2013 Field Season Summary for the Adult Sturgeon Population Study

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

By Jason DuBois and Michael D. Harris

16 December 2013

Field Season: 07 August 2013 – 23 October 2013

Introduction

An adult sturgeon population study conducted by the California Department of Fish and Wildlife (CDFW, formerly Department of Fish and Game) has been ongoing intermittently since 1967. Part of the study is a "high-value reward" tagging program. Presented here is a summary of the 2013 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 07 August 2013 and ended 23 October 2013. 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 2013 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".

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).

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) tag[1] to fish 86 – 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, courtesy of Harry Morse). Each tag was labeled with a reward value 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 “possibly shedding the 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.

[1] See Appendix 1

Bycatch was identified to species, counted, measured if Chinook Salmon[2] 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

We set the net 211 times during 44 boat-days (39 calendar days) for a total of 156 hours of fishing time (~13,400 net-fathom-hours). Average fishing time per set was about 45 ± 9.3 (SD) minutes. Nets were set an average of 5 times per day per boat.

One hundred ninety four (194) White Sturgeon and 7 Green Sturgeon were captured (includes recaptured fish). Of the White Sturgeon captured, 117 were then tagged. We tagged no Green Sturgeon this year.

Two 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 2013 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)
11-Sep-13	FF2069	Suisun Bay	2011	2	132	144	6.0
18-Sep-13	ST13161	Suisun Bay	2011	2	106	115	4.5

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

Average daily CPUE for legal-sized (102–152 cm FL) White Sturgeon was 0.4 ± 0.1 (SE) and for all sizes of White Sturgeon was 1.4 ± 0.2 (SE). Average daily CPUE per drift (net set) for all sizes of White Sturgeon was greatest on 21-Aug (7.5 ± 2.5 (SE); Figure 1). Average CPUE for all sizes of White Sturgeon was roughly the same each month (range 1.2-1.6). Catch per 100 net-fathom hour of White Sturgeon within the current slot limit (102–152 cm FL) was 0.4 ± 0.1 (SE), a value well below the historical average of 2.9 and the lowest on record (Figure 2).

[2] For salmon, we also recorded condition, coloration, and presence/absence of adipose fin

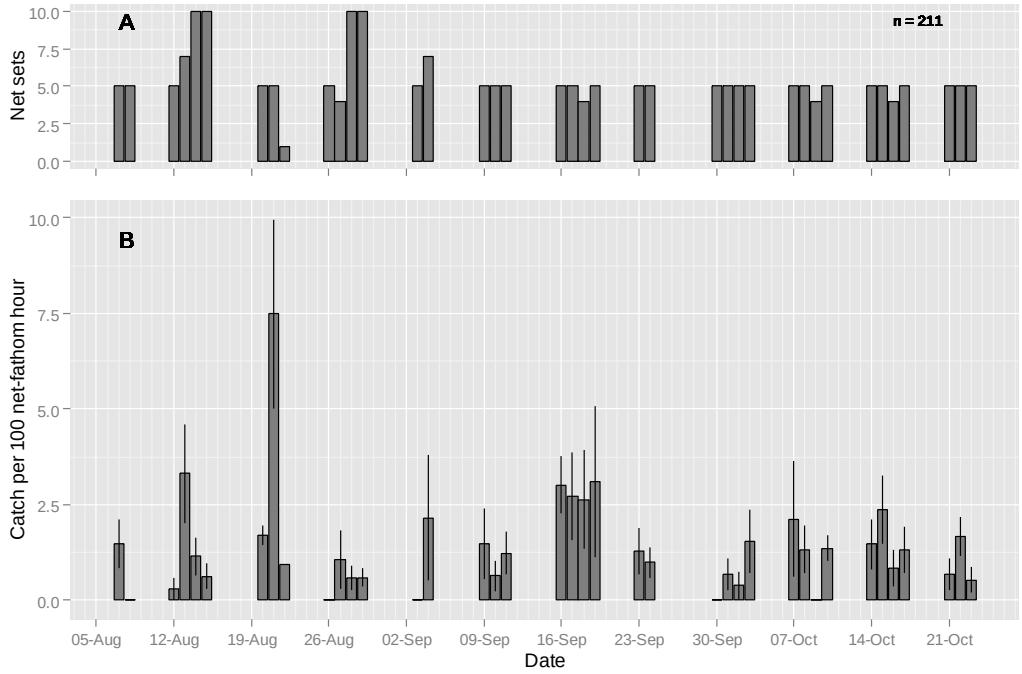

Figure 1. (A) Number of net sets each day, (B) White Sturgeon average catch per 100 net-fathom hour ± 1 SE of all net sets that day (average was zero on 08-Aug, 26-Aug, 03-Sep, 30-Sep, and 09-Oct); Note: date shown = Monday (year = 2013)

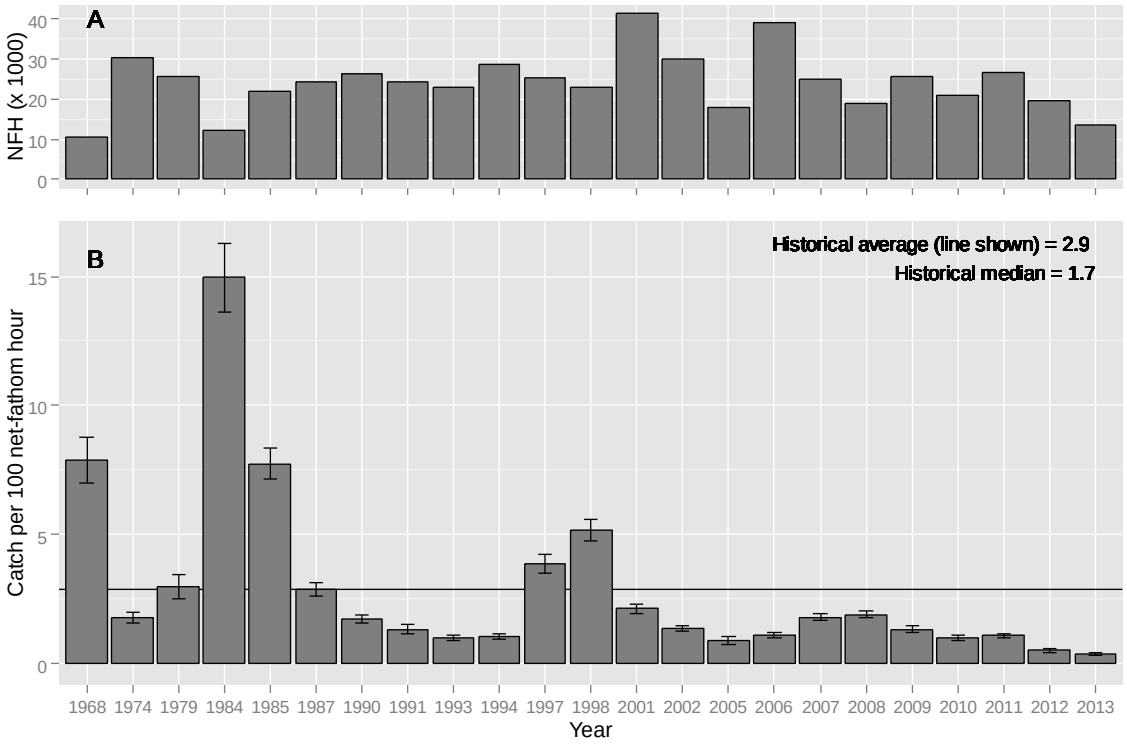

Figure 2. (A) Annual fishing effort (as net-fathom hour [NFH]), (B) Average catch per 100 net-fathom hour ± 1 SE (using all net sets) of White Sturgeon within current slot limit (102–152 cm FL) captured during CDFW sturgeon population study tagging operations

The 2009-2013 White Sturgeon length frequency distributions show (1) strong cohorts (from mid-to-late 1990s) within the legally-harvestable size range have substantially diminished, (2) the progression of a strong cohort (from 2006) toward harvestable size, and (3) oversized fish may have become (slightly) relatively more abundant over time (Figure 3).

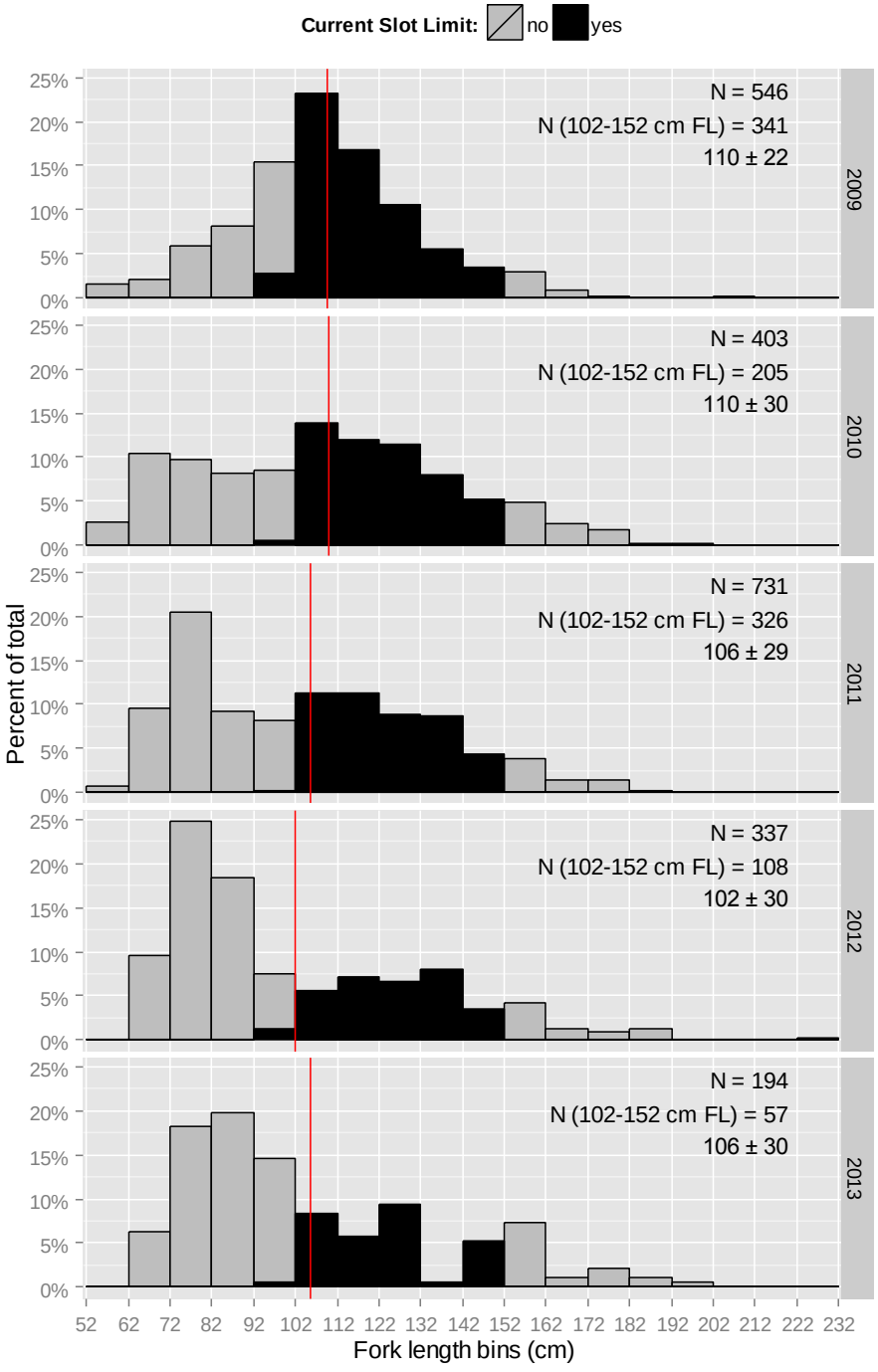

Figure 3. Length frequency distribution (as percent of total catch per year) of White Sturgeon for years 2009–2013; red line indicates average (also included as average ± SD on right side of plot); number within the current legal harvestable size (102-152 cm FL) included for reference

We measured 7 Green Sturgeon. Size ranged 59-121 cm FL, and the average was 83 ± 21 (SD) cm FL. Four Green Sturgeon were captured in August (N=2, San Pablo Bay; N=2, Suisun Bay), two were captured in September (both from Suisun Bay) and one was captured in October (also from Suisun Bay).

No bycatch was retained and most was released alive. Bycatch was more diverse in San Pablo Bay (Table 3). Chinook Salmon (N=275 total, N=264 length approximated) ranged 60–105 cm FL and averaged 87 cm FL. (Note: Lengths 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 no instances of California sea lions within 50 meters of the net and (2) no instances of seals or sea lions raiding the net. In Suisun Bay, we observed (1) three instances of harbor seals and 141 instances of California sea lions within 50 meters of the net, (2) no instances of seals raiding the net and 96 instances of at least one sea lion (seemingly 1 or 2 individuals) raiding the net, and (3) no sturgeon being raided from the net.

Table 2. Numbers of other species caught (bycatch) during the 2013 sturgeon tagging season

Bycatch Species	Scientific Name	San Pablo Bay	Suisun Bay	Total	Percent of Total
Bat Ray	*Myliobatis californica*	21	-	21	6.5%
Chinook Salmon	*Oncorhynchus tshawytscha*	7	268	275	85.4%
Leopard Shark	*Triakis semifasciata*	2	-	2	0.6%
7-Gill Shark	*Notorhynchus cepedianus*	6	-	6	1.9%
Starry Flounder	*Platichthys stellatus*	3	6	9	2.8%
Striped Bass	*Morone saxatilis*	1	8	9	2.8%
Total		**40**	**282**	**322**	

Acknowledgments

We thank the *Martinez Marina* and the *Vallejo Municipal Marina* for providing berths for our research vessels.

For their dedication and hard work, we thank Fish and Wildlife Vessel Mates Ken Flowers, Gary Webb, Ramiro Soto, and David Hull; Fish and Wildlife Technician Jared Mauldin; Environmental Scientist Jennifer Messineo; Senior Laboratory Assistants Aaron Ngo and Linda Warkentin; and Scientific Aides Michelle Avila, Kirsten Bates, Rose Cardoza, Kristina L'Estrange, Kari McClanahan, Trishelle Morris, and Andreas Raisch.

Appendix 1 (Tag numbers released in 2013)

	From	To
$20 Tags	ST12934	ST12944
	ST12947	ST12947
	ST12953	ST12975
	ST13119	ST13123
	From	**To**
$50 Tags	FF1933	FF1944
	FF1952	FF1974
	FF2119	FF2122
	From	**To**
$100 Tags	HH1933	HH1944
	HH1952	HH1962
	HH1964	HH1974
	HH2119	HH2122