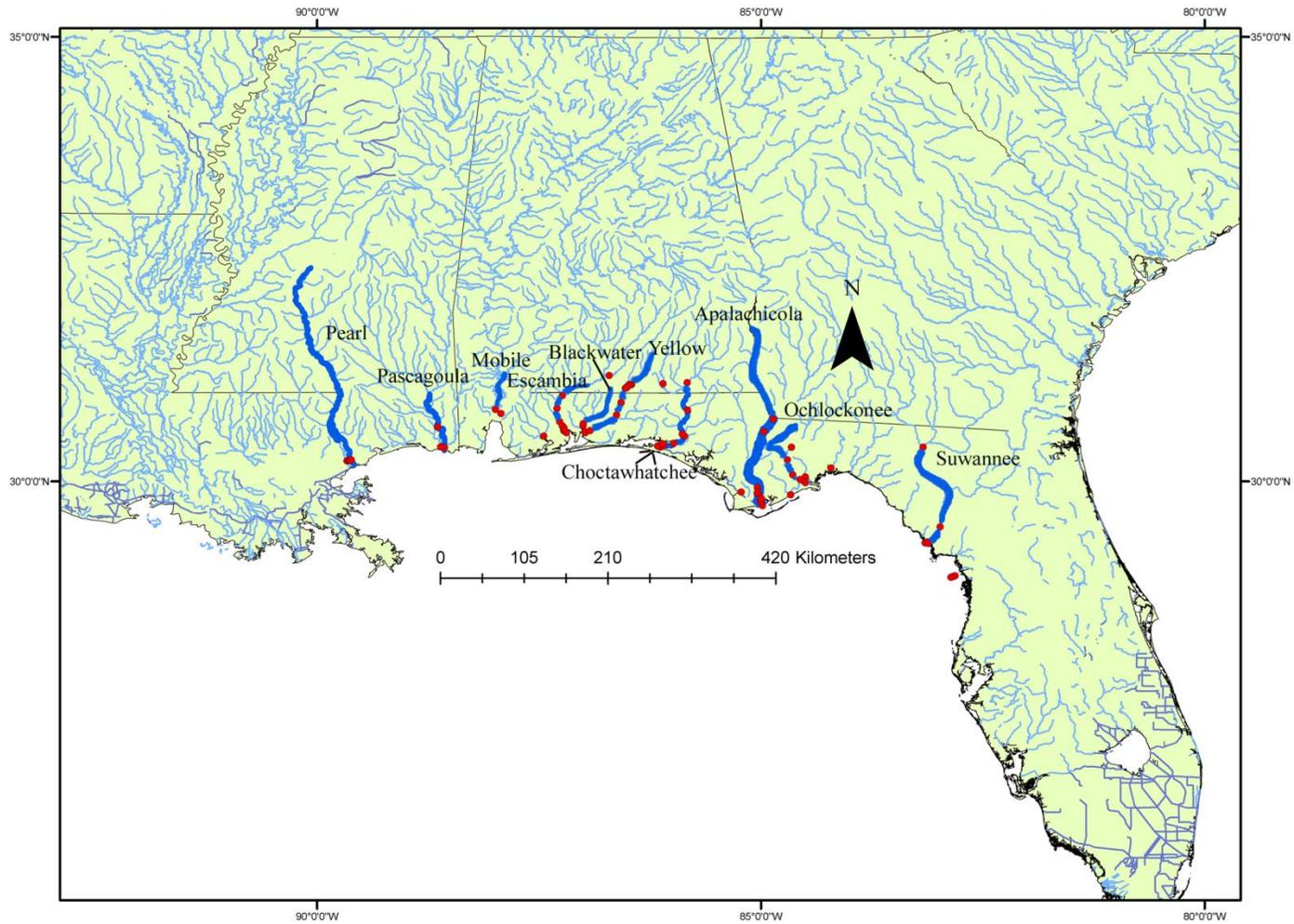


Figure 1. Locations of river VEMCO receivers set to detect Gulf sturgeon during the Five Year Project.

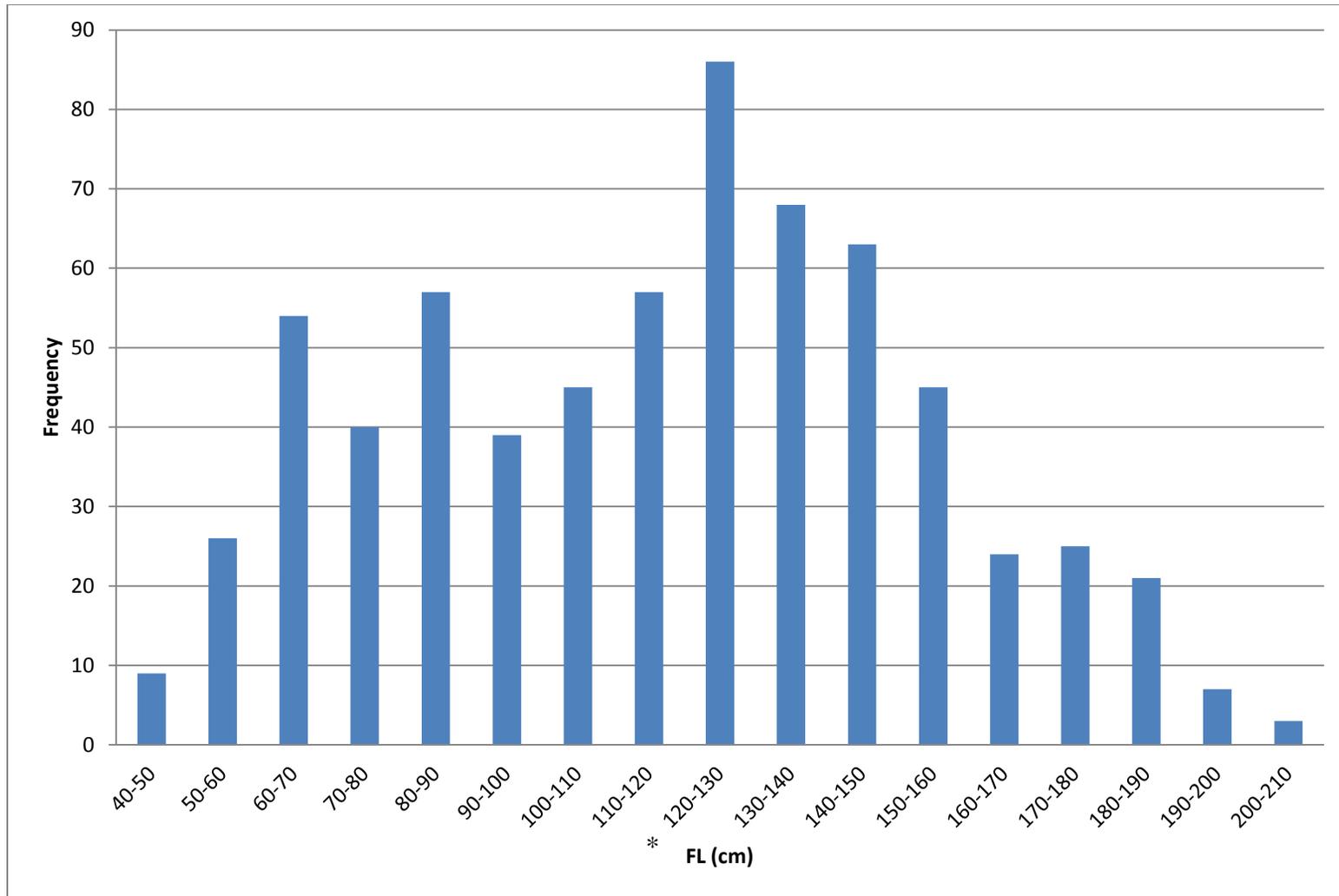


Figure 2. Length-frequency of all unique Gulf sturgeon measured during 2011 by cooperative Gulf sturgeon researchers. The asterisk denotes approximate size at maturity.

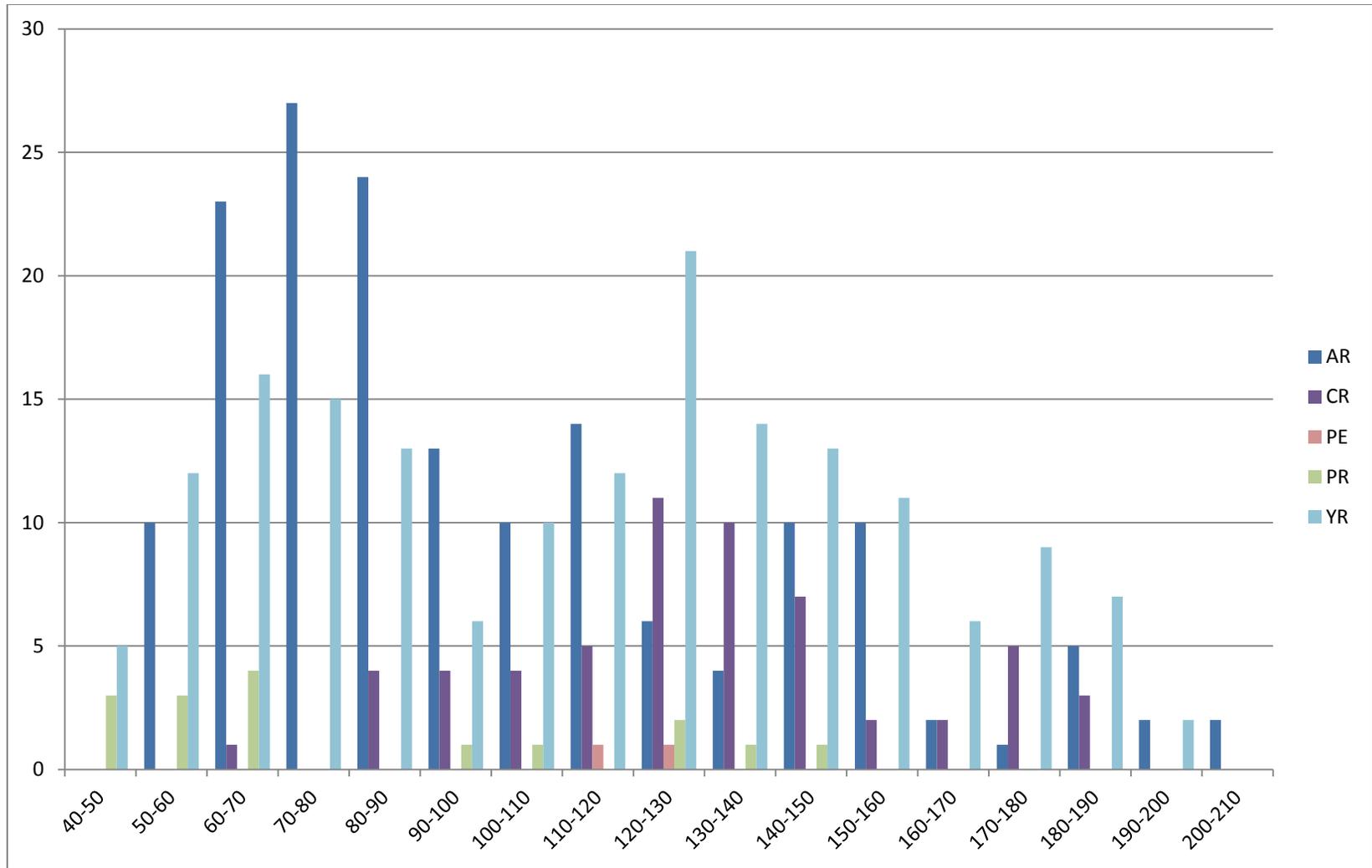


Figure 3. Length-frequency distribution of the five “core” rivers measure by cooperative Gulf sturgeon researchers. Location codes are as follows: AR Apalachicola, CR Choctawhatchee, PE Pearl, PR Pascagoula, and YR Yellow.

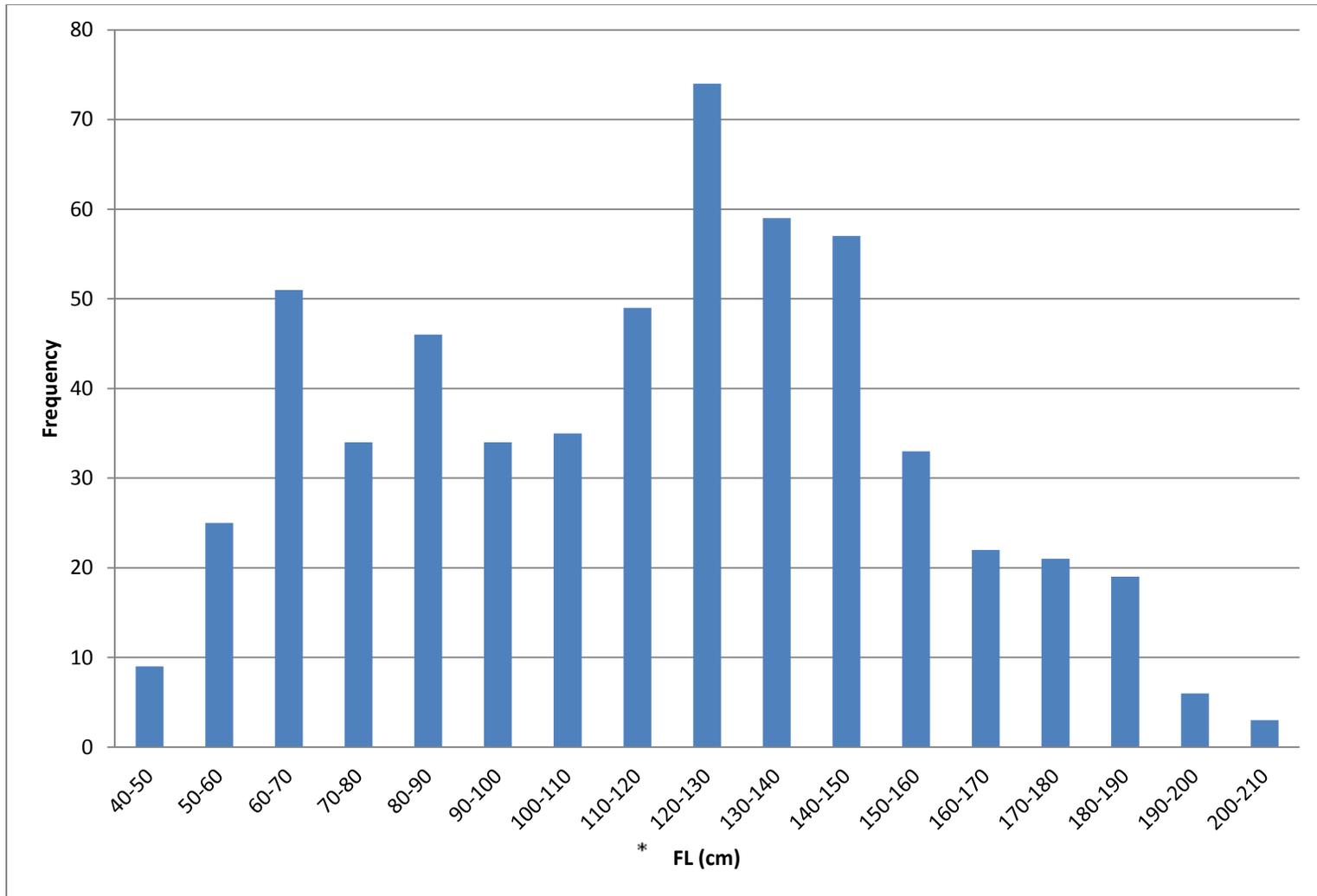


Figure 4. Length-frequency of all Gulf sturgeon inserted with new PIT tags in 2011 by cooperative Gulf sturgeon researchers. Data do not include all Gulf sturgeon tagged on the Suwannee River. The asterisk denotes approximate size at maturity.

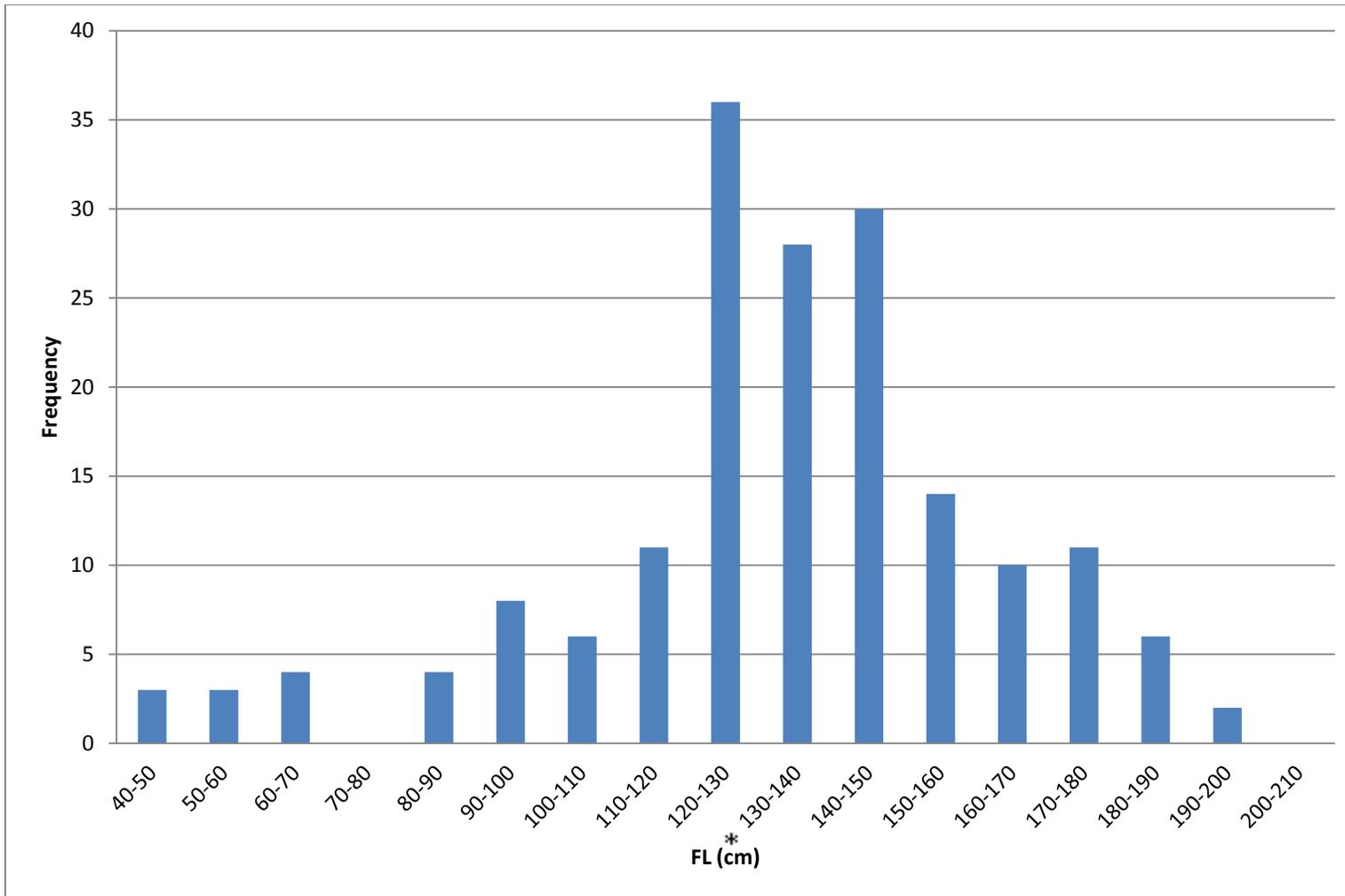


Figure 5. Length-frequency of all Gulf sturgeon surgically implanted with internal transmitters during 2011 by cooperative Gulf sturgeon researchers. Data do not include all Gulf sturgeon tagged on the Suwannee River. The asterisk denotes approximate size at maturity.

GSP - Reports - Windows Internet Explorer
 https://grunt.sefsc.noaa.gov/gsp/reportForm.jsp/rpttype=anmitk

Certificate error

EFFORT_ID	RESEARCHER_ID	LOCATION_CODE	ANIMAL_ID	OCCURENCE	EFFORT_DATE	PIT_TAG_NBR	OTHER_TAG_NBR	FL	TL	WT	SEX	INT_EXT	SCAN_TYPE	TEND_HAUL	TEND_HAUL_NBR	TIME_BEGI
LG_KSH20-MAY-98SR	KSH	SR	8789	1	1998-05-20 00:00:00.0	51153E3C7D		124.0	140.0							
LG_ASMR08-JUN-04AR	ASMR	AR	8789	2	2004-06-08 00:00:00.0	51153E3C7D		171.5	186.7	42.91						
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LG_ASMR18-OCT-06AR	ASMR	AR	8789	4	2006-10-18 00:00:00.0	4614341550		175.3	198.1	45.36						
0001276	JPK	AR	8789	5	2011-10-04 00:00:00.0	4614341550		185	206		U		1	H	1	0948

Do you want to open or save gsp_xpt.txt (1.13 KB) from grunt.sefsc.noaa.gov?

Figure 6. Screen print of the capture history of a Gulf sturgeon captured in October 2011, output via internet interface application.

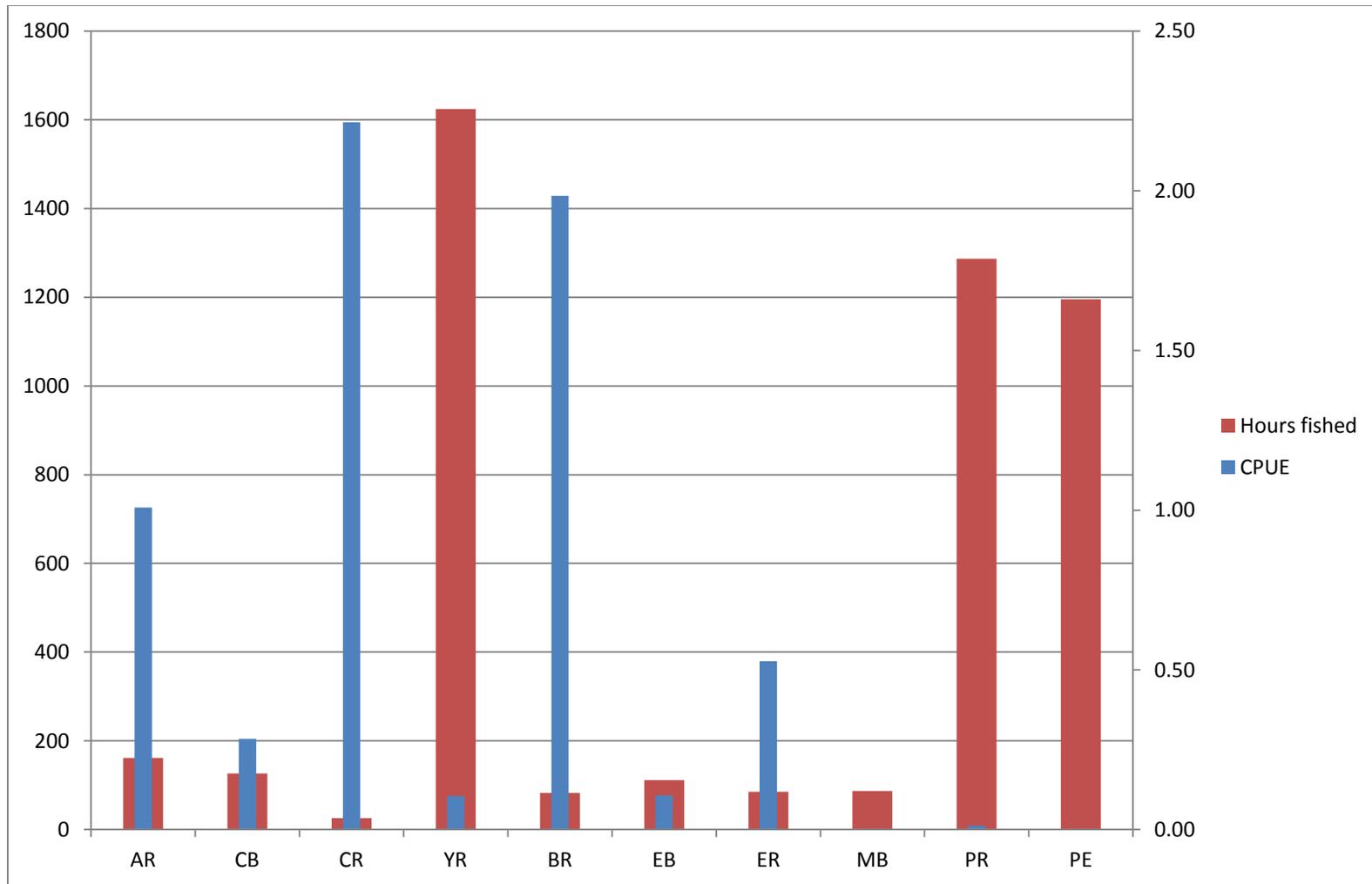


Figure 7. Total fishing time and CPUE for sampling locations. Location codes are as follows: AR Apalachicola River, BR Blackwater River, CR Choctawhatchee River, Escambia River, MB Mobile Bay, PE Pearl River, PR Pascagoula River, YR Yellow River. Locations are from east to west (left to right) on the x-axis. The Suwannee and Ochlockonee Rivers are not included in analysis.