

2014 Field Season Summary for the Sturgeon Population Study

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

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Field Season: 06 August 2014 – 22 October 2014

Introduction

A sturgeon population study conducted by the California Department of Fish and Wildlife has been ongoing intermittently since 1967. Part of the study is a “high-value reward” tagging program. Presented here is a summary of the 2014 sturgeon-tagging field season. For summaries from previous seasons, please click [Bibliography](#).

The population study is designed to understand and monitor the population dynamics of White Sturgeon (*Acipenser transmontanus*) and to a lesser extent Green Sturgeon (*A. medirostris*), with the ultimate goal being to provide the tools to inform management. 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 2014 field season was to capture, tag, measure, and release in good condition as many White Sturgeon as possible and to document previously-tagged sturgeon. This season as (mostly) part of an age-and-growth study, USFWS staff collected biological samples from a subset of captured White Sturgeon and monitored for 69Khz acoustic transmitter tags.

Methods

Our field season began 06 August 2014 and ended 22 October 2014. We captured sturgeon using trammel nets deployed from the CDFW research vessels *Striper II* (fishing in Suisun Bay) and *New Alosa* (fishing in San Pablo Bay or Suisun Bay).

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 2014 season, the *New Alosa* was berthed at the *Vallejo Municipal Marina*, and the *Striper II* was berthed at the *Martinez Marina*. Each vessel had a crew of 3-4 people including a boat operator and biological staff. Typically one of the biological staff would assist the boat operator in the releasing and retrieval of the nets.

Both vessels were equipped with one 100-fathom (~183 m) trammel net, one hydraulic net reel, one resuscitation tub, and one tagging station. 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 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".

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 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 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).

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 84-204 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, courtesy of Harry Morse). Each tag was labeled with a reward value of \$20, \$50, or \$100 (see Appendix 1).



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.

USFWS technicians collected biological samples from White Sturgeon that were (generally) below the size limit for tagging. Samples were only taken from the first five fish of each size category caught. Each sampled fish was immediately returned to the water after a small clip was taken of the marginal pectoral fin ray close to the base of the fin and a blood sample was drawn from the caudal artery. USFWS also monitored for and noted the occurrence of signals from 69Khz acoustic tags.

Bycatch was identified to species, counted, measured if Chinook Salmon¹ or Leopard Shark (sexed also) and released as quickly as possible. 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

Nearly all fishing effort and catch was in Suisun Bay (see Appendix 2). We set the net 399 times during 77 boat-days (43 calendar days) for a total of 281 hours of fishing time (~24,600 net-fathom-hours). Average fishing time per set was about 43 ± 6.6 (SD) minutes. Nets were set an average of 5 times per day per boat.

Five hundred twenty-one (521) White Sturgeon and 30 Green Sturgeon were captured (includes two recaptured White Sturgeon). Of the White Sturgeon captured, 255 were then tagged. We tagged no Green Sturgeon this year.

Average daily CPUE for legal-sized (102-152 cm FL) White Sturgeon was 0.5 ± 0.1 (SE) and for all sizes of White Sturgeon was 2.0 ± 0.2 (SE). Average daily CPUE per drift (net set) for all sizes of White Sturgeon was greatest on 07-Oct (5.5 ± 1.5 (SE); Figure 1). Average CPUE for all sizes of White Sturgeon was roughly the same each month (range 2.0-2.2). Catch per 100 net-fathom hour of White Sturgeon within the current slot limit (102-152 cm FL) was 0.46 ± 0.05 (SE), a value well below the historical average of 2.8 (Figure 2).

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

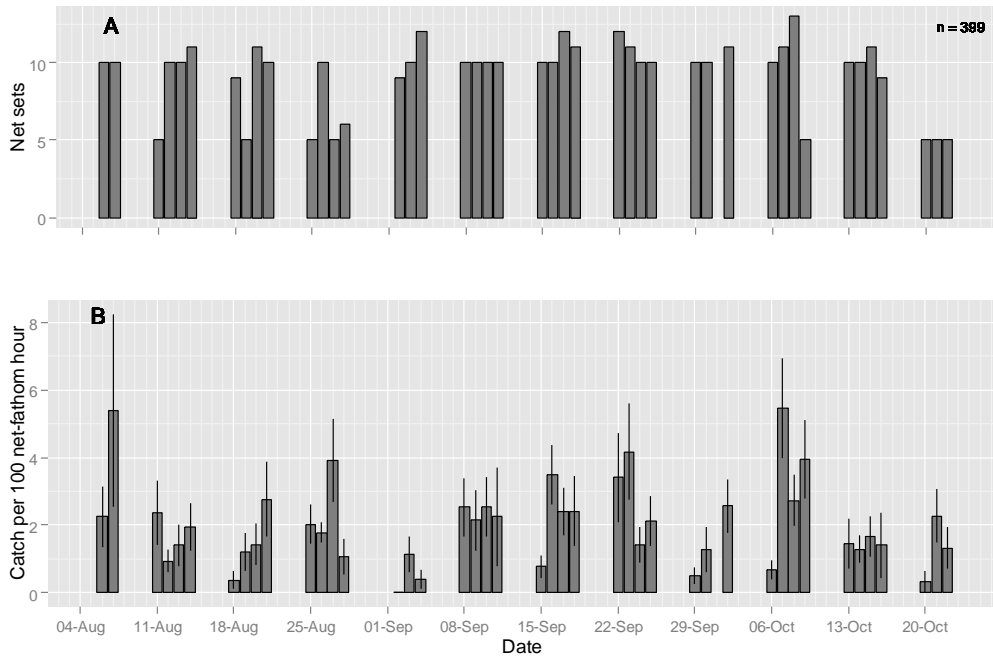


Figure 1. (A) Number of net sets each day, (B) White Sturgeon average catch per 100 net-fathom hour \pm 1 SE of all net sets that day (average was zero only on 02-Sep); Note: date shown = Monday (year = 2014)

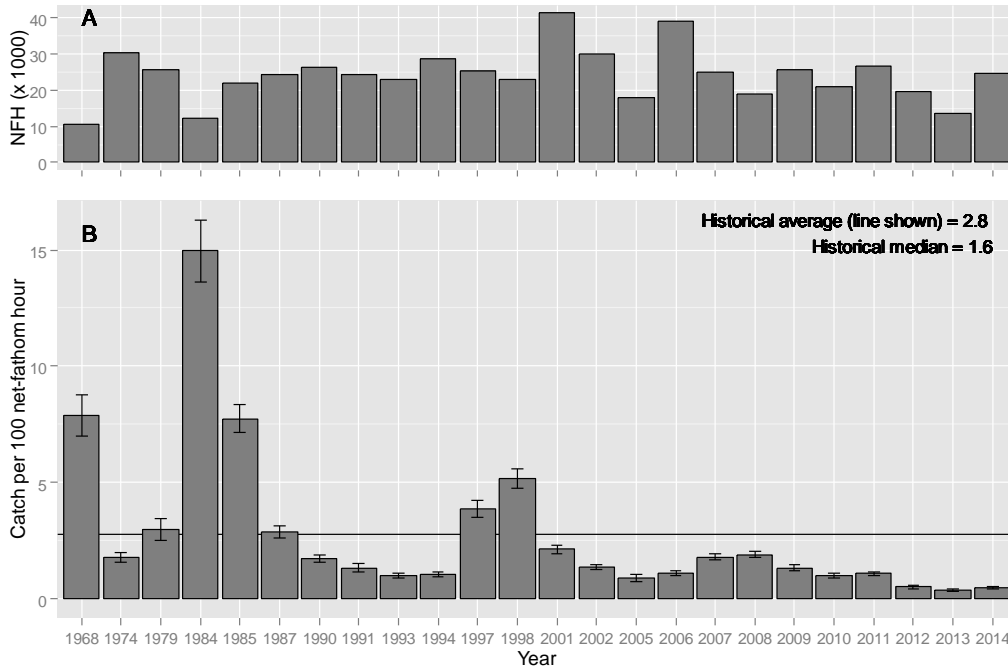


Figure 2. (A) Annual fishing effort (as net-fathom hour [NFH]), (B) Average catch per 100 net-fathom hour \pm 1 SE (using all net sets) of White Sturgeon within current slot limit (102–152 cm FL) captured during CDFW sturgeon population study tagging operations

The 2010-2014 White Sturgeon length frequency distributions show (1) strong cohorts (from mid-to-late 1990s) within the legally-harvestable size range have substantially

diminished and (2) the progression of a strong cohort (from 2006) toward harvestable size (Figure 3).

Green Sturgeon ranged 48-130 cm FL and the average was 81 ± 25 (SD) cm FL. Fourteen Green Sturgeon were captured in August (N=8, San Pablo Bay; N=6, Suisun Bay), 11 were captured in September (N=1, San Pablo Bay; N=10, Suisun Bay), and five were captured in October (all from Suisun Bay).

No bycatch was retained and most was released alive. Bycatch was more diverse in San Pablo Bay (Table 1). Chinook Salmon (N=272 total; N=269 length approximated) ranged 45-108 cm FL and averaged 82 cm FL. (Note: Lengths of Chinook Salmon were approximated in order to return these fish to the water quickly.)

In San Pablo Bay, we observed (1) three instances of harbor seals and two instances of California sea lions within 50 meters of the net and (2) one instance of at least one sea lion raiding the net and no instances of seals raiding the net. In Suisun Bay, we observed (1) 18 instances of harbor seals and 380 instances of California sea lions within 50 meters of the net, (2) five instances of seals raiding the net and 161 instances of at least one sea lion (seemingly 1-2 individuals) raiding the net, and (3) one instance of a White Sturgeon being raided from the net by a California sea lion.

Table 1. Numbers of other species caught (bycatch) during the 2014 sturgeon tagging season

Bycatch Species	Scientific Name	San Pablo Bay	Suisun Bay	Total	Percent of Total
Bat Ray	<i>Myliobatis californica</i>	29	0	29	7.7%
Brown Smoothhound	<i>Mustelus henlei</i>	2	0	2	0.5%
California Halibut	<i>Paralichthys californicus</i>	5	0	5	1.3%
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	6	266	272	71.8%
Diamond Turbot	<i>Hypsopsetta guttulata</i>	3	1	4	1.1%
Leopard Shark	<i>Triakis semifasciata</i>	18	0	18	4.7%
Starry Flounder	<i>Platichthys stellatus</i>	13	18	31	8.2%
Striped Bass	<i>Morone saxatilis</i>	0	18	18	4.7%
Total		76	303	379	

USFWS collected 138 fin clips and 71 blood samples from White Sturgeon with fork lengths 55-99 cm FL and from one oversized White Sturgeon (200 cm FL). Eighty-six percent of the fin clips and 90% of blood samples were from fish 60-89 cm FL. Eleven acoustic tags were detected in Suisun Bay, 3 acoustic tags were detected at Garnet Point, and most of the detected acoustic tags had been applied to White Sturgeon.

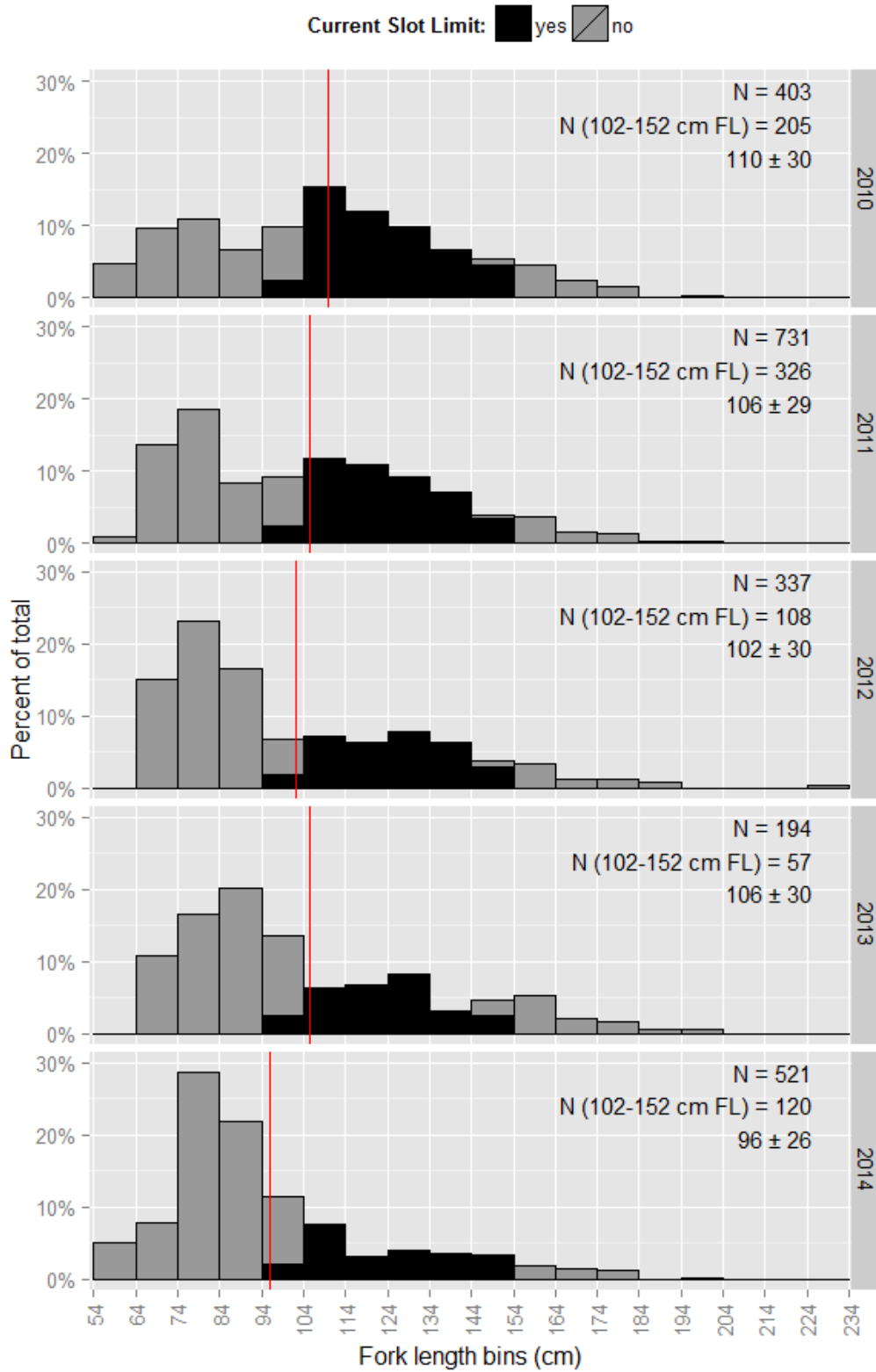


Figure 3. Length frequency distribution (as percent of total catch per year) of White Sturgeon for years 2010–2014; red line indicates average (also included as average \pm SD on right side of plot); number within the current legal harvestable size (102-152 cm FL) included in figure for reference

Acknowledgments

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Affiliation	Name	Position
CDFW	Christina Cardenas	Scientific Aide
	Rose Cardoza	Scientific Aide
	Greg Ferguson	Technician (hatchery)
	Ken Flowers	Mate
	Paula Higginson	Scientific Aide
	David Hull	Mate
	Ryan Kok	Scientific Aide
	Jared Mauldin	Technician
	Mike McCluskey	Mate
	Lance Meyer	Technician (hatchery)
	Peter Moniz	Scientific Aide
	Trishelle Morris	Senior Lab Assistant
	Matt Siefert	Technician
	Ramiro Soto	Mate
Gary Webb	Mate	
USFWS	David Dominguez	Technician
	Jimmy Faulkner	Technician
	Garrett Giannetta	Technician

Appendix 1 (Tag numbers released in 2014)

	From	To
	ST12976	ST12999
\$20	ST13124	ST13125
Tags	ST13222	ST13276
	ST13280	ST13282
	From	To
	FF1975	FF1999
\$50	FF2123	FF2125
Tags	FF2222	FF2276
	FF2280	FF2282
	From	To
	HH1975	HH1999
\$100	HH2123	HH2125
Tags	HH2221	HH2275
	HH2280	HH2281

Appendix 2 Spatial and temporal (monthly) catch of White Sturgeon (WST) per net set per vessel. Four net sets in Suisun Bay and 37 nets sets in San Pablo Bay are not shown for purposes of image scaling.

