

2017 Field Season Summary for the Sturgeon Population Study

California Department of Fish and Wildlife
Bay Delta Region (Stockton)

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Field Season: 10 August 2017 – 26 October 2017

Introduction

A sturgeon population study conducted by the California Department of Fish and Wildlife (CDFW) has been ongoing intermittently since 1967 (annually since 2005). Part of the study is a “high-value reward” tagging program. Presented here is a summary of the 2017 sturgeon-tagging field season. For summaries from previous seasons, please click [Bibliography](#).

The population study is designed primarily to understand and monitor the fishery for and population dynamics of White Sturgeon (*Acipenser transmontanus*) is also used to monitor aspects of the Green Sturgeon (*A. medirostris*) population. The tagging portion of the population study provides data on relative and absolute abundance, harvest rate, mortality rate, individual growth rates, and large-scale movement/migration patterns.

Our primary objective during the 2017 field season was to capture, tag, measure, and release in good condition as many White Sturgeon as possible and to document previously-tagged sturgeon. As part of an on-going collaboration, our staff collected sturgeon tissue for San Francisco Estuary Institute to monitor Selenium concentrations in White Sturgeon.

Methods

Our field season began 10 August 2017 and ended 26 October 2017. We captured sturgeon using trammel nets deployed from the CDFW research vessels *Striper II* and *New Alosa* (both vessels fishing in Suisun Bay and the *Striper II* fishing also in the lower San Joaquin Delta and the lower San Joaquin River).

We continued the two major alterations to our sampling methodology, which we implemented to decrease interactions with marine mammals and improve the condition of captured fish: (1) reduced the length of net in the water from 200 fathoms (~366 m) to 100 fathoms (~183 m) and (2) decreased soak time from about 45 minutes to about 30–35 minutes.

The *New Alosa* is a 42-foot West Coast-style combination-type fishing vessel with a 610 hp Volvo engine capable of cruising at 17 knots, and the *Striper II* is a 32-foot Southeast Alaska-style gillnetting vessel with a 6-V 53 Detroit Diesel engine capable of 7.5 knots. For the 2017 season, the *New Alosa* was berthed at the *New Bridge Marina (Antioch, CA)* and the *Striper II* was berthed at both the *Martinez Marina* and the *New Bridge Marina* (to finish the season). Each vessel had a crew of 3-4 people including a boat operator and biological staff.

Both vessels were equipped with one 100-fathom (~183 m) trammel net, one hydraulic net reel, one resuscitation tub, and one tagging station. The boat operator typically ran the boat, operated the net hydraulics, and extracted fish from the net upon retrieval. The deckhand tended the net during deployment and assisted the boat operator by removing fish and debris from the net. Scientific staff measured all sturgeon, tagged White Sturgeon, recorded bycatch, collected biological data/samples, and assisted with boat duties as needed.

The 100-fathom net was comprised of four contiguous 25-fathom (45.7 m) long by 2-fathom (3.7 m) deep sections. Each 25-fathom section was made up of a gillnet panel between two panels of trammel net. The gillnet was an Alaska salmon-style webbing made up of multi-strand monofilament twist. The trammel net was made up of three multi-strand twisted nylon braids. The diagonal dimension of the gillnet mesh varies by 25-fathom net section and is typically assembled in the following order: 8", 7", 6", and 8". Due to a shortage of staff and spare panels, both vessels began the season with the following configuration of panels: 8", 7", 6", and 7".

Nets were set in locations selected by the boat operator to avoid known snags and (when possible) to target signs of sturgeon aggregations (e.g., many jumping sturgeon). The net was deployed across the stronger of the prevailing current or wind and took approximately five minutes to set. The deployed net was continuously monitored to detect snags, tangles, and marine mammal interactions, as well as to avoid conflicts with other vessels, channel markers, and other hazards. The nets were set as many times as possible (usually 4-6) in a given workday.

Data collected during each net set included (1) the time of the start and end of the net set/retrieve, (2) the latitude/longitude of the start of the net set, (3) the water temperature, (4) the number of pinnipeds in the vicinity of and raiding the net, (5) any vessel interactions, and (6) the weather conditions (based on the Beaufort scale).

Each sturgeon brought on a vessel was to be immediately removed from the net and either carefully placed in the tagging cradle or placed in a plastic tub filled with water pumped from the current location. Sturgeon were placed in the tub only when processing could not be completed in a timely manner (e.g., when several came on-board from the same small section of net).

We checked each sturgeon for old tags (i.e., PIT, disc, etc.) and evidence of a shed or clipped tag, recorded fork length to the nearest centimeter (cm FL), attached a disc-dangler (Petersen) to White Sturgeon 78-196 cm FL, and assessed overall condition/stress level (good, fair, or poor). The tag was placed in the flesh just below the base of the dorsal fin, midway between the anterior and posterior ends of the fin (see photo at right, CDFW file photo). Each tag was



labeled with a reward value of \$50, \$100, or \$150 (see Appendix 1), which — in an effort to improve the accuracy of harvest rate estimates by increasing the willingness of anglers to contact us about recapture of tagged fish — is a change from recent rewards values of \$20, \$50, or \$100.

Fish showing an unusually high level of stress and/or trauma (e.g., lack of “gilling”, lack of vigor) were placed in the plastic holding tub for resuscitation and released without a tag as soon as their condition appeared to improve. We checked all sturgeon for signs of having shed a tag — defined as a captured sturgeon that did not have a tag and did not show an obvious sign of having been tagged (i.e., wires present), but did exhibit open sores or scars at the location of tagging.

We collected 1-3 White Sturgeon muscle plugs from the area just posterior to the dorsal fin, stored the plugs on dry ice, and provided the plugs to San Francisco Estuary Institute staff each week.

Bycatch was identified to species, counted, and released as quickly as possible. In addition, Chinook Salmon¹ and California Halibut were measured. We noted all marine mammals (Pacific harbor seals and California sea lions) observed within 50 meters of the net and instances of a marine mammal observed raiding the net (i.e., eating or appearing to eat a fish in or taken from the net).

Catch per unit effort (CPUE) was calculated to estimate daily and monthly relative abundance and to compare annual estimates of relative abundance for White Sturgeon. Catch was calculated as the sum of all newly-tagged fish, recaptured fish, and non-tagged fish. The unit of effort was 100 net-fathom hour, which is equivalent to a net 100 fathoms long fishing for one hour. Effort was calculated by weighting the soak time (i.e., the amount of time between the end of the net set and the beginning of the net retrieve) by 100% and the amount of time for the net deployment and the net retrieval by 50%.

Results

Most fishing effort and catch was in Suisun Bay (see Appendix 2; we concluded the season fishing 4 days in the lower San Joaquin Delta and lower San Joaquin River). We set the net 186 times during 38 boat-days (34 calendar days) for a total of 140 hours of fishing time (~11,360 net-fathom-hours). Average fishing time per set was about 45 ± 8.3 (SD) minutes. Nets were set an average of 5 times per day per boat.

On the *New Alosa*'s final day (26-Sep), the end 8" panel was extensively damaged and removed during Set 4. On 19-Sep during Set 3, a 7" panel was extensively damaged and removed from the *Striper II*. Before fishing the next day, the *Striper II* crew added an 8" panel.

Four hundred twelve (412) White Sturgeon and eight (8) Green Sturgeon were captured. Of the White Sturgeon captured, 289 were then tagged. We recapture three previously tagged White Sturgeon (Table 1). Two of those recaptures had been both PIT tagged and disc tagged in 2007, only the PIT tag was detected, and neither disc tag had been reported by an angler. We also recaptured two newly-tagged sturgeon in the following set (not reported here).

¹ For salmon, we also recorded condition, coloration, and presence/absence of adipose fin

Table 1. White Sturgeon recaptured during 2017 fieldwork

Date of Recapture	Tag Number	Recapture Location	Year Tagged	Years at Large	Length at Tagging (cm TL)	Length at Recapture (cm TL)	Growth per Year (cm)
15-Aug-17	21165 ^a	Suisun Bay	2007	10	144	160	1.6
6-Sep-17	8390 ^b	Suisun Bay	2007	10	141	159	1.8
4-Oct-17	HH2145	Suisun Bay	2015	2	101	124	11.5

Note: Length at recapture converted from cm FL to cm TL for comparison with length at tagging

^a PIT tag number, fish also tagged in 2007 with disc tag HH1507 not attached at time of recapture

^b PIT tag number, fish also tagged in 2007 with disc tag FF1256 not attached at time of recapture

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Average daily CPUE for legal-sized (102-152 cm FL) White Sturgeon was 1.28 ± 0.07 (SE) and for all sizes of White Sturgeon was 3.47 ± 0.19 (SE). Average daily CPUE per drift (net set) for all sizes of White Sturgeon was greatest on 18-Sep (12.09 ± 3.22 (SE); Figure 1).

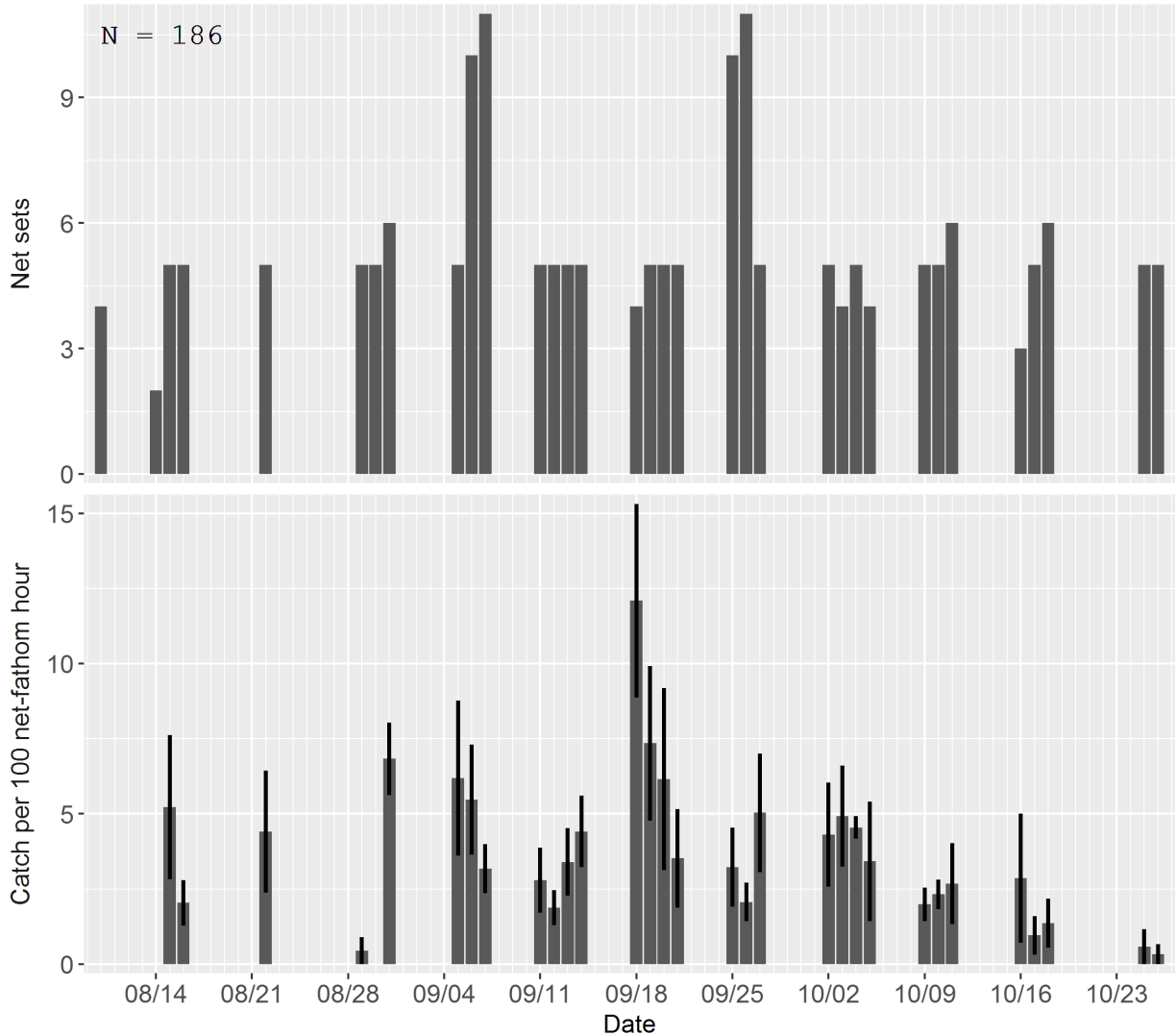


Figure 1. (top) Number of net sets each day, (bottom) White Sturgeon average catch per 100 net-fathom hour \pm 1 SE of all net sets that day; Note: date shown = Monday (year = 2017)

Average monthly CPUE for all sizes of White Sturgeon was 2.7 (Aug), 4.4 (Sep), and 2.4 (Oct). Catch per 100 net-fathom hour of White Sturgeon within the current slot limit (102-152 cm FL) was 1.30 ± 0.13 (SE), a value below the historical (period) average of 2.5, but noticeably higher than the previous five years (Figure 2).

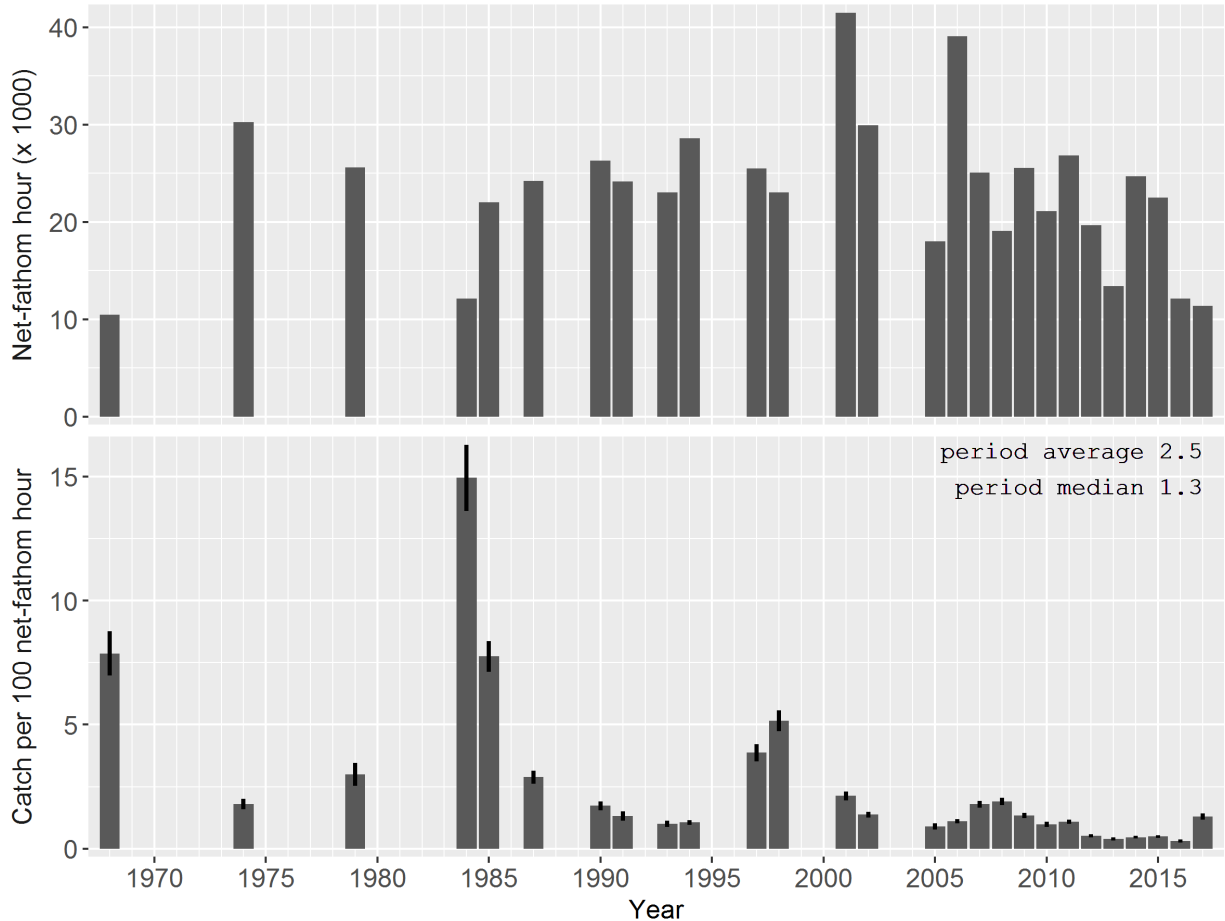


Figure 2. (top) Annual fishing effort (as net-fathom hour [NFH]), (bottom) Average catch per 100 net-fathom hour \pm 1 SE (using all net sets) of White Sturgeon within current slot limit (102–152 cm FL) captured during CDFW sturgeon population study tagging operations

The 2013-2017 White Sturgeon length frequency distributions show (1) strong cohorts (from mid-to-late 1990s) within the legally-harvestable size range have substantially diminished, (2) progression of the strong 2006 cohort toward and within harvestable size, and (3) signs that what should be a modest 2011 cohort is recruiting to the nets (Figure 3).

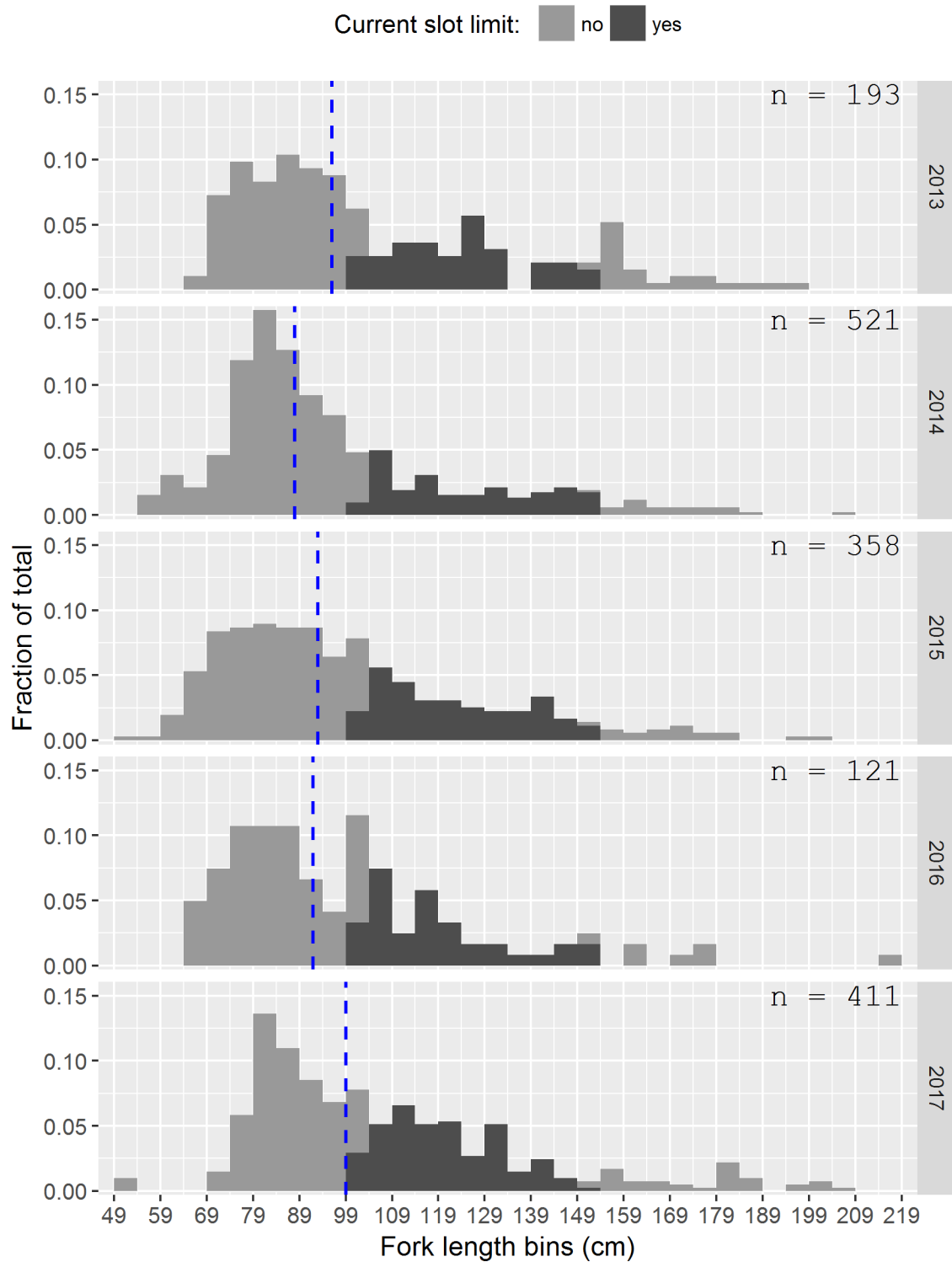


Figure 3. White Sturgeon length frequency distribution (as fraction of total catch per year) for years 2013–2017; blue dashed vertical line indicates annual median fork length; 2017 includes 10 fish where fork length was visually estimated and does not include one fish not measured; bins by 5 cm

No bycatch was retained (Table 2). Chinook Salmon (N=26 total; N=26 length approximated) ranged 56-92 cm FL and averaged 74 cm FL. (Note: Lengths of Chinook Salmon were approximated in order to return these fish to the water quickly.) California Halibut (N=9 total; N=8 length recorded) ranged 42-65 cm TL and averaged 54 cm TL. No other bycatch were measured.

Table 2. Numbers of other species (bycatch) caught during the 2017 sturgeon tagging season

Bycatch Species	Scientific Name	Count	Percent of Total
California Halibut	<i>Paralichthys californicus</i>	9	19.1%
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	26	55.3%
Starry Flounder	<i>Platichthys stellatus</i>	9	19.1%
Striped Bass	<i>Morone saxatilis</i>	3	6.4%
Total		47	

In Suisun Bay, we observed a per-set average of 1.4 (\pm 0.7 SD) sea lions and 0.02 (\pm 0.14 SD) seals within 50 meters of the net, we observed sea lions raiding the net during 38% of the sets, and we never observed a seal raiding the net. In all other locations, we observed only one sea lion within 50 meters of the net and no seals within 50 meters of the net.

For the San Francisco Estuary Institute, we collected muscle plugs from 62 White Sturgeon with fork lengths 98-183 cm FL (Figure 4).

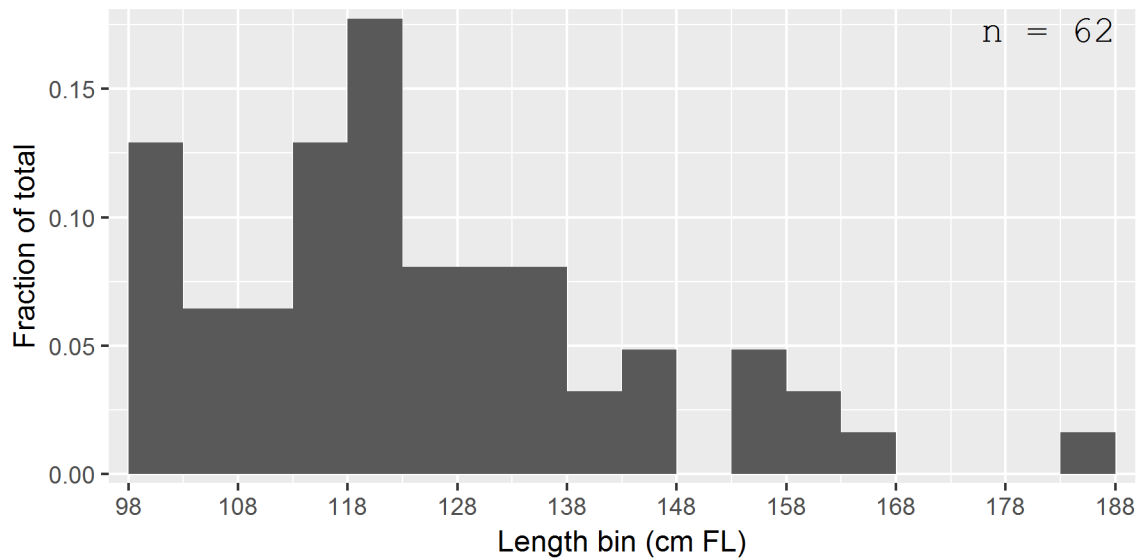


Figure 4. Length frequency of White Sturgeon from which biological samples (muscle plugs) were collected during 2017 tagging operations; bins by 5cm

Acknowledgments

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Affiliation	Name	Position
<i>CDFW</i>	Kevin Banks	F & W Technician
	Jeremiah Bautista	Environmental Scientist
	Ken Flowers	Mate
	Mike Grady	F & W Technician
	April Hennessy	Environmental Scientist
	David Hull	Mate
	Ryan Kok	Senior Laboratory Assistant
	Sunny Lee	Scientific Aide
	Spencer Lewis	F & W Technician
	Rob McLean	Scientific Aide
	Nicole Montoya	Scientific Aide
	Josh Slocum	Scientific Aide
	Ramiro Soto	Mate
	Linda Warkentin	Senior Laboratory Assistant
	Hailey Wright	Scientific Aide

Appendix 1 (Tag numbers released in 2017)

Value	From	To	N
\$50	FF2315	FF2329	15
	FF2340	FF2421	82
\$100	HH2315	HH2329	15
	HH2340	HH2373	34
	HH2375	HH2420	46
\$150	HF2315	HF2329	15
	HF2339	HF2420	82

Appendix 2 Spatial and temporal (monthly) catch of White Sturgeon (WST) per net set per vessel in 2017; for ease of plotting, viewing only Suisun Bay

