

# Draft 2008 Field Season Summary for the Adult Sturgeon Population Study

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## 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 2008 sturgeon-tagging field season.

The tagging program is designed to understand and monitor the population dynamics of white sturgeon (*Acipenser transmontanus*) and green sturgeon (*Acipenser medirostris*), with the ultimate goal being to provide the tools to inform science-based resource management decisions. These tools include relative and absolute abundance, harvest rate, overall 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. We also collaborated with other researchers investigating various aspects of sturgeon biology.

## Methods

Sturgeon were captured using trammel nets deployed from the research vessel *Striper II* in Suisun Bay from August 11 to October 29, 2008. We continued the two major alterations to our sampling methodology designed to decrease interactions with marine mammals, including shortening the amount of net in the water from 200 fathoms (366 m) to 100 fathoms (183 m) and decreasing soak time from about 45 minutes to about 30 minutes.

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. The vessel was equipped with one 100-fathom (183 m) trammel net, one hydraulic net reel, one resuscitation tub, and one tagging station. The *Striper II* was berthed in the Martinez Marina and used a standard crew of four people, including a boat operator, a deckhand, and two Scientific Aides.

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 4-5) in a given workday.

Data collected about 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 (based on the Beaufort scale).

Each sturgeon brought on the vessel was either immediately removed from the net and 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 they could not be processed in a timely manner (e.g., several came on-board from the same small section of net).

We checked each fish for old tags and evidence of a shed or clipped tag, recorded total length to the nearest cm, attached a disc-dangler (Petersen) tag to fish 100cm -196cm total length, took a biological sample, and assessed overall condition/stress level (good, fair, or poor). The tags were placed in the flesh just below the base of the dorsal fin, midway between the anterior and posterior ends of the fin (see photo below, photo courtesy Harry Morse). Each tag was labeled with a reward value of \$20, \$50, or \$100.



A few fish were too large (approx. > 180 cm) for the cradle, so were processed on the deck. 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 as soon as their condition improved.

Recaptured fish were retagged if the old tags were too tight or loose or had caused sores to form. Captured sturgeon that had obviously been tagged at one time but in which the tag was no longer present (i.e. wire was present below the dorsal fin) were recorded as having a “shed tag” then re-tagged and released. Sturgeon that did not have a tag or wires present but exhibited open sores or scars at the location of tagging were recorded as having “possibly shed tags”.

Biological samples were collected on certain fish for collaborators. Fin samples (< 1 cm<sup>2</sup>) were taken from the dorsal or pectoral fin on most sturgeon irrespective of size. All samples were stored in ethanol for later analysis.

Bycatch was speciated, counted, measured if Chinook salmon or California halibut, and released as quickly as possible. 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 were recorded.

## Results

We set the net 249 times during 56 boat-days for a total of 232 hours of fishing time (19,075 net-fathom-hours). Average fishing time per set was 56 minutes and we set an average of 4.4 times per day.

Six hundred fifteen white sturgeon and 14 green sturgeon were captured. Of the white sturgeon captured, 530 were tagged. We recaptured 10 white sturgeon and observed 3 that had evidence of shed tags (Table 1). We did not recapture any previously-tagged green sturgeon.

Table 1. White sturgeon recaptured during 2008 sturgeon-tagging field work by DFG in Suisun Bay. Asterisk denotes possible measurement error.

<b>Tag ID</b>	<b>Release Date</b>	<b>Recapture Date</b>	<b>Release Length (cm)</b>	<b>Recapture Length (cm)</b>
HH615	10/15/01	09/02/08	126	153
ST11901	09/21/05	10/08/08	150	158
HH987	08/08/06	10/14/08	113	121
HH1008	08/23/06	08/11/08	101*	98*
ST12162	09/27/06	09/26/08	138	138
FF1343	08/07/07	10/09/08	97	107
HH1356	08/08/07	10/14/08	92	94
FF1215	08/13/07	10/07/08	110	116
HH1370	08/14/07	08/29/08	110	118
HH1221	08/16/07	09/03/08	136	136

We made no “true” in-season recaptures, defined for statistical purposes (i.e. assuming random mixing in the population) as a sturgeon recaptured greater than 30 days from the initial tagging date but within the 2008 tagging season.

Approximately 68% of white sturgeon were released in good condition, 27% were released in fair condition, and 5% were released in poor condition. Seventy-one percent of green sturgeon were released in good condition and 29% were released in fair condition. The only capture-related sturgeon death we observed was 1 white sturgeon killed by a California sea lion.

Catch per unit effort (CPUE) was calculated to contrast with catch rates from previous years. Catch was calculated as the sum of all newly-tagged fish, recaptured fish, and un-tagged fish brought to the boat. The unit of effort was 100 net-fathom-hours, which is equivalent to a net 100 fathoms long fishing for 1 hour. Effort was calculated by weighting the soak time (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% (assuming a steady rate of deployment/retrieval).

Average daily CPUE for legal-sized (117 – 168 cm) white sturgeon was 1.7. Average daily CPUE for all sizes of white sturgeon was 3.1. Average daily CPUE for all sizes of white sturgeon was greatest on October 14 (CPUE = 12.1; Figure 1). Exceptional CPUE appeared to

have occurred randomly throughout the three months of sampling and did not appear to correlate well with the CPUE on adjacent days. The CPUE time series (Figure 1) did not appear to show any strong temporal autocorrelation, though some periodicity may be present due to tidal influences. CPUE for all sizes of white sturgeon was slightly higher in August compared to September and October (Figure 2).

Figure 1. Catch per 100 net-fathom hours by day for all sizes of white sturgeon.

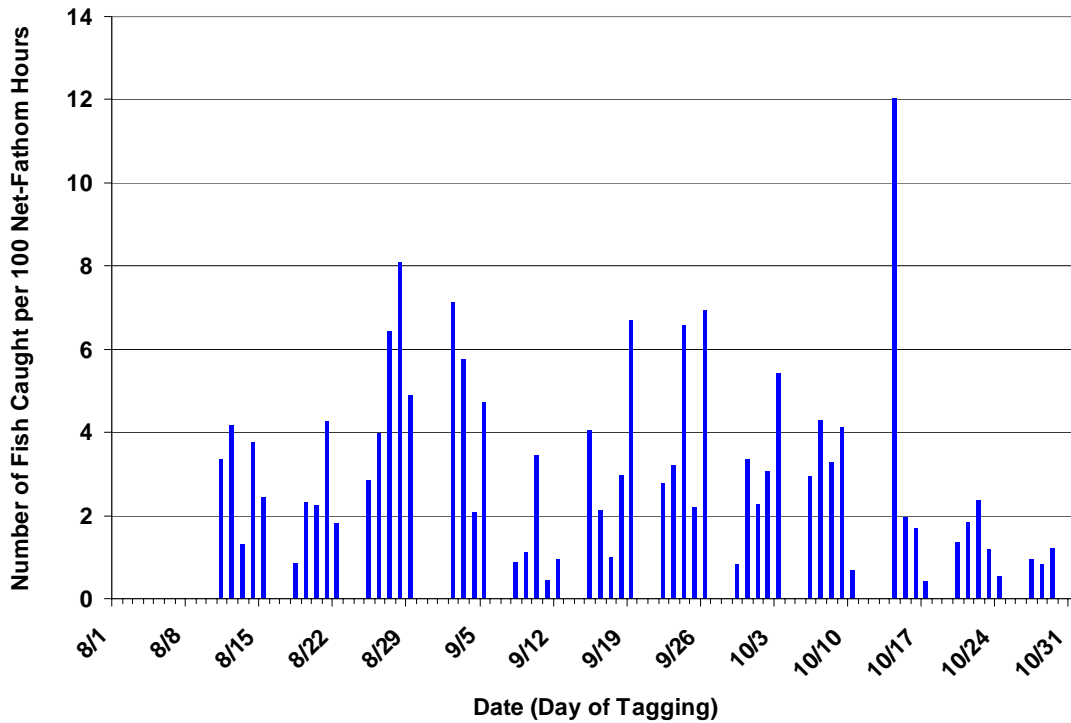
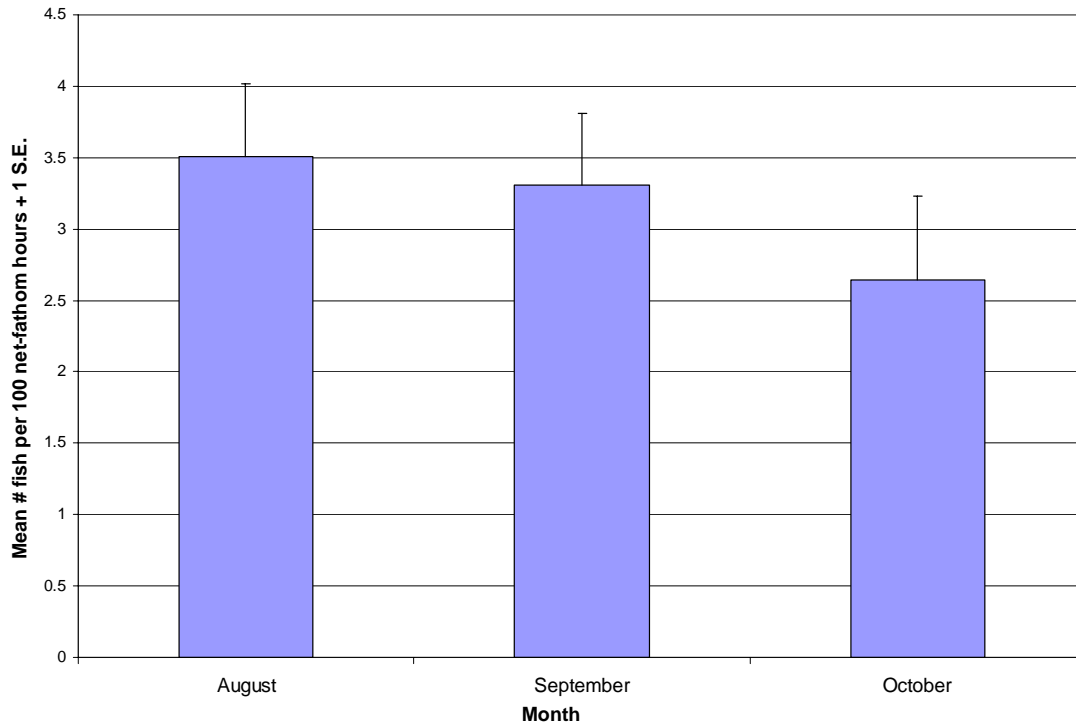
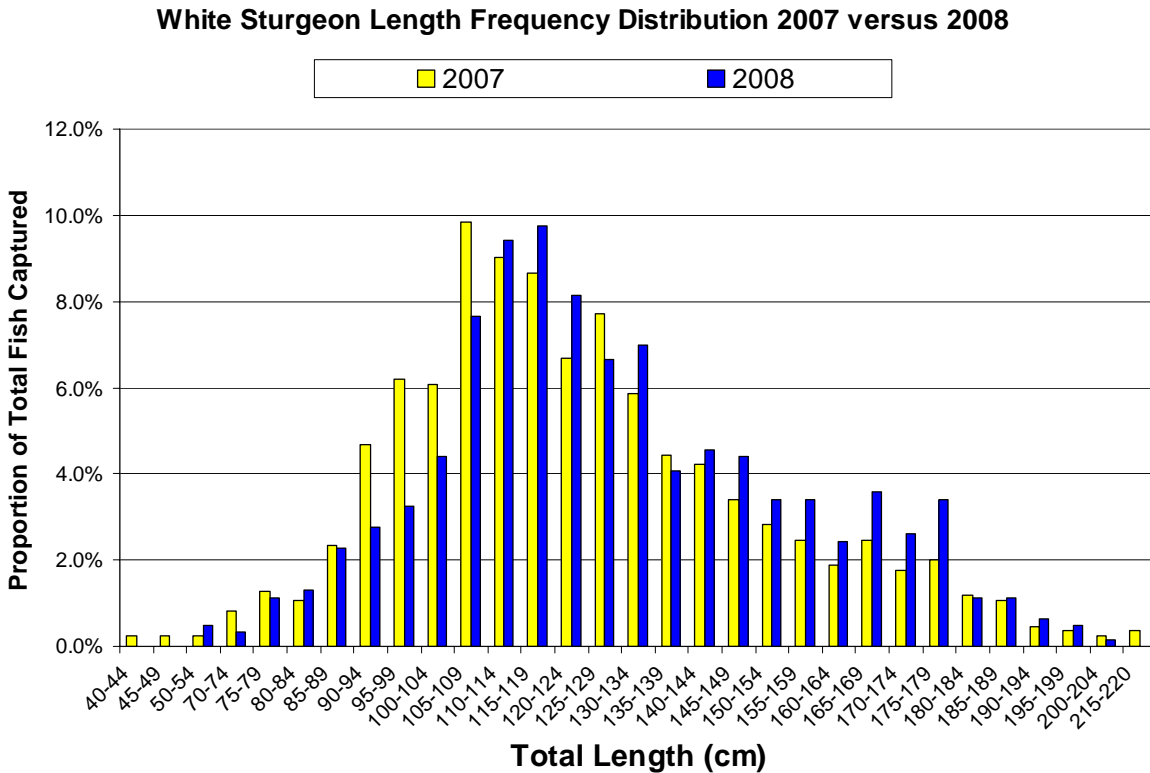


Figure 2. Monthly CPUE for all sizes of white sturgeon during the 2008 tagging season.



The white sturgeon length frequency distribution was slightly bi-modal, with the major peak at 115 cm-119 cm total length (Figure 3). Most of the fish were close to the minimum legal size of 117 cm, indicating that a large cohort of fish is nearing entry into the recreational fishery. Few green sturgeon were captured and measured ( $n = 14$ ) and no meaningful interpretation of the size frequency distribution is possible.

Figure 3. Length frequency distribution for all white sturgeon measured. Y-axis is the percent of total fish caught per year within the specific length range. The 2007 tagging season length frequency distribution is shown for comparison.



Bycatch was primarily starry flounder, Chinook salmon, and striped bass (Figure 4). No bycatch was retained and most was released alive. Bycatch was lower than during tagging in 2007 (578 in 2007; 100 in 2008). Some Chinook salmon and striped bass were killed by California sea lions and Pacific harbor seals while in the nets (n = 3).

**Discussion**

Sampling effort was 24% less and total catch of white sturgeon was 268 fish fewer (30% less) than in 2007. CPUE of fish within the current legal-sized slot limit (117 – 168 cm) at the time of tagging was below the historical average of 3.2 (Figure 5).

Population metrics using the data collected this season will be calculated and presented in the future.

Figure 4. Total by-catch from sturgeon tagging operations during the 2008 tagging season, with the number of individuals caught below the species common name.

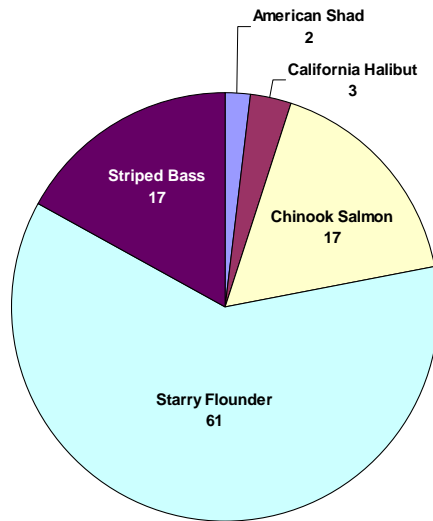
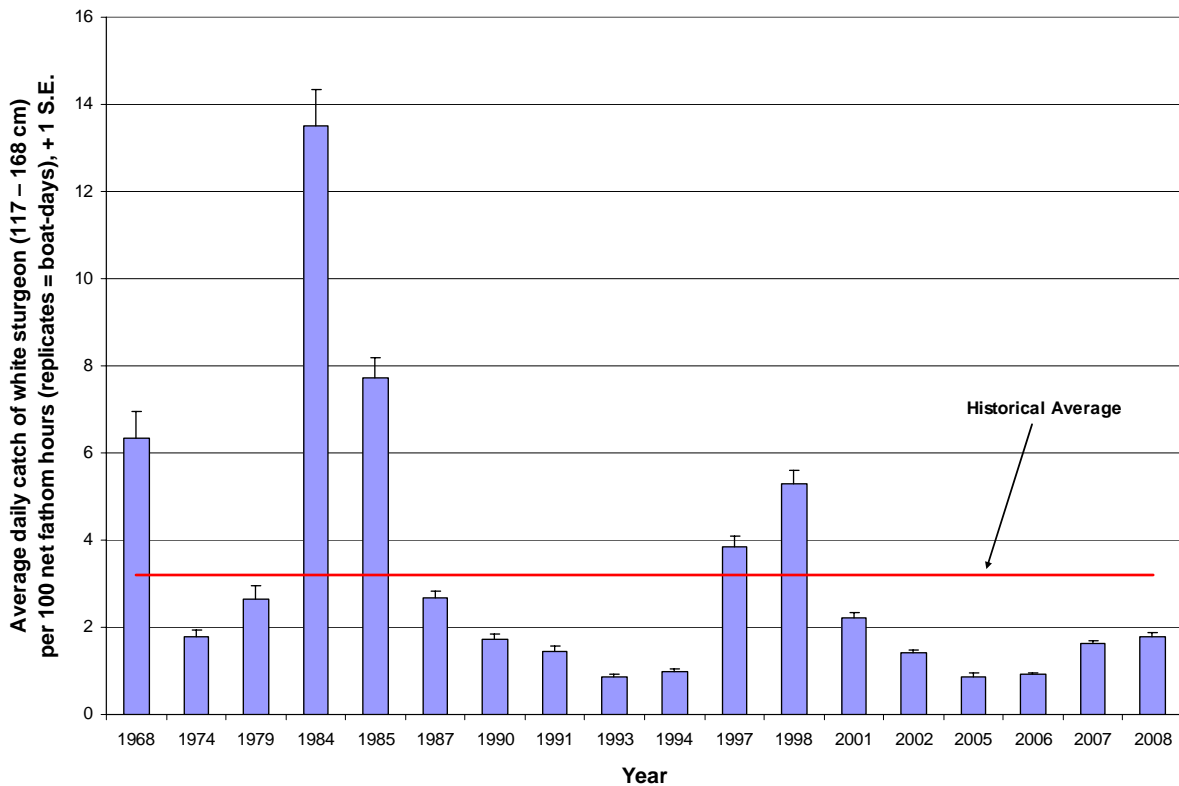


Figure 5. Average daily CPUE of white sturgeon within current legal-sized slot limit captured during CDFG sturgeon population study tagging operations.



The 2008 white sturgeon length frequency distribution shifted slightly to the right (larger total length) compared with 2007, consistent with the growth of individuals. The cohort from the mid-1990s continued to move into the legal-sized slot limit (117 – 168 cm).

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