

# **2012 Field Season Summary for the Adult Sturgeon Population Study**

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

By Jason DuBois, Teresa MacColl, and Michael D. Harris

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**Field Season: 01 August 2012 – 30 October 2012**

## Introduction

An adult sturgeon population study conducted by the California Department of Fish and Game (CDFG) has been ongoing intermittently since 1967. Part of the study is a “high-value reward” tagging program. Presented here is a summary of the 2012 sturgeon-tagging field season. For summaries from previous seasons, please click [Bibliography](#).

The tagging program is designed to understand and monitor the population dynamics of white sturgeon (*Acipenser transmontanus*) and green sturgeon (*A. medirostris*), with the ultimate goal being to provide the tools to inform management. These tools include relative and absolute abundance, harvest rate, mortality rate, individual growth rates, and large-scale movement/migration patterns.

Our objective during the field season was to capture, tag, measure, and release in good condition as many sturgeon as possible and document previously-tagged sturgeon.

## Methods

Our field season began 01 August 2012 and ended 30 October 2012. We captured sturgeon using trammel nets deployed from the CDFG research vessels *Striper II* (fishing in Suisun Bay or Lower San Joaquin Delta [Lower Delta]) and *New Alosa* (fishing in San Pablo Bay or Suisun Bay). We continued the two major alterations to our sampling methodology designed 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 2012 season, the *New Alosa* was berthed at the *Vallejo Municipal Marina* and the *Striper II* was berthed at the *Martinez Marina*. Each vessel typically had a standard crew of 3-4 people including a boat operator, a deckhand, a scientific aide, and a biologist.

Both vessels were equipped with one 100-fathom (~183 m) trammel net, one hydraulic net reel, one resuscitation tub, and two tagging stations. Typically, the boat operator 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 upon retrieval. The scientific aide and biologist measured and tagged sturgeon, recorded bycatch, collected biological data/samples, and assisted with other 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 varied by 25-fathom net section and was assembled in the following order: 8", 7", 6", and 8"<sup>1</sup>.

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 and end of the net set/retrieve, (3) the water temperature, (4) the number of pinnipeds patrolling and raiding the net, (5) any vessel interactions, and (6) the weather conditions (based on the Beaufort scale).

Each sturgeon brought on the 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 bay. 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). A few fish were too large (approx. > 180 cm) for the cradle, so were processed on the deck.

We checked each fish for old tags (i.e., PIT, disc, etc.) and evidence of a shed or clipped tag, recorded total length to the nearest cm (cm TL), attached a disc-dangler (Petersen) tag<sup>2</sup> to fish 100 – 258 cm TL, 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, courtesy of Harry Morse). Each tag was labeled with a reward value of \$20, \$50, or \$100.

Each fish in good condition was immediately released. Fish showing an unusually high level of stress and/or trauma (e.g., lack of “gilling”, lack of vigor, or severe bleeding) 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 “possibly shedding the tag” — defined as a captured sturgeon that did not have a tag and did not show an obvious sign of having



<sup>1</sup> Both vessels began the season with this configuration; on 20-Sep *New Alosa* replaced one 8" panel with one 6" panel and on 14-Aug *Striper II* replaced one 8" panel with one 7" panel

<sup>2</sup> See Appendix 1

been tagged (i.e., wires present), but did exhibit open sores or scars at the location of tagging. However, this season we did not observe any sturgeon as such.

Bycatch was identified to species, counted, measured if Chinook salmon, California halibut, or leopard shark (sexed also) and released as quickly as possible. We noted all marine mammals (Pacific harbor seals and California sea lions) within 50 meters and any instance of a marine mammal predation on fish captured in 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 un-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

We set the net 290 times during 60 boat-days (38 calendar days) for a total of 238 hours of fishing time (~19,600 net-fathom-hours). Average fishing time per set was about  $49 \pm 9.6$  (SD) minutes. Nets were set an average of 5 times per day per boat.

Three hundred thirty-seven (337) white sturgeon (WST) and 17 green sturgeon (GST) were captured (includes recaptured fish). Of the white sturgeon captured, 170 were then tagged. Of the green sturgeon captured, 13 were then tagged.

Six white sturgeon — tagged in previous seasons — were recaptured (Table 1). We did not recapture any previously-tagged green sturgeon.

**Table 1. White sturgeon recaptured during 2012 sturgeon-tagging field work**

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-12	ST12283	Suisun Bay	2009	3	128	156	9.3
21-Aug-12	HH2059	Suisun Bay	2011	1	140	143	3.0
28-Aug-12	HH2051	Suisun Bay	2011	1	207	> 200 <sup>a</sup>	NA
29-Aug-12	HH2141 <sup>b</sup>	Suisun Bay	2011	1	127	131	4.0
30-Aug-12	FF2128	Suisun Bay	2011	1	102	114	12.0
29-Oct-12	FF1880	Lower Delta	2010	2	126	141	7.5

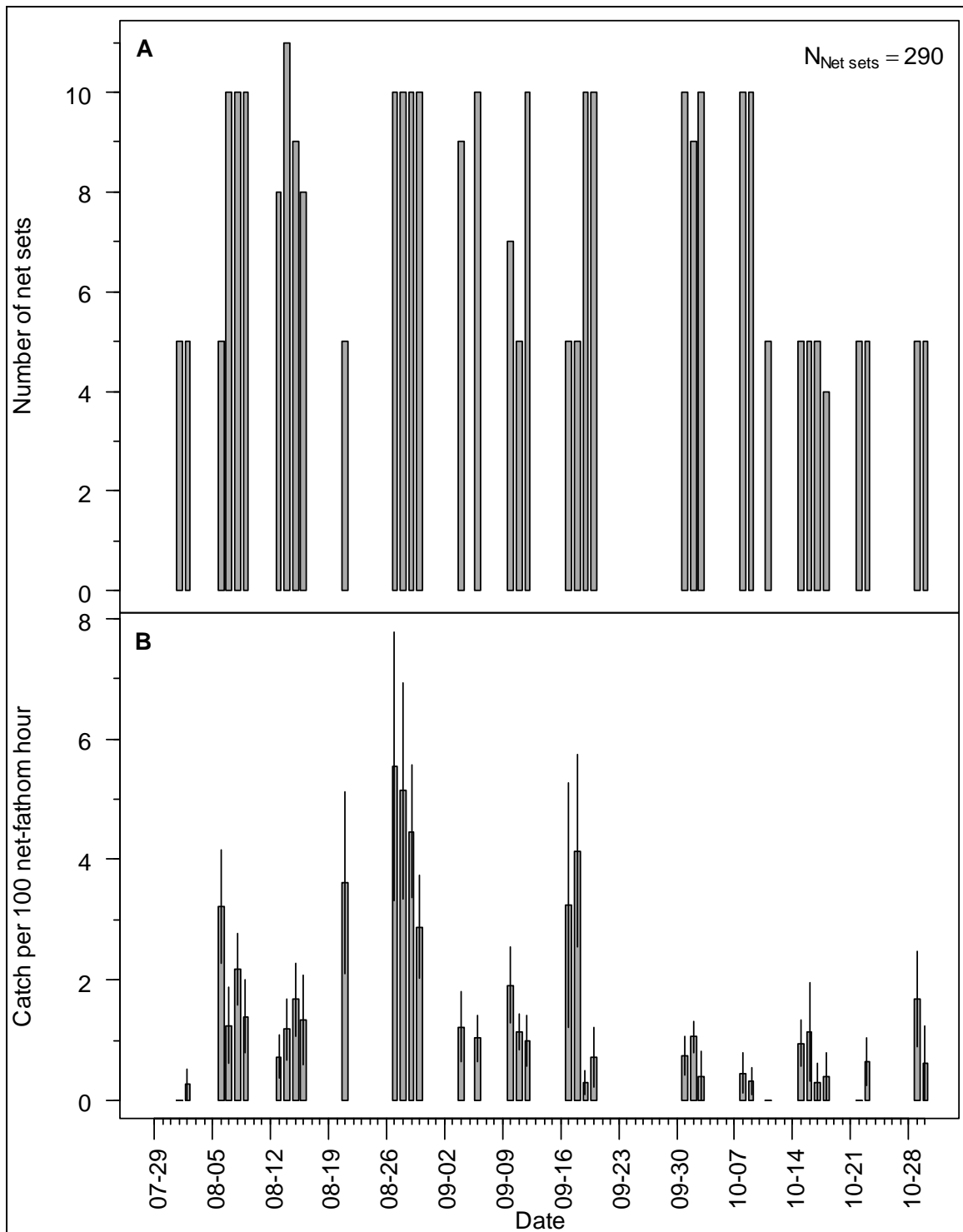
<sup>a</sup> Accurate measurement not available

<sup>b</sup> Tag was pulled out of fish by the net; fish retagged with HH2205 on 29-Aug-2012

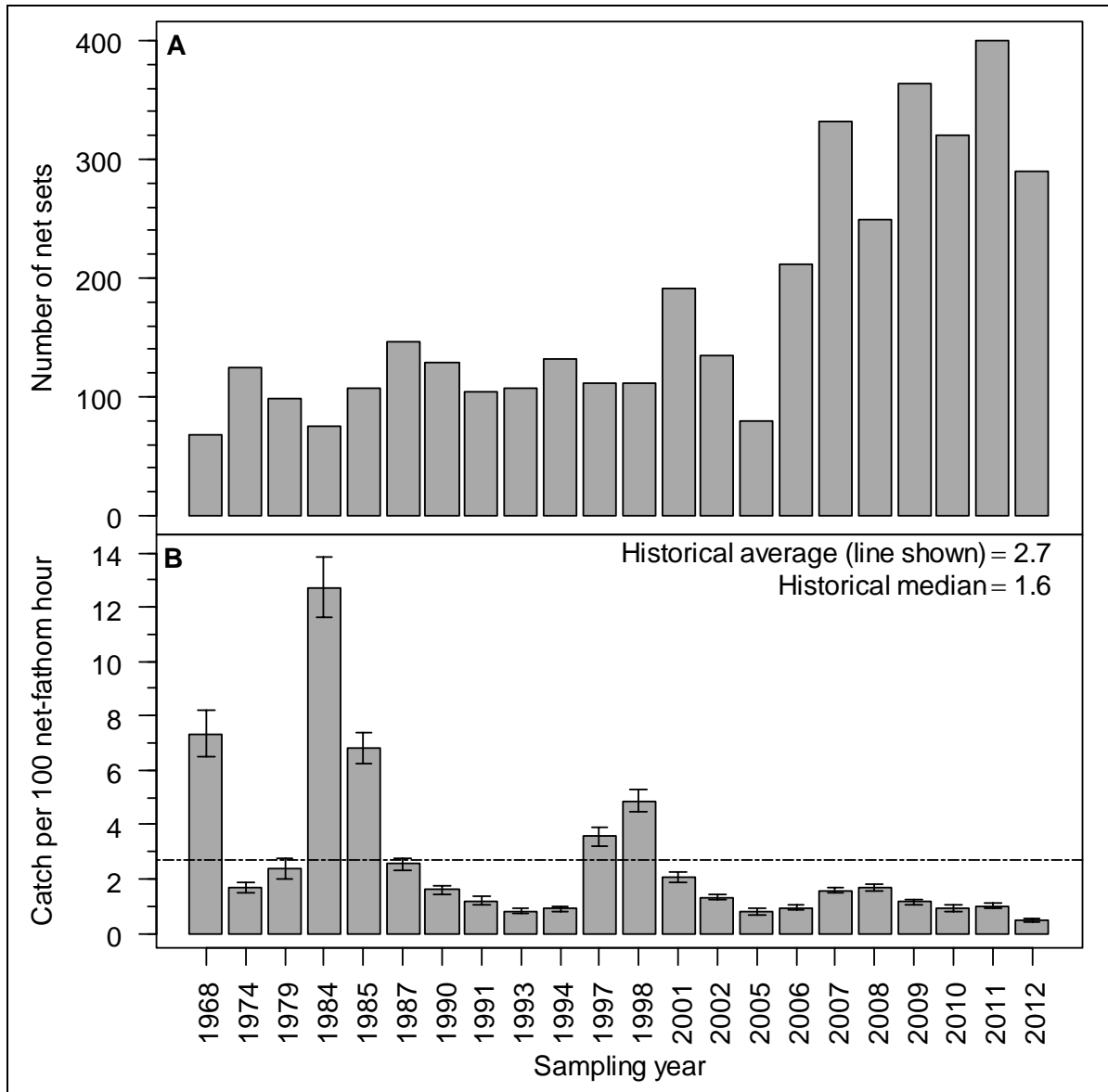
Average daily CPUE for legal-sized (117 – 168 cm TL) white sturgeon was  $0.5 \pm 0.1$  (SE) and for all sizes of white sturgeon was  $1.6 \pm 0.2$  (SE). Average daily CPUE per drift (net set) for all sizes of white sturgeon was greatest on 27-Aug ( $5.6 \pm 2.2$  (SE); Figure 1). Average CPUE for all sizes of white sturgeon decreased steadily each month (Table 2). Catch per 100 net-fathom hour of white sturgeon within the current slot limit (117 – 168 cm TL) was  $0.5 \pm 0.1$  (SE), a value well below the historical average of 2.7 and the lowest on record (Figure 2).

**Table 2. Average catch per 100 net-fathom hour per month (in 2012) for white sturgeon**

Month	Average CPUE	SE	Number of net sets
August	2.5	0.3	126
September	1.4	0.3	71
October	0.6	0.1	93

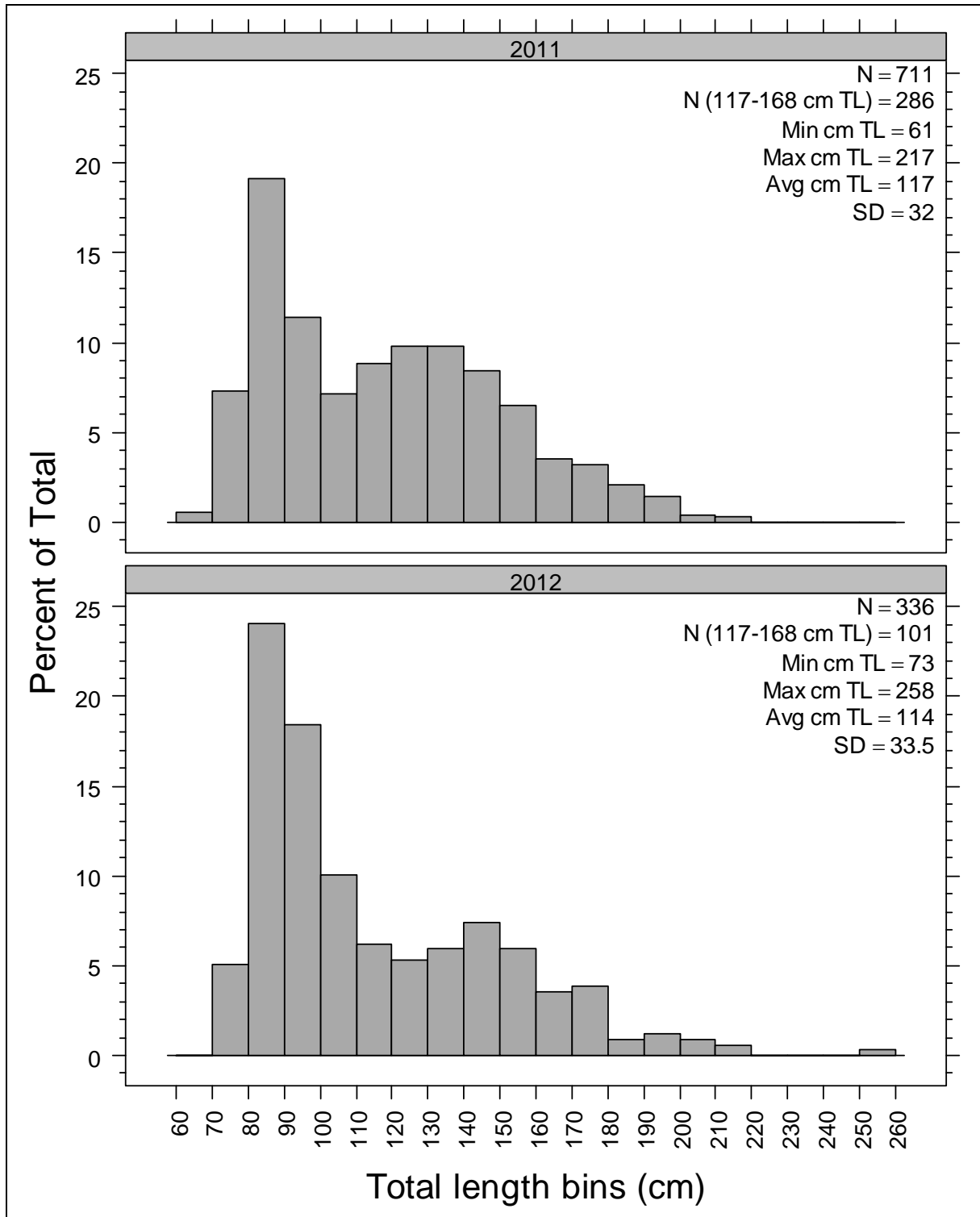


**Figure 1. (A) Number of net sets each day, (B) White sturgeon average catch per 100 net-fathom hour  $\pm$  1 SE of all net sets that day (average was zero on 01-Aug, 11-Oct, and 22-Oct); Note: date shown = Sunday (year = 2012)**



**Figure 2. (A) Number of net sets completed annually, (B) Average catch per 100 net-fathom hour  $\pm$  1 SE (using all net sets) of white sturgeon within current slot limit (117 – 168 cm TL) captured during CDFG sturgeon population study tagging operations**

The white sturgeon length frequency distribution (for 2012) was possibly bi-modal, with the strongest peak at 80 – 89 cm TL (nearly 25% of total catch; Figure 3).

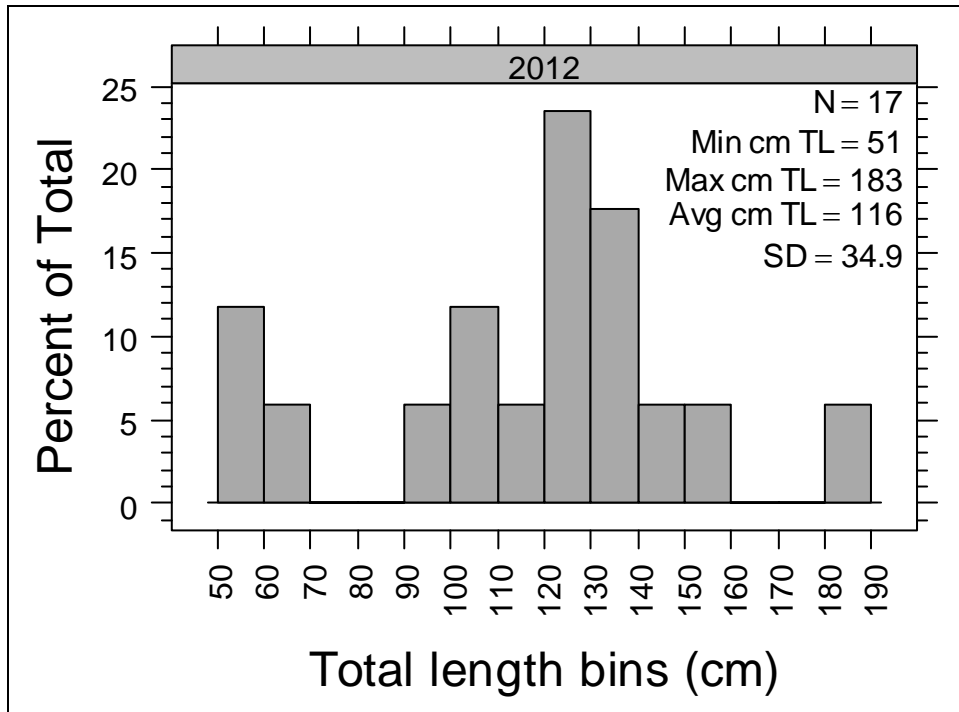


**Figure 3. Length frequency distribution (as percent of total catch) of white sturgeon in 2011 (top) and 2012 (bottom); number within the current legal harvestable size (117 -168 cm TL) included for reference**

We measured 17 green sturgeon (Figure 4). The size range was between 51 and 183 cm TL, and the average was  $116 \pm 35$  (SD) cm TL. Most green sturgeon were captured



during August (N=10, San Pablo Bay; N=3, Suisun Bay), and only four were captured after 01-Sep (N=1, San Pablo Bay; N=3, Suisun Bay).



**Figure 4. Length frequency distribution (as percent of total catch) of green sturgeon in 2012**

No bycatch was retained and most was released alive. Bycatch was more diverse in San Pablo Bay (Table 3). California halibut (N=12) ranged from 52 – 92 cm fork length (cm FL) and averaged  $61 \pm 13$  (SD) cm FL. Chinook salmon (N=482 total, N=480 length approximated) ranged from 50 – 100 cm FL and averaged 80 cm FL. (Note: Lengths were approximated in order to return these fish to the water quickly.) Female leopard sharks (N=13) ranged from 91 – 114 cm TL and averaged  $104 \pm 7$  (SD) cm TL. Male leopard sharks (N=19) ranged from 88 – 131 cm TL and averaged  $108 \pm 10$  (SD) cm TL.

In San Pablo Bay, we observed six instances of at least one seal within 50 meters of the net, one instance of at least one sea lion within 50 meters of the net, and one instance of at least one seal raiding the net. In Suisun Bay, we observed seven instances of at least one seal within 50 meters of the nets, 142 instances of at least one sea lion within 50 meters of the net, and 66 instances of at least one sea lion raiding the net.

We had only one adverse interaction with another vessel. On 29-Oct while fishing in Lower San Joaquin Delta, a boat ran over the net directly astern of our vessel. The net did not sustain significant damage, and we added four small buoys to the float line for better visibility.

**Table 3. Numbers of other species caught (bycatch) during the 2012 sturgeon tagging season**

Bycatch Species	Scientific Name	Lower San Joaquin Delta	San Pablo Bay	Suisun Bay	Total	Percent of Total
Bat Ray	<i>Myliobatis californica</i>		339		339	36.0%
Brown Smoothhound	<i>Mustelus henlei</i>		3		3	0.3%
California Halibut	<i>Paralichthys californicus</i>		12		12	1.3%
California Skate	<i>Raja inornata</i>		2		2	0.2%
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>		39	443	482	51.2%
Diamond Turbot	<i>Hypsopsetta guttulata</i>		5		5	0.5%
Leopard Shark	<i>Triakis semifasciata</i>		32		32	3.4%
Red Gunnel	<i>Pholis schultzi</i>		1		1	0.1%
7-Gill Shark	<i>Notorhynchus cepedianus</i>		8		8	0.8%
Skate, unid	NA		1		1	0.1%
Starry Flounder	<i>Platichthys stellatus</i>	2	9	23	34	3.6%
Striped Bass	<i>Morone saxatilis</i>	1	3	15	19	2.0%
Thornback	<i>Platyrhynoides triseriata</i>		4		4	0.4%
<b>Total</b>		<b>3</b>	<b>458</b>	<b>481</b>	<b>942</b>	

### Acknowledgments

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### Appendix 1 (Tag numbers released in 2012)

	From	To
<b>\$20 Tags</b>	ST13095	ST13112
	ST13179	ST13221
	From	To
<b>\$50 Tags</b>	FF2094	FF2100
	FF2102	FF2112
	FF2179	FF2221
	From	To
<b>\$100 Tags</b>	HH2094	HH2112
	HH2179	HH2220